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THE NAVAL ANNUAL, 1906.

EDITED BY

JOHN LEYLAND AND T. A. BRASSEY, A.I.N.A.

PART I.—Lord BRASSEY, K.C.B.; JAMES R. THURSFIELD; G. R. DUNELL; CARLYON BELLAIRS, R.N., M.P.; "ARCHIMEDES"; Commander PALADINI; Commander CHAS. N. ROBINSON, R.N.; and the EDITORS.

PART II.—List of Ships: Commander CHAS. N. ROBINSON, R.N., and JOHN LEYLAND.

PART III.—Armour, Ordnance and Ordnance Tables.

PART IV.—LORD CAWDOR'S MEMORANDUM; FIRST LORD'S MEMORANDUM; BRITISH AND FOREIGN ESTIMATES.

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PREFACE.

THE present time is one of very critical importance for the British Navy, and, indeed, for all Navies. Changes of the utmost importance, affecting both the *personnel* and the *matériel* of the Fleet, have been introduced, which would appear to mark the beginning of a new epoch in the history of the Navy. The lessons of the war in the Far East are not yet completely known, though in this country more than any other, save those which were actively engaged in the conflict, they are beginning to be fully realised. In many respects they were anticipated, and the Dreadnought, which was designed before they were known, has been changed in no essential particular. Other Powers are following in our wake, and endeavouring to gain the advantages which we are believed to have secured by building larger vessels of increased speed and more powerful armament. There are new views as to systems of propulsion, relative speed, armament, and the distribution of armour.

In the *Naval Annual* an endeavour has been made to give a faithful view of these various questions, in the chapters on the British and Foreign Navies, in Mr. Dunell's chapter on the Turbine, in a "symposium" on the subject of Speed, in which both sides of the question are set forth in the views of many authorities, and in the section on Armour and Ordnance. In the chapter on the War the purpose has been to describe the events, chiefly in relation to the battle of Tsushima, with accuracy, and to suggest rather than enforce the lessons, so that readers may draw the lessons for themselves.

The war added nothing to our knowledge of the value of a highly-trained *personnel*, but it brought to fresh prominence the qualities essential for success in naval operations. In particular it placed in the clearest light the necessity of good gunnery. The British Navy has made an enormous advance in this matter, and the new importance attached to the subject is indicated by the appointment of a Director of Target Practice. Commander C. N. Robinson has therefore contributed a chapter on the Gunnery Practice of the Fleet, which shows not only the results attained, but the conditions which had led to the decline of gunnery, and the influences which told against it.

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Intimately related to efficiency in this direction is the general and special efficiency of British naval officers. The new scheme of naval training is in full operation, though its results will not be seen for some years. Lord Brassey discusses generally the subjects treated in Lord Cawder's Memorandum, while both sides of the argument are made clear in the conflict of opinion which has arisen in regard to the engineering training of officers, Lieut. Carlyon Bellairs leading the attack upon the new scheme, while a very competent writer, whose personality is necessarily veiled under the pseudonym of "Archimedes," makes a vigorous defence. The *Naval Annual* has consistently advocated a policy of constituting a numerically-sufficient Naval Reserve through the Mercantile Marine instead of endeavouring to keep the Navy on what is practically a war footing, and Lord Brassey again strongly enforces this point.

The naval manœuvres of the year being intended to test upon a large scale the new scheme elaborated for the protection of trade, combined with the putting to sea of every fighting vessel intended to be used in war, Mr. Thursfield has written a valuable chapter on the subject of commerce protection, which shows the diminished danger to shipping in the conditions of the modern sea-going trade. This chapter will probably be considered one of the most instructive in the volume. In view of last year having been the centenary of Trafalgar, it was thought well to signalise it in the *Naval Annual* by adding a chapter on the literature of the centenary, with an appreciation of the professional and personal qualities of Nelson.

The permanent features of the volume are maintained in its chapters on naval progress at home and abroad, its lists of fighting vessels of all nations, its diagrams of ships (the latter all now on the smaller scale and much improved), and its ordnance and other tables. In Part IV. it has been thought advisable to reprint Lord Cawdor's Memorandum and the important Note on Dockyard Reorganisation. The First Lord's Memorandum and the Estimates are given in the usual form. The illustrations of new ships are by Mr. W. Fred. Mitchell.

To many who have assisted in various ways, but whose names cannot be mentioned, acknowledgments are due. To those who have enabled us to eliminate inevitable errors, particularly in the ship lists, we are much indebted; and we hope our correspondents will continue this kindly assistance, which is of the utmost value.

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PART I.

CHAPTER I.

Progress of Navies.

Great Britain.

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THE progress of the British Navy is so fully dealt with in the First Lord's Memorandum and other papers issued by the Admiralty, that a brief summary is all that is necessary here. The most remarkable fact in the year under review is the enormous increase in the forces in commission, or immediately available on the outbreak of war, which are now concentrated in European waters. With very few exceptions, all our most effective battleships and cruisers are in commission in the Channel, Atlantic, or Mediterranean Fleets, or in the Reserve. Never before has the British Navy been in such a condition of immediate preparedness for war as at the present time. The Navy is in fact being maintained in peace time on a war footing. During the year 1905, five battleships were completed, three of them belonging to the programme of 1901–2—the King Edward VII., Commonwealth, and Dominion, commissioned respectively on February 7, May 15, and August 15—and two of them to the programme of 1902–3—the New Zealand, commissioned on July 11, and the Hindustan on August 22. Five armoured cruisers of 10,700 tons, all belonging to the programme of 1901–2, were also out of hand and commissioned—the Antrim, Carnarvon, Hampshire, Roxburgh, and Devonshire. Within the year a number of scouts were likewise completed—the Adventure, Patrol, Foresight, Forward, Pathfinder, Sentinel, and Skirmisher—with the third-class cruisers Amethyst, Diamond, and Sapphire, and seventeen destroyers. The vessels remaining to be completed at the beginning of the year, some of which have since undergone their trials, were the battleship Hibernia (programme 1903–4), the armoured cruisers Argyll (programme 1901–2), Duke of Edinburgh, and Black Prince (programme 1902–3), as well as the scout Attentive. The principal vessels launched in 1905 were the battleships Africa and Hibernia, and the armoured cruisers Cochrane, Achilles, Natal, and Warrior. All these belong to the programme of 1903–4. The scout Attentive and eight destroyers also took the water. The following were the vessels building or to be laid down before the end of the financial year: battleships, Lord Nelson (Palmer), Agamemnon (Beardmore), Dreadnought (Portsmouth); the armoured cruisers Shannon (Chatham), Minotaur (Devonport), Defence (Pembroke),

Programmes and progress.

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Invincible (Elswick), Inflexible (Clydebank), Indomitable (Fairfield); five ocean-going torpedo-boats, twelve of the coastal class, and one fast ocean-going destroyer. Four armoured ships (no details published) are in the programme of 1906–7.

Battleships.

The results of the trials of the King Edward VII. and Commonwealth were given last year. The following are the particulars of those of the New Zealand, which is engined by Messrs. Humphrys, Tennant and Co., and has Niclausse and cylindrical boilers:—

At one-fifth Power.			At four-fifths Power.			At full Power.		
Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.
knots. 9*	3,979	lbs. 2	knots. 16·87*	12,981	lbs. 1·83	knots. 18·59	18,440	lbs. 2·1

* By log.

The Africa and Hibernia were launched on May 20 and June 17 respectively.

Dreadnought.

The Dreadnought, officially laid down at Portsmouth on October 2, 1905, though some material had already been built into her, was launched by his Majesty on February 10, 1906. The Admiralty announce that the period of building for armoured vessels is to be reduced to two years, but the Dreadnought is to be completed in February, 1907. The rapidity of her construction will therefore out-rival that of the Majestic and Magnificent, which were completed within two years from the date of the laying of their first keel plates. The Dreadnought represents a remarkable development in naval construction, which has been for some time foreshadowed, notably by Colonel Cuniberti, the famous Italian naval constructor. The Russo-Japanese war, more particularly the battle of Tsushima, established the fact that naval engagements can and will be fought at greater distances than were formerly considered possible. Hence the medium armament is held by many authorities to lose much of its value. In the *Naval Annual* of last year it was reported that the Japanese contemplated laying down a battleship with an armament of four 12-in. and ten 10-in. guns. The Dreadnought is to carry a main armament of ten 12-in. 45-calibre guns, of 50 per cent. greater power than those carried by the Majestics. The medium armament disappears entirely. The main armament of the new German battleships to be laid down this year comprises eight 11-in. guns, with a medium armament of twelve 7·5-in. guns, and the new United States battleships Michigan and Carolina will carry a main armament of 12-in. guns. The question of protection enters also very largely into the consideration, and the *Times*,

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in describing the new ship, said that it was understood she was to be made as nearly unsinkable as possible from the explosion of a torpedo or mine. It was even stated that there would be no openings in the watertight bulkheads. Particulars of the Dreadnought not having been made public officially, the following is condensed from an account published in *Engineering*, February 9, 1906 :—

On the forecastle there will be mounted two 12-in. guns in a barbette, the centre line being considerably above the water-level. On each side, a short distance to the rear, there will be two other pairs of 12-in. guns on the upper-deck level, and in order to enable these guns to fire ahead an embrasure is formed at each side of the forecastle, so that all six 12-in. guns may take part in a running fight. At the same time four of them can be used on each broadside. Aft there are two pairs of guns, both in the centre line of the ship, one pair to the rear of the other; but with this difference, as compared with the American design, that both pairs of guns are on the same level and a considerable distance apart. These four guns, therefore, firing on either beam, cannot be fired astern, although they have a very considerable arc of training abaft and forward of the beam. The arrangement reduces the astern fire to two guns, which is less than in any preceding ship where there are either 9·2-in. guns or 6-in. quick-firers on each quarter. But the pair of 12-in. guns should be adequate, in view of the other qualities of the Dreadnought, in connection with probable combatants. Her speed of 21 knots would probably enable her to outclass any more powerfully-armed vessel, as in most foreign Powers the question of cost must militate against high speed with such gun-power. None of the guns are at a less height than the upper-deck level, and the two forward barbette guns are on the forecastle. Another important point in reference to the armament is the protection against attack by torpedo and submarine-boats. In the Dreadnought the intention is to adopt an entirely new weapon, using an 18-lb. shot.

The placing of the guns on the upper deck has materially simplified the arrangement of the armour, and the adoption of turbines has assisted towards this higher gun-platform, because the weights with turbine machinery are lower in the ship, and thus the centre of gravity is considerably lower; at the same time the top hamper in the ship has been reduced. The main belt in the way of the machinery has been increased in thickness to 10 in., and the upper deck is armoured. The gun mechanism is protected by thick heavy hoods, as in the case of the earlier barbette guns; and the gun-mountings, while largely protected by the main broadside armour, are further shielded by armour barbettes or cylindrical casings.

The adoption of the steam-turbine has not only increased the speed, but has resulted in the improvement of the manœuvring quality of the ship. Four shafts are adopted, and this has greatly facilitated the fitting of a double stern with two rudders—a form of stern advocated for some time for heavy battleships. The cutting away of the deadwood in combination with a balanced rudder has improved the turning moment of later single-stern battleships by 30 per cent.; and as the double rudder enables a larger area to be utilised effectively, without increasing the torsion on the threaded shaft of the steering gear, there will be still better facility in manœuvring. While there is no change so far as the upper works are concerned, the stern of the ship is doubled under water, with two rudders quite 20 ft. apart. The contract for the turbine machinery was placed with Messrs. Vickers, Sons and Maxim, Limited, and it is anticipated that with the four propellers running at over 300 revolutions, the power developed will be equal to 23,000 I.H.P. There will be two high-pressure turbines and two low-pressure turbines, each on separate shafts, and each shaft will also carry an astern turbine, two of which will take high-pressure and two low-pressure steam. The high-pressure main and astern turbines are to be on the wing shaft, and the two inside shafts, in addition to carrying the low-pressure ahead and astern machines, will also have turbines of small diameter for cruising purposes. Steam for the low powers will pass from the boiler into the cruising turbines, thence to the high-pressure wing turbines, and back to the low-pressure turbine before entering the condenser. This will enable a full range of expansion to be economically attained, even with a small volume of steam. The steam pressure is to be higher than in any previous turbine ship, as the eighteen Babcock and Wilcox boilers are to be worked at 250 lb. pressure, which will be slightly reduced at the high-pressure turbines. The boilers, consistent with the latest practice, will be fitted for working not only with coal, but with oil fuel. In order to reduce the power necessary to attain a speed of 21 knots, and to reduce the draught for a given displacement—the Dreadnought when ready for sea will be about 18,000 tons on

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26 ft. draught—it was decided to increase the length of the ship from the 410 ft. of the Lord Nelson to close upon 500 ft., with a beam of 82 ft. This increase in length has the further advantage that it will afford greater room forward and abaft for magazines under the 12-in. guns without interfering with the under water torpedo-tube gear in connection with the five submerged tubes. The larger magazine will, of course, be forward, where there are six 12-in. guns.

Armoured cruisers. Devonshire class.

The whole of the Devonshire class have been completed or are in commission. We give below the results of trials of the four ships not given last year. These as well as the results of other trials are taken from *Engineering*.

	Makers of Machinery.	At one-fifth Power.			At four-fifths Power.			Full Power.		
		Speed.*	I.H.P.	Coal.	Speed.†	I.H.P.	Coal.	Speed.†	I.H.P.	Coal.
		knots.		lbs.	knots.		lbs.	knots.		lbs.
Antrim .	J. Brown & Co.	14·46	4,668	2·06	21·33	14,628	1·95	23·02	21,604	2·22
Argyll. .	Scotts Co. .	13·7	4,726	1·94	20·8	15,108	1·82	22·38	21,190	2·2
Hampshire	Hawthorn, Leslie	14·6	4,687	2·02	21·47	14,445	1·84	23·47	21,508	1·87
Roxburgh	London & Glasgow Co.	14·38	4,635	2·1	21·54	15,037	1·99	23·63	22,102	2·3

* By log. † MM.

The Antrim and Hampshire are fitted with Yarrow, the Argyll with Babcock and Wilcox, the Roxburgh with Dürr boilers, in all cases in combination with cylindrical boilers. The designed speed of the class was 22¼ knots, which has been considerably exceeded on trial by every ship of the class except the Argyll. The comparatively poor performance of the latter is attributed to the propellers, and the fact that the vessel was three months out of dock.

Duke of Edinburgh.

The Duke of Edinburgh and Black Prince (displacement, 13,550 tons) have passed through their trials. The former was built at Pembroke, and engined by Hawthorn, Leslie and Co.; the latter was both built and engined by the Thames Ironworks.

	At one-fifth Power.			At four-fifths Power.			Full Power.		
	Speed.	I.H.P.	Coal.	Speed.†	I.H.P.	Coal.	Speed.†	I.H.P.	Coal.
	knots.		lbs.	knots.		lbs.	knots.		lbs.
Duke of Edinburgh . .	14·4*	5,039	2·2	21·1	16,908	1·87	22·84	23,685	1·96
Black Prince	14·6†	4,879	2·11	21·5	16,699	1·99	23·65	23,939	2·1

* By log. † MM.

The designed speed of these ships was 22¼ knots, which the Black Prince has exceeded on trial by over a knot. She is now in commission. The Duke of Edinburgh with other propellers is probably

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capable of the same speed. The four other cruisers of this class have been launched, the Achilles at Elswick on June 17, the Cochrane at Fairfield on May 20, the Natal at Barrow on October 1, and the Warrior at Pembroke on November 25.

Cruiser race.

The following description of the cruiser race across the Atlantic is summarised from the *Engineer* :—

The ships taking part were—

Name.	Displacement.	Horse-power.	Boilers.
Drake	14,100	30,000	Belleville
Cornwall	9,800	22,000	Babcock
Essex	9,800	22,000	Belleville
Bedford	9,800	22,000	Belleville
Berwick	9,800	22,000	Niclausse
Cumberland	9,800	22,000	Belleville

All have a designed maximum speed of 23 knots at full power.

Before leaving New York all ships were coaled to the full capacity. As there was not sufficient Welsh coal available, the flagship Drake, record holder of all previous races, was ordered to fill up with American coal—a handicap which created great satisfaction in the squadron. The ships steamed at easy speed to off Sandy Hook, where the signal was made "make your way independently to Gibraltar at greatest speed with the coal on board"—2500 tons in the Drake, and 1600 tons in the other ships.

At 1.30 P.M. on November 20 the ships formed in line off Sandy Hook, received the order to start, and up to the evening of the 24th kept practically all together.

At 3 P.M. on the 25th the Bedford developed hot bearings in the port engine, and had to stop that engine for a couple of hours, and so got hopelessly left astern.

In the afternoon of the next day, 26th, the order was:—

1	Drake	—
2	Berwick	3 miles from 1
3	Cumberland	All about 12 miles astern
4	Cornwall	
5	Essex	

On the evening of the 26th most ships had used up their normal coal, and great difficulty was experienced in getting at the reserve supply. All officers and deck hands not on duty volunteered for getting coal out of the reserve bunkers.

At daylight on the 27th the amount of coal remaining was:—

Drake	305 tons
Berwick	256 ,,
Cumberland	297 ,,
Essex	317 ,,
Cornwall	240 ,,

During the 27th the Cumberland began to creep steadily up, and in the afternoon the positions were:—

1	Drake	—
2	Berwick	1 mile from 1
3	Cumberland	$\frac{1}{4}$ mile from 2
4	Cornwall	Well astern
5	Essex	

Five minutes after midnight the Drake passed Tarifa Point, the Berwick being 1600 yards astern of her, and the Cumberland a little astern again. The other two ships were out of sight, having given up the struggle to a certain extent on account of the difficulty of "scraping bunkers for coal dust."

The Drake's time for the whole run was 7 days 7 hours 10 minutes, being an average speed of 18·504 knots for the entire trip. For the first few days a much higher rate was maintained, but towards the end a heavy fall in speed brought down the average in all the ships. All the ships burned coal heavily; it was shovelled on without regard for the usual economical rules. On the fourth day out the Drake suffered a good deal of trouble from her American coal, which exhibited a poor calorific value compared with Welsh coal.

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The Drake attained a speed of 22 knots, the other cruisers speeds of 20 to 22 knots on their trials at four-fifths power. It is interesting to note how much the speed on this long voyage fell short of the trial performance. It is a strong argument in favour of the merchant cruiser, which can be depended upon to cross the Atlantic at her trial speed.

The second-class cruiser Encounter attained a speed of 21 knots on her full-power trials. With her sister ship, the Challenger, she is now in commission on the Australian station.

Scouts.

The following are the particulars of the trials of the Scout class:—

Name of Vessel.	Builders and Makers of Machinery.	Displacement.	Boilers.	96 Hours' Trial. Second 48 hours.			Eight hours' full-power trial. Last 6¼ hours of above.	
				I.H.P.	Speed.	Coal.	I.H.P.	Speed.
		tons.			knots.	lbs.		knots.
Sentinel .	Vickers, Maxim .	2,940	Normand .	1,012	10·63	2·27	17,488	25·07
Skirmisher	" " .	2,940	" .	995	10·9	2·49	17,013	25·19
Pathfinder	Cammell, Laird .	3,000	Laird . .	1,063	10·92	2·35	17,176	25·34
Patrol . .	" " .	3,000	" . .	1,170	10·97	2·17	16,460	25·06
Forward .	Fairfield . . .	2,945	Thornycroft	845	10·32	2·65	15,018	25·15
Foresight .	" . . .	2,945	"	812	10·57	2·5	14,277	25·12
Adventure.	Elswick (Hawthorn)	2,940	Yarrow . .	1,080	10·24	2·42	15,850	25·42
Attentive .	" "	2,940	" . .	1,072	10·34	2·34	16,212	25·88

The Attentive during the last hour of the trial steamed 26¼ knots, and is therefore claimed to be the fastest vessel afloat of her size.

De-stroyers.

The following are the results of the official trials of destroyers:—

Name of Vessel.	Builders and Makers of Machinery.	Displacement.	Type of Boiler.	Heating Surface.	Grate Area.	Four Hours' Speed Trial. Indicated Horse-Power.	Speed.
		tons.		sq. ft.	sq. ft.		knots.
Boyne . .	Hawthorn, Leslie.	550	Modified Yarrow .	14,852	276	7,457	25·72
Moy . .	Cammell, Laird .	550	Laird	14,880	233	7,388	25·60
Ouse . .	" " .	550	"	14,880	233	7,344	25·56
Gala . .	Yarrow	590	Yarrow	16,000	269	7,515	25·90
Garry . .	"	590	"	16,000	269	7,859	26·51
Swale .	Palmers Company	550	Reed	15,520	319	7,466	25·59
Ure . .	" "	550	"	15,520	319	7,399	25·65
Wear . .	" "	550	"	15,520	319	7,294	25·62
Colne . .	Thornycroft . .	550	Thornycroft-Schultz	16,160	268	7,884	25·57
Doon . .	Hawthorn, Leslie.	550	Yarrow	14,852	276	7,358	25·80
Kail . .	" " .	550	"	14,852	276	7,239	25·74
Ness . .	J. S. White . .	535	White-Forster . .	15,640	251	7,163	25·62
Nith . .	" . .	535	" . .	15,640	251	7,177	25·69
Chelmer .	Thornycroft . .	550	Thornycroft-Schultz	16,160	268	8,034	25·70
Rother .	Palmers Company	550	Reed	15,520	319	7,213	25·51
Liffey . .	Cammell, Laird .	550	Laird	14,880	233	7,384	25·51

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The Cricket, the first of the new coastal destroyers building under the naval programme of 1905–6, was launched by Messrs. White at East Cowes, January 23, 1906. These vessels will be propelled by Parsons turbines, the machinery approaching 4000 I.H.P. The steam in the Cricket will be supplied by two boilers, each of 2000 H.P., of the White-Forster pattern, fired by liquid fuel, on a system experimented on with success by the Admiralty. No coal stowage is provided. She is representative of a type of vessel which, with a speed of 26 knots, maintained on an eight hours' full-power trial, is a development of the late first-class torpedo-boats driven by reciprocating machinery, which, with slightly less displacement, have a speed of 25 knots with 3000 H.P.

Naval gunnery.

An immense improvement has taken place in the last four years in the shooting of the Navy, thanks to the encouragement given by the Board of Admiralty, and last, but not least, to the spirit of emulation between ships' companies and squadrons, excited by the publication of the results. A chapter on this subject is included in the *Naval Annual.*

Personnel.

We have frequently protested in these pages against the continuous increase in the permanent force that has been going forward for many years. We have pointed out that to maintain the Navy in peace time on what is practically a war footing, in order to give the necessary practice at sea to the permanent force men, was to impose too great a burden on the resources of the country; and that, when the demand for economy came, the economy would be made in the future, as in the past, in the shipbuilding votes. On these grounds we urged that increased attention should be devoted to the development of Naval Reserves in the mercantile marine, amongst our fishing population, and in the Colonies. The reduction in the Navy Estimates in the last two years is almost wholly due to the cutting down of the shipbuilding votes (the net decrease in 1906–7 as compared with 1905–6, taking dockyard and contract work together, is £1,590,000; the decrease in 1905–6 as compared with the preceding year was about £3,000,000); all entries in the Naval Reserve have been stopped. If economy in the Navy Estimates is desired by the Government now in power, it should be borne in mind that the cost of a Naval Reserve man is one-tenth that of a permanent force man, and that a small reduction in the permanent force would enable a very large number of men to be added to the Naval Reserve, with the important incidental effect of increasing the supply of British seamen in the mercantile marine.

T. A. BRASSEY.

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CHAPTER II.

Progress of Navies.

Foreign Navies.

France.

Minister's Memorandum.

The Estimates for 1906 amount to £13,000,000, or an increase of £253,000 over those of last year.

The Minister of Marine adopted the practice of the First Lord of the Admiralty, and issued an explanatory Memorandum with the Navy Estimates. While the policy is laid down which it is proposed to observe in relation to the shipbuilding programme, it is recognised that the conditions under which such programme is drawn up, and the situation of the country itself, may be modified. Thus the programme must be submitted to periodical revision, and when a group of vessels is put in hand, care must be exercised that they have their proper place in the general scheme of organisation adapted to national policy. The following is quoted from the Memorandum:—

"Since November, 1899, there has been no revision of the naval programme as a whole, and we have been content to complete the units, the immediate necessity for which had been then recognised, and the construction of which had been sanctioned by Parliament by the special Bill of 1900. The Superior Council of the Navy, which sat between the 10th and 15th of last May, has pronounced in favour of the following constitution of our naval forces, which has been drawn up with a due regard to the financial resources of the country and the strength of the *personnel*, so as to maintain at almost the present limits the expenditure demanded from the country:—

"Five squadrons of six battleships each, with four units in reserve—that is, thirty-four battleships.

Five divisions of three first-class armoured cruisers each, with three reserve units—that is, eighteen first-class armoured cruisers.

Twelve second-class armoured cruisers, for divisions on foreign stations, with six reserve units—that is, eighteen second-class armoured cruisers, viz., six for China, three for the Atlantic, two for the Indian Ocean, one for the Pacific.

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One scout for each squadron, with one in reserve—that is, six squadron scouts.

A destroyer for each battleship, with six for the squadron in the Far East.

Fifty-eight destroyers for torpedo-boat divisions, for submarines or independent divisions, with fifteen in reserve—that is, a total of one hundred and nine destroyers.

Forty-nine submarines for defensive purposes.

Eighty-two submarines or submersibles for offensive purposes.

One hundred and sixty-six torpedo-boats.

"Starting from that, and taking into account ships already built or in course of construction, and deducting those which will soon be condemned as obsolete, we shall have to build between now and 1919:— New programme.

"Eleven battleships, ten first-class armoured cruisers, six second-class armoured cruisers, six scouts, sixty-six destroyers, eighteen defensive submarines, seventy-two offensive submarines, and fifty torpedo-boats.

"A first estimate shows that if these units are completed on the designs which at present seem the best, between now and 1919 an annual sum of 121,000,000 francs (£4,840,000) for new construction will have to be provided."

The Minister of Marine insists on the necessity of each squadron of six battleships being homogeneous; and, subsequently to the presentation of the Estimates, the Chamber sanctioned the proposal of the Minister to put in hand in 1906 three battleships in addition to three already included in the programme, thus making a complete division of six battleships to be begun during the year. It is provided, however, that no other vessels of more than 2000 tons shall be laid down in 1906. Battleships to be begun in 1906.

The plans of the new battleships by M. Lhomme are not yet finally settled. They will be of 18,000 tons displacement and have a speed of 19 knots, with 22,500 I.H.P., but the Superior Council of the Navy was to consider the possibility of increasing the speed. The armament will comprise four 12-in. guns in two closed turrets (with ammunition for 74 rounds per gun); twelve 9·4-in. guns in six turrets (with 100 rounds per gun)—in place of the eighteen 6·4-in. guns in the Patrie and République, and the ten 7·6-in. guns in the four ships of the Liberté class—as well as sixteen 2·9-in. Q.F. guns (500 rounds) and eight 3-pdrs. There will be two submerged torpedo tubes. M. Thomson, Minister of Marine, contends that the weight of metal thrown per minute by the French ships, as compared with

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the Dreadnought, will be almost equal ahead, superior on the beam, and much more than twice as heavy astern, on the presumption that the French 9·4-in. gun will fire three rounds to the two rounds of the British 12-in. gun. A 15 will be laid down at Brest, and A 16 and A 17 in private yards. The others are A 15, 16 and 17 *bis*. M. Bos, in his report on the Budget, argued in favour of a single type of gun (the 10·8-in.) for the main armament, but, in view of the fact that this gun had still to be designed, accepted the armament proposed by the department. He also advocated extension of the protection of battleships vertically above and below the water-line, protection of the steering-gear and communications, reduction of superstructures and masts, protection of funnels and armoured funnel gratings, to prevent fragments of shells reaching the engine-rooms, grouping of the smaller guns for purposes of command, better protected conning-towers, and the suppression of torpedo tubes and the ram.

Cruisers.

The displacement of the first-class armoured cruisers would not exceed 14,500 tons; speed, 23 knots; protection and radius of action the same as of the Léon Gambetta; armament, four 9·4-in., sixteen 6·4-in. guns. The second-class armoured cruisers would have the same protection, range of action, and speed as the Dupleix, but a more powerful armament. The displacement would not exceed 9000 tons. No armoured cruisers, however, will be laid down in 1906.

Scouts.

The particulars of the scouts, which are also deferred, are as follows: Displacement, 3500 tons; speed, 24 knots; range of action, 6000 miles. There will be an armoured deck over the machinery and boilers. The armament will consist of 2·8-in. or, if possible, 3·9-in. guns.

Torpedo flotilla.

To the torpedo flotilla the Superior Council of the Navy attaches much importance, on the ground that rapid progress can be made, while, owing to the limited resources of the country, the building of large ships must necessarily be slow. Great value is assigned to the destroyer, and of this class a large flotilla is to be created. It was proposed in the Estimates of 1905 to substitute eight destroyers for twenty torpedo boats. Provision is made in the new Estimates for laying down ten more destroyers and twenty submersibles.

The dimensions of the new destroyers will be almost the same as those of the Claymore class (336 tons), but 30 tons larger, in order that they may be strengthened forward for ramming torpedo-boats or submersibles. The torpedo-boats will be of the 98-ton Normand class. The new submarines will be of two types—defensive and offensive. The former will be of the Naïade type; the latter will have a displacement of from 450 to 500 tons. (See below for details, p. 14.)

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M. Bos's criticisms of programme.

The programme of new construction submitted by the Admiralty was severely criticised by M. Bos in his report, first, as insufficient to maintain the position of France as a Naval Power; secondly, as regards the type of ship proposed. As regards (1), M. Bos observed that the rapid growth of the German and the United States Navies, the rise of Japan to the rank of a first-class Naval Power, the destruction of the Russian Navy, and the European political situation, made it necessary for France to adopt a programme of much more than mere replacement, and that under the programme proposed by the Ministry France would be in 1918 the fourth and perhaps only the fifth Naval Power. His argument has carried weight in the increase of the battleship programme. M. Bos instituted the following comparison between the French and German Fleets in 1908, but since he wrote three battleships have been added to the programme for 1906.

		French Fleet. (new programme).	German Fleet (law of 1900).
First Line:	Battleships	17	27
	1st class armoured cruisers	15	8
	2nd class „ „	5	—
Second Line:	Battleships	8	11
	Coast defence ships	9	8
	Protected cruisers	37	44

Moreover the German Navy had, at the present time, a superiority in number of battleships, this superiority being further increased by the fact that the German ships are more modern, more homogeneous, and faster than those of the French. M. Bos's figures appear unduly pessimistic. The French have a considerable superiority in armoured cruisers, and an overwhelming superiority in the torpedo flotilla.

The following are the statistics given by M. Bos for 1919 under the new programme, but the three battleships must be added:—

	French Fleet.	German Fleet.
Battleships	34	38
1st class armoured cruisers	18	14
2nd class „ „	18	—

Germany will also have thirty-eight small cruisers.

M. Bos concluded with an earnest appeal to Parliament and the country to make further sacrifices to maintain the naval power of France, and the decision to put in hand six battleships instead of three was an answer to his appeal.

FRENCH BATTLESHIP "SUFFREN."

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armour protection will consist of a complete water-line belt of hardened steel 6·7-in. thick, tapering to 3·6-in., with an upper belt 5 in. thick, tapering to 2·2-in., reaching to the main deck and rising to the upper deck forward. The armour on the main turrets will be 7·8-in. thick, with 5-in. ammunition hoists; on the secondary turrets 5 in. thick, and on the main deck casemates 4 in. The armament has been revised, as in the Quinet, and will comprise fourteen 7·6-in., twelve 2·4-in., and ten smaller, with two submerged torpedo tubes. The complement consists of 30 officers and 708 men.

Cruiser refits.

The Jean Bart, after being fitted with Niclausse boilers, underwent her trials in October. With an I.H.P. of 5415 she attained a speed of 16 knots. Her speed in 1891 with cylindrical boilers was, however, 16·68 knots with an I.H.P. of 5174 at normal draught.

The Dupuy de Lôme is being reconstructed. The after military top is being removed, and the forward military top has been lowered. The smaller quick-firing guns from the former will be mounted on the superstructure.

Torpedo-boat destroyers.

Of the twenty-three destroyers of the 1900 programme, twenty are in commission, and the remaining eight will be completed by February, 1907. Eleven additional boats are under construction in the dockyards to be completed by the end of 1909, and sixteen are to be built in private yards, one of 1903 programme to be completed in 1906, eight of the 1905 programme to be completed by the end of 1908, and six of the 1906 programme to be completed by the end of 1909. The destroyer Claymore, built by M. Normand, at Havre, will be delivered in 1906, and at the same yard eight others (M 47 to 54) were ordered in 1905. Six additional (M 59 to 64) will be ordered in 1906. The Stylet, Mortier, and Tromblon have been launched at Rochefort (335 tons), where the Pierrier, Obusier, Carquois, Trident, Fleuret, Coutelas, Glaive, and Poignard are in hand, to be completed in 1906–7, and to be followed by M 55 and M 56. At Toulon the Cognée, Hoche, Massue, M 57 and M 58 are in hand.

Torpedo-boats.

Of the 1900 programme forty are in commission, and the remaining ninety-five are completing. Of the latter, two first-class boats will be completed in the dockyards by the end of 1906, as will also the remainder, which are being built in private yards. A large number of boats were launched and completed in 1905.

Submersibles and submarines.

Six large submarines to be completed in 1906 and 1907, the Emeraude, Opale and Rubis (Cherbourg), and the Saphir, Topaze and Turquoise (Toulon) have been designed by M. Maugas (390 tons). On August 26 the order was issued to put in hand eighteen other submarines from the plans of M. Laubeuf, twelve at Cherbourg (Q 52

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to Q 63), three at Rochefort (Q 64 to Q 66), and three at Toulon (Q 67 to Q 69). These are to be completed in 1908 and 1909. Displacement 398 tons; length, 160 ft.; beam, 16 ft. 4 in.; 700 H.P.; maximum speed 12 knots; 2 screws; 7 torpedo tubes; complement, two officers and twenty-two men. These particulars are from the *Moniteur de la Flotte*, and are additional to the details of the programme. The decision to put these large submersibles in hand was the result of important comparative trials between the submersible Aigrette and the submarine Z, which took place at Cherbourg, the former showing incontestable superiority in all respects. Five other submersibles (Q 70 to Q 74), are to be ordered at Cherbourg in 1906, where two small boats of the Guêpe class, designed by M. Petithomme (45 tons), are suspended. At Rochefort five boats (Q 75 to Q 79) will be put in hand, and at Toulon ten boats (Q 80 to Q 89), to be completed in 1910. At Toulon (in addition to Q 67 to Q 69 named above), the Omega, Y, and Cigogne are in hand, as well as the Laubeuf boats Circé and Calypso.

Ships removed from the list.

The old cruisers Sfax and Tage, the third-class cruisers Bugeaud, Suchet, and Coetlogon, and the armoured gunboats Flamme and Grenade have been, or are about to be, struck off the list of effective ships.

Personnel.

The completion of the ships of the 1900 programme necessitates an increase of *personnel* which, during the years 1906–7–8, will amount to 42 executive officers and 2700 petty officers and men. In 1919, on the completion of the contemplated programme, the peace effectives of the fleet will consist of 1872 executive officers and 65,528 officers and men, increased, when on a war footing, to 1985 officers and 80,076 men. The new battleships will require complements of about 740 officers and men as against 675 of the Gaulois class.

M. Bos, in the report summarised in the *Naval Annual* for 1905, called attention to the deficiency in the numbers furnished by the present methods of enlistment. A departmental committee has since reported on the subject. M. Bos, in the report on the Estimates for 1906, agrees with the general conclusion of the committee, and believes that the three sources of supply, viz., the inscription maritime, re-engagements, and voluntary enlistments should all be maintained with certain modifications. The present deficiency will be accentuated by the passing of the law reducing service in the Army to two years; and by the consequent necessity of reducing by one year the term of service in the Navy for those enlisted for three years, for five years, or for long service.

What steps are suggested for making good the deficiency?

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Inscription maritime.

The Departmental Committee proposes that privileges hitherto accorded to the *inscrits maritimes* in civil life should be withdrawn from those who only engage for two years, and should be confined to those who engage to serve for four or five years. M. Bos suggests instead that the *inscrit maritime* should be given the option of serving in the Army or Navy; that if he elects to serve in the Navy his compulsory term of service should be for three years and he should retain his privileges in civil life, and that special inducements in the shape of bonuses and higher pay should be offered to him to extend his services to four or five years.

Voluntary enlistment.

It is to voluntary enlistment that M. Bos looks to make good the greater part of the deficiency. He proposes (1) to suppress voluntary enlistment for three years; (2) to offer greater advantages to those who enlist for five years; (3) to follow the example of the British Navy, and to extend the enlistment for long service from seven to eight, ten or twelve years. The Departmental Committee recommended ten years. Special inducements, involving a heavy charge on the Estimates, would have to be offered to men to enlist for long service, but they are necessary in the interests of the country.

Administration.

By a decree of April 21, 1905, the Superior Council of the Navy has been reconstituted—a change made in view of the preparation of the new shipbuilding programme. It now consists of the five vice-admirals who are naval prefects at the ports, the vice-admirals commanding in chief the naval forces in home waters, two vice-admirals and two rear-admirals residing in Paris and nominated by Presidential decree, and the chief of the staff. The same decree suppressed the Consultative Naval Committee and created a permanent consultative section of the Superior Council, comprising one vice-admiral and two rear-admirals. Another decree of the same date constituted a Technical Committee, formed in three sections severally concerned with sea-going vessels, coast defence vessels, and material and effectives. This Technical Committee assumes the duties of four boards which have been suppressed—the Council of Works, the Committee of Control, the Submarine Committee, and the Trials Committee. There have been some changes also in the central administration. The service of submarine defences having been suppressed, the technical and administrative bureau for torpedo and electricity has disappeared, and a large part of its duties is executed by the Department of Naval Construction. To this department the technical section for naval construction, which was autonomous, has now been attached. M. Lhomme now presides over the department in succession to M. Bertin. M. Thomson, Minister of

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Marine, has also constituted a technical and administrative cabinet and a civil cabinet at the ministry.

The armoured cruiser Sully, which ran upon an uncharted rock in Along Bay on February 7, 1905, notwithstanding many measures taken to save her, became a total wreck after eight months. She broke in two upon the ledge of rock, but her guns and much material were saved out of her. There was no loss of life. The submarine Farfadet, from causes not completely understood, filled with water and sank in the lake at Biserta, and Sub-lieut. Robin and thirteen seamen, who were able to take refuge in the after compartment of the boat, were drowned after forty-eight hours of agony. The boat was refloated, but too late to save the lives of her company. Disasters.

Manœuvres of much importance took place in the Mediterranean, under the direction of Admiral Fournier, the Mediterranean and Reserve Squadrons taking part, as well as four battleships and coast defence ships specially mobilized. Manœuvres.

Germany.

The growth of the German Navy has proceeded steadily on the lines adopted in the Navy Act of 1900—two first-class battleships being laid down and two completed every year. Under the Act of 1900, augmented by the large armoured cruisers, six in number, to be built under the additional programme of 1906, the German Fleet is to be composed of thirty-eight battleships, twenty large (armoured) cruisers, and thirty-eight small cruisers. The following is the constitution of this fleet as so far provided for, or to be provided for, in 1906, it being understood that the ships of the Siegfried class and their predecessors remain in the battleship list *pro formâ*, and pending the building of ships to replace them: Battleships (thirty-seven): Württemberg, Baden, Oldenburg, eight Siegfrieds, four Brandenburgs, five Kaisers, five Wittelsbachs, five Braunschweigs, five Deutschlands, Ersatz Bayern, and Ersatz Sachsen, the last two being of the programme of 1906. Large cruisers (fifteen): Kaiserin Augusta, five Hertha class, Fürst Bismarck, Prinz Heinrich, two Prinz Adalbert class, two Roon class, two Scharnhorst class (new programme), and E. Small cruisers (thirty-seven): Greif, Jagd, two Schwalbe class, six Bussard class, two Irene class, Gefion, Hela, seven Gazelle class, three Frauenlob class, eight Hamburg class, three O class, Ersatz Pfeil, and Ersatz Comet. Naval establishment.

The first ten of the small cruisers just enumerated are no longer included in the comparative tables of the *Naval Annual.*

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Addition to the Navy Act of 1900.

In November, 1905, the *Novelle,* or addition to the Navy Act of 1900, was accepted by the Federal Council, and provided for the increase of the programme by five armoured cruisers for foreign service, and one as a reserve. It has since been sanctioned by the Reichstag. The necessity for the increase is explained as follows: "When the present Navy Bill was proposed in 1900, the German Governments considered it necessary, for the due representation of German interests abroad, to ask for a greater number of men-of-war than had been provided in the first Navy Bill of 1898 for this purpose. The increased number asked for amounted to six large, and seven small cruisers. It was not intended to commence the construction of these cruisers till the year 1906, in order to complete the battle fleet first. The Reichstag at that time rejected this request. Now that the time proposed for the commencement of the construction has arrived the United Governments find themselves compelled to repeat their request for the six large cruisers.

Cruiser programme.

"The Navy Bill would thus altogether provide for service abroad ten large cruisers, which are to be used :—

4 as stationary vessels, based on experience already gained;
4 as a cruiser squadron, for use where it may become necessary;
2 as a reserve.

The reasons existing at that time for an increase, viz., the representation and promotion of the over-sea interests of the Empire, remain still valid to-day. But a further most important reason has been added. In consequence of the formation of strong and numerous squadrons of armoured cruisers by other nations a forcible necessity has arisen also for the German Navy to have at its disposal, in case of war outside the sphere of the home battle fleet, at least one squadron of efficient armoured cruisers."

The cost of these six cruisers, including armament, is estimated at £8,250,000, and will be spread over the period 1906–15. The ultimate total addition made necessary by the new cruiser programme will be 126 executive and 40 engineer officers, 16 surgeons, 8 paymasters, and 5643 warrant officers and men.

Supplementary to the *Novelle* of the law of 1906 is a memorandum upon the shipbuilding programme. Increased expenditure is made necessary by (*a*) the additional cruisers; (*b*) an increase of torpedo-boats—twenty-four divisions (144 boats) instead of sixteen divisions (96 boats); (*c*) an annual appropriation of £250,000 for the construction of submarines and experiments with this species of craft; (*d*) the necessary increase in the size and power

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of ships and torpedo craft, as indicated by experience of recent years, and particularly by the Russo-Japanese War.

Under the original and additional programme there are to be completed (1906–17) eighteen battleships (two yearly up to 1910), thirteen large cruisers, twenty-four small cruisers, and twenty-four torpedo-boat divisions. Upon these vessels the cost is expected to be £5,850,000 in 1906, rising progressively to £7,350,000 in 1911, and falling to £5,650,000 in 1917.

Additions to the *personnel* will be necessary as follows: (*a*) for the new cruisers, see above; (*b*) for the increased number of torpedo-boats—99 always ready with full complements—53 officers and 2218 men; (*c*) by the increased armament of ships and the necessity of making better use of it, 90 officers and 1907 men; (*d*) by the increased size of ships and torpedo-boats, 140 officers and 7514 men; (*e*) by changes in ships in commission, 64 officers and 842 men; (*f*) by increased requirements on shore, 132 officers.

Battle-ships.

Two battleships of the Braunschweig class, 12,997 tons displacement, have been completed. The Elsass attained a mean speed of 18·7 knots on a measured mile, with 16,812 I.H.P. Her sister ship, the Preussen, attained a mean speed of 16·41 knots with 9717 I.H.P. on her natural draught trials, and 18·6 knots with 18,374 I.H.P. on the trials with forced draught. There only remains to be completed the Lothringen of this class. Of the Deutschland class, the Hannover was launched at Stettin on September 29, 1905, and the Pommern at Wilhelmshaven on December 2. Q and R have been laid down at Kiel and Danzig respectively. The Deutschland class was fully described on p. 205 of the *Naval Annual* of last year.

"S" class.

The new battleships, Ersatz Bayern and Ersatz Sachsen, of the "S" class, will be the largest battleships yet built in Germany, and will displace 18,000 tons. With regard to the increase in the displacement, Admiral von Tirpitz, during the Budget debate in the Reichstag, justified the caution which had been exercised by the Imperial Marine in adopting a decision on this point; but it had now been realised that the chances of conducting a successful action at long ranges had recently been greatly increased, with the result that a heavier armament must be carried. The Dreadnought furnished evidences of the consequences of this change of views. The German Navy could not remain blind to these advances, and must follow suit. In conclusion, the Secretary of State gave confidential information with regard to the question of armament. The estimated cost of the new battleships is given in the new German Navy Bill, which was accepted by the Federal Council on November 16, as

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£1,825,000 as compared with an average cost of £1,214,000 for the Deutschland class.

Armoured cruisers.

The armoured cruisers Roon and Yorck, of 9350 tons displacement, have been completed. With 12,930 I.H.P. the Yorck steamed at 19 knots on her forty-eight hours' trial, and with 19,183 I.H.P., forced draught, at 21·1 knots. The armoured cruiser Scharnhorst, of 11,319 tons displacement, has been launched at the Blohm and Voss Yard, Hamburg, and a sister ship is in hand at the Weser Yard, Bremen. Length, 449½ ft.; beam, 70¾ ft.; draught, 24½ ft.; 22·5 knots; 26,000 I.H.P.; Schultz small-tube boilers. The armament will consist of eight 8·2-in. guns, four mounted in pairs in turrets, and four in casemates on the upper deck; six 6-in. guns in a redoubt on the main deck; twenty 3·4-in. guns and fourteen smaller Q.F. guns, and four torpedo tubes. The armour belt of hardened steel is 6 in. thick amidships, tapering to 3 in. at the ends. The armoured deck is 2 in. thick on the sloping portions, and 1½ in. thick on the flat. The redoubt is protected by 4¾-in. to 6-in. armour. The 8·2-in. guns are protected by 6·7 in. to 5·9 in. of hardened steel. The normal coal supply is 800 tons; the maximum 2000 tons. Complement 650.

The armoured cruiser E is to be laid down in 1906, and will be of a new and larger class, displacing 15,000 tons.

Third-class cruisers.

Three third-class cruisers, of 3200 tons displacement, were completed last year—the Lübeck, München, and Berlin. They attained a maximum speed on trial of 23·5, 23·4, and 23·2 knots respectively. The Lübeck is fitted with turbine engines.

The Leipzig was launched March 31, 1905; the Ersatz Alexandrine was launched on September 23 at the Imperial Dockyard at Danzig, and has been named the Danzig; and the Ersatz Meteor was launched at Kiel on December 12, and has been named the Königsberg.

Three cruisers of the same type, though somewhat larger (3350 tons) —Ersatz Wacht, O, and Ersatz Blitz—were laid down during the year at Danzig, Bremen, and Stettin respectively, and two third-class cruisers—Ersatz Pfeil and Ersatz Comet—are to be laid down in 1906.

A mining ship will also be laid down this year.

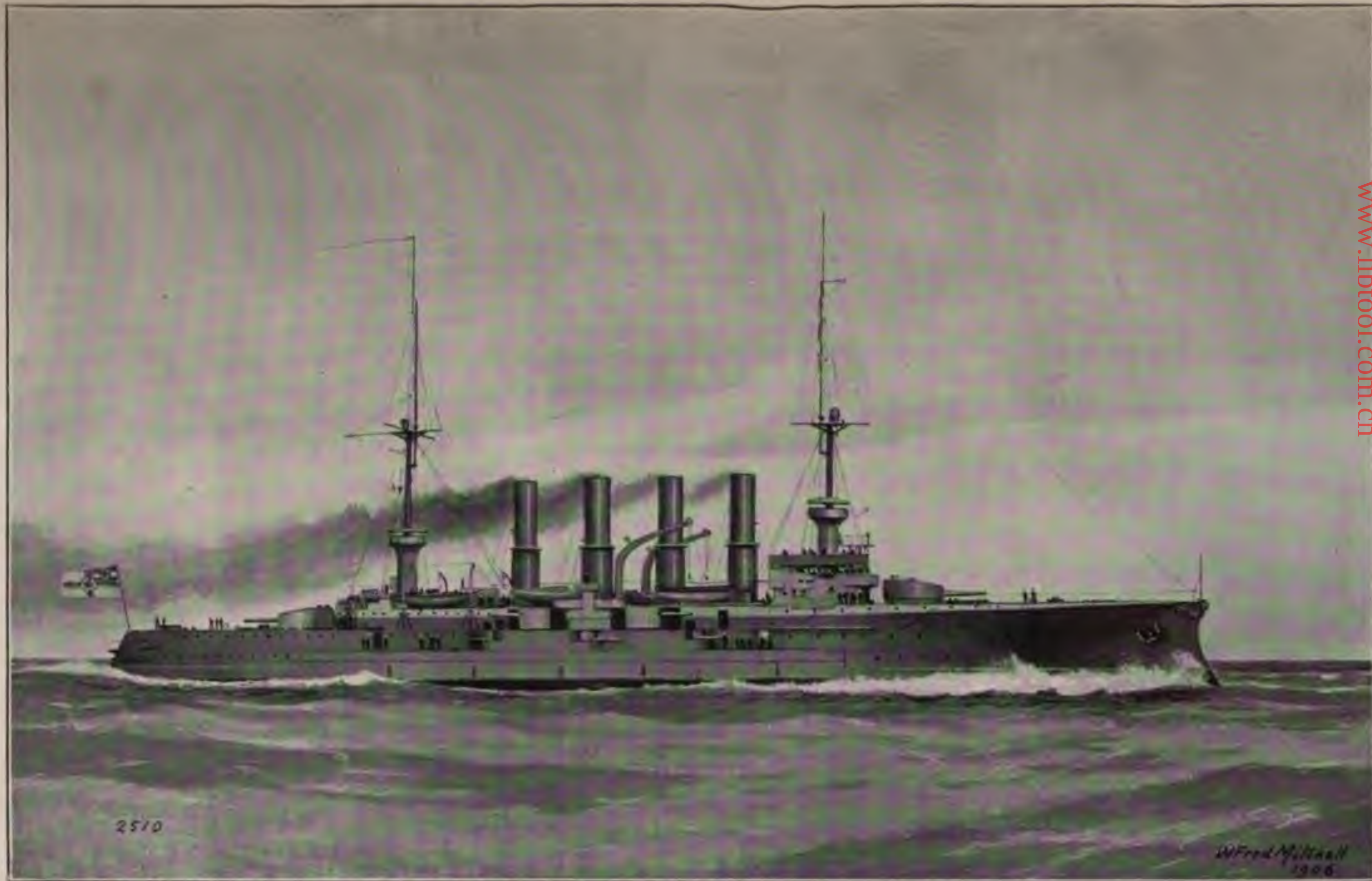
Torpedo craft.

A division of sea-going torpedo-boats, Nos. 132 to 137, has been ordered from the Germania Yard.

The torpedo-boat S 125, fitted with turbines, attained a speed of 29·5 knots on her trials instead of the 27 knots estimated.

S 126 was sunk by collision, with a loss of 33 lives.

Two torpedo-boat divisions are to be laid down in 1906. The displacement of the latest type of torpedo-boats will be 570 tons, as against the 420 tons of S 131, the largest torpedo-boat at present in



GERMAN ARMOURED CRUISER "YORCK."

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the Navy. The new boats represent a considerable advance in several respects. They will have a more powerful gun equipment, greater speed, and light armoured protection for the engines and boilers. The speed will be 30 knots, as compared with the maximum of 27 knots hitherto attained. The armament will consist of four 5-centimetre (2-in.) and two 8·8-centimetre (3½-in.) quick-firing guns; hitherto only three 5-centimetre (2-in.) guns have been carried. The bunkers will be considerably enlarged, so that, in spite of the increased consumption of coal, the radius of action will be much increased.

The protected cruisers of the Hertha class, five in number, are to be modernised at a cost of a million marks (£50,000) each. They are to be fitted with water-tube boilers, and are to receive other structural improvements designed to increase their fighting capacity. The work is to be carried out in the Government yards, and will probably be completed in 1908. Refits.

The total numbers proposed for the Navy in 1906 are 43,474, of which 1511 are executive officers, 553 cadets, 269 engineers. The increase in the year is 2802. *Personnel.*

ITALY.

A chapter is included in this volume by Commander Paladini, which deals with the naval policy of Italy, the shipbuilding programme as explained by Admiral Mirabello, the new class of 22½-knot armoured cruisers, approximating to 10,000 tons, and the new and remarkable mining and blockading vessel. It is, therefore, unnecessary to deal here with the Italian Navy at any great length. Although only one armoured cruiser, the Francesco Ferruccio, was completed during 1905, considerable progress was made in advancing to the trial stage the battleships Regina Elena and Vittorio Emanuele III., while the battleship Napoli was launched on September 10, and the armoured cruiser San Giorgio, which belongs to the new class, on July 5. There remained on the stocks the battleship Roma, which is far advanced, and the armoured cruiser San Marco, which was begun in 1905 at Castellamare. At the end of 1905 there were building in Italian yards 25 boats of the destroyer type, and six at Elbing, 26 of these being of size and power somewhat similar to the coastal destroyers now building for the British Navy. The Italian boats are twin-screw, with I.H.P. aggregating 3000, as against the British single-screw of the same power. Of these 26 boats, 16 are of the Thornycroft type, built from the drawings and incorporating the patents of that firm. The larger boats, or sea-going destroyers, of which four are Progress made.

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now building, are also all of the Thornycroft type. They are similar to the 30-knot destroyers supplied by that firm to Japan, with certain improvements suggested by the Italian Admiralty. They are twin-screw boats of 6000 I.H.P., and the machinery is so arranged as to be coal-protected at the sides, which method suggested itself to the Italian Admiralty after the lessons of the war were discussed on information received from Japan. The smaller coastal destroyers are also being coal-protected in the same way, having longitudinal side bunkers throughout the machinery space. The following is a summary of the destroyers, showing the type and where they are being built:—

No. of Boats.	Type.	Where Building.
10 Coastal Destroyers . . .	Thornycroft. . .	Pattison, Naples.
6 " " . . .	" . . .	Odero, Genoa.
4 " " . . .	Odero	Odero, Genoa.
1 " " . . .	Gabbiano . . .	Spezia.
6 " " . . .	Schichau . . .	Schichau, Elbing.
4 Sea-going Destroyers . .	Thornycroft. . .	Ansaldo, Armstrong, Genoa.

Trials.

The battleship Benedetto Brin ran her trials in August at Spezia, making 18 knots with 106 revolutions and 15,600 I.H.P. With forced draught she attained 20,400 I.H.P., though the contract was only 19,000. Her coal consumption was 1·67 lb. per horse-power per hour, or 24·5 lb. per square foot of grate area. The speed attained was not given in the published report. The cruiser Francesco Ferruccio attained a speed of 17½ knots with 106 revolutions and 9500 I.H.P.

Charges against the administration.

The administration of the Italian Navy has been the subject of a stringent inquiry, owing to the attacks made upon it. It was said firstly, that the administration had permitted frauds in contracts for food supplies, but this was not proved, or at least there was no proof that the Ministry of Marine had connived at it; secondly, that great waste was permitted in regard to new material, which was allowed to deteriorate, and this charge seemed to be rather better founded, for the system was bad; thirdly, that owing to the length of time taken to build ships and changes made in the designs, large sums were wasted, and it was proved that the Filiberto, Saint Bon, and some other ships had been much too long in hand, and that the designs had been altered, causing unnecessary outlay; and fourthly, that the interests of the country and of the Navy had been deliberately sacrificed by the adoption of inferior armour plating in order to promote a private industry—the Terni Steel Works. To this last charge it was answered that the Terni company had been the only Italian

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company which offered to supply armour at all, and that the plates were considerably cheaper than those of Krupp, and though they were not so good, they showed sufficient resistance when put to any reasonable test. Since the publication of the report, some changes have been introduced into the system of administration.

Interesting manœuvres took place at the end of September under the direction of the Duke of Genoa as admiralissimo. The Red Fleet, under command of Rear-Admiral Bettolo, consisted of some of the older battleships with a large torpedo flotilla and some scouts, and was given a value of 65, while the Blue Fleet under command of Vice-Admiral Gualterio, constituted of the most recent battleships and armoured cruisers, with scouts and sea-going destroyers, was assigned a value of 100. On the night of September 20, the Blue Fleet being at Gaeta and the Red Fleet at Maddalena, Admiral Bettolo despatched the Tripoli, disguised as a coasting vessel, to mine the harbour of Gaeta in the vicinity of the adversary, an operation which was admitted to be a success. The Duke of Genoa, however, not to end the manœuvres abruptly, ordered a fresh beginning, and the Blue Squadron left Gaeta in order to establish the blockade of Maddalena according to the scheme. The light division patrolled the approach in touch with the battleships, but, favoured by the darkness, Admiral Bettolo sent out his destroyers, which passed unperceived through the blockading lines, and then returning, succeeded in torpedoing the Regina Margherita, flagship of Admiral Gualterio, and the despatch vessel Coatit. Two hours later torpedo boat flotillas were launched at the blockaders, and the Benedetto Brin, the Pisani, the Filiberto, and the Regina Margherita were considered to have been torpedoed. Finally, the Red admiral, on the night of September 22, put to sea, and escaped through the blockading lines, but was pursued by the Varese. This cruiser was in the outer line of the blockaders, but Admiral Bettolo proceeded at full speed, and reached a distance of 50 miles from the port, which, under the rules, completed his success. The King reviewed the whole Fleet on August 4, when 80 vessels were present, the whole steaming past the Lepanto at 10 knots.

Manœuvres.

JAPAN.

The battleship strength of the Japanese Navy has been completely changed since the commencement of the war. Half of the original six battleships have been lost. The Yashima and Hatsuse were sunk off Port Arthur in 1904. The Mikasa, flagship of Admiral Togo in the war, took fire, her magazine exploded, and she sank at Sasebo

Results of the war.

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on September 12, 1905. Half her crew were drowned. As she sank in shallow water it should be possible to raise her, for the Japanese have displayed great skill in this class of work off Port Arthur. A committee, under the presidency of Admiral Misu, was appointed to inquire into the cause of the disaster. Baron Yamamoto, Minister of Marine, said it would probably not be discovered until the ship was refloated. He described a rumour that the disaster was due to malevolence arising from discontent in the Navy as being as false as it was absurd. To compensate for their losses, the Japanese have already raised the Retvizan (re-named Hizen), the Poltava (re-named Tango), the Peresviet (re-named Sagami), and the Pobieda (re-named Suo). They captured the new first-class battleship Orel (re-named Iwami), and the second-class battleship Nicolai I. (re-named Iki), two coast-defence ships Apraxine (re-named Okinoshima) and Seniavine (re-named Mishima). In the cruiser classes the Japanese lost the Yoshino, sunk by collision, and the small cruiser Miyako. On the other hand, they raised the armoured-cruiser Bayan (re-named Aso), the second-class cruiser Pallada (re-named Tsugaru) at Port Arthur, and they raised the Varyag (re-named Soya), which was sunk at Chemulpo. The gunboats Gaidamak (now Shikinami) and Posadnik (now Makigumo) as well as the destroyer Silni (now Fumizuki) have also been raised at Port Arthur, with the Volunteer Fleet cruiser Angara (now Anegawa) and several hired merchant vessels. In addition to the battleships and coast-defence vessels taken in action, the Reshitelni (now Yamahiko) and Biedovi (now Satsuki) were captured. It is possible that the old armoured-cruisers Admiral Nakhimoff, Vladimir Monomach, and Dmitri Donskoi may be raised.

New construction. Battleships.

The battleship Katori was launched from Messrs. Vickers' yard at Barrow on July 4; displacement 15,950 tons, as compared with the 16,400 tons of the Kashima, which was launched at Elswick on March 22. The armament is the same in both cases. Both ships have been fully described in the *Naval Annual*. The battleship Satsuma, believed to be of 19,000 tons, has been laid down at Yokosuka, to be completed in 1907. The Aki, of the same type, is about to be laid down in Japan, and will be completed early in 1908.

Armoured cruisers.

Four armoured cruisers (said to be on the increased displacement of 16,000 tons) are under construction in Japan. The Tsukuba was launched at Kure on December 26, 1905. The Ikoma, also building at Kure, is well advanced. The Kurama is building at Yokosuka, and the Ibuki at Kure.

Second-class cruiser.

The second-class cruiser Tone (4800 tons displacement) is building at Sasebo, and the despatch vessel Yodo (1200 tons) at Kobe.

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Ten destroyers have been built in Japan during the year, but the total numbér launched or in hand at Yokosuka, Maizuru, Kobe, Sasebo, Kure, Nagasaki, and Osaka is twenty-four. Destroyers.

It has long been known that ultimately the largest classes of warship building would be undertaken in Japan. In the *Naval Annual*, 1900, p. 54, will be found on account of the shipbuilding resources of the country, contributed in the previous year to the *Jiji-Shimpo* by Mr. Sassow, Director of Japanese Naval Construction. At that time the limit of size was about 5000 tons at Yokosuka, the most important of the dockyards, but a dock capable of taking the largest battleship was completed there (in which the Victorious was docked), and the dockyard has since been greatly developed. The difficulty has hitherto been that all the principal material for shipbuilding had to be bought abroad, but, as was pointed out in the article on the Japanese Navy in the *Naval Annual*, 1904, p. 193, Japan possesses extensive deposits of iron ore; and Japanese coal, though not of the best quality for warships, is used by all the coasting steamers of Singapore. Since 1896 more than three millions sterling have been expended on a steel foundry and rolling mills at Kure, and on the Imperial Steel Works at Wakamatsu. "It is believed," says the writer above referred to in the *Naval Annual* of 1904, "that 100,000 tons of steel can be turned out annually. Part of the iron ore used is imported from China, and part is mined in Japan. . . . A 9·2-in. gun from the arsenal at Kure was exhibited at the Osaka Exhibition in 1903, and appeared to be a beautiful model." The resources of Sasebo and Maisuru have also been developed, and the war with Russia has given a great impetus to all the establishments. Ship-building resources.

As a result of the policy steadily pursued for many years, Japan has now become independent of European countries for the construction of battleships and their armament. There are few more noteworthy facts than this in the naval history of the year under review.

Russia.

The Russian Navy was almost annihilated in the war with Japan. Losses in the war.

Of first-class battleships, the Petropavlovsk, Osliabya, Kniaz Souvaroff, Borodino, and Alexander III. were sunk; the Peresviet, Pobieda, Poltava, Sevastopol, Retvizan, and Orel were captured, the first five at Port Arthur, the last-named in the battle of Tsushima. There remain four ships—the Tria Sviatitelia and the Kniaz Potemkine (name since changed to Panteleimon), of the Black Battle-ships.

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Sea Fleet, the Cesarevitch, which escaped to Kiao-Chao, and the Slava, which was not completed in time to leave with Admiral Rozhdestventsky. The second-class battleships Navarin and Sissoi Veliky were sunk, and the Nicolai I. was captured at Tsushima. One coast-defence ship was sunk, and the remaining two were captured.

Cruisers.

Of armoured cruisers, the Rurik, Admiral Nakhimoff, Dmitri Donskoi, and Vladimir Monomach were sunk; the Bayan was captured. The Rossia and Gromoboi alone remain. The Russians were more fortunate with their second-class cruisers, and have lost only the Varyag, sunk at Chemulpo and since raised by the Japanese, and the Pallada, taken at Tsushima. The Diana escaped to Saigon, the Askold to Shanghai, and the Aurora and Oleg to Manila. Of third-class cruisers, the Boyarin, Novik, Svietlana, and Izumrud were sunk; the Jemtchug escaped to Manila, and the Almaz to Vladivostock. Two armoured gunboats, the Otvajny and Gremiastchy, were sunk; two torpedo gunboats, the Gaidamak and Posaduik, were captured; twenty destroyers and several old gunboats were taken or destroyed.

New programme.

According to the *Neue Freie Presse*, the new programme sanctioned recently by the Tsar, and to be spread over a term of nine years, comprises 12 battleships, 15 cruisers, 46 destroyers, 18 torpedo-boats, 10 submarines, 7 gunboats, 9 monitors, and 1 mining ship.

Naval construction. Battleships.

The Andrei Pervozvannyi was launched at Galerny Island on May 12, 1905. The sister ship, the Pavel I., is building at the Baltic Yard, St. Petersburg: Displacement, 16,630 tons; I.H.P., 18,000; speed, 18 knots. The armament comprises four 12-in., twelve 8-in. guns, twenty 12-pdrs., and twenty-six smaller Q.F. guns, with six torpedo tubes. Protection is afforded by a water-line belt 11 in. thick amidships, tapering to 6 in. at the ends. The side armour is carried up to the main deck from the stop to the after turret. The 12-in. guns are mounted, as usual, in pairs in turrets, protected by 12-in. armour, the forward turret being in the forecastle, the after turret in the upper deck. Of the 8-in. guns, eight are mounted in pairs in turrets amidships on the upper deck, four in single turrets at the angles of the superstructure. All these turrets have 7-in. armour. The armament is so distributed that two 12-in. and six 8-in. guns can fire ahead or astern. If the side between the main and upper decks is unprotected by armour, the main and auxiliary armament appears to be seriously exposed. The upper armament deck is 2·4 in. thick, and the lower is from 2 to 1½ in. in thickness. The normal coal supply is 1500 tons, and the maximum is said to amount to 3000 tons.

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RUSSIAN BATTLESHIP "SLAVA."

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The Evstafi and Ioann Zlatoust, which are building at Nikolaieff and Sevastopol respectively, are some 3000 tons smaller than the ships just described. I.H.P., 10,600; speed, 16–17 knots. The armament comprises four 12-in., four 8-in., and twelve 6-in. guns., fourteen 12-pdrs. and ten smaller Q.F. guns, with five torpedo tubes. The maximum thickness of the belt line is 9 in., and of the armoured deck 3 in. The main armament is protected by 10-in., and the auxiliary armament by 5-in. armour. The normal coal supply is 700 tons, and the maximum 1400 tons. Evstafi.

The armoured cruiser Rurik is being built by Messrs. Vickers, Sons, and Maxim at Barrow, and the following are her characteristics: Displacement, 15,000 tons; length, 490 ft.; beam, 75 ft.; draught, 26 ft.; armament, four 10-in., eight 8-in., twenty 4·7-in., fourteen smaller guns; torpedo tubes, two submerged; 19,700 I.H.P.; speed, 21 knots. Messrs. Vickers are makers of the engines and boilers, which are of the Belleville type. Enormous increase of weight of defensive material is understood to have been introduced into this ship, in view of the lessons learned from the Russo-Japanese war. Belt, 6 in., 4 in., and 3 in.; sides, 3 in.; bulkheads, 3 in.; gun position, 8 in. to 7 in.; decks, 1½ in. to 1 in.; coal capacity, 1200 tons normal, 2000 maximum; complement, 800. Armoured cruisers.

The smaller armoured cruiser Admiral Makaroff, of the original Bayan class, is building by the Forges et Chantiers de la Méditerranée at La Seyne: Displacement, 7900 tons, with mean draught of 21 ft. 3 in.; length, 443 ft.; beam, 57 ft. 3 in. Armament, two 8-in. in turrets, eight 6-in. in redoubts, twenty 12-pdrs., four 6-pdrs., two submerged torpedo tubes. Engines of 16,500 I.H.P., and Belleville boilers with economisers; speed, 21 knots. Protection—belt, 6¾ in. at the top and 3½ in. at the bottom, reducing to 4 in. at the ends; bulkheads, 6¾ in.; deck, 2 in.; conning tower, 5½ in.; turrets, 5¾ in.; redoubts, 3 in.; ammunition passages, 3 in.; six searchlights; normal coal capacity, 750 tons—maximum, 1020 tons; complement, 500. The Bayan and Pallada, of the same class, are to be built at the New Admiralty Yard, St. Petersburg.

The second-class cruiser Don has a length of 502½ ft.; beam, 57½ ft.; maximum draught, 29½ ft.; 14,000 I.H.P.; full trial speed, 19 knots. The torpedo gunboats Vzadnik and Gaidamak (580 tons) were launched in 1905.

Four destroyers of 26 knots speed (324 tons) have been completed at La Seyne; four have been built by M. Normand at Havre; and four others of the French Framée type are building at the same port by the Forges et Chantiers. Of these, two have been launched. Destroyers.

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Some seventeen of the same class are building, or to be built, in Russia, as well as two of the Sokol class and ten torpedo-boats, making about forty-one in all.

National subscription.

A subscription was set on foot to make additions to the fleet, and a committee was formed, which, in consultation with the Admiralty, decided to devote the fund to the building of torpedo cruisers, of 500–600 tons displacement, and submarines. Subscriptions came from the Emir of Bokhara (£100,000), from the Senate of Finland (£40,000), from the nomad Trukhmans of Stavropol (£33,000), and from other sources, and the amount received, reported up to February 19, 1905, was £1,400,000. This sum enabled eighteen torpedo cruisers and four submarines to be arranged for, and progress would have been more rapid but for the strikes and other troubles. The Moskvityanin and Dobrovoletz are in hand at the Putiloff works, the machinery being supplied by Schichau, of Elbing. Others which have received names reminiscent of large donors or districts which have contributed are the Emir Bokharsky, Finn, Stavropolsky Trukhmenetz, Kazanetz, Voiskovoi, and Ukraina. Of the four submarines one has been completed, and bears the name of Field-marshal Graf Sheremeteff, that officer having given £201,000. Officers and men of the army have contributed generously, and the fund has been chiefly built up by small sums. The social troubles have affected the subscriptions, but as money is received, it is proposed to put other vessels in hand.

Submarines.

In addition to the submarine named above, the Okuny, Peskar, and Nalim are believed to have been launched in 1905, and the Sig, Plotva, Kefal, Akula, Makrely, Bychok, Keta, and Paltus are said to be in hand.

United States.

Rapid expansion.

The growth of the United States Navy has been rapid, although latterly there has been some retardation, and it is now one of the most important factors in the politics of the world. What is known as the "New Navy" dates from 1883, when the naval appropriations for the year amounted to £2,564,000. There has recently been prepared as a Senate Document by Mr. Pulsifer, Clerk of the Senate Committee on Naval Affairs, a paper entitled a "Compilation of the Annual Naval Appropriations from 1883 to 1905," which enables us to estimate the effort that has been made and the success that has been attained. Expenditure occupies a first place in the statement, and it is shown that the appropriations have marked an increase in

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each year since 1883, and that for the twenty-three years ending with the appropriation of March 3rd, 1905, the total was £208,081,000. This sum represents regular, annual, and other appropriations, including those for the Naval Academy, Marine Corps, and all other objects related to the Navy. It is a significant fact that within the twenty-three years there has been expended a sum amounting to nearly three times as much as the entire income of the Government in 1883, and almost twice as much as its entire income in 1905. The outlay is estimated to be equal to one per cent. of the estimated wealth of the nation. The total appropriations for naval construction (hulls, armour, armament, and machinery) amount during the twenty-three years to a total of £50,454,000.

The report shows that the vessels number altogether 326, being 270 fit for service, including those under repair, thirty-four in course of construction, seven authorised, and fifteen for harbour service. There are twenty-seven first-class battleships, one second-class battleship, twelve armoured cruisers, twenty-two protected cruisers, eleven gunboats, thirty-five steel torpedo-boats, sixteen destroyers, four harbour defence monitors, three unprotected cruisers, twenty-three various gunboats, and three scout cruisers, the others being of lesser type and nominal fighting value.

The report also gives us some very interesting particulars of the cost of maintaining vessels of the various types during the year 1905, exclusive of repairs, and counting cost of commission and pay of officers. The following are details for the various classes of ships:—First-class battleship, Maine, £108,900; second-class battleship, Texas, £72,100; armoured cruiser, Brooklyn, £95,230; protected cruiser, Olympia, £78,000; monitor, Wyoming, £34,000; gunboat (1710 tons), Bennington, £31,140; gunboat (1777 tons), Castine, £26,600; gunboat (1000 tons), Newport, £20,600; torpedo-boat destroyer, Bainbridge, £13,740; torpedo-boat (estimated), £4,800; submarine torpedo-boat, Porpoise, £4,112.

Present situation

The following table shows the state of advancement on February 1st of the various ships under construction, giving the percentage completed:—

Battleships.

Virginia, at Newport News, 93·60; Nebraska, at Seattle, 86·17; Georgia, at Bate, 93·35; New Jersey, at Quincy, 96·50; Rhode Island, at Quincy, 99·50; Connecticut, at New York, 95·16; Louisiana, at Newport News, 95·24; Vermont, at Quincy, 73·50; Kansas, at Camden, New Jersey, 72·50; Minnesota, at Newport

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News, 82·08; Mississippi, at Philadelphia, 49·08; Idaho, at Philadelphia, 47·19; New Hampshire, at Camden, N.J., 37·10.

Armoured Cruisers.

California, at San Francisco, 38·7; South Dakota, at San Francisco, 87·30; Tennessee, at Philadelphia, 94·53; Washington, at Camden, N.J., 94·40; North Carolina, at Newport News, 34·48; Montana, at Newport News, 30·11.

Protected Cruisers.

St. Louis, at Philadelphia, 88·34; Milwaukee, at San Francisco 89·80.

Training Ships.

Cumberland, at Boston, 95·00; Intrepid, at Mare Island, 97·50.

Scout Cruisers.

Chester, at Bath, 18·87; Birmingham, at Quincy, 21·00; Salem, at Quincy, 21·10.

Submarine Boats.

Cuttlefish, at Quincy, 51·00; Viper, at Quincy, 43·30; Tarantula, at Quincy, 43·50; Octopus, at Quincy, 43·10.

Battleships. Georgia class. The Rhode Island, of the Georgia class (14,948 tons displacement), on a preliminary trial on November 11 attained an average speed of 19 knots in four hours. The Rhode Island, New Jersey and Virginia have been completed.

Connecticut class. Of the Connecticut class (displacement 16,000 tons), which comprises six ships, the Louisiana maintained an average speed at her official trials, on December 14, of 18·82 knots with 20,500 I.H.P. The contract speed was 18 knots. The Kansas, of the same class, was launched at the yard of the New York Shipbuilding Company, Camden, N.J., on August 12, the Minnesota, at Newport News, on April 8th, and the Vermont, at Quincy, Mass, on August 31.

Two battleships of the 13,000-ton type were launched at Cramp's Yard, Philadelphia, the Mississippi on September 30, and the Idaho on December 9.

New Hampshire. The description of the Connecticut class given in the *Naval Annual* of 1904 applies to the New Hampshire. The principal difference is a slight increase in the thickness of the armour on the

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UNITED STATES ARMOURED CRUISER "WEST VIRGINIA."

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barbettes and turrets of the 12-in. guns. The 12-in. barbettes have 11 in. of armour in front, and in the rear 7½ in. above the gun deck, and 6 in. between the berth and gun decks. The 12-in turrets will have a front plate of 12 in. thick, rear and side plates 8 in. thick, top plates 2½ in. thick. This compares with a maximum protection of 10 in. for the main armament of the rest of the Connecticut class. The thwartship bulkheads at the ends of the casemates are to be 7 in. thick throughout, instead of 6 in. as in the Connecticut.

Armoured cruisers.

The Washington, 14,500 tons, was launched at Camden, N.J., March 18, and the St. Louis, 9700 tons, by Messrs. Neafie, Philadelphia, May 6. The Charleston has been completed for trials at Newport News. The New York is to be refitted and re-armed at a cost of £300,000.

The gunboats Paducah and Dubuque, of 1085 tons displacement, have been completed.

Scout cruisers.

The armament of the scout cruisers Birmingham, Chester, and Salem was originally intended to consist of twelve 3-in. guns. This has now been changed to two 5-in. guns, one mounted on the forecastle, the other on the main deck aft, and six 3-in. guns. The contract for the building of the Chester, which is to be fitted with Parsons turbine machinery, was signed with the Bath Ironworks, Maine, on May 4, 1905; price £337,000, to be completed in thirty-six months. The contracts for the Birmingham and Salem were signed with the Fore River Shipbuilding Company, Quincy, Mass., on May 17, 1905, at a price of £301,000 for each vessel; the Birmingham to be built entirely on the department's designs, and to be completed in thirty months. The propelling machinery of the Birmingham will be the vertical twin-screw, four-cylinder, triple expansion type. The Salem is to be equipped with Curtis turbines, and to be completed in thirty-four months. The I.H.P. in both cases is 16,000. Nickel steel protection will be fitted on the shell plating for the length of the machinery space, including the dynamo-room, extending from a point 3ft. 4in. below the normal water line to a point 9ft. 6in. in wake of the boiler-rooms. All nickel steel fitted on the shell plating to be 80lbs.

Ships removed from the list.

The dynamite guns have been removed from the Vesuvius, and the entire armament from the Philadelphia. The Montgomery has been turned into a torpedo training ship, and the Detroit, Bancroft, and some other gunboats have been, or will soon be, handed over to Naval Militia Organisations of various States.

New programme.

The new programme recommended by the Department consisted of two battleships (cost £1,500,000 apiece), two scout cruisers (cost £400,000 apiece), four destroyers, two submarines or submersibles,

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one gunboat of the Helena type, and two river gunboats. Total cost, £4,660,000.

Design of new battle-ships.

The Secretary of the Navy in the above programme for new construction overrode the recommendations both of the General Board and the Board on Construction. The General Board had recommended the construction of three battleships, three scout cruisers, four destroyers, four torpedo-boats, four submarines, one gunboat of the Helena type, two small gunboats, and two river gunboats. Total cost, £7,192,000. The Board on Construction had proposed that the programme should be limited to three battleships, three scout cruisers, and two river gunboats, at a cost of £5,740,000.

"The General Board," he says, "recommend that the South Carolina and Michigan should be increased in displacement from 16,000 to 18,000 tons. The Board on Construction dissents from this recommendation. The General Board has further recommended the authorisation of three battleships, to cost approximately £1,650,000 each, and to be of such tonnage as will suffice to secure an armament of at least ten 12-in. guns. The Board on Construction dissents from this recommendation likewise, and advises instead three battleships, at an estimated cost of £1,500,000 each, with an anticipated armament of eight 12-in guns, and substantially the same tonnage as is contemplated for the South Carolina and Michigan.

"After very carefully weighing these divergent views, I feel that it is not as yet sufficiently clear that the larger and more costly battleships would have such increased efficiency in battle as to justify the certain addition to the public burdens involved in accepting the views of the General Board." Unless, therefore, the President of the Congress should direct otherwise, the construction of the South Carolina and Michigan was to be on the plans approved by the Board on Construction. In relation to the new programme the report proceeds:—"The same reasons which lead me to think it inexpedient to enlarge the dimensions of the South Carolina and Michigan lead me to advise that the battleships to be authorised be of the type recommended by the Board on Construction. Should professional opinion become substantially unanimous in advocating larger vessels before the construction of these ships is actually commenced, their plans can be, of course, remodelled."

It has more recently been stated (March) that the Naval Committee of the House of Representatives has recommended, in accordance with the suggestions of Admiral Dewey and Mr. Bonaparte, an appropriation to build the most powerful battleship in the world, and that the displacement will be 19,000, and the speed 23 knots.

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The most important section of Mr. Bonaparte's report is that in which he deals with the strength required by the United States Navy, and the programme of future construction :—

"If circumstances remain as they now are, I see no reason to suppose the number of ships in our Navy need increase. On the contrary, it is reasonable to anticipate that their number will be reduced, and even reduced materially, within the next five years. . . . In other words, the aggregate of our battleships, armoured cruisers, and coast defence vessels, built, building, or authorised, would seem, according to present indications, sufficient to provide for any contingencies within the limits of probability."

After discussing the value of the ships at present on the list, Mr. Bonaparte says :—

"While any discussion of our future needs and the proper means to meet them must be, of necessity, largely conjectural, I think it may be safely said that if the situation is not complicated by any unforeseen developments, our programme of naval construction for the future, in so far as it relates to our fighting fleet alone, should consist in substituting five new battleships for the ten coast defence vessels of the Monitor type, and two new armoured cruisers for the oldest vessels of these types on our register, and that these substitutions should be made, at latest, within the next six years."

On January 1st, 1906, there were 2275 officers on the active list, 917 being "line" officers, 575 staff officers, 173 midshipmen at sea and 592 warrant officers. The officers on the retired list numbered 716. The enlisted force consisted of 9570 petty officers, 2078 apprentices under training, and 19,715 seamen and other ratings. The total naval *personnel* numbered 34,336, while the Marine Corps had a total strength of 7448 officers and men. *Personnel.*

The provision of engineers under the new system has been a difficulty. **Engineers.**

The Secretary of the Navy does not think that the Personnel Bill offers the best solution for the engineering problem, but to change it would be embarrassing and a change of policy is in itself an evil. In view of this fact and the further fact, that the chief difficulty is with engineering duty on shore, the Secretary reaches the following conclusion :—

"We must remember that some traditions of our Navy constitute obstacles to its thoroughgoing enforcement. Steam was introduced into warships long after the organisation of the Navy, and some officers have not yet outgrown the idea that the engines of a ship are, in some sort, an excrescence, and those in charge of them rather auxiliaries to the fighting force than members of it. I believe that

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with a thoroughgoing and persevering application of the law, and the consequent assignment to engineering duty of all junior line officers in turn, and their retention on such duty long enough to insure adequate provision for the engineering needs of all our commissioned ships (so far as the limited number of our officers may permit), it will be possible to provide a thoroughly satisfactory engineering service at sea.

"To speedily attain the end desired, we must relinquish some theoretical advantages, and I therefore submit for your consideration and that of the Congress the advisability of promptly organising a service of marine engineers for shore duty only, corresponding to the civil engineers now employed at our naval stations. I feel confident that a corps of this character could be readily recruited from graduates of the best schools of engineering in the country, and that after a comparatively brief apprenticeship at our several Navy yards, under the instruction of officers belonging to the former corps of engineers, they would be fully qualified to replace these officers, upon the retirement of the latter, in all forms of shore duty. It will be noted that by this suggestion the alarming scarcity of competent officers for such posts would be remedied within a very short time, whereas the system suggested in the report of the Engineer-in-Chief, to which I have referred, could bear fruit only after a period of many years.

"I recommend, as a further measure of relief, that the number of warrant machinists now allowed by law be increased by at least one-third, and, to render service in this capacity attractive to the class of men we desire to obtain for it, they should be rendered eligible not only for commissions in the line on the same terms as other warrant officers, but for appointment to the lowest grade of the suggested Corps of Marine Engineers, of course, upon condition of passing satisfactorily a very thorough examination to establish their qualifications."

AUSTRIA-HUNGARY.

og The battleship Erzherzog Ferdinand Max, sister ship to the Erzherzog Karl and the Erzherzog Friedrich, was launched at the Stabilimento Tecnico at San Marco, near Trieste, on May 21. A description of this type was given in the *Naval Annual* of 1905. The sister ship Erzherzog Friedrich completed her trials, steaming at 20·75 knots with 18,340 I.H.P., while the contract was 19·25 knots and 14,000 I.H.P. The coal consumption varied from 1·55 lb. to 1·85 lb. per horse-power per hour.

rg. The armoured cruiser Sankt Georg has completed her official trials.

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Though the contract was for 21 knots speed and 13,000 I.H.P., the speed obtained was 22 knots with 15,270 I.H.P. The machinery was constructed by the Stabilimento Tecnico of Trieste.

The destroyer Huszar, built by Messrs. Yarrow & Co., underwent her official trials in the Thames at the end of June. With a displacement of 400 tons, she attained a speed of 28·537 knots during a continuous run of three hours. Five of this type will be built at Trieste, and six at Fiume. Six of these boats are to be provided for in 1906. Destroyers.

The trials of the torpedo-boat Kaiman, built by Messrs. Yarrow & Co., also took place in June. With a load of 55 tons, she attained a speed of over 26 knots. In all, thirteen torpedo-boats of the class are now building, and ten are to be provided for in 1906. Torpedo boats.

Argentina.

The convention of May 1902 between Argentina and Chile put an end to the strained relations between the two countries, and enabled the two battleships and two armoured cruisers, which were in hand in England and Italy, to be sold to other Powers, but the responsibility for national defence remained; and at the conclusion of manœuvres in September and October, 1904, which had for their scheme the defence of the Rio de la Plata, General Roca, President of the Republic, insisted upon the importance of making additions to the fleet. His successor, Dr. Quintana, in his inaugural address to the Congress, pointed out the same necessity, upon the ground that Argentina must necessarily be a sea Power. The port of Bahia Blanca must be completed, the defence of the Rio de la Plata must be made secure, and the naval arsenal must be reorganised. In May, 1905, the President again laid stress upon the importance of the Republic being a sea Power, since it must hold the supremacy in South America. He proposes that coast defence ships and torpedo craft for the protection of the Rio de la Plata and other rivers shall be purchased. As yet no beginning has been made with this programme, but two gunboats of 800 tons and of 15 knots speed have been laid down. Their armament is to consist of two 6-in. guns, and the cost of each will be about £80,000.

Brazil

The programme sanctioned December 14, 1904, authorised the President to put in hand twenty-nine various vessels (three battle-

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ships of 12,500–13,000 tons; three armoured cruisers of 9200–9700 tons; six destroyers of 400 tons; twelve torpedo boats; and three submarines and auxiliaries); and it is proposed to begin the programme by ordering the three battleships, increased to 16,000 tons displacement. Negotiations are still in progress.

Four river gunboats have been built by Messrs. Yarrow for service on the Amazon.

The old turret-ship Aquidaban, which was sunk by a torpedo during the rebellion of 1894, sank as the result of an explosion in her powder magazine on January 21. She was at the time with the Barroso and Tiradentes in Jacarepagua Bay, near Angrados Reis, the three ships having on board the commission appointed to survey the place for a military port and dockyard. The dead numbered 223, including Rear-Admirals Rodrigo Rocha, commanding the first division, Candido Brazil, chief of the naval engineers, and Calbeiros da Graça, director of hydrography, Captain Alvis de Barros, of the Naval Council, and other officers.

Chili.

The *Marine Rundschau* (February, 1906) states that the building of a battleship, two cruisers, and four destroyers has been arranged for.

The cruiser Presidente Pinto, 2074 tons, built at La Seyne in 1890, was lost in May, 1905. She was on her way to Talcahuano to undergo repairs when she ran aground and became a complete wreck, her guns being the only valuable material recovered. Her company were saved. The disaster occurred in the neighbourhood of Quellon, in the Isles of Chiloe.

Greece.

During the past year the Government decided to take the first step in the extension of the torpedo fleet. One destroyer, to be delivered in twelve months, has been ordered from Messrs. Yarrow: displacement, 390 tons; speed, 31 knots; cost, about £57,000. A second destroyer, to be delivered in nine months, has been ordered from the Vulcan Company, Stettin: speed, 30 knots; cost, £49,000; and another is in hand at the same yard.

Netherlands.

The fifth small battleship of the Koningin Regentes type will be armed with two 9·4-in., six 5·9-in., and six 3-in. guns, with two torpedo tubes.

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PERU.

The protected cruiser Almirante Grau was launched by Messrs. Vickers at Barrow, March 27th, 1906: displacement, 3200 tons; 370 ft. long; 2 6-in. guns (each with a training arc of 270 degrees), 8 14-prs., 8 1¼-prs.; 2 submerged torpedo tubes; 14,000 I.H.P.; 24 knots; complement 300. A sister vessel is in hand.

SPAIN.

The armoured cruiser Cardenal Cisneros, the most modern ship in the Spanish Navy, struck an uncharted rock near the Mexeldo headland on October 28, and sank in forty minutes in deep water. No life was lost. The court-martial adjudged her commander to be culpable. There is a possibility that she may be refloated.

The two torpedo-boats Ariete and Rayo have been destroyed by fire while in the dockyard.

SWEDEN.

The Naval Estimates for 1906 amount to £1,164,333, being an increase of £44,000 over those of 1906. Of this amount £254,850 are allocated to new construction, and includes sums for the completion of the battleship Oskar II. and the construction of four torpedo-boats and a flotilla of destroyers. Certain items of the 1901 programme have been allowed to drop out.

The Oskar II. was launched at the Lindholm Yard, Gothenburg, June 6; and the armoured cruiser Fylgia at the Finboda Yard, Stockholm, December 20.

The torpedo-boat destroyer Magne has been completed by Messrs. Thornycroft at Chiswick. Carrying a load of 50 tons, she attained a speed at her trials of 30·705 knots with 7700 I.H.P.

The torpedo-boat Plejad, built by Messrs. Normand at Havre, was launched in June. Her estimated speed is 26 knots, and she is to be the model for the construction of similar boats to be built in Swedish yards. The submarine Hajen has undergone successful trials.

T. A. BRASSEY.
JOHN LEYLAND.

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CHAPTER III.

Comparative Strength.

Changes of the year.

In the year under review the changes in the relative strength of the leading Naval Powers of the world have been important. Russia, owing to the losses in the war, which have been detailed in the previous chapter, has been reduced—temporarily, at any rate—to the rank of a third-class Naval Power. Japan, though she has lost half of the six battleships with which she commenced the war (the Mikasa, however, may be refloated), has far more than made good her losses by the ships captured at the Battle of Tsushima, or raised since the taking of Port Arthur. She has two powerful battleships now completed in England; she has a considerable amount of new construction in hand in Japan, and has thus become independent of European shipyards. The Japanese must now take rank amongst the leading Naval Powers of the world. No addition has been made to the battleship strength of the French Navy during the year, though an extensive programme of new construction has been introduced. While the French Navy has remained stationary for many years, the German Navy has been steadily increasing at the rate of two first-class battleships a year, on the lines of the programme laid down in the Navy Act of 1900. For the United States Navy three battleships have been completed, and no less than five launched, but there will be some diminution in the rate of growth in future years. The Secretary of the Navy is of opinion that the Navy has now reached the strength required to protect adequately the interests of the country. The Italian Navy, like that of France, has for many years remained stationary, while the navies of other Powers have been increasing. A new programme of somewhat modest dimensions has been proposed, and with the rapidly increasing prosperity of the country, it is probable that further expenditure on the Navy will ere long be authorised. Amongst the minor Naval Powers, Austria has been building some useful fast battleships of moderate size, which will make her no despicable foe for her old antagonist Italy.

Ships in commission.

The important changes in the distribution of the British naval forces, which were described last year, have now been completed. The result has been a very large increase in British naval strength at

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Class.	GREAT BRITAIN. Channel Fleet.	Atlantic Fleet.	Mediterranean.	GERMANY. Active Battle Fleet.	FRANCE. Northern Squadron.	Mediterranean. Active Squadron.	Mediterranean. Reserve.
Battleships	Albemarle Canopus Cæsar Cornwallis Duncan Exmouth Glory Goliath Illustrious Jupiter Montagu Ocean Prince George Russell Swiftsure Triumph	Commonwealth Dominion Hindustan Edward VII. Magnificent Majestic New Zealand Victorious	Bulwark Formidable Implacable Irresistible London Prince of Wales Queen Venerable	1st Squadron.† Wittelsbach Zähringen Wettin Mecklenburg K. Karl der Grosse K. Wilhelm der Grosse K. Friedrich III. 2nd Squadron. Preussen Hessen Elsass Braunschweig Brandenburg K. Friedrich Wilhelm Weissenburg Wörth	1st Division. Masséna Carnot Jauréguiberry 2nd Division. Henri IV. Bouvines Tréhouart	1st Division.‡ Suffren Gaulois St. Louis 2nd Division. Iéna Bouvet Charlemagne	Brennus Charles Martel Hoche
Cruisers, 1st Class	1st Squadron. Good Hope Argyle Antrim Devonshire Hampshire Roxburgh	2nd Squadron. Drake Bedford Berwick Cornwall Cumberland Essex*	3rd Squadron. Leviathan Carnarvon Lancaster Suffolk	Friedrich Karl Prinz Heinrich	Gloire Leon Gambetta Jules Ferry Reserve Division. Jeanne d'Arc Amiral Aube Condé	Marseillaise Kleber Dupuy de Lôme	..
Cruisers, 2nd Class	Dido Juno	Arrogant	Diana Minerva Venus	..	..	..	..
Cruisers, 3rd Class	Topaze Sapphire Patrol (scout)	Amethyst	..	Arcona Frauenlob Hamburg Ariadne Berlin Medusa	Forbin	Du Chayla Galilée Lalande	..
Destroyers	24	12	22	..	9	10	..

* Will be replaced by Duke of Edinburgh. † Another of the Kaiser class to be added.
‡ The République is intended to join the squadron in September.

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the point where it was most needed, viz., in Home waters. Such concentration had become necessary, mainly owing to the rapid increase of the German Navy. In the following table is given the number of battleships in commission in European waters for the British, German, and French Navies, for the year 1894, 1899, 1903–1905, and 1906 :—

—	GREAT BRITAIN.					GERMANY.	FRANCE.			
								Mediterranean.		
	Channel.	Atlantic.	Mediterranean.	Reserve.	Total.	—	Northern Squadron.	Active.	Reserve.	Total.
1894	3	4	10	—	17	—	6	8	6	20
1899	10	8	11	—	29	7	6	6	9	21
1903	10	6	14	—	30	8	5	6	3	14
1905	12	8	8	8	28	12	6	6	3	15
1906	16	8	8	13	45	15	6	6	3	15

Nearly all our completed first-class battleships are now in commission in European waters, while thanks to the withdrawal of the battleships from the China Station—made possible by the annihilation of the Russian Fleet in those waters—and of a large number of small cruisers and gunboats from other stations, an effective reserve squadron of thirteen battleships has been created and manned with nucleus crews. We have forty-five battleships ready for sea on the outbreak of war, an increase of twelve ships, as compared with last year (taking into account the five battleships on the China Station). This fine result has been achieved with a considerable economy in the maintenance of the Navy, for the reasons already given. The increase in the German Battle Fleet to fifteen ships has been met by the increase in the Channel Fleet to sixteen ships.

British squadrons.

The detailed list of the several squadrons is given, as usual, on the previous page. It will be noted that the composition of the British squadrons is as far as possible homogeneous. The Mediterranean Fleet is absolutely so, consisting, as it does, of eight ships of identical armament and speed. The same will shortly be the case with the Atlantic Fleet, to which the newest ships are attached as soon as ready for sea. It consists at present of five of the King Edward class, and three Majestics, which are a knot slower than the King Edwards. The Majestics will be replaced by King Edwards in the course of the year. The Channel Fleet comprises four Majestic

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class, six Duncan class, four Albion class, and two Swiftsure class. With the exception of the Majestics, the ships of this squadron are smaller, and therefore more suitable for operations in the waters of Northern Europe than most of our battleships. All except the Majestics had a trial speed of over 18¼ knots.

In addition to the three cruiser squadrons enumerated in the list of our three principal fleets, we have a fourth squadron now described as the "North America and West Indies and Particular Service Squadron," which includes four Edgar class, three other second-class cruisers, and four third-class cruisers, three of which are specially allocated to the Newfoundland fishery. Three Edgars and the Furious are at present employed as tenders.

The Fleet in Commission in Reserve comprises :—

Reserve Fleet.

—	Sheerness—Chatham.	Portsmouth.	Devonport.
Battleships . .	Albion Ramillies (E) Repulse (E) Resolution Royal Oak	Barfleur (E) Centurion (E) Revenge	Empress of India Hood (E) Nile Trafalgar (E) Vengeance
Cruisers, 1st Class .	Aboukir Amphitrite Argonaut (E)	Cressy Ariadne Bacchante (E) Spartiate (E)	Monmouth Europa (E) Niobe
Cruisers, 2nd Class .	Blenheim Talbot Vindictive (E) Black Prince	Gladiator Eclipse	Blake (E) Doris
Cruisers, 3rd Class .	Charybdis Thetis	Hermione Pandora	Æolus Sirius
Scouts	Adventure Attentive	Foresight Forward	Skirmisher
Torpedo-Gunboats .	3	1	1
Destroyers . .	25	19	32
Torpedo-Boats . .	9	16	9

(E) Denotes emergency ship.

There is an increase in all classes as compared with last year, viz., thirteen battleships as compared with eight, twenty-four cruisers as against twenty-one, seventy-six destroyers as against forty-eight.

Germany.

The German Battle Fleet is, with the exception of the four Brandenburg class, homogeneous as regards speed. The Brandenburgs are two knots slower than the rest of the fleet, while the Kaiser class, of which there are to be four, and the Wittelsbach class, of which there

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are now four in the active fleet, carry no guns heavier than the 9·4-in., a serious defect in view of the most recent developments of long range fire. An even more serious weakness in the German Fleet is the want of cruisers. The Germans have eight ships of the Siegfried class in reserve, which are not included in the table because they are not in commission and cannot be considered effective against any of the forty-four British battleships.

France.

The French have, as last year, eleven first-class and three second-class battleships, and one coast defence ship. Some modern armoured cruisers have been substituted for third-class cruisers.

Distribution of French ships.

M. Bos.

The present distribution of the French battleships and armoured cruisers is severely criticised by M. Bos, as well as by "Kermarec," in a recent number of the *Yacht*. M. Bos devotes a section of his report to Bizerta, which he considers of first-class importance as a naval base. He points out that its position is admirable for securing the command of the Mediterranean, and for obstructing the trade route to the East *viâ* the Suez Canal. He, as well as the *Yacht*, advocates the concentration of all the French battleships in the Mediterranean, and the armoured cruisers at Brest and Cherbourg, in the following passage :—

Nous persistons donc à penser, malgré tout, (viz., the arguments of Captain Sorb for quitting the Mediterranean), que tous nos cuirassés d'escadre seraient mieux à leur place et rendraient de plus grands services dans la Méditerranée que dans l'Océan; à Brest et à Cherbourg, les croiseurs-cuirassés avec des défenses mobiles; à Bizerte les cuirassés avec de nombreux contre-torpilleurs, des submersibles de grands tonnages et des croiseurs-éclaireurs de 3000 tonnes à 25 nœuds de vitesse.

In making the above recommendation, M. Bos contemplates three hypotheses: war with Germany, war with England, and war with Italy. In the event of a war with Germany, he relies on England siding with France (a not unjustifiable assumption), and neutralising the German Fleet. In the event of war with England, he reckons on the French Fleet at Bizerta being able to meet the Mediterranean Fleet, based on Malta, and the Atlantic Fleet, based on Gibraltar, in detail. In reasoning thus, M. Bos ignores the certainty that before the outbreak of war, the Mediterranean and Atlantic Fleets would be combined at Gibraltar, or in the most suitable position for meeting any movement of the French Fleet. In the event of war with Italy, Toulon and Bizerta are equally suitable as bases for the French Fleet.

The *Yacht*.

The writer in the *Yacht* argues as follows :—

Les gardes-côtes cuirassés, désormais de peu d'utilité en Méditerranée, auraient leur raison d'être à Cherbourg où, placés en réserve pendant la paix, ils constitueraient en temps de guerre une escadre de neuf bâtiments qui, appuyée sur nos flottilles de torpilleurs et de sous-marins, assurerait l'inviolabilité de nos côtes et obligerait notre adversaire, quel qu'il soit, à maintenir dans la Manche un nombre au moins égal de cuirassés.

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To argue that coast-defence ships (most of which are out of date), torpedo-boats, and submarines, can secure the northern coasts of France from attack, is to ignore the teachings of history. Security from attack, or, in other words, command of the sea, can only be obtained by fighting for it. Nothing will compensate for inferiority in the line of battle.

Weakness of the French Navy.

The French have a difficult choice before them. A concentration of their battleship strength is clearly desirable. If all their first and second-class battleships are combined, the French Fleet would have a fair chance of holding its own against the German Navy, which has little or nothing to fear from the Russian Fleet in the Baltic. Such a course would mean the abandonment of the Mediterranean to the other Powers of the Triple Alliance, assuming that they were involved in the war. The assistance of England is France's only hope under present conditions, in the event of war with Germany. For many years the policy of new construction in France has been too much based on the ideas of the *guerre de course* school. Large sums have been spent on cruisers, submarines, and torpedo-boats, which would have been better spent on battleships. The result is that France now finds herself with a navy which is insufficient, unaided, to protect her interests against her most probable enemies. A vigorous policy of battleship construction, as recommended by M. Thomson and M. Bos, is necessary if France is to maintain her position amongst the Naval Powers of the world.

Other Navies.

Of the Navies not included in the table, the Russians have only two completed first-class battleships, the Cesarevitch and the Slava, remaining in the Baltic; while the Italians will have, as last year, in full commission for six months, four battleships and three armoured cruisers.

Eastern waters.

In Eastern waters the reorganisation of the China, East Indies, and Australian squadrons, under the title of the Eastern Fleet, has been completed. The China Squadron has become the Cruiser Squadron, and comprises four first-class, and two third-class cruisers, besides nine gunboats and thirteen destroyers. In the East Indies there is one second-class cruiser with three third-class cruisers and three gunboats; while on the Australian Station there is the Powerful, with two second-class cruisers and five of the Pelorus class.

The French Far Eastern Squadron consists of three armoured cruisers, the Guichen, and two third-class cruisers. The Sully, which became a total loss, has been replaced by the Dupetit-Thouars. In both the Pacific and Indian Oceans, France has one third-class cruiser. In addition to the above, there are several gunboats, six destroyers, and six submarines in Indo-China.

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The German Squadron in the Far East has been considerably reduced. It now comprises one armoured cruiser, one second-class and one third-class cruiser, besides four gunboats, and two torpedo-boats, but is to be strengthened.

The United States Asiatic Squadron includes three battleships (the Ohio, Oregon, and Wisconsin), three protected cruisers, five destroyers, and three gunboats. The coast defence ship Monadnock and several gunboats are stationed in the Philippines.

Good Hope Station.

Our squadron on the Cape of Good Hope Station has been reduced to one second-class and three third-class cruisers. The expenditure of £2,000,000 on the dockyard at Simon's Bay seems less than ever justifiable.

Comparative tables.

Though there are arguments for a re-classification of battleships, none has been attempted in the comparative tables. It has been urged that the Royal Sovereigns should be relegated to the second class, but now that the whole of the secondary armament has been mounted in casemates, their great weakness has been remedied. If the Royal Sovereign class be degraded, the Renown, the Canopus class, and the Majestic class should be similarly treated, and if the Majestic class, why not the Formidable class? In fact, in the list of British first-class battleships, there is no clear line of demarcation till we come to the Edward VII. Of the foreign first-class battleships, the German Brandenburg class are certainly—and the French Charlemagne class, the Italian E. Filiberto and St. Bon, are probably—less powerful than any ships in the British first class. To take age as the basis of classification would lead to many anomalies.

First-class battleships.

The present position as regards first-class battleships is as follows:—

	Great Britain.	Germany.	United States.	France.	Japan.	Russia.	Italy.
Built	45	18	15	11	10	4	4
Building	6	6	10	6	2	4	4
Total	51	24	25	17	12	8	8
To be laid down 1905-6.. ..	4	2	2	6	–	–	–

In completed first-class battleships (nearly all of which are in commission) we are at present considerably superior to a combination of the German and United States Navies (though such a combination is inconceivable), or to any three European Navies combined. The British Navy has never been in so strong a position as at the present time. The large sums devoted to new construction in recent years have not been thrown away. The French Navy has dropped further behind the German and United States Navies during the past year. The Navy of our ally, Japan, has now risen to the fifth place, and is superior to the Navy of either Italy or Russia.

H.M.S. "FORWARD."

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Turning to the future, the outlook is not so good. Taking first-class battleships, built and building, we have fifty-one, the same number as Germany and the United States combined; while Germany, France and Russia together have forty-nine. In the following table is given an estimate of the relative strength in first-class battleships when all those now on the stocks are completed:— Future position.

	England.	United States.	Germany.	France.	Japan.	Russia.	Italy.
1907 (end)	49	24	22	15	10	4	6
1908	51	25	24	17	10	6	8
1909	55 (?)	25 (?)	26	20 (?)	12	8	8

The interesting point in the above table is that by the end of 1907 the United States Navy will be stronger than that of Germany in first-class battleships; but, unless the rate of construction is very much improved, and the Michigan and South Carolina completed in three years, she will lose that superiority in 1909, the figures being twenty-five instead of twenty-seven for the United States, as against twenty-six for Germany. To the British total of 51 for 1908 must be added four ships to be laid down this year, which will probably be completed by the end of 1909.

In second-class battleships we are as well off as France, while Germany and the United States possess none. In battleships of the third-class, a large proportion of the vessels which swell the totals of Germany and the United States are small coast-defence ships or monitors, which will shortly disappear from the effective list of the respective navies. Second and third class battleships.

In armoured cruisers we stand well. The increase in speed of the battleship renders it doubtful whether any more vessels of this class will be laid down for the British Navy. The fourth armoured cruiser of the programme of 1905–6 is not to be put in hand. The Japanese, however, have laid down, or are about to lay down, four of 14,000 tons or more; Germany is building three; Italy, four; while Russia has in hand two, and possibly will lay down two more. No armoured cruisers are included in the United States or French programme of new construction for the present year. Armoured cruisers.

A review of the comparative tables shows that the British Navy is in armoured ships, at any rate, being well maintained at a strength sufficient to ensure that indispensable condition of our national existence—the command of the sea. Fast medium-sized cruisers appear to be needed for the protection of commerce.

T. A. Brassey.

TABLE I.—FIRST-CLASS BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1891	Empress of India	
1891	Hood	
1892	Ramillies	
1892	Repulse	14,150
1892	Resolution ...	
1892	Revenge	
1892	Royal Oak ...	
1891	Royal Sovereign	
1895	Renown	12,350
1894	Magnificent ...	
1895	Majestic	
1895	Prince George ...	
1895	Victorious ...	
1896	Cæsar	14,900
1896	Hannibal	
1896	Illustrious ...	
1895	Jupiter	
1896	Mars	
1897	Canopus	
1899	Glory	
1898	Albion	12,950
1898	Goliath	
1898	Ocean	
1899	Vengeance ...	
1898	Formidable ...	
1898	Irresistible ...	
1899	Implacable ...	15,000
1899	London	
1899	Venerable ...	
1899	Bulwark	
1901	Albemarle ...	
1901	Cornwallis ...	
1901	Duncan	14,000
1901	Exmouth	
1901	Russell	
1901	Montagu	
1902	Queen	15,000
1902	Prince of Wales	
1903	Swiftsure	11,880
1903	Triumph	
1903	Edward VII. ...	
1903	Commonwealth	
1903	Dominion ...	
1903	Hindustan ...	
1904	New Zealand ...	16,350
1905	*Africa*	
1904	*Britannia* ...	
1905	*Hibernia*	
	Lord Nelson ...	16,500
	Agamemnon ...	
1906	*Dreadnought* ...	18,000
	51 ships.*	745,910

GERMANY.

Launched.	Name.	Displacement.
		tons.
1891	Brandenburg ...	
1891	Kurfürst Friedrich Wilhelm	9,874
1891	Weissenburg ...	
1892	Wörth	
1896	Kaiser Friedrich III.	
1897	Kaiser Wilhelm II.	
1899	Kaiser Wilhelm der Grosse ...	10,974
1900	Kaiser Barbarossa	
1899	Kaiser Karl der Grosse	
1900	Wittelsbach ...	
1901	Wettin	
1901	Zähringen ...	11,643
1901	Mecklenburg ...	
1901	Schwaben... ...	
1902	Braunschweig...	
1903	Elsass	
1903	Hessen	12,997
1903	Preussen	
1904	*Lothringen* ...	
1904	*Deutschland* ...	
1905	*Hannover* ...	
1905	*Pommern*... ...	13,200
	Q	
	R	
	24 ships.†	282,551

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1893	Indiana	
1893	Massachusetts...	10,288
1893	Oregon	
1896	Iowa	11,340
1898	Kearsarge... ...	11,540
1898	Kentucky... ...	
1898	Alabama	11,565
1898	Illinois	
1898	Wisconsin ...	11,653
1901	Maine	12,300
1901	Missouri	
1901	Ohio	12,440
1904	*Georgia*	
1904	*Nebraska* ...	
1904	New Jersey ...	14,948
1904	Rhode Island ...	
1904	Virginia	
1904	*Connecticut* ...	
1905	*Kansas*	
1904	*Louisiana* ...	16,000
1905	*Minnesota* ...	
	New Hampshire	
1905	*Vermont*	
1905	*Idaho*	13,000
1905	*Mississippi* ...	
	Michigan... ...	19,000
	South Carolina	
	27 ships.	371,847

FRANCE.

Launched.	Name.	Displacement.
		tons.
1891	Brennus	11,190
1894	Carnot	11,954
1893	Charles Martel	11,693
1893	Jauréguiberry...	11,637
1895	Masséna	11,735
1896	Bouvet	12,007
1895	Charlemagne ...	11,108
1896	Gaulois	11,105
1896	St. Louis	11,090
1898	Iéna	11,861
1899	Suffren	12,527
1903	*Patrie*	
1902	*République* ...	
1905	*Liberté*	14,635
1904	*Justice*	
1905	*Vérité*	
1904	*Démocratie* ...	
	17 ships.§	215,717

JAPAN.

Launched.	Name.	Displacement.
		tons.
1896	§Fuji	12,320
1896	Asahi	12,300
1899	Shikishima ...	15,200
1906	Kashima	16,400
1905	Katort	15,950
	Aki	19,000
	Satsuma	
1901	Iwami‡	13,516
1900	Hizen‡	12,700
1898	Sagami‡	12,674
1900	Suo‡	
1894	Tango ‡	10,960
	(Mikasa sunk at Sasebo.)	
	12 ships.	172,694

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1892	Tria Sviatitelia	13,318
1900	Kniaz Potemkine	12,480
1901	Cesarevitch ...	12,912
1903	Slava	13,516
1905	*Imperator Pavel I.*	16,630
	Andrei Pervozvannyi ...	
	Ioann Zlatoust	12,733
	Evstafi	
	8 ships.	110,952

ITALY.

Launched.	Name.	Displacement.
		tons.
1897	E. Filiberto ...	9,645
1897	Saint Bon... ...	
1901	Ra Margherita	13,214
1901	Benedetto Brin	
1904	*Ra Elena*... ...	
1904	*Emanuele III.* .	12,425
	Roma	
1905	*Napoli*	
	8 ships.	95,418

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TABLE II.—SECOND-CLASS BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1888	Nile	11,940
1887	Trafalgar	
1893	Barfleur	10,500
1892	Centurion... ...	
1886	Anson ...	10,600
1885	Benbow	10,600
1885	Camperdown ...	10,600
1885	Howe	10,300
1884	Rodney	10,300
	B.	
1882	Collingwood* ...	9,500
1887	Sans Pareil* ...	10,740
	11 ships.	117,520

FRANCE.

Launched.	Name.	Displacement.
		tons.
1883	Baudin	10,884
1879	Duperré	11,032
1881	Courbet	10,195
1879	Dévastation ...	10,095
1885	Formidable ...	10,878
1886	Hoche	10,581
1890	Magenta	10,680
1887	Marceau	10,558
1887	Neptune†... ...	10,810
1899	Henri IV. ...	8,807
	10 ships.	104,521

JAPAN.

Launched.	Name.	Displacement.
		tons.
1889	Iki	9,672
	1 ship.	9,672

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1892	Georgi Pobiedonosetz	10,280
1891	Navarin	10,206
1886	Catherine II. ...	10,180
1887	Sinope	10,180
1886	Tchesmé	10,930
1896	Rostislav	8,880
1890	Dvenadzat Apostoloff ...	8,433
	7 ships.	69,089

ITALY.

Launched.	Name.	Displacement.
		tons.
1885	Andrea Doria ...	11,027
1884	R. di Lauria ...	10,997
1885	F. Morosini ...	11,145
1888	Re Umberto ...	13,673
1890	Sardegna	13,640
1891	Sicilia	13,087
	6 ships.	73,569

* Armaments not removed. † Boilers defective.

TABLE III.—THIRD-CLASS BATTLESHIPS AND COAST DEFENCE SHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1871	Devastation ...	9,330
1872	Thunderer ...	
1882	Colossus	9,420
1882	Edinburgh ...	
	4 ships.*	37,500

GERMANY.

Launched.	Name.	Displacement.
		tons.
1880	Baden	7,252
1878	Bayern	
1877	Sachsen	
1878	Württemberg ...	
1884	Oldenburg ...	5,140
1889	Ægir	4,084
1890	Odin	
1895	Siegfried	4,049
1894	Beowulf	
1891	Frithjof	
1893	Hagen	
1892	Heimdall	
1892	Hildebrand ...	
	12 ships.	66,610

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1892	Texas	6,315
1883	Amphitrite ...	3,990
1876	Miantonomoh ...	
1883	Monadnock ...	
1883	Terror	
1891	Monterey	4,084
1884	Puritan	6,060
1900	Arkansas	3,235
1900	Nevada	2,714
1901	Florida	3,235
1900	Wyoming ...	3,218
	11 ships.	45,821

FRANCE.

Launched.	Name.	Displacement.
		tons.
1892	Bouvines	6,691
1893	Tréhouart ...	6,671
1892	Jemmapes ...	6,474
1892	Valmy	
1885	Caïman	7,050
1883	Indomptable ...	7,105
1885	Requin	7,078
1881	Terrible	7,206
1883	Furieux	5,925
	9 ships.	60,674

JAPAN.

Launched.	Name.	Displacement.
		tons.
1882	Chin Yen... ...	7,400
1894	Mishima † ...	4,792
1896	Okinoshima † ...	4,126
	3 ships.	16,318

ITALY.

Launched.	Name.	Displacement.
		tons.
1878	Dandolo	12,071
1880	Italia...	15,407
1883	Lepanto	15,549
	2 ships.	43,027

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GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
22	Powerful	14,200
22	Terrible	
20¼	Andromeda ...	
20¼	Diadem	11,000
20¼	Europa	
20¼	Niobe	
20¼	Amphitrite ...	
20¼	Argonaut	
20¼	Ariadne	11,000
20¼	Spartiate	
21	Aboukir	
21	Bacchante ...	
21	Cressy	12,000
21	Euryalus	
21	Hogue	
21	Sutlej	
23	Drake	
23	Good Hope ...	14,100
23	King Alfred ...	
23	Leviathan ...	
23	Monmouth ...	
23	Kent	
23	Bedford	
23	Essex	
23	Berwick	9,800
23	Cornwall	
23	Cumberland ...	
23	Donegal	
23	Lancaster ...	
23	Suffolk	
22¼	Devonshire ...	
22¼	Antrim	
22¼	Argyll	10,850
22¼	Carnarvon ...	
22¼	Hampshire ...	
22¼	Roxburgh ...	
22¼	Duke of Edinburgh	
22¼	Black Prince ...	
22¼	*Achilles*	13,550
22¼	*Cochrane*	
22¼	*Natal*	
22¼	*Warrior*	
22¼	*Minotaur*	
22¼	*Shannon*	14,600
22¼	*Defence*	
	Invincible ...	
	Inflexible	
	Indomitable ...	
	48 ships.	531,800

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
19	Fürst Bismarck	10,570
20¼	Prinz Heinrich	8,759
20¼	Prinz Adalbert	8,858
20¼	Friedrich Karl...	
21	Roon...	9,350
21	Yorck	
22½	*Scharnhorst* ...	11,319
22½	*C*	
	8 ships.†	68,383

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
21·9	Brooklyn	9,215
21	New York ...	8,200
22	West Virginia	
22	*California* ...	
22	Colorado	13,680
22	Maryland... ...	
22	Pennsylvania ...	
22	*South Dakota*...	
22	*St. Louis*	
22	Charleston ..	9,700
22	*Milwaukee* ...	
22	*Washington* ...	
22	*Tennessee*... ...	14,500
22	*Montana*	
22	*North Carolina*	
	15 ships.	186,595

FRANCE.

Speed.	Name.	Displacement.
kts		tons.
21	Jeanne d'Arc ...	11,092
21	Gueydon	
21	Montcalm ..	9,367
21	Dupetit Thouars	
21	Condé	
21	Gloire	
21	Marseillaise ...	9,856
21	Amiral Aube ...	
21	Léon Gambetta	
22	Jules Ferry ...	
22	*Victor Hugo* ...	12,351
22	*Jules Michelet*..	
21	*Ernest Renan*...	13,427
23	*Edgard Quinet*	
23	*Waldeck-Rousseau* ...	13,780
	15 ships.	168,283

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
21½	Asama	9,700
21½	Tokiwa	
21	Adzuma	9,436
20	Yakumo	9,850
21	Idzumo	9,750
21	Iwate	
20	Kasuga	7,700
20	Nisshin	
21	Aso‡...	7,726
	Ikoma	
	Tsukuba	16,000
	Ibuki...	
	Kurama	
	13 ships.	137,312

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
20	Rossia	12,130
20	Gromoboi	12,336
	Rurik	15,240
	Admiral Makaroff	7,726
	4 ships.§	47,432

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Giuseppe Garibaldi	7,294
20	Varese	
20	F. Ferruccio ...	
22½	*San Giorgio* ...	
22½	*Amalfi*	9,842
22½	*Pisa*	
22½	*San Marco* ...	
	7 ships.	61,250

† E (15,000 tons) projected. ‡ Taken from Russians. § 2, Bayan and Pallada, projected.

Table V.—Second-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
21½	Blake	9,000
21½	Blenheim	
19¾	Crescent	7,700
20	Edgar	7,350
20	Endymion ...	7,350
19¾	Gibraltar	7,700
20	Grafton	7,350
20	Hawke	7,350
19¾	Royal Arthur ...	7,700
19¾	St. George ...	7,700
20	Theseus	7,350
19½	Diana	
19½	Dido	
19½	Doris...	
19½	Eclipse	
19½	Isis	5,600
19½	Juno	
19½	Minerva	
19½	Talbot	
19½	Venus	
19	Arrogant ...	
19	Furious	5,750
19	Gladiator	
19	Vindictive ...	
20	Hermes	
20	Highflyer... ...	5,600
20	Hyacinth	
21	Challenger ...	5,880
21	Encounter ...	
	B.	
	Aurora	
	Immortalité ...	5,600
	Narcissus... ...	
	Undaunted ...	
	33 ships.*	209,910

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
21	Kaiserin Augusta	5,956
21	Freya	
21	Hertha	5,569
21	Victoria Luise	
21	Hansa	5,791
21	Vineta	
	6 ships.	34,245

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
22·8	Columbia	7,375
23	Minneapolis ...	
21½	Olympia	5,870
	3 ships.	20,620

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
20	Dupuy de Lôme	6,676
19	D'Entrecasteaux	7,995
23	Guichen	8,151
23	Châteaurenault	7,898
18	Bruix	4,735
18	Chanzy	4,736
18	Charner	4,702
18	Latouche-Tréville	4,681
19	Pothuau	5,374
19	Cecille	5,839
23	Jurien de la Gravière ...	5,595
21	Desaix	
21	Dupleix	7,578
21	Kléber	
	14 ships.	89,116

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
22	Chitose	4,760
22	Kasagi	5,416
23	Soya†	6,500
20	Tsugaru‡... ...	6,630
	4 ships.	23,306

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
18	Pamyat Azova	6,734
20	Aurora	6,731
20	Diana	6,630
23	Askold	5,905
23	Bogatyr	
23	Kagul	6,645
23	Otchakoff... ...	
23	Oleg	6,675
	8 ships.	57,203

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Carlo Alberto ...	6,396
	Vettor Pisani ...	
	Marco Polo	4,511
	3 ships.	17,303

* Armaments of ships under B not yet surrendered. † ex Varyag. ‡ ex Pallada.

TABLE VI.—THIRD-CLASS CRUISERS.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
19½	Astræa	
19½	Bonaventure ...	
19½	Cambrian... ...	
19½	Charybdis ...	
19½	Flora...	4,360
19½	Forte...	
19½	Fox	
19½	Hermione... ...	
19¾	Æolus	
19¾	Brilliant	3,600
19¾	Indefatigable ...	
19¾	Iphigenia	
20	Latona	
20	Sappho	3,400
20	Scylla	
19¾	Sirius	3,600
20	Terpsichore ...	3,400
20	Thetis	3,400
20½	Pelorus	
20	Proserpine ...	
20	Pegasus	
20	Perseus	2,135
20	Prometheus ...	
20	Pyramus	
20	Pandora	
20	Pioneer	2,200
20	Psyche	
23	Amethyst... ...	
22	Diamond	3,000
22	Sapphire	
22	Topaze	

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
20	Gefion	3,712
20	Irene...	4,233
19	Prinzess Wilhelm ...	
21	Gazelle	2,603
21	Niobe	
21	Medusa	
21	Nymphe	
21	Amazone	2,618
21	Ariadne	
21½	Thetis	
21½	Frauenlob ...	
22	Arcona	2,657
22	Undine	
23	Bremen	
23	Hamburg ...	
23	Berlin	
23	Munchen	3,200
23	Lubeck	
23	*Leipzig*	
23	*Danzig*	
23	*Königsberg* ...	
	O	
	Ersatz Wacht...	3,300
–	*Ersatz Blitz* ...	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
18½	Detroit	
18½	Marblehead ...	2,089
18½	Montgomery ...	
20	Albany	3,487
20	New Orleans ...	
20	Baltimore... ...	4,413
18	Chicago	5,273
19	Newark	4,098
19½	San Francisco...	
19	Cincinnati ...	3,213
19	Raleigh	
24	*Birmingham** .	
24	*Chester**	3,750
24	*Salem**	

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
20	Davout	3,031
20	Linois	2,308
20	Galilée	2,318
20	Lavoisier	2,285
20½	D'Estrees... ...	2,421
20½	Infernet	2,435
19½	Alger	4,313
19	Isly	4,406
19	Jean Bart... ...	4,044
19½	Chasseloup-Laubat	3,824
19½	Friant	3,882
19½	Pascal	3,951
19	Descartes	3,970
19	Cassard	3,890
19	D'Assas	3,962
19	Du Chayla ...	3,890
19	Catinat	4,048
19	Protet	4,001
20½	Cosmao	1,923
20½	Forbin	1,935
20½	Lalande	1,968
20½	Surcouf	2,012
20½	Troude	1,994

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
20	Akashi	2,657
20	Suma	
19	Akitsushima ...	3,150
18	Idzumi	2,800
19	Chiyoda	2,450
17	Hashidate ...	
17	Itsukushima ...	4,277
17	Matsushima ...	
18½	Naniwa	3,700
18½	Takachiho ...	
20	Niitaka	3,420
20	Tsushima... ...	
20	Otawa	3,000

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
19	Almaz	3,285
23	Jemtchug ...	3,106

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Vesuvio	3 373
18	Etna	3,470
17½	Fieramosca ...	3,534
19	Stromboli... ...	3,836
21	Piemonte	2,597
19	Calabria	2,428
19½	Dogali	2,055
18	Elba	2,690
17½	Giovanni Bausan	3,277
19	Etruria	
18	Liguria	2,245
18	Umbria	
21	Lombardia ...	2,351
20	Puglia	2,498

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TABLE VI.—THIRD-CLASS CRUISERS (*continued*).

GREAT BRITAIN.		
Speed.	Name.	Displacement.
kts.		tons.
25	Adventure* ...	2,940
25	Attentive* ...	
25	Foresight* ..	2,945
25	Forward* ...	
25	Pathfinder* ...	3,000
25	Patrol*	
25	Sentinel* ...	2,940
25	Skirmisher* ...	
	B†	
20	Andromache ...	3,400
20	Apollo	3,400
19¾	Intrepid	3,600
20	Melampus ...	3,400
20	Naiad	3,400
19¾	Pique	3,600
19¾	Rainbow	
19¾	Retribution ...	
19¾	Spartan	
20	Tribune	3,400
20	Medea	2,800
20	Medusa	2,800
19	Philomel	2,575
20	Pactolus	2,135
20	Pomone	2,135
	54 ships.	171,185

GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
	24 ships.	73,945		14 ships.	48,299		23 ships.			13 ships.	43,785		2 ships.	6,391		14 ships	38,844

* Scouts.

† The armaments of ships under B not yet surrendered.

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Effective Fighting Ships, Built and Building.

Class.	Great Britain. Built.	Building.	Total.	Germany. Built.	Building.	Total.	United States. Built.	Building.	Total.	France. Built.	Building.	Total.	Japan. Built.	Building.	Total.	Russia. Built.	Building.	Total.	Italy. Built.	Building.	Total.
Battleships:—																					
1st Class ...	45	6	51	18	6	24	15	12	27	11	6	17	10	2	12	4	4	8	4	4	8
2nd Class ...	11	—	11	—	—	—	—	—	—	10	—	10	1	—	1	7	—	7	6	—	6
3rd Class ...	4	—	4	13	—	13	11	—	11	9	—	9	3	—	3	—	—	—	3	—	3
Total ...	60	6	66	31	6	37	26	12	38	30	6	36	14	2	16	11	4	15	13	4	17
Cruisers:—																					
1st Class ...	38	10	48	6	2	8	7	8	15	10	5	15	9	4	13	2	2	4	3	4	7
2nd Class ...	33	—	33	6	—	6	3	—	3	14	—	14	4	—	4	8	—	8	3	—	3
3rd Class ...	54	—	54	18	6	24	11	3	14	23	—	23	13	—	13	2	—	2	14	—	14
Total ...	125	10	135	30	8	38	21	11	32	47	5	52	26	4	30	12	2	14	20	4	24

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CHAPTER IV.

THE ATTACK AND DEFENCE OF COMMERCE.

Introduction.

"THE harassment and distress caused to a country by serious interference with its commerce will be conceded by all. It is, doubtless, a most important secondary operation of naval war, and is not likely to be abandoned till war itself shall cease; but, regarded as a primary and fundamental measure, sufficient in itself to crush an enemy, it is probably a delusion, and a most dangerous delusion when presented in the fascinating garb of cheapness to the representatives of a people. Especially is it misleading when the nation against whom it is to be directed possesses, as Great Britain did and does, the two requisites of a strong sea-Power—a widespread healthy commerce and a powerful Navy." Such is the considered judgment of Captain Mahan on the subject which is to be discussed in this chapter. The same great writer has shown that during the war of the French Revolution and Empire the direct loss to this country "by the operation of hostile cruisers did not exceed 2½ per cent. of the commerce of the Empire; and that this loss was partially made good by the prize-ships and merchandise taken by its own naval vessels and privateers." During the same period the French mercantile flag disappeared entirely from the seas, while the volume of British maritime commerce was more than doubled. In a former war, when the British supremacy at sea was more seriously challenged, premiums of fifteen guineas per cent. were paid in 1782 on ships trading to the Far East. From the spring of 1793 to the end of the great struggle with Napoleon no premiums exceeding half that rate were paid. From all this it would seem to follow that of two belligerents in a naval war, that one which establishes and maintains an effective command of the seas will be absolute master of the maritime commerce of the other, while his own maritime commerce, though not entirely immune, will suffer no such decisive losses as will determine or even materially affect the course and issue of war, and may, indeed, emerge from the war much stronger and more prosperous than it was at the beginning.

Such is the ascertained and undisputed teaching of history in the past. But history deals only with the past, and the past to

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How far does recent experience confirm the teaching of the past?

which appeal is made above, differs so widely from the present in respect of the methods, opportunities, implements, and international conventions of naval war, as well as in respect of the conditions, volume, and national importance of maritime commerce that we must needs be very warily on our guard against taking the history of the past as an unconditional guide in the naval warfare of the present and the future. The teaching of the late war in the Far East, which was waged entirely under modern conditions, has not yet been sufficiently studied, its *data* have not yet been sufficiently sifted, to justify any detailed and critical examination. But certain broad principles seem already to emerge from it. It has been said above that an effective command of the sea is the condition precedent of the comparative immunity of the maritime commerce of a belligerent. The Japanese command of the sea was never fully established until after the battle of Tsushima. For that reason it was impossible for Russian maritime commerce to be seriously assailed by Japan anywhere outside the area of immediate conflict—it may be added that the volume of Russian maritime commerce is so insignificant that, even had it been possible for Japan to assail it in the open and at a distance, it would have been scarcely worth her while to do so. But within the area of immediate conflict—the only area that counted for practical purposes—the effective, but not absolute, command of the sea was secured by Japan from the very outset. This is proved by the fact that the transport of the Japanese armies in unprecedented numbers across the sea to Manchuria, their maintenance and continuous reinforcement there with all the supplies that a modern army in the field requires, though not entirely unmolested, was never seriously interrupted. A command of the sea which, though not absolute, is effective enough to secure the transport, supply, and reinforcement of great armies—that is, to maintain the continuous flow of a stream of immense volume—must needs be more than effective enough to furnish a corresponding immunity to the much smaller, though doubtless more widely diffused, stream of private maritime commerce, and even of neutral commerce engaged in the transport of contraband. A certain amount of damage was done, no doubt, from time to time, by Russian cruisers, which possessed, in Vladivostock, a secure and unmolested base. But it was comparatively insignificant, and it had no appreciable effect on the course and issue of the war.

The American War of Secession.

The teaching of the Cuban war between Spain and the United States need not be considered. Maritime commerce, its defence and attack, hardly came into view in connection with it. Spain had too little commerce to be worth the attention of the United States, and

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no warships at all that could be employed against the commerce of the United States. But the case is somewhat different with the American War of Secession. This was waged in the period of transition from the old warfare to the new. Navies already consisted almost exclusively of steamships, but these steamships still possessed considerable sail-power, and many of them employed steam only as an occasional auxiliary, while the mercantile marine of all countries, and more especially of the United States, still consisted very largely of sailing-ships. Now, an armed steamship, even if only furnished with auxiliary steam-power, must needs be master of every unarmed sailing-ship it meets, and, being possessed of sail-power, it is endowed with a mobility, a range of action, and a power of keeping the sea which are far greater than those of any warship, which, being propelled by steam alone, can go no further afield than its coal endurance allows. These considerations go far to explain the relatively very large amount of damage done by the Alabama and other commerce destroying cruisers fitted out by the Southern States during the American War of Secession. The naval forces of the North were very greatly superior to those of the South; so much so, that they were able to maintain a fairly effective blockade of the Confederate ports over a very wide extent of sea-board. But, concentrating their attention almost exclusively on the maintenance of that blockade, they were not able, or were adjudged by the naval authorities to be not able, to afford adequate protection to the sea-going mercantile marine of the North. The consequence was that the Alabama and her consorts had things nearly all their own way for many months, and that the mercantile flag of the North disappeared almost entirely from the seas. This, however, was due quite as much to faults of strategic disposition as to deficiency of naval force. The career of the Alabama very quickly came to an end when effective measures were taken to bring her to book. Had these measures been taken, as they should have been, at the outset, her depredations would have been comparatively insignificant. Her career is a very instructive object-lesson—applicable, however, for the most part, only to her own peculiar and very exceptional period of transition—in the methods of commerce destruction, but, rightly regarded, it is a still more instructive object-lesson in the wrong methods of commerce defence. It proves only what really needs no proof, that a single armed steamship can do immense damage to a mercantile marine consisting almost entirely of sailing-ships wholly unarmed, if no attempt is made to bring her to book. The attempt to forecast what would happen in a naval war in these days to the British mercantile marine from the depredations of the Alabama during the

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War of Secession is a very unintelligent one, and quite a foolish one, if the real facts of the case are either entirely ignored or sedulously misinterpreted.

The depredations of the Alabama have been exaggerated.

For, after all, apart from the very exceptional circumstances and conditions of the time, these depredations, though very serious and almost ruinous in their indirect effects, were not so extensive as has often been represented. The damages wrought by the Alabama and such of her consorts as came within the purview of the Geneva Tribunal were assessed by that Tribunal at some £3,000,000 sterling; and it has often been said that the Government of the United States experienced some difficulty in discovering claimants for the whole of that amount—which was really a very insignificant sum compared with the total cost of the war to the North. In a Memorandum communicated by the Admiralty to the Royal Commission on Supply of Food and Raw Materials in War, it is stated that, "even the Alabama herself only averaged three prizes per month during her career, and the Shenandoah, which met with no opposition in her attack on the American whalers, only averaged 3·8 per month, and the average number of prizes for the whole thirteen Confederate Government commerce destroyers only amounted to 2·7 per month, and some of these appear to have been small fishing craft and insignificant coasters." The Report of the Commission further states, on the authority of information supplied to it—though whether by the Admiralty or not is not stated—that "the Confederate cruisers were eight in number, and that at different times they fitted out captured sailing ships as tenders to the total number of four. The former captured three steamers and 208 sailing ships, and the latter captured nineteen sailing ships. It also appears that of the eight cruisers three were steamers without sail-power, and their career was short, and five were steamers with good sail-power, of which the three best sailers (Alabama, Florida, and Shenandoah) had the longest careers. The Alabama once cruised for five months without coaling, and four times for three months." Thus the steamers without sail-power were ineffective and their careers were short, although the efforts of the North were intermittent, and strategically often ill-conceived. Those which possessed good sail-power were able to keep the sea for a much longer period than any modern vessel, whether warship proper or merchant ship armed for the occasion, could do. It is thus manifest that any inferences drawn from the depredations of the Alabama and her consorts must be drawn in accordance with these authentic and very significant facts and figures.

Nor, again, must too great stress be laid on the fact that the depredations of the Alabama and her consorts practically drove the

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Federal mercantile flag from the seas for the time being. This is entirely in accordance with the teaching and experience of naval history. A single cruiser unmolested and unpursued is practically in command of the whole area of sea left undefended against her depredations. The hostile mercantile flag cannot, therefore, exist within that area. It is not so much the certainty of capture, as the appreciable risk of capture, which drives the ships flying that flag home, and they will not quit their shelter again until the assailant is disposed of, any more than birds scared by a hawk will quit their hiding places until the hawk is out of sight. But this is quite a different thing from the actual captures made by the assailant. Floating commerce disappears and its profits vanish so long as the assailant is unmolested and undisposed of, but in ordinary circumstances it would reappear as soon as that consummation was reached. It did not reappear in anything like the same volume, either during the War of Secession after the Alabama was disposed of, nor afterwards when the war was over. But the Alabama and her consorts counted for very little in this result. We learn from the Admiralty Memorandum already quoted above, that "a Select Committee of the American Congress in 1869 reported that the decline in American tonnage due to the war amounted to a loss of less than 5 per cent. of the whole from captures, together with a further loss of about 32 per cent. of vessels either sold or transferred temporarily to neutral flags; and they concluded that American shipping did not revive after the war, owing to the burdens of taxation which the war had left imposed on all the industries of the country, but which operated with peculiar hardness on the shipping interest, inasmuch as it was thereby subjected to the unrestricted competition of foreign rivals, not only in Home ports, but in all parts of the world." We have seen that the loss to British maritime commerce during the wars of the French Revolution and Empire did not exceed an average of 2½ per cent. annually during the whole of the period of conflict, and that at the end of that period the volume of commerce, in spite of its losses, was at least doubled. The direct loss to the maritime commerce of the Northern States of the Union during the War of Secession was about twice as much under conditions which deprived the Federal Government of that effective command of the sea which is essential to the defence of commerce. In addition, the maritime commerce of the United States suspended during the war did not revive afterwards, but that was due to economic and fiscal causes, with which the Alabama and her consorts had little or nothing to do. Surely in the light of these facts and figures it is time that the Alabama myth should be taken as finally exploded.

The 'Alabama' was for a long time unmolested.

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Modern conditions, and how far they affect the foregoing conclusions.

It would thus appear that there is nothing in the history of the recent past to disallow the teaching of the more distant past, to the effect that the command of the sea is essential for the successful attack upon commerce, and that an adverse command of the sea is a sure safeguard against such an attack. Still it is not to be denied that the conditions of modern naval warfare and of modern maritime commerce differ very materially from those which prevailed in the wars of the past. British maritime commerce, with which we are mainly concerned, is vastly greater now than it was in the wars of the eighteenth century, and it is also immeasurably more important to the welfare and even to the very existence of the country. Then it was mainly a source of wealth, now it is an absolute necessity of bare existence. If we lost it in those days we were the poorer, but we were still able to feed ourselves and to maintain the bulk of our internal industries. War would have been infinitely more burdensome in those conditions, but unless or until the country was successfully invaded, it would not have been destructive to the nation. In these days the total destruction of our maritime commerce would, even without invasion, mean national destitution and collapse. There is no need to labour this point. It is accepted on all hands without dispute. A fleet in effective command of the sea is the only thing in these days that stands or can stand between this nation and its destruction.

British maritime commerce less assailable now than it was in the past.

On the other hand, British maritime commerce, though now so vastly greater in volume and vital importance, is in many respects less assailable than it was in the days of old. Not only has the substitution—now so largely effected—of steam for sails endowed the modern merchant vessel with a much higher average speed, but it has enabled it to take much more direct courses, and, what is much more important, to vary those courses within very wide limits, almost at discretion. In the old days the courses open to a sailing vessel were rigidly circumscribed within 18 points of the compass out of 32—or 20 points at the outside—according to the direction of the wind. Hence, in order to reach her destination, a sailing vessel was often compelled to steer a very indirect course so as, by taking advantage of the prevailing wind, to enable her to get towards her destination by a succession of oblique courses determined by the wind alone, and therefore not calculable beforehand. A steamship can at all times steer towards any prescribed point of the compass. Hence, the maritime commerce of the world is now for the most part confined to certain well-defined "trade routes," so insignificant in width that even when traced on a globe of considerable dimensions, they are little more than lines. Within the areas bounded by these

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lines it is hardly too much to say that a hostile cruiser seeking to prey upon commerce would be hard put to it to find so much commerce to prey upon as would pay her own coal bill. It follows that hostile cruisers engaged in a *guerre de course* must, to make their warfare effective, lie in wait for their prey on or in the immediate neighbourhood of the trade routes. It is there then that the belligerent in command of the sea will send his cruisers to intercept them. He can also in many cases give instructions by telegraph to merchant vessels of his own nationality to take some divergent course for a time, sufficiently removed from the ordinary trade route to throw the assailant off the scent. In these circumstances the havoc wrought by the raiding cruiser, though vexatious and costly for the moment, is not likely to be ruinous in the long run.

British trade routes and their defence.

Now as far as British maritime commerce is concerned the only trade routes which need be considered are those which traverse the Atlantic and the Mediterranean. These all converge finally in the area of sea defined by the Land's End, Cape Clear, and Cape Finisterre, and it is manifest that within that area it is most likely that British naval force will at all times be found supreme. The subsidiary route which leads to British ports round the North of Ireland might also be assailed, and would therefore have to be guarded; but here again the point of attack is much nearer to the centres of British naval power than it is to the naval bases of any other nation. The case is different in the Mediterranean, but not so different as to constitute an exception to the general rule, so long as the British command of that sea is unimpaired. In any case the defence of commerce which follows a clearly defined trade route must needs be a simpler matter that it was when routes were varied indefinitely according to the wind, and when therefore there was not very much more reason for finding the ships to be assailed in one position than in another, except indeed, at the points of concentration; and at these, of course, the defence was much stronger and more highly organised than anywhere else. War, said Napoleon, is an affair of positions. When the positions are known beforehand they can, of course, be much more easily assailed than when they are not. On the other hand they can also be much more easily defended. The best way to defend them is, if possible, to catch the assailant as he leaves his port. If that fails, the next best thing is to keep a sharp look for him at each of the comparatively few positions for which he must make. Even if his speed, vigilance, and ingenuity enable him to evade capture there, two results must inevitably follow. He will do little damage so long as he is constantly being hunted off the trade route, and within a very short time his coal will be exhausted and his powers of offence

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will be paralysed until he can replenish his bunkers. Then the whole proceeding will be repeated *da capo*. The hunter will become the hunted. The last thing that a commerce destroyer wants to do is to fight engagements with his equals. He may prove victorious in the engagement, but, even so, he is not likely to come off scot-free, or in any condition to pursue his enterprises with effect. In his evidence before the Food Supply Commission, Admiral Sir Cyprian Bridge, an expert strategist, a former Director of Naval Intelligence, an experienced Commander-in-Chief afloat, and a profound student of naval history, stated "that it would be a liberal estimate to allow fourteen days without replenishing coal bunkers for a commerce destroyer proceeding at any considerable speed." That represents the extreme tether of such a vessel. If she has a long way to go before reaching her hunting ground, much of her coal will be burnt before she can set to work, since she must go at high speed in order to minimise the risks of observation and capture by the way. More will have to be reserved to enable her to reach a friendly coaling station or some secure and secluded position at sea for the purpose of replenishing her bunkers. How many days will be left to her for the prosecution of her marauding purpose under conditions which imply that she must be prepared at any moment either to fight an action which must bring her career as a commerce destroyer to an end or to run away as fast as she can, well knowing that unless she can give her pursuers the slip she will never be left until she has been hunted down? The Food Supply Commission was officially assured by the Admiralty that if the enemy should merely detach one or two cruisers from his main forces for the purpose of harassing our commerce we could always spare a superior number of vessels to follow them. Such a superior number should make assurance doubly sure; for Admiral Bridge pointed out to the Commission that "even if only one of our cruisers were in pursuit, it could be made too dangerous for a hostile cruiser to remain on or about a trade route." He added, however, that in his opinion protection could be best assured "by keeping the enemy's commerce destroyers continually on the look-out for their own safety." The whole strategy of the situation is here succinctly defined. If the enemy's cruisers are concentrated, being confronted, as, *ex hypothesi*, they must be, by a similar concentration in superior numbers on our part, they cannot be destroying commerce, this being essentially an operation which involves dispersion. If, on the other hand, the enemy disperses his cruisers for the purpose of preying upon commerce there is nothing to prevent our detaching a superior number of cruisers to pursue them; that required superiority of numbers being implied not only

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in the "two Power standard," but also in the fundamental proposition that the safety of this country depends absolutely on an assured command of the sea.

The number of possible assailants of commerce much smaller than in former times.

The next point to be considered is that, whereas the volume of maritime commerce to be attacked has increased enormously, the number of its possible assailants has very materially diminished. The number of the sheep is vastly greater, but the wolves are less numerous, and the watch dogs are more than their match. The tendency of modern naval development has been to increase altogether beyond comparison the power of the individual units of naval force, but to diminish their aggregate numbers. In the year of Trafalgar there were 556 British sea-going warships in commission, of which 106 were ships of the line and the remainder cruisers, large and small, including frigates, other than ships of the line. Thirty-two more, twelve being ships of the line, were "in ordinary"—that is, available for sea service. There were also built or building 130 more, of which twenty-six were ships of the line. The total tonnage of all these ships was 634,278 tons, that of the sea-going and fighting ships actually available for sea service 430,115 tons, or less than the tonnage of thirty-six modern battleships. The tonnage of the ships of the line in commission and in ordinary was 208,817 tons, or less than the tonnage of seventeen modern battleships.* The British Navy is now far stronger than it ever was in time of peace or war, and its annual cost has in recent years reached an unprecedented figure. Its effective fighting units are now all in commission either afloat or in reserve, with the exception of a small number of not very modern ships which are kept in readiness for emergency, though not in commission. In the *Navy List* for January, 1906, the total number of ships mostly in commission, and all either available for the pendant or in an advanced stage of preparation, is given as 177, of which sixty-three are battleships, thirty-five armoured cruisers, twenty-one protected first-class cruisers, thirty-six and fourteen protected cruisers of the second and third classes respectively, and eight scouts. These 177 pendants are of course immeasurably superior in offensive and defensive force to the 700 odd pendants of 1805; but as commerce destroying is essentially an affair of the dispersion of naval force, and does not—or did not in the old days—require any considerable weight of armament in the individual assailant, it stands to reason that out of an aggregate of 700 pendants many more could be spared for dispersion than can possibly be the

* These figures, with the exception of the tonnage for modern battleships, are taken from a paper read at the Institution of Naval Architects on July 19, 1905, by the Chief Constructor of the Navy. Sir Philip Watts explains in a note that the tonnage of 1805 ships is given in "builders' old measurement."

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case out of an aggregate of 177 pendants in all. Torpedo craft are not reckoned in the foregoing enumeration because, as will be shown presently, torpedo craft are very inefficient vessels for the prosecution of a *guerre de course*, except in special circumstances and within a very limited range of action. But for the purposes of full comparison it may be mentioned that the number of British destroyers is given in the *Naval Annual* for 1905 as 143, and of first-class torpedo-boats as 110, thus raising the total number of pendants to 370, as against 700 odd in 1805. As the British Navy is more than equal to those of any two other Powers it follows that the total number of available pendants possessed by any other single Power cannot be more than half of this total.

Privateering.

There is moreover another point of very great importance in this connection. "Privateering is and remains abolished" was a clause in the Declaration of Paris formulated in 1856, but not accepted either then or since by all the maritime Powers. It may be urged perhaps that the Declaration of Paris is a mere paper convention which some Powers have not formally accepted, and that it might not be respected by a belligerent who found it his interest to disregard it. If it rested on the comparatively feeble sanction of International Law alone this argument would not be without weight. But privateering is not merely forbidden by International Law alone; it is largely disallowed and put out of date by the changes that have taken place in the materials and methods of naval warfare. In the old days a privateer could be built and armed in almost any port of the enemy; she could obtain supplies and execute necessary repairs in almost any other port. She required a very moderate armament, her chief defence against the warships of the enemy being her capacity to show a clean pair of heels. In many cases it was not even necessary to build a vessel for the purpose. For longshore warfare against the enemy's ships traversing narrow waters, and often forced by the wind to hug the shore, any handy vessel, a fishing smack or even a row-boat, would sometimes serve; and this kind of warfare against the slow and unhandy craft of those days was often very destructive. Thus, both in the narrow seas and in the open, the privateer was almost ubiquitous and withal exceedingly elusive. It is recorded of one famous French sea-going privateer that the value of her prizes amounted to something like a million sterling before she was captured. All this kind of warfare is now manifestly obsolete; no row-boat, fishing smack, or small craft of any kind, such as might easily overpower a ship becalmed or overhaul a slow sailer near the shore, would have much chance even against a modern "tramp" which is never becalmed, need never approach the coast, and can

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generally steam some 10 knots at a pinch. Their occupation is gone without the aid of International Law at all. The sea-going privateer, on the other hand, must needs be a vessel of very high speed, and therefore of considerable size. In these days of rapid communication her construction could hardly escape observation, and her first exit from port would rarely be unmolested or even unobserved by an enemy who knew his business. Even the Alabama game is probably played out. Her construction was perfectly well known to the Federal Government, and though she left this country without her armament she would certainly have been stopped by the British Government but for a concurrence of untoward circumstances—the chief of which was the sudden illness of the law officer to whom the papers were referred—which are very unlikely to occur in the same combination again. The consequences to this country were such that a weak neutral in any future war is not likely to care to face them. Nor will it be at all a promising speculation to build a fast sea-going privateer even in a belligerent country; her construction is almost certain to be detected, and she is likely to have a very short shrift as soon as she puts to sea. If the country of her origin is one which has adhered to the Declaration of Paris her crew if captured will assuredly be treated as pirates. Thus privateering is practically a thing of the past; the imperfect sanctions of International Law might not have been strong enough to abolish it if circumstances had not already practically put an end to it, as indeed the Declaration of Paris itself admits. "Privateering *is* and remains abolished."

The commerce destroying of the future.

We may thus conclude with some confidence that the commerce destroying of the future will be conducted by the regular and recognised warships of a belligerent, with the possible addition of exceptionally fast merchant steamers armed and commissioned for the time being as regular warships. But these latter, being no match, except in speed, for any sea-going warship proper, must needs take to flight whenever a hostile cruiser is sighted, so that on a trade route properly guarded and patrolled their depredations would have to be conducted under very untoward conditions. It is probable too that the struggle for existence, of which war is one of the extremest forms, would lead rapidly to the elimination from the ranks of commerce destroyers of all warships except large, fast, and powerful armoured cruisers, since the employment of even one of this type of vessel would, sooner or later, place at her mercy every unarmoured vessel of speed inferior to her own. Now, as against any single antagonist, this country possesses an ample supply of armoured cruisers for the protection and patrol of her trade routes, and even as against any two Powers her position is still one of assured

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superiority, especially when it is considered that no antagonist, whether single or combined, who was attempting to dispute the command of the sea with this country, would ever dream of fatally impairing the strategic and tactical efficiency of his fighting fleet by sending off all or any considerable proportion of the comparatively few armoured cruisers he possesses to prey upon British commerce. If he takes the sea at all it must be for the purpose of trying conclusions with the British fleets in the open, in which case he will want all the available units of effective force that he can scrape together for the purpose, or for the purpose of some distant and hazardous combination—how hazardous let the story of the Trafalgar campaign bear witness—in which case all the armoured cruisers he can lay his hands on will not be more than sufficient for the indispensable work of scouting. If, on the other hand, recognising that he is not strong enough to try conclusions in the open, he remains within the shelter of his fortified bases, then every cruiser which manages to make its escape must and will be shadowed, pursued, and harried to the bitter end by a superior force of British cruisers detached from the main fleets for the purpose. The main British fleets will of course be strategically so placed as to have the best chance of bringing the enemy to an action as soon as possible whenever he takes the sea. Their positions will be so chosen as to be just beyond the range of nocturnal torpedo attack, and yet not so far afield but that intelligence of the enemy's movements can be very rapidly transmitted to them. Togo has shown how the thing can be done, and what Togo did no British admiral need fear being unable to do. Close and vigilant as the watch on the enemy's ports may be, however, it is probable that single cruisers may make their escape from time to time, and even get clear away; but if they are bent on commerce destroying their destination must needs be known within such narrow limits of approximation as have been indicated above. There they must be looked for, picked up, shadowed and harried until they are finally brought to action. Before that is done they will very probably have made a few captures or even many if our naval forces are insufficient or ill-disposed. But no one need suppose that any nation can go to war without incurring losses. The thing is to reduce the losses to a *minimum*, and that is done by a sufficiency of naval force, by strategic wisdom in its disposition, by incessant vigilance and tactical skill in its handling. The Admiralty has declared that if one or two cruisers should escape the surveillance of our squadrons we could always spare a superior number to follow them. There is no reason to fear that any future Alabama will be left unpursued for even as much time as her bunkers will allow her to keep the sea.

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The conclusions here reached are closely in accord with the view taken by the Admiralty in its communications with the Food Supply Commission. Some of these communications were confidential and have not been made public, but in a Memorandum printed by the Commission the Admiralty laid down two broad general principles as deduced from the teaching of naval history:—"1. That the command of the sea is essential to the successful attack or defence of commerce, and should therefore be the primary aim. 2. That the attack or defence of commerce is best effected by concentration of force, and that a dispersion of force for either of those objects is the strategy of the weak, and cannot materially influence the ultimate result of the war." With the strategy and dispositions best adapted for securing and maintaining the command of the sea—which must always be not merely the primary but the paramount aim of this country—we are not here concerned. Concentration of force must, according to the Admiralty, be its indefeasible condition. The dispersion of force for the purpose of attacking commerce is also, we are told, the strategy of the weak, and, it is added, that it would be not less the strategy of the weak to disperse force, in the first instance, for the defence of commerce. This might seem to imply that the stronger Naval Power might safely and even, in certain circumstances, with advantage leave its commerce to take care of itself until it is attacked. Paradoxical as this conclusion may seem, there is nevertheless no small element of truth in it. If it be true that an attack upon commerce by a Power which does not command the sea cannot materially influence the ultimate result of the war, that belligerent would be a fool who jeopardised his own command of the sea by dispersing his forces for the defence of commerce to such an extent as to give his adversary an advantage in the main conflict. Conversely, the other belligerent would be still more a fool if, when his only hope, and that a slender one, of securing the command of the sea lay in the combination and concentration of all his available forces, he dispersed any of them in pursuit of a strategic object which could not materially affect the ultimate result of the war. From this point of view there is no little wisdom in leaving commerce to take care of itself until it is attacked—first, because it cannot be attacked by the enemy without weakening his chance of obtaining the command of the sea; and, secondly, because if it is attacked the stronger belligerent will always be able to dispose of its assailants before they have done any irreparable damage. The strategic question here involved is not however to be settled by merely abstract considerations. It depends upon the concrete conditions of the particular conflict in hand. If the naval forces of this country are so superior to those of

The views of the Admiralty and some deductions therefrom.

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the adversary that the latter cannot hope to secure the command of the sea, and will not risk all in contending for it, he will naturally turn to the alternative of attempting to harass British maritime commerce as much as possible. In that case it might be expedient to guard and patrol the trade routes from the outset, but always and only on the condition that the main fleets are not thereby so weakened as to place their command of the sea in any jeopardy. If, on the other hand, the enemy's naval forces are so powerful as to compel this country to use all its forces to overawe or overpower them, then since the defence of commerce is merely a secondary object, and the command of the sea is always the primary, and to this country the paramount, object of naval warfare, it stands to reason that the primary object must not in any way or to any degree be sacrificed to the secondary. The same reasoning applies to the weaker belligerent. So long as he has any chance, or thinks he has any chance, of obtaining the command of the sea he will be exceedingly chary of detaching from his main fleets, which alone can enable him to compass his purpose, any ship either fit to lie in the line or qualified to serve him by scouting for the purpose of preying on commerce; and if she does not answer to one or other of these descriptions she will be a very inefficient commerce destroyer at the best. The ship which is to prey upon commerce with any effect in these days will always have to be appreciably superior in speed, or else at least not inferior in armament, to any of those which are likely to be told off to defend it.

Difficulties of the modern commerce destroyer.

Let us now consider how it will fare with a commerce destroyer thus detached, and consider the conditions of her warfare with those of her predecessors in the days of old. It may be presumed that she will start from the port or station in which the main forces of the enemy, or some considerable portion of them are concentrated for the purposes of the main conflict—for if she is known to be isolated and detached already, the port in which she is stationed is not likely to be left unobserved. The first thing she has to do is to get away undetected, or at least unmolested, and it must be assumed as a matter of course that any port in which a main fleet of the enemy is concentrated will be closely watched by a superior force of the British Fleet. Evasion is not easy in these circumstances, but it will now and again, perhaps not infrequently, be successfully accomplished. Having regard to the port from which she issues, the trade routes which are nearest to it, and the limits of her coal-supply, it will not be difficult to determine her probable destination; and even if she has escaped entirely undetected, her presence in this or that locality will soon be known by the non-arrival at home of merchant vessels she has captured, if not by the arrival in one of her

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own ports of her prizes for adjudication. In these days of telegraphs and universal publicity, proceedings such as these cannot long be kept secret. So far in the hypothetical case under consideration every advantage has been given to the commerce destroyer. She has been allowed to escape undetected, to reach her cruising ground without mishap, and there to be unmolested until such time as the news of her depredations has reached this country. It need hardly be said that these favourable conditions will very rarely prevail in practice, but if we consider the worst case that could happen and see what it comes to, we shall be in a better position for considering any less extreme cases.

Difficulty of furnishing prize crews.

Next, having got our commerce destroyer on to her cruising station, let us consider what she can do there. It is by no means so easy a thing for a commerce destroyer in these days to capture a merchant vessel and send her into port for adjudication as it was in former times. The mere capture will, of course, be effected without difficulty. An unarmed merchant vessel has no choice but to surrender when summoned by an armed warship, and here it may be remarked parenthetically, that to arm a merchant vessel with a view to enabling her to resist must always be a very questionable policy in these days. She cannot by any feasible method of armament be made equal to the feeblest of cruisers likely to be employed in the attack on commerce, and any show of armed resistance will entitle her assailant to send her to the bottom without further parley. But assuming that she surrenders when summoned, what is the assailant then to do? In the old days, any half-dozen seamen commanded by a midshipman or a warrant officer were competent to navigate the prize into port. They had only to disarm the crew and put them under hatches and the thing was done. Nowadays the complement of a man-of-war is very highly specialised, and, as a rule, no man-of-war carries more stokers and engine-room specialists than are required for the efficient working of the engines. As the assailant of commerce must always be ready to put forth her extreme speed in the very probable event of coming across an enemy, she will part with any portion of her engine-room complement with very great reluctance. Every prize she makes in these circumstances materially impairs her own efficiency, and it is safe to say that she will make very few before she is at the end of her tether in this respect. It may be that very large cruisers will be able to provide in some measure against this contingency by shipping an extra complement at the outset. But their resources in this respect are strictly limited, not only by inexorable conditions of space, but also by the consideration that the supply of skilled stokers and other engine-room specialists

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is by no means inexhaustible, and that their employment in this subsidiary operation of warfare must needs *pro tanto* impair the efficiency of the main fighting fleets. If a commerce destroyer must carry the engine-room complement of some three or four ordinary men-of-war for the purpose of capturing about a dozen merchant ships of the enemy, and must run an appreciable risk of having them all taken prisoners or sent to the bottom before she has made a single capture, it may well be questioned whether the game will be found to be worth the candle.

Destruction of prizes and its difficulties.

But, it may be suggested, there is another alternative. Instead of capturing the prizes and sending them into port for adjudication. the assailant may sink them without further ado. International Law sanctions this in certain contingencies, and no doubt it will sometimes be done even in defiance of International Law. But the proceeding is not without its difficulties and disadvantages. It entails the loss of all prize-money in respect of the ships so dealt with, and thereby it eliminates one of the strongest motives which actuated the commerce destruction of the past. But besides this it requires the assailant to offer the hospitality of an already over-crowded ship to the crews of the vessels thus disposed of. There will be no great consideration shown to such prisoners, of course, But in any case they must be fed, and they must be accorded as much cubic space as will suffice, if only barely, to keep them alive until they can be disembarked. The crew of a single tramp will cause very little difficulty. But if the assailant happens to come across an Atlantic liner with 2000 or 3000 persons on board, she is likely to find herself in a very awkward dilemma. If she determines to send her prize into port, she will have to provide an adequate prize crew for the purpose. If she determines to send her to the bottom, she must take on board, feed, and house all those 2000 or 3000 persons, and then her position if she has to fight an action will be no very enviable one. Perhaps the best thing for her to do would be to escort her prize into port. But this is to risk her own destruction as well as the recapture of the prize—which must be faced in any case—and it also withdraws her from her hunting ground.

Difficulties of coal supply.

There is yet another respect in which the modern commerce destroyer is sharply differentiated from her predecessors in the past. They were propelled by sails and could keep the sea as long as their supply of food and other stores lasted, and this period may be put at not less than six months on the average. It is true that the supply of water was limited, and could only be replenished by a visit to the shore. But a fully equipped naval base was not necessary for this purpose, and there were many secluded places on neutral coasts

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where water could be clandestinely obtained by a belligerent ship with very little risk of prevention, or even of detection. The modern commerce destroyer, on the other hand, depends solely on steam, and must replenish her bunkers at least once a fortnight. Neutral ports are closed to her, for none but a very powerful and very benevolent neutral would risk the displeasure and possible retaliation of a belligerent in command of the sea by supplying the ships of the other belligerent with fuel to be immediately used in the further prosecution of their belligerent enterprises. If the commerce destroyer's own ports are far distant she will use up no small percentage of her total coal supply in going to and fro; and broadly it may be stated that if the distance from her base to her cruising ground is much more than a quarter of her radius of action as measured by her coal supply, she will be very slow to engage in the enterprise at all. Let us suppose that it takes her three and a half days to get to her cruising ground, and, of course, the same time to get back. Allowing her fourteen days' total coal-supply, how long will she be able to stay there? Certainly less than seven days, because she must always keep an appreciable amount of coal in reserve to meet the contingency of a sustained pursuit at topmost speed by an adversary neither weaker nor slower than herself. It is hazardous to attempt to evaluate the amount of this reserve in exact figures, but it could hardly be less than two days' supply at normal speed, because at high speed the consumption of coal increases much more nearly in a geometrical than in an arithmetical ratio to the increment of speed attained. No captain of a man-of-war in his senses would ever allow his coal-supply in time of war to run down to a point at which it would only just suffice to take him back to his nearest port at economical speed. Hence, in the case supposed, the number of days for which a commerce destroyer with a supply of coal for fourteen days on board could engage in her enterprise at a distance of three and a half days' steaming from her base would be five at the outside. Her only alternative would be to coal at sea. But this cannot be done in all localities, nor in any but the finest weather. The colliers must meet her at a pre-arranged rendezvous, and they are liable to capture in transit. If she takes them with her they may still be captured by an enemy who puts her to flight; and even if at last she finds a place and a time at which she can coal without great difficulty she is liable at any and every moment to be surprised by an enemy just when she is in the very worst trim either for fighting or for running away.

It remains to consider the part likely to be played by torpedo craft in the work of commerce destruction. In the first place a

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Torpedo craft as commerce destroyers.

torpedo-craft is incapable either of furnishing a prize crew to a captured vessel or of taking on board the crew of a merchant vessel of any but the smallest size. Her radius of action is also extremely limited, because in the daytime she is no match for any sea-going warship except in speed. Hence she will for the most part confine her operations to half the distance she can cover between dusk and dawn, and the limits of her cruising ground being thus defined, it will not be difficult for a belligerent in command of the sea to organize an offensive defence against her attacks which will render her operations, to say the least, extremely hazardous. It is true that there are certain regions of the Mediterranean in which British merchant vessels might, in certain contingencies, be exposed to assault from hostile torpedo-craft. But the limits of these regions are determined by the radius of action of the torpedo-craft as above defined, and until the menace of the torpedo-craft within these limits is abated by the offensive defence above mentioned, it may be necessary to direct British merchant vessels to keep outside them. This question was very fully considered by the Food Supply Commission in view of an opinion advanced in his evidence by Admiral Sir John Hopkins to the effect that "on the assumption of our Channel and Mediterranean Fleets being masters of the situation to a *certain extent* . . . . it is certain that a British ship could not go through the Mediterranean in those circumstances." The phrase "being masters of the situation to a *certain extent*" is not very happily chosen. If it means that the fleets in question are in effective command of the sea, then it also must mean, *ex vi termini*, that the operations of any commerce destroyer, whether cruiser or torpedo-craft, will assuredly be extremely hazardous within the area of command. If, on the other hand, it means anything less than this, then the assumption is totally at variance with the fundamental postulate that in any maritime war this country must command the sea or perish. It may be, indeed, that even when an effective command of the sea is established, it will be impossible, as Sir John Hopkins said, "to safeguard every route so minutely that hostile cruisers could not creep in on some part of it and molest our mercantile marine." So far as this is so it may perhaps serve in some measure to sustain the modified opinion subsequently expressed by Sir John Hopkins to the effect "that a British ship could not go through the Mediterranean under the circumstances cited without running great risks." But on this it may be observed, first, that the risks run by the marauding cruisers are likely to be at least as great as those run by the mercantile marine; and, secondly, that the more effective way of safeguarding the route threatened may very well be to watch the ports of exit of

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the marauders, with a sufficient force properly disposed and adapted for the purpose, rather than to patrol the route itself and wait for the marauders to appear. Be this as it may, it is worthy of note that Admiral Bridge, on being asked if he concurred in the opinion of Sir John Hopkins, replied, "Not at all"; and that the Commission itself summed up the whole controversy as follows: "We may point out that in view of the geographical position of the principal maritime countries, British ships could scarcely be in any serious danger, except in the case of a war with France"—now, happily, a much more remote contingency than it was when the Commission was conducting its enquiries—"where they would be threatened with attack from the French torpedo-boat stations on the North African coast. Moreover, in this case the danger to commerce seems to be considerably less than would appear at first sight, when it is remembered that British vessels need not pass within 100 miles of these stations, and that torpedo-craft are singularly ill-adapted for preying upon commerce. Such craft can neither spare prize-crews nor accommodate anyone above their complement number, so that if employed against commerce, they could only compel vessels to follow them into port on pain of being torpedoed. A French torpedo-boat which had captured a grain-ship in the Mediterranean would very likely have had to steam 200 miles, the speed on the return journey being limited, of course, by the speed of the captured ship." It may be added that in this process of convoying the prize into port the torpedo-craft would run great risk of capture, with very little chance of escape. The only other waters which might seem to afford good hunting-ground for torpedo-craft bent on commerce destroying are the English Channel and its approaches. But these are precisely the regions in which the British command of the sea is likely to be most effective and ubiquitous. Indeed, it may be affirmed, with some confidence, that so long as this country holds the effective command of the sea, hostile warships of any kind will be very chary of entering the Channel at all, and not very eager to approach it. Even in the contingency, now happily so remote, of a war with France it must be remembered that torpedo-craft issuing from French ports in the Channel will be met by a sustained offensive defence on our part. If the experience, frequently repeated, of manœuvres is any guide, it would seem that such an offensive defence, skilfully organised and relentlessly pursued, very soon results in effectually abating the menace of hostile torpedo-craft. At Port Arthur, again, the Russian torpedo-craft did next to nothing, being completely overmatched by the offensive defence of the Japanese.

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Conclusion.

It results, from the foregoing investigation, that, so long as this country retains an effective command of the sea, the maritime commerce of the whole Empire, though not entirely immune to injury and loss, will, on the whole, be exposed to far less risk than British maritime commerce had to incur in the war of the French Revolution and Empire. That risk has been estimated at not more than 2½ per cent. per annum on the total value of the commerce involved This conclusion is established by the following considerations:—

1. All experience shows that commerce-destroying never has been, and never can be, a primary object of naval war.

2. There is nothing in the changes which modern times have witnessed in the methods and appliances of naval warfare to suggest that the experience of former wars is no longer applicable.

3. Such experience as there is of modern war points to the same conclusion and enforces it.

4. The case of the Alabama, rightly understood, does not disallow this conclusion, but on the whole rather confirms it.

5. Though the volume of maritime commerce has vastly increased the number of units of naval force capable of assailing it has decreased in far greater proportion.

6. Privateering is, and remains, abolished, not merely by the fiat of International Law, but by changes in the methods and appliances of navigation and naval warfare which have rendered the privateer entirely obsolete.

7. Maritime commerce is much less assailable than in former times, because the introduction of steam has confined its course to definite trade routes of extremely narrow width, and has almost denuded the sea of commerce outside these limits. The trade routes being defined, they are much more easy to defend, and much more difficult to assail.

8. The modern commerce destroyer is confined to a comparatively narrow radius of action by the inexorable limits of her coal supply. If she destroys her prizes she must forego the prize-money and find accommodation for the crews and passengers of the ships destroyed. If she sends them into port she must deplete her own engine-room complement, and thereby gravely impair her efficiency.

9. Torpedo-craft are of little or no use for the purposes of commerce destruction except in certain well-defined areas where special measures can be taken for checking their depredations.

Of course, all this depends on the one fundamental assumption that the commerce to be defended belongs to a Power which can, and does, command the sea. On no other condition can maritime commerce be defended at all. But on no other condition can the British Empire exist.

James R. Thursfield.

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CHAPTER V.

STEAM ENGINEERING—THE TURBINE.

THE attention of marine engineers is at the present time so largely devoted to the great change in propelling machinery now taking place that no excuse is needed for devoting the whole of the space available in the *Naval Annual* for engineering matters to the steam turbine, especially as there has been little change in other branches of late. The water-tube boiler—the other great revolution in ship propulsion—remains in much the same position as when we last wrote; for war vessels it is practically universal, but in the mercantile marine it has made comparatively small progress. The fitting of small-tube boilers into some of the largest ships in the Royal Navy is a notable feature, but these types of steam generator have already been fully dealt with in former issues of the *Naval Annual*.

Steam turbines for vessels of the Royal Navy and mercantile marine.

It is understood that the Admiralty has decided—and doubtless the fact will be publicly announced before these lines are in print—that practically all vessels in progress for the Royal Navy, and not yet engined, are to be fitted with steam turbines as a means of propulsion. It is a step that constitutes one of the most important incidents in the records of naval construction, and may be coupled with that hardly less striking fact in the history of the mercantile marine—the placing of steam turbines in the two new Cunarders, each of about 70,000 H.P., now under construction on the Tyne and on the Clyde. As the warships that are thus to be propelled by turbine machinery include the new Dreadnought—of 18,000 tons and 23,000 H.P., the largest and most powerful battleship yet laid down—and the three first-class cruisers, Invincible, Inflexible, and Indomitable, and as the new Cunarders far surpass in size and power any vessels that have preceded them, it will be seen that the largest and by far the most important ships ever put in hand, either for war or commerce, are to have propelling engines of a type that a year or two ago was considered to be suitable only for small craft of special design, and a very few years earlier was not thought to be applicable for marine propulsion at all.

The advance of the steam turbine.

The advance of the steam turbine has been truly phenomenal, and we may fairly take pride in it being due to British ingenuity supported by British enterprise. With so little practical experience

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on a large scale, the decision to discard the time-honoured reciprocating engine may have seemed a bold one; and, indeed, it was a bold one, both for the Admiralty and the Cunard Company. Foreign naval authorities are proceeding more cautiously. The German Government are making the venture with two third-class cruisers—the Lübeck with Parsons turbines, and a sister vessel with Curtis turbines. The Americans are undertaking a similar experiment with three scouts. Happily, so far as experience has yet gone, it may be said that the boldness of the British Admiralty and of the Cunard Company has been justified. There are now a number of vessels, some of large size, fitted with Parsons turbines, and, generally, their performance has been successful. It is perhaps worth considering what corresponding degree of boldness would have been necessary had by chance the steam turbine been the original marine motor, and had it been proposed to substitute for its simple and continuous rotary motion the reciprocating movements of the heavy pistons, slide-valves, crossheads, and connections of the older steam-engine—masses of metal which have to be brought to rest and restarted twice in every revolution, thus involving serious alternations of stresses on crank-pin brasses and main bearings.

In former issues of the *Naval Annual* particulars of early applications of the steam turbine for marine purposes have been given, the Parsons and Rateau forms having been described and illustrated. It is now desirable that the further experience which has been gained should be put on record.

Steam turbines in German and American warships.

We have already made reference to the German and American ventures in this field, and may add a few details. The Lübeck is, as stated, a third-class cruiser of 3200 tons displacement, and her turbines were designed to develop 10,000 H.P., the speed at this power being estimated at 22 knots. Owing to the insistence on a middle line bulkhead, the arrangement of machinery appears to be somewhat unusual. The details are not generally known, but it has been stated, on what appears to be good authority, that there are four shafts, each with a single screw. The two wing screws are each driven by a high-pressure turbine. The two inside shafts are each driven by two elements of a compound turbine. The two centre screws are used for cruising purposes, being actuated by the forward turbine on each of their shafts, these turbines forming respectively a high and low-pressure element of a complete compound turbine. The condensers for the port and starboard engine rooms are situated in the wings abreast of the low-pressure elements. The provision made for going astern appears to be somewhat complex, there being, we understand, both separate reverse turbines and reversing blades

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placed inside the exhaust end of the low-pressure elements. From the way the machinery is packed in, one would anticipate that the engine-rooms would be hot and crowded. The Lübeck made some trials, but the details have not transpired. As there are in the German Navy further ships of the same class fitted with reciprocating engines, a comparison will be possible, for those who get the information, not only between the two types of turbine, but also between the turbines and the ordinary means of propulsion.

The three American scouts that are to be used for gaining information on the subject are the Chester, Birmingham, and Salem, now building. They are of 3750 tons displacement, 16,000 H.P., and are designed for a speed of 24 knots. At present little is known outside official circles about the machinery of these vessels; but doubtless we shall have full particulars later on, for the Americans are extremely liberal in publishing information on technical matters connected with the engineering of their Navy.

The Amethyst and Topaze trials.

In the *Naval Annual* for 1902 reference was made to the Admiralty having determined to place turbine machinery in a third-class cruiser, and, as we stated at the time, the trials of this vessel were anticipated with interest. These trials have been carried out, and some particulars have been made known through the columns of the Press. The chief object the Admiralty had in view, when deciding to put Parsons steam turbines in the third-class cruiser Amethyst, was to make a comparison of a general nature with the ordinary engines fitted in sister ships of what is known as the Topaze class, the Topaze herself being selected for purposes of comparison. The ships of this class are of 3000 tons displacement, and were designed for a speed of $21\frac{3}{4}$ knots with 9000 I.H.P. The class has been quite successful when judged by the popular standard of excess of actual speed over the legend speed; though this is not a very sound method of judgment, for it is naturally easy for designers to obtain satisfactory results by allowing wide margins of safety.

The trials of the four vessels of this class were mentioned in the last issue of the *Naval Annual*, when speed, power, and coal consumption were given. Since then fuller particulars have been made public, so that more definite conclusions can be drawn as to the performance of the steam turbine. It need hardly be said that no very exact comparison of the respective efficiencies of different engines in different ships can be formed by coal consumption at various speeds, even when the ships are supposed to be identical. As is well known, no two ships are absolutely the same; and, in spite of improved methods of construction of the present day, really surprising differences are found in the performance of vessels, even when unusual pains have

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been taken to adhere to a common model. The steamship as a whole is so complicated a machine that it is very difficult to apportion figures of merit to each component part. First there is the hull to take into account, and the skill displayed in its design can only be estimated by means of tank experiments; unless we can go through the costly and difficult process of towing the actual ship, as the late Dr. Froude did with the Greyhound. A frequent cause of difference is the state of the ship's bottom; though all crucial experiments should be made with vessels newly docked. In the present case, as all the ships were from the same drawings, model experiments would not be of any assistance for comparative purposes, and it could only be hoped that there were no great differences in form.

The next element to take into consideration would be the propellers; but if vessels under trial are of similar form in regard to the after body, the propellers may be alike and the engines may be run at the same number of revolutions. The steam turbine, however, in order to be efficient must turn more quickly than the reciprocating engine, and this necessarily affects the design of the screw. The mechanical efficiency of the engine and shafting has next to be considered; then the thermal efficiency of the engine; and, lastly, the efficiency of the boilers.

It is evident therefore that to test the respective efficiencies of two very different types of engine by fuel consumed at certain speeds affords only a rough guide. It is, nevertheless, a very practical one, especially from the ship owner's point of view, if data are collected from a wide series of trials with different ships, and the other elements of the whole design remain as nearly constant as possible—a very difficult end to reach.

Influence of high speed of turning on screw design.

The necessarily high speed of turning of the turbine makes it essential that the propellers should be of comparatively small diameter, otherwise the peripheral speed of the blades would be too great. In the early days of the screw propeller it was feared that engines could not be run fast enough to render a directly coupled propeller effective, and for this reason spur gearing was introduced in steamers to increase the speed of revolution that was made by the engine to that needed to render the screw efficient. Since those days we have made advances in the construction of marine engines, and have learnt the value of high piston speeds and quick turning, so that it has been sometimes suggested that the practice above mentioned should be reversed, and that the engines should be geared down instead of up. Toothed gearing is, however, a feature to be avoided if possible, more especially on board ship. Designers of marine steam turbine machinery have therefore preferred to put up with possible loss in

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the propeller rather than introduce geared wheels, in spite of the simplification of the designing of propellers that would result. In considering this branch of the subject we must remember that the reciprocating engine propeller has the advantage of years of experience and of trials innumerable, whilst the best form of screw to use with the turbine is a matter upon which much has to be learnt. In either case—whether it be that of the reciprocating engine or the turbine—the problem that has to be solved is of so complex nature that dependence has to be placed largely on experimental results. As experience accumulates the turbine and its quickly turning propeller may be expected to advance as a means of marine propulsion.

The screw propeller at one end of the shaft, and the steam turbine at the other, although analogous in some respects, operate in media of opposite characters. The turbine is driven by an elastic fluid, whilst the screw does work on one that is practically non-elastic. The designer has therefore two sets of conditions to consider. In any case when making comparison of efficiency between turbine and reciprocating marine engines, the screw and the engine should be taken together. If the quick-turning turbine necessitates a less efficient screw being used, that is a defect of the engine that should be set against advantage gained in other directions. This branch of the subject has been dealt with in detail by Mr. E. M. Speakman in a paper, full of valuable data, read at a meeting of the Institution of Engineers and Shipbuilders of Scotland on the 24th of October last; and reprinted in *Engineering* of December 8th, 1905, and also in the *Engineer* at about the same time.

The boilers of the Topaze class.

By means of certain particulars of the trials of the Amethyst and her sister ships, for which we are indebted to a paper read by Messrs. Parsons and Stoney before the Institution of Civil Engineers and also to *Engineering*, we are able to carry the inquiry into turbine performance a step further—even if a somewhat uncertain one—than is possible through a bare record of fuel and speed; conclusions drawn from these data alone being rendered less trustworthy from the fact that the vessels were fitted with boilers of different types.

The turbines of the Amethyst were supplied with steam by Yarrow boilers, the total heating surface being 25,968 ft.; the Topaze had the Normand type of boiler with a total heating surface of 26,000 ft.; and the Sapphire had Reed boilers with a total heating surface of 26,010 ft. The heating surface of the boilers in the three ships was therefore practically equal; although we must not forget that one design might be considered superior to the others. The amount of fuel burnt was, however, variable. In the Yarrow boilers

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Rate of fuel consumption.

of the Amethyst it was on the full-power trial at the rate of 0·93 lb. of coal per foot of heating surface per hour; in the Normand boilers of the Topaze it was 1 lb.; and in the Reed boilers of the Sapphire 0·98 lb. There was, therefore, a reduction of 7 per cent. in the coal consumption of the Amethyst as compared to the Topaze, and, as might be gathered, the rate of evaporation per unit of heating surface was affected in the same direction, for whilst in the Amethyst the steam generated per foot of heating surface per hour was 7·35 lb., in the Topaze it was 8·02 lb. The difference in air pressure in the stokehold recorded on the trials would account for this, it having been found necessary to blow harder with the boilers of the Topaze than with the Yarrow boilers.

Steam pressures.

The differences between steam pressures recorded, although not excessive, would affect a close comparison were the engines under trial of the same type. In the present case we must presume that the pressures suitable for the conditions were selected. In regard to the speed of revolutions, as already stated, the steam turbine was faster than the reciprocating engine, and the designing of propellers for the former is a more difficult task than for the latter, so that when comparing the two descriptions of motor the turbine must bear its disability in this respect. In the case of the Amethyst, however, the revolutions were not very greatly in excess of those in destroyers with reciprocating engines, but in torpedo craft the ratio of power to displacement is much higher than in the cruiser. It will be convenient to give particulars of the propellers here. The Amethyst has three screws, each on its own shaft. The wing screws are 6 ft. 8 in. diameter and 5 ft. 9 in. pitch, the area of each being 19·48 square feet. The centre propeller is also 6 ft. 8 in., the pitch being 6·56 ft., more nearly according to general practice. The area is 19·64 square feet. At 10-knots speed the slip was 11·3 per cent.; at 14 and 18 knots it was 13·6 per cent.; at 20 knots, 14·4 per cent.; and at 23½ knots, 17·1 per cent.

Water consumption.

By a comparison of the figures recorded in the trials, but which are too voluminous to reproduce, the fuel burnt and the water consumption of the engines in both the Amethyst and Topaze may be seen. The results have also been set out on diagrams published in *Engineering*. Two of these diagrams we now reproduce from the pages of that journal in Figs. 1 and 2, and they enable the performance of the two ships to be seen at a glance. Some details respecting the sister vessels Sapphire and Diamond, with reciprocating engines, are also plotted, but it is not necessary to deal with these, as the particulars are not so complete as those for the other vessels.

An analysis of the figures indicates that at the lower speeds the

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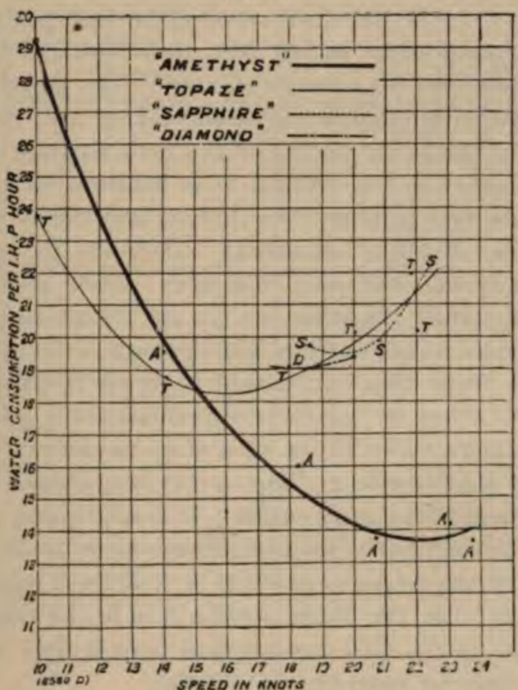
steam turbine is not so economical as the reciprocating steam engine. Starting at 10 knots, or about 57 per cent. less than the full speed, the Amethyst's engines consumed 29·3 lb. of total water (steam) per I.H.P. (estimated) per hour, whilst the reciprocating engines of the Topaze needed but 23·74 lb., as indicated by the curves in Fig. 1. On speed increasing the turbine ship improved in performance until about 14 knots was reached, when the total consumptions were—Amethyst 19·6 lb. and Topaze 18·77 lb. The latter ship's engines were indicated at 2251 H.P., and the Amethyst's turbines were estimated to give about the same power. After this point it

Fig. 1.



Water consumption per hour per I.H.P. at various speeds.

will be seen that the Amethyst's curve continues to improve steadily, whilst that of the Topaze approaches a decline in value, until at 15 knots the curves cross, the total water consumption per I.H.P. being equal for both sets of machinery. After that the economy of the Topaze's engines remains practically stationary for a time and then falls off, whilst the Amethyst's continues to improve steadily. At 18 knots, with a horse-power of about 4770 indicated, the recorded figures are—16 lb. of water per I.H.P. per hour for the

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Amethyst, as shown by the spot on the diagram, and 18·95 lb. for the Topaze; and at over 20 knots, Amethyst 13·8 lb. and Topaze 20·07 lb. On the full-power trials of the Amethyst her highest speed was 23·63 knots, and the estimated I.H.P. was 14,000, the water being 13·6 lb. per I.H.P. per hour. The engines of the Topaze did not indicate more than 9868 H.P., and the highest speed reached was 22·1 knots, at which the consumption of water for her engines was 20·18 lb. per I.H.P. per hour, as shown by the lower spot on the diagram; at a somewhat lower speed on another trial the performance was not so good, as shown by the upper spot.

Water consumption of auxiliaries.

The water consumptions refer to total water supplied to the boilers. By means of suitable tanks fitted on the upper deck it was possible to arrive at the exact quantity of feed pumped into the boilers, the arrangements having been those usually followed. The steam generated was not however all used by the propelling engines, the many auxiliaries fitted in war vessels taking their share. In the Topaze the air pumps are worked off the main engines, but after this vessel was designed it was decided to fit separate air pumps. The auxiliary machinery includes two electric light engines, two evaporators, and two distilling condensers. There are the usual pumps, air compressors, and other usual machinery. How much of this was taking steam during the trials we are not aware, but as the tests were competitive we may assume that the naval authorities took care to treat both ships alike. It should be noted in passing that the exhaust steam from the Amethyst's auxiliaries was passed directly to the condensers, whilst in the other ships the remaining energy in it—which is considerable in some cases—was utilised by the low-pressure element of the main engine. It is anticipated that when in future ships the auxiliaries' exhaust steam is taken to the low-pressure turbine, a great improvement in steam economy will result, especially at low powers when the steam consumption of the auxiliaries bears a higher ratio to the total consumption than it does when greater power is required for faster speeds of vessel.

The calculated figures referring to steam used by the auxiliaries of the Topaze are given. When the vessel was running 10 knots they used 4538 lb. of water per hour, or over 21 per cent. of the total; at 14 knots the amount was 5672 lb., or over 13 per cent. of the total. At 18 knots the steam consumption on the main engines only of the Topaze was 15·45 lb. per I.H.P. per hour, at 14 knots it was 16·25 lb., and at 20 knots 16·91 lb.

Coal consumption.

The total coal consumption curves at various speeds, shown by the diagram, Fig. 2, follow the water curves fairly closely. Reducing the figures to coal burnt per unit of power, we find that at

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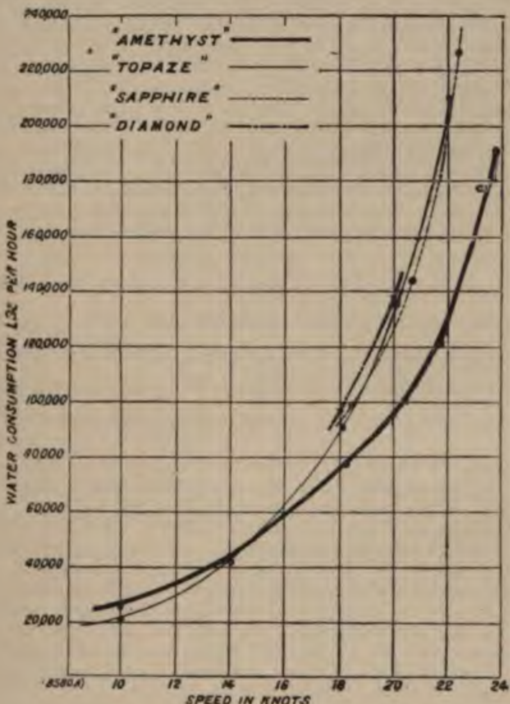
10 knots the Amethyst's turbines required 3·22 lb. per I.H.P. per hour, and the engines of the Topaze but 2·56 lb. At about 15 knots the curves on Fig. 2 cross. We have not the calculated figures showing coal per hour per I.H.P. at this speed, but at 14 knots the Amethyst burnt 2·1 lb. and the Topaze 2·06 lb. At the highest speeds the Amethyst burns but 1·74 lb. of coal per I.H.P. per hour and the Topaze 2·65 lb.

It will therefore be seen that, so far as these figures go, the ship with reciprocating engines at a speed of 10 knots had an advantage

Fig. 2.



Coal consumption per hour at various speeds.

over the turbine ship of about 19 per cent. in total water consumption per I.H.P., but this figure may be much reduced in future vessels with auxiliaries having their exhaust steam utilised in the main engines. At full-power trials the result is reversed, and the turbines in the Amethyst consumed 32 per cent. less water per I.H.P. than was needed for the engines of the Topaze; whilst at speeds of about 15 knots the economy is approximately the same for both types.

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Strategical considerations. Lord Glasgow's opinion.

For the class of vessels under consideration—third-class cruisers—economy of fuel is an important feature; and it would be for the naval strategist or tactician to say, when the engineer has given him the technical data, on which side the advantage lies. A retired naval officer, who has seen service in many waters—some of a very stirring nature—has set forth the problem in concise terms. In his presidential address to the Institution of Naval Architects at the last spring meeting, Lord Glasgow said when speaking of the trials of these vessels:—

At higher speeds the turbine machinery appears decidedly more economical in fuel, whilst at lower speeds the reciprocating engines have the advantage. At 10 knots a ton of coal would, according to the published figures, carry the Amethyst 7·42 miles, whilst the Topaze, a sister ship with reciprocating engines, would on the same consumption steam 9·75 miles—the difference in favour of the reciprocating engine being 2¼ miles. That is a very substantial advantage. At 14 knots the superiority of the older type of engine is less marked; it has fallen, in fact, to one-fifth of a mile, the miles steamed per ton of coal being respectively 6·6 and 6 8. An increase of another 4 knots in speed quite reverses the position, for at 18 knots the Amethyst steamed 4·8 miles for a ton of coal burnt, and the Topaze 3·7 miles—a difference of $1\frac{1}{10}$ miles in favour of the turbine. At 20 knots the Amethyst ran 4·22 miles and the Topaze 2·9 miles per ton of coal burnt. At 23·6 knots—a speed the Topaze did not reach—the Amethyst would steam over 2 miles per ton of coal, whilst at 22 knots the Topaze would cover 1·89 miles per ton.

Lord Glasgow proceeded to point out that it was for the naval authorities to draw conclusions whether the gain in maximum speed, and a lower coal consumption, at high speeds (*i.e.*, anything above 15 knots) was more than equivalent to greater radius of action at lower speeds. This point he proceeded to elaborate as follows:—

The coal capacity of these ships is 750 tons, and if we imagine the exigencies of war to require a voyage of 7300 miles without coaling, the Topaze would be able to carry out the duty, whilst the Amethyst could not, her radius of action being but 5570 miles. The question arises, however, whether in time of war these small cruisers would be able to jog along leisurely round the globe at a speed of 10 knots. If for strategical reasons 18 knots were needed, and a voyage of 3600 miles were contemplated, the Amethyst could accomplish it on her coal supply, but the Topaze could not. Or, to put the matter another way, if the voyage were 2770 miles, the limit of steaming for the Topaze at 18 knots, the Amethyst would arrive at the rendezvous with enough coal to fight an action, and to afterwards steam between 700 and 800 miles at 18 knots, or about 1000 miles at 14 knots, and proportionately further at 10 knots.

Low power for cruising.

The difference in economy between the higher and lower power trials of the Amethyst would have been more marked than it was had it not been that the vessel was fitted with separate steam turbines for cruising purposes. For reasons which lack of space prevents us discussing, the steam turbine is at its maximum practical efficiency when run at high speeds of revolution, the economy falling off rapidly at low powers. In former vessels an attempt had been made to remedy this defect by fitting ordinary reciprocating engines for cruising purposes, when comparatively little power was needed. Various methods of combining the ordinary engines and steam

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turbines have been suggested, and some carried out. Mr. Parsons, in a paper read before the Institution of Shipbuilders and Engineers of Scotland, described a plan by which both kinds of propelling engines were fitted to one shaft in common. At cruising speeds the reciprocating engines, which were to be of the triple-expansion type, would receive steam direct from the boilers, and the exhaust steam—which would be at higher pressure than usual with condensing engines, say, at that of the atmosphere—would then pass to the turbines. At high speeds the reciprocating engines would not receive steam, the turbines alone propelling the vessel. It has been objected to this plan that when the whole power of the machinery is chiefly needed, a considerable part is not in use, and that there is a possible cause of accident in the reciprocating engines breaking down if run at a speed very much higher than that for which they were designed. Professor Rateau, therefore, adopted an arrangement in which reciprocating engines actuated one propeller entirely, the exhaust steam being taken either to the turbines or direct to the condenser, as might be desired. In the first-class torpedo-boat built by Yarrow & Co., and fitted with the Rateau turbine and a reciprocating engine, the latter ran separately, working a central shaft, whilst the high-pressure element of the turbine actuated the shaft on the port side, and the low-pressure element the starboard shaft, there being, therefore, three lines of shafting.

Turbines and reciprocating engines combined.

There are, however, objections to this multiplication of machinery, and in the Amethyst, which represents the result of Mr. Parsons' more recent experience, propulsion at all speeds is effected by turbines alone. The arrangement is as follows: There are three lines of shafting, each with one three-bladed propeller. For full-power runs there is one element of a compound turbine on each shaft; but for cruising speeds two elements of a smaller compound turbine are brought into play, and are used in conjunction with the main turbine. On the forward end of one wing shaft there is the high-pressure element (what is here meant by an element corresponds to one cylinder of an ordinary compound engine) of the cruising turbine, as well as the low-pressure element of the main turbine. On the other wing shaft there is, at the forward end, the second or intermediate element of the cruising turbine, as well as a second element of the full-power turbines. For cruising, steam is taken first to the high-pressure cruising element on one wing shaft, then to the intermediate element on the other wing shaft, and finally to the element which acts both as a low-pressure element for cruising and a high-pressure element for full-power runs.

The cruising turbines in the Amethyst.

In this way it will be seen that a wide range of variation in the

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Distribution of steam in Amethyst's turbines.

expansion of steam can be secured. For instance, on the 10-knot trial, the steam pressure in the first (cruising) element was 94 lb. to the square inch, in the intermediate (cruising) element 19 lb., and in the low-pressure cruising element (*i.e.*, the high-pressure full-power element) 2·7 lb. In the low-pressure elements of the main turbines, through which the exhaust passed to the condenser, the vacuum in one was 21·7 in. and in the other 19·9 in. On the 18-knot trial, the cruising high-pressure element was cut out, steam being first admitted into the second element of the cruising pair, the pressure being 137·5 lb. per square inch. In the main high-pressure element the pressure was 53·7 lb. per square inch, and in the low-pressure elements the vacuum was 1·3 in. At the full speed of above 23 knots, both elements of the cruising turbine were cut out, steam being taken direct to the high-pressure element of the main engines at 174·3 lb., and from thence to the two low-pressure turbines in parallel at a pressure of 27·3 lb., where it was expanded down to a vacuum of about 27 in.

It will be seen, therefore, that the excellent economy obtained over a wide range of speed was secured by somewhat special arrangements, and it would not be reasonable to expect like results to follow if the steam had been admitted at all powers to an ordinary turbine without changing the grouping. At the same time, the combination adopted is perfectly legitimate, and it only remains to consider the cost and to set it against the gain, though to do this thoroughly would need more information than has at present been acquired. The additional steam connections and valves needed with this arrangement is the one drawback to the system, involving, as they do, extra cost and weight and occupying space. Moreover, to have one complete engine idle when full power is required is, as Prof. Rateau has pointed out in connection with the reciprocating engine, a serious matter. We have, however, some particulars—originally published in *Engineering*—of the engine weights of the Amethyst and the Topaze.

Weight of the Amethyst's and Topaze's engines.

The total for the reciprocating-engined ships of the class ranges from 530 to 540 tons, the Topaze machinery weighs 537 tons. In the Amethyst the corresponding weight is 535 tons. The Amethyst, however, attained a higher speed than the Topaze, and assuming that the power and speed curve was common to both ships, the H.P. developed per ton would be greatly in favour of the turbine; thus on the trial of November 10—when the weather was more favourable than on the other full-speed trial—the Amethyst reached 23·63 knots, whilst the best the Topaze did was 21·82 knots. On the assumption stated—*i.e.*, that the power and speed curve was common to both ships—the turbines developed about 14,000 H.P. at the highest speed

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of steaming, whilst the reciprocating engines of the Topaze gave as a maximum 9868 I.H.P. when the speed was 22·103 knots. The Amethyst's turbine engines therefore developed 26 I.H.P. per ton, and the reciprocating engines of the Topaze only 18·3 I.H.P. per ton.

The Amethyst trials supply the most satisfactory record yet made public of the performance of a marine turbine in a vessel of fairly large size, because the details are comparable to those obtained with a sister ship fitted with ordinary engines. It is to be regretted that the boilers were not alike; but the measurement of water consumed (in the shape of steam) by the engines removes this defect in the comparison, so far as engine performance is concerned; supposing, of course, the steam supplied was of the same quality in both cases, that is to say, was equally dry; a point that may perhaps be allowed in absence of evidence to the contrary.

Indicators for steam turbines.

The most unsatisfactory feature about tests of marine steam turbines in vessels is the manifest impossibility of taking indicator diagrams. With land turbines, which are chiefly used for generating electric current, this is of little consequence, as the power developed by the prime mover can be determined within a close approximation of accuracy by measurement of the current generated by the dynamo; such a mode of determination being even more satisfactory than that by the steam engine indicator when used on high speed engines. Records thus obtained are extremely useful for checking results or forming estimates of the performance of turbines on board ship; and probably Mr. Parsons is able to arrive at a fairly just conclusion of what power his turbines are giving out under some conditions. Such estimates are, however, at best only partially satisfactory; at anything short of the best they are apt to be extremely misleading.

The Denny and Johnson torsion indicator.

Several suggestions have been made for "indicating" turbines, some quite impracticable. The most promising invention is that introduced by Mr. Archibald Denny and Mr. C. H. Johnson, of Dumbarton. The instrument is illustrated in Fig. 3, for the use of which we are indebted to the editor of *Engineering*. The general principle upon which the instrument works is simple to a degree, but a very close approach to accuracy is needed in the construction of the mechanism to secure useful records. It will be understood that every length of shafting must be twisted, more or less, when subjected to torsional stress, and, naturally, the greater the power transmitted the more will any given shaft be twisted. Though the amount of flexure may be so small as not to be apparent to ordinary observation, it is, in a length of marine shafting, sufficient to be recorded by the ingenious mechanism of the Denny and Johnson metre. The

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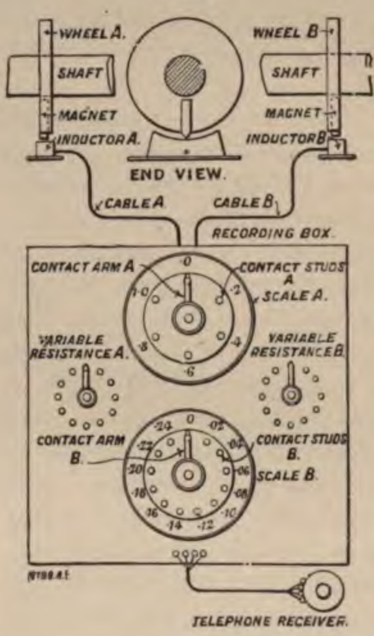
instrument is made by Messrs. Kelvin and James White, of Glasgow.

The diagrammatic illustration, Fig. 3, shows the general arrangement. There are fitted two wheels, A and B, at a suitable distance apart. These are shown in the upper part of the diagram. It should be explained that, in order to bring the drawing within reasonable space, the shaft is represented as broken off, the middle part being removed, and an end view, with the shaft in section, is shown between the two parts. On each wheel there is fixed a permanent magnet, shown in the end view, and indicated by dotted lines in the side views. Under each wheel there is placed an inductor, the upper part of which forms the arc of a circle concentric with the wheels, as shown. The inductors are composed of soft iron quadrants, and are placed on gun metal stands. On each of the two quadrants are a certain number of windings of insulated wire, and it will be seen that when either of the magnets passes over a winding an electrical current will be set up, supposing the circuit to be completed in the manner presently to be explained.

FIG. 3.



All that is needed to measure any torsion of the shaft is to find the time at which one magnet passes a given point—*i.e.*, one of the inductor windings—during a revolution, and to compare this with the time the second magnet passes one of its inductor windings; it being understood that when the shaft is at rest, or transmitting no power, both magnets point radially from the axis of the shaft in the same longitudinal plane. Naturally, the greater the distance apart the magnets and their coils are placed the more pronounced will be the record; and it is desirable that the position of one magnet should be as near the engine as possible. The means by which the record is taken are as follows: The end of each one of the windings of the inductors, in which the current is generated, has a wire leading from it, and each wire ends in a stud on one or other of the two dials shown in the lower part of Fig. 3. As a matter of convenience the wires from each indicator respectively are laid together in a cable.

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Each dial has a contact arm which can be made to revolve so as to touch any one of the studs in its series. The contact arm of each dial is electrically connected to the inductor by a single wire, so as to complete the electrical circuit. It will be seen, therefore, that the circuit can be completed of any one winding at will. If, for instance, the contact arm of dial A be set at stud No. 2, the circuit of winding No. 2 will be completed; and, at the instant the magnet on wheel A passes that winding, current will flow. The same applies to the wheel B and its circuits. There are six windings on the A inductor, and on the B inductor there are fourteen. The reason for the difference in numbers will be explained presently.

Method of operating the torsion metre.

To take a reading the wheels are so set on the shaft that the magnets, when the engines are at rest, are each over the windings at the end of the two quadrants respectively, the contact arm being then at zero on the scale. If the engine were started and no power were being transmitted there would, of course, be no torsion of the shaft, and the magnets would each pass the zero windings at the same instant. If, however, there were a retarding force at one end of the shaft, such as would be exerted by a screw propeller, the shaft would be twisted, and the magnet at the propeller end would lag behind the one near the engine. The amount of lag would be a measure of the twisting moment, and thus a measure of the power exerted by the engine.

To obtain actual measurements of the extent of twisting the electrical device referred to is used. The six windings on the inductor A are all one-fifth of an inch apart, whilst the fourteen windings on the inductor B are all one-fiftieth of an inch apart. When both magnets pass the winding in circuit at the same time two electrical currents are set up, and these, being caused to flow in opposite directions, neutralise each other, so that no sound is heard in a telephone receiver placed in the circuit. That would indicate that power was not being transmitted. As the engine gained speed the shaft would twist and the magnet at the propeller end would lag behind the other, so that the two zero windings would not generate current at the same instant, they would therefore not neutralise each other, and a ticking sound would be set up in the telephone. The operator would shift the contact arm B to the next stud, and, if the noise in the telephone were to continue, from stud to stud, until, by the cessation of the ticking, it was shown that the magnets were each one passing its winding at the same instant. It will be evident that for each division the contact arm is shifted the shaft is twisted one-fiftieth of an inch at its periphery (that being the distance the B windings are apart); an allowance having to be made for the

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amount the magnet projects. The force needed to twist the shaft through a given arc being known, the power exerted by the engine at any given time can be ascertained.

There are certain details necessary to the working of this apparatus to which we have not made reference as they do not affect the fundamental principle; for instance, resistances have to be placed in the circuits so as to ensure that the same strength of current from both A and B generators is received in the telephone; otherwise, of course, the currents would not neutralise each other. The arms for regulating these resistances are shown in the illustration. It will also be seen by the figure that the inductor A, the one at the engine end, has six studs and, therefore, as stated, six windings. It is not, however, necessary to move the contact arm A until the torsion on the shaft is too great for B to register. The arm A is then shifted through one or more divisions, and the sum of the distances through which both arms have been moved will give the correct reading. It may be added that in setting the contact arms the magnet A of the inductor at the turbine end of the shaft should be in the zero position when it is over the winding it will first meet as it rotates, the B magnet should be at zero when it is over the last winding. This will allow the winding that is in circuit to be put forward in the A inductor and backward in the B inductor as is necessary for the working of the apparatus.

Accuracy of the torsion metre.

We have not any records obtained by this method of engine-indicating in actual practice, but it is said to have been proved to be within 1 per cent. of accuracy. It is evident that if dependence can be placed upon it to give records within these limits we have here an instrument that is far superior to the old steam engine indicator, which we owe originally to the fertile genius of James Watt. It is possible for the mathematician to calculate the power needed to twist a shaft through any given angle if the physical properties of the material of which the shaft is made are known, and the shaft is homogeneous throughout. Engineers are, however, a little wary of building too heavily on the deductions of the pure mathematician; he sometimes leaves something out. Here, however, what one might call the theoretical aspect of the invention is borne out by experiments on an adequate scale made by a firm of high scientific reputation, and we must therefore conclude that we have secured one of the most valuable advances in engineering practice that has been made for some time past. It is such an instrument as Froude longed for, and it would have rendered his brilliant investigations even more fruitful than they have been.

In making a comparison between the Denny–Johnson indicator

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and the Watt type, or any of its modern forms, we must remember that the latter is very far from perfect, especially when used with high-speed engines; moreover, the new method would give the total efficiency of the engine, whilst the Watt indicator gives only the thermal efficiency, and takes no record of mechanical efficiency. The many chances of error to which the ordinary steam engine indicator are subject are well known; among them throttling of steam in connections, inertia of moving parts, improper rigging of the apparatus, and even errors in calculation from the indicator cards. All these would seem to be absent with the new arrangement, supposing dependence can be placed on measurements taken of the twist of a shaft under varying torsional stresses. In place of setting his assistants to work, the chief engineer or captain of the ship could find the power being developed at any instant, or a recording apparatus might perhaps be devised to give a continuous diagram of power developed over the whole voyage. The value this would be to navigators, naval architects, and engineers would be very great; for instance, in the proportioning of shafting we should have something definite about the changes of stress set up in shafting by racing of propellers in rough weather—a cause to which so many disablements of machinery and possible losses of good ships that never came to port may be traced.

The great event in the engineering world during 1905 was the completion of the Cunard liner Carmania—one of the largest ships in the world—and no record of the year would be complete without some mention of the incident. This fine vessel is 672 ft. 6 in. long over all, 72 ft. wide, and 19,524 tons gross register. She is a triple-screw ship, and her propelling machinery is entirely Parsons steam turbines. She ran her trial trip last November, steaming for six hours, four runs being made on the measured mile, the results of the four runs giving a speed of 20·19 knots. The sister ship Caronia, with reciprocating engines, made a speed of 19·5 knots on her trial, and the higher speed shown by the Carmania is attributed to the superiority of her propelling machinery. The Carmania.

Unfortunately, the data at our disposal are not sufficient to enable any definite conclusion to be drawn as to the efficiencies of the engines in the Caronia and Carmania respectively; and we have already commented upon the unsatisfactory nature of comparisons of engine efficiency deduced only from speeds attained by ships. What one would like to know would be the coal burnt respectively by the Caronia and the Carmania over a lengthened period of service, but this, we fear, we are unlikely to get. Moreover, as the power developed by the Carmania's turbines is unknown, we cannot say

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positively whether the higher speed was due to higher power of the engines, though presumably this was the case; but one would like to learn whether additional power was due to forcing the boilers, and was therefore obtained presumably at the expense of coal consumption.

The Carmania, as stated, is a triple-screw ship, there being one propeller on each of three shafts. The centre shaft is driven by the high-pressure turbine, and the two wing shafts are driven by the low-pressure turbines. Sternway is obtained by special blades on the two low-pressure turbines, the wing screws being used for reversing the progress of the ship. There are eight double-ended and five single-ended boilers, the steam generating plant being practically the same as in the Caronia, but the steam-pressure is 195 lb. to the square inch in the Carmania, instead of 210 lb. as in the Caronia. Another feature in which the two ships differ is in the condensers and their gear. In the Carmania the condenser surface is 20 per cent. greater than in the Caronia, and the capacity of the centrifugal pumps for circulating water is double that of the latter ship.

The area occupied by the Carmania's machinery is the same as that required for the Caronia's quadruple expansion engines; but there is a small saving, about 5 per cent., due to the use of the turbines. This is not a very great gain, but there are the other advantages to which reference has already been made; and if the extra speed reached over that of the Caronia is not obtained at the expense of fuel economy or additional first cost, it is a very substantial gain in itself.

Value of a low vacuum.

The value of low vacua is far greater in a steam turbine than in a reciprocating engine. In any steam engine the difference between the temperature of the steam on entering and on escaping to the condenser is, as it were, the total available capital; that is to say, the maximum efficiency that could be reached under ideal conditions would be represented by the well-known formula of Carnot $\frac{T_1 - T_2}{T_1}$ It will be evident, therefore, that the more nearly vacuum is reached in the condenser, with a given initial steam pressure, the higher will be the thermal efficiency of the engine. There are, however, mechanical considerations which limit the vacuum—or, to speak more correctly, the approach to vacuum—which is practically advisable in a reciprocating engine. At very low absolute pressures, the temperature of steam is low. Though this is an advantage in one respect, as it increases the range of temperature, there is the drawback that the walls of the low-pressure cylinder are so far cooled that excessive condensation of the initial steam is

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set up. Another reason why complete vacuum is not practically advisable in reciprocating engines is that in order to utilise very low absolute pressures the area of the piston must be large. This necessitates a cylinder of abnormal size, and the loss in mechanical efficiency is considerable.

It will be understood that the steam turbine does not suffer in this way when the pressure is brought nearer to zero. The flow of steam being continuous in one direction there are no alternations of hot and cold steam, and there is no loss due to the friction of an over-large piston. For these reasons it pays to secure as near an approach to perfect vacuum in the condenser as possible. Mr. Parsons and Mr. Stoney have stated, in a paper read last year before the Institution of Civil Engineers, that with a steam turbine for 1500 kilowatts, working at two-thirds normal output, an increase of 1 inch of vacuum at 26 inches has the effect of diminishing the consumption of steam by the turbine to the extent of about 4 per cent.; at 27 inches of vacuum the decrease due to an inch more of vacuum was 4½ per cent.; at 28 inches it was 5½ per cent.; and between 28 and 29 inches it was 6 to 7 per cent. This was with steam, not superheated, at a pressure of 155 lb. to the square inch. It may be stated here, although it does not bear directly on the subject immediately under notice, that the same authorities question whether the saving in coal by the adoption of pressures higher than 150 lb. to 200 lb. per square inch is sufficient to justify the increase. Superheating has, however, a very marked effect in diminishing steam consumption, for it is found that every 10° Fahr. of superheat reduces steam consumption by about 1 per cent.

The need for high vacua with the steam turbine, in order to secure maximum efficiency, has led Mr. Parsons and those who work with him to pay great attention to the condensing plant. Compared to ordinary practice they have given increased condenser surface and greater volume of circulating water, the latter being made to flow through the condenser tubes at higher velocity; the tubes are spaced wider, and a weir is provided so as to hold up the condensed water, and keep the bottom two or three rows of tubes always submerged. A larger air-pump is also used.

The vacuum augmenter.

With these arrangements it is possible to keep a vacuum of 27½ to 28 inches. With the prospect of gain held out by the steam turbine it is, however, worth while to make an effort to go beyond even this high vacuum, and the arrangement illustrated in Fig. 4* has therefore been introduced.

* We are permitted to reproduce this diagram by the courtesy of the Institution of Naval Architects.

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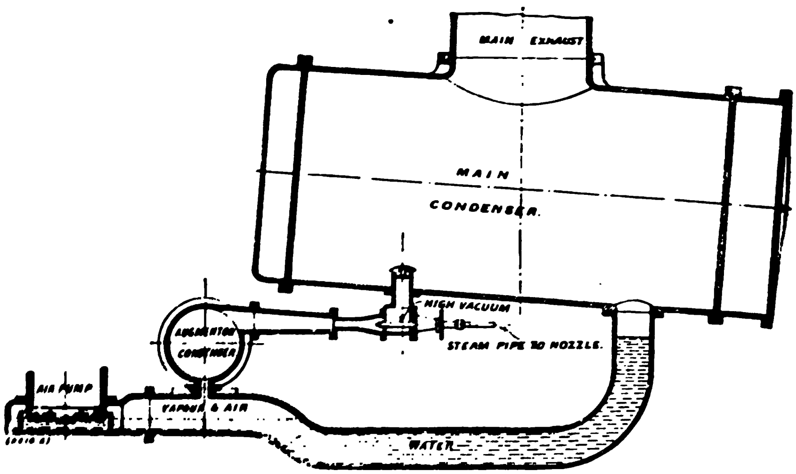
A steam jet is placed in a contracted pipe between the condenser and the air-pump, and this draws air and vapour from the condenser, thus reducing the vapour density by about one-third. The mixture of air and vapour is compressed in the contracted pipe to about one-half of its bulk, and is then delivered to a small auxiliary or augmenter condenser, which has a cooling surface equal to about 2 or 3 per cent. of that of the main condenser. Here the air is cooled and the vapour partially condensed, after which it passes to the air-pump as shown. The air-pump is placed below the bottom of the condenser, in accordance with approved practice, and the pipe

FIG. 4.



leading from the main condenser to the air-pump is bent down so as to form a water seal between the condenser and air-pump. The consumption of steam in the jet is 1 to 1½ per cent. of that dealt with at normal load in the condenser, and the observed total reduction of steam consumption in the turbine is from 5 to 8 per cent. at full load, the condenser, the volume of circulating water, and velocity of the air-pump being the same. In the Manxman, a cross-Channel steamer running from Liverpool to the Isle of Man, and fitted with steam turbines, the saving in steam consumption, due to the use of this augmenter condenser, was 6 per cent.

G. R. DUNELL.

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and was proceeding through the Mediterranean. His force had been organised with great difficulty, and the troubles which had been found in preparing Rozhdestvensky's fleet were many times greater in the case of Niebogatoff's reinforcement, and, when at length he joined the Commander-in-Chief, the latter is said to have declared that the state of the ships filled him with despair—a statement which is not supported by Niebogatoff's own account of the condition of his squadron. On April 8 Admiral Rozhdestvensky appeared off Singapore, and proceeded thence to Kamranh Bay, on the coast of Annam, in the waters of French Indo-China. He was reported there on April 14, and he remained at Kamranh until April 26, engaged in coaling and completing supplies. His sojourn in neutral waters caused the utmost indignation in Japan, but the French Admiral was unable to get the Russians to move, and it is stated that, when at length they left, it was under express orders from the Tsar. On the next day, however, April 27, the fleet was reported at Honkohe Bay, some 60 miles up the coast, and it was still there on May 8, some of the ships remaining until May 12. Admiral Niebogatoff was meanwhile approaching. He appeared off Saigon on May 9, and was warned away by the French officials, but a scout from the main squadron met him, and he joined Rozhdestvensky in the vicinity of Honkohe.

The combined fleet comprised the following vessels:

Battleships: Kniaz Souvaroff, Alexander III., Borodino, Orel, Osliabya, Sissoi Veliky, Navarin, Nicolai I.

Armoured Cruisers: Admiral Nakhimoff, Dmitri Donskoi, Vladimir Monomakh.

Coast Defence vessels: Admiral Ouchakoff, Admiral Seniavine, General Admiral Apraxine.

Protected Cruisers: Aurora, Oleg, Almaz, Jemtchug, Izumrud, Svietlana.

Auxiliary Cruisers: Kuban, Ural, Terek, Rion, Dnieper.

Destroyers: Buini, Bravi, Blestiaschy, Bystri, Bodry, Bezumprechni, Biedovi, Gromki, Grozni.

Also seven volunteer transports, nine other transports, the hospital ships Orel and Kostroma, the floating workshops Kamchatka and Anadyr, and several store ships, steam tugs, and other auxiliaries.

Alternatives before Rozhdestvensky.

The problem that presented itself to Admiral Rozhdestvensky admitted of several solutions. He might proceed either through the Strait of Formosa or outside the island, and he might reach Vladivostock, which was the first object he had in view, by steaming through the Strait of Korea, as he eventually elected to do, or, proceeding outside the Japanese Islands, might have entered the Sea of Japan through the Tsugaru Strait, between the islands of Hondo and Yezo, or through the Strait of La Pérouse to the north of the latter island. The course he took after leaving Honkohe was by the south of Formosa through the Bashee Channel, by which he entered the Pacific Ocean, thus giving no indication of his subsequent

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intentions. If he had then proceeded to the east of the main island of Japan, and through the Tsugaru Strait, his route would have been some 850 miles longer than that which he actually adopted, and, if he had gone further north round the island of Yezo, and through the Strait of La Pérouse, the distance would have been much greater, and, as some consider, would have made that course impracticable.

Niebogatoff's opinion.

It is desirable at this point to refer to certain statements made by Admiral Niebogatoff in the course of his defence, as published in the *Russ* newspaper.* He asserts that Admiral Rozhdestvensky did not communicate to him the plan of the campaign. Consultations were not arranged with him or the captains, and they were thus not only prevented from co-operating as effectively as they might have done, but from expressing opinions as to the course which in their judgment it would be best to pursue. Admiral Niebogatoff declares that he was not even informed of the death of Rear-Admiral Fölkersahm, and that, as a consequence, he himself stood next in authority to Rozhdestvensky. Yet, even in these circumstances, he says, he was not permitted to express any judgment upon the conduct of the operations, nor was he invited to discuss the subject. In order to learn something of the plans of Rozhdestvensky he studied the Admiral's orders, but, for the most part, these related to the safe stacking of coal on board the ships (with which, he says, they were overloaded to the extent of sinking them below their proper water-line), and to remarks on defective handling of ships during the evolutions of the day.† Admiral Niebogatoff gives particular application to his protest in relation to the route adopted by his chief, and says that he does not think Rozhdestvensky had the moral right to enter upon such an important undertaking without consulting others, thus making them "the blind instruments of his will." Admiral Niebogatoff's own view is that it would have been possible to pass through the Strait of La Pérouse, for he calculated that, when the ships went into action, they had on board coal for 3000 miles' steaming, the supply being, in his opinion, greatly in excess of the requirements.‡

Preliminaries of the engagement.

It seems nevertheless probable that Rozhdestvensky's preoccupation in regard to his coal was really the determining factor in his decision

* I am greatly indebted to an excellent translation of this document made by Captain G. A. West, late R.F.A., which has kindly been placed at my disposal.

† Statements in some Russian papers do not attribute to Admiral Rozhdestvensky this attitude towards his subordinates.

‡ Capt. Klado, in his theoretical reconstruction of the operations ("La Bataille de Tsoushima," Pt III.), assuming that the Russian Fleet was well supplied with coal, severely criticises Rozhdestvensky's decision to attempt the passage of the Korean Strait.

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to pass through the Korean Strait, although thereby he brought himself within range of the Japanese naval arsenal of Sasebo. Moreover, the La Pérouse Strait was capable of being defended by mechanical mines, and the Tsugaru Strait was known to be mined, besides being long, and difficult in foggy weather. The Japanese had observed Rozhdestvensky's movements when he left the waters of Formosa, and the fact that his fleet was no longer on the coast of Annam must have been known in Japan by May 17. On the 20th and 21st the Russian squadron was steaming east, and on the next day, in fine weather, it coaled again from transports. It then proceeded north to the vicinity of Woosung, and sent some transports into Shanghai. Capt. Klado assumes that the Russian admiral could have communicated telegraphically from Shanghai with Admiral Jessen at Vladivostock, and might have counted on the help of the division from that place at the decisive moment. Captain Ito, of the Japanese Navy, has said that the Japanese scouts came into direct contact with Rozhdestvensky for the first time somewhere to the south of Kiushiu on May 26, and on that day a large Russian force was sighted off the Saddle Islands. It therefore presented itself almost as a certainty to Admiral Togo that his adversary had decided to pass through the Korean Strait, as the reasons given above had suggested he would do, and the only point really in doubt was as to whether he would steam east or west of Tsushima. It has been suggested that even at this time the Russian admiral might have changed his route and thrown the Japanese off the scent, but the fact is that his fleet had none of the qualities necessary for swift strategic movements, and that it was accompanied by auxiliaries which further reduced its mobility.

Togo's plan of campaign.

Captain Akiyama, of the Japanese Navy, in the course of an article contributed, with the sanction of the superior Naval authorities, to the journal *Asahi*, has stated that Admiral Togo's plan of campaign comprised seven periods, covering four days and nights. It was prepared in view of a meeting with the Russian Fleet in or near the place where the actual engagement occurred, and the dispositions prepared had reference to the waters between the island of Quelpart, through the Strait of Korea, and Vladivostock. The operations of the first and second periods did not take place because of the bad weather, and therefore the action began with the third section or period of the plan of operations. As to the sixth and seventh sections of the scheme, they were not carried out because of the complete success attained in the middle periods. The third period, according to Captain Akiyama, consisted of the attack by day with the full strength of the Japanese Fleet, which took place on May 27,

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while the fourth period was that of the night torpedo attack, and the fifth that which consisted in the bringing to action of the surviving ships of the defeated squadron.

The adversaries in touch.

On the night of May 26, or early the next morning, the Russian admiral's wireless telegraphic apparatus apprised him that he was in the vicinity of the Japanese, and at dawn, on the eventful day, the weather was misty, with a wind from the south-west, and a sea which caused his ships to roll heavily, and greatly distressed the destroyers. Admiral Togo had placed two lines of vessels extended on scouting service on the coasts of Korea and Japan, and, at five o'clock on the morning of the 27th, the auxiliary cruiser Shinano Maru sighted the Russians advancing to the south of Quelpart Island "at a point designated as number 203." * She communicated the intelligence by wireless telegraphy to Admiral Togo, and added that the Russians were apparently intending to pass through the eastern channel between Tsushima and the Japanese mainland. Two hours later the Idzumi, "which had been stationed as the left wing scout of the inner line," reported that the Russians were then 25 miles north-west of Ukushima, and were shaping a course to the north-east. The Japanese cruisers were spread out to keep in touch with the movements of the Russians, and Admiral Togo left his base in the deep inlet of Chin-hai Bay, near Masampo, in Southern Korea, with his battleships and the armoured cruiser division (Admiral Kamimura), and, passing north of Tsushima, concentrated his forces to the north of Kotsu Island. Vice-Admiral Kataoka was in command of the cruiser squadron, which included the older cruisers Matsushima, Hashidate, and Itsukushima, and there were detachments under Admiral Dewa, who had his flag in the Kasagi, Admiral Uryu, with his flag in the Naniwa, and Captain Togo.

The Japanese Commander-in-Chief says, in his report, that his cruisers had completely succeeded in their object of keeping him informed by wireless telegraphy. The following is his account of what happened:—

Notwithstanding the heavy mist, which covered the sea and restricted the range of vision to about five miles, the information I received enabled me, when the enemy was yet thirty or forty miles away, to form a perfectly clear idea in my mind of the manner of their approach. I was thus able, long before I saw the enemy with my own eyes, to know that their fighting force comprised the whole of the Second and Third Baltic Squadrons; that they were accompanied by seven special service vessels; that the enemy's ships were disposed in two columns; that their battle squadron was placed at the head of the starboard column, with the special service-ships in the

* To understand this message it is necessary to observe that, for conveyance of information, the whole area of sea between the island of Quelpart and Vladivostock had been parcelled out into squares like those on a chess-board. Each square had its number, and when "203" reached Togo's staff, maps lying before them showed the exact point where Rozhdestvensky's ships had been sighted.

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rear; that their speed was about 12 knots, and that they were continuing to steam in a north-easterly direction. With this information before me, I resolved to meet the enemy with the main strength of my fleet near Okinoshima at about two o'clock in the afternoon, and to open the attack upon the head of their port column. The battle squadron, under my command, and the armoured cruiser squadron, under Vice-Admiral Kamimura, the detachment under Vice-Admiral Uryu, and the various destroyer flotillas arrived at a point about ten miles north of Okinoshima by about noon, and in order to appear on the port side of the enemy they changed their course to the west. At about 1.30 p.m. the Dewa detachment, the cruiser squadron, and the detachment of Captain Togo, still keeping in touch with the enemy, joined us one after the other.

Rozhdestvensky's formation.

It is now time to turn to the advance of the Russian Fleet, and an attempt shall be made to describe its movements and changes of formation, with the understanding that no confidence can be felt in regard to some of the evolutions. It seems certain, however, that at 8 a.m. on the day of the engagement Rozhdestvensky's main force was in single column line ahead, himself leading with the first division formed of the four ships of the Souvaroff class. The second division followed, with the Osliabya at its head, probably flying the flag of Admiral Fölkersahm though that officer had died a few days before. The line was closed by the third division, under command of Admiral Niebogatoff, with his flag in the Nicolai I. The speed, according to the report of Baron Fersen, commanding the cruiser Izumrud, was 8 knots, but it was increased to 11 knots when the Japanese cruisers appeared, and at 9.40 the course was N. 23 E. The transports were in line on the starboard side, and further away were the two divisions of cruisers under Admiral Enquist and Captain Chien. It is worth while to notice that Admiral Niebogatoff says in his defence that on the eve of the battle Rozhdestvensky had caused his fleet to practice a certain evolution, thereby needlessly fatiguing the men. He further says that all the ships were filled with coal to their utmost capacity, the armour of the water-line being submerged some 2 ft. Coal was found everywhere, even on the upper decks and in the officers' cabins; and it is reported that this was not used, while the bunkers were exhausted, whereby the tendency of the ships to roll in the heavy sea was much increased. The Japanese cruisers, which were sighted at 9 o'clock, steamed upon a course parallel to that of the Russian Fleet, with their leading vessel on the port beam of the Osliabya at a distance of 50 cables, preceded by four destroyers. At 10.15 appeared on the starboard hand four other Japanese vessels, recognised as the Chitose, Kasagi, Niitaka, and Tsushima, which soon took station with the other cruisers on the port side. At 11.15 the Nicolai I., flagship of Admiral Niebogatoff, and the other ships of the third division which were following, opened fire. It does not appear that Admiral Enquist took measures to drive off the enemy's cruisers, but they soon disappeared, and the firing ceased at 11.30.

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The ruling factor in the engagement.

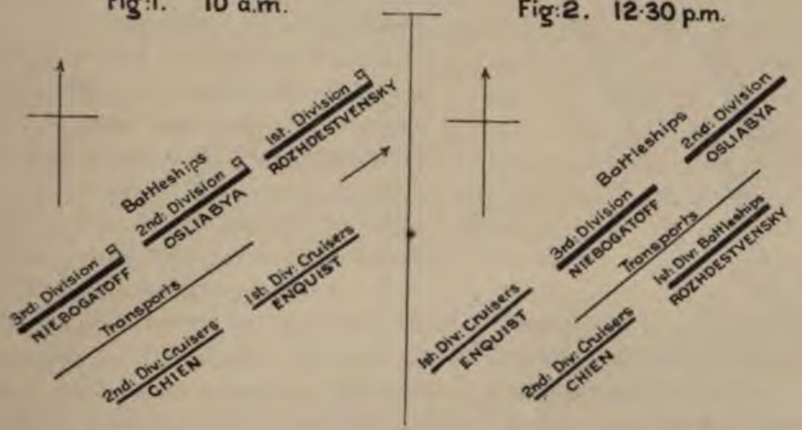
It is highly important to remember that Rozhdestvensky was resolved at all costs to push on to Vladivostock, and that Togo was fully aware of his purpose. This intention gave its special character to the engagement, and if it be not understood the real lesson of the battle will be lost. This object of reaching the northern port, as the necessary preliminary to further operations, was indeed the ruling factor in the battle, and we shall see that Togo continually used his superior speed to frustrate Russian movements to the north, and that, when he lost touch with his adversaries in the fog, his knowledge of their purpose enabled him to discover them again.

The battle joined. Rozhdestvensky's change of formation.

Now began certain movements which were not completed when the battle was actually joined, and which seem to disclose some instability of purpose on the part of Rozhdestvensky, due perhaps

Russian Formation.

Fig:1. 10 a.m. Fig:2. 12·30 p.m.



in part to the failure of his officers to carry out his orders. Shortly after 12.20 he ordered the first and second divisions to turn eight points to starboard, whether together or in succession is not stated by the Izumrud report, but at 12.30 the second division had not done so, and "the order was annulled to take the direction N. 23 E." Inasmuch as this was the course set in the morning, and there is no record of its having been changed, the meaning of the latter part of this statement is obscure; but the probability is that the second division and the ships following held on their original course, while the first division led by the Souvaroff had formed a second column to starboard, and apparently in so doing had fallen somewhat astern. At any rate, it is quite certain that the port column was led into action by the second division, and was headed

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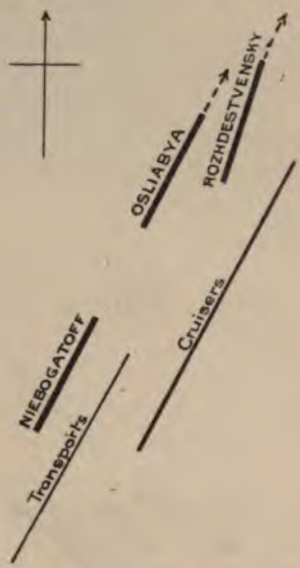
by the Osliabya. At 1.30 or 1.45, when the Japanese Battle Fleet was sighted, Rozhdestvensky appears to have seen the mistake he had made, and he therefore ordered the Osliabya to reduce speed to 8 knots, and his own division of four battleships to turn eight points to port. The object of this movement was to bring the fleet back into its original formation of single column line ahead, with the transports on the starboard side. There is some obscurity in the succeeding portion of the Russian report. It is stated that Rozhdestvensky again turned to starboard, as the whole fleet did shortly afterwards; but evidently he was still on that side, and we read that he was unable to get up with his other divisions, and thus he appears not to have been in a position to make his intended movement to port. The Admiral next signalled to the second and third divisions to form line ahead, and at 2.8 or a little earlier the Souvaroff opened fire. There appears to be no doubt that the formation intended by Rozhdestvensky was not fully completed at the time.

Fig. 3.

Russian Formation 1·30 p.m.

Japanese bearing down.



Admiral Togo's account of the action generally confirms at this stage the statements made on the Russian side. He says that at 1.45 he first sighted the Russians on his port bow, a few miles to the southward. As he had anticipated from the messages he had received, the four battleships of the Souvaroff type formed the starboard column, while the port column was led by the Osliabya, which was followed by the Sissoi Veliky, Navarin, and Nakhimoff, after which came the Nicolai I. and the three coast defence ships, while dimly discernible in the distance was a long line of the protected cruisers, the old armoured cruisers, and the special service vessels. The two cruisers Izumrud and Jemtchug were in the van between the battle columns, probably as scouting and repeating vessels. Thereupon Togo gave the order for battle, and at 1.55 p.m. hoisted the signal which will become as famous as Nelson's: "The salvation or the fall of the Empire depend upon the result of this engagement; do your utmost, every one of you." The Japanese Battle Squadron then steamed for

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a time in a south-westerly direction as if to pass the Russians on an opposite course; but at 2.5 the direction was altered sharply to the east, about twelve points to port, the ships evidently turning in succession in order to pass obliquely or even at right angles across the heads of the Russian columns. The battleships were followed in this movement by Kamimura's armoured cruiser division, while the detachments under Dewa and Uryu, the cruiser squadron (Kataoka) and the Togo detachment, in pursuance of the Admiral's plan, steamed to the south in order to come upon the rear of the enemy. Their operations shall be dealt with later on.

The Japanese initial advantage.

By these skilful movements rapidly made by their adversary the Russians were at the very outset placed at serious strategical and tactical disadvantage—strategical disadvantage because their adversary lay between them and their object of getting north, and tactical disadvantage because the heads of their lines were subjected to a terrible concentrated fire, while the guns of their ships astern were masked. They therefore were compelled to alter course to the eastward, so that the two lines were brought in due time upon a course approximately parallel to one another. General Linievitch in his report upon the engagement, based upon the statements of officers of the Almaz, Grozni, and Bravi, says that the first Russian division inclined two points to starboard, and placed itself at the head of the second division of battleships. It would therefore appear that the fleet endeavoured to form, and by the curve to starboard which it took was ultimately enabled to form, a single irregular column. The Russians opened fire at 2.8 p.m. at a range of about 8000 yards, and for their starboard column about 9500 yards, but the Japanese did not reply until the range was under 7000 yards, and was decreasing rapidly.

The Japanese main squadron which thus bore down upon the Russians from the north-east was in two divisions, the first comprising the battleships Mikasa (flag of Vice-Admiral Togo), Shikishima, Fuji, and Asahi, with the armoured cruisers Kasuga and Nisshin, and the other the armoured cruisers Idzumo (flag of Admiral Kamimura), Iwate, Yakumo, Adzuma, Asama, and Tokiwa. Admiral Togo describes the effect of his tactical movements as being to "press obliquely" upon the heads of the Russian columns, and to turn them more to the eastward.

The enemy's van, when our battle squadron bore down upon it, changed its course slightly to starboard, and at 2.8 p.m. the enemy opened fire. We did not at once reply, but on reaching the range of 6000 mètres we concentrated a heavy fire on the two leading battleships. The enemy seemed to be gradually forced towards the south-east, and his port and starboard columns both turned by degrees to the east, his fleet thus forming an irregular single column which steamed parallel with our fleet. The Osliabya, which was at the head of the port column, was soon badly damaged, and left the line of battle bursting into flames.

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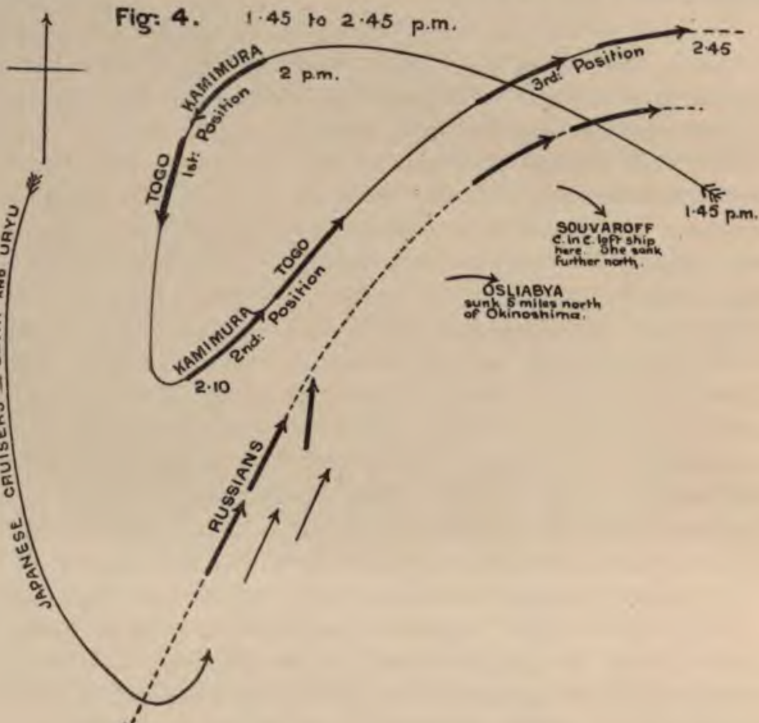
The speed and situation of the fleets.

Admiral Togo, according to all the evidence accessible, was steaming at 15 knots, while his adversary, according to the statement of Baron Fersen, commanding the Izumrud, was proceeding at 12 knots, which is perhaps a little in excess of the actual speed attained. However, it may be well to assume that the speed of the Japanese was roughly 3 knots greater than that of the Russians. Commander Daveluy of the French Navy, to whose admirable volume "La Lutte pour l'Empire de la Mer" I am greatly indebted, makes some remarks in relation to the respective speeds of the two belligerents which deserve

Fig: 4. 1·45 to 2·45 p.m.



notice. He impresses upon his readers that speed is a tactical element, and that it would be dangerous to regard it as an arm, but points out that in the battle of Tsushima it played a notable part, to which sufficient attention has not been given. The advantage of speed was revealed in the initial movement, which, if it did not decide the course of the battle, at least strongly contributed to the result. In order that the flank movement of the Japanese battleships should produce its full effect, it was necessary that it should be executed with rapidity. If Togo had advanced *avec une lenteur majestueuse* towards the Russian Fleet, Rozhdestvensky would have

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had time to adapt his own movements in a more rational manner to meet the attack, but, says Commander Daveluy, the suddenness of the onslaught paralysed him. A heavy sea was running, and the Russian battleships, overloaded with coal, rolled very greatly, so that at times the portions of the hulls below the side armour were visible to the Japanese gunners, while at other times the armour-belt was entirely below water. It is alleged, as I have said, that this excessive rolling was attributable to the fact that the Russians had used the coal in their bunkers, and had left almost untouched that which had been stacked upon the decks of the ships.* From the very outset the superiority of the Japanese fire became manifest, and it has been asserted by Japanese writers that careful observations proved that the Japanese scored three hits for every one made by the enemy in the opening stage of the engagement, and that very soon the ratio was increased to four to one. The *Times* correspondent said it was noticed that the Japanese bluejackets remained perfectly cool throughout. Scarcely any of them had recourse to the buckets of drinking water placed within reach, and there was absolute confidence of victory in these battle-tried seamen.

The Osliabya.

When Togo altered course, taking his turn of about twelve points to port in order to cross the bows of the Russian columns, the superiority of his tactics became almost immediately apparent, for his ships poured their concentrated fire of terrible violence upon the leading ships, and the Osliabya was soon covered with flames, and leaking very badly, so that at the beginning of the battle she fell out of the line, as Togo says, and went to starboard, to sink an hour later. Reports of survivors say that the first two Japanese shells caused serious leaks in the ship, and that water poured in in such large quantities that it was with the utmost difficulty she could be kept afloat, and she was heeling badly.

Japanese gunnery and tactics.

Captain Akiyama, in the description already referred to, states that the rapid success attained by the Japanese Admiral had nothing astonishing in it. He had with him four battleships and eight armoured cruisers, but they were not demoralised as were the ships of the Russians. It has been calculated that an average of at least four hits was made in every ten rounds, while two hits in ten rounds was estimated as the Russian average; but, as a matter of fact, the probable figure was one out of ten. The proportion therefore was as one to four, and the Japanese gun fire had four times the effect of that of the Russians. It may even be said, remarks the Japanese officer, that one of Togo's vessels was equal to four of Rozhdestvensky's, and therefore that the four Japanese battleships would be equal to

* M. Bos in his "Rapport" on the French Navy Estimates.

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sixteen ships of the enemy. He remarks that the quality of Japanese gunnery was the result of training and exercises extended over many years. But Captain Akiyama proceeds to say that the superiority of the Japanese depended very largely upon their excellent tactics. They appear to have known no other formation than the line ahead, and he says that the initial movement was that known as the "Teiji sempo" (Teiji = the Chinese character Tei; sempo = tactics), and was of ancient origin in the Japanese Fleet. It consisted really in the endeavour to get the Japanese ships across the bows of the Russians, so as to concentrate a crushing fire upon the leading ships. In a later phase of the action, says Captain Akiyama, Togo practised the old "Otsuji sempo," Otsu being a Chinese character similar to the letter L, implying an enveloping curve or movement.*

The Souvaroff. Niebogatoff's intervention.

Pursuing his course after dealing so heavily with the Osliabya, Togo still directed his concentrated fire upon the leading ships, and it was now the turn of the Kniaz Souvaroff, Rozhdestvensky's own flagship, which was soon covered with flames, and in a situation of the utmost distress, falling away from the head of the starboard line as her consort had done from that of the port line. Admiral Niebogatoff, in the Nicolai I, seeing the plight of the flagship, with both her funnels smashed and flames issuing from many parts of her, while the Japanese cruisers were bearing down towards her, went to her assistance. There may be some doubt as to whether this happened at the beginning of the action or later in the day, when the Souvaroff, hard beset, was struggling with assailants resolved to give her the *coup de grâce*. If Niebogatoff went to the assistance of the flagship when she first fell away from her station at the head of the starboard column, he must have left the line of battle at the head of the third division, but whenever his movement took place, he was able to relieve the pressure upon the Souvaroff, and she had some respite from her assailants, being thus enabled to combat the flames. Niebogatoff claims that the Kasagi, flagship of Rear-Admiral Dewa, suffered serious injury from the shells of the Nicolai I., and was compelled to seek shelter under the land to execute repairs. This is confirmed by Togo, who says she was hit below the water-line, whereupon Dewa transferred his flag to the Chitose.

The Alexander III. and Sissoi Veliky.

The Alexander III. was now leading the starboard column of the Russians and the Sissoi Veliky the port column, though by this time, as the course was deflected to starboard, the Russian formation was straightening out into an irregular line ahead. The superior speed of the Japanese was enabling them to overlap the Russian van, and it was in order to prevent their adversary from getting across their bows

* Translation in the *Mitteilungen aus dem Gebiete des Seewesens*, xxxiv., No. 2.

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that the Russians were gradually forced to starboard, and thus it was that the fleet, though in much disorder, took the intended formation of a single line, and was driven rapidly to the south. The engagement had been proceeding about three-quarters of an hour when the Alexander III. was very badly damaged and in flames, with a heavy list to port. She also had to leave the line, and Captain Ozeroff, of the Sissoi Veliky, reported that a great fire broke out on board his own ship, and that twelve holes were made by the heavy Japanese shells, whereby large quantities of water inundated the compartments and his ship heeled to starboard. The whole of the Japanese armoured cruiser squadron was now following in the wake of the battle squadron, and the range was diminishing, while confusion was increasing in the Russian line, and fires broke out in several of the vessels bringing up the rear. Dense volumes of smoke from the burning ships were carried by the westerly wind, and combined with the fog to envelop completely the Russian Fleet, so that for a time it was necessary for the Japanese to cease fire. Some damage had also been inflicted on the Japanese ships, the armoured cruiser Asama being struck by three shells near the water line aft, and having her steering gear damaged, so that she began to leak badly, and had to leave the line of battle to effect some hasty repairs.

Frustration of the Russian attempt to escape.

Admiral Togo's account of the effects of his tactical movements and his heavy and accurate fire are particularly interesting. He says that at about 2.45 p.m. the issue of the day was already decided. His battle fleet had forced the Russians to the south, and his ships maintained their intermittent fire whenever the enemy's vessels were seen through the fog and smoke. It may be assumed that the only preoccupation of the Russians was by this time to escape, and of Togo to use his speed to prevent them from doing so. He says that at about 3 p.m. his fleet was already ahead of the Russians, steaming to the south-east, when the adversary suddenly went about and headed for the north, evidently with the hope of getting away in that direction to Vladivostock. The Borodino led in this movement, which appears to have been effected by turning through three-quarters of a circle to starboard, while Togo, to meet it, and to prevent the distressed Russians from accomplishing their purpose, signalled to his ships to alter course together sixteen points to port, the armoured cruiser Nisshin being brought to the head of the line. The course was to the north-west in order to close upon the Russian ships, and Togo says—"the armoured cruiser squadron, following in the main squadron's wake, changed front, and again forced the enemy southward, firing on them heavily." Seeing that Togo was endeavouring

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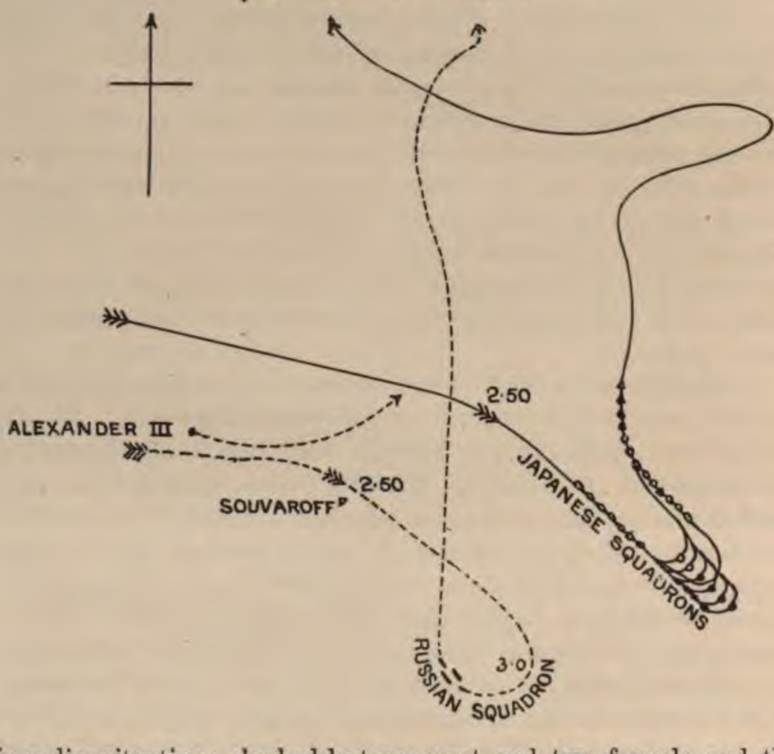
once more to cross their bows, the Russians thus turned again to the south, but the Japanese, circling round and using their superior speed, soon came abreast of them.

The Osliabya sinks. Desperate plight of the Souvaroff.

The Osliabya was by this time in a state of extreme distress. Lieut. Durnovo, commanding the destroyer Bravi, who had been standing by with the Buini to render help to the doomed ship, took off 175 officers and men, and the two destroyers together are said to have saved nearly 400.* The ship sank at ten minutes past three, about an hour after the battle began. The Kniaz Souvaroff was also

Fig: 5. 2·45 to 3·45 p.m.



in a dire situation; she had lost one mast and two funnels, and the whole ship was enveloped in smoke and flame, and had become almost unmanageable. Before four o'clock Admiral Rozhdestvensky had been put on board the destroyer Buini, but was afterwards transferred to the Biedovi, which later in the day was compelled to surrender to

* Lieut. Durnovo says that somewhat later a shell exploded in the stokehold of his destroyer, doing great damage and killing nine men and wounding others. His speed was thus reduced to 11 knots; but, in order to escape his pursuers, he unshipped his mast and painted his funnels white. Boiler tubes burst and he had other troubles, and was reduced to a speed of 5 knots. His coal being exhausted he burned all the wood he had on board, but at last reached Vladivostock on May 30th.

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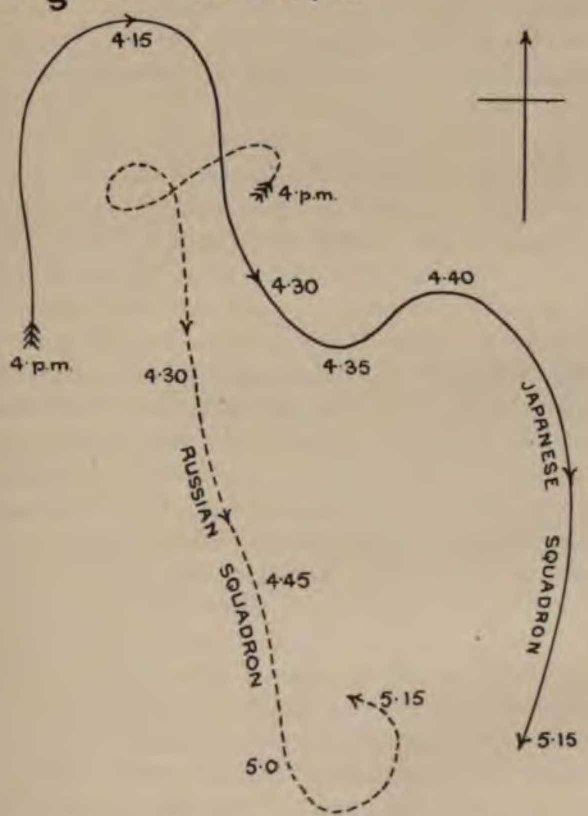
the Sazanami, and thus the Russian admiral became a prisoner of the Japanese. Admiral Togo gives a particular account of the attack made upon the disabled Souvaroff by his destroyer flotilla :—

Special mention must be made of daring incidents which took place during this period of this battle—being dashing torpedo attacks made upon the disabled flagship Souvaroff by the Chihaya and the Hirose destroyer flotilla at about 3.40, and by the Suzuki destroyer flotilla at about 4.45. The result of the first attack was uncertain, but one of the torpedoes discharged in the latter attack struck the enemy's vessel on the port quarter, and she was soon seen to heel about ten degrees. During these torpedo attacks the Shiranui, of the Hirose flotilla, and the Asashio, of the Suzuki flotilla, were subjected to heavy fire by the enemy's vessels in the neighbourhood, and were each struck by a shell. They were for a time in a dangerous condition, but fortunately were able to escape.

Meanwhile the Alexander III., though badly injured, had succeeded in making good some of the damage inflicted upon her, and had joined her consorts, while they, suffering heavily, were still being driven to the south. At about 4 p.m. the Russians turned to the west, but Togo, moving on an enveloping curve, they circled to the east and then went once more to the southward. Togo then kept a

Russian disasters and failure of attempts to escape.

Fig: 6. 4 to 5·15 p.m.



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course approximately parallel, the Russians being on his starboard side; but, at about 4.35, he seems to have gone to port for some unknown reason, thus making an outward movement to be explained perhaps by the fog causing him to lose touch for a time. He says that he took up the chase with his main fleet, led by the armoured cruiser squadron, in the fog and drifting smoke. The Russians were lost to sight, and he went south for eight miles without seeing them, though he engaged certain of the Russian second-class cruisers and special service vessels which he found within range. These had already suffered very severely from the attacks of the Japanese cruisers, of which something has yet to be said. Not finding his adversary, the Japanese admiral again turned to the northward at 5.30 p.m., while his armoured cruisers proceeded to deal with the Russian scattered vessels. He was still steaming north, when he encountered the enemy's special service ship Ural and sank her, and presently he sighted a group of six Russian ships evidently endeavouring to escape to the north-east. He overhauled them, and engaged them on a parallel line, but, soon getting ahead of them, made the same movement which had already been so successful, using his speed to concentrate upon their leading ships. The course of these survivors of the Russian Squadron, which to begin with was north-east, was thus gradually turned to the west, and finally to the north-west, the Japanese movement being an enveloping curve; and, as in the opening movement of the battle, the fleet being in close order, while the Russians were apparently straggling, it was possible to bring to bear a concentrated fire upon individual ships in the line. Togo says that the effect of his gun-fire became more and more evident, while the fire of the Russians grew weaker. The Alexander III. again fell out of the line, and soon afterwards capsized and sank, and before seven o'clock a very serious fire was observed on board the Borodino, in which at 7.23 there was a great explosion, apparently of a magazine, and she also immediately went to the bottom; forty of her men were rescued by the Japanese cruiser Kasuga.

Alexander III. and Borodino.

Souvaroff.

At about the same time the Kniaz Souvaroff, which had been maintained afloat with the utmost difficulty, was despatched. She had been discovered by the Japanese cruisers and destroyers in company with the auxiliary steamer Kamchatka; the latter was sunk by gun-fire, while the Souvaroff was attacked by the destroyers. She still endeavoured gallantly to repel them, but two torpedoes, discharged by the Harusame, struck her, one in the neighbourhood of the engines and the other aft, and she sank at 7.20. Although driven from the line, leaking and in flames, she had been kept afloat for over five hours, notwithstanding the fact that she had been twice

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torpedoed two hours before she went to the bottom. Sunset was now approaching, and the destroyer and torpedo-boat flotillas were coming out to complete the terrible work of destruction. Therefore, Togo relaxed his direct efforts, and at sunset proceeded to the east with his own division, despatching orders that the whole fleet should rendezvous near Matsushima on the next morning.

The cruiser operations.

It is now necessary to give an account of the operations of the detached cruiser divisions under Admirals Dewa and Uryu and Captain Togo. These vessels were the Kasagi, Chitose, Niitaka, Otawa, Naniwa, Takachiko, and Tsushima, possibly with some others. When the battle began they left the main fleet, as has been stated, in order to steam along the port side of the enemy and to threaten his rear, which consisted of the armoured cruisers Dmitri Donskoi, Vladimir Monomach, Aurora, Oleg, and some others. The cruisers shelled the Russians as they passed them on an opposite course, and then came round the rear to attack on the starboard side.

Availing themselves of their superior speed these detachments frequently put about their heads, and appeared now on the enemy's port and then on his starboard side, thus continuing the attack for some thirty minutes. The Russian rear detachments were in this way thrown into disorder, and the special service ships, after repeatedly changing their course, were driven in various directions. In the meantime, a little after 3 p.m., a vessel of the Aurora type advanced and threatened to attack our forces, whose heavy fire, however, repulsed her with heavy damage. At about 3.40 p.m. three Russian destroyers again dashed towards us, but were easily driven off without accomplishing anything. The joint attack of the Dewa and Uryu detachments had remarkable results by 4 p.m. The rear detachments of the enemy had been completely routed, and had become separated from one another. All their vessels had sustained more or less damage, and some special service ships had already been disabled.

Enquist's failure

Admiral Enquist was in command of the Russian cruisers in this part of the scene of battle, but he seems to have made no effort to engage the assailants, and, acting on the defensive, permitted them to work their will upon his rearmost ships. As Commander Daveluy says, this part of the action defies analysis, but its result, at the end of two hours' fighting, was to throw the Russian rear into complete disorder. Three of the auxiliaries, one said to be the Anjier, another the Irtish, and a third the Russ, were so injured that the first two sank immediately, and the third afterwards on the coast of Tsushima. At 4.30 Admiral Kataoka arrived with the force known as the Cruiser Squadron, comprising three vessels of the Hashidate class, the Chiyoda, and some others, and, under the pressure of this greater force, the Russian cruisers were at length driven away from the tail of the line towards the south. It is surmised by Commander Daveluy that the real object of the Japanese was not to engage the hostile cruisers, but to drive them away, and attack the auxiliaries

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Admiral Enquist has since stated that he had received secret orders from Rozhdestvensky, that, in case the battle should go against the Russians, he was to endeavour with his cruisers to reach Shanghai, where coal could be procured, and he might hope to escape. He says his vessels had suffered considerable damage, and were encumbered with dead and wounded, and that at the end of the day, when he saw that all hope of victory had gone, he turned to carry out his orders, though he despaired of going north only when he saw the Japanese destroyers watching the passage in that direction, and discerned many warships in the distance. It seemed to him that it would be better to save his three cruisers, the Aurora, Oleg, and Jemtchug, than to sacrifice them and the lives of their companies in a useless conflict. He endeavoured to reach Shanghai, but, on the second night, saw, or thought he saw, a Japanese squadron proceeding in the same direction. He therefore determined to proceed to Manila, and, when he arrived there, being offered only twenty-four hours' hospitality, and repairs being impossible within the time, he determined to neutralise his force. In the Aurora many guns were out of action, other damage was done, and many were killed and wounded, while the Oleg was seriously damaged, and a large hole had been made in her side near the water-line. No particulars are given concerning the Jemtchug.

Night operations of the Japanese destroyers.

Disaster closed the day of battle, and at nightfall some twenty Japanese destroyers and sixty-four torpedo-boats issued forth in search of the survivors of the Russian Fleet. Admiral Niebogatoff, who had nine of the Russian warships with him, and was endeavouring to get away to Vladivostock, says that the night fighting consisted of uninterrupted attacks by the flotillas, but the ships belonging to his own division were undamaged, and were navigated in safety without lights. His flagship was attacked at short range, and, by skilful handling, one torpedo passed close under her stern as she turned to avoid the impact. Resistance was especially difficult because of the guns of the Orel being damaged and useless, while those of the other ships with him were of an old pattern and fired only about one round per minute. To complete the difficulties of the situation, Admiral Enquist had taken his departure for Manila, thus abandoning his comrades, or, at any rate, giving up all hope of reaching Vladivostock. The ships with Niebogatoff were the Nicolai I., the three coast-defence ships of the Admiral class, the Orel, the Sissoi Veliky, the Navarin, the Admiral Nachimoff, and the Izumrud. The Sissoi was in difficulties owing to some of her compartments being full of water, and the upper works of the Orel had been completely shattered, but otherwise the vessels had not greatly suffered, partly because, at the beginning of the action, they had been masked by the

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leading ships, and partly owing to the fact that Togo had concentrated his efforts upon the newer and more important vessels.

Further Russian disasters.

Up to 11 o'clock at night torpedo attacks were continued without interruption, and the Admiral Nachimoff and Sissoi Veliky were both torpedoed, and fell astern, while the Admiral Ouchakoff and the Navarin separated for safety. They were, however, encountered at two o'clock the next morning 27 miles north of Tsushima by the Suzuki destroyer flotilla, and the Navarin was torpedoed twice, and sank rapidly, while the Admiral Ouchakoff escaped, only to be overcome on the afternoon of the 28th by Japanese armoured cruisers, which pursued her until 8 o'clock in the evening, when she replied to their summons to surrender by opening fire, and soon afterwards sank, perhaps by opening her valves. Fortunately, 300 of her company were saved. The Vladimir Monomach was also torpedoed during the night attack, but continued to float.

Niebogatoff's situation; his surrender.

Admiral Togo had ordered his fleet to rendezvous on the morning of the 28th near Matsushima, and he soon had intelligence of the whereabouts of Admiral Niebogatoff, concerning whose course he could entertain no doubt. The Russian admiral was sighted by the cruisers of Admiral Kataoka's division, who informed Togo by wireless telegraphy, and he at once took measures to complete his victory of the previous day. When Niebogatoff saw the Japanese cruisers he cleared for action and turned to attack them, but they had no disposition to fight, and so again he shaped his course towards Vladivostock. His situation was hopeless, and by 9 o'clock Japanese vessels were showing themselves in several directions. An hour later he counted twenty-seven of them, and the bigger Japanese ships approached and opened fire, their speed enabling them to choose their own range, while Niebogatoff's old guns could not touch them. This disadvantage was fatal, for the enemy's range was superior, and whenever Niebogatoff made an attempt to approach in order to use his guns, the Japanese retired so as to keep outside his range. In these circumstances resistance was impossible, and would only have led to useless slaughter of officers and men. The majority of the ships' boats were damaged and it was impossible to launch the others under the heavy fire. Moreover the ships' companies were completely exhausted. The Admiral, therefore, consulted with Captain Smirnoff and his other officers, and it was agreed that there was no chance of inflicting any damage upon the enemy. It was therefore decided to surrender. The following is Admiral Togo's account of the conclusion of the action :—

At 10.30 a.m. at a point 18 miles south of Takeshima (the Liancourt Rocks) the enemy's vessels were completely enveloped. They were the battleships Nicolai I.

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and Orel, the coast defence ships General Admiral Apraxine and Admiral Seniavine and the cruiser Izumrud. Another cruiser was observed far to the south, and finally disappeared. The enemy's vessels had been severely damaged and were no match for our superior force, so that, immediately after the opening of fire by our battleship and cruiser squadrons, Rear-Admiral Niebogatoff, commander of the enemy's squadron, and his subordinate officers, expressed their desire to surrender. I accepted this proposal, and specially permitted the officers to wear their swords. But the enemy's cruiser Izumrud, availing herself of her high speed, escaped southward prior to the surrender, but being checked by the Togo detachment, she then ran eastward. The Chitose, arriving from Aburaya Bay, after sinking *en route* the same morning one of the enemy's destroyers, set out at once in pursuit of the Izumrud, which, however, made good her escape to the north.

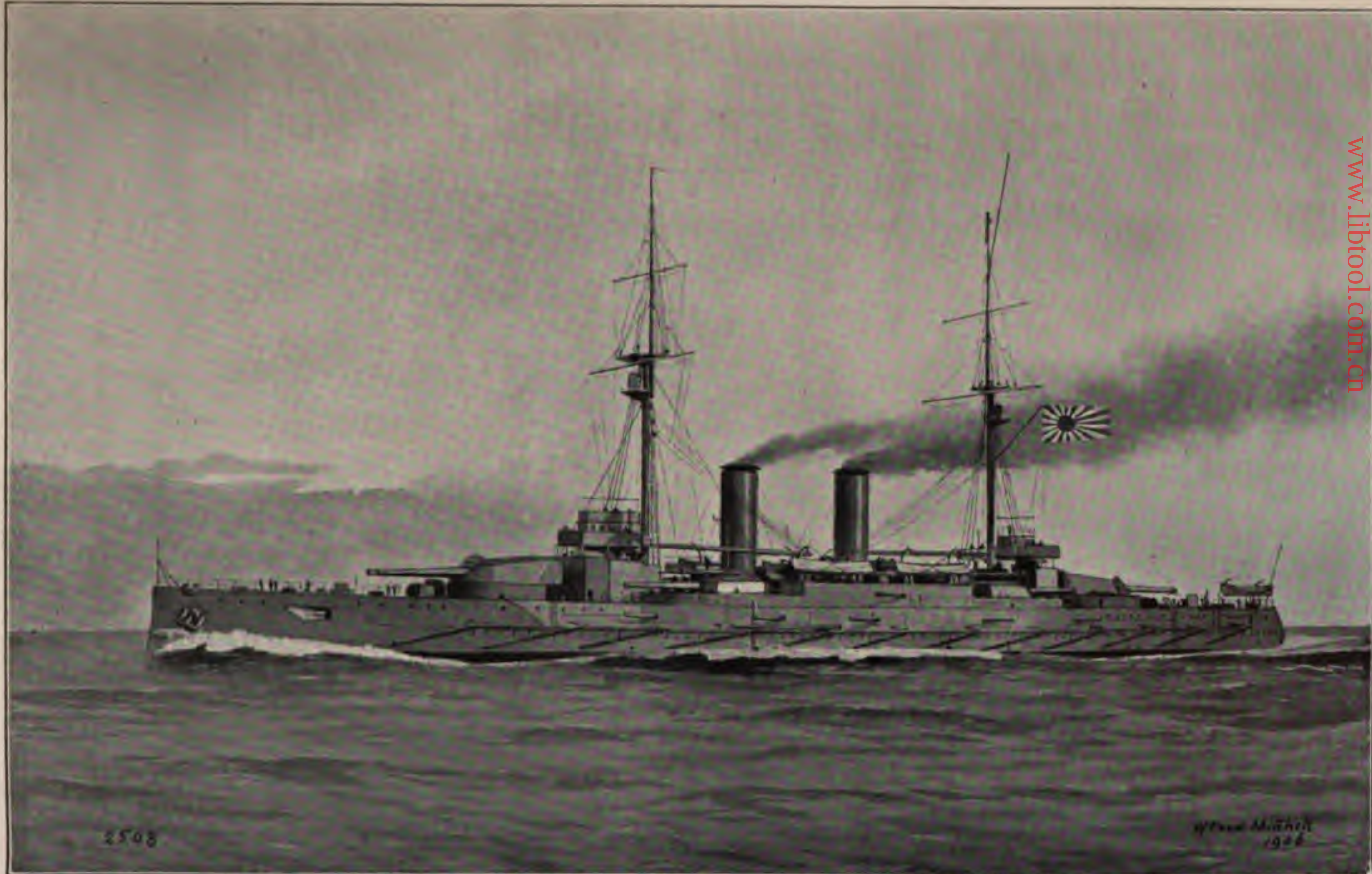
Was Niebogatoff's surrender justified?

The surrender of Admiral Niebogatoff has excited a great deal of discussion, and that unfortunate officer was sentenced to one of the most degrading punishments which could have been inflicted upon him, being deprived of all rank by judges unknown to him, and he was denied, he says, all his legal rights. It would have been possible for him, no doubt, to open his Kingston valves and send his ships to the bottom, but in that case probably very few of his officers and men would have been saved; and, in his explanation, he has pointed out that military officers who surrender fortresses after prolonged resistance receive the honours of war, instead of being punished as he has been. It is, perhaps, difficult to imagine a Japanese admiral surrendering as Niebogatoff did, but the following is the comment of a prominent Japanese officer upon the subject, quoted from the *Times*:—

Folks looking with every-day eyes condemn this surrender as cowardly and disloyal. But the changes that a soldier's sentiments undergo on such occasions are not a simple matter like the movements of chessmen at a desk. Admiral Niebogatoff is an officer of reputation and common sense. He suffered from no lack of resolution to blow up his four ships and thus prevent them from falling into his enemy's hands. But the feat would have been hard to accomplish. Sympathising with the pain the Russian Admiral must have felt, I think that those who condemn him for surrendering really underrate the skill shown by Togo and the efforts made by all under his command to render this surrender inevitable. Consider the reasons of the capitulation. Not only had the Russian vessels been deprived of a large part of their fighting power during the battle of the previous day, but thereafter they had been subjected to a terrible torpedo onslaught throughout the night. They were so weary as to be almost incapable of movement. They did not know what had become of their comrades. At this hour of anguish and danger Togo's flagship suddenly appeared at the head of a fleet of twenty-seven warships, strong and fresh. What was to be expected but surrender in such conditions? The Russian officers are just as brave as ours. No one should fall into the error of imagining that any ordinary considerations would induce them to surrender.

End of the action.

At 7 o'clock in the morning the Svietlana was sighted and pursued by the Niitaka and Otawa, and at 11 o'clock was sunk, and the destroyer Bystri, which was in company with her, shared the same fate. The Admiral Nachimoff and Vladimir Monomach, which had been seriously injured in the engagement of the 27th and had been torpedoed during the night, were seen to sink at 10 o'clock on the morning of the 29th. The Sissoi Veliky also went down, but the Japanese saved 570 of her company. The fate of the Ouchakoff



JAPANESE BATTLESHIP "KASHIMA."

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has already been described. The Dmitri Donskoi, which had taken on board some of the survivors of the Osliabya and the Buini, the latter having also been sunk, was menaced by the Japanese cruisers, and being seriously distressed on the morning of the 29th her commander sank her in deep water, her company escaping to the shore of Matsushima.

News of the disastrous event was awaited with the keenest anxiety at Vladivostock, and on May 29th at 6 p.m. the Almaz was seen approaching the port. She brought the first news of the great calamity, and was followed by the destroyers Grozni and Bravi carrying survivors. Thus General Linievitch was enabled to despatch the first Russian official account of the disaster. The Izumrud, which had taken a prominent part in the action, and whose officers have given the best report of it from the Russian side, reached Vladimir Bay, 150 miles north of Vladivostock, on the night of the 29th or early the next morning, but she ran upon a rock, and her commander, having landed all her company, blew her up, lest she should fall into the hands of the Japanese.

The news received at Vladivostock.

I am indebted for the following excellent summary of the material results of the engagement to an article on the battle by Captain Richard Wainwright, U.S.N., in the *Proceedings of the United States Naval Institute,* Vol. XXXI., No. 4:—

Summary of results.

Osliabya.—Head of port column. Was set on fire and sunk by gun-fire. Driven out of line in less than thirty minutes after the battle began, floated thirty minutes longer. Sunk in about one hour after the battle began by gun-fire.

Kniaz Souvaroff.—Head of starboard column. Was set on fire before 2.45 p.m. Driven out of line in less than forty minutes after the battle began, floated four hours and forty minutes longer. Sunk in five hours and fifteen minutes after the battle began. Was isolated and had lost one mast and two funnels by 3.10 p.m. Attacked by destroyers at 3.40 p.m. and again at 4.45 p.m. One torpedo known to have hit in last attack. Listed ten degrees under this blow. Again attacked by destroyer flotilla attached to cruiser squadron, hit three times, and sank at 7.20 p.m. on the 27th.

Alexander III.—Second of starboard column. Set on fire and sunk by gun-fire. Driven out of line in less than forty minutes after the battle began, floated four hours and twenty-seven minutes longer. Capsized and sunk at 7.7 p.m., or five hours and two minutes after the battle began.

Borodino.—Third of starboard column. Set on fire at 6.40 p.m. At 7.23 a serious explosion, probably magazines, took place and she sank instantly. Driven out of line in four hours and thirty minutes after the battle began, floated forty-three minutes longer. Sank in five hours and eighteen minutes after the battle began.

Orel.—Fourth of starboard column. Surrendered morning of 28th to battle fleet. Unprotected and lightly protected parts wrecked by gun-fire. Heavy armour unpierced. Main turrets not seriously injured. No hits below the water-line. No torpedo hits. Engines intact. One 12-in. gun lost muzzle end.

Sissoi Veliky.—Second in port column. Torpedoed during night of 27th. Sank at 11.5 a.m. 28th.

Navarin.—Third in port column. Torpedoed. Hit once on starboard and once on port side. Sank at 2 p.m. 28th.

Admiral Nachimoff.—Fourth in port column. Torpedoed night of 27th. Sank at 10 a.m. on the 28th.

Nicolai I.—Niebogatoff's flagship. Followed the Admiral Nachimoff when in column. Surrendered morning of the 28th.

Admiral Ouchakoff.—Second in Niebogatoff's division. Refused to surrender and was sunk by gun-fire about 5 p.m. on the 28th.

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Admiral Seniavine.—Third in Niebogatoff's division. Surrendered on the morning of the 28th.

Admiral Apraxine.—Fourth in Niebogatoff's division. Surrendered on the morning of the 28th.

Dmitri Donskoi.—Attacked by gun-fire and by torpedoes in the afternoon and evening of the 28th. Found sunk off Ullondo on the morning of the 29th.

Vladimir Monomach.—Torpedoed in the night of the 27th. Sank at 10 a.m. on the 28th.

Aurora, Oleg, and Jemtchug.—Escaped to Manila.

Almaz.—Escaped to Vladivostock.

Izumrud.—Escaped and wrecked in Vladimir Bay.

Svietlana.—Sunk in one hour by gun-fire from cruisers Otawa and Niitaka.

Destroyers.—Five sunk, one captured, two escaped.

Conclusion.

Such was the great battle of Tsushima, the most important naval engagement which the world has seen since Trafalgar. Fought in the year of the centenary of Nelson's triumph, it was a victory as significant, as complete, and as far-reaching in its effects as that of the year 1805. It has put an end, perhaps for centuries, to all aspirations of Russia towards naval predominence in the Far East, and has closed to her the long-sought outlook upon the Pacific and the China seas which was her ambition—who shall say not her necessity ?—with future consequences for Europe and Asia which no man can measure. In its immediate effects the victory of Togo crushed out any hope that Russia might retrieve her fortunes in the land campaign. Admiral Togo, at the conclusion of his despatch, attributes the victory to the illustrious virtues of the Emperor of Japan, and the small number of casualties in his fleet to the protection of the spirits of the Imperial ancestors. "He blew with His winds and they were scattered," we may read on the Armada memorial on Plymouth Hoe. The God of Victories is with those who worship truly at his shrine, but seamen do not need to be told that the victory of Japan, like that of England in 1588, was the result of certain very real, ascertainable, and wholly mundane causes. It was the necessary consequence of the definite purposes and the far-seeing vision of statesmen who knew what they were striving for, and left no measure unessayed which might compel the attainment of it. There were strategists who knew how to dispose wisely the naval forces provided in order to attain the end in view, and there was a tactician who was a master of his art. There were men also who could be trusted to shoot straight and to shoot rapidly, and with them officers who were worthy and competent to lead. Patriotism, valour, discipline, and moral courage nerved and strengthened the arm of Japan. In material matters the Japanese Fleet had unquestionable superiority over the armaments opposed to it, but it was the resolution, the strength, the courage and the skill of officers and men that bound victory to the national colours. Many lessons may doubtless be drawn from the events of the

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battle—lessons of the importance of efficient gunnery, of the relative value of speed, of the right character and distribution of armour and armaments, and of other matters. The writer will not attempt to enforce such lessons. The object has been to enable naval officers to discover the lessons of Tsushima for themselves.

JOHN LEYLAND.

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CHAPTER VII.

THE ENGINEERING QUESTION.—I.

Conditions of change.

OVER half a century has now elapsed since the formation of the naval engineering branch, and for a generation the battleship has been deprived of the auxiliary motive power of masts and sails. With increased importance as the producers of motion, the engine-room *personnel* tended to make ever-increasing encroachments on the limited accommodation of warships, varying from one-third of the crew in the battleship to two-thirds in the destroyer. At the same time the demand for close attention to practical engineering training appeared to be growing, for it is now generally agreed that the repeated breakdowns at one time experienced with Belleville boilers were due to lack of training. To realise the change one need but compare the flagship Marlborough of the Crimean War period with the King Edward of to-day. While the Marlborough made but slight mechanical demands on the crew, the King Edward has forty-two steam-engines, ninety hydraulic machines, and fifty-five electric engines. To manipulate and repair the machinery a class of working engineer known as the engine-room artificers became indispensable. Had the country elected to train these men from the beginning the cost would have been enormous. We were saved doing so by the system of apprenticeship in the workshops of the country. This policy of selecting men direct from the ranks of the civilian mechanics has received even greater development in the United States. Now, however, there is a divergence of policy, for the Admiralty announced in the Cawdor Memorandum (Nov. 30, 1905) that the artificers are to be reduced in numbers and restricted to repair work, while mechanics to run the engines are to be trained up from among the stokers. The reason for the decision is very obscure, for it will be extremely expensive to train stokers for this purpose. The policy scarcely takes account of the fact that the two classes are drawn from different strata of the population, and the engine-room artificers became mechanics by a process of natural selection, having served as such before ever they entered the Navy. As it is not proposed to train the stokers sufficiently to execute anything but minor repairs, their harbour time will be largely wasted. The artificers, being only

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about half as numerous, cannot hope to execute repairs so rapidly as is now the case. The artificers cannot do repair work in any case while machinery is in motion, and it seems only reasonable to use them to run the engines which they so well understand. It should also be noted that they are drawn from exactly the same class as that which furnishes the fine body of engineers in the mercantile marine, and their examinations closely correspond to that for a Board of Trade certificate as engineer.

The economic difficulty.

If changes in the motive power have brought new classes of officers into existence, those in the offensive power have been equally remarkable. The Marlborough half a century ago accommodated more officers and men than flag-ships of to-day, and relied on nearly the whole complement to assist in combatant duties. Her batteries could be easily controlled by one officer for the whole length of the deck. This is no longer the case; and it is possible to point to 6-in. and smaller guns in all our battleships which are at times without any provision for control by a responsible officer in battle. The many isolated gun and torpedo positions, the strain to which officers are subjected by night as well as day, the losses a battle inflicts among those above the protective deck, the growth of numerous auxiliary craft which have to accompany and to conform to the movements of a fleet, all point with growing insistence to the need of providing fighting officers in excess of peace requirements. The result was that side by side with the growth of machinery leading to the introduction of artificer engineers, whose attainments naturally gave them a right to cabin space, there existed a scarcity of combatant officers for war purposes. This scarcity was in those posts usually filled by officers of lieutenant's rank so that it might be met by the temporary use of officers, trained for the purpose, in other grades during their early periods of service. The provision of officers for war is the great economic difficulty which far outweighs the social rivalries that loom so big in the engineer controversy of the past. Therein lies the main difference to mercantile practice, where ships subordinate everything to running expenses, and maintain a staff on deck purely for navigation purposes.

The remedy.

It was open to the Admiralty to turn in three directions for extra officers for navigation and fighting work:—

(*a*) The Paymaster branch.
(*b*) The Marines.
(*c*) The Engineers.

If they elected to supersede the paymaster branch they could claim the practical experience of the Army to guide them, and no

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risks would be run. In the case of the Marines the risk run would be that the latter might suffer as soldiers; but it was rightly contended that the officers had a great deal of spare time on board ship, and this might well be devoted to learning how to handle ships, so that in their junior period of service they might be available for watch duties. So far as the gunnery and discipline were concerned, the marine officers performed identical duties with the executive officer. In addition the medical qualifications as regards eyesight were the same for marines and executive officers, whereas no such stringent requirements are necessary in the case of the engineer. For these reasons the writer had always urged the system of common entry and early training for the executive and marine branches, the training being more rigidly concentrated on sea practice under the officers of the ships than had hitherto been the case. He was strengthened in this view by the fact that just as with the engineering branch want of concentration had led to many breakdowns, so with the executive the lack of concentration on seamanship and gunnery had led to many collisions, groundings, and indifferent gunnery. The gunnery is being vastly improved; but the groundings and collisions are costly both in loss of fighting strength and waste on repairs. In 1904 there were no less than sixty-five collisions and groundings of warships commanded by lieutenants and above, and thirteen among the torpedo-boats. This is exactly at the rate of three a fortnight, and it is not to be remedied by sending officers to spend fifty per cent. of their time in the engine-room. It condemns the old system of training, but it does not endorse the new.

The Admiralty's decision.

As is well known the Admiralty elected to ignore (*a*) and to supersede (*b*) and (*c*) by executive officers trained as fighting seamen and engineers under a common system. They were fortified in their desire to supersede the present engine-room branch owing to what was regarded as a formidable agitation on the part of the engineer officers, supposed by some to have had its root origin in discontent with their social status.* Even if such discontent existed it was not sufficient to balance against the advantages derived by the fact that parents were enabled to send their sons into the engineering branch who now cannot possibly afford the very high cost of

* NOTE.—This idea, held so largely by executive naval officers, must be accepted with caution. Compare the following from a speech by Engineer E. E. Thumwood at Royal United Service Institution in April, 1896:—

"The second prize essayist mentions a sense of isolation felt by the Engineer Officers of the Royal Navy. I do not know any Engineer Officer of the Royal Navy who feels socially or professionally in any way this isolation. I may say for myself I have felt very much part and parcel of the Navy. The essayist mentioned that, certainly in a most graceful manner; still he alludes to a lack of co-operation and sympathy between the executive and the engineering officers of the Service. I deny that it is at all wanting even in time of peace, but in time of trial, rest assured, a perfect co-operation and mutual accord would be found to exist."

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the training at Osborne. It is significant that similar agitations broke out about the same period in France and the United States, showing that it would be a mistake to consider the stir as purely factitious. In the case of America the engineer had entered the same training establishment and gone through a similar course to the deck officer, so that common entry alone had not proved a panacea. The real solution in the opinion of the writer was considerably to increase the emoluments of the engineers as had been partially done with gratifying results in the case of the artificers, without attempting to disturb the rigid specialisation which is necessary for efficiency. The fact of having a purely specialist branch of engineers also enabled us to draw similar officers from the mercantile marine and to avail ourselves of the technical and grammar schools of the country in the competitions for entry as engineer students. The number of junior engineer officers was far in excess of requirements, a fact that is recognised under the new Admiralty scheme, which proposes to reduce the engineer specialists in each ship by over 50 per cent., so that the largest ships are to carry only three engineer officers. The result of the redundancy of numbers of highly trained officers, who could earn so much more on shore, was a very poor prospect of promotion, leading to considerable discontent. Except in the dockyards and at the Admiralty there are no positions for engineer officers carrying sufficient responsibility to justify the granting of high rank, whereas in the case of the executive line corresponding positions in the fleets exist by force of circumstances. This was all clearly recognised by the Board of Admiralty in 1901. In December Lord Selborne's Board decided upon a policy of reduction of engineer officers and a substantial increase in the artificer engineers who correspond to the engineers of the French and German Navies and the warrant machinists of the American Navy.

Points of agreement.

In the meantime the Board was re-constituted, and just over twelve months later the country was startled by the proposals which it is not too much to say revolutionise the entry and training of officers. As outlined in the Selborne Memorandum the idea was to have—

(1) One system of supply.
(2) One system of entry.
(3) One system of training.

This change had the merit that it could be arrested or altered at any time in the ensuing four years, for the entries of engineer students were to be continued in much reduced numbers. It also gave the Admiralty a breathing period in which they were untroubled by the civil engineering agitation, and many officers firmly

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believed this to be their chief object, more especially in view of Lord Selborne's policy in 1901.

Certain premises of the Selborne Memorandum are almost universally admitted. In the battle between sail and steam the latter has been indisputably the victor. There is not to-day in the Navy a single vessel with the auxiliary motive power of masts and sails. The Admiralty were appealed to again and again to declare the old-fashioned seamanship to be dead, for while it still continued to be enthroned in the training system of the Navy no sufficient practice in gunnery, etc., could be effected. On the other hand the progress of engineering had been extraordinary. So far we are all agreed. Disagreement commences where Lord Selborne proceeded to draw his conclusions from the above facts.

Specialisation.

"In the old days it sufficed if a naval officer were a seaman. Now, he must be a seaman, a gunner, a soldier, an engineer, and a man of science as well." Such an argument might with equal plausibility be urged of any civil profession which is dependent for its workings on other related trades, and yet the whole tendency of our social economy has been to increased specialisation. Everything depends on the precise meaning to be attached to the words quoted. The development which Lord Cawdor's Memorandum has now given to the Selborne scheme has rendered this unmistakable. To Lord Selborne's one system of supply, one system of entry, and one system of training, must be added one class of officer, who will be trained in every duty on board the ship except those of the surgeon and the paymaster. The inevitable result is that men acquainted with handling ships and guns are assailing the scheme as providing insufficient training in seamanship, etc.; and on the other hand, many mechanical engineers declare that the practical training in engineering is wholly inadequate. It may here be stated that for the four years at Osborne and Dartmouth 30 per cent. of the time is devoted to mechanical engineering in a very severe syllabus extending to over 40 hours a week exclusive of time spent over gymnastics and practical seamanship in boats, etc. The boy then spends seven months in a training ship. In tabular form the course of his career may be exhibited thus:—

Age in Years.	
13 . .	Entry into Osborne
15 . .	Enters college at Dartmouth.
17 . .	Joins training ship for seven months.
$17\frac{3}{4}$ . .	Joins Navy for three years.
$20\frac{3}{4}$ . .	Goes through shore courses for sub-lieutenant lasting over one year in many cases.

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Age in Years	
21½ to 22 .	Finishes courses and goes to sea for a little over a year.
22¾ to 24 .	Commences special training in engineering, marine officer's duties, or other specialist work.
24¼ to 27 .	Goes to sea as a specialist officer.

After about 27½ may present himself for examination as commander in the executive line.

To judge of the training, whether as seaman or engineer, we have to compare a system where these boys would specialise as engineers or executives from the first. Opinions may differ as to whether it is wise to revert to the age of thirteen years for entry; but if a higher age were selected it would tell most against the Admiralty scheme, because of the amount of special knowledge of three distinct professions that is required after entry. Everybody acknowledges that it is as necessary for the executive officer to take account of engine-room requirements as it is for him to possess sufficient knowledge of hygiene to enter sympathetically into the standpoint from which the ship's surgeons tender their advice. For this reason engineering training in moderation has for years past been given to executive officers. For the sake of their gunnery and torpedo work it might be contended that more mechanical knowledge than hitherto is necessary. We might fix the limit of time devoted to mechanical engineering at 10 per cent. of the time instead of 30 per cent., as is the case to-day in the colleges, and 10 per cent. at sea, instead of over 50 per cent. The result would be somewhat as follows: Instead of the boys spending four years in the college they would go to sea nine and a half months earlier, with precisely the same knowledge on every subject except engineering, and the naval instructor could still be done away with. The all-important training in responsibility would thus commence earlier. The two alternatives.

The Admiralty's intention is to devote more than 50 per cent. of the time at sea to engineering, but for the purposes of argument we may call it fifty. Allowing seven months for time spent on leave, sick, and on passage, we then find that three years and five months could be devoted to seamanship, gunnery, torpedo, navigation and pilotage under the alternative scheme, with four months to engineering, as compared with one and a half years for each under the Admiralty's proposals. It may here be noted that though it is a familiar criticism that the Admiralty appointed no committee to examine this question before issuing the Selborne Memorandum, there was a committee on naval training in 1898 which reported that three years is the absolute Sea training.

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minimum of sea-training for a midshipman. If we exclude the seven months as a schoolboy in a sea-going training-ship as giving no responsibility, the Admiralty scheme only provides a little over a year of genuine sea-training as midshipman. In the case of the engineer students under my alternative scheme, the college training would exclude the portion of their time devoted to seamanship, enabling them to get to sea with the same knowledge of their speciality some months earlier. They would obtain over three years and nine months' experience in engine practice, and then could undergo any special courses at the age of twenty instead of about twenty-three as proposed under the scheme of the Admiralty. The difference here is, of course, brought about by nearly three years being used up under the Admiralty's scheme through the future officers of the engine-room going through special gunnery, torpedo, navigation, and other courses, which have nothing to do with engine-room practice. Between these two alternatives the public must necessarily judge, and the better to enable them to do so we may again hark back to Lord Selborne's Memorandum.

Naval character.

"In dealing with this question, the Board have been always conscious of the supreme importance of preserving to the naval officer his unmistakable character. This character is developed from the early training in responsibility, the powers of self-reliance thereby engendered, and the essential unity of the Service. Notwithstanding the fact that during the transition period the system of naval education has been the subject of much criticism, the character of the naval officer has remained unimpaired, and character is of more value than knowledge." This standpoint should be applied to the alternative schemes. "The training in responsibility, the powers of self-reliance thereby engendered, and the essential unity of the Service," are impressed upon the midshipman by his work as a seaman on deck. There he understudies the lieutenants, and handles men or takes charge of boats, where an error of judgment may result in loss of life. In these duties he imbibes all the zest for strenuous endeavour taught by the gun-layers' and battle tests with the guns, and the competitions with boats, anchors, and net defence. If he is associated long enough with his seniors, he receives those intimate lessons which involve all that is best in the traditions of the Service. There also the sense of comradeship is engendered. We have to compare a system which devotes nearly three and a half years to sea-training against one and a half years under the Admiralty scheme—a system of whole-hearted allegiance against one of divided allegiance, and one in which there is no divided responsibility for the boy's progress against one in which the responsibility is dual in its

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character, for the boy is placed alternately under the executive officer above the protective deck and the engineer officer several decks below.

Admiralty admit sea-training defective.

Observers cannot fail to be struck by the fact that a series of circulars recently issued by the Admiralty point to the training in seamanship as not nearly so thorough as it should be even now when attention is not unduly diverted to the engine-room. On December 15, 1904, a circular was issued by the Admiralty "calling the attention of all commanding officers to the necessity of exercising the greatest care in preventing damage to colliers whilst employed coaling His Majesty's ships, and of ensuring that every precaution is taken that the collier is brought alongside and secured in a seamanlike manner." Again, in October, 1905, the Board issued a circular stating that they "recently had under consideration several cases in which collisions have occurred owing to insufficient regard having been paid by officers of His Majesty's ships to certain of the regulations for the prevention of collisions at sea." Later on we had the scathing minute on the stranding of the Assistance, in which a number of officers of all ranks were, to say the least of it, accused of lack of seamanship; and incidentally it was revealed that the Board had not sufficiently appreciated the importance of testing the defective ground tackle of the Assistance. The present writer compiled a list of thirty-six collisions and groundings recorded in the Press of British warships, exclusive of torpedo-boats, during six months of 1905. The official returns show sixty-five collisions and groundings of men-of-war and thirteen of torpedo-boats in 1904. This is at the rate of three a fortnight. It is clear that they cannot be reduced by diverting the attention of officers for 50 per cent. of their time to the engine-room. The history of gunnery has been very similar, and it is only now by the most careful attention that the number of so-called miss-fires are being reduced. In the handling of torpedo craft there is much to be desired. A preliminary course of Whitehead torpedo work is the only way the present ignorance of many of the officers in charge of these vessels can be remedied. Officers who have seen the German torpedo craft at work are loud in their expressions of admiration. It is astonishing how soon officers forget the smattering of gunnery and torpedo which is given them, and the Admiralty ought really to insist that the whole gunnery and torpedo training of midshipmen and sub-lieutenants should be levelled up far above the present standard.

The rivalry for promotion.

When the cadets themselves become lieutenants, difficulties are by no means diminished under the new scheme, for the divided allegiance between the deck and the engine-room reasserts itself in new

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forms. The struggle for promotion becomes the strongest incentive appealing to the officers. Owing to the fact that the highest posts will be open to all officers of the Navy, the competition for flag rank will be something like thirty-five for each vacancy. It must necessarily result that those officers who concentrate their attention on fighting work will be the best fitted for the highest posts of the Navy. The danger is that, under these circumstances, both zeal and comradeship will suffer, for, as will be seen later, the engineer will not begin to specialise until he is twenty-three years of age. He will then go ashore for a college training, which has not been defined, but which can hardly be of less than two years' duration. On going to sea, his attention ought to be absorbed in his engineering work. On the other hand, those who have not specialised in engineering will be enjoying all the advantages of purely naval training, with the certain knowledge that in five years after becoming lieutenants they will have to face an examination for commander in the following subjects:—

Court-martial procedure.
International law.
Knowledge of British and foreign warships, guns, torpedoes, etc.
Naval history.
Signals.
Strategy.
Tactics and battle formations.

In this examination the specialist lieutenants (E) will be hopelessly handicapped. There is no parallel to the gunnery, torpedo, navigating or flag-lieutenants whose special work is all immediately connected with the seaman's environment, the chief problem of their lives being the handling of ships as fighting platforms. Examinations or no examinations, there is no more exacting mistress than the sea, and it is the instinctive realisation of this supreme truth on the part of the deck officer in the American Navy that is the root cause of the present failure of their fighting engineer scheme. The statement is not one susceptible of proof on paper, but it was realised by the poet who wrote:—

"Would'st thou," so the helmsman answered,
"Learn the secret of the sea;
Only those who brave its dangers
Comprehend its mystery."

The American experiment.

This failure of the American experiment is alarming, for the fact is undoubted that in 1902 and 1903 we were officially assured that the experiment had been an undoubted success. It was our only practical guidance, apart from the Japanese attempt to unite the

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executive and engineering branches into one—an attempt which was frankly condemned after four and a half years' trial. The failure is rendered all the more marked in that it is recorded in the report for 1905 of the Engineer-in-Chief, who is a frank believer in the excellence of the scheme :—

> So long as the older officers of the former engineer corps remained available for service at sea, supplemented by the new body of officers called warrant machinists, the engineering duty of the Fleet was satisfactorily performed. . . . So few officers of the line are taking up engineering seriously that the situation is becoming alarming. That the Department must do something to relieve this situation, and do that something at once, is only too obvious to the most casual observer of present conditions. Were the country suddenly plunged in war, the Navy would find itself in no condition to win battles. As necessary as good markmanship is the ability to carry our guns to the firing line and to keep them there amidst the havoc created by modern ordnance, and this will never be done with amateurs in charge of the machinery.

The detractors of the scheme point—as Admiral Luce, U.S.N., has recently done in the *North American Review*—to the awful loss of life caused by the explosion of the Bennington's boilers, which were in charge of an officer who was one of the direct products of the American scheme.

The Japanese experiment.

Having referred to the American experiment, it is but natural that a few words should be devoted to the Japanese trial, lasting four and a half years. This is best described in the words of one of the Japanese captains of large ships in the recent war :—

> Our ships, during the blockade of Port Arthur, were under constant steam for a considerable period, coaling and victualling at sea, without breakdowns in the engine-room resulting from this constant service. . . . Our system of training engineers is totally different from that in force in the British Navy. Eighteen years ago we tried to bring up naval engineers in the naval college, giving them the same education as that accorded to their brothers of the executive branch. This was generally similar to the present system of the Royal Navy. We, however, found that courses of navigation, seamanship, etc., are absolutely unnecessary for engineer officers, while the course dealing with small details of engineering practice was not required by the executive officer. Hence we abolished this system after trying it for a few years, and then brought into force the modern Japanese system. Under present conditions, the entrance examination for engineers is much the same as that for the executive branch, but the education given the engineer is totally different, and is four months longer in duration.

It is significant that after six years' trial the Americans appear to be nearing the conclusion that the Japanese reached after four and a half years. As straws showing the way the wind blows, it may be noted that a private Bill has been introduced into Congress to re-establish the Engineer Corps, and the head of the engineering department has reported that there are only two alternatives, viz., to re-establish an Engineer Corps or to form one out of the executive branch permanently detailed for engineering duties. He is, however, opposed to returning to the old system. The Secretary of the Navy responsible for the scheme has also put it on record that he has so little belief in it that he anticipates that the machinists, who correspond to our engine-room artificer class, will "become a

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future Engineer Corps, just as the late Engineer Corps developed from civilians appointed into the Navy during the early days of steam."

Inquiry urged.

We have dealt shortly with the Japanese and American experiments, for, besides our own knowledge of the method adopted by the mercantile marine, they are the only data we have to go upon, beyond the excellence of the naval officer under the old system, in spite of certain admitted defects of training. The existence of this body of evidence does not of itself condemn the Admiralty scheme; but it justifies the demand for an enquiry into the principles, scope, and effect of that scheme. Many who were conciliated by Lord Selborne's Statement that "it is proposed to make the division into the various branches definite and final" have become hostile as the result of the action of the Admiralty and its committee in deciding, eight and a half years before specialisation in engineering, etc., begins, that all officers shall be able to pass from one branch to another. In 1901 Lord Selborne, on the authority "of admirals and captains fresh from the sea," declared that, "so far as the *personnel* goes, it is scarcely possible to improve the officers or the men." They say with extraordinary unanimity that, subject to some improvements in detail, the general system of training young officers and seamen leaves nothing to be desired. Again, in the annual statement on the Navy Estimates for 1902–3, the First Lord wrote that "the system judged by its results—the excellence of the officers trained under it—is a good one." There surely is ground for enquiring what happened since that time, when Lord Selborne was advised by three members of the Board that introduced the scheme of 1902, and by a fourth, Sir A. Douglas, who was subsequently chairman of the committee in 1905, of whose report at the time of writing we know nothing beyond the references to it in Lord Cawdor's Memorandum, and the fact that there was a minority report.

Second state of the argument.

The committee referred to was chosen by the Admiralty to deal with the allocation of duties of the new officers, and to report:—

(*a*) Whether any necessity exists for the distinct classification of such officers under existing branches of the Navy, with a view to their remaining specialised for the whole of their future service.

(*b*) Whether specialisation for a period of their career only is necessary; and, if so, to indicate the procedure that should be followed to carry out the necessary duties of the Service afloat.

(*c*) How best to provide for filling efficiently the higher scientific appointments of the Admiralty and dockyards.

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Once the argument of the unity of the Service is allowed free rein, so that one system of supply, one system of entry, and one system of training, is the adopted formula, it inevitably follows that the cry rises up, "Why then divide (specialise) at the age of twenty-three?" So with the committee's majority report. "The report has convinced the Board that there will be no need for a final division into the three branches, and that specialisation for a period only is necessary, as opposed to permanent classification into separate lines. There can be no question of the great advantage to the efficiency of the Service that this removal of differences will entail." It is necessary, however, to point out that the only experience before the committee as to the technical capabilities of the future officer has been with 85 children of 12½ to 14½ years of age, who, allowing for holidays and Sundays, had been under instruction for just 15 months. Of these 85 boys who passed an easy qualifying examination, no less than thirty are since stated to have been rejected during the two years. That all is not well is shown by the raising of the age of entry from 12 to 13. Unlike the boys of the same age who used to enter twenty years ago, they were passed into the Service without competition. They were chosen by what is known as a Selection Board, which sees each candidate for a few minutes' conversation only. These are indisputable facts. The writer has been made personally cognisant of the case of three boys rejected by the first Selection Board who, at the higher age, subsequently passed in fourth, sixth and thirteenth into H.M.S. Britannia. The system may be a good one, and it is right to bear in mind that it has been commended by distinguished men, but clearly it is against the accepted practice of the country, and is therefore a fit subject for an enquiry. This is rendered the more necessary owing to the use which is made in the Memorandum of the report of a committee of which Parliament, the Press, and the public know nothing. Such a course on the part of a Cabinet Minister in Parliament as a reference to any unknown document would inevitably be followed by the successful demand for the production of the document. The writer rejoices that after three months' discussion, and the refusal to him of this report in the first instance, it is now to be made public. It will, however, appear too late for treatment in this article; and it can only be hoped that when the report appears it will be seen that the committee consisted of broad-minded, impartial men free from departmental influence, that the terms of reference treated naval war training as a whole, and, while taking the fullest evidence from every branch affected, was careful above all things to take cognisance of the views of distinguished flag-officers and captains, with large fleet

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experience, who are among those most likely to be members of the Board of Admiralty in the future.

Continuity of policy.

The way continuity of policy has been achieved in the past is that the Sea Lords at the Board undoubtedly represented the prevailing opinion among officers who were likely to succeed to the Board. The quotations we have given show that Lord Selborne followed this course in 1901 and the beginning of 1902. On all occasions when drastic changes were introduced the admirals commanding fleets were fully consulted. In the case of the Selborne Memorandum, the Secretary to the Admiralty stated, on March 4, 1903, that the procedure was that "the First Lord sent a copy of his Memorandum *at the time of issue* to all the admirals in command of foreign stations. There was no necessity to consult them on the new scheme before its adoption, as the Board of Admiralty, from the nature of its constitution, is fully competent to act on its own initiative." The Board, however, never votes, and the First Lord has full power to carry any proposal through, even though as many as three out of four of his Sea Lords dissent. The correct spirit is, of course, the one given in Lord Selborne's Memorandum itself, when he says: "Every detail connected with the education of these young officers will be carefully thought out and considered, and the best authorities, naval and civil, will be consulted by the Board." As character is of more value than knowledge, and as the greater includes the less, it was even more incumbent on Lords Selborne and Cawdor to consult the great body of flag officers concerning the tremendous changes they proposed to effect in the type of officer who is to occupy all the subordinate posts on board ship in the near future. At about the time the Selborne Memorandum was issued, the Financial Secretary of the Admiralty was declaring the Sea Lords of the Admiralty to have insufficient leisure for considering the great problems confronting them. The statement constituted the strongest argument for a committee of inquiry.

The immediate need.

Happily, the mistake can be corrected, for the changes have been less than three years in existence, and, owing to the wise foresight of the Admiralty, the entries of engineer students have been continued up to the present time. It is therefore possible for an impartial committee to examine into the precise scope and effect of the changes initiated by the Selborne and Cawdor Memoranda of 1902 and 1905. Such a course is quite consistent with precedent, and is consonant with the actions of Lord Selborne's Board in appointing Sir Edward Grey's committee and others too numerous to mention. It is in reality a means favourable to continuity of policy, for it places, in a convenient manner, at the disposal of the First Lord the

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views of distinguished flag or other officers who are likely to be members of the Board of Admiralty in the near future. If the changes are of the beneficial character that they are believed to be by such distinguished officers as Sir John Fisher, then they will be triumphantly vindicated by the Committee. The voice of criticism will be hushed during all these coming years, which otherwise are likely to be a cycle of distressing controversy, reacting to the detriment of what was once known as "the silent Navy." Precious to the heart of the nation above all its possessions, the Navy should be interwoven into the national life so as to be the best visible expression of the nation itself. In what way has the Admiralty set to work to accomplish this high purpose? They have cut the Navy altogether adrift from the public, the grammar, and the technological schools of the nation. This year they have stopped the direct entry of engineers and removed the best of the opportunities which induced highly trained mechanics into the engine-rooms of the ships, neither of which class costs the Navy a penny. The mercantile marine have been curtly told that their deck officers must learn engineering if they are to retain the cadetships which have been annually given to the Worcester and the Conway. The Royal Naval Reserve entries have been stopped for no better reason than that the engineers do not know seamanship and the deck officers cannot handle engines. The entire body of officers can now only be drawn from a limited class able to afford an outlay of £550 to £600 in four years on a cadet son. The divorce of the Navy from the nation is being relentlessly completed while the nation is asleep, but there are not wanting signs that the people are beginning to wake up, for all the agencies of public opinion are at work on this scheme in Parliament, the Press and the platform.

CARLYON BELLAIRS.

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CHAPTER VIII.

THE ENGINEERING QUESTION.—II.

The attitude of the critics.

SINCE the issue of Lord Cawdor's "Statement of Admiralty Policy," dated November 30th, 1905, there has been much discussion, both within the Service and without, as to the effect of certain changes in relation to the careers of officers and men which were therein laid down. Many letters have appeared in various quarters denouncing what is known as the "new scheme," certain of them from the pen of a distinguished admiral, and some showing complete want of understanding of the subject, and there has been a discussion in the House of Commons, even including a proposal to appoint an investigating committee of three to report on the disputed questions—a committee, as some have suggested, composed of members ignorant of naval affairs, "their ignorance being the measure of their impartiality." Those who are discontented with the arrangements now being introduced have also been supported by a good deal of uninformed criticism in the Press. The discussion has turned chiefly upon the suppression of the distinction between the executive and engineering branches of the Navy, with the substitution of specialism in each, which it has been decided to bring about. Undeniably this part of the scheme is viewed in many influential quarters with much questioning, and it therefore seems important to place in a clear and comprehensible light some of the points which have been impugned. Various causes have contributed to the attitude of the hostile critics. There is, in the first place, a natural and characteristic conservatism in the Navy, which prompts those who have been trained and have served in past conditions to look unkindly upon proposals for radical change until the necessity for such change has been demonstrated. There has also been manifested a spirit of opposition in some powerful engineering circles outside the Navy, for it is discerned that engineer officers of the present class and training are destined within a measurable space of time to disappear. It must further be noted that there are powerful influences at work, which it is unnecessary to specify, these being of a more personal character, leading to the development of a spirit of opposition to changes emanating from the present Board of Admiralty.

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In what follows there shall be set forth some of the reasons which underlie the new policy. It will be seen that those who are opposed to it represent the forces of reaction, that they are men who, instead of leading in the forefront of progress, would have us cling in the new Navy of steel and steam to things that belonged to the dead Navy of oak and hemp. They are of the class of those who despised the engineer when he first came into the Navy, who stood aghast when the navigator was admitted to eexecutiv rank, who held unavailingly to the old system of mast and sail.

Failure to understand the new conditions.

The objections which have been raised appear to the writer to arise from a singular failure to take a firm hold of the principles involved, combined with a misunderstanding, on the part of some, of the purpose in view, and a misinterpretation of very essential facts. Thus there are those who write and speak as if the Admiralty intended to turn out a class of officers who might be engineers in one commission, navigators in another, gunnery officers in a third, Marines in a fourth, and so on. "Interchangeability" of this sort is a figment of the imagination. If we may judge by the opposition manifested to the scheme, it seems to be assumed that all is now for the best in the engineering bránch of the Navy. But the truth is that the system was vicious from the beginning. When the engineer first came in no one foresaw what he would become, and the needs of the Service have been provided for by a series of devices and expedients designed to relieve immediate pressure. The demands at the outbreak of the Russian war were met by bringing in all sorts and conditions of more or less competent engineers. There was no recognition of the value or even of the necessity of the engineer officer. Discontent, therefore, grew up in the branch, promotion was slow, entries were few, and withdrawals were many, so that at length the young men entering were compelled, under a bond of a substantial sum of money, to serve for a term of years. Expedient followed expedient, and vacancies were filled from outside sources, until, at length, Keyham was established, but the Admiralty made no adequate provision for the enormous demands resulting from the programme of the Naval Defence Act. Keyham would not hold the necessary numbers, and "temporary" and "probationary" officers were sought for, but the initial vice remained. A root of discontent and of final inefficiency had been planted in the Service, and nothing would avail but radical change. If it be asked why this change is made in the British Navy and not in others, save that of the United States, the answer is that the British Navy is the greatest and most progressive in the world, and that the necessities imposed upon us will inevitably, sooner or

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later, be imposed upon others. The plain truth is that a time had come when either the executive officer must be dominated by the engineer, or must himself absorb the engineer, and as to which is the more desirable solution of the problem there cannot be two opinions. I am aware that Admiral FitzGerald appears, to some extent at least, to have changed his view, but, in illustration of what I say, I cannot do better than quote from an article he wrote in the *National Review* in June, 1900.

> The Navy has made great strides in the direction of becoming a mechanical profession since Sir Geoffrey Hornby's day. Almost everything is now done on board men-of-war by machinery; manual labour is nothing; and the tendency is to increase the machinery, and to do nothing by hand which can be done by steam, electricity, or hydraulics. Not only the motive power, but the fighting power of our ships is all machinery. . . . Already the engineers are calling out for executive rank and executive titles. This is quite natural, as they see that they do most of the work, and that the maintenance of our modern ships in a state of fighting efficiency is the business of mechanics and not of sailors. . . . It is not difficult to foresee that unless our executives—both officers and men—receive a more mechanical training than they do at present, they will be gradually ousted by the engineers and artificers. . . . The "sailor," as we have hitherto known him, cannot survive long, as there is no place for him in a modern man-of-war.

As Lord Charles Beresford said in the course of an interview, when Lord Selborne's Memorandum was challenged, "the executive officer remained ignorant of one of the most important parts of his profession; changing circumstances involved new conditions, and it was important that naval officers should have an opportunity of adding to their other professional attainments the essential knowledge of marine engineering." That the officer who generates a gas from gunpowder or cordite, and uses it to propel the projectiles which are to win the battle, is as much a marine engineer as the officer who generates steam from coal or some other fuel, and uses it to propel the ship to the scene of battle, was the cardinal fact which lacked recognition.

Necessity for change.

The progressive developments in all naval material, so surprising and so little anticipated, which have marked the gigantic strides between the launch of the Victory and that of the Dreadnought, are now conspicuous to everyone, but not everyone has realised the consequences that must inevitably follow. Until recently, strange as it may now appear, the young officer was trained in methods of ship propulsion which are applied no more in the Navy—a species of teaching still continued in foreign fleets, to which are even added new vessels built to train boys in systems of seamanship which belong to a century ago. It is valuable training, no doubt, for educing the qualities of quickness of eye, readiness in emergency, and decision of character, but it can no longer be maintained. Officers to whom is entrusted the command of ships of war cannot be divorced from the means by

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which those ships are brought into strategical and tactical use. The soldier who was embarked in the early fighting vessel was inevitably merged very soon with the seaman and severe punishment awaited the too conservative nation which was blind in that matter to the logic of facts. It became the highest skill of the new sea officer to handle his ship in stress of weather so as to keep her efficient, and in action to lay her where she could inflict the greatest damage upon the enemy. Naval warfare was, in fact, as it yet is, fundamentally a matter of movement and position combined with hard hitting, and as soon as movement and position became dependent on engine power, and the means of hard hitting on mechanism, it was certain that sooner or later—and the sooner the better for the Navy—the naval officer would become an engineer. It is certainly a remarkable thing that there appears to be a notion abroad that the object of the Admiralty is to abolish the engineers, which is emphatically not the case at all; the purpose, on the contrary, being to make every officer a trained engineer, with engineering as a specialism, just as are gunnery, torpedo, and navigation. It is not considered that the efficiency of the new training is a matter of mere personal opinion or of conjecture. The Admiralty contend that they were justified in adopting the new scheme, because the conditions it aims to establish are strictly analogous to those which already exist in the Navy and in civil professions, and it is believed that no doubt as to satisfactory results can exist in the minds of those who have thoroughly investigated and completely understood the facts of the case and the circumstances and figures involved.

The Selborne and Cawdor Minutes.

Some surprise was caused by the fact that the Cawdor Memorandum announced a development of the new system of entry and training in advance of the measures adopted under the Memorandum issued by Lord Selborne. The fact is that, when the new system was first introduced in 1902, the Admiralty felt that, because of insufficient experience and of inadequate data bearing upon the subject, it would have been unjustifiable to hold out to all candidates who might enter for the three branches—executive, engineering, and Marine—the hope that they might eventually become captains of ships and admirals of fleets. It was premature to declare that it would be possible to do away completely with the distinction between the branches when the officers reached the rank of lieutenant; but there could be no question that to do so would be an immense advantage, and would add to the general efficiency of the Navy by providing the possibility of interchange of duties, and therefore giving a reserve of officers for each branch. There was, however, no immediate reason for coming to a decision, and accordingly the

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Admiralty considered it best to assume that the division into various branches would be made definitely. They did not thereby bind the hands of themselves or their successors, and from the very beginning, as Lord Selborne explained (House of Lords, May 8th, 1903), he "fully believed and hoped" that a removal of the barrier between the branches would become possible, and that engineers as a finally specialised branch would "disappear altogether." In a letter to a correspondent, written on January 9th, 1903, he said that the system of a definite division between branches could only apply to the principles adopted by the Admiralty Board at the time, and would leave any future Board free to relax the rule if it thought fit. There is thus nothing essentially new in the Cawdor Memorandum, and it should have caused no surprise.

Developments in the Cawdor scheme.

Why, it is now asked, should a decision have been arrived at to remove the distinction between the branches when so short a time has elapsed, and no direct evidence has yet been made available? Why should the change be made at all? The answer surely is that in the Navy all has been changed, and is changing rapidly, except until recently in the case of the *personnel*, and that to stand still in this important matter was to incur danger, to retard progress, and, in fact, to recede. At any rate, Sir Archibald Douglas's Committee, after discussing the matter in detail, arrived at a conclusion which convinced the Admiralty that there would be no need for a final division into the three branches, and that specialisation for a period only was necessary, as opposed to permanent classification into separate lines. There were cogent reasons also for hastening a decision. Uncertainty as to future developments was seen to be exercising a disturbing effect on the cadets and those who were interested in them, whereby it was feared a deleterious effect on the entry of cadets and their training might follow. It is, at least, curious that the most serious criticism passed upon the Selborne scheme was that it left open the old difficulty, and indeed introduced a new one, by providing, after the common entry and training of officers, for a definite and final separation, which would be a hardship and a fruitful source of discontent. If the selection of boys for entry is difficult and invidious, how much more difficult and invidious would be the later selection of officers for the three branches of the Service. Hence was seen the importance of arriving at a decision, and from what follows it will be made clear that to arrive at a decision was not only imperative, but that the decision was well justified for very practical reasons. Those who have investigated the subject are perfectly well aware that it is nothing less than absurd to allege, as some do, that engineering training cannot profitably begin at the age of thirteen.

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Opposition to the scheme. Engineering inefficiency alleged.

The grounds of the objection to the new proposals are two-fold—a fear that the engineering efficiency of the Navy may be impaired by the work being committed to officers who have not been trained from the beginning and throughout their service in the duties, and a fear, on the other hand, that the seaman-like qualities of officers will suffer if part of their youthful training be given up to engineering, and they are from time to time employed in the engine-room. It may be well to examine the first of these matters with some care, because the impeachment of the new system of training officers for engineering duties has assumed a large place in the attacks made upon the Admiralty. It has been said that an officer may even be sent to sea with the rank of a senior lieutenant, and be employed in executive duties after being occupied for eight years exclusively in engineering work and experience, and therefore that, whatever may be his fitness for the duties of the engine-room, he could not well be equipped for the duties of the deck. The training, it has been said, which he would require in order to execute those duties efficiently he would not have received, and he would have received training which he did not require, the object being either to make the engineer fight the ship, or, on the other hand, the officer who should be on the bridge to take his duties in the engine room! It has been alleged that engineering is such a very special business, that it cannot possibly be learned by an officer who has anything to do with executive duties. But, as Lord Charles Beresford said, in speaking of the Selborne scheme, there "is no reason why lieutenants (E) should not be just as good and useful experts in their speciality as the gunnery, torpedo and navigating lieutenants of the present day, without in the slightest degree detracting from their ability to become excellent executive officers. In fact, no reason can be adduced to show that they would not be quite as capable of commanding ships and fleets as their brother officers." Yet there have been gloomy vaticinations, which remind one of the outcry raised when the old navigation branch was abolished, and the charmed circle was broken by the entry of the successors of the old masters to share with their comrades all the advantages of the Service. It was foretold that dangers would ensue, and that catastrophes would inevitably follow, whereas the truth is that the navigating branch of the Navy is now as efficient as any other.

The allegation disproved.

It must be noticed that the duties performed by the engineer officers of the Navy are not precisely the same, as some imagine, as those performed by engineers in the mercantile marine. Engineer officers take their watches in the engine-room, but in practice the actual duties are performed by engine-room artificers and stokers—

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the former a class of highly trained and skilled mechanics—under the supervision of the engineer officers. The Admiralty does not propose to abolish the artificers, but, on the contrary, has made arrangements to give them very special training and employ them in their proper duties. The engineer officer exercises control, but the stoker cleans and preserves in order the hull and machinery; the artificer ratings repair, adjust and examine the machinery, while the stokers tend the boilers, and the artificers chiefly execute watch-keeping on machinery in motion. As to the work of supervision, it must, of course, be undertaken by those who are thoroughly efficient and themselves competent to do the work; and there may be absolute confidence, in view of what is being done, that such competence will be found in officers who are trained in engineering as a specialism and become lieutenants (E). It is admitted, though the statement is not universally true, that the officers trained under the old system were efficient for their duties, and it is capable of demonstration that the lieutenants (E), under the new scheme, will be possessed of more extensive knowledge of engineering duties than the engineers who were trained at Keyham, more especially in the work of practical engineering, applied mechanics, and thermo-dynamics. The lieutenants (E) will have undergone a training of ten years upon a well organised plan, and of this period they will have had four and a half years at sea, acquiring the habit of command which is so necessary a part of the mental and moral equipment of naval officers, and they will have studied their work as engineers in actual sea-going conditions. The engineer under the old system did not have more than six years' training, even if he proceeded to become a higher Greenwich specialist, and his training, besides being mostly on shore, was not upon a perfectly organised plan. It can be shown that, under the new scheme, practically all naval officers will have learned as much of practical mathematics and marine engineering as was acquired by the engineer from Keyham who had not taken up the advanced mathematical course. Out of his nine years' training every sub-lieutenant will have been employed for nearly three years at Osborne, Dartmouth, and at sea in engineering work and duties, and three years is the length of the Keyham course, while the lieutenant (E) will have undergone a training of three and two-thirds years, and the higher specialists will have had practically the same period of training as has been given under the old system to the higher specialists.

Merits of the new system.

Those who have any doubt as to the efficiency of the new system should certainly visit the establishments at Osborne and Dartmouth to convince themselves. The following account of the character of

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the latter establishment is quoted from an article by a Civil Engineer published in the *Times*.

Dartmouth College in this respect would be a revelation to them; for they would there have positive proof that the technical conceptions which under faulty systems of teaching were only with difficulty imparted to senior students can be and are, under proper guidance, made as clear as the day to these fortunate lads. Sound training in physics and mechanics, acquired in the laboratories, is the foundation of this success. Sound training in mathematics, built up in and through and around the laboratory work, is the superstructure. The substitution for toys and analogies of actual machines, gear, and ships is the broadening influence; while the methods and discipline characteristic of the Navy give to the whole the sense of trustworthiness and strength. Critics should visit Dartmouth College and judge for themselves. They should see what is now done to reduce the main conceptions of mechanics and engineering to the limits of comprehension of the healthy-minded schoolboy: and they should judge as to whether the process of acquirement is or is not as easy to the lad as, say, Latin grammar or Greek verse. The mechanical apparatus in the laboratory, for enabling quantitative notions to be gained of such terms as velocity, mass, acceleration, wave-length, inertia, and moments, admits of no doubt as to the practicability of the syllabus. Ideas already planted at Osborne concerning statics and the efficiency of machines are at Dartmouth developed into quantitative conceptions regarding momentum, projectiles, harmonic motion, and the balancing of rotating and reciprocating parts. When they leave Dartmouth at least 50 per cent. of the cadets will have mastered the elements of the differential and integral calculus; all will have done a fair amount of analytical geometry, trigonometry, and spherical trigonometry, and, of course, algebra will be well taught. The water-tanks are being employed for instruction in quantitative measurements of meta-centric height and curves of buoyancy. The cadets soon realise that these are but long names for comparatively simple notions, and it is already observed that so keen is their interest in physics that they are making strenuous efforts to pursue their mathematics so as to follow up the enticing track which is there revealed to them.*

It is unnecessary to describe the further training of officers who specialise as lieutenants (E). But it is nothing less than a gratuitous assumption, supported by no shadow of evidence or probability, that engineering efficiency will be impaired under these men, or that breakdowns are likely to be more frequent in the future than in the past. Everyone who knows anything about the Navy is aware that breakdowns have most frequently occurred in ships mobilised for manœuvres with complements new to them, and often owing to the inexperience of stokers in managing the new water-tube boilers; and it is precisely in regard to these matters that the new policy of nucleus crews, and of ships in commission in reserve, and the better training of stokers, will prove advantageous. The old system was not condemned because of engineering breakdowns and disasters, and it is a grotesque assumption that the engineers of the new class will be responsible for any deterioration in this matter. Everything, indeed, encourages us to believe that engineering efficiency will be greater in the future than in the past.

A great deal has been made, both in the United States and in this country, of the disaster which occurred in the American gun vessel Bennington at San Diego, whereby various critics, and some who should have been better informed, assumed that a practical The Bennington disaster.

* *Times*, Feb. 26, 1903.

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condemnation had been brought about of the United States system of amalgamating the branches, which was thus presumed to have been demonstrated to be a complete failure. Now, in the first place, the American system cannot be compared with our own, because it began at the top, and almost by a stroke of the pen attempted to make the "line" officer responsible for engineering duties, whereas the British Admiralty is beginning at the bottom, and training youths in the work of the engineer, and providing afterwards for proper specialism. Those who are acquainted with the characteristics of the American system are well aware that the defect is not in the system itself, but in the way in which it has been administered. Rear-Admiral Rae, Engineer-in-Chief of the United States Navy, who has said that, "were the country suddenly plunged into war, the Navy would find itself in no condition to win battles," does not propose to reconstitute the old engineering corps of the Navy, but is at pains to show why that should not be done. The engineering course at the Naval Academy is most complete, but the officers are not subsequently properly employed, and there can be no doubt that the intention of those who framed the Naval Personnel Bill has been ignored. The United States executive officer will have to recognise that naval engineering requires such specialism as is being adopted in this country. As to the case of the Bennington, it is a known fact that she was fitted with obsolete machinery, and there is not the least reason to believe that the disaster would have been averted if the two branches had never been amalgamated. Lieut.-Commander L. H. Chandler, U.S.N., who has made a most exhaustive study of the whole engineering question, has demonstrated the fundamental merit of the United States system in a contribution to the United States Naval Institute, which all who would understand the matter may be recommended to consult.*

Amalgamation in the U.S. not a failure.

He says that the friends of the new system have felt so confident of its strength that they have paid no regard to the rabid attacks made upon it. The radical mistake was in thinking that only the cadets who were to become engineer officers needed a higher engineering knowledge, "whereas, in fact, every cadet needs it." The naval officer of the day must of necessity be a competent engineer, and this was the cause of the passage of the Personnel Bill. "Follow naval history from the beginning," says Lieut.-Commander Chandler, "and you will see that from the day when sea warfare first became a science 'amalgamation' has been the key to success. England first of all nations recognised the necessity for that first amalgamation"—the amalgamation of the soldier and the seaman—

* "Proceedings of the United States Naval Institute," vol. xxxi., No. 4.

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"and her dominions forthwith extended to the ends of the earth." This incisive writer goes on to say that England will follow the example of the United States—we have already done so, and improved on it—"and behind her will come lagging the other nations, in which the blindness of caste rules that a man cannot be a military officer and a mechanic at the same time."

In relation to the special matter of the Bennington, Lieut.-Commander Chandler says that, up to the time of the disaster, the spirit to inspire a movement towards steam engineering was almost lacking, and for various reasons the time and attention given to it was sadly below that given to the other branches. As the Chief of the Bureau of Steam Engineering said, for three years absolutely nothing was done by the younger line officers to acquire engineering experiences, and later, owing to the scarcity of officers for the large number of ships in commission, little in that direction was accomplished. "Engineering logically belongs to the line, and the line should be made to perform that duty earnestly." It is denied that the United States amalgamation has reduced the number of competent engineer officers available, and it is asserted that the cry for more engineers was caused exclusively by the same reason that brought about the great scarcity of sea-going officers of both branches. It is sufficiently demonstrated by the powerful article which has been quoted that amalgamation in the United States Navy has not in itself been a failure, but that, on the contrary, it has all the elements that ensure its becoming a complete success.

The new training and seamanship.

Let us now turn to the other allegation of the opponents of the new measure—that seaman-like efficiency will be impaired by it, and that disasters in navigation are the consequences to be expected. This is purely a speculative opinion contrary to all the probabilities of the case, and shall not be discussed at length. The midshipman will have much more thorough training in deck duties than his predecessor, and because he will spend 50 per cent. of his first three years as sub-lieutenant or junior lieutenant in the engine-room department, there is nothing to show that he will be less capable of deck duties, for have not many admirals spent a much longer period on half-pay when they were young naval officers? As to the gunnery lieutenant, his career, after Part II. at Greenwich, will be identical with the previous system, except that his engineering experience should fit him to undergo the shore courses more quickly, and to spend more time at sea, while musketry, field training, and company drill being under the lieutenant (M), he will have much more time for the general work of his profession. As to the lieutenant (E), he will have experiences of deck watch-keeping which none of his pre-

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decessors have had, and he will have been thoroughly trained in the duties of the seaman. Moreover, he will have frequent opportunities of handling the ship, and with a view to his ultimate reversion to the executive line, he will necessarily keep abreast of the duties. Indeed, looked at from every point of view, the seaman-like efficiency of the Navy cannot be impaired. As to the casualties which have occurred in the past, they have been smaller in number than in any foreign Navy or in the mercantile marine, and no training could altogether eliminate them. They occur mostly in destroyer work, in conditions assimilated as much as possible to those of war, in which "dash" is encouraged. Such mishaps have occurred frequently under the old system, and are likely to be reduced under the new.

Artificers and stokers.

Some other points call for notice. The Admiralty has wisely attached great importance to the training and right employment of artificers and stokers. The more highly trained specialists are to be relieved from the routine duty of engine-room watch-keeping, and satisfaction is to be given to a very deserving class of men, the stokers, by opening to them opportunities of advancement through the creation of the new chief petty officer rating of mechanician. The highly-trained engine-room artificers will be enabled, as a consequence, to devote their time to the real calling of artificers, instead of largely to engine-room watch-keeping. At the same time the stoker ratings will be eligible for promotion to warrant rank. It will be less expensive to train them for the new duties assigned to them than to enter skilled workmen, and then teach these engine driving, and divert them from their repair work while they are being so trained and employed. In harbour the artificers will be fully occupied in ordinary maintenance work and the supervision of the large number of stokers, and at sea, when the main engines are running, they will carry out repairs on the very numerous auxiliary engines and machines, which have such an important place in modern vessels, and upon groups of boilers and accessories which may not be in use. Under the old system, when the artificers have been employed in watch-keeping, some of this work has lapsed. The artificers are skilled men who have had their training in various trades as engine fitters, boilermakers, coppersmiths, moulders or pattern makers, but most of them have had to learn a large part of their engine-room and stokehold duties after entering the Service, and, if the stoker class can be so trained, there is no reason for diverting skilled artificers, who have served a long apprenticeship, from their legitimate occupations. Moreover, it is a satisfactory thing that warrant rank is now opened to the large body of 29,000 stokers.

The great advantage offered by the revised scheme is that it will

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Conclusion.

provide for an interchange of officers in case of necessity, and that it will combine specialism with an equal future for all officers. If it be considered that a greater number of fighting officers is required in these days of strenuous war service and danger to life on deck from the storm of shot and shell, it will be seen that the new arrangements will provide a potential reserve from the engine room. Indeed, there will be a reserve for both classes of officers, since all can be trained to perform ordinary duties in either place. At the same time there is the advantage of providing a class of highly trained artificers produced from the entering of boys, and of employing them upon work demanding the greatest skill. These are things well worth striving for, and we may look forward with full confidence to the future. An evil campaign, it is true, has been started against the Admiralty, and the forces of obstruction and retrogression, of prejudice and prepossession, have been arrayed. Even an attempt has been made to drag the Navy into the political arena, and to raise a war of classes over the question of the entry of officers. The plain duty of Englishmen is to wait and see how the new scheme, promising so well, works out in practice. There could be no sense in appointing a committee of inquiry. What could be its competence? Are we, forsooth, to suspend the system already set in motion, when no other is suggested or devised, at the whim of an uninformed opposition? Many changes have already been made by the Admiralty which can be tested by their results. The cost of the Navy has been reduced by several millions by getting rid of what was of no use for war purposes, and the arrangements are now such that all officers and men are employed where they can be really trained and do good service, instead of some of them, as under the condemned system, being either quartered on shore or distributed on detached and unnecessary duty in various parts of the world. The principle has been declared and accepted of giving the engineer officer the same chances of promotion as any other officer, and it is a sound principle. Other countries are encountering the difficulties which confront us. We have faced the problem boldly and have grappled with its difficulties, and they are preparing to follow us in the path we have chosen. This is the conviction of those who have investigated and understand the new scheme of naval training—a scheme which is but one part of a mighty reform destined to bring every element of naval power into a state of immediate readiness for war.

"ARCHIMEDES."

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CHAPTER IX.

THE PROBLEM OF SPEED—BOTH SIDES OF THE QUESTION.

The problem stated.

MAINLY as an important consequence of the naval actions of the Russo-Japanese war, but partly as the outcome of an old controversy revived by the events, a great deal has been written recently concerning the relative value of speed, strategically and tactically, and it seems desirable to give a place to the discussion in the *Naval Annual*. The question was debated twenty years ago at the Royal United Service Institution, when Sir Cooper Key—whose view was that 12 knots was a maximum for battleships—presided over a meeting at which Admiral Sir Edmund Fremantle spoke of speed as "of the first value," and applied his arguments to show how it could be used. Two years later, in February, 1888, Sir Edmund Fremantle read a paper on "Speed as a Factor in Naval Warfare," in which he dealt fully with the subject, contending that speed in the steam navy is the equivalent of the weather gauge of the older seamen.

A solution in practice.

The necessity of arriving at a conclusion as to the qualities necessary to be embodied in ships of war, and chiefly in battleships, has now given a character of urgency to the discussion of this subject, because the navies of the world have entered upon a new era of warship building, which began with the laying down of the Dreadnought. Although professional opinion remains to some extent undecided, a practical decision seems to have been arrived at in favour of much higher speed. Thus the Dreadnought is credited with 21 knots, and Admiral von Tirpitz, Secretary of State for the German Navy, speaking recently in the Reichstag concerning the new battleships, said that the German Navy "could not remain blind to these advances, and must follow suit." The new Japanese and German battleships are, it is understood, to steam at 19½ knots, while the French Minister of Marine has increased the speed of the projected battleships to 19 knots, and before the plans are definitely approved, it is anticipated that a higher rate may be sanctioned, probably of 19½ or 20 knots, as advocated in some professional circles.

Abstract value of speed.

In the abstract, few deny the value of speed, but modern ships always represent a compromise, and there are those who think that speed may be purchased at too great a price by the loss of protection, gun power, or range of action, and who even question the value of

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superiority of speed. The possibility of using thinner armour, and the new policy of displacing the medium armament of battleships, seemed to some to promise an economy of weight, which might be used in the increase of engine power; though a certain doubt attends this matter, since one lesson of the war has been the need of more complete protection, and a great weight of armour has been built into the new Russian armoured cruiser Rurik and other vessels as a direct consequence. This was a difficulty that never troubled the old seamen except when, as happened in the early 18th century, French ships were found to be more speedy than our own. Nelson had no doubt of the advantage of superior mobility strategically in his movements in the Mediterranean and his chase of Villeneuve, nor tactically would any old seaman have undervalued it as an essential for gaining the weather gauge and bearing down on an adversary. French tactics were largely based upon an attempt to reduce the enemy's speed by doing as much damage as possible to his masts and yards by employing the *tir à démâter* rather than the *tir à couler bas.*

THE CASE AGAINST HIGH SPEED.

The late Rear-Admiral H. J. May, in two remarkable papers published in 1897, attached very high value to speed, as some thought to the disadvantage of gun-power, and some discussion ensued. Admiral Sir Cyprian Bridge, in his comments upon the last naval campaign in the *Naval Annual* last year, and with the actions of August 10 and 14, 1904, under consideration, said that the view was confirmed of those officers who had made a close study of naval tactics that no great value as a factor in tactics could be assigned to speed, while even in the strategical domain anticipations of the advantage to be gained from superior speed had only been partially fulfilled.

Opinion of Sir Cyprian Bridge.

> The reasons of the disappointment of the expectations formed concerning superior speed have been in part disclosed by the incidents of the late campaign. We see now that many things which will neutralise it are likely to happen. The faculty of proceeding at a speed superior to that of your adversary may remain unimpaired, and yet—as were Vice-Admiral Kamimura's cruisers on August 14—you may be unable to take advantage of it. The necessity of husbanding her coal-supply may compel, indeed is very likely to compel, a 25-knot Novik to proceed, as that ship had to do, at a moderate rate. A fast ship may find that she cannot put forward her utmost speed because of injuries to her funnels or because she has been obliged to disconnect some of her boilers. We should not hastily draw conclusions concerning speed. What we ought to do is to remember that it is only one of the various elements of fighting efficiency. A ship of war is intended primarily to fight and not to run away. We should therefore be careful not to give to any other element undue predominance over the element of offensive power in the design of a ship meant to be capable of destroying or defeating her antagonist. In ships for fighting general actions—that is, ships for fighting in combination with consorts—the element of offensive power in any individual should bear the proper relation to the aggregate of that power in the whole group. Suitable dispersion should be given to the instruments of offensive power, and allowance should be made for suitable

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concentration of their effect. For certain classes of vessels, which usually will be of small size, very high speed, greater than that of an antagonist if possible, should be provided; but it must be understood that these vessels can play only a special and restricted part in war.

The same distinguished officer, in a letter criticising the design of the Dreadnought,* has said that battles are won with weapons, and that speed is not a weapon, but a factor of strategy and tactics in the guise of mobility, and no more a weapon than coal endurance, which is also a factor of tactics. "Failure to understand the essential distinction between speed and armament has been at the bottom of many mistakes in naval design, and is the parent of most of the enormous costliness of modern navies."

Sir Reginald Custance.

Sir Reginald Custance also, in the course of a plea for the study of tactics, in the *Naval Annual*, 1905, said the question as to whether speed could give any tactical advantage beyond the power to accept or refuse action was still a doubtful question, and would remain so until properly investigated and tested by experiments. When this opinion was written the battle of Tsushima had not been fought, but it may be well in relation to it to cite what was said in a recent article in *Blackwood's Magazine*.† The writer, aware that high speed was much in favour, said he doubted the wisdom of the decision on the ground that it had been proved "by an acute and competent hand," and confirmed by his own observations at sea, that a superior speed of two or three knots does not give any particular tactical advantage to a fleet. He thought it unwise to come to a hasty conclusion on a matter of such importance, where immense sums of money were involved, and urged that tactical exercises should be carried out to test the question.

Commander Daveluy.

These opinions, based as they are upon a consideration of the relative value of the factors necessary for success in naval warfare, are entitled to the most careful consideration. The same view has been taken by other writers whose opinions must be recorded here. Commander Daveluy, of the French Navy, has said, like Sir Cyprian Bridge, that speed is not a weapon, but an element facilitating the use of weapons, as are the sun and the sea, and being an element auxiliary to weapons, cannot be substituted for them. "La vitesse, en effet, ne procure pas un bonheur sans mélange; elle pèse lourd et elle coûte cher." He added that France, by seeking absolute superiority of speed, would add to her numerical inferiority an inferiority of power. "Quelle doctrine déprimante!" ‡ The same author has said that no Power has the secret of constructing vessels

* *Times*, March 2, 1906.
† February, 1906.
‡ "Étude sur le combat naval," 1902, pp. 135-6.

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swifter than those of her neighbours, that speeds of various classes of vessels tend to be equalised, and that an advantage gained in construction would soon be lost. Supernatural qualities must not be attributed to speed; it is not power but the means of employing power, and no one has the right to sacrifice a single gun to it.* Again, speaking of the late war, Commander Daveluy writes :—

À propos des trois combats de la guerre russo-japonaise (10 août, 14 août, 1904, 27 mai, 1905), on n'a pas manqué de dire et de redire que les victoires des Japonais avaient eu pour principale cause leur supériorité de vitesse qui leur avait permis de rester maître de la distance de combat. C'est donc que la distance ne profite pas au même degré aux deux adversaires, tout en restant la même pour chacun. . . . "Le vainqueur sera celui qui sera capable d'imposer la distance." Cette formule a beaucoup de partisans. D'abord c'est une formule; ensuite, cet aphorisme enveloppe d'une forme vague les mystères du champ de bataille; enfin, cette façon de réduire l'adversaire n'est pas coûteuse; elle bat en brèche la suprématie des gros bataillons. Bref, c'est une panacée universelle. C'est surtout un sophisme et un sophisme dangereux. En fait, on ne s'en est jamais servi que pour préconiser les grandes distances de combat; c'est le grand cheval de bataille des gens qui aiment passionnément la défensive. . . . En définitive, la vitesse est bien un élément tactique; il serait dangereux d'en conclure qu'elle est une arme. . . . Aussitôt qu'une puissance maritime développe sur ses vaisseaux un élément quelconque, que ce soit la vitesse ou l'armement, toutes les autres marines l'imitent aussitôt, et la ridicule progression des tonnages à laquelle nous assistons depuis vingt ans n'a pas d'autre origine.†

M. de Lanessan.

Another French writer, M. de Lanessan, formerly French Minister of Marine, who was responsible for the shipbuilding programme of 1900, in a volume upon the lessons of the Russo-Japanese war, has devoted exhaustive attention to the armament and protection of ships of war, thereby assigning a lower place to speed, concerning which, he says, that the results of the battle of Tsushima were far from being favourable to the vessels in which protection had been sacrificed to speed. He had already in his volume, entitled "Le Programme Maritime de 1900" (p. 64), declared that every trial had shown that a squadron of well protected vessels would have, in action, the advantage over a squadron of vessels of better speed not well protected. The ex-Minister, in his new book, does not enter into this matter at length, and he seems to consider that the active argument which has been caused by the question in France, has turned upon the advantages of speed as a source of security. "The battle of Tsushima," he says, "is precisely interesting from the point of view of the discussions which have for some time taken place in this country on the subject of the utility of speed, regarded as a means of protection for vessels."‡ The view thus presented is certainly a partial one, and does not rightly appreciate the advantages which French advocates of high speed hope to obtain by it.

* "Étude sur la stratégie navale", 1905, pp. 96-7.
† "Les Leçons de la Guerre Russo-Japonaise, 1906," pp. 129, 136–7.
‡ "Les Enseignements Maritimes de la Guerre Russo-Japonaise," 1905, pp. 65–6.

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M. Ferrand and other French authorities.

M. Ferrand, a distinguished French naval engineer, has discussed the subject much more fully in a remarkable article in the *Journal des Débats*.* He admits the strategical and tactical value of speed, but insists upon the excessive cost of ships which are to embody all the *desiderata* sought for. This is a point of view to be noticed in French contributions to this discussion, because France, having smaller resources available for her Navy than this country, must necessarily consider very carefully in which direction best to employ them. M. Ferrand's great objection is that such a battleship as he supposes would be required would swallow up one-sixth of the whole French Navy budget, but his critics think he greatly exaggerates this matter. He cannot see why the speed should be arrested at 21 knots. Why should it not be increased to 25 knots, and why should not there be battleships of 30,000 tons? The increase would not be greater proportionately than that made within the last thirty years. Common sense, says M. Ferrand, demands a compromise, and sacrifices are necessary. They cannot be made in the matter of armament or protection. Speed may enable a belligerent to choose his adversary, and to some extent to influence the combat, but in the case of a vessel designed *combattre de près*—and the necessities of tactics impose this conception—are not these advantages, asks M. Ferrand, compensated by the disadvantages? Superiority of speed, even in time of peace, is, he says, often precarious. An accident, bad coal, untrained men, may destroy the dearly-bought additional knots. Again, it seems impossible to manœuvre a fleet in fighting order at more than 13 or 14 knots, while coal consumption is so great at high speeds that they are never resorted to in long-distance steaming. Moreover, stability, armament, and the *personnel* can be protected, but there is no means known to naval architecture of protecting speed. Engines and boilers may be behind armour, but it is impossible to protect the funnels from danger, and he points to Tsushima for proof of the result. Finally, the vessel desired, strong in armament and protection, could be built upon a displacement of 17,000 tons for forty-six million francs. As to M. Ferrand's supposed high-speed battleship, he thinks she would be of 19,000 tons, and would cost more than fifty-one million francs, or considerably over £2,000,000, while all the docking facilities and equipments of the arsenals would not suffice.

Another writer in the *Débats* has enforced the same views by contending that speed must be sacrificed in a large degree to range of action.† He contends that these two qualities are antagonistic, or

* August 18, 1905.
† October 21, 1905.

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in some measure mutually destructive. Increase of weight and space occupied in the engines and boilers involves reduced coal capacity. When speed is increased coal is rapidly expended, and thus there is an economical speed of about 10 knots usually adopted. "Give an admiral vessels of 20 knots, and he will be very careful how he uses their speed, knowing that if he steams at high speed he will not be able to steam far." Thus it is argued that speed is not of high strategic value.

The experienced officer, known as M. Pierreval, writing in the *Moniteur de la Flotte*,* has taken the view that maximum speed is always deceptive, because engines are working at their utmost power, and this he takes to be a general reason for not sacrificing offensive strength to the probability of a superiority in speed; while another writer in the same journal has expressed the view, which appears to be prevalent in France, that England, having greater resources, would always be able to build vessels possessing higher speed, and, whatever speed was given to French vessels, we should build vessels still swifter. He pointed out that speed is not a weapon, but that it facilitates the employment of weapons, while, when it is in the service of the weak, it offers a fatal temptation to them to attempt to escape.

The Arguments in Favour of High Speed.

Speed of the Dreadnought.

We shall now turn to the weighty opinion on the other side. Many of those who maintain the necessity of superior speed in British battleships are on the active list, and some of them holding high commands and appointments, so that they cannot express their opinions in public. But they have afforded practical proof of their belief in high speed by deciding to give the Dreadnought 21 knots. This, in itself, appears a powerful argument, for the decision has been arrived at by the Admiralty Committee on Designs, which was appointed to consider questions in connection with features in the future designs of fighting ships. This Committee consists of the First Lord of the Admiralty, the First and Second Sea Lords, the Controller and his professional officers, and the Fourth Sea Lord; while associated with them specially for the consideration of designs of ships as related to tactics, are the Admirals commanding in the Channel and the Atlantic and the Rear-Admiral commanding torpedo and submarine craft. A high scientific authority, a professor of naval architecture, two experts of the very highest standing from private yards, the Director of Naval Intelligence, and three post-

Admiralty Committee on Designs.

* October 7, 1905.

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captains, complete this very strong committee, and it must be assumed that the Dreadnought is the result of their deliberations. The committee is believed to hold the view that battle practice must not be regarded merely in the tactical or gyratory aspect, apart from the all-important factor of gun fire. Speed, it is argued, gives the choice of range, and is a fundamental principle in fighting a fleet, which it affects as a whole and not merely in its individual ships. If, therefore, we design a ship, ignoring this fundamental requirement, it is said that we reduce the value, not only of the ship herself, but of every fleet she steams with, and thus influence the design of ships subsequently built.

Opinions of anonymous flag-officers.

Certain flag-officers, who are advocates of speed in battleships, have communicated to the writer of these pages their views upon the subject. One of them, who desires that his name shall not be made public, says that of the strategical value of speed there can exist no doubt whatever, "as experience and reason alike demonstrate." He will not admit that the point admits of any argument, and, as to the tactical value of speed, he holds strongly that it is the modern equivalent of the advantage which the seamen of sailing days possessed when they gained the weather gauge through higher speed than their opponents or better seamanship. "In action, superior speed will enable a belligerent to select the object of his attack, to concentrate his fire upon any desirable part of the enemy's force, to bring the enemy between two fires, to choose his own range, and to make it impossible for the enemy to escape." The officer in question says that he is speaking not merely of high speed, but of superior speed, and he adds that, however much inclined foreign nations may be to be content with moderate or even high speed, owing to restricted financial resources, the insufficiency of their docking facilities for large ships, or other causes, this country cannot afford to be satisfied with anything less than superior speed. He therefore says that the wisdom of giving 21 knots to the Dreadnought should be clear to anyone who considers the question from the standpoint of the modern British Fleet. He does not say that speed is a weapon, as some may have urged, but that it is the means, and "in all probability may be the only means, by which weapons can be employed to the best advantage, or perhaps employed at all."

Sir Edmund Fremantle.

Admiral Sir Edmund Fremantle, who has taken a prominent part in the discussion as to the value of speed, has also consented to express his views. He says:—

I do not propose to touch on the strategical value of speed, which appears to me self-evident, nor on the advantage of speed to a cruiser, nor on the vexed question as to the value of our fast armoured cruisers, which are sometimes spoken of as

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auxiliary battleships, at other times as commerce protectors. I confine my remarks here to the tactical value of speed in a fleet composed of battleships intended to "lie in the line." It may be pardonable here for me to state that I have always been an advocate for speed, and to refer to a lecture which I gave at the United Service Institution in February, 1888, called "Speed as a factor in naval warfare," in which I endeavoured to deal fully with the subject strategically and tactically. My paper was written to advocate speed in our battleships, partly in answer to the late Admiral Sir George Elliot and others, who considered that it was of little consequence in a ship intended primarily to fight.

Nevertheless, as Sir W. White is constantly reminding us, a battleship must be a compromise, and though I may not concur entirely with Admiral Sir Cyprian Bridge's views on this subject, as stated in last year's *Naval Annual*, I can quite agree with him in his general summary (page 171), in which he says—"We should not hastily draw conclusions concerning speed. What we ought to do is to remember that it is only one of the various elements of fighting efficiency."

Primarily, then, I admit that the principal value of speed is strategical rather than tactical. It has been fairly compared to the weather gauge, enabling a commander who has superior speed to force or avoid an action; when once the battle has been joined it takes a minor place to offensive and defensive power. But, although this is true in a general sense, it gives the option to the admiral commanding the faster fleet to fight at the distance he prefers, and I cannot agree with the writer of a recent article in *Blackwood*, who, in his scientific study of the Tsushima battle, says that "neither in theory nor in practice has it ever been proved that superior speed gives any tactical advantage unless it be thought an advantage to run away." I specially demur to his statement that when the lines of the two fleets were steering parallel courses, if either side wished to close it was perfectly feasible for him to do so without materially altering his bearings. Space does not admit of my arguing this, but I hold that the option lay entirely with Togo, and that Rozhdestvensky would not have been able to close or increase his distance without so changing the bearings as to put his broadside guns out of action and placing himself at a disadvantage.

I am content here to quote from Capitaine de Frégate René Daveluy's interesting study of the Tsushima action in his book, "La Lutte pour l'Empire de la Mer," and I do so with the more confidence, as he is no advocate for extreme speed. Yet he says, "Quant à la relation qui existe entre la vitesse et la distance de combat, voici en quoi elle consiste; si l'on a foi dans la puissance de son matérial et dans la valeur de son personnel, il faut se servir de la vitesse pour se rapprocher." He then tells us that speed allowed Togo to execute his initial manœuvre with rapidity, which gave no time to his opponent to rectify his faulty formation; and he sums up his views on speed as follows: "En définitive, la vitesse est bien un élément tactique; il serait dangereux d'en conclure qu'elle est une arme . . . La vitesse est l'auxiliare de la force; elle ne peut la remplacer." Speed, then, I agree with Captain Daveluy, is of tactical as well as strategical value. That too much can be sacrificed to attain great speed must generally be admitted, and it is perhaps the fear that this may be done which has caused distinguished officers paradoxically to depreciate its value. In conclusion, I consider that the arguments used to support powers of offence and defence at the expense of speed are based on the erroneous view that a naval action is a duel where both sides are equally intent on a fight to a finish. That this is not the case, can be abundantly proved historically, and it certainly has no support from the actions of the recent war.

I feel confident that no theoretical arguments would make a British admiral content to command a fleet which had a speed of, say, 2 knots less than that of his enemy.

Another British admiral who regards speed as the equivalent of the old weather gauge is Sir John Hopkins. He says it gives the tactical advantage of choice of position, and "denies to the adversary any facilities which superiority in speed on his side would or might give him. Speed is a factor in a fighting unit as much as armament, armour, coal-supply, etc., and if our designers can give it without encroaching too much on other necessary things, let us thankfully accept it." Sir John Hopkins's views were expressed in a letter to Sir John Hopkins.

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the *Globe* (July 3, 1905), in which he enforced the value of speed both for strategical and tactical purposes :—

This opinion, I am pleased to think, is shared by most naval officers, and, what is of more importance, by the rising school of young naval tacticians. In the Parliamentary report on the naval manœuvres of 1901, the following paragraph is of interest: "The X Fleet maintained the single-line formation throughout, and having a considerable superiority of speed, manœuvred to concentrate the fire of the Fleet on the van of B, working round gradually and closing. B Fleet was thus forced to keep altering course on the inner circle" So here we see, in an official document laid before the House of Commons by the Admiralty, a tacit recognition of the value of speed, which we may emphasise by remarking that naval minds at the time, were much impressed by so able a tactician as Sir Gerard Noel being so badly beaten owing to the "turn of speed" possessed by his opponents. Togo's great victory was mainly owing to his choice of position throughout the fight by reason of his fleet's superior speed, this being duly endorsed by the admission of the discomfited Russian admiral. But we might urge a dozen reasons for accelerating speed, but I fail to detect one for reducing it, except the limitations to armour, cold storage, armament, etc., imposed by sacrificing too much to horse-power; and the majority of us rejoice in the design of the latest British battleship, which rumour asserts will dominate all former types by carrying an entire armament of 12-in. guns, and steaming 20 or 21 knots.

Many foreign officers who have carefully investigated the actions of the war range themselves on the same side as the admiral, and entertain no doubt as to the value of superior speed. Admiral Bienaimé, in the discussion on the French Navy Estimates, March, 1906, expressed great dissatisfaction at the contemplated speed of 19 knots for the new battleships, and said he felt convinced that if French battleships should have only this speed they would soon be outdistanced by foreign vessels. It was therefore advisable boldly to endeavour to increase speed, even if ultimately homogeneity would have to be sacrificed. Admiral Dewey also is reported to have said in an interview, "We want bigs guns in a big ship; there is only one kind of effective naval fighting machine, and that is the speedy battleship. All the others are no earthly good."

Admiral Bienaimé.

Admiral Dewey.

Admiral Rozhdestvensky, in his order to the Russian Fleet, April 26, 1905, after the junction with Niebogatoff, included among the advantages which he attributed to the Japanese the higher speed of their vessels. The German semi-official *Marine Rundschau*, which quotes this statement, makes a point of the inclusion of the armoured cruisers with the Japanese battle squadron, and remarks upon the advantage which their superior speed conferred upon them, enabling them to chose desirable positions and concentrate their fire.*

Admiral Rozhdestvensky.

Admiral Niebogatoff stated, as a reason for his surrender, that his five ships were surrounded by Japanese warships, and that his enemy, by means of his superior speed, always kept outside the available range of the Russian guns, so that his squadron was an easy target, and was not in a position to reply. Captain Klado, in his remarks

Admiral Niebogatoff and Captain Klado.

* *Marine Rundschau*, August-September, 1905.

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upon the battle of Tsushima,* surmises that the addition of the Nicolai I., Navarin, and Admiral Nakhimoff to Rozhdestvensky's fleet may have induced him to approach nearer than would otherwise have been desirable. "But do not let us forget that the choice of this distance, concerning which there has been so much dispute, did not depend only upon him. Not only were his vessels slower than those of the Japanese, but they were accompanied by slow transports and auxiliaries which impeded their mobility."

In the report of Rear-Admiral Enquist on the battle of Tsushima he drew attention to the advantages which the Japanese possessed.† "Every time that our squadron turned to the north it was met by the enemy, thanks to his superior speed, and our leading ships were under the fire of the enemy's battleships. The tactics of the Japanese compelled our squadron to turn in a circle round our transports and torpedo craft, while the Japanese described an enveloping circle. It was difficult for us to escape from this situation because of the low speed of our vessels." The *Times* correspondent at Tokio in his remarkable account of the great battle,‡ took the same view. He said that the Russians, when they saw Togo bearing down from the west, sheered off to keep a parallel course, but that manœuvre could not have succeeded without a material increase in speed, and not all the ships could keep up the speed required. Among the causes of the victory he said that the superior gunnery of the Japanese was supplemented by tactics which furnished opportunities for its maximum efficiency. The Japanese vessels were again and again in positions that enabled them to concentrate their fire on special units of the enemy's fleet, and their greater speed gave them the opportunity of doing so. "It is easy to see what great advantages attended Togo's tactics, but it is also easy to see that such tactics would not have been possible had he not been able to outsteam the Russians who committed the error of mixing their units, so that the speed of the whole had to be reduced to the speed of the lowest."

Admiral Enquist.

The *Times* correspondent.

Captain Wainwright, United States Navy, with special reference to the position adopted by Sir Cyprian Bridge and Sir Reginald Custance,§ says, "surely no British officers who have had the opportunity of participating frequently in the P. Z. exercises would fail to recognise the advantages of superior speed."

Captain Wainwright, U.S.N.

Of course, if there is no advantage gained in capping a column or drawing past the flank of an enemy, thus concentrating the fire of the fleet on one or two of his

* "La Bataille de Tsoushima." Translated from the Russian by René Marchand, Paris, 1905.

† *Mitteilungen aus dem Gebiete des Seewesens*, viii., 1905.

‡ *Times*, August 22, 1905.

§ "Proceedings of the United States Naval Institute," xxxi, No. 4, Dec. 1905.

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vessels, then speed is of little value in actual battle, but no point is more clearly shown forth by the Battle of the Sea of Japan than the fact that capping the column and holding the key is of supreme value. The Osliabya was set on fire and driven out of the line as the four Japanese battleships headed the Russian columns. Then as they passed along ahead of the right column, the Souvaroff was driven out of line, and continuing as they steamed to the southward and westward around the head of the column, the second in line, the Alexander III., was dropped. Then the third in line, the Borodino, was set on fire and sunk later in the afternoon. The Orel, the fourth vessel in the right column, was the only vessel of that column to escape destruction by gun-fire, and she was pretty well smashed up. Of the vessels following the Orel, after the irregular column was formed, the Sissoi Veliki and Admiral Nakhimoff were torpedoed on the night of the 27th; the Navarin on the 28th. In fact ships were damaged very nearly in proportion to their distance from the head of the column, and one after the other, by the concentrated fire of the four Japanese battleships. Those in the rear that did not suffer by this concentration, and were only subject to long-range firing from the armoured cruiser squadron, were sunk by torpedoes or forced to surrender the next day by the Japanese battleship squadron, with the exception of the Ouchakoff, which vessel refused to surrender and was sunk by gun-fire and possibly by friendly hands. Does not this prove the advantage of speed? It may be argued that had the Russians deployed before sighting the Japanese the advantage of speed would not have been so apparent. This is true, and had they used the inner circle and fired straight, the battle would have had other ending; but, as it was, speed helped the Japanese to hit a hard blow in the beginning and make the battle a decisive one.

M. Lockroy.

M. Lockroy, formerly French Minister of Marine, who appears to have been in close touch with French naval thought, and has written much upon the lessons of the war in the *Temps*, has strongly advocated high speed.* In reference to the argument of M. Ferrand, cited above, M. Lockroy says that the type of vessel advocated is the vessel of yesterday, and that what is required is the vessel of to-morrow, a vessel more powerful than the King Edward VII., the Nelson, or the Satsuma. How, he asks, could a squadron of vessels then proposed to be of 18 knots approach another squadron which did not desire to join battle? This, says M. Lockroy, is the essential question. Doubtless, he remarks, in action the speed will not be more than 12 knots, but speed is a strategic quality, and even a tactical quality of the first order. The battle of Tsushima demonstrated the fact, and, if Togo was able to envelop the Russian squadron, to take it in flank or to strike at its van or its rear, it was because his vessels were more rapid than those of his adversary. "Like the grenadiers of Napoleon, the Japanese vessels won the battle *avec leurs jambes*." If Sampson at Santiago could not have steamed at adequate speed he never would have forced the Spaniards upon the shore. "At sea, as upon land, speed is an element of victory, and to deprive oneself of it is voluntarily to condemn oneself to defeat."

Other French authorities.

Other French authorities have argued in favour of high speed. In the *Journal de la Marine, Le Yacht*, appeared an article protesting against 18 knots, which some seamen thought sufficient, on the ground that the actual engagement between squadrons has not alone

* *Temps*, September 7, 1905.

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to be considered, but the period also before the action, in which tactical advantage would be assured by superior speed. The events of Tsushima were cited in support of this view. "We must avoid making our ships inferior to those of other nations; we might have to regret it bitterly later on."* Captain Vignot, also a strong advocate of high speed, has presented a calculation to show that to give an 18-knot vessel of 18,000 tons a speed of 21 knots, a sixth of her heavy armament would be sacrificed, or, say, two 12-in. guns out of twelve, or one-tenth of her protection, and he questions whether many French officers would refuse the speedier ship.†

Captain von Labrès and other foreign authorities.

Captain Rudolf von Labrès, of the Austrian Navy, a well-known student of naval tactics, is another advocate of high speed, who believes that a 20,000 tons battleship steaming at 20 knots will become the standard type. But he says, from his national point of view, that the ship of the future will not be satisfactory if she does not possess higher speed than British ships. "If the Japanese Fleet had not been constituted of swifter vessels than those of the enemy, the latter would have escaped to Vladivostock; and, in the same way, if a British squadron wishes to bring a weaker squadron to action, it must consist, not only of more powerful ships, but of swifter ships."‡ Commander Normann-Friedenfels, of the Austro-Hungarian Navy, is in agreement with his comrade upon the question of speed, and his long series of notes contributed to the *Mitteilungen aus dem Gebiete des Seewesens* is illustrative of his contention. Superior speed, he says, is one of the most valuable qualities in a fighting fleet. Wireless telegraphy and efficient scouting informed Admiral Togo of his enemy's movements, but it was his speed that enabled him to make good use of his advantage, and this superiority is valuable in tactics as it is in strategy.§

The last foreign opinion to be cited is that of Captain Bonamico, of the Italian Navy, who in deducing lessons from the late war, says that speed, "the principal tactical factor," enabled the Japanese to make the best use of their fire, while the Russians were greatly disadvantaged by their lack of mobility.‖

* The *Yacht*, January 6, 1906.
† *Moniteur de la Flotte*, September 30, 1905.
‡ *Mitteilungen aus dem Gebiete des Seewesens*, xxxiii, No. 11.
§ Ibid, No. 9.
‖ *Rivista Marittima*, July, 1905.

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CHAPTER X.

NAVAL RESERVES AND SEA TRAINING.

I.

The Reserve and the mercantile marine.

THE Naval Reserve has for many years been a prominent subject in the *Naval Annual.* In the present issue it will be specially considered in connection with the manning of the mercantile marine. Viewed as an employment for British seamen, the denationalisation of the mercantile marine is a grave national misfortune. It has been computed that some £2,000,000 are paid annually in wages to foreigners. The statistics given by Mr. Lloyd-George in introducing the Merchant Shipping Acts Amendment Bill should arrest attention. Our British merchant seamen have been reduced from 200,000 in 1870 to 176,000 in 1904. The foreign element has increased from 9·08 per cent. in 1893 to 22·80 per cent. in 1902. In 1904 no less than 39,000 foreigners and 42,000 Lascars were serving in British ships.

The increase in the employment of Asiatics is due to changed conditions. The services of our Eastern fellow subjects are essential for the manning of steamships passing through the Suez Canal to the hottest regions in the globe.

The Merchant Shipping Acts Amendment Bill.

The large proportion of foreigners serving in tramp steamers and sailing ships trading in other seas is due to causes not inherent, but with which it is only possible partially to deal by legislation. Wages are low and the life hard. British seamen wisely look for the best billets. There are few foreigners in our ocean liners, in the home trade, and the fisheries. The Merchant Shipping Acts Amendment Bill, recently introduced by Mr. Lloyd-George, will insure improvement in the conditions of service in the mercantile marine. In a large number of sailing ships and tramps the food provided is "nothing better than a miserable, monotonous scale of salt beef, biscuits, tea, and sugar; bad provisions tend to desertion, and militate against boys joining or remaining in the mercantile marine." The difficulty will be met in Mr. Lloyd-George's Bill. A minimum scale of food will be drawn up. Cooks will be required to go through a course of training. Provisions will be inspected by officers of the Board of Trade.

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Rates of wages are not under the control of Parliament. Foreigners are well content to serve in British ships for £3 a month all found. Such rates seem beggarly to British seamen in comparison with the average earnings in the United Kingdom. If our seamen were enrolled and trained in larger numbers for the Reserve the position would be improved. Wages would be supplemented by the pay received from the State as Naval Reservists.

The policy here suggested may be opposed at the Admiralty. It may be contended that no difficulty is found in raising men for the Fleet under the present system. Our seamen are entered as boys. There is practically no limit to the numbers who volunteer. The term of service in the Navy having been shortened except for skilled ratings, the Reserves are being filled up rapidly by the men who leave the Navy under the non-continuous system.

Faults of the present system.

In reply, it may be urged that the present system tends to draw the Navy and the mercantile marine further and further apart—a result specially to be regretted at a time when a serious national effort is called for to encourage boys to go to sea. Nor is it well to look only to men trained in the Navy for the reinforcement of the Fleet. The men of the Fleet Reserve, however excellent their early training, must lose their sea habits after long years ashore. In this essential qualification the sea-keeping men brought into the Fleet from the Reserve must be valuable to the Navy. The cost of the present system is excessive. By increasing the Reserves for manning the Navy in numbers and efficiency, we may strengthen our resources for expansion in an emergency, while the cost would be more than covered by the reductions, which, with adequate Reserves, could safely be made in our permanent forces for manning the Navy.

Expansion of the Reserves necessary.

It is not necessary to pursue the general argument; we have the assurance of the Admiralty that it is not intended to cut down the Reserves. This, however, is not enough. Gradual expansion of Reserves should be the policy of the future.

Recent changes.

Here we may pause for a few words on recent changes. The closing of the shore batteries caused unnecessary apprehension. It is waste of public money to drill Reservists in batteries at guns of obsolete pattern. Batteries were popular with Reservists, glad to secure an annual respite from the sea without going away from home. The closing of the shore batteries will take away one of the inducements to enrol in the Reserve. The Admiralty offer compensations. The pay of seamen under the new regulations will be at the rate of 1s. 6d. a day, with free rations. Embarkation gratuities are on a liberal scale—for three months, £5; for 28 days, £2 5s. The Reservists in the fourth and subsequent years of enrolment draw their

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retainers of £6 per annum without having to drill. The new regulations give further advantages. Reservists will have the option at the age of sixty of receiving a pension of £12 per annum, or a gratuity of £50 in lieu of pension. The pay of the seaman as a Reservist is liberal. It compares favourably with the wages earned by his services at sea in the mercantile marine.

II.

Training of Reserve officers.

Suggestions.

Turning to sea-training, let us deal first with the officers of the Reserve. Many are highly efficient as navigators and seamen. Few have had the opportunities of general education which the Admiralty gives to cadets reared in the Service. It would cost little to extend to the cadets of the Reserve some of the advantages afforded to the Navy. And the need is great.

To cadets aspiring to the more responsible positions in the mercantile marine the school-ships Worcester and Conway offer an education leaving nothing to be desired. The training so well begun is not followed up. When the cadet goes to sea as an apprentice, the only ships, so far as the present writer knows, in which naval instructors will be found and education is systematically carried on, are those sailing under the house flag of Messrs. Devitt and Moore.

Every cadet in the Reserve should receive such an education as will qualify him to serve in the Navy. A grant not exceeding £50 should be a sufficient supplement to the premiums paid by the parents and guardians of cadets. The grant from the State should be payable on the completion by the cadet of four years' service at sea, and on passing the Board of Trade and any further examination which the Admiralty might require. The ships should be preferably sailing ships, or ships fully rigged, of the class approved in Germany. They should be periodically inspected, whether at home or abroad, by Admiralty officers. The number of midshipmen being regulated by the Admiralty according to naval requirements, the grant for the training of officers would never lead to abuses.

Training of seamen Reserves.

From the officers of the Reserve let us turn to the seamen. For service before the mast apprenticeship to the sea has practically ceased under the British flag. Nothing is being done by the State or by shipowners to train our seamen as in the older days. In Germany large masted training-ships, with auxiliary power, are maintained by the leading companies, visiting every sea. Sea-going training-ships have been established by several States of the American Union. They have been seen in British ports. It is a good example for ourselves.

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Proposals put forward.

Two schemes have been put forward by the Board of Trade for the encouragement of apprenticeship to the sea. Neither has been satisfactory to shipowners. Under the plan proposed in March, 1899, the advantages offered to shipowners, in the partial remission of light dues, were practically limited to the home and short voyage trades. The owners of the ships best adapted for the training of seamen received no appreciable benefit.

A revised scheme was subsequently proposed. It failed to command support from shipowners. The following were the main features:—Grant of £10 to the shipowner for every Royal Naval Reservist carried at the end of the first year of training. At the end of the second year a further grant of £5. Boys to be apprenticed for three years. Pay, first year, £8; second year, £12; third year, £15. Outfit at starting, of the value of £4, to be provided by the shipowner. Retainers to be paid by the Government quarterly to the apprentices: first year, 5*s.* per quarter; second year, 7*s.* 6*d.*; third year, 10*s.* Bonus of £1 10*s.* on joining the seamen class. The terms were not liberal to the boys. The shipowners objected to the outfit.

The subject discussed.

Special efforts made.

The training of seamen for the mercantile marine was discussed in a paper lately read by Lieutenant Bosanquet at the Royal United Service Institution. Under the scheme which he recommended boys would be entered through training-ships, such as the Warspite, or a training establishment on shore, such as that at Liscard. They would engage for an apprenticeship of three years; the first year in harbour or shore training, the remainder of the term in a sea-going ship. On going to sea the boys would receive the market rate of wages. The grant to shipowners in respect of Royal Naval Reserve boys carried in their ships would be on a scale sufficiently liberal to make the carrying of apprentices to the Reserve profitable. Messrs. Devitt and Moore are now carrying out a training scheme on the lines indicated by Lieutenant Bosanquet. The Illawarra, a full-rigged ship, well-known in the Australian trade, has been placed under offer to the Warspite. The regulations, prepared by a Committee over which Admiral Sir N. Bowden Smith presided, may secure a thorough training in seamanship. A chaplain is appointed to each ship to undertake the religious teaching and general education of the boys. The cost to the Marine Society will not exceed £25 for a voyage of nine months.

A scheme of training for seamen has recently been inaugurated at Liverpool by a few public spirited shipowners, among whom Sir Alfred Jones has taken a leading part.

The sea-training home at Liscard has accommodation for one hundred boys. The training includes all the teaching which can be

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given ashore or in a harbour-ship. It includes swimming, boat-pulling, knotting and splicing, rifle drill, squad drill, clothes mending, and fire exercise. The regulations as laid down for the Liscard home are applicable to all similar institutions for the training of seamen. The boys are indentured to the superintendent for three years. When sent to sea their career is carefully followed. On their return to Liverpool from a voyage they are met and brought back to the home; their kit is put in order; their money is banked, and they go on leave.

The Liscard home is burdened with a debt of £8,000 for initial expenses. The home might readily be enlarged if funds were available. As in the Warspite scheme for a sea-going training, so in the training home at Liscard, the essential difficulty lies in the impossibility of raising, whether by private subscription or by contributions from shipowners, the funds required for work on an adequate scale.

Nor is it reasonable to put a charge on Navy Votes for services not essential to the efficiency of the Navy. All charges laid upon the Navy fall into the category of war expenditure, which the present Government is pledged, so far as possible, to diminish.

Nor can we look to the shipowners. Powerful companies have no difficulty in manning their ships with prime British seamen. A foreigner is rarely seen in these well-appointed vessels. The shipowners not in command of ample resources, and who have to face keen competition, cannot undertake the training of men. They employ such as offer at the lowest rate of wages.

State aid required.

It is evident that we must look to State aid. Contributions may fittingly be made from many sources—from grants in aid of technical education, from funds voted directly by Parliament and administered by the Board of Trade, or, again, from local funds, from County Councils, and the Poor Law Authorities. Boys have been sent to the Liscard home by the Surrey County Council and the Scotch Office. Payment is made at the rate of £25 a year. This might be carried further. Such ships as the Warspite, and such sea-training homes as that at Liscard, should be utilised and supported to the fullest possible extent. It is not necessary at the present stage to create new institutions. To increase the means of training seamen will be for the public advantage in many ways, whether in the higher efficiency of the merchant service or as a check to physical deterioration. In a luxurious age it is an object of national concern to encourage men to go down to the sea in ships. If we put the case for grants-in-aid on the broadest grounds of patriotism, if we urge that there is no type of character more attractive than that of the brave, true-

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hearted, British seaman, we may not ask in vain for the aid of the State in the training of boys for the noble calling of the sea.

Engine-room Reserves.

Happily we are not wholly dependent on Reserves created by State aid. No branch of the Reserve is more necessary for the Navy than that to which we look for the reinforcement of the engine-room complements. If the mercantile marine can no longer supply seamen, it can supply efficient stokers in full numbers. The force already enrolled is considerable. It can readily be increased. It was recommended by Sir Edward Grey's Committee on the Manning of the Navy that men should be enrolled at Bombay, Calcutta and Malta. A beginning has been made at Malta. No action has yet been taken in the Indian ports.

R.N. Volunteers.

As a Reserve for gunnery duties we have a valuable force in the Royal Naval Volunteers. The movement, which the Admiralty has wisely decided to revive, is making progress. Officers and men are keen and intelligent. They have exceptional qualifications for gunnery duties. More opportunities of training afloat are required. A sea-going ship should from time to time visit each of the ports for gunnery practice at sea, observing that it is difficult for the classes from which the volunteers are recruited to leave their employments for periods of drill in the reserve ships at the naval ports.

Colonial Reserves.

Having dealt with the Reserves of the Navy at home, let us turn to the patriotic efforts which are being made by our Colonial fellow subjects to co-operate with the Mother Country. The fisheries on the Great Bank of Newfoundland have been, from a remote date, an important training ground for seafaring men. The Navies of the United States and of France are manned with fishermen reared in that great school of seamanship. The Admiralty should do more for the reserve in Newfoundland. The hardy seafaring men of our oldest colony have responded with alacrity to the call for volunteers. The ships in which they have been drilled have in some cases been too obsolete in type and in armament for the training of the splendid Reserve which should be raised on the storm-beaten shores of Newfoundland.

New-foundland.

Australia and New Zealand.

In Australia, as in Canada, it is the aspiration of the people to raise local forces for local defence. The government of the Commonwealth are following the lines traced in a report by their Naval Director, Captain Creswell, a retired officer of the Royal Navy, long at the head of the Marine of South Australia. Captain Creswell recommends that Australia should maintain as a local force coast-defence vessels and torpedo craft in sufficient numbers to ward off the attacks of hostile raiders. Let us raise no objection to such a suggestion. In any national emergency the Colonies will stand ready to act with the

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Imperial Navy, under the direction of Imperial officers. Australia, according to a recent return, has more than 35,000 prime men in the well paid coasting trade. A commencement has been made in the enrolment of a Naval Reserve, both in Australia and New Zealand. A force of five thousand men could, without difficulty, be organised. In a national emergency they would fill up complements on the Australian stations, thus setting free permanent men for a mobilisation of the ships at home.

Canada.

Under the administration of Mr. Prefontaine Canada made a beginning in a national effort for naval defence. A force of Naval Reserve men has been enrolled. Preliminary arrangements have been made for drill on board a small Canadian cruiser.

The proposals now under consideration in Canada and Australia for the creation of naval forces for local defence give promise of far-reaching results in the future. It is vain to look for contributions by the Colonies to the Imperial Exchequer. That opinion was strongly held by Sir Cyprian Bridge, when Commander-in-Chief on the Australian Station. The taxation necessary for such a purpose would be unpopular. Contributions have been given grudgingly in Australia. We have received none from Canada. The true policy is to encourage the Colonial Governments to organise naval forces for local defence. With or without express agreement, the Colonial forces will aid in the defence of the Empire in any emergency. Observations recently made in this sense by Lord Tweedmouth will command general assent.

BRASSEY.

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CHAPTER XI.

THE ITALIAN NAVY.

POSSESSING considerable maritime interests, and having a long and vulnerable coast-line, the need for a powerful Navy is more evident to the Italian to-day than it was in the past, and, owing to the increase in naval construction, the Navy has become a powerful factor in military and political affairs. The physical conformation and position of Italy in the Mediterranean are favourable to a development of naval power, because, while she has the means of offensive action on both coasts, the short land frontier is difficult of access, and, invasion from the sea being easy, the possibility of offensive action on land is relegated to a secondary position. These considerations give ground for hoping that the warlike and commercial qualities, which were the moving power in the Italian Republics in the Middle Ages, have not been completely lost by the race, and that the people will again take to sea life with increasing ardour.

On March 17th, 1861, when the Kingdom of Italy was proclaimed, the Navy was composed of 79 vessels of various types, having a total tonnage of 77,000, and the naval establishments were at Genoa, Foce, Leghorn, Naples, Castellamare, and Ancona, while a commencement had been made with the work of making the Bay of Varignano available as a naval port. None of these establishments, however, were in a position to construct iron ships, which were already beginning to be introduced in foreign navies, and therefore everything had to be created anew—ships, dockyards, and maritime bases—and the country, at the request of the Government, has found enormous sums for the purpose, amounting to some three milliards of francs, or about £120,000,000, but of this sum only £34,000,000 could be devoted to new construction, the remainder being spent on other auxiliary naval purposes.

The new fleet.

The policy pursued, whether in the construction of ships or the fortification of the coast, has been that of preparing a force which could be applied to the defensive strategy most suitable to a nation which has many populous coast towns undefended against an enemy more powerful at sea. The assumption of such an attitude does not exclude vigorous attack on the coasts, territory, and sea-borne commerce of the assailant, and might finally lead to a tactical offensive in the best conditions as regards locality and numbers. It is

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obvious that the warships most suitable for this kind of warfare must be of high speed, well armed and protected, and sufficiently independent, and Italian naval constructors have never lost sight of these qualities amid all the rapid changes in naval construction due to the progress of metallurgy and ballistics. Every ship designed by them has therefore always represented, at the moment when it was laid down, the best that could be produced, and it is not the fault of admirals or constructors if the Italian Navy is now in a condition which does not correspond with the just ambitions of the nation.

The causes for the temporary naval decadence of Italy, which are now in some measure disappearing, are of two kinds—the politico-economical and the technical, but, above all, the economical. A careful examination of the Navy Estimates of Italy indicates that, if the nation has spent much, it has spent wisely, but little in a relative sense, since the praiseworthy exertions of a few years lasted too short a time, and the sums voted diminished or remained stationary, while the navy estimates of other countries increased. Rising from the revolution, and from a mixture of various elements with diverse traditions, the new naval administration of the kingdom had the merits and defects due to its origin, and, amongst the defects, the most serious were the old bureaucratic organisations and provincial interests, some long continuing, which did not permit, and still do not permit, the employment of the sums voted for the Navy in a way to give the best results. On the other hand, while the first warships built had already absorbed more than £8,000,000, an immense sum for a poor country, the introduction of high explosives in shells, and of the quick-firing gun, changed, in a moment, the problem for the naval constructor, virtually condemning all the ships already afloat or in an advanced stage of construction. The exertions made by the young Navy were rendered fruitless, and new sacrifices were demanded from the country. The Navy Estimates, which stood at £5,089,878 for 1905–6, have been raised to £5,570,158 for the year 1906–7, and are intended to stand at a figure of about £5,380,000 up to the year 1916–17, the Minister being given the power to spend within four years the total increase of £4,980,000 in addition to the ordinary Navy Estimates for naval construction.

Blockade vessel.

The ships of the Vittorio Emanuele type have already been sufficiently described in the *Naval Annual*. We shall therefore only give particulars of the remarkable armoured mining and blockading vessel now under construction at the Royal Arsenal at Venice, and of the new type of armoured cruiser. In the Report to the Chamber of Deputies on the Navy Estimates, the view is expressed that the best type of ship for mining and blockading purpose belongs to the

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category of scouts, and, in the opinion of the Admirals of the Supreme Commission, there should be constructed for the Navy a special type, intermediate between the battleship and the scout, capable in the last resort of taking her place in the line of battle. The principal characteristics of the design for the new vessel are: length, 410 ft.; beam, 54¼ ft.; draught, about 17 ft.; displacement, 5500 to 6000 tons; speed, 25 knots; thickness of belt armour, 6 in., and of that for the protection of the armament, 4·7 in. The armament would comprise four 8-in. guns (instead of three, as originally proposed), numerous 3-in. guns, and an ample supply of blockade mines. Coal-supply 1000 tons.

Armoured cruisers.

The following particulars of the new cruisers of the San Giorgio type are taken from the *Rivista Marittima*. They are designed by Chief Constructor Masdea, the well-known designer of the Garibaldi type, of which the Kasuga and Nisshin are well-known examples. A careful examination of the plans of this new type of cruiser, of which four are being constructed, shows that the designer has endeavoured to produce a form of hull which will give great speed combined with proper sea-keeping qualities. A principle of duality will be applied on board by installing two stations for the production of electric power and light, and by placing the boilers in two groups forward and abaft of the engines. The protection afforded will be ample, and there will be a good reserve of buoyancy. The armament will be mounted as high above the water-line as possible, and the percentage of armour-plated surface to the total area of side will be large. The following are the principal characteristics: length 429¾ ft., beam 68¾ ft., draught 24¾ ft., displacement 9832 tons. The armament includes four 10-in. guns of 40 calibres, mounted in two turrets, one on the upper deck aft and one on the forecastle, the former at 22 ft. and the latter at 31 ft. above the water-line; eight 8-in. guns, of 45 calibres, mounted in pairs in turrets on the upper deck amidships, 22 ft. above the water-line, besides sixteen 3-in. guns, of which eight are mounted on the forecastle, two on the upper deck, and six in the battery amidships, and eight 1·8-in. guns. There are three torpedo-tubes, one aft, above the water-line, and two forward, submerged. The armour belt is formed of plates 7 in. to 8 in. thick over the machinery and boiler-space, tapering to 3½ in. at the bow and stern, and there is a higher range of plating from the bow to the after-turret with a maximum thickness of 7 in., which rises amidships to protect the bases of the 8-in. gun turrets. The bulkheads at each end of the redoubt are 7-in. thick, the lower armoured deck is 1·2 in. thick, and the upper armoured deck 1·6 in. to 1·8 in. thick. There are two triple-expansion four-cylinder engines, capable of developing 18,000 I.H.P.

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with accelerated draught and 13,000 with natural draught, the corresponding speeds being 22·5 and 20 knots. Normal coal-supply 700 tons, maximum 1500 tons. The large number of guns, their calibre, and their protection evidently give the new cruisers powerful offensive qualities, and the protection of the hull by side armour, bulkheads and steel deck seems to be well thought out.

Programme.

The naval programme was explained to the Chamber of Deputies by Admiral Mirabello, Minister of Marine, when the estimates of 1906–7 were introduced. It was proposed to construct three armoured cruisers of 10,000 tons, ten destroyers, seven submersibles and fifteen sea-going torpedo boats, these being in addition to the vessels to be provided for in the ordinary budgets of the three years 1906–7, 1907–8, and 1908–9. By the latter year there would be added to the Italian Navy four battleships of the Vittorio Emanuele class, four armoured cruisers of 10,000 tons, one mining and blockading vessel, fourteen 13-knot destroyers, twelve submersibles, and forty-two sea-going torpedo boats of about 215 tons.

Defence of the Peninsula.

A right understanding of the essentials for the defence of the Italian Peninsula was arrived at slowly, and it may be traced back to 1863, though not until a few years later was the matter well understood. The subject has been dealt with exhaustively by Captain Bonamico, but it is of retrospective interest, and shall not be dealt with at any great length here. There were those who proclaimed the necessity of the fleet without realising what was required in an organised plan of naval defence. Even in 1873 the Budget Committee, while admitting that the geographical situation of the country made a strong Navy essential for security, expressed the opinion that fortified posts along the coast were necessary, and there was no recognition of the complete effectiveness of a powerful fleet for the defence of the country. It was not until after much controversy that a more sane view was taken of the problem of defence, and Admiral Morin explained the essentials of the situation when he said that only those places should be defended by powerful works on shore which were the bases of the fleet, while, as to the remainder of the coast, either it could be defended by the fleet, or its defence was impossible. So long as the fleet was not destroyed there was little reason for fear, while, if it were annihilated, no means of defence could be efficacious. It was therefore determined to create a defensive system based upon mobile naval forces with sufficient range of action, and a torpedo flotilla operating from well-chosen strategic points, these being chiefly Messina and Maddalena, while the bases of the fleet were upon three seas, Spezia, Taranto, and Venice being the protected places. The newest ships

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constitute the active fleet, with the older vessels as a reserve, based upon Taranto, the latter force being commissioned from time to time so as to be mobilised rapidly. The torpedo-boats are mostly maintained with complete complements.

The naval bases.

Some brief notes may be interesting concerning certain of the naval bases. Genoa, which possesses important maritime resources, is capable of rendering great services to the fleet, but the armaments of the forts are somewhat antiquated, and the place is now open to bombardment. Maddalena is the centre, within a radius of some 200 miles, of the long coast from Marseilles to Gaeta, while the distance is not more than about 120 miles in the region between the mouths of the Arno and the Tiber, where it is thought an invasion would most probably be attempted. Accordingly, Maddalena, being a position of great strategic importance upon the Strait of Bonifacio, between Corsica and Sardinia, has received considerable development, but much more is required to make it the effective centre it should be for the operations of the fleets and flotillas. Spezia is the largest arsenal and dockyard in the kingdom, and the natural defensive centre of the Ligurian Sea. It has been provided with formidable defences, and is fully equipped as a great naval establishment and dockyard for the building, arming, equipping, victualling, and repairing of ships. Messina, upon the Strait between Sicily and the mainland is another important strategic situation, and is defended by powerful batteries, with the object of making it impossible for an enemy to pass from the Tyrrhenian to the Ionian Sea. This is the only maritime place in the kingdom which would compel a blockading fleet to divide itself into two portions, neither of them able to join or assist the other. Messina as a base would enable a naval force to be despatched within six or seven hours to any point threatened on the coast of Sicily or on the mainland from Cape Colonna to the mouth of the Gulf of Taranto. The place is also regarded as a base for vessels engaged in the *guerre de course*, and Captain Bonamico has described it as the finest strategic position in the Mediterranean. Taranto, while it cannot be described as an important strategic centre, presents exceptional hydrographic conditions, giving it considerable value as a naval base, but the dockyard there has not been fully completed and equipped as was intended, though it is capable of undertaking large repairs, and is the site of important stores of ammunition, coal, and victualling supplies. Venice is the only maritime place in the Adriatic basin, since Ancona has been struck off the list of fortified positions. Although not perfectly secure from bombardment, Venice is regarded as a good defensive centre in the Northern Adriatic, and it may be considered

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as a refuge port, with means of refitting and stores. The Italians are, however, convinced that Venice could not be a sufficient base for the fleet in any operations with the neighbouring empire, and some uneasiness has been caused in certain quarters by the decision of the Austro-Hungarian Government to establish a squadron for the Adriatic.

Personnel. In the *Naval Annual* of 1896, the experienced writer who calls himself "Jack la Bolina" gave an account of the administrative machinery of the Italian Navy, and since there have been few changes it is unnecessary to repeat here what will be found in that volume. Neither is it necessary to explain the system of recruiting seamen for the Italian Fleet, further than to say that the system is based upon the law enforcing the personal obligation of Italian subjects for military service. Special enlistments are also made, and, in case of war or necessity, captains of ships abroad are authorised to enlist sailors from vessels of the national mercantile marine found in foreign ports to the extent of one-fourth of the crews of these vessels. There is also a naval reserve composed of men enlisted by conscription who have completed their period of active service, while the reserve officers are retired officers of the Navy or its auxiliary services, and engineers from the mercantile marine; and the medical service would be made up by the entry of civilian practitioners. In the *Naval Annual* of 1896, already referred to, a sufficient account will be found of the system of entering and training officers. It may be added that promotions are made by seniority, by selection, and by competitive examinations. The following table gives a complete statement of the *personnel* of the Italian Navy in the present year.

General Staff	Admiral	1	
	Vice-Admirals	7	
	Rear-Admirals	14	
	Captains	58	
	Commanders	70	
	Corvette Commanders	75	
	Lieutenants	410	
	Sub-Lieutenants	160	
	Midshipmen	165	
			960
Corps of Naval Constructors	Lieutenant-General	1	
	Major-Generals	3	
	Colonels	8	
	Lieutenant-Colonels	14	
	Majors	31	
	Captains	117	
	Lieutenants	118	
	Sub-Lieutenants	62	
			354
Medical Corps	Major-General	1	
	Colonels	6	
	Lieut-Colonels	11	
	Majors	23	
	Captains	102	
	Lieutenants	76	
			219

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Victualling Corps	Major-General	1	
	Colonels	6	
	Lieutenant-Colonels	16	
	Majors	21	
	Captains	120	
	Lieutenants	100	
	Sub-Lieutenants	16	
			280
	Total		1,813

The warrant officers, petty officers, and seamen, including writers, musicians, etc., number 18,542.

Establishments.

The naval arsenals are under the authority of officers with the rank of rear-admiral, who control the establishments and direct the movements of vessels in the ports. Each arsenal has also a Director of Construction and a Director of Ordnance, the latter having to do also with the torpedo service and electric equipments. A good deal of work required for the Navy is entrusted to private establishments, and naval officers and specialists are deputed to supervise operations in progress at Genoa, Leghorn, the Terni steel works, and elsewhere. In every fortified place there is a commander of local defences, fixed and mobile, including torpedoes, mines, batteries, semaphores, telegraphic and telephonic communications, and the ships and torpedo boats assigned to local defence. The hydrographic service of the Navy has its headquarters at the Hydrographic Institute at Genoa. The Royal Naval Academy for the training of officers is at Leghorn, the course covering a period of three years, and in each year eight and a half months are employed in study ashore and three and a half months in work at sea. The Royal Engineering School is at Venice, and the course there is for three years.

The Italian mercantile marine is in close relations with the Navy, and its affairs are in the hands of the Director General of that department, who is responsible to the Minister of Marine. Inasmuch, however, as the *Naval Annual* does not concern itself with merchant shipping, it is unnecessary here to say anything about the present situation of this associated branch of the Italian naval service. Undoubtedly in certain circumstances the mercantile marine would prove a valuable auxiliary in personal and material respects to the Navy.

Osvaldo Paladini,
Capitano di Corvetta.

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CHAPTER XII.

The Gunnery Practice of the Fleet.

The Admiralty circular.

On January 31 of this year the Admiralty issued the following circular letter to all Commanders-in-Chief, Captains, Commanders, and commanding officers of H.M. ships and vessels:—

My Lords Commissioners of the Admiralty, having had under their consideration the results of the gunnery practices of the Fleet for 1905, are pleased to note with the utmost satisfaction the very considerable increase in battle efficiency, and the marked improvement in all directions, which these results disclose.

2. This remarkable increase in accuracy of fire is attributed to several causes, of which the principal are the great interest and keen spirit displayed by officers and men, the general introduction and use of additional instructional appliances, and the improved system of gunnery training now in operation.

3. My Lords desire to emphasize the fact that battle efficiency entirely depends on the successful combination of officers, gunlayers, guns' crews, and *matériel*. It is therefore absolutely essential that each and every unit should be in the highest state of efficiency.

4. In the case of the Exmouth—the flagship of the Commander-in-Chief of the Channel Fleet—which has attained the highest gunnery efficiency of the year, it is the good work of the officers, combined with the skill of the gunlayers and guns' crews as displayed in the gunlayers' test, and the perfection of the *matériel*, which have placed her first in battle practice. This practice my Lords consider to be the test of gunnery efficiency. Other ships, such as the Leviathan, Albemarle, and Russell, which have done well in the gunlayers' test, have also attained a high standard at battle practice, showing that gunnery efficiency is general throughout the ship.

5. In the cases of ships which have done well in the gunlayers' test but have failed at battle practice, some reason for this failure, apart from the competence of the gunlayers, must be sought for, whilst, in the opposite case of success at battle practice and comparative failure at gunlayers' test, as exemplified by the Queen, King Edward VII., Dido, Astræa, and Carnarvon, the former good results would probably have been exceeded had the gunlayers shown greater proficiency.

6. My Lords regret to observe a marked difference between the ships at the head of the list and those at the bottom. As regards the latter, instructions have been issued for a full and careful enquiry to be made into the causes tending to unsatisfactory results. Printed tables of the results are being issued separately.

Finally, my Lords are pleased to express in the strongest terms their high appreciation of the result of the gunnery practices, taken as a whole, for the year 1905.

Its significance.

This official expression of their Lordships' appreciation of the improvement in the marksmanship of the Fleet constitutes an historical document of cardinal importance; it marks indeed the beginning of a new era in the condition and aspects of naval gunnery. It will be noticed that their Lordships do not merely express their satisfaction at results, but they indicate several causes to which they attribute the increased accuracy of the gunners, and they define the essentials of battleworthiness; the more successful officers and men are singled out for praise, while it is clearly signified that the less

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satisfactory may expect to be visited with their Lordships' displeasure unless an adequate explanation of shortcomings can be given. Here then a standard of excellence in gunnery is set up by the highest authorities, for the attainment of which reward is promised, while no one is left in doubt as to what may be expected by those who from undue attention to some other department of the naval economy, or by negligence, should fail to try and reach it. The letter is at once an official pronouncement that as battle efficiency is the first consideration so accuracy of fire is the first essential to its attainment; that everything else is to be deemed of secondary importance in relation to proficiency in this respect, and that officers who look for future advancement will find no better stepping-stone to the goal of their ambition than a zealous effort to achieve distinction in this direction.

Larger importance attached to gunnery.

That the conditions thus created by this circular letter are novel no one who has any real knowledge of the Navy during the last half century will deny, nor is it necessary to labour the point that these conditions must make most materially for the increased efficiency of the Fleet as a fighting machine. Both facts find recognition in the Admiralty letter; what is not fully explained is the process of evolution of thought which has made the change possible and has assisted to bring it about. The gradual improvement in shooting, culminating in the excellent results which have aroused the admiration of the country, and satisfied their Lordships; the altered standpoint from which gunnery has come to be regarded by the Navy itself, and the difference in the attitude adopted by authority—all these are matters which it should be as useful to explain as it is needful that they should be put on record. It is not the purpose here to apportion responsibility, nor to attempt justification for past policies, but merely to describe events and to indicate the causes that have led to them.

It should be at once said that what has now occurred is not altogether a new thing in our naval annals. History repeats itself, and in the early years of the nineteenth century just such a change as would appear to have now taken place was brought about, as all naval reforms of value have been brought about, by a demand from within the Service—a growth of naval opinion at once spontaneous and evolved by force of circumstance, based upon principles and in accordance with practice which had already stood the test of time and trial.

Former conditions.

Let me quote from the "Fragments of Voyages and Travels" of Captain Basil Hall, volumes which every naval officer may always read with advantage and benefit. In a chapter on "Naval

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Captain Basil Hall.

Gunnery," in the third volume of the third series (edition, 1833), he writes :—

Officers who have served much afloat in old times tell us that there was a great want of efficiency in that department of naval discipline which relates to the management of the great guns. Many ships, it is true, even during the early period of the last war, were brought into admirable fighting by dint of the spontaneous exertions of their commanders. But in these instances the result was generally due to the combined talents, experience, and industry of those particular officers, and owed hardly anything to the merits of the general system in force throughout the fleet. In too many vessels of war, however, the exercise of the great guns was much neglected, or at most attended to just so far as the technical rules of the service rendered necessary. And this occurred not unfrequently even where there could be traced no want of ability or of zeal on the part of the officers. The naval profession, indeed, is so diversified in its objects that it offers many interesting fields of view to the attention of those who engage in it heartily; and as these assume more or less importance in the eyes of commanding officers, according to their several tastes and habits, sometiems one department and sometimes another gains the ascendency too much to the exclusion of the others.

Thus, some men in command dwell with undue attention upon the seamanship part of their duty, and think scarcely of anything but the rigging and sails, reefing and furling, and consider it an affair of life and death to make or shorten every sail from royals to courses in so many seconds. Others devote their thoughts almost wholly to clean decks, clean clothes, clean hammocks. Some think nothing worthy of much attention but the exact navigation of the ship, and in their scientific devotion to the moon and stars are apt to forget all sublunary affairs. Lastly come those who hold that, as fighting is the grand object of a ship of war, their duty to their king will be best served by keeping his Majesty's arms in good order, and in teaching his servants how to use them. There is much plain sense in this, and it is only to be regretted that this fancy for bringing the warlike part of the profession (a pretty important one) into an efficient state was not universal.

Such, however, were the difficulties which officers had had to contend with that in spite of all their zeal, it too often happened that they could not always accomplish their purpose, without neglecting some other important subjects, to which it was likewise their duty to attend. Whatever was the cause, the fact of some of his Majesty's ships being formerly left at times in a state of comparative inefficiency in the actual exercise of the great guns must be admitted; and were the thing less serious or less calculated to be attended with a loss of national reputation, we might almost smile at the absurdity of such a state of things. A plain shore-going person might well ask how it came about that the art of handling the guns should ever be neglected in any man-of-war when such prodigious sums were expended in equipping her, in other respects, with every possible requisite to enable her to cope with her enemies. Our ships are greatly improved in strength and every warlike quality, and there is no lack of supplies in any department, of stores, provisions, ordnance, men or officers. Why then to the education which is now so general in every other branch of the profession should not that of warlike science and gunnery practice be added?

It may seem strange that such a state of things should have existed in a service which had only just emerged from a great struggle, but Captain Hall is not the only witness to its existence, nor was he alone in his endeavour to impress upon his brother officers the utility and the necessity of establishing a scientific system of great gun practice. Sir Philip Broke, who, by the gunnery training he had given to his men in the Shannon, was able to capture the Chesapeake in eleven minutes, thereby reversing the usual result of the engagement of our ships with those of the enemy, was among the first to urge the importance of scientific and patient instruction in the art of straight shooting. Sir John Pechell, an officer of great practical knowledge, was another reformer; and he, like Sir Philip Broke,

Sir Philip Broke.

Sir John Pechell.

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devised a mechanical apparatus for teaching the seamen how to take aim. But perhaps the most remarkable invention of the time was that of Captain George Smith, who was the first commander of the new gunnery school, and the chief merit of whose movable target and dotting contrivance was, we are told, "the absolute necessity of deliberation which it inculcates by proving to the seamen that, unless they really used patience and acquire the habit of taking great care, they will never hit their enemy except by chance." Here is a little bit more from Captain Hall, which is surely as valuable advice to-day as it was when written:— Captain George Smith.

After all, then, the point of greatest importance in any system of naval gunnery is the unceasing inculcation and the habitual exercise of the coolest deliberation—a quality unspeakably more important than rapid firing. If, indeed, quick and correct firing could be conjoined, it would be idle practice to talk of limiting the celerity of the practice; but as experience goes to prove that, but a small proportion of all the shot fired in any action take effect, it becomes of much greater moment to fire seldom, but with precision, than frequently and at random. In fact, the best kind of training would be that which would teach the men to consider it irksome and disgraceful to make a blustering noise to no purpose, and at the same time should convince them of the paramount importance of taking such a careful aim before pulling the trigger, that not a single shot should ever miss. Under the most favourable circumstances, even in a still harbour, this is not easy; while, at sea, though the surface be not rough, the difficulty is immensely increased, and if darkness, smoke, violent motion, and the awkward intrusion of the enemy's shot, be superadded, the embarrassment to unpractised officers and men becomes so great, that much efficient service with the guns cannot be reckoned upon. These, however, are the golden moments for a well-disciplined and well-exercised crew to take advantage of. For such circumstances must insure the triumph of whichever party has learnt his business so thoroughly as to see his way clearly in the midst of a confusion, terrific to his antagonist, who has not learnt the value of systematic coolness and deliberation.

There were, of course, those who opposed the reforming spirit of the time, and who argued that it was waste of time to attempt to teach men to shoot straight when the standing rule for a British captain was to get so close alongside the enemy that no shot could miss. These opponents of progress quoted Nelson in support of their views, but while they used the words of the great admiral, they overlooked or misunderstood the spirit which inspired his instructions, and failed to appreciate his genius for accommodating the means to the end. A startling reply was given to their reasoning by the American frigate captains, who did not permit our ships to get alongside theirs, and who, "by reason of the greater speed, and the larger manœuvring powers of their ships, were able to choose and preserve the distance most favourable to the use of their longer ranged guns." This sentence must surely have a familiar ring to some of our controversialists to-day. Those who care to appeal to history for argument on the subject of the tactical value of speed, the benefits which accrue from carrying one type of long range guns, and the disadvantages to which a nation is exposed by having a number of vessels of inferior classes in her Navy, will find much to interest them

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in Sir Howard Douglas's work on "Naval Gunnery." That by holding to right principles success may be achieved is demonstrated by the action between the British Phœbe (Captain Hillier) and the American Essex (Captain Porter), with ample confirmation and illustration of the benefits conferred by speed coupled with long-range guns, provided the latter are handled by good marksmen. Captain Porter says:—"The Phœbe, by edging off, was enabled to choose the distance which best suited her long guns, and kept up a tremendous fire which mowed down my brave companions by the dozen." And, again, "the enemy, from the smoothness of the water and the impossibility of reaching him with our cannonades, was enabled to take aim at us as at a target; his shot never missed our hull, and my ship was cut up in a manner never before witnessed." Those who will turn to the report of Admiral Niebogatoff in the chapter on the late war in this volume will find an almost exact parallel to these remarks. The science in seamanship displayed by Captain Hillier, the training in gunnery he had given his men, and the foresight of the authorities in providing him with an armament of longer range than that of his nominally more powerful antagonist—these factors would not probably have had so large an influence in the action had not the Phœbe also possessed the advantage of greater speed in the smooth water which prevailed.

Opponents of progress.

It was not, however, until many years later that the authorities could be persuaded that systematic training in gunnery was essential. The retarding causes were many, but that which had the greatest influence resulted from a system of training the younger officers, which took place wholly at sea and was mainly intended to make them sailors. Under this system the technical instruction given to the youngsters was imparted by old petty officers, illiterate, prejudiced, and firmly convinced that to be a sailor was the same thing as being a seaman, just as there are people to-day who are persuaded that "a marine engineer" is merely a synonym for "a steam engineer." Thus it came about that to handle a ship under sail in all weathers was regarded as the primary desideratum, and officers trained in this way grew up with a low idea of the value of scientific gunnery. Such views were traditional in the Service, and its older elements were not sufficiently progressive to seek to get out of the groove. If any desired further enlightenment on the theory or practice of gunnery they were forced to seek it beyond the Navy.

Capt. R. A. Lawson, R.A., on gunnery.

When it was deemed desirable that Prince William Henry (afterwards William IV.) should know something about the guns of a ship and how to use them to the best advantage, Captain Robert Lawson, of the Royal Regiment of Artillery, was invited to prepare some

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"Memorandums" for the purpose, and his manuscript, dated "New York, Oct. 2, 1782," neatly bound in leather, with illustrations and tables of naval ordnance, and the book plates of Prince Henry and Captain FitzClarence, R.N., is now in my possession. Captain Lawson appears to have been somewhat in advance of his time, for he has a good many hints to give to the young sea officer based on experiments he had carried out at Gibraltar, and on his experience "of what happened at Philadelphia to the rebel frigate Delaware, when the ship was set on fire by a shell fired from an 8-in. howitzer, and had to strike her colours to the gunners in the fort." It might have made some difference in the world's history if his suggestions to use shell from ships' guns had been adopted by the naval authorities in 1782.

Sir Charles Douglas and other reformers.

That there were exceptions to the rule among the naval officers, even of that time, is true; notably Sir Charles Douglas, who at his own cost fitted the guns of the Duke with flint locks, by which the use of the slow match and the powder horn for priming might be discontinued. The Duke was one of the vessels which contributed so largely to Rodney's victory of April 12, 1782, mainly owing to the many progressive appliances in gunnery introduced by Sir Charles and the training he had given to her crew. But although the value of the novelties was clearly demonstrated and their aid to increased efficiency, it took nearly as long to drive this into the heads of the authorities as it did to get telescopic sights accepted for the Navy after their value had been proved in the Scylla and other ships.

On the whole, advancement in gunnery was brought about by suggestions from outsiders, working on receptive and adaptable brains in the Navy. Thus there can be no question that Broke—whose capture of the Chesapeake has already been referred to, and whose education and training had been something more than that of a tarpaulin—owed a good deal to the advice of Dr. Inman, the professor at the Royal Naval College. Inman's work on naval gunnery, by the way, possesses something more than archæological interest even now. Similarly when the great change took place, which dates from the establishment of a school of gunnery at Portsmouth by Lord Melville in 1830, it was from Sir Howard Douglas, an artillery officer, that the naval authorities took the idea. He had persistently urged upon the Admiralty the important advantages which might result from enlightening by theory and practice, during peace, a large proportion of officers and men who would have to fight the guns in time of war. He was supported by Broke, Pechell, Penrose, Bowles, and other progressive naval officers; but the scheme was his, and the curriculum of study was drawn up on lines which he laid down.

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There were people then who opposed the natural process of evolution in gunnery, just as there had been opponents to Lord St. Vincent's policy of economy and efficiency. Such forces have ever been arrayed against progress, advancement, and reform. The result has often been not to conserve, but to embalm. It has been said of such reactionaries that they objected to the introduction of steam propulsion, and compared the engineer to "a Lascar with an oil-can"; that they clung to yard and mast training, and asserted that no seaman could be bred in a steam fleet; that they systematically opposed all proposals for ameliorating the conditions of life afloat, and accused those who were labouring in the best interests of their brother seamen of planning to introduce trade unionism; that they have been consistent advocates of the "paint and polish" school, which taught that efficiency was the product of that kind of cleanliness which has been likened to "a whited sepulchre"; that they have always exerted their influence against, and have been a hindrance to, every measure which bade fair to bring better pay, promotion, or greater content to the men of the Navy. At all events reaction was at the back of the opposition to the movement for an improvement in gunnery which has just been described, and it may be permissible to say that there are those who assert that this attitude of mind is now displayed in the attempts made to convince the people of this country that an administration which has shown itself progressive along the whole line of naval organisation must be curbed at any cost. In this way the tide of progress may have been stemmed at times, but in spite of such intervals of stagnation the onward movement continues, gaining accelerated impetus in the rebound, because the Navy must be brought to perfection as a fighting machine or it is unfit for its vital duties in time of war.

The Excellent.

Unfortunately, when the new gunnery training school was established in the Excellent, the efforts of the older officers of the "sharpen your cutlasses, boys, and the day's your own" way of thinking were able to prevent it being all the success that it promised. Gunnery was regarded by such men as an adjunct to rather than as the essence of a man-of-war's-man's training. A specialised class was thus created, whose business was made more or less a mystery, upon which no one outside the inner circle of the Excellent was considered to be capable of forming an opinion. Indeed, officers of sea-going ships were treated with scant civility if they did venture to offer their suggestions. Naturally the state of affairs was not invariably the same, but those interested in the subject will find much light thrown upon the circumstances here

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referred to in the correspondence of naval officers just before and just after the war with Russia. The Admiralty left details of administration to the ordnance department, the officials of which were fully employed in settling large questions of material—the introduction of new artillery, new mountings, new weapons and projectiles, with the never ending ramifications of the struggle between the gun and the armour-plate. The end was overlooked in arranging for the provision of the means. Details, many of them of the utmost importance, were left to the staff of the Excellent, and captains of sea-going vessels resented this, particularly if they happened to have been in the training ship themselves, and knew that applications and suggestions were often, if not generally, dealt with by young lieutenants and sometimes even by warrant officers.

The decline of gunnery.

So year by year gunnery became more unpopular afloat, and among the senior officers it was as often as not neglected, ignored, or treated with contempt. In the ships the gunnery lieutenant, the only commissioned officer assumed to be an exponent of the art—nobody else was encouraged to study it—took one of two courses, either he fought all he could to get men and material for drill, and was always in hot water with the senior executive, or he allowed matters to drift, knowing full well that at inspections a little smartness in clearing away the guns, with the utterance of certain shibboleths, imposing and mysterious to the admiral, would carry him through. The moment he became a commander he kicked away the ladder on which he had risen, and devoted his time and energy to subjects which were more pleasing to his captain and superior officers. "A smart ship and a clean ship" was the verdict which carried approval with everyone, and no young officer could be so foolish as to put initiative and zeal into gunnery when practice with the guns meant dirtying the paint work, and ability to hit a target was as nothing in the scale with shifting yards or striking topmasts faster than any other ship. There is a passage in Mr. Arnold White's book "Nelson and the Nineteenth Century" which may be quoted here, so true is the picture drawn of the conditions which ruled during the period just referred to:—

As time passed and the weapons improved, the gulf between the specialist's work and the daily work of the ship widened, until eventually the other lieutenants, through no fault of their own, became comparative nonentities in the fighting organisation of their ships, while the commander has frequently obstructed the war training of the men, and at the best of times can only be a passive spectator. Until a few years ago the progress of shooting in the Navy went on quietly and smoothly. All the necessary information was contained in the gunnery manual and drill book, and a "taboo" was pronounced on all thought and experiment outside that narrow circle. It was true that the annual prize firing usually resulted in a very small percentage of hits, but that was considered inevitable in much the same way as

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plague or smallpox in days gone by. When flagships were engaged in giving practice it was not unusual for admirals to remain on shore and escape the noise and nuisance. Besides, the shooting could not be bad, since no ships were better. Whale Island and the gunnery manual had reduced gunnery to a stereotyped code. All was peace.

The Scylla and Terrible.

Things went on pretty much as here described until 1898, when two things happened to draw the attention of the naval world to the subject of marksmanship with big guns. One was the battle off Santiago, when of Cervera's squadron of cruisers it was said that "their fire was at first terrific, but the harm done was next to nothing, owing to the unskilful handling of the Spanish guns," nor did the proportion of hits to shots fired redound greatly to the credit of the American gunners. The second concerned the record firing of the Scylla, a small vessel on the Mediterranean station. The captain of the Scylla (now Rear-Admiral Sir Percy Scott) had struck out a line of his own. He had provided his own telescopic sights, and instructed his men with a loading teacher and a dotter, both of his own invention; so that presently the ship made a score at prize firing such as the Navy had never thought possible. There can be no doubt that at the time many people believed that the score was "faked," and it was not until it had been repeated before independent witnesses that the fact gained general credence. Even this was not sufficient to overcome the indifference and inertia of the higher officials. It was not until the captain of the Scylla showed that in another ship (the Terrible), and with a different company, he could better the previous performance, and several other vessels on the China station had copied the Terrible's methods with satisfactory results, that it was generally admitted that good shooting, and straight shooting only meant careful and systematic training.* The Americans had already recognised the need for improvement, and an Inspector of Target Practice, in the person of Lieut. W. Sims, had been appointed to reorganise this department of gunnery with marked results.

It was about this time that the Press became interested, and when someone asked "For what does the British Navy exist?" and was told "To use its weapons to destroy the national foe!" the pregnant fact was disclosed that what should be the first essential to efficiency was the last consideration. There was no system for making the men shoot straight, and no encouragement for them to try and do so. In many ships, indeed, a prize was given for the cleanest gun by the gunnery lieutenant, a premium against using the gun for its legitimate purpose. The process of evolution in scientific gunnery was

* Those who wish to see what a marvellous improvement in marksmanship may be effected in a short time by using mechanical assistants in training should consult the tables showing results of prize firing in the Barfleur from 1899 to 1901, compiled and prepared by her gunnery lieutenant.

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slow, but it was sure, and the publication of the comparative results of the prize-firing in the newspapers gave it an impetus by creating healthy emulation. The authorities might be dilatory in supplying the necessary appliances for training and improving sights, but just as the officers in Rodney's time had found the flint locks for their guns, so many of the officers now followed Scott's lead, bought their own appliances and altered their sights themselves, so that soon a marked difference was apparent in the returns. At first there was a strong demand for large money prizes for the best shots, but a better lead was given by Admiral Eardley Wilmot in an article contributed to the *Engineer* in November, 1901. He wrote:—

More money prizes are not required, but honorary distinctions to ships, officers, and men that excel in great gun shooting would be appreciated. A bluejacket is as proud of a badge as an officer is of a C.B., but he carries nothing to show that he is a marksman with a 4·7-in., a 6-in., or 12-in. gun. What issues depend upon directing with precision in action the 850-lb. projectiles from the 12-in. guns of the Majestic! The individuals who waste the fewest of these shots should be held in honour and cherished. Then as regards the officers by whose assiduity and zeal good results are attained. What a stimulus to improved shooting would the occasional promotion of an officer for efficient gunnery in sea-going ships give! Is not too much thought, even now, of "decorating the ship," as Roosevelt says of 1812?

Sir John Fisher and Sir Edward Seymour instituted station challenge shields for good shooting in the Mediterranean and China, Lord Selborne promised a decoration for good marksmanship, and the system of naming cruisers after counties and colonies was utilised in the same direction.*

Capt. Percy Scott at Whale Island.

In 1903 Captain Percy Scott was selected to take command of the gunnery school at Whale Island, and now with the support of Sir John Fisher he introduced a new system of training, the principle underlying which was that the men should be trained by repeatedly doing the thing, and not by reading out of a book how it was to be done. A simple change, but one fraught with big results. However, the system, although it then came into working in the Excellent, was not accepted in full for the naval service until Sir John Fisher had become First Sea Lord. It was intended by the new scheme to bring the ships and squadrons into competition in gunnery in the same manner that they were in competition for everything else. But such

* There was still much opposition in certain quarters, and Lord Charles Beresford, in April, 1902, answering objections at the time, said:—"With regard to gunnery, Admiral FitzGerald writes that my statement as to its want of proficiency casts a slur on the whole gunnery department of the Navy. I am profoundly amazed at the ignorance of Admiral FitzGerald on this point. I do not believe there is a gunnery officer in the Service who does not think that the want of proficiency in heavy gun shooting is lamentable. There are brilliant exceptions on the China Station, showing what is possible in regard to proficiency in heavy gun-firing. These good results have been brought about by the energy, zeal, and pecuniary sacrifice of the officers concerned, and more particularly by one, the captain of the Terrible. If the standard of the Terrible is attainable, why are not all the ships of the Fleet near it?"

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a plan was not one that commended itself to all the senior officers afloat, and it remained in abeyance until Captain Jellicoe came into office as Director of Naval Ordnance in February, 1905, Captain Scott having been in the meantime promoted to flag rank, and appointed to the newly-instituted post of Inspector of Target Practice. For the first time the new system was given a fair chance, and the phenomenal results of all the gun practices, which were issued as Parliamentary Papers, furnish a happy augury for its satisfactory and successful working. How they were regarded at the Admiralty has been seen from the circular letter already quoted.

The great advance in efficiency.

So far as the gunnery of the Fleet is concerned there has not been for a long time such a remarkable year as 1905. From the returns of battle practice we may see that the rapidity of fire has been just doubled, and the hits doubled also, which means, in other words, that the fighting efficiency or battleworthiness of the Fleet has been doubled. Then, too, as Mr. Robertson explained to the House of Commons, the guns of the Navy have been resighted in accordance with modern, practical and scientific notions, while all the necessary appliances and instruments in connection with battle firing are now in course of being issued. This means much more than appears on the surface, because at the ranges at which battles are now likely to take place the sighting and range-finding and spotting can no longer be performed without special mechanical implements, in the use of which practice is as necessary as for laying and sighting a gun. The tables published on pp. 182–3 have been so arranged that they can be posted in a convenient place on board every ship in the Navy. This is an entirely new departure, and calculated, by officially stimulating the spirit of emulation, to have a very beneficial effect. There are certain points in these returns which will strike everyone as deserving attention and consideration. Thus as regards the gun-layers' test the *Times* says:—

The improvement in marksmanship shown by its contents has been noted with much satisfaction by their lordships, and it should certainly tend to increase the confidence which the nation with justice places in the Navy. The improvement to which we refer is most aptly demonstrated by one concrete fact. Everyone will remember the stir which was created by the announcement that Petty Officer Grounds had, in the firing some two years ago, made eight hits in eight rounds fired in one minute. From this return we learn that there are more than fifty men who have achieved this feat, and several who have improved upon it. This alone would be sufficient evidence of the increased importance in which good marksmanship is held in the Fleet, and of the additional efforts that have been made to improve it. But there is much more in the return of a similar nature. Their lordships point out in their covering letter the difference in the size of the target, that in use this year having an area of a little over 300 square feet, while that in use in 1904 had an area of 600 square feet. This circumstance should be borne in mind in considering the results attained. The average number of points per man in 1904 was 43·22, while this year it has risen to 68·26. This enormous increase is shown, by an examination of the report, to be due to the splendid firing made by the leading ships in each squadron.

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But the gun-layers' test, which was the all-in-all of gunnery, is now only a minor factor, and but a preliminary to the real test, which is the battle practice, and here we may quote the *Times* again:—

The salient points about the gunnery of the Navy in 1905 have been the great improvement in markmanship shown by the result of the heavy gunlayers' test, the encouragement to good shooting given by the publication of the returns, and the prompt manner in which the results have been got out by the department of the Director of Naval Ordnance. The firing of 1905 shows an immense advance on anything that has ever been done before, the gain of 25·04 points per man meaning an increase in the efficiency of the Fleet. It may be well to point out the differences between the heavy gunlayers' test and the battle practice. The one is preliminary to the other. The men who manipulate a gun are three in number, and they must be trained together; this training is carried out in sea-going ships, and the gunlayers' test shows the result of it. This trial is carried out at a range at which the man firing can see if his shot has made a hole in the target or not, probably not more than 1500 yards. The guns' crews, when perfect in drill and exercise, are ready for the battle practice, which is carried out at ranges about four times the distance, and therefore such as to involve the use of instruments, while the details of this firing are confidential.

Finally, a word must be said about the difference between the scores of the ships at the top of the list and those at the bottom, a deplorable revelation indeed. The Admiralty have already taken notice of these circumstances. They have recognised their appreciation of the good records of certain ships by preferment and decoration of the officers responsible, and thus made it clear that those who will endeavour to make their ships efficient for battle may make sure of reward. On the other hand, by a number of courts of inquiry which have been held, and by certain results which have followed, the Board have given a clear indication also that in the future neglect of gunnery will not be tolerated. Throughout the Fleet now the battle practice test has been made the same, and is arranged on similar lines for every squadron and every ship. These tests have already begun, and the comparisons now made possible, with the publicity given by early presentation of the results to Parliament, will assuredly have the effect of stimulating interest and providing an additional incentive to each ship to do its utmost.

Unequal results.

CHAS. N. ROBINSON.

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Results of Practices, 1905.

Order of Merit.	Battle Practice.		Heavy Gunlayers' Test.		Gunlayers' Test, Light Q.F. 12-Pounders.		Gunlayers' Test, Light Q.F. 6- and 3-Pounders.	
	Ship.	Points.	Ship.	Points.	Ship.	Points.	Ship.	Points.
1	Exmouth	374·8	Exmouth	127·78	Exmouth	54·10	King Edward VII.	48·75
2	Queen	322·2	Bulwark	114·04	Hyacinth	48·92	Shearwater	43·88
3	Leviathan	268·8	Illustrious	108·87	Albemarle	40·29	Majestic	42·90
4	King Edward VII.	261·4	Mars	107·05	Euryalus	39·33	Monmouth	42·25
5	Albemarle	228·5	Leviathan	105·38	Drake	39·33	Exmouth	40·63
6	Dido	216·2	Albemarle	104·84	Cornwallis	39·13	Magnificent	39·00
7	Astræa	213·2	Russell	100·38	Sentinel	37·98	Carnarvon	34·13
8	Carnarvon	205·0	Perseus	100·09	Queen	37·41	Hyacinth	34·13
9	Russell	178·5	Majestic	95·59	Bulwark	35·97	Diana	32·50
10	Prince of Wales	164·0	Montagu	92·23	Donegal	35·97	Lapwing	32·50
11	Juno	156·5	Iphigenia	91·40	King Edward VII.	34·53	Formidable	30·88
12	Venus	156·5	Sutlej	90·91	Venus	31·65	Prometheus	28·03
13	Hindustan	153·7	Hyacinth	88·58	Albion	31·08	Sapphire	26·81
14	Drake	150·3	New Zealand	87·75	Prince George	30·93	Alacrity	26·00
15	Dominion	148·7	Berwick	87·64	Monmouth	30·21	Bulwark	26.00
16	Bulwark	146·5	Drake	87·03	Magnificent	25·90	Challenger	26·00
17	Formidable	146·5	Ocean	84·79	Formidable	25·90	Cumberland	26·00
18	Sutlej	140·5	Hindustan	84·66	Triumph	25·49	Queen	24·38
19	Minerva	134·2	Venerable	84·56	Suffolk	24·46	Topaze	24·38
20	Duncan	128·8	Monmouth	81·49	Majestic	23·74	Triumph	24·38
21	Venerable	128·8	Roxburgh	80·81	Prince of Wales	23·74	Antrim	23·40
22	Cornwallis	123·0	Revenge	80·04	Venerable	23·02	Commonwealth	22·98
23	Swiftsure	117·9	Venus	78·83	Leviathan	21·10	Bedford	22·75
24	Triumph	117·9	Amethyst	78·05	New Zealand	21·10	Cornwall	22·75
25	London	117·2	Doris	77·15	Challenger	20·14	Crescent	21·22
26	Cæsar	111·3	Cæsar	77·14	Implacable	20·14	Cornwallis	21·13
27	Topaze	102·5	Formidable	76·12	Victorious	19·42	Implacable	21·13
28	Hampshire	90·2	Bedford	75·34	Berwick	18·70	Redbreast	21·13
29	Implacable	87·8	Pelorus	74·58	Diana	18·70	Venerable	21·13
30	Magnificent	87·8	Pegasus	74·58	Minerva	18·70	Fox	20·58
31	Commonwealth	87·2	Goliath	73·45	Dominion	18·22	Barham	19·50
32	Roxburgh	82·0	Queen	72·19	Sutlej	18·22	Berwick	19·50
33	Cumberland	82·0	Sapphire	71·96	Andromeda	17·27	Diadem	19·50
34	Goliath	76·2	Victoria	71·86	Irresistible	17·27	Good Hope	19·50
35	Perseus	71·7	Sirius	71·36	Cornwall	15·83	Diamond	18·28
36	Canopus	70·3	Cumberland	70·73	Juno	15·83	Pelorus	18·28
37	Lancaster	64·5	Euryalus	70·08	Commonwealth	15·35	Minerva	17·88
38	Irresistible	58·5	Forte	68·81	London	15·11	Pegasus	17·06
39	Good Hope	54·7	Diana	68·77	Arrogant	14·39	Roxburgh	17·06
40	Euryalus	46·8	Hogue	68·04	Cumberland	14·39	Torch	17·06
41	Albion	46·7	Diamond	68·03	Lancaster	12·95	Hogue	16·25
42	Andromeda	46·2	Astræa	67·90	Diadem	12·47	Leviathan	16·25

43	Diana	44·7	Commonwealth	67·89	Bedford	11·51	Victorious	15·84
44	Crescent	44·2	Canopus	67·86	Essex	11·51	Bonaventure	15·17
45	Majestic	41·0	Andromeda	67·43	Good Hope	11·51	Forte	15·17
46	Amethyst	41·0	King Edward VII.*	67·29	Pathfinder	11·51	Amethyst	14·63
47	Hogue	41·0	Crescent	66·07			Hampshire	14·63
48	Fox	41·0	Duncan	66·67			Irresistible	14·63
49	Proserpine	41·0	Prince George	66·34			New Zealand	14·63
50	Pelorus	41·0	Diadem	64·16			Prince George	14·63
51	Prince George	35·2	Centurion	63·82			Skipjack	14·63
52	Suffolk	35·2	Fox	63·59			Venus	14·63
53	Monmouth	35·2	Suffolk	61·50			Prince of Wales	13·00
54	Antrim	32·8	Cornwallis	60·08			Hussar	12·75
55	Bonaventure	32·8	Good Hope	59·35			Jason	12·19
56	Terpsichore	30·7	Latona	59·16			Proserpine	12·19
57	Diadem	30·7	Prince of Wales	59·04			Sentinel	12·19
58	Cornwall	29·3	Topaze	58·88			Astræa	12·02
59	Berwick	29·3	Carnarvon	58·63			Albion	11·38
60	New Zealand	25·7	Lancaster	58·43			Juno	11·38
61	Arrogant	24·6	Challenger	57·03			Sirius	11·07
62	Victorious	11·7	Antrim	56·69			Albemarle	9·75
63	Glory	11·7	Glory	56·59			Circe	9·75
64	Forte	8·2	Dido	55·35			Dryad	9·75
65	Hyacinth	7·5	Juno	55·35			Donegal	9·75
66	Bedford	5·8	Minerva	55·35			Euryalus	9·75
67	Donegal	5·8	Magnificent	54·49			Hebe	9·75
68	Essex	0·0	Irresistible	54·25			Lancaster	9·75
69			Skipjack	52·92			Leda	9·75
70			Arrogant	52·20			Speedy	9·75
71			Hampshire	49·95			Suffolk	9·75
72			Dominion	49·73			Dominion	8·36
73			Clio	49·72			Halcyon	7·31
74			Cadmus	47·01			Harrier	7·31
75			Swiftsure	46·96			Perseus	7·31
76			Triumph	45·36			Terpsichore	6·83
77			Halcyon	45·36			Arrogant	6·50
78			Implacable	45·05			Essex	6·50
79			Albion	44·55			Pathfinder	6·09
80			London	44·27			Cadmus	4·88
81			Terpsichore	44·04			Speedwell	4·88
82			Donegal	43·05			Drake	3·25
83			Cornwall	43·05			London	3·25
84			Scylla	41·58			Sutlej	3·25
85			Essex	41·51			Clio	2·44
86			Harrier	37·80				
87			Torch	36·63				
88			Sappho	35·91				
89			Proserpine	33·36				
90			Sphinx	31·40				
91			Hebe	30·24				
92			Speedwell	30·24				
93			Bonaventure	27·22				
94			Circe	22·68				
95			Hussar	22·68				
96			Leda	22·68				
97			Prometheus	21·59				
98			Dryad	15·12				
99			Speedy	7·56				
100			Jason	Nil.				

* In the Heavy Gunlayers' Test, 1906, the King Edward VII. made a splendid record, 13 hits out of 14 rounds being made from the 12-in. guns and 30 out of 33 from the 9·2-in. guns, while 11 hits in 11 rounds were made with one 6-in. gun.

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CHAPTER XIII.

Observations on the Statement of Admiralty Policy Lately Laid Before Parliament.

The Memorandum presented to Parliament by the late Board of Admiralty deals with changes undertaken during the past three years. The responsibility and the merit are shared by Lord Selborne and Lord Cawdor and by their naval advisers. On the leading features of recent Admiralty policy the writer has no unfriendly criticisms to offer. It should be the aim of every naval administration to maintain the Fleet at a sufficient strength with the least addition to the public charge. While the state of the Navy to-day is largely due to former administrations, special acknowledgments are due to the present Board, whose policy it has been to concentrate expenditure on effective services.

Since the great naval war our strength at sea in relation to those Powers which we must be prepared to meet has never been more commanding. As to officers and men we are strong in numbers, and the standard of efficiency is high. In battleships ready for sea we are superior to any three European Navies combined, and such a combination is inconceivable. In cruisers our superiority is far in excess of the three-Power standard. But in the number of ships building we are not keeping pace with the programmes of construction proposed or in course of execution for other Naval Powers. Progress should be measured, not by the number of ships laid down, but by the output of new tonnage. In appropriations for new construction we equal, and more than equal, all the European Powers combined. In rapidity of construction we have no rival. The cost of building being less in Great Britain than elsewhere, we shall be safe in measuring relative progress by the relative expenditure on construction. The figures below were given to Parliament by Captain Pretyman :—

New construction.

FIVE YEARS—1900-1905.

New Construction.	£
Great Britain	47,000,000
France and Germany combined	26,000,000

Tons Built.	Tons.
Great Britain	602,000
France	178,000
Germany	199,000

For the year 1905–6 the amount taken in the British Estimates for new construction was, in round figures, £10,000,000, being somewhat

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in excess of the total for France and Germany. In the class of battleships we have added to the British Navy in five years nineteen units, aggregating 289,000 tons. In the same interval no battleships have been completed for the French Navy. The German Navy has been reinforced with seven ships, aggregating 100,000 tons.

Mobilisation has been perfected; the exercises of the Fleet have been carried out on a scale without precedent. To get ready for service without the element of excitement which actual war creates is a hard task for Admiralties and admirals. Mobilisations afford the best means of giving instruction in the actual operations of war. Gunnery, under Sir Percy Scott and Captain Jellicoe, is greatly improved. Mobilisation and gunnery.

The duty—the imperative duty—of keeping down war expenditure in peace, has not been neglected at the Admiralty. In the fifteen years—1890 to 1905—the aggregate charge for the Navy had increased from 14½ to 38½ millions. In the last two years the Estimates have been cut down by five millions. Naval strength and naval expenditure, as recent experience has shown, are not always correlative. Russian Navy Estimates have greatly exceeded those of Japan. We have the assurance of the Admiralty that with the reduced Estimates ample provision has been made for the fighting efficiency of the Fleet and its instant readiness for war. The economies have been made where economies had been long called for. In the manning of the Navy a wise change of policy has taken place. For many years we had been adding 5000 men annually to the naval force; in ten years the manning votes had been increased by more than £3,000,000. It was a heavy and an unnecessary increase of the public charge. Some reduction has already been made in the votes for manning; it may be carried further. A return presented to Parliament in August last showed not less than 41,000 men in shore establishments and ships in reserve. It is not well to keep large numbers away from the sea service. With permanent men in full numbers for all ratings which need special training, we may fill up from the Reserves. The strength required in war had never been maintained by any Naval Power as a permanent force. Large economies have been effected by putting aside ships of obsolete type, yet costly to maintain. The Fleet has been re-distributed. Ships have been withdrawn from distant foreign stations, where foreign flags were seldom seen. Our Fleet in commission has been concentrated in European waters, in squadrons of battleships and cruisers, all of the most powerful type. We are strong where strength is needed—near the centre of affairs. Economies.

Turning to branches of administration in which there is room for improvement, little shall be said here about the education of naval Education of naval officers.

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officers, that subject being dealt with elsewhere in this volume. To the regret of all lovers of sailing the seamanship of the elder day has been put aside as a lost art. Knowledge of the management and the upkeep of machinery has become essential. It was necessary to extend technical and professional instruction. Some of the instruction now given has no direct bearing on the duties of the executive line. It may be possible on the mechanical side to do less, and in the management of boats, under sail and pulling, to do more than at present. In an occasional dash from Dartmouth Harbour into the open experiences very useful to midshipmen may be gained.

Turning to general education, the classics have been given up. In all other general subjects—in mathematics, French, English literature, history, and geography—much more instruction is given to naval cadets at Osborne and Dartmouth than at our public schools. Every scheme of education must be a compromise, and must fall short of an ideal standard.

Modern languages.

It is desirable that more instruction in modern languages should be given at Dartmouth. The cadets work hard and no subject now taught can be omitted. That wider knowledge of modern languages, which is of such great practical use to the naval officer, must be acquired later. In the British Navy the knowledge of modern languages is not a strong point. Of 5000 officers above the rank of warrant officer only sixty are qualified in French. Naval officers should be encouraged to qualify as interpreters by more liberal rewards. In the examination for lieutenants more marks should be given for proficiency in modern languages.

Sir Charles Shadwell's Committee.

On naval education generally the report of Sir Charles Shadwell's Committee on the Higher Education of Naval Officers may still be consulted with advantage. The Committee expressed doubt as to the advisability of making instruction in the Navy too exclusively mathematical. It would, they believed, be admitted by all mathematical teachers that on a large proportion of men, however intelligent in other lines of thought, mathematics are practically thrown away. They may afford a kind of mental discipline, but they are never assimilated in a form to be applied. The extent to which mathematics should be insisted upon depends on the future career of the student. It is the greatest glory of Cambridge that it produced Sir Isaac Newton. He was the direct product of a high mathematical training. It is the aim of a naval training to produce a Nelson or a Togo. Trafalgar and Tsushima were won by skill in the handling of fleets, by superior skill in gun laying, and by personal qualities not directly the product of mathematical training.

The Report of the Committee included some interesting observa-

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tions on the education of cadets. Comparing the system pursued in the British with those prevailing in the services of other great maritime Powers, the essential difference lies in the age of entry—thirteen for the British Navy, never less in the foreign services than fourteen, while it may be as high as eighteen. The previous school training of cadets destined for the foreign naval services having been, as the Committee observed, much more extended, "they must, as a rule, be better grounded in all appertaining to book-learning, and having received a greater amount of mental training they must be better qualified to enter on more advanced studies, and to improve their general and special education." What would Sir Charles Shadwell's Committee have said if they had had the opportunity of seeing the cadets of Osborne and Dartmouth at their work in the engineering shops? They might perhaps have said that, as a means of engaging the faculties on the work in hand, and cultivating habits of accuracy, the new mechanical training could hardly be surpassed.

Extension of service in first sea-going ship.

No mechanical training, however, can supply all the qualifications required in the higher ranks of the Navy. This should be kept in view. It should be possible to extend the period of education for cadets, while holding to the traditions of the British Navy in favour of early service at sea. It is proposed that cadets on leaving Dartmouth shall go to sea for six months in a ship specially commissioned as a sea-going training ship, with a staff under whom the general education of the cadets can be carried forward. If the time in the training-ship were extended from six to twelve months, much might be done to advance general education. No education which it is possible to give to cadets can fully qualify for all the duties and responsibilities of high command. But results have been admirable in the Navy, nor is the Navy the only profession in which the best men have acquired the highest qualifications they possess by self-teaching.

Ship-building.

The Admiralty statement deals with the obsolescence of warships—a fateful subject for naval administrators. The shipbuilding of the Navy is a problem of exceeding difficulty. We have proof in the fact that one hundred and fifty ships, costly and of recent date, have been put aside as obsolete. It may be that too many have been put aside. Those ships were laid down by successive Boards of Admiralty on which the best officers of the Navy were serving. They were unable to anticipate the development of the future. Let us hope that the ships we are building to-day will remain longer on the list. All belong to types which every naval administration approves.

Programmes of construction for the British Navy have never been fixed upon abstract principles. We have looked to the construction

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in hand for other Powers which we must be prepared to meet, and we have tried "to go one better." This we have certainly done in our latest creation. In dimensions, in armament, in armour, in speed, in coal endurance, the Dreadnought has no rival. The experiences of the Russo-Japanese war have been carefully considered. They may have been anticipated in the design for the Dreadnought. The Parliamentary Committee on the French Navy Estimates recommend that secondary armaments should be removed; that the heavy guns should be of uniform calibre, and mounted in turrets, not in casemates; that the area of protected side should be extended, with some reduction in thickness of armour; that the speed should be raised to 21 knots. We have all these features in the Dreadnought. There are criticisms on the Dreadnought, and more especially with reference to the removal of the secondary armament. In an able volume on the experiences of the war in the East, M. de Lanessan, recently Minister of Marine in France, insists that secondary armaments should be retained. Quoting the reports of Admiral Togo, Captain Klado and General Linievitch, M. de Lanessan states that the 6-in. guns of the Japanese ships wrought havoc in the unarmoured upper works of the Russian ships. At long range they could not pierce armour; the continuous explosion of shell on the turrets and the gun positions made it impossible for the Russian gunners to reply with effect to the Japanese fire. Leaving technical questions to experts, it is an agreeable duty to give the acknowledgments which are due for the design to Sir Philip Watts and his assistants, and to the officers and workmen at Portsmouth Dockyard for the performance of a memorable feat in completing the Dreadnought for launching in four months from the date of laying down. The shipbuilding officers in the Royal yards may claim a further merit. The ships they build compare favourably in point of cost with contract-built vessels. That is a result not attained in other countries.

The Dreadnought.

Professional officers.

The occasion seems fitting for calling attention to the position of the chief professional officers of the dockyards. The writer may, perhaps, claim a hearing as having been Chairman of the Departmental Committee, on whose report, made in 1883, the Constructors were organised as a Royal corps. The scheme submitted to our committee had been drawn up by the late Sir Houston Stewart and Sir William White. It gave to the professional officers a more defined position in the Service, with suitable gradations of rank. The additions to pay were slender. Salaries should be more liberal in a position so responsible as that of the manager of a dockyard, charged, as at Portsmouth, with the building of the Dreadnought, and the direction of the labours of many thousands of men. The

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technical assistants to the Admiral Superintendents—offices lately abolished—with no direct responsibility, received £1000 a year. It would be no unreasonable reward to raise the salary of the manager of the three principal yards, by increments, to a level with that of Superintendent of Construction Accounts at the Admiralty. Prizes should be offered to the corps of Constructors. The resistance of the Treasury in these matters is not always for the public advantage.

Returning to shipbuilding policy, it is necessary to provide vessels for scouting duties. Eight ships have lately been completed, specially designed to act as scouts. They cost some £300,000 each. Their high speed is their only merit. Too restricted in dimensions, they are neither cruisers nor combatants. For scouting within close range, destroyers are available, and they combine fighting qualities with ability for gathering information. For a wider range, let us look to the ocean-greyhounds of the mercantile marine, strongly recommended by Lord Charles Beresford to the Committee on Steamship Subsidies. No ships, he said, could do their work better than the ocean-greyhounds, built for speed in any weather. We have proof of the superiority of fast merchant steamers for service as ocean scouts in the latest performances of our most powerful cruisers. In a race across the Atlantic from New York to Gibraltar the squadron under the command of Prince Louis of Battenberg made an average speed of 18½ knots, showing a considerable falling off from the 22 knots of the measured mile. A high speed was maintained so long as the supply of coal to the furnaces could be kept up. It fell away when coal had to be taken, with great labour, from reserve bunkers. The merchant cruisers have an advantage over regularly built vessels of war in the fact that their coal supply is conveniently stored. It is not used as coal armour. The experiences of the United States Navy are described in an able prize essay by Commander Bradley Fiske. They show the value of merchant steamers as ocean scouts. In the war with Spain, vessels like the Yale and Harvard made excellent scouts. Their great mass enabled them to keep up their speed in any kind of seaway, and their large bunkers enabled them to stay long at sea. They could always be relied upon not to break down; and the fact that they looked like merchant ships masked somewhat their identity. In France, opinion grows in favour of building only battleships for the Navy, the scouts of the fleet being drawn from the subsidised mail services. With the double purpose of extending their trade and creating a reserve of merchant-cruisers, all the maritime powers are liberal in steamship subsidies. The wisdom of such a policy for ourselves was admitted when the agreement was entered into with the Cunard Company. It

Scouts.

Merchant cruisers.

Steam-ship subsidies.

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does not appear necessary to have insisted on a speed of 25 knots. Nor, on the other hand, should vessels be accepted of the class included in the return moved for by Lord Spencer. Of thirty-eight vessels, five only had a speed of 20 knots and over. In urging a policy of subsidies, political considerations should not be put out of view. We desire to strengthen the unity of the Empire. We cannot better promote that great object than by accelerating transportation for for mails, emigrants, and merchandise. There is a further argument in support of the policy now recommended. We can build ships for peaceful service without creating that rivalry in preparations for war which every statesman would wish to avoid. The last of the old contracts shortly expires. The opportunity is favourable for a new departure in the policy of the Admiralty in relation to mercantile auxiliaries.

Cruisers.

Cruisers have always been a prominent feature in the building programme for the British Navy. At the present time the battleship tonnage, building and completing, for the United States, France, Germany and Japan is double the tonnage of the armoured cruisers in hand. For the British Navy these proportions are reversed.

SHIPS BUILDING AND COMPLETING ON DECEMBER 1 LAST.

	Battleships.	Armoured Cruisers.
United States	15	8
France	6	5
Germany	6	2
Japan	7	4
	34	19

Total tonnage: battleships, 504,000 tons; cruisers, 240,000 tons.

Our latest armoured cruisers may be classed as battleships. They are the light division of our battle fleet. We are bound to have ships in the British Navy equal in speed to any under foreign flags. These fast battleships will be the defenders of commerce.

Torpedo flotilla.

Destroyers will form an essential element in all fighting squadrons. They will keep off hostile destroyers; they will form the in-shore squadrons. The war in the East has shown how formidable are the risks for heavy ships from night attacks by torpedo vessels and from submarine mines. Off Port Arthur, the Russian flag-ship Petropavlovsk and two first-class Japanese battleships, both on the same day, were destroyed by mines. For operations near the land, and for the protection of heavy ships from the torpedo, a large torpedo flotilla is required. The British Navy is strong in destroyers. In the paper read at the Institution of Civil Engineers (for which the Telford gold medal was awarded), reference was made by the present writer to the armoured torpedo-ram as a formidable assailant of large

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battleships. The torpedo-ram should be strongly armoured at the water-line. The machinery and buoyancy should be protected.

Questions have been recently raised in certain quarters as to the vessels most suitable for flag-ships. In land warfare the General remains at a distance from the fighting line. The Admiral leads his fleet into action. The heaviest fire is concentrated on the foremost ship. In the war in the East the loss was heavy among the Russian flag officers. The suggestion comes from the United States that vessels should be specially constructed as flag-ships—large, fast, well armoured, and lightly armed, with an Admiral's observing station high up, like Farragut's, with tall signal masts, well clear of the smoke. Flag-ships.

The ever-growing expenditure on works has at last received a check. The Admiralty announce a saving on former Estimates of five millions sterling. Has the last word been said in regard to reduction on works? The naval force at the Cape has been lately reduced to four cruisers, of which the flag-ship only is of the first class. Is the commitment to an expenditure of four millions in Simon's Bay irrevocable? Is it too late to cut down the present scheme? We are bound to maintain our base at Cape Town, where alone the mercantile marine can coal and repair, and where all trade is centred. It is not policy to duplicate establishments in close proximity—within a morning's ride on a Cape pony—both of which must be adequately defended. The account for the naval yard in Simon's Bay will not close with the completion of breakwaters and workshops. When the works are finished a permanent charge must be thrown on Navy Estimates for the pay of a large force of skilled workmen at colonial rates. Is it proposed to maintain a dockyard establishment at Simon's Bay on a scale commensurate with the new works? Could continuous employment be found? The scheme was authorised during the pressure caused by the war, under circumstances not likely to recur. Works. Simon's Bay.

BRASSEY.

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CHAPTER XIV.

The Trafalgar Centenary and its Literature.

Nelson as the kindling spirit.

The centenary of Trafalgar left some mark, as was fitting and, ind inevitable, upon the literary annals of the year of its celebrat Nothing, it is true, has been added, or perhaps could have b added, to the imperishable glory and renown of the matchless adm He remains "the embodiment of our sea power," to use the phra Captain Mahan, the loyal sailor of whom St. Vincent said that was "but one Nelson;" the "greatest of our heroes, and the d to ourselves," as Lord Rosebery has spoken of him. Thus he before us in the year of the centenary in that high place to the affectionate gratitude of a people had long before raised hi towering sea-genius of our nation, the generous leader and insp men, the beacon-light of patriotism and self-sacrifice, the consu master of the seaman's art, the organiser and administrator parallel, the marvellous human fragment compounded of contrary qualities, wherein glowed the spark of divine fire a henceforward shall be kindled the spirit of British seam knew this Nelson from many an eloquent page before the c of Trafalgar came, and we know him no better now. Nor said that anything of definitely ascertained knowledge added to our conception of his methods or procedure in th and tactics of Trafalgar, though a certain advance has b towards a clearer view of his purposes.

International aspect of the celebration.

Not the least satisfactory feature of the Trafalgar cele that it aroused no trace of resentful or injured feeling that on the other hand, wherever the celebration was d the occurrences of Trafalgar were described, there was l written page a very high estimate of the great qualiti and his officers as the patterns for later seamen. Not o the case in France and Spain, but in the professional Germany, Austria, Italy, and the United States. In Fra the spirit of historical enquiry was moved, and th preparation a work—"La Campagne Maritime de 18 —wherein Major Desbrière, Chief of the Historical French Army General Staff, is embodying the result o

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International aspect of the celebration.

Not the least satisfactory feature of the Trafalgar celebration was that it aroused no trace of resentful or injured feeling abroad, and that on the other hand, wherever the celebration was discussed, or the occurrences of Trafalgar were described, there was left upon the written page a very high estimate of the great qualities of Nelson and his officers as the patterns for later seamen. Not only was this the case in France and Spain, but in the professional literature of Germany, Austria, Italy, and the United States. In France, especially, the spirit of historical enquiry was moved, and there is now in preparation a work—"La Campagne Maritime de 1805: Trafalgar"—wherein Major Desbrière, Chief of the Historical Section of the French Army General Staff, is embodying the result of his researches

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in French, English, and Spanish archives, having already in his "Projets et Tentatives de Débarquement aux Iles Britanniques" brought together many important papers relating to the events that preceded Trafalgar.

The foreign Press.

The French Press, with a rare and noble sentiment of justice, extolled the high qualities of Nelson, his audacity, his decision, his tenacity, and the largeness of his view. But the *Moniteur de la Flotte* remarked that there needed to be explained the full measure in which Nelson was served by his officers and men, while his adversary, Villeneuve, had to support him seamen who were little trained and little tried. Full justice must be done to the splendid courage of the French and Spanish officers and seamen in the great battle, and Villeneuve has certainly been vindicated in some degree. He allowed opportunities of training his ships' companies to escape him, but it has been made quite clear that he was not surprised by Nelson's method of attack, that he could not depend upon his captains, and that he did not dare to venture any innovation in the traditional tactics of the single line. He had said to his officers that Nelson would not be content to form a line of battle parallel to the allied line, but that he would attack fiercely, endeavour to concentrate upon the rear, or cut the line, falling then upon the broken *pelotons*, and enveloping and destroying them. This, indeed, had been pointed out already by Admiral Jurien de la Gravière, who said that we were victorious because our ships' companies were better trained and our squadrons better disciplined than those of the French—a superiority which was the work of Jervis and Nelson, and "it is Nelson organising his forces whom we must endeavour to know if we would understand Nelson victorious in his happy audacity." Such generous expressions concerning Nelson and his comrades had their counterpart in Spain, and it may be worth while to mention that in a centenary number of the *Epoca* of Madrid, which gave portraits of the principal officers in the Spanish Fleet, Don Juan Pérez de Guzmán remarked that our celebration gave no offence in Spain, which considered the commemoration of Trafalgar as a glory of her own, since the name of Nelson could not be mentioned without recalling the valour and patriotism of Gravina, Churruca, Galiano, and Alcedo. He added that Trafalgar Square in London—the monument of the skill and courage of the British Navy—was a monument also of the skill and the valour of the seamen of Spain.

It might be tedious, and it is unnecessary here to attempt to catalogue the very considerable Nelson literature of last year. Song books, books for children, volumes of naval history for boys, like the "Nelson Navy Book," of Mr. J. Cuthbert Hadden, the clever and

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paradoxical "Trafalgar Refought," by the late Sir W. Laird Clowes and Mr. Alan H. Burgoyne, and one or two attempts to deduce lessons, or even, it might be said, to force ideas, like that remarkable book "Nelson and the Twentieth Century," by Mr. Arnold White and Mr. Hallam Moorhouse—these have had their place and their hour There is no space to notice them here. What seems desirable is to indicate the character and purport of certain articles, volumes and discussions, which may be grouped round the personality of Nelson, the Navy of which he was the finest flower, and the tactics of the actions in which he triumphed and died.

Biography.

No new biography of Nelson has appeared, for none was needed. Captain Mahan had filled the canvas in his "Nelson, the Embodiment of the Sea Power of Great Britain," and Lord Rosebery had given a picture, vivid in its characterisation, of the hero of whom he truly says, "there is no figure like his among those who have ploughed the weary seas." But Professor J. K. Laughton, than whom no one can write better of Nelson, whose letters and despatches he has edited, has signalised the year by producing an admirable popular volume full of instruction for the general reader, entitled "Nelson and his Companions in Arms."

Nelson as the great seaman.

The finest tribute to the Admiral which has graced the year appeared in the *Times* on the day of the celebration, and it shall not pass without notice here because it embodies an admirable presentment of Nelson as the composite and matchless being he was. Not many are competent to understand, and perhaps not many have tried to understand, how and why Nelson was the greatest seaman the world has ever known, for undoubtedly, as the *Times* said, the popular conception of his qualities is still largely a misconception. It was not by Trafalgar alone that Napoleon's naval combination were overthrown, nor even by Nelson's own transcendant share in the dispositions that overthrew them, for the Emperor had abandoned his schemes for the invasion of England, and had broken up his camps at Boulogne, and marched the grand army to the overthrow of Austria before the great engagement was fought. Ulm had capitulated on the day before Trafalgar, and Austerlitz was won a month before Nelson's body was carried to its resting-place in St. Paul's. Trafalgar was thus, in a sense, only the tactical consummation of the strategic conflict, and in that conflict Nelson, though the first and greatest of the actors, was not the only occupant of the stage. It was Nelson the man, with that large, generous, loving, wistful and lovable character of his, that had given him an abiding place in the hearts of his countrymen. But the great seaman had a real title to their regard and gratitude because of his superlative professional

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qualities. The *Times* discriminated between the two personalities which were found in Nelson as a seaman :—

> There was the wary, thoughtful, studious tactician full of reflection and circumspection, the man whom Hood had singled out, when he was quite a young captain and had never served with a fleet, as an officer to be consulted on questions of naval tactics, who had studied Clerk of Eldin and bettered the instruction of the landsman with the insight of a great seaman, who had meditated on the tactical methods of Rodney and Hood and Howe and many others, and had combined and improved on them all; and there was also the man who when he came into action never faltered for a moment, always saw the right thing to be done and did it even, as at St. Vincent, without waiting for orders, always kept the signal for close action flying, trusted absolutely in himself and in his comrades because he had inspired them, and never thought that all was done that ought to have been done unless all that was possible had been accomplished—*nil actum reputans dum quid superesset agendum*. It is the rare combination of these two different types in one personality that explains and justifies Captain Mathan's pregnant remark—"No man was ever better served than Nelson by the inspiration of moment; no man ever counted on it less." He was one of those consummate men of action in whom the native hue of resolution is never allowed to be sicklied o'er with the pale cast of thought. For this reason men of a different mould were too prone to believe that the thought was not there. In truth, it was ever present and all-pervading, but it was so completely assimilated into a resolution alike unfaltering and unerring that it acted with the precision and rapidity of an instinct.

Here is finely disclosed the secret of Nelson's incomparable greatness as a seaman, though it was not fully grasped by his contemporaries, who saw in him a man of supreme force as well as a comrade and inspirer. As Lord Rosebery has said, there was also the fascinating incongruity of so great a warrior's soul being encased in so shrivelled a shell, and there was his chivalrous devotion to his officers and men, with his manifest and surpassing patriotism and his easy confidence in victory. Again, he was brilliantly single-minded, unselfish, and unsordid, while perhaps above all he was "eminently human."

Hardy and Nelson.

We catch a glimpse of Nelson, but no more, in one of the most interesting of the Centenary books, "The Three Dorset Captains at Trafalgar: Thomas Masterman Hardy, Charles Bullen, Henry Digby," by Mr. A. M. Broadley and Mr. R. G. Bartelot. It is unfortunate that we do not learn more from this volume of the personality of the great admiral in the hour of his triumph and in the months that preceded it, but there are sufficient reasons for this. The major part of the book is devoted to the life and letters of Nelson's famous flag-captain, but Hardy was not a man of the pen, his letters were addressed to his relatives, and were concerned mostly with family affairs, and he was placed in a very delicate position, as shall presently be explained. Hardy joined the Navy in 1781, being rated as "captain's servant" in the Helena, then commanded by Captain Francis Roberts, but he seems a little later to have joined the merchant service. He returned, however, to the Navy, through the personal influence of Alexander Hood, and was promoted to the rank of lieutenant on board the Meleager with Lord Hood's fleet in the

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Mediterranean. There he made his first acquaintance with Captain Nelson, and a warm friendship sprang up between the two, based upon mutual respect, for Nelson was then one of the most brilliant officers, and Hardy had proved himself a bold and skilful seaman. It was at this time that the famous episode occurred when the Minerve was passing through the Straits of Gibraltar with the Spaniards in chase, and Hardy, seeing a man fall overboard, got into the jolly-boat and put off to rescue him. Then it was that Nelson showed the value he set upon a brave man and said: "By G—, I'll not lose Hardy! Back the mizen topsail." Hardy was present in the Minerve at Cape St. Vincent, and afterwards gained new credit by his desperate courage in the capture of the Mutine, which he commanded at the Nile. Then he became Nelson's flag-captain in the Vanguard, and afterwards, as all the world knows, in the Victory. He lived to hold important commands, and to be First Sea Lord of the Admiralty, where he pursued a policy, which is the policy to-day, of never allowing "any foreign Power to gain, even temporarily, an advantage over us." He used to say, "Happen what will, England's duty is to take and keep the lead."

The references to Nelson in Hardy's letters are few and rarely of much importance. They reflect to some extent the feeling which Nelson had against Troubridge, though, later, Hardy expresses great esteem for that officer. Writing on board the Isis at Dungeness on October 14, 1801, Hardy speaks thus: "I left Lord Nelson three days ago very much displeased with the Admiralty for refusing him leave of absence, but I think they seem determined to oppose him in everything he wishes. I begin to think Lord St. V. wishes to clip his wings a little, and certainly has succeeded a little in the affair of Boulogne. Troubridge, like a true politician, forsakes his old friend (who has procured him all the honour he has got) and sticks fast by the man who is likely to put him forward hereafter." A little later Hardy was writing that Nelson would not be employed if he could possibly help it, "but I am of opinion that old St. Vincent will not let him remain at home if he can possibly help it." Nelson had given to Hardy a hundred acres in any part of his estate at Bronte that Hardy chose to select, "with apartments in his house, a knife and fork, etc., he being determined to reside there in peace." "The former part I certainly have accepted and intend to keep, but the latter I have not yet determined on, nor shall I till I know the company that will attend him there."

Hardy and Lady Nelson.

In this last remark is revealed a sentiment which Hardy entertained towards Nelson. Though constantly brought into relations with Lady Hamilton, he was, and remained to the end, a great friend and

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admirer of Lady Nelson. When he was a young captain she had interested herself in his welfare, and he appears to have been outspoken in his sympathy for her when she finally separated from her husband. Writing in June, 1802, he says: "I breakfasted this morning with Lady Nelson; I am more pleased with her, if possible, than ever; she certainly is one of the best women in the world." When Sir William Hamilton died, Hardy, writing on board the Amphion, April 6, 1803, said, "How her Ladyship will manage to live with the Hero of the Nile now, I am at a loss to know, at least in an honourable way." But when Nelson fell at Trafalgar, Hardy, writing on board the Victory off Cadiz, October 27, 1805, said: "We have, on the 21st inst., obtained a most glorious victory over the combined fleets, but it has cost the country a life no money can replace, and one for whose death I shall for ever mourn."

The various personalities in Nelson.

Hardy's letters bring us into relation with a side of Nelson's life that received some attention at the time of the centenary, and produced two extremely interesting volumes, which might perhaps more suitably have appeared at another time. The truth is that in Nelson, the man, there were various personalities. In the brief interview with Wellington the soldier saw two of them. One was the vain and garrulous braggart, whose conversation, "if I can call it conversation, was almost all on his side and all about himself, and in, really, a style so vain and so silly as to surprise and almost disgust me." But there was immediately revealed another Nelson—the man who "talked of the state of this country and of the aspect and probabilities of affairs on the Continent with a good sense, and a knowledge of subjects both at home and abroad, that surprised me equally and more agreeably than the first part of our interview had done; in fact, he talked like an officer and a statesman." The third Nelson, as a man, is seen in certain forbidding glimpses and in letters to Lady Hamilton which are contained in the Morrison Collection—letters, as the *Times* has said, in which "it is only charitable to suppose that his mental balance was for the moment overthrown."

Books on Lady Hamilton.

The two volumes which have been referred to are "Emma, Lady Hamilton," by Mr. Walter Sichel, and a volume bearing the same title by Mr. J. T. Herbert Baily. To neither of these can very great interest be denied. Mr. Sichel has worked exhaustively, though here and there he does not seem to be perfectly informed or to elucidate all the aspects of the strange life of the siren who bewitched Nelson. A part of the volume has no concern with Nelson himself, but the whole of the circumstances of his relationship with Lady Hamilton are laid clearly before the reader, and some new light is

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thrown upon the situation at Naples. As is not surprising in a biographer, Mr. Sichel is an admirer of his subject, and he enforces the services of Lady Hamilton, particularly in regard to the victualling of the fleet which enabled Nelson to gain the battle of the Nile. Nevertheless, the book has not the effect of maintaining Nelson upon the exalted pinnacle to which he has rightly been raised. He once said, "If there were more Emmas there would be more Nelsons," but it must be confessed that Mr. Sichel's volume shows us clearly that such Nelsons would not be the great seamen and patriots whom Nelson had in his mind when he uttered those words. Mr. Baily's volume is interesting also, but it is more remarkable for its beautiful and attractive series of portraits than for its historical value. He has been keenly alive to the high merits of the pictures by Romney, Sir Joshua Reynolds, and others, and upon these has expended judicious care.

The Navy in Nelson's time.

It was perhaps unfortunate that the centenary celebrations were devoted too exclusively to Nelson, and that no serious effort was made to show in what measure he was assisted by the other admirals, nor what were the qualities of the fleet he commanded. Many opened a volume entitled "Sea Life in Nelson's Time," by Mr. John Masefield, with the expectation that it would picture the things that contributed to the victory. The book is indeed one of entertaining character, and full of singular matter, known indeed to the student, but very little to the general reader. The picture is not, however, that of the Navy which Nelson commanded, and which St. Vincent had invigorated and purged. Indeed, it is impossible to avoid the conclusion that the author has gone in quest of the picturesque, and has found it in a large part of the century that preceded Trafalgar. He describes the captain as a real autocrat, and groups with him the lieutenants, the midshipmen, and the humours of the midshipmen's berth, and has many things to say about the "quota men" and others. The book contains a good deal also about the salt beef of stony hardness, the pork of horrible quality, the sea pie, the "burgoo," the "skillagolee," the abominable cheese, the living biscuit, and the grog and other things that sometimes made up the seaman's life in former times. These things are to be found in the graphic pages of the novelist, the playwriter, and the pamphleteer, who exaggerated or caricatured each for his own purpose. There were hard things in the life of the Navy, but no one can read the story of St. Vincent's command in the Mediterranean, of his administrative work, or of the internal economy of the ships of Nelson without feeling that the evil time had passed away. As a matter of fact, the British seaman in 1805 was generally well fed and cared for, and it

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had been a chief preoccupation of Nelson and the other admirals to procure abundant fresh meat and provisions, while it is well known that Collingwood and others expended great efforts to provide amusements and diversions for the men. Thus we are justified in thinking that Mr. Masefield's book does not give us a true picture of naval life in Nelson's time, and that the men who fought in the great war did not suffer such hardships or ill-treatment as some have supposed. There had grown up a school of trained and thinking officers, although they lived under the influence of an old tradition; and certainly the Fleet was well organised, well administered, and the internal economy of its ships was in a high state of efficiency.

The tactics of Trafalgar.

It now remains to give some account of a controversy which took place in the centenary year of Trafalgar concerning the much-disputed tactics of the engagement. It might seem strange that not until a hundred years after the battle should anything approaching an agreement upon the subject have been arrived at by the critics, and even now the whole question may be described as still tangled, complex, and, in large measure, undetermined. All that can be said is that, if we cannot tell precisely how the attack was delivered, we are now able to say definitely how it was not delivered. To that extent has the atmosphere been cleared by the controversy, although there are still some who are disposed to say that the accepted version of the battle cannot be overthrown. Sir Edmund Fremantle is one high authority who holds this view, and certainly his judgment must have weight in the scale. There was no active disposition in the years following the battle to discuss the manner in which it was fought; men were well content that the success had been so triumphant, while naval officers who had been engaged were, many of them, distributed in distant parts of the world, and those who were in England were in few cases wielders of the pen. There was, in fact, a general failure to grasp the tactical principles which Nelson had so completely made his own, and also a tendency towards a dangerous misunderstanding of his teaching. All this resulted from the fact, to which Mr. Julian Corbett has alluded in his "Fighting Instructions, 1530—1816" (Navy Records Society), that there was at the time practically no instruction for officers in the theory of tactics, and thus that the "go at 'em" heresy came into vogue, and the conception of Nelson's famous Memorandum was degraded. Extracts from the logs were printed by Sir Harris Nicolas, but it was not until 1900 that Admiral Sturges Jackson made them really accessible, in two volumes, issued by the Navy Records Society.

There had, meanwhile, grown up a conception of the battle far removed from the facts, and essentially doing dishonour to Nelson.

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A distorted view of the tactics.

It was asserted that the great seaman made no attempt to form his fleet in the prescribed position in lines parallel to that of the enemy, and that the British Fleet bore down in two lines ahead, each ship following in the wake of the one next ahead of her, at nearly right angles to the enemy's line, thereby exposing the leading ships to great, and, as it was sometimes said, unnecessary risk. Even Captain Mahan has given a plan of the action, which may perhaps be described as frankly conventional, embodying this idea. Now, as the scholarly and experienced naval correspondent of the *Times* has said, in discussing the subject, if we should accept this view of the action, it would destroy, once and for all, every notion that the world had hitherto formed of Nelson's character and career. It was this point that brought the tactics of Trafalgar so prominently forward in the year of the centenary. Nelson had spoken of commanding a "band of brothers" at the Nile, but such a band would not be commanded by a man who, "having taken his captains into his confidence as fully as any admiral ever did, could not be trusted not to make fools of them by changing his mind without saying a single word to any one of them."

Admiral Colomb's argument.

The late Admiral Colomb threw down the challenge to the conventional historians in 1899, and enforced his conclusions with great cogency. He asserted, with good reason, that there had been little attempt to apply a scale to evidence, that the historians had, one and all, combined to destroy Nelson's character as a tactician, and that they had come to think about him "as if he were only a sort of first captain of the Victory." The diagrams ignored pretty equally Collingwood's despatch and Nelson's order. Admiral Colomb's view was that the ships in column, instead of being in a line astern of one another, were in a line upon one another's starboard quarters, these lines being parallel to one another and to the enemy's line when it was on the port tack. Nelson's order of October 9th was thus, he said, carried out, except that Nelson bore up earlier than he had originally intended.

Mr. Corbett's "Fighting Instructions."

Mr. Corbett's "Fighting Instructions," published last year, have thrown a flood of light upon many questions at issue, and his volume is undoubtedly one of the most important contributions yet made to the study of naval tactics. He, however, adopted the view that Nelson made an "impulsive change" of plan, and that the attack was made in line ahead instead of line abreast as had been intended, while the balance of the attack was upset. "So far from Nelson concentrating, he boldly, almost recklessly, exposed himself, for a strategical object, to what should have been an overwhelming concentration on the leading ships of his two columns." It was a

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well-judged risk, but an enormous risk, and nothing could be finer as a piece of subtle tactics. "At Trafalgar it was a pure battle-risk —a mad, perpendicular attack in which every recognised tactical card was in the enemy's hands. But Nelson's judgment was right." Had not Jurien de la Gravière said, "Le génie de Nelson c'est d'avoir compris notre faiblesse?"

Mr. Newbolt's "Year of Trafalgar."

In Mr. Henry Newbolt's "The Year of Trafalgar" (Murray, 1905) will be found a most illuminative discussion of the problem. Let it be said incidentally that the general course of the campaign is discussed in the book, that the ships and signals are described, and that the whole circumstances of the battle are explained, while there is a second part to the volume containing a valuable collection of "Poems of Trafalgar." This is one of the most interesting books which appeared in the centenary year. In regard to the tactics of the action, Mr. Newbolt reaches the conclusion that the lee division, at any rate, while it began by approaching the enemy in column, changed to a line of bearing, not kept nor intended to be kept with accuracy, but ordered by Collingwood with the intention of giving the faster sailing ships the opportunity of using their full powers. As to the weather line, the formation was not changed to the same extent, for it was to overpower the enemy's commander-in-chief by a concentration upon him, and at the same time to sever his van entirely from the rest of the line.

Sir Cyprian Bridge on the tactics.

The subject was brought to fresh prominence by a masterly address delivered by Sir Cyprian Bridge at the meeting of the Navy Records Society on July 7th, 1905, in which that distinguished officer enforced, with a wealth of criticism, the views which Admiral Colomb had so skilfully put forward. He said that if we had regard to the famous Memorandum, in which Nelson embodied what he called "the Nelson touch," we could only come to the conclusion that he intended to fight the battle in one way; while, if we read most of the historians, and looked at the plans even down to and including that of Captain Mahan, we were driven to the conclusion that, so far from fighting the battle in the way he intended and had carefully explained, Nelson actually fought it in quite another way, and in a way which, according to Admiral Colomb, "it is hardly too much to say was the worst possible way." Moreover, the contemporary evidence of officers present was so confusing and conflicting as to make at first sight as much for one solution as for the other. A protracted controversy in the *Times* ensued, in which several highly competent authorities were not able to come to any definite agreement, though, as has been said, there was some approach to the conclusion as to what had not been done on the memorable day.

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The *Times* naval correspondent.

The whole subject was summed up in a brilliant series of articles by the Naval Correspondent of the *Times*, who gave a very luminous exposition of the difficult problem and the solution to which criticism had pointed. It would not do to adopt the "headlong" theory as describing Nelson's tactical dispositions. When he was quite a junior officer Lord Hood regarded him as an officer to be consulted "on questions of naval tactics." Nelson was undoubtedly far ahead of the ideas of his time. He had been a student of Clerk of Eldin's "Naval Tactics," upon which he had improved, developing the principles adopted by Rodney in his engagement with De Guichen in 1780; and of Lord Howe in the action of the First of June. The circumstances of the battle were influenced by the conditions in which it was fought, but it seems impossible not to agree with the correspondent of the *Times* that Mr. Corbett's idea of the "mad, perpendicular attack" is untenable.

Nelson had, in fact, ordered the course and formation of his fleet in such a manner as to bring about the situation prescribed in the Memorandum, and, when the enemy began to wear, he made no essential alteration in his plan. He adapted his disposition to the altered situation, because he saw with sure and instant glance that the original plan might still serve in its essential features, and that any attempt to readjust them would cause the loss of precious time on a day that was all too short. Therefore the rear was attacked and crushed almost exactly as Nelson had intended, while the van and centre were contained, both being rendered immobile during the first critical moments of the onslaught. Nelson instilled indecision and confusion into the mind of Villeneuve by the uncertainty of the point which he would attack, although Villeneuve had foreseen the general character of the assault that was to be made upon him, but which he found himself unable to counteract. Collingwood never had any other idea than that the attack was carried out as Nelson intended it should be. "As the mode of our attack," he said, "had been previously determined on and communicated to the flag officers and captains, few signals were necessary, and none were made except to direct close order as the lines bore down." On the other hand, Captain Moorsom, of the Revenge, wrote to his father six weeks after the battle: "A regular plan was laid down by Lord Nelson, but not acted upon." There was also an anonymous officer of the Conqueror who criticised Nelson's action at Trafalgar, though it is observable that this writer attributed to Nelson an intention which Nelson nowhere avows, and which is directly at variance with the text of the Memorandum. There is also to be considered the evidence of Captain Harvey, of the Téméraire, written two days after the battle,

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in which that officer, who followed Nelson into the fight and was to have led the weather line if Nelson had not led it himself, says: "It was noon before the action commenced, which was done according to the instructions given to us by Lord Nelson."

The final effect of the lucid criticism of the correspondent of the *Times* was to vindicate Nelson from the aspersions which misconception of his action had practically cast on his professional honour, and from this conclusion few who have weighed the evidence will be disposed to dissent. There may be differences of opinion, it is true, as to whether the ships bore up together or in succession—a point hotly debated in the correspondence in the *Times*—but there can be no question as to Nelson's broad purpose, as explained in his Memorandum, having been executed in his ever-memorable engagement. A great deal more might have been written upon the subject here, but, as in dealing with the high appreciation of Nelson's character, attainments, and services, which forms the first part of this chapter, there is a limitation of space to be observed, and the object has been attained of placing upon record some characteristics and results of the literary activity to which the centenary of Trafalgar gave rise.

JOHN LEYLAND.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c. Armoured cruiser.
a.g.b. Armoured gunboat.
b. Barbette ship.
c.b. Central-battery ship.
c.d.s. Coast-defence ship.
comp. (in armour column). Compound or steel-faced armour.
corv. Corvette.
cr. Cruiser.
d.v. Despatch vessel.
g.b. Gunboat.
g.v. Gun-vessel.
H.S. Harveyised or similar hard-faced steel.
K.S. Krupp steel.
shd. Sheathed.
P. Protected.
t. Turret-ship (in class column).
t. Trial speed and I.H.P. at trials (in speed and I.H.P. columns).
to.cr. Torpedo-cruiser.
to.g.b. Torpedo-gunboat.
to.r. Torpedo-ram.

l. Light guns under 15 cwt., including boats' guns.
M. Machine guns.
f. tu. or b. tu. Fixed or bow tube for discharging fish torpedoes.
sub. Submerged tube for do.
A. Armstrong guns.
K. Krupp guns.

W.T. Water-tube boilers, where the type is not known or not yet decided.
B. Belleville.
Bl. Blechynden.
B. & W. Babcock and Wilcox.
D'A. D'Allest.
D. Dürr.
E. Earle.
Ex. Express.
Du T. Du Temple.
L. Laird.
L.N. Laird-Normand.
M. Mumford.
Nic. Niclausse.
Nor. Normand.
N.S. Normand-Sigaudy.
R. Reed.
T. Thornycroft.
T.S. Thornycroft-Schulz.
W.F. White-Forster.
Y^1. Yarrow small tube.
Y^2. Yarrow large tube.
V.E. Vickers Express.
cyl. Cylindrical.

GREAT BRITAIN.—Armoured Ships.

Class	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Second-ary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Aboukir	shd.	12,000	440	69½	26¼	21,375 B.	Fairfield	Fairfield	1900	1902	751,118	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	..	2 9·2-*in.*, 12 6-*in.*, 14 12-*pr.*, 3 3-*pr.*, 8 M., 2 l.	2	21·6 t	800 1600	755
a.c.	Achilles		13,550	480	73½	27	23,500 Y² & cyl.	Elswick	Hawthorn	1905	..	1,119,743	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-*in.*, 4 7·5-*in.*, 2 12-*pr.*, 28 3-*pr.*, 2 M.	3	22·33	1000	704
b. 1st cl.	Africa		16,350	425	78	26¾	18,000 B. & W. & cyl.	Chatham	J. Brown	1905	..	1,368,249	9 H.S.	2–1	8·7	12 H.S.	12–6 H S.	7 K S.	4 12-*in.*, 4 9·2-*in.*, 10 6-in., 28 small.	4	18·5	950 2150	776
b. 1st cl.	Agamemnon		16,500	410	79½	27	16,750 Y²	Govan	Hawthorn Leslie	Bldg.	..	1,505,504	12	..	8	..	..	..	4 12-*in.*, 10 9·2-*in.*, 37 small.	5	18	900	865
b. 1st cl.	Albemarle		14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,009,835	7–3 K.S.	2–1	..	7 K.S.	11 K.S.	6 K.S.	4 12-*in.*, 12 6-*in.*, 12 12-*pr.*, 6 3-*pr.*, 8 M., 2 l.	4	18·6 t	900 2000	750
b.	Albion		12,950	390	74	26	13,500 B.	Blackwall	Maudslay	1898	1902	858,745	6–2 H.N.	3–1	..	12–8 H.N.	12–6 H.N.	5 H.N.	4 12-*in.*, 12 6-*in.*, 12 12-*pr.*, 6 3-*pr.*, 8 M., 2 l.	4	18·25 t	1000 2300	700
	Anson		10,600	330	68½	27¼	11,500	Pembroke	Humphrys	1886	1889	769,923	18–8 *comp.*	3–2½	..	16–6 *comp.*	14–12 *comp.*	..	4 13·5-*in.*, 6 6-*in.*, 12 6-*pr.*, 10 3-*pr.*, 7 M., 2 l.	2	16·75 t	900 1200	515
a.c.	Antrim		10,850	450	68½	25	21,604 Y. & cyl.	Clydeb'nk	J. Brown & Co.	1903	1905	873,625	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 7·5-*in.*, 6 6-*in.*, 2 12-*pr.*, 22 3-*pr.*, 2 M.	2	23·02 t	800 1950	655
a.c.	Argyll						21,190 B. & W. & cyl.	Greenock	Greenock Foundry	1904	1906	873,598									22·38 t		
a.c.	Bacchante	shd.	12,000	440	69½	26¼	21,520 B.	Clydeb'nk	J. Brown	1901	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	..	2 9·2-*in.*, 12 6-*in.*, 14 12-*pr.*, 3 3-*pr.*, 8 M., 2 l.	2	21·75 t	800 1600	755
b. 2nd c.	Barfleur	shd.	10,500	360	70	25½	13,163	Chatham	Greenock Foundry	1892	1894	582,605	12 *comp.*	2½–2	4 N.S.	8 *comp.*	9 *comp.*	4–2 N.S.	4 10-*in.*, 10 6-*in.*, 2 9-*pr.*, 8 6-*pr.*, 9 3-*pr.*, 7 M.	3	18·50	750 1240	625
a.c.	Bedford		9800	440	66	24½	22,457 B.	Fairfield	Fairfield	1901	1903	706,020	4–2 K.S.	2–¾	..	3 K.S.	4 K.S.	4 K.S.	14 6-*in.*, 10 12-*pr.*, 3 3-*pr.*, 2 M., 2 l.	2	22·7 t	740 1760	687
b. 2nd c.	Benbow		10,600	330	68½	27¼	11,500	Blackwall	Maudslay	1885	1888	774,791	18–8 *comp.*	3–2½	..	18–6 *comp.*	14–12 *comp.*	..	2 16·25-*in.*, 10 6-*in.*, 12 6-*pr.*, 10 3-*pr.*, 7 M., 2 l.	2	16·75 t	900 1200	510

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a.c.	Berwick . .	9800	440	66	24½	22,000 Nic.	W. Beardmore & Co.	Humphrys	1902	1903	750,984	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 6-in., 10 12-pr., 3 3-pr., 9 M.G.	2	23·0	800 / 1600	655
a.c.	Black Prince .	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall	Thames Ironworks	1904	1906	1,133,514	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-in., 10 6-in., 2 12-pr., 28 3-pr., 2 M.	3	23·65 t	1000 / 2000	704
b. 1st cl.	Britannia . .	16,350	425	78	26¾	18,000 B&W&cyl	Portsm'th	Humphrys	1904	..	1,357,139	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 28 small.	4	18·5	950 / 2150	776
b. 1st cl.	Bulwark . .	15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 12-in., 12 6-in., 18 12-pr., 6 3-pr., 8 M., 2 l.	4	18·0	900 / 2000	750
b. 1st cl.	Cæsar .	14,900	390	75	27½	12,000	Portsm'th	Maudslay .	1896	1897	885,212	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 2 M., 2 l.	5	17·5	900 / 2000	757
b. 2nd c.	Camperdown .	10,600	330	68½	27¼	11,500	Portsm'th	Maudslay .	1885	1889	769,993	18 comp.	3–2½	..	16 comp.	12 comp.	..	4 13·5-in., 6 6-in., 12 6-pr., 10 3-pr., 7 M., 2 l.	2	16·9 t	900 / 1200	515
b. 1st cl.	Canopus .	12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1900	866,516	6 H.S.	3–1	2 N.S.	12 H.S.	12–5 H.S.	5 H.S.	4 12-in., 12 6-in., 12 12-pr., 6 3-pr., 8 M., 2 l.	4	18·25	800 / 1850	700
a.c.	Carnarvon .	10,850	450	68½	25	21,489 Nic.&cyl	Beardm're	Humphrys	1903	1905	858,130	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 7·5-in., 6 6-in., 2 12-pr., 22 3-pr., 2 M.	2	23·3 t	800	655
b. 2nd c.	Centurion shd.	10,500	360	70	25½	13,214	Portsm'th	Greenock Foundry	1892	1893	593,050	12 comp.	2½–2	4 N.S.	12 comp.	9 comp.	6–2 K.S.	4 10-in., 10 6-in., 8 6-pr., 12 3-pr., 7 M., 2 l.	3	18·25	750 / 1125	625
a.c.	Cochrane . .	13,550	480	73½	27	23,500 Y² & cyl.	Fairfield .	Fairfield .	1905	..	1,129,452	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-in., 4 7·5-in., 2 12 pr., 28 3-pr., 2 M.	3	22·33	1000	704
b. 3rd c.	Colossus . .	9420	325	68	26¼	5500	Portsm'th	Maudslay .	1882	1886	781,537	18–14 comp.	3–2½	..	16–13 comp.	16 comp.	2	4 12-in., 5 6-in., 4 6-pr., 10 3-pr., 6 M., 4 l.	2	14·2 t	970	388
b. 1st cl.	Commonwealth	16,350	425	78	26¾	18,538 B&W&cyl	Fairfield .	Fairfield .	1903	1905	1,392,411	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 28 small.	4	19·01 t	950 / 2150	776
a.c.	Cornwall . .	9800	440	66	24½	22,000 B. & W.	Pembroke	Hawthorn	1902	1905	756,274	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23·6 t	800 / 1600	655
b. 1st cl.	Cornwallis .	14,000	405	75½	26¾	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,030,302	7 K.S.	2–1	1½	14 K.S.	11–6 K.S.	6 K.S.	4 12-in., 12 6-in., 12 12-pr., 6 3-pr.	4	18·9 t	900 / 2000	750
a.c.	Cressy . shd.	12,000	440	69½	26¼	21,210 B.	Fairfield .	Fairfield .	1899	1901	749,324	6 K.S.	3–2	..	5 K.S.	6 K.S.	..	2 9·2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 M., 2 l.	2	20·79	800 / 1600	755
	Cumberland .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1903	1904	718,168	4–2 K.S.	2–¾	..	5	5–4	4 N.S	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23·0	800 / 1600	655
	'ence . .	14,600	490	74½	26	27,000 Y²	Pembroke	Scotts S. & E. Co.	Bldg.	..	1,296,098	6–4	1–½	3	..	..	..	4 9·2-in., 10 7·5-in., 30 small.	5	23	..	755
	vastation .	14,600	285	62¼	27½	7000	Portsm'th	Maudslay	1871	1873	383,950	12–10	3–2	..	12–10	14	..	4 10-in., 6 6-pr., 8 3-pr., 5 M., 2 l.	2	14·0	1800	410

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Devonshire** .	10,850	450	68½	25	21,000 Nic. & cyl.	Chatham	Thames Ironworks	1904	1905	818,167	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 2 *12-pr.*, 22 *3-pr.*, 2 M.	2	22·25	800 1600	655
b. 1st cl.	**Dominion** .	16,350	425	78	26¾	18,438 B. & W. & cyl.	Barrow .	Vickers .	1903	1905	1,365,790	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	6	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 28 small	4	19·5 *t*	950 2150	776
a.c.	**Donegal** . .	9800	440	66	24½	22,000 B.	Fairfield .	Fairfield Co.	1902	1903	715,947	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0	800 1600	655
a.c.	**Drake** . .	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 M.	2	24·11 *t*	1250 2500	900
b.	**Dreadnought***	18,000	500	82	26	23,000 B. & W.	Portsm'th	Vickers§ .	1906	..	..	10	..	..	..	..	..	10 *12-in.* and smaller guns	..	21	..	..
a.c.	**Duke of Edinburgh**	13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,071,611	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 2 *12-pr.*, 28 *3-pr.*, 2 M.	3	22·84 *t*	1000	704
b. 1st cl.	**Duncan** .	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,023,147	7 K.S.	2–1	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	18·9 *t*	900 2000	750
b. 3rd cl.	**Edinburgh** .	9,420	325	68	26¼	5,500	Portsm'th	Humphrys	1882	1886	735,354	18–14 *comp.*	3–2½	..	16–13 *comp.*	16 *comp.*	...	4 *12-in.*, 5 *6-in.*, 4 *6-pr.*, 10 *3-pr.*, 6 M., 2 l.	2	14·2	970	388
b. 1st cl.	**Empress of India**	14,150	380	75	27½	13,000	Pembroke	Humphrys	1891	1893	846,321	18–5 *comp.*	3	5	16 *comp.*	17–6 *comp.*	6–2 K.N.C.	4 *13·5-in.*, 10 *6 in.*, 16 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3	18·0 *t*	900 1450	740
a.c.	**Essex** . .	9,800	440	66	24½	22,000 B.	Pembroke	John Brown	1901	1903	736,557	4–2 K.S.	2–¾	..	5	5	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	23·0	800 1600	655
a.c.	**Euryalus** . shd.	12,000	440	69½	26¼	21,318 B.	Barrow .	Vickers .	1901	1904	782,901	6 K.S.	3–2	2	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 8 M.	2	21·63 *t*	800 1600	755
b. 1st cl.	**Exmouth** .	14,000	405	75½	26½	18,346 B.	Laird .	Laird .	1901	1903	1,032,409	7 K.S.	2–1	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	19·0	900 2000	750
b. 1st cl.	**Formidable** .	15,000	400	75	26¾	15,000 B.	Portsm'th	Earle .	1898	1901	1,022,745	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4	18·0	900 2000	750

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b. 1st cl.	Glory	12,950	390	74	26	13,500 B.	Laird	Laird	1899	1901	841,014	6 H.S.	3–2	2 N.S.	12 H.S.	12–5 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	5	18·25	800 / 1850	700
b. 1st cl.	Goliath	12,950	390	74	26	13,500 B.	Chatham	Penn	1898	1900	866,006											
a.c.	Good Hope	14,100	500	71	26	31,071 B.	Fairfield	Fairfield	1901	1902	990,759	6 K.S.	3–2	..	5 K.S.	6–5½ K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 M.	2	23·5 *t*	1250 / 2500	900
a.c.	Hampshire	10,850	450	68½	25	21,508 Y. & cyl.	Elswick	Hawthorn	1903	1905	833,817	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in.*, 6 *6-in.*, 2 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·47 *t*	800 / 1600	655
b. 1st cl.	Hannibal	14,900	390	75	27½	12,000	Pembroke	Harland	1896	1897	906,799	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 M., 2 l.	5	17·5	900 / 2200	757
b. 1st cl.	Hibernia	16,350	425	78	26¾	18,000 B.&W. & cyl.	Devonp'rt	Harland & Wolff	1905	..	1,352,970	9 H.S.	2–1	8	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 28 small	4	18·5	950 / 2150	776
b. 1st cl.	Hindustan					18,521 B.&W. & cyl.	Clydeb'nk	J. Brown & Co.	1903	1905	1,365,636	9 K.S.	2–1	8	12 K.S.	12 N.S.	6 N.S.			19·01 *t*		
a.c.	Hogue	shd. 12,000	440	69½	26¼	21,432 B.	Barrow	Vickers	1900	1902	749,809	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·6 *t*	800 / 1600	755
t. 1st cl.	Hood	14,150	380	75	27½	13,000	Chatham	Humphrys	1891	1893	849,252	18 *comp.*	3	5 *comp.*	17 *comp.*	18–6 *comp.*	6–2	4 *13·5-in.*, 10 *6-in.*, 10 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3	17·5	900 / 1800	730
b. 2nd c.	Howe	10,300	325	68	27½	11,500	Pembroke	Humphrys	1885	1889	705,412	18 *comp.*	3–2½	..	16 *comp.*	11½ *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 12 *6-pr.*, 10 *3-pr.*, 7 M., 2 l.	2	16·8	900 / 1200	515
b. 1st cl.	Illustrious	14,900	390	75	27½	12,000	Chatham	Penn	1896	1898	894,585	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 M., 2 l.	5	17·5	900 / 2200	757
b. 1st cl.	Implacable	15,000	400	75	26¾	15,000 B.	D'port	Laird	1899	1902	989,116	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4	18·0	900 / 2000	755
b. 1st cl.	Irresistible						Chatham	Maudslay	1898		1,048,136											
a.c.	Invincible‡	..	..	..	..	..	Elswick	Humphrys	Bldg.	..	..	..	..	..	..	..	..	..	..	..	..	..
a.c.	Inflexible‡						Clydeb'k	J. Brown	Bldg.													
a.c.	Indomitable‡						Fairfield	Fairfield	Bldg.													
b. 1st cl.	Jupiter	14,900	390	75	27½	12,000	Clydeb'nk	Thomson	1895	1897	902,011	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 M., 2 l.	5	17·5	900 / 2200	757

* Details not official. † Details of cost incomplete. ‡ Details not made public. § Turbine machinery of Parsons type.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Kent . . .	9800	440	66	24½	21,000 B.	Portsm'th	Hawthorn	1900	1903	700,283	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	24 *t*	800/1600	500
b. 1st cl.	King Edward VII.	16,350	425	78	26¾	18,138 B. & W. & cyl.	Devonp'rt	Harland .	1903	1905	1,383,845	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	6	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 28 small	4	19·04 *t*	950/1200	776
a.c.	King Alfred	14,100	500	71	26	30,893	Barrow .	Vickers	1901	1903	978,125	6-5-4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 l.	2	23·46	1250/2500	813
	Leviathan .					31,203 B.	Clydeb'nk	J. Brown			1,012,959									23·28 *t*		
a.c.	Lancaster .	9800	440	66	24½	22,000 B.	Elswick .	Hawthorn	1903	1904	732,858	4–2 K.S.	2–¾		5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0	800/1600	500
b. 1st cl.	London . .	15,000	400	75	26½	15,000 B.	Portsm'h	Earle .	1899	1902	1,036,393	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4	18·0	900/2000	755
b. 1st cl.	Lord Nelson .	16,500	410	79½	27	16,750 B. & W.	Jarrow .	Palmer .	Bldg.	..	1,506,483	12		8	..	..	..	4 *12-in.*, 10 *9·2-in.*, 37 small		18	900	865
b 1st cl.	Magnificent .	14,900	390	75	27½	12,000	Chatham	Penn .	1894	1895	908,789											
b. 1st cl.	Majestic . .	14,900	390	75	27½	12,000	Portsm'th	Barrow .	1895	1895	916,382	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 M., 2 l.	5	17·5	900/2200	757
b 1st cl.	Mars . .	14,900	390	75	27½	12,000	Birkenh'd	Laird .	1896	1897	902,402											
a.c.	Minotaur .	14,600	490	74½	26	27,000 Y²	Devonp'rt	Harland & Wolff	Bldg.	..	1,330,263	6–4	..	..	..	..	..	4 *9·2-in.*, 10 *7·5-in.*, 30 small.	5	23	1000	755
a.c.	Monmouth .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Shipbg. Co.	1901	1903	979,591	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	23·0	800/1600	500

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b. 1st cl.	**Montagu** .	. 14,000	405	75½	26½	18,285 B.	Devonport	Laird .	1901	1903	979,591	7 K.S.	2–1	1½	14 K.S.	11·6 N.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	4	18·8	900 / 2000	750
a.c.	**Natal** .	. 13,550	480	73½	27	23,500 Y² & Cyl.	Barrow .	Vickers .	1905	..	1,147,960	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 2 *12-pr.*, 28 *3-pr.*, 2 M.	3	22·33	1000	704
b. 1st cl.	**New Zealand**	. 16,350	425	78	26¾	18,440 B. & W. & Cyl.	Portsm'th	Humphrys	1904	1905	1,335,485	9 K.S.	2–1	8–7 K.S.	12 K.S.	12 K.S.	6	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 28 small	4	18·59	950 / 2150	776
t. 2nd c.	**Nile** † .	. 11,940	345	73	27½	12,000	Pembroke	Maudslay	1888	1890	890,283	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 8 *6-pr.*, 12 *3-pr.*, 7 M., 3 l.	3 (2 sub.)	16·7	900 / 1200	558
b. 1st cl.	**Ocean** .	. 12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	883,778	6 H.S.	2–1	..	12 H.S.	12–5 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4 (4 sub.)	18·25	800 / 1850	700
b. 1st cl.	**Prince George** .	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	895,504	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 l.	5	17·5	900 / 2200	757
b. 1st cl.	**Prince of Wales**	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,114,079	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4	18	900	755
b. 1st cl.	**Queen** .	. 15,000	400	75	26¾	15,000 B. & W.	Devonport	Harland & Wolff	1902	1904	1,074,999											
b. 1st cl.	**Renown** . shd.	12,350	380	72	26¾	12,000	Pembroke	Maudslay	1895	1896	709,706	8–6 H.S.	3–2	..	10–6 H.S.	10 H.S.	6–2	4 *12-in.*, 10 *6-in.*, 14 *12-pr.*, 12 *3-pr.*, 2 M., 2 l.	5 (2 sub.)	18·0	900 / 1450	674
b. 1st cl.	**Ramillies** .	. 14,150	380	75	27½	13,000	Glasgow	Thomson	1892	1893	902,600											
b. 1st cl.	**Repulse** .	. 14,150	380	75	27½	13,000	Pembroke	Humphrys	1892	1894	851,474	18–5 *comp.*	3	5–4 N.S.	16 *comp.*	17 *comp.*	6–2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3 (2 sub.)	17·5	900 / 1450	730
b. 1st cl.	**Resolution**	. 14,150	380	75	27½	13,000	Jarrow .	Palmer	1892	1893	875,522											

* Details of cost incomplete.

† The bow and stern torpedo ports in Trafalgar and Nile remain, but tubes have been removed in these vessels and in all the "Admiral" class.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
1st cl.	Revenge .	14,150	380	75	27½	13,000	Jarrow	Palmer	1892	1895	876,101											
b. 1st cl.	Royal Oak .	14,150	380	75	27½	13,000	Birkenh'd	Laird	1892	1894	899,272	18–5 comp.	3	5–4 N.S.	16 comp.	17 comp.	6–2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 2 M., 2 l.	3 (2 sub.)	17·5	900/1800	730
b. 2nd c.	RoyalSovereign	14,150	380	75	27½	13,312	Portsm'th	Humphrys	1891	1892	839,136											
b. 2nd c.	Rodney .	10,300	325	68	27¼	11,500	Chatham	Humphrys	1884	1888	769,923	18 comp.	3–2½	..	16 comp.	11 comp.	..	4 *13·5-in.*, 6 *6-in.*, 12 *6-pr.*, 10 *3-pr.*, 6 M., 2 l.	2	16·75	900/1200	515
a.c.	Roxburgh .	10,850	450	68½	25	22,102 D. & cyl.	London & Glasgow	London & Glasgow Company	1904	1905	829,367	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 2 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·63 t	800/1600	655
b. 1st cl.	Russell .	14,000	405	75½	26½	18,229 B.	Jarrow .	Palmer .	1901	1903	1,037,995	7 K.S.	2–1	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	19·3 t	900/2000	750
a.c.	Shannon .	14,600	490	75½	25	27,000 Y²	Chatham	Humphrys	Bldg.	..	1,355,116	6–4	1–½	3	..	..	..	4 *9·2-in.*, 10 *7·5-in.*, 30 small.	5	23	950	755
a.c.	Suffolk .	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	722,681	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	24·7 t	800/1600	500
a.c.	Sutlej . shd.	12,000	440	69½	26¼	21,261 B.	Clydeb'nk	Clydebank Company	1899	1902	755,690	6 K.S.	3–2	..	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	21·77 t	800/1600	755

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b. 1st cl.	**Swiftsure** .	. 11,800	436	71	24½	12,500	Elswick .	Humphrys, Tennant	1903	1904	845,036	7	3	7	..	10	7 K.S.	4 *10-in.*, 14 *7·5-in.*, 24 small.	2	19·6 †	800 / 2000	700
b. 1st cl.	**Triumph** .	. 11,950					Barrow .	Vickers .	1903		845,479											
t. 3rd c.	**Thunderer**	. 9330	285	62¼	27	7000	Pembroke	Maudslay	1872	1877	873,038	12–10	3–2	..	12–10 *	14–12	..	4 *10-in.*, 6 *6-pr.*, 8 *3-pr.*, 4 M., 2 l.	2	14·0	1600	592
t. 2nd c.	**Trafalgar** *	. 11,940	345	73	27½	12,000	Portsm'th	Humphrys	1887	1890	819,192	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 8 *6-pr.*, 12 *3-pr.*, 6 M., 3 l.	4 (2 sub.)	16·7 †	900 / 1200	572
b. 1st cl.	**Victorious**	. 14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	885,212	9 H.S.	3–2½	..	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	17·5	900 / 2200	757
b. 1st cl.	**Venerable.**	. 15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,092,753	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	2	18·3 †	900 / 2000	755
b. 1st cl.	**Vengeance**	. 12,950	390	74	26	13,500 B.	Barrow .	Vickers .	1899	1901	836,417	6 H.N.S.	2–1	..	12 H.N.S.	12–6 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 8 M.	4	18·5	800 / 1850	750
a.c.	**Warrior** .	. 13,550	480	73½	27	23,500 Y² & cyl.	Pembroke	Wallsend, Slipway, etc., Co. .	1905	..	1,154,058	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 2 *12-pr.*, 28 *3-pr.*, 2 M.	3	22·33	1000	704
	4 armoured ships, programme 1906–7	Details not published.																				

* The bow and stern torpedo ports in Trafalgar and Nile remain, but tubes have been removed in these vessels and in all "Admiral" class.

† Details of cost incomplete.

The battleships **Rupert, Collingwood, Conqueror, Hero,** and **Sans Pareil,** and the armoured cruisers **Aurora, Immortalité, Narcissus** and **Undaunted,** have been struck out of the "fighting division of the Navy," but their armaments have not been removed, and they are shown in the official Navy List as available for "subsidiary purposes."

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GREAT BRITAIN.—Cruising Ships, &c.

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Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. Scout .	Adventure .		2940	374	38¼	13½	15,850 Y mod.	Elswick .	Hawthorn.	1904	1905	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·42 *t*	150	268
P. 3rd cl. Cr.	Æolus .	shd.	3600	300	43	17½	9000	Devonp'rt	Hawthorn.	1891	1893	213,180	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	19·75	400 / 535	273
P. 3rd cl. Cr.	Amethyst .	.	3000	360	40	14½	14,200 Y mod.	Elswick .	Parsons Turbine	1903	1905	228,426	..	..	12 *4-in.*, 8 *3-pr.* .	2	23·42	300	296
P. 1st cl. Cr.	Amphitrite	shd.	11,000	435	69	25¼	18,000 B.	Barrow .	Vickers .	1898	1900	552,795	4	3–6 H. S.	16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
P. 1st cl. Cr.	Andromeda	shd.	11,000	435	69	25¼	16,500 B.	Pembroke	Hawthorn.	1897	1900	574,916	3–6	3	16 *6-in.*, 14 *12-pr.*, 4 *3-pr.*, 2 M.	2	20·5	1000	600
P. 1st cl. Cr.	Argonaut .	shd.	11,000	435	69	25¼	18,000 B.	Fairfield .	Fairfield .	1898	1900	545,756	4	3–6 H. S.	16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
" " .	Ariadne .	shd.	11,000	435	69	25¼	18,000 B.	Clydeb'nk	JohnBrown	1898	1900	541,927							
P. 2nd cl. Cr.	Arrogant .	.	5750	320	57½	21	10,000 B.	Devonp'rt	Earle .	1896	1898	279,248	1–2 N. S.	3 N.S.	10 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 1 l., 5 M.	2	19·6	500	480
P. 3rd cl. Cr.	Astræa .	shd.	4360	320	49½	19	9112	Devonp'rt	Devonport	1893	1894	254,217	2–1	3	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	19·75	400	312
P. Scout .	Attentive .	.	2940	374	38¼	13½	16,212 Y.	Elswick .	Hawthorn .	1904	1906	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·88 *t*	150	268
P. 3rd cl. Cr.	Barham .	.	1830	280	35	13¼	4700 T.	Portsm'th	Hawthorn .	1889	1890	113,702	2–1	2	6 *4·7-in.*, 4 *3-pr.*, 2 M.	2	18·6	140	169

P. 2nd cl. Cr.	Blake . .	9000	375	65	25¾	20,000	Chatham.	Maudslay .	1889	1892	453,240	6–3	6	2 9·2-*in.*, 10 6-*in.*, 16 3-*pr.*, 7 M., 2 l.	2	21·5	1500	570
P. 2nd cl. Cr.	Blenheim . .	9000	375	65	25¾	21,411	Blackwall	Humphrys	1890	1893	434,806							
P. 3rd cl. Cr.	Bonaventure shd.	4360	320	49½	19	9000	Devonp'rt	Hawthorn.	1892	1894	249,727	2–1	2	2 6-*in.*, 8 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	3	19·5	400	312
P. 3rd cl. Cr.	Brilliant . shd.	3600	300	43¾	17½	9164	Sheerness	Hawthorn.	1891	1893	218,145	2–1	2	2 6-*in.*, 6 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	3	19·7	400	273
P. 3rd cl. Cr.	Cambrian. shd.	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	244,725	2–1	2	2 6-*in.*, 8 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	3	19·5	400	312
P. 2nd cl. Cr.	Challenger .	5880	355	56	21¼	12,500 B.&W.	Chatham	Wallsend Eng'ng Co.	1902	1904	360,194	..	..	11 6-*in.*, 9 12-*pr.*, 6 3-*pr.*, 2 M.	2	20·75 to 21·0	500	..
P. 3rd cl. Cr.	Charybdis shd.	4360	320	49½	19	9000	Sheerness	Earle .	1893	1895	241,029	2–1	2	2 6-*in.*, 8 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	3	19·5	400	312
T. G. B .	Circe* . .	810	230	27	8¾	5800 F.	Sheerness	Penn .	1892	1893	65,683	..	2	2 4·7-*in.*, 4 3-*pr.*	5	21·6	100	91
P. 2nd cl. Cr.	Crescent . shd.	7700	360	60	23¾	12,000	Portsm'th	Penn .	1892	1894	392,453	5–1	6	1 9·2-*in.*, 12 6-*in.*, 12 6-*pr.*, 5 3-*pr.*, 6 M., 2 l.	2 (1 sub.)	19·7	850	560
P. 1st cl. Cr.	Diadem . shd.	11,000	435	69	26	16,500 B.	Fairfield	Fairfield .	1896	1899	554.863	4–2½	4½–2	16 6-*in.*, 14 12-*pr.*, 4 3-*pr.*, 2 M.	2 (1 sub.)	20·5	1000	357
P. 3rd cl. Cr.	Diamond . .	3000	360	40	14½	10,066 N. L.	Birkenh'd	Laird .	1904	1905	231,010	..	..	12 4-*in.*, 8 3-*pr.*	2	22·17 *t*	300	296
P. 2nd cl. Cr.	Diana . shd.	5600	350	54	21	9600	Fairfield	Fairfield .	1895	1898	253,009	2½	3	5 6-*in.*, 6 4·7-*in.*, 9 12-*pr.*, 7 3-*pr.*, 5 M., 1 l.	..	19·5	..	..
" " .	Dido . . shd.	5600	350	54	21	9600	Glasgow.	London and Glasgow Co.	1896	1898	254,190	2½	3	11 6-*in.*, 9 12-*pr.*, 7 3-*pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	470
" " .	Doris . shd.	5600	350	54	21	9600	Barrow .	Barrow .	1896	1898	256,306							

* Re-engined and reboilered with Thornycroft small-tube water-tube boilers at Fairfield.

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
T. G. B.	**Dryad**	1070	250	30½	9	3500	Chatham	Maudslay	1893	1894	74,174	..	2	2 *4·7-in.*, 4 *6-pr.*	5	19·0	100	120
P. 2nd cl. Cr.	**Eclipse** shd.	5600	350	53	20¼	9600	Portsm'th	Portsm'th	1894	1897	276,313	1½–3	3	11 *6-in.*, 8 *12-pr.*, 6 *3-pr.*, 5 M., 1 l.	3	19·5	550	477
P. 2nd cl. Cr.	**Edgar**	7350	360	60	23¾	12,000	Devonp'rt	Fairfield	1890	1893	410,980	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4	20·5	850	544
P. 2nd cl. Cr.	**Encounter**	5880	355	56	21¼	12,500 Dürr	Devonp'rt	Devonport Dockyard	1903	1906	370,275	..	..	11 *6-in.*, 9 *12-pr.*, 6 *3-pr.*, 2 M.	2	20·75 to 21·0	600	..
P. 2nd cl. Cr.	**Endymion**	7350	360	60	23¾	12,000	Hull	Earle	1891	1894	375,350	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2	20·5	850	544
P. 1st cl. Cr.	**Europa** shd.	11,000	435	69	26	16,500 B.	Clydeb'nk	Thomson	1897	1899	564,690	4–2½	4½–2	16 *6-in.*, 14 *12-pr.*, 4 *3-pr.*, 2 M.	2	20·5	1000	357
P. 3rd cl. Cr.	**Flora** shd.	4360	320	49½	19	9000	Pembroke	Barrow	1893	1895	242,276							
" "	**Forte** shd.	4360	320	49½	19	9000	Chatham	Chatham	1893	1895	240,571	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	19·5	400	312
" "	**Fox** shd.	4360	320	49½	19	9000	Portsm'th	Portsm'th	1893	1895	245,571							
P. Scout	**Foresight**	2945	360	39	14	14,277 T.	Fairfield	Fairfield	1904	1905	285,672	1½–⅝	..	10 *12-pr.*, 8 *3-pr.*	2	25·12 *t*	150	268
"	**Forward**					15,018 T.					285,326					25·15 *t*	380	

P. 2nd cl. Cr.	**Furious** . shd.	5750	320	57½	21	10,000 B.	Devonp'rt	Earle .	1896	1899	275,158	1–2	3	10 *6-in.*, 9 *12-pr.*, 3 *3-pr.*, 5 M., 1 l.	2	19·0	500	480
" " .	**Gladiator** . shd.					10,000 B.	Portsm'th	Mandslay .	1896	1900	287,604							
P. 2nd cl. Cr.	**Gibraltar** . shd.	7700	360	60	23¾	12,000	Glasgow .	Napier .	1892	1894	373,236	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2	19·7	850	544
T. G. B. .	**Gossamer** . .	735	230	27	8¼	6,000	Sheerness	Sheerness .	1890	1891	52,416	..	2	2 *4·7-in.*, 3 *4-pr.*	2	20·0	100	91
P. 2nd cl. Cr.	**Grafton** . .	7350	360	60	23¾	12,000	Blackwall	Humphrys	1892	1894	372,890	..	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2	20·0	850	560
T. G. B. .	**Halcyon** .	1070	250	30½	9	6000 L.W.R	Devonp'rt	Cammell Laird	1894	1895	75,206	..	2	2 *4·7-in.*, 5 *6-pr.* .	5	19·0	100	120
" .	**Harrier** . .	1070	250	30½	9	3500	Devonp'rt	Hawthorn	1894	1895	73,036	..						
P. 2nd cl. Cr.	**Hawke** . .	7350	360	60	23¾	12,000	Chatham .	Fairfield .	1891	1893	400,702	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2	20·0	850	544
T. G. B. .	**Hazard** . .	1070	250	30½	9	3500	Pembroke	Fairfield .	1894	1894	77,322	..	2	2 *4·7-in.*, 5 *6-pr.* .	3	19·0	100	120
P. 2nd cl. Cr.	**Hermes** . shd.	5600	350	54	20½	10,000 B. & W.	Fairfield	Fairfield .	1898	1900 1902	281,776	1½–3	3	11 *6-in.*, 9 *12-pr.*, 6 *3-pr.*, 2 M.	2	20·0	600	477
" " .	**Highflyer** shd.	5600	350	54	20½	10,000 B.	Fairfield	Fairfield .	1898	1900	280,182							
" " .	**Hyacinth** . shd.	5600	350	54	20½	10,000 B.	Glasgow .	London and Glasgow Co.	1898	1901	288,595							
P. 3rd cl. Cr.	**Hermione** shd.	4360	320	49½	19	9000	Devonp'rt	Thomson .	1893	1895	223,324	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	19·5	400	312
T. G. B. .	**Hussar** . .	1070	250	30½	9	3500	Devonp'rt	Hawthorn .	1894	1895	72,313	..	2	2 *4·7-in.*, 4 *6-pr.* .	5	19·0	100	120

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Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	**Indefatigable** shd.	3600	300	43¾	17½	9000	Glasgow .	London and Glasgow Co.	1891	1892	183,568	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 1 M., 1 l.	3	19·75	400	273
" " .	**Iphigenia** . shd.	3600	300	43¾	17½	9000	Glasgow .	London and Glasgow Co.	1891	1893	186,146							
P. 2nd cl. Cr.	**Isis** . . shd.	5600	350	54	21	9600	Glasgow .	London and Glasgow Co.	1896	1898	253,733	2½	3	11 *6-in.*, 9 *12-pr.*, 7 *3-pr.*, 5 M., 1 l.	4 (2 sub.)	19·5	550	470
" " .	**Juno** . shd.	5600	350	54	21	9600	Barrow .	Barrow .	1895	1898	256,106							
T. G. B. .	**Jason*** . .	810	230	27	8¾	5800 R.	Barrow .	Barrow .	1892	1893 1902	50,161	..	2	2 *4·7-in.*, 5 *3-pr.* .	3	21·9 *t*	100	91
P. 3rd cl. Cr.	**Latona** . .	3400	300	43	16½	9000	Barrow .	Barrow .	1890	1892	174,017	2	2–1	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	20·0	400	273
T. G. B. .	**Leda*** . .	810	230	27	8¾	5800 T.	Sheerness	Penn .	1892	1894	62,789	2	..	2 *4·7-in.*, 5 *3-pr.* .	5	21·8	100	91
P. 2nd cl. Cr.	**Minerva** . shd.	5600	350	53	20½	9600	Chatham.	Chatham .	1895	1897	275,331	1½-3	3	11 *6-in.*, 9 *12-pr.*, 6 *3-pr.*, 5 M.	2 (2 sub.)	19·5	550	437
P. 1st cl. Cr.	**Niobe** . shd.	11,000	435	69	26	16,500 B.	Barrow .	Vickers .	1897	1899	548,283	4–2½	4½–2	16 *6-in.*, 14 *12-pr.*, 4 *3-pr.*, 2 M.	2 (2 sub.)	20·5	1000	600
T. G. B. .	**Niger** . .	810	230	27	8¾	6282 R.	Barrow .	Barrow .	1892	1894 1902	50,572	..	2	2 *4·7-in.*, 5 *3-pr.* .	3	20·5 *t*	100	91
P. Scout .	**Pathfinder**	3000	370	38¾	14	17,176 L.N.	Birknhd.	Laird .	1904	1905	273,147	½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·34 *t*	150/380	268
" .	**Patrol** .					16,460					273,523					25·06 *t*		

P. 3rd cl. Cr.	Pandora	2200	305	36¾	13½	7000 T.	Portsm'th	Portsm'th	1900	1901	165,218							
" "	Pegasus	2135	300	36½	17	7000 R.	Jarrow	Palmer	1897	1899	134,919							
" "	Pelorus	2135	300	36½	17	7000 Nor.	Sheerness	Thomson	1896	1897	154,315							
" "	Perseus	2135	300	36½	13½	7000 T.	Hull	Earle	1897	1901	133,461							
" "	Pioneer	2200	305	36¾	13½	7000 T.	Chatham	Fairfield	1899	1900	148,894	2	·22	8 *4-in.*, 8 *3-pr.*, 2 l.	2	20·0	250 517	224
" "	Prometheus	2135	300	36½	13½	7000 T.	Hull	Earle	1898	1901	131,743							
" "	Psyche	2200	305	36¾	17½	7000 T.	Devonp'rt	Devonport	1898	1900	156,890							
" "	Proserpine	2135	300	36½	17	7000 T.	Sheerness	Devonport	1896	1899	165,020							
" "	Pyramus	2135	300	36½	13½	7000 R.	Jarrow	Palmer	1897	1900	135,249							
P. 1st cl. Cr.	Powerful . shd.	14,200	500	71	29	25,000 B.	Barrow	Barrow	1895	1898	705,335	3–6	6	2 *9·2-in.*, 16 *6-in.*, 16 *12-pr.*, 8 *3-pr.*, 9 M., 2 *12-pr.* boat.	4	22·1	1500 3000	840
P. 2nd cl. Cr.	Royal Arthur shd.	7700	360	60	27¾	12,000	Portsm'th	Maudslay	1891	1893	412,033	5–1	6	1 *9·2-in.*, 12 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2 (2 sub.)	19·7	850	567
P. 2nd cl. Cr.	St. George. shd.	7700	360	60¾	23¾	12,000	Hull	Maudslay	1892	1894	399,755	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2 (2 sub.)	19·7	850	559
P. 3rd cl. Cr.	Sapphire	3000	360	40	14½	10,200	Palmer	Palmer	1904	1905	226,277	..	..	12 *4-in.*, 8 *3-pr.*	2	22·45 t	300	296
" "	Sappho	3400	300	43	16½	9861	Poplar	Penn	1891	1893	176,813	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·47	400	273
" "	Scylla	3400	300	43	16½	9280	Poplar	Penn	1892	1893	176,655	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·62	400	273
P. Scout	Sentinel	2940	360	40	14¼	17,488 Nor. V.E.	Barrow	Vickers	1904	1905	276,837	1½–⅝	..	10 *12-pr.*, 8 *3-pr.*	2	25·07 t	150 410	268

* Re-engined and reboilered.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. Scout .	Skirmisher .	2940	360	40	14¼	17,053 Nor.	Barrow .	Vickers .	1905	1905	276,579	1½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·19	150	268
T. G. B. .	Skipjack . .	735	230	27	8¼	6000 R.	Chatham .	Laird .	1889	1890 1899	61,102	..	2	2 *4·7-in.*, 5 *3-pr.* .	5	20·5	100	91
" " .	Speedwell .	735	230	27	8¼	6000 R.	Devonp'rt	Laird .	1889	1890 1899	60,837							
P. 1st cl. Cr.	Spartiate . shd.	11,000	435	69	26	18,658	Pembroke	Maudslay .	1898	1902	654,661	4–2½	4½–2	16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 2 M.	2 (2 sub.)	21·0 *t*	1000	600
P. 3rd cl. Cr.	Sirius . shd.	3600	300	43¾	17½	9000	Elswick .	Maudslay .	1890	1892	190,991	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·75	400	273
T. G. B. .	Speedy . .	810	230	27	8¾	4703 T.	Chiswick	Thornycrft	1893	1894	61,638	..	2	2 *4·7-in.*, 5 *3-pr.* .	3	20·21	100	91
P. 2nd cl. Cr.	Talbot . shd.	5600	350	53½	21	9600	Devonpr't	Devonport	1895	1897	263,699	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 4 M., 1 l.	3 (2 sub.)	19·5	550	433
P. 3rd cl. Cr.	Terpsichore .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	176,616	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 9 M., 1 l.	3	20·0	400	275
P. 1st cl. Cr.	Terrible . shd.	14,200	500	71	27	25,000 B.	Glasgow .	Thomson .	1895	1898	708,619	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 8 *3-pr.*, 9 M., 2 *12-pr.* boat.	4	22·4	1500 / 3000	840
P. 2nd cl. Cr.	Theseus . .	7350	360	60	23¾	12,000	Blackwall	Maudslay .	1892	1894	370,359	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 6 M., 2 l.	2 (2 sub.)	20·0	850	544

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P. 3rd cl. Cr.	**Thetis** . .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	175,862	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *3-pr.*, 1 *3-pr.*, 4 M., 1 l.	3	20·0	400	273
P. 3rd cl. Cr.	**Topaze** . .	3000	360	40	14½	9860 L.N.	Birkenh'd	Laird .	1903	1905	242,444	..	..	12 *4-in.*, 8 *3-pr.* . .	2	22·1 *t*	300	296
P. 2nd cl. Cr.	**Venus** . shd.	5600	350	54	21¼	9600	Fairfield .	Fairfield .	1895	1898	254,184	2½	3	11 *6-in.*, 9 *12-pr.*, 7 *3-pr.*, 4 M., 1 l.	3 (2 sub.)	19·5	550	470
" " .	**Vindictive** .	5750	320	54	20½	10,000 B.	Chatham	Chatham .	1896	1897	282,879	1–2 N.S.	3	10 *6-in.*, 9 *12-pr.*, 3 *3-pr.*, 5 M., 1 l.	2	20·1 *t*	500	450
T. D. S. .	**Vulcan** . .	6620	350	58	23	12,032	Portsm'th	Humphrys	1889	1894	380,831	5–2½	2	8 *4·7-in.*, 12 *3-pr.*, 16 M., 1 l.	6 (2 sub.)	20·0	1000	433

River Gunboats.—**Robin, Nightingale, Snipe, Sandpiper** (1897), 85 tons; **Woodcock, Woodlark** (1898), 122 tons, 2 6-prs., 4 Maxims; **Kinsha** (1901), **Teal, Moorhen** (1902), 180 tons, 2 6-prs., 13 knots; **Widgeon** (1905).

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*3rd Class Cruisers:* **Andromache, Apollo, Intrepid, Melampus. Naiad, Pique, Rainbow, Retribution, Spartan,** and **Tribune,** which were built under the Naval Defence Act; **Pomone** and **Pactolus** (completed 1900–1); **Medea** and **Medusa** (re-engined and reboilered last year); **Philomel, Champion,** and **Bellona.** *Torpedo-Gunboats:* **Alarm, Antelope, Sheldrake,** and **Onyx.** The following small craft have been placed on a "Special Service List" of "unprotected ships": **Sphinx, Lapwing, Redbreast, Ringdove, Dwarf, Shearwater, Bramble, Britomart, Clio,** and **Cadmus.**

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Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	*Umbria	Cunard Co.	501½	57	26	8,128	14,500	19½
	*Campania	"	610	65	26	12,950	30,000	21
	*Lucania	"	610	65	26	12,952	30,000	21
	Empress of India . .	Canadian Pacific Rlwy. Co.	440	51	24½	5,934	10,000	16
	Empress of China . .	" " "	440	51	24½	5,947	10,000	16
	Empress of Japan . .	" " "	440	51	24½	5,940	10,000	16
	†Tartar	" " "	376	47	33¼	4,425	4,900	14
	†Athenian	" " "	365	45½	29	3,882	4,600	14

* The Cunard Company holds all vessels, for the time being the property of the Company, at the disposal of His Majesty's Government for hire or purchase.

† In addition to the above, the Canadian Pacific Railway Company engages to hold these two vessels at the disposition of the Admiralty without further subsidy.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Almirante Brown**	4267	240	50	20½	4500	Poplar	1880	1882	270,000	9 *comp.*	1½	8 *comp.*	7 *comp.*	8 *comp.*	..	10 *5·9-in.* (Canet), 4 *4·7-in.*, 8 *2·4-in.*, 2 M.	2	13·75 *t*	650	350
a.c.	**Garibaldi**	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.*	..	19·9 *t*	1000	500
a.c.	**General Belgrano**	7069	328	59¾	24	13,000	Leghorn	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 10 *2·2-in.*, 8 *1·4-in.*, 2 L., 2 M.	4 sub.	20·1 *t*	1000	500
a.c.	**General San Martin**	6773	328	59¾	24	13,000	Leghorn	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 12 *2·2-in.*, 10 *1·4-in.*, 2 L., 2M.*	4 sub.	19·8	1100	500
c.d.s.b.	**Independencia**	2336	230	44½	13	3000	Birkenhead	1891	1893	176,000	8 *comp.*	2	..	8 *comp.*	8 *comp.*	..	2 *9·4-in.*, 4 *4·7-in.* (A), 4 *3-pr.* (A), 4 M.	2	14·4 *t*	340	225
c.d.s.b.	**Libertad**	2336	230	44½	13	3000	Birkenhead	1890	1892	176,000											
a.c.	**Pueyrredon**	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4 in.*, 2 M.*	4 sub.	20·1 *t*	1000	500

* Garibaldi, General San Martin, General Belgrano and Pueyrredon have Armstrong guns.

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ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	A	800	..	..	..	..	. . .	Bldg.	..	85,000	..	..	2 *6-in.*	..	15·0	..	..
g.b.	B																
cr.	Buenos Aires shd.	4780	396	47¼	19	17,000	Elswick	1895	1895	383,000		4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*, 16 *3-pr.*, 6 *1-pr.*	5	23·2* *t*	1000†	429
to.g.b.	Espora	520	210	25	8	3500	Birkenhead	1890	1891	..	..	..	3 *3-in.*, 4 *3-pr.*, 2 M.	5	20·0	100	124
cr.	Nueve de Julio	3570	354	44	19½	14,350	Elswick	1892	1892	293,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	5	22·74 *t*	770†	300
cr.	Patagonia	1419	220	32¾	12¾	2400	Trieste	1885	1887	100,000	1½	4	1 *10-in.*, 3 *6-in.*, 6 I., 10 M.	..	13·0	350	210
to.g.b.	Patria	1070	250	31	10	4500	Birkenhead	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
cr.	25 de Mayo	3200	325	43	16	13.800	Elswick	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	6	22·43 *t*	600†	185

* Natural draught. † Bunker capacity.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. Cadet training vessel Argentina, 807 tons, launched 1883. There are two old gun vessels, Paraná and Uruguay, 550 tons (1874), and several other small gunboats; also the torpedo-ram Maipù (1063 tons, 1750 I.H.P.), built in England in 1880. The Florio Company sold to the Argentine Government the steamships Arno, Regina Margherita, and Sempione to be converted into cruisers; and the Spanish firm of Pinillos, Salny & Co. the Barcelona (4020 tons register) and Cadiz (4218 tons), which have been renamed Pampa and Gaucho.

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AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.b.	Arpád	8208	354¼	65¾	23¼	15,000 B.	Trieste	1901	1903	650,900	8½ K.S.	2½	4 K.S.	8 K.S.	8¼ K.S.	5 K.S.	3 9·4-in., 12 5·9-in., 10 2·8-in., 8 M., 2 l.	2 (sub)	19·6 t	500 / 840	638
	Babenberg							1902	1904	667,000											
Riv. Mon.	Bodrog	433	184	31½	4	1400	Neupesth	1904	1905	..	2	1	..	..	3	1½	2 4·7-in., 1 4·7-in. howitzer, 3 M.	..	13·0	62	..
c.d.s.	Budapest	5462	305	55¾	21	9185 B.	Trieste	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 9·4-in., 6 5·9-in., 12 1·8-in., 6 M., 2 l.	4	17·8 t	500	450
b.	Erzherzog Friedrich							1904											20·57		
b.	Erzherzog Karl	10433	390½	72¼	24½	18,340 t., Y. 14,000 Y.	Trieste	1903	1906	912,500	8¼ K.S.	3	5 K.S.	8 K.S.	9¼ K.S.	7 K.S.	4 9·4-in., 12 7·5-in., 12 2·8-in., 6 1·8-in., 8 M., 2 l.	2 (sub)	19·25	1315	..
b.	Erzherzog Ferdinand Max							1905													
b.	Habsburg	8208	354¼	65¾	23¼	15,000 B.	Trieste	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 9·4-in., 12 5·9-in., 10 2·8-in., 8 M., 2 l.	2 (sub)	19·6 t	500 / 840	638
a.c	Kaiserin Maria Theresia	5187	351	52½	21¼	9755	Trieste	1893	1895	304,187	4	2	..	4	4	4	2 9·4-in., 8 5·9-in., 14 1·8-in., 6 M., 2 l.	4	19·0	740	502
a.c	Kaiser Karl VI.	6151	367½	56	20¼	12,800 B.	Trieste	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 9·4-in., 8 5·9-in., 16 1·8-in., 4 M., 2 l.	4	20·7 t	800	535
Riv. Mon.	Körös	437	177	29½	4	1250	Buda Pesth	1892	1893	..	2	¾	..	..	3	..	2 4·7-in., 2 2 8-in., 2 M		10·0	..	77

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b.	Kronprinz Rudolph	6830	295	62¼	25½	6500	Pola	1887	1890	330,000	12–10	2½	..	10	10	..	3 *12-in.* (K.), 6 *4·7-in.*, 13 *1·8-in.*, 2 *1·4-in.*, 4 M., 2 l.	4	16·0	600	446
,,	Kronprinzessin Stephanie	5069	278¾	55¾	21½	8000	Trieste	1887	1890	300,000	9 *comp.*	1	.	..	8 *comp.*	..	2 *12-in.* (K.), 6 *5·9-in.*, 11 *1·8-in.*, 2 *1·4 in.*, 4 M., 2 l.	4	17·0	400	423
Riv. Mon. ,,	Leitha Maros	305	166	27½	3½	700	Buda Pesth	1871	1872	20,000	1½	1	..	..	2	..	1 *4·7-in.*, 3 M.	..	8·0	20	57
c.d.s.	Monarch	5550	305	55¾	21	8900	Pola	1895	1898	399,062	10½ H.S.	2¼	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·4 *t*	500	450
a. c.	St. Georg	7185	383¾	61⅔	21¼	15,270 *t* Y.	Pola	1903	..	581,583	8¼–6½ K.S.	1½	5 K.S.	7 K.S.	8¼–5¼ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 9 *2·8-in.*, 14 M., 2 l.	2 (sub)	22 *t*	1000	..
Riv. Mon.	Szamos	437	177	29½	4	1250	Buda Pesth	1892	1893	..	2	¾	..	..	3	..	2 *4·7-in.*, 2 *2·8-in.*, 2 M.	..	10·0	..	75
,,	Temes	433	184	31¼	4	1400	Neupesth	1904	1905	..	2	1	..	..	3	1½	2 *4·7-in.*, 1 *4·7-in.* howitzer, 3 M.	..	13·0	62	..
c.d.s.	Wien	5550	305	55¾	21	8480	Trieste	1895	1897	397,850	10½ H.S.	2¼ H.S.	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·6 *t*	500	450

The Tegetthoff, 7390 tons, launched 1878, is used as harbour-defence and barrack-ship at Pola.

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AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	Aspern	2362	301¾	39½	14¼	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 / 500	289
to. g. b.	Blitz	354	193½	22¼	8	3500	Elbing	1888	1899	..	..	..	8 *1·8-in.*	4	21·0	250	59
cr. 2nd cl.	Kaiserin Elizabeth	4000	321½	47½	18½	8000	Pola	1890	1892	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 13 *1·8-in.*, 4 M., 2 l.	5	19·0	660	418
cr. 2nd cl.	Kaiser Franz Josef I.	3966	321½	47½	18½	8000	Trieste	1889	1891	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 16 *1·8-in.*, 2 l.	5	19·0	660	426
to. g. b.	Komet	354	193½	22¼	8	3500	Elbing	1888	1889	..	..	..	9 *1·8-in.*	4	21·0	50	59
cr. 3rd cl.	Leopard	1506	224	34	14	6000	Elswick	1886	1888	200,000	..	..	2 *4·7-in.*, 10 *1·8-in.*	4	18·3	250	186
g. b.	Lussin	995	200¼	26¼	12¼	1830 Dürr.	Trieste	1883	1885	..	1½	..	2 *5·9-in.* (K.), 7 M., 1 l.	..	14·0	200	154
to. g. b.	Magnet	502	220	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 *t*	105	80
to. g. b.	Meteor	344	187	22¼	8	3500	Elbing	1887	1889	..	..	..	9 *1·8-in.*	4	23·1	120	59
cr. 3rd cl.	Panther	1506	224	34	14	6000	Elswick	1885	1887	..	..	..	2 *4·7-in.*, 10 *1·8-in*	1	18·5	250	186
T. D. S.	Pelikan	2431	279	39¼	15½	4600	Elbing	1891	1893	..	..	..	2 *5·9-in.* (K.), 8 smaller	4	18·0	..	198
to. g. b.	Planet	492	210	23	8¼	3500	Jarrow	1889	1890	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	3	19·6	78	84
to. g.b.	Satellit	531	220	26¾	9¼	4000	Elbing	1893	1893	..	1½	..	1 *2·8-in.*, 8 *1·8-in.*	..	21·87	76	84
to. cr.	Szigètvár	2313	301¾	39½	14¼	7300 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 / 500	289
to. cr.	Tiger	1649	233	32¾	15½	5260	Trieste	1887	1889	..	..	..	4 *4·7-in.*, 10 *1·8-in.*	1	18·0	300	195
to. g. b.	Trabant	522	220	23	8¼	3500	Trieste	1890	1891	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	3	20·0	..	84
to. v.	Zara	837	179½	26¼	12¼	800	Pola	1879	1880	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	Zenta	2264	301¾	39½	12¼	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·9 *t*	470 / 500	289

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.
Five patrol boats (30 tons, 2000 H.P.) are in hand for the Danube, two of them fitted with Parsons turbines.
Donau, training corvette, launched at Pola, 1893 (2307 tons).

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BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t. River	Alagoãs . .	335	120	28	4¾	180	Brazil . .	1886	1888	..	4½	4½	..	..	4½	..	1 *7-in.* M.L.R. (Whitworth), 2 M.	..	7·0	..	43
t. River	Maranhao .	463	137	34½	6½	700	Rio de Janeiro	1890	1892	..	5 H.S.	2	..	..	6	..	2 *4·7-in.*, 1 *2·5-in.*, 5 M. . .	..	12·0	..	..
c.d.s., t. c.d.s., t.	Marshal Deodoro Marshal Floriano	3112	267½	48	13¼	3400	La Seyne D'A.	1898 1899	1900 1901	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 2 *5·9-in.* howitzers, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236	200
t. River	Pará . . .	463	137	34½	6½	700	Rio de Janeiro	1890	1892	..	5 H.S.	..	..	..	..	..	2 *4·7-in.*, 1 *2·5-in.*, 5 M. . .	..	12·0	..	..
t. River	Pernambuco .	463	137	34½	6½	700	Rio de Janeiro	1905	Bdg.	..	5 H.S.	2	..	..	6	..	2 *4·7-in.*, 1 *2·5-in.*, 5 M. . .	..	12·0	..	..
t. River	Piauhy . .	335	120	28	4¾	180	Brazil .	1887	1889	..	4½	4½	..	..	4½	..	1 *7-in.* M.L.R. (Whitworth) .	..	7·0	..	43
t.	Riachuelo shd.	5700	305	52	19½	7300	Poplar .	1883 1895	1888	365,000*	11 *comp.*	2	..	10 *comp.*	10 *comp.*	..	4 *9·2-in.* (Whitworth, altered by Armstrong), 6 *4·7-in.*, 2 *3-pr.*, 15 M.	5	16·71	800	450
t. River	Rio Grande .	335	120	28	4¾	180	Brazil .	1888	1890	..	4½	4½	..	..	4½	..	1 *7-in.* M.L.R. (Whitworth) .	..	7·0	..	43

* Exclusive of guns and ammunition.

Floating batteries, Brazil (1518 tons) and Lima-Barros (1444 tons). Three battleships of 13,000 tons and three armoured cruisers are projected.

The turretship Aquidaban (4950 tons), sunk by explosion of magazine in Jacarepagua Bay, January 21, 1905, with great loss of life.

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BRAZIL.—Cruising Ships, &c.

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
cr.	Almirante Tamandare shd.	4660	294	46	18¼	7500	Brazil .	1890	1893	..	1½	3	10 *6-in.*, 2 *4·7-in.*, 8 M. .	8	17·0	750	450
„	Andrada . . . shd.	2559	252¾	34	18	3600	Bergen .	1890	1892	..	..	..	2 *4·7-in.*, 2 *14-pr.*, 6 *6-pr.*, 6 *1-pr.*	5	17·0	..	300
„	Barroso . . . shd.	3600	330	43¾	16¾	7500	Elswick .	1896	1897	..	3	4½ shields	6 *6-in.*, 4 *4·7-in.*, 10 *6-pr.*, 4 *1-pr.*, 4 M.	3	20·0	700	300
„	Benjamin Constant . shd.	2707	236	46	18	2800	La Seyne .	1892	1894	..	2	..	4 *6-in.*, 8 *4·7-in.*, 8 M., 4 l.	4	14·0	260	287
to.cr.	Caramuru	1014	249½	30¾	10¼	6000	Kiel . .	1896	1897	..	½	..	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*	3	22·5	..	..
to.g.b.	Gustavo Sampaio . .	500	197	21	7¾	2500	Elswick .	1893	1894	..	..	..	2 *20-pr.*, 4 *7-pr.* . .	3	18·0	150	95
cr.	Primeiro de Março . .	715	167¼	26¼	10½	750	Brazil . .	1881	1883	..	..	..	7 *4·5-in.* M.L.R.(Whitworth), 4 M.	..	9·0	..	..
„	Quinze de Novembro	1300	210	35	13	3300	Elswick. .	1892	1894	..	2–1	..	6 *4·7-in.*, 4 *6-pr.*, 6 M. .	4	17·0	170	160
to.cr.	Tamoyo	1063	269	28¾	9¾	6500	Kiel . .	1898	1900	..	..	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	23·0	293	110
„	Timbira	1014	249½	30¾	10¼	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110
g.v.	Tiradentes . . . shd.	800	165	30	11	1200	Elswick .	1892	1893	..	..	..	4 *4·7-in.*, 3 *6-pr.*, 4 M. .	2	14·5	110	107
to.cr.	Tupy	1014	249½	30¾	10¼	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, eight paddle gunboats, 120 tons to 160 tons, and four 12-knot river gunboats built at Poplar.

CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Almirante O'Higgins shd.	8500	411¾	62½	22	16,000 B.	Elswick .	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	8 (2 sub.)	21·5 *t*	1260	..
b.	Capitão Prat . . shd.	5981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	6 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 6 *2·2-in.*, 4 *1·8-in.*, 10 *1·4-in.*, 5 M.	4	18·3 *t*	775	485
a.c.	Esmeralda . . .	7020	436	53¼	22¼	16,000	Elswick .	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 *t*	1350	500

The Almirante Cochrane (3500 tons), built at Hull, 1874, is used as a depôt ship.

Cruising Ships, &c.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
to.g.b	Almirante Condell . / Almirante Lynch .	750	240	27½	10½	4500 B.	Birkenhead .	1890	1892	..	..	..	3 *14-pr.*, 4 *3-pr.*, 2 M. .	5	21·0	210	..
"	Almirante Simpson. .	812	240	27½	10½	4700 N.	Birkenhead .	1896	1896	..	..	4½	2 *4·7-in.*, 4 *3-pr.* . .	3	21·0*t*	200	..
cr.	Blanco Encalada . shd.	4400	370	46½	18½	14,500	Elswick .	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 *t*	†900	427
"	Chacabuco . . shd	4500	360	46	18‡	15,750	Elswick .	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000 †	..
"	General Baquedano (Training)	2330	240	45¾	18‡	1500 B.	Elswick .	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 *t*.	200 / 300	302
"	Ministro Zenteno . shd.	3600	330¼	43¾	16¾	6500	Elswick .	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** .	3	20·0*t*	800	..
"	Presidente Errázuriz shd.	2047	268	35¾	19½	5400	La Seyne .	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong. † Bunker Capacity. ‡ Mean Draught.

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CHINA.—Cruising Ships, &c.

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	Foo-Ching	2500	253	36¼	18	2400	..	1893	1895	..	4–2	4½	3 *5-in.* (K.), 4 M., 2 l.	..	16·0	..	..
to.g.b.	Fei-Ying	837	257¼	28½	12½	4500 Y.	Stettin	1895	1895	..	..	2	2 *4-in.*, 6 *3·4-in.*, 4 smaller	3	21·8 *t*	75	90
cr.	Hai-Chi.	4300	396	46¾	18½	17,000	Elswick	1898	1899	..	5	6	2 *8-in.*, 10 *4·7-in.*, 12 *3-pr.*, 4 *1·4-in.*, 6 M.	5	24·0	300	374
„	Hai-Shen	2903	314¾	41	16	8000	Vulcan. Stettin.	1898	1898	..	3	2	3 *6-in.* (K.), 8 *4-in.*, 6 *1·4-in.* Hotchkiss, 6 M.	3 (1 sub.)	20·7 *t*	220 / 500	244
„	Hai-Shew							1897	1898								
„	Hai-Yung							1897	1898								
„	Hi-Ying	2165	253	36¼	18	2400	..	1895	1897	..	..	..	2 *8-in.* (A.), 8 *4·7-in.*, 4 M.	1	21·0	..	..
to.cr.	Kien-Wei	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 *3·9-in.*, 3 *2·5-in.*, 6 *1·4-in.*	2	22·5	360	300
„	Kien-Gnan						Foochow	1899	1902	..	..	..					
cr.	King-Ching	2100	250	36	20	2400	..	1886	1888	..	..	..	3 *7-in.* (K.), 7 *40-pr.*, 6 M.	2	14·5	360	300
to.g.b.	Kwang-Ting	1000	235	27¼	11¼	3400	..	1890	1892	..	..	..	3 *4·7-in.*, 4 M., 2 l.	4	16·0	..	120
cr.	Nan-Schuin	2165	253	36¼	18	2400	Kiel	1884	1886	..	..	..	2 *8-in.* (A.), 8 *4·7-in.*, 9 M.	1	14·5	600	250
„	Nan-Ting	2165	253	36¼	18	2400	Kiel	1883	1885	..	..	..	2 *8-in.* (A.), 8 *4·7-in.*, 9 M.	1	15·0	600	250

Torpedo-gunboat Pei-Ting (349 tons), four gunboats of 411 tons, two of 300 tons, four of 215 tons (defence of Canton Roads), training vessel Tung-Chi, 1700 tons—all launched 1885–88.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	Gorm . .	2307	231	40	14	1670	Copenhagen	1870	1873	104,000	7–4½	..	..	..	8	..	2 *10-in.* (A.) M.L.R., 3 *3·4-in.* (K.), 4 M.	..	12·25	115	158
t.	Helgoland. .	5263	257½	59¼	18¾	4000	Copenhagen	1878	1881	275,000	12–6	4	10	7	10	..	1 *12-in.* (K.), 4 *10·2-in.*, 5 *4·7-in.*, 10 M.	4	12·0	230	350
c.d.s.,t.	Herluf Trolle .	3415	271	50	16½	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
b.	Iver Hvitfeldt .	3208	242	49½	18	5100	Copenhagen	1886 1900	1889	200,000	12	2	..	9½	8	..	2 *10·2-in.* (K.), 4 *4·7-in.*, 12 M.	4	15·6	250	298
c.d.s.,t.	Lindormen .	2043	216	39½	13¾	1560	Copenhagen	1868	1870	93,000	5–3	..	..	..	6	..	2 *9-in.* (A.) M.L.R., 3 *3·4-in.* (K.), 4 M.	..	12·0	120	140
c.b.	Odin . . .	3034	237	50	15½	2260	Copenhagen	1872 1902	1875	147,000	8–4	1½	..	7	8 comp.	..	4 *10-in.* (A.) M.L.R., 4 *3·4-in.* (K.), 7 M.	..	12·4	180	236
c.d.s.,t.	Olfert Fischer	3415	271	59	18¾	4200	Copenhagen	1903	1905	..	8–4 K.S.	..	7 K.S.	..	6 K.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
c.d.s.,t.	Peder Skram							Bldg.	..												
c.d.s.,t.	Skjold . .	2115	226½	38	13½	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4½	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *1·8-in.*, 1 M.	4	13·0	280	210
T. S.	Tordenskjold .	2362	221½	43¼	15½	2600	Copenhagen	1880	1883	138,900	..	4–2	..	..	8 comp.	..	1 *14-in.* (K.), 4 *4·7-in.*, 8 M.	4	14·0	170	220

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DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Fyen . . shd.	2555	226½	45½	18	2700	Copenhagen .	1882	1884	170,000	1½	..	18 *5·9-in.* (K.), 8 M. .	2	13·0	290	407
3rd cl. cr.	Geiser . . .	1260	257½	27½	11¼	3000 T.	Copenhagen .	1892	1893	..	1½	..	2 *4·7-in.*, 4 *3·4-in.*, 6 M. .	4	17·1 *t*	125	155
"	Heimdal . .	1260	257½	27½	11¼	3000 T.	Copenhagen .	1894	1896	..	1½	..	2 *4·7-in.*, 4 *3-pr.*, 6 M. .	4	17·5	125	155
"	Hekla . . .	1260	233	32¾	11¼	3000 T.	Copenhagen .	1890	1893	..	1½	..	2 *6-in.*, 4 *2·2-in.*, 6 M. .	4	17·0	125	155
cr.	Valkyrien . .	2854	268	43½	18	5300	Copenhagen .	1887 1896	1890	..	2½	..	2 *8·2-in.* (K.), 6 *5·9-in.*, 4 Q.F., 10 M.	5	17·0	450	300

Gunboats.—Five (*Lille Belt*, *Öresund*, *Store Belt*, *Grönsund*, *Guldborgsund*), of 150 to 240 tons, 200 to 400 I.H.P.
Esbern Snare (torpedo school-ship), 530 tons, 2-in. belt.
Hjaelperen (mining), 280 tons; *Sleipnir* (ice-breaker), 1260 tons, 3000 I.H.P. Training-brig *Örnen* (310 tons).
The *Beskytteren*, torpedo transport, 389 tons, 600 I.H.P., B. & W. boilers, 3 1·8-in. Q.F., launched 1900.

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FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	A 15* . .						Brest .														
t.	A 16 . .	18,000	475¾	84½	27¾	22000	Private Yard	Pro.	..	1,833,000	9¾ K.S.	..	..	..	10¼ K.S.	..	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*	2 (Sub.)	19·0	2000	681
t.	A 17 . .						Private Yard														
a.g.b.	Achéron . .	1693	181	40¼	11¾	1700	Cherbourg.	1885 1900	1887	100,000	9½–6 *comp.*	2½	..	..	8 *comp.*	..	1 *10·8-in.*, 3 *3·9-in.*, 2 *1·8-in.*, 4 M.	..	13·0	100	101
a.c.	Aube (Amiral) .	9856	458	66¼	24½	22,155 *t* B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 26 small Q.F. and M.	5 (2 sub.)	21·9 *t*	970 / 1590	615
b.	Baudin . .	10,884	321½	69¾	26¼	8320	Brest .	1883 1899	1885	600,000	14–10	4	..	..	16½	4½	2 *14·5-in.*, 4 *6·4-in.*, 8 *5·5-in.*, and 17 *1·8-in.*	4	15·0	800	630
t.	Bouvet . .	12,007	401¼	70¼	27½	14,000 B.	Lorient .	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 19 small Q.F. and M.	4 (2 sub.)	18·2 *t*	621	621
t.	Bouvines .	6691	293¾	58¼	23¼	8400 A'D.	La Seyne .	1892	1894	594,640	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 10 *1·4-in.* M.	2	16·05 *t*	300	323
t.	Brennus . .	11,190	361	67	26¼	14,000 B.	Lorient .	1891	1895	991,767	15¾ *comp.*	4	4¾ *comp.*	..	17¾ *comp.*	4¾ *comp.*	3 *13·4-in.*, 10 *6·4-in.*, 26 small Q.F. and M.	4	17·1 *t*	800	696
a.c.	Bruix . .	4735	365¼	46	19¾	9049 B.	Rochefort .	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 4 *1·4-in.*, M.	4	18·3 *t*	406	391
t.	Caïman . .	7050	278¼	59	24½	6000	Toulon .	1885 1892	1887	..	19½	3	..	..	10 H.S.	..	2 *10·8-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*, 2 M.,	4	14·5 *t*	400 / 800	332
t.	Carnot . .	11,954	382¼	70½	27¼	16,300 *t* D'A.	Toulon .	1894	1896	1,070,088	17¾–9 *comp.*	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 16 *1·8-in.*, 10 *1·4-in.*	4 (2 sub.)	17·86 *t*	705	625
a.c.	Chanzy . .	4736	348	46	19¼	8300 B.	Bordeaux .	1894	1896	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 6 *1·8-in.*, 6 *1·4-in.*, M.	4	18·0	413	375

* Three others are to be put in hand in 1906—A 15 *bis*, A 16 *bis*, A 17 *bis*.

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	**Charlemagne** .	11,108	385½	66½	27½	14,500 B.	Brest .	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	4 (2 sub.)	18·1 *t*	680 / 1100	631
t.	**Charles Martel** .	11,693	392½	71	27½	14,996 *t* D'A.	Brest .	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 14 *1·8-in.*, 5 *1.4-in.*	6 (2 sub.)	18·1 *t*	677	632
a.c.	**Charner** . .	4702	348	46	19½	8300 B.	Rochefort .	1893	1895	353,200	3⅝–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *6·5-in.*, 14 small Q.F. and M.	4	18·2 *t*	413	375
a.c.	**Condé** . .	9856	453	63¾	24½	22,175 Nic.	Lorient .	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	5 (2 sub.)	21·4 *t*	970 / 1590	615
c.b.&b.	**Courbet** . .	10,196	312	67	25	8100	Toulon .	1881 1899	1884	800,000	15–9	2½	..	12	9½	4½ shield.	4 *13·3-in.*, 3 *9·4-in.*, 11 *5·5 in.*, 6 *1·8-in.*, 18 M.	5	15·4 *t*	1000	669
t.	**Démocratie** .	14,635	438¾	79½	27½	18,000	Brest .	1904	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	793
a.c.	**Desaix** . shd.	7578	426½	58¼	24¼	17,715 *t* B.	St. Nazaire	1901	1903	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·7 *t*	880 / 1200	531
c.b.&b.	**Dévastation** .	10,095	312	67	25	8320 B.	Lorient .	1879 1901	1882	..	15–9	2½	..	12	9½	4½	4 *10·8-in.*, 2 *9·4-in.*, 14 *3·9-in.*, 24 smaller Q.F., 14 M.	4	15·17 *t*	950	685
a.c.	**DupetitThouars**	9367	452¾	63¾	24½	22,000 *t* B.	Toulon .	1901	1905	831,839	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	(2 sub.)	22·5 *t*	† 1020 / 1600	610
a.c.	**Dupleix** . shd.	7578	426½	58¼	24¼	17,100 B.	Rochefort .	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·0	880 / 1200	531

† Including liquid fuel.

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a.c.	**Dupuy de Lôme**	6676	374	51½	26¾	14,000 N.S.	Brest .	1890	1893	416,000	4	2	4	..	4	4	2 *7·6-in.*, 6 *6·4-in.*, 12 *2·5-in.* and *1·8-in.*, 8 M.	4	20·0	900	515
a.c.	**Edgard Quinet**	13,780	515	70¼	27½	36,000 Guyot	Brest .	Bldg.	..	1,229,000	6½–3½	2¼	5-2	..	8	5½	14 *7·6-in.*, 12 *2·4-in.*, 10 smaller.	2 (sub.)	23·0	1242 / 2300	738
a.c.	**Ernest Renan** .	13,427	515	70½	26¾	36,000	St. Nazaire	1906	..	..	6¾–4 H.S.	2	5-3 H.S.	..	8 H.S.	5 H.S.	4 *7·6-in.*, 12 *6·4-in.* 21 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	23·0	1354 / 2300	674
b.	**Formidable** .	10,878	321½	69½	26¼	9700	Lorient .	1885 1899	1888	467,520	14–10	3	..	..	16½	4½	2 *14·5-in.*, 4 *6·4-in.*, 8 *5·5-in.*, 17 *1·8-in.*	6	16·0	900	640
c.d.s., b.	**Furieux** . .	5925	248	59	21¾	5033 B.	Cherbourg	1883 1904	1885	264,640	20–13 *comp.*	3½	..	..	9 K.S.	..	2 *9·4-in.*, 4 *3·9-in.*, 4 *2·5-in.*, 8 *1·8-in.*	2	14·3 *t*	290	248
a.g.b.	**Fusée** . shd.	1124	165	32½	10¼	1500	Lorient .	1884	1886	68,000	10–7 *comp.*	2	..	..	4 *comp.*	..	1 *9·4-in.*, 1 *3·5-in.*, 4 M. .	1	13·0	120	84
t.	**Gaulois** . .	11,105	385½	66½	27½	14,500 B.	Brest .	1896	1898	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	4 (2 sub.)	18·0	680 / 1100	632
a.c.	**Gloire** . .	9856	453	63¾	24½	20,500 Nic.	Lorient .	1900	1904	883,269	6–4 H.S.	2	5-2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	5 (2 sub.)	21·0	970 / 1590	615
a.c.	**Gueydon** . . (Amiral)	9367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	6–3¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 / 1600	610
t.	**Henri IV.** .	8807	354½	72	23	11,500 Nic.	Cherbourg .	1899	1903	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 *10·8-in.*, 7 *5·5-in.*, 12 *1·8-in.*, 2 M.	2 (sub.)	17·2 *t*	735 / 1100	464
t. & b.	**Hoche** . .	10,581	333	65½	27¼	11,300 B.	Lorient .	1886 1900	1889	700,000	18–14 *comp.*	3	3	..	16 *comp.*	..	2 *13·4-in.*, 2 *10·8-in.*, 12 *5·5-in.*, 4 *2·5-in.*, 9 *1·8-in.*, 12 *1·4-in.*, 8 M.	5	16·0	800	660
t.	**Iéna** . . .	11,861	400¾	68¼	27½	16,500 *t* B.	Brest .	1898	1901	1,111,340	13¾-6 H.S.	2½	5-4 H.S.	..	..	4 H.S.	4 *12-in.*, 8 *6·4-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 5 *1·4-in.*, 13 *1·4-in.* M.	4 (2 sub.)	18·2 *t*	820 / 1100	631
t.	**Indomptable** .	7105	279¾	59	23½	6605 Nic.	Lorient .	1883 1902	1886	..	19½ *comp.*	3	..	..	10 H.S.	..	2 *10·8-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*, 2 M.	4	14·8 *t*	400 / 800	332
t.	**Jauréguiberry** .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne .	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 *1·4-in.*, 8 M.	6 (2 sub.)	18·07 *t*	700	625
a.c.	**Jeanne d'Arc** .	11,092	477¼	63¾	26½	28,000 Guyot	Toulon .	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*, 2 M.	2 (sub.)	21·7 *t*	1400 / 2000	626
c.d.s., t.	**Jemmapes** .	6474	284	57¾	22	9250 D'A.	St. Nazaire	1892	1894	525,000	17¾–10	4–2¾	..	..	17¾	..	2 *13·4-in.*, 4 *3·9-in.*, 4 *1·8-in.*, 10 *1·4-in.*, M.	2	16·7 *t*	300	334
a.c.	**Jules Ferry** .	12,351	480½	70¼	27	29,200 Guyot	Cherbourg	1903	1905	1,169,940	6¾–4 H.S.	2	5-3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	23·0 *t*	1320 / 2100	728

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Jules Michelet.	12,370	480½	70¼	27	29,000 Guyot	Lorient .	1905	..	1,183,800	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 24 *1·8-in.*, 2 *1·4-in.*	5 (sub.)	23·0	1320 / 2100	724
t.	Justice .	14,635	438¾	79½	27½	18,000 Nic.	La Seyne .	1904	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	793
a.c.	Kléber . shd.	7578	426½	58¼	24¼	18,000 Nic.	Bordeaux .	1902	1903	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·2	880 / 1200	531
a.c.	Latouche - Tréville	4681	348	46	19¼	8300 B.	Havre .	1892	1893	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 *1·4-in.*, M.	4	18·2 *t*	406	375
a.c.	Léon Gambetta	12,351	480½	70¼	27	27,500 Nic.	Brest .	1901	1904	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	22·0	1320 / 2100	728
t.	Liberté .	14,635	434¾	79½	27½	18,000 B.	St. Nazaire	1905	..	1,421,708	11 H.S.	..	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	793
b.	Magenta .	10,680	330	65½	27¼	12,000	Toulon .	1890 1901	1893	760,960	18–12	3	..	..	16	2 screen.	4 *13·4-in.*, 14 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 M.	3	16·25 *t*	800	660
b.	Marceau .	10,558	330	65½	27¼	14,000 Nic.	La Seyne .	1887 1901	1890	769,080	18	3	..	..	16	2 screen.	4 *13·4-in.*, 17 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 M.	6	16·4 *t*	800	660
a.c.	Marseillaise .	9856	453	63¾	24½	20,500 B.	Brest .	1900	1903	881,270	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	5 (2 sub.)	21·0	970 / 1590	615
t.	Masséna .	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15¼ 15¾ H. S.	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	6 (2 sub.)	17·1 *t*	630	642
a.g.b.	Mitraille . shd.	1110	165	32½	10½	1500	Rochefort	1886	1888	70,000	10–7 *comp.*	2	..	..	4 *comp.*	..	1 *9·4-in.*, 1 *3·5-in.*, 4 M.	..	13·0	120 †	84
a.c.	Montcalm. .	9367	452¾	63¾	24½	19,600 N.S.	La Seyne .	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 / 1600	612
b.	Neptune* .	10,810	330	65½	27¼	12,000 B.	Brest .	1887	1892	780,000	18	3	..	..	16	2 screen.	4 *13·4-in.*, 16 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 M.	5	16·02 *t*	800	660

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t.	Patrie .	. 14,635	438¾	79½	27½	18,000 Nic.	La Seyne .	1903	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	793
a.g.b.	Phlégéton .	. 1767	187	40¼	11¾	1700	Cherbourg	1890	1892	142,000	9–6 *comp.*	2	..	..	8 *comp.*	..	1 *10·8-in.*, 1 *5·5-in.*, 4 *1·8-in.*, 4 M.		12·4 *t*	72	101
a.c.	Pothuau .	. 5374	370½	50¼	21	10,398 B.	Havre .	1895	1896	384,000	3⅛–2	3⅜	2½	..	9½	5½	2 *7·6-in.*, 10 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*	2	19·2 *t*	538	461
t	République	. 14,635	438¾	79½	27½	18,000 N.	Brest .	1902	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	793
b.	Requin .	. 7078	279¾	59	24½	7000 Nic.	Bordeaux .	1885 1902	1888	..	19½ *comp.*	3	..	..	10 H.S	..	2 *10·8-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*, 12 M.	4	15·0	400 / 800	332
t.	Saint Louis	. 11,090	385½	66½	27½	14,500 B.	Lorient .	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	4 (2 sub.)	18·0	820 / 1150	631
a.g.b.	Styx . .	. 1767	187	40¼	11¾	1700	Cherbourg	1892	1893	142,000	9–6 *comp.*	2	..	..	8 *comp.*	..	1 *10·8-in.*, 1 *5·5-in.*, 4 *1·8-in.*, 4 M.	..	13·0	72	101
t.	Suffren .	. 12,527	411¾	70¼	27½	16,500 Nic.	Brest .	1899	1903	1,195,564	12–8 H.S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in.*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	4 (2 sub.)	18·0	1100 / 1820	615
b.	Terrible .	. 7206	279¾	59	24½	6230	Brest .	1881 1902	1884	..	19½ *comp.*	3	..	..	10 H.S.	..	2 *13·4-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	4	14·5 *t*	400 / 800	332
t.	Tréhouart	. 6671	293¼	58¼	23¼	8500 B.	Lorient .	1893	1896	593,100	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 4 *1·4-in.*, 8 M.	2	15·76 *t*	300	337
c.d.s., t.	Valmy .	. 6477	293¾	57¼	23¼	8954	St. Nazaire	1892	1895	578,957	17¾	4	..	..	17¾	..	2 *13·4-in.*, 4 *3·9-in.*, 4 *1·8-in.*, 10 M.	2	16·7 *t*	300	297
a.c.	Vauban .	. 6110	267¾	57	24	4560	Cherbourg	1882	1885	..	9 *comp.*	2	..	..	8 *comp.*	..	4 *9·4-in.*, 1 *7·6-in.*, 6 *5·5-in.*, 12 M.	2	14·32 *t*	550	440
t.	Vérité .	. 14,635	438¾	79½	27½	18,000 B.	Bordeaux .	1905	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905 / 1825	822
a.c.	Victor Hugo	. 12,351	480½	70¼	27	27,500 B.	Lorient .	1904	..	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	22·0	1320 / 2100	728
a.c.	Waldeck-Rousseau	. 13,780	515	70¼	27½	36,000 Guyot	Lorient .	Bldg.	..	..	6½–3½	2½	5	..	8	5½	14 *7·6-in.*, 14 *2·4-in.*, 10 smaller.	2 (sub.)	23·0	1242 / 2300	738

* Reconstruction deferred.—Boilers defective.

† Including liquid fuel.

The old battleships Duperré and Redoutable, the coast defence ships Fulminant, Tempête, Tonnerre, and Vengeur, and the armoured gunboat Cocyte have been removed from this List.

The armoured cruiser Sully (9856 tons) was wrecked in Along Bay, Tonkin.

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FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Alger**	4313	346	45¼	19½	8254 B.	Cherbourg	1889	1893	280,000	3½	..	4 *6·4-in.*, 6 *5·5-in.*, 10 smaller, 10 M.	5	19·61 *t*	860	325
to. g. b.	**Bombe**	413	196¾	21½	·5¾	2000 D'A.	Havre	1885	1886	..	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
to. g. b.	**Casabianca**	974	262½	26¾	11½	5200 D'A.	Bordeaux	1895	1896	98,985	½	..	1 *3·9-in.*, 3 *2·5-in.*, 5 *1·8-in.*, 4 *1·4-in.*	3	22·0	116	143
3rd cl. *cr.*	**Cassard**	3890	325½	45	20½	10,143 D'A.	Cherbourg	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
to. g. b.	**Cassini**	966	262½	27¼	11½	5500 D'A.	Bordeaux	1894	1894	98,500	½	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	2	21·2 *t*	110	118
3rd cl. *cr.*	**Catinat** shd.	4048	331¾	44½	21	9000 B.	Havre	1896	1897	324,992	3	2 shield	4 *6·4-in.*, 10 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.* M.	2	19·0	563	384
2nd cl. *cr.*	**Cécille**	5839	378¾	49¼	19¾	10,200	La Seyne	1888	1890	299,666	4	..	8 *6·4-in.*, 10 *5·5-in.*, 6 *1·8-in.*, 14 M.	4	19·0	940	486
3rd cl. *cr.*	**Chasseloup-Laubat**	3824	308½	43½	20¾	9000 D'A.	Cherbourg	1893	1894	256,320	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 12 *1·4-in.*, M.	2	19·25 *t*	587	358
2nd cl. *cr.*	**Châteaurenault** shd.	7898	442¾	55¾	24½	24,300 *t* N.S.	La Seyne	1898	1902	606,656	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	24·19 *t*	1400 / 2100	625
to. cr.	**Condor**	1229	216½	29¼	15¼	3800	Rochefort	1885 1896	1886	80,000	1½	..	5 *3·9-in.*, 8 *1·8-in.*, 6 M.	5	17·7 *t*	160	134
3rd cl. *cr.*	**Cosmao**	1923	312	30½	14	6000	Bordeaux	1888	1890	133,000	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·5 *t*	200	190
to. g. b.	**Couleuvrine**	369	196¾	21½	6	2047	Havre	1885	1886	33,778	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63

to. g. b.	**Dagué**	402	196¾	21½	6	2000	Havre	1885	1886	36,119	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	**D'Assas**	3962	325½	45	20½	9500 D'A.	St. Nazaire	1896	1898	292,682	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 11 *1·4-in.*	2	19·25 *t*	630	393
3rd cl. *cr.*	**Davout**	3031	295¼	40	17½	9000 Nic.	Toulon	1890	1902	221,827	3	..	6 *6·4-in.*, 4 *3·9-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 M.	4	20·07 *t*	600	336
g. v.	**Décidée**	635	184¾	26¼	12¼	1000 Nic.	Lorient	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
2nd cl. *cr.*	**D'Entrecasteaux** shd.	7995	383½	58½	25¾	13,500	La Seyne	1896	1898	667,740	4	10–3 H.S.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	6	19·2 *t*	650	521
3rd cl. *cr.*	**Descartes** shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·7-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
3rd cl. *cr.*	**D'Estrées** shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort	1897	1900	208,200	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*	..	20·5 *t*	345/480	234
to. g. b.	**D'Iberville**	952	262½	27	11¼	5060 D'A.	St. Nazaire	1893	1894	99,120	½	..	1 *3·9-in.*, 1 *2·5-in.*, 4 *1·4-in.*	6	21·4 *t*	117	118
to. g. b.	**Dragonne**	403	196¾	21½	6	2000	Havre	1885	1886	36,074	..	..	4 *5·5-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	**Du Chayla** shd.	3890	325½	45	20½	10,009 D'A.	Cherbourg	1895	1897	315,835	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b.	**Dunois**	889	256	27¾	12¾	7000 N.S.	Cherbourg	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.*	..	23·0	137	128
to. cr.	**Epervier**	1268	216½	29¼	15½	3200	Rochefort	1885	1887	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	17·6 *t*	160	134
to. cr.	**Faucon**	1311	216½	29¼	15½	3200	Toulon	1887	1888	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	18·0	150	134
to. g. b.	**Flèche**	418	196¾	21½	6	200	Havre	1885	1886	37,517	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	**Fleurus**	1289	229¾	29¼	15¼	4000 Nic.	Cherbourg	1893	1898	128,530	..	..	5 *3·9-in.*, 6 *1·8-in.*, 4 M.	4	17·6 *t*	118	179
3rd cl. *cr.*	**Forbin**	1935	312	30½	16	5700	Rochefort	1888	1890	123,739	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·6	200	190
T.D.S.	**Foudre**	5984	370½	52½	23½	11,900 *t* D'A.	Bordeaux	1895	1897	407,712	3½	..	8 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	4	19·9 *t*	840	410
3rd cl. *cr.*	**Friant**	3882	308½	43½	20¾	9000 Nic.	Brest	1893	1894	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358

FRANCE.—Cruising Ships, &c.—*continued.*

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Galilée . . .	2318	330¼	34½	17¾	6600 B.	Rochefort .	1896	1897	208,152	1½	2 sh eld	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 8 *1·4-in.*	2	20·0	226	248
2nd cl. *cr.*	Guichen . . shd.	8151	436¼	54¾	24½	24,000 D'A.	St. Nazaire .	1897	1902	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	23·0	1460	625
3rd cl. *cr.*	Infernet . . shd.	2435	311¾	39¼	15½	8500 Nor.	Bordeaux .	1899	1900	193,000	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*	2	20·5	345/450	234
3rd cl. *cr.*	Isly	4406	346	43½	19½	8100	Brest . .	1891	1892	252,760	3	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	5	18·3	880	332
2nd cl. *cr.*	Jurien de la Gravière shd.	5595	440	48¾	22	17,000 Guyot	Lorient . .	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.* . .	2	22·9 *t*	600/900	511
3rd cl. *cr.*	Jean Bart . .	4044	346	43½	19½	10,000 Nic.	Rochefort .	1889	1891	283,240	4	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	5	19·0	940	332
g. v. .	Kersaint . . shd.	1223	226	34½	15	2200	Rochefort .	1897	1898	107,933	..	..	1 *5·5-in.*, 5 *3·9-in.*, 7 *1·4-in.*	..	15·0	199	110
to. g. b.	La Hire . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1898	1899	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
3rd cl. *cr.*	Lalande . . .	1968	311½	31¼	14	6000	Bordeaux .	1888	1900	133,800	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	22·0	200	190
to. g. b.	Lance . . .	395	196¾	21½	5¾	2000 Du T.	Havre . .	1886	1887	39,964	..	..	4 *1·8-in.*, 3 M. . .	2	18·0	100	63
3rd cl. *cr.*	Lavoisier . .	2285	330¼	34½	17¾	6400 B.	Rochefort .	1897	1899	202,024	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 4 M.	2	20·0	226	248

to. g. b.	**Léger** . . .	509	197	23	10½	2360 B.	Lorient . .	1891	1892	52,000	..	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	3	18·8 *t*	130	69
to. g. b.	**Lévrier** . . .	497	197	23	10½	2240 B.	Lorient . .	1891	1892	52,000	..	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	3	18·5 *t*	130	69
3rd cl. *cr.*	**Linois** . . .	2308	321½	34½	17½	6600	La Seyne .	1894	1895	163,014	1½	3·9 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*, 4 M.	4	20·5 *t*	200	248
3rd cl. *cr.*	**Pascal** . . .	3951	326	42¼	21½	9000 *t* B.	Toulon . .	1895	1897	322,321	1½	..	4 *6·4-in.*, 10 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*, M.	2	20·0 *t*	650	378
3rd cl. *cr.*	**Protet** . . shd.	4001	331¾	44¾	21	9300	Bordeaux .	1898	1900	324,992	2½	2 shield	4 *6·4-in.*, 10 *3·9-in.*, 10 *1·8-in.*, 2 *1·4-in.*	2	20·2 *t*	563	384
to. g. b..	**Sainte Barbe** . .	430	196¾	21½	6	2000	Rouen . .	1885	1886	43,233	1½	..	4 *1·8-in.*, 3 M. . .	2	18·0	100	63
to. g. b..	**Salve** . . .	406	196¾	21½	6	2000	Rouen . .	1886	1887	42,538	1½	..	4 *1·8-in.*, 3 M. . .	2	18·0	100	63
3rd cl. *cr.*	**Surcouf** . . .	2012	312	30½	14	6000	Cherbourg .	1888	1900	131,200	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·5 *t*	200	190
g. v. .	**Surprise** . . .	617	184¾	24½	12¾	853 *t*	Havre . .	1895	1896	50,954	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·4 *t*	73	99
3rd cl. *cr.*	**Troude** . . .	1994	311½	31¼	14	6000	Bordeaux .	1888	1900	33,383	1½	..	4 *5·5-in.*, 8 smaller, 4 M. .	5	20·9 *t*	200	190
to. g. b..	**Vautour** . . .	1266	216½	29¼	15½	3391	Toulon . .	1886	1888	87,733	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	17·3 *t*	150	134
to. g. b..	**Wattignies** . .	1272	230	29¼	15	4189	Rochefort .	1891	1892	111,000	..	..	5 *3·9-in.*, 6 *1·8-in.*, 7 *1·4-in.*, M.	4	18·61 *t*	160	180
g. v. .	**Zélée** . . .	554	185½	26	10½	1000 Nic.	Rochefort .	1899	1900	..	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	80	75

Gun vessel Fulton (899 tons); gunboats Comète, Lion, Vipère (468 to 497 tons). Shallow-draught gunboats Argus and Vigilante, launched at Chiswick 1900:—displacement, 122 tons; 13 knots. Transport despatch vessel Vaucluse, launched 1901.

Merchant Cruisers (Auxiliary to French Navy).

To what Company belonging.	Name.	Register Tonnage.	Length.	Beam.	Depth.	H.P. (nominal.)	Speed.	When built.
		Tons.	Feet.	Feet.	Feet.		Knots.	
Compagnie Générale Transatlantique	La Lorraine	11,869	563·1	60·0	35·9	2108	20	1900
	La Savoie	11,200	563·1	60·0	35·9	2108	20	1900
	L'Aquitaine	8810	500·0	57·3	34·0	1825	19	1890
	La Touraine	9047	520·2	56·0	34·6	1616	19	1890
	Duc de Bragance	2096	334·6	34·2	16·8	426	17½	1889
	Eugène Pereire	2078	334·6	35·1	23·9	437	17½	1888
	Général Chanzy	2299	341·2	35·7	15·5	478	17½	1891
	La Bretagne	7112	495·4	51·8	34·5	1149	17½	1886
	La Champagne	7087	493·4	51·8	34·5	1149	17½	1885
	La Gascogne	7395	495·4	52·2	34·8	1308	17½	1886
	Maréchal Bugeaud	2206	342·5	34·1	23·0	482	17½	1890
	Ville d'Alger	2211	342·7	36·1	23·0	208	17½	1890
	La Navarre	6648	471·0	50·5	36·4	983	17	1892
	La Normandie	6283	459·3	49·2	34·1	1147	16	1882
	Ville de Tunis	1966	317·3	34·6	16·8	444	15½	1884
	Moïse	1873	310·0	33·5	16·7	443	15	1880
	St. Augustin	1854	314·0	33·8	16·5	443	15	1880
	Versailles	4336	373·7	45·3	27·0	780	..	1882
	Ville de Madrid	1874	308·7	33·5	16·7	370	15	1880
	Ville de Naples	1879	311·6	34·1	16·7	506	15	1881
Messageries Maritimes	Armand Béhic	6635	486·6	50·1	36·8	821	17½	1892
	Australien	6570	482·3	49·2	34·1	818	17½	1889
	Polynésien	6569	482·3	49·2	34·1	818	17½	1890
	Ville de la Ciotat	6631	485·8	49·9	36·8	819	17½	1892
	Annam	6344	446·2	50·9	36·1	832	17½	1898
	Atlantique	6708	468·9	50·6	32·8	832	17½	1899
	Tonkin	6364	446·2	50·9	36·1	832	17½	1898
	Ernest Simons	4562	442·9	47·1	36·7	727	..	1893
	Indus	6357	446·2	50·8	36·1	417	..	1897
	Brésil	5876	463·9	46·4	32·5	743	16½	1889
	Chili	6375	462·6	47·6	36·7	719	..	1894
	Cordillère	6379	462·6	47·6	36·1	721	..	1895
	La Plata	5807	462·6	45·9	32·5	520	16½	1889

NOTE.—The armament for the larger ships is 7 5·5-in. and smaller quick-firers.

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GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c. d. s.	Aegir	4084	267	49¼	17¾	4800 T.	Kiel (Danzig)	1895 1903	1897	233,500	9½ H.S.	2	..	..	8¾ H.S.	..	3 9·4-in., 10 3·4-in., 6 M.	4 (1 sub.)	14·8 t	225 †	276
b.	Baden	7252	321½	60	15½	6200 Dürr.	Kiel	1880 1897	1884	444,886	16	2¾	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
a. g. b.	Basilisk	1901	154¼	36	10¼	759	Bremen	1878	1879	58,042	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	9·0	40	76
b.	Bayern	7252	321½	60	19½	6326 Dürr.	Kiel	1878 1896	1882	406,660	16	3	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
t.	Bayern (Ersatz)‡	18,000	..	..	..	..	..	Pro.	..	1,825,000	..	..	..	..	..	..	.. .. ..	..	19·5	..	..
c. d. s.	Beowulf	4049	267	49¼	17¾	4800 T.S.	Bremen	1890 1902	1893	175,000	9½	1¼	..	..	8	..	3 9·4-in., 10 3·4-in., 7 M.	4	15·0	580 †	297
b.	Brandenburg	9874	354¼	65	24½	9640	Stettin (Vulcan)	1891	1893	606,500‖	15¾ comp.	2½	..	..	11¾ comp.	1½	6 11-in., 8 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	3	16·5 t	680 800	552
t.	Braunschweig	12,997	398½	73½	24½	16,000 T. S. & C.	Germania	1902	1904	1,157,500	9–4 K. S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (sub.)	18·0	700 1600§	660
a. g. b.	Biene	1091	154¼	36	10¼	759	Bremen	1876	1877	62,853											
a. g. b.	Camäleon	1091	154¼	36	10¼	759	Bremen	1878	1880	57,564	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
a. g. b.	Crocodil	1091	154¼	36	10¼	759	Bremen	1879	1880	57,237											
a. c.	C.	11,500	449½	70¾	24½	26,000 T.S.	Bremen (Weser)	Bldg.	..	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 8·2-in., 6 6-in., 20 3·4-in., 14 smaller.	4	22·5	800§ 2000	650
t.	Deutschland	13,200	398½	72¾	24½	16,000 T.S. & C.	Germania	1904	..	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 22 3·4-in., 4 1·4-in., 4 M.	6 (sub.)	18·0 t	700 1800†	736
t.	Q.						Schichau	Bldg.	..	..											
t.	R.						Germania	Bldg.	..	..											
t.	E‡	15,000	..	..	..	..	..	Pro.	..	..	..	..	..	..	..	..	.. .. ..	..	..	..	..
t.	Elsass	12,997	398½	72¾	24½	16,812 W.T. & C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (5 sub.)	18·7	800 1600†	660
a. c.	Friedrich Karl	8858	393¼	65¼	24	18,500 Dürr.	Hamburg	1902	1904	875,000	4 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (3 sub.)	20·5 t	950 1500†	504

† Also liquid fuel. ‡ Estimates, 1906; particulars not disclosed. § And 200 tons "tar oil." ‖ Exclusive of armament.

ITALY.—Armoured Ships—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Marco Polo	4511	327	48¼	19½	10,543 *t*	Castellamare	1890	1895	344,400	4	1	4	4	4	..	6 5·9-*in.*, 10 4·7-*in.*, 2 2·9-*in.*, 9 2·2-*in.*, 4 1·4-*in.*, 2 M.	5 (1 sub.)	19·0	600	391
b.	Napoli	12,425	435½	73½	27¼	20,000 Nic.	Castellamare	1905	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-*in.*, 12 8-*in.*, 12 3-*in.*, 12 1·8-*in.*	4 (2 sub.)	22·0	1000 / 2000	..
	Regina Elena					20,000 B.	Spezia	1904	..												
a.c.	Pisa	9832	429¾	68¾	24¾	18,000	Castellamare	Pro.	..	..	8–3½	1½	7	7	7–6	..	4 10-*in.*, 8 8-*in.*, 16 3-*in.*, 8 1·8-*in.*	3 (2 sub.)	22·5	700 / 1500	..
b.	Regina Margherita	13,214	426½	78¼	27¼	20,664 Nic.	Spezia	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 12-*in.*, 4 8-*in.*, 12 6-*in.*, 16 3-*in.*, 8 1·8-*in.*, 4 M.	4 (sub.)	20·2 *t*	1000 / 2000	719
”	Re Umberto	13,673	400	76¾	28½	19,500	Castellamare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 67-*ton* (A.), 8 6-*in.*, 16 4·7-*in.*, 2 9-*in.*, 15 2·2-*in.*, 14 1·4-*in.*, 2 M.	5	19·0	1200	785
”	Roma	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1906	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-*in.*, 12 8-*in.*, 12 3-*in.*, 12 1·8-*in.*	4 (2 sub.)	22·0	1000 / 2000	..
”	Ruggiero di Lauria	10,997	328¼	65¼	27¼	10,600	Castellamare	1884	1887	777,560	18 *comp.*	3	18 *comp.*	14 *comp.*	18 *comp.*	..	4 105-*ton* (A.), 2 6-*in.*, 4 4·7-*in.*, 2 2·9-*in.*, 10 2·2-*in.*, 17 1·4-*in.*, 2 M.	5 (2 sub.)	17·0	910	509
a.c.	San Giorgio	9832	429¾	68¾	24¾	18,000	Castellamare	1905 Bldg.	..	..	8–3½ H.S.	1½	7 H.S.	7 H.S.	7–6 H.S.	7 H.S.	4 10-*in.*, 8 8-*in.*, 16 3-*in.*, 8 1·8-*in.*	3 (2 sub.)	22·5	700 / 1500	..
	San Marco																				
b.	Sardegna	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14½ *comp.*	..	4 67-*ton* (A.), 8 5·9-*in.*, 16 4·7-*in.*, 2 2·9-*in.*, 20 2·2-*in.*, 10 1·4-*in.*, 2 M.	5	20·1 *t*	1200	785
”	Sicilia	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 67-*ton* (A.), 8 5·9-*in.*, 16 4·7-*in.*, 2 2·9-*in.*, 20 2·2-*in.*, 10 1·4-*in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese	7294	344	59¾	23½	13,500 B.	Leghorn (Orlando)	1899	1900	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 10-*in.*, 2 8-*in.*, 14 6-in., 10 2·9-*in.*, 6 1·8-*in.*, 2 M.	4	20·0	650 / 1200	500
b.	Vittorio Emanuele III.	12,425	435½	73½	27¼	20,000 B.	Castellamare	1904	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-*in.*, 12 8-*in.*, 12 3-*in.*, 12 1·8-*in.*	4 (sub.)	22·0	1000 / 2000	..
a.c.	Vettor Pisani	6396	325	59	23	13,000	Castellamare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 6-*in.*, 6 4·7-*in.*, 2 2·9-*in.*, 10 2·2-*in.*, 10 1·4-*in.*, 2 M.	4	20·0	600	504

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a. g. b.	Mücke	1091	154¼	36	10¼	759	Bremen	1877	1878	60,960	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
a. g. b.	Natter	1091	154	36	10¼	759	Bremen	1880	1881	52,822											
c. d. s. b.	Odin	4084	267	49¼	17¾	4800 T. S.	Danzig	1894	1896	..	9½ n. s.	2	..	..	8¾ n. s.	..	3 9·4-in., 10 3·4-in., 6 M.	3 (1sub.)	15·0	225§	266
b.	Oldenburg	5140	246	59	19½	3900	Stettin	1884	1887	235,342	12 comp.	1	..	..	8 comp.	..	8 9·4-in., 2 3·4-in., 6 M.	4	13·5 t	475	356
t.	Pommern	13,200	398½	72¾	24½	16,000 T. S.	Stettin (Vulcan)	1905	..	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 22 3·4-in., 4 1·4-in., 4 M.	6 (5sub.)	18·0	700	736
t.	Preussen	12,997	389½	73¾	24¼	18,374 W.T.& C.	Stettin	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 11-in., 14 16·7-in., 12 3·4-in., 12 1·4-in. & 8 M.	6 (5sub.)	18·0 t	1800§ 800	660
a. c.	Prinz Adalbert	8858	393½	65½	24	18,500 Dürr.	Kiel	1901	1903	885,000	4 K.S.	1½	3 K.S.	3 K.S.	6 K.S.	4 K.S.	4 8 2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (3sub.)	20·0	1600§ 950	504
a. c.	Prinz Heinrich	8759	396	64½	25½	15,000 Durr.	Kiel	1900	1902	730,000	4 K.S.	2½	4 K.S.	..	6 K.S.	4 K.S.	2 9·4-in., 10 5·9-in., 10 3·4-in., 10 1·4-in., 4 M.	4 (3sub.)	20·0	1500§ 950	528
a. c.	Roon	9350	403¼	65½	24	19,000 Dürr.	Kiel	1903	1905	875,000	4–3 K.S.	2¾	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (sub)	21·0	750	50
b.	Sachsen	7252	321½	59	21	6000 Dürr.	Stettin	1877 1896	1878	422,178	15¾	3	10	..	15¾	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2sub.)	14·0	1800§ 700	376
t.	Sachsen (Ersatz)*	18,000	..	..	..	..	..	Pro.	..	1,825,000	..	..	..	..	..	..	..	..	19·0	..	..
a. c.	Scharnhorst	11,500	449½	70¾	24½	26,000 T. S.	Hamburg	1906	..	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 8·2-in., 6 6-in., 20 3·4-in., 14 smaller	4	22·5	800§	650
t.	Schwaben	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelmshaven	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	2000 700	715
c. d. s.	Siegfried	4049	267	49¼	17¾	4800 T. S.	Germania	1889	1890	175,000	9½	1½	..	..	7¾	..	3 9·4-in., 6 3·4-in., 6 M.	4	14·8 t	1450§ 225§	276
a. g. b.	Salamander	1091	154¼	36	10¼	759	Bremen	1880	1881	56,914											
a. g. b.	Skorpion	1091	154¼	36	10¼	759	Bremen	1877	1877	60,796	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
a. g. b.	Viper	1091	154¼	36	10¼	759	Bremen	1876	1877	61,463											
a. g. b.	Wespe	1091	154¼	36	10¼	759	Bremen	1876	1878	53,771											
b.	Weissenburg	9874	354¼	65	24¾	9000	Stettin (Vulcan)	1891	1893	659,475‡	15¾	2½	..	..	11¾	1½	6 11-in., 8 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	3 (sub.)	16·0	680	552
t.	Wettin	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Schichau	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	800 700 1450§	715
t.	Wittelsbach						Wilhelmshaven	1900	1902	1,071,250											
b.	Wörth	9874	354¼	65	24½	10,224 (t)	Kiel	1892	1894	595,250‡	15¾	2½	..	..	11¾	1½	6 11-in., 8 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	3 (sub.)	17·2	680	552
b.	Württemberg	7252	321½	60	19½	6000 T. S.	Stettin	1878 1898	1881	402,512	15¾	3	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2sub.)	14·0	800 700	376
a. c.	Yorck	9350	403¼	65½	24	19,183 Dürr.	Hamburg	1904	1905	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (sub.)	21·1 t	750 *	550
t.	Zähringen	11,643	393¾	68¼	24¾	15,000 C.&T.S.	Germania	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	19·0	1600† 650 1000§	715

* Estimates, 1906; particulars not disclosed. † Kaiser Wilhelm II. specially fitted as fleet flagship to receive the Emperor, with a staff of 64. ‡ Exclusive of armament. § Also liquid fuel.

GERMANY.—Cruising Ships.

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Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns	Torpedo Tubes.			
			tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. cr.	Amazone	shd.	2618	328	38½	16	8000 T.S.	Kiel (Germania)	1900	1901	247,000	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 l.	2 (sub.)	21·5 t	560	249
" "	Arcona	shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	21·0	700	249
" "	Ariadne	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	560	249
" "	Berlin.	shd.	3200	341	43¼	16½	11,000 T.S.	Danzig	1903	1904	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·2 t	800	..
" "	Blitz		1360	246	32¾	13½	2839	Kiel	1882	1883	66,935	..	..	6 3·4-in., 4 M.	3	16·0	180	135
" "	Blitz (Ersatz)		3350	..	..	..	13,200 T.S.	Kiel	Bldg.	..	..	.	..	10 4·1-in., 14 1·4-in.	2	23·5	400 850	295
" "	Bremen		3200	341	43¼	16½	10,000 T.S.	Bremen (Weser)	1903	1904	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·0	800	..
" "	Bussard		1555	256	30¼	18¼	2900	Danzig	1890	1890	..	3	..	8 4·1-in., 7 M.	2	16·5 t	300	165
to. g. b.	Comet		971	262½	31¼	13¾	5000	Stettin	1892	1896	..	2	..	4 3·4-in., 2 M.	3	21·0 t	120	115
3rd cl. cr.	Condor		1614	246	33½	15	2930	Hamburg	1892	1892	..	3	..	8 4·1-in., 7 M.	2	16·5 t	300	165
3rd cl. cr.	Cormoran		1614	246	33½	15	2930	Danzig	1892	1893	..	3	..	8 4·1-in., 7 M.	2	16·0	300	165
3rd cl. cr.	Danzig		3200	341	43¼	16½	10,000 T.S.	Danzig	1905	..	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
g.b.	Eber		977	206¾	30¼	10¾	1300 T.S.	Danzig	1903	..	91,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·0	240	121
3rd cl. cr.	Falke		1555	246	33½	15	2900	Kiel	1891	1902	..	3	..	8 4·1-in., 7 M.	2	15·5 t	300	165
3rd cl. cr.	Frauenlob	shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. cr.	Freya		5569	344½	57	20¾	10,000 Nic.	Danzig	1897	1898	..	4 N.S.	4 N.S.	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5 t	825	465

3rd cl. cr.	Gazelle	shd.	2603	328	38½	16⅔	6400 Nic.	Kiel (Germania)	1898	1898	225,000	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 l.	3 (1sub.)	18·0	560	210
2nd cl. cr.	Gefion		3705	344½	42¾	20¾	9000	Danzig (Schichau)	1893	1894	..	1¼	..	10 4·1-in., 6 2·1-in., 1 l., 8 M.	2	19·0	780	302
3rd „	Geier	shd.	1597	249¼	34¾	15½	2960	Wilhelmshaven	1894	1896	..	3	..	8 4·1-in., 7 M.	2	16·2 t	300	165
3rd cl. cr.	Greif		1971	318	32	14¾	5400	Kiel	1886	1887	..	..	..	2 3·4-in., 4 M.	..	19·0	350	170
g. v.	Habicht		848	174	29½	11½	600	Elbing	1879	1880	33,054	..	..	5 4·9-in., 5 M.	..	12·0	100	130
3rd cl. cr.	Hamburg	shd	3200	341	43¼	16¼	11,000 T.S.	Stettin (Vulcan)	1903	1904	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·28 t	800	249
2nd cl. cr.	Hansa	shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan)	1898	1899	..	4 N.S.	4 N.S.	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5	825	465
d.v.	Hela		2004	328	36	14¾	5860	Bremen	1895	1896	..	1¼	..	4 3·4-in., 6 1·9-in., 2 M.	3	20·0	500	178
2nd cl. cr.	Hertha		5569	344½	57	21¾	10,000 B.	Stettin (Vulcan)	1897	1898	..	4 N.S.	4	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5 t	825	465
g. b.	Iltis	shd.	881	203½	29¾	10¾	1300 T	Danzig (Schichau)	1898	1898	100,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	165	121
3rd cl. cr.	Irene †	shd.	4224	308	46	21	8000	Stettin	1887	1888	220,000	3	..	4 5·9-in., 8 4·1-in., 6 1·9-in., 1 l., 8 M.	3	19·8 t	540	365
to. g. b.	Jagd		1230	275½	31½	13¾	4000	Bremen	1888	1889	..	2	..	4 3·4-in., 2 M.	3	20·0	230	141
g. b.	Jaguar	shd.	900	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1899	90,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	165	121
2nd cl. cr.	Kaiserin Augusta*	shd.	5956	387	52½	23	14,000	Kiel (Germania)	1892	1896	..	3½	..	12 5·9-in., 8 3·4-in., 2 l., 8 M.	5	21·0	850	436
3rd cl. cr.	Königsberg		3200	341	43¼	16¼	11,000 T.S.	Kiel	1905	..	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·0	800	..
„ „	Leipzig		3200	341	43¼	16¼	11,000	Bremen (Weser)	1905	1906	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l	2 (sub.)	23·0	800	..
„ „	Lübeck		3200	341	43¼	16¼	10,000 T.S. tur.	Stettin (Vulcan)	1904	1906	254,500	2	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·5 t	800	..
g. b.	Luchs		962	206¾	30¼	10¾	1300 T.S.	Danzig	1899	1900	91,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	240	121
3rd cl. cr.	Medusa	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	560	249
„ „	München	shd.	3200	341	43¼	16¼	11,000 T.S.	Bremen (Weser)	1904	1905	254,500	..	..	10 4·1-in., 10 1·4-in., 4 M., 2 l.	2 (sub.)	23·4 t	800	..
„ „	Niobe	shd.	2603	328	38½	15	8000 T.S.	Bremen (Weser)	1899	1901	217,500	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 l.	2 (1sub.)	20·0	560	250
„ „	Nymphe	shd.	2618	328	38½	15	8000 T.S.	Kiel (Germania)	1899	1901	217,500							
„ „	O.		3350	..	..	..	13,200	Danzig	Bldg.	..	..	..	..	10 4·1-in., 14 1·4-in.	2	23·5	400 / 850	295

* Being partially reconstructed.

GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			kts.	tons.	
g. b.	Panther	962	206¾	30¼	10¾	1300 T.S.	Danzig	1901	1902	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 t	240	121
cr.	Pelikan (mining ship)	2215	259	38	14½	3000	Kiel	1890	1891	..	..	..	4 *3·4-in.*, 4 M.	..	15·4 t	370	183
3rd cl. *cr*	Pfeil	1360	246	32¾	13½	2700	Wilhelmshaven	1882	1883	73,605	..	..	4 *3·4-in.*, 4 M.	3	16·0	180	135
" "	Pfeil (Ersatz)*	3350	..	..	..	..	.. ..	Pro.	..	..	..	..	.. ..	..	23·5	..	..
" "	Comet (Ersatz)*																
" "	Prinzess Wilhelm shd.	4224	339½	46	21	8000	Gaarden	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *1·9-in.*, 1 l., 8 M.	3	18·7 t	540	365
g. v.	Schwalbe	1102	203	30½	12¼	1500	Wilhelmshaven	1887	1887	..	3	..	8 *4·1-in.*, 7 M.	..	13·5 t	264	117
3rd cl. *cr.*	Seeadler	1614	246	33½	15	2800	Hamburg	1892	1892	..	3	..	8 *4·1-in.*, 7 M.	2	16·0	300	165
g. v.	Sperber	1102	236	29¾	12½	1500	Wilhelmshaven	1888	1889	..	3	..	8 *4·1-in.*, 6 M.	..	13·5 t	264	117
3rd cl. *cr.*	Thetis. shd.	2618	344½	38½	16	8000 T.S.	Danzig	1900	1901	247,000	2	..	10 *4·1-in.*, 14 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·8 t	560	249
g. b.	Tiger	962	203½	29¾	10	1300 T.S.	Danzig	1899	1900	..	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 t	240	121
3rd cl. *cr.*	Undine shd.	2657	328	38½	15	8000 T.S.	Kiel (Howaldt)	1902	..	254,500	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. *cr.*	Victoria Luise	5569	344½	57	21¾	10,000 Dürr.	Bremen	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 t	825	465
" "	Vineta shd.	5791	345½	57¾	21¾	10,000 Dürr.	Danzig	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 t	825	465
3rd cl. *cr.*	Wacht (Ersatz)	3350	..	..	..	13,200 T.S.	Stettin (Vulcan)	Bldg.	..	..	..	..	10 *4·1-in.*, 14 *1·4-in.*	2	23·5	400 / 850	295

* Estimates, 1906.

The Imperial Yacht Hohenzollern. 4187 tons, 9460 I.H.P., 22 knots, carries 8 1·9-in. Q.F., but provision is made for mounting 3 4·1-in., 12 1·9-in. Q.F. and 4 M. River gunboats for China, the Tsingtau, Vaterland and Vorwärtz (168 tons). The mining vessels A and B are in hand.

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Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
North German Lloyd	Kronprinz Wilhelm	14,800	640	0	66	0	26	3	30,000	23	1901	The armament is of 6-in. and smaller quick-firers.
	Kaiser Wilhelm der Grosse	14,349	625	0	66	0	27	0	28,000	23	1897	
	Kaiser Wilhelm II.	19,500	678	0	72	0	..		44,000	24	1902	
	Aller	5217	436	6	48	0	..		1300(*a*)	16	1885	
	Trave	5262	436	6	48	0	..		1300(*a*)	16	1886	

(*a*) Nominal horse-power.

GREECE.—Armoured Ships.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Hydra**	4808	334½	51¾	23¼	7000	St. Nazaire La Seyne	1889 1900	1891	..	11¾-4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
"	**Psara**	4808	334½	51¾	23¼	7000	Havre La Seyne	1890 1897	1892	..	11¾-4	2½	3	..	13½	..					
"	**Spetsai**	4808	334½	51¾	23¼	7000	Havre La Seyne	1889 1900	1891	..	11¾-4	2½	3	..	13½	..					

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
g.v.	**Acheloos**	420	130	24½	11½	400	Blackwall	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
"	**Alphios**	420	130	24½	11½	400	Blackwall	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
"	**Eurotas**	420	130	24½	11½	400	Dumbarton	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
corv.	**Sfaktirea**	1000	216½	29¼	18	2400	England	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M.	..	14·5	100	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 2 Whitehead torpedo-launching guns on broadside, 2 under-water torpedo tubes ahead; 14 knots speed. Gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885; 4 gunboats, A. β. Γ. Δ. (52 tons, 1 4·7-in. Krupp), launched 1881; and 3 mining vessels (300 tons), launched 1881.

ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	ins	ins.	ins.	ins.	ins.			knots.	tons.	
a.c.	**Amalfi** . . .	9832	429¾	68¾	24¾	18,000	Castellamare	Pro.		880,000	8–3½	1¾	7	7	7–6	..	4 *10-in.*, 8 *8-in.*, 16 *3-in.*, 8 *1·8in.*	3 (2sub.)	22·5	700 1500	
„	**Ammiraglio di St. Bon**	9645	344½	69¼	24¾	13,500	Venice . .	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	548
b.	**Andrea Doria** . .	11,027	328¼	65¼	27¼	10,500	Spezia . .	1885	1889	765,500	18 *comp.*	3	18 *comp.*	14 *comp.*	18 *comp.*	..	4 *105-ton* (A.), 2 *6-in.*, 4 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 17 *1·4-in.*, 2 M.	5 (2sub.)	16·[illegible] *t*	850	526
„	**Benedetto Brin** . .	13,214	426½	78¼	27¼	20,400 B.	Castellamare .	1901	1904	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5 *t*	1000 2000	719
	C (Mining Blockade Ship)*	6000	410	54¼	17	..	Venice . .	Bldg.	..	..	6	..	..	..	..	4¾	4 *8-in.*, many *12-prs.*	..	25·0	1000	
a.c.	**Carlo Alberto** . .	6396	325	59	23	13,220 *t*	Spezia . .	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	19·2 *t*	1000	500
t.	**Dandolo** † . . .	12,071	341	64¾	26½	8045	Spezia . .	1878 1898	1881	872,640	21½	2	17	16	10 H.S.	2 screens	4 *10-in.* (A.), 7 *6-in.*, 5 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 14 *1·4-in.*, 2 M.	4	15·6 *t*	732	506
„	**Duilio** . . .	10,962	341	64¾	26½	7710	Castellamare .	1876	1880	850,400	21½	2	17	16	18	..	4 *100-ton* M.L.R. (A.), 3 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 22 *1·4-in.*, 2 M.	3	15·0	1000	487
„	**Emanuele Filiberto** .	9645	344½	69¼	24¾	,500	Castellamare .	1897	1902	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	536
b.	**Francesco Morosini** .	11,145	328¼	65¼	27¼	9560	Venice . .	1885	1889	770,680	18 *comp.*	3	18 *comp.*	14 *comp.*	18 *comp.*	..	4 *105-ton* (A.), 2 *6-in.*, 4 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 17 *1·4-in.*, 2 M.	5 (2sub.)	17·0	850	509
a.c.	**Francesco Ferruccio** **Giuseppe Garibaldi**	7294	344	59¾	23¼	13,500 Nic. 14,713 *t* Nic.	Venice . . Sestri-Ponente (Ansaldo)	1902 1899	1904 1901	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 1200	540
„ *b.*	**Italia**	15,407	400½	74	31¼	11,986 *t*	Castellamare .	1880	1884	1,167,680	16 funnel op'nings	3	..	..	19 *comp.*	..	4 *100-ton* (A.), 8 *6-in.*, 4 *4·7-in.*, 12 *2·2-in.*, 24 *1·4-in.*, 2 M.	4	18·0 *t*	1200	748
b.	**Lepanto** . . .	15,549	400½	74	31¼	15,800 *t*	Leghorn (Orlando)	1883	1887	1,150,880	16 funnel op'nings	3	..	..	19 *comp.*	..	4 *100-ton* (A.), 8 *6-in.*, 4 *4·7-in.*, 12 *2·2-in.*, 34 *1·4-in.*, 2 M.	4	18·38 *t*	1650	748

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ITALY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Marco Polo	4511	327	48¼	19½	10,543 *t*	Castellamare	1890	1895	344,400	4	1	4	4	4	..	6 *5·9-in.*, 10 *4·7-in.*, 2 *2·9-in.*, 9 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 (1sub.)	19·0	600	391
b.	Napoli	12,425	435½	73½	27¼	20,000 Nic.	Castellamare	1905	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	4 (2sub.)	22·0	1000 2000	..
	Regina Elena					20,000 B.	Spezia	1904	..												
a.c.	Pisa	9832	429¾	68¾	24¾	18,000	Castellamare	Pro.	..	..	8–3½	1¾	7	7	7–6	..	4 *10-in.*, 8 *8-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (2sub.)	22·5	700 1500	..
b.	Regina Margherita	13,214	426½	78¼	27¼	20,664 Nic.	Spezia	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.* 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	20·2 *t*	1000 2000	719
,,	Re Umberto	13,673	400	76¾	28½	19,500	Castellamare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	5	19·0	120·	785
,,	Roma	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1906	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	4 (2sub.)	22·0	1000 2000	..
,,	Ruggiero di Lauria	10,997	328¼	65¼	27¼	10,600	Castellamare	1884	1887	777,560	18 *comp.*	3	18 *comp.*	14 *comp.*	18 *comp.*	..	4 *105-ton* (A.), 2 *6-in.*, 4 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 17 *1·4-in.*, 2 M.	5 (2sub.)	17·0	910	509
a.c.	San Giorgio San Marco	9832	429¾	68¾	24¾	18,000	Castellamare	1905 Bldg.	..	..	8–3½ H.S.	1¾	7 H.S.	7 H.S.	7–6 H.S.	7 H.S.	4 *10-in.*, 8 *8-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (2sub.)	22·5	700 1500	..
b.	Sardegna	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14¼ *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
,,	Sicilia	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1900	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650 1200	500
b.	Vittorio Emanuele III.	12,425	435½	73½	27¼	20,000 B.	Castellamare	1904	..	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	4 (sub.)	22·0	1000 2000	..
a.c.	Vettor Pisani	6396	325	59	23	13,000	Castellamare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	20·0	600	504

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ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.*	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed.	Coal.	Comp'ement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr.	Agordat	1292	287½	30½	11	8000	Castellamare	1899	1900	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	22·0	160	158
d.v.	Archimede	772	230	26¼	10	1401	Venice	1887	1888	60,120	..	..	4 *4·7-in.*, 2 *2·2-in.*, 2 *1·4-in.*	2	16·0	210	109
to.g.b.	Aretusa	833	230	26¾	11¾	4420	Leghorn (Orlando)	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·7 *t*	120	111
3rd cl. cr.	Calabria	2428	249½	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	..	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	16·4 *t*	500	257
to.g.b.	Calatafimi	833	229½	27	10¼	4136	Castellamare	1893	1894	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·0	120	111
"	Caprera	833	230	27¼	10¼	4189	Leghorn (Orlando)	1894	1895	72,920	1	..	2 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*	5	21·0	120	111
to.cr.	Coatit	1292	287½	30½	11	8160	Castellamare	1899	1902	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	21·1 *t*	160	158
3rd cl. cr.	Cristoforo Colombo	2713	249	36	17½	2321	Venice	1892 Rebuilt	1893	157,240	..	..	6 *4·7-in.*, 2 *2·2-in.*, 4 *1·4-in.*	..	16·0	445	238
g.v.	Curtatone	1272	177¼	32¾	13½	1100	Venice	1887	1888	58,440	..	..	4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	12·0	197	131
g.b.	Cyclope	831	..	..	..	2298	Naples	1903	1903	..	..	..	..	..	15·0	..	..
3rd cl. cr.	Dogali	2055	250	37	14½	7600	Elswick	1887	1889	156,040	2	4½	6 *6-in.* (A.), 1 *2·9-in.*, 9 *2·2-in.*, 2 *1·4-in.*, 2 M.	4	19·66 *t*	480	257
"	Elba . shd.	2689	272½	40¾	16½	7471 *t*	Castellamare	1893	1895	200,000	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·9 *t*	500	272

* Shields.

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ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
2nd cl. *cr.*	Etna	3470	282½	42½	19	6169	Castellamare	1885	1887	226,720	1½	5	2 *9·8-in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·8	630	315
to.g.b.	Euridice	905	229½	27	10¼	4162	Castellamare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·8 *t*	120	111
3rd cl. *cr.*	Etruria	2245	262½	39½	16½	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·84 *t*	400	257
2nd cl. *cr.*	Fieramosca	3534	290	43½	19¼	7700	Leghorn (Orlando)	1888	1890	240,120	1½	5	2 *9·8-in.*, 6 *6-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·5 *t*	450	315
d.v.	Galilei	886	230	26½	8¼	1384	Venice	1887	1888	56,720	..	..	4 *4·7-in.*, 2 *2·2-in.*, 2 *1·4-in.*,	2	15·0	210	109
3rd cl. *cr.*	Giovanni Bausan	3277	275½	42½	18¼	6500	Elswick	1883	1885	179,120	1½	5	2 *9·8-in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 4 *2·2-in.*, 8 *1·4-in.*, 2 M.	3 (1sub.)	17·5 *t*	600	295
to.g.b.	Goito	843	230	25½	11¾	2620	Castellamare	1887	1888	70,680	1	..	4 *2·2-in.*, 5 *1·4-in.*	5	19·0	130	111
g.v.	Governolo	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	200	131
to.g.b.	Iride	931	229½	27	10¼	4242	Castellamare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·6 *t*	120	111
3rd cl. *cr.*	Liguria	2245	262½	39¼	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·6 *t*	430	257
" "	Lombardia	2351	262½	39½	16½	6843 *t*	Castellamare	1890	1892	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·0 *t*	430	257
to.g.b.	Minerva	833	246	27½	11¾	4800 W.T.	Sestri (Ansaldo)	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111

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to.g.b.	**Montebello**	801	230	25½	11¾	2776	Spezia	1888	1899	74,120	..	1	6 *2·2-in.*, 2 *1·4-in.*	4	18·0	100	111
„	**Partenope**	821	246	27½	11¾	4200	Castellamare	1890	1890	71,000	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	4	19·0	100	111
3rd cl. *cr.*	**Piemonte**	2597	300	38	15	12,000	Elswick	1888	1890	220,000	3	3	6 *6·6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 6 *1·4-in.*, 4 M.	3	21·0	560	325
„ „	**Puglia**	2498	269	41	16¾	7000	Taranto	1898	1900	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
d.v.	**Rapido**	1568	262½	30½	12½	1450	Leghorn (Orlando)	1876	1877	77,400	..	..	5 *2·2-in.*, 2 M.	1	13·4	300	135
to.g.b.	**Saetta**	395	187	19¾	6½	2400	Castellamare	1887	1888	38,880	..	..	2 *2·2-in.*, 4 *1·4-in.*	3	20·0	90	70
2nd cl. *cr.*	**Stromboli**	3836	282¼	42½	19	6298	Venice	1886	1888	220,080	5	1·5	2 *9·8-in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·0	600	315
to.g.b.	**Tripoli**	885	230	25¾	11¾	2543	Castellamare	1886	1887	72,080	..	1	7 *2·2-in.*	4	18·0	130	107
3rd cl. *cr.*	**Umbria**	2245	262½	39½	16½	7104 *t*	Leghorn (Orlando)	1891	1893	183,120	4½	2	4 *5·9-in.*, 6 *4·7-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 1 L., 2 M.	2	18·83 *t*	430	257
to.g.b.	**Urania**	833	230	27	11¼	4397	Sestri (Odero)	1891	1892	72,920	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·0	120	111
2nd cl. *cr.*	**Vesuvio**	3373	282¼	42½	19	6820	Leghorn (Orlando)	1886	1888	218,320	5	1·5	2 *9·8-in.*, 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·0	600	315
g.v.	**Volturno**	1155	177¼	32¾	14¼	1100	Venice	1887	1888	58,960	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	206	131

Subsidised auxiliary cruisers and despatch vessels.—Nord America, Vittoria, Duca de Galliera, and Duchessa di Genova (La Veloce S.S. Co.), Regina Margherita, Elettrico, Candia, Malta, Perseo and Orione (Navigazione Generale). The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. Two lagoon gunboats are in hand at private yards, and the coal and liquid fuel transports Bronte and Sterope (9490 tons) at Leghorn.

JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.*	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in	in.	in.	in.			knots.	tons.	
a.c.	Adzuma . .	9436	431½	59¼	24¾	17,000 B.	St. Nazaire .	1899	1901	..	7-3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 8-in., 12 6-in., 12 3-in., 8 1·8-in.	5 (4 sub.)	20·0	600 / 1275	482
b.	Aki . . .	19,000	..	..	..	..	..	Pro.	..	..	9-5 K. S.	..	..	..	..	..	4 12-in., 12 10-in., 12 4·7-in.	5 (4 sub.)	19·0	..	..
t.	Asahi . . .	15,200	400½	75½	27¼	15,000 B.	Clydebank .	1899	1900	..	9-4 H. S.	4-2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 12-in., 14 6-in., 20 12-pr., 8 3-pr., 4 2½-pr.	4 (sub.)	18	700 / 1549	750
a.c.	Asama . . .	9700	408	67	24½†	19,000 t	Elswick .	1898	1899	..	7-3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 8-in., 14 6-in. (A), 12 12-pr., 8 2½-pr.	5 (4 sub.)	22·1 t	600 / 1409	482
„	Aso (ex Bayan) .	7726	443	55¾	22	17,400 B. t.	La Seyne .	1900	1902	..	8-3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 8-in., 8 6-in., 20 2·9-in. 20 3-pr., 6 1-pr.	6 (2 sub.)	22 t	750 / 11,000	..
b.	Chin-Yen . .	7400	308½	59	20	6200	Stettin .	1882	1884	..	14	3	12	..	12	..	4 12-in. (K.), 4 6-in., 8 1., 8 M.	3	14	1000	250
a.c.	Chiyoda . .	2450	308	42½	14	5700 B.	Clydebank .	1889	1890	..	4½	1-2	..	..	..	..	10 4·7-in., 14 3-pr., 3 M.	3	17·5	420	300
b.	Fuji . . .	12,320	374	73	26½	14,000	Thames .	1896	1897	..	18-6 H. S.	4-2½	4 H.S.	..	14 H. S.	6 H.S.	4 12-in., 10 6-in., 20 3-pr., 4 4½-pr.	5 (4 sub.)	19·2 18·5 t	1100	600
„	Hizen (ex Retvizan)	12,700	374	72¼	25	16,000 N.	Philadelphia	1900	1902	..	9-4 K.S.	4	6-2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 12-in., 12 6-in., 20 3-pr., 6 1-pr.	..	18·0	800 / 2000	..
a.c.	Ibuki . . .	16,000	..	..	..	..	Kure .	Bldg.	..	..	7-5 K.S.	..	..	..	7 K.S.	..	4 12-in., 8 8-in., 14 4·7-in.	5 (4 sub.)	..	..	..
„	Idzumo .	9750	400	68½	24¼†	17,300 B. t.	Elswick	1899	1901	..	7-3½ H.N.S.	2½	5 H.N.S.	..	6 H. N.S.	6 H.N.S.	4 8-in., 14 6-in., 12 12-pr., 8 2½-pr.	4 (sub.)	22·0	600 / 1412	672
„	Iwate . .							1900	1901										21·7 t		
b.	Iki (ex Nicolai I) .	9672	326	67	23	8000 B.	St.Petersburg	1888	1892	..	14-6 comp.	2½	..	..	10 comp.	6 comp.	2 12-in., 4 9-in., 8 6-in., 12 Q.-F., 8 M., 4 1.	6	14·8 t	..	600
a.c.	Ikoma . .	16,000	..	..	..	..	Kure .	1906	..	..	7-5 K.S.	..	..	..	7 K.S.	..	4 12-in., 8 8-in., 14 4·7-in.	5 (4 sub.)	..	..	..
b.	Iwami (ex Orel) .	13,516	367½	76	26	16,000 B.	St.Petersburg (Galerny)	1902	1904	..	9-4 K.S.	2½-1½	6 K.S	9 K.S.	10 K.S.	6 K.S.	4 12-in., 12 6-in., 20 3-in., 20 3-pr., 6 1-pr.	4 (2 sub.)	18·0	800 / 2000	740

b.	Kashima . .	16,400	425	78⅛	26½	15,600 W. T.	Elswick .	1905	1906	..	9–4 K.S.	3–2	6	6	9 K.S	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	18½	750 / 2150	980
a.c.	Kasuga . .	7700	344	59¾	24¼	13,500	Sestri Ponente .	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20·0	600 / 1150	500
b.	Katori . . .	15,950	420	78	27†	16,000 Nic.	Barrow .	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	18½	750 / 1800	..
a.c.	Kurama . .	16,000	..	..	..	..	Yokosuka .	Bldg.	..	..	7–5 K. S.	..	..	..	7 K. S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*	5 (4 sub.)	..	..	..
.	Mikasa ‡ . .	15,200	400	76	27¼	16,431 B.	Barrow .	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	(4 sub.)	18·5	700 / 1520	935
"	Mishima (*ex* Seniavine)	4792	265	52½	17	5000	St.Petersburg	1894	1895	410,000	10	3	..	..	7–8	..	4 *9-in.*, 4 *6-in.*, 6 *1·8-in.*, 8 M.	4	16·0	400	318
a.c.	Nisshin . .	7700	344	59¾	24¼	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20·0	600 / 1150	500
b.	Okinoshima (*ex* Apraxine)	4126	277½	52½	17½	5757 *t.*	St.Petersburg (New Admiralty)	1896	1898	..	10 H. S.	3	..	..	7¾ K. S.	..	3 *10-in.*, 4 *6-in.*, 6 *1·8-in.*, 8 *1·4-in.*	4	15·0 *t*	215	318
"	Sagami (*ex* Peresviet)	12,674	401¼	71¾	26	14,500	St.Petersburg (Baltic)	1898	1901	..	9–7 H. S.	2¾	6 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *10-in.*, 11 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*	6	18·0	800 / 2056	732
"	Satsuma . .	19,000	..	..	..	..	Yokosuka .	Bldg.	..	..	9–5 K. S.	..	..	..	..	..	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*	5 (4 sub.)	18·0	..	..
"	Shikishima . .	14,850	400	75½	26½	16,355 B.	Thames .	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S	12 H. N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	5 (4 sub.)	18·3	700 / 1722	741
"	Suo (*ex* Pobieda) .	12,674	401¼	71½	26	14,500 B.	St.Petersburg (Baltic)	1900	1901	..	9½–4 H. S.	2¾	9 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *10-in.*, 11 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*, 2 l.	6	18·0	800 / 2056	732
"	Tango (*ex* Poltava)	10,960	367½	69	26	11,255 *t.*	St.Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H. S.	6	4 *12-in.*, 12 *6-in.*, 34 smaller	6	16·2 *t*	900	700
a.c.	Tokiwa . .	9700	408	67	24¼†	20,556 *t.*	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	23·0	600 / 1409	500
"	Tsukuba . .	16,000	..	..	..	..	Kure . .	1905	..	..	7–5 K. S.	..	..	..	7 K. S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*	5 (4 sub.)	..	..	..
"	Yakumo . .	9850	407¾	64¼	23¾	16,000 B.	Stettin .	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	500

* All Q.F. guns and 12-in. for new ships are Armstrong. † Mean draught. ‡ Sunk by explosion in magazine. Will probably be refloated.

JAPAN.—Cruising Ships, &c.

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	Akagi	615	164	27	10	700	Yokosuka	1889	1891	..	..	..	1 *8·2-in.*, 1 *5·9-in.*, 2 L., 2 M.	..	13·0	..	113
cr.	Akashi	2657	295¼	41¾	16½	8500	Yokosuka	1897	1898	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 10 *3-pr.*, 2 *2½-pr.*, 4 M.	2	20·0	200/544	..
„	Akitsushima	3150	302	42½	18½	8400	Yokosuka	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.*	4	19·0	..	330
t.g.b.	Chihaya	1250	273	31½	10	5500	Yokosuka	1900	1901	..	..	..	2 *4·7-in.*, 4 *12-pr.*	5	21·0	123/344	..
cr.	Chitose	4760	395	49	18	Nor. 15,500	San Francisco	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	4	22·5	350/1000	405
„	Hashidate	4277	295	50¾	21¼	5400	Yokosuka	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.* 11 *3-pr.*, 6 M.	4	17·0	400	350
„	Itsukushima	4277	295	50¾	21¼	5400	La Seyne	1891	1893	..							
g.v.	Iwaki	700	147	25	11	700	Yokosuka	1883	1884	..	..	..	1 *5·9-in.*, 2 *4·7-in.*	..	10·0	600	115
„	Idzumi	2800	270	40	18½	6500	Elswick	1878 1892	1879	..	3	2¼ shield	2 *6-in.*, 6 *4·7-in.*, 7 *6-pr.*, 2 M.	..	17·4 t	400	300
cr.	Kasagi	5416	374½	48¾	19	13,492	Philadelphia	1898	1899	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	4	22·7 t	350/1000	405
t.c.	Katsuraki	1476	206¾	36	15	1600	Yokosuka	1885	1887	..	..	..	2 *6-in.* (K.), 5 *4·7-in.*, 2 M.	2	13·0	..	242
„	Musashi																
t.g.b.	Makigumo (*ex* Posadnik)	400	192½	24½	7½	3600	Elbing	1892	1892	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	3	22·0	90	87
cr.	Matsushima	4277	295	50¾	21¼	5400	La Seyne	1890	1892	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·5 t	400	350
g.v.	Maya	615	154	27	10	700	Yokosuka	1886	1887	..	..	..	1 *8·2-in.*, 1 *4·7-in.*, 2 M.	..	13·0	60	113
cr.	Naniwa	3700	300	46	18½	7235	Elswick	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *6-in.*, 2 *3-pr.*, 10 M.	4	18·72 t	800	350
„	Niitaka	3365	235½	44	16½	10,000 Nic.	Yokosuka	1902	1905	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	..

cr.	**Otawa** . . .	3000	341	42½	17	10,000 Y.	Yokosuka .	1903	1904	..	..	..	2 *6-in.*, 6 *4·7-in.*, 4 *12-pr.* 2 M., 2 l.	..	21·0	600 875	..
t.g.b.	**Shikinami** . . . (*ex* Gaidamak)	400	192½	24¼	7½	3000	Abo, Finland .	1893	1894	..	..	..	2 *1·8-in.*, 7 *1·4-in.*, 10 M.	3	22·0	90	87
"	**Soya** . . . (*ex* Varyag)	6500	420	52	20¾	20,000 Nic.	Philadelphia .	1899	1900	..	3	..	12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	6 (2sub.)	23·0	770/1250	571
"	**Suma** . . .	2657	306¾	40	16¼	8500	Yokosuka .	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*.	2	20·0	200	..
"	**Takao** . . .	1774	230	33	13	2330	Yokosuka .	1888	1889	..	..	..	4 *6-in.*, 1 *4⅔-in.* do., 6 M. .		15·0	300	255
"	**Takachiho** . . .	3700	300	46	18½	7500	Elswick .	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *6-in.*, 2 *3-pr.*, 10 M.	4	18·7 *t*	800	365
"	**Tatsuta** . . .	875	240	27½	13	5500	Elswick .	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.* . . .	5	21·0	200	..
"	**Ten-riu** . . .	1500	200	32	16½	1250	Japan .	1882	1885	..	..	..	1 *6·6-in.* (K.), 6 *4·7-in.*, 2 l.	..	12·0	256	222
cr.	**Tone** . . .	4800	..	..	..	..	Sasebo .	Bldg.	..	..	..	..	. . . . .	..	..	..	..
"	**Tsugaru** . . . (*ex* Pallada)	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	6 *6-in.*, 20 *12-pr.*, 8 *1-pr.*	4	20·0	900/1400	422
"	**Tsukushi** . . .	1350	210	32	15	2887	Elswick .	1882	1893	..	..	..	2 *10-in.* (A.), 4 *4·7-in.*, 2 l., 4 M.	2	16·5 *t*	250	190
"	**Tsushima** . . .	3365	235½	44	16½	10,000 Nic.	Kure .	1902	..	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.* .	..	20·0	600	..
g.b.	**Uji** . . .	620	180	27¾	10	1000 B.	Kure .	1903	..	..	..	..	4 *12-pr.*, 3 M. . . .	..	13·0	100	..
cr.	**Yayeyama** . . .	1600	315	34½	15	6000 Nic.	Yokosuka .	1889	1890	..	..	..	3 *4·7-in.*, 6 M. . . .	2	20·0	..	200
"	**Yamato** . . .	1476	206¾	36	15	1600	Yokosuka .	1885	1886	..	..	..	2 *6·6-in.* (K.), 5 *4·7-in.*, 4 M.	2	13·0	..	242
d.v.	**Yodo** . . .	1200	..	..	..	..	Kobe .	Bldg.	..	..	..	..	. . . . .	..	23·0	..	..

The gunboats Chen-Pei, Chen Pien, Chen Nan, Chen Hsi, Chen Chung and Chen Tung (440 tons) were captured from the Chinese.
Some gunboats are being constructed at Yokosuka; also two river gunboats, the Sumida and Fushima.
Messrs. Thornycroft have built a river gunboat of 13·27 knots speed.
The Takasago, Miyako, Oshima, and Atago were sunk by mines or collision during the war.
Magazi, cruiser, 2300 tons, said to be building at Nagasaki.

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NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
c.d.s.t.	De Ruyter . .	5014	316¾	51½	21¾	6377 t.	Amsterdam .	1900	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-in., 4 5·9-in., 10 2·9-in., 4 1·4-in.	3 1 sub.	16·5 t	680	444
,,	Evertsen . . .	3464	282¾	47	16¾	4735	Flushing .	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-in., 2 5·9-in., 6 2·9-in., 8 1·4-in.	3	16·0	280	268
,,	Hertog Hendrik .	5014	316¾	51½	21¾	6000 Y.	Amsterdam .	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-in., 4 5·9-in., 10 2·9-in., 4 1·4-in., 2 l.	3	16·5	680	444
,,	Koningin Regentes	5014	316¾	51½	21¾	7290 Y.	Amsterdam .	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-in., 4 5·9-in., 6 2·9-in., 4 1·4-in., 2 l.	3 2 sub.	16·5	680	444
t. & b.	Koningin Wilhelmina der Nederlanden . shd.	4527	327½	48¾	20	4600	Amsterdam .	1892	1894	..	..	3	..		11	..	1 11-in., 1 8·2-in., 2 6·6 in., 2 6·6-in., 4 2·9-in., 4 1·4-in., 6 1·4-in., 2 M.	4	16·5	448	293
c.d.s.t.	Kortenaer . .	3464	282¾	47	16¾	4658	Amsterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-in., 2 5·9-in., 6 2·9-in., 8 1·4-in.	3	16·0	280	260
t. & b.	Marten Tromp .	5211	316¾	51½	21¾	6377 t	Amsterdam .	1904	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-in., 4 5·9-in., 10 2·9-in., 4 1·4-in.	3 2 sub.	16·5 t	680	444
,,	Piet-Hein . .	3464	282¾	47	16¾	4736 t	Rotterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-in., 2 5·9-in., 6 2·9-in., 8 1·4-in.	3	16·2 t	280	260
t. & b.	Reinier Claeszen .	2440	229½	44¼	15	350	Amsterdam .	1891	1892	..	4¾–2 comp.	3	..	..	11 comp.	6 comp. shield	1 8·2-in. (K.), 1 6·6-in., 1 2·9-in., 4 1·9-in., 3 1·4-in.	2	12·5 t	88	160
,,	No. 5 . . .	5211	316¾	51½	21¾	6000 Y	Amsterdam	Bldg.	..	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-in., 6 5·9-in., 6 2·9-in., 4 1·4-in., 2 l.	3 2 sub	16·0	680	441

Two coast defence vessels of 850 tons and three monitors of 680 tons, projected.

Coast defence monitors (launched 1868–78) Schorpioen, Stier, Matador, Draak, Luipaard, Wesp, Haai, Hyena, Panter, Bloedhond, Cerberus, Krokodil and Heiligerlee, 2200 tons to 1500 tons.

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NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.					£	Inches.	Inches.			knots.	tons.	
g. v.	Assahan (I)		787	179	30¾	11½	1353	Rotterdam	1900	1900	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	120	95
,,	Borneo (I)	shd.	787	179½	31	13¼	1040	Glasgow	1892	1893	..	..	..	6 4·1-in., 1 2·9-in., 2 1·4-in., 2 M.	..	13·0	124	106
,,	Ceram (I)	shd.	541	176	25½	10¼	800	Flushing	1887	1887	..	..	..	3 4·7-in. (K.), 1 2·9-in., 2 1·4-in.	..	12·5 t	70	82
,,	Edi (I)		787	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
,,	Flores (I)	shd.	541	176	25½	11¼	650	Amsterdam	1887	1888	..	..	..	3 4·7-in., 1 2·9-in., 2 1·4-in.	..	11·7	75	82
cr.	Friesland		3847	307	49	17¾	10,000 Y.	Rotterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 smaller.	4	19·8 t	400	333
,,	Gelderland		3969	310¾	49	17¾	10,000 Y.	Feijenoord	1898	1900	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
,,	Holland		3847	307	49	17¾	10,000 Y.	Amsterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·6 t	400	333
g. v.	Java (I)	shd.	1279	205¼	31¼	14	1050	Rotterdam	1885	1887	..	..	..	1 5·9-in., 3 4·7-in., 1 2·9-in., 2 1·4-in.	..	12·5 t	160	104
,,	Koetei (I)		778	179	30¾	11½	1412	Amsterdam	1898	1899	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	120	97
,,	Lombok (I)	shd.	591	176	27¼	11	990	Amsterdam	1891	1892	..	..	..	3 4·7-in., 1 2·9-in., 2 3-pr.	..	12·0	55	84
,,	Mataram (I)		797	179½	30¾	11¾	1100	Amsterdam	1896	1897	..	..	..	3 4·7-in., 2 3-in., 2 1·4-in.	..	13·0	113	95
,,	Nias (I)		797	179½	30¾	11¾	1227	Amsterdam (Huygens)	1895	1896	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	120	95

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NETHERLANDS.—Cruising Ships—*continued.*

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Noord-Brabant	3969	310¾	49	17¾	10,000 Y.	Flushing	1899	1901	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
cr.	Serdang (I)	797	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
g.v.	Siboga (I)	778	179	30¾	11½	1395	Amsterdam	1898	1899	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95
sl.	Sommelsdijk shd.	997	178½	31	14	700	Amsterdam	1881	1882	..	..	..	1 *5·9-in.*, 3 *4·7-in.* (K.), 1 *2·9-in.*	..	10·0	150	88
cr.	Sumatra (I)	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	..	1 *8·2-in.*, 1 *5·9-in.*, 2 *4·7-in.*, 1 *2·9-in.*, 4 *3-pr.*, 2 M.	..	17·0	225	183
g.v.	Sumbawa (I)	591	176	26½	11¼	930	Flushing	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·5 *t*	60	84
cr.	Utrecht	3969	310¾	49	17¾	10,000 Y.	Amsterdam	1898	1900	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
cr.	Van Speyk shd.	3669	302	41	23	2891	Amsterdam	1880	1881	..	..	..	6 *6·6-in.* *6-ton*, 8 *4·7-in.* (K.), 2 *2·9-in.*, 6 *3-pr.* 2 M.	..	14·0	360	280
cr.	Zeeland	3847	307	49	17¾	10,589 Y. *t*	Flushing	1897	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·4 *t*	400	333

Gun-vessels of the Indian Navy: Arend, Flamingo, Raaf, Reiger, Zeeduif, Zwaan, Pelikaan, Condor, Gier, Zeemeeuw, Zwaluw (400 tons), launched between 1880 and 1891; Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Favant, and Valk between 1894 and 1903; Argus and Cycloop (438 tons), 1893.

Sixteen Gunboats (*Staunch class*) of 268 tons; also *three small gunboats* of 210 tons, *one steel gunboat* of 108 tons, and the old frigate Koningin Emma der Nederlanden.

Bellona (920 tons), gunnery training ship.

NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Eidsvold . / Norge .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5	400 / 600	261
"	Harald Haarfagre . / Torkenskjold	3556	280	48½	16½	3700	Elswick	1896 / 1897	1898 / 1899	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *1½-pr.*	2 sub.	17·2	200 / 500	248

Also the old monitors Mjölner, Skorpionen, Thor and Thrudvang.

Cruising Ships.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Æger . .	387	108½	29½	8	450	Horten	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.* 2 *1·9-in.*	..	9·0	..	43
g.v.	Ellida . .	984	187	32¾	14¼	900	Horten	1880	1881	..	..	..	5 *5·9-in. 4-ton* (K.), 1 *4·7-in.*, 1 l., 2 M.	1	12·0	97	128
"	Frithjof . .	1349	216½	32¾	13¼	300	Horten	1896	1898	..	..	..	2 *4·7-in.*, 4 *2·9-in.* 4 *1·4-in.*, 2 l.	3 1 sub.	15·0	120	156
"	Heimdal . .	620	167¼	26¾	11¾	700	Christiania	1892	1893	..	..	..	4 *2·5-in.*	..	12·0	92	62
"	Sleipner . .	571	173¾	26	9½	800	Horten	1877	1878	..	..	..	1 *10·2-in. 22-ton* (K.), 1 *5·9-in. 4-ton* do., 1 M.	1	12·0	80	87
to.g.b.	Valkyrien. .	374	190	24½	9½	3300 †	Elbing.	1896	1897	..	..	..	2 *2·7-in.* 1 M.	2	23·2*t*	90	57
g.v.	Viking . .	1095	203½	30½	13	2000	Horten	1891	1892	..	1½	..	2 *5·9-in.* (A.), 4 *2·5-in.*, 4 *1·4-in.*, 2 M.	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 t., 450 I.H.P., armed with one large gun and machine guns in each.
Sixteen smaller Gunboats, of 60 tons, 70 I.H.P., and 7½ knots speed; each armed with one 5½-inch gun. Also several smaller gunboats.

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PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	**Vasco da Gama** .	2972	233	40	18¼	6000 W.T.	Blackwall . Leghorn	1876 1903	1878	132,000	9¾–4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·5 *t*	100	218

The Vasco da Gama has been reconstructed by Messrs. Orlando at Leghorn; she has been lengthened 23 ft., rearmed and reboilered.

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. . .	**Adamastor** .	1962	250	35	14	4000	Leghorn .	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
corv. . .	**Affonso de Albuquerque**	1111	203	33	13½	1360	Blackwall .	1884	1885	56,500	..	..	2 *6-in.* (A.), 5 *4·7-in.*, 2 *2·5-in.*, 2 M.	..	13·3 *t*	140	183
" . .	**Diu** . . .	717	147	27½	13	700	Lisbon . .	1889	1891	..	..	..	1 *5·9-in.* (K.), 2 *4·7-in.*, 1 *3-pr.*, 2 M.	..	12·0	80	114
cr. . .	**Dom Carlos I.** .	4100	360	46½	17½	12,500 Y.	Elswick .	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v. . .	**Dom Luiz I.** .	710	151	27¼	13¾	512	Lisbon . .	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M. .	..	9·9	100	..

PORTUGAL.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
g.v.	Liberal	580	140	25½	10½	580	Birkenhead	1884	1886	32,500	..	..	1 *6-in. 4-ton* (A.), 3 *4-in.*, 2 M.	..	11·0	90	109
„	Patria	620	196¾	27½	8½	1800	Lisbon	1903	..	..	..	..	4 *4-in.*, 6 *1·8-in.*	..	15·0	..	..
cr.	Rainha Amelia	1640	246	36	14¾	5000 Nor.	Lisbon	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	..	250
„	São Gabriel / São Rafael	1772	246	35½	14¼*	4000 N.S.	Havre	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200
w.g.b.	Tejo	522	229½	23	..	7000	Lisbon	1901	1902	..	..	..	1 *3-in.*, 6 *1·8-in.*	3	25·0	..	85
„	Zaire	580	140	25½	10½	580	Birkenhead	1884	1885	32,500	..	..	1 *6-in.* (A.), 3 *4-in.*, 2 M.	..	11·0	90	109
„	Zambeze	627	143	25¾	12	500	Lisbon	1886	1887	..	..	..	1 *6-in.* (A.), 2 *4-in.*, 2 M.	..	10·0	85	107

* Mean draught.

Eighteen small gunboats and about 29 light-draught steel river-gunboats. Two gunboats of 220 tons, the Al. Baptista de Andrade and Thomaz Andrea for Mozambique and Timor.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Admiral Makaroff .	7900	443	75¾	23	16,500 B.	La Seyne .	1906	..		6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	2 sub.	21·0	750 / 1020	500
b.	Alexander II . shd.	9244	326	67	23	8000	St. Petersburg.	1887	1890	..	14–6 *comp.*	2½	..	6 *comp.*	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 4 *6-pr.*, 4 *3-pr.*, 6 M.	5	16·5 *t*	1200	604
"	Andrei Pervozvannyi	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg. (Galerny)	1905	..	1,170,000	11–6 K.S.	2½	..	..	12 K.S.	7 K'S.	4 *12-in.*, 12 *8-in.*, 20 *12-pr.*, 20 *3-pr.*, 6 *1-pr.*, 8 M. 2 l.	4 2 sub.	18·0	1500	..
a.c.	Bayan . . .	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	Pro.	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	2 sub.	21·0	750 / 1020	500
b.	Catherine II., B.S. .	10,180	331	69	26½	10,600 B.	Nicolaieff .	1886	1889	900,000	18–10 *comp.*	3	14 *comp.*	..	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 *6-pr.*, 6 M.	7	15·5 *t*	886	325
"	Cesarevitch . .	12,912	388¾	76¼	26	16,300 B.	La Seyne .	1901	1902	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *1·8-in.*, 6 *1·4-in.* 4 M., 2 l.	6 2 sub.	19·6 *t*	900 / 1350	732
t.	Dvenadzat Apostoloff (Twelve Apostles), B.S.	8433	330	60	25½	11,500	Nicolaieff .	1890	1892	..	14–6 *comp.*	2½	10 *comp.*	12 *comp.*	12 *comp.*	5 *comp.*	4 *12-in.*, 4 *6-in.*, 8 *3-pr.*, 10 M.	6	16·6 *t*	800	500
"	Evstafi, B.S. . .	12,733	372¼	72¾	27	10,600 B.	Nicolaieff .	Bldg.		..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.* 14 *3-in.*, 8 *1·8-in.* 2 *1·4-in.*, 6 M., 2 l.	5	16	670 / 1400	731
a.c.	General Admiral shd.	4722	285½	49¼	21	4472	St. Petersburg	1873	1875	..	6	..	..	..	..	..	6 *8-in.*, 2 *6-in.*, 10 Q.F. and M., 5 l.	4	14·2 *t*	1000	312
"	Gertzog Edinburgski	5050	285½	49¼	21	5222	St. Petersburg	1875	1877	..	6	..	..	..	6	..	4 *8-in.*, 5 *6-in.*, 12 Q.F., 6 l.	2	15·2 *t*	1000	500
b.	Georgi Pobiedonosetz B.S.	10,280	320	69	26½	10,600 13,468 *t*	Sebastopol .	1892	1896	*431,000	16–11	..	12	..	12	..	6 *12-in.*, 7 *6-in.*, 8 *3·9-in.*, 6 M.	7	16·5 *t*	700	500
a.c.	Gromoboi . . shd.	12,336	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S	6 H.S.	6 H.S.	4¾ H.S.	4 *8-in.*, 16 *6-in.*, 6 *4·7-in.*, 20 *3-in.*, 36 small Q.F. and M.	5 4 sub.	20·0	2500	814
a.g.b.	Grozjastchy . .	1492	229	41¾	11	2000 B.	St. Petersburg	1890	1891	..	5	1½	..	3½	..	..	1 *9-in.*, 1 *6-in.*, 8 Q.F.	2	15·0	100	120

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b.	**Ioann Zlatoust, B.S.** .	12,733	372¼	72¾	27	10,600 B.	Sebastopol	Bldg.	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.* 14 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 6 M., 2 l.	5	16·0	670† / 1400	636
a.g.b.	**Khrabry** . . .	1492	229	41¾	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	1 *9-in.*, 1 *6-in.*, 8 Q.F.	2	15·0	100	120
a.c.	**Pallada** . . .	9700	443	75¾	23	16,500 B.	St. Petersburg. (New Admiralty)	Bldg.	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	2 sub.	21·0	750 / 1020	500
„	**Pamyat Azova** shd.‡.	6734	377	51	23	8000	St. Petersburg	1888	1890	350,000	9 *comp.*	2½	..	8 *comp.*	8 *comp.*	..	2 *8-in.*, 13 *6-in.*, 14 Q.F., and 3 M.	7	18·8 *t*	1000	525
t.	**Panteleimon, B.S.** (*ex* Potemkine)	12,480	372¼	72¾	27	10,600 B.	Nicolaieff .	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 16 *6-in.*, 14 *3-in.*, 6 *1·8-in.*, 14 *1·4-in.*, 6 M., 2 l.	5 sub.	17·0	670†	636
b.	**Pavel I (Imperator)** .	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg (Baltic)	Bldg.	..	1,170,000	11–6 K.S.	..	..	..	12 K.S.	7 K.S.	4 *12-in.*, 12 *8-in.*, 20 *12-pr.*, 20 *3-pr.*, 6 *1-pr.*, 8 M., 2 l.	4 2 sub.	18·0	1500	..
t.	**Peter Veliky** . .	9891	328¼	62¼	23¾	8258	St. Petersburg	1872	1875	..	14–8	3	8	.	8	..	4 *12-in.*, 4 *8·4-in.*, 13 Q.F., 4 l.	1	14·5 *t*	1200	436
a.c.	**Rossia** . . . shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1898	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 16 *6-in.*, 12 *3-in.*, 36 small Q.F. & M.	5	20·0	2500 §	725
t.	**Rostislav, B.S.** . .	8880	341	66½	24	8500	Nicolaieff .	1896	1899	..	15¾–8 H.S.	2-3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *5·9-in.* (Canet), 12 *1·8-in.*, 4 *1·5-in.*, 2 M.	2–3	16·0	§550 / 800	624
a.c.	**Rurik**‖ . . .	15,000	490	75	26	19,700 B.	Barrow . .	Bldg.	..	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 *10-in.*, 8 *8-in.*, 20 *4·7-in.*, 14 smaller.	2 sub.	21·0	1200 / 2000	800
b.	**Sinope, B.S.** . .	10,180	331	69	26½	13,000 B.	Sebastopol .	1887	1890	900,000	16–11 *comp.*	3	14 *comp.*	12	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
„	**Slava** . . .	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	..	..	9–4 K. S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	4 2 sub.	18·0	1250 / 2000	740
„	**Tchesmé, B.S.** . .	10,930	331	69	26½	11,000	Sebastopol .	1886	1888	900,000	16 *comp.*	3	14 *comp.*	..	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	15·0	886	325
„	**Tria Sviatitelia, B.S.**	13,318	357½	72¼	27	10,600	Nicolaieff .	1893	1896	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 *12-in.*, 8 *6-in.*, 4 *4-in.*, 4 *7-in.*, 56 smaller Q.F. & M.	6 2 sub.	18·0 *t*	1006	582

Four coast-defence ships, the Admiral Chichagoff, Greig, Lazareff and Spiridoff, completed 1869–70.

* Exclusive of armament. † And liquid fuel, 580 tons. ‡ To receive Belleville boilers and be reconstructed.
§ And liquid fuel. ‖ Two projected.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			Knots.	tons.	
a.c.	Admiral Makaroff .	7900	443	75¾	23	16,500 B.	La Seyne .	1906	..		6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 8-in., 8 6-in., 20 12-pr., 4 6-pr.	2 sub.	21·0	750 / 1020	500
b.	Alexander II . shd.	9244	326	67	23	8000	St. Petersburg.	1887	1890	..	14–6 comp.	2½	..	6 comp.	10 comp.	6 comp.	2 12-in., 4 9-in., 8 6-in., 4 6-pr., 4 3-pr., 6 M.	5	16·5 t	1200	604
"	Andrei Pervozvannyi	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg. (Galerny)	1905	..	1,170,000	11–6 K.S.	2½	..	..	12 K.S.	7 K.S.	4 12-in., 12 8-in., 20 12-pr., 20 3-pr., 6 1-pr., 8 M. 2 l.	4 2 sub.	18·0	1500	..
a.c.	Bayan . . .	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	Pro.	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 8-in., 8 6-in., 20 12-pr., 4 6-pr.	2 sub.	21·0	750 / 1020	500
b.	Catherine II., B.S. .	10,180	331	69	26½	10,600 B.	Nicolaieff .	1886	1889	900,000	18–10 comp.	3	14 comp.	..	14 comp.	..	6 12-in., 7 6-in., 8 6-pr., 6 M.	7	15·5 t	886	325
"	Cesarevitch . .	12,912	388¾	76¼	26	16,300 B.	La Seyne .	1901	1902	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 12-in., 12 6-in., 20 3-in., 20 1·8-in., 6 1·4-in. 4 M., 2 l.	6 2 sub.	19·6 t	900 / 1350	732
t.	Dvenadzat Apostoloff (Twelve Apostles), B.S.	8433	330	60	25½	11,500	Nicolaieff .	1890	1892	..	14–6 comp.	2½	10 comp.	12 comp.	12 comp.	5 comp.	4 12-in., 4 6-in., 8 3-pr., 10 M.	6	16·6 t	800	500
"	Evstafi, B.S. . .	12,733	372¼	72¾	27	10,600 B.	Nicolaieff .	Bldg.		..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 12-in., 4 8-in., 12 6-in. 14 3-in., 8 1·8-in. 2 1·4-in., 6 M., 2 l.	5	16	670 / 1400	731
a.c.	General Admiral shd.	4722	285½	49¼	21	4472	St. Petersburg	1873	1875	..	6	..	..	..	..	..	6 8-in., 2 6-in., 10 Q.F. and M., 5 l.	4	14·2 t	1000	312
"	Gertzog Edinburgski	5050	285½	49¼	21	5222	St. Petersburg	1875	1877	..	6	..	..	..	6	..	4 8-in., 5 6-in., 12 Q.F., 6 l.	2	15·2 t	1000	500
b.	Georgi Pobiedonosetz B.S.	10,280	320	69	26½	10,600 13,468 t	Sebastopol .	1892	1896	*431,000	16–11	..	12	..	12	..	6 12-in., 7 6-in., 8 3·9-in., 6 M.	7	16·5 t	700	500
a.c.	Gromoboi . . shd.	12,336	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S.	6 H.S.	6 H.S.	4¾ H.S.	4 8-in., 16 6-in., 6 4·7-in., 20 3-in., 36 small Q.F. and M.	5 4 sub.	20·0	2500	814
a.g.b.	Grozjastchy . .	1492	229	41¾	11	2000 B.	St. Petersburg	1890	1891	..	5	1½	..	3½	..	..	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120

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b.	Ioann Zlatoust, B.S.	12,733	372¼	72¾	27	10,600 B.	Sebastopol	Bldg.	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 12-in., 4 8-in., 12 6-in., 14 3-in., 8 1·8-in., 2 1·4-in., 6 M., 2 l.	5	16·0	670† 1400	636
a.g.b.	Khrabry	1492	229	41⅔	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120
a.c.	Pallada	9700	443	75⅔	23	16,500 B.	St. Petersburg (New Admiralty)	Bldg.	..	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 8-in., 8 6-in., 20 12-pr., 4 6-pr.	2 sub.	21·0	750 1020	500
"	Pamyat Azova shd.‡	6734	377	51	23	8000	St. Petersburg	1888	1890	350,000	9 comp.	2½	..	8 comp.	8 comp.	..	2 8-in., 13 6-in., 14 Q.F., and 3 M.	7	18·8 t	1000	525
t.	Panteleimon, B.S. (ex Potemkine)	12,480	372¼	72¾	27	10,600 B.	Nicolaieff	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 12-in., 16 6-in., 14 3-in., 6 1·8-in., 14 1·4-in., 6 M., 2 l.	5 sub.	17·0	670†	636
b.	Pavel I (Imperator)	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg (Baltic)	Bldg.	..	1,170,000	11–6 K.S.	..	..	..	12 K.S.	7 K.S.	4 12-in., 12 8-in., 20 12-pr., 20 3-pr., 6 1-pr., 8 M., 2 l.	4 2 sub.	18·0	1500	..
t.	Peter Veliky	9891	328¼	62¼	23¾	8258	St. Petersburg	1872	1875	..	14–8	3	8	.	8	..	4 12-in., 4 8·4-in., 13 Q.F., 4 l.	1	14·5 t	1200	436
a.c.	Rossia shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1898	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 8-in., 16 6-in., 12 3-in., 36 small Q.F. & M.	5	20·0	2500 §	725
t.	Rostislav, B.S.	8880	341	66½	24	8500	Nicolaieff	1896	1899	..	15¾–8 H.S.	2-3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 10-in., 8 5·9-in. (Canet), 12 1·8-in., 4 1·5-in., 2 M.	2–3	16·0	§550 800	624
a.c.	Rurik‖	15,000	490	75	26	19,700 B.	Barrow	Bldg.	..	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 10-in., 8 8-in., 20 4·7-in., 14 smaller.	2 sub.	21·0	1200 2000	800
b.	Sinope, B.S.	10,180	331	69	26½	13,000 B.	Sebastopol	1887	1890	900,000	16–11 comp.	3	14 comp.	12	14 comp.	..	6 12-in., 7 6-in., 8 Q.F., 6 M.	7	16·75	886	325
"	Slava	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	..	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 12-in., 12 6-in., 20 3-in., 20 3-pr., 6 1-pr.	4 2 sub.	18·0	1250 2000	740
"	Tchesmé, B.S.	10,930	331	69	26½	11,000	Sebastopol	1886	1888	900,000	16 comp.	3	14 comp.	..	14 comp.	..	6 12-in., 7 6-in., 8 Q.F., 6 M.	7	15·0	886	325
"	Tria Sviatitelia, B.S.	13,318	357½	72¼	27	10,600	Nicolaieff	1893	1896	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 12-in., 8 6-in., 4 4-in., 4 7-in., 56 smaller Q.F. & M.	6 2 sub.	18·0 t	1000	582

Four coast-defence ships, the Admiral Chichagoff, Greig, Lazareff and Spiridoff, completed 1869–70.

* Exclusive of armament. † And liquid fuel, 580 tons. ‡ To receive Belleville boilers and be reconstructed. § And liquid fuel. ‖ Two projected.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
to.g.b.	Abrek	535	212¼	24¾	9	4506 t	Abo	1896	1897	53,600	½	..	2 3-in., 4 1·8-in.	2	21·2 t	..	..
2nd cl. cr.	Admiral Korniloff	5800	351	48½	20	9000	St. Nazaire	1887 1895	1889	296,000	2½	..	14 6-in., 6 1·8-in., 6 1·4-in., 5 l.	6	17·5 t	1100	425
"	Almaz	3285	325	43½	17½	7,500 B.	St. Petersburg (Baltic)	1903	1903	..	2¾	5–3½ K.S.	6 4·7-in., 8 1·8-in., 2 1·4-in., 3 M.	6	19·0	560	340
"	Askold	5905	426½	49¼	20¾	24,000 T.S.	Kiel (Germania)	1900	1901	..	3	4	12 6-in., 12 3-in., 8 1·8-in., 2 1·4-in., 2 M.	6 (2 sub.)	23·8 t	720 / 1100	500
"	Aurora	6731	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1902	..	2½	..	8 6-in., 20 3-in., 8 1·4-in.	3	20·0	900 / 1400	422
"	Bogatyr	6645	416¾	54½	20¾	20,300 Nor.	Stettin (Vulcan)	1901	1901	..	2	5 N.S.	12 6-in., 12 3-in., 6 1·8-in., 2 1·4-in., 2 M.	6 (2 sub.)	24·0 t	720 / 1100	580
to.g.b.	Captain Sacken, B.S.	742	210	24	8¾	3400	Nicolaieff	1888	1889	40,700	..	..	7 4·7-in., 7 M.	3	18·5 t	97	120
g.v.	Chernomoretz, B.S.	1224	210	35	11	1500 B.	Nicolaieff	1889	1891	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5 t	250	161
cr.	Diana	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	8 6-in., 20 3-in., 8 1·4-in.	3	20·0	900 / 1400	422
corv.	Donetz, B.S.	1224	210	35	11	1500 B.	Nicolaieff	1887	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5 t	250	161
"	Griden, B.S.	400	192½	24¼	7½	3500	Nicolaieff	1893	1894	66,600	..	..	2 1·8-in., 7 1·4-in., 10 M.	3	22·0	90	60
cr.	Jemchug	3106	347¾	41½	16	17,000 Y.	St. Petersburg (Nevsky)	1903	1904	..	2	..	8 4·7-in., 6 1·8-in., 2 1·4-in., 1 M.	5	23·0	600	340
"	Kagul, B.S.	6645	439	54½	20½	19,500	Nicolaieff	1903	1905	..	2¾	5–3½ K.S.	12 6-in., 12 3-in., 6 1·8-in.	5 (2 sub.)	23·0	720	..
to.g.b.	Kazarsky, B.S.	400	190	24	8½	3500	Elbing	1890	1891	32,500	..	..	9 1·8-in. (Hotchkiss)	2	23·0	90	60
g.b.	Khivinetz	1340	230	36	10½	1400 B.	St. Petersburg (New Admiralty)	1904	..	..	..	..	2 8-in., 8 3-in., 4 M.	..	13·0	..	200
g.v.	Kubanetz, B.S.	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 8-in., 1 6-in., 7 Q.F.	2	13·8 t	250	161
to.g.b.	Lieutenant Ilyin	714	230	24	8¾	3500	St. Petersburg	1887	1888	40,150	..	..	7 3-pr., 10 M.	7	20·1 t	97	120
g.v.	Mandjur	1416	210	35	11	1400	Copenhagen	1886	1887	..	1½	..	2 8-in., 1 6-in., 7 Q.F., M., & 4 l.	2	14·0	160	179

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cr.	Oleg	6675	439¾	54½	20½	19,500 Nor.	St. Petersburg. (New Admiralty)	1903	1904	..	2¾	5–3½	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*	2 sub.	23·0	600	340
cr.	Otchakoff, B.S.	6645	439	54½	20½	19,500 Nor.	Sebastopol	1902	1905	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 6 M.	2 sub.	23·0	720 1100	..
3rd cl. *cr.*	Pamyat Merkuriya, B.S.	2997	295	41	17	3000	Toulon	1880	1882	..	..	..	6 *6-in.*, 8 Q.F. & M., 4 l.	2	16·0	1100	200
sl.	Plastun	1255	206¾	32¾	14	1268	St. Petersburg.	1879	1880	..	..	..	3 *6-in.*, 7 Q.F. & M., & 4 l.	..	13·0	250	172
3rd cl. *cr.*	Rynda	3508	265¾	46	16	3000	St. Petersburg.	1885	1887	..	1½	..	4 *6-in.*, 9 Q.F., M., & 4 l.	..	14·8 *t*	710	322
corv.	Strjelok	1343	206¾	32¾	14	1528	St. Petersburg.	1880	1881	..	..	..	3 *6-in.*, 7 Q.F., M., & 4 l.	..	13·0	250	172
g.v.	Teretz, B.S.	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·8 *t*	250	161
"	Uraletz, B.S.	1224	210	35	11	1500 B.	Sebastopol	1888	1890	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·8 *t*	250	161
cr.	Vitiaz	6375	414	52½	20¾	20,000 B.	St. Petersburg (Galerny)	Bldg.	..	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (2 sub.)	23·0	720	..
sl.	Vjestnik	1255	206¾	32¾	14¼	1268	St. Petersburg.	1879	1880	..	..	..	3 *6-in.*, 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	Voevoda	400	192½	24¼	7½	3600	Elbing	1892	1893	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	3	22·0	90	87
g.v.	Zaporojetz	1224	210	35	10	1500	Nicolaieff	1887	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	13·5 *t*	250	161

Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels Volga and Bakan. Lena (ex Kherson), 10,225 tons, Rion (ex Smolensk), 11,850 tons, and Dnieper (ex Petersburg), 9252 tons, transport vessels taken over from the Volunteer Fleet and renamed. Auxiliary steamers Don (ex Furst Bismarck), Kuban (ex Auguste Victoria), Terek (ex Kaiserin Maria Theresia).

Torpedo-gunboats (508-625 tons, 19 knots), building at St. Petersburg, some of them launched, out of money furnished by national subscription: Ukraina, Voiskovoi, Stavropolsky-Trukhmenetz, Finn, Kuznetz, Steregustchy, Strashny, Donskoi-Kasak, Emir Bukharsky, Dobrovolety, Moskvityanin, Vsadnik, Gaidamak, Kondratenko, Sabaikaletz, Ussurietz, Amuretz, Sibirsky-Strielok, Okhotnik, Pogranitschik, and two unnamed.

Auxiliary Steamers.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Speed.
	BLACK SEA CO.		tons.	ft.	in.	ft.	in.	ft.	in.					
Transport Cruisers	Czar	S.	2340	319	0	37	0	23	6	1	350 nom.	Newcastle	1883	14
"	Czarevna	"	2340	319	0	37	0	23	6	1	350 nom.	"	1883	14
"	Czaritza	"	2340	319	0	37	0	23	6	1	350 nom.	"	1883	14
"	Grand Duke Alexis.	"	2350	284	0	37	0	14	9	1	3500	Hebburn	1890	16
"	Grand Duke Constantine . . .	"	2400	284	0	37	0	15	0	1	3500	"	1891	16
"	Roumantzeff	"	760	212	0	28	0	7	6	2	1000	"	1894	13
	(and many others)													
	VOLUNTEER FLEET.*													
cr.	Kiev	"	10,500	440	0	49	6	24	0	2	3200	Clydebank	1895	13
"	Nijni Novgorod	"	7876	325	0	40	0	23	6	1	2000	Elswick	1891	11½
"	Saratoff	"	8556	462	0	50	0	24	0	2	10,000	Glasgow	1892	19
"	Tamboff	"	8640	385	0	45	0	24	6	1	2,500	Dumbarton	1893	12¾
"	Vladimir	"	10,500	440	0	49	6	24	0	2	3,200	"	1895	12
"	Voronej	"	10,500	440	0	49	6	24	0	2	3,200	"	1895	12
"	Yaroslav	"	8640	385	0	45	0	24	6	1	2,500	"	1893	12¾

* Kherson, Smolensk, and Petersburg transferred to the Navy as fleet auxiliaries and renamed.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Cataluña** .	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
br.	**Numancia** .	7190	314½	55¾	25¼	3708	La Seyne	1863 1897	1865	315,600	5½	..	4¾	..	5	4¾	4 *8-in.*, 4 *6·2-in.*, 10 *5·9-in.*	2	8·0	1100	600
b.	**Pelayo** .	9744	330	66	25	9000 Nic.	La Seyne	1887 1897	1890	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

The Armoured Cruiser Cardenal Cisneros (6889 tons) was lost October, 1905, through running on the rocks at Mexeldo Headland.

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
cr.	Alfonso XII	3041	278¾	42½	16½	4800	Ferrol	1887	1890	..	..	..	6 *6·2-in.* (Hontoria), 2 *2·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	17·5 *t*	600	300
g.b.	General Concha	515	157½	25½	8½	600	Ferrol	1883	1884	..	..	..	3 *4·7-in.* (Hontoria), 2 Q.F., 1 M.	1	11·0	80	93
cr.	Conde de Venadito	1112	210	32	12½	1600	Cartagena	1888	1890	..	..	..	4 *4·7-in.* (Hontoria), 2 *2·7-in.*, 2 Q.F., 5 M.	2	14·0	220	130
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
„	Destructor	458	192½	25	7	3800	Clydebank	1887	1888	..	..	..	1 *3·5-in.*, 4 *6-pr.*, 4 M.	3	22·56 *t*	104	55
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	..	..
sl.	Infanta Isabel	1112	211	32¼	12½	1500	Cadiz	1885	1887	..	..	..	4 *4·7-in.* (Hontoria), 2 *2·7-in.*, 3 Q.F., 4 M.	2	14·0	220	130
„	Isabel II	1112	211	32¼	12½	1500	Ferrol	1886	1888								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276

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SPAIN.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.	ins.			knots.	tons.	
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 4·7-*in.* (Hontoria), 4 1·6-*in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molins	562	190	23	10¼	2600	Ferrol	1891	1893	..	..	..	2 4·7-*in.* (Hontoria), 4 2·2-*in.*, 1 M.	2	12·0	106	80
,,	Martin Alonso Pinzón							1892	1893								
,,	Nueva España	620	190	23	11½	2600	Carraca	1889	1890	..	..	..	2 4·7-*in.* (Hontoria), 4 2·2-*in.*	2	14·0	106	91
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	Bldg.	..	..	..	3	10 5·5-*in.*, 12 2·2-*in.*, 2 1., 8 M.	3	20·0	..	..
,,	Rio de la Plata . shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 5·5-*in.*, 4 3·9-*in.*, 4 2·2-*in.*, 6 M.	2	20·0	270	213
g.v.	Temerario	562	190	23	10¼	2600	..	1889	1890	..	..	..	2 4·7-*in.* (Hontoria), 4 2·2-*in.*, 1 M.	2	15·0	106	82
,,	Vincente Yáñez Pinzón	562	190	23	10¼	2600	Ferrol	1891	1892	..	..	..	2 4·7-*in.* (Hontoria), 4 2·2-*in.*, 1 M.	2	12·0	106	80

Hernán Çortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, gunboats; Asturias, Nautilus, Bilbao, Gen. Vales, training ships; Urania, hydrographic service; Giralda, royal yacht.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t	Aeran . .	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 8·2-in., 6 5·9-in., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	17·2 t	370	250
"	Dristigheten .	3445	285	48½	16	5400 Y.	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 8·2-in., 6 5·9-in., 10 2·2-in., 2 M.	2 sub.	16·5	300	..
a.c.	Fylgia . Unnamed .	4100	377¼	48¾	16	12,000 Y.	Stockholm	1905 Bldg.	..	385,700	4 K.S.	2	..	..	4 K.S.	..	8 5·9-in., 14 2·2-in. . .	2	21·5	350 / 900	350
c.d.s., t.	Göta . .	3238	258½	48	16¾	4750	Gothenburg	1890	1891	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	2 10-in., 4 6-in., 5 2·2-in., 8 M.	3	16·0	240	150
"	Manligheten .	3612	287	49¼	16½	7400 Y.	Malmö .	1902 1904	..	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 8·2-in., 6 5·9-in., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	17·0	370	250
"	Njord . .	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 9·8-in., 6 4·7-in., 10 2·2-in., 4 M.	1	16·5	275	200
"	Oden . .	3445	278¼	48½	17½	5330	Stockholm .	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 9·8-in., 4 4·7-in., 10 2·2 in., 4 M.	1	16·5	275	200
"	Oskar II .	4203	313¾	49½	16¾	8500 Y.	Gothenburg	1905	..	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 8·2-in., 8 5·9-in., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	18·0	350 / 500	326
"	Svea . .	3051	248¼	49¼	17	3640	Gothenburg	1886 1904	1887	..	11¾–8	2	..	..	11½	..	2 10-in. (A.), 4 4·7-in., 6 2·2-in., 8 M.	1	14·7 t	220	268
"	Tapperheten .	3612	287¼	49¼	16½	6000 Y.	Malmö .	1901 —	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 8·2-in., 6 5·9-in., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	16·5	370	250
"	Thor . .	3445	278¼	48½	17½	5350	Stockholm .	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 9·8-in., 6 4·7-in., 10 2·2-in., 4 M.	1	16·5	275	200
"	Thule . .	3248	260¾	48	16¾	4740	Stockholm .	1892 1904	1894	..	11¾–8	1⅞	..	..	11½	..	2 10-in. (A.), 4 6-in., 5 2·2-in., 8 M.	2	16·2 t	250	165
"	Wasa . .	3612	287	49¼	16½	6000 Y.	Stockholm .	1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 8·2-in., 6 5·9-in., 10 2·2-in., 2 1·4-in., 2 M.	2 sub.	16·5	370	250

The old coast-defence ships John Ericsson, Thordön, and Tirfing, 1500 tons, Loke, 1600 tons, and the armoured gunboats Berserk, Björn, Folke, Gerda, Hildur,

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SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	Claes Horn	787	222	27	10¼	3600	Stockholm	1899	1900	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	20·0	..	100
"	Claes Uggla	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-in., 4 2·2-in.	1	20·5	..	100
g.v.	Edda	549	183¾	27	10¼	960	Carlskrona	1885	1886	..	..	..	1 10·6-in., 1 6-in., 2 1·5-in., 2 M.	..	13·6 t	80	76
corv.	Freja	1968	216	40	19¾	1750	Malmö	1885	1887	..	..	..	4 6-in., 8 4·7-in., 4 1·5-in., 2 2·5-in., 5 M.	..	14·1 t	180	250
to.g.b.	Jacob Bagge	787	222	27	10¼	3970	Malmö	1898	1899	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	19·5	..	100
to.g.b.	Örnen	787	222	27	10¼	4100	Gothenburg	1896	1897	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	19·5	..	100
"	Psilander	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	20·5 t	..	100
"	Skäggald	527	171¼	26	9¾	780	Stockholm	1879	1880	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·2 t	80	72
"	Skuld	527	171¼	25¼	10¾	780	Carlskrona	1879	1880	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·0	80	72
"	Verdande	527	171½	25½	10¼	780	Carlskrona	1879	1880	..	..	..	1 10·6-in., 1 4·7-in., 2 M.	..	13·2 t	80	72

Several old gun vessels of 500 tons; four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.

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TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in			knots.	tons.	
c.b.	Assar-i-Tewfik	4613	272¼	52½	25	3560	La Seyne	1868	1870	..	8	..	..	..	6	..	2 9·2-*in.*, 6 6-*in.*, 10 12-*pr.*, 12 6-*pr.*	..	13·0	400	..
,,	Hamidieh	6700	292	55¾	24¾	4500	Turkey	1885	1893	..	9	3	5	..	5	..	10 10·2-*in.* (K.), 2 6·6-*in.*, 6 l., 2 M.	2	13·0	600	..
c.b.	Messoudieh	9120	331½	59	25¾	11,000 Nic.	Thames Genoa	1874 1901	1876	..	12	1	12	..	6–9	12	2 9·2-*in.*, 12 6-*in.*, 14 3-*in.*, 10 6-*pr.*, 2 3-*pr.*, 2 l.	..	17·5 t	600	..

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TURKEY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in	in.			knots.	tons.	
cr.	Abdul Hamid	3800	340	47½	16	12,500 Nic.	Elswick	1903	1904	..	4–1½	..	2 6-*in.*, 8 4·7-*in.*, 6 1·8-*in.*, 6 M.	2	22·2 t	600	300
,,	Abdul Medjidieh	3432	331¼	42	16	12,000 Nic.	Philadelphia	1903	1904	..	4–1½	..	2 6-*in.*, 8 4·7-*in.*, 6 1·8-*in.*, 6 M.	2	22·2	600	300
,,	Heibetnuma	1960	226	37	14	2500 ind.	Turkey	1890	1893	..	..	..	3 5 9-*in.* (K.), 6 4·7-*in.*, 6 Q.F.	2	14·0	..	..
g.v.	Lutfi-Hamayoun	1313	210	35	14	2800	Turkey	1892	1894	..	..	..	4 6-*in.* (K.), 6 4·7-*in.*, 6 Q.F.	2	13·0	..	..
to. g.b.	Namet	900	230	31	16½	4500	Gaarden	1890	1891	..	..	¼	2 4-*in.* (K.), 16 M.	2	19·0	..	111
,,	Pelenk-i-deria	840	236¼	31	10½	5000	Gaarden	1890	1891	..	..	¼	2 4-*in.* (K.), 16 M.	2	20·0	..	111
g.v.	Sedul Bahr	800	173½	26½	11½	160	Turkey	1894	1897	..	2	..	4 4·7-*in.* (K.), 6 M.	2	12·7	120	..
to. g.b.	Shahani-deria	450	200	23	9	3000	Turkey	1892	1894	..	..	..	2 4·7-*in.* (K.), 6 M.	4	22·0	..	..
g.v.	Zuhaf	800	173½	26½	11½	160	Turkey	1894	1896	..	..	..	4 4·7-*in.* (K.), 6 M.	2	12·7	120	..

UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			Knots.	tons.	
t.	Alabama	11,565	368	72¼	26	11,207 t	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5½ H.S.	12 H.S.	15 H.S.	6 H.S.	4 13-in., 14 6-in., 12 6-pr., 11 1-pr., 4 M., 2 l.	4	17·0 t	800 / 1275	592
c.d.s., t. (2 t.)	Amphitrite	3990	259½	55½	14⅔	1600 B. & W.	Wilmington	1883 reblt.	1895	..	9–5 N.S.	1½	..	..	11½ N.S.	..	4 10-in., 2 4-in., 2 6-pr., 2 3-pr., 8 1-pr., 3 M., 1 l.	..	10·5	250	182
c.d.s., t. (1 t.)	Arkansas	3235	252	50	12⅔	1739 T.	Newport News	1900	1902	197,267	11–5 H.S.	1½	..	..	11 H.S.	..	2 12-in., 4 4-in., 3 6-pr., 6 1-pr., 2 M.	..	12·0 t	400	222
a. c.	Brooklyn	9215	400½	62	26¼	18,425	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 8-in., 12 5-in., 12 6-pr., 4 1-pr., 4 M., 2 l.	..	22·2 t	900 / 1622	718
,,	California	13,680	502	69½	24½	23,000 B. & W.	S. Francisco	1904	..	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 (sub.)	22·0	900 / 2000	829
,,	Charleston	9700	424	66	25½	27,200 B.&W.	Newport News	1904	1906	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 6-in., 18 3-in., 12 3-pr., 12 1-pr., 10 M., 2 l.	..	22·0	650 / 1500	664
,,	Colorado	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	2 (sub.)	22·2 t	900 / 2000	829
t.	Connecticut	16,000	450	76⅔	26⅔	16,500 B. & W.	New York	1904	..	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	4 (sub.)	18·8 t	900 / 2200	803
c.d.s., t. (1 t.)	Florida	3235	252	50	12⅔	2336 Nor.	Elizabeth-port	1901	1903	190,075	11–5 H.S.	1½	..	..	11 H.S.	..	2 12-in., 4 4-in., 3 6-pr., 6 1-pr., 2 M.	..	12·4 t	355	222
Super-posed turrets.	Georgia	14,948	435	76¼	23⅔ †	19,000 Nic.	Bath, Me.	1904	..	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 12-in., 8 8-in., 12 6-in., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	4 (sub.)	19·0	900 / 1704	812
b.	Idaho	13,000	375	77	25	10,000 B. & W.	Philadelphia	1905	.	616,360	9–4 K.S.	..	7 K.S.	7 K.S.	12–8 K.S.	6 K.S.	4 12-in., 8 8-in., 8 7-in., 12 3-in., 6 3-pr., 4 1-pr., 8 M., 2 l.	2 sub.	17·0	600 / 1750	725
t.	Illinois	11,565	368	72¼	26	12,757	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5½ H.S.	12 H.S.	15 H.S.	6 H.S.	4 13-in., 14 6-in., 16 6-pr., 6 1-pr., 4 M., 2 l.	4	17·45 t	800 / 1275	686
p.	Indiana	10,288	348	69¼	27¼	9,607 B. & W.	Philadelphia	1893	1895	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10 H.S.	4 13-in., 8 8-in., 4 6-in., 20 6-pr., 6 1-pr., 2 M., 1 c.	1	15·5 t	400 / 1567	497
,,	Iowa	11,340	360	72¼	26⅔	11,933	Philadelphia	1896	1897	618,514	14 H.S.	2¾	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 12-in., 8 8-in., 6 4-in., 20 6-pr., 4 1-pr., 4 M., 2 l.	4 (sub.)	17·1 t	625 / 1795	520
t.	Kansas	16,000	450	77	26⅔	16,500 B. & W.	Camden, N.J.	1905	..	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 M., 2 l.	..	18·0	900 / 2200	854
ram	Katahdin	2155	250¾	43½	16	5,014	Bath, Me.	1893	1896	191,102	6–3 H.S.	2–6	..	..	18 con. tr. H.S.	..	4 6-pr.	..	16·1 t	175 / 192	97

* The sums given in this column are exclusive of the cost of armour and armament, according to the system of making appropriations in the estimates.

† Mean draught.

UNITED STATES.—Armoured Ships—*continued*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
super-posed turrets	Kearsarge Kentucky	11,540	368	72¼	25¾	11,788 12,179	Newport News.	1898	1900	462,345 each	16½–4 H.S.	2¾–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 14 *5-in.*, 20 *6-pr.*, 8 *1-pr.*, 4 M., 2 l.	4	16·8 16·9 *t*	410 1591	690 686
t.	Louisiana .	16,000	450	76¾	26¾	20,500 B. & W.	Newport News.	1904	..	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 L.	4	18·8 *t*	900 2200	803
,,	Maine . .	12,300	388	72¼	25½	15,693 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0 *t*	1000 1800	551
a.c.	Maryland .	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 1850	829
b.	Massachusetts	10,288	348	69¼	27⅓	10,240	Philadelphia	1893	1896	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 4 *6-in.*, 20 *6-pr.*, 8 *1-pr.*, 2 M., 2 l.	3	16·2 *t*	400 1560	509
c.d.s.,t. (2 t.)	Miantonomoh.	3990	259½	55¼	15	1,426	Chester .	1876 reblt.	1891	..	7–4 *comp.*	1¾	..	..	11½ *comp.*	..	4 *10-in.*, 2 *6-pr.*, 2 *3-pr.*, 4 *1-pr.*, 1 M.	..	10·5	250	149
t.	Michigan** .	16,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8 *12-in.*	..	19·0	..	..
a.c.	Milwaukee .	9700	424	66	25½	21,000 W.T.	S. Francisco.	1904	..	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·0	650 1500	664
t.	Minnesota .	16,000	450	77	26¾	16,500 B. & W.	Newport News	1905	..	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·0	900 2200	881
b.	Mississippi .	13,000	375	77	25	10,000 B. & W.	Philadelphia	1905	..	616,360	9–4 K.S.	..	7 K.S.	7 K.S.	12–8 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 sub.	17·0	600 1750	725
t.	Missouri .	12,300	388	72¼	25½	15,845 T.	Newport News	1901	1903	592,828	12–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 4 *1-pr.*, 2 M., 2 l.	2 sub.	18·1 *t*	1000 1836	551
c.d.s.,t. (2 t.)	Monadnock .	3990	259⅓	55½	14½	3,000	Vallejo, Cal.	1883 reblt.	1896	..	5–9 H.S.	1¾	..	..	11½ H.S.	..	4 *10-in.*, 2 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M.	..	12·0	250 386	213
a.c.	Montana .	14,500	502	72¾	25	25,000 B & W.	Newport News	Bldg.	..	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·0	900 2000	845
c.d.s.,t.	Monterey .	4084	256	59	15¼	5244 B. & W.	S. Francisco.	1891	1893	345,731	13–6 H.S.	3	..	..	13 H.S.	..	2 *12-in.*, 2 *10-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M.	..	13·6 *t*	200 233	218
Super-posed turrets.	Nebraska .	14,948	435	76¼	23¾ †	19,000 B. & W.	Seattle. .	1904	..	767,210	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0	900 1900	812
c.d.s.,t. (1 t.)	Nevada . .	3714	252	50	12¾	2,400 Nic.	Bath, Me. .	1900	1903	197,267	11–5 H.S.	1½	..	..	11 H.S.	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	..	13·0 *t*	338	222

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t.	NewHampshire	16,000	450	77	26¾	16,500 B. & W.	Camden, N.J.	Bldg.	..	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 12 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4	18·0	900 2350	916
Super-posed turrets.	New Jersey	14,948	435	76¼	23¾ †	19,000 B. & W.	Quincy,Mass.	1904	1905	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0	900 1900	812
a.c.	New York	8200	380½	64¾	27½	17,075	Philadelphia	1891	1893	613,377	4 H.S.	6–3	..	..	10 H.S.	5–4¼ H.S.	12 *8-in.*, 12 *4-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 2 l.§	2	21·0 *t*	750 1334	498
,,	North Carolina	14,500	502	72¾	25	25,000 B. & W.	Newport News	Bldg.	..	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·0	900 2000	845
t.	Ohio	12,440	388	72¼	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11–4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	17·8 *t*	1000 2144	521
b.	Oregon	10,288	348	69¼	27¼	11,033	S. Francisco.	1893	1896	653,447	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 4 *6-in.*, 20 *6-pr.*, 4 *1-pr.*, 4 M., 1 l.	3	16·8 *t*	400 1594	500
a.c.	Pennsylvania	13,680	502	69½	24½	23,600 Nic.	Philadelphia	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 2000	829
c.d.s.,t. (2 t.)	Puritan	6060	290¼	60	18½	3,700	Chester	1882 rebIt.	1896	..	14–6 H.S.	2	..	..	14 H.S.	..	4 *12-in.*, 6 *4-in.*, 6 *6-pr.*, 2 *1-pr.*, 4 M.	..	12·4 *t*	307	230
Super-posed turrets.	Rhode Island	14,948	435	76¼	23¾ †	19,000 B. & W.	Quincy,Mass.	1904	1905	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0	900 1900	812
a.c.	St. Louis	9700	424	66	25½	21,000 B. & W.	Philadelphia (Neafie)	1905	..	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·0	650 1500	664
t.	South Carolina**	16,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. .. ..	..	19·0	..	..
,,	South Dakota	13,680	502	69½	24½	23,000 B. & W.	S. Francisco.	1904	..	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·0	900 2000	829
,,	Tennessee	14,500	502	72¾	25	23,000 B. & W.	Philadelphia	1904	..	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·0	900 2000	858
c.d.s.,t. (2 t.)	Terror	3990	259½	55½	15¼	1,600	Philadelphia	1883 rebIt.	1896	737,700	7–4 N.S.	1¾	..	..	11½ N.S.	..	4 *10-in.*, 4 *4-in.*, 2 *6-pr.*, 2 *3-pr.*, 2 *1-pr.*, 2 M.	..	10·5	250 285	443
t.	Texas	6315	301¼	64	25¼	8,507	Norfolk	1892	1895	513,716	12 N.S.	2	..	12 N.S.	12 N.S.	..	2 *12-in.*, 6 *6-in.*, 12 *6-pr.*, 4 *1-pr.*, 6 M., 1 l.	..	17·8 *t*	500 845	428
t.	Vermont	16,000	450	77	26¾	16,500 B. & W.	Quincy, Mass.	1905	..	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·0	900 2200	854
Super-posed turrets	Virginia	14,948	435	76¼	23¾ †	19,000 Nic.	Newport News	1904	1905	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0	900 1900	812
a.c.	Washington	14,500	502	72¾	27	25,000 B. & W.	Camden, N.J.	1905	..	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·0	900 2000	858
,,	West Virginia	13,680	502	69½	24½	26,135 B. & W.	Newport News	1903	1905	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·1 *t*	900 2000	829
t.	Wisconsin	11,653	368	72¼	26	12,452	S. Francisco.	1898	1901	549,666	16½–4 H.S.	3–4	5¼ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	4	17·1 *t*	800 1310	583
c.d.s.,t. (1 t.)	Wyoming	3218	252	50	12¾	2,451 B. & W.	S. Francisco.	1900	1903	200,350	11–5	1½	..	..	11	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	..	12·4 *t*	881	222

* See note on previous page. † Mean draught. ‡ Including armour, but not armament. § New armament proposed.

** All details of the new battleships uncertain. One battleship proposed to be of 19,000 tons is in the new estimates.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. †	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.*	Complement
		tons.	ft.	ft.	ft.					£	in.	in			knots.	tons.	
cr.	Albany . shd.	3487	345	43¾	20	7500	Elswick	1899	1900	247,611	3	3–1¼ shields	10 5-in., 10 3-pr., 12 1-pr., 2 M., 1 l.	..	20·5 t	512 747	356
g.b.	Annapolis	1000	168	36	12½	1227 B.&W.	Elizabeth Port	1896	1897	46,789	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 M.	..	13·1 t	100 225	135
cr.	Atlanta	3000	271¼	42¼	20½	4030 C. & B.&W.	Chester	1884	1886	126,785	1½	..	2 8-in., 6 6-in., 6 6-pr., 4 1-pr., 2 M.	..	15·6 t	382 573	304
,,	Baltimore	4413	327½	48½	24	10,064	Philadelphia	1888	1890	272,270	4–2½	4½ shield	12 6-in., 6 3-in., 6 3-pr., 4 1-pr., 5 M., 1 l.	..	20·1 t	709 1064	383
g.v.	Bancroft	839	187½	32	13	1213	Elizabeth Port	1892	1893	51,371	½	..	4 4-in., 8 3-pr., 1 1-pr., 1 M.	..	14·37 t	100 136	195
,,	Bennington	1710	230	36	16½	3392	Chester	1890	1891	100,894	½	..	6 6-in., 4 6-pr., 4 1-pr., 4 M.	..	17·5 t	200 403	195
scout	Birmingham	3750	420	46¾	17	16,000 W.T. turb.	Quincy, Mass.	Bldg.	..	301,000	2–1½	..	2 5-in., 6 3-in.	2 sub.	24·0	1250	356
cr	Boston	3000	271¼	42¼	20½	4030	Chester	1884	1887	127,196	1½	..	2 8-in., 6 6-in., 6 6-pr., 4 1-pr., 2 M., 1 l.	..	15·6 t	380 456	282
g.v.	Castine	1177	204	32	14¼	2199	Bath, Me.	1892	1894	65,450	½	..	8 4-in., 4 6-pr., 2 1-pr., 1 M.	..	16·0	125 292	151
cr.	Chattanooga shd.	3200	292	44	16¾	5303 B.&W.	Elizabeth Port	1903	1904	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·65 t	470 700	302
scout	Chester	3750	420	46¾	17	16,000 W.T. turb.	Bath, Me.	Bldg.	..	337,000	2–1½	..	2 5-in., 6 3-in.	2 sub.	24·0	1250	356
cr	Chicago	5273	325	48½	22½	9000 C. & B.&W.	Chester	1885	1889	182,677	1½	4 shield	4 8-in., 14 5-in., 9 6-pr., 2 1-pr., 2 M., 1 l.	..	18·0	831	409
,,	Cincinnati	3213	300	42	20¼	8,490 B.&W.	Brooklyn	1892	1894	226,055	2½	4	11 5-in., 8 6-pr., 2 1-pr., 2 M.	..	19·0	350 468	314
,,	Cleveland shd.	3200	292	44	16¾	4640 B.&W.	Bath, Me.	1901	1903	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·4 t	470 700	302
,,	Columbia	7375	412	58¼	25¼	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 8-in., 2 6-in., 8 4-in., 12 6-pr., 2 1-pr., 2 M., 1 l.	..	22·8 t	750 1670	477
g.v.	Concord	1710	230	36	16½	3404	Chester	1890	1891	100,894	½	..	6 6-in., 2 6-pr., 2 3-pr., 2 1-pr.	..	16·8 t	200 401	194

" "	Denver . Des Moines } shd.	3200	292	44	16¾	4135 B. & W.	Philadelphia Quincy, Mass.	1902	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·75	470/700	303
g.v.	Dolphin . .	1486	240	32	17	2255	Chester .	1884	1885	64,728	..	..	2 *4-in.*, 1 *6-pr.*, 6 *3-pr.*, 2 M.	..	15·5 *t*	173	117
"	Don Juan de Austria*	1159	210	32	13	1500	Cartagena .	1889	1892	..	..	..	6 *4-in.*, 4 *6-pr.*, 4 M. . . .	..	14·0	210	130
"	Dubuque . .	1085	174	35	13	1193 B. & W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·9	200	162
cr.	Galveston . shd.	3200	292	44	16¾	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	470/700	302
g.v.	Helena . .	1392	250¾	40	10	1988	Newport News	1896	1897	57,536	½	2½	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M.	..	15·5 *t*	100/300	256
" "	Isla de Cuba* Isla de Luzon*	1125	192	30	12¼	2627	Elswick .	1887	1888	..	2½	..	6 *3-in.*, 4 *6-pr.*, 4 M. / 4 *4-in.*, 4 *6-pr.*, 4 M.	..	16·0	160	160
"	Machias . .	1177	204	32	14¼	2046	Bath, Me. .	1891	1893	65,450	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	15·46 *t*	125/292	151
cr.	Marblehead .	2089	257	37	16¾	Nor. 5450	Boston .	1892	1894	138,498	½	..	10 *5-in.*, 6 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18·9 *t*	200/340	248
g.b.	Marietta . .	1000	174	34	13½	1054 B.&W.	S. Francisco.	1896	1897	45,823	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	13·2 *t*	100/239	140
cr.	Minneapolis .	7375	412	58¼	25½	20,862	Philadelphia	1893	1894	552,754	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	23·0 *t*	750/1200	477
"	Montgomery ‡ .	2089	257	37	17	5584	Baltimore .	1891	1894	125,860	½	..	4 *6-pr.*	6 (2 sub.)	18·8 *t*	200/340	257
g.v.	Nashville . .	1371	220	38	12	2536 C. & Y.	Newport News	1895	1897	57,536	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	16·7 *t*	150/400	176
cr.	Newark . .	4098	311½	49¼	22½	8868	Philadelphia	1890	1891	256,437	3–2	2 shield	12 *6-in.*, 6 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	..	19·0	400/809	384
g.b.	Newport . .	1000	168	36	13	1009	Bath, Me. .	1896	1897	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·2 *t*	100/230	147
cr.	New Orleans shd.	3487	346	43¾	19¾	7500	Elswick .	1896	1898	293,684	..	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	20·0	512/767	366
"	Olympia . .	5870	340	53	24¾	17,313	S. Francisco.	1892	1895	369,054	4½	4–2½	4 *8-in.*, 10 *5-in.*, 14 *6-pr.*, 4 *1-pr.*, 2 M.	..	21·69 *t*	400/1169	450
g.v.	Paducah . .	1085	174	35	13	1000 B.&W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	162

* Captured at Manila after the battle of May 1, 1898. The following gunboats were captured during the war with Spain, or subsequently purchased: Alvarado, Arayat, Calamianes, Callao, El Cano, Leyte, Mariveles, Mindoro, Pampanga, Panay, Paragua, Quiros, Villalobos.
† Prices exclusive of armament. ‡ Torpedo training ship.

UNITED STATES.—Cruising Ships, &c.—*continued.*

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	**Petrel**	892	176¼	31	13½	1045	Baltimore	1888	1889	50,755	..	..	4 *6-in.*, 2 *3-pr.*, 4 M.	..	11·8 *t*	100 / 200	122
g.b.	**Princeton**	1000	168	36	12½	923	Camden	1897	1898	47,262	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·0	100 / 238	135
cr.	**Raleigh**	3213	300	42	20¼	8500 B.&W.	Norfolk	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	9·0	350 / 460	313
scout	**Salem**	3750	420	46¾	18¼	16,000 W.T. turb.	Quincy, Mass.	Bldg.	..	301,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	24·0	1250	356
cr.	**San Francisco**	4098	310	49¼	22¼	10,604	S. Francisco.	1889	1891	293,435	3–2	2 Shields	12 *6-in.*, 10 *6-pr.*, 4 *1-pr.*, 2 M.	..	19·5	350 / 628	383
„	**Tacoma** . shd.	3200	292	44	16¾	5288 B.&W.	S. Francisco.	1903	1904	212,325	..	2 Shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 *t*	470 / 700	302
g.v.	**Topeka**	1700	250	35	..	2200	Kiel	1881	1882	..	..	..	6 *4-in.*, 6 *3-pr.*, 2 *1-pr.*, 1 M.	..	16·0	273 / 410	167
g.v.	**Vicksburg**	1000	168	36	12½	1118	Bath, Me.	1896	1898	47,406	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·7 *t*	100 / 239	135
„	**Wheeling**	1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·9 *t*	120 / 226	140
„	**Wilmington**	1392	250¾	40	10	1894	Newport News	1895	1897	57,536	1	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	15·0 *t*	100 / 300	175
„	**Yorktown**	1710	230	36	16½	3392	Philadelphia	1888	1889	93,496	..	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 4 *1-pr.*, 2 M.	2	16·1 *t*	200 / 380	195

Also the sailing training ship Chesapeake (1175 tons), built at Bath, Me., and launched 1899. The steel sailing training ships Cumberland and Intrepid and the wooden brig Boxer have been launched, 1904.

The armament of the Philadelphia and the dynamite guns of the Vesuvius have been removed.

Enrolled Auxiliary Cruisers of the United States Navy.

Class.	NAME.	Gross Tonnage.	Length.	Beam.	Depth.	Indicated Horse-Power.	Where Built.	When Built.	Owners.	Armament.	Speed.
			ft.	ft.	ft.						
1st	St. Louis	11,629	535½	63	26¾	18,000	Philadelphia	1895	International Navigation Co.	The armament comprises 6-*in.*, 5-*in.*, and 4-*in.* guns.	22·2
,,	St. Paul	11,629	535½	63	26¾	18,000	,,	1895	,,		22·5
,,	Paris.	10,794	517	63¼	22	20,000	Clydebank, Scotland	1889	,,		20·7
,,	New York	10,802	517	63¼	22	20,000	,,	1888	,,		20·6

Converted Merchant Vessels Retained.

Class.	NAME.	Displace ment.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armament.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.				£		knots.	tons.	
cr.	Buffalo	6888	380½	48	22	3600	Newport News	1893	117,949	12 5-*in.*, 6 6-*pr.*, 4 4-*in.*, 2 M.	14·5	100	297
,,	Dixie	6145	389½	48	19¾	3800	Newport News	1893	117,949	8 5-*in.*, 4 6-*pr.*, 4 1-*pr.*, 2 M.	16·0	1371	181
,,	Panther	4260	310	40	18¼	..	Philadelphia	1889	77,055	6 5-*in.*, 12 4-*in.*, 6 3-*pr.*, 1 M.	13·0	475	198
,,	Prairie	6872	390½	46½	22	3800	Philadelphia	1890	117,949	8 6-*in.*, 6 6-*pr.*, 4 3-*pr.*, 4 1-*pr.*, 2 M.	14·5	1000	295
,,	Yankee	6888	380½	48	22	3800	Newport News	1892	117,949	8 5-*in.*, 6 6-*pr.*, 2 1-*pr.*, 2 M.	14·5	1000	282
,,	Mayflower (yacht)	2690	275	36	17¼	4600	Clydebank	1896	88,359	. . . .	16·8	584	160

The armament of the above vessels includes 4-in., 5-in., and 6-in. guns.

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SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Belgium.—Several steam vessels, between 419 and 684 tons, principally employed as packets, under the orders of the Government. The Ville d'Anvers, 414 tons, for fishery protection.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube completing at Leghorn. Other ships are to be laid down. The Nadiezda, a despatch vessel (715 tons) of the French Casabianca type, launched at Bordeaux in 1898; speed, 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes.

Colombia.—The cruiser Almirante Lezo (*ex* El Baschir), of 1200 tons displacement; 2500 H.P.; speed, 18 knots; built in 1892, bought from Morocco, 1902. Two gunboats, Chercuito, 643 tons, and Bogota. Two river gunboats, General Nerino and Esperanza, 400 tons.

Ecuador.—Two old (1886) French despatch vessels, Papin and Inconstant (891 tons), built of wood and iron, were bought. One torpedo boat and two steam transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai. Some steam vessels on the coast.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun vessel, 22nd of December.

Mexico.—Two gun-vessels, Tampico and El Cruz, launched at Elizabethport, New Jersey, September, 1902, displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun-vessels Bravo and Morero, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched at the Orlando Yard, Leghorn, 1904. The Zaragoza, built of steel, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Two gun vessels—Democrata and Mexico, of 450 tons and 11 knots speed, armed with 2 6½-in. muzzle-loaders and 2 small guns. Two small gunboats of 10 knots speed. Five torpedo boats.

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Peru.—Almirante Grau, cruiser, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; launched at Barrow, March, 1906; 2 6-in., 8 14-pr., 8 1¼-pr.; 2 submerged torpedo-tubes; 1½-in. armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. A sister vessel is in hand at the same yard. Eclaireur, cruiser, 1769 tons, launched 1877, and partially reconstructed. Bought from France. Lima, built 1881, of 1700 tons displacement, 1800 I.H.P., 16 knots speed; armament, 2 6-in. B.L.R. guns. Screw steamer, Santa Rosa, of about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats of 45 tons, and 3 first-class torpedo boats, these forming the sea division. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, the *torpilleur de barrage* Alexandru cel Bun (104 tons), 5 sloops, 2 small torpedo boats, and the paddle steamer Romania, 240 tons, repaired 1890. The shipbuilding programme contemplates the building of 8 monitors of 500 tons, 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. A despatch vessel, a transport, and several steamers.

Venezuela.—The gunboats Bolivar (571 tons, 18·6 knots) and Miranda (200 tons, 12 knots); transports Restaurador (568 tons) and Zamora (350 tons).

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BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions: Length.	Dimensions: Beam.	Dimensions: Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain. TORPEDO-BOAT DESTROYERS.			Feet	Feet.	Feet.		Tons.		Knots.				Tons.
†Ardent	Thornycroft ..	1894	201·6	19	7·3	2	247	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
Banshee	Laird	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 5-6 prs.	2	50	
†Boxer	Thornycroft ..	1894	201·6	19	7·3	2	247	4,500	27·17	1-12 pr. 5-6 prs.	2	45	60
†Bruizer	" ..	1895	201·6	19	7·3	2	247	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
*Charger	Yarrow..	1894	190	18·5	5·25	2	250	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	White	1894	205·6	20	..	2	270	4,370	27·21	1-12 pr. 5-6 prs.	2	50	60
Contest	Laird	1894	210	19·5	..	2	290	4,400	27·4	1-12 pr. 5-6 prs.	2	50	60
†Daring	Thornycroft ..	1893	185	19	7	2	237	4,300	27·70	1-12 pr. 3-6 prs.	3	45	50
*Dasher	Yarrow..	1895	190	18·5	5·25	2	250	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
Dragon	Laird	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 5-6 prs.	2	50	
Ferret	"	1893	194	19·25	5	2	280	4,810	27·62	1-12 pr. 3-6 prs.	3	50	70
Fervent	Hanna	1895	20[illegible]	19	7·8	2	27[illegible]	3,800	[27]	1-12 pr. 5-6 prs.	2	50	70
†Handy	Fairfield	1895	200	19	7·8	2	26[illegible]	3,800	27·04	1-12 pr. 5-6 prs.	2	50	70
Hardy	Doxford	1895	196	19	5	2	245	4,200	26·8	1-12 pr. 5-6 prs.	2	50	70
†Hart..	Fairfield	1895	185	19	7	2	260	4 010	27·07	1-12 pr. 5-6 prs.	2	50	70
*Hasty	Yarrow..	1894	190	18·5	5·25	2	250	3,250	26·08	1-12 pr. 5-6 prs.	2	45	60
Haughty..	Doxford	1895	196	19	5	2	265	4,000	27·1	1-12 pr. 5-6 prs.	2	50	60
Havock	Yarrow..	1893	180	18·5	5·25	2	240	3,500	26·77	1-12 pr. 3-6 prs.	3	43	57
Hornet	"	1893	180	18·5	5·25	2	240	4,000	27·31	1-12 pr. 3-6 prs.	3	43	57
†Hunter	Fairfield	1895	200	19·7	6·5	2	260	4,000	27·2	1-12 pr. 5-6 prs.	2	45	60
Janus	Palmer	1895	200	19·7	6·5	2	252	3,789	27·8	1-12 pr. 5-6 prs.	2	50	60
Lightning	"	1895	200	19·7	6·5	2	252	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Lynx	Laird	1894	194	19·25	5	2	280	4,000	27·00	1-12 pr. 3-6 prs.	3	50	70
Opossum	Hawthorn	1895	200	19	5·2	2	290	4,052	28·24	1-12 pr. 5-6 prs.	2	50	60
Porcupine	Palmer	1895	200	19·7	6·5	2	288	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
Ranger	Hawthorn	1895	200	19	5·2	2	264	3,900	27·13	1-12 pr. 5-6 prs.	2	50	60
Rocket	Brown & Co. ..	1894	205·6	19·5	5·25	2	280	4,200	27·37	1-12 pr 5-6 prs.	2	50	60
Salmon	Earle's Co.	1895	200	19·5	5·4	2	264	3,580	27·6[illegible]	1-12 pr 5-6 prs.	2	50	60
Shark	Brown & Co. ..	1894	205·6	19·5	5·25	2	280	4,250	27·59	1-12 pr 5 6 prs.	2	50	60
Snapper	Earle's Co.	1895	200	19·5	5·5	2	270	4,500	27·9	1-12 pr. 5-6 prs.	2	50	60
Spitfire	Armstrong	1895	200	19	5·3	2	300	3,780	27·5	1-12 pr. 5-6 prs.	2	45	60
Starfish	Vickers	1894	195	20·5	..	2	265	4,000	27·97	1-12 pr. 5-6 prs.	2	45	60
Sturgeon	"	1894	195	20·5	..	2	265	4,010	27·16	1-12 pr. 5-6 prs.	2	45	60
Sunfish	Hawthorn	1895	200	19	5·2	2	290	4,292	27·62	1-12 pr. 5-6 prs.	2	50	60
Surly	Brown & Co. ..	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	50
Swordfish	Armstrong	1895	200	19	5·3	2	300	4,100	[27]	1-12 pr. 5-6 prs.	2	45	60
Teazer	White	1895	20[illegible]	19·5	5·6	2	270	4,500	[27]	1-12 pr. 5-6 prs.	2	50	60
Wizard	"	1895	200	19·5	5·2	2	270	4,400	[27]	1-12 pr. 5-6 prs.	2	45	60
Zebra	Thames Ironwork-	1895	200	20	6	2	300	3,850	27·00	1-12 pr. 5-6 prs.	2	50	60
Zephyr	Hanna	1895	200	[illegible]	5·3	2	270	3,850	[27]	1-12 pr. 5-6 prs.	2	50	60
†Albatross	Thornycroft ..	1898	227·6	21·25	8·5	2	360	7,900	32	1-12 pr. 5-6 prs.	2	68	100
†Angler	" ..	1896	210	19·6	7·1	2	278	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Brown & Co. ..	1901	218	20·0	5·6	2	470	6,000	31	1-12 pr. 5-6 prs.	2	60	80
†Ariel	Thornycroft ..	1897	210	19·6	7·1	2	278	5,800	30·59	1-12 pr. 5-6 prs.	2	60	80
†Avon	Vickers	1896	210·6	21·6	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	86
Bat	Palmer	1896	215	20·75	6·8	2	326	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Vickers	1897	210·6	21·6	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Brown & Co. ..	1896	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch..	Earle's Co.	1901	210	20·6	5·8	2	300	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Cheerful	Hawthorn	1897	210	21·0	8	2	308	6,000	30	1-12 pr. 5-6 prs.	2	62	82
†Coquette	Thornycroft ..	1898	210	19·5	7·2	2	285	5,800	30·31	1-12 pr. 5-6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	324	6,336	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cygnet	Thornycroft ..	1898	210	19·5	7·2	2	285	5,800	30·35	1-12 pr. 5-6 prs.	2	60	80
†Cynthia	" ..	1898	210	19·5	7·2	2	285	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
†Desperate	" ..	1895	210	19·6	7·2	2	275	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Dove	Earle's Co.	1898	210·0	20·6	5·8	2	300	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Brown & Co. ..	1901	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Laird	1897	227 6	22·0	9	2	465	9,000	31	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Falcon	"	1901	220	21·3	9	2	300	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Fame	Thornycroft ..	1896	210·6	19·6	7·1	2	275	5,800	30·16	1-12 pr. 5 6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	325	6,581	30·5	1-12 pr. 5-6 prs.	2	60	91
Flirt..	"	1897	215	20·7	6·8	2	328	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flying Fish	"	1897	215	20·7	6·8	2	323	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91

* Built by Yarrow, fitted with Thornycroft W.T. boilers at Earle's. All Jarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W.T. boilers. The Skate has been used as a target.

Great Britain—*continued.*

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Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.			
†Foam	Thornycroft	1896	210	19·6	7·1	2	275	5,800	30·18	1–12 pr. 5–6 prs.	2	58
Gipsy	Fairfield	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
Greyhound	Hawthorn	1900	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60
Griffon	Laird	1896	210·0	20	5·3	2	300	6,000	30·11	1–12 pr. 5–6 prs.	2	58
Kestrel	Brown & Co.	1898	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
Kangaroo	Palmer	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..
†Lee	Doxford	1899	210 0	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58
Leopard	Vickers	1897	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
Leven	Fairfield	1901	218 0	20.0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Lively	Laird	1901	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Locust	,,	1896	210	21·7	5·3	2	300	6,000	30·16	1–12 pr. 5–6 prs.	2	58
†Mallard	Thornycroft	1896	210·6	19·6	7·1	2	275	5,800	30·11	1–12 pr. 5–6 prs.	2	60
Mermaid	Hawthorn	1898	210	21 0	8	2	308	6,000	30	1–12 pr. 5–6 prs.	2	62
Myrmidon	Palmer	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..
Orwell	Laird	1901	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Osprey	Fairfield	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
†Ostrich	,,	1901	210	21·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
Otter	Vickers	1896	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60
Panther	Laird	1897	210·6	21·7	5·3	2	300	6,000	30·14	1–12 pr. 5–6 prs.	2	58
Peterel	Palmer	1899	215	20·8	..	2	365	6,200	30	1–12 pr. 5–6 prs.	2	62
Quail	Laird	1895	213·6	21·6	5·3	2	300	6,000	30·38	1–12 pr. 5–6 prs.	2	58
Racehorse	Hawthorn	1900	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60
Recruit	Brown & Co.	1901	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Roebuck	Hawthorn	1901	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60
Seal	Laird	1897	218·0	20·0	5·6	2	300	6,000	30·15	1–12 pr. 5–6 prs.	2	58
Spiteful	Palmer	1898	215	20·75	6·8	2	334	6,500	30·1	1–12 pr. 5–6 prs.	2	..
Sprightly	Laird	1901	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
†Stag	Thornycroft	1899	210	19·75	7·2	2	285	5,800	30	1–12 pr. 5–6 prs.	2	60
Star	Palmer	1896	215	20·75	6·88	2	328	6,266	30·7	1–12 pr. 5–6 prs.	2	58
Success	Doxford	1901	210·0	21·0	9·2¾	2	350	6,000	30	1–12 pr. 5–6 prs.	2	62
†Sylvia	,,	1897	210	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58
Syren	Palmer	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..
Taku	Schichau	1898	193·6	20	5	2	305	6,500	32	6–3 pr. Q.	2	..
Thorn	Yarrow	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Thrasher	Laird	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5 6 prs.	2	58
Tiger	Brown & Co.	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Vigilant	,,	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
†Violet	Doxford	1897	210	20·75	6·88	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58
Virago	Laird	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5–6 prs.	2	58
*a*Vixen	Vickers	1901	210·0	20·0	5·8	2	327	6,000	30	1–12 pr. 5–6 prs.	2	62
Vulture	Brown & Co.	1898	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Whiting	Palmer	1896	215	20·75	6·88	2	330	6,239	30·2	1–12 pr. 5–6 prs.	2	58
Wolf	Laird	1897	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58
Derwent	‡Hawthorn	1904	220	23	10	2	534	7,000	25	1–12 pr. 5–6 prs.	2	70
‡Eden	,,	1903	220	23	8½	6	527	7,000	25	1–12 pr. 5–6 prs.	2	70
Exe	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5 6 prs.	2	70
Ribble	Yarrow	1904	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70
Itchen	Laird	1903	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70
Usk	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5 6 prs.	2	70
Teviot	White	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70
Ettrick	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70
Foyle	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70
Erne	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5 6 prs.	2	70
Arun	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70
Blackwater	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5 6 prs.	2	70
Cherwell	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70
Dee	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70
Jed	Thornycroft	1904	222	23½	9·6	2	640	7,500	25½	1–12 pr. 5–6 prs.	2	70
Kennet	,,	1903	222	23½	9·6	2	640	7,500	25½	1–12 pr. 5–6 prs.	2	70
‡Velox	Hawthorn	1902	210	23	8½	8	440	8,000	27	1–12 pr. 5 6 prs.	2	63
Waveney	Hawthorn	1903	220	23½	10	2	534	7,000	25	1–12 pr. 5–6 prs.	2	70
Welland	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70
Chelmer	Thornycroft	1904										
Boyne	Hawthorn	1904										
Colne	Thornycroft	1905										
Doon	Hawthorn	1904										
Gala	Yarrow	1905										
Garry	Yarrow	1905										
Kale	Hawthorn	1904										
Rother	Palmer	1904										
Liffey	Laird	1904	222	23½	9·6	2	600	7,500	25·5	1–12 pr. 5–6 prs.	2	72
Moy	,,	1904										
Ness	White	1905										
Nith	,,	1905										
Ouse	Laird	1905										
Swale	Palmer	1905										
Ure	Palmer	1904										
Wear	Palmer	1905										

† Have Thornycroft W.T. boilers. ‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.
a Has four Express W.T. boilers.

The fourteen vessels of the programme 1904-05 were not put in hand.

Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity
			Length.	Beam.	Draught.								
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Ocean-going.													
‡*Afridi	Armstrong	..											
*Cossack	Laird	..	250	25	7·6	3	790	..	33	3-12-prs.	2	60	9 / 18
*Ghurka	Hawthorn	..											
*Mohawk	White	..											
†*Tartar	Thornycroft ..	..	272	26	9·0	3	800	14,500	33	..	..	68	..
Coastal.													
*Cricket	White	1906	..	..	..	..	220	..	..	..	..	..	..
*Dragon Fly ..	„	1906	..	..	..	..	220	..	..	..	..	..	..
*Firefly	„	..	..	..	..	..	220	..	..	..	..	..	..
†*Gadfly	Thornycroft ..	..											
†*Glowworm ..	„ ..	..											
†*Gnat	„ ..	..	168	17·6	6·0	3	230	3,700	26	2-12 prs.	..	35	..
†*Grasshopper ..	„ ..	..											
†*Greenfly	„ ..	..											
*Mayfly	Yarrow	..	..	..	..	..	230	..	..	..	..	..	..
*Moth	„	..	..	..	..	..	230	..	..	..	..	..	..
*Sandfly	White	..	..	..	..	..	220	..	..	..	..	..	..
*Spider	„	..	..	..	..	..	220	..	..	..	..	..	..
1 special ocean-going t.b.d. (programme 1905–6)	Cammell Laird ..	..	..	..	..	..	..	..	36	..	..	..	..
5 ocean-going t.b.ds. (programme 1906–7) design not settled ..	..	..	..	..	..	..	..	..	..	..	..	..	..
12 coastal t.b.ds. (programme 1906–7) design not settled ..	..	..	..	..	..	..	..	..	..	..	..	..	..
TORPEDO BOATS.													
FIRST CLASS—													
21, 22 (2 boats) ..	Thornycroft ..	1885	113	12·5	5·7	1	63	730	20	..	3	..	10
23, 24 (2 boats) ..	Yarrow	1885–6	113	12·5	5·5	1	67	600	19·5	2-3 prs.	3	..	
25–29 (5 boats) ..	Thornycroft ..	1886	127·5	12·5	6·2	1	60	600	21	..	4	15	
30–33 (4 boats) ..	Yarrow	1886	125	13	5·5	1	60–66	670	19·5	2-3 prs.	5	15	20
a34–38 (5 boats) ..	White	1886	125	14·6	4	1	60–66	950	18–19	..	5	15	
39, 40 (2 boats) ..	Yarrow	1885	100	12·5	..	..	40	500	..	..	1	15	
41–60 (20 boats) ..	Thornycroft ..	1886	127·5	12·5	6·2	1	60	700	21	2-3 prs.	4	15	
61, 63–74, 76–78 (16 boats)	Yarrow	1886	125	13	5·5	1	75	700	19–20	2-3 prs.	5	15	20
79	„	1886	125	13	5·5	..	75	1,000	22·4	2-3 prs.	..	15	20
80	„	1887	135	14	6	1	105	1,540	23	4-3 prs.	5	21	30
81 (*ex* Swift)	White	1885	150	17·5	..	1	125	..	..	6-3 prs.	3	25	35
82–87 (6 boats) ..	Yarrow	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
88, 89 (2 boats) ..	„	1894	142	14·75	4·5	1	112	1,600	..	3-3 prs.	3	18	20
90	„	1895	140	14·25	3·7	1	100	1,430	..	3-3 prs.	3	18	18
91, 92 (2 boats) ..	Thornycroft ..	1894	140	15·5	7·5	1	130	2,400	23–24	3-3 prs.	3	18	25
93	„ ..	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
94–96 (3 boats) ..	White	1894	140	15·5	..	1	130	2,000	23·2	3-3 prs.	3	18	25
97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3-3 prs.	3	18	25
†98 and 99 .. .. / 107 and 108	Thornycroft ..	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
109–113	„ ..	1902	166	17·25	8·4	1	200	2,900	25	3-3 prs.	3	32	42
114–117	White	1903	165	17·6	8·8	1	205	2,900	25	3-3 prs.	3	32	23
SUBMARINES.													
5 boats (Nos. 1–5) .	Vickers	1901–2	63·4	11·9	..	1	120	150	7½	..	1	7	..
3 boats (Nos. A 2–A 4, programme 1902–3)	„	1903	100	10	..	1	180	150	15 / 10	..	2	..	11
9 new boats (Nos. A 5–A 13 (programme 1903–4)	„	1904	150	..	..	..	..	..	16	..	..	..	..
10 new boats (B Class)	„	1905	..	..	..	..	300	850	13·9	..	..	..	..
11 new boats (programme 1905–6) ..	„	..	..	..	..	..	..	..	..	..	..	..	..
10 new boats, contract (programme 1906–7)	..	..	..	..	..	..	..	..	..	..	..	..	..
2 new boats, Chatham (programme 1906–7)	..	..	..	..	..	..	..	..	..	..	..	..	..

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
a No. 34 is fitted with Laird W.T. boilers.

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Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	27·4 *t.*	*1 14-pr.	3	54	80
Missiones..	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr,	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*	Q.F., 2 M.	3	54	80
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Yarrow ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15
4 boats	Yarrow ..	1880–2	100	12·5	6	1	52	600	20	2 mach.	3	14	10

The two 150-ft. boats are named Comodoro Py and Murature.

The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.

The four 100-ft. boats are named Alerta, Centella, Ferre, and Py.

* ¼-in. plating over entire engine and boiler space (Yarrow W.T. boilers).

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Husar	Yarrow ..	1905	219·8	20·3	..	2	384	6,000	28·5	1 12-pr. 7 3-pr.		64	
FIRST CLASS—													
Adler, Falke	Yarrow ..	1886	135	13·7	5·6	1	95	900	22·4	2 Nord.	2	16	28
22 boats	Elbing, Trieste, &c.	1886-9	128	15·9	6·9	1	83	900 / 1,000	17·5 to 21·5	2 mach.	2	15	28
Kaiman	Yarrow ..	1905	179·9	18·0	..	1	197	3,000	26	4 3-pr.		25	
Boa													
Cobra													
Kigyo	Yarrow ..	1898-9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr. Q.F.	3	24	30
Python													
Viper	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr. Q.F.	2	26	30
Natter	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr. Q.F.	3	..	30

Five destroyers building and six to be ordered, 1906; thirteen sea-going torpedo boats (Kaiwan class) building and ten to be ordered, 1906.

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Araguary	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Iguatemi	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcilio Diaz	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·8	2 Q.F.	4	27	22
5 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	28	2-1 prs.	3	24	30

Two submarine boats, Jacinto Gomez and Mello Marques.

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Chili.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella ..	Laird	1896	210	21·6	5·4	2	300	6000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero.. ..	Laird	1896	210	21·6	5·4	2	300	6000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano ..	Laird	1896	210	21·6	5.4	2	300	6000	30·35	1-12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme ..	Laird	1896	210	21·6	5·4	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Tarpa .. .. .. Capitan O'Brien ..	Laird	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Yarrow ..	1896 1898	152·6	15·3	7·9	1	140	2200	27·5 27·2	3-3 pr. Q.F.	3	28	40
Tegualda, Quidora, and Fresia	Yarrow ..	..	87	10·9	..	1	..	400	..	..	..	..	
SECOND CLASS—													
1 boat	White	1892	60	9·6	5	1	15	270	19	..	1	..	
1 boat	La Seyne ..	1895	42	8·6	..	1	..	..	..	..	1	..	

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso.

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
3 boats	Elbing ..	1886–97	144·3	16·4	7·5	1	128	1,400	24·2	4 1-pr. revs.	2	20	15
25 boats	Stettin, &c. .	1886–87	110	13	4·9	1	65	1,000	19·5	1-pr. revs.	3	16	10
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	
SECOND CLASS—													
1 boat	Foochow ..	1903	88·6	6·7	3·3	1	30	550	20·5				

About twenty boats only are said to be serviceable.

Costa Rica.

Costa Rica has one 62-ft., 15-knot boat.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Hajen .. .. .. Havörnen .. .. Söbjörnen	Copenhagen Copenhagen Copenhagen	1896 1897 1898	154·3	15·4	7·9	2	142	2,317	22·9	1 4·7-in. 1 1-pr.	3	..	..
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Sóulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Four destroyers and two boats are provided for.

France.

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Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse..	Normand ..	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen ..	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Carabine	Rochefort ..	1902	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Carquois	Rochefort ..	Bldg.	190·3	19·6	10·3	2	335	7,200	30	1-9 pr.	2	62	37
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Claymore	Normand ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	61	75
Coutelas	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dard	Rouen ..	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6 3prs.	2	62	75
Durandal	Normand ..	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort ..	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fauconneau	Normand ..	1900	183·9	20·8	10·3	2	300	5,000	27·1	1-9pr. 6-3prs.	2	62	84
Flamberge..	Rochefort ..	1901	183·9	20 8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Francisque..	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Glaive..	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	61	75
Hache	Toulon ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand ..	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs.	2	62	84
Harpon	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Javeline	Nantes ..	1903	183·9	20·11	10 3	2	300	7,000	29·3	1-9pr. 6 3prs.	2	62	75
Massue	Toulon ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort ..	1906	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Mousquet	Nantes ..	1902	183·9	20·11	10·3	2	300	6,300	30 2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Obusier	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Pertuisane	Rochefort ..	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs	2	62	75
Pistolet	Nantes ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6 3prs.	2	62	75
Rapière	Rochefort ..	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sagaie..	Havre(F.&C.)	1902	183·9	20·11	10·3	2	300	6,000	30·1	1-9pr. 6-3prs.	2	62	75
Sarbacane	Rochefort ..	1903	183·9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Stylet	Rochefort ..	1905	190·3	20·11	10·3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Takou*	Elbing ..	1898	193·7	21·0	..	2	280	6,000	25	6-3 pr. Q.F.	2	62	67
Tromblon	Rochefort ..	1905	190·3	21 0	..	2	335	6,300	25	6-3 pr. Q.F.	2	62	67
Trident	Rochefort ..	Bldg.	190·3	19·6	10·3	2	335	7,200	30	1-9 pr.	2	62	37
Yatagan	Nantes ..	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	33
M 47-52 (6)	Normand ..	Bldg.											
M 53-54 (2)	Normand ..	Pro.											
M 55-56 (2)	Rochefort ..	Bldg.	190·3	20·11	10·3	2	335	6,800	28	1-9pr. 6-3prs.	2		
M 57-58 (2)	Toulon ..	Bldg.											
M 59-64 (6)	..	Pro.											
SEA-GOING—													
Agile	La Seyne ..	1889	139	14·7	7·7	2	121	1,100	20·4	3-3 prs.	2	26	14
Alarme	St. Nazaire	1889	151	15·7	8·3	2	169	1,400	20·5	2-3 prs.	4	30	40
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	25·17	2-3 prs.	2	31	17
Archer	Normand ..	1893	138	14·7	6·5	2	131	1,250	21	2-3 prs.	2	26	17
Argonaute..	St. Denis ..	1893	141	16·4	9·3	2	131	1,500	25·1	2-3 prs.	2	34	16
Audacieux..	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Aventurier	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	20·5	2-3 prs.	4	34	40
Averne	Havre(F.&C.)	1894	141	16·4	9·3	2	133	1,500	24·4	2-3 prs.	2	27	16
Borée	Bordeaux ..	1900	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Bourrasque	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·41	2-3 prs.	2	..	18
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	131	2,700	27·2	2-1 prs.	2	32	17
Corsaire	St. Denis ..	1893	160·5	15·	5·4	2	171	2,500	25·5	4-1 prs.	2	32	15
Coureur	Chiswick ..	1888	147·5	14·5	4·6	2	129	1,550	23·28	4 Nords.	2	27	22
Cyclone	Normand ..	1898	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Dauphin	Havre(F.&C.)	1894	141	16·4	9·3	2	137	1,500	25·22	2-3 prs.	2	34	16
Défi	St. Nazaire..	1889	151	15·7	8·3	2	173	1,400	21	2-3 prs.	4	30	40
Dragon	Normand ..	1892	138	14·7	8·2	2	129	1,400	25	2-3 prs.	2	26	15·5
Eclair	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·5	3-3 prs.	2	26	17
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2-3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,100	31·2	2-1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2-3 prs.	2	26	15·5
Grondeur	Havre(F.&C.)	1892	147·5	14·5	5	2	130	1,550	21	2-3 prs.	2	27	20
Kabyle	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·6	3-3 prs.	2	27	17
Lancier	Normand ..	1893	138	14·7	8·2	2	128	1,400	25·79	2-3 prs.	2	26	15·5
Mangini	Nantes ..	1896	147·6	14·8	7·9	2	129	2,100	27·5	2-3 prs.	2	34	17
Mistral	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Mousquetaire	Havre(F.&C.)	1892	154	15·7	7	2	150	2,100	24·77	2-1 prs.	2	32	18
Orage	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·7	3-3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15·7	8·3	2	174	1,400	20	2-3 prs.	4	30	40
Rafale..	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·47	2-3 prs.	2	..	18
Sarrasin	Bourdeaux..	1893	139	14·7	7·7	2	131	1,100	20·5	3-3 prs.	2	26	14
Simoun	Havre(F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Siroco	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Téméraire	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	21	2-3 prs.	4	30	40

* Captured from the Chinese at Taku, 1900. N.B.—"F. & C." "Forges et Chantiers."
"Normand" means that the boat has been built at that firm's yard at Havre.

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Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardjoeno	Yarrow ..	1886	125	13	6	1	83	80	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Yarrow ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Yarrow ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Yarrow ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Scylla	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24.3	2 1-prs.	3	18	20
Hydra	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	1904	152 6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Sphinx and another..	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
4 Ophir type	..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 2-prs.	2	25	36
2 Ophir type	..	Pro.	152·6	15·3	7·9	1	130	1,900	27	2 2-prs.	2	25	36

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel. One submarine boat (Holland type) to be purchased.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in.Q.F.	2	..	..
Storm, Brand, Trods	Christiania..	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana ..	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauk, Falk	Christiana ..	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..

First-class torpedo boats, 23 knots, Ore and Raven, launched 1904; No. 24 building.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				
Submarine—													
Plongeur	Lisbon ..	1892	72·1	11·5	..	..	100	..	6		4	6	

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Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet	Feet.		Tons.		Knots.				Tons.
Naluka	Havre.. ..	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre.. ..	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre.. ..	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Soimul	Yarrow ..	1882	63	8	3	1	12	150	16·5	..	..	8	
Vulturul	Yarrow ..	1882	63	8	3	1	12	150	16·5	..	..	8	

Russia.

Name or Number. N.B.—There is some doubt as to the 1895 and 1898 destroyers.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.													
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Prytki	Poplar.. ..	1895	190	18·6	7.0	2	240	4,400	29.7	1 12-pr, 3 3-pr	2		
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Pilky, Ridny, Posluchny, Protchny, Poratsaluschy, Prontsiteliny, Podvitsny	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	1	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Bravi, Vidny	Nevsky and Ishora ..	1900–2	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	3		
Grozni, Gromiashtchi	St. Petersburg	1904	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	3		
Tverdy, Totschny, Trevoshny	Abo	1905	196 9	18·4	11·5	1	240	6,000	27	1 12-pr, 5 3-pr	3		
Iskousny, Ispolnitelni, Kriepky, Legky	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	20 100
Lovki, Letutshi, Lihoi	Havre (Normand)	1905	185·8	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	20 100
Boievoi, Editelny, Burni, Vnimatelni, Vnushitelni, Vynoslivny, Silni, Storoshevoi, Stroiny, Rasyashtshy, Rastoropny, Burakoff, Dyelni, Dostoiny, Deyatelni, Myetky, Molodetsky, Moshtshny, Sergieff, Yorasvisky, Sviereff, Dmitrieff, Malleieff, Anastosoff	Russian Yards	1905 & Bldg.	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	20 100
FIRST CLASS—													
Aspen	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Bjerke	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Dago	Abo	1891	152	13	8·3	..	100	1,000	19				
Domeness	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Eckness	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Hapsal	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Hogland	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Kotka	Abo	1891	152	13	8·3	..	100	1,000	19				
Kronschlot	Ishora.. ..	1891	152	13	8·3	..	100	1,000	19				
Moonsund	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Nargen	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Pernoff	Normand ..	1892	137·9	14·9	6·8	2	120	1,600	25	2 3-prs.	2	26	16
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Seskar	Ishora.. ..	1891	152	13	8·3	..	100	1,000	19				
Sestoretsk..	Normand ..	1894	118	13·2	8·6	1	80	1,300	24	2 1-prs.	2	21	10
Tosna	Putiloff ..	1893	127·9	15·7	6·9	1	98	1,250	21	..	2	13	17
Transund	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
8 boats	St. Petersburg	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
2 boats	Putiloff ..	1894	138	14·7	9·9	2	118	..	25	2 mach.	2	26	
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
8 boats	Nevsky ..	1898	..	..	..	..	118						

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Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
BLACK SEA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka	Nicolaieff ..	1903-4	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
Stremitelini, Strogi, Smetlivy, Svirepy†	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Zadorni, Zorki, Zvonki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bestrachni, Beschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2		
Grozovoi, Vlastni ..	Havre (F. & C.)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr 5 3-pr	2	..	80
Boiki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			

† These destroyers proceeded from Cronstadt to Sebastopol, unarmed, January, 1903, passing the Dardanelles by consent of the Porte.

A small submarine boat from the plans of Lieut. Kolbasieff and Engineer Kuteinikoff has received the name of Matros Piotr Koschka. Bubnoff's submarine, the *Delfin* (77 ft., 175 tons), made a successful run of 36 hours from Kronstadt to Bjoerkoe, 26 hours submerged. It is stated that six more are to be built. There are two submersibles, 80 ft. long, designed by Drzewiecki. Graf Sheremeteff completed at St. Petersburg, and several others said to be in hand.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Terror .. .. .. Audaz	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 2 1-pr.	2	67	100
Osado .. .. .. Proserpina	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 2 1-pr.	2	70	90
FIRST CLASS—													
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·1	2 mach.	2		
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Bustamente	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-prs.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·3	1 mach.	2		
Halcón	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Julian Ordoñez ..	Chiswick ..	1885	117·7	12·5	6·2	1	65	660	20·1	2 1-in. Nord.	2		
Orion..	Gaarden ..	1885	125–	15·5	3·5	1	85	1,000	21·5	2 1-pr. revs.	2	18	16
Barcelo	..	1886	117·7	12·5	6·2	1	63	660	20	2 mach.	2		
VEDETTE BOATS—													
3 boats	East Cowes	1892	60	9·3	..	..	..	..	18·3				
SUBMARINE—													
Peral..	Carraca ..	1889	70	8·5	..	2	87	60	10				

Ariete and Rayo, first-class torpedo boats, destroyed by fire at Carraca, Cadiz, Dec. 10, 1905.

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Sweden.

Torpedo Boats.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyer—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Mode	Yarrow ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. / 5 6-prs.	2	55	95
Magne	Thornycroft	1905	216·7	20·0	7·2	2	350	7,400	30·5	1 12-pr. / 5 6-prs.	2	59	96
First Class—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt..	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F.	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Mira	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion .. .. .. / Sirius .. .. .. / Kapella	Carlskrona..	1903	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Pleiad	Normand ..	1905	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	—
2 boats (9 and 11) ..	Carlskrona..	1894	126·8	13·11	7·7	1	86	850	19·5	2 mach.	2	16	15
Second Class—													
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 81	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 83	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 85	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
Third Class—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 / 1890	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
Submarine—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12–11	..	1	..	..
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10–7	..	..	..	..

Provision is made for one destroyer and some torpedo boats in 1906.

Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Gaarden ..	1894	187	21·6	..	2	270	1,200	25	6 1-pr. revs.	2		
Tajjar	Gaarden ..	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
First Class—													
Ellagot, Ac-Hisar ..	Sestri Ponente	1901	165·8	18·6	4·5	..	165	2,200	27				
7 boats	Sestri Ponente	Bldg.	165·8	18·6	4·5	..	165	2,200	24				
A. B...	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16
Edjder (No. 10) ..	Gaarden ..	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
5 boats	Gaarden ..	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
2 boats	Kiel	1892	127	..	..	..	..	..	22				

United States.

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Name.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Armament. Torpedo Tubes.	Complement.	Maximum Coal Capacity.
			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
DESTROYERS—													
Bainbridge	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.*	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Chauncey	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Dale	Richmond	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Decatur	Richmond	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Lawrence	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Macdonough	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Paul Jones	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	7,000	29·3	2 12-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Whipple	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Worden	Baltimore	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Bagley	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,000	30	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	3,910	28	3 3-pr.	3	29	..
Blakely	Boston	1902	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
De Long	Boston	1901	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	3,400	28·58	4 1-pr.	3	32	76
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,600	30	4 6-pr.	2	..	76
Foote	Baltimore	1896	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
Goldsborough	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	5,880	30	4 6-pr.	2	..	131
Nicholson	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
O'Brien	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	3,800	28·63	4 1-pr.	3	32	76
Rodgers	Baltimore	1896	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	26	4 1-pr.	3	32	60
Shubrick	Richmond	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stockton	Richmond	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stringham	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	30	7 6-pr.	2	..	120
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Tingey	Baltimore	1901	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,000	26·25	3 3-pr.	3	29	70
Winslow	Baltimore	1897	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
SEA-GOING—													
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·5	3 1-pr.	3	23	36
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22·5	3 1-pr.	3	..	..
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22·5	3 1-pr.	3	..	..
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing	1898	149 3½	17 5	..	2	145	..	..	..	..	..	..
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
THIRD CLASS—													
Gwin	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
SUBMARINE—													
Adder	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Grampus	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Holland	Elizabethport	1896	51 0	10 3	..	1	74	150	8	1 dynamite	1	5	..
Moccassin	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Pike	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Plunger	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Porpoise	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Shark	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Cuttlefish	Quincy, Mass.	Bldg.											
Viper	Quincy, Mass.	Bldg.											
Tarantula	Quincy, Mass.	Bldg.											
Octopus	Quincy, Mass.	Bldg.											

* Guns of destroyers of this class are Driggs Semi-Automatic Quick-Firers.

Six destroyers and six torpedo boats are intended to be laid down in 1905.

With the exception of the Lawrence, Macdonough, and Stewart, all the destroyers in the first alphabetical list have Thornycroft water-tube boilers. The Farragut, Goldsborough and Stringham have also boilers of this type.

The submarine Fulton, of the Holland type, built experimentally by the Holland Company, was launched June, 1901. Two submarines of 105 tons and two of 81 tons are to be built by the Fore River Company.

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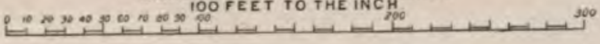
PLANS

OF

BRITISH AND FOREIGN SHIPS.

SCALE FOR HALF-PAGE PLATES.
100 FEET TO THE INCH



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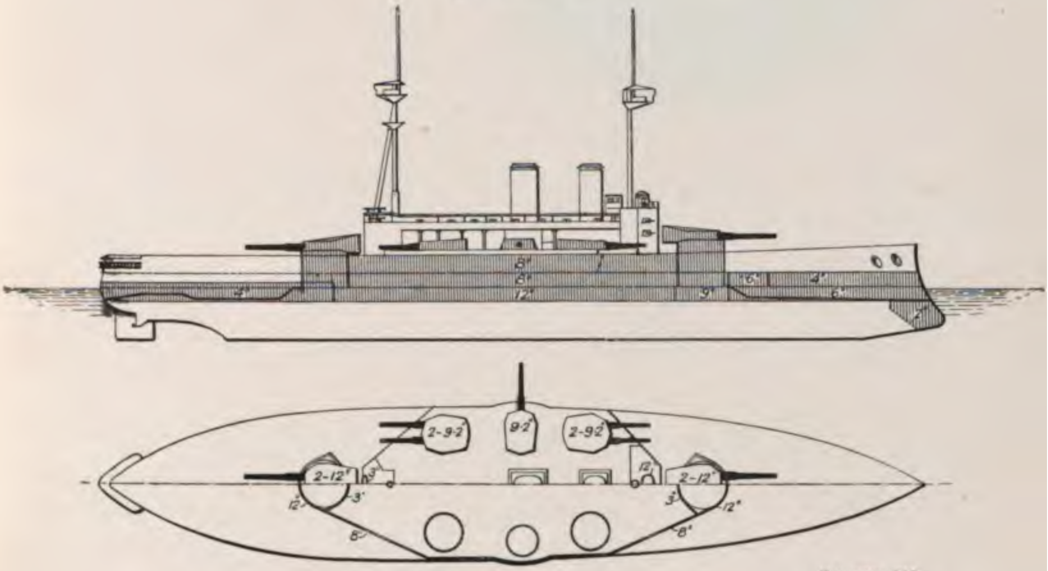
GREAT BRITAIN.

BATTLESHIPS.

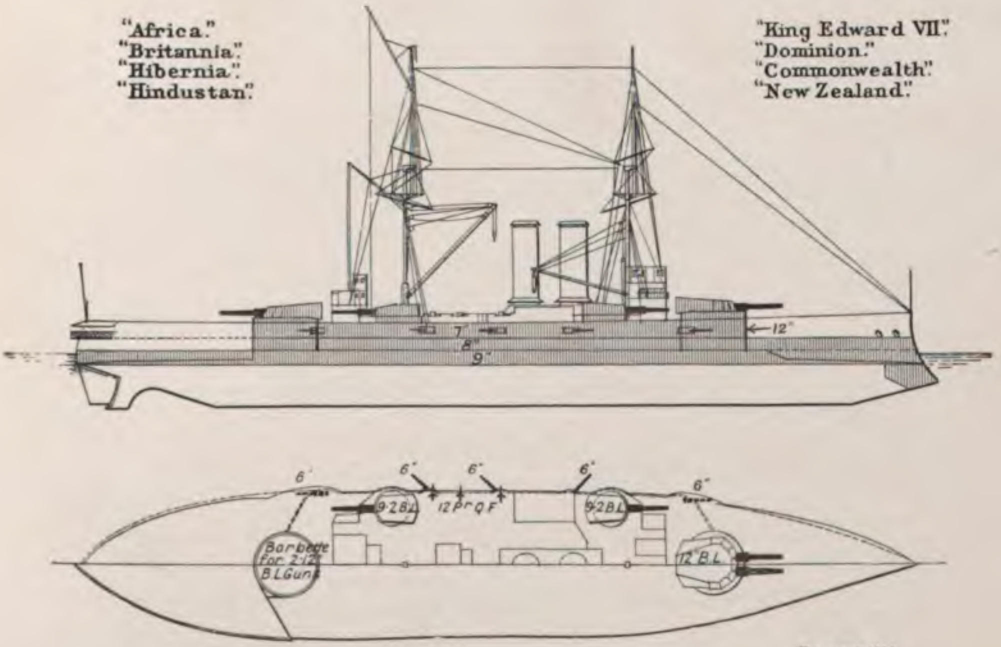
"Lord Nelson"
"Agamemnon"



See page 212.

"Africa."
"Britannia."
"Hibernia."
"Hindustan."

"King Edward VII."
"Dominion."
"Commonwealth."
"New Zealand."



See page 208.

PLATE 1.
b 2

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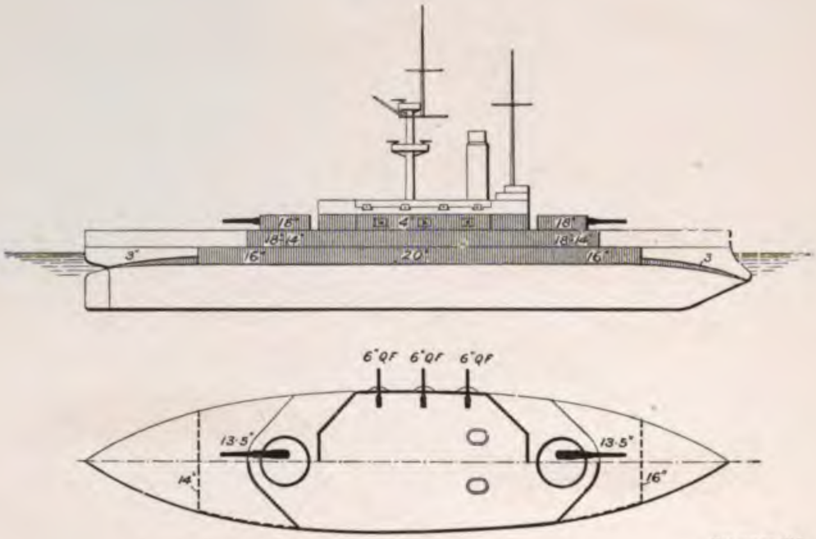
GREAT BRITAIN.

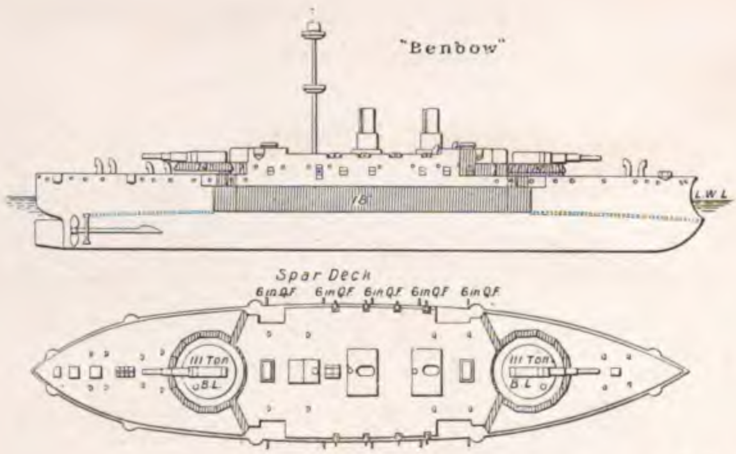
BATTLESHIPS.

Trafalgar.
Nile.



See page 215.

"Benbow"



See page 208.

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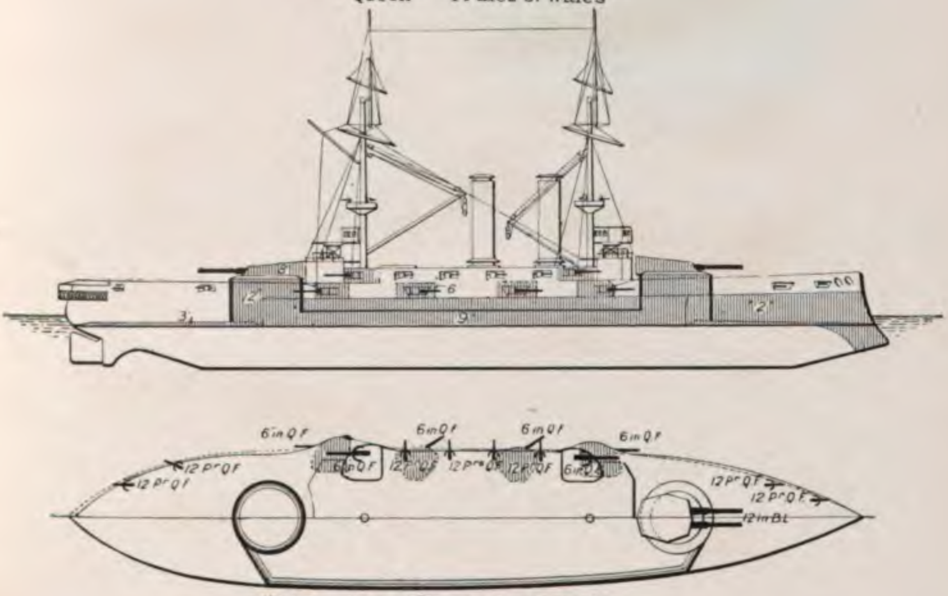
GREAT BRITAIN.

BATTLESHIPS.

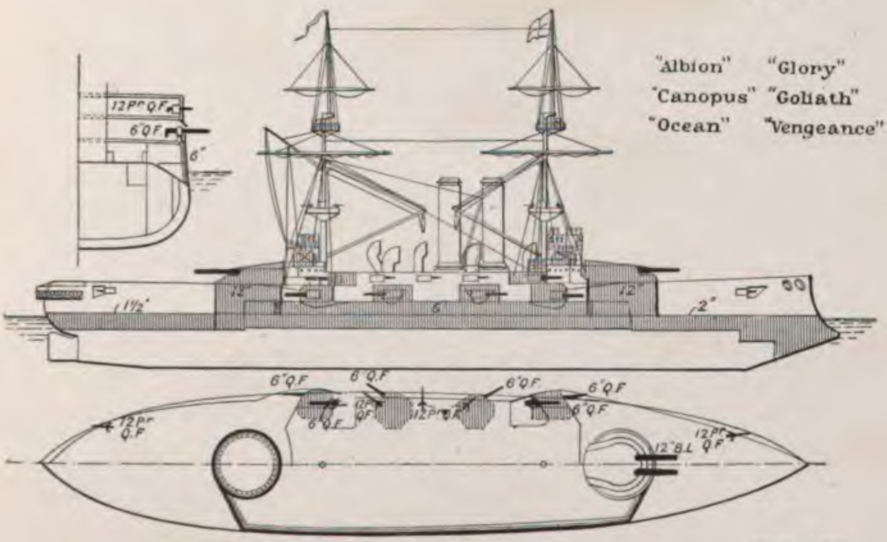
"Formidable", "Irresistible", "Implacable",
×"Bulwark", ×"London", ×"Venerable",
×"Queen" ×"Prince of Wales"



×In These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead

See page 210.

"Albion" "Glory"
"Canopus" "Goliath"
"Ocean" "Vengeance"



See page 208.

PLATE 3.

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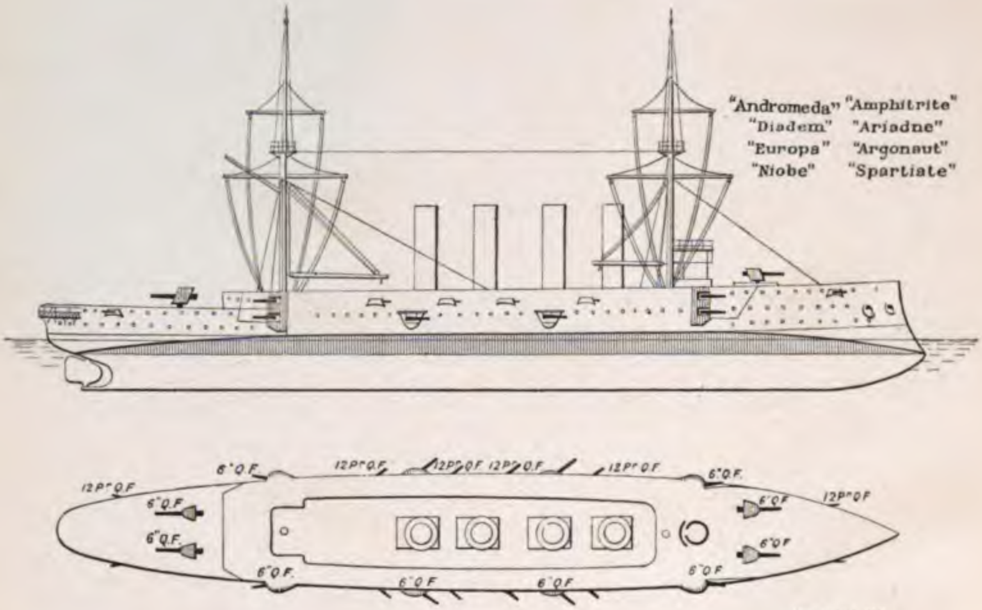
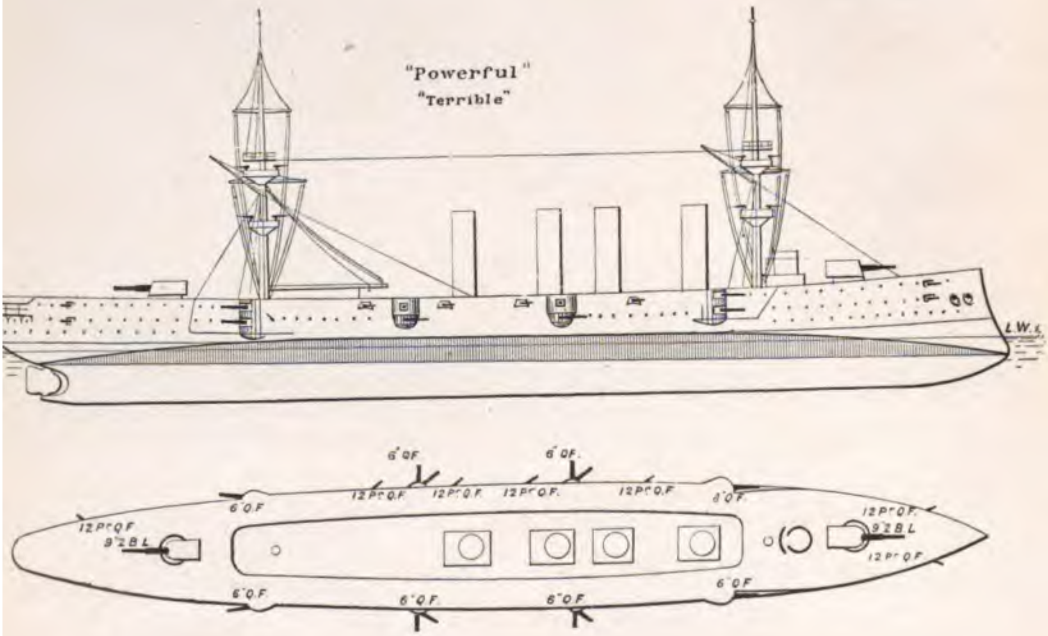
GREAT BRITAIN.

CRUISERS.



See page 216.



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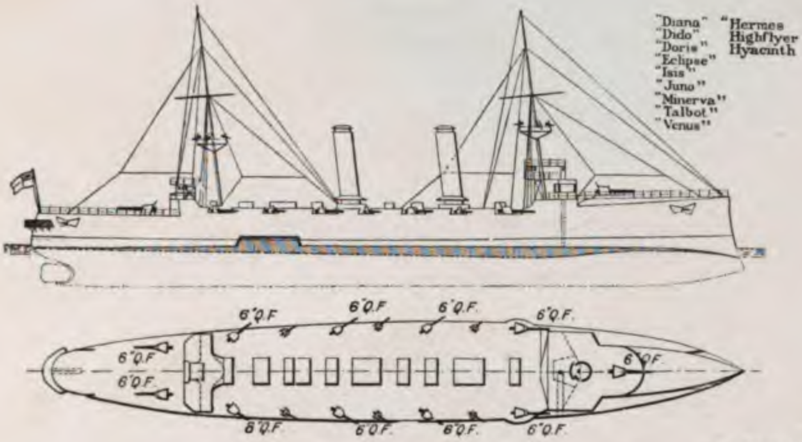
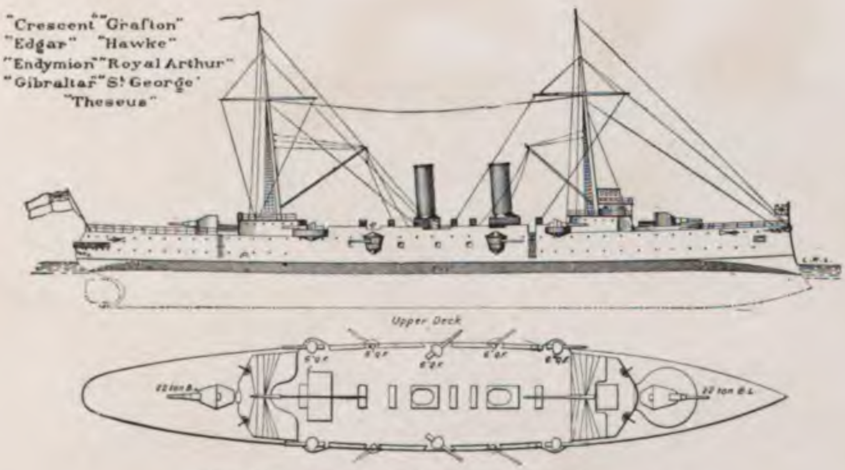
GREAT BRITAIN.

CRUISERS.



See Page 217.



Note. *The Crescent and Royal Arthur have two 6 in guns forward in place of the 22 ton gun, and have a forecastle.*

See page 217.

PLATE 11.

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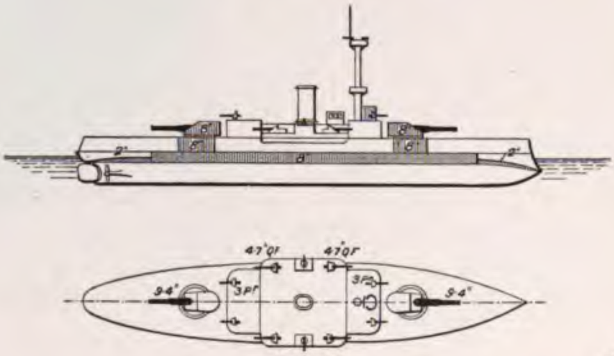
ARGENTINA.

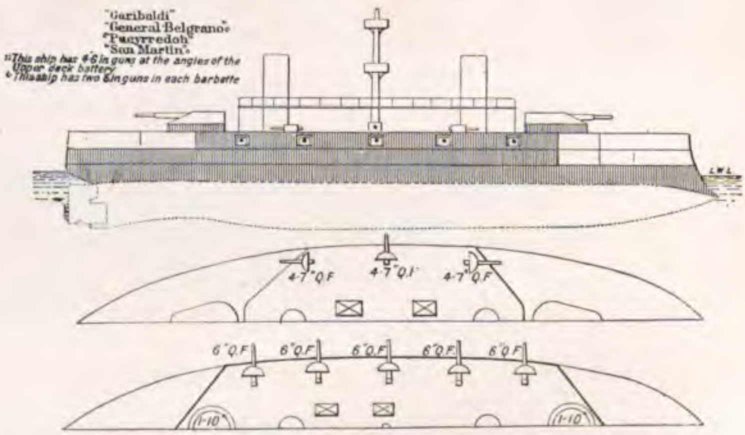
COAST DEFENCE SHIPS.

Libertad.
Independencia.



See page 224.

ARMOURED CRUISERS.



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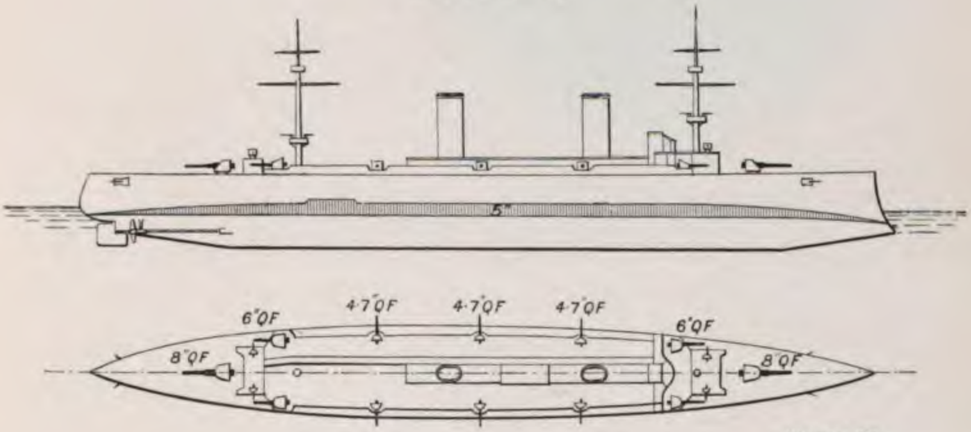
ARGENTINA.

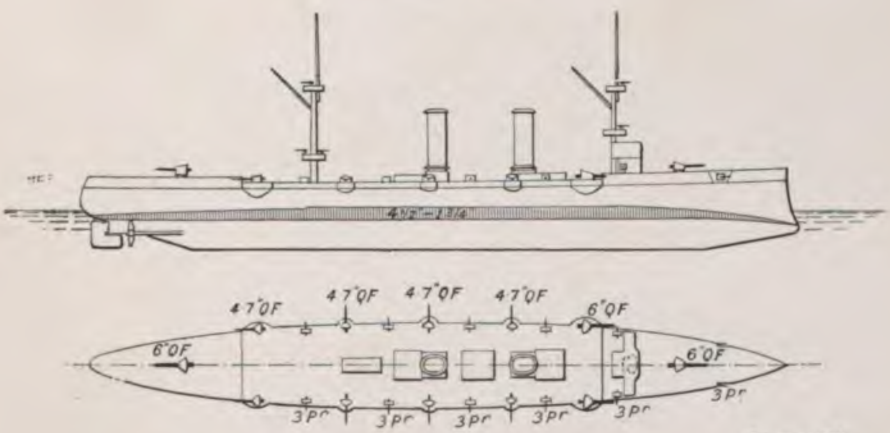
CRUISERS.

"Buenos Aires"



See page 225.

"Nueve de Julio"



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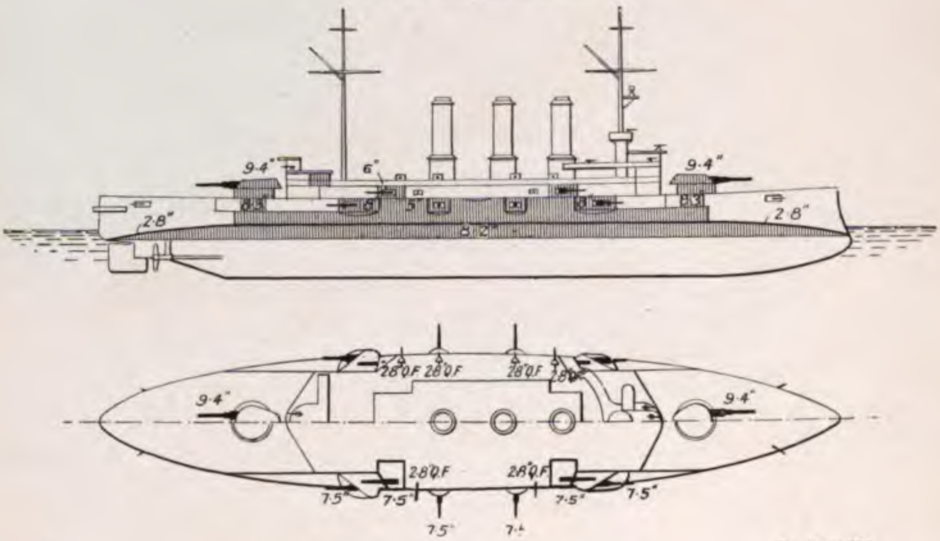
AUSTRIA.

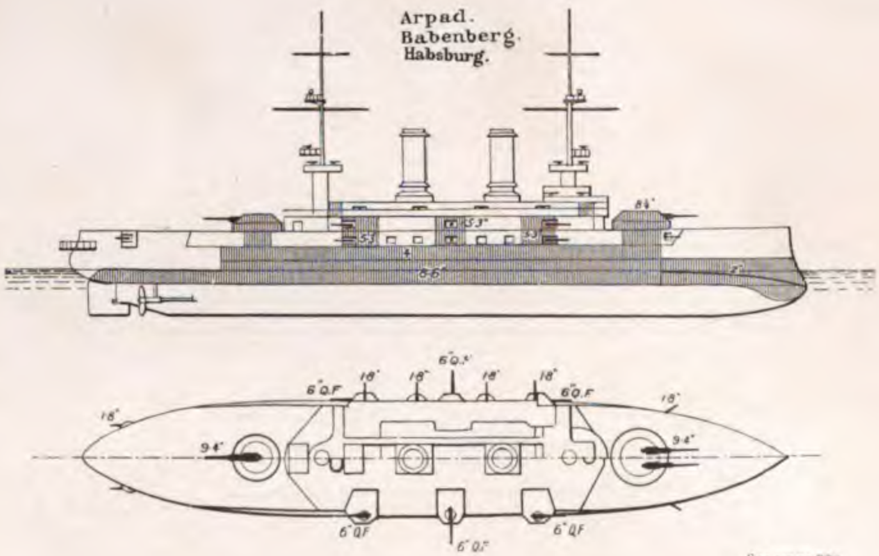
BATTLESHIPS.

Erzherzog Karl
"Erzherzog Friedrich"



See page 226.

Arpad.
Babenberg.
Habsburg.



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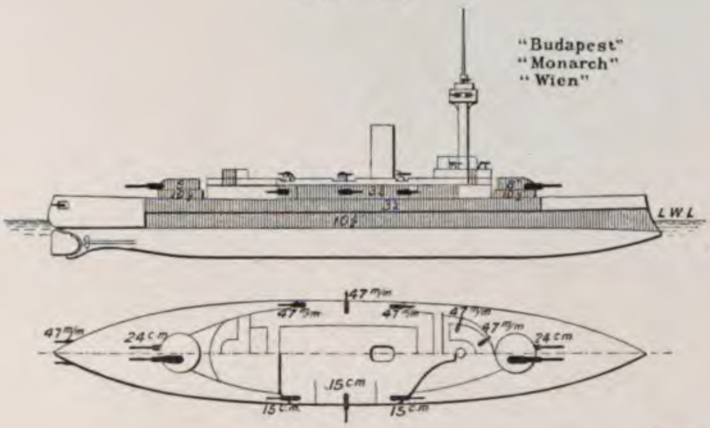
AUSTRIA.

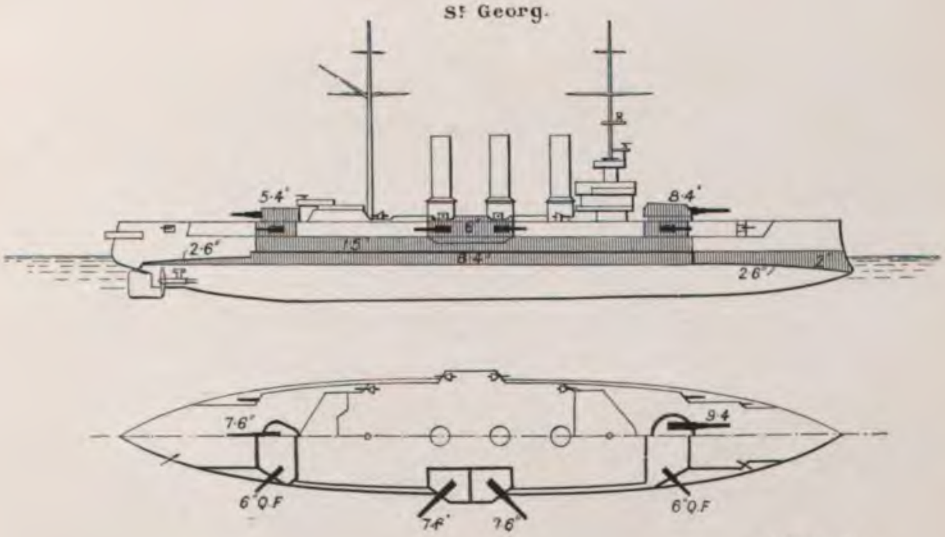
BATTLESHIPS.



See page 226.

ARMOURED CRUISER.

St Georg.



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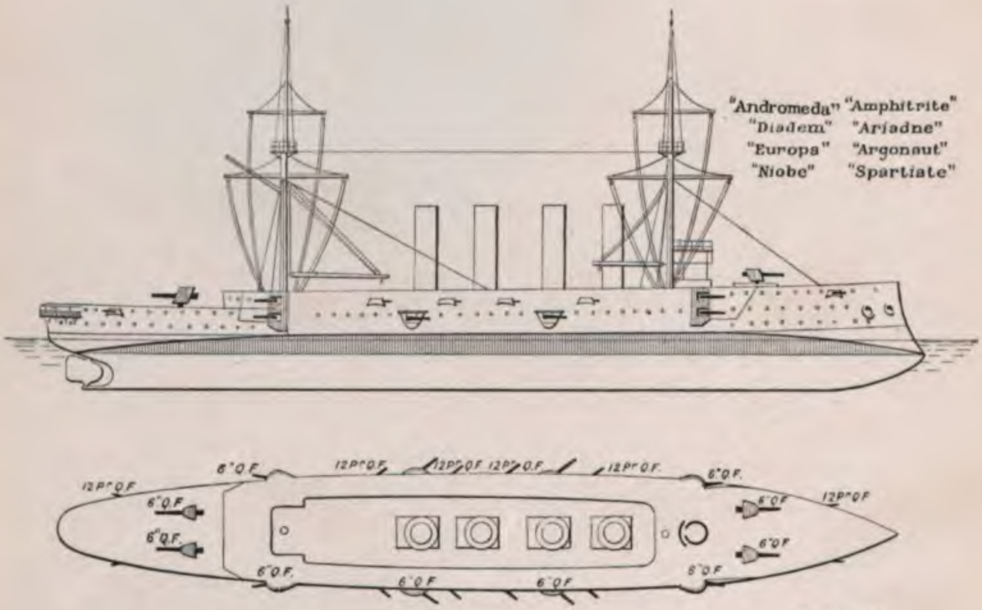
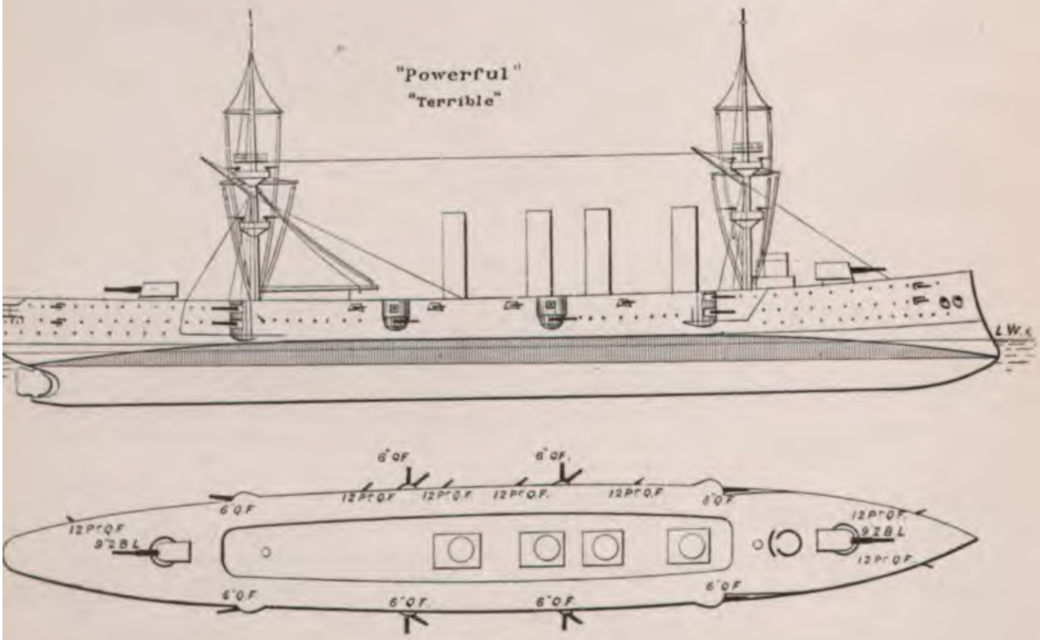
GREAT BRITAIN.

CRUISERS.



See page 216.



See page 221.

PLATE 10.

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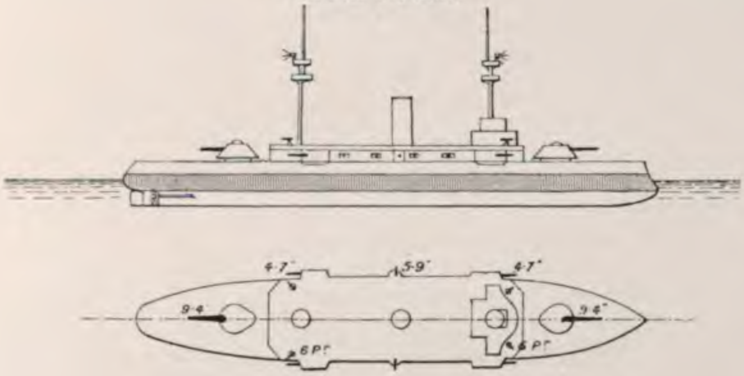
BRAZIL.

COAST DEFENCE SHIPS.

Marshal Deodoro
Marshal Floriano.



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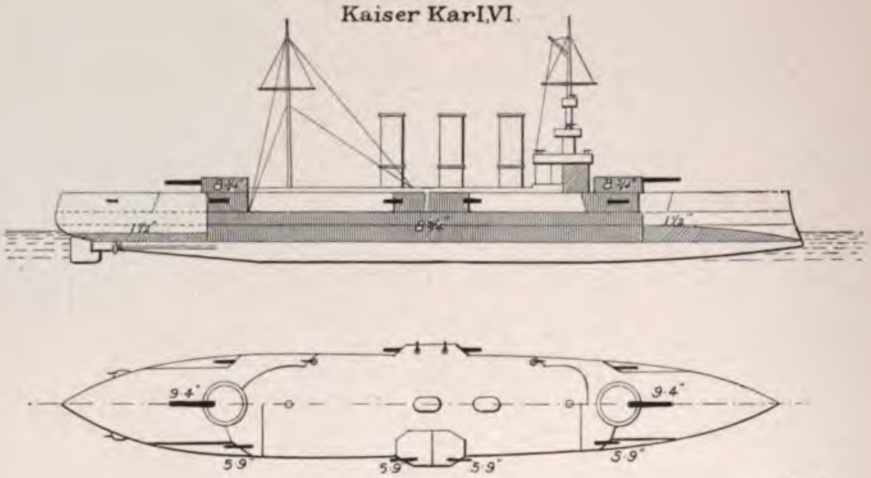
AUSTRIA.

ARMOURED CRUISERS.

Kaiser Karl VI.



See page 226.

"Kaiserin Maria Theresia"

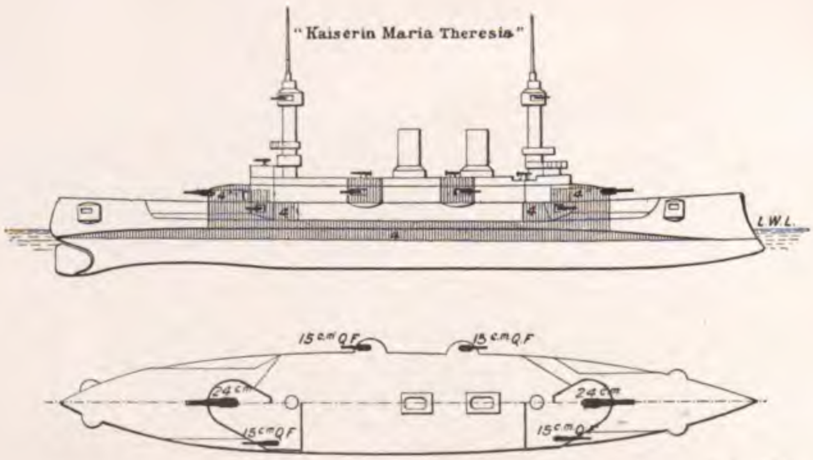


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PLATE 16.

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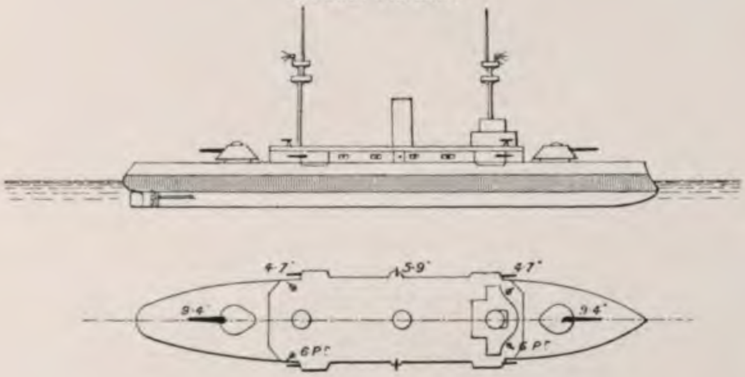
BRAZIL.

COAST DEFENCE SHIPS.

Marshal Deodoro
Marshal Floriano.



See page 229.

PLATE 17.
C 2

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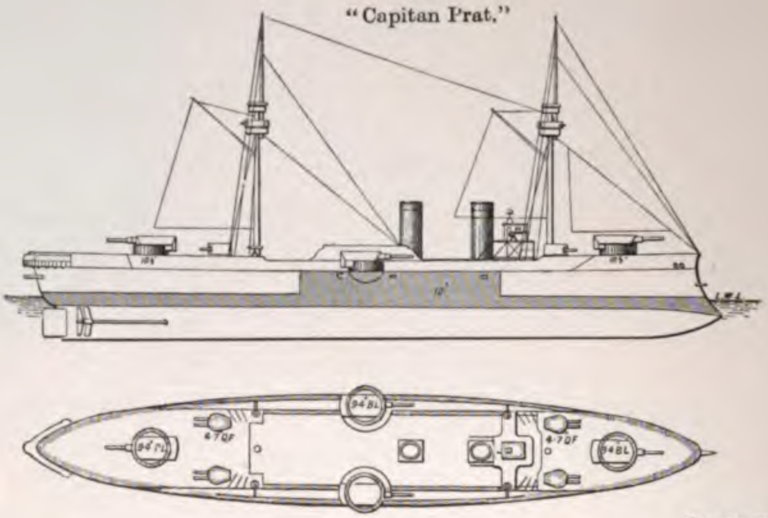
CHILI.

BATTLESHIP.

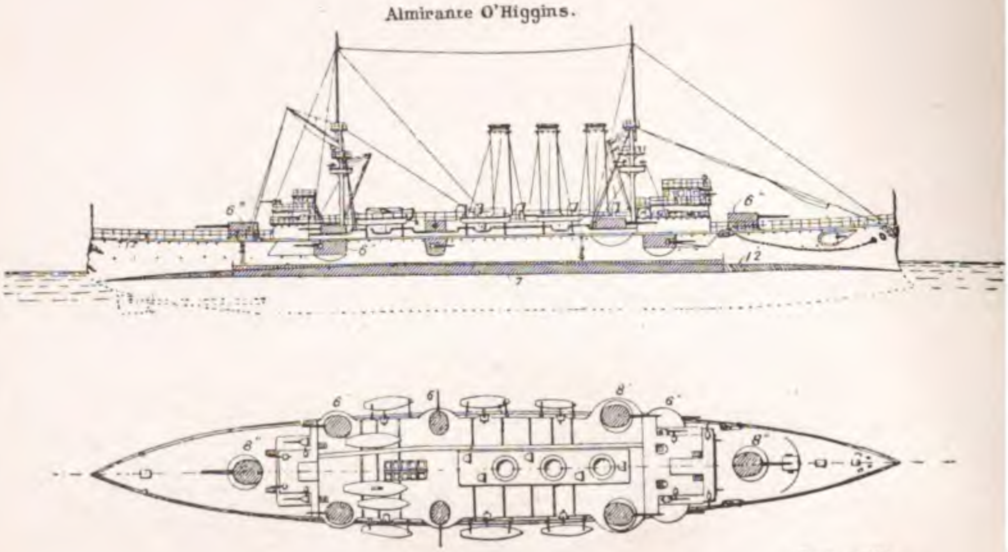
"Capitan Prat."



See page 231.

ARMOURED CRUISER.

Almirante O'Higgins.



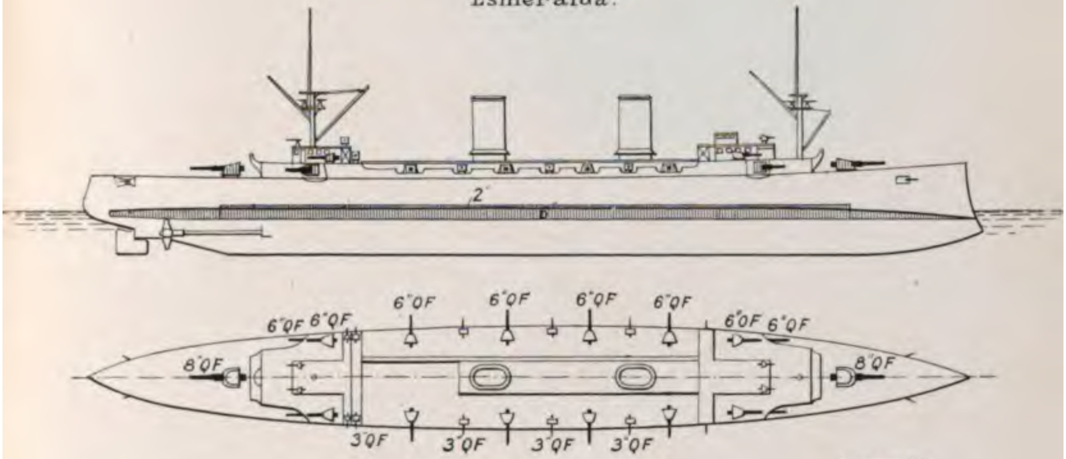
See page 231.

PLATE 18.

www.libtool.com.cn CHILI.

ARMOURED CRUISER.

"Esmeralda."



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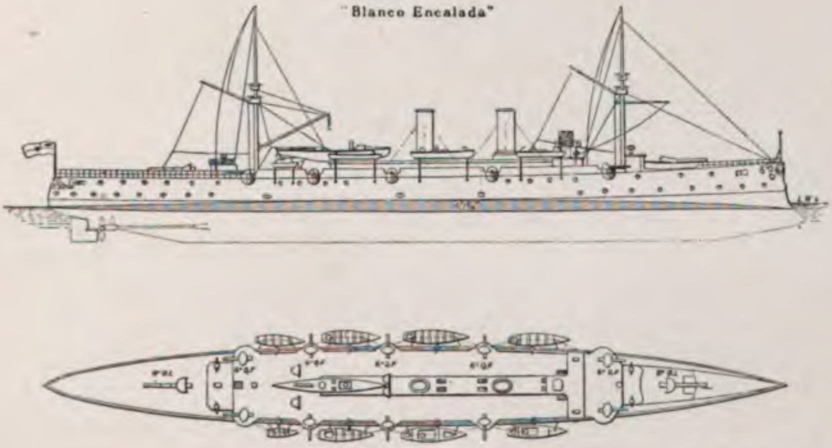
CRUISER.

"Blanco Encalada"



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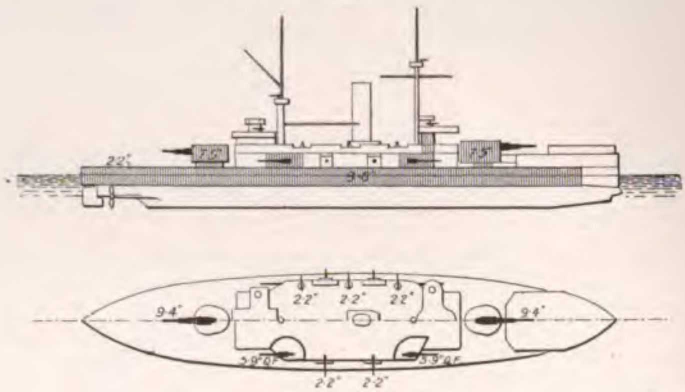
COAST DEFENCE SHIPS.

Herluf Trolle.
Olfert Fischer.
Peder Schram.



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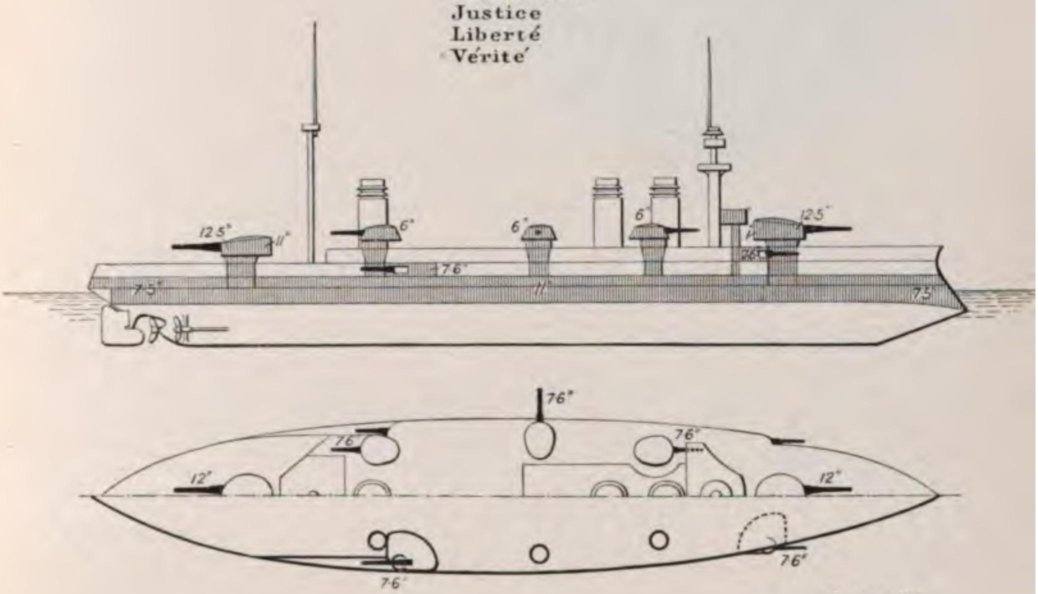
www.libtool.com.cn

FRANCE.

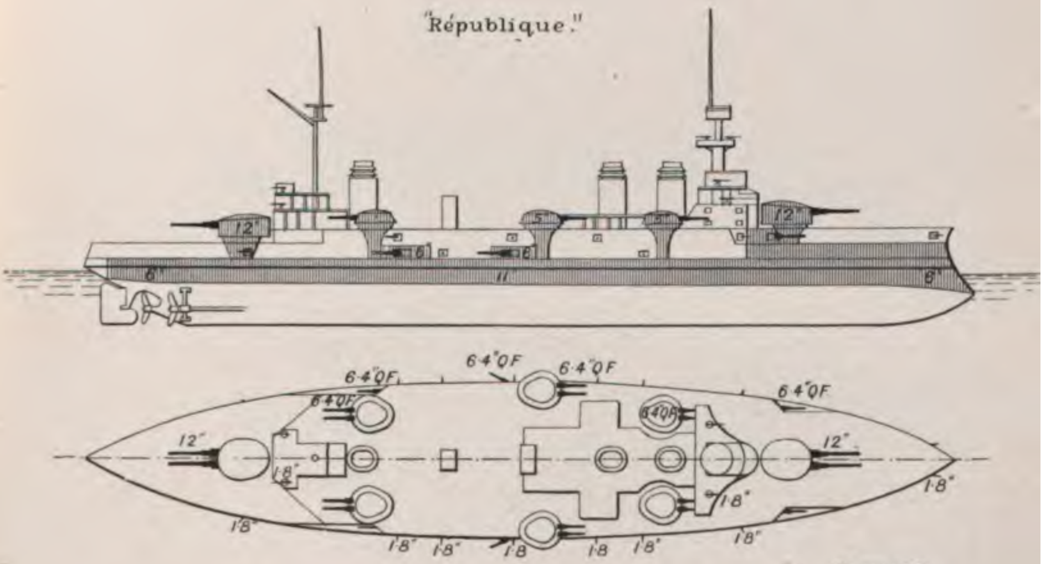
BATTLESHIPS.

Démocratie
Justice
Liberté
Vérité



See page 236.

"République."



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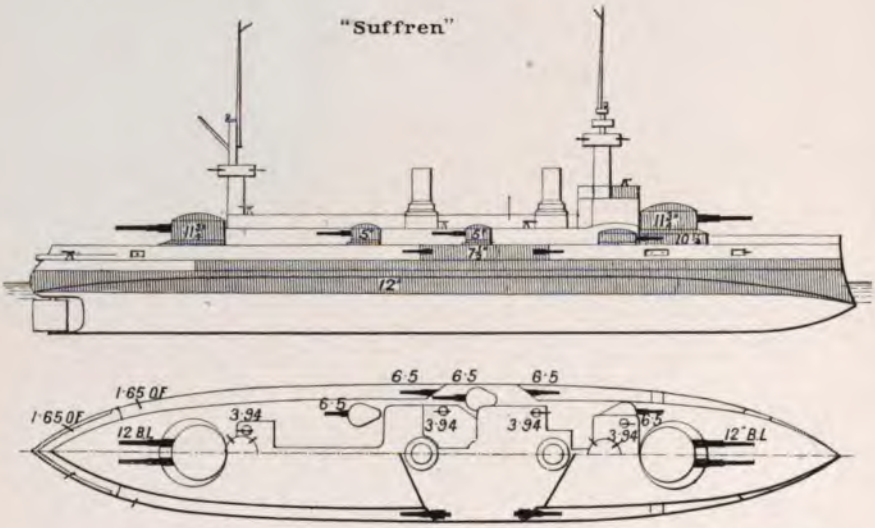
FRANCE.

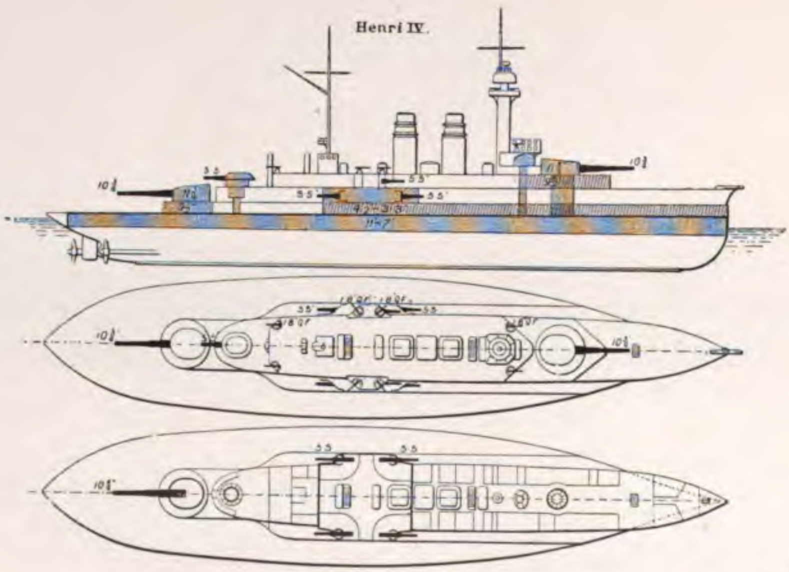
BATTLESHIPS.

"Suffren"



See page 239.

Henri IV.



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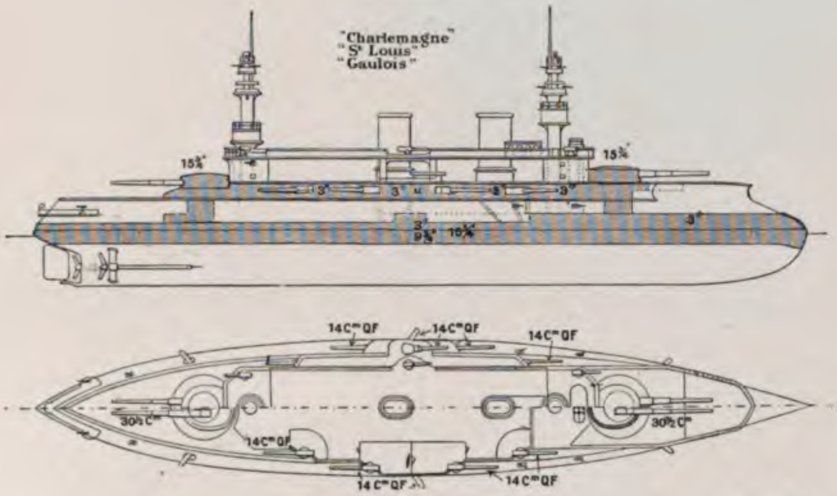
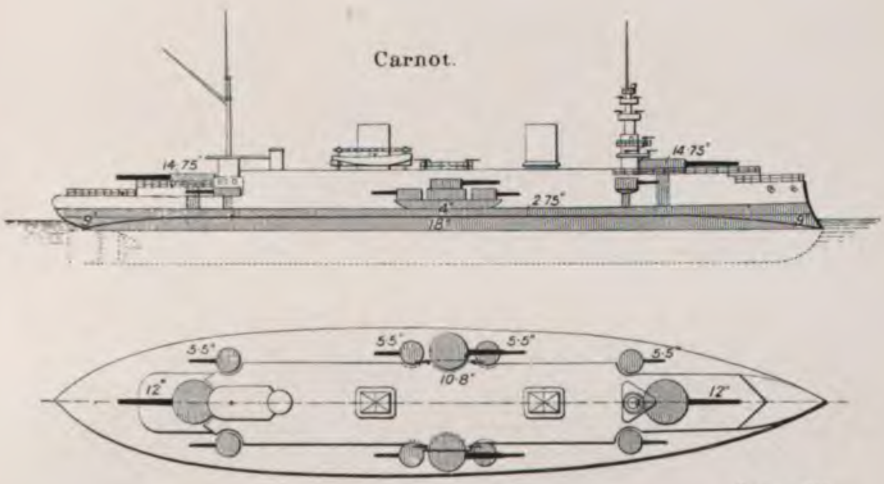
FRANCE.

BATTLESHIPS.



See page 236.



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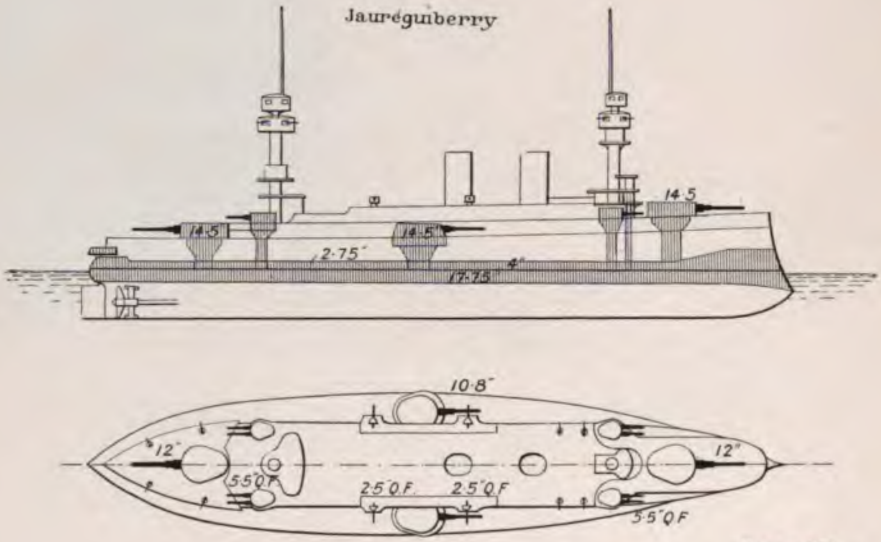
FRANCE.

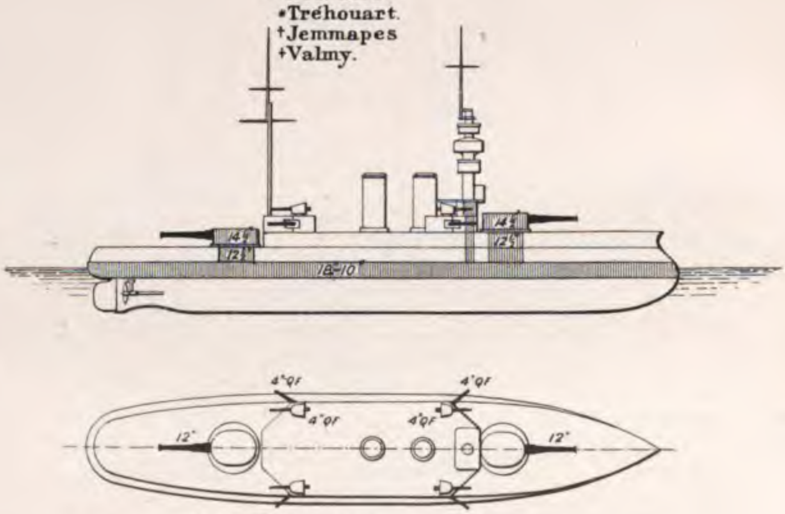
BATTLESHIPS.

Jauréguiberry



See page 237.

Bouvines
*Tréhouart.
†Jemmapes
†Valmy.



* The "Tréhouart" has but one funnel.

† These ships have 13.4" guns in the turret and only 4.4" guns. The forward 13.4" gun is mounted on the same deck as the after one.

See page 235.

PLATE 24.

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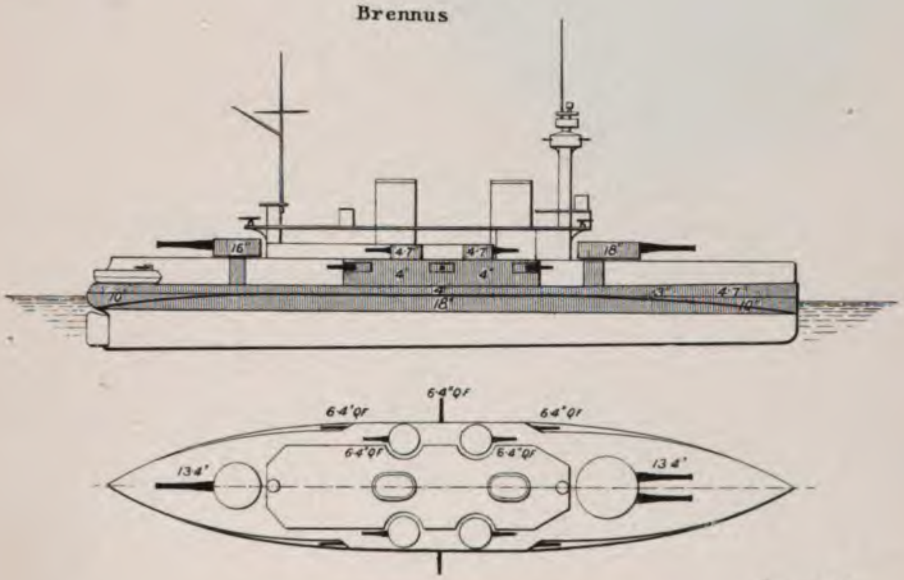
FRANCE.

BATTLESHIPS.

Brennus



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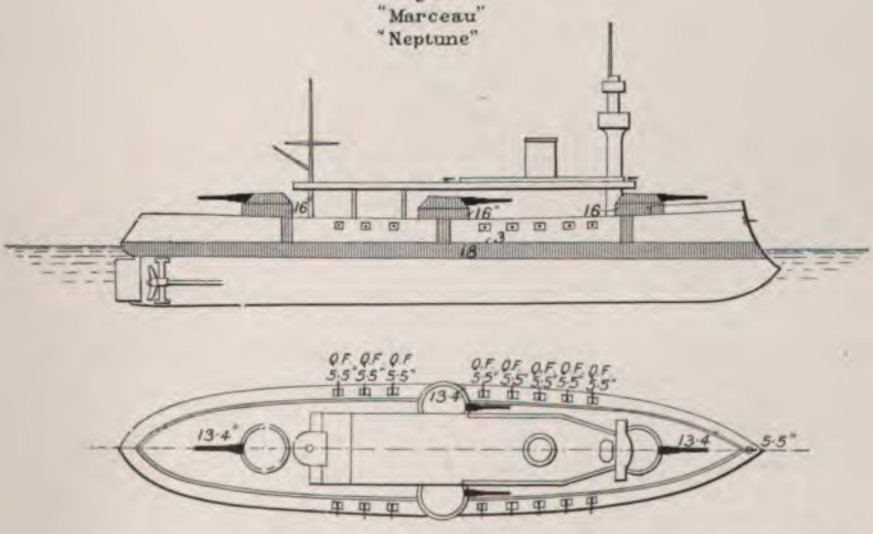
"Magenta"
"Marceau"
"Neptune"



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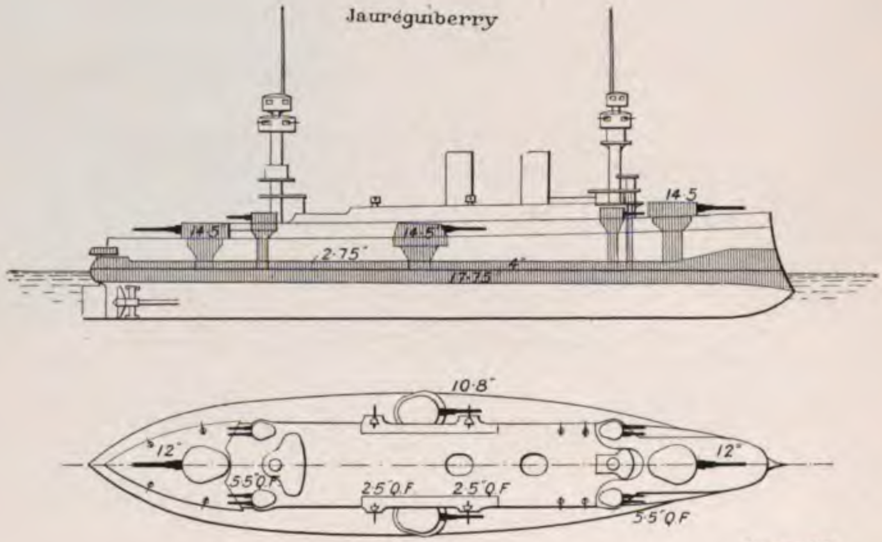
FRANCE.

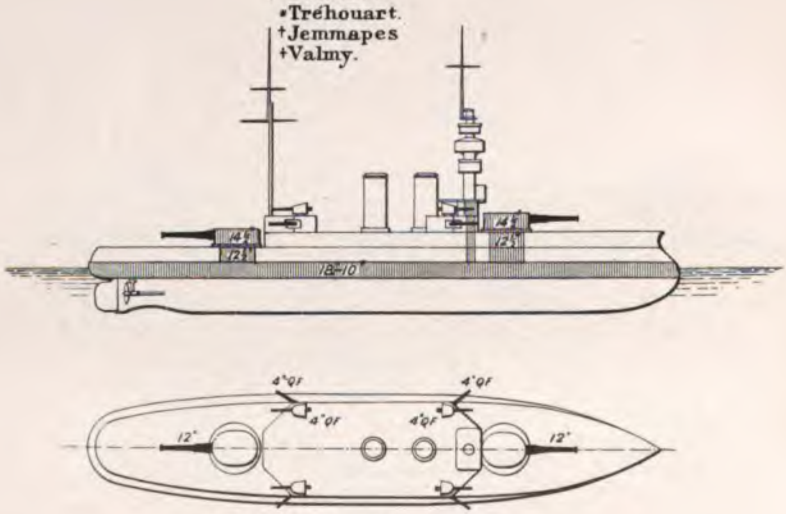
BATTLESHIPS.

Jauréguiberry



See page 237.

Bouvines
*Tréhouart.
†Jemmapes
†Valmy.



* The "Tréhouart" has but one funnel.

† These ships have 13·4" guns in the turret and only 4·4" guns. The forward 13·4" gun is mounted on the same deck as the after one.

See page 235.

PLATE 24.

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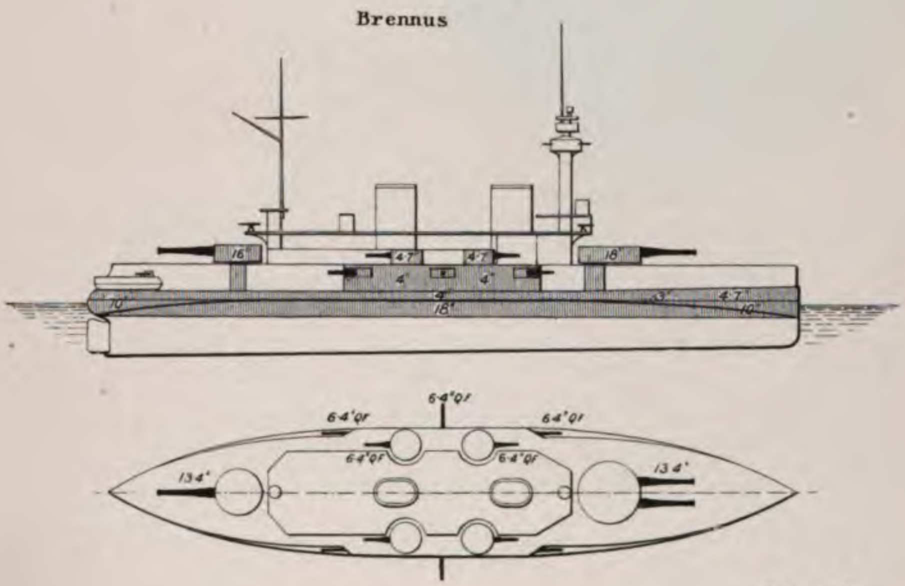
FRANCE.

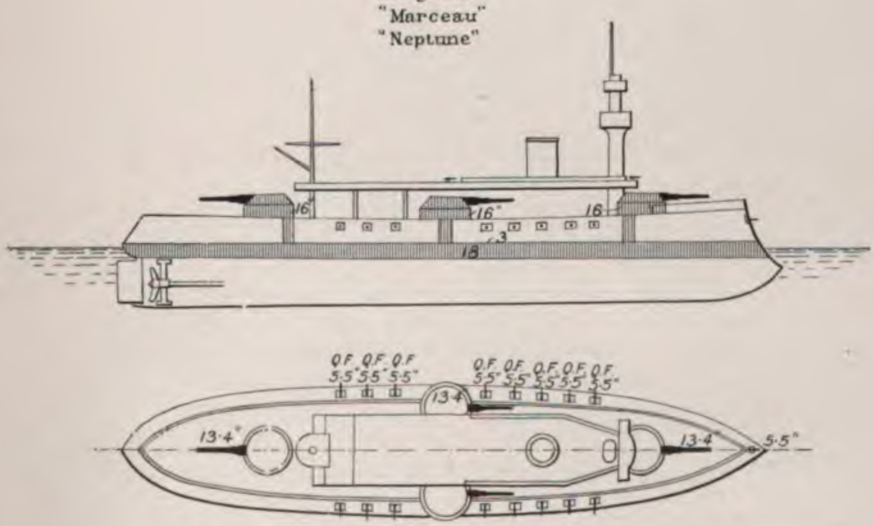
BATTLESHIPS.

Brennus



See page 235.

"Magenta"
"Marceau"
"Neptune"



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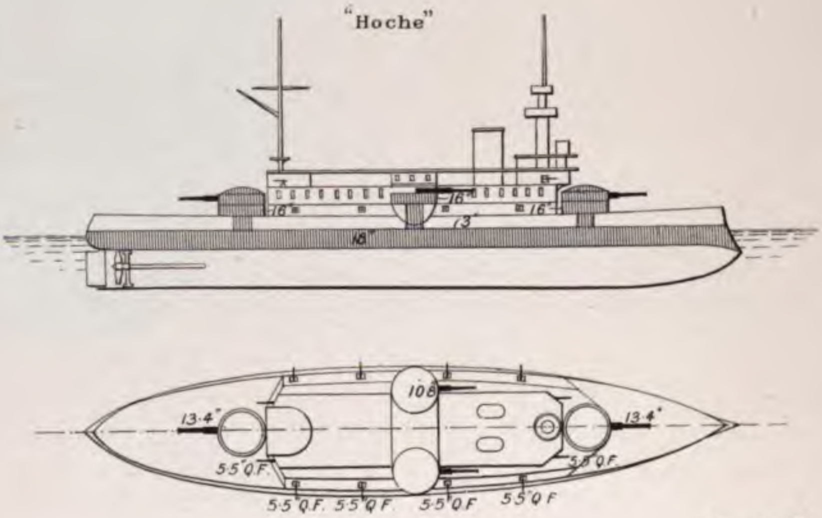
FRANCE.

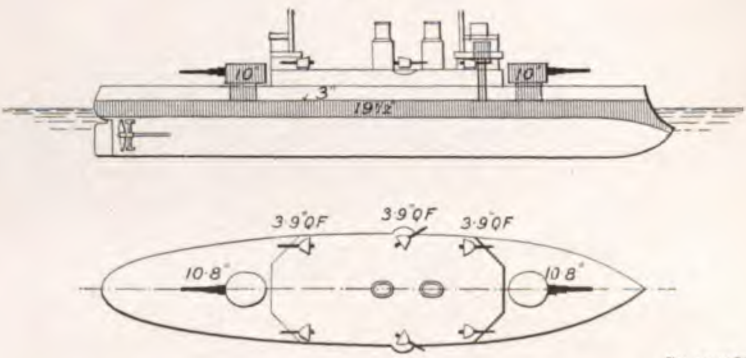
BATTLESHIPS.

"Hoche"



See page 237.

"Caiman"
"Indomptable"
"Requin"
"Terrible"



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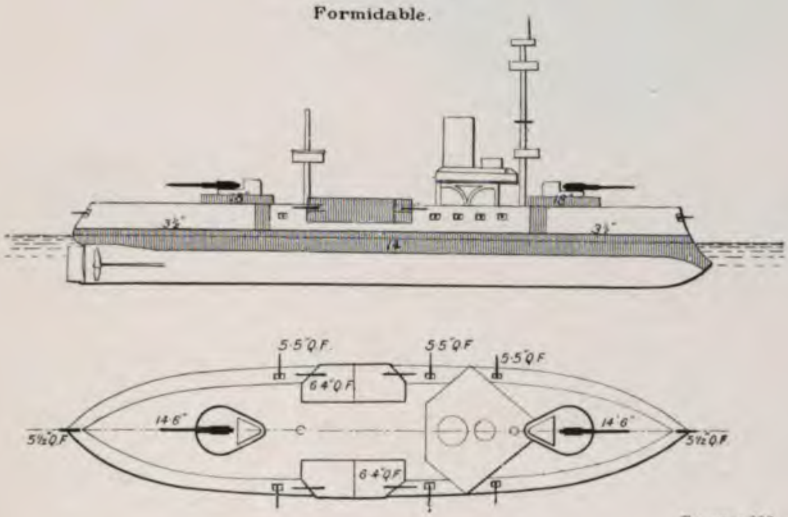
FRANCE.

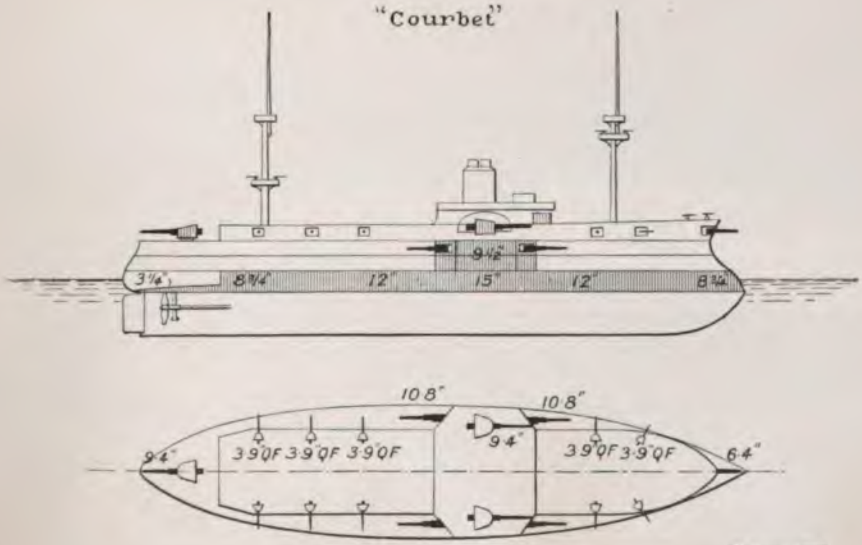
BATTLESHIPS.

Amiral Baudin.
Formidable.



See page 235.

"Courbet"



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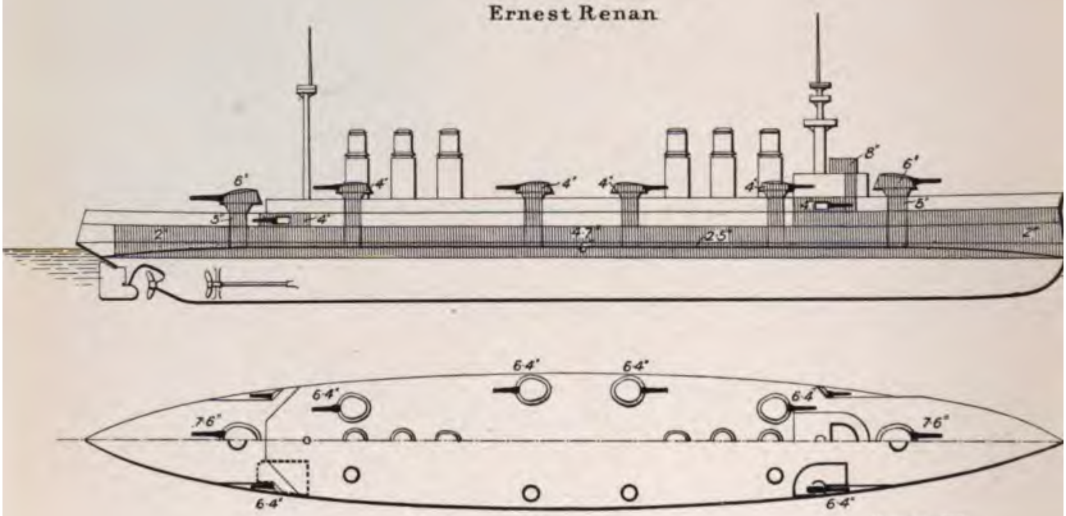
FRANCE.

ARMOURED CRUISER.

Ernest Renan



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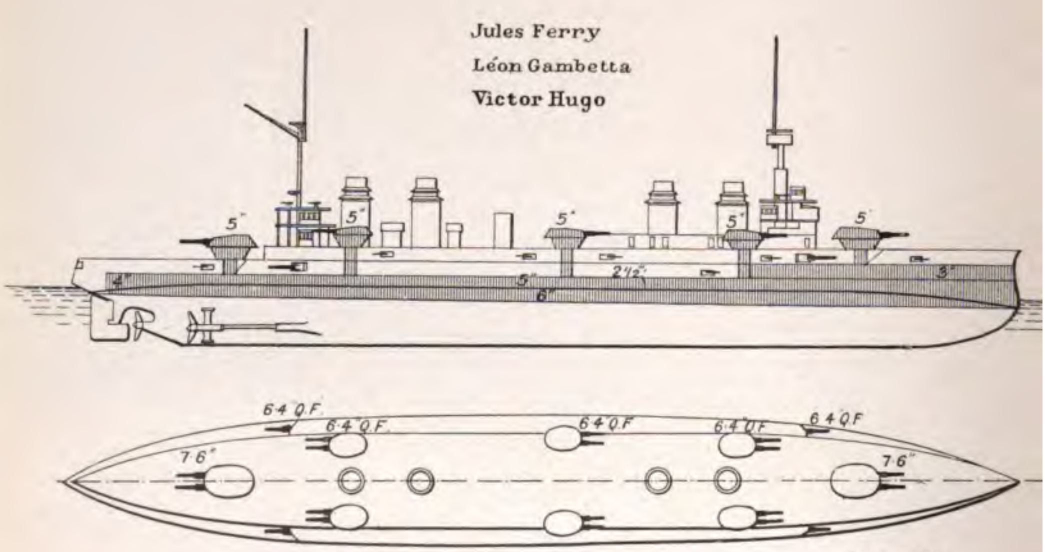
Jules Ferry

Léon Gambetta

Victor Hugo



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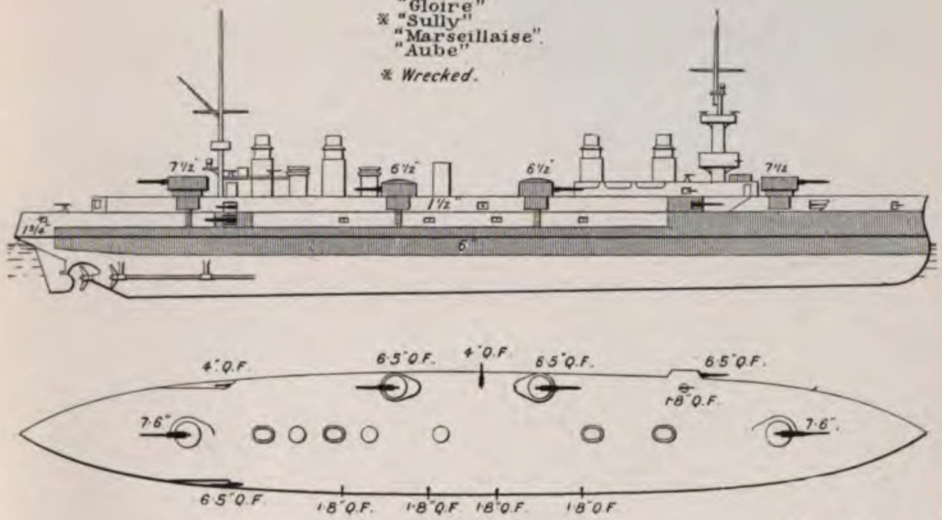
FRANCE.

ARMOURED CRUISER.

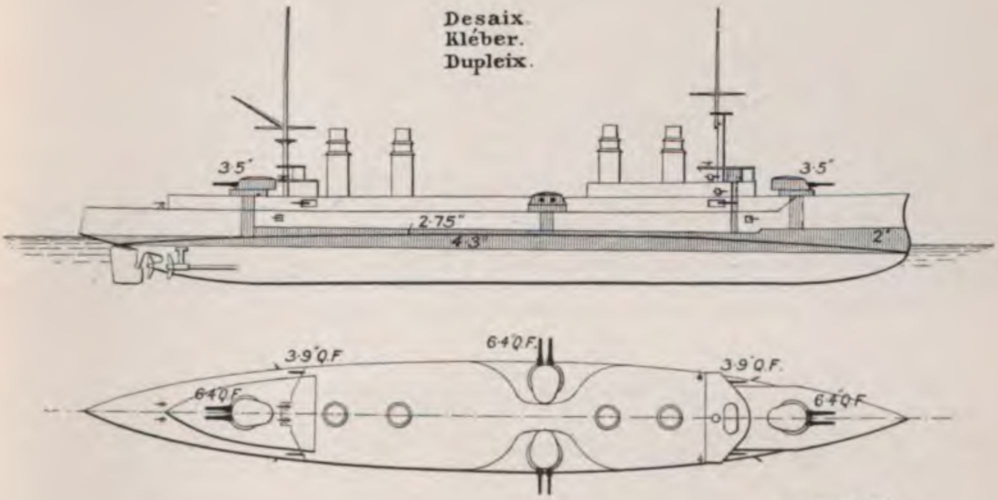
"Condé"
"Gloire"
※ "Sully"
"Marseillaise".
"Aube"

※ *Wrecked*.



See page 236.

Desaix.
Kléber.
Dupleix.



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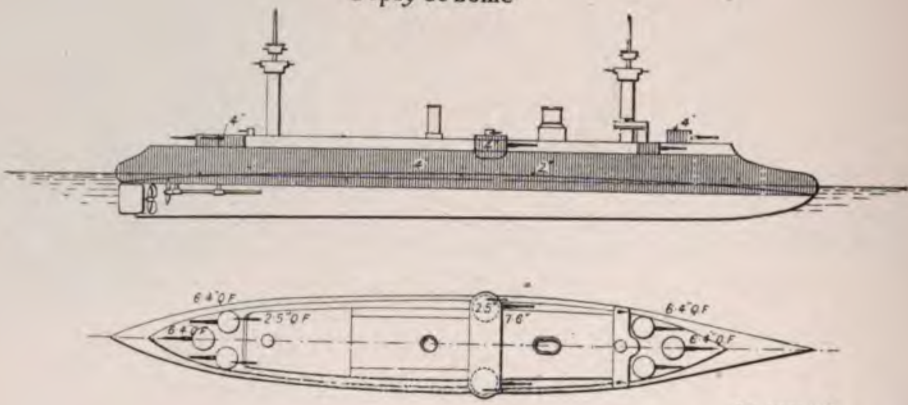
FRANCE.

ARMOURED CRUISER.

"Dupuy de Lôme"



See page 237.

CRUISER.

Jurien de la Gravière

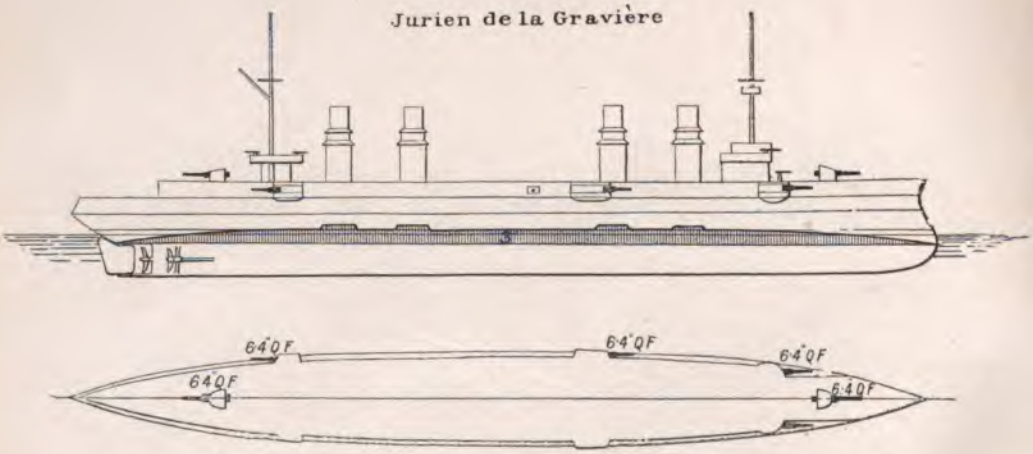


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PLATE 32.

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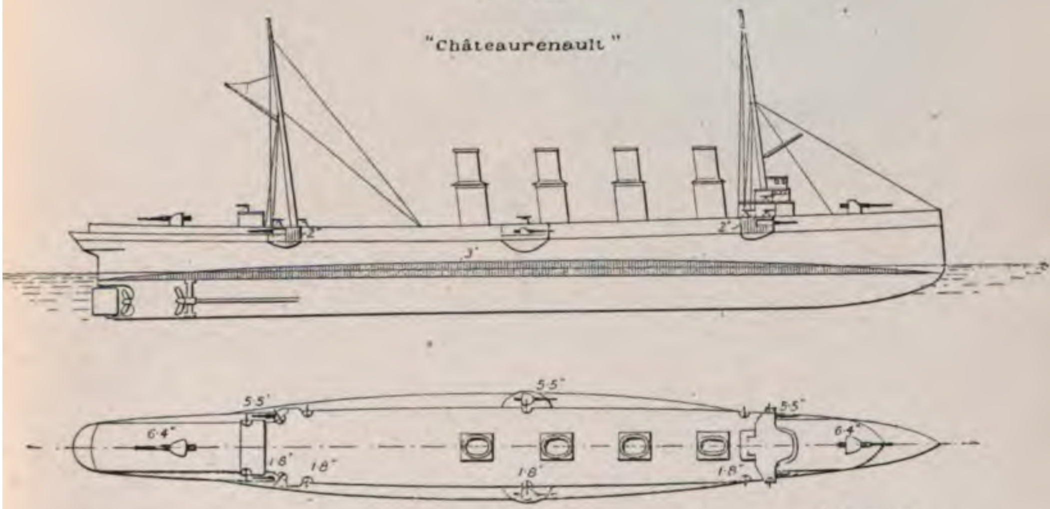
FRANCE.

CRUISERS.

"Châteaurenault"



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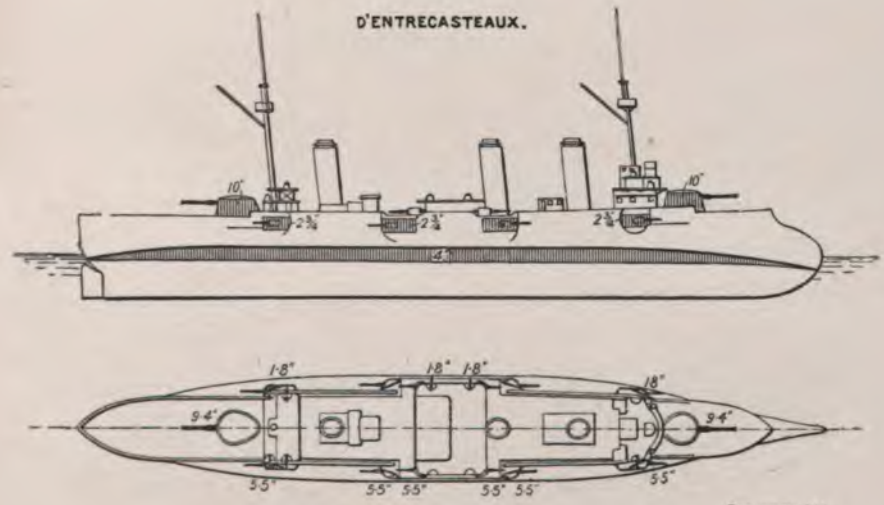
D'ENTRECASTEAUX.



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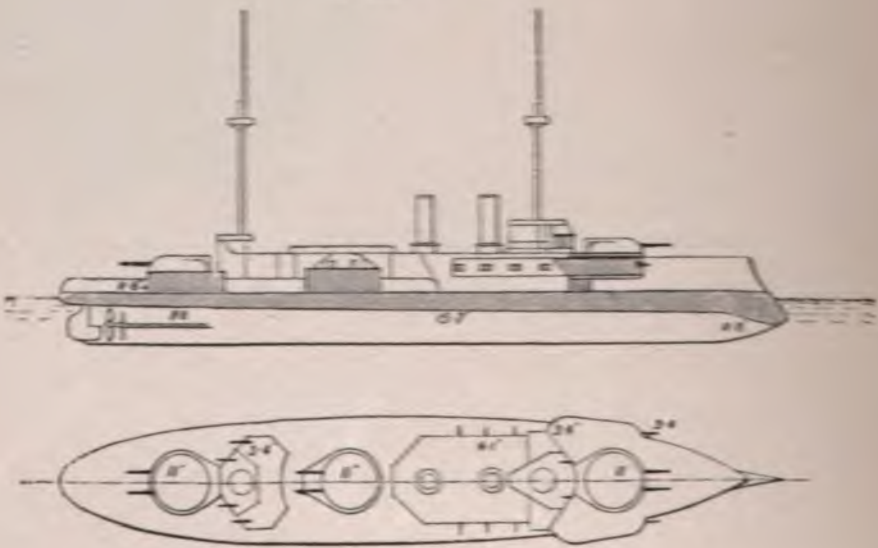
GERMANY.

BATTLESHIPS.

Kurfürst Friedrich Wilhelm
Brandenburg
Weissenburg
Wörth



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ARMOURED CRUISERS.

Cruisers C & D

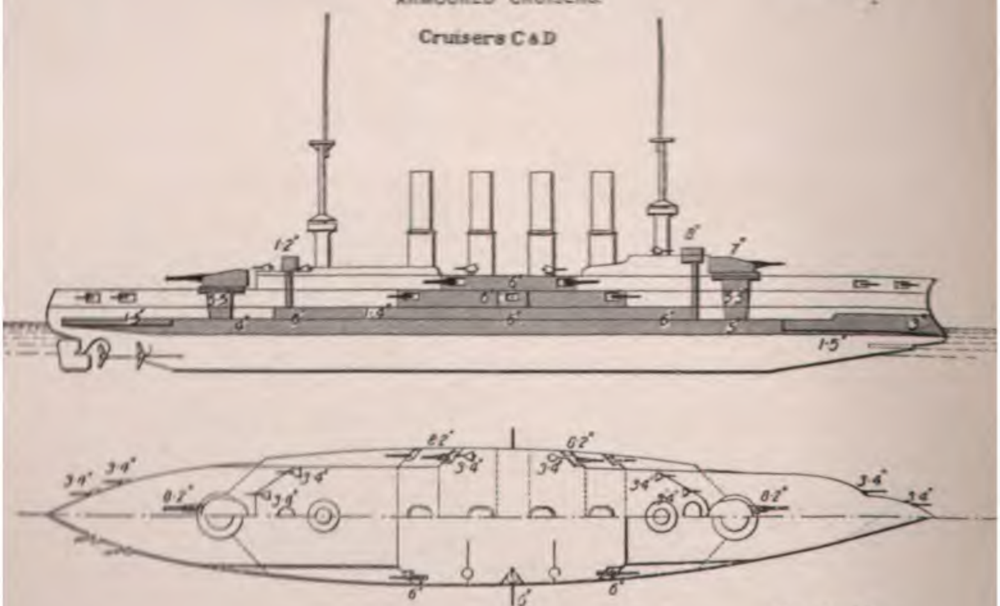

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PLATE 36.

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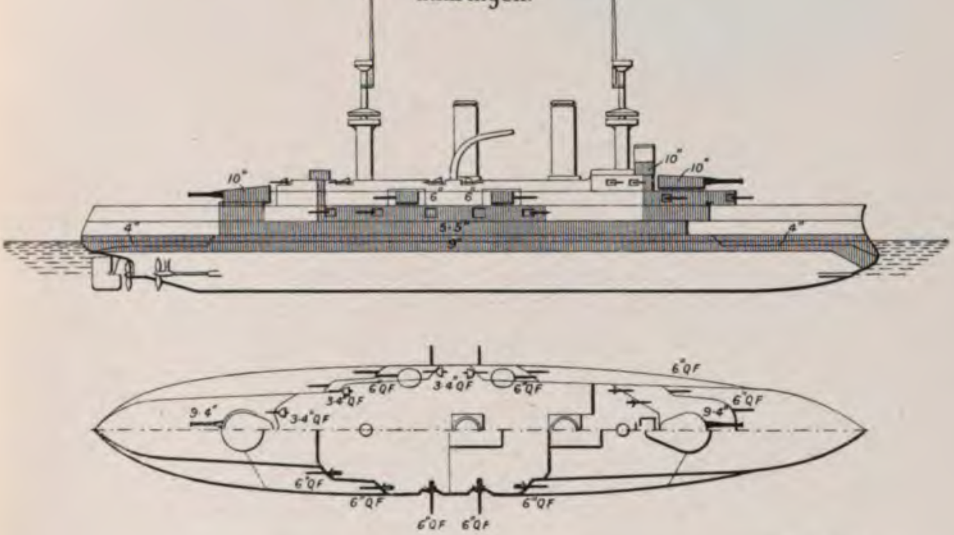
GERMANY.

BATTLESHIPS.

Wittelsbach.
Mecklenburg.
Schwaben.
Wettin.
Zähringen.



See page 247.

Kaiser Friedrich III.
Kaiser Karl der Grosse.
Kaiser Wilhelm II.
Kaiser Wilhelm der Grosse.
Kaiser Barbarossa.

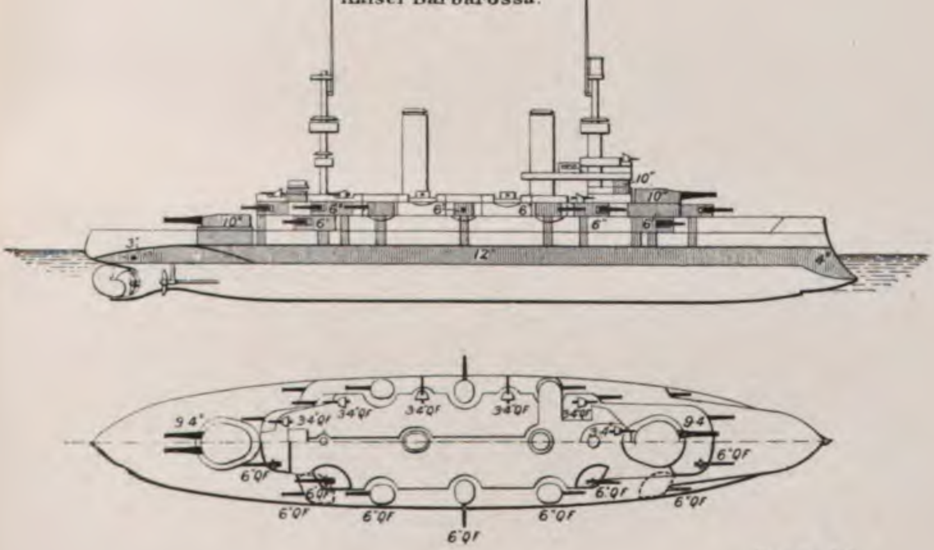


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PLATE 35.

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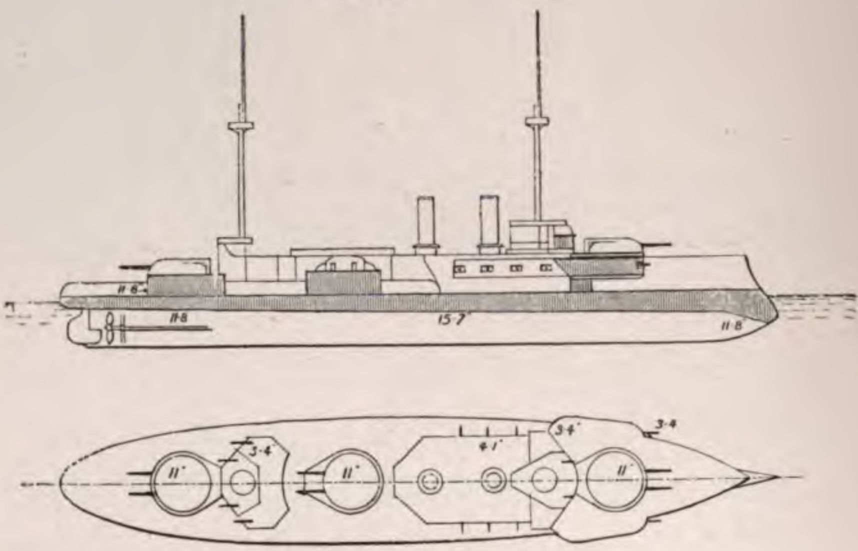
GERMANY.

BATTLESHIPS.

Kürfurst Friedrich Wilhelm
Brandenburg.
Weissenburg.
Wörth



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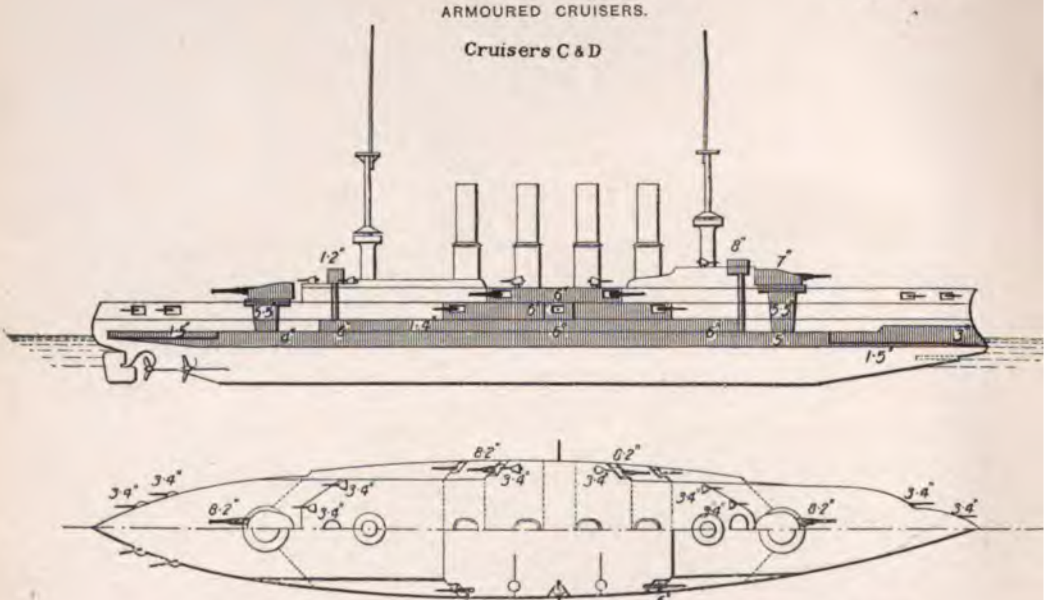
ARMOURED CRUISERS.

Cruisers C & D



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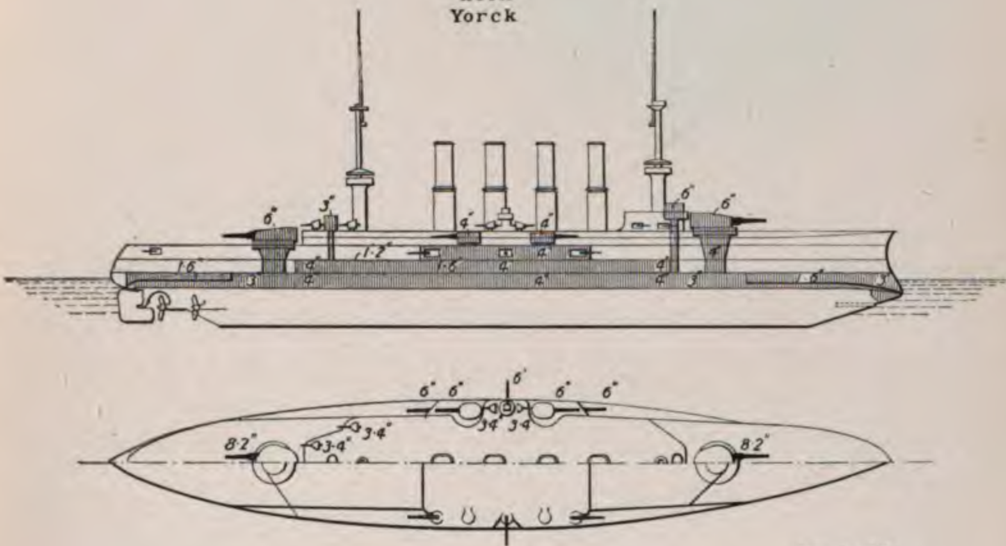
GERMANY.

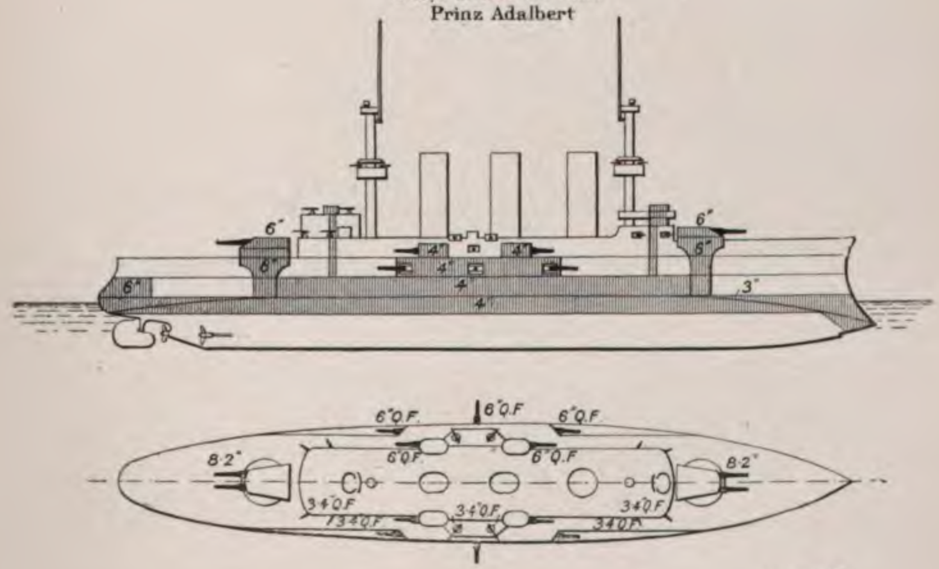
ARMOURED CRUISERS.

Roon
Yorck



See page 247.

Prinz Friedrich Karl
Prinz Adalbert



See page 247.

PLATE 37.

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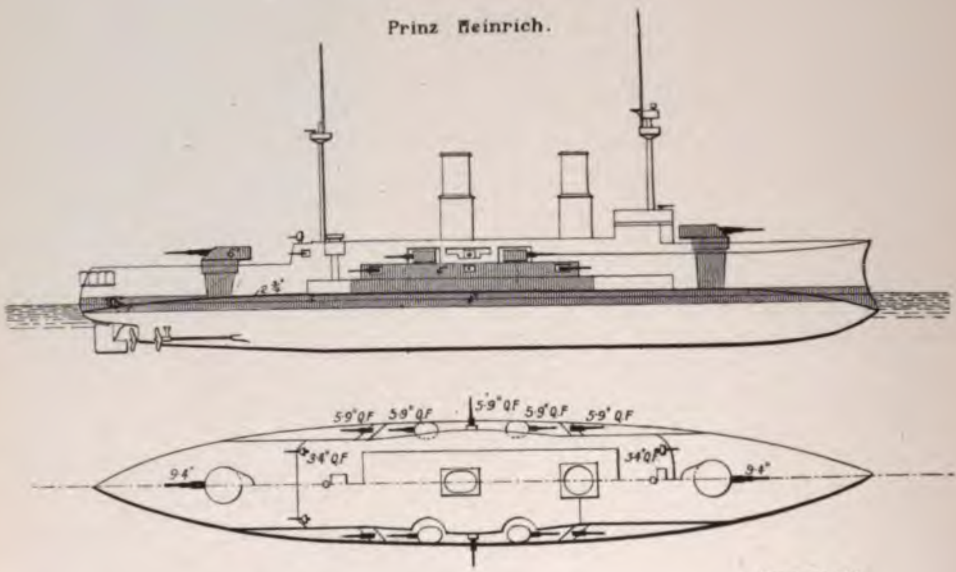
GERMANY.

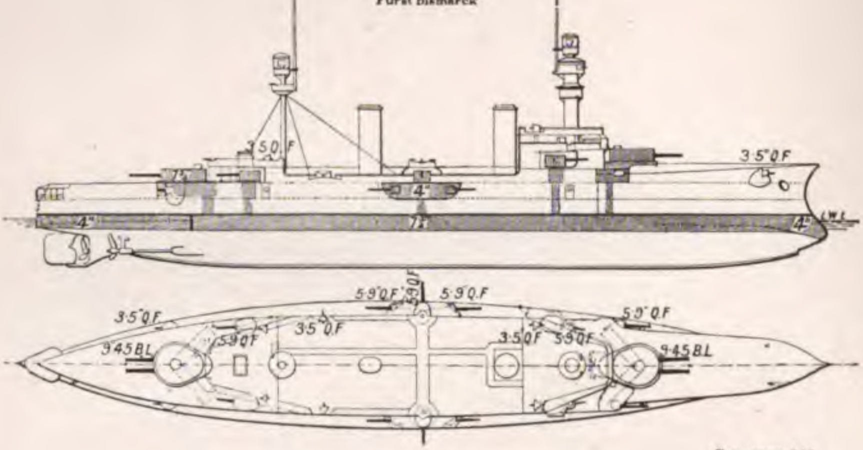
ARMOURED CRUISERS.

Prinz Heinrich.



See page 247.

"Fürst Bismarck"



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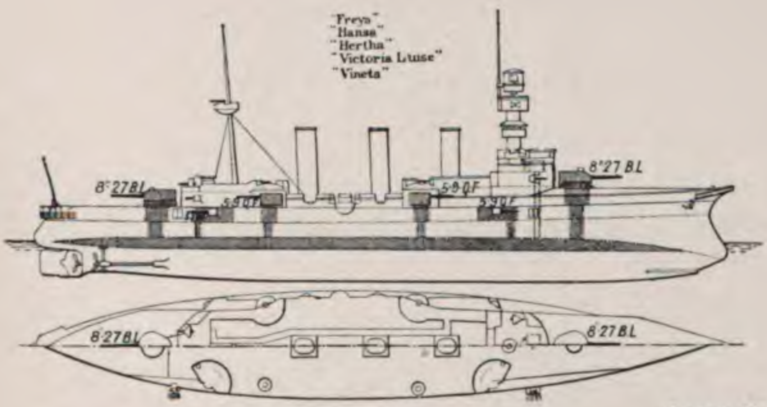
GERMANY.

CRUISERS.



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GREECE.

BATTLESHIPS.

Hydra. Psara. Spetsai.

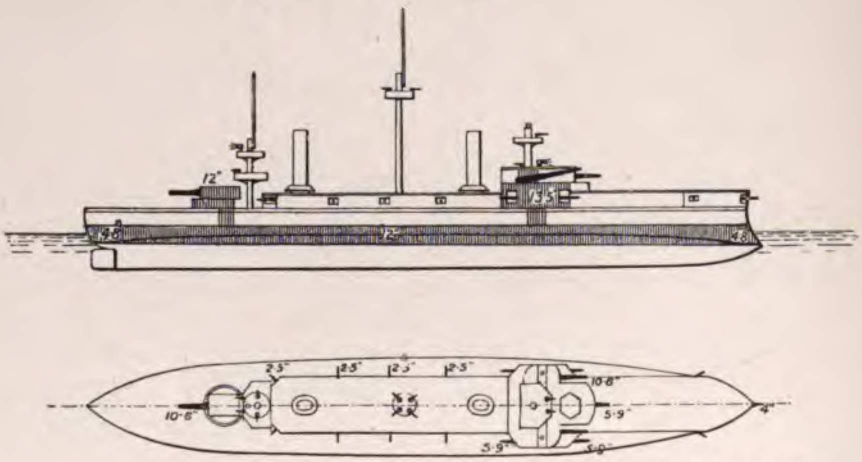

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PLATE 40.

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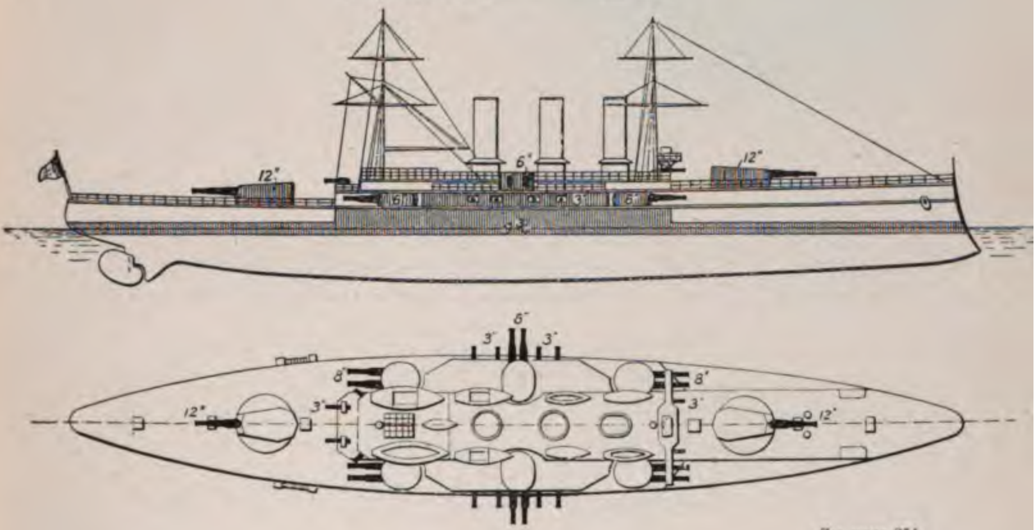
ITALY.

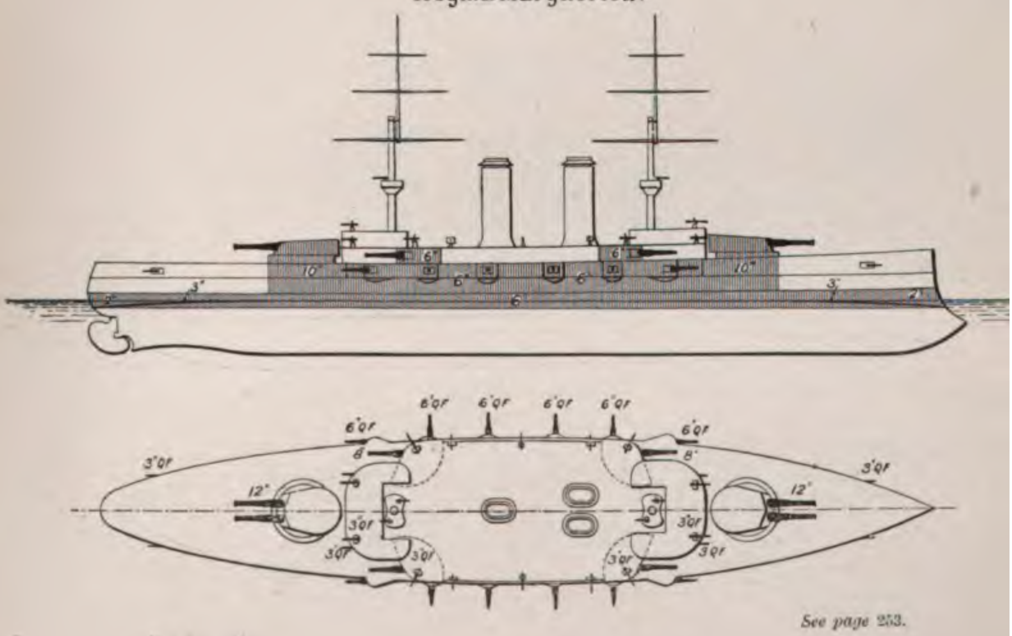
BATTLESHIPS.

Vittorio Emanuele. Napoli.
Regina Elena. Roma.



See page 254.

Benedetto Brin.
Regina Margherita.



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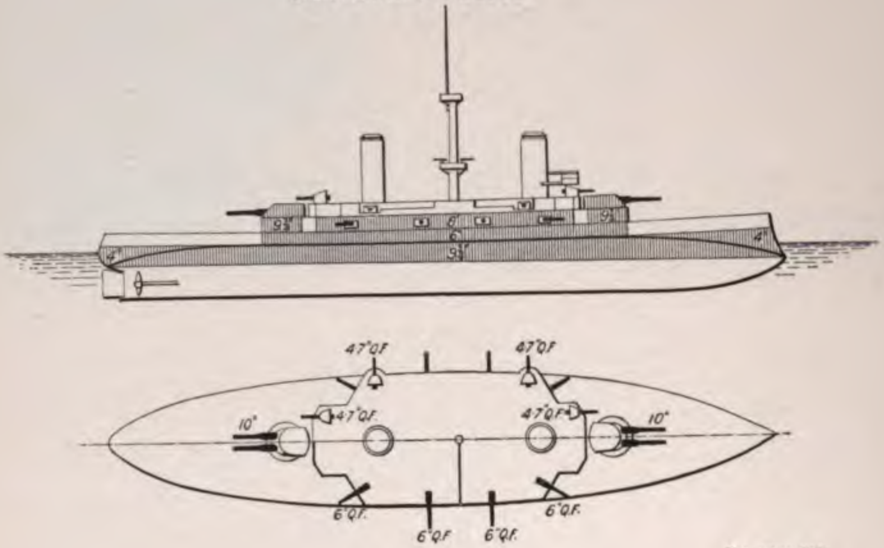
ITALY.

BATTLESHIPS.

Ammiraglio di St. Bon
Emanuele Filiberto



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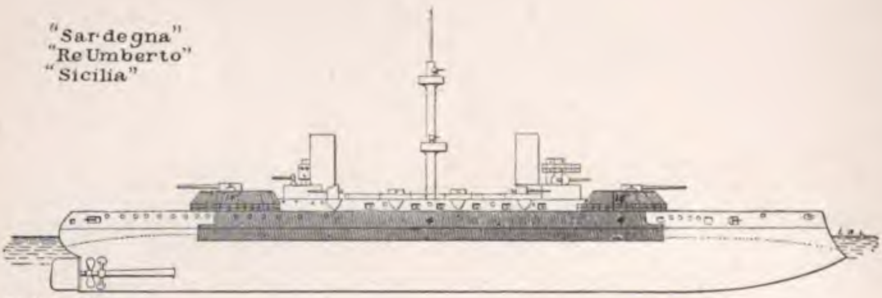
"Sardegna"
"Re Umberto"
"Sicilia"



Note. Sardegna is 3 ft [illegible] longer and 3 ft [illegible] broader than the other two.

See page 254.

PLATE 42.

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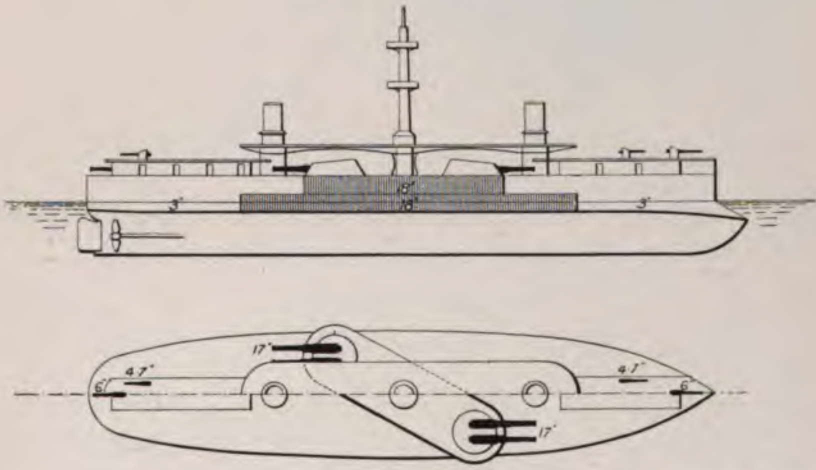
ITALY.

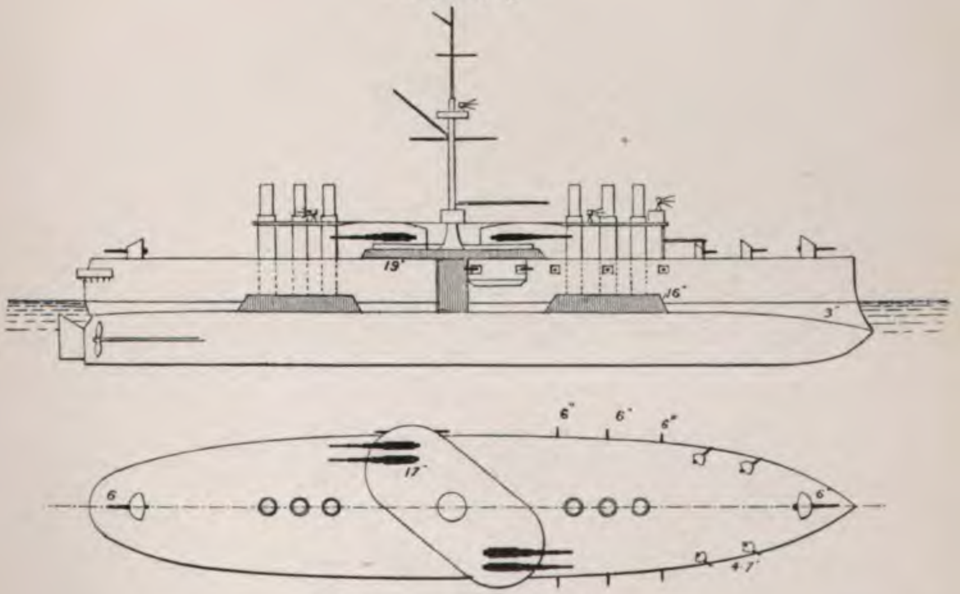
BATTLESHIPS.

Andrea Doria.
Francesco Morosini.
Ruggiero di Lauria.



See page 253.

Italia.
Lepanto. ※



※ *The Lepanto has four funnels.*

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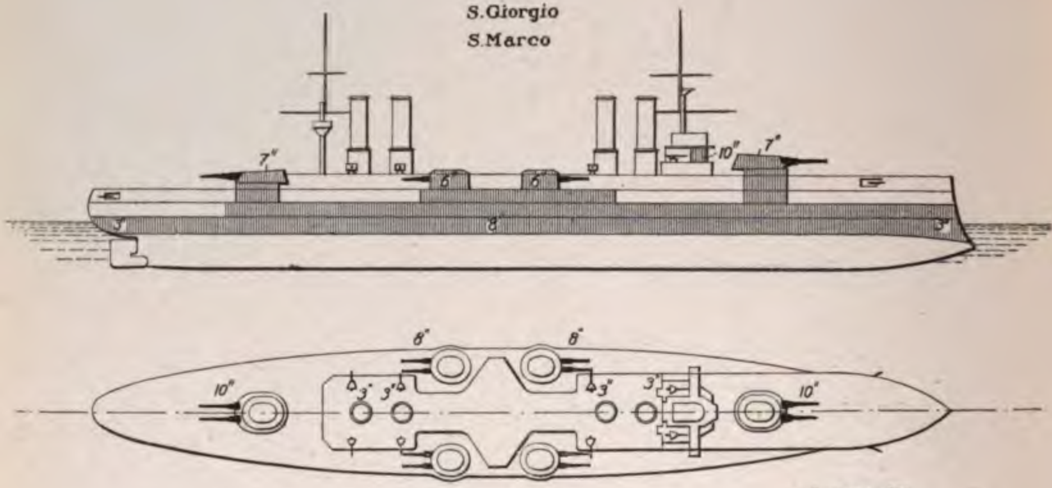
ITALY.

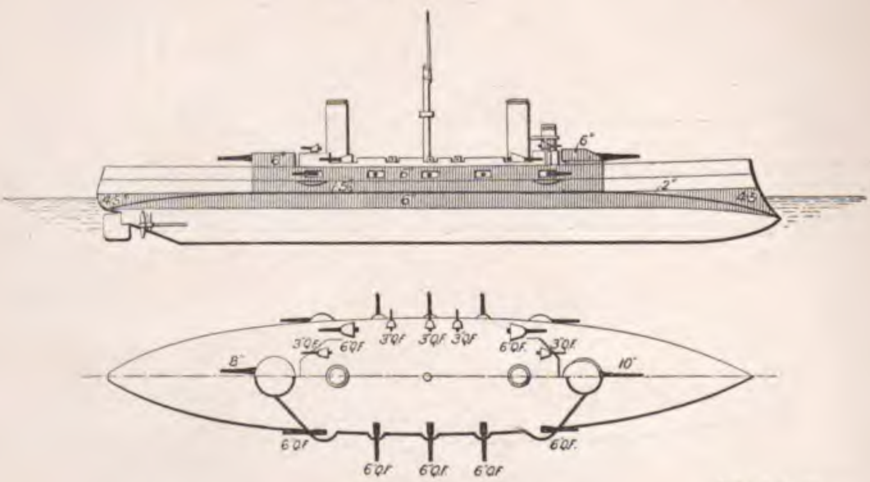
ARMOURED CRUISERS.

Amalfi
Pisa
S. Giorgio
S. Marco



See page 253.

Francesco Ferrucio
Guiseppe Garibaldi
Varese



See page 253.

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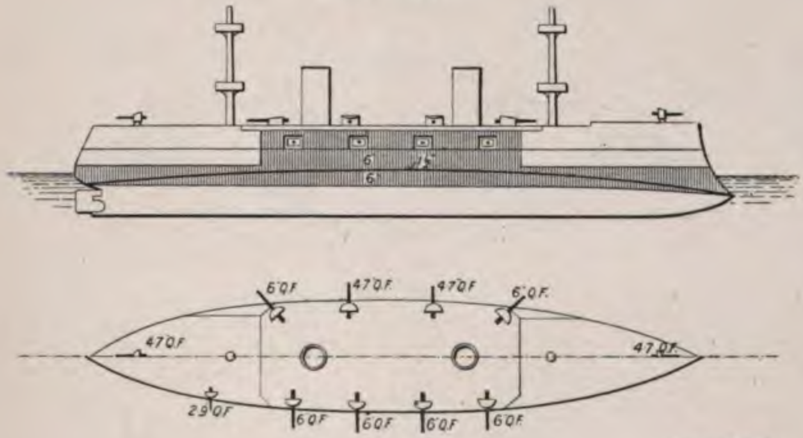
ITALY.

ARMOURED CRUISERS.

"Carlo Alberto"
"Vettor Pisani"



See page 253.

PLATE 45.

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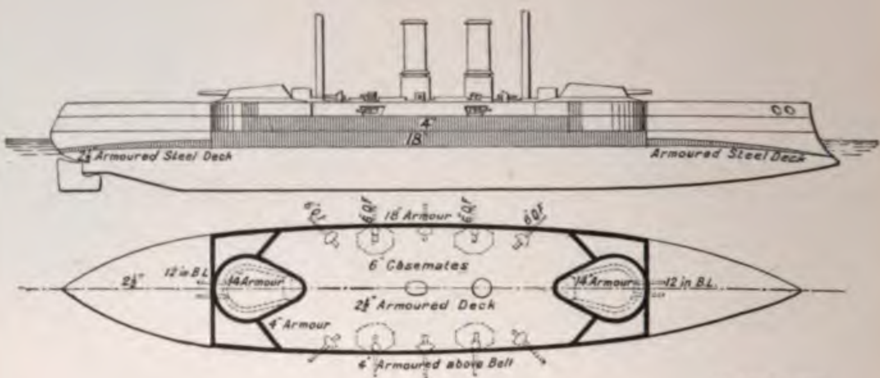
JAPAN.

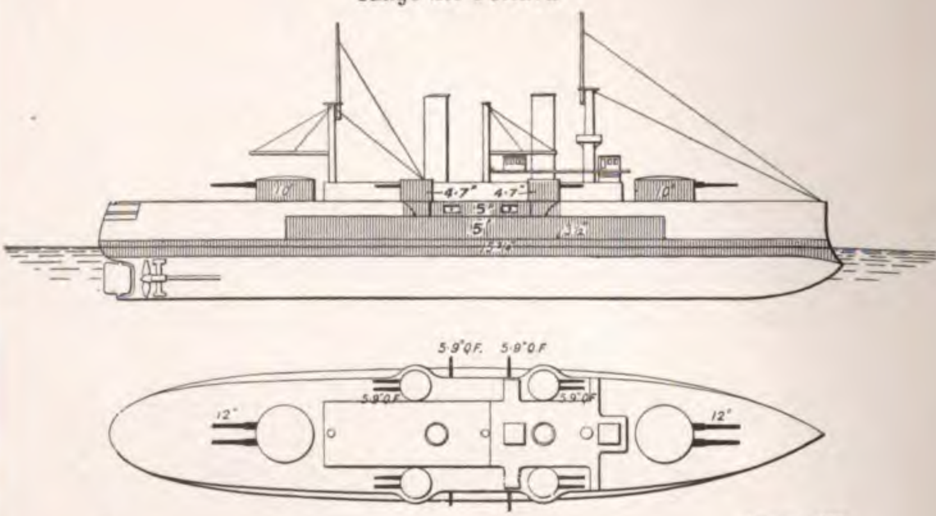
BATTLESHIPS.

"Fuji."



See page 258.

"Tango" *late* "Poltava"



See page 259.

PLATE 48.

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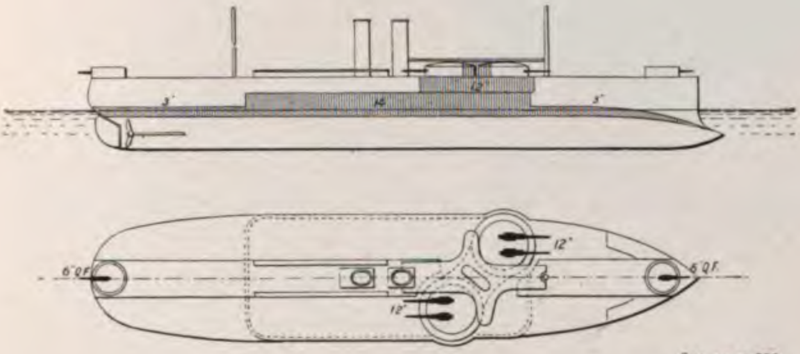
JAPAN.

BATTLESHIP.

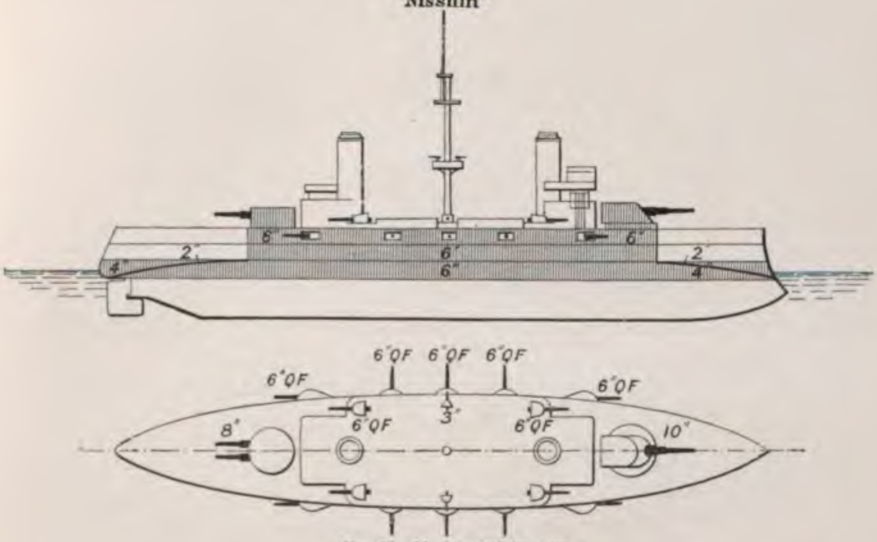
Chin Yen.



See page 258.

ARMOURED CRUISERS.

"Kasuga"
"Nisshin"



The Nisshin has 2-8 in. guns in fore barbette.

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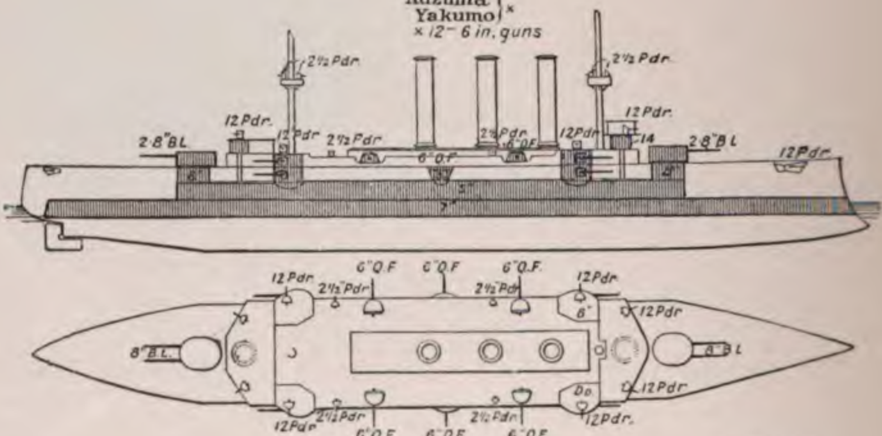
JAPAN.

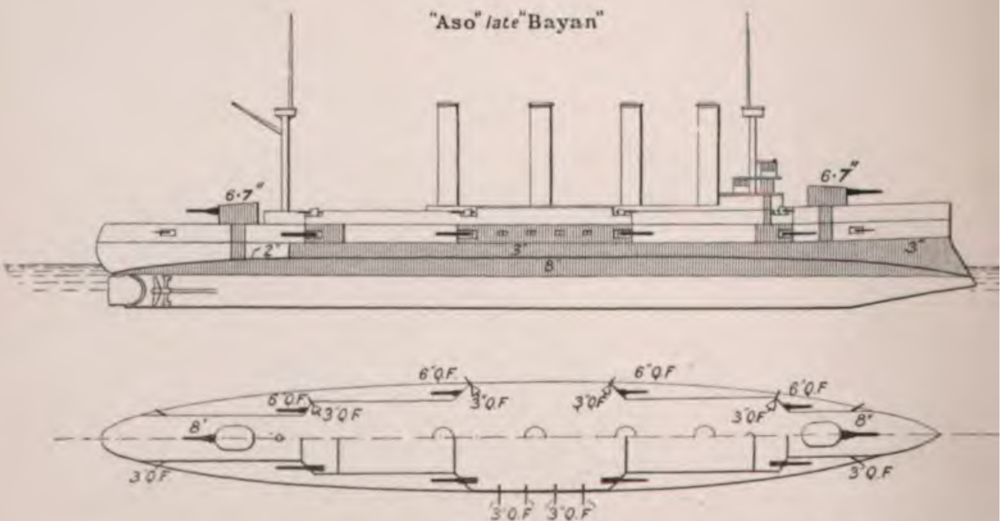
ARMOURED CRUISERS.

Idzumo
Iwati
Adzuma } ×
Yakumo }
× 12 – 6 in. guns



See page 258.

"Aso" late "Bayan"



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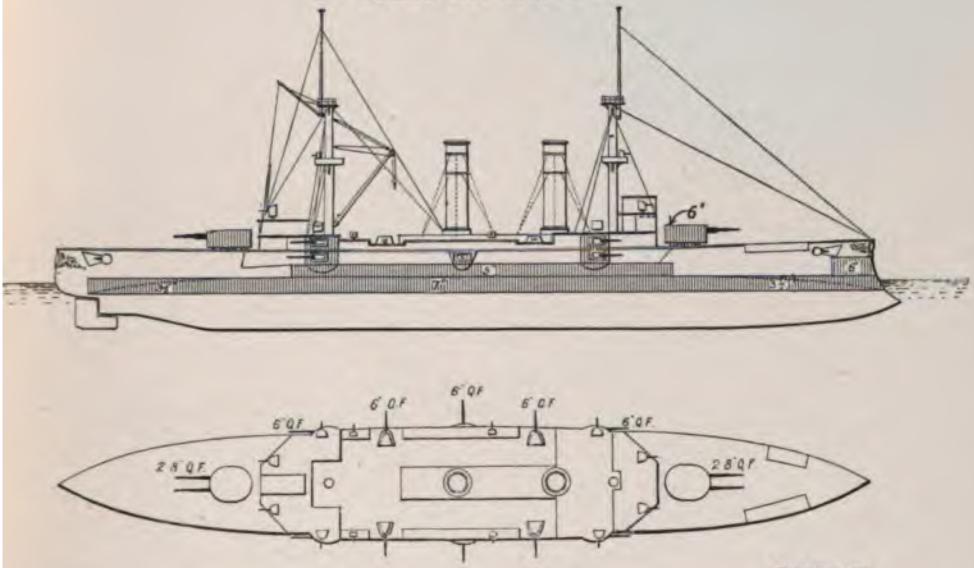
JAPAN.

ARMOURED CRUISERS

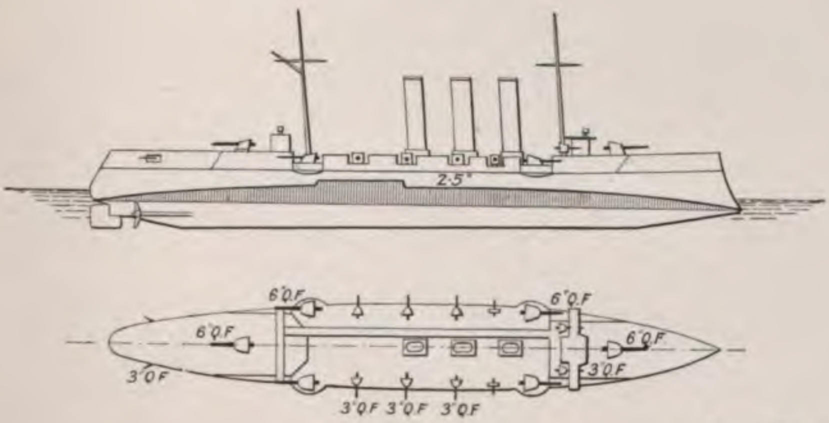
Asama and Tokiwa



See page 258.

CRUISERS.

Niitaka.
Tsushima.



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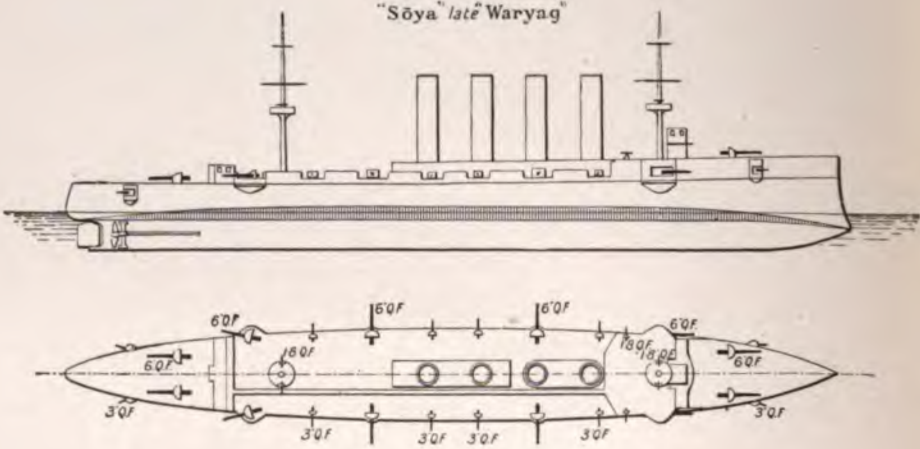
CRUISER.

"Sōya" late "Waryag"



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See Plate 62 for Tsugaru, *ex* Pallada.

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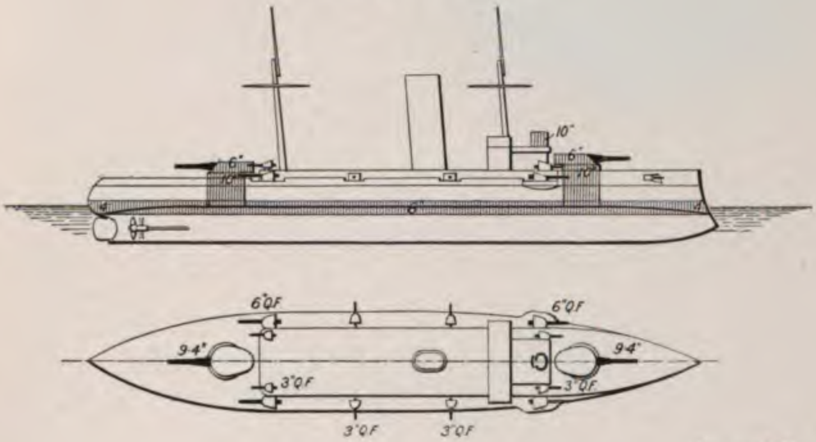
NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter
Hertog Hendrik
Koningin Regentes.



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"Evertsen"
"Piet Hein"
"Kortenaer"

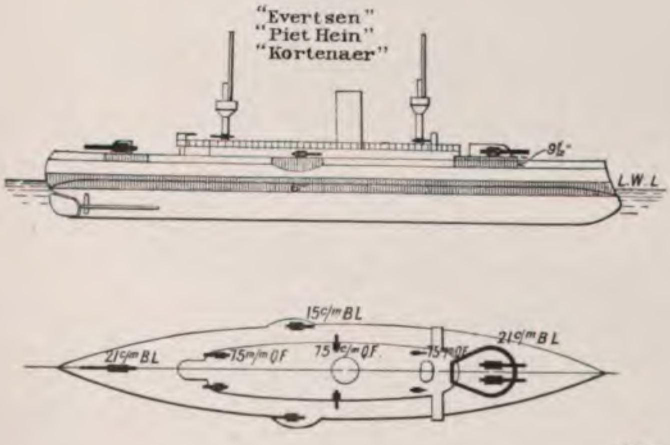

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Plate 53.

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NETHERLANDS.

BATTLESHIP.

Koningin Wilhelmina der Nederlanden.

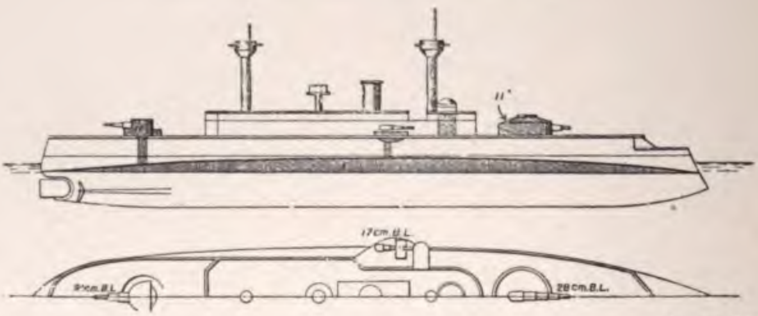

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PLATE 54.

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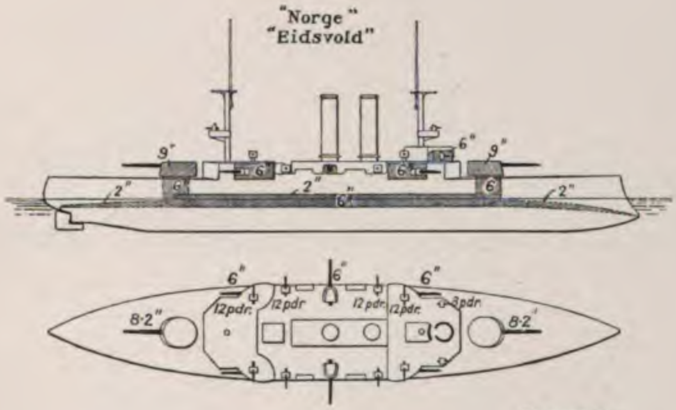
NORWAY.

BATTLESHIPS.

"Norge"
"Eidsvold"



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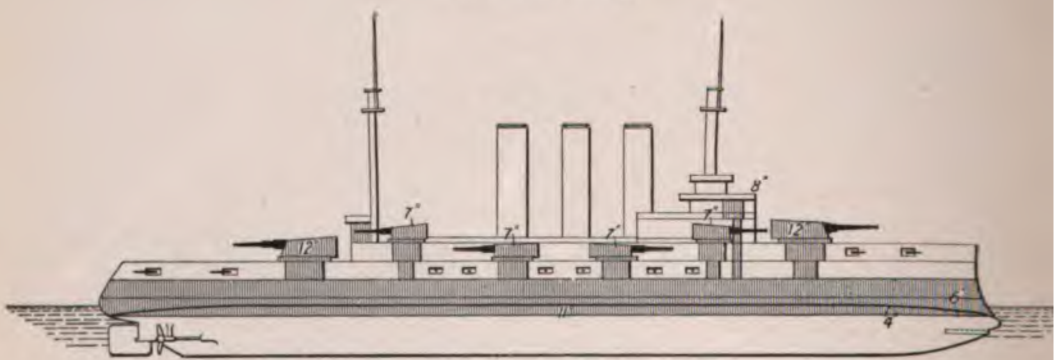
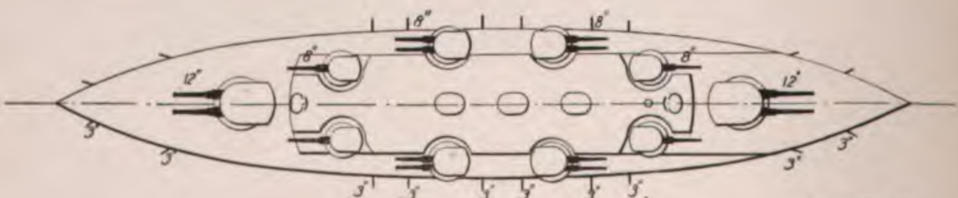
BATTLESHIPS.

Imperator Pavel
Andrei Pervozvannyi





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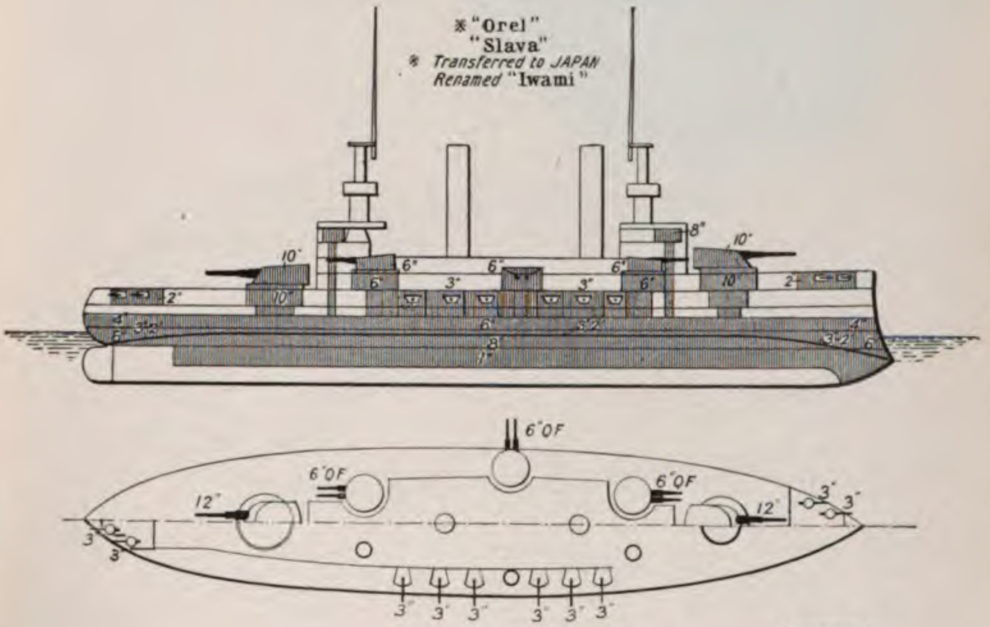
RUSSIA

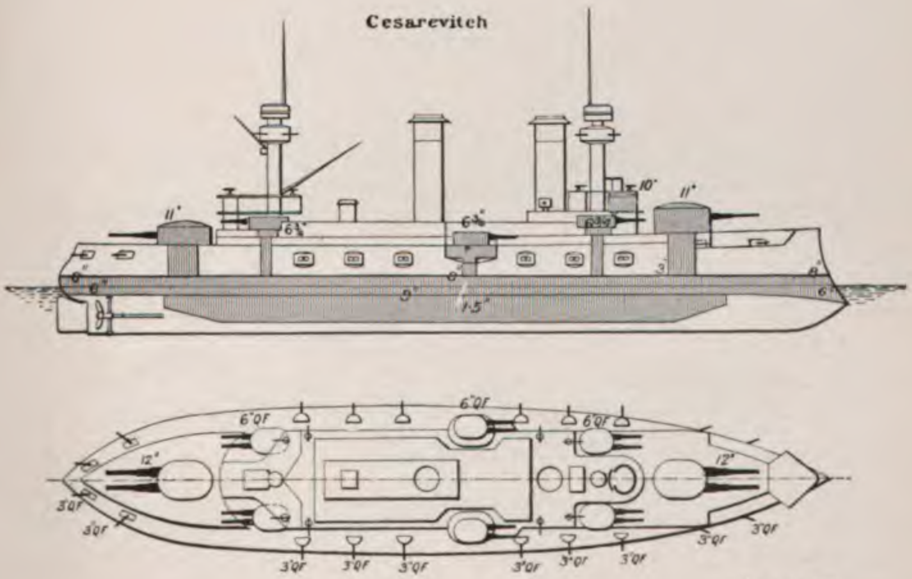
BATTLESHIPS.

※ "Orel"
"Slava"
※ Transferred to JAPAN
Renamed "Iwami"



See page 258.

Cesarevitch



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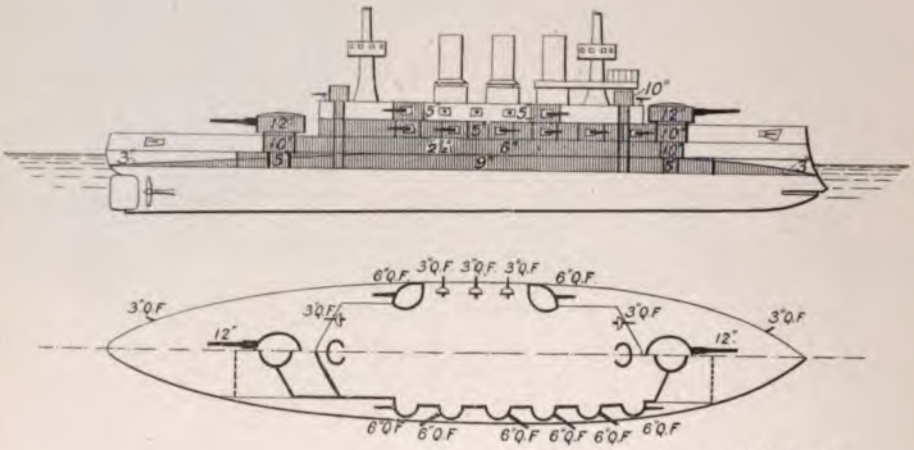
RUSSIA.

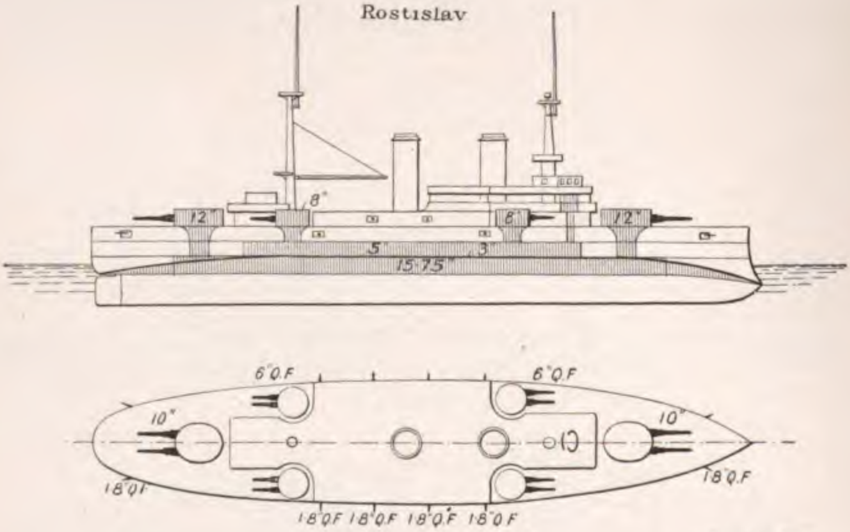
BATTLESHIPS.

Panteleimon, *ex* Kniaz Potemkine Tavritchesky.



See page 269.

Rostislav



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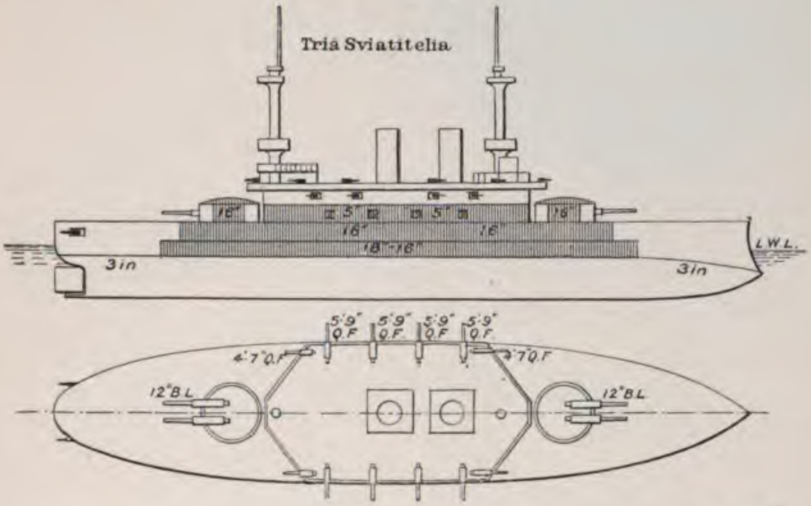
RUSSIA.

BATTLESHIPS.



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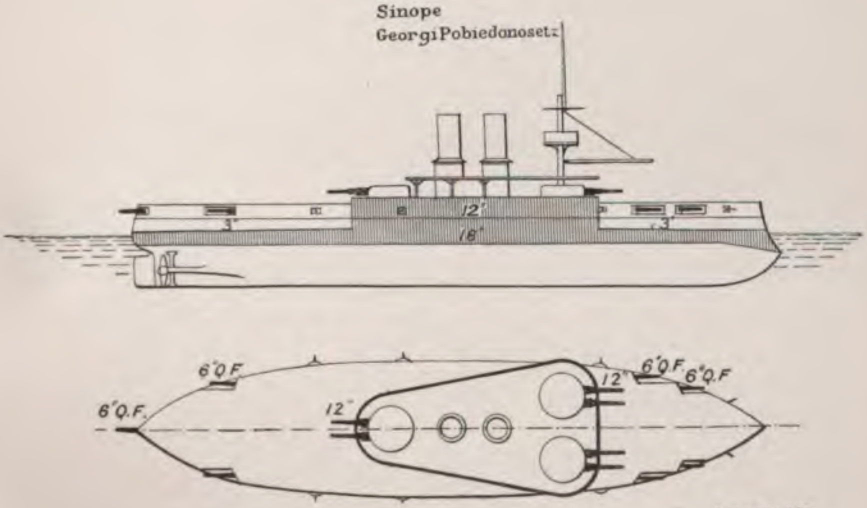
Catherine II
Tchesmé
Sinope
Georgi Pobiedonosetz



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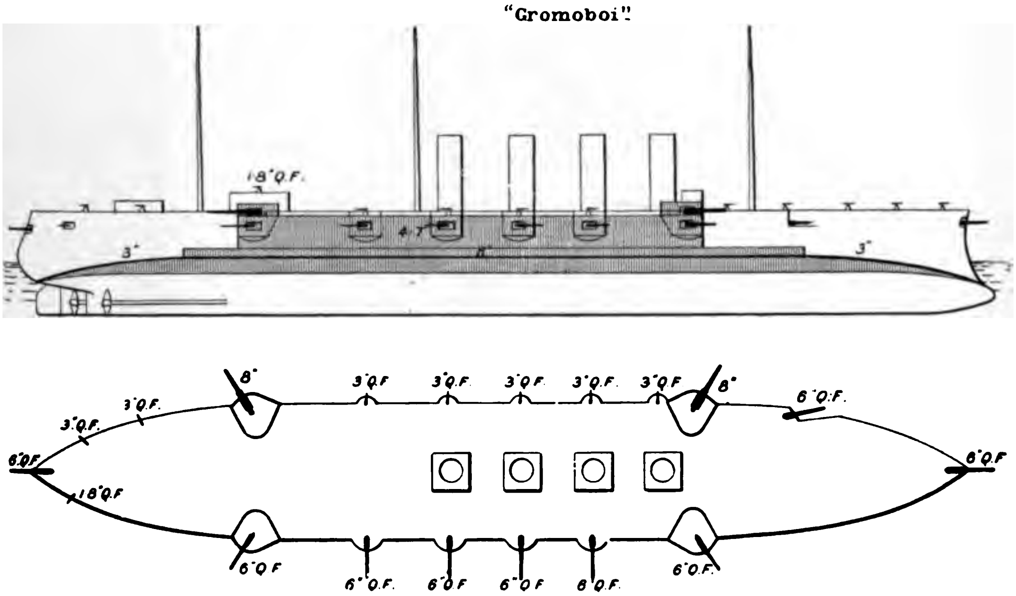
RUSSIA.

ARMOURED CRUISERS.

"Gromoboi".



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Rossia

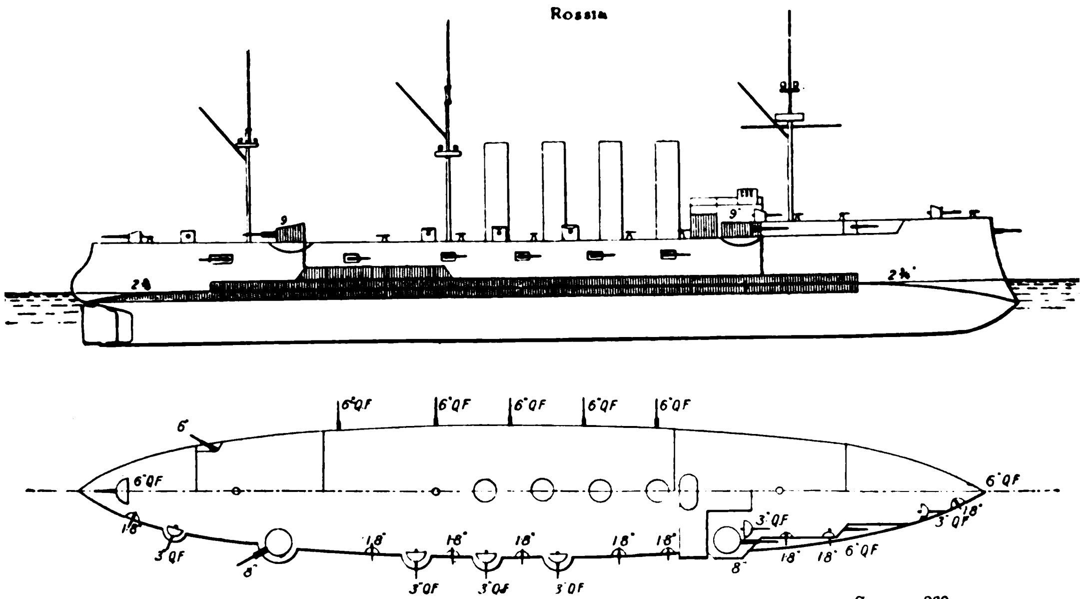

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Plate 60.

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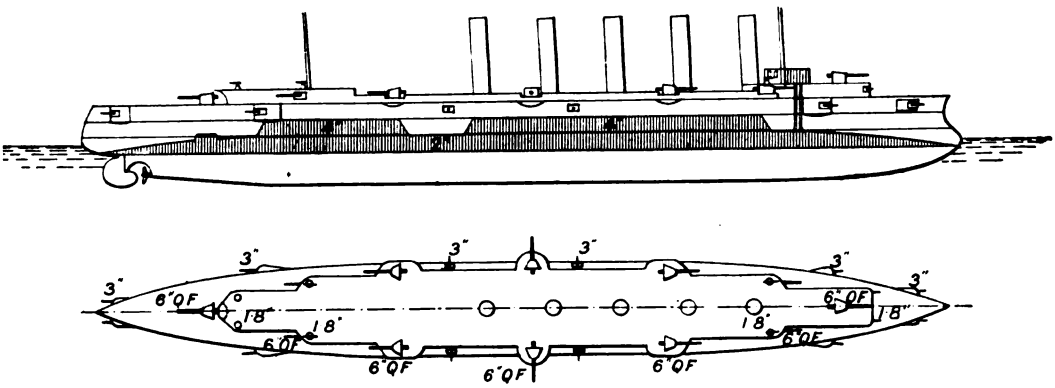
RUSSIA.

CRUISERS.

"Askold"



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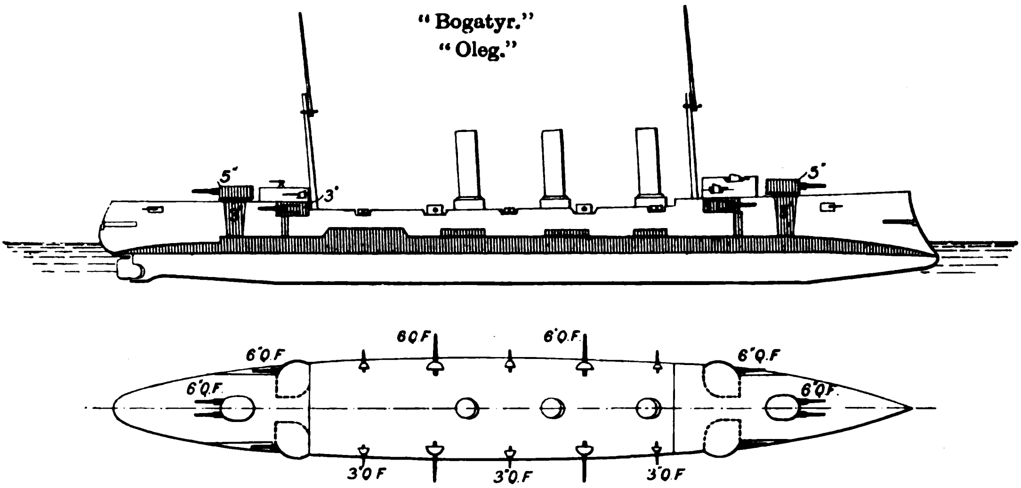
"Bogatyr." "Oleg."



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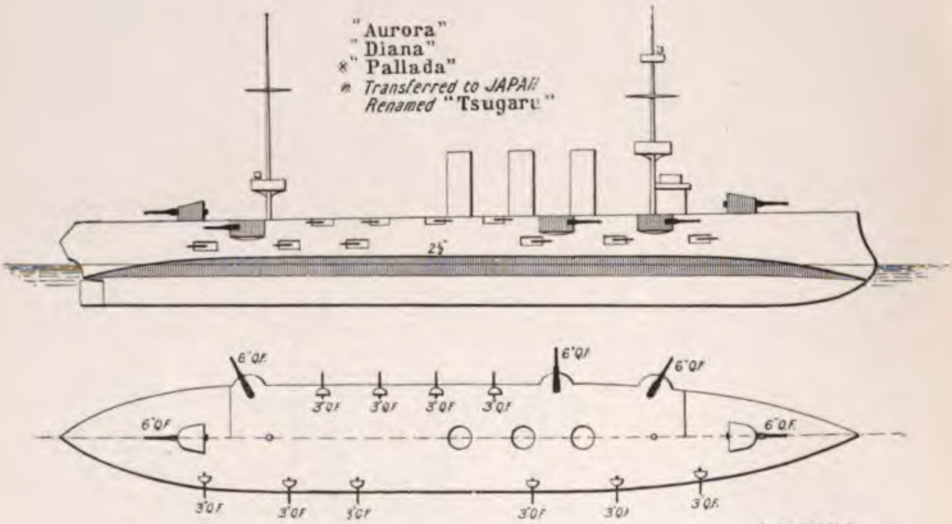
CRUISERS.



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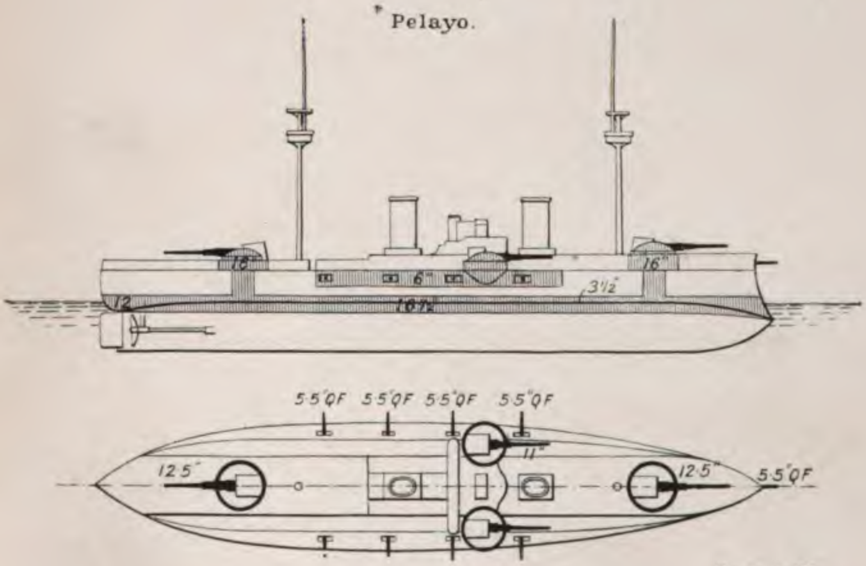
SPAIN.

BATTLESHIP.

* Pelayo.



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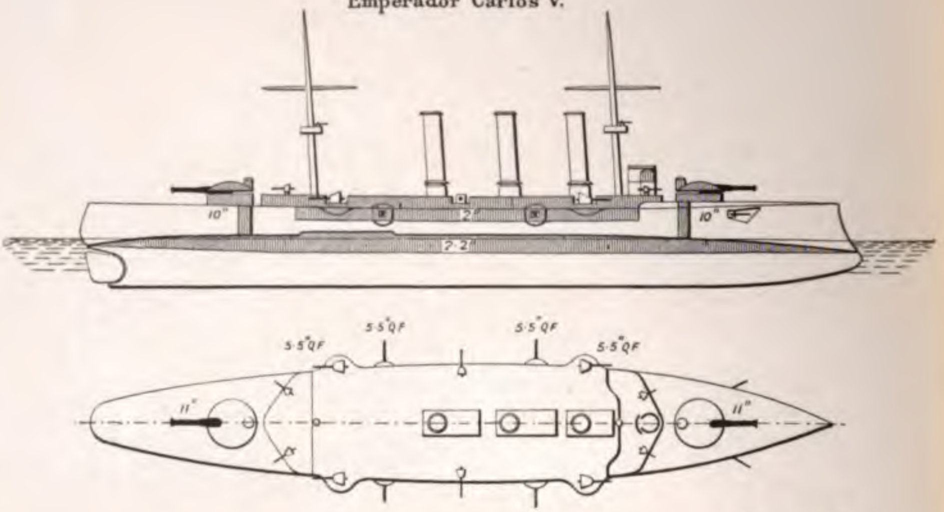
SPAIN.

ARMOURED CRUISER.

Emperador Carlos V.



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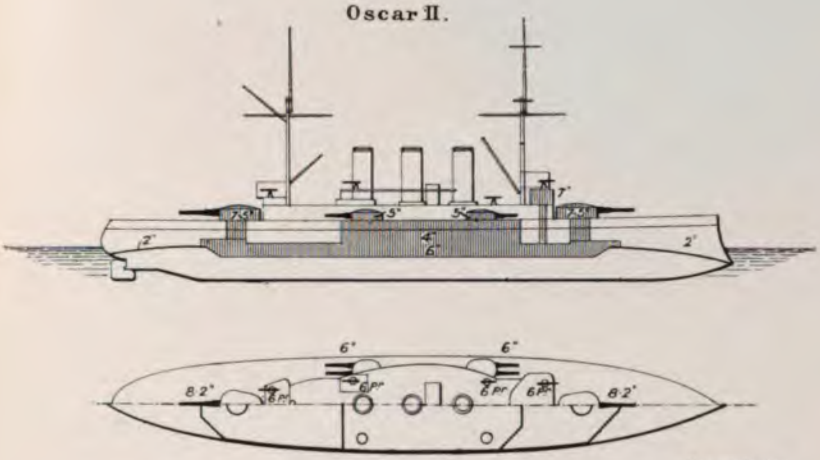
SWEDEN.

BATTLESHIP.

Oscar II.



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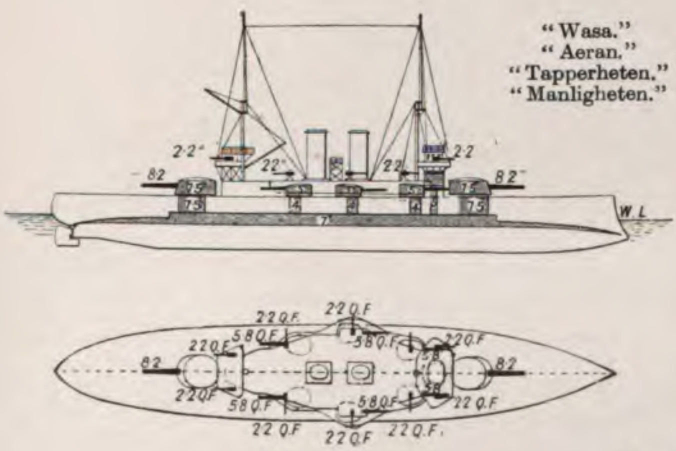
COAST DEFENCE SHIPS.

"Wasa."
"Aeran."
"Tapperheten."
"Manligheten."



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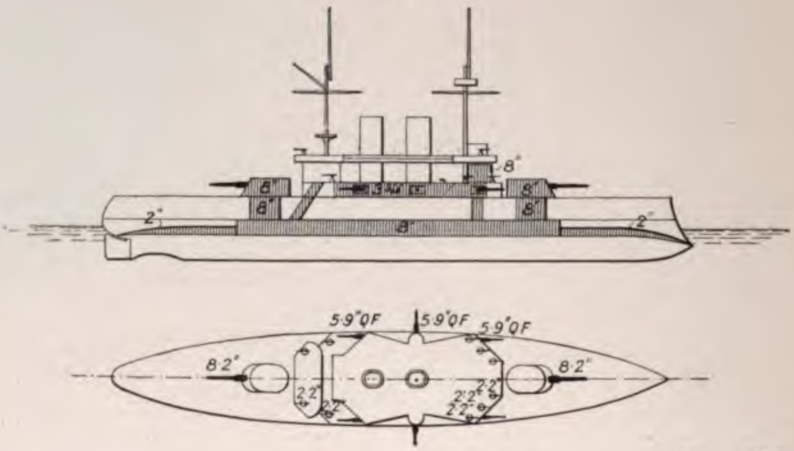
SWEDEN.

COAST DEFENCE SHIP.

"Dristigheten"



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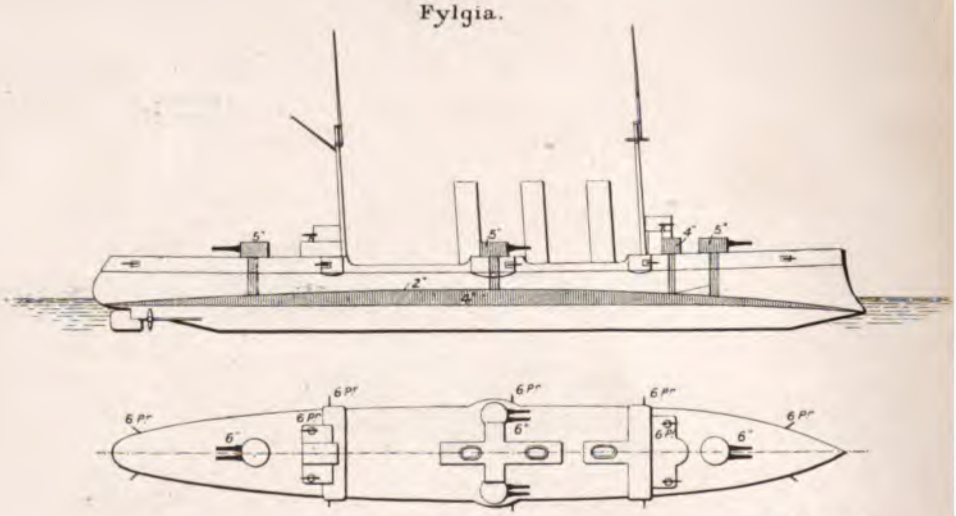
ARMOURED CRUISER.

Fylgia.



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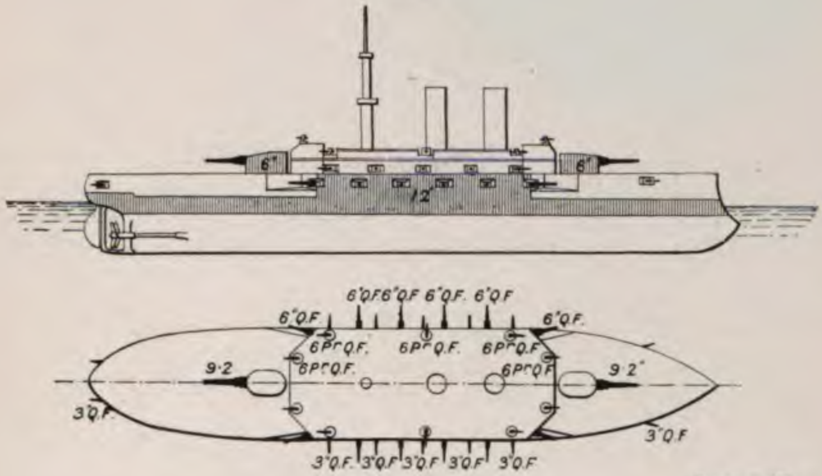
TURKEY.

BATTLESHIP.

Messoudieh.



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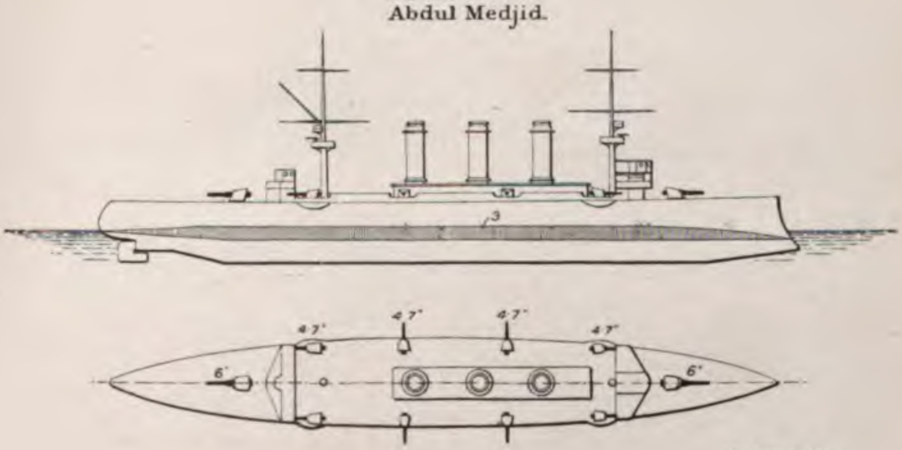
CRUISERS.

Abdul Hamid.
Abdul Medjid.



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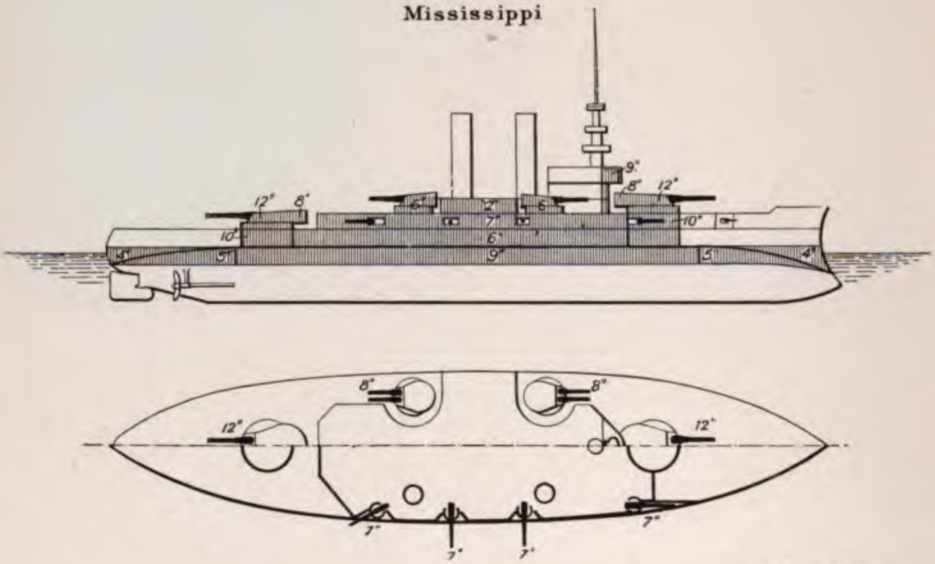
UNITED STATES.

BATTLESHIPS.

Idaho
Mississippi



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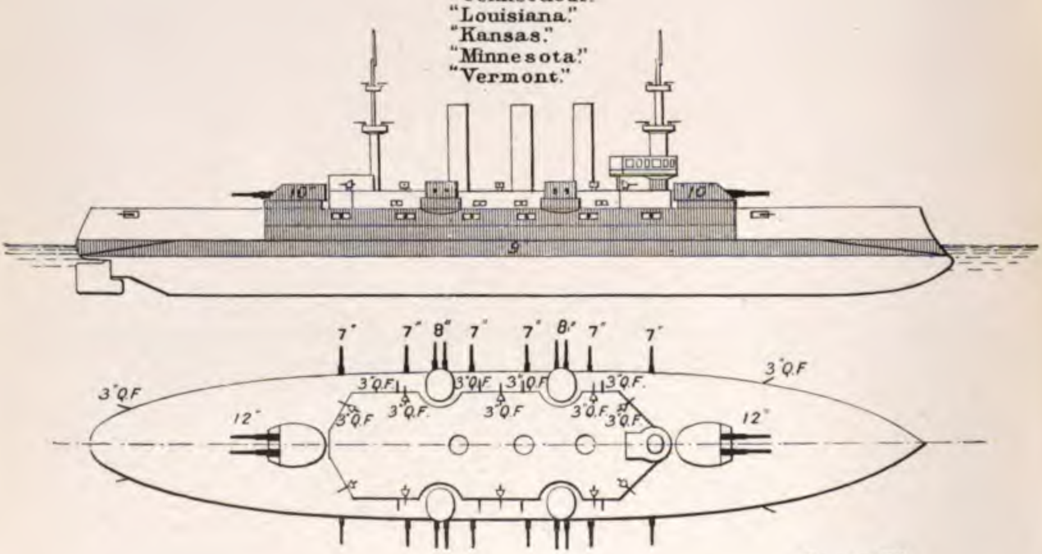
"Connecticut." "Louisiana." "Kansas." "Minnesota." "Vermont."



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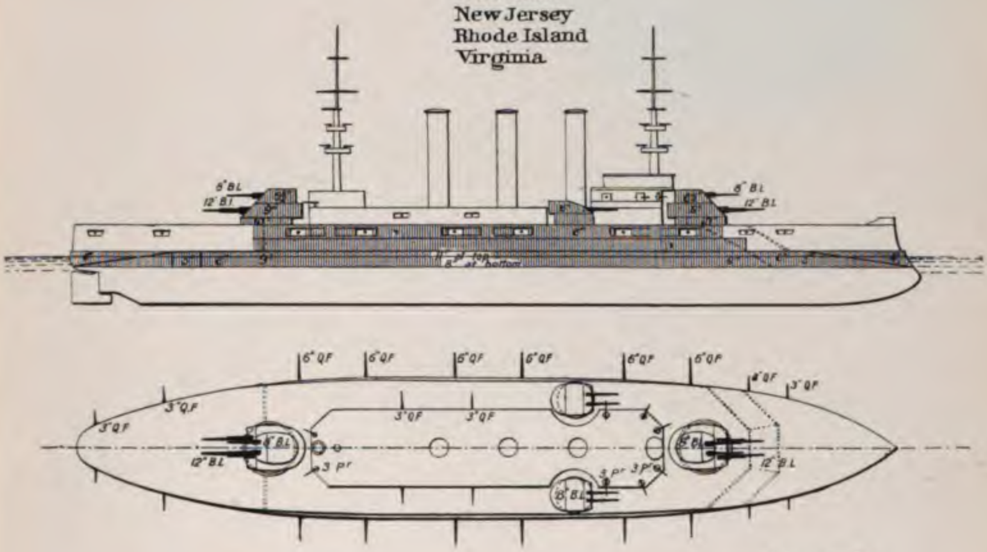
UNITED STATES.

BATTLESHIPS.

Georgia
Nebraska
New Jersey
Rhode Island
Virginia



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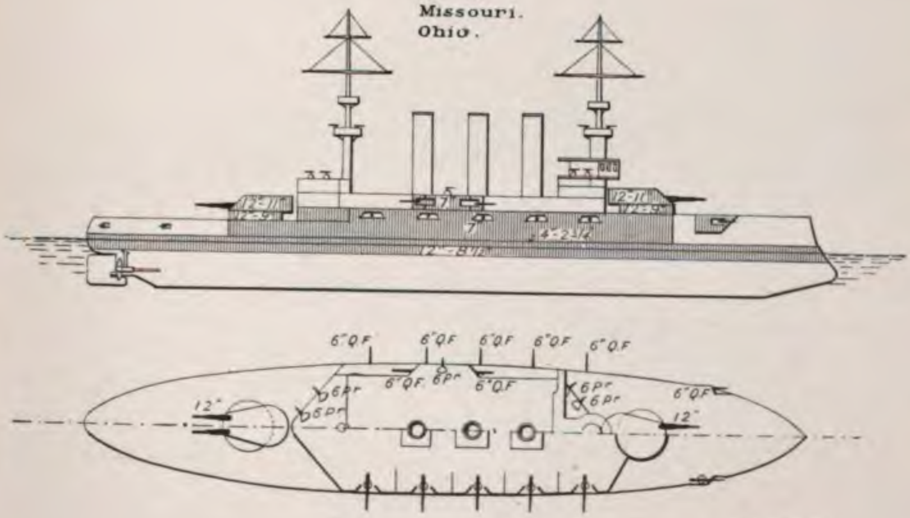
Maine.
Missouri.
Ohio.



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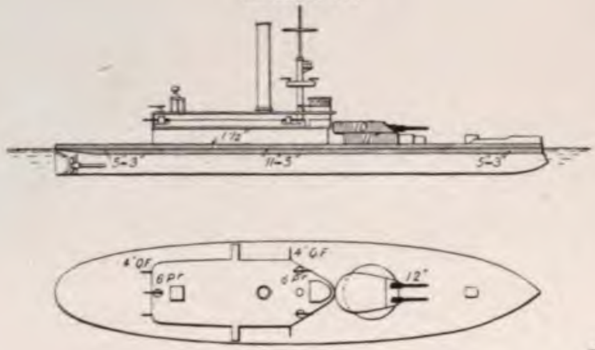
www.libtool.com.cn UNITED STATES.

BATTLESHIPS.

Florida.
Nevada.
Wyoming.
Arkansas.



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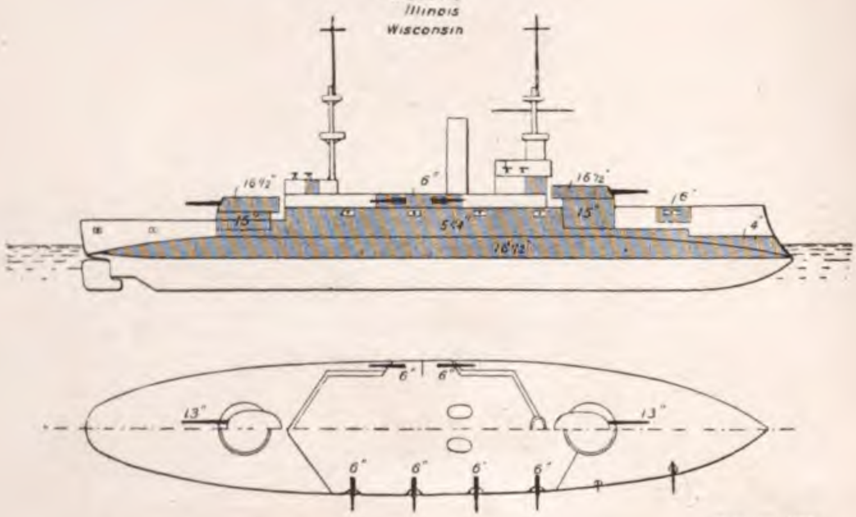
Alabama
Illinois
Wisconsin



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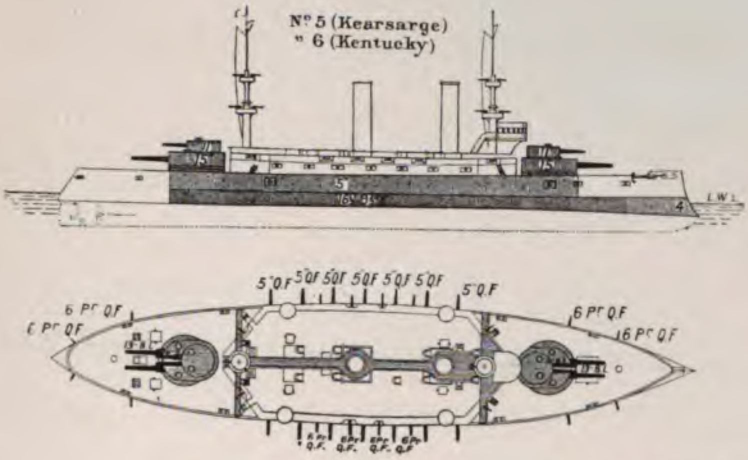
UNITED STATES.

BATTLESHIPS.

No 5 (Kearsarge)
" 6 (Kentucky)



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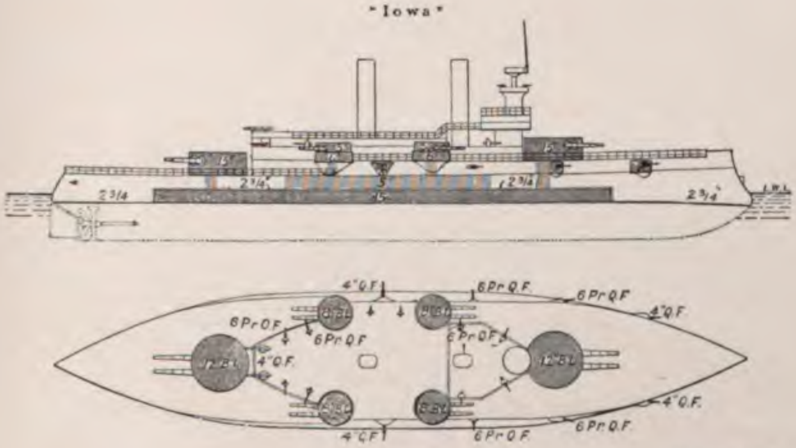
"Iowa"



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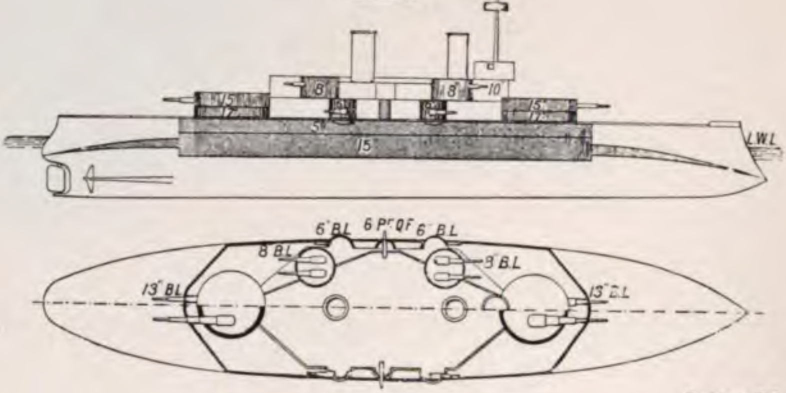
UNITED STATES.

BATTLESHIPS.

"Oregon"
"Massachusetts"
"Indiana"



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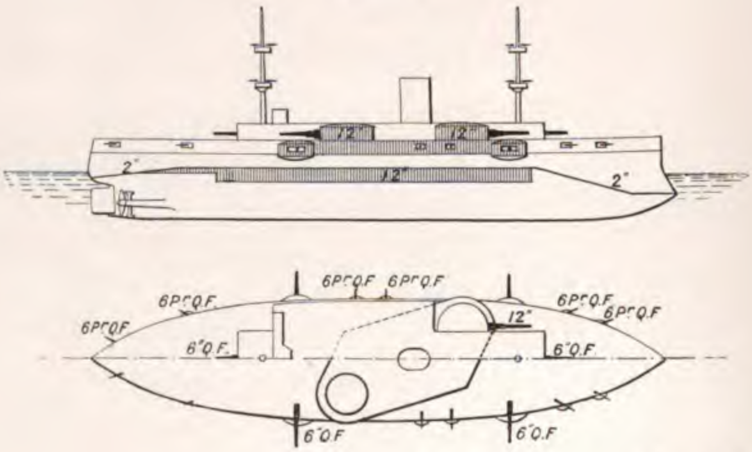
Texas



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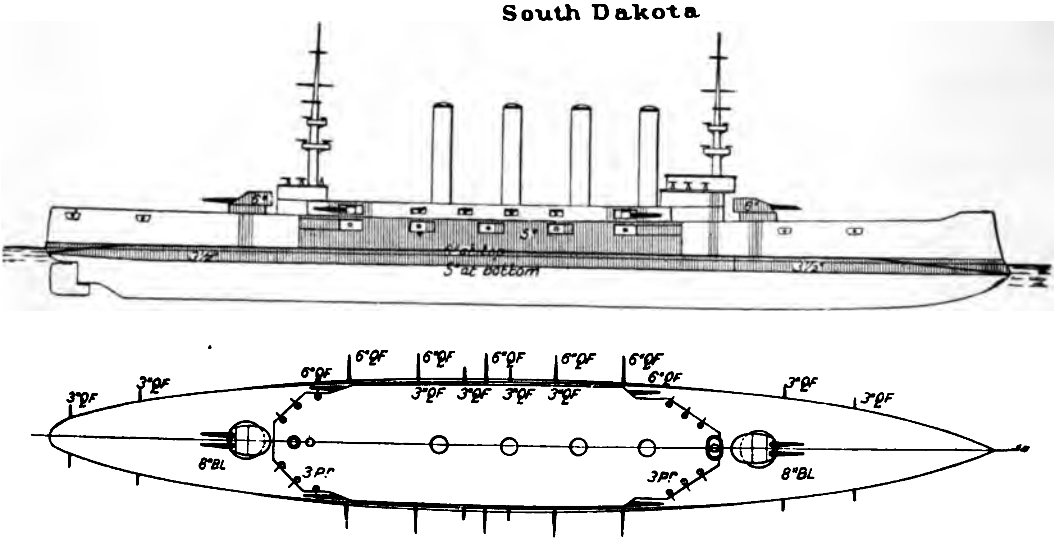
UNITED STATES.

ARMOURED CRUISERS.

California.
Pennsylvania.
West Virginia
Colorado
Maryland
South Dakota



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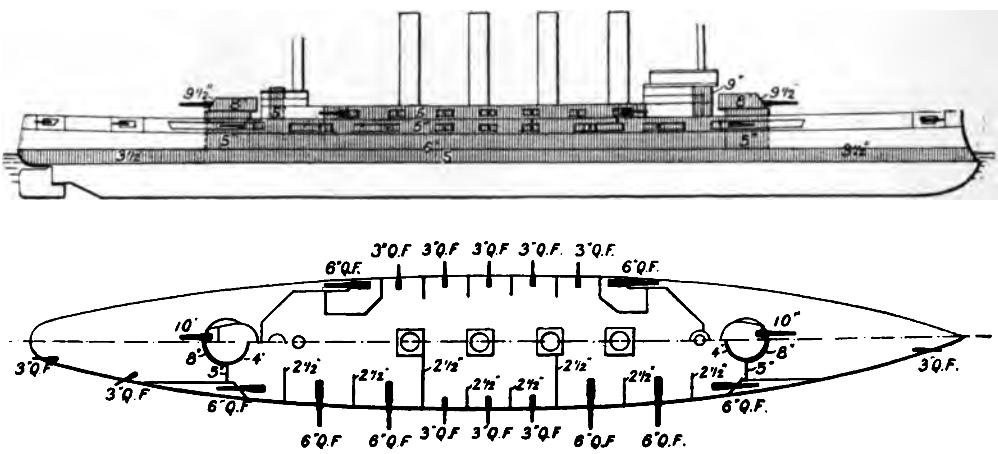
Montana. **Washington.**
North Carolina. **Tennessee.**



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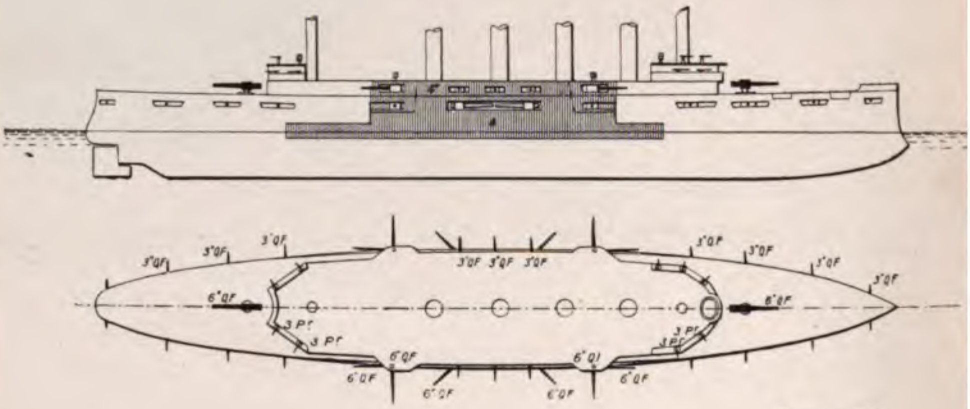
UNITED STATES.

ARMOURED CRUISERS.

Charleston.
Milwaukee.
St Louis.



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"Brooklyn"

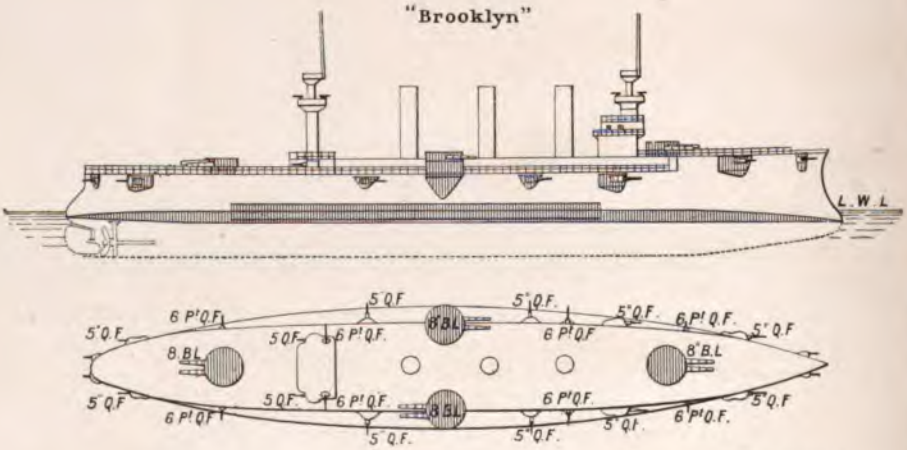

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PLATE 74.

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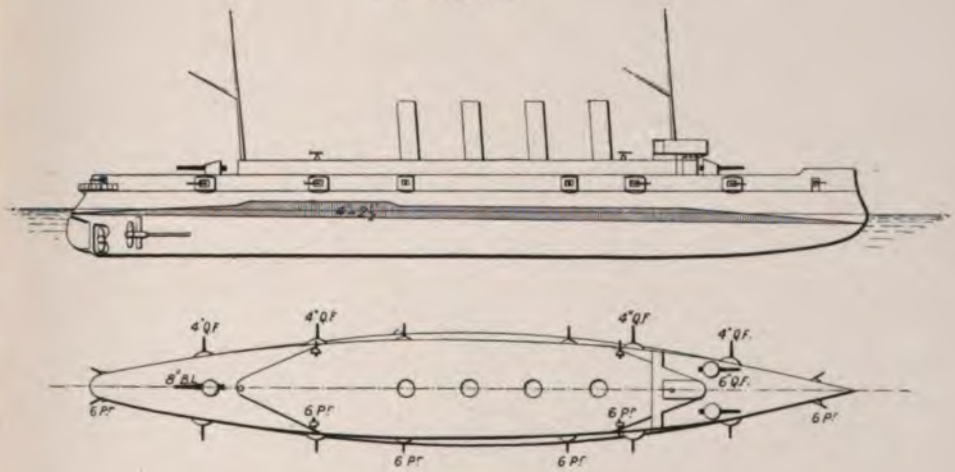
UNITED STATES.

CRUISERS.

Columbia.
Minneapolis



Note - *Minneapolis has only two funnels.*

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PART III.

ARMOUR AND ORDNANCE.

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PART III.

CHAPTER I.

ARMOUR.

The war and its lessons.

THE subject of the armour and armouring of ships of war has been treated in the *Naval Annual* for many years back with such exhaustive completeness that it is felt unnecessary to devote very great space to the matter in the present volume. Two reasons may seem to justify this course. There is practically no very notable development to record, and, in regard to trials, both at home and abroad, there is a great tendency to conceal the actual results attained. This is seen in almost every country save the United States. The British Admiralty has prohibited the publication of any official information relating to trials of armour plates and new projectiles without express permission. It may also be noted that the lessons of the war, in so far as they relate to the distribution of armour, and therefore to some extent its character, have not been disclosed, and are not, perhaps, even now fully understood. It is, for example, inadvisable to discuss the special features of the Dreadnought, although it is known that the placing of the heavy guns on the upper deck has to some extent simplified the arrangement of the armour, while the main belt over the machinery spaces has been increased in thickness to 10 in. Of the particular arrangements in foreign ships it is impossible to speak, but it is known that additional armour has been built into some vessels in course of construction as a direct result of the teaching of the war. Although information may be described as scanty, the year has certainly not been fruitless in progress, and the ceaseless contest between the armour plate and the projectile goes on with unabated energy. For the plate, the Krupp process, introduced in 1895, and, some modifications of it, still hold the field. As to the projectiles, those which are capped are now commonly used in the trials of armour plates.

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The difficulty of the subject.

Readers of the *Naval Annual* have been enabled to keep well abreast of all these matters. Up to the year 1900 the subject was handled most capably by the late Captain Orde Browne, R.A., who had exceptional opportunities of gaining information both from within and without the Service. When he died the subject passed into the hands of another most experienced authority, since dead, whose standpoint was notably that of the naval gunnery officer. Last year, one equally experienced, in the person of Captain Tressider, C.M.G., undertook to write upon the subject, and it was dealt with from the point of view of one who, as he said, was behind the scenes in the factory. The treatment was strictly technical and scientific, and the chapter possessed the highest value. Now, the subject falls to another writer, who, in view of all that has been done in the past in the *Naval Annual*, and, to some extent, because of the difficulties which Captain Tressider and himself have found in obtaining permission to use all the information necessary for a complete treatment of the subject, will deal with the matter more briefly. He is induced to do so, moreover, because of a necessary limitation set upon the space available to him.

Armour plate problems and the capped projectile.

The modern armour plate, although no longer described as compound, is yet essentially of that character, because it combines its hard face with its tough back, though, of course, two plates have not to be united, more or less imperfectly, in making it. The increase of resisting power against uncapped projectiles, due to many improvements in methods of manufacture, has been set forth as follows:—Resistance to perforation presented by 15 in. of wrought iron may be estimated to be about the same as would be presented by 12 in. of simple steel or compound plate, or 7½ in. of Harveyized steel, or 5¾ in. of Krupp steel. These, of course, are not fixed figures, since the resistance of plates varies somewhat. Nevertheless, this increased resistance was a great boon to the naval constructor, because it enabled him to protect a greater area of his ships than had been possible before the new processes came in. The introduction of capped projectiles has, however, undoubtedly placed the matter in a new light, and it is no longer possible to say that the plate retains the same relative value as before the system of capping came in.

The effect of placing a cap upon an armour-piercing projectile augments its powers of penetration by from 15 per cent. to 30 per cent., although it is generally held that they give little or no assistance at striking velocities below 1,800 f.s., nor at highly oblique angles of impact. It is often said that the projectile has

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gained the better of the armour plate, but, unless all the data are clearly understood, this may mean little, although, at the present time, owing to the material increase in the effectiveness of A.P. projectiles through the adoption of caps, and also to the universal adoption of higher velocity, it cannot be affirmed that armour plates possess the same value, relatively, for protection as before they were subjected to the impact of capped projectiles. At the same time it must be observed that the greater ranges at which in all probability actions will be fought will tend to reduce the advantages which are gained by the gun through the increase of the velocity of its projectile and the new system of capping. In other words, it may be said that if the gun has hastened to overtake the armour plate, the latter has gained by withdrawing to a greater range. In considering these matters, a point of some importance to be remembered is that the results of trials may sometimes be subject to fluctuations and uncertainties, owing to accidental variations in the quality of the plates or projectiles used. This variation may be held to exist, notwithstanding the great care taken in producing a proper depth of carbonisation and hardness of plate, and also the right hardness of the projectile. These facts may serve to explain the surprises that sometimes appear in the test of armour plate and A.P. projectiles. Another point to which reference may be made is the difference of opinion which has arisen as to the wisdom of placing thin armour on our new ships. There are those who maintain that, while thin plates will not keep out any heavy projectiles, they may just be sufficient to help them to burst satisfactorily after passing through.

Perforation of capped and uncapped projectiles.

It seems desirable, before going any further, to recur to what Captain Tressider said last year in relation to the proposed figure of merit (F.M.) introduced by Major Wolley Dod, late R.A., of Hadfield's Steel Foundry Company, Ltd. The figure of merit (F.M.) of a plate against a given round is the ratio between the thickness of wrought iron the round can just perforate and the thickness the plate must have just to accept the perforation by the round, while the factor of perforation is the ratio between the thickness of wrought iron the round can just perforate and the thickness of the given plate. It will also be useful to reproduce the tables prepared by Captain Tressider, for the perforation of Krupp steel by uncapped projectiles, and of the perforation by capped A.P. projectiles, premising that the table for the latter is only tentative, and that the whole of the table may be subject to modification in the light of later experience.

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PERFORATION IN INCHES OF KRUPP STEEL BY UNCAPPED SERVICE A.P. PROJECTILES.

(Based on Krupp's formula $t^2 = \frac{WV^2}{D} \times \log^{-1} \bar{7}{\cdot}6469$.)

Projectile.	Striking Velocity.												
	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
4·7-in. of 45 lbs.	3·12	3·35	3·55	3·77	3·95	4·18	4·35	4·58	4·80	5·00	5·20	5·40	5·63
6-in. of 100 lbs.	4·08	4·34	4·60	4·87	5·15	5·41	5·70	5·98	6·25	6·51	6·80	7·08	7·38
7·5-in. of 200 lbs. / 8-in. of 212 lbs.	5·10	5·43	5·80	6·12	6·48	6·82	7·18	7·51	7·86	8·20	8·55	8·89	9·23
9·2-in. of 380 lbs.	6·42	6·88	7·30	7·74	8·17	8·60	9·02	9·44	9·89	10·30	10·75	11·19	11·60
10-in. of 500 lbs.	7·11	7·59	8·05	8·51	8·98	9·44	9·92	10·40	10·88	11·34	11·80	12·28	12·75
12-in. of 714 lbs.	7·72	8·24	8·75	9·25	9·77	10·29	10·80	11·32	11·82	12·35	12·86	13·37	13·90
12-in. of 850 lbs.	8·44	9·00	9·54	10·11	10·68	11·24	11·79	12·34	12·90	13·47	14·02	14·58	15·15

PERFORATION IN INCHES OF KRUPP STEEL BY UNCAPPED SERVICE A.P. PROJECTILES.

(Based on Tresidder's formula.)

Projectile.	Striking Velocity.												
	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
4·7-in. of 45 lbs.	3·0	3·3	3·6	3·9	4·1	4·5	4·7	4·9	5·2	5·4	5·5	5·8	6·2
6-in. of 100 lbs.	3·9	4·3	4·6	5·0	5·3	5·5	5·7	5·9	6·4	6·9	7·4	7·9	8·6
7·5-in. of 200 lbs. / 8-in. of 212 lbs.	4·7	5·0	5·3	5·5	6·1	6·7	7·2	7·8	8·5	9·3	9·9	10·7	11·4
8-in. of 250 lbs.	5·1	5·4	5·7	6·0	6·6	7·2	7·8	8·5	9·3	10·0	10·8	11·6	12·4
9·2-in. of 380 lbs.	5·7	6·0	6·3	7·2	8·1	8·9	9·7	10·8	11·7	12·5	13·2	14·0	14·9
10-in. of 500 lbs.	5·9	6·5	7·3	8·2	9·1	10·2	11·2	12·0	12·9	13·7	14·6	15·5	16·4
12-in. of 714 lbs.	6·4	7·3	8·1	9·1	10·3	11·4	12·2	13·1	14·0	15·0	15·9	16·9	17·8
12-in. of 850 lbs.	7·1	8·2	9·1	10·5	11·5	12·4	13·3	14·3	15·3	16·3	17·4	18·4	19·5

PERFORATION IN INCHES OF KRUPP STEEL BY CAPPED SERVICE A.P. PROJECTILES.

(Based on Tresidder's formula, modified by consideration of the relation between the thickness of the plate and the calibre of the projectile.)

Projectile.	Striking Velocity.												
	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
4·7-in. of 45 lbs.	3·3	3·7	4·1	4·5	4·9	5·3	5·8	6·3	6·8	7·4	8·0	8·5	9·2
6-in. of 100 lbs.	4·3	4·8	5·3	5·9	6·4	7·0	7·6	8·3	9·0	9·7	10·5	11·3	12·1
7·5-in. of 200 lbs. / 8-in. of 212 lbs.	5·5	6·1	6·8	7·5	8·1	8·9	9·6	10·5	11·4	12·3	13·3	14·3	15·3
8-in. of 250 lbs.	5·9	6·6	7·3	8·1	8·8	9·6	10·5	11·4	12·4	13·4	14·4	15·5	16·5
9·2-in. of 380 lbs.	6·8	7·6	8·5	9·3	10·1	11·1	12·0	13·1	14·2	15·4	16·5	17·8	19·0
10-in. of 500 lbs.	7·5	8·4	9·3	10·2	11·1	12·1	13·2	14·4	15·6	16·8	18·2	19·5	21·0
12-in. of 714 lbs.	8·2	9·2	10·1	11·2	12·2	13·3	14·5	15·7	17·0	18·4	19·8	21·3	22·9
12-in. of 850 lbs.	9·0	10·0	11·0	12·2	13·2	14·5	15·7	17·1	18·6	20·0	21·6	23·2	24·9

Cammell plates.

We are enabled to illustrate two remarkable K.C. plates, 12 in. and 6 in. thick respectively, manufactured by Messrs. Cammell, Laird and Co., which have resisted the impact of Holzer A.P. projectiles. The 12-in. plate represents the armour for the Commonwealth,


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12-IN. PLATE OF THE COMMONWEALTH, MANUFACTURED BY MESSRS. CAMMELL, LAIRD & CO., AFTER UNDERGOING ADMIRALTY ACCEPTANCE TEST WITH 12-IN. PROJECTILES OF 718 LB. WEIGHT.

CAMMELL 6-IN. K.C. PLATE AFTER TRIAL WITH 6-IN. HOLZER A.P. PROJECTILES.

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and has undergone the Admiralty acceptance test with 12-in. projectiles of 718 lb. weight. It will be observed that the details of velocity, etc., on the blackboard with this plate have been blotted out in accordance with Admiralty requirements, but the Admiralty have given the necessary permission for the use of the

Hadfield "Era" Plate ($3\frac{5}{16}$ in.), tested with $4\frac{1}{2}$ in. common shell (31 lb.), S.V. 2140 f.s., S.E. 983 ft.-tons.

photograph. The trial of the 6-in. plate was a private one, and the plate gave most excellent results. The striking velocities of the first four rounds were respectively 1977, 1972, 1970, and 1962 f.s., while the fifth round, which struck a little above the centre of the plate,

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was fired even at a higher velocity. The gun used was a 6 in., firing Holzer A.P. projectiles. In the case of both the 12-in. and 6-in. plates the backs were quite perfect.

Messrs. Hadfield have also been very successful with their "Era" armour plates. We illustrate a somewhat remarkable test of Hadfield "Era" plates.

Back view of the "Era" Plate.

one of these steel plates, which, we understand, are cast and not forged, and contain a considerable amount of manganese amongst other alloys. It may be questioned whether a K.C. armour plate of the same thickness would have resisted the severe impact of this common shell. The plate was $3\frac{5}{16}$ in. thick, and the weight of the

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10·5 cm. ($4\frac{1}{8}$ in.) projectile, filled with salt, was 31 lb., while the striking velocity was 2140 f.s., the striking energy 983 f.t., and the F.P. 3·12. The test was very severe for a plate of that thickness, and the illustration is noteworthy. We understand that good results are being got for shields and other similar purposes with this new steel, and some other remarkable results have been attained. Projectiles from 6-in., 7·5-in., 9·2-in., and other guns have been fired at a 6-in. "Era" plate at Shoeburyness, at an angle of 30 degrees from the perpendicular to the plate's face. It is stated that the capped shot generally got through, except perhaps in the case of the 6-in., which was deflected, while the uncapped shot did not penetrate, except in one instance of the smaller type. The details of the "Era" steel have not been disclosed.

The action of the cap.

A very clear account was given in the *Naval Annual* last year of the manner in which the cap acts upon the plate. The hard face of the plate has for its purpose to start the destruction of the delicate point of a projectile before that point has obtained any appreciable penetration at all, since directly it has entered, even as much as $\frac{1}{8}$ of an inch, it obtains a side support which increases the difficulty of breaking it, and the further it goes in the less support it needs and the more it gets. It follows from this (1) that the hard face has only a very minute fraction of a second of time in which to perform its main function; and (2) that anything that will enable the extreme point of the shot to hold together during this brief period is likely to save the projectile from fatal initial pulverisation, and to defeat the main object of hardening the face of the plate. This is the whole *raison d'être* of the cap, and it cannot now be seriously alleged that its action is in the nature of a lubricant.

New capped projectiles. Messrs. Firth's shells.

In relation to the new projectiles it is impossible to give precise data without divulging confidential information, but the difficult nature of the specification of the new capped A.P. shell for the British Government is well known. Supplies have been called for of various calibres of this new type of shell. Messrs. Thomas Firth & Sons, of Sheffield, though they have not yet submitted any of their 12-in. projectiles of this latest type for proof, have fired successfully those of 10-in. and 9·2-in. calibres in the severe tests required by the stringent conditions laid down for acceptance. We are able to illustrate 10-in. and 9·2-in. capped A.P. shells, showing the condition of each after penetrating a 9-in. K.C. plate at a velocity of 1963 f.s. for the 10-in. and 2030 f.s. for the 9·2-in. The same firm have been equally successful with 8-in., 7·5-in., 6-in., and 4·7-in. shells fired respectively against K.C. plates of the same thickness as the calibre. The velocities for the 8-in., 7·5-in., and 6-in. shells were respectively

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1931 f.s., 1997 f.s., and 2016 f.s. These armour-piercing capped shells are known as "Firth-Rendable," and the caps are made of soft material, and fixed to projectiles very carefully designed. They are intended to burst after perforating the armour plates attacked, and have a chamber capacity to carry a bursting charge equivalent to 2½ per cent. of the total weight of the shell. In regard to the 8-in. shell the official report states that there was a "perfect test, the shell having been recovered without the slightest deformation, and quite cold."

"Firth-Rendable" Shell after firing.

The Hadfield Company has also been very successful with its capped "Heclon" A.P. shell, of which large quantities have been passed into the Army and Navy services, including 9·2-in., 7·5-in., and 6-in. calibre. Important tests have also been carried out in Spain, with the result that a considerable supply of large-calibre capped shell are to be supplied. One of the "Heclon" projectiles was recently fired at an important foreign proving ground, of which the name is not to be disclosed, giving very remarkable results. We are informed that the plate attacked was 12 in. in thickness, of the K.C. type, backed with 12 in. of oak backing, and three ½-in. skin plates. Hadfield "Heclon" shell.

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Such a plate is usually attacked by a one-calibre projectile, that is 12 in., but in this case one of the "Heclon" projectiles, 10-in. calibre, was fired at it with the low velocity of 1877 f.s. The shell perforated the plate and backing, and was found with only the point and two pieces of the shoulder broken off no less than 2600 ft. beyond the target. The 7·5-in. "Heclon" projectiles have also repeatedly perforated 9-in. K.C. plates at 1975 f.s. velocity, the shell passing through this severe ordeal, and being found practically undamaged a considerable distance behind the plate. It is recorded that on 14 lots of this calibre shell supplied to the British Government no less than 14 proof shell have been fired, every one of which passed through a 7-in. K.C. plate, and was recovered on the other side in a condition for bursting. A later trial of a 9·2-in. "Heclon" A.P. shell against a K.C. plate 11 in. thick is reported. The shell had a striking velocity of 2000 f.s., and perforated the plate, being found undamaged at the back.


Hadfield 9·2-in. "Heclon" A.P. shell after perforating 11 in K.C. Plate, s.v. 2000 f.s.

The Bethlehem Company's bursting shells.

The writer is greatly indebted to Mr. John F. Meigs, Engineer of Ordnance for the Bethlehem Steel Company, South Bethlehem, Pennsylvania, who says, in relation to the question of projectiles, that there is a tendency in the United States to do away with all projectiles except those that are armour-piercing, and to so modify and improve these that, while retaining their ability to penetrate armour, they can be fragmented as effectively as weaker steel shell. Armour-piercing projectiles of these new types, containing large bursting charges, have been made and subjected to the usual acceptance tests, and have been successful. Photographs showing bursts of 4-in. and 6-in. projectiles of these types are very interesting. Both shells passed through a thickness of hard-faced armour equal to their diameter, and were burst in flight behind the plate by the charges which they contained. Like results have been obtained with 3-pdr. and 1-pdr. projectiles of the same type. (It should not be understood, however, that there is a disposition in the United States Navy to do away entirely with shrapnel, and many gunnery experts consider shrapnel fire as very effective and valuable.)

The bursts of capped 6-in. (102 lb.) and 4-in. (31 lb.) A.P. shells referred to took place at the Bethlehem Company's proving grounds,

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October 12 and 26, 1905. They were ribbed cavity armour-piercing shells manufactured by the Bethlehem Steel Company, and black powder was used as the bursting charge. After penetrating a 4-in. hard-faced Harveyized plate the 4-in. A.P. shell burst about 8 feet in rear of the plate and one hundred and seventy-two fragments were recovered. The 6-in. shell, after penetrating a 6-in. hard-faced Krupp plate, burst about 8 feet in the rear, and about 650 fragments were recovered. The average weight of the fragments recovered was about 2·4 oz. It may be noted in relation to these trials that, because an A.P. shell bursts with good fragmentation after passing through an armour plate whose thickness is that of the calibre of the gun, it does not follow that it will break up well after passing through a half-inch plate. This is a real difficulty, and if the Americans have got over it, they have certainly made a step in advance.

The Bethlehem Company's armour plates.

Mr. Meigs has most kindly sent over photographs of 11-in., 9-in., and 6-in. Kruppized plates and of a 5-in. Harveyized plate, which have undergone tests required under the contracts for ships of the United States Navy, "the velocities never being pushed to the failure of the plates." The main idea would seem to be the obtaining of a plate which will not break up under fire from a shell of equivalent dimensions, the calibre being approximately the same as the thickness of the plate, with such striking velocity as might be expected at fighting range. Capped projectiles were used throughout at the trials, and they are now always used in the United States. There are no particulars of oblique impact. Unfortunately the photographs arrived too late to be reproduced in this volume, but particulars of the successes will be interesting. In the case of each plate three rounds were fired, and in only one instance was a slight crack developed. The first plate was an 11-in., representing the side armour of the Georgia and the conning tower of the Nebraska. The gun was a 10-in., with Carpenter capped projectiles, weighing 510 lb., and the striking velocities in the three rounds varied from 1562 to 1639 f.s., and the energies from 8636·5 to 9508·9 f.t. The actual thickness at point of impact was 10¾ in., and in no case was the plate cracked, while in each round the shell was broken up. The next plate is an 11-in. Kruppized, representing the side armour of the Connecticut, and here, again, three rounds were fired with the same shell, the striking velocities rising from 1563 to 1649, and the energies from 8647·5 to 9625·3. The results upon the plate and the shell were the same as in the case of the other 11-in. plate. The next photograph is of a 9-in plate, representing the side armour of the New Hampshire. An 8-in. gun was used with a

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projectile weighing 260 lb., the last two rounds being with Midvale capped shells. The striking velocities ranged between 1688 with the first round and 1726 with the second, and the energy between 5141·9 and 5363·3. No cracks were developed in the plate, and the shells were broken up. Another photograph depicts a 6-in. plate representing the turrets of the Connecticut, against which 6-in. shells were fired, the maximum striking velocity being 1649 and the energy 1981·6. The results upon the plate and the shell were precisely as in the other cases and no bolts were broken, while the backing was not disturbed. Another 6-in. plate representing the barbettes and the thwartships armour of the New Hampshire was tried under like conditions, and with the same satisfactory results. The last of the photographs represents a 5-in. Harveyized plate representing the side armour of the North Carolina. The gun was a 5-in., and the weight of the projectile 50 lb.; the maximum striking velocity was 1691, and the energy 992·3. In the first and third rounds there were no cracks, while certain hair cracks developed at the upper end of the plate from the second impact. In all three rounds the shell was wrecked. It appears that through an inadvertence at the proving ground the actual striking velocity was 170 f.s. higher than the contract requires, making the velocity about equivalent to what the contract requires for a Krupp plate of the actual thickness. In the case of all these Bethlehem plates, of which particulars are given, the plate was passed on the three impacts mentioned in each case.

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CHAPTER II.

Ordnance.

The year has witnessed a very important change in the armament of battleships by the suppression of the medium armament in many new vessels. This measure has been taken in the case of the Dreadnought, which has a main armament of ten 12-in. guns with no medium armament, but a large equipment of guns firing 18 lb. shots as a defence against torpedo attacks. In the new French battleships, unless the plans should be changed, there will be four 12-in. guns and twelve 9·4 in., but no smaller armament, except the 2·9-in. anti-torpedo-boat gun. The rapidity of fire with big guns has greatly increased within recent years. The destructive effect of their shell fire, not only to life, but to the structure of ships, is far greater than with smaller guns; and future naval actions will presumably be fought at ranges exceeding 3000 yards, at which big guns are much more effective than smaller ones. Therefore, in many naval circles it is contended that the medium armament has lost its value, although it is right to say that in some navies this view is not held to be absolutely confirmed. The lighter armament has for its purpose to deal only with torpedo craft, and, therefore, the character of the light gun becomes a matter of great importance. There are those who say that the proposed minor armament of the French ships, as also of the Dreadnought, is not sufficient, and in some quarters it is maintained that the 4-in. or 4·7-in. gun is the right protection from torpedo-boat attack. For the better co-ordination of fire, it seems now to be the practice to place these smaller guns in groups. **New ideas as to armament.**

Progress in gun designing has principally taken the direction of increase in length and the use of higher pressures to obtain higher velocities. Thus in the British Service a 50-calibre 9·2-in. gun is under construction, with a view to replacing the 45-calibre gun, and the 45-calibre 12-in. will supersede the 40-calibre gun now mounted in our latest ships. The increase in length greatly augments muzzle energy, velocity, and penetration, and there is a tendency to a redistribution of the thickness between tubes, wire, and jackets, and to the adoption of a uniform or similar type of rifling. In the Japanese battleships just completed at Elswick and Barrow the 10-in. guns are of 50-calibres, and the 12-in. of 45 calibres. Taking these ships **Progress in gun design.**

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as examples of progress, it may be mentioned that the Mikasa's 12-in. guns fired charges of only 147 lb. of the old cordite, whereas the new ships' 12-in. guns fire 260 lb. of M.D. cordite. The Mikasa's guns realise a velocity of 2400 f.s., while those of the Kashima and Katori have a velocity of 2850 f.s. The Service 12-in. guns will obtain somewhere near 2800 f.s. Experiments have clearly proved the advantage of uniform rifling over the increasing twist with the modern high velocity guns, and more accurate shooting has been the result, as the projectiles take their twist with more certainty. The rifling has been the cause of considerable trouble with some experimental high-velocity guns having an increasing twist.

Increased rapidity. Attention has been concentrated on appliances for insuring greater rapidity of accurate fire with large guns. Amongst these may be named a modified arrangement of breech mechanism, known as the "pure couple," which has been introduced by Messrs. Vickers, to increase the power (at the expense, of course, of more turns of the hand mechanism) for seating and unseating the obturator pad, which was highly desirable, on account of the hard work involved in these operations. A further account of the Vickers breech mechanism is given below. Hydraulic breech mechanisms have been generally introduced for 12-in. guns, and in the Japanese battleships this is also to be found with the 10-in. guns. Loading at any angle of elevation is adopted for all the new 12-in. guns, although the advantages gained by this system are very nearly, if not quite, balanced by the disadvantage of extra complication and weight. It seemed to have been adopted entirely on account of the possibility it provides of keeping the sight on the target during the operation of loading.

In regard to training and elevating gear, it may be said that there has been no change beyond making it easier to work the gun, and with regard to the training gear, the present idea is to attain a slow and accurate creep under absolute control, so as to follow a target with certainty. The maximum speed with turrets is one turn in two minutes, but the minimum speed is one turn in six hours or more, while the Kashima turrets can train as slowly as one turn in thirteen hours.

Vickers' breech mechanism. We are enabled to illustrate the special breech mechanism of Messrs. Vickers, designed to incorporate certain important features which shall be described, and the same firm has other mechanisms designed to embody the feature of the couple which is used, as will be seen, in the 12-in. mechanism. It is thus applied to the mechanism of the 10-in. gun, which is practically the same in all its important features as the 12-in., which we illustrate, except that the breech

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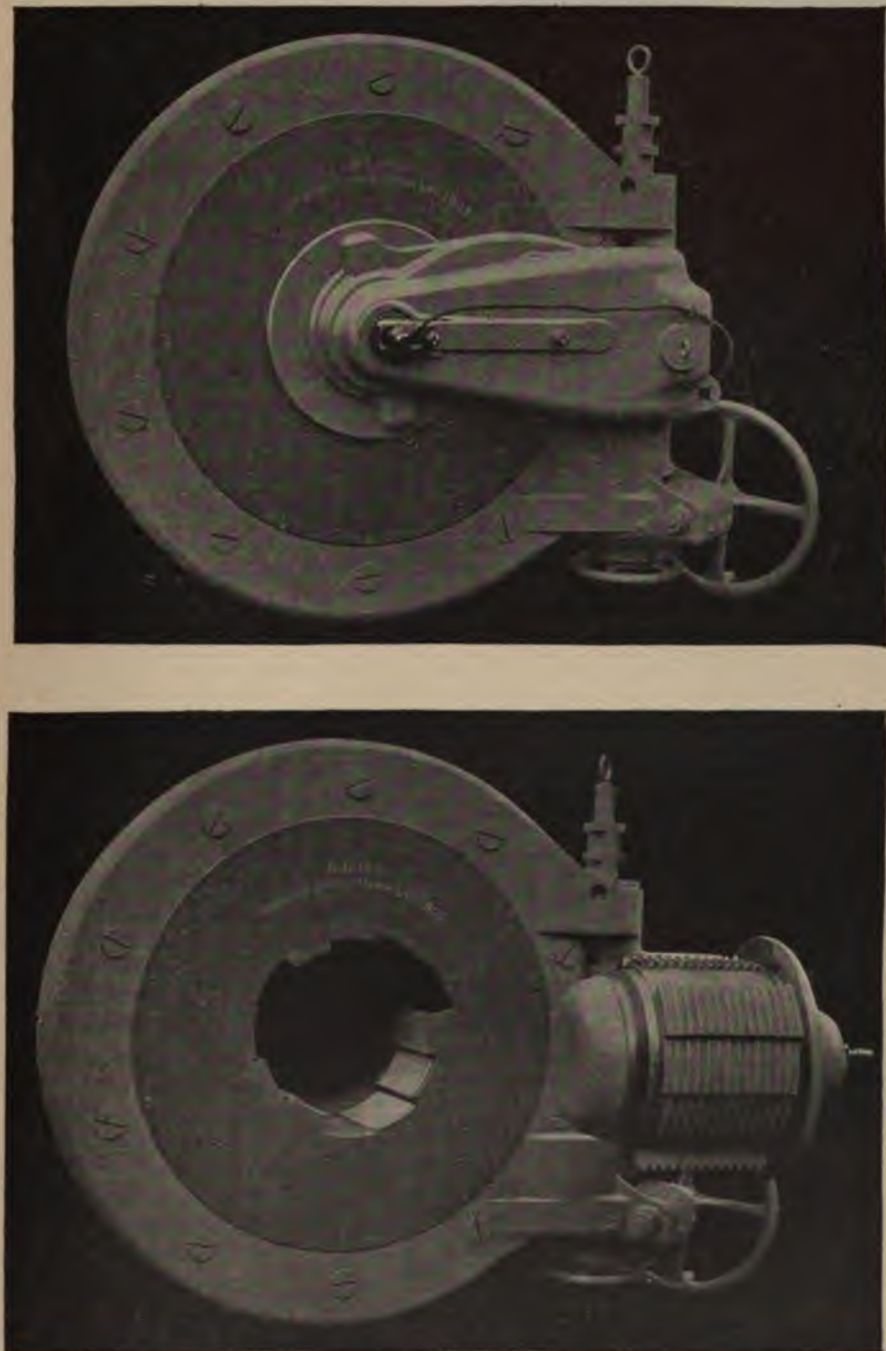

VICKERS' SPECIAL 12-IN. BREECH MECHANISM, CLOSED AND OPEN.

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action is operated by a hand lever instead of a hand wheel and worm gear. The Vickers breech mechanism for the 12-in. 45-calibre gun is of a new and improved type, giving considerable increase of power when closing the breech, and is operated by the hand wheel, with worm and worm wheel gear, referred to mounted in a suitable bracket on the end frame of the gun.

The breech screw is of the "Vickers" type, and is mounted and retained on the stem of the carrier by interrupted screw threads in the usual manner. One of the chief features of this mechanism consists in the application of the pure "couple," which has been referred to, for rotating the breech screw. In breech mechanisms as at present generally constructed the breech screw is rotated by a turning moment which has been found to set up considerable friction, owing to the tendency of such moment to occasional axial displacement of the breech screw. By applying a "couple" for this purpose this difficulty is obviated, so that the whole of the available turning force applied to the breech screw is utilised in seating the obturator. The arrangement for actuating the breech screw is as follows:—The rear face of the screw is provided with two studs diametrically opposite to each other, and around these are fitted two sliding blocks which engage with corresponding holes in a lever plate, having a long grooved arm. The lever plate is pivotally mounted on the same axis as the breech screw, though not directly pivoted on to the stem of the carrier on which the breech screw rotates, but is fitted around a sleeve, this sleeve surrounding part of the stem of the carrier to the rear of the breech screw. The hole in the lever plate is slightly elongated with respect to the outside diameter of the sleeve, and the holes in the lever plate, into which are fitted the sliding blocks on the studs of the breech screw, are made slightly longer than the blocks themselves, and, furthermore, a greater clearance than is usually allowed is made between the breech screw and the stem of the carrier on which it turns. This arrangement, together with the clearance just enumerated, absolutely ensures that any small inaccuracies in the manufacture of these parts of the mechanism are automatically adjusted, and also that the breech screw is mechanically quite independent of the lever itself, except its engagement through the studs with their sliding blocks. As a result, when a turning moment is given to the lever, this in turn operates on the breech screw as a pure "couple." Engaging with the groove of the long arm of the lever-plate is a roller pin projecting forwardly from a short crank mounted on the carrier, the form of the groove being such that the maximum possible power is exerted when seating the obturator. The pivot for the short crank is provided with a roller-bearing to eliminate, as far as possible, the friction of the toggle-joint action of the crank before the final operation of seating the obturator. The arrangement of the crank with respect to the groove in the long arm is such that a locking point is formed when the breech is closed. The crank has spur teeth which gear with a pinion formed on a short horizontal shaft having at its other end a bevel wheel, which gears with a second bevel wheel fixed on the axis pin of the carrier. The axis pin of the carrier is operated by the worm-wheel gear at its lower end. A cam plate is fitted to the short crank for operating the firing gear. The mechanism may be provided with separate electric and percussion firing locks.

Anti-torpedo guns.

We turn now to the smaller guns intended for defence against the attack of torpedo craft. This question, as we have said, has been much discussed as a result of the Russo-Japanese war, and calibres of guns have been advocated or adopted which seem out of proportion to the object to be attained. It is pointed out that with the heavier ordnances, preferred in some quarters for this minor purpose, the provision of sufficient ammunition might become a difficulty. It has been contended that the insufficient stopping power of the 12-pdr. guns was not definitely shown by the events of the late war, and that any failure probably resulted from the character of the projectiles employed, and, still more, from insufficient rapidity, and, above all,

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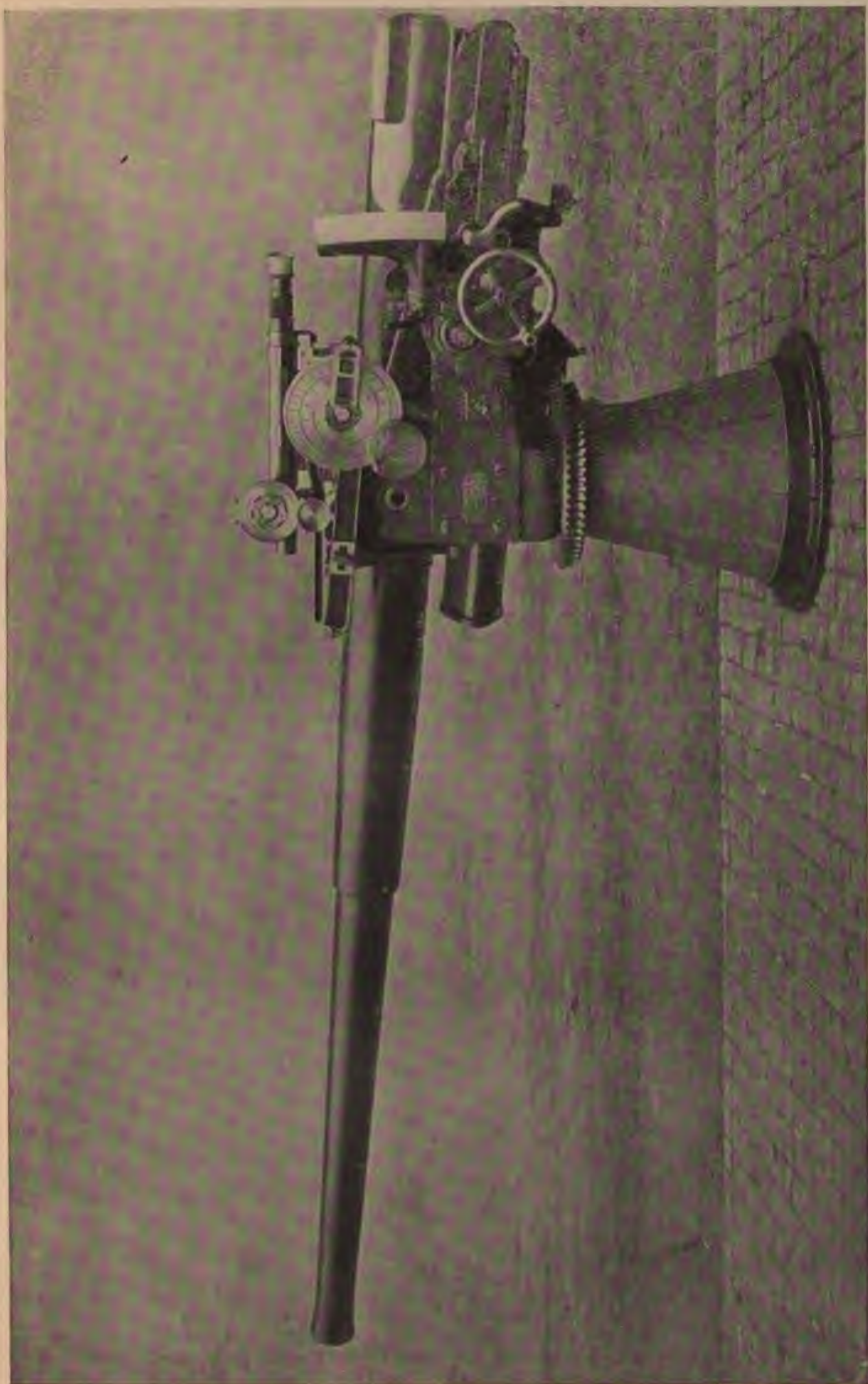

Vickers' 3-in. 12-pounder 50-calibre Gun on Ship Mounting.

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from want of precision of fire. We illustrate Messrs. Vickers' latest 12½-pdr. gun. on its naval mounting which meets the difficulty. The breech mechanism is of the vertical block type, and can be operated semi-automatically by the mechanism being opened by the recoiling of the gun after firing, and closed by the operation of loading; or quick-firing by the mechanism being opened and closed by hand.

The Vickers' 12½-pdr.

The breech block is capable of vertical movement and contains the firing pin, main spring, trigger, cocking lever, etc., and the gun is fitted with a powerful extractor, which has its lower end arms for retaining the mechanism in its "open" position. On the right-hand side of the breech end is a spring case, containing a powerful clock spring, one end of which is fastened to the case and the other to an outer hub, this outer hub being keyed to an inner one fixed to the axis of the crank. Projections on the side of the outer hub engage with corresponding ones on the inner plate of the spring case, so that the weight of the clock spring is not transmitted to the crank axis when the mechanism is completely closed. This enables the mechanism to be converted to Q.F. without unwinding the clock spring, relieves the breech mechanism lever from pressure when home, and allows of rapid and easy inspection of any portion of the mechanism.

The hand lever is mounted on a bracket on the right hand of the cradle, and actuates the mechanism by a crank pin working in a horizontal slotted link secured to the crank axis pin, and can be readily put in and out of the gear by withdrawing the crank pin against the action of a spring. This is so arranged that in whatever position the link may be when the gun runs out, there can be no damage to either or any portion of the mechanism, and the hand lever is arranged to provide means of easily adjusting the strength of the clock spring.

For semi-automatic firing the action is as follows:—The breech is opened by moving the hand lever, whereby a crank is turned, the action of which brings down the breech block, and winds up the clock spring. At the same time the main spring is compressed, and is kept in this position by the motion of the trigger. The breech block in moving down strikes the rear portion of the lower extension of the extractor and causes the upper portion to move out from the face of the end of the barrel, and brings the front portion of the lower extension of the extractor to engage with corresponding gaps on the crank boss, thus preventing the mechanism from closing by the reaction of the clock spring. The spring crank pin on hand lever axis is now withdrawn, and the hand lever, which is disengaged from the mechanism, is returned to its closed position, leaving the mechanism open. The cartridge is then smartly pushed into the bore, and as it goes forward within the chamber, its rim strikes against the extractor claws, thus forcing the extractor towards the face of the gun. During this movement the lower extension of the extractor is withdrawn from the crank boss, and the block is then free to rise. The clock spring being fixed on the axis of the crank, rotates it, thus raising the breech block until the breech is closed. The sear of the trigger is now engaged with the cocking lever, thus holding the firing-pin back, and by pulling the trigger to the rear, the cocking lever is released and the firing pin thrown forward by the action of the main spring. The lower part of the cocking lever is so arranged as to be acted upon by a lever operated from the pistol grip arm for re-cocking purposes if necessary.

On pulling the trigger the gun is fired and recoils in the cradle, the hand lever remaining stationary. The gun is provided with a pawl pivoted at the left-hand side of the breech so that as it returns after recoil the pawl engages a toe-piece which is mounted on the same axis as the crank which operates the mechanism. The action of the pawl causes the crank to rotate, and thereby bring down the breech block, laying the breech open for the next round. The extractor is actuated by the fall of the block; it first loosens the cartridge by a slow movement which, rapidly accelerating, finally ejects it to the rear.

The gun may be easily and quickly converted from a semi-automatic to an ordinary quick-firer at any time. To do this, the rearmost pin securing the hand-lever bracket to the cradle is withdrawn, and the bracket swung round on the remaining one. The spring case is then removed, and the pawl thrown out of action by a switch. The slotted link and hand lever are replaced in position, and the gun is then ready to be used as an ordinary quick-firer. The action of the mechanism when using it as a quick-firer is as follows:—The breech is opened by moving the hand lever and the final downward movement of the block compresses the buffers in the crank. The lower portion of the extractors engage with the crank

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boss and prevent the buffer springs from raising the block. When the cartridge is pushed into the bore, the rim of the case slightly depresses the block against the action of the buffer springs, which cause it to rise again behind the case. This effectually retains the case should the loading take place with the gun elevated. On the case being pushed slightly further against the extractor claws, the lower portions are disengaged from the crank boss, and the block rises slightly. The rest of the closing of the mechanism is performed by means of the hand lever, and the gun is fired in the same manner as described for semi-automatic action.

The Canet 12-pdr.

We are indebted to Messrs. Schneider, of Paris, Le Creusot, and Havre, for interesting particulars concerning their new patterns of ordnance, of which we are enabled to present illustrations. The remarkable Schneider-Canet powerful, semi-automatic 12-pdr. may be mentioned first. Its breech mechanism is upon the principle of concentric screws (*filets concentriques*), which are worked by hand with very great rapidity, and lend themselves very readily to the adaptation of a semi-automatic movement operated by a hand lever and crank with springs. The breech can be opened only after the discharge and throws out the empty cartridge case, and it is closed with the introduction of a new cartridge. Firing is automatic, or at the will of the gunner, and danger is said to be impossible, because the percussion needle can only be brought into position when the breech is completely closed. The breech mechanism consists of a very few pieces, and is easily removed by hand. The mounting has a central pivot, and the gun is so well balanced and provided with arrangements against friction, that it is moved in any direction with the utmost ease, while the arrangements are such that its movements can be arrested immediately, enabling it to be laid and maintained precisely upon the object. The sighting is telescopic. Great attention has been paid to the rapid supply of ammunition, which is made semi-automatically by arrangements which will be seen in the picture. The whole disposition of the gun seems to be exceedingly simple, and we are informed that the rate of fire is from 35 to 40 aimed rounds per minute. The explosive charge is "Schneiderite," a powerful and very safe explosive, and the fuse is arranged with the object of bringing about the explosion while the shell is passing through the plates of the torpedo-boat attacked. MM. Schneider have constructed a completely analogous gun of smaller calibre, 57mm. (6-pdr.).

Hand loading for big guns.

The same enterprising firm have devoted attention to a system of rapid ammunition supply to guns of large calibre, so arranged that little or no mechanical aid is required. Any mechanism actuated by power, hydraulic or electric, is subject to breakdown, and a mechanism has therefore been introduced whereby shells of 12-in. and 10-in. guns can be man-handled, the motive power required being reduced to a strict minimum, and involving only the application of mechanical arrangements which are very simple and strong.

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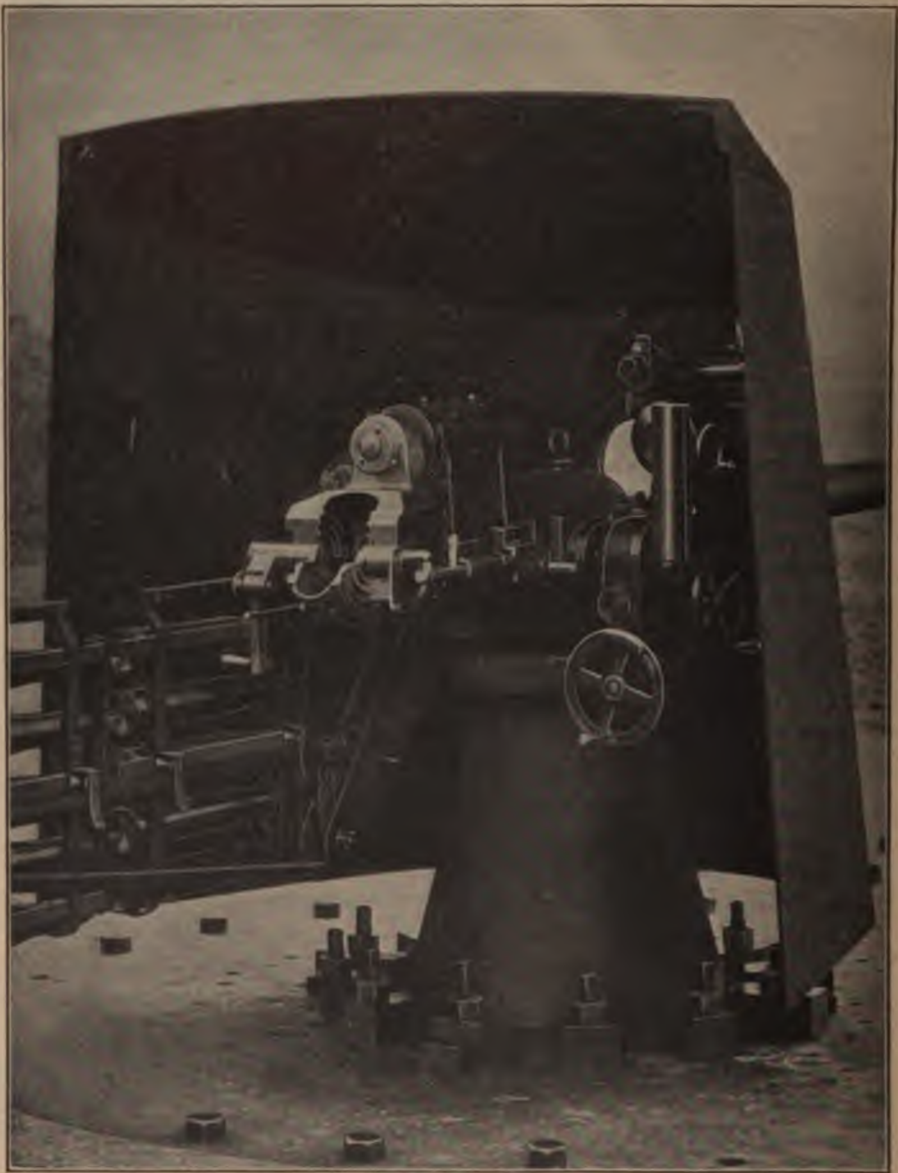

SCHNEIDER-CANET SEMI-AUTOMATIC 57 MM. (2·2 IN.) QUICK-FIRER ON SHIP MOUNTING.

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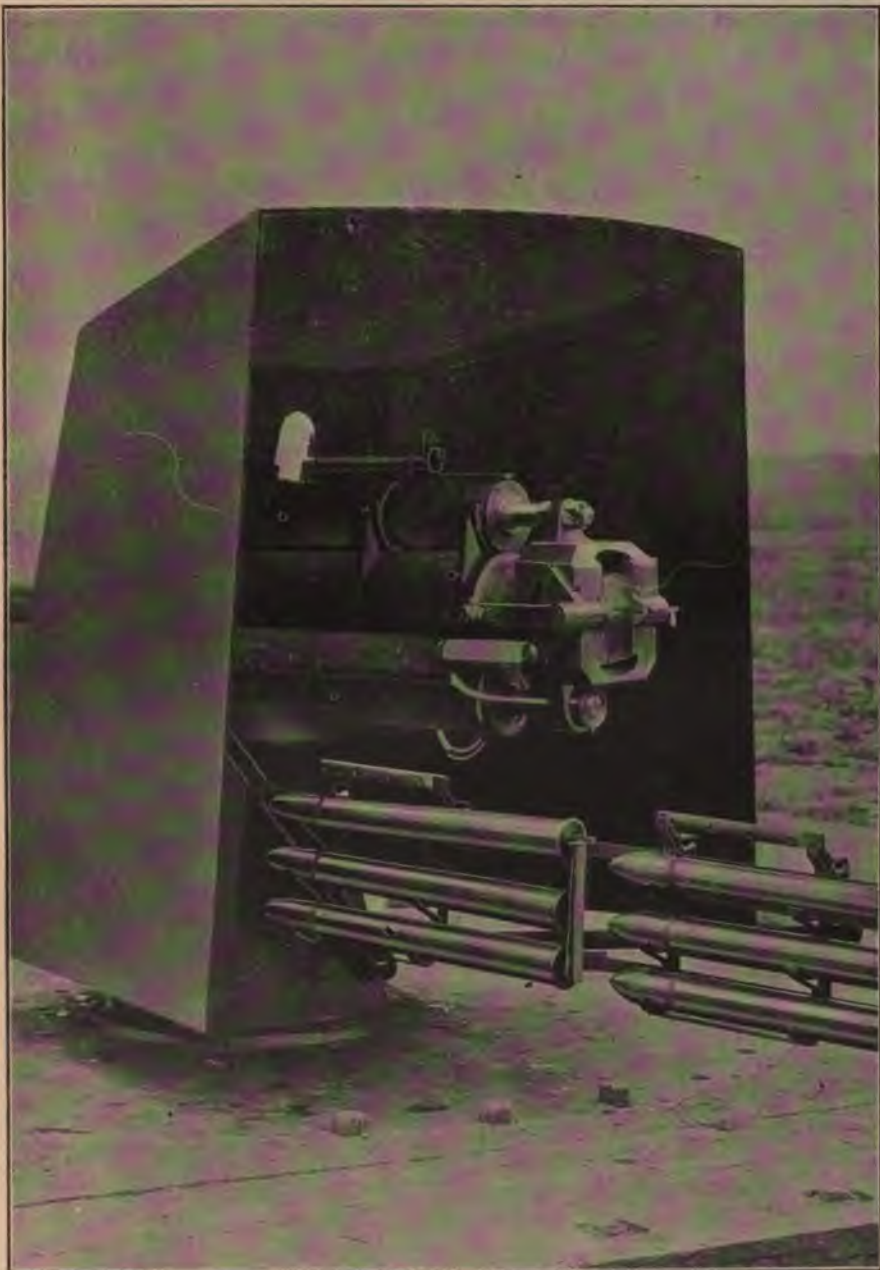

Schneider-Canet Semi-automatic 75 mm. (2·9 in.) Quick-firer on Ship Mounting.

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We illustrate a gun so adapted for coast use, being a 9·4-in. The breech mechanism is of great simplicity, and can be operated by hand if required. The gun is mounted upon a central pivot with hydraulic brakes, and is provided with very ingenious arrangements to absorb the recoil and bring the gun into the loading position. Moreover, the adjustments are such that the aim can be taken by telescopic arrangement while the gun is being loaded. The picture will explain very clearly the system of ammunition supply, and, with some modification, it can be adapted to use on board ship.

Erosion of guns. Bethlehem guns.

Mr. Meigs makes some interesting remarks upon the subject of erosion, remarking that the power of the gun can be augmented either by increasing the velocity or the weight of the projectile. If the weight be increased less ammunition will be carried, and the rate of fire will be reduced, while if the striking energy be developed, the "life" of the gun may be reduced. He says that in the United States the high velocities now employed have brought into prominence the question of the rapid burning or wearing away of guns, particularly of the larger calibres; but in this country it is considered that with the new M.D. cordite, using high velocities, the "life" of the gun will be sufficient for all purposes. Yet it would seem that in the United States it is proposed in some quarters to lower the velocities of guns, particularly of the large guns, on the ground that the "life" of these guns is so short as to constitute a serious menace. It has even been proposed, says Mr. Meigs, that the guns of a fixed weight (probably the present weight, or about 60 tons) should be made of larger calibre—that is, should be of more than 12-in. calibre, with the object of lowering the velocities of these guns and increasing the weights of their projectiles, lowering the pressures and temperatures of the gas in them, and extending their "life." This is obviously a matter upon which different opinions are likely to be held, and the erosion of United States guns would seem to offer a practical commentary upon the nitro-cellulose propellant in use, which was supposed to reduce this evil to a minimum. It may be pointed out that the "life" of a gun depends principally on the weight of cordite burned, and that if in a 12-in. gun 200 lb. of cordite gave a certain energy, evidently more would be required to obtain the same energy in a larger gun of approximately the same weight, for the larger gun would be shorter in proportion, and the "life" of the gun would accordingly be shorter.

Bethlehem guns. An interesting question raised.

In relation to his idea of enlarging the calibre of guns, Mr. Meigs points out that the 18-in. 28-cal. Bethlehem gun weighs about what the present 12-in. 45-cal. guns weigh, and has a greater projectile energy throughout flight than the 12-in. gun. This gun is one built

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SCHNEIDER-CANET 24 CM. (9·4 IN.) GUN WITH QUICK-LOADING MANUAL ARRANGEMENT.

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by the company, on order, several years ago, for an experimental and special purpose; and Mr. Meigs mentions it, not with a view of recommending this special calibre, but for the purpose of suggesting that a calibre and weight might be arrived at which would meet all requirements as to destructive energy, penetrative power, flatness of trajectory, and durability of gun. The idea is interesting, but the satisfactory character of our new cordite seems to obviate the difficulties to which he refers; and therefore to make unnecessary any increase in the calibre of big guns for the British Navy.

Range-finding and transmission and control of gun fire.

Unremitting attention is being paid in every navy to the development of plans and installations whereby the fire of ships' guns, as a whole, may be directed and controlled. In all the new ships great thought has been directed to this matter, with the result that they are far more efficient fighting machines than they were. Much progress has been effected, also, in the certainty and sureness and ease with which guns are moved in elevation and laid upon targets and kept there during the motion of the ship, and also to eliminate all lost motion in the gear driving the guns, whereby the ease of the gun-layer's work is increased.

A new range indicator.

The Americans appear to have led the way in devices for transmitting orders and ranges from the conning-tower or other stations in the ship. Some years ago they had the "battle order indicator" working in the Illinois and other ships. In British vessels there are now improved systems, and great advances have been made. Last year a new range indicator was perfected which deserves to be mentioned here. The invention is called the Vyvyan-Newitt range-finder, and is the invention of Lieutenant Arthur Vyvyan, the details of mechanism having been designed by Mr. Newitt, R.N., an electrical engineer. The main idea is that of transmitting the range observations, taken by a range officer stationed in the "fire control top" upon the mast of a war vessel, electrically, to the various gun positions on board. The apparatus enables the officer in the top to set the actual sights of the guns by means of a series of electric motors, the motors controlling the sights working synchronously with the motor in the top. Any movement in the motor at the "top" is thus transmitted to the gun positions. The speed of ship and deflection of the range are provided for automatically. The installation for working this range transmitter is to be fully tested at Whale Island and in a war vessel.

BRITISH RIFLED ORDNANCE.

Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Rifling. Twist one turn in Least at breech.	Rifling. Twist one turn in Greatest at muzzle.	Rifling. System.*	Charge (full). Weight.	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
QUICK-FIRING GUNS (using metal cases)																								
6·0 in.	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in. Q.F.C.	5 "	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2	6·4
4·7 in.	41 cwt. 42 "	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10·5 9·5	6·9 6·5	4·9 4·6	3·3 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·667	0·500	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	.	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr ..	5 cwt.	I. & II.	80·63	40	.	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0·45 in.	63 lbs.	I.	45·0	..	.	..	10	27	Enf'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

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BRITISH RIFLED ORDNANCE.—*continued.*

Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter (at largest).	Chamber. Length to base of projectile.	Rifling. Twist one turn in. Least at breech.	Rifling. Twist one turn in. Greatest at muzzle.	System.†	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Projectile. Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Perforation of wrought iron. At muzzle.	Perforation of wrought iron. At 1000 yards range.	Perforation of wrought iron. At 2000 yards range.	Perforation of wrought iron. At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	I. II. & III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179¾	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	45 & 46 tons.	III. IV. V. & V.w	328·5	25·25	16·0	48·0		35		88 8	30	12·0	714	$31\frac{13}{16}$ ‡‡95 **79	0·202	0·413	1914	18,130	24·4	21·5	18·9	16·1	6
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	$80–1\frac{9}{11}$	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17.5	87·2		..		201 8 9 8	50 3¾	12·0	850	"	..	..	2481 §2580	36,290 39,280	39·7 42·0	35·4 38·0	31·6 34·6	28·7 32·0	12½ 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18 ‡‡33 $**30\frac{6}{16}$	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.A&C & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380		0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

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9·2-in ††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46		..		..	..	..	200	..		0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		47 2	0 8	30 2½	7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35		14	12	20	6·0	100	7$\frac{4}{16}$ **9$\frac{13}{16}$	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30					6·0											
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7		30		20	0	20	6·0	100	9	0·360	0·463	2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4½ 5
5-in.	38 cwt. 40 cwt.	II. III. IV. & V.	139·15	25·07 25·0	5·75	19·05		25		4	7½	7·5	5·0	50	7$\frac{12}{16}$ 3$\frac{5}{16}$	0·500	0·400	1750	1,062	8·8	6·6	5·3	4·1	..
4-in.	23 cwt. 26 cwt.	II.II$_a$ III.III$_A$ IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	1$\frac{12}{16}$ 3$\frac{3}{16}$	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain.
† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite; ** Cast steel; †† A 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

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AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	30 5 L. 35 K. 80	24 L. 40 K. 01	24 L. 40 K. 94	24 L. 35 K. 86	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 35 K. 86	15 L. 35 K. 80	12 L. 40 Skoda.	12 L. 35 K. 80	12 L. 35 K. 87
Calibre, in inches	12·01	9·45	9·45	9·45	7·5	5·91	5·87	5·87	4·72	4·72	4·72
Length: Total, in feet	35·11	31·6	..	27·60	26·3	19·5	17·13	17·13	..	13·8	13·8
Length: Rifled Portion, in ins.	314·8	..	..	237·7	..	..	151·4	153·6	..	128·5	126·3
Length: Powder Chamber in ins.	69·9	..	..	65·2	..	..	37·3	35·4	..	24·0	26·3
Length: Of bore in calibres	35	40	40	35	42	40	35	35	40	35	35
No. of Grooves	68	72	..	25	..	..	36	36	36	32	36
Twist in calibres	45–25	..	..	26·9	..	..	45–25	25	25	25	25
Weight: Gun, tons	47·2	21·5	27·8	26·6	11·6	5·18	5·7	4·69	1·97	2·25	2·31
Weight: Breech Block, in lbs.	3306·9	..	..	1776·9	..	..	445·3	463·0	..	253·5	211·6
Weight: Steel Shell "	1003·1	474	474	474·0	198	112·5	112·5	86·0	52·4	57·3	57·3
Weight: Common Shell "	1003·1	474	474	474·0	..	112·5	112·5	69·9	52·4	57·3	57·3
Weight: Shrapnel Shell "	..	..	..	..	..	..	112·4	71·9	..	57·3	57·3
Weight of Bursting Charge: Case Shot "	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Steel Shell "	10·6	..	..	5·1	..	..	1·3	1·76	..	0·55	0·55
Weight of Bursting Charge: Common Shell "	97·7	..	..	17·9	..	..	5·29	3·86	..	2·2	2·2
Weight of Bursting Charge: Shrapnel Shell "	..	..	..	..	..	..	1·26	1·10	..	0·57	0·57
Weight of Firing Charge: Steel Projectile, in lbs.	156·5 24 cm.N	120·6	91·5	99·2N	56N	28·8	22·5 15 cm.N	38·8*	9·7	19·8 B	12·13N
Weight of Firing Charge: Common Shell, in lbs.	156·5 N 24 cm.N		91·5	99·2N			22·5 15 cm.N	38·8*		19·8 B	12·13N
Weight of Firing Charge: Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..
Weight of Firing Charge: Exercising, in lbs.	154·3B	..	..	..	..	..	28·7	19·6	..	11·0	6·6 N
Weight of Firing Charge: Saluting "	19·8 O	..	..	15·4 O	..	..	4·74	4·74 O	..	2·4 O	2·4 O
Muzzle Velocity, in feet	1969	2595	2264	2100	2700	2608	2133	1969	2264	1755	2133
Muzzle Energy: Total, foot-tons	26,970	22,121	16,845	14,500	10,025	5308	3549	2312	3554	1215	1808
Muzzle Energy: Per inch circumference, foot-tons	714·8	..	..	488·3	..	..	192·5	125·4	..	82·5	122·2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	30·1	34·5	29·0	25·8	27·3	22·0	16·1	12·6	13·7	9·7	12·9
Perforation of Krupp Steel, 3000 yds., inches	10	9½	8	7	6¾	5	3½	..	..	..	..

NOTE.—C for cube powder; * prismatic powder; O, ordinary powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

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DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.													
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	24 cm.	24 cm.	21 cm.	15 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm.	8·7 cm.
Calibre, in inches	13·98	12·01	10·24	10·24	9·4	9·4	8·24	5·9	5·91	5·91	5·91	4·72	4·72	3·43
Total length, in feet	29·1	22·0	32·8	18·77	31·4	31·6	24·04	..	17·1	12·63	10·7	11·8	..	11·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	..	..	264·5	..	190·3	135·0	112·9	128·8	..	..
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	37	37·5	35	40	32·2	22·8	19·1	27·3	37·5	37·1
Number of Grooves	80	68	60	60	..	..	48	..	36	36	36	32	..	..
Twist of Rifling, in calibres	45	45	70–25	45	..	..	70–25	..	70–25	45	45	25	..	..
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	25·4	22·9	13·3	..	4·7	4·4	3·5	2·13	..	..
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	..	..	903·9	..	390·2	330·7	324·1	229·2	..	..
Weight of Steel Shell, "	1157·4	725·3	451·9	451·9	353	353	238·1	112	112·4	..	86·0	..	44	..
Weight of Chilled Shell, "	1157·4	725·3	..	451·9	..	..	..	..	..	86·0	86·0	..	..	..
Weight of Common Shell, "	1157·4	725·3	451·9	451·9	230	353	238·1	112	112·4	69·4	69·4	57·3	44	20
Weight of Shrapnel Shell, "	1157·4	725·3	451·9	451·9	..	..	238·1	..	112·4	86·0	86·0	57·3	..	..
Weight of Case Shot, "	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge, Common Shell, "	57·3	39·7	25·4	25·4	16·5	16·5	12·8	6·2	6·2	3·0	3·0	1·7	..	..
Weight of Firing Charge, Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	..	75*	105·8	20·9*	41·9	19·3	21·8	17·4	9·7*	3·59*
Weight of Firing Charge, Common Shell, "	330·7	180·2	191·8	112·4	..	75*	105·8	..	41·9	19·3	21·8	17·4	..	..
Muzzle Velocity, Armour-piercing Projectile, feet	1762	1675	2018	1640	2159	2362	2021	2264	1800	1565	1542	..	2460	2379
Muzzle Velocity, Common Shell, "	1762	1675	2018	1640	..	..	2021	..	1890	1683	1690	1720	..	..
Muzzle Energy, Total foot-tons	24910	14110	12770	8428	11,440	13,656	6745	3981	2784	1461	1418	..	1846	780
Muzzle Energy, Per inch circumference, foot-tons	568·3	374·1	396·8	262·0	..	..	260·6	..	150·0	78·7	73·0	..	..	..
Perforation at Muzzle, wrought iron, Tresidder's formula	25·6	20·1	22·9	16·8	23·3	26·7	18·5	17·8	15·6	12·6	..	..	14·2	10·7
Perforation Krupp Steel, 3000 yards, inches	7	5½	6	4¾	6	7	5	3½	3	..	..	..	..	..

* Smokeless powder.

There are also a Finspong 6-in. and a 44-calibre 5-pr. Hotchkiss, V. = 2362 f.s.

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DUTCH NAVAL ORDNANCE.

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	Krupp Breech Loading Q.F.											Dutch Breech Loading.
Designation by Calibre, in centimètres	28	24	21	21	21	No. 2.	15	15	12	12	12	12
Calibre, in inches	11·0	9·4	7·91	8·2	8·2	5·87	5·9	5·9	4·72	4·72	4·72	4·72
Total Length, in feet	27·5	31·6	24·04	24·0	27·5	17·13	17·1	19·7	13·9	15·9	13·78	13·78
Length of Rifled Portion of Bore, in inches	..	..	222·2	..	..	151·4	..	..	..	..	128·5	..
Length of Powder Chamber "	..	..	42·4	..	..	37·7	..	..	..	..	24·0	..
Length of Bore, in Calibres	27	37	35	32	37·1	35	32	37	32·3	37·3	35	35
Number of Grooves	..	..	$\frac{48}{64}$	..	..	44	..	..	..	..	32	32
Depth of Grooves, inches	..	..	0·059	..	..	..	..	..	..	..	..	0·06
Twist of Rifling, in Calibres	..	..	∞–25	..	..	25	..	..	..	..	25	∞–45
Total Weight, in tons	27	25·3	$\frac{12·79}{13·98}$	14·0	16·2	4·72	3·8	4·7	1·9	2·7	2·26	2·31
Firing Charge — Armour-piercing Projectile, in lbs.	185	..	99·2	119	..	49·6	15·4	18·5	..	..	19·8	19·5
Firing Charge — Common Shell "	..	..	99·2	..	..	49·6	..	..	..	..	19·8	19·8
Weight — Armour-piercing Projectile "	761	474	308·6	309	309	112·2	100	88·2	52·4	57·4	57·3	57·3
Weight — Common Shell "	..	..	308·6	..	..	112·2	..	..	..	..	57·3	57·3
Weight — Case Shot "	..	..	..	..	..	..	..	..	..	..	57·3	..
Bursting Charge — Armour-piercing Projectile "	..	..	4·6	..	..	..	..	..	..	..	..	..
Bursting Charge — Common Shell "	20	..	12·3	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1627	2562	1739	1903	2067	2001	2034	2461	2034	2067	1755	1804
Muzzle Energy — Total, in foot-tons	13,960	21,589	6471	7760	9756	3115	2867	3703	1503	1689	1224	1264
Muzzle Energy — Per inch Circumference, foot-tons	..	..	260·7	..	..	169·0	..	..	..	..	82·5	85·2
Perforation at Muzzle, in inches	20·0	34·0	{16·8 / 17·1}	19·4	21·9	{13·6 / 14·8}	14·3	17·9	11·6	12·4	{9·4 / 10·1}	9·6
Perforation Krupp Steel, 3000 yards	5½	9½	3½	4½	5	..	..	..	..	..	..	..

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.					Model 1887.			
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4	34	30·5	27	19
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Length of Bore, in cals.	45	45	45	40	40	35	40	45	40	40	42	45	45	45
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Rifling Twist	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6
Weight of Firing Charge: Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1
Weight of Firing Charge: Com. Shell lbs.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight: Armour-piercing Projectile* lbs.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3
Weight: Com. Shell "	..	644	476	317	165	..	..	..	..	..	..	..	..	..
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625	2560	2625	2625	2625
Muzzle Energy: Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898
Muzzle Energy: Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1	..	815·8	670·7	329·1
Perforation at Muzzle† wrought iron, inches.	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4	40·8	37·3	33·7	23·4
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½	13	11	9	5½

Date and Pattern of Gun.	1884.					1881.						
Desig. by Calibre, in cms.	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge: Armour-piercing Projectile, lbs.	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge: Com. Shell lbs.	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight: Armour-piercing Projectile* lbs.	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight: Com. Shell "	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7
Muzzle Velocity, in f.-s., A.P. Projectile	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy: Total, in f.-t.	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy: Per in. circ., f.-t.	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches.	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* Steel or chilled iron. † By Tresidder's formula.
Some 50-calibre 24-cm. and 19·4-cm. are being made. The velocity will be about 3000 f.s.

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We illustrate a gun so adapted for coast use, being a 9·4-in. The breech mechanism is of great simplicity, and can be operated by hand if required. The gun is mounted upon a central pivot with hydraulic brakes, and is provided with very ingenious arrangements to absorb the recoil and bring the gun into the loading position. Moreover, the adjustments are such that the aim can be taken by telescopic arrangement while the gun is being loaded. The picture will explain very clearly the system of ammunition supply, and, with some modification, it can be adapted to use on board ship.

Erosion of guns. Bethlehem guns.

Mr. Meigs makes some interesting remarks upon the subject of erosion, remarking that the power of the gun can be augmented either by increasing the velocity or the weight of the projectile. If the weight be increased less ammunition will be carried, and the rate of fire will be reduced, while if the striking energy be developed, the "life" of the gun may be reduced. He says that in the United States the high velocities now employed have brought into prominence the question of the rapid burning or wearing away of guns, particularly of the larger calibres; but in this country it is considered that with the new M.D. cordite, using high velocities, the "life" of the gun will be sufficient for all purposes. Yet it would seem that in the United States it is proposed in some quarters to lower the velocities of guns, particularly of the large guns, on the ground that the "life" of these guns is so short as to constitute a serious menace. It has even been proposed, says Mr. Meigs, that the guns of a fixed weight (probably the present weight, or about 60 tons) should be made of larger calibre—that is, should be of more than 12-in. calibre, with the object of lowering the velocities of these guns and increasing the weights of their projectiles, lowering the pressures and temperatures of the gas in them, and extending their "life." This is obviously a matter upon which different opinions are likely to be held, and the erosion of United States guns would seem to offer a practical commentary upon the nitro-cellulose propellant in use, which was supposed to reduce this evil to a minimum. It may be pointed out that the "life" of a gun depends principally on the weight of cordite burned, and that if in a 12-in. gun 200 lb. of cordite gave a certain energy, evidently more would be required to obtain the same energy in a larger gun of approximately the same weight, for the larger gun would be shorter in proportion, and the "life" of the gun would accordingly be shorter.

Bethlehem guns. An interesting question raised.

In relation to his idea of enlarging the calibre of guns, Mr. Meigs points out that the 18-in. 28-cal. Bethlehem gun weighs about what the present 12-in. 45-cal. guns weigh, and has a greater projectile energy throughout flight than the 12-in. gun. This gun is one built

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SCHNEIDER-CANET 24 CM. (9·4 IN.) GUN WITH QUICK-LOADING MANUAL ARRANGEMENT.

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by the company, on order, several years ago, for an experimental and special purpose; and Mr. Meigs mentions it, not with a view of recommending this special calibre, but for the purpose of suggesting that a calibre and weight might be arrived at which would meet all requirements as to destructive energy, penetrative power, flatness of trajectory, and durability of gun. The idea is interesting, but the satisfactory character of our new cordite seems to obviate the difficulties to which he refers; and therefore to make unnecessary any increase in the calibre of big guns for the British Navy.

Range-finding and transmission and control of gun fire.

Unremitting attention is being paid in every navy to the development of plans and installations whereby the fire of ships' guns, as a whole, may be directed and controlled. In all the new ships great thought has been directed to this matter, with the result that they are far more efficient fighting machines than they were. Much progress has been effected, also, in the certainty and sureness and ease with which guns are moved in elevation and laid upon targets and kept there during the motion of the ship, and also to eliminate all lost motion in the gear driving the guns, whereby the ease of the gun-layer's work is increased.

A new range indicator.

The Americans appear to have led the way in devices for transmitting orders and ranges from the conning-tower or other stations in the ship. Some years ago they had the "battle order indicator" working in the Illinois and other ships. In British vessels there are now improved systems, and great advances have been made. Last year a new range indicator was perfected which deserves to be mentioned here. The invention is called the Vyvyan-Newitt range-finder, and is the invention of Lieutenant Arthur Vyvyan, the details of mechanism having been designed by Mr. Newitt, R.N., an electrical engineer. The main idea is that of transmitting the range observations, taken by a range officer stationed in the "fire control top" upon the mast of a war vessel, electrically, to the various gun positions on board. The apparatus enables the officer in the top to set the actual sights of the guns by means of a series of electric motors, the motors controlling the sights working synchronously with the motor in the top. Any movement in the motor at the "top" is thus transmitted to the gun positions. The speed of ship and deflection of the range are provided for automatically. The installation for working this range transmitter is to be fully tested at Whale Island and in a war vessel.

BRITISH RIFLED ORDNANCE.

Ordnance.										Charge (full).	Charge (cordite).		Projectile.						Ballistics (with full charges).					
Nature.					Chamber.		Rifling.														Perforation of wrought iron.			
							Twist one turn in																	
Calibre or Pr.	Weight.	Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.*	Weight.	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
QUICK-FIRING GUNS (using metal cases)																								
6·0 in.	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in. Q.F.C.	5 ,,	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2	6·4
4·7 in.	41 cwt. 42 ,,	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10·5 9·5	6·9 6·5	4·9 4·6	3·3 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·667	0·500	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr. ..	8 cwt	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	.	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr. ..	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr ..	5 cwt.	I. & II.	80·63	40	.	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr. ..	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0·45 in.	63 lbs.	I.	45·0	..	.	..	10	27	Enf'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

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action is operated by a hand lever instead of a hand wheel and worm gear. The Vickers breech mechanism for the 12-in. 45-calibre gun is of a new and improved type, giving considerable increase of power when closing the breech, and is operated by the hand wheel, with worm and worm wheel gear, referred to mounted in a suitable bracket on the end frame of the gun.

The breech screw is of the "Vickers" type, and is mounted and retained on the stem of the carrier by interrupted screw threads in the usual manner. One of the chief features of this mechanism consists in the application of the pure "couple," which has been referred to, for rotating the breech screw. In breech mechanisms as at present generally constructed the breech screw is rotated by a turning moment which has been found to set up considerable friction, owing to the tendency of such moment to occasional axial displacement of the breech screw. By applying a "couple" for this purpose this difficulty is obviated, so that the whole of the available turning force applied to the breech screw is utilised in seating the obturator. The arrangement for actuating the breech screw is as follows:—The rear face of the screw is provided with two studs diametrically opposite to each other, and around these are fitted two sliding blocks which engage with corresponding holes in a lever plate, having a long grooved arm. The lever plate is pivotally mounted on the same axis as the breech screw, though not directly pivoted on to the stem of the carrier on which the breech screw rotates, but is fitted around a sleeve, this sleeve surrounding part of the stem of the carrier to the rear of the breech screw. The hole in the lever plate is slightly elongated with respect to the outside diameter of the sleeve, and the holes in the lever plate, into which are fitted the sliding blocks on the studs of the breech screw, are made slightly longer than the blocks themselves, and, furthermore, a greater clearance than is usually allowed is made between the breech screw and the stem of the carrier on which it turns. This arrangement, together with the clearance just enumerated, absolutely ensures that any small inaccuracies in the manufacture of these parts of the mechanism are automatically adjusted, and also that the breech screw is mechanically quite independent of the lever itself, except its engagement through the studs with their sliding blocks. As a result, when a turning moment is given to the lever, this in turn operates on the breech screw as a pure "couple." Engaging with the groove of the long arm of the lever-plate is a roller pin projecting forwardly from a short crank mounted on the carrier, the form of the groove being such that the maximum possible power is exerted when seating the obturator. The pivot for the short crank is provided with a roller-bearing to eliminate, as far as possible, the friction of the toggle-joint action of the crank before the final operation of seating the obturator. The arrangement of the crank with respect to the groove in the long arm is such that a locking point is formed when the breech is closed. The crank has spur teeth which gear with a pinion formed on a short horizontal shaft having at its other end a bevel wheel, which gears with a second bevel wheel fixed on the axis pin of the carrier. The axis pin of the carrier is operated by the worm-wheel gear at its lower end. A cam plate is fitted to the short crank for operating the firing gear. The mechanism may be provided with separate electric and percussion firing locks.

Anti-torpedo guns.

We turn now to the smaller guns intended for defence against the attack of torpedo craft. This question, as we have said, has been much discussed as a result of the Russo-Japanese war, and calibres of guns have been advocated or adopted which seem out of proportion to the object to be attained. It is pointed out that with the heavier ordnances, preferred in some quarters for this minor purpose, the provision of sufficient ammunition might become a difficulty. It has been contended that the insufficient stopping power of the 12-pdr. guns was not definitely shown by the events of the late war, and that any failure probably resulted from the character of the projectiles employed, and, still more, from insufficient rapidity, and, above all,

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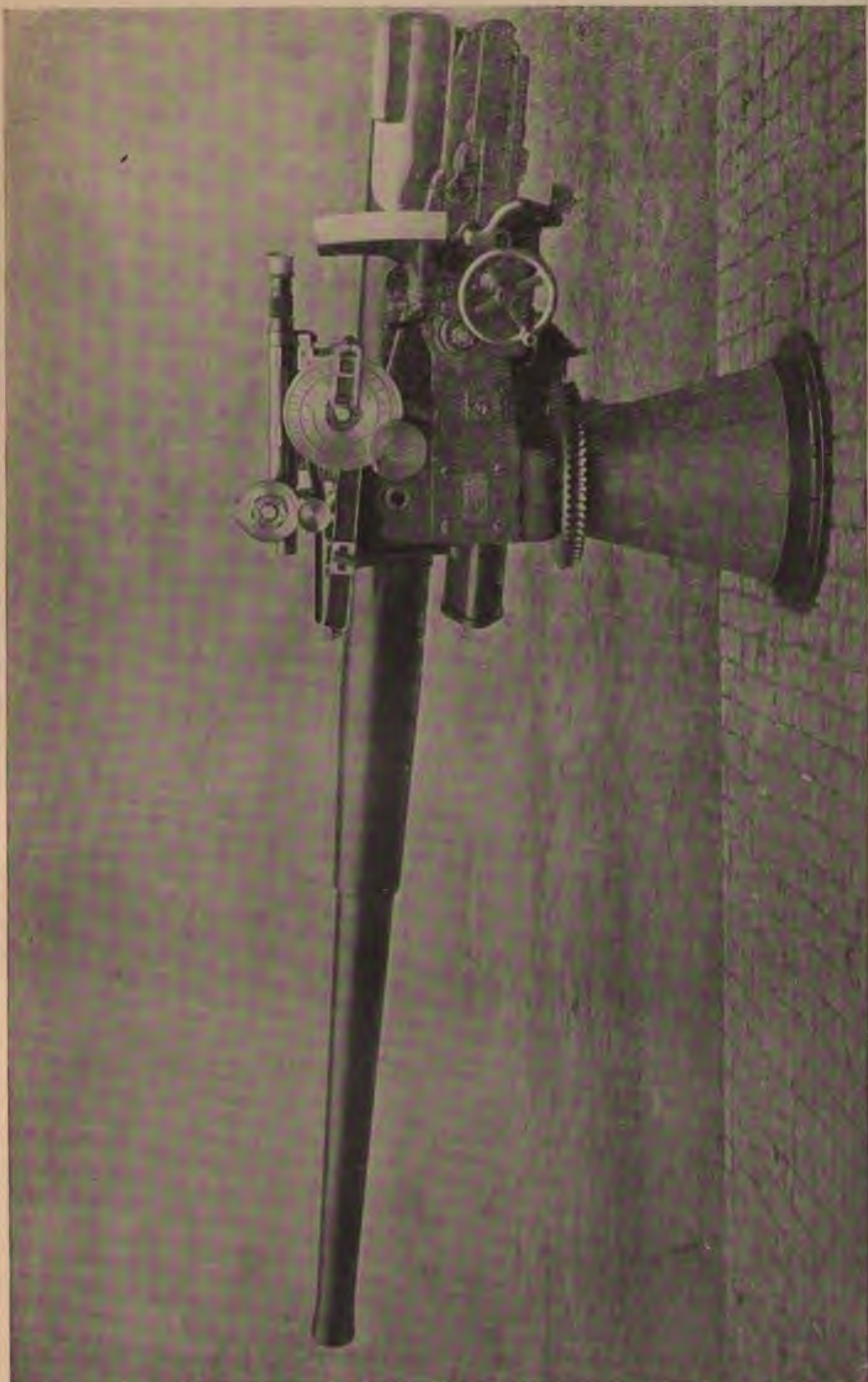

Vickers' 3-in. 12-pounder 50-calibre Gun on Ship Mounting.

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action is operated by a hand lever instead of a hand wheel and worm gear. The Vickers breech mechanism for the 12-in. 45-calibre gun is of a new and improved type, giving considerable increase of power when closing the breech, and is operated by the hand wheel, with worm and worm wheel gear, referred to mounted in a suitable bracket on the end frame of the gun.

The breech screw is of the "Vickers" type, and is mounted and retained on the stem of the carrier by interrupted screw threads in the usual manner. One of the chief features of this mechanism consists in the application of the pure "couple," which has been referred to, for rotating the breech screw. In breech mechanisms as at present generally constructed the breech screw is rotated by a turning moment which has been found to set up considerable friction, owing to the tendency of such moment to occasional axial displacement of the breech screw. By applying a "couple" for this purpose this difficulty is obviated, so that the whole of the available turning force applied to the breech screw is utilised in seating the obturator. The arrangement for actuating the breech screw is as follows:—The rear face of the screw is provided with two studs diametrically opposite to each other, and around these are fitted two sliding blocks which engage with corresponding holes in a lever plate, having a long grooved arm. The lever plate is pivotally mounted on the same axis as the breech screw, though not directly pivoted on to the stem of the carrier on which the breech screw rotates, but is fitted around a sleeve, this sleeve surrounding part of the stem of the carrier to the rear of the breech screw. The hole in the lever plate is slightly elongated with respect to the outside diameter of the sleeve, and the holes in the lever plate, into which are fitted the sliding blocks on the studs of the breech screw, are made slightly longer than the blocks themselves, and, furthermore, a greater clearance than is usually allowed is made between the breech screw and the stem of the carrier on which it turns. This arrangement, together with the clearance just enumerated, absolutely ensures that any small inaccuracies in the manufacture of these parts of the mechanism are automatically adjusted, and also that the breech screw is mechanically quite independent of the lever itself, except its engagement through the studs with their sliding blocks. As a result, when a turning moment is given to the lever, this in turn operates on the breech screw as a pure "couple." Engaging with the groove of the long arm of the lever-plate is a roller pin projecting forwardly from a short crank mounted on the carrier, the form of the groove being such that the maximum possible power is exerted when seating the obturator. The pivot for the short crank is provided with a roller-bearing to eliminate, as far as possible, the friction of the toggle-joint action of the crank before the final operation of seating the obturator. The arrangement of the crank with respect to the groove in the long arm is such that a locking point is formed when the breech is closed. The crank has spur teeth which gear with a pinion formed on a short horizontal shaft having at its other end a bevel wheel, which gears with a second bevel wheel fixed on the axis pin of the carrier. The axis pin of the carrier is operated by the worm-wheel gear at its lower end. A cam plate is fitted to the short crank for operating the firing gear. The mechanism may be provided with separate electric and percussion firing locks.

Anti-torpedo guns.

We turn now to the smaller guns intended for defence against the attack of torpedo craft. This question, as we have said, has been much discussed as a result of the Russo-Japanese war, and calibres of guns have been advocated or adopted which seem out of proportion to the object to be attained. It is pointed out that with the heavier ordnances, preferred in some quarters for this minor purpose, the provision of sufficient ammunition might become a difficulty. It has been contended that the insufficient stopping power of the 12-pdr. guns was not definitely shown by the events of the late war, and that any failure probably resulted from the character of the projectiles employed, and, still more, from insufficient rapidity, and, above all,

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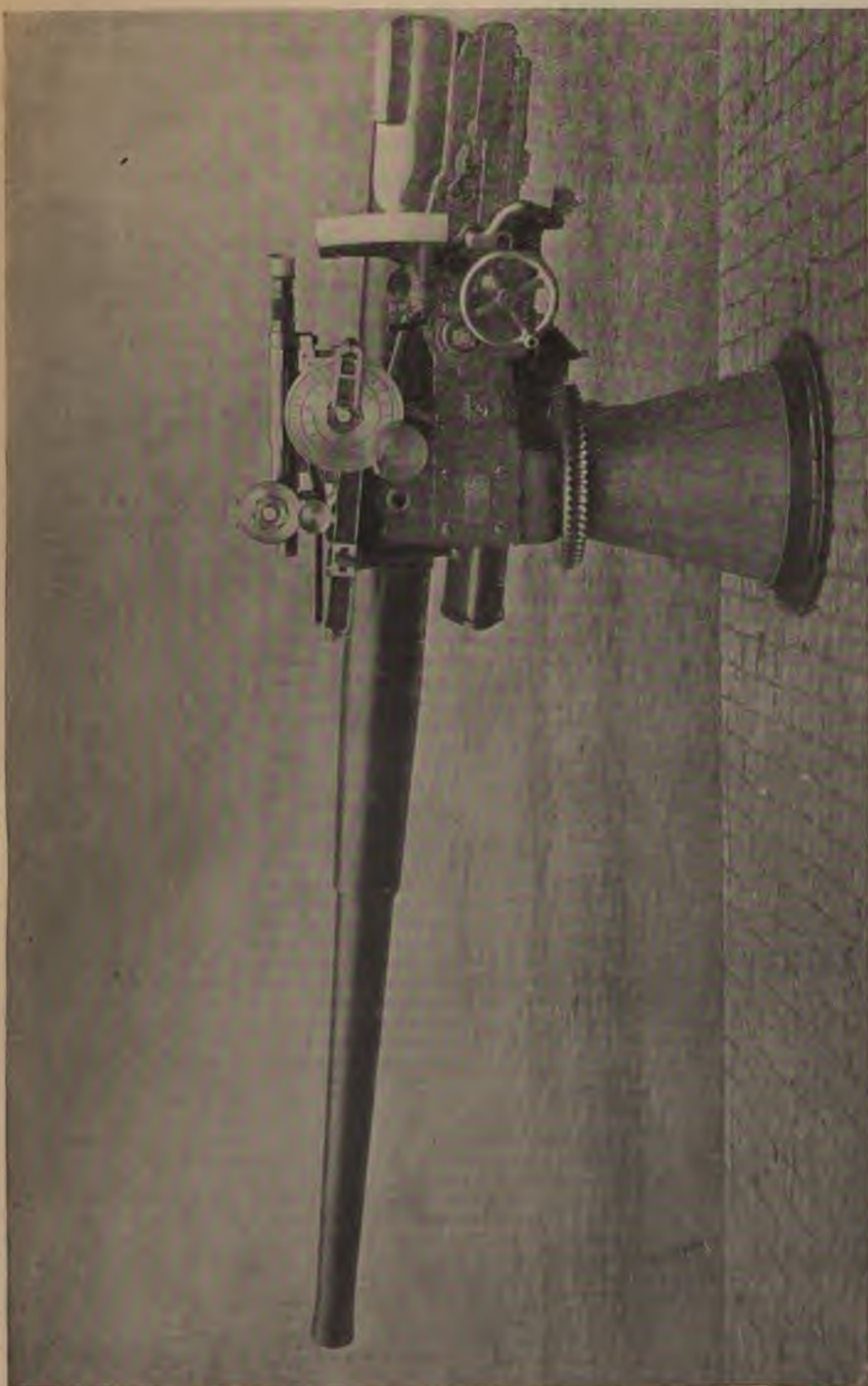

Vickers' 3-in. 12-pounder 50-calibre Gun on Ship Mounting.

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from want of precision of fire. We illustrate Messrs. Vickers' latest 12½-pdr. gun. on its naval mounting which meets the difficulty. The breech mechanism is of the vertical block type, and can be operated semi-automatically by the mechanism being opened by the recoiling of the gun after firing, and closed by the operation of loading; or quick-firing by the mechanism being opened and closed by hand.

The Vickers' 12½-pdr.

The breech block is capable of vertical movement and contains the firing pin, main spring, trigger, cocking lever, etc., and the gun is fitted with a powerful extractor, which has its lower end arms for retaining the mechanism in its "open" position. On the right-hand side of the breech end is a spring case, containing a powerful clock spring, one end of which is fastened to the case and the other to an outer hub, this outer hub being keyed to an inner one fixed to the axis of the crank. Projections on the side of the outer hub engage with corresponding ones on the inner plate of the spring case, so that the weight of the clock spring is not transmitted to the crank axis when the mechanism is completely closed. This enables the mechanism to be converted to Q.F. without unwinding the clock spring, relieves the breech mechanism lever from pressure when home, and allows of rapid and easy inspection of any portion of the mechanism.

The hand lever is mounted on a bracket on the right hand of the cradle, and actuates the mechanism by a crank pin working in a horizontal slotted link secured to the crank axis pin, and can be readily put in and out of the gear by withdrawing the crank pin against the action of a spring. This is so arranged that in whatever position the link may be when the gun runs out, there can be no damage to either or any portion of the mechanism, and the hand lever is arranged to provide means of easily adjusting the strength of the clock spring.

For semi-automatic firing the action is as follows:—The breech is opened by moving the hand lever, whereby a crank is turned, the action of which brings down the breech block, and winds up the clock spring. At the same time the main spring is compressed, and is kept in this position by the motion of the trigger. The breech block in moving down strikes the rear portion of the lower extension of the extractor and causes the upper portion to move out from the face of the end of the barrel, and brings the front portion of the lower extension of the extractor to engage with corresponding gaps on the crank boss, thus preventing the mechanism from closing by the reaction of the clock spring. The spring crank pin on hand lever axis is now withdrawn, and the hand lever, which is disengaged from the mechanism, is returned to its closed position, leaving the mechanism open. The cartridge is then smartly pushed into the bore, and as it goes forward within the chamber, its rim strikes against the extractor claws, thus forcing the extractor towards the face of the gun. During this movement the lower extension of the extractor is withdrawn from the crank boss, and the block is then free to rise. The clock spring being fixed on the axis of the crank, rotates it, thus raising the breech block until the breech is closed. The sear of the trigger is now engaged with the cocking lever, thus holding the firing-pin back, and by pulling the trigger to the rear, the cocking lever is released and the firing pin thrown forward by the action of the main spring. The lower part of the cocking lever is so arranged as to be acted upon by a lever operated from the pistol grip arm for re-cocking purposes if necessary.

On pulling the trigger the gun is fired and recoils in the cradle, the hand lever remaining stationary. The gun is provided with a pawl pivoted at the left-hand side of the breech so that as it returns after recoil the pawl engages a toe-piece which is mounted on the same axis as the crank which operates the mechanism. The action of the pawl causes the crank to rotate, and thereby bring down the breech block, laying the breech open for the next round. The extractor is actuated by the fall of the block; it first loosens the cartridge by a slow movement which, rapidly accelerating, finally ejects it to the rear.

The gun may be easily and quickly converted from a semi-automatic to an ordinary quick-firer at any time. To do this, the rearmost pin securing the hand-lever bracket to the cradle is withdrawn, and the bracket swung round on the remaining one. The spring case is then removed, and the pawl thrown out of action by a switch. The slotted link and hand lever are replaced in position, and the gun is then ready to be used as an ordinary quick-firer. The action of the mechanism when using it as a quick-firer is as follows:—The breech is opened by moving the hand lever and the final downward movement of the block compresses the buffers in the crank. The lower portion of the extractors engage with the crank

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boss and prevent the buffer springs from raising the block. When the cartridge is pushed into the bore, the rim of the case slightly depresses the block against the action of the buffer springs, which cause it to rise again behind the case. This effectually retains the case should the loading take place with the gun elevated. On the case being pushed slightly further against the extractor claws, the lower portions are disengaged from the crank boss, and the block rises slightly. The rest of the closing of the mechanism is performed by means of the hand lever, and the gun is fired in the same manner as described for semi-automatic action.

We are indebted to Messrs. Schneider, of Paris, Le Creusot, and Havre, for interesting particulars concerning their new patterns of ordnance, of which we are enabled to present illustrations. The remarkable Schneider-Canet powerful, semi-automatic 12-pdr. may be mentioned first. Its breech mechanism is upon the principle of concentric screws (*filets concentriques*), which are worked by hand with very great rapidity, and lend themselves very readily to the adaptation of a semi-automatic movement operated by a hand lever and crank with springs. The breech can be opened only after the discharge and throws out the empty cartridge case, and it is closed with the introduction of a new cartridge. Firing is automatic, or at the will of the gunner, and danger is said to be impossible, because the percussion needle can only be brought into position when the breech is completely closed. The breech mechanism consists of a very few pieces, and is easily removed by hand. The mounting has a central pivot, and the gun is so well balanced and provided with arrangements against friction, that it is moved in any direction with the utmost ease, while the arrangements are such that its movements can be arrested immediately, enabling it to be laid and maintained precisely upon the object. The sighting is telescopic. Great attention has been paid to the rapid supply of ammunition, which is made semi-automatically by arrangements which will be seen in the picture. The whole disposition of the gun seems to be exceedingly simple, and we are informed that the rate of fire is from 35 to 40 aimed rounds per minute. The explosive charge is "Schneiderite," a powerful and very safe explosive, and the fuse is arranged with the object of bringing about the explosion while the shell is passing through the plates of the torpedo-boat attacked. MM. Schneider have constructed a completely analogous gun of smaller calibre, 57mm. (6-pdr.). **The Canet 12-pdr.**

The same enterprising firm have devoted attention to a system of rapid ammunition supply to guns of large calibre, so arranged that little or no mechanical aid is required. Any mechanism actuated by power, hydraulic or electric, is subject to breakdown, and a mechanism has therefore been introduced whereby shells of 12-in. and 10-in. guns can be man-handled, the motive power required being reduced to a strict minimum, and involving only the application of mechanical arrangements which are very simple and strong. **Hand loading for big guns.**

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Schneider-Canet Semi-automatic 57 mm. (2·2 in.) Quick-firer on Ship Mounting.

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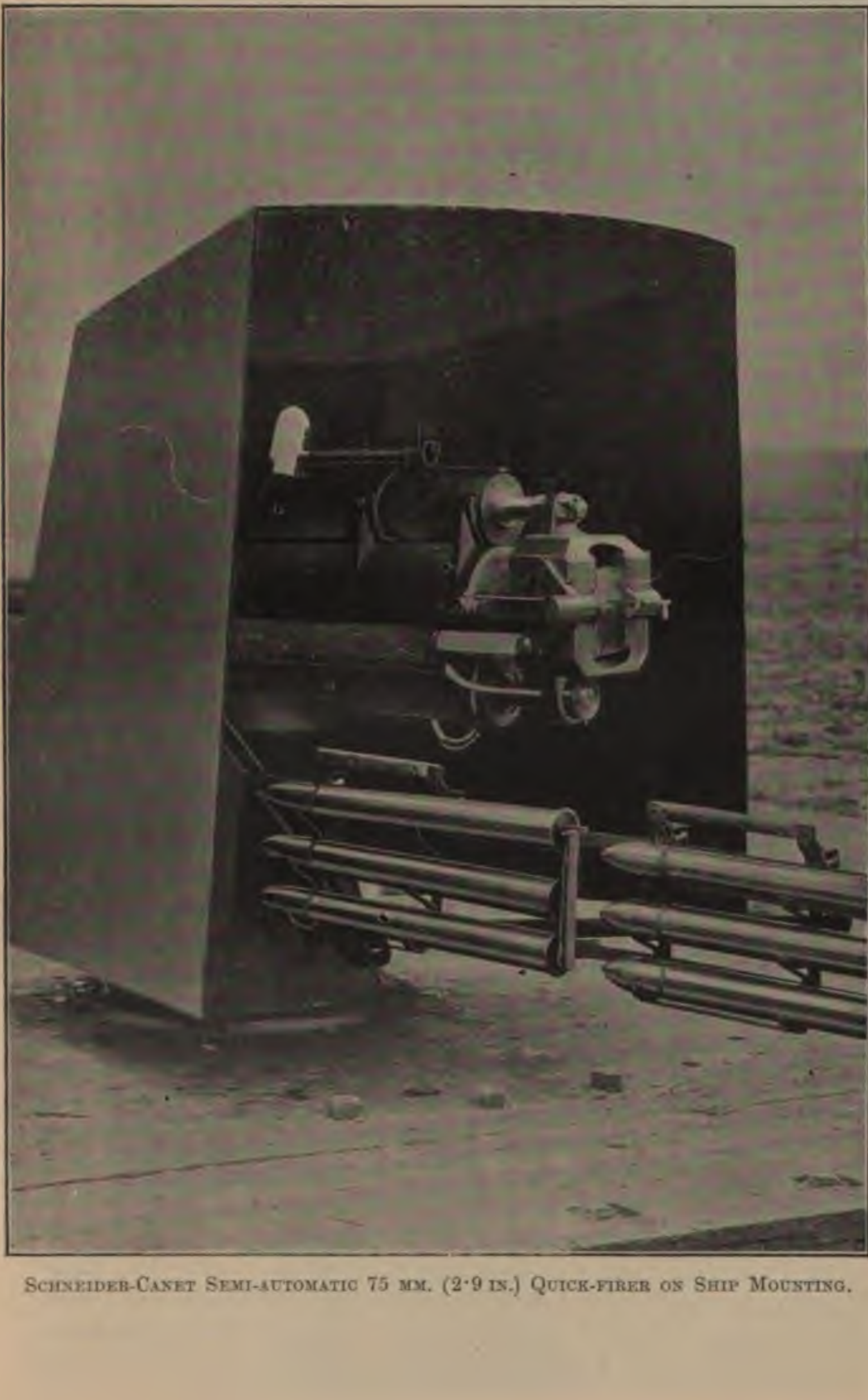

SCHNEIDER-CANET SEMI-AUTOMATIC 75 MM. (2·9 IN.) QUICK-FIRER ON SHIP MOUNTING.

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We illustrate a gun so adapted for coast use, being a 9·4-in. The breech mechanism is of great simplicity, and can be operated by hand if required. The gun is mounted upon a central pivot with hydraulic brakes, and is provided with very ingenious arrangements to absorb the recoil and bring the gun into the loading position. Moreover, the adjustments are such that the aim can be taken by telescopic arrangement while the gun is being loaded. The picture will explain very clearly the system of ammunition supply, and, with some modification, it can be adapted to use on board ship.

Erosion of guns. Bethlehem guns.

Mr. Meigs makes some interesting remarks upon the subject of erosion, remarking that the power of the gun can be augmented either by increasing the velocity or the weight of the projectile. If the weight be increased less ammunition will be carried, and the rate of fire will be reduced, while if the striking energy be developed, the "life" of the gun may be reduced. He says that in the United States the high velocities now employed have brought into prominence the question of the rapid burning or wearing away of guns, particularly of the larger calibres; but in this country it is considered that with the new M.D. cordite, using high velocities, the "life" of the gun will be sufficient for all purposes. Yet it would seem that in the United States it is proposed in some quarters to lower the velocities of guns, particularly of the large guns, on the ground that the "life" of these guns is so short as to constitute a serious menace. It has even been proposed, says Mr. Meigs, that the guns of a fixed weight (probably the present weight, or about 60 tons) should be made of larger calibre—that is, should be of more than 12-in. calibre, with the object of lowering the velocities of these guns and increasing the weights of their projectiles, lowering the pressures and temperatures of the gas in them, and extending their "life." This is obviously a matter upon which different opinions are likely to be held, and the erosion of United States guns would seem to offer a practical commentary upon the nitro-cellulose propellant in use, which was supposed to reduce this evil to a minimum. It may be pointed out that the "life" of a gun depends principally on the weight of cordite burned, and that if in a 12-in. gun 200 lb. of cordite gave a certain energy, evidently more would be required to obtain the same energy in a larger gun of approximately the same weight, for the larger gun would be shorter in proportion, and the "life" of the gun would accordingly be shorter.

Bethlehem guns. An interesting question raised.

In relation to his idea of enlarging the calibre of guns, Mr. Meigs points out that the 18-in. 28-cal. Bethlehem gun weighs about what the present 12-in. 45-cal. guns weigh, and has a greater projectile energy throughout flight than the 12-in. gun. This gun is one built

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SCHNEIDER-CANET 24 CM. (9·4 IN.) GUN WITH QUICK-LOADING MANUAL ARRANGEMENT.

BRITISH RIFLED ORDNANCE.—*continued.*

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Ordnance.										Charge (cordite).		Projectile.						Ballistics (with full charges).					
Nature.					Chamber.		Rifling.												Perforation of wrought iron.				
							Twist one turn in.																
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	I. II. & III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179¼	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	45 & 46 tons.	III. IV. V. & V.*	328·5	25·25	16·0	48·0		35		88 8	30	12·0	714	31 13/16 ‡‡95 **79	0·202	0·413	1914	18,130	24·4	21·5	18·9	16·1	6
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1 9/11	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17.5	87·2		..		201 8 9 8	50 3¾	12·0	850	"	..	..	2481 §2580	36,290 39,280	39·7 42·0	35·4 38·0	31·6 34·6	28·7 32·0	12¾ 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.* & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.*&c & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380	‡‡33 **30 5/16	0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

BRITISH RIFLED ORDNANCE.

Ordnance. Nature. Calibre or Pr.	Ordnance. Nature. Weight.	Ordnance. Nature. Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Rifling. Twist one turn in Least at breech.	Rifling. Twist one turn in Greatest at muzzle.	Rifling. System.*	Charge (full). Weight.	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
QUICK-FIRING GUNS (using metal cases)																								
6·0 in.	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in. Q.F.C.	5 ,,	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2	6·4
4·7 in.	41 cwt. 42 ,,	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10·5 9·5	6·9 6·5	4·9 4·6	3·3 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·667	0·500	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	.	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr ..	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
..HINE GUNS.																								
ar 0·45 in.	63 lbs.	I.	45·0	..	.	..	10	27	Enf'ld	grains. 31 Cordite	..	..	0·450	grs. 480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
3			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain. b With 4 grs. R.F.G. *Note.*—An armour-piercing shell has now come in for the 6-in. guns.

BRITISH RIFLED ORDNANCE.—*continued.*

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Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter (at largest).	Chamber. Length to base of projectile.	Rifling. Twist one turn in. Least at breech.	Rifling. Twist one turn in. Greatest at muzzle.	System.†	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Perforation of wrought iron. At muzzle.	Perforation of wrought iron. At 1000 yards range.	Perforation of wrought iron. At 2000 yards range.	Perforation of wrought iron. At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	I. II. & III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179½	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	45 & 46 tons.	III. IV. V. & V.w	328·5	25·25	16·0	48·0		35		88 8	30	12·0	714	31 13/16 ‡‡95 **79	0·202	0·413	1914	18,130	24·4	21·5	18·9	16·1	6
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1 9/11	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17.5	87·2		..		201 8 9 8	50 3¾	12·0	850	"	..	..	2481 §2580	36,290 39,280	39·7 42·0	35·4 38·0	31·6 34·6	28·7 32·0	12¼ 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.ᴬ & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18 ‡‡33 **30 6/16	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.ᴀ&c & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380		0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

9·2-in ††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46		..		..		..	..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		47 2	0 8	30 2½	7·5	200	18¼	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35		14	12	20	6·0	100	7 4/16 **9 13/16	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30					6·0											
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7		30		20	0	20	6·0	100	9	0·360	0·463	2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4¼ 5
5-in.	38 cwt. 40 cwt.	II. III. IV. & V.	139·15	25·07 25·0	5·75	19·05		25		4	7¼	7·5	5·0	50	7 13/16 3 5/16	0·500	0·400	1750	1,062	8·8	6·6	5·3	4·1	..
4-in.	23 cwt. 26 cwt.	II.II$_A$ III.III$_A$ IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	1 13/16 3 3/16	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain.
† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite; ** Cast steel; †† A 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

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AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	30 5 L. 35 K. 80	24 L. 40 K. 01	24 L. 40 K. 94	24 L. 35 K. 86	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 35 K. 86	15 L. 35 K. 80	12 L. 40 Skoda.	12 L. 35 K. 80	12 L. 35 K. 87
Calibre, in inches	12·01	9·45	9·45	9·45	7·5	5·91	5·87	5·87	4·72	4·72	4·72
Length — Total, in feet	35·11	31·6	..	27·60	26·3	19·5	17·13	17·13	..	13·8	13·8
Length — Rifled Portion, in ins.	314·8	..	..	237·7	..	..	151·4	153·6	..	128·5	126·3
Length — Powder Chamber in ins.	69·9	..	..	65·2	..	..	37·3	35·4	..	24·0	26·3
Length — Of bore in calibres	35	40	40	35	42	40	35	35	40	35	35
No. of Grooves	68	72	..	25	..	..	36	36	36	32	36
Twist in calibres	45–25	..	..	26·9	..	..	45–25	25	25	25	25
Weight — Gun, tons	47·2	21·5	27·8	26·6	11·6	5·18	5·7	4·69	1·97	2·25	2·31
Weight — Breech Block, in lbs.	3306·9	..	..	1776·9	..	..	445·3	463·0	..	253·5	211·6
Weight — Steel Shell "	1003·1	474	474	474·0	198	112·5	112·5	86·0	52·4	57·3	57·3
Weight — Common Shell "	1003·1	474	474	474·0	..	112·5	112·5	69·9	52·4	57·3	57·3
Weight — Shrapnel Shell "	..	..	..	..	..	..	112·4	71·9	..	57·3	57·3
Weight of Bursting Charge — Case Shot "	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge — Steel Shell "	10·6	..	..	5·1	..	..	1·3	1·76	..	0·55	0·55
Weight of Bursting Charge — Common Shell "	97·7	..	..	17·9	..	..	5·29	3·86	..	2·2	2·2
Weight of Bursting Charge — Shrapnel Shell "	..	..	..	..	..	..	1·26	1·10	..	0·57	0·57
Weight of Firing Charge — Steel Projectile, in lbs.	156·5 24 cm.N	120·6	91·5	99·2N	56N	28·8	22·5 15 cm.N	38·8*	9·7	19·8 B	12·13N
Weight of Firing Charge — Common Shell, in lbs.	156·5 N 24 cm.N		91·5	99·2N			22·5 15 cm.N	38·8*		19·8 B	12·13N
Weight of Firing Charge — Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..
Weight of Firing Charge — Exercising, in lbs.	154·3B	..	..	..	..	..	28·7	19·6	..	11·0	6·6 N
Weight of Firing Charge — Saluting "	19·8 O	..	..	15·4 O	..	..	4·74	4·74 O	..	2·4 O	2·4 O
Muzzle Velocity, in feet	1969	2595	2264	2100	2700	2608	2133	1969	2264	1755	2133
Muzzle Energy — Total, foot-tons	26,970	22,121	16,845	14,500	10,025	5308	3549	2312	3554	1215	1808
Muzzle Energy — Per inch circumference, foot-tons	714·8	..	..	488·3	..	..	192·5	125·4	..	82·5	122·2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	30·1	34·5	29·0	25·8	27·3	22·0	16·1	12·6	13·7	9·7	12·9
Perforation of Krupp Steel, 3000 yds., inches	10	9½	8	7	6¾	5	3½	..	..	..	..

NOTE.—C for cube powder; * prismatic powder; O, ordinary powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

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DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.													
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	24 cm.	24 cm.	21 cm.	15 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm.	8·7 cm.
Calibre, in inches	13·98	12·01	10·24	10·24	9·4	9·4	8·24	5·9	5·91	5·91	5·91	4·72	4·72	3·43
Total length, in feet	29·1	22·0	32·8	18·77	31·4	31·6	24·04	..	17·1	12·63	10·7	11·8	..	11·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	..	..	264·5	..	190·3	135·0	112·9	128·8	..	..
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	37	37·5	35	40	32·2	22·8	19·1	27·3	37·5	37·1
Number of Grooves	80	68	60	60	..	..	48	..	36	36	36	32	..	..
Twist of Rifling, in calibres	45	45	70–25	45	..	..	70–25	..	70–25	45	45	25	..	..
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	25·4	22·9	13·3	..	4·7	4·4	3·5	2·13	..	..
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	..	..	903·9	..	390·2	330·7	324·1	229·2	..	..
Weight of Steel Shell, „	1157·4	725·3	451·9	451·9	353	353	238·1	112	112·4	..	86·0	..	44	..
Weight of Chilled Shell, „	1157·4	725·3	..	451·9	..	..	..	..	..	86·0	86·0	..	..	..
Weight of Common Shell, „	1157·4	725·3	451·9	451·9	230	353	238·1	112	112·4	69·4	69·4	57·3	44	20
Weight of Shrapnel Shell, „	1157·4	725·3	451·9	451·9	..	..	238·1	..	112·4	86·0	86·0	57·3	..	..
Weight of Case Shot, „	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge, Common Shell, „	57·3	39·7	25·4	25·4	16·5	16·5	12·8	6·2	6·2	3·0	3·0	1·7	..	..
Weight of Firing Charge, Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	..	75*	105·8	20·9*	41·9	19·3	21·8	17·4	9·7*	3·59*
Weight of Firing Charge, Common Shell, „	330·7	180·2	191·8	112·4	..	75*	105·8	..	41·9	19·3	21·8	17·4	..	..
Muzzle Velocity, Armour-piercing Projectile, feet	1762	1675	2018	1640	2159	2362	2021	2264	1800	1565	1542	..	2460	2379
Muzzle Velocity, Common Shell, „	1762	1675	2018	1640	..	..	2021	..	1890	1683	1690	1720	..	..
Muzzle Energy, Total foot-tons	24910	14110	12770	8428	11,440	13,656	6745	3981	2784	1461	1418	..	1846	780
Muzzle Energy, Per inch circumference, foot-tons	568·3	374·1	396·8	262·0	..	..	260·6	..	150·0	78·7	73·0	..	..	..
Perforation at Muzzle, wrought iron, Tresidder's formula	25·6	20·1	22·9	16·8	23·3	26·7	18·5	17·8	15·6	12·6	..	..	14·2	10·7
Perforation Krupp Steel, 3000 yards, inches	7	5½	6	4⅔	6	7	5	3½	3	..	..	..	..	..

* Smokeless powder.

There are also a Finspong 6-in. and a 44-calibre 5-pr. Hotchkiss, V. = 2362 f.s.

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DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading Q.F.											Dutch Breech Loading.
Designation by Calibre, in centimètres	28	24	21	21	21		15	15	12	12	12	12
Calibre, in inches	11·0	9·4	7·91	8·2	8·2	No. 2. 5·87	5·9	5·9	4·72	4·72	4·72	4·72
Total Length, in feet	27·5	31·6	24·04	24·0	27·5	17·13	17·1	19·7	13·9	15·9	13·78	13·78
Length of Rifled Portion of Bore, in inches	..	..	222·2	..	..	151·4	..	..	..	..	128·5	..
Length of Powder Chamber "	..	..	42·4	..	..	37·7	..	..	..	..	24·0	..
Length of Bore, in Calibres	27	37	35	32	37·1	35	32	37	32·3	37·3	35	35
Number of Grooves	..	..	48/64	..	..	44	..	..	..	..	32	32
Depth of Grooves, inches	..	..	0·059	..	..	..	..	..	..	..	..	0·06
Twist of Rifling, in Calibres	..	..	∝–25	..	..	25	..	..	..	..	25	∝–45
Total Weight, in tons	27	25·3	12·79/13·98	14·0	16·2	4·72	3·8	4·7	1·9	2·7	2·26	2·31
Firing Charge { Armour-piercing Projectile, in lbs.	185	..	99·2	119	..	49·6	15·4	18·5	..	..	19·8	19·5
Firing Charge { Common Shell "	..	..	99·2	..	..	49·6	..	..	..	..	19·8	19·8
Weight { Armour-piercing Projectile "	761	474	308·6	309	309	112·2	100	88·2	52·4	57·4	57·3	57·3
Weight { Common Shell "	..	..	308·6	..	..	112·2	..	..	..	..	57·3	57·3
Weight { Case Shot "	..	..	..	..	..	..	..	..	..	..	57·3	..
Bursting Charge { Armour-piercing Projectile "	..	..	4·6	..	..	..	..	..	..	..	..	..
Bursting Charge { Common Shell "	20	..	12·3	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1627	2562	1739	1903	2067	2001	2034	2461	2034	2067	1755	1804
Muzzle Energy { Total, in foot-tons	13,960	21,589	6471	7760	9756	3115	2867	3703	1503	1689	1224	1264
Muzzle Energy { Per inch Circumference, foot-tons	..	..	260·7	..	..	169·0	..	..	..	..	82·5	85·2
Perforation at Muzzle, in inches	20·0	34·0	{16·8 17·1}	19·4	21·9	{13·6 14·8}	14·3	17·9	11·6	12·4	{9·4 10·1}	9·6
Perforation Krupp Steel, 3000 yards	5½	9½	3½	4½	5	..	..	..	..	..	..	..

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FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.				
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64
Total length, in feet	..	..	..	..	..	..	..	..	..	..
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..
Length of Bore, in cals.	45	45	45	40	40	35	40	45	40	40
Number of Grooves	..	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..
Rifling Twist	..	..	..	..	..	..	..	..	..	..
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6
Weight of Firing Charge: Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1
Weight of Firing Charge: Com. Shell lbs.	..	..	..	..	..	..	..	..	..	..
Weight: Armour-piercing Projectile* lbs.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3
Weight: Com. Shell "	..	644	476	317	165	..	..	..	..	..
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625
Muzzle Energy: Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898
Muzzle Energy: Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1
Perforation at Muzzle† wrought iron, inches	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½

Date and Pattern of Gun.	Model 1887.				1884.					1881.						
Desig. by Calibre, in cms.	34	30·5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	..	..	..	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	42	45	45	45	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge: Armour-piercing Projectile, lbs.	220·5	198·4	114·6	44·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge: Com. Shell lbs.	..	..	..	..	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight: Armour-piercing Projectile* lbs.	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight: Com. Shell "	..	..	..	..	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7
Muzzle Velocity, in f.-s., A.P. Projectile	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy: Total, in f.-t.	42040	30750	22750	7898	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy: Per in. circ., f.-t.	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	13	11	9	5½	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* Steel or chilled iron. † By Tresidder's formula.

Some 50-calibre 24-cm. and 19·4-cm. are being made. The velocity will be about 3000 f.s.

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FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	16·47.	Q.F. Guns. 16·47	16§	16‡	14§	14	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	16·47	16·47			13·86		10·00		
Calibre, in inches	6·46	6·46			5·44		3·94		
Total length, in feet	26·9								
Length of Bore, in inches	..								
Length of Bore, in calibres	47·5	45	45	30	45	30	60	50	26
Number of Grooves	..								
Depth of Grooves, inches	..								
Rifling Twist	..								
Total weight, in tons	8·5*	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge: Armour-piercing Projectile* . . lbs.	..	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
Weight of Firing Charge: Common Shell . . "	..								
Weight: Armour-piercing Projectile . . lbs.	115	115	99·21		66·14		30·87		
Weight: Common Shell . . "	..								
Weight: Case Shot . . "	..								
Muzzle Velocity, in ft.-secs.	3000*	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy: Total, in foot-tons	7185	6568	4730	3061	3160	2022	1340	1266	725
Muzzle Energy: Per in. circ. foot-tons	..	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches	26·3	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3,000 yards	5¾	5¼	4	..	..	..	..	..	..

* Estimated. † By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.
§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

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GERMAN NAVAL ORDNANCE.

	Krupp Steel Breech-loading Guns, designated by calibre.																		
Designation in centimètres	30·5 jack'd.	28	28	26 long.	26 jack'd.	26 short.	24 Q.F.	24 long.	24 long.	21 Q.F.	17	15 Q.F.	15 Q.F.	10·5 Q.F.	10·5 Q.F.	12·5 hoop'd.	10·5 long.	8·8	6
Calibre, in inches	12·01	11·02	11·02	10·33	10·33	10·33	9·45	9·45	9·45	8·2	6·7	5·9	5·9	4·13	4·13	4·92	3·96	3·42	2·36
Length: Total, in feet	21·98	36·75	32·15	18·77	18·77	17·06	31·50	27·56	23·63	27·4	22·3	17·6	19·7	12·1	13·9	9·60	12·08	11·3	4·1
Length: Rifled portion, in ins.	181·9	407·9	352·8	149·8	150·0	129·3	349·6	302·4	201·6	..	..	..	..	..	..	85·7	113·6	..	44·3
Length: Powder Chamber „	45·3			44·7	44·4	44·7	..	..	53·5	..	..	..	..	..	..	16·7	19·5	..	..
Length: Bore, in calibres	18·9	40	35	18·8	18·8	16·8	37·4	32·0	26·1	37·0	37·7	32·2	37·0	32·2	37·2	20·8	33·6	37·2	..
Number of Grooves	72	..	..	36	48	36	..	..	56	..	..	..	..	..	..	32	32	..	24
Depth of Grooves, in inches	0·079	..	..	0·077	0·079	0·077	..	..	0·059	..	..	..	..	..	..	0·059	0·049	..	..
Twist, in calibres	45	..	..	50	50	50	..	..	25	..	..	..	..	..	..	40	25	..	..
Weight: Gun, including Breech Gear, tons	35·4	43·4	43·2	21·7	18·7	17·7	25·4	21·7	18·7	14·0	7·8	4·4	5·4	1·25	2·28	1·38	1·15	..	0·10
Weight: Breech Block, in lbs.	2954	..	..	2050	1973	1973	..	..	..	..	..	..	..	..	..	163·1	149·9	..	..
Weight: Armour-piercing projectile, in lbs.	725·3	562·2	562·2	412·3	412·3	412·3	474·0	474·0	474·0	309	..	88	88	40	40	..	..	2·18	..
Weight: Common Shell, in lbs.	725·3	595·0	474·0	357·1	357·1	357·1	474·0	474·0	474·0	309	154	..	..	..	..	40·1	39·7	..	6·61
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	..	..	5·3	5·3	5·3	7·05	7·05	6·6	4·4	154	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	25·4	25·4	14·3	14·3	22·0	16·5	16·5	15·4	11·1	..	..	..	..	..	2·4	0·9	..	..
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	198·0§	297·6	105·8	105·8	125·7	89·3	152	152·1	60·2	..	13·5	18·7	4·8	..	..	..	..	..
Initial Velocity: Armour-piercing projectile, ft.-secs.	1713	2700§	2133	1588	1588	1578	2296	1803	1657	2360	44	2034	2560	2034	2349	..	..	2400§	..
Initial Velocity: Common shell, ft.-secs.	1713	..	..	1641	1641	1654	..	..	1657	..	2700	..	..	..	..	1545	1526	..	1545
Muzzle Energy: Total, foot-tons	14,750	30,000§	17,740	7211	7211	7119	17,330	10,683	9024	11,934	..	2525	4003	1119	1530	..	..	720	..
Muzzle Energy: Per in. circ., ft.-tons	391	..	512·4	223	223	220	..	401·2	304	..	7795	..	..	..	..	..	..	..	..
Perforation at Muzzle, by Tresidder's formula	20·8	39·0	26·7	15·1	15·1	15·0	29·7	20·7	18·0	26·7	25·5	13·4	19·0	10·8	13·3	..	..	10·0	..
Perforation Krupp Steel, 3000 yards, inches	5¾	11½	7¼	..	..	..	8½	5¾	5¼	6½	5¾	..	4	..	..	..	..	..	..

§ Estimated.

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ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.					Q.F.	Armstrong B.L.	Armstrong Quick-Firing.					
Designation by Calibre, in centimètres	43·1†	43·1† Early Pattern. 1882.	34·3	30·5	25·4	20·3	15·2	15·2	15·2	15·2	12·0	12·0	7·6
Calibre, in inches	17	17	13·5	12	10	8	6	6	6	6	4·7	4·7	3·0
Length: Total, in feet	40·75	39	36·09	..	34·8	..	16·9	17·0	20·9	20·9	16·2	13·0	..
Length: Rifled Bore, in inches	346·8	315·7	..	..	..	..	..	..	..	..	189	..	..
Length: Powder Chamber, in inches	84·5	98	..	..	..	..	..	..	..	..		..	..
Length: Bore, in Calibres	27	26	..	40	40	45	32	33·0	40	40	40	35	40
No. of Grooves	82	82	56	..	..	..	..	..	..	..	22	22	..
Twist of Rifling, in Calibres	50	50	..	..	..	..	..	..	..	..	34·4	..	..
Total Weight, in tons	104·3	101·5	67·9	..	30	..	5·4	5·1	5·7	6·5	2·05	1·69	0·6
Firing Charge: Armour-piercing projectile, lbs.	900·0	725	630·5	..	..	..	46	46	46	17·6*	..	..	..
Firing Charge: Common Shell, „	600	480	..	..	..	..	..	.	..	..	..	..	..
Weight: Armour-piercing projectile, „	2000	2000	1250	850	448	250	98	98	100	100	45·0	36·0	12
Weight: Common Shell, „	2000	2000	1250	..	..	..	..	..	..	..	..	36·2	..
Weight: Shrapnel „	2017	2017	1250	..	..	..	..	..	..	..	..	29·8	..
Weight: Case Shot „	..	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge: Armour-piercing projectile, „	32	32	17·4	..	..	..	2·0	2·0	5·1	4·4	..	1·83	..
Bursting Charge: Common Shell, „	60	60	87·1	..	..	..	..	..	..	..	..	3·02	..
Bursting Charge: Shrapnel „	5	5	4·25	..	..	..	..	..	..	..	..	0·35	..
Muzzle Velocity, in ft.-secs.	1992	1935	2016	2500	2460	2600	1952	1985	2149	2297	2180	..	2625
Muzzle Energy: Total, foot-tons	55,030	51,930	35,230	36,925	18,798	11,730	2577	2705	3169	3622	1490	..	573
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Tresidder's formula	36·7	35·0	33·0	40·0	31·0	28·3	13·2	13·6	15·4	17·0	12·4	..	10·2
Perforation Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	..	3½	..	..	..

* Ballistite. † There are four types of these guns, viz.—Lauria, Lepanto, Italia, Morosini.

Note.—There is also a 6-inch quick-firing gun, 40 cals. M.V., 2600 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

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RUSSIAN NAVAL ORDNANCE.

	Obukhoff Steel Breech Loading Hooped Guns.				Steel B.L. Guns.		
Designation by Calibre, in inches	12	9	8	6 Long.	4·2 9-pdr.	3·43 Long. 4-pdr.	3·43 4-pdr.
Calibre in centimètres	30·48	22·86	20·32	15·24	10·67	8·70	8·70
Total Length, in feet	35	26·25	23·33	17·5	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	..	..	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	..	..	8·0	10·7	..
Length of Bore in Calibres, including Powder Chamber	31·9	35	35	35	17·4	21·4	..
Number of Grooves	..	..	..	..	16	24	12
Depth of Grooves in ins.	..	..	..	.	0·055	0·050	0·050
Twist of Rifling in cals.	..	..	..	.	50	40	41
Total Weight, in tons	55·7	19·44	13·64	6·26	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	731	..	..	..	..	..	..
Weight of Chilled Shell, ,,	..	..	..	..	..	..	..
Weight of Common Shell, ,,	..	268·2	192·3	73·35	24·2	15·2	12·6
Weight of Case Shot, ,,	..	..	..	..	22·3	15·2	11·0
Weight of Firing Charge: Steel Shell, ,,	338	..	..	89·38	..	..	..
Weight of Firing Charge: Chilled Shell, ,,	..	..	..	39·6	..	..	..
Weight of Firing Charge: Common Shell, ,,	..	180	88·2	39·6	2·6	3·1	1·3
Muzzle Velocity, in feet	2090	2376	1925	2080	..	1444	..
Muzzle Energy: Total, foot-tons	22130	10,500	..	2682	..	..	..
Muzzle Energy: Per Inch Circumference, foot-tons	587·1	371·4	..	142·3	..	..	..
Perforation at Muzzle, in inches	..	20·2	..	12·50	..	..	..
Perforation at Muzzle, by Tresidder's formula	28·3	24·0	15·7	..	..	..	..
Perforation Krupp Steel, 3000 yds., inches	8	6	..	..	..	..	..

There exist also 15 and 10·7 cm. Krupp guns.

NEW PATTERN RUSSIAN NAVAL GUNS.

The following guns are in use in the Russian Navy, the ballistics being somewhat as under :—

	12-in.	10-in.	9-in.	8-in.
Weight	59 tons	32 tons	..	..
Length	40 cals.	45 cals.	45 cals	45 cals.
Projectile	720 lbs	488 lbs	403 lb.	188 lbs
Muzzle Velocity	2600 f.s	2600 f.s	2500 f.s	2800 f.s
Perf. Wt. Ir. Muzzle	38 ins.	35 ins.	32 ins.	27 ins.
Perf. Wt. Ir. 2000 yds.	30 ,,	27 ,,	24 ,,	20 ,,
Perf. K.S. 3000 yds.	12 ,,	10½ ,,	8½ ,,	6½ ,,

Q.F. GUNS.

	6-in.	4·7-in.	12-pdr.
Length	45 cals.	45 cals.	50 cals.
Projectile	89 lbs.	46 lbs.	12 lbs.
Muzzle Velocity	2900 f.s.	2600 f.s.	2700 f.s.
Perf. Wt. Ir. Muzzle	22½ ins.	15½ ins.	10·2 ins.
Perf. Wt. Ir. 2000 yds.	13 ,,	9 ,,	4·8 ,,
Perf. K.S. 3000 yds.	4¾ ,,	..	..

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SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 83.								Armstrong, Pattern 83.			Armstrong.			Krupp.							
	Breech Loading.											Muzzle Loading.		Pattrn. 81 B.L.	Breech Loading.		Q.F. guns.					
Designation by Calibre	32-cm.	28-cm.	24-cm.	20-cm.	18-cm	16-cm.	14-cm.	12 cm.	12-cm.	8·7-cm.	7·5-cm. long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	15-cm.	14-cm.	12-cm.	75-mm.	57-mm.	47-mm.
Calibre, in inches . .	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72	4·72	3·4	2·95	9·00	8·00	6·00	5·87	4·72	5·9	5·51	4·72	2·95	2·24	·85
Length: Total length, in feet	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5	13·75	7·9	7·50	13·0	11·0	14·5	17·13	11·81	19·6	20·7	..	..	..	..
Length: Rifled Portion, in inches	352·4	309·1	..	..	..	170·6	149·1	126·0	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	..	..	..	..	..
Length: Powder Chamber, in inches	86·8	77·1	..	..	..	49·8	53·9	39·4	19	13	13	..	..	29·7	..	..	..	..	..	..	..	..
Length: Bore, in calibres	35	35	30	..	30	35	35	35	33	27	28·7	14	14·75	26·1	35	30	37	45	45	40	42	40
No. of Grooves . . .	80	70	60	50	45	40	35	30	22	20	18	6	4	28	36	32	..	..	..	..	..	..
Depth of Grooves, in ins.	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	..	..	..	..	..	..
Twist of Rifling, in cals.	From 0 to 30.								40	30	35	45	40	100 to 40	25	25	..	..	..	..	..	..
Total Weight, in tons .	47·3	32·5	20·7	11·5	8·71	6·1	4·1	2·6	2·2	0·45	0·35	12·0	9·0	4·0	4·7	2·1	4·39	4·8	2·65	0·9	0·34	0·23
Weight: Armourpiercing projectile, in lbs.	1041	694·3	438·7	253·5	187·4	130·1	86·0	53·1	39·2	..	..	250·0	180·0	78·3	84·9	43·65	100	70	55	14	6	3·3
Weight: Common Shell, in lbs.	879·6	586·4	370·4	213·8	..	112·4	75·0	47·2	36·4	14·1	11·5	250·0	180·0	73·6	65·5	34·61	..	..	..	..	..	..
Weight: Ring Segment, in lbs.	886·3	590·8	370·4	211·6	..	112·4	75·0	47·6	38·6	15·4	11·7	..	..	83·6	..	34·61	..	..	..	..	..	..
Firing Charge: Armour-piercing projectile, in lbs.	485·0	352·7	220·5	112·4	94·8	66·1	44·1	28·7	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	15·4	7·1	1·93	..
Firing Charge: Other projectiles	463·0	319·7	220·5	..	..	61·7	..	28·7	11·9	4·0	4·0	33·0	21·0	24·9	25·4	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2034	2034	2034	2034	2034	2054	2001	1988	2000	1625	1709	1339	1339	1929	2001	1887	2264	2460	2423	2100	1870	2330
Muzzle Energy: Total, in ft.-tons	29850	24030	12580	7271	5374	3806	2386	1511	1087	258	233	3105	2239	2018	2357	1076	3554	2936	2238	428	145	124
Perforation at Muzzle, in inches	32·9	28·7	24·6	20·5	18·6	16·6	13·9	11·6	9·3	..	..	10·6	9·6	11·0	12·7	9·7	17·0	16·5	15·5	7·9	5·0	5·7
Perforation Krupp Steel, 3000 yards	11	8	6¼	4¾	4¼	3½	..	..														

Note.—The Carlos V. has 11-in. 45-cal. guns. M.V. probably 2500 f.s.

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NAVAL ORDNANCE OF SWEDEN AND OF NORWAY.

	Sweden.										Norway.								
	Armstrong.					Bofors.	New Pattern Q.F.		M. 85.	M. 89.	Modern Guns.								
Designation by Calibre, in cms.	15·2	25	25	25	24	21	15 Q.F.	12 Q.F	25	15	21	21 Q.F.	21 Q.F.	15	15 Q.F.	12 Q.F.	12 Q.F.	76mm.	7cm.
Calibre, inches	6·0	10	10	10*	9·45	8·2	5·9	4·7	10·00	6·0	8·24	8·0	8·24	5·9	..	4·7	4·7	3·0	2·8
Total Length, feet	..	33·4	29·5	28·6	27·0	30·7	22·2	17·9	28·33	16·98	24·0	27·9	31·3	19·6	..	..	..	..	..
Length: Rifled Portion of Bore, ins.	..	..	..	..	..	..	..	..	260·9	155·2	..	..	..	..	..	..	..	..	..
Length: Chamber, "	..	..	..	..	..	..	..	..	58·1	35·2	..	..	..	..	..	..	..	..	..
Length: Bore in calibres, "	50	40	32	35	32·4	43	43	43·3	32·9	32	32	40	43·8	37·1	43·8	45	43·9	40	38
Number of Grooves	..	..	..	..	..	..	..	..	42	28	..	..	..	..	..	..	..	..	..
Twist of Rifling	..	..	..	..	..	..	..	..	40	30	..	..	..	..	..	..	..	..	..
Total Weight, tons	7·8	30*	29·5	28·6	23·5	16·3	5·8	2·7	29·8	5·2	13·9	15·5	18·7	5·6	..	3·1	2·65	0·6	0·63
Weight of: Armour-piercing Shell in lbs.	100	450	450	450	400	309	100	46	449·7	100	309	210	309	112	..	46	45	12·5	10·3
Weight of: Common Shell, in lbs.	..	..	401	401	..	..	..	..	401·2	100	..	..	..	..	..	..	..	..	..
Weight of Firing Charge: Armour-piercing Shell, in lbs.	37·5	160†	242	†	182	..	18	9·15	242·5	54·0	115	32	47	58·4	..	6·6	8·4	1·7	1·9
Weight of Firing Charge: Common Shell, lbs.	..	..	..	..	..	..	..	..	242·5	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet.	2800	2600*	2100	2362	2051	2297	2460	2428	2100	2067	1903	2242	2300	2070	2502	2361	2570	2200	2279
Muzzle Energy, Total foot-tons	5442	21120	13760	17406	11670	11303	4196	1893	13750	2964	7760	7319	11344	3328	..	1785	2060	419	404
Perforation through Iron by Tresidder's formula	22·8	33·6	24·5	29·2	22·9	25·7	18·9	14·2	24·5	13·9	19·2	20·2	25·6	15·6	..	13·6	15·3	8·0	8·4
Perforation Krupp Steel, 3000 yds.	4¾	10½	6	8	6	6½	4¼	..	6½	..	4¾	4¾	6½	..	..	..	..	..	..

* Schneider-Canet. There are also 6-pdrs., with M.V. 2165 f.s. to 2310 f.s., and 3-pdrs., with M.V. 2428 f.s. † Smokeless powder.

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UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service Charge. Brown Powder.	Weight of Service Charge. Smokeless Powder.	Weight of Projectile.	Muzzle Velocity (Service). Brown Powder.	Muzzle Energy. Brown Powder.	Perforation of Wrought Iron at Muzzle.†	Perforation of Krupp Steel at 3000yds.
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.	inch.
3-in. (14 pr.)	3	0·87	12·5	149·7	125·5	..	21·3	..	5	14	3000	874	13·5	..
4-in. Q.F., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	..	33	2000	915	9·8	..
4-in. Q.F. Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	..	33	2000	..	9·8	..
4-in. Q.F., Mark VII., of 50 Cals.	4	2·56	17·0	200·0	168·4	..	31·6	..	15	32	2900	1,999	16·9	..
5-in. Q.F., Mark I.	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	..	60	2000	1,660	11·8	..
5-in. Q.F. Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	..	50	2300	1,834	13·2	..
5-in. Q.F., Mark V.	5	4·46	21·3	250	212·9	..	37·2	..	27	60	2900	3,503	20·5	4¼
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	..	100	2000	2,773	.*	..
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	..	100	2000	..	13·8	..
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	..	100	2000	..	..	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	..	100	2080	2,990	14·7	..
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	34·0	..	..	100	2150	3,204	15·4	..
6-in. Q.F. Gun	6	6·0	21·3	243·8	204·3	..	37·0	44 to 47	..	100	2150	3,200	15·4	..
6-in. Q.F., Mark VI.	6	8·17	25·0	293·7	245·3	..	48·4	..	46	100	2900	5,838	24·2	5
7-in. Q.F.	7	..	..	..	..	..	..	..	74	165	2900	9,646	28·7	6½
8-in. B.L.R., Mark I.	8	12·3 / 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	..	250 / 250	2000 / 2000	6,932	19·0	4½
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	..	..	..	..	19·0	4½
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	..	250	2080	7,498	20·1	4¾
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	..	250	2150	8,011	21·1	5
8-in. B.L.R., Mark V., of 45 Cals.	8	18·0	28·6	335·0	271·0	..	64·0	..	115	250	2800	13,602	31·4	8
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	..	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark I., of 35 Cals.	10	27·1 / 28·2	30·5	343·8	283·7	zero to 1 in 25	57·2	..	..	500	2060	14,709	25·0	6¾
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	..	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	..	500	2100	15,285	25·8	7
10-in. B.L.R., Mark III., of 40 Cals.	10	33·4	33·3	389·0	313·4	..	75·6	..	240	500	2800	27,204	42·0	12
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	..	850	2100	25,985	30·8	9
12-in. B.L.R., Mark III., of 40 Cals.	12	52	41·8	480·1	388·1	..	91·9	..	350	850	2800	46,246	47·2	16
13-in. B.L.R., Mark I. and II.	13	60·5	40·0	454·5	370·5	..	80·9	..	230	1100	2100	33,627	33·5	11

NOTE.—The weight of fixed ammunition for Q.F. 4-in. and 5-in. guns is 58 and 96 lbs. respectively.

† By Tresidder's formula.

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ELSWICK GUNS.

This Table is supplied by the Manufacturers.

					*			Pole Gun.				Naval Landing.	Field.	Field.	Horse Artillery.
Diameter of Bore, ins.	1·46	1·46	1·85	1·85	1·85	2·24	2·24	2·953	3	3	3	3	3	3	3
do. do. mm.	37	37	47	47	47	57	57	75	76	76	76	76	76	76	76
Length of Bore, cals.	25	45	40	50	46	40	50	14·13	40	50	50	22	28	30	23
Weight of Gun	lb. 79	lb. 268	lb. 506	lb. 1067	lb. 560	lb. 840	cwt. 10¼	lb. 210	cwt. 12	cwt. 18	cwt. 18¼	cwt. 6·0	cwt. 7·25	cwt. 7·5	cwt. 6
do. Projectile, lbs.	1·1	1·5	3·3	3 3	3·3	6	6	11·75	12¼	14	12·5	13·2	15	14·3	12·5
do. Cordite Charge [lbs.	oz. 1·125	oz. 4.5	oz. 7·94	lb.oz. 1 4½	oz. 8·0	oz. 9·2	...	oz. 6	lb.oz. 1 10	lb oz. 3 0	lb.oz. 3 4	lb.oz. 1 1¼	lb.oz. 1 3	oz. 16·375	lb.oz. ...
do. M.D. do., lbs.	...	...	...	1·6	...	...	lb.oz. 1 3	...	2 0	3 11	4·0	...	..	...	1 4
Muzzle Velocity, f.s.	1540	2300	2132	2800	2300	1968	2400	1070	2210	2690	2800	1700	1700	1650	1700
Muzzle Energy, f.t.	18	55	104	179	121	161	240	93	473	702	680	265	300	270	250
Penetration at Muzzle, ins.	1·9	4·3	5·2	7·8	5·7	5·6	8·0	...	8·8	11·9	11·6	...	...	...	...
Rounds per Minute ...	...	25	30	30	30	25	25	20	20	20	20	20	20	20	20

	Field.	Jointed Howitzer.			Howitzer.	Howitzer.			Field Position.	Howitzer.		Howitzer.			
Diameter of Bore, ins.	3·3	3·3	3·5	4	4·3	4·7	4·7	4·7	5	5	5·87	6	6	6	6
do. do. mm.	84	84	89	102	109·2	120	120	120	127	127	149	152	152	152	152
Length of Bore, cals.	28	16	40	50	12·5	12	40	45	32	8·4	46	12	40	45	50
Weight of Gun	cwt. 9	lb. 407	cwt. 24	cwt. 41·0	cwt. 7	cwt. 10	cwt. 42	cwt. 53	tons 2	cwt. 9	tons 7	cwt. 25	tons 6·6	tons 7·35	tons 8·75
do. Projectile, lbs.	18·5	15	20	31	40	45	45	45	60	50	99·25	100	100	100	100
do. Cordite Charge [lbs.	lb.oz. 1 3¾	oz. 11	4·0	...	oz. 15·75	1·5	5·5	lb.oz. 8 2¼	8·5	oz. 11·5	21·5	2·1	18·3	26	36
do. M.D. do., lbs.	1 8	...	...	10	...	...	...	...	...	...	...	...	...	32	37
Muzzle Velocity, f.s.	1635	1090	2430	2850	980	1070	2200	2552	2115	782	2625	857	2500	2800	3050
Muzzle Energy, f.t.	336	123	819	1746	266	357	1510	2110	1826	212	4742	509	4334	5436	6492
Penetration at Muzzle, ins.	...	...	11·0	16·0	...	...	11·6	15·1	12·9	...	21·5	...	19·5	25·7	26·3
Rounds per Minute ...	20	...	17	15	...	...	12	12	10	...	10	..	10	10	10

Diameter of Bore, ins.	7·5	7·5	8	8	8·24	9·2	9·2	10	10	10	12	12	12
do. do. mm.	190	190	203	203	210	234	234	254	254	254	305	305	305
Length of Bore, cals.	45	50	45	50	44	46	50	40	45	50	40	40	45
Weight of Gun	tons 13·8	tons 15	tons 18·0	tons 21	tons 18·1	tons 26·65	tons 28	tons 31	tons 34	tons 41	tons 48·5	tons 51	tons 58
do. Projectile, lbs.	200	200	250	250	308·6	380	380	450	500	500	850	850	850
do. Cordite Charge [lbs.	...	...	...	...	47	...	...	81·5	...	...	141	...	...
do. M.D. do., lbs.	74·25	76	66	90	52	134	151	86·5	167	200	155	282	325
Muzzle Velocity, f.s.	2900	3000	2600	3000	2300	2750	3030	2400	2800	3000	2400	2650	2900
Muzzle Energy, f.t.	11663	12481	11781	15600	11320	18500	24190	17973	26219	33318	33949	41386	49568
Penetration of Muzzle, ins.	31·8	32·75	29·6	35·7	27·0	34·0	41·4	29·9	39·8	45·1	38·4	44·6	51·0
Rounds per Minute ...	5	5	5	5	5	4	4	3	3	3	2	2	2

Some Results Actually Obtained.

12 pr. 50 cals., Kite: 10 rounds in 31 seconds.

4·7-in. 42 cwt. gun with single motion breech mechanism: 5 rounds in 22 seconds at Silloth at a target—2 hits, range 1000 yards; 7 rounds in 25 seconds at drill.

Barfleur prize firing, 4·7-in. Q.F., 5·7 hits per gun per minute.

6-in. twin mounting, Cumberland: 5 pair rounds in 109 seconds.

6-in. gun with single motion breech mechanism: 7 rounds in 61 seconds at Silloth, Cordite charge; 4 rounds in 20 seconds at drill.

Terrible (China), prize firing, 6-in. Q.F., 4·25 hits per gun per minute, and 11 rounds in 2 minutes.

Ariadne prize firing, 6-in. Q.F., 19 rounds, 17 hits in 2 minutes.

7·5-in. gun, Carnarvon: 8 rounds in 111 seconds; Hampshire, 6 in 60 secs.; Swiftsure, 11 in 2 mins., 7 hits.

9·2-in. gun, Aboukir: 5 rounds in 85 seconds.

9·2-in. gun, King Edward VII.: 6 rounds in 110 seconds.

12-in. gun, interval 49 seconds, Illustrious: 6 rounds were fired from 1 turret in 1 minute 47 seconds.

Pair 12-in. guns, Goliath, 8 rounds in 2 minutes 10 seconds.

Ocean (China), prize firing, 12-in. B.L., 0·54 hits per gun per minute.

Mars (Channel) „ „ 0·42 „ „

Russell, battle practice, 12-in. barbette, 5 hits per gun per minute.

* Also arranged for Landing Carriage.

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VICKERS, SONS & MAXIM'S GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 mm. 30 cal.	37 mm. 42·5 cal.	3-pdr. 50 cal.	6-pdr. 50 cal.	Mountain. 12-pr. 15·07 cal.	Field. Light. 3-in. 22.64 cal.	Field. Heavy. 3-in. 29 cal.	3-in. 50 cal.	4-in. 50 cal.	4·7-in. 45 cal.	4·7-in. 48·4 cl.	14 cm. 45 cal.	6-in. 45 cal.	6-in. 50 cal.	7·5-in. 45 cal.	7·5-in. 50 cal.	8-in. 45 cal.	8-in. 50 cal.	9·2-in. 47 cal.	9·2-in. 50 cal.	10-in. 45 cal.	12-in. 40 cal.	12-in. 45 cal.
Gun.	Diameter of Bore .ins.	1·457	1·457	1·85	2·244	2·85	3	3	3	4	4·724	4·724	5·512	6	6	7·5	7·5	8	8	9·2	9·2	10	12	12
	Length of Bore . .ins.	43·5	62	92·5	112·2	42·94	67·92	87·2	150	200	212·6	228·45	248	269·5	300	337·5	375	360	400	429·3	460	450	480	540
	Length of Gun . .ins.	73·75	94	98·9	118·6	48·44	72·22	90·63	154	206·35	220	236·2	257·7	279·2	310·07	349·2	386·7	372·1	412·125	442·35	473	464·9	496·5	557·55
	Maximum pressure in Chamber, tons per sq. in.	13	14	17	16	14	14·5	15	17	17	17	18	16·5	17·75	18	18	17·5	17	18	18	18	18	18	18
	Weight of Charge lbs.	·0782	·1875	1·066	1·55	·45	1·078	1·875	5·375	11·75	19·5	14·4	21·875	35·25	43	78·25	80·03	94	123·5	170·5	184	250	309	356
	Weight of Projectile lbs.	1	1·25	3·3	6	12·5	12·5	17·63	12·5	31	45	45·14	88·19	100	100	200	200	250	216·7	380	380	496·7	850	850
	Weight of Gun . . .	c. q. l. 3 2 24	c. q. l. 5 1 19	c. q. l. 5 2 4	c. q. l. 8 3 8	c. q. l. 2 1 26	c. q. 5 3	c. q. 7 2	c. q. l. 16 1 16	t. c. q. 1 16 1	t. c. q. 3 3 3	t. c. 3 13	t. c. 5 18	t. c. q. 7 8 2	t. c. 7 16	t. c. q. 14 0 2	t. c. 16 0	t. c. q. 18 16 2	t. c. 16 10	t. c. 28 1	t. c. q. 27 16 1	t. c. 34 11	t. c. 50 7	t. c. 57 14
	Muzzle Velocity . .f.s.	1800	2350	2800	2600	1110	1700	1700	3000	2950	2925	3000	2860	3012	3290	2875	3007	2850	3300	3025	3110	3000	2750	3000
	Muzzle Energy . .f.t.	22·5	48	179·4	281	161	250	353·4	780	1870	2670	2817	4990	6290	7505	11465	12540	14080	16360	24110	25485	30990	44570	53045
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . .ins.	1·9	3·3	6·7	7·5	..	..	..	11·25	15·4	16·65	17·3	22·1	23·65	26·9	28·75	30·75	31·1	34·6	39·25	40·85	43·2	45·8	51·9
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . .ins.	1·5	2·6	5·1	5·4	..	..	..	8·7	11·9	12·9	13·4	17·1	18·4	20·9	22·25	23·7	24·1	26·8	30·45	31·7	33·55	35·5	40·2
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . .ins.	..	..	..	..	..	..	..	..	..	..	4·2	6·2	6·3	6·95	8·9	9·35	10	10·1	13·35	13·85	15·3	17·45	19·6
	Rounds per minute . .	300	300	30	28	14	20	20	20	15	12	12	10	10	10	8	8	6	6	4	4	3	2	2
Mounting.	Weight of Mounting complete with Shield . .	c. q. l. 4 1 10	c. q. l. 3 2 5	c. q. 11 2	c. q. l. 14 2 9	c. q. l. 6 3 7	Weight of equipment with 18 rounds. t. c. q. 1 8 3	Weight of equipment with 36 rounds. t. c. 1 16	t. c. q. 1 6 1	t. c. q. 3 15 2	t. c. 3 16	t. c. q. 4 10 3												
	Thickness of Shield .ins.	¼	no	25	no	·1	¼	no	2	3 & 33	2 & 1/16	3							Depending on type of Mounting used.					
	Weight of Shield . . .	q. l. 3 11	shield	c. q. l. 1 0 12	shield	q. l. 1 8	1 cwt.	shield	c. q. 9 0	t. c. q. 1 4 3	t. c. q. 1 4 3	t. c. q. 1 17 2												
	Angle of Elevation . .	16°	13°	20°	20°	25°	16°	16°	20°	20°	20°	20°												
	Angle of Depression . .	25°	25°	20°	10°	15°	8°	8°	10°	7°	7°	10°												

SCHNEIDER - CANET GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres .	305		274·4		240		210		200		175		150		120		100		75		65		57		47	37
Calibre, in inches . .	12·0	12·0	10·9	10·9	9·4	9·4	8·3	8·3	7·9	7·9	6·9	6·9	5·9	5·9	4·7	4·7	3·9	3·9	2·9	2·9	2·5	2·5	2·21	2·21	1·8	1·4
Length, in calibres . .	45	50	45	50	45	50	45	50	45	50	45	50	45	50	45	50	45	50	50	60	50	60	50	60	60	60
Weight, in tons . . .	52·9	57·3	38·5	41·7	25·8	27·9	17·3	18·6	14·9	16·2	10·0	10·8	6·3	6·8	3·2	3·5	1·9	2·0	·85	1·2	·55	·76	·45	·55	·30	·17
Weight of A.P. Projectile, lbs.	826	826	606	606	407	407	275	275	231	231	165	165	99	99	48	48	28·6	28·6	14·3	14·3	8·8	8·8	6	6	3·3	1·76
Weight of Charge . .	Not	stated																								
Muzzle Velocity, ft.-secs. .	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2871	3035	2952	3116	2952	3116	3116	3116
Muzzle Energy, ft.-tons .	50007	55717	36670	40859	24667	27487	16667	18572	14002	15601	10000	11143	6001	6686	2932	3268	1734	1931	820	917	533	594	362	400	223	119
Perforation of Steel at muzzle (ins.)	38·3	41·6	34·6	37·4	30·1	32·3	26·2	28·3	24·3	26·3	22·1	23·9	18·2	20·1	13·9	15·0	11·6	12·5	9·3	10·0	7·9	9·1	7·1	7·5	5·9	5·0
Perforation of Steel at 3000 yards (ins.) . . .	29·3	31·9	25·5	27·8	21·2	23·1	17·5	19·2	16·1	17·3	13·8	15·2	10·2	11·8	6·4	6·9	4·6	4·9	..	..	..	..	..	..	..	..

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KRUPP QUICK-FIRING GUNS, Mark 1901.

Tables supplied by Manufacturers.

NAVAL GUNS.

Calibre, in centimètres		7·5			10·5			12			15			21			24			28			30·5	
Calibre, in inches		2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01	
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1488	1711	1936	3748	4189	4740	5512	6283	7055	10582	12015	13558	29321	33279	37258	44092	50265	56438	70105	79807	89507	90609	103174	120141
Weight of Gun, in tons	0·66	0·76	0·86	1·67	1·86	2·11	2·45	2·79	3·14	4·70	5·34	6·03	13·08	14·80	16·56	19·60	22·34	25·09	31·16	35·48	39·79	40·28	45·86	51·45
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·77	3·12	3·54	10·47	12·57	14·33	15·66	17·97	20·62	29·99	34·40	39·47	82·47	94·59	108·71	124·58	143·10	164·27	198·41	227·07	262·35	255·73	293·21	337·30
Muzzle Velocity, in ft.-secs.	2690	2890	3068	2835	3022	3199	2877	3038	3225	2854	3008	3196	2851	3015	3196	2854	3018	3199	2854	3018	3202	2854	3018	3199
	2388	2566	2723	2500	2661	2822	2539	2677	2841	2556	2697	2858	2559	2707	2868	2533	2687	2845	2523	2664	2835	2526	2674	2838
Muzzle Energy, total ft.-tons	576	665	749	1720	1952	2191	2659	2969	3340	5099	5680	6389	14037	15684	17620	21169	23718	26655	33561	37595	42435	45564	48728	54859
Perforation through Steel, in ins.	7·13	7·91	8·58	10·87	11·92	12·93	12·87	13·90	15·15	16·15	17·41	18·98	23·20	25·13	27·30	26·96	29·20	31·73	31·80	34·45	37·48	34·94	37·84	41·10
Perforation through Iron, Tresidder's formula	9·9	11·0	11·7	14·7	17·24	18·77	18·35	19·91	21·77	22·66	24·52	26·84	31·73	34·51	37·65	36·47	39·66	43·27	42·52	46·28	50·57	46·42	50·47	55·08
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·52	3·74	4·02	4·98	5·29	5·66	8·14	8·65	9·22	9·84	10·45	11·13	12·11	12·86	13·70	13·58	14·41	15·33

COAST GUNS.

Calibre, in centimètres		7·5			10·5			12			15			21			24			28			30·5	
Calibre, in inches		2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01	
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1861	2094	2326	4519	5115	5688	6724	7606	8188	12897	14661	16314	35715	40344	44974	53792	60847	67902	85538	96782	108025	110671	125001	139772
Weight of Gun, in tons	0·83	0·93	1·03	2·01	2·27	2·53	2·99	3·38	3·77	5·73	6·52	7·25	15·88	17·93	19·99	23·92	27·05	30·18	38·02	43·02	48·02	49·20	55·57	62·13
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·99	3·35	3·76	11·80	13·45	15·32	17·53	19·96	22·93	33·52	38·15	43·88	92·59	105·40	120·83	140·02	159·42	182·57	222·67	253·53	291·00	286·60	326·28	374·78
Muzzle Velocity, in ft.-secs.	2876	2999	3123	2930	3107	3281	2920	3097	3268	2882	3068	3242	2887	3068	3245	2897	3074	3248	2897	3074	3251	2894	3068	3248
	2664	2775	2885	2582	2740	2894	2572	2733	2887	2589	2753	2900	2592	2756	2913	2576	2733	2887	2562	2720	2871	2562	2720	2877
Muzzle Energy, total ft.-tons	620	703	795	1836	2065	2307	2736	3082	3429	5228	5905	6583	14425	16232	18168	21815	24557	27430	34690	39047	43564	44855	50341	56473
Perforation through Steel, in ins.	7·52	8·23	8·98	11·40	12·40	13·40	13·15	14·29	15·43	16·42	17·91	19·37	23·62	25·76	27·91	27·54	29·98	32·43	32·48	35·37	38·31	35·63	38·71	42·01
Perforation through Iron, Tresidder's formula	10·5	11·3	12·0	16·46	17·97	19·50	18·76	20·49	22·21	23·05	25·24	27·42	32·34	35·42	38·53	37·29	40·76	44·27	43·51	47·56	51·73	47·39	51·72	56·35
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·55	3·83	4·08	5·05	5·40	5·76	8·25	8·81	9·37	10·00	10·66	11·32	12·30	13·11	13·92	13·78	14·66	15·60

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BETHLEHEM STEEL CO.

ORDNANCE.

This Table is supplied by the Manufacturers.

Calibre.	Length of bore.	Calibre.	Weight of gun.	Weight of projectile.	Muzzle velocity.	Muzzle energy.	Perforation of wrought iron.*	Perforation (3000 yds.) of K.C. armour by capped A.P. shell, normal impact.	Limit beyond which capped A.P. shell will not perforate K.C. plate. 12-in. plate.	Limit beyond which capped A.P. shell will not perforate K.C. plate. 7-in. plate.
inches.	cals.	cms.	lbs.	lbs.	feet per second.	foot-tons.	inches.	inches.	yards.	yards.
1·457	46	3·7	120	1	2300	37	3·5	..	..	..
1·851	46	4·7	550	3	2600	142	6·4	..	..	..
2·244	50	5·7	960	6	2400	240	7·3	..	..	..
3	50	7·62	1900	13	2800	707	11·7	..	..	..
			tons.							
4	40	10·16	1·6	33	2250	1,159	11·6	..	..	..
4	50	10·16	2·6	33	2900	1,924	17·0	..	..	..
4·724	50	12·0	4·2	45	2900	2,623	18·3	..	..	..
5	45	12·7	3·4	60	2500	2,599	16·5	3·9	..	..
5	50	12·7	4·75	60	2900	3,490	20·5	4·6	..	..
6	45	15·24	7·2	105	2600	4,967	21·2	5·7	..	1,820
6	50	15·24	8·4	105	2900	6,180	24·9	6·5	..	2,630
7	45	17·78	12·7	165	2800	8,967	27·3	8·1	..	4,010
7	50	17·78	14·5	165	2900	9,619	28·8	8·5	..	4,310
8	45	20·32	18·6	250	2800	13,587	31·5	10·3	1,780	6,070
10	45	25·4	35·4	500	2800	27,174	39·8	15	5,280	11,100
12	45	30·48	53·0	850	2800	46,195	47·4	19·5	8,870	Max. Range
18	28	45·72	60·0	2000	2250	70,185	42·7	19·9	9,500	Max. Range

* By Tresidder's Formula.

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PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

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PART IV.

ADMIRALTY POLICY.

MEMORANDUM ON "ADMIRALTY WORK AND PROGRESS."

(*Published December*, 1905.)

INTRODUCTION.

THE Board of Admiralty desire to present to Parliament (and through Parliament to the Public) an account of the progress that has been made in carrying out and developing the series of reforms that have been undertaken during the past three years.

While falling under several main heads, and at first sight perhaps not very closely connected, these reforms are all related and interdependent, and have their foundation in the reorganisation of the *personnel* and in the redistribution of the Fleet described in the two Statements issued by my predecessor in the December of 1902 and 1904. The reconstitution of Naval Education brings about far-reaching effects on the period of service and the allocation of officers, and reacts again on the entry and organisation of the Seamen, Stokers, and Marines. The release of crews from ships which would not be of value in war has made it possible to man Reserve ships with permanent crews, thereby largely increasing their efficiency, and consequently their instant readiness for war. The formation of a Reserve Fleet ready for immediate service allows of a more advantageous distribution of the Sea-keeping Fleet and of a better system of training for the Royal Naval Reserve. The elimination of the older vessels, which require the most frequent overhaul and repair, greatly reduces the work of the dockyards, and therefore allows of a reorganisation of the labour conditions.

DEVELOPMENT OF THE NEW SYSTEM OF ENTRY AND TRAINING OF OFFICERS.

When the new system was introduced in 1902 the Board felt that, owing to lack of experience and of sufficient *data*, they were not justified in holding out to all candidates who should enter for the three branches—Executive, Engineering, and Marine—the hope that they might eventually become Captains of Ships and Admirals of

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Fleets. It was premature then to declare that it would be possible to do away completely with the distinction between the three branches when the officers reached the rank of Lieutenant.

That the general efficiency of the Navy would be much assisted by the removal of this distinction was to them beyond doubt, but there was no necessity to come to an immediate decision upon this point, and accordingly, without in any way tying their hands, or those of their successors in the future, the Board considered it best to assume that the division into the various branches would be definite and final.

In order, therefore, to allow the Admiralty a completely free hand, no candidate has been accepted who has not volunteered for any one of the three branches.

It will be remembered that, in order to provide for the new Cadets during the first two years of their training at the age of from twelve to fourteen, a new College was built at Osborne, and a new system of education and training has there been inaugurated with great success.

The progress of the Cadets during their first two years has been most carefully watched, and at the close of this period the Board felt that the experience gained warranted them in instituting a detailed inquiry into the probable future development of the new officer.

A Committee was appointed under the presidency of the Commander-in-Chief at Portsmouth, Admiral Sir Archibald Douglas, G.C.V.O., K.C.B., to consider whether the time has arrived to formulate regulations for the allocation of the duties of future officers in the various branches of the Service, and to report:—

(*a*) Whether any necessity exists for the distinct classification of such officers under existing branches of the Navy, with a view to their remaining specialised for the whole of their future service.

(*b*) Whether specialisation for a period of their career only is necessary; and, if so, to indicate the procedure that should be followed to carry out the necessary duties of the Service afloat.

(*c*) How best to provide for filling efficiently the higher scientific appointments of the Admiralty and Dockyards.

The report, which is discussed in detail in a separate note, has convinced the Board that there will be no need for a final division into the three branches, and that specialisation for a period only is necessary, as opposed to permanent classification into separate lines.

There can be no question of the great advantage to the efficiency of the Service that this removal of differences will entail.

The Royal Marines will not in future possess a staff of officers entirely distinct, as at present, from the officers of the Royal Navy,

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but the Board see no reason why the historic traditions of this famous corps should not be carried on with a solidarity enhanced rather than diminished by the closer association of its officers of every rank with the sea service, of which it, as the Sea Regiment, has been for more than two centuries the honoured and invaluable ally.

Engine-Room Watch-Keeping.

Sir Archibald Douglas's Committee was also asked to report on the methods for providing Warrant Officers capable of taking charge of the Stokehold and Engine-room Watches, so as to relieve the more highly trained officers of the ship from the routine duty of Engine-room Watch-keeping.

It has long been felt that the Stoker Class should have better opportunities of advancement, and in the Memorandum of December, 1902, the creation of the new Chief Petty Officer rating of Mechanician, to be filled from the Stoker Class, was announced.

Further consideration of the various duties in the Stokehold and Engine-room led the Committee to recommend that in future the highly trained Engine-room Artificer Class should not, as heretofore, be called upon to undertake ordinary watch-keeping duties, but should be enabled to devote all their time to their real calling of Artificers, and that watch-keeping duties should be undertaken by men selected from the Stoker Ratings after a suitable course of instruction.

The Board have adopted this policy, and the Stoker Ratings will in future be eligible for promotion to Warrant Officer rank for duty as Engine-room Watch-keepers.

Royal Naval Reserve.

The arrangements for the drill and training of men of the Royal Naval Reserve have been recently reviewed in order to improve the efficiency of this branch of the Reserves, and also to reduce its cost.

Hitherto Royal Naval Reserve men have been drilled on board the harbour drill ships and batteries established round the coasts of the United Kingdom, and a certain number have undergone a period of naval training on board the sea-going drill ships, or in ships of the Channel Fleet. This system is, however, no longer well adapted to the requirements of the Service, inasmuch as the greater part of the drill has been devoted to gunnery, a class of duty which is very unlikely to devolve upon Royal Naval Reserve men in war, and as (excepting perhaps the limited number of men who embark for nine

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months of naval training) they do not acquire and maintain sufficient knowledge of the general routine of a man-of-war.

The establishment of the divisions of ships in commission in Reserve has now given an opportunity for affording the Royal Naval Reserves the training in which they have hitherto been wanting. These ships have only a portion of their crews on board, and can therefore accommodate a considerable number of Reserve men, with advantage both to themselves and to their crews. Although the ships only go to sea for cruises once a quarter, the general routine is much the same as when they are fully commissioned for sea service, and since they will change frequently, the Reserve men will have more facilities for becoming familiar with the internal economy of a modern man-of-war.

It has accordingly been decided that from the 1st April next, all drill at batteries and in harbour drill ships shall cease, and the establishments will be closed, except in few cases, where the present system will be continued a little longer. These exceptions are the drill ships in London, Aberdeen, Bristol, and Liverpool, and the Royal Naval Reserve batteries at Penzance, Yarmouth, Wick, Stornoway, Lerwick, Greenock, Upper Cove, and Rosslare.

Under this new system of training, the men will be expected to embark in the first year for three months, and thereafter for one month every alternate year.

Non-continuous Service.

The development of the Non-continuous Service system of entry of seamen, as a supplement to, and partial substitute for, the Continuous Service system, which has been almost universal for 50 years, is described in a separate note. The Continuous Service plan is very costly, but is still required for the production of the higher gunnery and other skilled ratings of the Fleet.

There are, however, a great number of men who do not need this expensive training, and can profitably be passed, after a shorter period of service, into the Royal Fleet Reserve.

Changes affecting the Pay of the Men of the Fleet.

Two advantages are to be given to the Seamen and Marines afloat, beginning in October, 1906:—

(*a*) A provision allowance of 8½d. a day will be paid to Warrant Officers, Seamen, and Marines on ship's books who are away on leave beyond 48 hours. This privilege or its equivalent is already enjoyed

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by soldiers and Marines on shore strength, and will take effect after 30th September next.

(*b*) Under the arrangement hitherto prevailing men may make monthly allotments of money from their wages to their relatives at home, subject, in the case of foreign stations, to a portion of their wages being retained in hand as a security against loss by death, desertion, &c. The sum allotted is sent to their relatives through the Admiralty from the ship at the end of the month. This system of withholding earnings occasions much dissatisfaction among the men, and distress to their families, who have to wait a considerable time after a ship sails for a foreign station before receiving means of support by means of regular allotment. Now that deaths are reported by telegraph, and even postal intelligence of a man's desertion is very rapid, there is no serious risk of the loss of public money in foregoing the retention of deposits, and in all ships commissioned after the 30th September next this system will be changed.

In 1903, it was decided to recognize the value of the services of Chief Petty Officers by the award of improved pensions, the estimated ultimate additional expense being £73,000 per annum. This concession took effect on 1st April, 1903, and has been the cause of a feeling of great satisfaction amongst the Petty Officers and seamen of the Fleet.

Reorganisation of Reserve of Ships.

The plan for the substitution of Reserve Squadrons, manned by nucleus crews and stationed at each of the three Home Ports, for the old "Fleet Reserve" system, as described by Lord Selborne last December, has proved completely successful, and all the ships now in the fighting line are always ready for sea.

At the same time the list of the Navy has been reduced by the removal of nearly 150 ships of all descriptions which had but a small fighting value.

The elimination of older ships permits the whole of the War Fleet to be manned with active service ratings, with the exception of stokers, all of whom can be provided from the Royal Fleet Reserve with the exception of 600 men. It is expected that in the course of the year a large proportion of the active service stokers needed will be obtained.

Our best fighting machines must be kept at the highest state of efficiency, and other ships and vessels hitherto retained, in some cases because "they might come in usefully for subsidiary purposes

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in future war," must be placed in an altogether secondary position, and not relied on as the first fighting line of the Navy.

The Distribution of Ships among the Fleets.

The distribution of the ships of H.M. Navy in peace time must largely depend on the international relations of the Powers.

A distribution of Fleets adapted to the requirements of the old wars led to the growth of subsidiary dockyards and depôts abroad. Considerations of convenience and labour conditions in both home and foreign dockyards have in the past led to a certain customary peace distribution of ships which has at times been persisted in even when war seemed imminent. Plainly, however, peace considerations cannot be allowed to regulate the strategic distribution of our ships at the outbreak of hostilities.

The periods of European rest as well as the stable grouping of international interests during the latter part of the last century had assigned certain degrees of relative importance to our various squadrons and the scale of their strength has been reflected in the rank and capabilities of the Admirals selected to command them. So much has this been the case that to-day people are apt to look on a definite number of ships on any given station as a fixed quantity rather than a strategic exigency.

This idea must be entirely dispelled. Squadrons of varying strength are strategically required in certain waters; but the kaleidoscopic nature of international relations, as well as variations or new developments in sea-power, not only forbids any permanent allocation of numbers, but in fact points the necessity for periodic redistribution of ships between our Fleets to meet the political requirements of the moment.

Since the redistribution of the Fleet described by the late First Lord in his Memoranda of 6th December, 1904, and 15th March of this year, the following are the chief changes that have taken place:—

The strength of the Channel Fleet has been increased to seventeen battleships.

The strength of the First and Second Cruiser Squadrons has been completed to six armoured cruisers of the latest type in each case.

A Squadron of three cruisers has been employed in connection with the settlement of fishery questions in Newfoundland, and is now leaving for an extended cruise down the coasts of North and South America and back by the West Coast of Africa, and the

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cruisers Cambrian and Flora are about to proceed on a prolonged cruise on the Pacific Coast and the adjacent islands.

The Board attach much importance to the provision of repair ships to attend the squadrons at sea. The damage done to the Assistance by her recent stranding in Tetuan Bay will take a considerable time to make good, and so a similar vessel has been bought to replace her temporarily. When the Assistance is ready for sea again, there will be repair vessels with the four principal Fleets.

Manœuvres.

The Grand Manœuvres have been arranged to take place in June next, when in association with the putting to sea of every fighting vessel, large and small, intended to be used in war, there will be an extended test made as to the scheme recently elaborated for the protection of trade, when the co-operation of the shipping interest is hoped for in elucidating this difficult problem.

Shipbuilding Policy.

Before deciding on the building policy of the present year, an accurate review of our naval position as regards other Powers had to be made.

It must be remembered that however formidable foreign ship-building programmes may appear on paper, we can always overtake them in consequence of our resources and our power of rapid construction.

Rapid shipbuilding is of great importance, because:—

(*a*) The fighting vessel is sooner tested, so that improvements suggested by experience may be effected, and defects may be brought to notice in time to be avoided in succeeding vessels. Thus it is most desirable to complete the first ship of a new class with all possible despatch.

(*b*) It is obviously more conducive to the immediate fighting power of the Fleet to push forward a limited number of vessels to completion than to spend the same money on a larger number building at a slower rate.

(*c*) There is the financial benefit of sooner getting interest on capital by having vessels at sea ready to fight instead of partly completed and not ready to fight, even if the number of the latter is much greater.

(*d*) It is economical to run all the shipbuilding machinery at its full ordinary rate of output. There is a constant gain in building more rapidly up to the point when men begin to be too closely

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packed to work without hindering each other, or at which excessive overtime and high rates of pay are involved.

(*e*) An immediate result of building at, say, twice the usual rate would be that only one-half as many ships would be under construction at any one time. There will be needed, therefore, for building purposes, proportionally less slip, dock, and basin accommodation.

At the present time strategic requirements necessitate an output of four large armoured ships annually, and unless unforeseen contingencies arise, this number will not be exceeded. The period of building is to be two years, and therefore four ships will be laid down each year, and there will be eight ships in course of construction in any one year either in the dockyards or by contract.

The Board have come to the conclusion that the right policy is to make out their programme of shipbuilding for the next year only, and while they anticipate at present that the output of four large armoured ships a year should suffice to meet our requirements, there would be no difficulty whatever in increasing this output to whatever extent may be necessary in consequence of any increase of Naval Power abroad.

Dockyard Reform.

As foreshadowed in the First Lord's Statement that accompanied the Navy Estimates for this year, the subject of the administration of the several Naval Establishments has been enquired into, and important organic changes have been decided upon, especially in regard to the dockyards, &c., as explained later in Note D. relating to dockyard re-organisation.

Naval Expenditure.

The Navy Estimates as now presented yearly to Parliament must not be looked on only as the cost of our first line of defence. They also include the cost of many subsidiary services, some of which only indirectly affect the Navy, such as, for instance, fishery duties, scientific services, and the work of the Coastguard. These absorb about £1,000,000 of the money included in the Navy Estimates.

The whole cost of the observatories at Greenwich and the Cape of Good Hope falls on the Navy Estimates, although they are mainly of scientific interest and only indirectly of practical service to the Navy.

Policing the fisheries costs £260,000 a year, which is necessarily spent on a type of ship which would not be built for war alone.

It is desirable to remember how this million is spent, when considering the amount of Naval Expenditure.

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CONCLUSION.

The whole of the recent reforms have an effect on the Navy Estimates. The elimination of older ships reduces the number of men required; it permits us to keep the Navy up to the most modern requirements, while limiting the charges incident to increase of numbers. The reduction of the smaller establishments abroad has made possible considerable saving in stores and maintenance charges. With the condemnation of old ships, obsolete guns and armaments disappear; consequently magazine accommodation on various stations for innumerable classes of ammunition is no longer necessary, the maintenance of plant for repairing and altering types of guns and munitions is no longer required, and the space vacated can be devoted to more useful purposes, thus saving new expenditure on works.

The new education scheme will give Naval Officers of the future an adaptability for the duties of all the branches of their calling, which will make possible a certain reduction of the number of officers as compared with present requirements.

The development of the non-continuous service system for seamen, and the restriction of re-engagement for pension to the higher ratings, will effect considerable savings on the non-effective votes for pensions. The entry of non-continuous service men will effect a saving in the cost of early training.

I have recently received the report (given in a separate note) of a Committee I appointed to consider the Estimates for 1906–7, and I am able to say that these various economies will allow the Board to diminish the sum for which Parliament will be asked by a further 1½ millions beyond the 3½ millions reduction made last spring.

I am bound, however, to add a word of caution, for the public cannot rely on this reduction being continued in future years if foreign countries make developments in their shipbuilding programmes which we cannot now foresee, but the programme of shipbuilding we have in view for future years, and have provided for, will in the opinion of the Board of Admiralty meet all the developments of which the resources of foreign countries seem at present capable.

I append some notes which have been prepared in the department with respect to certain of the principal changes.

CAWDOR.

November 30, 1905.

The notes referred to by Lord Cawdor relate to the principal reforms undertaken by the Admiralty in the period 1903–5, and are arranged under the heads:—A.—*Personnel*; B.—Fleet Reorganisation; C.—Obsolescence of Warships; D.—Dockyard Reorganisation; and E.—Estimates Committee. Under the first of these heads the votes are

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classified as follows: Education of Officers; The Duties of Engine-room Watchkeeper, and the Training of Boy Artificers; Education and Training of Men; Employment of Non-continuous Service Men, and Amendment of Service in Fleet Reserve; Gunnery Schools; Signal Schools; Physical Training; Gunnery Practice; Bands; Removal of "Undesirables."

The following is the principal portion of the important Note D. on the subject of Dockyard Reorganisation:—

Intimately connected with the reorganisation of the distribution of building and repair is the reorganisation of control in the dockyards and the kindred Supply establishments. The Board of Admiralty, therefore, most carefully inquired into the organisation and general labour conditions, with a view to a co-ordination of system among all supply departments, and they have decided on the following improvements in administration.

The Victualling, Armament, Coaling, and Store Departments, as well as the Dockyard, will be under the supervision and administration of the Admiral Superintendent. Obviously with this increase of supervision it is impossible for this Officer to be held as fully responsible for details in the departments of the Chief Constructor and Chief Engineer as he is under existing regulations.

It is essential that naval officers of high rank should be in charge of the Dockyards as superintendents, since the Service afloat is so much concerned. Their authority as representatives of the Admiralty must be supreme, but their functions should be mainly general direction and supervision, leaving the management to Heads of Departments, and holding the latter personally responsible to them for the conduct of the business of the Departments throughout.

The Chief Constructors and Chief Engineers of the Dockyards at present are held responsible for the proper and economical performance of the work without tangible means of fulfilling their responsibility. It is of first importance that they shall be brought into line with similar positions in private trade, and be constituted managers of their Departments, with full authority therein, including the power to enter, discharge, promote, or punish men (short of discharging men on the establishment), procure their own yard machinery, and get so far as practicable their own stores direct from the contractors under standing contracts without any intermediaries, and control the stock and storage appertaining to their Departments. The extended powers thus conferred on these officers will be rigidly controlled by the financial limitations consequent on the allocation of Dockyard moneys.

The Admiral Superintendent will be to these officers in the position of owner (acting on behalf of the Admiralty) to whom the managers will be immediately responsible, and he will be constantly referred to in every matter of importance, and will issue all orders for work to be undertaken. There will be no lessening whatever of the position and responsibility of the Admiral Superintendent by constituting these two officers managers of their Departments; it will merely give them powers for the exercise of which they will be responsible to the Superintendent, and which are absolutely essential to good administration. At the same time a consolidation and simplification in the methods of keeping accounts will be introduced.

The office of the Director of Dockyards as at present constituted has been abolished. A Director of Dockyards and Dockyard Work has been appointed, and he will be continually inspecting the Dockyards and the Dockyard work, instead of, as hitherto, being too constantly employed on clerical work at the Admiralty.

Primarily, it is intended that his whole time should be occupied in close, personal, technical supervision of the Dockyards and of all Dockyard work, except when it may be necessary to attend at the Admiralty to confer with the Controller of the Navy and other Officers. He will give close personal attention, not only to the general organisation and equipment of the Dockyards, and to the co-ordination of the work of the various departments, but to the classification and distribution of, and check over, labour, as well as the supply, storage, stock, and transportation of materials for Dockyard use. He will also carefully scrutinise the incidental and establishment expenditure of all descriptions.

Since, by his appointment, provision has been made for authoritative technical advice in matters connected with Dockyard administration, and since he will frequently visit all the Dockyards and confer with the superintendents and officers, it is considered unnecessary to continue the office of Civil Technical Assistant to the Superintendents at the three larger Dockyards, and that office will be abolished at an early date.

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It will form an important branch of the duties of the Director of Dockyards and Dockyard Work, to examine and report to the Controller upon the defects of ships requiring large repair, and Dockyard proposals in regard thereto, as well as upon estimates of cost, and for this purpose, and matters generally connected with the Engineering Department, an Engineer Assistant will be appointed.

The responsibilities of the Superintendents and Officers in these matters will be in no wise modified by the new duties of the Director of Dockyards, who will render them every assistance.

He, together with his Engineer Assistant, will visit private Shipbuilding and Engineering Establishments as frequently as may be necessary to keep touch with developments and improvements in shipbuilding arrangements, etc., and in the use of labour-saving appliances.

With a view to relieving him of clerical and other miscellaneous duties at the Admiralty, it has been decided to appoint a separate officer for this purpose, viz., the "Superintendent of the Dockyard Branch" at the Admiralty. He will be directly under the Controller, but will receive instructions from the Director of Dockyards and Dockyard Work in matters appertaining to his duties at the Dockyards, and render him such assistance as he may require; he will further supervise the Admiralty staff of the Dockyard Branch of the Controller's Department.

It will be gathered from the above arrangement that the Board intend that all executive officers in, or associated with, the Dockyards, especially those who are charged with the supervision of work and labour, shall be hampered as little as possible with clerical office work, so that they may be able to devote their valuable time to the personal management of their Departments and general oversight of work in progress.

The Director of Naval Construction will be brought closely in touch with the actual construction of the ships. He will be the principal technical officer under the Controller of the Navy, and in charge of all matters relating to design and naval construction.

Another alteration previously mentioned that has been decided on is the co-ordination of the several Naval Establishments (except Naval Hospitals) under one Naval control, viz., that of the Admiral Superintendent. At present some establishments are under the Admiral Superintendent, and others under the Commander-in-Chief. The Commander-in-Chief is supreme, but his important Fleet duties render it impossible that he can exercise the required supervision over Naval establishments such as the Victualling and Naval Ordnance Departments as well. The proposed system is already in operation at Malta with admirable results.

It has been found that under this system of dual control, it has not been practicable to adapt the storage space and auxiliary services of the several establishments to the requirements of the system treated as a whole, in consequence of their having always been looked on as entirely distinct services, with storehouses, workshops, steam vessels, barges, etc., staff and work-people special to each. The Naval Establishments Committee have the consideration of the details in hand, with the object of concentrating the administration of these several services, so that the general requirements of the Ports can be ministered to from a common standpoint; but before action in this direction can be taken, it is necessary to establish this general control, and as the Admiral Superintendent is at the head of by far the most important of the Naval Establishments in the Port, the general administration of such of the business as is more or less common to all should naturally devolve upon him.

To facilitate the development of this important work, it has been decided to give the Admiral Superintendent the assistance of a Post Captain, with the title of Deputy Superintendent, instead of the present title of Captain of the Dockyard. He will assume the present duties of the Captain of the Dockyard, with Commanders under him to assist him in his work. This arrangement will not occasion any additional expense, nor will it interfere with the control of the Heads of Departments at the Admiralty, responsible for the Administration of the Victualling and Ordnance services. Under these new conditions, the administration of the Coaling Department will again revert to the Admiral Superintendent.

An important consequence to the consolidation of all Supply Departments under one Head will be the possibility of the re-arrangement of storehouses, whereby space surplus in the case of one Department will be available for others, thus saving expenditure of money, which was at times inevitable under the more insular system.

Stores for shipbuilding purposes will be kept separate from those for Naval purposes, and the management will be responsible for the provision of such stores as are required by them, under effective financial control, thus saving a duality of control and responsibility which has resulted in unnecessary office work and the accumulation of large stocks in the past.

A most careful survey of all stock is being held, the standards are being revised, and means adopted to prevent the accumulation of items which are liable to become out-of-date in a short time.

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The following tables appear as appendices A and B:—

APPENDIX A.

Table I.—Fleet in Commission.

	Battle-ships.	*Arm-oured Cruisers.	Large 1st and 2nd Class Protected Cruisers.	Smaller 2nd and 3rd Class Protected Cruisers.	Scouts.	Gun-boats.	Des-troyers.	T.B.	Sub-marines.
Channel . . .	17	6	2	2	1	—	24	—	—
Particular service.	—	—	5	1	—	—	—	—	—
Training ships .	—	—	5	—	—	—	—	—	—
Home waters . .	—	—	—	1	—	14	—	20	17
Atlantic . . .	8	6	1	1	1	—	†12	12	—
Mediterranean .	8	4	3	—	1	—	‡22	9	—
Eastern Fleet .	—	5	3	9	—	—	13	4	—
Cape	—	—	1	3	—	—	—	1	—

* Armoured cruisers include Powerfuls and Diadems. † Six in commission, six in reserve.
‡ Fifteen in commission, seven in reserve.

Table II.—Fleet in Commission in Reserve in Home Waters.

Battleships.	*Armoured Cruisers.	Large 1st and 2nd Class Protected Cruisers.	Smaller 2nd and 3rd Class Cruisers.	Scouts.	Gunboats.	Destroyers.	T.B.
12	14	8	8	5	3	71	33

* Armoured cruisers include Powerfuls and Diadems.

APPENDIX B.

Financial Saving Consequent on the Reorganisation of the Fleet.

(As estimated in April, 1905.)

Table I.—Cost of New Organisation.

	Pay, Wages, and Allowances.	Victual-ling.	Maintenance of Ships, including Hull, Machinery, Gun Mountings, Torpedo Fittings, Maintenance Stores, and Coal.	Medi-cines.	Naval Ordnance Stores.	Miscel-laneous.	Total.
	£	£	£	£	£	£	£
Additional vessels in Commission . . .	585,000	195,000	See below*	5,000	60,000	25,000	870,000
Ships with nucleus crews	506,000	160,000	See below*	4,000	40,000	10,000	720,000
Vessels in full commission with nucleus crews, and in dock-yard hands, *i.e.*, the entire Fleet, except ships building . . .	—	—	*3,105,000	—	—	—	3,105,000
Cost of Naval Establishments at:—							
Jamaica	—	—	—	—	—	—	Nil
Halifax	—	—	—	—	—	—	
Esquimalt . . .	—	—	—	—	—	—	
Trincomalee . .	—	—	—	—	—	—	
Ascension . . .	75,000 inclusive of all Establishment charges						75,000
Cape of Good Hope							
Bermuda . . .							
Total . . .	1,166,000	355,000	3,105,000	9,000	100,000	35,000	4,770,000

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TABLE II.—COST OF FORMER ORGANISATION.

	Pay, Wages, and Allowances.	Victualling.	Maintenance of Ships, including Hull, Machinery, Gun Mountings, Torpedo Fittings, Maintenance Stores, and Coal.	Medicines.	Naval Ordnance Stores.	Miscellaneous.	Total.
	£	£	£	£	£	£	£
Ships in Commission reduced	1,055,000	350,000	See below†	10,000	105,000	50,000	1,570,000
Ships in Fleet Reserve .	208,000	60,000	See below†	2,000	—	5,000	275,000
Vessels in Commission, in Fleet and Dockyard Reserve—*i.e.*, the entire Fleet except ships building	—	—	†3,950,000	—	—	—	3,950,000
Cost of Naval Establishments at:—							
Jamaica . . . . / Halifax . . . . / Esquimalt . . . / Trincomalee . .	117,000	Inclusive of all Establishment charges					117,000
Ascension . . . / Cape of Good Hope / Bermuda . . .	150,000						150,000
Total . . .	1,530,000	410,000	3,950,000	12,000	105,000	55,000	6,062,000
Less expenses under New Organization (see Table I.)	1,166,000	355,000	3,105,000	9,000	100,000	35,000	4,770,000
Estimated net annual saving	364,000	55,000	845,000	3,000	5,000	20,000	‡1,292,000

‡ Exclusive of a prospective reduction of about £60,000 a year in liability for retired pay and pension.

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First Lord's Statement explanatory of Navy Estimates, 1906-7.

The Estimates for 1906-7 amount to £31,869,500, as opposed to £33,389,500 for the current year, a reduction of £1,520,000. The method by which this reduction has been obtained is described in one of the Appendices (Estimates Committee) to the Blue Book, "A Statement of Admiralty Policy" (Cd. 2791), issued by my predecessor in November last, anticipating much of that usually made on presentation of the Estimates. The present Estimates are substantially in agreement with the forecast given in that Statement.

The following is the usual statement of work done by the various departments of the Admiralty during the present financial year.

Distribution of the Fleet.

Mediterranean.

The Battleship Squadron, consisting of eight ships of the Formidable class, has remained unaltered. The second class cruisers attached to it have been reduced, by the withdrawal of the Juno, to three ships of the Talbot class.

In the Third Cruiser Squadron the armoured cruiser Carnarvon, of the Devonshire class, has replaced the Aboukir. The repair vessel Vulcan has been appropriated for special service with the Mediterranean Destroyers affiliated to that Squadron.

North America and West Indies.

In the Fourth Cruiser Squadron, the Royal Arthur has replaced the Ariadne as flagship, and the Edgar has relieved the Gibraltar. The Eclipse was temporarily, added but has now been withdrawn, and has been attached to the Royal Naval College, Osborne, in place of the Hermes. The Diamond, which was attached to the Fourth Cruiser Squadron for permanent service in the West Indies, has been replaced by the Indefatigable.

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The sloop Fantome has been brought home from Halifax and will shortly be fitted for surveying service. Three cruisers of the Apollo class have been employed in connection with the Newfoundland fisheries, and are now proceeding on a cruise along the east coast of South America and the west coast of Africa under the command of Commodore Sir Alfred Paget.

China.

Considerable changes have been made in the China Squadron. All the battleships have been withdrawn, while of the cruisers the Amphitrite has been replaced by the Diadem, and the Sutlej, Hogue, and Andromeda will shortly be relieved by the armoured cruisers King Alfred, Kent, and Donegal. The second class cruiser Bonaventure was transferred from the Pacific Station to relieve the Thetis, but is now about to be withdrawn from the China Station, and the Flora has replaced the Iphigenia and Sirius.

The two sloops Cadmus and Clio have been transferred from the Australian to the China Station. The gunboats Bramble and Britomart will shortly be put in commission on the Station for service on the rivers. The shallow-draught steamer Nightingale is being sent out from England, making ten vessels of this type on the China Station, for river work.

Australia.

The Powerful has relieved the Euryalus as flagship.

This Squadron has been strengthened by the addition of the second-class cruiser Cambrian. The third-class cruiser Wallaroo has been withdrawn and the second-class cruiser Encounter has joined the Station.

The Psyche, Pyramus, and Pioneer have replaced as drill ships the Katoomba, Phœbe, and Mildura. The five third-class cruisers now on the Station are all of the same type. The sloop Torch has been paid off and laid up at Sydney, and there are now no vessels of this class on the Station.

East Indies.

The Hermes has replaced the Hyacinth as flagship.

The Renown, and the escorting ship the Terrible, which were placed at the disposal of Their Royal Highnesses the Prince and Princess of Wales, have been visiting various ports on the East Indies Station.

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Cape of Good Hope.

No alteration has taken place with the exception of the relief of the Barrosa by the Pelorus.

Atlantic Fleet.

This Fleet now includes eight battleships, viz., five of the new King Edward VII. class and three of the Majestic class. The vessels replaced have been the Cæsar, Hannibal, Jupiter, Mars, and Illustrious.

The Arrogant has replaced the Doris as one of the cruisers attached to the Battle Squadron.

In the Second Cruiser Squadron, which is affiliated to the Atlantic Fleet, it is intended to replace two of the Monmouth class cruisers shortly by two cruisers of the Duke of Edinburgh class.

Channel Fleet, including First Cruiser Squadron.

One of the chief features of the past year in the distribution of H.M. ships has been the strengthening of the Channel Fleet.

The number of battleships has been increased to seventeen, and the composition of this fleet will shortly be as follows: six battleships of the Duncan class, five of the Canopus class, four of the Majestic class and the Triumph and Swiftsure (ex Chilian ships).

The cruisers attached to the Battle Squadron have been augmented by the Juno, transferred from the Mediterranean.

The Sapphire and the Home Torpedo Boat Destroyer Flotillas are now attached to the Channel Fleet. The Sapphire has become the flagship of the rear-admiral (called the admiral (D)) who has been appointed in command of all torpedo-boat destroyers, torpedo gunboats (except those employed on fishery duties), torpedo boats and submarines in full commission and in commission in Reserve. Three scouts will shortly be employed on service with the Destroyer Flotillas.

In the First Cruiser Squadron, affiliated to the Channel Fleet, the Roxburgh, Antrim, Devonshire, and Argyll have replaced the Kent, Bedford, Donegal, and Monmouth, and the Hampshire has been added. The Good Hope remains the flagship.

Home Ports.

The Actæon has been commissioned as the new torpedo school at Sheerness.

The Fisgard and the Tenedos, formerly stationary depôt ships

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for destroyers, have been appropriated for boy artificers' training establishments at Portsmouth and Chatham, and the Assistance, temporarily used as a training ship for boy artificers, has been transferred to the Atlantic Fleet as a repair ship. The Indus has recently been commissioned as the new mechanicians' training establishment at Devonport.

The Mercury, hitherto employed as navigational school ship, has been relieved by the Dryad and Harrier, and has been placed under the inspecting captain of submarine boats, as submarine depôt ship. Sapphire II. (formerly Imperieuse) has become the depôt ship at Portland for torpedo boat destroyers.

Considerable alterations have been made in the harbour training ships for boys; the Boscawen has been paid off and Boscawen II. and III. have been removed from Portland to Harwich and made tenders to H.M.S. Ganges, the ship attached to the new training establishment for boys at Shotley. The St. Vincent and Caledonia, training ships at Portsmouth and Queensferry, have been paid off.

Coast Guard and Fishery Service Vessels.

The sea-going Royal Naval Reserve drill ships have been paid off, as it has been decided to train Reserve men in the ships of the divisions in commission in reserve at the Home ports. After the 1st April next the harbour drill ships, with the exception of those at London, Aberdeen, Bristol, and Liverpool, will be discontinued.

Five of the torpedo gunboats are being transferred from the Admiral commanding the Coast Guard and Reserves to the Admiral (D).

Visits.

Besides the visits mentioned in the "Statement of Admiralty Policy," page 29, a visit was paid by a French Fleet to Portsmouth in August, and by the China Squadron to Japan in September and October.

H.R.H. Prince Arthur of Connaught proceeded from England on a special mission to Japan, embarking at Hong Kong in H.M.S. Diadem. The Diadem will remain in Japan during His Royal Highness' stay.

Manœuvres.

Combined battle exercises were carried out by the Mediterranean and Atlantic Fleets last May, and again in August.

The Reserve Divisions engaged in manœuvres last July with

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Squadrons selected from the Channel Fleet, First and Fourth Cruiser Squadrons, and destroyer flotillas.

Torpedo craft exercises have been taking place in Home waters, and combined exercises of the Channel, Mediterranean, and Atlantic Fleets, and First, Second, and Third Cruiser Squadrons are now in progress on the coast of Portugal.

Personnel.

Officers.

The new Royal Naval College at Dartmouth has been practically completed, the first term of cadets entered at the R.N. College, Osborne, having been transferred to Dartmouth in September, 1905. The Britannia training establishment was closed at the same time, the cadets then under instruction being embarked on two cruisers for the purpose of completing their instruction under the old conditions. The headquarters of the cruisers was established at Bermuda, where suitable arrangements had been made for the convenience of the cadets. The cadets entered in September under the old system, and those entered in January, 1906 (the last to be so entered), were received at the Royal Naval College, Dartmouth, where they are instructed, as far as possible, side by side with the cadets transferred from Osborne.

Mr. Charles Godfrey, assistant-master at Winchester College, was selected as head master of the R.N. College, Osborne, in succession to Mr. Ashford, who was transferred to Dartmouth in September.

The selection of candidates for cadetships continues to be made under the scheme laid down in 1903, and the reports presented to Parliament in 1905 (Cd. 2450) were favourable to the system by which all candidates appear before the Interviewing Committee before being selected for the final qualifying examination.

The organisation and staffs of the cadets' colleges have been reviewed, and various economies have been introduced, including a simpler and more wholesome dietary.

The question of the training of naval officers and their appropriation for specialist branches, such as gunnery, engineering and marine, received further consideration in the course of the year, and a full statement in regard to this important subject was set forth in the Parliamentary Paper (Cd. 2791) published in December, 1905.

The arrangements for the study and examination of midshipmen have been revised. In future Part I. of the examination will be held three times a year, and young officers will be expected to present

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themselves on their return from sea, without any preliminary course of study at the Royal Naval College. An executive officer will be detailed in every ship for supervising the instruction of the midshipmen, whether a naval instructor is borne or not. The examinations in seamanship will also be held at fixed dates three times a year.

The school of navigation will be located in future at the college in Portsmouth dockyard, and the sub-lieutenants will go through their pilotage course here instead of at the Royal Naval College Greenwich.

A beginning has been made with the scheme of sending abroad assistant clerks of the accountant branch for study of foreign languages. Six young officers were selected in October, 1905, four being sent to France and two to Germany, and so far the reports of their progress are satisfactory. Six more were detailed for study abroad in January, 1906.

The war courses for officers, which were formerly held at the Royal Naval College, Greenwich, have been developed and rearranged. In future these courses will be held at a naval port, where it is hoped that a large number of officers will be able to take advantage of this important aid to their professional training. The first course under the new system is being held at Devonport; the next one will begin at Portsmouth at the beginning of March, 1906. Portsmouth presents special advantages for the holding of the war courses, and it is under consideration to treat this port as the centre of the naval war courses.

Men.

The completion of the boys' training establishment at Shotley has enabled the Admiralty to carry out their policy of paying off the old training ships and concentrating the training of boys. The training of boys on entry is now practically divided between Shotley and Plymouth, a very few boys being still entered in the Emerald at Queenstown.

The period of shore training of boys has been further reduced, corresponding to the older age at which they are entered, the total being eight months in the shore establishment and four months in the sea-going cruisers. A certain rearrangement of the periods and subjects of instruction has been made at the same time so as to secure more thorough instruction for the smarter boys. Boys who have completed their training in the shore establishments are now sent to the ships of the Reserve Squadrons pending draft to the sea-going cruisers.

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The training of youths continues to be carried out as arranged last year. They are first put through a preliminary course of about two months' training in the Boscawen III. at Shotley, and are then sent afloat in a sea-going cruiser for four months in the same manner as the boys.

The entry of special service men has been attended with satisfactory results throughout the year, especially in regard to stokers. After undergoing the preliminary training in the depôts, these men are sent for a short period to ships of the Reserve Squadrons while waiting draft.

As explained in the "Statement of Admiralty Policy," various changes are proposed in regard to the training and advancement of engine-room ratings. Warrant rank has been thrown open to the stoker class. The training of boy artificers and stokers qualifying for leading stoker and mechanician has been placed under an inspecting captain of mechanical training, the training of boy artificers being limited to the ports of Portsmouth and Chatham, and that of mechanician being concentrated at Devonport only.

With a view to reducing the number of non-swimmers in the Fleet, directions have been issued for general swimming instruction to be given for half an hour daily in all ships, and for arrangements to be made in suitable localities for parties of non-swimmers to be sent away for instruction to swimming baths, etc. The test of ability to swim has also been raised, and arrangements have been made for advanced classes in life-saving to be formed among the more proficient swimmers.

Coast Guard.

The reorganisation scheme of 1903 is now fully established, and works very satisfactorily. New Coast Guard instructions have been completed and issued.

A considerable reduction has been made during the last year in the *personnel* and the buildings of the Coast Guard.

Stations which required extensive repairs, or where the quarters were found no longer suitable, have been closed.

The estimated numbers of the Coast Guard *personnel* for 1906–7 will be 4122 as compared with 4369 for 1905–6.

Improvements have been made in regard to the efficiency of the signal stations. A signal boatswain has been added to the staff of the admiral commanding Coast Guard and Reserves, and has been found very useful in carrying out certain periodical inspections of the crews of these stations.

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The wireless telegraph stations are now worked entirely by the Coast Guard. Of these, two have been opened during the present financial year, and another is now being opened as an intercepting station temporarily. In addition, three more stations are to be erected next year.

Royal Marines.

It was decided to reduce the establishment during the current financial year from 19,800 to 18,261—*i.e.*, by 1539. Of this reduction, 200 will be in the Royal Marine Artillery, and 1339 in the Royal Marine Light Infantry.

The Royal Naval School of Music, which was established in 1903, has made steady progress during the year. The present number of band ranks for service afloat has reached 950, the number originally authorised to be borne during the financial year. Twenty-seven bands under the new scheme are now embarked in H.M. ships.

The rating of turret gun-layer and turret sight-setter has been recently thrown open to the Royal Marines, and six have qualified for the former and thirteen for the latter rating. 679 qualified men (Q.M.) R.M.L.I. are fully trained and available for employment in their gunnery rating.

Owing to the exigencies of the naval service, Royal Marine officers have in the past experienced some difficulty in presenting themselves for examination for promotion at Army centres. Arrangements have recently been made with the War Office to provide for the literary part of the examination of Royal Marine officers being held in any ship and in any part of the world in which they may be serving, but the examination in practical handling of troops in the field will still have to be carried out at a military station. It is thought that this change will, to a large extent, obviate the necessity for provisionally promoting officers who have not passed the prescribed examination owing to want of opportunity.

Royal Naval Reserve.

The number of Royal Naval Reserve officers and men having reached requirements, entries have been temporarily suspended during the year.

Early in the financial year 1905–6, three months' training on board the ships of the Reserve Divisions was substituted for training on board special sea-going drill ships, allowing the latter to be withdrawn, and thereby effecting a large economy. It also tended to

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greater efficiency, as the ships of the Reserve Divisions are more efficiently armed vessels.

Considerable alterations in the system of training officers and men of the Royal Naval Reserve will come into force on April 1 next, as explained in the "Statement of Admiralty Policy" previously referred to. All drill and training are in the near future to be carried out in effective ships in commission instead of at shore batteries and in harbour drill ships.

Five harbour drill ships will be paid off and twenty-five batteries closed on March 31, 1906, the remaining four harbour drill ships and eight batteries being retained for a period in no case exceeding five years.

The strength of the Royal Naval Reserve (Home) on December 31, 1905, was :—

Executive officers . . .	1,599		
Commissioned engineer officers .	329	1,998	
Warrant engineers . . .	70		
Engine-room artificers . .	543		29,727
Seamen ratings . . .	20,719	27,729	
Firemen	6,467		

On the same date 386 officers on the active list had already undergone twelve mouths' naval training, and are in receipt of training fees.

Sixty-six officers are now undergoing the year's naval training, or have been appointed.

The strength of the Colonial Royal Naval Reserves is as follows :—

Colony.	Officers.	Men.	Date of Return.
Australasia	5	293	November 1, 1905.
Newfoundland . . .	—	560	December 31, 1905.
Malta	—	366	January 1, 1906.
	5	1,219	

Royal Fleet Reserve.

The numbers of this reserve have been considerably augmented during the year 1905, both through the normal wastage from the active list, and also through the special arrangement which was authorised last year, to which reference was made in the last Statement.

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The total strength of the Royal Fleet Reserve on December 31, 1905, was :—

—	Class A.	Class B.	Total.
Seamen, etc.	2,990	4,778	7,768
Stokers	958	1,376	2,334
Marines	1,590	2,621	4,211
	5,538	8,775	14,313

Royal Naval Volunteer Reserve.

A new division on the Tyne has been established, and the present strength of the whole force is as follows :—

Permanent Staff.

Officers	6	60
Petty officers and men	54	

Royal Naval Volunteers.

Officers	138	3537
Petty officers and men	3399	

During the year opportunities have been given to the Naval Volunteers to embark for periods of fourteen or twenty-eight days in the ships of the reserve divisions, and about 1120 officers and men took advantage of this.

Officers and men have also been permitted to go through special courses of gunnery, torpedo, and signalling.

Reports on them received from the captains of the ships are most satisfactory.

The Royal Naval Volunteer Reserve includes now a considerable proportion of men acquainted with trades (*e.g.* electricians, armourers, &c.) which are required in H.M. ships, and arrangements are now being made for men holding such qualifications to undergo a short training to obtain a certificate of competency in these trades. Those holding such certificates will be available for employment, when called upon, in their trades, and will constitute a valuable reserve for the Navy.

Greenwich Hospital Department.

Northern Estates.—Farms.

Owing to a succession of dry seasons, considerable difficulty has been experienced in connection with the water supply on the Scremerston Estate, and, in a lesser degree, at Alston.

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New sources of supply have now been rendered available, and, with a small additional expenditure next year, it is not anticipated the difficulty will recur.

All the farms are let.

The purchase of the remaining portion of the Priorsdale Estate (containing about 295 acres) for £7000 (including timber and farm buildings) was completed in August last. The acquisition of this estate, with the reservoir which serves the Greenwich Hospital Mines, the marketable timber, mineral rights, and sheltered land for wintering stock (of which the adjoining Greenwich Hospital farms were much in need), should, in every respect, prove to be an advantageous investment.

Greenwich Estate.

Considerable improvements have been effected in the market and its approaches with a view to rendering them better adapted for the increasing wholesale trade, and further reproductive expenditure will shortly be proposed in order to bring the scheme to completion. The opportunity having occurred of acquiring certain property adjoining the market which would furnish much-needed additional accommodation, it was secured on reasonable terms, and there is every reason to expect it will prove a useful addition to the estate.

The surrender of the short remaining term of the lease of the market tolls having been secured by purchase from the lessee, the management of the market and the collection of the tolls have been assumed by the department.

Further progress has been made in bringing property generally into a better state of repair, and also in modernising the better class of shop property. The benefit of these improvements is being felt in the letting of premises formerly unoccupied and in the higher rents now obtained.

Royal Hospital School, Greenwich.

The standard of efficiency has been maintained, and the highest possible educational grant again earned.

Painted Hall.

The work of cleaning and renovating the interior of the Painted Hall and re-hanging the pictures has been completed.

A fine collection of Nelson relics, consisting chiefly of silver plate has been presented by Dr. Thomas Corbett, of Droitwich.

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A miniature portrait, and a gold snuff box—relics of the late Admiral Sir Thomas Louis—have also been presented.

Investments.

The following changes in investments have been made during the year.

Loans Repaid.

£50,000 by the Corporation of Leeds.
£100,000 advanced on the security of estates in Northumberland.
£20,000 by the Local Board of Health, Burslem.

Loans Advanced and Renewed.

Loan of £82,000 on the security of freehold estates in Warwick and Worcester renewed for seven years. Rate of interest increased from $3\frac{1}{8}$ to $3\frac{3}{4}$ per cent.

Loan of £121,146 8*s.* on the security of freehold estates in Glamorganshire, renewed for four years. Rate of interest increased from $3\frac{1}{2}$ to $3\frac{3}{4}$ per cent.

Loan of £145,000 on the mortgage of freehold estates in Lancashire renewed for four years. Rate of interest increased from $3\frac{1}{2}$ to $3\frac{3}{4}$ per cent.

The renewal of these three loans resulted in an increase of income to the amount of £1178 a year.

Loan of £60,000 advanced on the security of the Hunstrete and Nylands estates in Somersetshire, for a period of twelve years. Rate of interest, $3\frac{5}{8}$ per cent.

Further loan of £60,000 to the Urban District Council of Merthyr Tydvil for a period of fifty years. To be repaid in half-yearly instalments of principal and interest combined. Rate of interest, 4 per cent. Only £30,000 has been advanced to date; the remainder will be paid early in the year.

ORDNANCE.

The amount asked for under Vote 9 for 1906–7 is the same as in 1905–6.

Provision has been made to complete the guns laid down for the vessels included in the 1904–5 programme, and for the Dreadnought, and to advance the guns for the other ships laid down in 1905–6.

The progress in manufacture and supply of guns during 1905–6 has been satisfactory. As regards the ships building and completing

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by private firms, the system of placing the guns on board the ships at their works, instead of at the dockyards, has been carried out successfully. Following upon the policy of disposing of the older ships, large numbers of obsolete guns and carriages have also been disposed of during the year, and the space thus set free used to store modern armaments. Similarly, large quantities of ammunition have become obsolete for naval purposes, and have either been disposed of or handed over to the War Office. Storage accommodation has thus become available for modern explosives, and congestion has been further relieved by ships in commission in reserve keeping their ammunition on board.

Regulations have been promulgated governing the examination of explosives on board H.M. ships, consequent on the shorter terms of commission which have been introduced.

Considerable improvements have been effected in the designs of recent B.L. guns, and steel of greater tensile strength and higher tenacity has been introduced both for new guns and for the repair of the older patterns.

The supply of the new pattern armour-piercing shell recently introduced has become general throughout the Fleet, and the difficulties of manufacture have been almost entirely overcome.

Improvements in new mountings have been effected principally in the direction of reducing the time required for loading by a more extensive use of power-worked appliances. Experiments are in progress with a view to improving the appliances for training and elevating guns. Designs of electrically operated mountings for heavy guns have also been worked out, and mountings to two different designs will be tried.

The improvements in sights are continuing on the lines of increased accuracy. A large number of new sights have already been supplied to sea-going ships.

Instructional Armaments.

Revised armaments, including instructional appliances for the new gunnery schools at Chatham and Devonport, the drill batteries at R.N. Barracks, Chatham, Portsmouth, and Devonport, and the R.M. Batteries, are ready for supply; and instructional appliances for teaching shooting and loading have been supplied to a number of sea-going ships. The drill batteries are being enlarged to meet the requirements of the new scheme of gunnery training, the success of which was shown by the result of the gunlayers' test in 1905.

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Target Practice.

Revised regulations for gunlayers' test and light Q.F. gunlayers' test, and for battle practice for both ships and torpedo boat destroyers were issued to the Fleet early last year, and the returns show a satisfactory improvement in the shooting. The practice for the present year will be continued on the same general lines, with such minor modifications as experience has shown to be desirable.

The appointment of an Inspector of Target Practice made early last year has proved successful, and the visits of this officer to the various fleets has exercised a beneficial effect without in any way lessening the responsibility of the various commanders-in-chief and captains of ships.

The supply of the necessary instruments for enabling fire to be opened with accuracy at long ranges was begun during last year and is now well advanced, a considerable number of ships having been already fitted. Provision has been made in the Estimates for continuing this work, the extreme importance of which is well shown by the returns of battle practice carried out in 1905.

New Torpedo School.

A new torpedo school for Chatham–Sheerness has been established in H.M.S. *Actæon* at Sheerness.

Firing Guns by Electricity.

The whole question of firing guns by dynamo power has recently been settled, and with this system missfires should be in the future considerably less than with the primary cell arrangement formerly in general use.

Ordnance Depôts.

In accordance with the general scheme for reorganisation of naval establishments at home, the naval ordnance depôts at Chatham, Portsmouth, and Plymouth, have, from January 1, 1906, been placed under the admirals superintendent of the respective dockyards instead of the commanders-in-chief.

It has been found possible to reduce the staff at the naval ordnance depôt at Malta without decreasing efficiency, and further reduction will be made if practicable.

The staff employed on naval ordnance duties at Gibraltar has been increased to cope with the additional work caused by the

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Atlantic Fleet being based on that port. Further increases will probable be necessary as the new buildings, etc., which are being provided are taken into use.

Additional magazine accommodation is being provided at Lodge Hill, Chatham, and additional accommodation for filled shell at Bull Point (Plymouth).

Coaling of the Fleet.

Further progress has been made in the introduction of craft and plant specially fitted for the rapid coaling of the Fleet.

The experiments for coaling H.M. ships at sea are being continued.

The reserves of coal and patent fuel on foreign stations have been revised where necessary in the light of the recent reorganisation of the Fleet.

New Construction.

Between April 1, 1905, and March 31, 1906, the following ships will have been completed and become available for service:—

- 3 *battleships:* Dominion, Hindustan, New Zealand.
- 8 *armoured cruisers:* Antrim, Argyll, Carnarvon, Devonshire, Hampshire, Roxburgh, Black Prince, Duke of Edinburgh.
- 1 *second class cruiser:* Encounter.
- 8 *scouts:* Adventurer, Attentive, Forward, Foresight, Pathfinder, Patrol, Sentinel, Skirmisher.
- 16 *destroyers.*
- 13 *submarines.*
- 1 *floating coal depôt.*

On April 1, 1906, there will be under construction: 6 battleships, 10 armoured cruisers, 12 destroyers (coastal), 5 destroyers (ocean-going), 1 destroyer (very fast ocean-going), 1 Royal yacht, 15 submarines and a repair ship. It is proposed to begin during the financial year 1906–7: 4 armoured vessels, 5 destroyers (ocean-going), 12 destroyers (coastal), 12 submarines.

Battleships.

The Committee on Designs, mentioned in last year's Statement, considered the various designs and settled the type of battleship to be laid down during the financial year 1905–6. This battleship, Dreadnought, is being supplied with turbine machinery on the Parsons system, and was laid down at Portsmouth on October 2, 1905, and launched on February 10 by His Majesty the King. It is hoped that the ship will be put into commission in the beginning of 1907.

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The Lord Nelson and Agamemnon of the 1904–5 programme, which are now under construction on the Tyne and Clyde respectively, have made considerable progress during the year, and it is expected that they will be completed by their contract dates.

The decision to rearrange the armament in the Warrior class has somewhat delayed their completion.

Armoured Cruisers.

The six armoured cruisers of the Devonshire class have passed successfully through their trials, and all of them are in commission. They attained an average speed of over 23 knots, and one reached 23·6 knots. They are practically identical in speed and coal endurance with the cruisers of the Monmouth class, but are superior in armament and protection.

The Duke of Edinburgh has successfully passed through all her trials, and attained a speed of 22·84 knots in rough water and a strong wind on the measured course at Polpero. She has been completed at Pembroke, and was commissioned with a nucleus crew on January 20, 1906.

The Black Prince has also passed through all her principal trials successfully, attaining a speed of 23·65 knots in fine weather on the Polpero course.

The four later ships of the Duke of Edinburgh class, which have an auxiliary armament of 7·5-in. instead of 6-in. guns, have all been launched during 1905–6.

The three armoured cruisers of the Minotaur class, which were laid down during January and February of 1905, have made good progress.

During the current financial year contracts have been entered into for the construction of three armoured cruisers, named Invincible, Inflexible, Indomitable. These vessels are to be ready for commission in May, 1908, *i.e.*, within thirty months from the date of ordering.

Scouts.

All the eight vessels of the new Scout class have been satisfactorily completed and put into commission. These vessels have fulfilled all the conditions of the designs, and have obtained speeds for 6½ hours' continuous steaming, varying from 25·06 knots to 25·88 knots. The eight vessels have been built from four different designs.

Destroyers.

All the vessels of the River class which were under construction at the commencement of the current financial year have been

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completed and put into commission, making in all thirty-four vessels of this class now in service.

The strength and sea-going capabilities of this class have been severely tested, and have proved very satisfactory.

The twelve coastal destroyers and the five ocean-going destroyers included in the current year's programme have all been ordered. The former will have a trial speed of 26 knots and the latter of 33 knots. Negotiations in connection with ordering one special ocean-going destroyer of 36 knots' trial speed are nearly complete.

The whole of the destroyers, included in this year's programme will have turbine machinery and be fitted for carrying and burning oil fuel.

Other Vessels.

The design of a new yacht for His Majesty has been completed, and the actual building is in hand on the Clyde.

The steamship Indrabarah, now named Cyclops, has been purchased for conversion into a fleet repair ship.

Submarines.

The eleven boats in the present year's programme have been ordered.

General.

Improved appliances for cooking, as well as bread bakeries, are being introduced into ships.

Improved sanitary, ventilating, warming and washing arrangements are also being introduced.

The use of electricity for many purposes on board H.M. ships continues to increase.

Machinery and Boilers.

The policy of fitting complete installations of water-tube boilers in warships has been continued, large tube boilers of Babcock and Wilcox or Yarrow type being fitted in battleships and first-class cruisers, and boilers of the small tube type being fitted in scouts and destroyers.

The conditions adopted last year, under which all contractors' machinery trials in new ships were to be carried out under service conditions, have been applied to all later ships.

The policy of providing reserve sets of auxiliary machinery, etc., has been continued during the past year by the provision of further

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auxiliary machinery, etc., typical for various classes of ships, and the stock is now practically complete to date. These reserve parts will enable ships to be supplied with replace auxiliary machinery with the least possible delay.

The provision of an adequate supply of fresh water for ships of H.M. Fleet has been under continued consideration. Additional evaporating and distilling plant has been supplied to each battleship which was below latest standard in this respect, when coming in hand for large refit.

All new ships are to be supplied with independent machines for ice-making and for cold storage.

Standardization—The extended policy adopted last year of making the main and auxiliary machinery of ships of the same class interchangeable as far as possible has been continued, and this plan is being carried out in all later ships including destroyers.

Electric Generating Machinery.—In consequence of the extension of the application of electric motors for driving auxiliary machinery and for ship's purposes generally where applicable, larger installations of generating machinery are being fitted in vessels under construction, and those on the more modern completed vessels are being increased as the ships are taken in hand for large refit.

Turbine Propelling Machinery.—In view of the satisfactory performances of H.M.S. Amethyst fitted with turbine propelling machinery, and of a rapidly increasing number of such installations in ships of the mercantile marine, it has been decided to adopt this means of propulsion in all the war vessels provided for during the present year.

As the result of experience it has been decided to replace the set of reciprocating machinery fitted in the Velox (turbine-propelled T.B.D.) for use at low speeds, by turbines adapted for cruising powers.

Liquid Fuel.—The experimental oil fuel establishment at Haslar has been completed, and trials with five of the latest types of water-tube boilers, together with instructional work, are in regular progress there.

The oil fuel installations in Mars and Hannibal are being brought up to date, and, as opportunity affords, oil fuel appliances are being fitted to H.M. ships Cæsar, Majestic, Magnificent, and Victorious. Installations are also in progress for all the later vessels building and completing.

The torpedo boat destroyer Spiteful, fitted to burn oil fuel only, is in commission as an instructional vessel for the training of engine room complements in the manipulation of oil-burning appliances.

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WORK AT THE DOCKYARDS.

Owing to changes in the organisation of the Fleet, the amount of repairing work in the dockyards has been substantially reduced. It has in consequence been necessary to discharge a large number of men during the current financial year. With a view to minimising the unavoidable distress, the discharges were restricted as far as possible to the summer months, and ceased in October last. Corresponding reductions have also been made in the various grades of subordinate officers and office staff.

During the current year further progress has been made in the development of Gibraltar Yard as a base for the Atlantic Fleet. A number of skilled workmen have been sent from England to strengthen the *personnel* of the yard, and the work of erecting machinery and working appliances in the various shops has been satisfactorily advanced.

The work of installing electric light and power in the dockyards and other naval establishments is well in hand. A portion of the installation at Pembroke is working, and it is expected that the installations at Portsmouth, Devonport, and Chatham will follow almost at once.

The installations at Gibraltar and the Cape of Good Hope are already running, and that at Malta will be ready in June next.

Opportunity has been taken in connection with this to place the organisation of the electrical staff of both Admiralty and dockyards on a permanent footing.

So far as yard machinery is concerned, the dockyards are now in a satisfactory position, and the replacement of obsolete machines by up-to-date plant has been practically completed.

The premium system of paying extra wages for increased output, which is under trial in some of the engineering workshops at the yards, has given satisfactory results.

Large Repairs.

The following ships have been or will be completed during the financial year: *Battleships*—Jupiter, Royal Oak, Illustrious, Mars, Vengeance. *Armoured Cruisers*—Aboukir, Cressy, Bacchante. *Protected Cruisers* (*First Class*)—Royal Arthur. *Protected Cruisers* (*Second Class*)—Arrogant, Cambrian, Flora. *Protected Cruisers* (*Third Class*) —Pioneer, Pyramus. *Special Service*—Actæon, late Ariadne (old). Fitted as a torpedo school for Sheerness.

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The most important of the refits to be carried out in 1906–7 are :—

Battleships—Hannibal, Royal Sovereign, Empress of India (work commenced in 1905–6), Albion.

Armoured Cruiser—Bedford.

Protected Cruisers (*First Class*)—Amphitrite (work commenced in 1905–6), Andromeda, Ariadne, Edgar, Gibraltar (work commenced in 1905–6), Hawke.

Protected Cruisers (*Second Class*)—Hyacinth, Bonaventure.

Sloops—Fantome, Merlin (to fit as surveying vessels).

NEW WORKS.

WORKS PROVIDED IN ESTIMATES.

Cape of Good Hope.—The hospital and sanatorium will be completed in 1906–7.

Chatham.—The conversion of Nos. 3 and 4 Slips into a boat store has been completed. The alterations to railways at the heads of Nos. 5 to 8 docks will be completed in 1905–6, and the improvement and extension of the dockyard water supply, the residence for the Commander-in-Chief, and the conversion of the Melville Hospital into marine barracks in 1906–7. It has been decided not to proceed with the plate and angle gas furnaces and the chain testing house.

Deal.—The reading and recreation rooms at the north barracks have been completed.

Gibraltar.—The cold meat store, carried out by War Department, is practically completed. The additional accommodation and improvements at the hospital will be finished in 1907–8.

Greenwich.—The engineering and chemical laboratories at the Royal Naval College have been completed.

Hong Kong.—The additional hospital accommodation and the ropeway for transporting ammunition are practically finished.

Malta.—The adaptation of War Department property at Vittoriosa for victualling purposes and re-provision of accommodation, the rifle range at Ghain Tuffieha, and the store for lubricating oil are practically finished. The renewal of the wharf walls in French Creek, the new buildings at the hydraulic dock, and the torpedo range will be completed in 1906–7. Progress is being made with the reservoir at Luca on a reduced scale. It has been decided not to proceed with the new storehouses at Corradino or to do any further work in connection with the catch for Corradino tanks.

Pembroke.—The new shipbuilding shop has been completed.

Plymouth.—The improvements of the married officers' quarters at

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the Royal Marine barracks have been completed. The improvements and alterations and the wards for lunatics and prisoners at the Royal Naval Hospital will be practically finished in 1905–6. At Devonport dockyard, the railways, north and south yards, and the new buoy house will be completed during next year; progress is being made with the new jetty and railways between Nos. 2 and 3 slips and the new machine shop, south yard.

Portland.—The three official residences, the store for lubricating oil, and the naval canteen, will be completed in 1905–6. The berthing for torpedo-boat destroyers will be completed in 1906–7. Progress is being made with the repairs to the head of the breakwater.

Portsmouth.—The new block for officer patients at Haslar Hospital is finished. In the dockyard, the railway and pickling tank at New Ground, the renewal of Sheer Jetty, and the alterations to No. 5 slip, will be completed in 1905–6. The lengthening of No. 5 dock will be completed in 1906–7, and progress is being made with the new steam factory, which is nearing completion. The reorganisation of the drainage at Eastney Royal Marine Barracks, and the adaptation and improvement of buildings at Haslar Hospital, will be completed in 1905–6. The accommodation for naval cadets at Osborne, and for sub-lieutenants under instruction at Whale Island, is approaching completion, and will be finished in 1906–7.

Sheerness.—The extension of the railway into the yard has been completed.

Sydney.—The prison on Garden Island has been completed.

The principal new works provided for in 1906–7 are:—

Chatham.—Hoo Ness; river-training works. Reconstructing side walls of Upnor entrance.

Greenwich.—Royal Naval College. Renewing portions of roofs of main blocks.

Harwich (*Shotley*).—New rifle range.

Plymouth.—Royal Naval Barracks. Widening drill shed.

Portsmouth.—New lock to existing basins, etc. Improving shipbuilding facilities. Lengthening No. 15 dock. Harbour protection.

Sheerness.—Harbour protection.

Woolwich.—Additional railway facilities.

Progress under Naval Works Loan Act.

(*a*) *Enclosure and Defence of Harbours.*

Malta Breakwater.—The purchase of foreshores, etc., and certain minor works connected with the scheme, have been completed or are well in hand. The main contract, that for St. Elmo and Ricasoli

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breakwaters, is being pressed forward, but serious delays have been caused by storms, and it has been found necessary to extend the contract dates for completion. The date for completion of the whole of this contract, is now October 1, 1908.

Gibraltar.—The commercial mole is now completed and in use.

Dover.—The south breakwater has been brought up to water level for a distance of about 1950 feet.

(*b*) *Adapting Naval Ports to present needs of Fleet.*

Keyham Dockyard Extension.—The three docks and the lock are completed. Closed Basin — excavation three-fourths completed. Tidal Basin—completed, and the dam in front of entrance being removed.

Hong Kong Dockyard Extension.—The tidal basin and wharf walls, and the deepening of basin areas, approaches to wharf walls, &c., are nearing completion. The construction of jetties on war department reclamation, and of buildings for the engineering and constructive departments, is being proceeded with. The dock and contingent works are well advanced.

Colombo Dock.—This dock, which is being partly paid for by the Admiralty, is in progress under the Colonial Government, and is approaching completion.

Simon's Bay Dockyard Extension.—The breakwater and the walls enclosing the new basin are in hand. The reclamation is in progress and the site for the dock is being excavated.

A scheme for providing houses for officers and men at this yard has been prepared.

Malta Dockyard Extension.—Progress on the two new docks being built by contract, has not been very satisfactory, serious delays having been occasioned by water at the head of the long dock, etc. The west dock is nearly completed.

Bermuda Dockyard Extension.—The work under the main contract for new breakwater, wharf, walls, etc., has progressed very slowly, but is now approaching completion.

Gibraltar Dockyard Extension.—Docks 1, 2, and 3, are in use, and the yard buildings and shops are nearing completion.

Deepening Harbours and Approaches.

Portsmouth.—The outer and inner bars and the harbour and approach channel have been practically completed. The formation of ships' berths in Main Channel and Fareham Creek, and in Fountain

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Lake, is in progress. In Haslar Creek the deepening of approach channel and boat camber, and formation of deep berth for floating dock, have been practically completed. Provision is made in Vote 10, 1906–7, for working Admiralty plant to be engaged upon the dredging remaining to be carried out.

Haulbowline.—The formation of torpedo boat trots and battleship berths is proceeding by contract, and will be completed in 1906–7.

Plymouth.—The dredging above Saltash Bridge is practically completed. Dredging in the Hamoaze off the Keyham extension works is being carried out by Admiralty plant. Provision for working this plant is made in Vote 10, 1906–7. Certain contract dredging off West Wall, and at lock entrance of Keyham extension, is in hand, and will be completed in 1906–7.

Coaling Facilities and Fuel Storage.

Plymouth.—Property has been acquired for the establishment of a coaling depôt. Railway sidings, coal bases, etc., are being carried out by departmental labour. A contract will be let for jetties and dredging.

Portland.—The contract for the extension of the present coaling etty is almost completed. Good progress has been made with the construction of tanks for storage of oil fuel.

Malta.—Completed, except for some excavation and roofing now in hand.

Hong Kong.—The coaling jetty at Kowloon, with railways and berths, is almost completed. Drawings and particulars for coal sheds are being prepared.

Gibraltar.—The coal island is finished and in use.

Buildings, etc.

Sheerness Depôt for Torpedo-boat Destroyers.—Good progress has been made with this scheme.

Naval Establishment at Rosyth.—The necessary land has been purchased. Arrangements have been made to obtain a permanent supply of water; the scheme (including new reservoir and mains) is being carried out by the Dunfermline District Committee. A railway line, to connect the naval establishment with the North British Railway, is being constructed by the railway company.

The question of the works to be undertaken at Rosyth is under further consideration. It will be unnecessary to make provision for them in Navy votes at present, as sufficient funds are available under the Works Loan Act, or preliminary services for the needs of 1906–7.

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Britannia Royal Naval College.—The main college has been completed and is in occupation. Subsidiary works are proceeding, and in some cases are approaching completion.

Magazines.—Increased magazine accommodation is being proceeded with at Chatham and Malta. Schemes are under consideration for providing additional magazine accommodation at other establishments.

Coast Guard Stations and Royal Naval Reserve Batteries.—The Coast Guard works already approved are approaching completion.

Torpedo Ranges.—The extension of the torpedo range at Horsea Island is practically completed.

Gunnery Schools.

Devonport.—Contracts have been let for the erection of a block of quarters for men, and for certain buildings for gunnery instruction. The works have been commenced.

Portsmouth.—The extension of a gun drill battery is nearly completed.

Chatham.—Tenders have been accepted for ammunition room and extension of barrack courses shed. The former work has been commenced.

(Signed) TWEEDMOUTH.

February 26, 1906.

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Abstract of Navy

Votes.		Estimates, Gross Estimate.	Estimates, Appropriations in Aid.
	I.—NUMBERS.		
A.	Total Number of Officers, Seamen, Boys, Coast Guard, and Royal Marines	129,000	....
	II.—EFFECTIVE SERVICES.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast Guard, and Royal Marines	6,946,527	135,827
2	Victualling and Clothing for the Navy	2,582,099	528,899
3	Medical Establishments and Services	294,797	19,297
4	Martial Law	14,795	95
5	Educational Services	229,461	63,861
6	Scientific Services	90,193	25,093
7	Royal Naval Reserves	434,761	8,161
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—*Personnel*	2,429,400	21,800
	Section II.—*Matériel*	3,355,200	528,000
	Section III.—Contract Work	8,725,400	137,000
9	Naval Armaments	3,135,123	149,123
10	Works, Buildings, and Repairs at Home and Abroad	1,986,500	32,000
11	Miscellaneous Effective Services	495,090	12,890
12	Admiralty Office	360,250	8,750
	Total Effective Services . £	31,079,596	1,670,796
	III.—NON-EFFECTIVE SERVICES.		
13	Half-Pay, Reserved, and Retired Pay	833,580	12,880
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,276,028	19,728
15	Civil Pensions and Gratuities	384,098	398
	Total Non-Effective Services £	2,493,706	33,006
	GRAND TOTAL £	33,573,302	1,703,802

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Estimates for 1906–1907.

1906–1907.	Estimates, 1905–1906.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers. 129,000	129,000	....	Total Numbers. 129,000	Numbers.	Numbers.	A.
£	£	£	£	£	£	
6,810,700	6,807,500	135,500	6,672,000	138,700	....	1
2,053,200	2,836,851	580,251	2,256,600	....	203,400	2
275,500	298,371	20,871	277,500	....	2,000	3
14,700	14,132	132	14,000	700	....	4
165,600	219,252	57,352	161,900	3,700	....	5
65,100	89,397	20,097	69,300	....	4,200	6
426,600	428,729	8,129	420,600	6,000	....	7
						8
2,407,600	2,790,100	21,800	2,768,300	....	360,700	Sec. I.
2,827,200	5,344,900	528,000	4,816,900	....	1,989,700	Sec. II.
8,583,400	7,959,800	132,000	7,827,800	760,600	....	Sec. III.
2,986,000	3,083,557	97,557	2,986,000	....	....	9
1,954,500	1,935,200	30,000	1,905,200	49,300	....	10
482,200	469,095	15,095	454,000	28,200	....	11
351,500	345,250	8,850	336,400	15,100	....	12
29,408,800	32,622,134	1,655,634	30,966,500	1,002,300	2,560,000	
820,700	813,744	12,844	800,900	19,800	....	13
1,256,300	1,253,661	19,761	1,233,900	22,400	....	14
383,700	388,648	418	388,200	....	4,500	15
2,460,700	2,456,053	33,053	2,423,000	42,200	4,500	
31,869,500	35,078,187	1,688,687	33,389,500	1,044,500	2,564,500	

Net Decrease £1,520,000

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STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1905–1906 and those for 1906–1907.

DECREASES.		£
Victualling and Clothing		203,400
Medical Establishments and Services		2,000
Scientific Services		4,200
Wages of Artificers and Police in Dockyards		363,533
Naval Stores, &c.		742,310
Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)		29,304
Hulls of Ships (Contract)		280,502
Repairs and Alterations by Contract of Ships, &c.		8,000
Machinery, &c., for His Majesty's Shore Establishments (Contract)		225,000
Royal Reserve of Merchant Cruisers		121,880
Projectiles and Ammunition		13,000
Small Arms, Maintenance of Naval Ordnance Vessels, &c.		70,000
Increase in amount of Receipts arising from the sale of unserviceable, &c., Naval Ordnance Stores		51,830
Gun Mountings		144,543
		£ 2,259,002
INCREASES.	£	
Wages, &c., of Officers, Seamen and Marines	138,700	
Martial Law	700	
Educational Services	2,510	
Royal Naval Reserves	6,000	
Propelling Machinery for His Majesty's Ships and Vessels (Contract)	92,749	
Armour for His Majesty's Ships and Vessels (Contract)	211,817	
Guns	100,000	
Torpedoes and Gun-cotton	38,000	
Works, Buildings, and Repairs	49,300	
Miscellaneous Effective Services	28,200	
Non-Effective Services	37,700	
Miscellaneous Increases	33,326	
		739,002
Net Decrease		£ 1,520,000

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STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

———		1906–1907.	1905–1906.
		£	£
NAVY ESTIMATES:			
Estimated Expenditure (after deducting Appropriations in Aid) . .		31,869,500	33,389,500
CIVIL SERVICE ESTIMATES: (a)			
Estimated Expenditure under—			
Class I. Vote 9.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c. .	21,370		
Rents, Insurance, Tithes, &c. . .	12,450		
Fuel, Light, Water, &c. . . .	5,400		
Furniture	10,000		
		49,220	41,050
Class I. Vote 10.—Surveys of the United Kingdom		900	900
" I. " 13.—Rates on Government Property . . .		122,700	117,200
" I. " 14.—Public Works and Buildings, Ireland:			
Coast Guard, viz.:	£		
Purchase of Sites	—		
New Works and Alterations, including Naval Reserve Stations . .	8,165		
Maintenance and Supplies . .	5,775		
	£13,940		
Naval Reserve, viz.:			
Maintenance and Supplies . .	160		
		14,100	25,053
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		4,183	4,105
" II. " 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		3,500	4,000
" II. " 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	8,900		
Expense and Manufacturing Accounts	5,270		
Store Accounts	5,910		
		20,080	18,500
Class II. Vote 23.—Stationery and Printing		100,000	100,000
" III. " 1.—Law Charges, England		8,015	7,413
Maintenance of Naval Prisoners:			
" III. " 7.—Prisons, England and the Colonies		3,896	4,522
" III. " 13.—Prisons, Scotland		140	140
" III. " 20.—Prisons, Ireland		193	310
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs.—Percentage for provision of funds for District Paymasters of the Coast Guard		138	137
Vote 1.—Customs.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,300
Vote 2.—Inland Revenue.—Analysis of Food, &c. . . .		275	340
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£ 17,200		
Vote 5.—Post Office Telegraphs.—Official Telegrams and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks)	21,250		
		38,450	37,210
Total	£	32,238,590	33,753,680

Note.—In addition to the Services shown above, an annuity of £16,243 1*s.* is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

(*a*) Provision is also made in the Estimate for Osborne (Class I., Vote 2.) for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne.

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STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE.														TOTAL.
		1	2	3	7	8			9	11	12	13	14	15		
						Section I.	Section II.	Section III.								
		£	£	£	£	£	£	£	£	£	£	£	£	£		£
India	Maintenance of His Majesty's Ships in Indian Waters . .	28,000	9,100	500	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..		100,000
	Indian Troop Service (on account of work performed by the Admiralty) . . .	..	..	..	..	..	..	..	..	..	3,050	..	..	350		3,400
Australian Commonwealth / New Zealand .	Maintenance of an Australasian Squadron and the establishment of a branch of the Royal Naval Reserve	58,000	18,300	600	5,000	..	30,700	95,000	5,500	7,000	..	8,500	11,400	..		200,000 / 40,000
Cape Colony . .	General maintenance of the Navy . .	11,100	4,600	..	..	4,900	9,100	14,100	6,200	..	..	..	..	..		50,000
Natal		7,700	3,200	..	..	3,400	6,400	9,900	4,400	..	..	..	..	..		35,000
Newfoundland .	Maintenance of a branch of the Royal Naval Reserve . .	..	..	..	3,000	..	..	..	..	..	..	..	..	..		3,000
	Total . . £	104,800	35,200	1,100	8,000	20,800	56,400	132,000	27,700	9,500	3,050	12,800	19,700	350		431,400

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VOTE (A).

NUMBERS of OFFICERS, SEAMEN, BOYS, COAST GUARD, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Twenty-nine Thousand.

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1906–1907.		NUMBERS, ALL RANKS. 1905–1906.		Numbers of all Ranks borne on 1st January, 1906.
	FOR HIS MAJESTY'S FLEET:					
Vote 1	Flag Officers	24		25		
	Commissioned Officers	4,526		4,430		
	Subordinate Officers	670		812		
	Warrant Officers	1,762		1,797		
	Petty Officers and Seamen	89,351		87,007		
	Boys (Service)	2,293	98,626	2,700	96,771	96,562
	COAST GUARD:					
	Commissioned Officers	110		103		
	Chief Officers Divisions and Stations	239		247		
	Petty Officers and Seamen	3,773	4,122	4,019	4,369	4,150
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers	469		467		
	Warrant Officers	44		44		
	Staff Sergeants and Sergeants	1,421		1,415		
	Band Ranks, Buglers and Musicians	1,466		646		
	Rank and File	15,472		17,062		
	Band Boys	363	(a) 19,235	349	19,983	19,041
	Total		121,983		121,123	119,753
	Net Increase		860			

(a) Including 13 officers, Sub-Head H.

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VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1906–1907.		1905–1906.		Numbers of all Ranks borne on 1st January 1905.
Vote 1	Naval Cadets	740		640		
	Engineer Cadets	117		138		
	Pensioners in Home Ships and in the Reserves, &c. . . .	471		968		
	Boys under Training—					
	Seaman Class . . .	3,200		3,600		
	Artificer	360		460		
			(b) 4,888		5,806	5,291
Vote 2	For Victualling and Clothing for the Navy	27		58		
Vote 3	For Medical Establishments and Services	577		584		
Vote 4	For Martial Law	19		12		
Vote 5	For Educational Services . .	619		463		
Vote 6	For Scientific Services . .	11		11		
Vote 7	For Royal Naval Reserves . .	18		..		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I. . . .	516		574		
	Section II. . . .	21		8		
	Section III. . . .	71		69		
Vote 9	For Naval Armaments . .	105		173		
Vote 10	For Works, Buildings, and Repairs, at Home and Abroad .	47		52		
Vote 11	For Miscellaneous Effective Services	1		1		
Vote 12	For Admiralty Office . .	67		66		
			2,129		2,071	2,115
	Total . . .		(c) 7,017		7,877	7,406
	Net Decrease.		860			
	Total, Sea Service . . .	121,983		121,123		
	„ other Services . .	7,017		7,877		
			129,000		129,000	
		No variation in Total.				

(b) Including 11 officers, Sub-Head H.

(c) Including				
Officers and Seamen	2,374	..	2,149
„ Retired Officers and Pensioners (Vote 1) .	471	..	957
„ Pensioners (other Votes) . . .	..	..	27
„ Boys (Training, Seaman Class) . .	3,200	..	3,600
„ Boys (Training, Artificer) . . .	360	..	460
„ Boys (Training, Artizan) . . .	381	..	456
„ Royal Marines	231	..	228
	7,017	..	7,877

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VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1907, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Two Million Four Hundred and Seven Thousand Six Hundred Pounds.
(£2,407,600.)

SECTION II.—MATÉRIEL.—Two Million Eight Hundred and Twenty-seven Thousand Two Hundred Pounds.
(£2,827,200.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Eight Million Five Hundred and Eighty-eight Thousand Four Hundred Pounds.
(£8,588,400.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

——	ESTIMATES. 1906–1907.	ESTIMATES. 1905–1906.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK. SECTION I.—PERSONNEL. *Dockyards at Home.*				
A.—Salaries and Allowances	(a) 209,828	212,183	..	2,355
B.—Wages, &c., of Men, and hire of Teams	1,731,375	2,125,868	..	394,493
C.—Wages, &c., of Police Force	46,546	46,595	..	49
D.—Contingencies	2,400	2,400	..	..
Naval Yards Abroad.				
E.—Salaries and Allowances	(a) 101,978	96,790	5,188	..
F.—Wages, &c., of Men, and hire of Teams	318,028	288,399	29,629	..
G.—Wages, &c., of Police Force	18,645	17,265	1,380	..
H.—Contingencies	600	600	..	..
£	2,429,400	2,790,100	36,197	396,897
Deduct,— I.—Appropriations in Aid	21,800	21,800	..	..
£	2,407,600	2,768,300	36,197	396,897
		Net Decrease	.	£360,700 (b)

(a) These amounts include the sums of £33,225 and £14,314 for pay of Inspectors of Trades at Home and Abroad respectively, which is charged direct to the cost of shipbuilding.
(b) This Vote is decreased by a transfer of £1,190 to Vote 5. There is, therefore, a real decrease of £359,510.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

	£
Section 1	699,000
„ 2	448,000
„ 3	8,088,000
	£9,235,000

The details of the total anticipated Expenditure on New Construction will be found on page 400.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1906-1907.	1905-1906.		
DOCKYARD WORK—*continued.* SECTION II.—MATÉRIEL.	£	£	£	£
Naval Stores, &c.				
A.—Timber, Masts, Deals, &c.	132,000	171,500	..	39,500
B.—Metals and Metal Articles	439,200	2,047,000	..	1,607,800
C.—Coal for Yard purposes	60,000	83,500	..	23,500
D.—Hemp, Canvas, &c.	163,500	173,300	..	9,800
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles	378,500	613,500	..	235,000
F.—Electrical, Torpedo, and other Apparatus	306,200	373,500	..	67,300
G.—Freight	61,500	68,000	..	6,500
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	44,400	40,800	3,600	..
I.—Gas, Electric Light, &c., Dockyards at Home and Naval Yards Abroad.	35,900	19,800	16,100	..
£	1,621,200	3,590,900	19,700	1,989,400
Deduct—				
J.—Appropriations in Aid.	508,000	508,000	..	..
£	1,113,200	3,082,900	19,700	1,989,400
Coal, &c., for the Fleet.				
K. I.—Coal, &c., for the Fleet	1,399,000	1,497,000	..	98,000
K. II.—New Craft and machinery for Coaling, &c.	55,000	80,000	..	25,000
K. III.—Wages of crews and coaling labour	126,000	113,000	13,000	
K. IV.—Maintenance of Craft for coaling, &c., and incidental expenses	79,500	64,000	15,500	..
K. V.—Lubricating Oils, &c., for the Fleet	74,500	..	74,500	..
£	1,734,000	1,754,000	103,000	123,000
Deduct—				
L.—Appropriations in Aid.	20,000	20,000	..	..
£	1,714,000	1,734,000	103,000	123,000
£	2,827,200	4,816,900	122,700	2,112,400
	Net Decrease		£1,989,700 (*a*)	

(*a*) This Vote is decreased by a transfer of £645,500 to Vote 8, Section III., and increased by a transfer of £34,000 from Vote 2. There is, therefore, a real decrease of £1,378,200.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

——	ESTIMATES. 1906-1907.	ESTIMATES. 1905-1906.	Increase.	Decrease.
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for His Majesty's Ships and Vessels	2,865,418	2,772,669	92,749	..
B.—Auxiliary Machinery for His Majesty's Ships and Vessels	139,899	169,203	..	29,304
C.—Hulls of Ships, &c., Building by Contract	1,866,728	2,622,923	..	756,195
D.—Armour for His Majesty's Ships and Vessels	1,554,600	..	1,554,600	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	100,000	108,000	..	8,000
F.—Inspection of Contract Work	64,497	62,484	2,013	..
G.—Gun Mountings and Air-Compressing Machinery	2,037,478	1,782,021	255,457	..
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad	75,000	200,000	..	125,000
H.H.—Replacement of Machinery for His Majesty's Shore Establishments	..	100,000	..	100,000
I.—Royal Reserve of Merchant Cruisers.	21,120	142,500	..	121,380
K.—Purchase of Ships, Vessels, &c. (Sub-Head D in 1905-6.)	660	..	660	..
£	8,725,400	7,959,800	1,905,479	1,139,879
Deduct— L.—Appropriations in Aid	137,000	132,000	5,000	..
£	8,588,400	7,827,800	1,900,479	1,139,879
	Net Increase		£760,600 (*a*)	

(*a*) This Vote is increased by a transfer of £645,500 from Vote 8, Section II. There is, therefore, a real increase of £115,100.

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET REPAIRS, MAINTENANCE, &c., (Exclusive of the FLEET

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SUB-HEADS under which this ESTIMATED EXPENDITURE will be provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)	
	Personnel, Sec. I.	Matériel, Sec. II.			
	£	£	£	£	
NEW CONSTRUCTION:					
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (*c*)	646,815	395,340	(*f*) 1,460,140	2,502,295	1
Machinery	26,645	15,580	760,833	803,058	2
	673,460	**410,920**	**2,220,973**	**3,305,353**	3
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (*c*)	22,640	35,410	(*g*) 3,754,614	3,812,664	4
Machinery	..	..	2,089,024	2,089,024	5
	22,640	**35,410**	**5,843,638**	**5,901,688**	6
C.—SMALL VESSELS (*d*) . .	2,900	1,670	40,520	45,090	7
TOTAL NEW CONSTRUCTION	**699,000**	**448,000**	**8,105,131**	(*e*) **9,252,131**	8
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c. . . .	813,092	451,500	363,508	1,628,100	9
E.—SEA STORES, &c. . . .	..	743,230	56,172	799,402	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	11
TOTAL . . . £	**1,512,092**	**1,642,740**	**8,524,811**	**11,679,633**	12

(*c*) Including Hydraulic and Transferable Gun Mountings, &c.
(*d*) Including Harbour Craft, and excluding Torpedo Boats, &c.
(*e*) Exclusive of £1,335 provided under Vote 2 for new Tank Vessels and Lighters for Victualling Yard Service, and £35,000 for Coaling Craft.
(*f*) Including £590,700 for Armour. (*g*) Including £953,900 for Armour.

VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION,
in the Year 1906-1907.
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COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the
AND NAVY AUDIT ACT, 1889.

	1906-1907.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1905-1906.			Difference between Direct Expenditure, 1905-1906 (B) and 1906-1907 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate, 1906-1907.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1905-1906.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	298,554	2,800,849	(h) 3,235,269	348,135	3,583,404	..	732,974
2	10,818	813,876	913,570	22,670	936,240	..	110,512
3	**309,372**	**3,614,725**	**4,148,839**	**370,805**	**4,519,644**	..	**843,486**
4	74,632	3,887,296	(i) 3,392,897	71,378	3,464,275	419,767	..
5	34,759	2,123,783	1,863,689	33,640	1,897,329	225,335	..
6	**109,391**	**6,011,079**	**5,256,586**	**105,018**	**5,361,604**	**645,102**	..
7	866	45,956	45,834	1,082	46,916	..	744
8	**419,629**	**9,671,760**	**9,451,259**	**476,905**	**9,928,164**	..	**199,128**
9	263,180	1,891,280	2,023,515	303,607	2,327,122	..	395,415
10	87,607	887,003	927,517	62,915	990,432	..	128,115
	770,416			843,427			
11	1,465,630	1,465,630	..	1,752,193	1,752,193	..	..
12	**2,236,046**	**13,915,679**	**12,402,291**	**2,595,620**	**14,997,911**	..	..

NET DECREASE ON DIRECT EXPENDITURE . . £722,658

(h) Including £1,260,090 for Armour.
(i) Including £475,693 for Armour.

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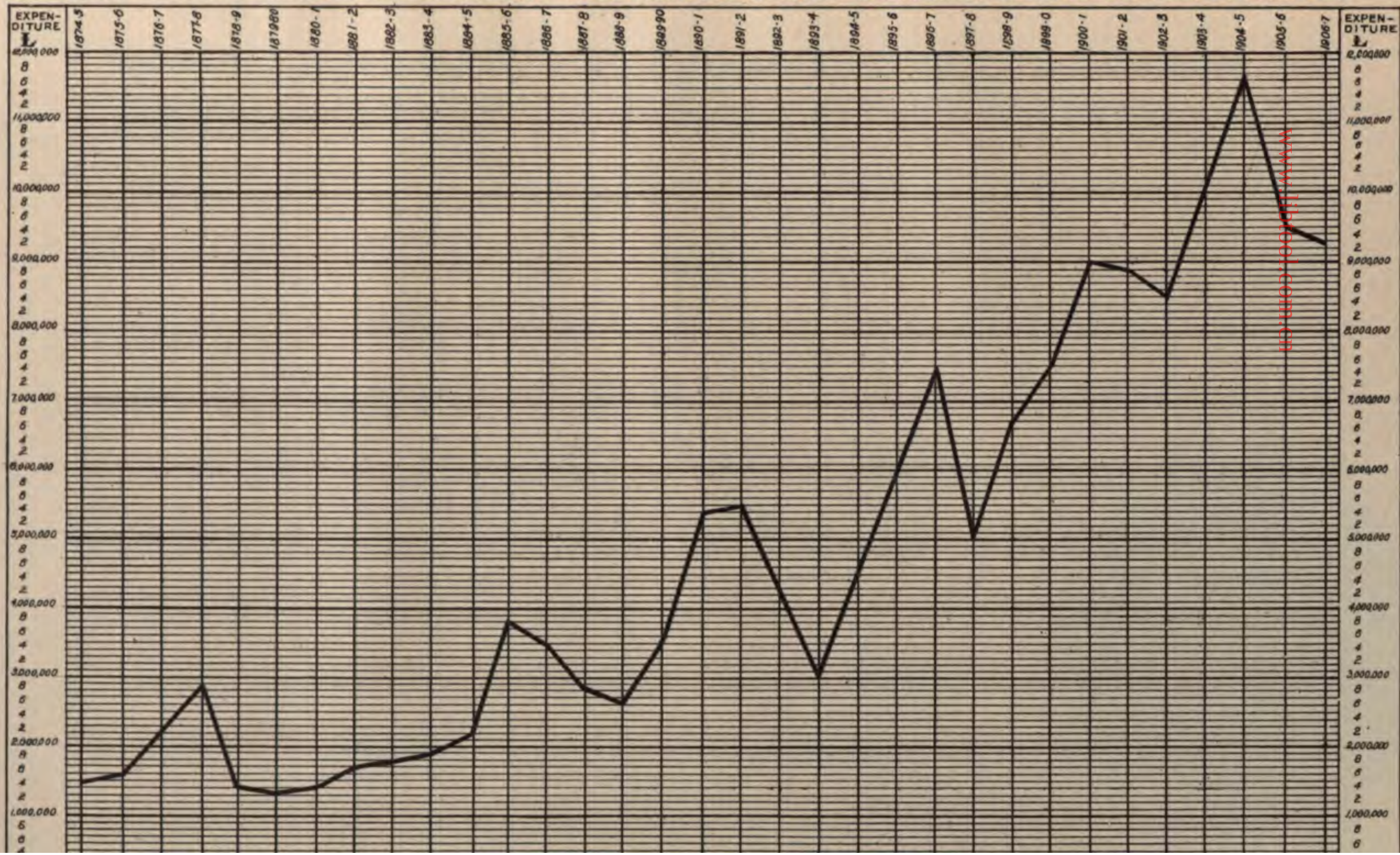
RECAPITULATION OF ESTIMATED EXPENDITURE.

SUB-HEADS OF EXPENDITURE.	Total Direct Expenditure.	Establishment, etc., Charges Apportioned.	New Construction.	Re-construction, Repairs, etc.		Sea Stores, etc.	Establishment, Incidental, and Miscellaneous Charges Unappropriated.		Aggregate, 1906–7.
				Ships for Reliefs or Re-commission.	Ships in Commission and Reserve.				
DOCKYARD WORK—	£	£	£	£	£	£	£	£	£
Section I.—*Personnel* . .	1,512,092	1,126,520	859,365	302,124	656,356	51,951	477,645	291,171	2,638,612
Section II.—*Matériel* . .	1,642,730	863,670	572,399	164,137	400,384	778,886	369,840	274,219	2,506,400
CONTRACT WORK—									
Section III.	8,524,811	245,856	8,239,996	40,669	327,610	56,172	52,755	—	8,770,667
Total Estimated Expenditure for 1906-1907	11,679,633	2,236,046	9,671,760	506,930	1,384,350	887,009	900,240	565,390	13,915,679
Totals of Sub-Heads £	13,915,679		9,671,760	1,891,280		887,009	1,465,630		13,915,679

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 33 YEARS BETWEEN 1874-75 & 1906-7



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LIST of New Ships and Vessels Estimated to be Passed into the Reserve Fleet during the Years 1906–1907 and 1905–1906.

1906–1907.

Name of Ship.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS.			
Dreadnought	Details not published.		
Africa	16,350	*18,000	18
Britannia	16,350	*18,000	18
Hibernia	16,350	*18,000	18
PROTECTED SHIPS.			
Nil.			
UNPROTECTED SHIPS.			
Cyclops	..	*3,500 (Howden's)	..
Ocean-going Torpedo Boat Destroyers 1	810 (estimated)	Turbine	3
Coastal Torpedo Boat Destroyers 9	..	Various	..
Submarine Boats 14	..	..	..

1905–1906.

Name of Ship.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS.			
New Zealand	16,350	*18,000	18
Commonwealth	16,350	18,000	18
Dominion	16,350	18,000	18
Hindustan	16,350	*18,000	18
Black Prince	13,550	*23,500	16
Duke of Edinburgh	13,550	*23,500	16
Antrim	10,850	*21,000	10
Argyll	10,850	*21,000	10
Carnarvon	10,850	*21,000	10
Devonshire	10,850	*21,000	10
Hampshire	10,850	*21,000	10
Roxburgh	10,850	*21,000	10
PROTECTED SHIPS			
Encounter	5,880	12,500	11
UNPROTECTED SHIPS.			
Pathfinder	3,000	*16,500	10
Patrol	3,000	*16,500	10
Forward	2,945	*16,500	14
Foresight	2,945	*16,500	14
Adventure	2,940	*16,000	10
Attentive	2,940	*16,000	10
Sentinel	2,940	*17,000	10
Skirmisher	2,940	*17,000	10
Torpedo Boat Destroyers 16	..	Various	..
Submarine Boats 14	..	..	..

* Forced draught.

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SUPPLEMENTARY ESTIMATE, 1905-6.

On December 28, 1905, the Admiralty wrote to the Treasury urging that larger supplies of armour should be obtained than would be covered by the voted provision in the current Navy Estimates, and proposing that the extra expenditure involved (amounting to £280,000) should temporarily be defrayed from savings on the aggregate of Navy Votes, 1905–6, under the powers vested in the Treasury by Section 5 of the Appropriation Act, 1905. Though taking some exception to the procedure the Treasury, in view of the statement that it would be "detrimental to the public service" if the expenditure in question were postponed "until provision can be made . . . . by Parliament in the usual course," gave the required authority on the understanding that when Parliament met a "token" Supplementary Estimate would be presented to the House of Commons with a view to obtaining the covering sanction of Parliament for the transaction at the earliest moment. This was accordingly done.

NAVAL WORKS ACT.

MEMORANDUM SHOWING PROGRESS AND EXPENDITURE.

Head (*a*).—ENCLOSURE AND DEFENCE OF HARBOURS.

Gibraltar Harbour.—Total Estimate in the Act 1905, £1,199,000. This item was expected to be finished in 1903–4, but although the Admiralty mole extension and the detached mole have been completed and in use for some time, the works will not be finally completed until 1906–7. The total estimated expenditure up to March 31, 1906, will be about £1,201,000.

Gibraltar Commercial Mole.—Total Estimate in the Act 1905, £669,000. The estimated expenditure up to March 31, 1906, will be about £645,000. The expected date of completion shown in the 1905 Act is 1906–7. The mole is practically completed and ready for use.

Portland Breakwater.—Total Estimate in the Act 1905, £650,000. This item has been completed.

Dover Harbour.—Total Estimate in the Act 1905, £3,500,000. The estimated expenditure up to March 31, 1906, is about £2,686,000. The date for completion given in the 1905 Act is 1908–9. The Admiralty Pier Extension, the east arm and the east reclamation are all completed, except the above-water work at the extremities of the breakwaters. The south breakwater is making good progress and a length of about 1950 feet has been brought up to water level.

Malta Breakwater.—Total Estimate in the Act 1905, £950,000. The expenditure incurred to March 31, 1906, is expected to be about

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£130,000. Expected date of completion, as shown in the 1905 Act, is 1909–10. The main contract for the construction of Ricasoli and St. Elmo breakwaters was originally due for completion on August 1, 1907. The contract has, however, been delayed by storms which have done considerable damage to the temporary staging. An extension of time has therefore been allowed, and the work of these breakwaters will not be finished until the end of 1907–8. It is hoped, however, that the whole of the work in connection with the item will be completed by the date shown in the 1905 Naval Works Act.

Head (*b*).—ADAPTING NAVAL PORTS TO PRESENT NEEDS OF FLEET.

Deepening Harbours and Approaches.—Total Estimate in the Act 1905, £1,360,000. Of this sum about £1,326,000 is expected to be spent to March 31, 1906. When the Naval Works Act, 1905, was framed it was decided that after 1905–6 this work should be continued as a charge to Navy Vote 10, with the exception of the balances of contract dredging in hand amounting to about £16,000. There is expected to be a saving of about £18,000 on the above total estimate.

Keyham Dockyard Extension.—Total Estimate in the Act 1905, £4,500,000. The expenditure up to March 31, 1906, will be about £3,721,000. The expected date of completion, as given in the 1905 Act, is 1908–9. The three graving docks and the entrance lock are completed. It is expected that one dock will be ready for docking a ship by June, 1906, or earlier.

Portsmouth Docks.—Completed.

Gibraltar Dockyard Extension.—Total estimate in the Act 1905, £2,809,000. Of this sum about £2,416,000 will be spent up to March 31, 1906. The date for completion given in the 1905 Act is 1907–8. The three graving docks are in use. The stores and shops are nearly completed and a large part in use.

Hong Kong Dockyard Extension.—The total estimate in the Act 1905, £1,500,000. The expenditure to March 31, 1906, is expected to be about £1,120,000. The expected date of completion, as shown in the 1905 Act, is 1907–8.

Colombo Dock.—The Admiralty share of the cost of the dock, which is being carried out by the Colonial Government, is £159,000. Of this sum about £159,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1905–6. Some supplementary works have still to be completed by the Colonial Government.

Pembroke Jetty, etc.—Total Estimate in the Act 1905, £133,500. The work has been completed.

Portsmouth Widening Caisson.—Completed.

Haulbowline Improvements.—Completed.

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Chatham Dock.—Total Estimate in the Act 1905, £450,000. Of this sum about £446,000 is expected to be spent to March 31, 1906. The work has been completed.

Malta Dockyard Extension.—Total Estimate in the Act 1905, £1,250,000. Of this sum about £909,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1907–8. The work on the main contract in connection with the item comprising the construction of the two docks and pumping station should have been completed by December 31, 1904, but the construction of these docks has been delayed by a variety of causes, and the work is very much behind the contract time. Should no further serious interruptions arise in the execution of the work it may still be possible to finish it by the date shown in the 1905 Naval Works Act, viz., 1907–8.

Bermuda Dockyard Extension.—Total Estimate in the Act 1905, £600,000 (including works, machinery, and floating dock). Of this sum about £530,000 is expected to be spent to March 31, 1906, including £234,000 for the floating dock, which has been completed, and is now at Bermuda. The expected date of completion, as shown in the 1905 Act, is 1907–8. The main contract in connection with this item is very nearly completed, but the rate of progress has been very slow, and the work is much behind the contract time.

Simon's Bay Dockyard Extension.—Total Estimate in the Act 1905, £2,500,000. Of this sum about £717,000 will be expended up to March 31, 1906. The date for completion given in the 1905 Act is 1908–9.

Coaling Facilities and Fuel Storage.—Total Estimate in the Act 1905, £1,280,000. Of this sum about £712,000 is expected to be spent to March 31, 1906. Considerable difficulty has been experienced in obtaining sites in connection with some of the schemes, and it is not anticipated that the work provided for in the above estimate can be finished until 1907–8, as shown in the Naval Works Act, 1905.

Chatham Dockyard Extension.—Total Estimate in the Act 1905, £700,000. The estimated expenditure to March 31, 1906, is £55,000. The date for completion of the preliminary work provided for in the above total estimate is 1906–7. It has been decided not to proceed with the main scheme originally intended.

Sheerness Depôt for Torpedo-Boat Destroyers.—Total Estimate in the Act 1905, £220,000. Of this sum about £132,000 is expected to be expended to March 31, 1906. The expected date for the completion, as shown in the 1905 Act, is 1907–8.

Naval Establishment at Rosyth.—The sum of £200,000 for preliminary work was provided in the 1905 Act. The sum of about £157,000 is expected to be expended to March 31, 1906, mainly on

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the purchase of land, the provision of residential and office accommodation, railway, etc., and the preparation of plans. The question of the main scheme is under consideration.

Head (*c*).—NAVAL BARRACKS, ETC.

Chatham Naval Barracks.—Completed and occupied.

Gunnery Schools.—Total Estimate in the Act 1905, £470,000. Of this sum it is estimated that about £45,000 will have been expended by March 31, 1906, on re-provision by War Department of accommodation given up by them to the Admiralty at Chatham, and work at other stations. The expected date of completion, as shown in the 1905 Act, is 1907–8.

Portsmouth and Keyham Naval Barracks. — Completed and occupied.

Chatham Naval Hospital.—Completed and occupied.

Walmer Marine Depôt and Keyham Engineers' College.—Completed.

"*Britannia*" *R.N. College.*—Total Estimate in the Act 1905, £425,000. Of this sum, about £390,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1906–7.

Magazines.—Total Estimate in the Act 1905, £1,335,000. Of this sum about £955,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1909–10.

Haslar Hospital Extension and Haulbowline Zymotic Hospital.—Completed.

Coast Guard Stations and R.N.R. Batteries.—Total Estimate in the Act 1905, £200,000. The sum of about £151,000 is expected to be spent to March 31, 1906. The date of completion is 1906–7. There is expected to be a saving of £40,000 on the total estimate.

Torpedo Ranges.—Total Estimate in the Act 1905, £320,000. Of this sum about £30,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1908–9.

Electric Light and Power in Naval Establishments.—Total Estimate in the Act 1905, £1,750,000. Of this sum about £837,000 is expected to be spent to March 31, 1906. The expected date of completion, as shown in the 1905 Act, is 1908–9.

Head (*d*).—SUPERINTENDENCE AND MISCELLANEOUS CHARGES.

Total Estimate in the Act 1905, £1,173,673. Of this sum about £714,000 is expected to be spent to March 31, 1906.

March, 1906.

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French Navy Estimates, 1906.

Cap. in Estimates. 1906.	Heads of Expenditure.	Credits voted for 1906.	Credits voted for 1905.
		£	£
	Personnel.		
1, 2	Admiralty Office	141,139	140,802
5, 6, 7	Navy Pay	2,135,561	2,017,565
8	Inspection of Administrative Services .	13,137	12,967
9, 10	Construction and Ordnance Staff . .	294,507	281,548
11, 12, 14, 15	Administrative Staff, Commissariat, and Inscription Maritime	291,256	286,448
13	Medical and Religious Staff	72,566	73,013
52	Fisheries and Navigation . . .	29,769	28,052
	Labour.		
	Wages—		
27	Shipbuilding; new construction; fitting for sea	489,297	491,480
29	Shipbuilding; repairs	236,931	213,816
24, 31	Master-attendants' and Storekeepers' Departments	277,530	269,965
35	Armaments; construction of new guns .	102,365	102,365
37, 39	Armaments; repairs	99,122	99,762
	Torpedoes, etc.	—	27,458
42	Works	26,783	26,783
18	Victualling	32,800	33,968
20	Hospitals, &c.	16,780	16,780
	Matériel.		
	Stores and Supplies—		
3	Admiralty	10,122	9,560
28	Shipbuilding in Dockyards	1,866,846	1,533,880
33, 34	Shipbuilding by contract	1,840,000	2,100,000
30, 32	Fitting for sea; maintenance; repairs .	598,987	590,092
	Carried forward . .	£8,575,501	£8,356,304

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Cap. in Estimates, 1906.	Heads of Expenditure.	Credits voted for 1906.	Credits voted for 1905.
		£	£
	Brought forward - -	8,575,501	8,356,304
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
25, 26	Repairs, conversions, &c., in dockyards and by contract	616,676	618,784
36, 38 40	Armaments; new guns and conversions; Powder, ammunition, repairs, tools, &c.	919,399	888,904
	Torpedoes	—	178,021
43	Works; new and large alterations. .	105,124	93,124
44	Ditto; deepening of the Charente .	8,000	6,000
41, 45	Ditto; supplementary for defence of military ports	701,918	679,518
46, 47	Ditto; repairs	67,141	65,167
4	Hydrographic Service	15,320	15,320
16	Clothing, &c.	134,278	126,241
17, 19	Victualling	886,817	839,172
21	Hospitals, &c.	76,424	76,504
48, 49	Fuel, lighting, office furniture, printing, &c.	42,714	40,024
	MISCELLANEOUS.		
22, 23	Travelling expenses, freight, allowance for lodgings, &c.	217,000	177,680
50	Charitable and subscriptions . . .	42,493	41,353
51	Pay of Reserve Officers	29,854	29,156
53, 54	Fisheries and Commerce (materials for protection, &c.)	16,200	15,660
53 *a*	School Ship hired from Mercantile Marine	1,740	—
53 *b* & *c*	Milan and Marseilles Exhibitions . .	1,000	—
55	Pensions	510,078	493,000
56	Secret Service	4,000	4,000
	Total . .	£13,001,677	£12,743,932

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1906.—BUILDING IN DOCKYARDS.

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Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1906.
					£	£
Battleships	République	Brest	1901	1906	1,458,194	155,226
	Démocratie	„	1903	1907	1,476,698	292,569
	A. 15	„	1906	1910	1,314,351	109,094
Armoured Cruisers, First-class	Victor Hugo	Lorient	1903	1906	1,204,465	131,993
	Jules Michelet	„	1902	1907	1,191,496	251,574
	Edgard Quinet	Brest	1904	1909	1,229,462	264,924
	WaldeckRousseau	Lorient	1905	1909	1,237,789	241,438
Torpedo-gunboats and Destroyers	Stylet	Rochefort	1902	1906	56,585	18,022
	Tromblon	„	1902	1906	56,585	18,801
	Pierrier	„	1903	1906	56,585	21,261
	Obusier	„	1903	1906	60,065	12,041
	Mortier	„	1903	1906	60,065	15,621
	Carquois	„	1904	1906	60,650	35,551
	Trident	„	1904	1906	60,650	36,071
	Fleuret (ex M. 40)	„	1905	1907	57,170	23,304
	Coutelas (ex M. 41)	„	1905	1907	57,170	22,628
	Glaive (ex M. 42)	„	1905	1907	60,650	27,308
	Poignard (ex M. 43)	„	1905	1907	60,650	26,788
	Cognée (ex M. 44)	Toulon	1905	1907	57,170	24,273
	Hache (ex M. 45)	„	1905	1907	57,170	20,273
	Massue (ex M. 46)	„	1905	1907	57,170	20,273
	M. 55 and M. 56	Rochefort	1906	1908	147,577	13,064
	M. 57 and M. 58	Toulon	1906	1908	147,577	20,344
First-class Torpedo-boats	368 and 369 (ex P. 138 and P. 189)	„	1904	1906	40,067	8,542
Submarines and Submersibles	Oméga	„	1903	1907	58,686	5,342
	Émeraude, Opale, Rubis	Cherbourg	1903	1906	174,342	68,752
	Saphir, Topaz, Turquoise	Toulon	1903	1906–7	174,342	46,166
	Circé (ex Q. 47), Calypso (ex Q. 48)	„	1904	1907	133,977	30,010
	Guêpes Nos. 1 and 2 (ex Q. 49 and Q. 50)	Cherbourg	1904	1906	24,948	11,694
	Q. 51 to Q. 60 (10), Q. 62 to Q. 89 (28)	Various	1905	1907–10	2,589,088	585,780
Total building in Dockyards				£	13,421,394	2,558,727

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PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1906.—BUILDING BY CONTRACT.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1906.
					£	£
Battleships	Patrie	La Seyne—Toulon	1901	1907	1,644,205	151,679
	Liberté	St. Nazaire—Brest	1902	1907	1,649,025	138,909
	Justice	La Seyne—Toulon	1902	1907	1,661,730	134,301
	Vérité	Bordeaux—Brest	1902	1908	1,660,424	122,077
	A 16	—	1906	—	1,550,571	90,000
	A 17	—	1906	—	1,550,571	90,000
Armoured Cruiser First-class	Ernest Renan	St. Nazaire—Cherbourg	1903	1908	1,424,007	401,643
Torpedo Boat Destroyer	Claymore	Le Havre—Cherbourg	1903	1906	75,226	24,329
Torpedo Gun-boats and Destroyers	M 47 to M 54 (8)	Various	1905	—	592,904	269,320
	M 59 to M 64 (6)	"	1906	—	444,678	156,601
First-class Torpedo Boats	295 to 317 (23)	"	1903–4	1905–6	403,344	73,820
	318 to 367 (50) (ex P 139 to P 188)	"	1904	1906–7	920,757	550,019
School of Pilotage	Chamois	—	1904	1906	26,043	10,585
	Total building by Contract				£13,603,485	2,213,283

N.B.—Provision has since been made for laying down three additional battleships—A 15, 16 and 17 *bis*.

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German Navy Estimates, 1906.

(*Converted at £1 = 20·43 marks.*)

ORDINARY PERMANENT ESTIMATES.

	Proposed for the financial year 1906.	Granted for the financial year 1905.
	£	£
Imperial Navy Office	87,773	80,762
Admiralty Staff	16,254	11,647
Look-out Stations and Observatories	17,444	17,607
Station Superintendencies	28,336	23,061
Administration of Justice	8,262	6,961
Naval Chaplains and Garrison Schools	6,612	5,334
Navy Pay	1,323,835	1,188,225
Maintenance of Ships in Commission	1,401,393	1,299,299
Victualling	101,092	85,323
Clothing	20,183	19,400
Garrison Works and Administration	73,091	67,359
Lodging Allowance	111,026	180,896
Medical Department	103,370	89,460
Travelling Expenses, Freight Charges, &c.	168,673	161,380
Training Establishments	19,823	19,783
Maintenance of Fleet and Docks	1,373,327	1,292,975
Ordnance and Fortification	505,072	454,158
Accountants' Department	42,746	35,958
Pilotage, Coastguard, and Surveying Service	34,718	33,090
Miscellaneous Expenses	73,367	64,376
Total of Ordinary Permanent Estimates carried to next page £	5,516,397	5,137,060
Administration of Kiau-chau Protectorate	4,994	4,717
	5,521,391	5,141,777

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Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1906.

For the Construction of—

	£
Battleship Lothringen (M), 4th and final instalment	115,027
" Deutschland (N), "	115,027
" Pommern (O), 3rd instalment	227,606
" Hannover (P), 3rd instalment	227,606
Large cruiser C, "	209,006
Small cruiser Leipzig (N), 3rd and final instalment	53,353
" Danzig (Ersatz Alexandrine) "	53,353
" Königsberg (Ersatz Meteor) "	53,353
Battleship Q, 2nd instalment	296,133
" R, "	296,133
Large cruiser Scharnhorst (D), 2nd instalment	246,206
Small cruiser O, "	119,187
" Ersatz Wacht, 2nd instalment	119,187
" Ersatz Blitz, "	119,187
Steamer for laying mines (A), 2nd and final instalment	48,948
Battleship Ersatz Bayern, 1st instalment	146,844
" Ersatz Sachsen "	146,844
Large cruiser (E), "	146,844
Small cruiser Ersatz Pfeil "	60,206
" Ersatz Comet "	60,2[illegible]6
Tender to School of Gunnery, at Sonnenburg	22,027
Steamer for laying Mines (B), 1st instalment	48,948
Fitting battleship of Sachsen class as Torpedo School Ship	7,342
Alteration and improvement of large cruisers Hertha and Victoria Louise, 1st instalment	24,474
One Torpedo-boat Division, 2nd and final instalment	119,432
Two " Divisions, 1st instalment	391,584
Experiments with designs for Submarines	122,370
Total	£3,596,433

Summary.

—	Proposed for the financial year 1906.	Granted for the financial year 1905.
	£	£
Ordinary Permanent Estimates	5,516,397	5,137,060
New Construction	3,596,433	3,366,128
Armaments, Torpedoes, and Mines	1,748,654	1,605,042
Other items	345,799	329,880
Extraordinary Expenditure	1,193,832	986,735
Total	£12,401,115	11,424,845

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Italian Navy Estimates, 1906-7.

Financial Year 1st July, 1906, to 30th June, 1907.

(Converted at £1 = 25 lire.)

——	Proposed for 1906-1907.	Revised Estimates, 1905-1906.
Ordinary Expenditure—General Expenses.	£	£
Admiralty	97,684	97,656
Pensions	266,000	251,200
Expenditure on various services connected with the Mercantile Marine	392,854	391,974
Total £	756,538	740,830
Expenditure for Naval Services.	£	£
General Staff of the Navy	145,320	142,760
Corps of Constructors	55,600	55,340
Medical Service	28,560	28,584
Commissariat Service	34,360	34,120
Pay of Officers, and Wages of Men	528,200	510,640
Gratuities, &c.	83,200	84,000
Forts—*Personnel*	15,200	15,000
Telegraph Service—*Personnel*	8,000	8,200
" " *Matériel*	10,000	11,600
Police (Dockyards)	11,200	11,280
Salaries and Office Expenses	7,200	7,120
Barracks, Maintenance, Lighting, etc.	5,160	8,280
Rents and Water Royalties	2,720	2,980
Ships fitting out, &c.	276,000	259,400
Fuel and Stores, for Ships in Commission	318,000	320,000
Victualling	349,000	344,800
Hospital Services	22,000	22,000
Naval Academy and Engineering School	15,840	15,045
Scientific Services—*Personnel*	960	1,354
" " *Matériel*	9,722	9,900
Workshops, Fortifications, and Stores—*Personnel*	62,140	60,632
Technical Department (Civil)—*Personnel*	38,920	38,216
Naval Constructors	21,720	21,600
Law Charges	1,320	1,280
Transport of Materials	5,000	4,720
Works Department—Repairs	98,160	96,400
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	62,000	110,000
Fuel and Stores for Shore Establishments	60,000	147,200
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	*965,914	900,000
Wages and Expenses of Dockyard employés	698,800	564,120
Guns, Torpedoes and Small Arms	108,000	108,000
Labour in Private Yards	10,000	..
Coast Defence—*Matériel*	12,000	..
Total (to next page) £	4,070,816	3,944,571

* The Estimates for 1906-7 provide for completion of battleships Vittorio Emanuele at Naples, and Regina Elena at Spezia; the continuation of battleships Roma at Spezia, and Napoli at Genoa; cruiser B at Castellamare; blockade ship C; submersibles Squalo, Navalo, Otaria, and Tricheco; 25 torpedo boats and destroyers, 2 lake gunboats, and various auxiliary vessels.

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EXTRAORDINARY EXPENDITURE.

—	Proposed for 1906–1907.	Revised Estimates, 1905–1906.
	£	£
Temporary Civil Staff	14,200	15,660
General Expenses and Half Pay	600	600
Expenditure on New Construction	..	104,493
Coast Defence and Fortifications	..	12,000
Torpedoes	..	24,000
Construction and purchase of Ships and Materials for the Navy (Law of July 2, 1905)	480,000	..
Total . . . . £	494,800	156,753

SUMMARY.

	£	£
Ordinary Expenditure—General Expenses	756,538	740,830
Expenditure for Naval Services	4,070,816	3,944,571
Extraordinary Expenditure	494,800	156,753
Depreciation of Ships in Commission	140,000	140,000
Rent of Lands occupied by Government	108,004	107,724
Grand Total . . £	5,570,158	5,089,878

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Russian Navy Estimates, 1906.

(*Converted at £1 = 9·6 Roubles*)

Heads of Expenditure.	1906.	1905.
	£	£
Central and Ports Administration	249,353	271,142
Educational	128,969	137,337
Medical	141,174	161,538
Pay of Officers and Men	620,359	752,929
Victualling	186,508	191,042
Clothing	195,997	377,188
Expenses of Ships in Commission	1,419,862	2,387,500
Hydrographic Department	137,761	119,058
Naval Armaments and Electric Lighting	1,233,964	1,579,718
New Construction and Repairs	4,751,903	4,069,703
Admiralty Yards and Workshops	622,627	669,895
Buildings, Rents, and Repairs	598,078	530,207
Travelling Expenses and Despatches	87,396	98,958
Subsidies	67,537	66,266
Reserves—*Personnel*.	252,956	221,486
Improvement of Naval Ports	106,423	470,400
Expenditure on account of Next Year's Estimates	40,732	45,330
Total £	10,841,599	12,149,692

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United States Navy Estimates, 1906-7.

(Converted at £1 = $4·8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Appropriated for year ending June 30, 1906.	Estimates for year ending June 30, 1907.
	£	£
Pay of the Navy	4,109,730	4,710,740
Pay, Miscellaneous	123,292	123,292
Contingent, Navy	13,357	13,357
Bureau of Navigation	365,756	410,978
„ Ordnance	862,285	3,164,000
„ Equipment	1,268,680	1,413,177
„ Yards and Docks	190,577	210,732
Public Works under Bureau of Yards and Docks	645,166	1,860,613
Public Works under Secretary of Navy (Naval Academy)	164,389	232,200
Public Works under Bureau of Navigation (Training Stations and War College)	19,419	201,026
Public Works under Bureau of Ordnance	17,713	131,439
Public Works under Bureau of Equipment	2,055	2,055
Public Works under Bureau of Medicine and Surgery	8,220	79,523
Bureau of Medicine and Surgery	79,112	84,249
„ Supplies and Accounts	1,209,067	1,352,313
„ Construction and Repair	1,638,307	1,773,518
„ Steam Engineering	817,404	1,311,500
Naval Academy	71,648	85,176
Marine Corps	846,478	1,279,418
Increase of Navy:— Construction and Machinery	6,249,015	3,663,992
Armour and Armament	3,698,757	2,876,812
Equipment	194,185	—
Total	£22,594,612	£24,980,110

Provision is expected to be made for one battleship of larger dimensions (19,000 tons) than the South Carolina and Michigan, which are to be of 16,000 tons.

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TRIALS OF THE NEW JAPANESE BATTLESHIPS.

The first-class battleship Kashima, built for the Imperial Japanese Government by Sir W. G. Armstrong, Whitworth & Co., at Elswick, began her official trials on April 3, 1906, and completed them on April 9. On the first day preliminary progressive runs were made over the Admiralty measured knot near the mouth of the river Tyne, to ascertain the speed corresponding to the varying revolutions, four pairs of runs being made at speeds ranging from 11 knots up to nearly full speed. On April 4 the gun trials at sea took place, three rounds being fired from all the 12-in., 10-in., 6-in., and smaller guns at angles calculated to place the most severe tests upon the structure of the vessel and the gun mountings. No damage was, however, sustained by any part of the ship beyond the breaking of glass and certain minor fittings of a trivial character.

The 24 hours' official trial at four-fifths power was commenced at 10.30 a.m. on April 5 and completed at the same hour on April 6. The machinery worked with admirable smoothness and regularity, the mean power developed during the whole period working out at close upon 13,000, the mean revolutions being 113·6, and the corresponding speed 18 knots. After allowing a day for cleaning boilers, the full power trial of eight hours' duration was commenced. Four consecutive runs with and against the tide were made over the measured course, the mean speed being 19·242 knots, the revolutions being just over 123, and the corresponding I.H.P. 17,280. During the last two hours of the trial the revolutions increased to nearly 125, with a corresponding increase of speed to 19½ knots. This completed the speed trials, no hitch whatever occurring throughout their course, the results obtained being most satisfactory, and largely in excess of the requirements stipulated in the contract, the guaranteed full speed being 18½ knots. The coal consumption on the eight hours' full-power trial worked out at 2·12 lb. per indicated horse-power per hour, and on the 24 hours' trial at 1·86 lb. per indicated horse-power per hour. The trials were carried out with the vessel at her full load draught.

On April 9 this very important series of trials was brought to a conclusion by the firing of torpedoes from the five submerged tubes with the ship under way at 15 and 17 knots. The conclusion of such a very important and arduous set of trials within the week, as well as the general efficiency of the vessel, and her armament and general equipment, reflects much credit upon the contractors and their staff.

The Japanese officers and crew, under Captain Ijichi, who arrived in the Tyne at the end of the previous week, were on board, and although the vessel was in charge of the contractors, the Japanese stokers did all the stoking during the steam trials, and contributed in no small way to the success of the trials.

The water-tube boilers, of which there are 20, arranged in three compartments, are of the latest improved Niclausse type, and these, as well as the triple expansion engines with which the vessel is fitted, have been supplied by Messrs. Humphrys, Tennant & Co., Deptford Pier, London. The following are the main particulars:—Diameter of H.P. cylinder, 36 in.; diameter of I.P. cylinder, 56 in.; diameter of L.P. cylinders, 63 in.; length of stroke, 4 ft.; four condensers, cooling surface, 18,700 sq. ft.; total heating surface of boilers, 42,960 sq. ft.; fire grate area, 1308 sq. ft.; boiler pressure, 230 lb. per sq. in. Otherwise the vessel, with her armour and armament, has been entirely constructed by Messrs. Armstrong.

The Kashima has a displacement of 16,400 tons. Her keel was laid on February 29, 1904, and she was launched on March 22, 1905. Thus her construction, and the completion of her trials in this period, or four months less than allowed for by the contract, may be considered a very good performance for the construction of a first-class battleship of the size of the Kashima. She is the third first-class battleship, and the fourteenth war vessel, which Messrs. Armstrong have constructed for the Imperial Japanese Government. The trials were attended by Captain Tanaka and Captain Fujii and their respective staffs on behalf of the Japanese Admiralty.

The sister battleship Katori, designed and constructed by Messrs. Vickers, Sons, & Maxim, completed on May 1 the trials specified in the contract. In this ship, as in the Kashima, important improvements in the gun-mounting machinery of the 12-in. and 10-in. guns were directed toward increasing the rapidity of fire and reducing the amount of manual labour involved in the transmission of ammunition and shot from the magazines to the guns. Special rapidity trials were undertaken, and several officers attended from the Admiralty, including the Director of Naval Ordnance. The prescribed test of firing two rounds from each of the twelve 6-in. quick-firing guns, three rounds from each of the 10-in. breech-loaders, and three rounds from each of the 12-in. weapons was carried through successfully. In some cases two of the guns were fired simultaneously, at various degrees of elevation and training, in order to test the structure of the ship in the resistance of stresses set up

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owing to the energy developed. This latter was considerably greater than in preceding ships, as the 12-in. guns are of the new 45 calibre type, and the 10-in. guns of 50 calibre design. The examination of the ship afterwards showed that all possible strains had been anticipated in the scantlings. It was found that in the case of the 10-in. guns five rounds were fired in 2 min. $8\frac{2}{5}$ sec., and that eight rounds were fired from the 6-in. quick-firers in 52 sec. As regards the steaming performance of the ship the conditions of the contract were more than fulfilled. The endurance trial was of twenty-four hours' duration, and was at three-fourths of the full power of the engines. On these trials, when the weather conditions were not only unpleasant but severe, the ship proved a steady boat, and the speed was 17·8 knots, and the coal consumption 1·6 lb. per I.H.P. per hour. On the full power, which was of eight hours' duration, the speed was 20·22 knots, this rate being the mean of several runs over a deep-sea course. For the remainder of the eight hours' trial the engines were continued at the same number of revolutions. The Katori is commanded by Captain Sakamoto, and on the trials the boilers were stoked by the Japanese crew.

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