GENERAL INSTRUCTIONS
TO
INSPECTORS OF MACHINERY
FOR
VESSELS OF THE NAVY BUILDING UNDER CONTRACT

1914

DEPARTMENT OF THE NAVY
BUREAU OF STEAM ENGINEERING
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GENERAL INSTRUCTIONS

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NAVY DEPARTMENT
BUREAU OF STEAM ENGINEERING

WASHINGTON
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INDEX OF CORRECTIONS AND ADDITIONS.

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INSTRUCTIONS TO INSPECTORS OF MACHINERY.

NAVY DEPARTMENT,
BUREAU OF STEAM ENGINEERING,
Washington, June 1, 1914.

The following instructions are issued for the guidance of officers and other employees of the Government engaged in inspection duty under cognizance of the Bureau of Steam Engineering for vessels of the Navy building under contract at private shipyards. As it is impossible in instructions of this character to cover every case that may arise, the bureau relies upon the judgment of inspecting officers, the object of the inspection being to obtain from the contractors thoroughly good work, as required by the specifications. If at any time doubt should arise respecting any question, it will be referred to the Bureau for decision.

R. S. GRIFFIN,
Engineer in Chief, U. S. Navy,
Chief of Bureau.

PART I.

DEFINITION OF DUTIES, GENERAL REQUIREMENTS, AND BUREAU PRACTICE.

INSPECTOR OF MACHINERY.

1. The Inspector of Machinery is the officer ordered by the Navy Department as such.

He shall sign all official correspondence, and shall be responsible that all office work is properly performed and that the required inspections are properly made.

He shall make such reports on fitness of officers, enlisted men, and civil employees as may be required.

2. The Inspector of Machinery is the representative of the Bureau of Steam Engineering, and as such he acts for the bureau, and the bureau will ordinarily be guided in its action by the recommendation and decision of the inspector. The action of the inspector and his decisions and recommendations should therefore be as nearly as possible in accordance with the policy of the bureau and with the idea of accomplishing the best results from the inspection in hand. Cooperation between the bureau and inspectors and the fullest interchange of opinion are encouraged and desired.

3. The bureau desires to have the inspector in an authoritative position to act for it and to render decisions, but desires that such action be in accordance with its policy and practice and in accordance with any instructions existing, and therefore in all cases the bureau is to be fully advised so that a complete understanding of matters in hand may always be readily available.

INSTRUCTION OF ASSISTANTS.

4. As the assignment of junior commissioned officers as assistant inspectors is to a large extent an extension of their training for future engineering duty, the inspector will cause them to pursue such engineering investigations that will best serve this purpose and will direct and instruct them in all particulars of engineering inspection work.

SUCCESSION OF RESPONSIBILITY.

5. In the absence of the Inspector of Machinery, the senior officer on duty as assistant shall act as inspector, and in case of the necessary absence of all officers attached to the office one of the civilian employees of the office shall be designated by the inspector to carry on the necessary work of the office, and sign such papers as may be necessary.

Assistants or civilian employees temporarily in charge shall carry on the work in conformity with the orders of and the general policy of the inspector of machinery.

SUGGESTIONS FROM INSPECTORS.

6. Suggestions of inspecting officers leading to improvements or desirable alterations in design are invited and will receive careful consideration. The inspectors shall report all desirable improvements or alterations in work or design that may come to their attention. If such suggestions are not always accepted, officers should bear in mind that other considerations not known to them are likely to enter into the questions involved. Whenever new methods of carrying on work, or special tools, apparatus, etc., come to the notice of the inspector, such information should be forwarded to the bureau in a report, especially when it is likely to be of special value. If in the opinion of the inspector any decision of the bureau is not to the best interest of the Government, he should not

hesitate to bring it to the attention of the bureau, stating fully the reasons for his opinion.

INTERCOURSE AND RELATIONS WITH CONTRACTORS.

7. Inspectors will establish such procedure with reference to the contractors as will conduce to efficient inspection and expeditious work. Regular and definitely understood methods of intercourse should also be established between the inspectors' assistants and the various employees of the contractors with whom it may be necessary to have dealings. It is specially important to secure the cooperation of the contractors and their employees, and every effort should be made to remove any causes of friction that may develop. The work of inspection should be so arranged as to give the contractors as little delay and extra work as possible, while still carrying out thorough inspection and conserving the interests of the Government.

The terms of the contract, the specifications and the approved drawings should be held as inviolate by the Government inspectors as by the contractors. They are definite agreements between the parties concerned, and their strict observance, if carried out with good judgment, together with firmness and common sense, can not do other than secure fair and just treatment to both of the contracting parties.

FAMILIARITY WITH CONTRACTOR'S PLANT.

8. In order to carry out the above, inspectors should make themselves thoroughly familiar with the plant, its capacity, its shop management, the means of carrying on work and the different methods employed. They should know who is responsible for the work from its inception to its completion, where all stages of work are done and by what means. In general, they should have a complete knowledge of the plant and everything pertaining thereto.

In this way confusion and misunderstanding will be avoided, and they will be able to understand both sides of any difference that may arise. The inspectors should endeavor to aid the contractors in any proper way they can, to the end that the work may be done as expeditiously as possible. They should confer with the representatives of the contractors during the preparation of plans, giving contractors such information as may be pertinent and necessary in regard to details, arrangement, etc., which will in their opinion carry out the bureau's requirements in the best way, bearing in mind, however, their position which is to see that the terms of the contract are carried out, both by the Government and the contractors.

9. Official dealings with the contractors should be by correspondence as far as may be practicable, to secure a record of the matter considered and conclusions reached for future reference and guidance.

SOURCES OF INFORMATION FOR INSPECTORS.

10. The following are the principal sources of information for inspectors in regard to work under construction:

(1) Circular of requirements for the bidder.
(2) The contract.
(3) The specifications and authorized changes.
(4) The contract plans.
(5) Type plans.
(6) Finished working plans.
(7) Specifications for standard articles.
(8) General and special orders and circular letters.
(9) Navy regulations.
(10) These instructions with corrections to date. Other instructions or requirements issued by the bureau.
(11) Good practice.
(12) Previous practice.

11. Inspectors should be thoroughly familiar with the above and with all conditions pertaining thereto. In

particular they should understand the contract and have a most thorough knowledge of the specifications, both the machinery specifications, the specifications for material, and parts of hull specifications relating to the machinery.

THE CONTRACT, ETC.

12. The contract is the legal agreement between the contractors and the Government under which a ship is built or certain work is done, and its terms are inviolate. It will contain the methods of fulfilling the contract, and the conditions under which the work will be done. In general it will contain the following information:

(1) Requirements in regard to plans and the conditions under which the same may be changed.
(2) Materials and workmanship and means of inspection.
(3) Time of completion and penalty for delay.
(4) Weight of machinery.
(5) Trials and performances.
(6) Acceptance of ship.
(7) Method of payment.

CONTRACT PLANS.

13. The bureau will, in general, furnish the contractors with the following contract plans, which shall be followed in the general preparation of detail working plans, viz:

Arrangement of machinery in engine compartments.
Arrangement of machinery and boilers in boiler compartments.
Arrangement of shafting.
Main condensers.
Arrangement of evaporators and distillers.
Lighting plans.
Interior communication plans.

SPECIFICATIONS.

14. The specifications and authorized changes therein will give in comprehensive form the method of construction of all work in the shops and on board ship. They will give the number of all articles to be supplied and by whom; the location of these articles and such detailed information as the bureau is able to furnish.

STANDARD PLANS.

15. All work should conform to the bureau's type plans and the material specifications in force at the time of signing of contract. The contractors may, however, in their discretion, be permitted to furnish material in accordance with later plans or specifications if specifically authorized by the bureau. Navy Department and bureau standards for various parts are designed to secure uniformity and interchangeability and reduce the number of patterns and spares to be carried. Standard apparatus should be used whenever possible. If for special conditions apparatus differing from standard is necessary, efforts should be made to use standard arrangements and dimensions as far as they can be made to apply.

The bureau's standard sheets and specifications are modified from time to time to meet new developments and improvements, and great care must be exercised to correct the files of standards as soon as new sheets or corrections are issued. The bureau invites suggestions relative to improvements or desirable additions to the standard sheets.

GENERAL REQUIREMENTS FOR WORK.

16. The contract, specifications, and approved plans define what work may be required and limit what the Government can obtain. Whether exact character of work is definitely defined or not it is the intention to have

work conform to the best engineering practice. It should be understood that at the time of signing the contract the Government intends to adopt the practice and methods that are in use at that time subject to such improvement as the development and elaboration of the plans and specifications may reasonably be expected to produce.

When plans have been approved by the bureau no changes will be permitted except by special authorization of the bureau unless the arrangement approved develops faults on trial when, in order to save time, the inspector may authorize the changes required to eradicate the faults, reporting immediately to the Bureau the nature of the changes and cause them to be entered on the finished plans.

BUREAU PRACTICE.

17. The inspectors shall familiarize themselves with the type plans and all the requirements of the machinery specifications for vessels building under their inspection, as well as the specifications for the inspection of material, the weight instructions, and with the hull specifications as far as they affect the machinery installation. They should also inform themselves in regard to the latest specifications for machinery and hulls for various vessels building, specifications for dynamos, electric motors, interior-communication instruments, and in general familiarize themselves with the latest requirements in all matters relating to the machinery of naval vessels and other vessels intended for naval use. They should keep themselves informed regarding bureau practice relative to details of the design and construction of machinery not specifically covered by the machinery specifications, and all information and instructions sent out by the bureau from time to time should be carefully read, indexed for reference, and the information therein utilized to the

fullest extent. The bureau will issue requirements of bureau practice, circular letters, and bulletins of information from time to time covering various matters.

FORM FILE.

18. For the information of the office force and for reference, each office will have a properly executed sample form of all forms required, filed in a form file for ready reference.

ENGINEERING INFORMATION FILED.

19. All possible engineering information within the scope or opportunities of the inspection office should be secured and accessibly filed so as to be of the greatest possible use in increasing the professional knowledge of the inspection force and the efficiency of the office.

MATERIALS AND DESIGN.

20. It is the purpose of the specifications to require the most practical and efficient design, material of the best quality for the purpose intended, and the highest grade of workmanship. Nothing short of these requirements should be accepted. This, however, should not be taken to mean that the most expensive material or manner of workmanship is necessarily to be required, but rather that which will conduce to the greatest efficiency of the machinery under construction, and which will be to the best interests of the Government.

In considering changes or modifications in the specifications, or in deciding matters wherein the inspector's decision or action is required, the guiding principle should be to render a decision that will be to the best interests of the Government and be fair and just to the contractors.

Where discretionary power is given the inspector, as in the following paragraph from bureau's specifications, it

will usually be found desirable to hold a conference with the contractors in order to reach an equitable settlement.

"Whenever pipes not specified to be lagged with metal are exposed to great heat, or where clothing is liable to be chafed, the pipes will be lagged with metal as directed."

INSPECTION OF VESSELS BUILT TO CONFORM TO COMMERCIAL PRACTICE.

21. Various auxiliary vessels of the Navy are built under inspection requirements of classification societies, such as United States Steamboat Inspection Service, American Bureau of Shipping, Lloyds, etc. The rules under which the inspection is to take place are stated in the contract, also whether the inspection is to be conducted by the inspectors of these classification societies or by the naval inspectors. When not so stated instructions are sent from the bureau.

The requiring of such inspection, in lieu of regular naval inspection, is usually for the purpose of reducing the cost of the vessel by allowing less expensive material to be used, and sometimes for the additional purpose of obtaining inspection and classification certificates from these organizations under which the inspection is conducted. In order to obtain the inspection or classification certificates the regulations of these classification societies often require that the inspection be conducted by the inspectors of the society issuing such certificates. This, however, does not limit further inspection as may be considered necessary or advisable by Government inspectors. Vessels building under such rules do not require as many detailed tests as are required for regular naval work, and in some cases allow the use of material of different grade. The workmanship is, however, to be first class in all respects and such as will give entire satisfaction in operation and durability.

In machinery built under rules of classification societies the Navy Department specifications for material do not apply, but instead the specifications of the society designated. These matters are stated in the contract, and its detailed requirements must be carefully read to avoid confusion on this point, especially in forwarding orders for material to the Inspectors of Engineering Material. No material need be inspected at place of manufacture except such as is required to be so inspected by the rules of the classification society. Such finished apparatus as may be specially designated will be inspected for workmanship and satisfactory operation at place of manufacture. The securing of the necessary certificates of classification, inspection, etc., is a matter for which the contractors are responsible, these being secured by contractors and supplied to the Government's representatives when the vessel is ready for delivery.

BEST COMMERCIAL PRACTICE.

22. The term "best merchant" or "best commercial practice" is used in connection with this character of work. While this is not absolutely definite, under it the bureau expects to receive an installation entirely suitable for the purpose for which the vessel is designed. While it may not require the most expensive class of work used for commercial purposes, it is not, on the other hand, to permit of a class of work that is in any way questionable or incomplete simply because it can be shown that such a character of work has been used commercially. It must be equal to the best satisfactory merchant or commercial practice.

Essentially the only difference between this and machinery built under the regular requirements of the bureau is the use of material of a commercial or lower grade and less stringent and detailed testing and meth-

ods of inspection. The workmanship, strength, and durability of the apparatus must be of entirely dependable character. The machinery specifications for such vessels are of a less rigid nature and permit the use of apparatus and material of a different character than is usually required for regular naval work. These specifications state what is and what is not permissible, and the contractors are not bound to give more than the contract and specifications call for except as a change in cost.

The contractors should be encouraged to construct the apparatus in conformity with the bureau standards and practice whenever they are willing to do so, and especially in cases where the rules of the classification society have no requirements covering the feature in question. This applies to such items as flanges, bolts, nuts, threads, valves, etc.

REFERENCE TO OTHER INSPECTORS OF MACHINERY.

23. The bureau desires to encourage references and exchange of ideas relative to work of inspection among various inspectors, and especially in the case of sister vessels and where there are several inspectors in the same vicinity; and in particular desires to emphasize the mutual benefit and increased knowledge and efficiency that can be secured by interchange of opinion and information between various inspecting offices. In doing this, however, proper regard should be had not to divulge private or confidential information of one contractor to another without the consent of the contractor originating the plan, design, or method of work.

THE GENERAL INSPECTOR OF MACHINERY.

24. The General Inspector of Machinery is ordered as such by the department. He will from time to time visit the various shipbuilding yards where work is being car

ried on under contracts with the Navy Department. Inspectors of machinery will give him access to the records of their office with full information covering the methods of carrying on the work of inspection, the ratings and duties of employees, etc. While the general inspector has no authority over the inspectors of machinery or the officers and civilian employees attached to their offices, he may make suggestions to inspectors of machinery with a view to bringing about uniformity in the method of carrying on work. His advice should be availed of by the inspector of machinery in all matters about which there may be any doubt. He will report to the bureau after making a visit of inspection, with such recommendations as he may deem pertinent.

PART II.

DIVISION OF WORK, ORGANIZATION OF FORCE, OFFICE REQUIREMENTS.

DIVISION OF WORK.

25. The Inspector of Machinery shall divide the work among his force having due regard to their rank, rating, and ability. They should, as far as possible, be detailed for the work that is in accord with their particular abilities. The aim should be to obtain the highest degree of excellence and efficiency from the force as a whole.

26. The work of inspection will be so arranged that the inspector, or one of his assistants, will have direct supervision over all the various details of the machinery installation. All finished work must be inspected personally by the inspector of machinery, or by such assistant inspector as may be specifically designated by him, before its incorporation into the general structure of the machinery. The responsibility for workmanship and soundness of material rests directly on the inspector, who should keep himself in close touch with the actual installation and when defects are discovered, or it is found that locations can be changed to advantage, he will take up these matters with the contractors or with the bureau as may be necessary.

ORGANIZATION OF INSPECTION FORCE.

27. The organization of the inspection force and their detailed duties with the system of office procedure is left to the inspector, subject to the various rules and regula-

tions issued by the Navy Department. Inspectors are expected to maintain their office and its personnel in the most efficient condition possible, and the responsibility for securing the best results from the force available will rest with the inspector.

There will usually be included the following:

Assistant inspectors of machinery, one of whom is assigned to the electrical inspection work.
Drafting force.
Clerical force.
Weight-compiling force.
Outside inspection force.

ASSISTANT INSPECTORS.

28. Officers detailed for duty as assistant inspectors will make themselves thoroughly familiar with the specifications, machinery, and material, and with all work assigned to them. They will keep the Inspector of Machinery informed of all matters concerning the progress of work, inspections, tests, desirable changes or alterations, unsatisfactory work, etc. They will be prepared to furnish the inspector of machinery with complete information on any subject concerning their work.

They will prepare such letters as may be required in answer to correspondence that may be referred to them.

They shall perform such work of inspection as will keep them thoroughly cognizant of the progress and quality of the work of manufacture and installation and will assist in the criticism of all plans and drawings. They shall see that all matters coming under their supervision are in compliance with the instructions contained herein, and will endeavor to gain as much information in regard to the methods of work and plans as may be of service to them.

29. Assistant inspectors are assigned partly with the idea of giving officers in the lower grades an opportu-

nity to become familiar with engineering practice, and especially with the special features of engineering inspection. They will therefore be required to inform themselves concerning the general engineering problems involved in the building of naval machinery, engineering shop practice, and the general matters of inspection work, so as to fit themselves for future responsible engineering duty.

ELECTRICAL INSPECTOR.

30. When sufficient assistant inspectors are detailed one will be assigned in charge of the inspection work of the electric plant and installation. Electrical draftsmen or aids will be placed directly under his supervision, as well as the gunner (electrical), when one is assigned. While the force charged with the inspection of electrical installation is in a measure apart, nothing is to be construed to preclude this force from doing any other inspection work whenever occasion arises to make this desirable.

WARRANT OFFICERS.

31. Warrant officers who are ordered to duty as assistants to the Inspector of Machinery shall, in general, perform duty in connection with the outside inspection work. They shall, however, perform such other duty as may be required of them by the inspector of machinery, it being desired that their practical experience and familiarity with the details of the care and operation of machinery be utilized to the fullest extent.

CIVILIAN EMPLOYEES.

32. The civilian employees are governed by the civil-service rules and departmental orders regarding them. They will perform such duties in line with their particular qualifications as may be required of them by the inspector. The following general divisions are made:

DRAFTING FORCE.

33. The drafting force shall be utilized in the preparation of such drawings, plans, and sketches as may be required and in the examination of plans submitted by the contractors. They will see that the specifications are followed in the preparation of plans, that the strength of all material is adequate, and that any special instructions for the correction of plans are complied with. They shall make themselves familiar with the plans in the course of preparation and be prepared to offer such criticisms or suggestions as may be pertinent when requested by the contractors. Any such criticisms or suggestions must be immediately reported to the inspector. Where no electrical aids are provided, the electrical draftsmen should assist in inspection and checking up work on vessels and in shops.

OUTSIDE INSPECTION FORCE.

34. The outside inspection force will usually be composed of expert electrical aids, assistant inspectors of material, and special mechanics. They shall make themselves thoroughly familiar with the work under construction, the quality of material being used, and the methods of construction. They will assist in carrying out all tests and inspections where required. They shall inspect all material received for government work and ascertain whether such material has been properly inspected and is as represented. No deviation whatever from the plans, specifications, and instructions can be authorized by them, nor shall they give any orders how work shall be done. In any case where the contractors have failed to follow the requirements of the plans, specifications, and instructions, or where incorrect work, or work not up to the standard is found, they will see that it is rectified or reported to the inspector.

35. All members of the inspection force are required cordially to cooperate one with another and to call attention to work that appears to be defective, whether coming under their direct supervision or not. No absolute restriction to individual duties will be permitted.

WEIGHT FORCE.

36. The weight clerk shall keep an accurate account of the weight of all material received on board and shall prepare such forms as may be required by the weight instructions.

Every item of finished material coming under the cognizance of the Bureau of Steam Engineering shall be accurately weighed and entered in accordance with the weight instructions on blanks furnished by the bureau. The weights of such other items as are not under the cognizance of the Bureau of Steam Engineering, but are included in Class V, in the weight instructions, will also be obtained and entered as directed. The inspector of machinery must familiarize himself with the weight instructions and assure himself that they are carried out. Special attention will be paid to see that the classifications and groupings are properly made.

A monthly return of machinery weights will be made to the superintending constructor as per NSE Form 106.

CLERICAL FORCE.

37. The clerical force shall keep a proper record of all correspondence received or sent and shall see that it is properly filed and indexed. The work of the office will be directly under the charge of the employee designated by the inspector for the duty of chief clerk, who will be responsible, under the direction of the inspector, for the proper filing, preparation, and handling of correspondence, and for the issue and carrying out of all general and special instructions relating to the office force.

ADDRESSES.

38. A record will be kept of the local addresses of all persons attached to the office.

OFFICE HOURS AND HOURS FOR WORK.

39. Clerical employees and draftsmen will be required to adhere to the hours fixed by the department, namely, 9 a. m. to 4.30 p. m., with half an hour intermission for lunch. Special mechanics and laborers who are employed in mechanical or equivalent occupation are required to work eight hours per diem. These hours of work will be arranged by the inspector in the manner that will secure the best results.

When for any reason, such as a test, it is necessary to have any of the inspector's force present beyond the regular hours for work this will be arranged by the inspector. Extra or overtime compensation for such cases is, however, not allowed by the department.

RECOMMENDATIONS AS TO RATINGS AND ADVANCEMENT.

40. These should be governed by the circular instructions issued from time to time by the department. A careful study and strict compliance with such instructions is enjoined upon all concerned. Recommendations for promotions of the civilian employees will, in the ordinary course, be made only after submission of the semiannual efficiency reports.

Part III.

CORRESPONDENCE, SUBMISSION OF DRAWINGS, CHANGES.

CORRESPONDENCE.

41. Correspondence should be numbered in accordance with some well-defined system, and special attention should be paid to see that it is carefully filed and indexed so as to be easily accessible for ready reference.

42. The requirements of the Navy Regulations and Instructions in reference to correspondence will be carefully adhered to; in addition the following instructions are to be complied with:

When the letter relates to a naval vessel, the name of the vessel will be given first in capitals, the remainder of the subject following. All such letters should be filed under ships' heads, letters of each ship being kept separate.

Letters will be briefed as to subject in accordance with the schedule furnished by the bureau, which may be modified from time to time as new developments may make desirable.

43. In briefing letters under "subject" the heads will be given first, followed by the subhead, then by the particular part referred to. For example:

DELAWARE: Boilers; internal fittings, dry pipe.

If the letter does not refer to a naval vessel but to some other contract the number of the contract will be given preceded by the word "CONTRACT" in capitals; followed by kind of contract, schedule, etc., as given

below, being either for a bureau S. & A. contract or a Navy pay office contract.

CONTRACT: Bureau S. & A. No. 19127, schedule 6025, class 57, items 1, 2, 6, 9; or

CONTRACT: Pay office, N. Y., No. 611, requisition 1619, class 126, items 3, 6, 7.

When the communication concerns material for stock the letter or order in question should have this stated under "subject."

The information outlined above to be given under "subject" should also appear on copies of orders for material, finished or unfinished, forwarded for inspection.

44. Separate letters shall be used for each vessel, except that in cases where the subject matter pertains identically and completely to more than one vessel of a class, a single letter with proper and equal mention of the contract number and name of each vessel to which the subject matter applies may be used in order to reduce the volume of correspondence.

Should a single letter applying to more than one vessel be used, the letter shall be filed under the head of the vessel of the lowest number to which the matter pertains and proper reference to this file and letter number made on the index card of each other vessel concerned.

COPIES, EXTRA.

45. When it is apparent that the correspondence is of such nature that it will be referred to other offices where a file copy would be desirable, extra copies should be made and forwarded, thus reducing the work of copying correspondence at the bureau.

STAMPS ON LETTERS.

46. The requirements of the naval instructions in regard to the placing of stamps and their general use must be carefully followed. Various stamps required by

the bureau must be carefully placed in their designated positions in order that such stamps may be readily accessible when the correspondence is filed. Special care will be taken to place on every communication of whatever nature received by the inspection office, either for the files or passing through the office, a receipt date stamp.

INDORSEMENTS.

47. Indorsements are authorized chiefly for the purpose of reducing clerical work on matters in question. They are not to be considered perfunctory, and must in all cases be properly attested by the official responsible for their issue. In referring to matter on indorsements the word indorsement and not letter should be used.

INDORSEMENT STAMP.

48. In forwarding correspondence submitted by the contractors the bureau permits the use of an indorsement stamp *only* in cases where no comment is in any way necessary or desirable. This stamp is designed to avoid clerical work and will be used *only* in cases where further comment is *entirely* superfluous and unnecessary. This indorsement stamp must be placed on the face of the letter and in the position that would be occupied by a written indorsement, and must be properly signed and numbered in each case.

URGENT MATTERS REQUIRING ACTION.

49. It frequently occurs that urgent matters requiring prompt action do not on the face of the letter indicate the urgency conspicuously, as when contractors in their letter of transmittal of a drawing request telegraphic reply and the request of urgency is not indicated conspicuously. In such cases the necessity for immediate action not being readily detected at the bureau, the mat-

ter is taken up in its turn, when, if the urgency were known, the matter would be handled immediately. Therefore, in such cases the inspector of machinery will indicate in bold type, conspicuously placed, that the matter is urgent. Regulation urgent slips will also be employed in such cases. (See paragraph 5314, Naval Instructions.)

INSPECTORS' COMMENT ON CORRESPONDENCE.

50. The bureau desires especially to impress upon its inspectors that in all matters that are referred to them the inspectors must fully and clearly submit their comment and recommendation, and that a definite expression of opinion must be stated in each case. The inspectors are the bureau's representatives, and the bureau relies upon them to supply it with information and an expert opinion on matters involved.

INCLOSURES.

51. When inclosures accompany letters, the papers will be arranged with the letter on top, and the inclosures following in regular consecutive order, the whole being secured at the top with a clip or other secure fastening. Pins are objectionable. Large tracings, drawings, or prints, unless of minor importance, will be forwarded under separate cover. They will not be folded, but will be rolled and securely wrapped for transmission.

LETTERS REFERRED TO CONTRACTORS.

52. When a letter is referred to an inspector requesting information, and it becomes necessary to obtain it from the contractors, the original letter and other correspondence must not, unless specifically directed, be forwarded to the contractors, but another letter will be addressed

to them by the inspector calling for the information desired. In other words, the contractors must not have access to the bureau's or the department's correspondence, and only so much of it as may be necessary shall be communicated to them.

Similarly, in acquainting the contractors with the action of the bureau or the department in any matter, such action should be communicated by a letter from the inspector and not by referring the bureau's or department's correspondence to them, unless specific authority to do so is given.

SUBCONTRACTORS.

53. All correspondence from the inspector of machinery or inspector of engineering material at the works of subcontractors relating to design, changes, etc., in material or apparatus being manufactured must be forwarded through the Inspector of Machinery at the works of the contractors for the vessel in question. The inspector will obtain an expression of opinion from the contractors before forwarding such correspondence to this bureau. This procedure is necessary for the reason that the contractor and not the subcontractor is responsible to the bureau, and the bureau has no authority to modify the arrangements between the contractor and subcontractor except in so far as making the inspection required. Nor can the bureau direct changes or modifications except through the contractors who are the responsible parties. These instructions are, however, not to be construed as restricting the right of any inspecting officer to communicate direct with the bureau if he may deem it necessary. Correspondence relating to the acceptance or rejection of material will be sent to the bureau direct.

REPORTS.

54. The following reports shall be submitted to the proper authorities at the times indicated.

To whom sent.	When made.	Nature of report.
Bureau S. E....	Yearly.....	Work done during previous year. Report to include work under Steam Engineering (machinery) and Steam Engineering (electrical).
Bureau S. E....	Yearly.....	Inventory of office equipment.
Bureau S. E....	Yearly.....	Office expenditures for year, including mileage.
Bureau S. E....	Semiannually.	Efficiency reports.
Bureau S. E....	Semiannually.	Recommendations for advancement.
Bureau S. E.; general inspector of machinery.	Monthly.....	Percentage of completion of machinery; includes Form N. S. E. 102, with a general statement of the work done, plans submitted, plans acted upon without reference to bureau.
Bureau S. E....	Monthly.....	Percentage of completion of electrical work; includes Form N. S. E. 30.
Bureau S. E....	Monthly.....	Number of hours each boiler has been under steam during month.
Bureau S. E....	Previous to trial of a vessel.	Corrected copy of machinery specifications and electrical specifications.
Bureau S. E....	Previous to trial of a vessel.	Synopsis of hull and machinery data, Form 77.
Bureau S. E....	Previous to trial of a vessel.	Drawings, in duplicate, showing location of gauges, pyrometers, thermometers, counters, all instruments for obtaining data on the trials, etc.
Bureau S. E....	On inspection.	Report of inspection and condition of coal bunkers and fuel-oil compartments (made jointly with superintending constructor).
Bureau S. E.; general inspector of machinery.	On delivery of vessel.	List of uncompleted work, with estimated amounts to be reserved to cover cost of each item. To include drawings, spare parts, tools, etc., required by contract and not yet supplied. In brief, everything not yet supplied by contractor and required to complete the contract.
Bureau S. E., commanding officer Comdt. delivery yard for G. S. K.	On delivery of vessel.	Inventory of spare parts and tools supplied by contractors, showing separately items to be carried on board and items to be stored at navy yard.
Bureau S. E....	On delivery of vessel.	Number of hours dynamos have been in operation, also conditions of running as to amperes, volts, pressure, vacuum, etc.
Commanding officer.	On delivery of vessel.	Remark book.
Bureau S. E....	After delivery.	Final weight sheets. To include a list of weights due to changes.
Trial board.....	On trial of vessel.	Weight of machinery, etc., in accordance with contract requirements and other instructions from the bureau.
Trial board.....	On trial of vessel.	Condition of machinery installation as to proper strength, construction and conformity to contract requirements.
Trial board.....	On trial of vessel.	Completeness of whole of S. E. installation.
Trial board.....	On trial of vessel.	Itemized lists of uncompleted and unsatisfactory work, machinery and electrical, including spare parts, etc., not yet furnished by contractors.

To whom sent.	When made.	Nature of report.
Trial board.....	On trial of vessel.	Tests of auxiliaries, with power and water consumption of same.
Trial board.....	On trial of vessel.	Tabular statement of gauge corrections from comparison with standard gauges.
Trial board.....	On trial of vessel.	Certified setting of boiler safety valves.
Superintending constructor.	Monthly.....	Weight report.
Engineer officer of vessel.	On delivery of vessel.	Special information and data.
Engineer officer of vessel.	On delivery of vessel.	Corrected copy of machinery specifications.

MATTERS RELATING TO OTHER BUREAUS.

55. When questions arise affecting matters under cognizance of other bureaus, or where action by another bureau is involved, recommendations from the representative of the other bureau should be obtained with a view to reconciling all differences before forwarding such communications to the bureau. This procedure must be followed whenever practicable in order to avoid the delay which sometimes occurs by reason of such recommendations being forwarded directly to the bureau without an expression of opinion from the representative of the other bureau concerned.

It is possible that cases will arise in which work under this bureau is distinctly predominant and urgent, requiring immediate action in the premises. In such cases, in order to avoid delay, the original will be immediately referred to the bureau and a copy forwarded to the representative of the other bureau for report and recommendation in matters under its cognizance.

Before forwarding to the bureau correspondence in any way affecting matters under cognizance of other bureaus, a memorandum or indorsement containing an expression of opinion from such bureau's representative should be obtained. When plans are transmitted that require the

approval of another bureau, a blue-print copy will be forwarded for the files of such bureau.

The foregoing will not be interpreted as restricting the right of the inspector of machinery to communicate directly with the bureau if he deems it proper to do so without consulting the representative of other bureaus.

DRAWINGS AND PLANS.

56. The inspector will require all plans to be submitted for approval before work is commenced. He will confer with the representatives of contractors during preparation of plans, giving the contractors such information as may be pertinent and necessary in regard to details, arrangement, etc., and which will, in his opinion, carry out the bureau's requirements in the best way. All drawings must be submitted by the contractors with a separate letter for each vessel to which such drawings apply except as modified by paragraph 44.

The inspector on receiving such plans will carefully examine them as to their agreement with the specifications and previously approved plans, and also as to excellence of design and arrangement, and will then forward them to the bureau with a letter of transmittal.

The letter of transmittal must contain the inspector's comments and recommendations and any suggestions for improvements, all comment to be as clear and concise as conditions will allow, and a definite expression of opinion on the matter in question must be clearly stated in each case.

If no departure from approved plans and specifications is found, and if the design meets with the inspector's approval, and no other comment is necessary, he may forward the matter to the bureau with a signed indorsement stamp placed upon the original letter of the contractors, as follows:

Name of inspection office.
Date..... Office letter No.....
Respectfully forwarded to the Bureau of Steam Engineering.
Drawing agrees with specifications.
Approval recommended.

Inspector of Machinery.

This forwarding stamp will be used *only* in cases where further comment is *entirely* superfluous and unnecessary.

57. In cases where drawings submitted do not agree with the specifications, or for other reasons modifications are considered desirable, the inspector will consult with the contractors regarding such departures, and will see that same are either corrected or that reasons for changes and departures are clearly stated in contractors' letter, and fully commented upon in the inspector's letter of transmittal. This procedure is important, and if strictly followed will save much needless correspondence.

In all cases the inspector will secure for his files, before forwarding the original tracing, a blue print of each design after stamping, and will retain the duplicate letters for same.

Letters will be forwarded in separate cover from plans, except where the latter are of approximately letter-paper size. In miscellaneous correspondence, as well as in that relating to drawings, separate letters must be written for each separate subject or design and for each vessel, if it relates to more than one vessel, except as permitted for sister vessels building at the same time.

SUBMISSION OF PLANS.

58. In the preparation of drawings one set only need be prepared and submitted for approval for two or more vessels of the same class building at the same yard at the same time, except in the possible case of a particular matter applying to one or more, but not to all. Where tracings are submitted and immediate action is desired

they should be accompanied by a blue print for the bureau's files, and for plans requiring reference to other bureaus, prints should be included for the files of each of such bureaus.

If blue prints are submitted, they will be forwarded to the inspector in triplicate, one set to be retained for the files of the inspector, one set to be forwarded for the bureau's action and file, and one set to be returned to the contractors by the inspector. The set for the inspector's files and for the contractors will, on receipt of bureau's action, be marked by the inspector with the bureau's action and number of bureau's letter. In case contractors require additional sets of blue prints marked with the bureau's action, the number desired will be forwarded by the contractors to the inspector to be marked and attested by him. Where the apparatus in question is to be furnished by a subcontractor and is to be inspected by another officer, the necessary prints for the use of such inspecting officer will be secured by the inspector and marked with the bureau's action as above and forwarded to such officer direct, in addition to the copy which accompanies the copy of the order sent to the bureau.

The Inspector of Machinery will keep a record of the work pertaining to vessels under his inspection which is being inspected elsewhere, and will take the necessary steps to see that the inspecting officers in each case are furnished with the necessary information relative to the inspection of the material or apparatus in question and with all the approved changes or additions made during the course of manufacture.

When drawings are received in the bureau they will be given the bureau's file number for plans. This file number will be sent to the inspector of machinery in the return letter acting thereon. Thereafter the plan will be referred to by its bureau file number.

ELECTRICAL PLANS.

59. In the case of plans for the electric plant, the same procedure will be followed, except that blue prints will be submitted in quadruplicate. Two of these should be forwarded to the bureau, one for its files, and one for marking up, if necessary, and return to the inspector with correspondence, and to be used in correcting inspector's and contractor's copies.

STANDARD TRACINGS.

60. In order to avoid the submission of numerous plans for fittings and apparatus subject to duplication in vessels building by various contractors, the bureau has arranged with various manufacturers for the filing at the bureau of standard tracings showing their apparatus. The rules regarding the submission of these tracings are as follows:

The manufacturers will submit to the bureau a full set of tracings of apparatus in question, type and size of which have been approved by the bureau. These tracings, after having the bureau's approval and its file number placed thereon, will be returned to the manufacturer, who will take such negative prints as he may desire, after which the tracings will be sent to and become the property of the bureau.

The tracings must be made on best quality of tracing cloth, each plan to be 27 by 40 inches and the work to be placed on the glazed side of the cloth. Each set of tracings must include all details and a general-arrangement drawing, showing assembly. Each detail drawing must show only details belonging to one assembled part, or group of similar parts.

Each plan must show the material of which each part is made. This may be included in a bill of material on the plan and reference made by numbers or letters; no

marking or notes, except those pertaining to the design of naval work shown on plan, will be permitted.

Plans will be made to scale, the scale being sufficiently large to permit plans being easily examined. All detail parts must be completely dimensioned, and assembly drawings must show general dimensions.

In the lower right-hand corner of each tracing there will be a space 6 inches high by 3 inches wide left for the bureau's approval and filing stamp.

The bureau's specifications will be strictly followed.

In order to facilitate the preparation of these plans, the bureau will answer any question, furnish blue prints indicating its requirements, and do all it reasonably can to avoid delay.

The bureau will not require contractors to furnish finished tracings of such apparatus for vessels, where the above-described plans have been approved and tracings filed with the bureau, but will accept, in lieu thereof positive reading white cloth Vandyke prints. Such prints must be on best-quality cloth about .004 inch thick, well shrunken before coating; all lines and dimensions must be clear and distinct and there must be no distortion of the drawing. The cloth must show at least 50 points on the Mullin paper-testing machine. Reference to vessels other than the one for which submitted must not appear on such prints. Finished blue prints will be furnished as required by the specifications. These prints will be given new numbers in numbering and indexing the finished drawings. The new number will be placed below the bureau number of the standard tracing, which number will not be erased.

The bureau will furnish prints for the use of the inspectors of machinery and material, and will not require the contractors to submit for approval more than a letter proposing the size and general type of apparatus where trac-

ings of the design are in the possession of the bureau. All blue prints required by the contractors for their use must be furnished by themselves.

In case manufacturers propose any change in design at any time in one of the plans on file in the bureau, duplicate prints with explanatory letter must be furnished after the change is finally approved. A correct tracing must be furnished, to be approved and filed with the standard set in the Bureau.

REMARK BOOK.

61. The Inspector of Machinery will keep for each vessel under his inspection a remark book, in which will be entered as they occur—

Note of any repaired portion of machinery deviating from the regular design, and note of any defects or discrepancies from regular requirements which have been made by proper authority.

Notes on tests or copy of test reports of the machinery installed, including hydraulic and steam tests of boilers and piping.

Brief of results of post-trial examination, including a complete account of any peculiarities of performance observed on the contract trials.

Record of clearances of principal bearings at time vessel was run on trial. This should include clearance of stern bearings and dummy and thrust clearances in the case of turbines.

Such other available information as may be of use to the senior engineer officer of the vessel, such as sizes and kinds of packing used in joints, length of time boilers have been under steam previous to commissioning.

A subdivision of remark book will have reference to the electric plant and should have such notes on tests of electric plant, including interior communication systems

and instruments as are not incorporated in the record of electrical appliances.

In general, anything concerning the machinery installation will be entered that will be of value to the officers who will have charge of the machinery afloat.

This remark book will be forwarded to the commanding officer when the vessel is commissioned, and report to this effect made to the bureau.

DEPARTURES FROM SPECIFICATIONS.

62. In cases where, in the development of design, contractors deem it advisable to make departures from the specifications, they will make application through the inspector of machinery, stating the nature and object of the change, accompanied by a full statement of the reasons therefor and advantages to be obtained. Departures from the specifications of minor import not involving a material change in design or a change of cost, will be acted upon by the bureau and such matters will be treated as developments rather than as changes. The inspector will in all such cases make a definite recommendation for approval or disapproval.

Where the matter involves change of cost or is a material change or alteration, it will be treated as a change and handled as directed under paragraphs 64, 65, Changes.

CHANGES AND DEVELOPMENTS.

63. In working out the details of the machinery and electrical installation the contractors have for their guidance the general contract plans and the specifications. These should have been well considered by the bureau and by the contractors so that, in order satisfactorily to complete the machinery, little departure therefrom will be found necesssary or desirable. In some cases it will be found that all parts of a design are not completely cov-

ered by the specifications, additional details being necessary to complete the design as a whole. In such cases the additional matter will be treated as a development involving no change in cost or in penalty weight. This is intended to include all incidental apparatus necessary to complete the installation or design referred to in the plans and specifications. In other cases where different arrangements or devices from those specified are employed or where an addition, not contemplated by the plans and specifications is required, the matter will be treated as a change under the contract.

Developments are matters necessary to the proper completion of the system or installation as contemplated in the design, and which may at times be included only in general terms in the specifications. If in a certain system, required by the specifications, some additional fitting or device is found to be necessary to insure its proper operation, such fitting would not be considered as a change but as a development. Modifications in the leads of piping to secure a satisfactory arrangement of the parts contemplated by the specifications would not be considered as a change but as a development necessary to complete the whole installation in a satisfactory and proper manner. On the other hand the installation of new devices, not called for by the specifications, and not necessary to secure proper and satisfactory operation as contemplated by the contract requirements, or the change of an approved satisfactory arrangement into one thought to be more desirable to the Government, do constitute a change. Broadly speaking, changes comprise modifications of what has been specifically stated to be required, or additions to and omissions from what is contemplated in the original design. They do not, however, include modifications necessary to make the installation called for by the contract operate satisfactorily.

INITIATION OF CHANGES.

64. Changes in the contract plans and specifications may be ordered by the bureau or the department on its own initiative, or may be made at the suggestion of the contractors. Modifications that do not involve change of cost require no further action than approval by the bureau. All matters involving a change in cost must be referred to the board on changes, and where the estimated cost exceeds $500 the change must be authorized by the department, and the report of the board on changes must be approved by the department.

CHANGES SUGGESTED BY CONTRACTORS.

65. In cases where contractors deem it advisable to make a change, they will make application through the Inspector of Machinery, stating the nature and object of the change, accompanied by complete plans and specifications of the proposed change, with a statement of the amount of increase or decrease in cost and weight. The inspector in forwarding such proposed change will carefully investigate the matter, and submit recommendation as to the advisability of the change and whether the matter should be considered as a change or a development of the plans and specifications.

ESTIMATE, SUBMISSION OF.

66. When changes are proposed or the bureau directs that estimates for change in cost be submitted from contractors and from inspectors, the inspector will make careful examination and investigation into the matter of the cost of the change and submit what, in his opinion, is a proper cost of the work under consideration, and the bureau's Form No. 17, provided for this purpose, will be filled out and transmitted to the bureau, with copy to General Inspector of Machinery.

Should there be a material delay in submitting contractor's estimate the inspector's estimate will be forwarded alone, so as to permit the approval of department to be obtained.

OVERHEAD CHARGE ALLOWANCE.

67. A proper charge for indirect expenses will be allowed in estimating items of increased cost, the amount to be based on current practice at the plant where the change is made and at other plants in that vicinity; but not to exceed 50 per cent of the cost of labor and 10 per cent of the cost of material unless special or peculiar considerations, under authority of the bureau, are to be taken into account. A similar allowance will be made in estimating items of decreased cost.

RECORD OF CHANGES.

68. There will be kept in the office of the inspector of machinery for each ship under inspection a special record of all proposed changes, showing by whom originated, when received by the inspector, when forwarded to the contractors, when forwarded to the bureau with estimate, when action of bureau or department is received, including a record of amount of increased or decreased cost and weight in each case.

PERSONNEL OF BOARD ON CHANGES.

69. The general inspector of machinery is the senior member of the board on changes. Of the two remaining members one will be from the Bureau of Steam Engineering, the other usually an inspector or assistant inspector of machinery not connected with the work of the yard where the board convenes.

INFORMATION SUPPLIED TO BOARD.

70. When questions are referred to the board on changes the inspector will be informed that such action has been taken. The inspector will then collect such data as are necessary for consideration by the board, including his own and the contractors' estimates, with such other data as may pertain thereto, and will furnish the same direct to the senior member of the board when the board meets. He will, after consultation with the contractors, inform the general inspector when the matter is ready for the board's consideration. When the change in question is simple and the cost can be readily estimated, it may be acted upon by the board at any time after the change is ordered and before the work is completed. If, however, the estimates of the contractors and the inspector are at variance, the change being of such nature as to make exact estimates difficult, or where the estimates are much involved, the matter should not be considered by the board until after the work is completed, unless the change is an omission for which actual cost can not be determined. In all cases the contractors shall be notified by the inspector in advance of the time of meeting of the board and shall be invited to have a representative present. The contractors may, if they so desire, present for the board's consideration records, receipted bills, etc., showing the actual cost of the change.

PRESENCE OF INSPECTOR AT MEETING OF BOARD.

71. The inspector of machinery must be present in person to advise the board at all meetings of the board on changes. When notified of the date of meeting of the board, if he finds it impracticable to be present, he will so inform the senior member, who will, if practicable, set another date for the meeting when the inspector can be present.

CONFERENCE WITH CONTRACTORS BEFORE SUBMISSION OF CHANGE.

72. In most instances, before recommending a change, it is desirable and in keeping with good business methods that the inspector and a proper representative of the contractors confer as to the necessity for or desirability of the change, that the matter may be the more clearly presented to the bureau for its consideration and decision. The effect of this procedure would tend to prevent references of unnecessary changes to the bureau, avoid delays in work, and lessen the volume of correspondence.

ESTIMATE OF CHANGE, FORM NO. 17.

73. The estimate of change of cost and weight (Form No. 17) which is forwarded to the bureau and to the board on changes should be made out in detail, showing the different items included in the change, their material and finish, cost of material and labor on each item, the cost of installation, drawings, cost of estimates, any work connected with the change, and the overhead charges allowed. Where a change involves both additions and omissions of labor or material, the additions and omissions shall be grouped separately on the estimate sheet or placed on separate sheets. The inspector or acting inspector will sign or initial the estimate sheet and will enter thereon in the remark column the contractors' estimate.

Part IV.

DIVISION OF WORK, COGNIZANCE.

WORK UNDER OTHER BUREAUS.

74. The inspector of machinery will keep himself informed on the work under other bureaus whenever the execution of same has any bearing on the performance or accessibility for overhauling or repair of any part of the machinery or other work under this bureau. In this connection the inspector will be particular to examine into the following:

Arrangements of fire main and salt and fresh water service generally. Drainage systems, including special floor drainage of machinery spaces. Location and fitting of reserve feed tanks, fuel-oil tanks, and location and accessibility of sea connections.

Water-tight subdivision in machinery spaces and the location of doors for access. Matters in connection with the proposed arrangement and fitting up and ventilation of machinery spaces, coal bunkers, machinery storerooms, engineer's office, machine shop, refrigerator and ice-machine rooms, blower rooms, evaporator rooms, drum rooms, engineer's wash rooms. Particular attention should be paid to the air-supply arrangement for forced-draft blowers and the arrangement for supplying air to fire rooms under natural draft. Access to and between various machinery spaces, including arrangement of elevators, hatches, ladders, etc., stowage, arrangements for spare parts and supplies, location of valve-lifting apparatus on deck.

75. Inspectors should pay special attention to see that adequate foundations and attachments to hull are built for auxiliary engines, especially for blowers and pumps, as there are numerous cases in which engines have been thrown out of line and damaged by reason of foundations or attachments not being sufficiently rigid. Whenever defects of this character come to the knowledge of the inspector they will be reported to the bureau, with the inspector's comment and recommendation.

76. With special reference to the duties of the engineer officer afloat, the inspector will use his best endeavor to secure the most efficient arrangement of steam and other machinery in all parts of the vessel, and will consult freely with inspecting officers in direct charge of the work. He will be careful to secure for all mechanism and pipes installed by this bureau, outside of machinery spaces, the best possible lead and location and also the best arrangement of smoke-pipe guys. Wherever, in his judgment, work done under other bureaus injuriously affects the efficiency of any installation of this bureau he will call the attention of the proper inspecting officer to such point and, if necessary, submit report to this bureau for its further action.

DIVISION OF WORK BETWEEN BUREAUS.

77. Inspectors should be careful to inform themselves on the accepted lines of cognizance between the different bureaus, and avoid as far as possible any confusion and unnecessary controversy relative to this matter. The bureau desires to impress upon its inspecting officers the necessity for familiarizing themselves with the parts of the machinery, piping, and general outfit of vessels now conceded to be under the cognizance of this bureau.

The bureau will furnish inspectors from time to time with information concerning decisions relative to ques-

tions of cognizance of work, and all such communications will be carefully filed and rendered accessible for reference.

78. Parts under cognizance of the Bureau of Steam Engineering at the present time are generally covered by the machinery specifications for each vessel and enumerated in the bureau's weight instructions. The only places where doubt may arise as to whether parts are under cognizance of this bureau or another bureau are at points of intersection of work under different bureaus. Department's decision affecting one such case is as follows:

All parts that may be considered as immovable, attached or fixed to the hull, and properly forming a part thereof, to be under the cognizance of the Bureau of Construction and Repair; and the several other parts that may be considered as movable, not attached or fixed to the hull, to be under the cognizance of that other bureau to which they pertain according to the various provisions of the regulations.

REMOVABILITY OF FITTINGS.

79. A further decision of the department is as follows:

The Bureau of Steam Engineering shall have discretionary power to designate which of the supports, brackets, or fixtures as pertain exclusively to its work should be made portable, and such portable fixtures, etc., shall be furnished and fitted by and be under the cognizance of the Bureau of Steam Engineering, with the proviso that the integrity of water-tight bulkheads, double bottoms, etc., shall be preserved by riveting such fixtures etc., as must of necessity be attached thereto.

80. As it is absolutely necessary to avoid any arrangement of fittings that will prevent free access at all times to all parts of the machinery spaces, and the ready removal of all supports for floor plates or piping, the bureau desires that all such work be carried out hereafter so that the features of removability shall be in all cases retained, except where it would of necessity interfere with the

water-tightness of bulkheads, and even in such cases riveted lugs will be applied, to which removable supports can be fitted by this bureau with bolts and not with rivets. The same general idea will govern other fittings where controversy might otherwise arise, as this bureau's control must be inclusive and definite over all such supports connected with the machinery installation that are not essentially immovable parts of hull attachments.

COGNIZANCE OF WORK.

81. The following is a résumé of principal matters affecting cognizance. The full decisions have not been quoted as many of them are long and much involved; but all essential points to date are covered therein.

Notes on Cognizance of Work.

GENERAL LINE OF DIVISION.

82. In general, all parts covered by the machinery specifications are under cognizance of the Bureau of Steam Engineering. This includes the boilers, uptakes, and smoke pipes; the main engines with all attachments and all auxiliary machinery pertaining thereto; all steam pumps, wherever placed or for whatever purpose; all steam and exhaust piping and valves; steam-pressure regulators; radiators for heating ship; steam traps; water piping in engine and fire rooms, except drain pipes connecting different compartments; and risers on fire and flushing mains from pumps, up to and including the valve on main. The location of radiators and leads of piping outside of machinery spaces must be satisfactory to the Bureau of Construction and Repair. In general, the cognizance of the Bureau of Steam Engineering ends with parts that are bolted to the hull structure. Parts that

are riveted to the hull are under cognizance of the Bureau of Construction and Repair. This rule places the foundations for the machinery, boilers, and steam engineering auxiliaries under the cognizance of the Bureau of Construction and Repair. They are, however, made to the satisfaction of the Bureau of Steam Engineering.

The following specific questions of cognizance have been decided by the department, or agreed upon by mutual consent of the bureaus:

ENGINE AND FIRE ROOM VENTILATION.

83. Ventilators in engine and fire rooms are under the cognizance of the Bureau of Construction and Repair, but must be satisfactory to the Bureau of Steam Engineering. Ventilating blowers are under the cognizance of the Bureau of Construction and Repair. Forced draft blowers are under cognizance of the Bureau of Steam Engineering. The movable automatic shutters on forced draft blower discharges, for regulating the distribution or pressure of air, are under the cognizance of the Bureau of Steam Engineering. (Bu. S. E. 47726–131–10; C. & R. 17697–E. 4.)

DRAINAGE SYSTEM.

84. The main and secondary drains and all branches thereof, are under the cognizance of the Bureau of Construction and Repair. When manifolds are fitted joining the suctions from main and secondary drains, inner bottoms, or other compartments, these manifolds are also under cognizance of the Bureau of Construction and Repair. The steam pumps, the pump suction manifolds, independent bilge suctions in boiler rooms, engine rooms and shaft alleys, the connection from the flanges on the construction and repair manifolds, or from the flanges on the main and secondary drains, where such manifolds have

not been fitted, are all under cognizance of the Bureau of Steam Engineering. (Bu. S. E. 1220–Y; 1317–YY.)

85. Independent bilge suctions to two or more compartments partake of the nature of a secondary drain and are under cognizance of the Bureau of Construction and Repair. (Bu. S. E. 84807–625.)

Where drainpipes connecting different compartments are not fitted and there are suctions from each compartment leading to manifolds in such compartment, these suctions are under the Bureau of Construction and Repair. (*Jupiter* case Bu. S. E. 69415–251–15.)

FRESH WATER SYSTEM.

86. The general fresh water system, including tanks, filling pipes, distributing pipes, etc., is under the cognizance of the Bureau of Construction and Repair. When pumps in the general fresh water system are operated by steam they are under the cognizance of the Bureau of Steam Engineering. Such pumps when operated by other means are under cognizance of the Bureau of Construction and Repair. The piping for handling the water in reserve feed tanks is under cognizance of the Bureau of Steam Engineering. The only exception to this is in the case of the fresh water filling pipe, ordinarily fitted to lead from overboard to the reserve feed tanks. The portion of this pipe outside of the machinery space is under the cognizance of the Bureau of Construction and Repair, which bureau supplies a flange just inside the machinery space, the piping from this point on being under the cognizance of the Bureau of Steam Engineering. (Bu. S. E. 1220–Y; 1317–YY, Dept. 8580–57 Jan. 30, 1904.)

87. Distiller connections to trimming tanks on destroyers: the Bureau of Steam Engineering has cognizance over parts in machinery spaces. The Bureau of Con-

struction and Repair has cognizance over other parts. (Bu. S. E. 61421–625.)

88. All bath water heaters are under the cognizance of the Bureau of Construction and Repair, but the steam and drain connections are under cognizance of the Bureau of Steam Engineering. A simple steam jet in a sink or bathtub is under cognizance of the Bureau of Steam Engineering.

REDUCING AND STOP VALVES.

89. Reducing and stop valves in steam to steering engine are under cognizance of the Bureau of Steam Engineering. (Bu. S. E. 76153–329–20.)

SEA CONNECTIONS AND VALVES BELONGING THERETO.

90. When leading to steam engineering pumps these are under cognizance of the Bureau of Steam Engineering. Any sections of such piping that are riveted to bulkheads or to the ship's side and are thus made a permanent part of the hull are under the Bureau of Construction and Repair. Zincs for protecting the hull at outboard connections and on shaft struts and stern tubes are under the Bureau of Construction and Repair. Zincs on shafts or attached to outboard bearing shells are under the Bureau of Steam Engineering. Strainers over sea injections belong to that bureau which has cognizance over the part to which they are bolted, but the area through strainer must be satisfactory to that bureau for whose purpose the injection is fitted.

BULKHEADS—WATER-TIGHT JOINTS.

91. All piping, engine braces, or other parts under cognizance of the Bureau of Steam Engineering that pierce water-tight bulkheads must be fitted at the bulk-

head to the satisfaction of the Bureau of Construction and Repair. Any fittings for the attachment of bulkhead stuffing boxes, etc., that are riveted to bulkheads are under the cognizance of the Bureau of Construction and Repair.

FLOOR PLATES, LADDERS, GRATINGS, ETC.

92. Engine and fire room floor plates, ladders, and gratings below the level of the protective deck are under cognizance of the Bureau of Steam Engineering. If on line with or above the protective deck, they are under the Bureau of Construction and Repair. Platforms and gratings fitted for attention to distillers or machinery in hatches are under the Bureau of Steam Engineering. The supports for such of these fittings as are under Steam Engineering are also under Steam Engineering if they are bolted to the hull structure. If riveted to the hull structure they are under the Bureau of Construction and Repair. The Bureau of Steam Engineering has discretionary authority to say which of the supports for floor plates shall be made portable. All ladder rounds on bulkheads are under cognizance of the Bureau of Construction and Repair.

SHAFT STRUTS AND STERN TUBES.

93. Shaft struts and stern tubes are under cognizance of the Bureau of Construction and Repair. They are bored out and stern bearings and bushings are fitted by the Bureau of Steam Engineering. Removable fair waters around shafting, on the bosses of struts, and at stern tubes are fitted by Steam Engineering.

REFRIGERATING MACHINERY.

94. Refrigerating machinery for ice making and for cooling cold storage and magazine spaces is under cognizance of the Bureau of Steam Engineering. This in-

cludes all dense air piping for machines of the air type and all piping for carrying refrigerant, as well as the cold brine piping for other machines, with pumps, valves, lagging, instruments, etc. Cooling water pipe connections to fire mains are under the Bureau of Construction and Repair. For magazine cooling the Bureau of Construction and Repair is, jointly with the Bureau of Steam Engineering, responsible for determining the capacity and location of the machines.

AIR-COMPRESSING MACHINERY AND PIPING.

95. Air compressors for charging torpedoes are under cognizance of the Bureau of Ordnance. Air-compressing machinery for all other purposes except in submarines when used for adjusting and diving under cognizance of the Bureau of Steam Engineering. Air reservoirs and air piping in the machinery spaces are under the Bureau of Steam Engineering. When air-compressing machinery under the cognizance of the Bureau of Steam Engineering is placed outside of the machinery space, the cognizance of the Bureau of Steam Engineering includes the air compressors themselves, the engines or motors for driving them, with all steam and exhaust pipes, valves, gauges, forced lubrication system complete, safety valves, and fittings. If the circulating water is taken from the fire main, the connections are under cognizance of the Bureau of Construction and Repair. If from an independent pump or pump attached to the machine they are under the Bureau of Steam Engineering. All air pipes outside of machinery spaces, including both suction and discharge connections to air compressors and reservoirs, are under the Bureau of Construction and Repair.

ASH EJECTORS, EXPELLERS, AND PIPING.

96. The general location, so far as concerns the piercing of bulkheads, decks, ship's side, etc., must be arranged to the satisfaction of the Bureau of Construction and Repair. The size of piping, general arrangement and location of openings in the ship's side or bottom, must be satisfactory to the Bureau of Steam Engineering. The Bureau of Steam Engineering has cognizance over the installation and over all parts not permanently attached to the hull of the vessel. Short sections of piping, riveted to bulkheads, or to ship's side, and forming a permanent part of hull, are under the Bureau of Construction and Repair.

TANKS, ETC.

97. All large tanks used for the storage of water and fuel oil are under the Bureau of Construction and Repair; this includes fuel oil settling tanks. Tanks for the storage of steam engineering supplies, such as lubricating oil and waste, and other tanks that constitute an integral part of any installation under cognizance of the Bureau of Steam Engineering are under the cognizance of that bureau. For example, the feed tanks, filter tanks, the drain and settling tanks in a forced lubrication system and the testing tank used in connection with the distilling plant are under the Bureau of Steam Engineering.

Feed and filter tanks are under cognizance of the Bureau of Steam Engineering in all cases. The Bureau of Construction and Repair will be consulted as to the location, method of securing, etc., of feed and filter tanks in those rare instances in which they are permanently fastened to the ship. Whenever the permanent ship's structure is so utilized, however, the Bureau of Construction and Repair is to retain cognizance of the integrity

and preservation of such portions of the tanks as are a part of the permanent structure of the ship. The department's decision in this case is based upon the peculiar circumstances of the case and forms an exception to the general rule concerning parts permanently attached to the ship's structure. (*Nebraska* decision—Bu. S. E. 57137–308–8–Dept. 10875–81, Apr. 23, 1912.)

COMBINED HEATING AND VENTILATING.

98. The ventilating pipe, including box for steam coil with its size and location, is under cognizance of the Bureau of Construction and Repair. The steam coil and its connection to steam-piping system is under cognizance of the Bureau of Steam Engineering. (Bu. S. E. 13396–C; 13041–CC.)

SMOKE-PIPE GUYS.

99. Are under cognizance of the Bureau of Steam Engineering but will be located jointly by the inspector of machinery and superintending constructor.

FUEL-OIL SYSTEM.

100. Storage tanks, settling tanks when in the nature of a permanent storage tank, and all filling pipes not connected to Steam Engineering pumps are under cognizance of the Bureau of Construction and Repair. All suction pipes, pumps, valves, manifolds, pressure pipes and valves and burners are under cognizance of the Bureau of Steam Engineering. All pipes that serve both as suction pipes and filling pipes are under the Bureau of Steam Engineering.

On destroyers where filling pipes are fitted as suction pipes for use with the vessel's fuel-oil pumps, the part within the machinery space is under the cognizance of the Bureau of Steam Engineering, while the deck fitting and part above deck is under cognizance of the Bureau

of Construction and Repair. (Bu. S. E. 13833–EE; C&R 23942–E. 25 to 28.) On larger vessels, where the filling pipes are brought into the machinery spaces and connect to the suction manifolds under Steam Engineering, the Bureau of Construction and Repair has cognizance up to and including the flange connecting to manifold. (See Specifications for Fuel-Oil System on recent ships.)

BULLETIN BOARDS—ENGINE-ROOM DESKS.

101. These are classed as equipage and are under cognizance of the Bureau of Construction and Repair.

SUBMARINES.

102. The Bureau of Steam Engineering has cognizance over the engine, shafting, and propellers, with their bearings and accessories. It also has cognizance over the dynamo or motor, storage batteries, and electrical apparatus. The air compressors and pumps, other than those required to operate the engines, are under cognizance of the Bureau of Construction and Repair.

STEAM LAUNCHES.

103. The Bureau of Steam Engineering has cognizance over the boiler, engine and all accessories, shafting, bearings, propeller, all piping, valves and other attachments necessary for the proper installation and working of the propelling machinery, pumps worked by power other than hand, and the portable flooring around propelling machinery. The tank under boiler, if fitted, is under the Bureau of Steam Engineering. In general, the division follows the same lines as on a large vessel.

MOTOR BOATS.

104. The Bureau of Steam Engineering has cognizance over the propelling machinery or motor, with all shafting, bearings, propeller, all piping, valves and other attach-

ments necessary for the proper installation and working of the propelling machinery, pumps worked by power other than hand, and the portable flooring around propelling machinery. (Bu. S. E. 15465–2; Dept. 20353–3 of Sept. 14, 1903.)

ENGINE COUNTERS.

105. Are under cognizance of the Bureau of Steam Engineering. Department's eighth indorsement No. 15–27, of June 24, 1905, gives the Bureau of Construction and Repair cognizance of Taylor counters until developed to the satisfaction of the trial board, its subsequent installation for trial purposes to be made under the cognizance of the Bureau of Steam Engineering. Department's fifth indorsement No. 3740, of February 2, 1906, authorized the Bureau of Construction and Repair to provide additional Taylor counters for use on the Pacific coast, that bureau having certified that this counter was still undeveloped.

ELECTRICAL WORK.

106. The following parts of the electrical equipment come under the cognizance of the Bureau of Steam Engineering:

107. Generating sets with engines or turbines complete, switchboards, wiring and conduit, lamps, and accessories; portable electric fans, searchlights, night-signal sets, telephones, electric bells, testing apparatus, radio apparatus, thermostats, tools for electric plant, storage batteries, dry and wet batteries, all electrical apparatus for interior communication, except battle-order transmission apparatus and range finders, but not excepting wiring.

This includes all electrical apparatus, except motors and their control apparatus for operating machinery under cognizance of other bureaus and such other apparatus as

has been placed under other bureaus by decisions of the department.

CONDUIT, ETC.

108. The Bureau of Steam Engineering is responsible for the supply and installation of electric wiring on vessels of the Navy, including conduits and fixtures, it being understood that the plans for the installation as far as they involve securing the strength and water-tightness of bulkheads, the size and location of holes in bulkheads, deck beams, and other integral parts of the hull (and any interference with the installation of other material) are subject to the approval of the Bureau of Construction and Repair. (Bu. S. E. 43673–625; Dept. end. of June 29, 1911.) This does not apply to wiring and conduit between motors and their controlling appliances which are under cognizance of the bureau having cognizance over the motor. (Dept. end. 18282–6 of Sept. 11, 1911.)

VOICE TUBES, PANELS, ETC.

109. Voice-tube panels for mounting call bells, push buttons, and annunciators in connection therewith are entirely under cognizance of the Bureau of Steam Engineering as far as relates to cost and changes of cost. Voice tubes, voice-tube terminal boxes, mouthpieces, etc., are under cognizance of the Bureau of Construction and Repair as regards cost and changes of cost. (Bu. S. E. 36821–726, Jan. 5, 1912.) All means of mechanical signal communication except engine and fire room telegraphs are under the Bureau of Construction and Repair as regards cost and changes of cost. (Bu. S. E. 5096–625.) Voice-tube panels include all cases where there is calling apparatus and voice-tube terminal boxes refer to cases where there is no calling apparatus. (Bu. S. E. 51855–768.)

ILLUMINATING SETS.

110. The illuminating outfit under cognizance of the Bureau of Steam Engineering includes the illuminating set complete, with braided cotton cord or steel-wire rope, as the case may be, also the sister hooks and turnbuckles attached to same. (Bu. S. E. 5166–290–5—Dept. 19344–49 of Nov. 10, 1911.)

ELECTRIC SEMAPHORE FOR SIGNALING.

111. The mechanical features are predominant and place this apparatus under cognizance of the Bureau of Construction and Repair. (Bu. S. E. 72820–711–2–L.)

GYRO COMPASSES.

112. Gyro compasses, including motor generators, fuse panels, starting panels, and switchboards, are under cognizance of the Bureau of Navigation. The wiring and conduit in connection with the instrument are under the Bureau of Steam Engineering. (Bu. S. E. 57418–604.)

ELECTRIC WATER HEATER.

113. Electric water heater for ship's barber is under cognizance of the Bureau of Construction and Repair. (Bu. S. E. 62925–625.)

COMBINED OIL AND ELECTRIC LIGHTING FIXTURES.

114. Combined oil and electric lighting fixtures are under cognizance of the Bureau of Steam Engineering.

DISTRIBUTION PANEL ON SUBMARINES.

115. Distribution panel on submarines is under cognizance of the Bureau of Steam Engineering, although containing switches for operating a motor belonging to the Bureau of Construction and Repair. (Bu. S. E. 37167–497.)

AEROPLANES.

116. The power plant, design, construction, installation, and repair are under Steam Engineering. This includes the engine, starter, shafting, propeller, radiator, cooling system, oil system, carburetor, gas leads and connections, muffler and exhaust piping, ignition system, magneto, generator if used for starting or ignition, ignition or starting batteries, shafting and gearing driven by main engine or its auxiliaries operating machinery under cognizance of other bureaus up to the gear or coupling directly connecting with such machinery; oil pumps, piping and reservoirs, main and auxiliary fuel tanks and piping, water, fuel, and oil gauges, fuel, lubricating oil bearings, brackets and supports for Steam Engineering installations which do not form an integral part of the structure; whistle and engine control signals. The controls for engines, including levers, pedals, push rods, or leads, including lead blocks or tubes, are under Steam Engineering, but the location of controls and leads to be satisfactory to the Bureau of Construction and Repair. (S. E. No. 75466–736.)

GENERAL WORKSHOP.

117. The Bureau of Construction and Repair fits up the shop, supplying all equipage, including work benches, tool and gear boards, lockers, drawers, shelves, wrench racks, foundations for tools, including drip pans if placed on the foundations, and tanks for oil and waste. The plans for and disposition of all such equipage must be satisfactory to the Bureau of Steam Engineering. The Bureau of Steam Engineering supplies all tools, both hand and power, including all motors, control apparatus, shafting, and belting.

BLACKSMITH SHOP.

118. The Bureau of Construction and Repair fits up the shop, supplying all equipage, including work benches, racks, lockers, shelves, and drawers for storing tools and stores, tanks for water and fuel oil, and coal bins, etc., and foundations for tools installed by the Bureau of Steam Engineering. The arrangement of such equipage must be satisfactory to the Bureau of Steam Engineering. The Bureau of Steam Engineering supplies the forges, anvils, blocks, and tools permanently installed in the shop.

FOUNDRY.

119. The Bureau of Construction and Repair fits up the shop, supplying all equipage, including sand boxes, tanks for fuel oil, coal bins, if required, lockers, racks, shelving, etc. The arrangements must be satisfactory to the Bureau of Steam Engineering, which supplies furnaces, crucibles, and all tools and accessories used in the foundry.

Part V.

OFFICE MATERIAL—VISITORS.

OFFICE JOURNAL.

120. An office journal will be kept, in which shall be entered the following information:

Reporting of officers for duty.

Detachment of officers, appointment of boards, and meetings and sessions of boards.

Appointments and change in office force.

Visits of distinguished officials.

Stoppage of work on account of strikes, etc.

Any important matters relating to machinery of vessels under inspection, such as dates of important tests, dock trials, accidents, and other important items. In particular any item of information having a direct bearing on any possible claim of the contractors for delay in the execution of a contract will be fully entered.

The journal will be examined and signed by the inspector of machinery at the end of each week.

OFFICE OUTFIT AND FURNITURE.

121. General requisitions for office supplies (appropriation: "Increase of the Navy, construction and machinery") must be submitted semiannually in June and December, in order that the matter may be taken up at the time and correspondence relative thereto be reduced as much as possible. Additional requisitions should only be made for such supplies as could not have been foreseen when the regular semiannual requisitions were submitted.

The bureau desires that office equipment, etc., should be of the most approved character and that all apparatus which will aid in the economical carrying on of the work be secured. The bureau, however, does not favor the

purchase of costly apparatus the need for which is not pertinent and when the service derived does not bear a proper proportion to the outlay necessary. Strict economy and special care should be exercised in the issue and use of office supplies and instruments. Recommendations from inspectors concerning improvements in office facilities, equipment, etc., will receive special consideration.

Inspectors will submit at the end of each calendar year a list of equipment in their respective offices, and the condition of the same, together with comments in reference to changes or additions which may be considered desirable.

VISITORS.

122. The department's instructions concerning visitors to vessels under construction are to be carefully complied with, and the contractors will be specially instructed concerning these requirements in order that confidential information concerning characteristics of machinery and apparatus may not be divulged to unauthorized persons.

In general, no visitors will be allowed to go on board vessels of the Navy under construction except by permission of the senior naval officer present, and no such permission shall be given anyone not known to be an American citizen of good standing and repute. In case visitors are permitted to go on board any vessel under construction, they shall be accompanied, if practicable, by an officer or other responsible person attached to the office of the inspector. In no case will unauthorized persons be given permission or permitted to take photographs or make sketches of the machinery or installation on board without authority from the bureau, or the Navy Department, and whenever photographs are taken on board, the department's instructions in that regard as applying to naval vessels will be strictly observed.

PART VI.

WEIGHTS.

WEIGHTS OF MACHINERY.

123. To carry out the provisions of the contract, and of that portion of the United States Navy Regulations relating to weights of machinery, every item of finished material coming under cognizance of the Bureau of Steam Engineering must be accurately weighed and entered, in accordance with the weight instructions, on blanks furnished by the bureau. The weight of such other items as are not under cognizance of the Bureau of Steam Engineering, but are included in Class V in the weight instructions, will also be obtained, if practicable, and entered as directed. The Inspector of Machinery must familiarize himself with the weight instructions, and assure himself that they are carried out in the classifications, groupings, and all other aspects. A monthly return of machinery weights will be made to superintending constructor as per form N. S. E. 106.

WEIGHTS OF CONTAINED WATER.

124. The provisions of the contract, with respect to the weight of contained water, will be strictly followed. The weight of water will be calculated for the temperature corresponding to trial condition, and will include the weight of steam in boilers and pipes. In entering the calculated weight of water in the weight sheets, the temperatures employed in the calculations, corresponding to each item, will be noted.

CENTERS OF GRAVITY.

125. In filling in the distances called for in the columns locating the centers of gravity of the machinery parts, great care will be exercised to obtain these distances as correctly as possible. The same lines, or planes of reference, will be used throughout the weight sheets.

FINISHED WEIGHTS.

126. The finished-weight sheets will be forwarded to the bureau as soon after all work is completed as possible. The report required in paragraph 167a is for the purpose of determining the approximate penalty weight of machinery for preliminary settlement. The penalty weight will be finally determined by the bureau after the finished-weight sheets have been received.

With the final weight sheets will be included a statement showing in detail increased or decreased weight due to authorized changes in machinery including electrical changes.

Part VII.

TESTS.

TESTS OF MATERIAL.

127. Tests of unfinished material are for the most part made by the Inspector of Engineering Material of the district where the material is manufactured, but in all cases where material is manufactured at the building yard the inspector of machinery will make the inspection and conduct the tests as required by the specifications for material.

TESTS AND CHEMICAL ANALYSES.

128. The bureau has regular forms for making records of tests of material and chemical analyses, and the inspector of machinery will, in all cases where either tests or chemical analyses are made of any material, make a record of same on such forms as the bureau furnishes, forwarding copies to the bureau.

WAIVERS OF MATERIAL.

129. In case of waivers of material the bureau has a regular form of waiver card which will be submitted to the bureau properly filled out either for its approval or with a statement on same showing that a waiver was granted by the inspector of machinery where it was of such a character that he felt satisfied in making a waiver.

TESTS OF MACHINERY.

130. The various parts of the machinery will be subjected to such hydraulic and steam tests before installation as are required by the specifications and directions

given by the bureau. The inspector will require the arrangements and methods of testing to be made to his satisfaction, and will keep a record of such tests.

PRESSURE TESTS ON SHORE.

131. The Inspector of Machinery must be present at the hydraulic and steam tests on shore of the boilers, condensers, and cylinders. The accuracy of all test gauges must be satisfactorily established, and the test must be properly applied. Measurements must be carefully taken before, during, and after the tests, so that any deformation indicating general or local weakness will be detected.

TESTS OF APPARATUS.

132. All auxiliary machinery will be tested in general to determine its satisfactory installation and to ascertain if the requirements of the specifications as to strength, capacity, and operation are met. These tests should be made if possible previous to the preliminary trial of the vessel. The data for curves of horsepower and revolutions of auxiliaries required for the use of the trial board should also be taken at the time such apparatus is tested.

133. In connection with these tests the following general instructions are given: Special requirements and features as to tests of particular apparatus are given in the contract and specifications. Other details will be given at such time as the apparatus is acted on by the bureau. The following matters of information are given to guide inspectors in making and reporting these tests.

FORCED DRAFT BLOWERS.

134. These will be tested by operating each set before preliminary trial to demonstrate proper assembling and adjustment. The details of requirements for tests of

capacity, etc., will be given in the specifications. In connection with the testing out of blower installation the tightness of the boiler compartment should be determined and the superintending constructor advised of any deficiency in the matter.

BOILERS.

135. Boilers will be subjected to trials and tests as are required by the specifications and contract, tests in each case to be as full and complete as possible. During both hydraulic and steam tests of boilers careful examination will be made of all parts in order to determine any tendency to distortion and any indication of leaks or bad workmanship.

In testing boilers with water pressure after installation on board ship the fall in pressure for 24 hours with pump shut off will be noted and recorded in report of test. A drop of more than 20 per cent of test pressure in 24 hours will be considered unsatisfactory.

EVAPORATING PLANT.

136. This test is made to demonstrate the capacity and also for determining any defects in installation, arrangement, and operation. If arrangements are available it is desired that the water from coils be measured to determine the steam consumption of the plant. Test reports should include the following data, in addition to report of capacity:

Pressures, in coils and shells.

Temperatures of circulating water (injection and discharge), feed water, distilled water, evaporator room, outside air.

Double strokes, circulating pump, feed pump, fresh-water pump.

Quality of water in grains of chlorine per gallon. More than two grains per gallon will not be considered satisfactory.

CIRCULATING PUMPS.

137. These may be tested either before or after installation on board, provided the necessary apparatus and facilities for carrying out all the requirements of the specifications for tests can be complied with. The water consumption of pump engine should be obtained and reported wherever required, and in other cases if possible.

REFRIGERATING PLANT.

138. This test should be run at least 24 hours unless otherwise specified. The time to cool the refrigerating chambers should be noted at frequent intervals. Several batches of ice should be frozen and the time for freezing noted. The horsepower of the machine will be determined if practicable and careful observations of the temperature of the discharge and temperature of the returned air or other cooling medium obtained. Observations will also be made of the time for rise in temperature of the refrigerating chamber with cooling medium cut off, in order to determine the efficiency of the insulation.

139. Tests to fully indicate the cooling ability of the refrigerating apparatus supplied for magazine refrigeration will be made, the specific requirements being contained in the specifications.

TESTS ON BOARD.

140. The Inspector of Machinery or authorized assistant will be present at the hydraulic and steam tests on board, to see that they are properly carried out, and that the results are satisfactory. Particular attention must be paid to the tightness of all joints subject to either steam or exhaust tension, both in pipes and connections.

ELECTRICAL TESTS.

141. Besides the inspection of work in the course of construction and erection, the following tests shall be held on all electrical work:

(1) 48-hour test on generators.
(2) Searchlight tests.
(3) Motor tests.
(4) Insulation tests.
(5) Interior communication tests.

These tests are described fully in the following enumerated advance sheets and specifications and subsequent corrections, additions, and changes.

Advance Sheet No. 18, of February 16, 1909, with modifications.

Specifications for installing electric plants and means of interior communication, included in ships' specifications.

INSULATING TESTS.

142. The insulating resistance of circuits operating on less than dynamo voltage may be measured at a pressure of 125 volts, voltmeter method, or an ohmmeter may be used.

MOTORS FOR MACHINE TOOLS.

143. Machine tools shall be tested after installation by operating the tool at full capacity for approximately one hour. The following features should be noted:

(1) Start and stop several times with and without load at high and low speed and note motor input both starting and steady.

(2) Note variations in speed, also heating by thermometer after about one hour full machine load at full field speed.

(3) Note convenience of controlling appliances; on lathes exceeding 6 feet between centers, the controller should be on lathe carriage.

Part VIII.

DIVISION OF CONTRACT PRICE, PAYMENTS.

DIVISION OF CONTRACT PRICE; ALLOTMENT FOR MACHINERY.

144. When the contract for the construction of a vessel has been signed, a copy of such contract will be furnished the inspector of machinery, together with the contract plans and specifications for the vessel. The Inspector of Machinery will then request the contractor to designate what portion of the contract price he desires to allot for parts covered by the machinery specifications. This will be submitted to the bureau for its approval. The inspector of machinery will, in consultation with the contractors, then subdivide the amount so approved among the several items on Bureau of Steam Engineering Form 102, which form will contain columns showing for each item the estimated weight of material, the amount allotted for material, the amount allotted for labor, and the total of the amounts for material and labor. In the preparation of this subdivision of the machinery allotment, special care will be exercised by the inspector to see that excessive amounts are not allotted to material or to items which are completed during the early stages of construction. The form, when approved by the bureau, will be used as the basis for monthly reports of progress on the vessel, as well as the special reports accompanying applications for payments.

MONTHLY REPORT OF PROGRESS.

145. At the end of each month a report will be made by the inspector of machinery showing the progress of the work for each vessel building under his inspection. This

report will state in detail the work of the previous month, and will include such data as the Inspector of Machinery may possess relative to prospective launching, tests, trials, etc. It will contain full information concerning causes of delay in the progress of work, such as an insufficient number of workmen, strikes, delays in receipt of materials, etc. The report will conclude with the inspector of machinery's estimate of the percentage of completion of the machinery at the close of the month. Accompanying the report will be a report on Form 102 and Form 2, "Report of installation of electric plant."

146. After the delivery of a vessel to the Government monthly reports of progress, Form 102, need not be submitted, but about the first of each month and until the vessel is finally accepted, a letter will be forwarded for each vessel stating all items of unfinished work with the percentage of completion.

APPLICATIONS FOR PAYMENT.

147. In order to carry out the department's instructions regarding the successive payments to contractors, the following papers relative to the contractors' application for each payment will be forwarded to the bureau:

(*a*) Notice from the contractors that they have made application for a payment.

(*b*) Statement in detail from the contractors, giving the amount included in the above application as due on machinery and cost of material and labor furnished.

(*c*) Special report on Form 102.

(*d*) Joint letter, signed by the Superintending Constructor and Inspector of Machinery, containing recommendation in case.

(*e*) Evidence, such as shall be submitted by the contractors, in compliance with the department's instructions, contained in its letter No. 5969–03, of July 1, 1903, that there are no liens or rights in rem against the vessel on which such payment is asked for or the material on

hand therefor that would interfere in any way with the rights of the Government in any event that may arise under said contract.

(*f*) Report in triplicate, Form 88.

(*g*) Affidavit showing that eight-hour law has been observed in construction of vessel and machinery in cases where this law applies.

If the boilers for the vessel are building under subcontract, the following additional papers will be included:

(*h*) Copy of the latest monthly report from the inspecting officer at the works of the subcontractors for boilers, giving the percentage of completion of boilers and amount earned for boiler work.

(*i*) Copy of certificate from subcontractors, as to percentage of contract price paid on boilers by the contractors.

(*j*) Additional insurance policies on boilers, payable to the Secretary of the Navy, covering the amount for which payment on boilers by the Government is requested. If these policies have been previously forwarded, the number and date of letter forwarding them will be given.

148. The contractor's bill, in quadruplicate, will be forwarded by the Superintending Constructor to the Bureau of Construction and Repair.

CREDIT FOR MATERIAL.

149. In making reports of progress and special reports accompanying applications for payment, Inspectors of Machinery will not give credit for material ordered from subcontractors until after its delivery at the building yard. This does not apply to the boilers when building under subcontract, for which credit may be given as the work progresses, as provided in paragraphs 148 and 151.

ANNUAL REPORT.

150. A special annual report will be made as soon as practicable after the end of each fiscal year on the progress of work on the machinery of each vessel during the

previous fiscal year. This report is required for use in preparing the annual report of the chief of bureau. It should be accurate and concise, and should be arranged under the following general headings, each vessel being given a separate sheet:

(*a*) Name of ship, date of contract, date to be completed, contract price, name of contractors, percentage of completion from which and to which the work on machinery has advanced during the year.
(*b*) Items of machinery that have been completed and installed.
(*c*) Items of machinery that have been erected in shops and are ready for installation.
(*d*) Items of machinery that are under way.
(*e*) Probable date of completion.

These general headings should be supplemented by any others that are deemed of sufficient interest to warrant mentioning in the annual report of the chief of bureau, but a list of changes in the original plans will not be included unless questions of special importance are involved.

BOILERS BUILDING UNDER SUBCONTRACT.

151. In cases where the boilers for a vessel building under contract are being built by parties other than the contractors, and the contractors desire that payment shall be made by the Government on account of the boilers, as the work progresses, the following procedure will be followed:

The contractors will allot for such portion of the boiler work as is done at the works of the subcontractors a portion of the contract price which must be approved by the bureau. The inspecting officer at the works of the subcontractors will then be directed to submit to the Inspector of Machinery for the vessel monthly reports

showing the percentage of progress on the boilers. Copies of these reports will be furnished to the contractors, who, in order to obtain credit for the boiler work, must furnish the inspector of machinery with certificates from the subcontractors, showing the proportion of the contract price that they have paid on the boilers. Insurance, payable to the Secretary of the Navy, must be effected on the boilers to the amount for which payment by the Government is requested, and the policies must be forwarded through the inspector of machinery to the bureau for deposit in the office of the Solicitor. When a payment is requested, papers will be forwarded in accordance with the instructions in paragraph 147, 148.

REQUEST FOR EXTENSION OF TIME OF DELIVERY.

152. These requests will be submitted through the Inspector of Machinery and the Superintending Constructor and in forwarding such requests inspectors will comment fully upon all matters bearing on the delay mentioned, in order that the bureau may be fully advised of all circumstances in making its recommendation to the department.

In making recommendations in this matter the wording and intent of the contract should be fully considered. Contractors are expected to have full knowledge of the practicability of their design and have control of their workmanship. Hence delays due to improper design and workmanship and failure of the apparatus provided by the contractors to pass tests are, generally speaking, not delays that warrant an extension of time.

In this matter, however, it is the intent of the bureau to give contractors equitable consideration and each case must necessarily be decided on its merits.

Part IX.

ORDERS FOR MATERIAL.

UNFINISHED MATERIAL.

153. On the receipt of contractors' orders for finished or unfinished material, the inspector of machinery will forward two copies of such order, with inclosures, direct to the inspector of engineering material in the district where the material will be manufactured and one copy to the bureau. Forwarding stamps of design supplied by the bureau will be placed in the upper left-hand corner on the reverse side of each copy of order, these being properly filled in according to requirements of stamp. The three copies must each have on them the name of the ship for which intended, and if not for a ship the information as to the bureau or Navy pay office contract as provided for, for the "subject." A copy of each order for material to be inspected on delivery will be forwarded to the Bureau of Steam Engineering in the same manner as orders to be inspected at place of manufacture. The proper stamped form will be used for forwarding and no indorsement or letter forwarding copy to the bureau will be required and no copy of plans will be forwarded except such as may be needed for the proper inspection of material ordered. The Inspectors of Engineering Material have authority to make the inspection without specific orders from the bureau. Any change in the specifications that may be approved by the bureau subsequently will be communicated by the Inspector of Machinery to the Inspector of Engineering Material and the bureau in the same manner as the original order.

154. Before forwarding orders inspectors will exercise care to see that they specify definitely what is called for. Specifications or parts of specifications referred to should be exactly designated; in case leaflet specifications are used reference should be made to same by number and date.

If composition metal is ordered it should be designated by the symbol standing for that composition.

155. The bureau will decide upon the final acceptance of material that does not fulfill the requirements of the specifications. In the case of the transfer of an order to another inspection district notice will be sent to the original district requesting that the copies of the order be forwarded to the new district, and a carbon copy of such notice will be sent by the Inspector of Machinery to the new district and one to the bureau. In the case of changes in, revocation, or cancellation of orders duplicate notices will be sent to the inspection office concerned and a carbon copy thereof to the bureau. The inspection office receiving notices of the transfer of an order so as to require inspection in another district will promptly forward the copies of the order transferred to the inspection office of the district to which transferred. Attention is called to the general specifications for inspection of material. When blue prints or other information on separate sheets is required for inspection, one copy will accompany each copy of order sent out by the Inspector of Machinery, either to the Inspector of Engineering Material or the Bureau of Steam Engineering.

FINISHED MATERIAL.

156. Where finished material is to be ordered by contractors from other firms, detail drawings, cuts, and specifications, such as will enable the bureau to obtain a complete knowledge of the requirements, must be sub-

mitted to the bureau for its approval. After such approval is given, if inspection is to be made at the place of manufacture, two copies of the order will be forwarded to the Inspector of Engineering Material and one to the bureau, as elsewhere specified, and inspection will be made in the same manner as for unfinished material. Copies of approved drawings necessary for inspection must accompany each copy of order for the use of the inspection officer and the bureau.

157. All auxiliary machinery and fittings will, where practicable, be inspected during construction at the place of manufacture. In the case of other finished material, where inspection at the building yard is authorized, the Inspector of Machinery will, on its receipt, make such inspection in accordance with approved drawings and specifications. Copies of an order for all finished as well as unfinished material that is to be inspected on delivery will be forwarded to the bureau with the proper forwarding stamp on the back of order as elsewhere directed. This should apply only where examination and visual inspection alone is required, or where the inspection can be more efficiently conducted at the shipyard than by a representative sent from the office of the Inspector of Engineering Material.

INSPECTION OF MATERIAL BEFORE APPROVAL OF DRAWINGS.

158. Inspection of material, when requested by the contractors, may be ordered previous to the approval of detail drawings for apparatus in which such material is to be used, at the contractors' risk only, subject to final approval of the drawings or details of the apparatus in question. The proper stamp filled in on back of copies of orders should indicate this condition. Credit for such material, when received at the building yard, will not be given until such drawings or details are approved.

MATERIAL REJECTED AT THE BUILDING YARD.

159. It must be understood that all material, whether finished or unfinished, is subject to inspection at the building yard by the Inspector of Machinery and will be rejected by him if found unsuitable for installation, whether it has been previously passed by another officer or not.

Where such material has previously passed inspection at the place of manufacture a report giving in detail the reasons for such rejection will be immediately forwarded by the Inspector of Machinery through the Inspector of Engineering Material, who passed such material, to the bureau.

In the case of steel castings the Inspector of Engineering Material must be furnished with heat and serial numbers of condemned castings.

PART X.

TRIALS AND TRIAL EQUIPMENT.

TRIAL EQUIPMENT.

160. The inspector will take measures to see that the various trial equipments required by the contract and specifications and by orders from the bureau to be fitted on vessels during their trials shall be installed in a thoroughly satisfactory manner.

Directions for the installation of other apparatus for use on trial, such as special counters, recording gauges, thermometers, will be given by the bureau previous to the trial, and care should be taken to secure the best possible location and installation of this apparatus for the purpose of securing data. After trials care will be taken to prevent any damage to trial equipment belonging to the Government.

CALIBRATION OF TORSION METERS.

161. This will be carried out carefully in accordance with special instructions and directions for the type of torsion meter installed. All data as to constants, results of calibration, etc., should be reported to the bureau, in duplicate, at least two weeks previous to the date of trial. As the correctness of data obtained for use in future designs depends directly upon the accuracy of the torsion meters, the need of absolute accuracy in calibration and installation of this apparatus is manifest. A description of the means taken for calibrating the shafts will be forwarded to the bureau for approval. If the type of

torsion meter permits it, the calibration of shafts should be made with torsion meter in place on the shaft.

WATER-MEASURING ARRANGEMENTS.

162. Special care is to be taken that the water-measuring arrangements are such as to secure reliability and accuracy as well as reasonable facility for operation. The measuring tanks must be carefully calibrated, and in the piping arrangements care must be taken that all water which should be measured passes through the measuring tanks. Make-up feed water must not pass through measuring tanks. The water-measuring apparatus will be tested to demonstrate its suitability previous to departure of vessel for official trials.

ARRANGEMENTS FOR MEASURING FUEL.

163. The inspector will see that suitable arrangements are provided by the contractors for measuring coal or oil on all trials where fuel consumption is required. When necessary such devices will be checked for accuracy.

BUILDERS' TRIALS.

164. On all builders' trials of a vessel, including dock trials, the Inspector of Machinery or commissioned assistant must be present. He will report to the bureau the results of such trials, with copies of the data obtained if of sufficient importance.

READINESS FOR PRELIMINARY TRIAL.

165. When the contractors for a vessel consider that they are ready for the official speed trial called for under the contract, they will request such trial in writing to the Secretary of the Navy, through the Inspector of Machinery and Superintending Constructor. Before approving such request it must be shown that the vessel is complete in all respects, except final painting and such other work as

will be injured on the trial. The Inspector of Machinery will report to the bureau regarding such completion, together with his recommendations.

SPARE PROPELLER BLADES.

166. Spare propeller blades will not be cast until after the trial, when the bureau will be consulted regarding the dimensions of blades desired.

REPORTS TO TRIAL BOARD.

167. When the board for the trial of a vessel is ordered the Inspector of Machinery will furnish it with reports, stating:

(*a*) The weight of the machinery, including the water in the boilers, surface condensers, and other parts of the machinery, in accordance with the contract, as nearly as can be ascertained at the time of preliminary trial. This statement will include separately the weight of machinery installed; of machinery, spare parts, etc., which remain to be installed or placed on board; the weight of water in machinery as per contract. It will also include a statement of the weight placed on board of temporary instruments and apparatus, to be removed after the trials.

(*b*) Whether the machinery, including the engines, boilers, and appurtenances, is strong and well built and in strict conformity with the contract, drawings, specifications, and duly authorized changes.

(*c*) Whether the machinery, including the engines, boilers, appurtenances and spare parts, is complete in accordance with the contract, drawings, specifications, and authorized changes therein. If it is not so complete your report will include a detailed list of all the items which are incomplete.

(*d*) The synopsis, Bureau of Steam Engineering Form 77, filled out with the machinery data for the vessel.

A sample letter of instruction in this matter is as follows:

FEBRUARY 5, 1913.

INSPECTOR OF MACHINERY.

Subject: Texas; Preliminary Trial: Instructions to Inspector of Machinery.

1. On the official trials of the *Texas* you are informed that you or one of your assistants will be required to report to the trial board when it assembles for the purpose of furnishing the board with any information that it may require.

2. You will furnish the board with all the information in your possession, including items of unfinished work, and afford it every facility for the examination of the plans and papers relating to this vessel, and will render the board all the assistance it may require in the performance of its duties. You are directed to furnish the board with a report (11 copies) which will include the following information (first copy to be carbon backed for blue printing):

(*a*) The weight of the machinery, including the water in the boilers, surface condensers, and other parts of the machinery, in accordance with the contract, as nearly as can be ascertained at the time of preliminary trial. This statement will include separately the weight of machinery installed; of machinery, spare parts, etc., which remain to be installed or placed on board; the weight of water in machinery as per contract. It will also include a statement of the weight placed on board of temporary instruments and apparatus, to be removed after the trials.

(*b*) Whether the machinery, including the engines, boilers, and appurtenances, is strong and well built and in strict conformity with the contract, drawings, specifications, and duly authorized changes.

(*c*) Whether the machinery, including the engines, boilers, appurtenances and spare parts, is complete in

accordance with the contract, drawings, specifications, and authorized changes therein. If it is not so complete your report will include a detailed list of all the items which are incomplete.

3. The instructions to the board will require a report of the power of the auxiliaries in use during the trials. You will arrange for such determination of the power expended in driving these auxiliaries and of the water consumption, as it is practicable to make before the trial; also submit reports of all capacity tests made by the contractors on their own initiative or required to be made by the specifications, and any further reports which will enable the board to estimate fairly the power of same on trial.

4. You will please direct the contractors to tabulate the tests of all steam gauges made in the presence of yourself and furnish a copy for the use of the trial board to show all gauge corrections.

5. You will direct the contractors to set the boiler safety valves by actual steam pressure at 295 pounds by a gauge which has been accurately standardized. This test will be made in your presence, and you will furnish to the trial board a certificate concerning the same.

6. Your attention is directed to the eleventh clause of the contract which requires a careful record of the amount of coal and water used on the various trials and of the amount of fuel oil consumed on trial (*e*). You are directed to see that the coal for use on these trials is bagged and weighed as required by the contract, and that the arrangements for measuring fuel oil and water are perfected and their efficiency thoroughly tested before reporting finally ready for the official trials. Careful calibrations will be made and reported of the fuel oil and water measuring tanks at observed temperatures. Graduated measuring strips will be fitted at gauge glasses, so that the

contents in gallons can be quickly and accurately read at any height of fuel oil or water in tanks.

7. The bureau incloses herewith one copy of the Synopsis of Machinery and Hull Data, which you will please fill out as regards constants and fixed data mentioned, as far as can be ascertained, previous to the trial. These synopsis sheets will be forwarded to the bureau for transmission to the trial board.

8. You will direct the contractors to fit in the engine room, and in a convenient place for reading, additional mechanical revolution counters as supplied by the bureau, one for each shaft, with electrical connections for marking the reading when passing ranges. These counters are for use during all the trials. Every precaution must be taken to have the motion of these counters absolutely reliable. The gear for operating them must be independent of that connected with the regular engine counters. After the trials this special gear will be removed from the ship.

9. It is directed that an electrical bell be fitted at the counters above mentioned, at the station for reading torsion meters, at the engine-room gauge board, and at the water-measuring tanks. These bells are to be on one circuit, separate from that connecting to the additional mechanical revolution counters, and connected with a portable contact maker on the upper forward bridge. The bells should be large and reliable, in order that there may be no doubt about their successful operation. A colored electric light will be placed in each fire room on a circuit, with push button near the counter station in starboard shaft alley, for use in making signals to fire rooms.

10. You will furnish a certificate of calibration of torsion meters and full report of calibration of shafts, with calculations of S. H. P. constants for the torsion meters used.

11. At least one month before the date of preliminary trials, drawings, etc., should be submitted in duplicate, one copy for the bureau and one for the trial board, showing arrangement of measuring water, fuel oil, and make-up feed. Also drawings in duplicate, giving complete information as to the location of all gauges, pyrometers, thermometers, special mechanical counters, torsion meters, etc., that is, of all instruments which will have to be read on trials, and also the location of water and fuel-oil measuring tanks.

168. The Inspector of Machinery or an assistant will be directed to report to the trial board and will be present during the trial. He will furnish the board with such information as it may require, in addition to the above-named reports, and will afford the board every facility for the examination of the drawings and papers concerning the vessel. During the trial this officer will regard himself as the direct representative of the bureau. While refraining from any action contrary to the wishes of the board he will report any circumstances or occurrences that he deems of importance direct to the bureau.

After the trial the inspector may be directed to make the post-trial examination and report results and recommendations to the trial board and bureau. When post-trial inspection is made by members of engineering trial board the inspector will be present and will afford such officers all assistance and information available.

CARE OF MACHINERY AFTER INSTALLATION.

169. When the work has so far progressed that the vessel is ready for steam, the Inspector of Machinery will see that nothing is done on board that will injuriously affect any part under cognizance of this bureau, and that all parts of the machinery after installation are protected from injury or improper exposure. Instances have

occurred where the boilers of a vessel were materially injured by the excessive use of cylinder oil in the sub-contractors' tests of the dynamo engines; in other cases corrosion has been discovered which begun before vessel was delivered. In particular, care must be exercised that no such occurrences take place.

Special attention is to be paid to see that apparatus is properly cleaned and taken care of after having passed acceptance tests.

INSPECTION OF COAL BUNKERS AND FUEL-OIL TANKS.

170. When the coal bunkers and fuel-oil tanks of a vessel building are completed and before coal or oil are put into the same they shall be inspected by the Inspector of Machinery and the Superintending Constructor, who shall prepare a joint report upon the condition of the same.

OUTFIT—INFORMATION FROM YARD SUPPLYING SAME.

171. When it is necessary to secure information concerning articles of outfit on Steam Engineering allowance list in connection with provision for stowage, etc., the Inspector of Machinery will request such information direct from the Commandant of the yard supplying the outfit.

PERSONS DETAILED FOR DUTY IN CONNECTION WITH SHIPS BUILDING.

172. All persons who are ordered to report to Inspectors of Machinery for duty in connection with vessels building will, besides such duty as may be regularly assigned them, make themselves thoroughly familiar with the ship in question, and in particular with the department or branch to which they are to be assigned.

They should familiarize themselves with the machinery of the vessel and bring such suggestions as may be deemed pertinent to the attention of the inspector. They will in every way possible assist the inspector in the work of inspection and in such tests of the machinery as may be made under his supervision.

The particular orders of officers and men assigned to duty in connection with vessels nearing completion may at times require special treatment. It must always be borne in mind that these instructions do not supersede any specific orders issued by the department. All persons who have been directed to report to the inspector are subject to his orders and directly under his control and direction.

COMMANDING OFFICERS AS GENERAL INSPECTORS.

173. Officers who are to command a vessel are frequently ordered before delivery as general inspector of a vessel. When an officer is ordered as general inspector for a vessel nearing completion, the inspector will afford such officer all possible information relative to the machinery of his ship, and will take under advisement all suggestions or recommendations by him, and will cooperate to secure as far as practicable any desirable improvements suggested by the general inspector. Matters of correspondence emanating from officers detailed for duty in connection with a vessel building will pass through the general inspector for the vessel, and all matters suggested by or through the general inspector of a vessel, which relate to matters under cognizance of this bureau, must pass through the Inspector of Machinery before any action can be taken by the bureau.

Should occasion require, general inspectors will be suitably informed of this requirement of the bureau.

THE SENIOR ENGINEER OFFICER.

174. The officer ordered as senior engineer officer of a vessel building will, when his orders permit, have general charge (under the inspector) of all other officers or enlisted men assigned to the engineer department of a vessel previous to commissioning.

Clerical work for the engineer department in compilation of details of organization and preparation of station bills, will be done by the officers or petty officers assigned to duty in connection with the vessel. The force of the inspector of machinery may assist in drafting work for station bill, etc., where it does not interfere with their regular duties.

All suggestions, recommendations, or criticisms of the machinery installation under cognizance of this bureau made by the officer ordered as senior engineer must pass through the inspector of machinery before being acted upon by the bureau.

DELIVERY OF VESSEL.

175. When contractors propose to deliver a vessel they will make request through the Inspector of Machinery and the Superintending Constructor. These requests will be forwarded to the bureau with full comment from the inspector as to proper completion of all matters for which the contractors are responsible, and with a list of uncompleted work, and a recommendation from the inspector as to the advisability or inadvisability of delivery at the time requested.

VESSEL COMPLETED; REPORTS.

176. When a vessel is delivered to the Government, the Inspector of Machinery will furnish to the bureau and to the commanding officer of the vessel the following reports:

(*a*) Report of uncompleted work.

(*b*) A complete inventory of the spare parts, stores, and tools furnished by the contractors, arranged according to titles alphabetically. This list, without prices, will be previously prepared and submitted to the contractors, with the request that they fill in said lists so as to make them show the numbers of each item supplied, the unit cost, and the total cost of same; and, for the purpose of showing that these entries have been made by the contractors, to state on the face of the list that the prices and numbers have been entered by them and are correct. Attached to this inventory there will be a supplementary list, showing the location where the various spare parts, tools, etc., are stowed. Where articles are packed, each package or box must be numbered, and this supplementary list will show the contents of each package.

(*c*) Any special information relative to the engineer department not included in items (*a*) and (*b*) which, in the opinion of the inspector of machinery, will be of special value to future engineer officers of the vessel. This report will not be required if all such information is contained in the remark book.

(*d*) Remark book (for commanding officer only).

177. Reports for the commanding officer may be sent to the commandant of the yard where delivered with a letter stating that they are for the commanding officer. An additional copy of the inventory, item (*b*), will be furnished the commandant of the yard for the general storekeeper.

RESERVATION FOR UNCOMPLETED WORK AT TIME OF DELIVERY.

178. When a vessel is delivered the inspector will submit his recommendation as to amount of reservation that should be made to cover cost of each item of uncompleted or unsatisfactory work for which the contractors are responsible. Instructions to this effect are sent to inspectors after the report of preliminary trial is received.

WORK REPORTED BY TRIAL BOARD.

179. As soon as report of preliminary trial of a vessel is received the bureau will forward one copy to the inspector of machinery for his information and files; a copy is also furnished the contractors by the Navy Department (usually via Bureau of Construction and Repair).

In the absence of other instructions the inspector will take up with the contractors all matters of uncompleted or unsatisfactory work reported by the trial board and for which the contractors are responsible with a view to securing their completion at as early a date as possible. Special instructions concerning these matters are, however, usually sent to the inspector by the bureau.

UNCOMPLETED WORK AFTER DELIVERY.

180. Work for which the contractors are responsible, other than supplying of spare parts, etc., uncompleted at time of delivery will usually be completed at a navy yard and the cost of same charged to contractors. Contractors may, however, be given the option of doing this work when practicable.

DEFECTIVE WORK DISCOVERED AFTER DELIVERY.

181. Reports of defective work discovered after delivery will be forwarded to the inspector for reference to the contractors, in order that, when practicable, the contractors' representative may have an opportunity to examine and comment upon the matter.

Such defects discovered after delivery will usually be repaired at a navy yard or by the ship's force and charged to the contractors, but where practicable the contractors may be permitted to make the repair should they desire to do so.

Part XI.

FINISHED DRAWINGS AND BOOKLET PLANS.

FINISHED DRAWINGS.

182. The drawings of the completed machinery and booklet plans, prepared as required by the specifications, must be in accordance with finished work, as installed. A certificate from the Inspector of Machinery, as to the correctness of each drawing, will appear on its face. A blank space at least 3 inches wide by 2 inches in height must be left in the lower right-hand corner of each drawing for the bureau's stamp and number.

The drawings will be numbered and indexed as follows:

1. The finished drawings will be numbered in the lower right-hand corner as shown on sample blue print which will be furnished by the bureau on request.

2. The index number and group letter, differing for each vessel, will be furnished on application to the Bureau of Steam Engineering, and these index numbers and group letters will be placed in their proper position, as indicated, on all finished drawings.

3. The file numbers, which will also be placed on drawings by the contractors before transmission to the bureau, will be consecutive, beginning with number 01 (for example, 01, 02, 03, 010, etc.), the sequence number in each case being preceded by zero to distinguish finished drawings from preliminary tracings and working drawings.

4. The tracings will be so numbered, as far as practicable, as to form groupings in accordance with the general outline of groupings in the weight instructions from this bureau.

5. Upon application from the Inspector of Machinery, a blank index book for each set of drawings will be furnished for the use of contractors. These index books will

be filled out and one copy will be transmitted with the set of finished drawings to the bureau for approval. After such approval is received and after all corrections and additions have been made and entered which may be directed by the bureau, additional prints being furnished as desired, the sets of blue prints referred to by the machinery specifications, corrected in accordance with the finally approved finished drawings, will be sent to the destinations given by the Bureau of Steam Engineering, each with its own completed index book.

This work will be done by the contractors as required by the specifications.

183. Where two or more vessels on the same design are built together by one firm, the number of tracings, vandykes, or blue prints required for one vessel only will be required, except that there must be a complete set of prints on cloth supplied to each vessel. Where there are differences in detail separate tracings will be required for each vessel.

184. The inspector will take adequate measures to have a set of blue prints of the finished drawings or a set of blue prints of the working drawings and the booklet plans, ready for issue to the vessel at the time she is placed in commission and will report to the bureau any probable delay in furnishing these plans. Extensive and entirely unnecessary delay is sometimes encountered in the delivery of these drawings and booklets. In cases where the data sheet that accompanies the booklet plans can not be supplied before delivery, the contractors may be authorized to make up the booklets with a stub sheet to which the data sheet may be attached when received. The booklets supplied the vessel will then be furnished without the data sheet, which will be forwarded to the vessel as soon as completed. The booklets to be forwarded to the bureau will not be sent on until the data sheet has been attached.

PART XII.

CIRCULAR LETTERS, CORRECTIONS, AND ADDITIONS.

CIRCULAR LETTERS.

185. Circular letters will be issued by the bureau from time to time (1) correcting or adding to the "General Instructions to Inspectors of Machinery"; (2) giving information concerning bureau practice in mechanical and (3) in electrical work.

186. These circular letters will be issued in serial numbers under each of the above headings, and at least two copies will be sent to each office. One file of these copies will be kept in a loose-leaf binder for ready reference; the other copies may be filed or used at discretion.

187. Circular letters referring to inspection of material will continue to be issued as at present and in continuance of the present numbers. These letters are of a different series from those mentioned above and are distinguished by the letter "S" following the file number.

CORRECTIONS TO GENERAL INSTRUCTIONS.

188. These, when received, will be entered in the Index of Corrections, in front pages of this book, and the paragraph affected will have a notation placed on margin abreast of it. These corrections will be issued in serial numbers in addition to the letter file number. A supply of extra copies will be kept at the bureau for issue on request.

CIRCULAR LETTERS OF BUREAU PRACTICE.

189. These will be issued on separate sheets or leaflets on official letter-paper size so that they may be filed in loose-leaf binders or kept in the correspondence files, or both, as may be desirable. The number of copies supplied to each office will be in accordance with a mailing schedule which may be modified from time to time, modifications being made as requested. A limited supply of extra copies will be kept on hand at the bureau for issue.

190. These circular letters are specially issued to cover the inspection of new work, as an instruction and guide to elaborate and explain to inspection force what should be required under the specifications, and to define where possible what practice, methods, and character of work are acceptable to the bureau, in order to secure uniformity and preserve a record of bureau practice which may be readily available for reference. They will also be used as a guide in connection with repair and overhaul work done at navy yards or elsewhere, and as matters of information to engineer departments on board naval vessels.

191. These letters are not "specifications" but are outlines of what the Bureau of Steam Engineering considers good practice on points considered, and contain information and explanations for the guidance of inspectors in carrying out the requirements of the specifications. The requirements as laid down in these letters and in any of the bureau or Navy Department standards may be made part of the machinery specifications or contract for any work done under cognizance of this bureau when so designated. In all cases they are to serve as a guide for the inspection force, but should cases arise where these circular letters differ from the requirements of the contract or the specifications, the contract or specifications will govern.

ADDITIONS AND MODIFICATIONS TO CIRCULAR LETTERS OF BUREAU PRACTICE.

192. Inspectors, officers of the machinery divisions of navy yards, and other officers are urged to forward to the bureau any information on subjects which may be applied to extend and improve the information contained in the citrcular letters of bureau practice. In order that the information contained may be made as accurate and useful as possible, any defects or desirable alterations should also be reported.

NOTE.—Material covered in paragraphs 27–31 and 33–100 of 1910 edition of "General Instructions to Inspectors of Machinery," has been omitted from this edition. The information and directions contained in these paragraphs will be embodied in "Circular Letters of Bureau Practice" to be issued later. The above paragraphs of 1910 edition will be followed till circular letters covering these subjects are issued.

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