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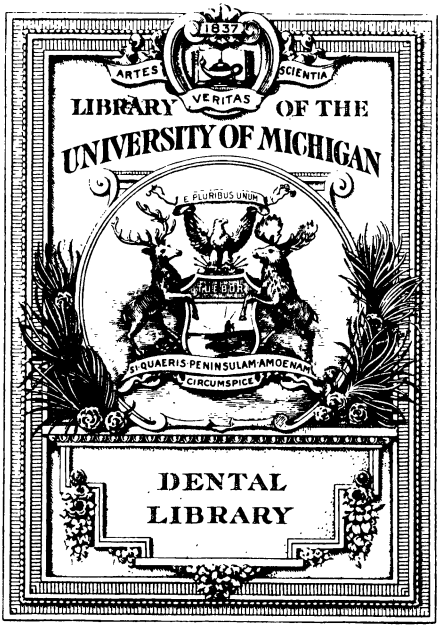

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INLAYS.

(By F. Ewing Roach, D. D. S., Professor of Porcelain Art, University of Illinois.)

CHAPTER VI.

GOLD INLAY.

The correlation of the gold and porcelain inlay justifies our seemingly impertinent digression at this juncture from the subject of dental ceramics.

The gold and porcelain inlay are reciprocally related. Development of either one results in development of the other. While wholly unlike in many respects, the initial steps in the operative procedure are so nearly identical, that a knowledge of the technics of one, comprehends, in a great measure, that of the other. The operator, who adopts either, is very likely to drift into the other. If you have success with gold inlays you will surely have success with the porcelain. Each has its place and the operator who is able to discriminate in the use of them, will meet with greater success by using both. The gold inlay, for large restorations in molars and bicuspids, more nearly approaches the ideal filling material than anything in use to-day.

I would not be understood as advocating the gold inlay to the exclusion of gold fillings. They have a distinctive place, and in deciding just when and where to use them should not require much study. For the smaller, simpler cavities the filling is to be preferred. The gold inlay is especially applicable to large restorations and should be confined mostly to this class of cavities.

The ideal filling material, as given by Dr. Miller in his book "Conservative Dentistry," should possess the following qualities:

(1) Sufficient strength, that it will not break nor wear away under the stress of mastication.

(2) Chemical indestructibility, that it may remain unaffected by the fluids of the mouth, or by any food, or drink.

(3) Permanence of form and volume in the mouth.

(4) Thermal nonconductivity, that changes of temperature in the mouth may not be conveyed to the pulp.

(5) A high degree of adaptability, that it may be made to fit the walls of the cavity so closely as to exclude moisture.

(6) Color resembling as nearly as possible the color of tooth to be filled.

(7) Absence of every quality injurious to the substances of the tooth, including the pulp or the mucous membrane, or to the general health of the patient.

(8) Ease of insertion.

(9) The least possible susceptibility to moisture.

With the single exception of No. 6, color, the properly constructed hollow gold inlay possesses all the qualities mentioned by Dr. Miller as essentials of an ideal filling material, and since the color is not a serious objection in the posterior teeth, there remains in reality but little to be desired in this new old filling material.

While the gold inlay has been made in various ways and with equally varying success, I am strongly of the opinion the hollow inlay made as indicated below is, for the following reasons better than the solid. More perfect adaptation, better attachment for cement and consequently more secure anchorage, more perfect contour and occlusion, and by reason of the minimum amount of gold and the greater amount of cement, less thermal conductivity.

It is claimed by some enthusiasts that porcelain is the nearest to an ideal filling material for all classes of cavities. While conceding to porcelain an unapproachable superiority in the majority of cavities in the anterior teeth and buccal cavities of the molars and bicuspids, I also recognize its inherent friability, which precludes it from first place in large restorations of the masticating surfaces, and in view of this weakness in porcelain, we must, as yet, compromise the one point of inharmonious color of gold, for its many other good qualities.

Cavity preparation for gold inlays, differs but little from that of porcelain. With a few slight variations they are identical. The greater strength of the gold permits of beveled margins and narrow necks projecting into fissures and for the same reason the question of anchorage is often simplified; therefore cavity preparation for gold is usually easier than for porcelain.

Sharp, well defined margins and avoidance of undercuts are equally as essential to success in gold as in porcelain inlays. The

rules governing anchorage for porcelain inlays should apply with equal force to the gold. Although given in a previous article we will repeat "that all inlays must have one or more of the following means of retention suplementing that of cement adhesion. *Either direct or frictional planes of resistance or some form of pin anchorage, suplementing that of cement adhesion.*"

The procedure in securing the matrix is identical with that of the porcelain and as we have described this in detail in a previous article will omit the repetition and take up strictly gold inlay features.

Either gold foil No. 30 or platinum .0001 may be used, but preference is given the latter for the reason that it is less liable to become distorted in handling and is fitted with equal facility. The color is not noticeable in the finished inlay.

It may be well to note, that it is not necessary to burnish matrix to fit perfectly the pulpal walls, as this portion will be cut out when the inlay is finished. It may also be noted that any considerable tear in the bottom of matrix will not only do no harm but will, on the other hand, prove an advantage, when we come to cutting out hole through which the solder is to be passed for reinforcing cap-piece. After the matrix is properly fitted, it should be removed and the cap-piece fitted to the cavity; for this purpose pure gold about 33 gauge is most suitable.

To best describe the procedure, we will take a disto-approximal cavity in a lower first molar. Cut a piece slightly larger than the cavity to be fitted and with contouring pliers produce the convex proximal contact surface and while piece is being held securely with the pliers cut slit on each side and bend over at right angles, to form the occluding surface, reverse pliers and give this surface a slight convexity to correspond with the fissures. In this way a normal contour and occlusion is easily and accurately obtained.

The piece should now be placed over the cavity and burnished down into contact with and slightly overlapping all margins. To further verify and perfect the occlusion, it is well to hold piece at cervical margin with an instrument, or wedge, while the patient bites down on the piece. The cap-piece may now be removed, the matrix returned to the cavity. The cap-piece should be refitted with matrix in place. Careful observation should be made at this time to see if contour, contact, occlusion and adaptation of cap-piece to matrix, is secured. The cap-piece and matrix are now removed, separate, carefully placed together in their proper relation and held by the overlap

with pliers until united with 22-K. solder around the entire margin. The bottom of the matrix can be cut now with fine pointed curved scissors without danger of distorting the marginal adaptation. Reinforce the entire inside surface of cap-piece and the matrix about one milimeter from margin with 18-K. solder, trim off overlap, dress down flush with cavity margins, polish and set.

It must be borne in mind that inlays are only intended for the larger cavities and it is especially so with the hollow inlay.

Very often it becomes necessary to extend the cavity into connecting fissures thereby forming narrow necks, which should be made solid in order to have the required strength. This is best accomplished by packing platinum foil into the matrix after it is burnished into the fissure and then fuse pure gold into it making a solid mass, flush with the margins. A very small neck made in this way is very strong and will often afford ample anchorage for a very large inlay.

As a means of anchorage in every large restorations where one or more cusps are involved and the pulp has been destroyed, it is usually advisable to reinforce the anchorage by means of a pin, and in the hollow inlay it is best to fit pin after inlay is made, so that it projects into hollow as far as possible without interfering with the accurate adjustment of the inlay. The pin and inlay are to be cemented to place at the same time as they will assume their relative positions better than when set separate.

To facilitate the work of cusp and fissure formation in these very large restorations some of the better stereotype dies may be used to advantage, using only that portion corresponding to portion of tooth to be restored.

If due care is taken throughout the operation the inlay will require no finishing after it is set and when done with a full conception of the possibilities of the method, no fear need be entertained that perfect margins and artistic results may not be obtained at a great saving of time and energy and with a much greater comfort to patient.

(To be continued.)

OPERATIVE DENTISTRY.

By R. B. Tuller, D. D. S., Clinical Professor of Operative Dentistry, Chicago College of Dental Surgery.

CHAPTER X.

CONTINUATION OF CAVITY PREPARATION.

An entire volume might be given to cavity preparation if the ground were covered to the limit, but as this series of papers is presented to practitioners rather than to inexperienced students it will not be necessary for me to enter into every detail of the preparation of all sorts and conditions of cavities to be found in the 32 teeth of the human mouth. I shall discuss rather some of the points on which there are divided opinions, endeavoring to emphasize the rational and most approved procedure.

The preparation of cavities involves, as a matter of course, the thorough removal of decay. The extent to which affected dentine should be removed or left over the region of the tooth pulp when there is danger of exposure by being extremely thorough in curetting or burring is a question on which opinions by good authorities are divided.

Dr. Ottolenqui in his book, "Methods of Filling Teeth," says in regard to clearing the cavity of all decay even to the exposure of the pulp, "It seems a rational proposition,"—to do so—yet it has been argued by high authorities that there are frequently occurring cases when it is best not to remove all the decayed dentine. This is a grave error. With some exceptions it is imperative that every trace of caries should be obliterated. The tooth about to receive a filling should be as wholly healthy as it can be made. It has been claimed that decay covering a pulp may be left in place and sterilized with safety and advantage. This sterilizing is usually done at the sitting at which the filling is placed. I have followed this advice in a few cases, where, in the front of the mouth it seems best to take every precaution to avoid destruction of the pulps and consequent discoloration. In every case I have afterward removed the fillings, because of a bluish appearance which subsequently presented, showing that despite the fact that the edges were yet perfect, decay was progressing internally. This shows that a perfect gold filling will not stop decay if carious dentine is left in the cavity. Experiments made by Prof. Miller are in harmony with this experience, since he shows that the germicides upon which most reliance has been placed are in-

effectual unless left in a cavity much longer and in greater quantity than has been our practice. When our chemists shall have discovered for us a sterilizing agent, the use of which will assure us of a discontinuance of carious action *in already carious dentine,* then, and not till then will there be any argument worth listening to against the assertion that *it is malpractice to fill over decay.*

"Indeed, in the light of present knowledge, the dentist must not only eradicate the truly carious dentine but he should also deal with the zone of infected dentine which lies adjacent.

"To fully comprehend the term 'infected dentine' which I introduce for the consideration of scientific and prophylactic practitioners of the future, we must understand the causes which produce dental caries, as well as the modus operandi of the agencies at work."

* * *

"The penetration of this acid solvent (produced by microscopic organisms) is greatly in advance of the inroads of actual decay, and the dentine itself may be affected and perhaps infected, while there might be slight evidences of decay at the external surfaces of enamel."

Perhaps a lack of full comprehension of the word caries leads to some errors with many operators in regard to excavating cavities. A carious condition is a pathological disintegration of bone or tooth substance—a decalcification and breaking down of the structure. It hardly seems possible that anyone should advocate the leaving of any of this disintegrated substance as protection over a pulp. The term carious condition I think is sometimes improperly applied to the affected and probably infected discolored and yet quite hard and firm tissue which composes the pulpal wall. It is not yet caries, and it is this condition of tissue, when properly sterilized, that should be left in preference to being more exacting in removal and exposing the pulp. There is rarely a cavity of any considerable depth that does not show by this discoloration that the tissue is affected clear to the pulp and probably more or less infected—invaded by micro-organisms. Being invaded, of course, the work of disintegration has begun, for the busy bee isn't "in it" with the enterprising and prolific microbe. He or she or it or all three are not lying there hibernating, and the probability is that the pulp has already felt the effect of their poisoning influence. The question is, is there a way that sterilization may be done at the one sitting and the poisonous influence to the pulp set on a safe road to recuperation?

I cannot do better than to quote Dr. C. N. Johnson on this subject, in his "Principles and Practice of Filling Teeth."

"In the preparation of cavities the operator often encounters a problem in the presence of a large mass of decalcified or partially decalcified dentine in the bottom of a cavity lying over the pulp. The treatment of this softened dentine is a subject that has long engaged the attention of operators and writers on dental topics, and the consensus of opinion seems in the past to have been favorable to the retention of a considerable portion of decalcified tissue for the purpose, as stated, of affording protection to the pulp. It has been argued that the pulp will accept more kindly this sort of protection than it will in the presence of any foreign material in the nature of a pulp-lapping. Some writers have even advanced the theory that the softened dentine would take on a hardening process and become recalcified when left in the cavity under these conditions, and protected from further external irritation by a filling.

"Without stopping to go into the histological process of tooth building and the pathological process of tooth disintegration, it is safe to assume that tooth tissue is not amenable to any such a law as would account for the recalcification of dentine once decalcified, and the sooner this idea is dismissed from the minds of our operators the better it will be for their patients. From the closest clinical observation of thoughtful men and from recent investigations into the penetrating effects of caries of the teeth, it would seem to be a serious menace to leave any considerable quantity of decalcified dentine under a filling. Miller has shown that tubuli of dentine are packed with micro-organisms for in advance of the actual breaking down of the tissue, and more recently Dr. J. Leon Williams has presented to us a revelation in the far-reaching effects of caries. * * *

"Let us study briefly the nature of this decalcified tissue which we were taught to leave under our fillings. It has in a large part been disorganized; it is packed with micro-organisms and infiltrated with poisons. If we seal it under a filling we have confined within the tooth just so much of a menace to the life and comfort of a pulp. It will not do to say that the micro-organisms thus inclosed are rendered harmless on account of cutting off their out-sustenance and allowing them to die. A mass of dead micro-organisms is by no means inert. In fact, scientists are telling us that from the dead bodies of micro-organisms come the most virulent poisons. Neither will it do to assume that by the application of an antiseptic to the

cavity we overcome the difficulty. * * * It would seem to be a fruitful field of research for some scientists to determine the kind of agent required to destroy the micro-organism and at the same time neutralize its poison.

"But what concerns us most in the consideration of the present subject is that by following the generally accepted teaching of the day in the management of decalcified dentine we are simply confining in intimate proximity to the pulp a mass of material which is peculiarly calculated to poison the pulp to death, and this is precisely what occurs in many of those vague cases where the pulp has unaccountably died under a filling without an exposure. The greatest surprise is that more pulps have not died from this treatment, and it is accounted for only on the ground that pulps are sometimes exceedingly tenacious of life, and protect themselves against the inroads of the poisonous process by throwing out a deposit of secondary dentine. Even in those cases where the pulp finally triumphs over the evil influence, the operation of filling is quite frequently succeeded by an extended period of sensitiveness, which is the direct result of the irritating influence of the infiltrated dentine. In almost every instance where softened dentine is left in the cavity as a source of pulp protection or to prevent shock from thermal changes, it defeats the very object for which it was left. This mass is exceedingly irritable. It is more sensitive to impressions of all kinds whether thermal, chemical or mechanical than is normal dentine. It would therefore seem theoretically that the less we left of this infected tissue under a filling the more comfortable would the tooth remain after the operation, and this very fact is amply borne out by clinical observation. In a close study of this question it has been noted that in those cases where a radical removal of all softened dentine has been effected there is seldom any complaint of subsequent sensitiveness.

"This does not imply that we must carelessly expose pulps by wanton slashing away at every cavity that presents. No operator should expose a pulp if it can be safely avoided. In working around a pulp under these conditions, as has already been intimated, a spoon-shaped excavator should be used to avoid needless exposure. The excavator should be thin and sharp, so as to peel up the leathery dentine with the utmost delicacy and the expenditure of little force."

"The rule to govern the operator in the management of decalcified dentine may be summarized as follows: Remove thoroughly all decalcified tissue in every instance where its removal will not result in

exposure of the pulp. In those cases where it extends to the pulp remove all that can safely be done short of actual exposure, and if large masses of decomposing tissue surround any portion of the pulp remove even if it causes exposure. The pulp will be safer under a capping of foreign material than when subjected to the influence of this infected and poisonous mass. Stained dentine is not necessarily an infected dentine. If hard and flint like it may be allowed to remain even if slightly discolored."

These two writers show the trend of up-to-date opinion, founded on the results of investigations and research by eminent scientists in contra-distinction to opinions formed without this later-day understanding concerning micro-organisms; and yet the older methods of leaving tooth tissue of some kind over the pulp in the hands of some operators, seemed to beget some good results that have stood the test of years. I mean to be understood by this that without the knowledge given us by Miller and others and verified in our own laboratories, and the laboratories of most dental colleges since, some operators seemed to grasp the idea that leaving some decayed dentine rather than expose the pulp meant doing about as is now done and suggested by above writers,—that is, removing all absolutely broken down tissue but leaving what is sometimes referred to as decayed tissue, tissue that is discolored and affected but softer perhaps than adjacent walls that have been thoroughly cleared of caries, yet retaining some integrity of structure. I was schooled in the older methods of treating these cavities and followed what we felt then were the best authorities; but I do not remember of ever leaving any really soft and broken down tissue over a pulp and someway never felt that that was exactly what was meant by our authorities. A leathery tissue was even worse than a soft disintegrated mass, in my mind. I have not had occasion to change my practice very much about what to leave, but I feel that I can secure and am using better germicides than I used to. Be that as it may, I do not remember any succession of pronounced results that could in any way be called dire or that warned me that my method was a bad one approaching mal-practice. A method that has given me satisfaction for years, and I know has others, is as follows: Dry out with thoroughness, and then apply germicide. If it can be left in a day or two so much the better. Upon removal dry again thoroughly and apply a thin copal ether varnish. The ether quickly evaporates leaving a protecting film from external influences. Several layers may be applied. If need be a

layer of oxy-phosphate cement may be introduced. Then comes filling. In other cases the procedure was like this: Thoroughly dry. Mix oxide of zinc into the liquid germicide and flow the mixture over floor of cavity. Draw surplus fluid from this with absorbents leaving a good layer. Over this must be put a layer of oxy-phosphate cement and then filling may be begun. I never got much satisfaction capping exposed pulps with anything, and I know the practice has been abandoned by many. If a pulp must be uncovered it must be devitalized, except in teeth not yet fully formed, there I would do the best I could to keep the pulp until tooth was well developed.

The germicide I have used in these cases mostly was pure beechwood creosote, to which later years I've been adding a fraction of one per cent of formalin.

(Continued next month.)

DENTAL THERAPEUTICS.

By Geo. W. Cook, B. S., D. D. S., Chicago, Ill., Professor of Bacteriology and Pathology, University of Illinois.

Chapter X.

The illustrations given with regard to the actions of bacteria in the presence or absence of air is for the purpose of drawing attention to a few well-defined facts regarding the action of the bacteria and their relation to certain pathological processes, as well as their fermentive action in certain fluids known as media, from which they draw their nutrition.

The gelatinous plax, if found on teeth, are only factors incident to the process of caries. But as it was not the intention to discuss this phase of the problem, we will return to the discussion of the pulp and its destructive changes.

One of the most difficult problems that faces the dentist in the treatment of teeth is the getting rid of these bacteria and their products, and at the same time preserve the natural color of the teeth. We have previously stated that the destruction of the pulp of the tooth can and does probably take place under two very different conditions when its destruction is brought about through the activities of micro-organisms. The decomposition of the pulp in one instance takes place under anærobic conditions, while in the other it may take place under ærobic conditions. When we have the decomposition of the pulp, or when the pulp is in that state known as the putrescent state, we have a number of chemical processes or changes very similar to those that take place in other putrefactive changes, or, in other words, a process that is very similar to the changes that take place in organic substances in the presence of bacteria and oxygen in the air. This is called putrefaction.

The part that is played in the decomposition of organic substance and its effect when introduced into the animal body has been recognized for a long time, but the effects of the products of putrefaction were not known in anything like a scientific way until 1856, when Panum, a Danish physiologist, treated putrid flesh in a way that it would destroy the living organisms therein contained, and introduced it into living animal organism and found that it had very deleterious effects.

Vaughan in 1885 extracted a substance from decomposing cheese called tyrotoxicon. This cheese had previously proven to be poisonous. Since that time various chemical products have been extracted

from putrefying material, until now a great number of ptomains have been extracted from putrefying flesh. These ptomains, as has been previously said, belong to a chemical substance which is very much like the alkaloids that are extracted from the vegetable substance in their chemical characteristics, a number of which are used as medicinal agents.

The chemistry of these basic substances known as ptomains is a complexed molecular structure, and many of the chemical changes that take place in the decomposition of the pulp would not differ from that tissue of other parts of the body. But in the decomposition of the pulp they are of no special importance to the dentist, other than their chemical effects in the way of bringing about discoloration.

Up to the present time the chemistry of discoloration of the tooth pulp has been looked upon as a very simple chemical process, spoken of as though there were only a few chemical products formed as the principal elements in the decomposition of the pulp tissue. While as a matter of fact there perhaps is no chemical reaction known to the science of chemistry that involves as many physical and chemical changes as the putrefactive decomposition process that may take place in the pulp; perhaps but few of these chemical elements might be detected, even though we had agents sufficiently delicate to determine their presence for the simple fact. These stages may last only for a short time until they again become decomposed and changed into another molecule.

When we think of the great complexity of the molecular structure of living substance we could not conceive of the process of decomposition of the pulp in a way that it would fall as it were from this high chemical constituent to a simple molecule like ammonium, water and carbon dioxide. They are the end products. There are a great many intermediate stages that take place between the decomposition of the proteid molecule, for instance, to the final termination which is ammonium, carbon, dioxide and water. And when it is considered that the bacterial action brings about this decomposition and that during this decomposition they excrete certain body substances that may mix and mingle with many of these compounds, and possibly enter into a chemical formation with many of these intermediate products.

Consequently, the decomposition of pulp tissue in the presence of

bacteria is no simple process but involves one of the most complexed chemical reaction known to the science of chemistry.

It has for a long time been suggested that the discoloration of the tooth structure was due to the iron that was present in the haemoglobin of the blood. But the human body, weighing 150 pounds, contains but 3 grams of iron or about 93 3-10 grains, and this is distributed in the following way: The red blood corpuscles and the blood forming organs, namely, the spleen, red bone marrow and the bile, contain about 90 per cent, or 2 7-10 grams, and this would leave for the rest of the body about 3-10 of one gram, which would be distributed about equally through the rest of the body, and would be so minute in quantity that I doubt if a test could be found delicate enough to determine its presence unless a large quantity of material was used. And when we take into consideration the size of the pulp it would be a question in the mind of anyone reasoning upon this subject whether enough iron will be present to give the colored appearance in the tissue of the tooth substance. And it would seem to anyone that this theory is no longer a tenable one, since when the pulp has undergone devitalization and decomposition the elements that are set free in the decomposition processes would be likely to have a strong affinity for the minute quantities of iron, and would form certain chemical combinations that would take away all of the iron in that tissue as quickly and as easily as it would combine with the already organized structure of the dentine. For the facts concerning the stable and fixed conditions of the dentine it is necessary to only say that it is a modified bone of epithelial organic origin and contains as its organic base 27 per cent of cologen, in which there is to be found an albuminous substance of an organic nature that is known as keratine, and gives on decomposition somewhat the same reaction as does albumin by the way of leucin, tyrocin, glutansenic acid, asparagic acid, etc., which gives the various color reactions to albumin. These cologens contain from 4 to 7 per cent sulphur, in fact, they are richer in sulphur than any other tissues of the body. Upon the decomposition of these cologens, which are found so plentiful in the dentine of the tooth, a part of the sulphur is broken up in the form of sulphides (SO_2) and diffuses through the dead dentine. If it acts as it does in other parts of the body it causes a bluish black or smoky color, in fact, nearly all of these organic compounds of sulphur are black or bluish black.

It is a pretty well observed fact that in all badly discolored teeth

in which the pulp has undergone putrefactive changes, the discoloration is due to the setting free of the sulphur from the cologen, which always produces a dark color. In the teeth that have been filled this change takes place very slowly so that the tooth discoloration is one of a slow process, and in fact it may take years. It matters but little whether the process takes place rapidly, as in the case where the pulp undergoes putrefactive changes in the presence of microorganisms, or whether it is one of those slow rearrangements of the chemical elements in the cologen organic basis, forming the sulphides that cause the dark discoloration. One is a rapid process of rearrangement while the other is slow and more fixed.

The sulphides of lead, silver, gold and mercury are all of a dark color and are capable of being removed with oxidizing agents, if that is the chemical substance that enters into the discoloration of tooth structure. But as for the remedies, as we know, those which are at the present time employed have no permanent influence on removing the discoloration as found in teeth that have undergone a slow degenerative process, as so frequently happens in the discoloration that takes place in that slow molecular rearrangement in the dentine itself.

Many of the oxidizing agents which are at the present time used will remove temporarily the discoloration, but it will in many instances slowly return, and the return is evidently due to the continual change in the dentine which slowly liberates a sulphide (SO_2), a process which will continue for an indefinite period unless the dentine can be permeated with an oxidizing substance that will oxidize the sulphides (SO_2) to sulphates (SO_3), which are a more fixed compound and does not lend a fixed discolored appearance through the enamel of the tooth.

This would seem to give a better hypothetical basis for reasoning out discoloration and its return after bleaching has been done, than would the other theory that has so long been looked upon as the true cause of discoloration of tooth substance. And beyond question this is based upon truly physiological principles as we know them at the present time.

Dr. J. P. Buckley, of Chicago, has given the best explanation of the chemical processes which take place, if we accept the theory that the iron compounds of the blood enter into the process of discoloration. And at the present time I know of no agent that will give

better results for the bleaching of teeth than the one introduced by Dr. Buckley (sodium dioxide).

Of course there is this to be said regarding this question: We are not familiar with all of the changes which take place in decomposition of the pulp in the presence of bacteria, nor are we at all familiar with what bacteria cell may carry into such tissue as the pulp, for we know that there is such a thing as the sulphur bacteria or the so-called iron bacteria (crenothrix) or the leptothrix ocharacea, which is found in water and has been known to produce very bad effects upon the human individual. This organism was capable of oxidizing ferrious compounds to ferric compounds, and was also capable of changing ferrious carbonate to ferric hydroxide ($2FeCO_3 + 3H_2O + O = Fe_2(OH)^6 + 2CO_2$). This organism was found to give the poisonous property in the water of Lake Tegel, and at one time caused great calamity with great suffering and loss of life in Berlin.

It has been observed that iron in the sheath of the crenothrix bears a strong relation to the physiological activities of this organism. Many of the so-called iron bacteria are supposed to be the causes of certain formations of the phosphates and silicates of iron that have been found in low, marshy sections.

Various illustrations of a similar nature might be brought to show that part of this coloring matter which is present in the tooth structure might be transported there through the cells of the microorganism that become inhabiters of the internal portion of the tooth. We have illustrations that in certain formation of so-called sulphur bacteria (beggiatoa) the sheaths of these organisms may or may not contain sulphur compounds. It is a well-established fact that a great many bacteria break up proteid substance. One of the end products of decomposition is sulphuretted hydrogen, and according to the explanation made by Buckley if discoloration is due to the iron compounds we have two possible sources for the formation of sulphide of iron, that of the decomposition of the pulp and possibly a minute quantity in the sheaths of many organisms.

I have on several occasions isolated an organism from the putrescent pulp that formed a dark pigment when grown on a substance containing considerable quantities of carbohydrates. In two instances I was able to bring about a similar discoloration of tooth substance, as is sometimes observed in certain forms of discoloration. Matthews and myself attempted to extract this pigment

by filtering out the bacteria and determining what was the principal constituent in this substance, and it was found that it consisted principally of sulphur uniting with the bacterial cell, and apparently there was but little of this sulphur that remained in the filtrate. Therefore, we came to the conclusion that this pigment remained in the bacterial sheath. But under certain circumstances especially where these organisms were grown in milk containing one and one-half per cent of asparagenic acid, this pigment was given up to the culture media to the extent that it would give a dark brown appearance on tooth structure, and also to white filter paper, and seemed to stain quite deeply. The first specimen of this organism was given to me by Dr. E. Lowly York. His specimen was also from a pulp undergoing degeneration.

While this organism has not been found sufficient number of times to make a definite statement capable of giving the discolored appearance to tooth structure, still my experiments and observation with this organism has led me to feel that while it does not form a sufficient amount of pigment to always be observed with the naked eye, but with certain combinations it will form a very dark compound. In the presence of the slightest trace of benzoic acid there is to be observed a decided discoloration, and one that is not easily removed by the ordinary means of oxidizing and washing away as in the usual method. At that time we were unfortunately detained from carrying out our experiments to anything like a definite conclusion, suffice it to say that we were of the opinion that this was an albuminous compound of sulphur, for with the most delicate test we were unable to obtain the evidence of a metallic reaction, but the presence of sulphur was evident.

We are unable at the present time to state whether or not the discoloration of teeth is due to a compound of iron or whether it is due to a sulphide of a keratine compound structure. This is a question that we are quite unable to settle.

I have in mind a series of experiments in the presence of certain bacteria that seems to me ought to throw some light upon this very complexing condition. The conditions that follow the physiological activity of bacteria in the presence of a complexed structure containing all of the elements that go to make up the nutritive function of a tissue like the pulp, is likely to baffle the most painstaking and delicate experimental work. However, it seems possible to advance this process to where we could at least give a more definite and

scientific reason for the condition that is sometimes so difficult to prevent, and more difficult to get rid of when discoloration has become so fixed and permanent as it sometimes seems to be. The method of treatment is most likely the cause of discoloration than is the iron or sulphur compound, as the case may be. My views on the treatment of teeth have become so radically changed in the last few years, and this has come out of the explanation that the various modes of action of disease germs have developed out of two activities, namely, their growth and multiplication, and the formation of poisonous compounds.

(To be continued.)

PROSTHETIC DENTISTRY.

TEMPERAMENTS AND DENTAL SHADES.

By B. J. Cigrand, B. S., M. S., D. D. S.,
(Professor of Prosthetic Dentistry and Technics, School of Dentistry, University of Illinois.)

CHAPTER X

No matter how anatomically correct or how skillfully adapted for speech and mastication an artificial denture may be, yet if it bear not the relation demanded by age, facial contour and temperament, it cannot be otherwise than that its artificiality will be apparent to every beholder. The law of harmony thus found in nature between the teeth and other physical characteristics requires due respect to

MOTIVE.

size, shape, color and other qualities in an artificial denture in order that it shall correspond with other indications of temperament. There is no dental service that, from the æsthetic standpoint, is as a rule so illy performed as the prosthetic.

To the prosthesist the lines of the face and all its numerous symbols is an essential factor in arriving at agreeable results.

In dental prosthesis and oral surgery the modern dentist must be, in the full sense of the word, a "facial sculptor," for to his tender care and consideration is left the molding of many a scowl or smile. He must appreciate the lines of beauty in expression and discern at a glance the changes necessary in the different physiognomy to make them charming and inviting rather than repellant and

false, and it is for this reason that a knowledge of temperament is imperative, since a violation of the rules of harmony would destroy the æsthetic features in either crown or bridge as well as denture.

The choice of his food is in perfect harmony with his physical and mental inclinations, and consequently the former is the energy with which he accomplishes the latter. Besides the character and outline of his teeth, their occlusal surfaces indicate to a certainty the preferences of his foods. This is best studied in the lower animal kingdom, since they live in perfect naturalness and have not been changed by conventionalities. The sharp, pointed teeth of the canine family, with jaws that have simply the ginglimoid movement, proclaim to those who understand the text theorem of mastication that meat is their favorite sustainer.

MENTAL.

The flat and cuspless molars of the grain and cereal eating animals state clearly the disposition of the animal. Comparative anatomy really forms the basis of perfect knowledge of human anatomy. The temperaments of people in consequence have a strong resemblance if not relationship to animal disposition.

The law of harmony thus found in nature, between the teeth and other physical charateristics, requires due respect to size, shape, color and other qualities in an artificial denture in order that it shall correspond with other indications of temperament.

The Motive Temperament.—To the ancients it was known as the muscolo temperament. Persons of this quality of body and mind are "human powers," strength and endurance their peculiar charac-

teristics, constitutional powers and great muscular strength. Tall and angular, active, steady and firm. Facial contour square, angular and high cheek bones. Complexion, dark and sallow. Quality of voice, strong and full of vibration. Nose, strong and usually Roman. Eyes, dark and piercing. Hair, dark, coarse and abundant. Fingers, long and knotty. Teeth angular, three sharp cusps; appetite, inclined to eat liberally of meat. Favorable characteristics, energetic, persevering, executive and ambitious. Unfavorable characteristics, extreme in expression and often domineering. Examples of type, old Roman. Comparative anatomy, the lion. Human example, Daniel Webster.

The Mental Temperament.—To the ancients known as the nervous temperament. This temperament might be called the sensitive, refined or brainy. External indications, well-developed nervous

SANGUINE.

system, studious and refined expression. Constitutional outline, full and graceful figure. General movements, quick, active, decided and restless. Facial contour, delicate, oval and finely cut. Complexion, abounding in grayish tint, lack of flush. Quality of voice, strong, clear, high pitched and melodious. Nose, well developed, usually Grecian. Eyes, bright, expressive, usually gray or blue. Hair, not abundant, and fine in texture, usually brown. Fingers, long and thin. Teeth abounding in oval outlines, appetite inclined to the fruits. Favorable characteristics, refined, imaginative, scholarly and studious. Unfavorable characteristics, sensitive, aspiring and often eccentric. Example of type, American people. Comparative anatomy, the grayhound. Human example, Thomas Jefferson.

The Sanguine Temperament.—To the ancients known as the plethoric temperament. This temperament might be called the sanguine, hyperæmic or cardiac. External indications, flush and florid complexion. Constitutional outline, medium in height and lively, general movements active and easy. Facial contour, round, with full forehead. Complexion, florid and animated. Quality of voice, soft and clear. Nose, rather small, usually Grecian. Eyes, usually blue. Facial contour, round and forehead unshapely; complexion, pallid and muggy. Quality of voice, poor and indistinct. Nose, small. Eyes, sleepy and inexpressive. Hair, blonde and sparing. Teeth, poor cusps, width predominating over length. Appetite, cereals. Fingers, medium in length and rounded. Favorable characteristics, mirthful, social and friendly. Unfavorable characteristics, passion-

LYMPHATIC.

ate and high-tempered. Examples of type, Danes and Germans. Comparative anatomy, shepherd dog. Human example, John Adams.

The Lymphatic Temperament.—To the ancients known as the phlegmatic. This temperament might be called stomachic or digestive. External indications, round and well-developed jaws. Constitutional outlines, fleshy and bulky, general movements slow and sluggish. Hair, coarse, straight and drab. Fingers, short, flabby and cold. Teeth scarcely any cusps. Wider and thicker than the sanguine. Appetite, succulent foods. Favorable characteristics, contented, agreeable and jolly. Unfavorable characteristics, sluggish, lazy and unenergetic. Example of type, Esquimaux. Compara-

tive anatomy, swine. Human example, Henry the Eighth of England.

As an aid to determining the teeth it might be well to say that when the jaw cannot be freely rotated it indicates a predisposition on the part of the patient to live the life of carnivora, meat-eating; while when the jaw can be readily thrown from right to left there is a disposition in the owner to be herbivorous, grain and vegetable eating. In the former I observe that the glenoid cavity is *deep* and in the latter *shallow.*

Dr. Royce some years ago read a paper in which he clearly showed the necessity of giving variation of shades to the teeth in full cases. He has conclusively demonstrated that, in a normal set of teeth, there are a great number of shades; that is to say, the laterals are of a peculiar shade; the cuspids are of a peculiar shade; the centrals are of a peculiar shade, and the bicuspids and molars accordingly. And he has shown us further that even the laterals are not of the same shade, but that there is a great variation in all these shades. It is one of the most important contributions to the art of prosthetic dentistry we have had his year. I am trying to follow it out, and I am getting splendid results from it. I am at the present time taking as many as five and six sets of teeth and arranging them for one set, and it was that same idea that prompted me to show before the Illinois State Dental Society some years since a set of teeth, articulated and occluded, according to the ideas I advanced in that paper, and the set of teeth I showed at that meeting was made from seven different sets of teeth.

As regards the variety of shades I spoke of, you will find that if the teeth are constructed on this plan, the variation of shade will give a magnificent set of teeth. It is following out nature's great law of correspondence, and if we do not adhere to this great law were are artisans and not artists. That is the difference between the mechanical dentist and the prosthetic dentist, the former being an artisan, the latter an artist.

With reference to the matter of shades of teeth, there is scarcely a Logan crown which is not from one to two shades too light. Possibly it is our own mistake. We have been taught that before setting a Logan crown, or any artificial tooth, we should clean the teeth. That is proper, but we must consider, when we match those teeth, that when we have thoroughly cleaned them they are not going to stay that way. You may tell a patient to brush his teeth three or

four times a day, and invariably he will not do so. After the Logan crown is in the mouth six months, although it was perfect as regards the law of correspondence when it left the office, how does it appear now? It is too white. It seems to me we match the teeth too carefully in some cases, and I think in many instances after we set a Logan or Richmond crown the color is a trifle darker than the case indicates, and after you have cleaned the teeth the patient will look decidedly better. Of course, it will have been a deception to the public. The deception of art is true art, and by so doing we will have made a step forward.

It was Dr. C. W. Peale who, something over one hundred years ago, recognized the variation of size and shade in the dental organs. He advocated years ago ideas which to-day are just being understood. He was an artist and a dentist and his knowledge of both made him stronger in either vocation. He recognized the great variety of shades which entered into the natural denture of man; he saw the variation and his early artificial teeth bore out the principle that "the teeth of one person are not of the same shade; nor do the shades remain the same through life."

Dr. Richardson, famous as a prosthesist, and Dr. Allport observed the same, while at present there is much discussion of that which Peale practiced a hundred years ago. He, being an artist, made nature his model and copied accurately the divinely ordained. To perfectly restore the face which has lost its dentures is indeed the crowning glory of prosthesis. To recognize the form and character of teeth required, as well as produce the shades of the teeth congenial to the age and temperament of the patient, is both an art and a science. We can only know how thoroughly scientific, artistic and technical the task of facial restoration is after having made nature our model and teacher.

(To be continued.)

ORIGINAL CONTRIBUTIONS

TOOTHSOME TOPICS.

By R. B. Tuller, D. D. S.

(No. 6.)

J. Dubkin Chumpley, D. D. S.,

Dentist.

Fine Gold Fillings a specialty.

Bird Center.

A professional card.

You've seen 'em like that, haven't you?

Fearing that D. D. S. may be misunderstood or misinterpreted, he makes it plain that he is a dentist.

He's no common, every day, all-around dentist, but one who makes a specialty of fine gold fillings.

What he does to fill in the time between fine gold fillings he does not say.

The chances are that he, now and then, packs in a "silver" filling or files up and polishes a rubber plate.

But he wants it distinctly understood that he don't do that every day. J. Dubkin Chumpley, D. D. S., Dentist, Fine gold filling a specialty, signifies, as he looks at it, a kind of upper crust dentist.

If you want to see him score set him to work on fine gold fillings.

Great large whoppers, too, that takes hours to insert—with rubber dam *in situ* during the entire operation.

Chumpley may sweat some and his back may be breaking, but he's got endurance—got it, maybe, on the college foot ball team.

Perchance he'll tell the patient that *this filling* is one of the most difficult a dentist is called upon to build.

Only specialists in gold fillings would locate anything so difficult.

Common, ordinary dentists would never consider anything but just common, ordinary amalgam in such a place.

And the patient? How does she—most always she—enjoy it?

Methinks I see a bedraggled looking female take a long sigh of relief as she impatiently helps J. Dub. remove the dam. Weary, worn, agonized, nerve-wrecked and half paralyzed, nearly in a state of collapse she departs and thinks, "Heavens! have I got to go through all that again for the one over on the other side?"

Well, she don't have to if Chumpley would just go and get wise on a little inlay work.

There are Chumpleys and Chumpleys, and again Chumpleys plus.

We've all been Chumpleys to a large extent, though we are but common, every day dentists and do not specialize fine gold work as though the other fellow did not make a *bete noir* of himself in the same old way.

Now, haven't you thought you'd like to do better for your patrons in some way and especially if it could be done in a way not less remunerative and saving time and strain on yourself?

Then why cling so devotedly and persistently to pounding in gold by a long, tedious method, when there is a better way?

A better way? Sure, a better and a much easier way—ten times easier for the patient and really nine and nine-tenths times easier for the dentist, possibly, in a large majority of cases.

The trend of progressive thought and action of up-to-date dentists is to eliminate as much as possible the horrors of the dental chair, or to reduce hours of nerve-racking strain and misery to minutes, and send patients away cheerful and not dreading the next engagement like a death sentence.

When you went to college how much more than one way did you learn to fill a tooth with gold?—that one way malleting in cohesive gold pellet by often taking hours and sometimes the better part of a day?

There are other very satisfactory methods calling for an intimate knowledge of non-cohesive and of crystal gold.

But malleting cohesive gold, by a slow, tedious process, at best, has stood, for years and now, the most approved method of filling teeth, and hence that is taught almost or quite to the exclusion of any other in most colleges; hence the specialist in fine gold fillings.

After some years of regular practice are you always satisfied that every gold filling you put in is a "peach"?—that is to say good?

Do you feel that most of them will do what they are mainly intended to do besides looking gaudy—preserve the teeth?

That you "can't teach an old dog new tricks" is an old saw, but no dentist ought to allow himself to be compared to an old dog.

If you are not wise, get wise as soon as you can. The high tide of cohesive gold work for large restorations of decayed and broken down teeth has been reached and passed.

I don't mean to say that the use of cohesive gold for a part of our work is out of date and perhaps never will be, but large and conspicuous restorations will be done in some easier and better way.

Many of you don't like the idea of getting out of the cohesive gold and mallet rut, but you've got to or be classed with Chumpleys, and some day in the trite but slangy saying, your name will be Dennis, alias Mud.

You must keep up with the procession. Why not get into the band-wagon and be not only in the procession but at the head? MAKE INLAYS.

Don't scowl! Don't howl! You'll have to come to it or drop behind.

Porcelain inlays? Yes, your anterior teeth. And your posterior ones, too, if you want to.

Say, you can set a porcelain inlay on the buccal surface, down under the edge of the gum, perchance, easier than you can put amalgam there.

Now, hold on! Don't get excited. I didn't say make and set the inlay, for it takes some little time to bake up an inlay.

But what I do contend is that you can prepare the cavity with much less cutting, saving your patient and yourself and when inlay is made it can be placed as easily as anything if made to go exactly to place when pressed in.

And if the cementing has been done properly it will stick and stay and preserve.

While you are doing the baking, sitting at easy posture in your laboratory and your patient is taking it easy reading or has gone out to return as you have agreed upon. When he or she comes back the setting is a very easy matter quickly done, as quick and easy as you'd insert an amalgam filling if you wish.

Porcelain inlays require some delicate skill and a good deal of painstaking effort in most cases, not to mention artistic taste and abil-

ity in shading and contouring; and, yes, after all they *sometimes come out.*

Great Peter! out?

Aye, 'tis true; they do. But take a little retrospect along those fine gold fillings you put in. Did any ever come out? Did any ever fail to protect though they staid in for a few months? Did the work you did after you perchance became a specialist in fine gold fillings always preserve?

What? Do you mean to say some came out? And some failed? Well, yes, of course; but, gee whiz! an inlay, why, an inlay should never have a fault.

Well, they don't have many—if the cavity is made right—if the inlay is made right—if it is set right.

The average gold filling is not a good filling because it does not preserve, though it may stick in a long time.

The average inlay—one not the very finest fit possible and not exactly correct in shade or contour—well, if it stays in, preserves, and it will stay in if conditions have been made right, same as a gold filling will stay in if the conditions peculiar to such work have been made right.

When one has become as familiar with inlay work as he is with gold filling his work will stand with equal or even greater certainty.

Don't you remember your miserable failures in your first cohesive gold work and even after you became quite expert?

But the purpose of this topic this time is not to give special pointers about porcelain inlays, but rather to emphasize the value of inlays so logical and correct and artistic and durable when made correctly, and their especial value in reducing if not entirely eliminating some of the terrors of the dental chair.

All I have said applies as well to gold inlays except as regards color. The display of glittering, gaudy gold is becoming more and more objectionable to refined tastes, and therefore porcelain is above gold in the esthetic sense, but gold inlays will preserve and they can be made exceptionally strong for masticating service in posterior teeth.

Gold inlays have been made for a good many years and have done everything expected of them. The process of making them seems to some a little difficult and complicated, but anyone who can make a good cohesive gold filling or a gold crown ought to soon turn his hand to making an inlay.

I have a method, original with me, which I would like to tell you about, and when once you are familiar with it by trying to make a few in teeth set in plaster you can save a lot of time and trouble in many cases. When you become expert you can save fully two-thirds or three-fourths the time it ordinarily takes to build up large cohesive gold fillings.

The cavity must be prepared with no under cuts. If any they must be filled up with cement and walls left smooth and sloping slightly outward. The margins may be beveled, same as for gold fillings. (The contrary is the case with porcelain—margins must be square.) In other words, the cavity must be made so that an impression of it would draw freely without dragging or distorting the material used.

In this process I take the impression in gold.

I will describe the process of making an inlay by my method of a simple large bowl-shaped cavity in a lower molar for instance.

Supposing cavity to be all ready I take a third or one-half a sheet of non-cohesive gold (cohesive doesn't work so easily) and fold it over and over on itself until I have a square about the size of the top of tooth. Laying it over the cavity, which may be moist, I force it to the bottom with a little ball of cotton, then expand it to the walls and fit it carefully over the margins and into all fissures or recesses described by surface within margin of cavity. Into this I pack a wad of crystal gold—enough to fill it comfortably, treating it as I would so much putty. Now let patient bite on it. Pack down or add more as may be indicated. Especial pains is to be made to fit with some firmness all around the margin carrying to the bottom of every pit and fissure it is supposed to occupy when finished.

To remove it from tooth, take hold of the overlapping gold foil with pliers and gently coax it out. Put it bottom up on a piece of glass, flow investment over it, just a thin layer. When that is hard turn top up and on a wire screen hold it over Bunsen flame, put on 18 or 20-K. solder and draw it down through till filled full, which will easily show. After trimming off surplus around margin it may be ground and finished a good bit, if not altogether, before setting, care being taken to not injure margins. I find my cutting pliers hold it best while finishing. Now put in cavity and burnish down margins, and after scoring the back to give hold for cement it is ready to set.

Wash out cavity and dry thoroughly and keep dry and then mix

cement and set. Wipe away surplus cement and force down hard. A hot burnisher will hurry the crystallization of cement. Edges should again be burnished down close. After a few moments, parafin may be made to flow over the margins and the work is done.

The time taken to make this inlay is, in expert hands, not over 15 or 20 minutes if everything is ready and convenient to work quickly.

Caution is needed, if a blow-pipe flame is used in soldering or the foil and crystal gold may be melted. I use most always a low Bunsen flame. Flux should be cautiously used too.

Now, I have made some of these crystal gold inlays by packing the cavity without a matrix except a strip of thin gold laid in first to lift it out by and have soldered it without inverting at all, though it is best to. Cover all but top with a coating of whiting and water. This is a quicker way still for simple cavities, but it takes experience to know just how to handle it and not melt a thin edge or run solder where not wanted.

(Toothsome Topics every month.)

PORCELAIN INLAYS.

By J. M. Thompson, Detroit, Mich.

CHAPTER II.

The method of preparing a cavity in a bicuspid is somewhat similar to that employed in molars, and in each case much attention must be given to every detail. A few general principles apply to all cases, but each tooth should be considered as an individual and treated according to its needs.

Drawing No. 3 is made from an upper bicuspid which has a bell-shaped crown with prominent cusps and represents a class of teeth that bring with them a number of hard problems for the inlay worker to solve. Right here it is clearly demonstrated whether one is a well-rounded thinker or a crank; and the old saying, "Be sure you're right, then go ahead," should be our motto.

Inlays should never be put in for the mere pleasure it gives the operator, for sometimes the scriptures are reversed and our laughter is turned into mourning. There are cases where it is better to put our energies into a demonstration of abilities in other lines and thereby save our friends.

Having decided to make an inlay for the case in hand let it be made a thing of beauty and a lasting tribute to our skill. Study first the occlusion and fix firmly in mind the line of direction in which the opposing tooth exerts its pressure, next form the cavity in such a manner that perfect margins will be assured, which mean more to the life of the filling than any other single consideration. Enamel may be finished to a very fine edge and still withstand the pressure necessary in setting an inlay, and if properly beveled there is little danger of cleavage.

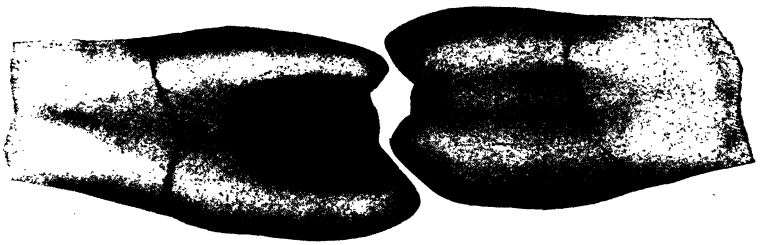
Referring again to Fig. 3, it will be seen that the margins are cut away so that plenty of room for a good body of porcelain is obtained. A good separation is, of course, necessary at all times, and if cavities of this class are at all deep, the nearer we can get to the bottom with our matrix the stronger will be the filling. Cavity walls at the occlusal border should be made perpendicular or parallel to the long axis of the tooth, thus reducing as far as possible the liability of fracture. This is really the vulnerable point in inlay work and is generally the first place for failure to begin. Bringing the joint too near the point of the cusp should be carefully avoided, especially in teeth similar to the one already described.

If the cusp of the opposing tooth is very long and seems to be a menace to the future of the filling, it is best to sacrifice a little of its length thus reducing the danger of its forcing the inlay out of place.

In cases where the lateral walls are badly undermined by caries and it is not advisable to cut them away, the under cuts may be temporarily filled with gutta-percha or plaster of paris, which makes it easy to withdraw the matrix when burnishing is completed. Steps are seldom if ever practical in bicuspids.

Cavities in cuspids present as few perplexities as any teeth with which we come in contact. Proximal cavities in these teeth are easily extended and inasmuch as the contouring is a simple matter there is little excuse for failure.

We now have for consideration the incisors and in these our artistic ability is put to its severest test. We may fail in matching



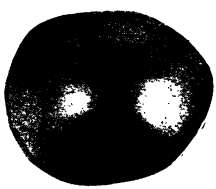
colors in every other place without seriously injuring our reputation, but here natural shades must be reproduced or we suffer accordingly. Each cavity must be prepared in a way that will combine the mechanical with the artistic and thus secure strength and beauty.

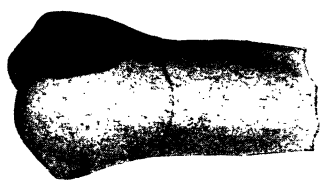
Simple cavities upon the proximal surfaces of centrals and laterals are sometimes the hardest to fill properly with porcelain. Considerable time is necessary as plenty of room must be obtained before a matrix can be removed without injury. Where these cavities extend nearly to the cutting edge and only a frail corner of enamel remains, it is always advisable to remove it and build in with porcelain. These restorations can be made real works of art, and also very durable.

As a general rule it is best to preserve as much as possible of the labial wall unless it is too frail to withstand the pressure of burnishing, or so thin and transparent that the cement will show through and upset the color of both tooth and inlay. The margins

of this surface should be beveled from within outward and finished to a knife edge. This accomplishes two things; viz., it makes a very clearly defined line in the matrix which is a perfect guide in forming the inlay, and also forms a joint which appears very superficial and exhibits a very small amount of cement. The writer does not claim any originality for the knife edge theory, as Dr. Reeves has advocated its use for some time. Its practical side appeals to one the first time they use it and to anyone familiar with some of the methods of those employed in fine joiner work, the tilted table of a band saw will be brought in mind. Where two pieces of wood of different colors are being worked together for inlaid table tops, etc., the beveled joint produces a finer finish than any other.

In cutting away the lingual wall it is generally advisable to remove it sufficiently so that a firm foundation is obtained as a seat for the inlay. The enamel margins should be perfectly square as a safeguard against fracture.





The labial wall acts as a support to the filling, preventing its being forced out during mastication. In these, as in all other cases, square corners should never be allowed to remain and the outlines of the cavity made as simple and plain as possible.

In the good old days when four foot wood was as plentiful as coal is at present, box stoves were made with corrugated sides in order to increase their heating capacity. It took a longer piece of iron to make one of the sides, thereby increasing the radiating surface. The idea of corrugation in building stoves was very practical, but in inlay work every angle should be reached by direct lines, thus reducing the length of the joint in which cement will be exposed to the action of the saliva. To speak more plainly, the writer wishes to protest against attempts on the part of some to teach a theory in which dovetailing is the underlying feature. It is not practical, inasmuch as it decidedly increases the amount of cement exposed.

(To be continued.)

ADENOIDS.

Cassius C. Rogers, Professor Physical Diagnoses, Chicago College of Dental Surgery, Dental Department University of Illinois.

Symptoms.—The objective symptoms vary according to the amount of hypertrophy and also as to the location. We should remember that it is not the amount of hypertrophy alone; a small amount of hypertrophied tissue, if it is located in the posterior nasopharynx, will cause a greater amount of symptoms than if it is a large growth located far down in the pharynx. Consequently its location is the primary thing for which we must look. A child troubled with this malady has a peculiar and characteristic facial expression. Remember the picture of the boy we had in the previous article; he has the typical facial expression of adenoid growths. What are the malpositions or the changes which take place in the face of one of these patients? First, the mouth stands open, the upper lip is thick, and is not long enough to cover the incisor teeth of the superior maxillary bone, and therefore the teeth are exposed, often the gum of the superior maxillary bone is exposed, due to the shortening and the turning up of the lip of the superior maxillary region, the lips are dry, the nose, instead of being developed properly, has an abnormally large tip which is blunt, making the so-called pug-nose, turned up nose, the alae of the nose are illy developed—they may be broad enough, but the cartilaginous portion of the alae of the nose just below the nasal bones, instead of being thrown out when an inspiration is taken, falls markedly in, shutting off the nasal passage; therefore instead of the alae expanding on inspiration they are really thrown into collapse, the sides coming in apposition so that it is impossible for the child to get air through the nose. The end of the nose being illy developed, we have a line or groove coming from the alae of the nose down to the angle of the mouth—a marked depression, giving the child a peculiar appearance. Then we have ptosis of the eyelids, that is, the eyes open only about two-thirds as wide as they should, giving the child a dreamy, sleepy appearance. The tongue is dry due to the air passing through the mouth directly down to the posterior nasopharynx; the lower pharynx and the larynx are dry because the air passes over them without being properly moistened; the upper nasopharynx and the nares become very moist and a catarrhal condition develops, and often on the posterior nasopharynx can be seen the mucus dropping down and forming a crust or false membrane on the posterior nasopharynx, as it dries

before it reaches the lower pharynx, and there is a constant hacking or clearing of the throat due to the secretions, coming down from the nasopharynx. There is a huskiness of the voice due to the dryness of the vocal cords or to a reflected oedematous condition. The child has a typical idiotic expression—it does not appear bright, and is no brighter than it appears. Once in a while you will find one of these children as far advanced in school as other children of the same age, but as a rule when they should finish the eighth grade they are just about finishing the sixth grade, and in going through the eighth grade they are generally about two years back of the children with whom they started in the primary room. They are slow to learn and quick to forget; they study hard, they learn, recite, and in two or three days it is all gone from them; they have not the power to retain what they have learned, this making it very difficult for these children to get along in school.

The symptoms we have aside from the facial expression and the catarrhal condition depend on the location of the vegetation. If we have the adenoids low down we may have no other symptoms; if high up in the center of the nasopharynx, between the Eustachian tubes, we have the secretion, instead of coming down through the nasal passage along the center of the nasopharynx, running to either side; the adenoids making an elevation or ridge, the secretions passing on either side of it must run over the mouth of the Eustachian tube, which in children is open, and therefore the infection travels up through the Eustachian tube and causes a catarrhal condition of the middle ear, and, what is worse, a catarrhal condition of the cochlea, often bringing about partial deafness and sometimes absolute deafness of these children by the time they are eight or nine years of age.

The pathological conditions in the nose, throat, and ear, are followed by the malposition of the chest; often these children are pigeon-breasted, still more often funnel-breasted; the sternum, instead of being normal, sinks in at the lower part, having a marked depression —the upper part of the chest is full, the lower part sunken in, and Harrison's groove is well marked; the patient not only has a deformed breast, but a diseased condition of the lungs, causing poor nourishment of the child. These children are nearly always poorly nourished, the appetite is poor, the color bad, the hemoglobin of the blood is far below normal, consequently the brain must be in the same condition, therefore the slow progress in school. These patients are nervous, easily excited, their rest is broken at night; there

is often an incontinence of urine, these children voiding the urine unconsciously at night; there is difficult breathing, snoring, and what is most terrifying to these children are the hideous dreams which disturb their rest; they awake in the night with a shriek, or tell in the morning of the terrible dreams they have had and of the agony they endured in the night. It is a common occurrence with these children to wake in the morning more tired than when they went to sleep, due to the nervous strain they have been under on account of dreams. This nervousness may develop into a chorea of the most exaggerated form (St. Vitus' Dance), in which the child twitches and jerks with an involuntary movement of the muscles. There is a neuralgic condition of the face, and especially of the teeth, causing subjective symptoms. Individuals who have an enlarged pharyngeal tonsil or enlarged lingual tonsil are very often the victims of what is called facial neuralgia, the patient complains of pain, and seeks the advice of a dentist. This pain may be caused primarily by decayed teeth, and generally is, but when the teeth are taken care of properly the neuralgic condition continues. In order to relieve the patient the growth must be removed. H. S. Straight, of Cleveland, Ohio, reports a case of continuous headache in a boy sixteen years of age, which persisted for three years, and which was entirely relieved on removal of the adenoids.

These patients are almost constantly catching cold, the slightest change in the temperature of the room, the slightest exposure to dampness, may cause a secretion from and congestion of these membranes and a discharge from the anterior and posterior nares.

Hajek reports that 3 per cent of his cases were due to measles, 4 per cent to scarlet fever, 3 per cent to influenza or pneumonia, 1 per cent to diphtheria, 16 per cent to frequent colds; in 63 per cent nothing in the way of exanthematous diseases could be discovered, although 35 per cent of the latter had some disorder of the throat besides the pharyngeal tonsil.

A. Brendel, in reporting 280 cases of disease of the ear, says that all but 69 had enlargement of the pharyngeal or the laryngeal tonsil.

Meyer reports 102 cases, and of these 72 had impairment of hearing or absolute deafness.

Swinburne says he has found a large proportion of all cases of adenoid vegetation coming under his observation also suffering with diseases of the ear.

In looking through the schools of the deaf and dumb, it is found that about 95 per cent of these individuals have enlarged pharyngeal or enlarged laryngeal tonsils. These children are often brought to an aurist with the complaint that they have been deaf from birth, and on examination we find an enlarged pharyngeal tonsil or tonsils. Of course it is a condition where the adenoids are probably caused from congestion, this condition passing up the Eustachian tube and attacking the cochlea and causing destruction of that portion of the eighth nerve concerned with hearing, and it is too late for anything to be done to cure the condition of deafness.

Theory for Stupidity in These Cases.—A. Jacobi sets forth a theory accounting for the stupidity of these children, and I think it is as plausible and reasonable as any we have, and it is one that cost him a great deal of study and observation. He claims that the stupidity in these cases is due to the relation of the lymphatic circulation to the nasopharynx, the brain being drained of its impurities by the lymphatic system. In case there is interference with this normal drainage, the toxins are stored up in the brain; instead of going to the circulation and coming down through the posterior nasopharynx, there is a damming up of this lymph charged with poisonous substances from the brain, causing pathological changes in the brain, and the stupidity of the child is the result. I do not think we could find a better reason for the stupidity of these children than he has found after a number of years spent in investigation of this subject. The dull expression is also produced by deafness and may be the cause of the inability to learn at school. These children often sit on the front seats at school and even then they do not catch near all that is said so far as instruction from the teacher is concerned.

Mouth-Breathing.—The patient is compelled to breathe through the mouth, the air is not properly warmed before it strikes the pharynx and larynx, causing a thickness of the mucous membrane and dryness of the throat; the bacteria that are inhaled lodge in the tonsils and crypts of the pharynx, causing complicated throat and laryngeal diseases.

Another marked pathological condition that will interest the dentist, is the early decay of the teeth. The deciduous teeth decay early, hardly ever remaining perfect. They are usually decayed to the gums between the fourth and sixth years, causing complicated diseases of the mouth and gums. The early decay of the teeth is probably due to the lodgment of bacteria, due to mouth-breathing,

the cold temperature striking directly against the teeth, the dryness of the teeth, and the inability of the patient to keep the mouth cleansed properly. I have seen children at the age of three years with the incisor teeth decayed to the gums, the decayed roots remaining. The first permanent molars decay early. It is due to the early decay of the teeth that these children are brought to the dentist, not so much because the teeth are decayed, but because they are aching. The parents think it is natural, if the child cannot breathe through the nose, for it to breathe through the mouth, claiming the early decay of the teeth is due to the excessive use of sweets. They may think it unfortunate that the child should have the appearance it has, but even so they can imagine it looks like the father or mother. But when one of these children commences to keep the parents awake at night crying with the toothache they begin to realize that something is wrong and seek relief, while perhaps the poor child has been suffering for four or five years and nothing has been done until the parents' rest is broken, then the dentist's services are sought, and it is the wise dentist that recognizes this condition and serves as a double blessing to his patient. This is probably the first intimation that the parents have that the child is suffering from any pathological condition. The dentist makes the examination of the mouth, finds decayed teeth, notes the stupid expression of the face and the characteristic appearance of the mouth, briefly examines the nasopharynx, finds the adenoid vegetation, and tells the parents what is the matter with the child; he then takes care of the teeth and advises the removal of the adenoids and proper treatment of the patient.

Treatment.—The treatment varies but little. It is both local and systematic. By local treatment in these cases is meant only surgical, sprays or local applications of medicine do absolutely no good. I do not believe that any man is justified in making a diagnosis of adenoids or of hypertrophied lingual tonsils and treating them with astringents to reduce their size. In a case of cancer or tumor of any kind, you would think a surgeon or a physician very unwise, if the tumor was in a position where it could be removed, to use local applications to reduce its size until the growth had extended to such a degree that it would be impossible to remove it by means of a surgical operation, and then, after the malignant growth had become so extensive that it would mean a recurrence or death to the patient to have it operated on, to then advise an operation. The time to operate on malignant growths and the time to operate on adenoids

or enlarged tonsils is at the time they are found. Generally you find malignant growths before they are so extensive that it is impossible to remove them. Adenoids can always be found before the patient's health is undermined or body permanently deformed.

The first thing that should be done which these growths are recognized is the advice of the removal. The future health and condition of the child must be thoroughly explained to the parents, then if they refuse operative treatment or to favorably consider your advice, the responsibility must be thrown upon them, and the child, when it grows to manhood or womanhood can only look upon its parents as the cause of its appearance and the condition of its health, and the parents must be responsible for the proper development and normal mental condition of the child when it grows up. If time is taken and proper advice given, generally the parents will submit. Once in a while you will find parents so obstinate that simply the advice or the suggestion that the child has a growth which should be removed will meet their disapproval.

General Anesthesia.—As to the operative treatment. The better way to perform the operation is under a general anesthetic (I am speaking of children now), either chloroform or nitrous oxid.

The anesthetist must be a skilled man in all cases. It is a great mistake to put the child into the hands of an unskilled man for any operation whatever, the anesthetist must be as skilled a man as the operator himself, and must be well versed in the operation, for if not he would not give the proper anesthesia in that particular case.

The death of adults under chloroform anesthesia is about one in four thousand anesthetics, while death from nitrous oxid is much lower—one in about two millions of anesthetics. There are annually given about 750,000 anesthesias of nitrous oxid, with very few deaths, and there are on record at the present time thirteen deaths due directly to the administration of nitrous oxid. Whether those were accidental deaths, or whether they were cases in which a certain amount of fright from any cause would have stopped the heart and caused death, we cannot tell. But nitrous oxid is a comparatively safe anesthetic, and practically it is the safest we have. No general anesthetic, I wish you to remember, is absolutely safe, because there is not one of them to which patients have not succumbed at the time the anesthetic was administered.

Chloroform anesthesia should never be given except with the patient in the recumbent position—never in the sitting position;

patients take the anesthetic much better in the recumbent position and there is not the danger or loss of life.

Nitrous Oxid.—A few years ago nitrous oxid was practically used only for its anesthetic effect during the extraction of teeth, it being suitable in these cases on account of the shortness of the time that a patient could be kept under the general anesthetic. However, at the present time a patient can be kept under nitrous oxid for half an hour, perhaps an hour. Within the last few years, however, I have operated for adenoids a number of times with the patient under nitrous oxid anesthesia, with great satisfaction. I have never operated with any anesthetic where I have been more pleased than in the cases in which the patient has gone to sleep under nitrous oxid, the patient in the sitting or in the recumbent position. But you should never remove adenoids with the patient in the sitting position, because there is quite a little hemorrhage, and this may run down into the larynx and finally cause a choking of the child with blood while asleep, or, what is worse, infection of the alveoli of the lungs with the pneumococcus, in which case the child in three or four days will have a typical pneumonia due to aspirating the blood from the posterior nasopharynx. Therefore the child should be placed in the recumbent position before any attempt is made to remove the adenoids.

Gardner Hunt and Hewett of England were the men who first advised the use of nitrous oxid in removing adenoids. They, however, claimed that its use would never become general on account of the shortness of the time that the patient could be kept under the anesthetic, but that has been overcome. A. Van Arsdale of New York also used it quite extensively in operating for removal of adenoids, but his criticism was the same as that which had already been made—the shortness of the general anesthesia.

Operating Without Anesthetic.—The operation without a general anesthetic is one that is sometimes advisable under circumstances where is would not be wise to give the patient a general anesthetic.

Local Anesthesia.—In these cases some men use local anesthesia, a weak solution of eucaine or cocaine being applied to the parts. Some authors advise cocaine 10 to 20 per cent; I do not use cocaine in 10 per cent strength for any case, and never shall use it in that strength. Four per cent is the strongest solution of cocaine I have ever used. When cocaine is used, be cautious; always examine the

pulse first, and, if necessary, the heart. The pulse, however, will generally tell you all you need to know. If you apply cocaine locally, and your pulse immediately becomes rapid, suspend your anesthesia —stop it—no matter whether the patient feels any uncomfortable sensations or not. The rapid pulse shows that the drug is irritating the nervous center, causing the heart to run away with itself, the cardio-inhibitory nerve is becoming paralyzed and the accelerator nerve is doing all the work, and the heart is going to wear out and the patient succumb unless something very urgent is done. Do not use cocaine in removing adenoids. If the adult is willing to have the operation performed under local anesthesia, surely he should have grit enough to have it done without an anesthetic at all, because it simply takes one sweep of the curette to remove the growth in many cases, and you can do that before the patient is aware of it. Local anesthesia of cocaine always has a tendency to increase the hemorrhage of the part, if anything, instead of diminishing it, so in cases where you expect hemorrhage especially, never use a local anesthetic of cocaine.

Adrenalin with chlorotone, or extract of suprerenal capsule, acts very nicely as a local anesthetic in these cases, and you have practically a bloodless operation—you can remove polypi of the nose, turbinates of the nose, tonsils from the throat, adenoids in the nasopharynx, with practically no hemorrhage; but it is the most deceiving thing that can be imagined; it constricts the capillaries, shuts off the blood supply, but it has a reaction coming on all the way from one to four hours afterwards, when the capillaries markedly dilate, and your secondary hemorrhage may sometimes be alarming it is so profuse. That is the objection to using chlorotone and suprarenal capsule as an astringent in operating around the nose and throat; those parts are extremely vascular. The operation practically is a bloodless one and the secondary hemorrhage is sometimes far greater than the primary would have been had these agents not been used.

Cocaine in connection with suprarenal capsule is another local solution that is used a great deal, the cocaine deadening, the suprarenal capsule contracting. In using this, however, the patient must be kept sight of for sometime after an operation, and I would not advise its use in operating on adenoids.

Position of Patient for Operation.—There is a proper way of holding these children when operated upon without an anesthetic.

Have the assistant seat himself in a chair, draw the child between his knees and have it sit on the chair right in front of him, locking his feet together over its feet, passing his arm under the patient's arm and placing the hands back of her head. Now the child cannot move her feet nor move in any way.

A mouth-gag should be properly adjusted in the same manner as when giving nitrous oxid.

Operation.—In operating pass the curette back of the soft palate until it is back against the posterior nasopharynx, turn the tip up, and press it up until it is pressed firmly against the septum of the nose, then press, come back until the blade passes through the adenoid, and do not stop until the firm tissue is felt, this can be told by the sound—one can hear the curette scraping against the fibrous tissue. One must use the sense of pressure, and one will soon become accustomed to it so that he will be able to exert just the right amount of pressure on the curette; press until one comes to fibrous tissues, then cut no deeper. The fibrous tissue is tough, the adenoids are very soft, and the curette has a tendency to simply go to the fibrous tissue and no deeper; remove everything down to the fibrous tissue. The best curette is the Gutstein, modified; the blade, instead of being as thick as the Gutstein is made, is only half as thick, so that when one gets to the nasal septum it can start to cut immediately, the cutting edge is on the lower part, the upper part is dull, hence it causes no cutting when it passes in, but when one presses it up against the nasal septum and start down with the proper pressure, the cutting edge is very sharp, and it cuts as it comes down. Care must be taken not to get over to the sides of the Eustachian tube and cut off the mouth of it, because if that should be done, it might set up an infection and cause otitis media. One must have a firm hold on the curette and the pressure must be just sufficient to carry the blade through to the fibrous tissue and remove everything; if the pressure is only sufficient to cut just a little ways, then the part that has been cut hangs down as a flap, causing the child to strangle, and the hemorrhage is more profuse when there is a loose flap than when the adenoids are entirely cut off.

The operation is very simple, and it is easily done. The only thing is that one must do several of them before they become accustomed to finding the growth, putting on a certain amount of pressure, and becoming familiar with the technique of the operation, which simply requires a little practice.

After operating on the growth the finger must be passed through the mouth, back of the soft palate and up into the posterior nares to see if there are any adenoids left, for if there are, while one still had the patient under their control, the mouth-gag in place, one can go back in mouth with the curette and remove them if they are in the region where one can get at them. Once in a while you will find the adenoids extending into the posterior nares; when that is the case they cannot all be removed with the curette, but one takes out what they can. Then pass his finger back of the uvula, press the adenoids up into the posterior nasopharynx and go in with biting forceps through the nose and cut them off, but be careful that the end of the finger is not cut off instead of the remaining adenoids.

Your finger must be your eye in this case; you have to tell where the adenoids are, you have to tell where the forceps are, and cut against the end of the finger, in that way removing the adenoids from the nasal passage.

In regard to disinfection in operations of this character, it is well known that the throat is a very hard place to disinfect, and it is a very hard place to infect. If we were to use sprays to disinfect the throats of these children, by the time we wished to operate the patient would be so unruly we could do nothing with them. Never use a disinfectant. The throat is very hard to infect, the mouth is normally full of germs, and it would not remain disinfected two minutes after you had used your disinfectant. Therefore do not aggravate the patient by attempting to disinfect the nose and throat, because it does absolutely no good. But disinfect your instruments —be sure that they are sterile—and then you have to run your chances so far as infection by other means is concerned. The parts are full of recesses and crypts. You cannot get at them to disinfect.

PROCEEDINGS OF SOCIETIES

PROCEEDINGS OF THE NORTHERN INDIANA DENTAL MEETING AT WABASH, SEPT. 15 AND 16, 1903.

(Continued from page 750.)

DISCUSSION OF DR. BUCKLEY'S PAPER.

Dr. Tuller: I don't feel competent to discuss this most excellent paper of Dr. Buckley's from the chemical standpoint, because I feel that I don't understand very much about chemistry. I, of course, have had years of experience in the use of arsenical preparations in the treatment of teeth we have to devitalize, and I came to the conclusion many years ago that some means to get along without it was very desirable. I have not used it in the past several years, except in a few instances where I have failed to get results with pressure anaesthesia, and in some of those cases—most of them, I believe—I failed with the arsenic as well, to reduce the pulps to insensibility. As Dr. Buckley has shown we have a lot of unpleasant things to deal with when we undertake to use arsenic, and among the things are aching teeth before the arsenic gets in its deadly work, and time consumed, not to mention the dangers of discoloration often a sequel to the arsenic method as the essayist has shown. In pressure anaethesia I have met with stubborn cases and to such an extent that I have given up and fell back on arsenical treatment. I had an experience within the past sixty days. I had a patient with pulp exposures, one in a molar and one in a bicuspid. Both appeared to be favorable to the use of the instrument I so often use in pressure anaethesia, and I applied it very thoroughly without any success in either case. I put in arsenic and sent patient away for forty-eight hours. When she returned I found pulp quite as sensitive as before. I applied the cocaine again under pressure, and after considerable time got into the pulp chamber. In both teeth I found a calcific deposit filling the chambers and extending a ways into the roots, terminating in each root in a live pulp. This deposit was not attached to the tooth at all, but filled the chamber with

the exception of a thin peripheral space seemingly filled with serum or protoplasm separating it from tooth walls.

With these two cases in one mouth and some other cases where I had knowledge of secondary deposit of dentine, I am led to the belief that this deposit may be the main cause of pressure anaesthesia failures, when we are satisfied that the fault does not lie in the method used, for any pressure method used that does not absolutely confine our solution to the tissue we wish to penetrate will fail. When we know we have not failed in confining the solution and the case is stubborn we may suspect a layer of secondary dentine (which will be penetrated if we persist) or a calcified pulp which does not seem to be affected at all; anyway in any reasonable time.

To produce anaesthesia in a tooth pulp by my method I do not go into the cavity of decay at all in many cases, but make a small hole through the enamel at the most available and at same time least conspicuous point and apply the cocaine with pressure to the tubules of healthy dentine. The solution soon penetrates the pulp, producing anaesthesia that benumbs the whole coronal portion of the tooth; then I can bore into the cavity without pain and uncover the pulp so that I can insure pressing cocaine to the apex of roots. When that is done removal follows immediately. The flow of blood can be checked with extract of the suprarenal gland, or by using it with the cocaine. It infiltrates the pulp and prevents much bleeding. Now these openings through the enamel are made at points, when possible, that will be embraced in the subsequent extension of the cavity for prevention, or for anchorage. In molars and bicuspids I can usually make this opening occlusally. Sometimes I push the gum up a little at neck of tooth and make the opening there. The selection of this point I believe often obviates the delay caused by secondary dentine. Whatever way you may get in and affect the pulp a little, you will find you can then cut in in any part of the coronal portion of the tooth with no pain. In a clinic before the Illinois State Dental Society at the last meeting, we failed for fully half an hour to get anaesthetic results, but perseverance was rewarded, and when the tooth was opened it was discovered that there was a receded pulp with the chamber walls thickened with secondary dentine.

So we have these difficulties to contend with in pressure anaesthesia, but are they more or worse than the difficulties, in one way and another, we have always had to contend with? I think

not; and when we are successful there is no better way or time to get out a pulp than while yet really vital and before any putrefactive changes have taken place, or septic influences introduced. Filling immediately may be done or not as each operator deems best, but it can be done in a day or so at most, almost always, and with no occasion to introduce anything into the tooth that might discolor it we eliminate many chances of the tooth ever becoming dark.

I have diverged some from the subject in describing ways and means of pressure anaesthesia because it is comparatively new, but the way to do it is quite as important as to know that it is the thing to be done. If you agree with the essayist that the immediate removal by some cataphoric process is the thing to do, you want to know how to do it, so I may be excused possibly for the divergence. When the case in hand will permit of the use of a soft rubber plug behind the pellet of cotton saturated with the cocaine preparation—no leaking out—nothing better is needed, but there are so many cases where that procedure does no good at all, because solution leaks away.

Dr. R. B. Tuller of Chicago then read a paper as follows:

INLAYS, GOLD AND PORCELAIN.

By R. B. Tuller, D. D. S., Chicago, Ill.

No subject in dental science has in late years been so widely and generally discussed as that of inlays; more especially, porcelain inlays. Being a subject of such interest to every progressive dentist, whether his opinions be positive or negative, pro or con, it has not been by any means exhausted, nor will it be for some time to come, any more than that of filling teeth in any other way. Until dentistry has progressed to the stage of practicing prophylaxis generally instead of repair, essays on filling teeth will be read and discussed. Inlays are demanded of us by our patrons for esthetic reasons as well as to avoid strain, discomfort, weariness and waste of time, to say nothing of the preserving quality of this class of filling when properly made.

We know a large proportion of the troubles above named may be avoided by making inlays, conserving our own energies at the same time, and if we can preserve a tooth better with an inlay why should we not hasten to perfect ourselves in this art? Like every

progressive step in dentistry, we must investigate and understand the underlying principles and become familiar with the technique of all details and phases of the operation.

Though we now and then hear of inlays dropping out, they have come to stay. There is no question about that, and *stay* of course we want them to.

There are some things quite essential to their retention and permanency, and it is some of these things I wish first to discuss. An inlay that does not stay is not worth the outlay. It is not worth the outlay of our time, taste and skill, say nothing of what it costs the patient in time, trouble and money. That is plain. Neither is a gold filling nor any other kind of filling.

Few of the progressive steps in dentistry are reached at a bound; on the contrary, they are gained only by study and thought and logical reasoning; by intellectual, painstaking effort and by zealous perseverance, not on the part of one person alone, but on the part of many workers along the same lines.

We have not arrived at every perfection in inlays; but they have many unquestionable merits—merits so rational and pronounced that we cannot turn our backs on them if we would. Therefore, our best efforts as progressive, scientific men should be given to overcoming their faults or the faults of their concomitants.

Cement of some kind is and always will be a concomitant of the inlay. While cement does better for us, the better we understand the nature of it, and especially the peculiarities of its properties in the exceedingly thin layer required to hold an inlay in place, there is yet much to be desired in the substance. Combined with hold-fast qualities and durability in the fluids of the mouth, we need a cement that is transparent or at least translucent. The opacity of cement interferes with our getting perfect matching in shades. Some day the ideal cement will be discovered for the ideal filling—the inlay.

It is surprising what fault may be found with a new idea. It is the ordeal that all innovation and advance has to go through; and properly so, since it leads to a better understanding. To know the faults as well as the merits of a thing is to be prepared to guard as well as may be against the troublesome features. But the persons who are fierce to glow over the lack of perfection in a new feature or method advanced strangely overlook the grave faults of their everyday present methods, seemingly blinded by familiarity. Many

of us get into ruts, and though not satisfied, are inclined to stay because it means an effort to get out and follow a new path.

When cohesive gold was first introduced as an advance step in the art of filling teeth, and especially in reproducing natural contours, if not colors, how often was defeat the reward of long and painstaking operations! How often beautiful fillings were dislodged in the finishing, or came back the next day or the next week in the hand or pocket of the patient, if perchance it had escaped being swallowed. It took a good many trials to get one in at all. It took further trials to get one anchored to stay for a time, and then it took longer trials, the test of time being necessary, to pack cohesive gold to the walls of the cavity so it would preserve as well as stay in. And even unto this day, when the high tide of cohesive gold work has surely been reached, and perhaps I may say passed, we hear *occasionally* of such fillings dropping out.

But you don't hear any one rise up in meeting and deride cohesive gold as a foolish fad. We see, every one of us, evidences of cohesive gold failing to protect and preserve. Of course, it is the work of the other fellow and not our own; but I have seen it, and so have you, when it was done by some of our reputed best operators.

Now, while there are some failures, particularly with beginners, in inlays, and while some operators will not be as careful and painstaking as is required of inlay work, so far as my insight, knowledge and experience goes, humanity can thank God and some of his progressive dentists for the inlay fad, if fad some choose to call it.

Only a few days ago a well-known dentist of our city (Chicago), and not an inlay faddist by any means, told me he had recently seen in the mouth of one of his patients several porcelain inlays that had been put in years ago by one of the early workers along this line. He remarked they were no beauties, for they lacked in good shade effect and were bunglingly made, but he said they were preserving the teeth all right.

Now I have had a good many years' practice and ought to know something about gold fillings as well as inlays, which, by the way, are not so new a thing as some may have an idea, and I want to make this assertion without fear of contradiction: That a poor inlay, if it stays in at all, is by long odds better than a poor gold filling. If the inlay comes out it generally leaves the cavity protected with a layer of cement for some time. If it stays in and is reasonably good fitting, though its color and shape may be off, it will protect the cement.

and the cement will protect the tooth better than any poor filling—quite as well or better than a very good filling. A poor filling may stay in position a long time on account of being well locked or anchored in, but decay goes under and around it at places, faster even than if the cavity was wide open; for it hides and protects the ever-increasing horde of microbes and deceives the patient, who is apt to think as long as the filling is visible and decay not too apparent, that the tooth is protected.

In the light of to-day we know that if some of the fillings that perplexed the beginners in cohesive gold work by dropping out had been set back with cement under pressure and other like conditions of inlay work now, and even if many that stayed in had been deliberately forced out and set back with cement, their work in many cases would have lasted indefinitely. My own experience has verified this in a number of cases, and if you will pardon me I will relate the first, which led to several repetitions.

Some fourteen or fifteen years ago, on a hot summer day, I undertook to put in a large disto-occlusal cohesive gold filling in a superior bicuspid for an exceedingly nervous, restless and impatient patient—one of the kind that begins to ask about the time you insert the fifth pellet of gold, "Goodness gracious! How much gold are you going to put into that cavity?" and follows that about five minutes later by asking if you are not nearly through, when you have hardly begun, and keeps up that query every few minutes to the end.

If anything ever goes wrong it is with just that kind of a patient, and though we can't always charge them with it, they are mostly to blame for it.

When the last pellet of gold was in and my patient as well as myself was nearly in a state of collapse, I spoke in that cheery manner we are wont to, "Only a little finishing, and I'll let you go—just a few moments more." I had barely begun to finish when I thought I saw something move. My thought did not beguile me; my filling was partially dislodged. I need not tell you, gentlemen, how I felt, for you have all been there, I dare say. I would rather have handed my patient one hundred in gold than to have told her at that time that my work had failed and she would have to go through it all again. I thought if I could only bridge over the acknowledgment of the failure until some other time when we would both be in a more composed state of mind, or even if I could make the filling stay in

until she got out of the office and I had a chance to "duck," as the boys say, I'd resort to most anything.

I went into my laboratory to think, and think quick and hard, for there was no time to waste. I thought of wax and of plaster, and then my eyes fell upon a package of Weston's cement. I mixed some in haste, and, taking a dab on a toothpick concealed in my hand, I managed to drop the filling out and daub in the cement and put the filling back without detection. I wedged a piece of the toothpick in between the filling and next tooth and proceeded to wipe away surplus cement and do a little finishing, and finally told her I thought that would do and I'd let her go and do the rest at the next sitting. I was so sure that it would not last that I said when she came back, "Well, hand it to me." She didn't understand, and as if jesting I said, "I thought you'd bring that filling back in your hand." She replied, "Yes you did. I think you pounded that in to stay. I don't believe I'd go through an ordeal like that again for all my teeth. I'll have cement rather and have them refilled when necessary."

Well, after that I could not bring myself to confess, but thought I would probably be exposed when I began finishing. Every whirl of the disc, every sweep of the strip, I expected to see it come out; but at length it was all done and it hadn't moved. I concluded to postpone the confession until some future day. I kept postponing until my conscience got seared. I have never been obliged to make any apologies or excuses for that work. It is one of the best in her mouth. I see it about twice a year and always inspect it. As a filling it was a failure; as an inlay it has been a success. Other fillings have been renewed, but not that one. That experience, with some later ones, put my mind in condition to favor inlays, and I made some in gold before being familiar with porcelain. Now I am making more porcelain and gold inlays than gold fillings, and I don't expect to regret many of them.

The very highest style of art in dentistry is displayed in inlay work, and especially porcelain, when made to fit accurately and when blending of shades and making of contours have been esthetically done.

Not every operator, to be sure, has the gift of artistic taste and an eye for delicate shades of colors or for accurate contouring an inlay. But I venture to say that he who does not show taste in making con-

tours of inlays will show a lack of it in the contouring of gold. The most exact and delicate manipulation is required in inlay work, and artistic taste and color selection are largely native talents. Not every one is gifted and some may fail, viewed from the esthetic standpoint, but I believe thousands of average operators may be easily schooled or may school themselves to make better inlays than the average gold fillings. The average operator in cohesive gold does not make many perfect fillings. The main object of any filling is to preserve. Measured as to that quality, there are but two kinds of gold fillings—*good* fillings and *bad* fillings. On the other hand, a bad inlay, or rather a badly shaped and shaded inlay, may preserve a tooth indefinitely and a shading several degrees off from the tooth usually looks better—more esthetic—than the gaudy glitter of gold.

Some years ago dentists generally awakened to the fact that gold fillings to be durable under stress of mastication needed to be properly and well seated instead of depending altogether on anchoring by retaining pits and undercuts. Now that is a principle that applies as well and even more emphatically to inlays, since they cannot have undercuts and retaining pits. The cavity must be so shaped and prepared that an impression taken of it will readily withdraw from it and a rigid finished inlay will push to place without difficulty. Porcelain inlays that are expected to take much wear and masticatory force should have a bulk usually that will give them strength, and then if properly fitted and seated (and cemented) they can be depended upon to do all the duty that can be consistently required of them or of the natural tooth itself.

As in filling, we should aim to have our inlay stand on a good square base and an incline given to the floor of the cavity and to any steps or recesses, so that occlusal pressure forces the inlay into the cavity instead of out, as the reverse incline would have a tendency to do.

My failures in inlays, which so far have not been many, are due either to not seating the inlay correctly, or after doing so, dislodging it, only slightly perhaps, by forcing in a wedge. However, if the seating was properly done the force of the wedge would not easily dislodge it. When the wedge or the pressure of an instrument cants the inlay a little it may not be detected at all until it is fast, because the surplus cement oozing out at joint hides the relation of parts. A proper seating means that cavity is so shaped that when inlay is pressed in it will go exactly to one place and then not be

easily displaced by the pressure it must be under until cement sets.

If the floor of a cavity is not made for a good base, but slopes the wrong way, pressure occlusally has a tendency to force cervical end out, or pressure at the cervical portions with a wedge slides the inlay out a little occlusally, and, as I have said, we may not be able to know that until the cement has hardened and we cannot remedy it. Proper seating means still further a seating that will resist the force of mastication, just the same as we figure on fillings. The problem of seating is one that should be well studied in the making of every inlay, or rather, the preparation of the cavity. In cavities that assume the round or oval shape, usually shallow ones on labial surfaces, it is well always to make one side so different in shape from the other that one can see at a glance if the inlay has been turned the wrong way. If the cavity is so made that one is puzzled as to which way inlay goes in and an attempt is made to force it the wrong way, it will very likely be chipped or cracked in two before we realize our mistake.

It was not my intention in this paper to outline the procedure from start to finish in making an inlay, because the current dental literature for a year or two has been full of all the methods known, and I take it that you all, or nearly all, if interested in the subject, have acquainted yourselves with the way.

The *Dental Summary,* a few months ago, devoted one entire number to porcelain work, publishing papers from the best workers in the country along that line. I deem it a very valuable hand book to any one interested.

My purpose here is to emphasize some of the causes of failure and the value of correctly made, seated and cemented inlays, both gold and porcelain.

Let us take the glass stopper to a bottle, and we can readily see that if it were cemented into the bottle it fits accurately it would be a difficult matter to separate the two pieces of glass again. All the cement is crowded out; only the thinnest layer remains; but it will hold fast and break up the glass before it will yield. If our inlays were all perfectly round and we could put them in as we do the stopper with a twist, we need never fear for them. Some inlays were put into round holes in the teeth some years ago on that principle. Round rods of porcelain were made of varying sizes and shades. Selecting a rod of proper shade, it was fitted into a round hole and

then nipped off; then the rough surface was ground down to tooth level and polished.

Now with nothing but exactly round holes can such a method be used, and their utility was very much limited. With irregular cavities we must simply endeavor to produce an absolute fit and keep as much wall or cement surface as possible; and under pressure force out surplus cement and hold under pressure free from moisture until cement has set. The closer the inlay fits and the less cement it takes to fill in between the better. When a cabinet-maker makes a close-fitting joint and glues it with but a film between he has a joint that will disrupt the wood if forced apart, but rarely the glue. If he makes a loose, poor-fitting joint and fills in with glue, it will soon separate. The sames rules hold good as to cementing inlays. The cement pressed out to the thinnest possible layer gives best results, even to holding tip of porcelain on incisal edge of incisors that have been accidentally broken off. Such a tip, however, is about the other extreme from the glass stopper. The glass stopper is the thing to keep in mind in fitting inlays, the best conditions being those where the inlay drops into a recess of reasonable depth, being, as before stated, well seated and well fitted.

One of the most difficult things for me in inlay work was to make good and satisfactory matrices in some places in the mouth, and I dare say others have like troubles. A matrix made out of the mouth in a duplicate of the cavity is often good enough to finish up the entire baking by, and some operators depend almost entirely on taking impresses, making counters in some hard, unyielding substance that one may swage the matrix into if he have a swaging outfit. If he has not such an outfit he may perhaps be successful with the process that has given me a good deal of satisfaction. I like good, tough, pink gutta percha for impression work. If the cavity is between the teeth it must, of course, be cut and prepared so that impression may be taken and withdrawn without distorting. The teeth must be well separated if need be. I then put in a rather thick, smooth strip of metal between the teeth, something as we insert a matrix for filling. I then force the warm gutta percha into the wet cavity until it is filled and all margins are covered, and then press the piece of metal toward the cavity, forcing gutta percha still further. After it has been cooled so as not to change shape easily, I remove metal strip, and that allows room enough to release and remove the impression easily. I usually take three impressions for

safety. I take the one I think the best, if there is any choice, and mixing up some thick setting cement to a dough, press it carefully and accurately into every recess of the impression, first rolling the dough in talcum powder so it will not stick too firmly to the gutta percha. When it is hard I warm up the gutta percha and remove. I then have a correct copy of the cavity in tooth. With this I can either burnish in the platinum or arrange it for swaging. I find that when my matrix is thus formed it is an easy matter to then put it in the tooth and burnish if I wish or feel safer to do so.

In some cases I let my patients go after taking an impression and getting shade with a shade guide, and don't see them again until the inlay is ready to set. But when I can consistently I like to try my work in the tooth after I have baked in the body and before margins are covered over, and then correct any lack of fit. If matrix is warped or sprung the least bit this enables me to correct the fault.

The gold inlay, I think, antedates the porcelain, and they have stood the test of time and in some respects have advantages over porcelain for molars and sometimes for bicuspids. The disadvantage of gold is the color. Certainly gold has a toughness and strength that cannot be had in porcelain, and that enables us to make a strong occlusal lock to our inlay in compound cavities with less substance than we can do with porcelain. And again, we can bevel margins for gold inlays and burnish down the attenuated margins, protecting our cement better from the influences of the fluids of the mouth than the use of porcelain permits of.

But anterior to the molars we must yield something to esthetics. Gold inlays can be made, too, much quicker, usually, than porcelain and much quicker and easier in most cases than one can mallet in cohesive gold; and as with porcelain, with much more ease in the whole operation for ourselves as well as our patients.

In large cavities it is not necessary always to make the gold inlay solid. What is termed by some a box inlay can be made. That is, a stiff, strong shell of gold—hollow inside. Such an inlay was described by Dr. Tileston of Louisville, Ky., in a paper and clinic given at the Indiana state meeting at Indianapolis, and I do not think I need to take the time to describe it here.

Perhaps most gold inlays are made about as follows:

Thirty-six or thirty-eight gauge pure gold is used for a matrix. The thicker the gold the better, so long as it is workable into every minute recess of the cavity. Gold is so soft it is more easily bur-

nished into a cavity than the thinner platinum used for porcelain, and, on the other hand, it is much easier to bend a little in handling and soldering. It is safest, perhaps, after it is gently coaxed out of the cavity, to flow an investment over its exterior until it has been stiffened up with preferably 22 k. solder, and if one is expert and careful enough this may be done without investing. Anyway, it may be returned to the cavity after the stiffening and any fault of warping or bending may be corrected, especially at margins. It is then placed on a soldering block and pieces of 20 k. gold may be soldered in with 20 k. solder, laying the pieces where needed to build to the shape desired, using but little solder and a very small, gentle blow pipe flame. At any stage it may be cooled and returned to the cavity to see if contouring is being done correctly. If not enough, more gold may be added, and if too much it may be filed or ground down, being careful that no bending out of shape occurs. Cusps may be built up by adding suitably shaped pieces of gold, and if all this work has been done with care it leaves but little to be done in finishing. To protect the thin edges in polishing the inlay may be pressed into modeling compound, so that all margins are supported and the bulk of compound makes it easier to hold in filling, grinding and polishing. Some prefer plaster investment, on account of the modeling compound becoming soft from heat of friction, but that need not occur if one is careful.

This inlay, if all steps have been properly carried out, should fit the cavity with the greatest precision, and the finishing to be done after setting need be but little if any at all. The exterior of inlay, where cement is to attach, should be slightly roughened by scraping a little with the edge of a fine file. As gold inlays are good conductors of heat and cold, it is a good plan to file away a little from the part that approximates the nerve chamber, sufficient to thicken the cement a little at that point. Or a layer of cement may be laid and hardened in the cavity over the pulp before the matrix is made. In the hollow or box inlays a hole is made in the shell at that point, which allows the cement to fill the interior, which reduces conductivity materially.

I have a plan of making very quick and good gold inlays where the cavities are simple that you may follow many times with as much satisfaction as I have in their use. I do not think better ones can be made in cavities favorable to this method.

Suppose that we have a large occlusal cavity in a lower molar. I

shape the cavity so that an impression will easily draw out, filling undercuts with cement if need be, and then wipe it out with cotton saturated with vaseline. Now I take a strip of Watt's crystal gold or White's moss fiber and roll it up until I have got a roll that I think is sufficient and press it all down into the cavity together, using my finger, perhaps, or a large-headed burnisher or flat instrument. I then let patient bite into it to get the shape in it of occluding tooth, and then press and mold all margins, leaving the occlusal shape just as I want it in the finished inlay. Now into the center of it I push a spur of gold plate. If I have condensed my gold enough the spur will lift the mass out when taken hold of with pliers. I mix a little investment and drop a little on a piece of glass and sink my inlay into it until it touches the glass. It hardens in a moment and I then dislodge it from the glass and put a few pieces of 18 k. solder on the top of gold and hold it on a wire support over a Bunsen flame and draw solder down through, adding more solder, until the crystal gold is filled, being careful that it has flowed well into the margins. Now I clip off the spur that protrudes and finish down complete and ready to set. This is the quickest method of making an inlay that I know of. The method is original with me, though I dare say others may have thought of it. From simple cavities, when you are familiar with the gold and method, you can go to more complicated ones, though when I come to use it in more extensive cavities I sometimes make a matrix and pack the crystal gold into that. Instead of a matrix of rolled gold, I frequently take a half sheet of soft gold and fold it over and over to the size needed, and press that in with cotton, and after shaping and fitting it to cavity somewhat I pack in the crystal gold as before and proceed in the same way about soldering. The several layers of gold foil are tough enough usually to enable one to take hold with the pliers and coax it out without using a spur. The cavity must be lubricated first just enough to overcome friction when we want to get it out, and then before setting be sure and remove the oil from cavity with chloroform. Eighteen-karat gold fused into crystal gold will appear a good 20 k. or better in finishing.

In soldering these inlays, the flame should be only sufficient to melt the solder. A blow pipe flame, unless very cautiously handled, may melt the foil or the crystal gold and change the shape of the bottom of inlay. This, however, may not do any serious harm in some cases; in others it may.

Now if the same precautions have been taken about seating gold inlays that I have tried to emphasize, nothing better can be made to prevent further decay in the cavities they are placed in, and especially when they are burnished down around margins. Where a matrix is used of rolled gold, a good overlap may be left to protect cervical margins. In compound cavities, retention can be secured, as I have mentioned, by making a strong hook or dovetail in the occlusal depression.

In conclusion I want to say that the public has been educated, to a considerable extent, in regard to the value of properly made inlays, and any who have gone through the experience of having them made find their troubles in the dental chair so much reduced, not to mention the aesthetic and preserving qualities, which they appreciate also, they are inclined to tie up to inlays in future.

In the country the demand for inlays is perhaps not so great, and especially at fancy prices, but with reference to gold inlays, I can assure you that you can, when you get your hand in, make inlays easier and quicker than you can put in many gold fillings and make more money at the same price.

Many people stay away from the dentist and lose valuable teeth just from the dread of the ordeal they must go through. When we learn how to obtund sensitive dentin with a good deal of positiveness and facility, and then make inlays while our patient goes out shopping or sits in our easy chair and reads the magazines, we will be able to gain the confidence of many who now shun us entirely. I have undoubted faith in the correctly made inlay. I am more and more of the opinion that the dentist, to be up to date, has to cut out in some way or avoid more and more the many exceedingly painful and disagreeable things we have been accustomed to inflict on our patients in the past, and the inlay will help in that.

As the next paper by Dr. J. Q. Byram of Indianapolis was on practically the same subject, both papers were discussed at the same time. The discussion of the two papers by Dr. Tuller and Dr. Byram follows:

DR. BYRAM'S PAPER:

TO WHAT EXTENT SHOULD PORCELAIN DISPLACE GOLD IN THE DENTAL ART.

By J. Q. Byram, Indianapolis.

Porcelain teeth were introduced in France about 1808. About

1825 M. Planton, a Frenchman, came to Philadelphia, bringing with him some porcelain teeth, such as were used in his native country. Samuel W. Stockton (an uncle of Samuel W. White), a jeweler by trade, who was very much interested in ceramics, became interested in the teeth and soon produced some that were far superior to the French product. It is said that Mr. Stockton carried his formulæ "in his head," and when he ceased to manufacture teeth, he refused to divulge his secret. So those who engaged in the manufacture of artificial teeth at this time were compelled to pass through a long experimental period. But after years of constant endeavor, there has been such an improvement in porcelain that to-day we are not only able to procure from the manufacturer teeth that are artistic and strong, but porcelain bodies, which enable the dentist to practice dental ceramics with a marked degree of success.

Dr. Charles H. Land says:* "Porcelain as applied to dentistry prior to the year of 1885 was exclusively confined to artificial teeth and a few cavity stoppers. The dawn of the new era which revealed a field of greater scope and greater value, was first made known to the profession by the publication of an article in the Independent Practitioner of August, 1886, entitled 'A New System of Restoring Badly Decayed Teeth.'"

With the birth of the new century began the development of the dental ceramic art with such great enthusiasm and improvement that no up-to-date dentist can practice artistic dentistry without adding porcelain to the list of filling materials. If porcelain is to displace gold in the dental art, we must determine to what extent it may be used with safety. For any material tried so long as gold, cannot be cast aside for a comparatively new one unless it can be demonstrated beyond a doubt that the new material will do what is claimed for it.

Ceramics, as applied to the dental art, may be classified into: (1) The products of the manufacturer, and under this should be classed all forms of porcelain teeth (including crowns) and porcelain bodies. (2) The products of the dentist. This may be divided, first, into the replacement of lost teeth, as in dentures and bridges; second, the restoration of the entire crown of the tooth; third, the restoration of a portion of a crown, as in a porcelain tip or an inlay.

The difficulty of construction and the expense of a continuous gum denture cause it to be a denture for the few. It is to be regretted that more platino-porcelain bridges are not constructed.

*Dental Cosmos, June, 1903.

They are especially indicated in spaces between the cuspids. If the superior incisors have been extracted for a length of time and there is a sinking of the lip, it is quite impossible to restore this condition with a gold-porcelain bridge. A porcelain surface is far superior to gold for mastication, so in all cases where the length of the teeth will permit of a large enough mass of porcelain for strength, platino-porcelain bridges between cuspids and molars may be used. In spaces between cuspids and molars in the inferior arch, there are but few cases where the gold-porcelain bridge with the occlusal surface of gold, has advantages over the all-gold bridge, and unless a bridge with the occlusal surface of porcelain is constructed the all-gold bridge should be inserted.

If there is any branch of dentistry in which porcelain can almost displace gold, it is in crowns. To say that all teeth should be crowned with porcelain is just as absurd as to say all teeth should be filled with porcelain. There is a great deal said about educating the public to a higher appreciation of artistic dentistry, but until we educate the dentist in esthetics we cannot hope for rapid progress. At a recent dental meeting there were at least fifteen dentists present, with gold crowns adjusted on incisors and cuspids. Imagine one of them teaching esthetic dentistry. There are so many forms of platino-porcelain and gold-porcelain crowns, that there is no excuse for adjusting gold crowns on incisors, cuspids and bicuspids except in cases of excessive abrasion and where the teeth are quite short.

One criticism offered to the platino-porcelain crown is that the platinum shows at the cervical margin, or in course of time, it may cause the gum to have a bluish tinge. If caps are constructed by the following method there will be no platinum exposed on the labial or buccal surfaces, and no opportunity for the gum to turn blue. Prepare the root so that opposite walls are parallel. Grind the face of the root flat, and rootward to the margin of the gum in the middle third. Take a wire measurement and fit a platinum band to the root. Grind the labial one-third of the root and band concave, mesio-distally, following the curvature of the gingival line. Remove the band and tack the lingual portion to the floor with the smallest amount of platinum solder. Adjust the band to the root and burnish the floor to it. This allows the labial one-third of the cap to follow the curvature of the gingival line, and if the labial portion of the face of the root has been ground just beneath the gum margin, the entire labial portion of the band will be covered by the gum. In case of

recession of the gum, or where it is deemed advisable to expose the metal on the labial or buccal surface, the platinum may be covered with pure gold by placing small pieces on the surface to be covered and fusing in the furnace.

As a filling material, porcelain is attracting the universal attention of the profession at the present time. And to what extent it will displace gold, depends upon the skill of the dentist and his clientele. There is a diversity of opinion of the practicability of porcelain as a general filling material and many of the best operators seem skeptical about its advantages over gold. Some of the porcelain enthusiasts have done more to cause well founded skepticism than the careful, conservative advocates can remove in a decade.

Dr. W. T. Reeves goes so far as to say: *"There are scarcely any cavities where gold can be utilized that porcelain cannot be successfully used, and there are so many places and conditions under which gold cannot be used, and where porcelain will be a perfect filling material with which to restore the lost tooth structure, that I place it first in the point of applicability." In the same article he says: "After the cement is completely crystallized, a thin porcelain filling in the occlusal surface of a molar will have the full strength of the whole tooth to resist the masticating stress and is in no danger of fracture.

Dr. Reeves, in speaking of the retention of porcelain inlays, says: **"I believe inlays depend for their strength of retention upon the close adaptation and crystallization of cement under pressure. If two pieces of glass are adapted with water between them to exclude the air, one cannot forcibly pull them apart. A joiner prepares the surfaces of two pieces of wood so that they are in close adaptation to each other, and placing glue between them, clamps them in a vise and allows it to harden. If there be any appreciable amount of glue there will be no strength of joints. There is no strength in the glue. The strength is due to close adaptation and crystallization under pressure. If this be true there is no need of inflicting the additional pain upon the patient that the self-retentive style of cavity formation would entail."

Such statements from enthusiastic experts will tend to get porcelain in ill repute, for the inexperienced will follow the teaching of the

*Dental Review, May, 1902.
**International Dental Journal, July, 1903.

experts and his judgment will be misguided by their teachings. Many operations fail, not because of lack of skill of the operator, but on account of poor judgment and misinformation. Only a few days ago a dentist of reputation as an operator, brought a matrix for an inlay to be baked. The cavity was prepared in such a manner that all walls converged toward the pulpal wall and instead of the walls forming angles they formed curves. When asked how he expected the inlay to be retained, his reply was, "by the cement." (A case of misguided judgment.) It is fallacy to say that inlays can be made to fit cavities so tight that their adaptation can be compared to two pieces of glass rubbed together or to two pieces of wood glued together.

Dr. C. N. Johnson,** one of the safest teachers to follow, says of inlays: "The demand for porcelain inlays sprang from the indiscriminate and inartistic display of gold in the anterior part of the mouth, whereby the esthetic sense of the people was too frequently offended. If the profession had more carefully studied the possibilities of platinum and gold for harmonizing shades on exposed surfaces there never would have developed the reflection upon the dental art that has been so justly urged against it, but it still remains true that there are certain cavities in which a well-made porcelain inlay is more artistic in appearance than it is possible to attain with any metal filling. It is also true that inlay work is less exhausting to the patient than extensive filling-building, and these two considerations should induce every operator to so perfect himself in inlay work that he is enabled to give his patients the benefit of the highest class of skill in those cases where inlays are indicated."

"The desirability of controlling caries in the anterior part of the mouth without the necessity for an objectionable display of gold, as also would the possibility of saving badly decayed teeth in any location where the insertion of gold foil is contra-indicated on account of too great tax on the patient or too much infliction on the impaired peridental membrane by the use of the mallet. Crown work as a result of the conditions just indicated, has too often been resorted to by operators in cases of extended decay at a period earlier than would make crowning more justifiable if some more feasible means could be employed to tide the tooth over a number of years. It is in cases of this kind that inlay work finds its most legitimate field."

It seems that the inexperienced would obtain better results in

**Principles and Practice of Filling Teeth, 2d Edition.

inlay work to follow the suggestions of the conservative teachers and not be carried away with the idea that they can use porcelain as a universal filling material because a few experts do. The indications for porcelain inlays have been discussed so much of late that every dentist who reads the journals has some idea of their application.

All labial and buccal cavities can be filled with porcelain to a better advantage than with gold. The patient is relieved of the unpleasantness of adjusting the rubber dam, the excruciating pain caused by the use of cervical clamps, and the sensitivity to thermal changes. Inlays can be made for such cavities that will harmonize with the natural teeth to such a degree that only the expert can detect them.

To what extent porcelain may be used in simple approximal, approximo-incisal and approximo-occlusal cavities, depends largely on stress. It is doubtful whether an approximal incisal or an approximo-occlusal cavity can be so prepared, and an inlay so constructed that it will resist stress to the same extent that a gold filling will. The friability of porcelain prevents the step portion of the filling from adding as much resistance as an equal mass of gold. Gold is a better filling material than porcelain unless a large portion of the occlusal surfaces of bicuspids and molars is involved. It is impossible to construct thin occlusal inlays without thin margins which are liable to fracture.

Those cases involving the incisal one-third or more of incisors and cuspids may be restored with porcelain by combining the principles of inlays and crowns. In case of a malformed incisor or cuspid, a porcelain tip can be adjusted to the tooth which will give as good service as a gold tip and better than a gold filling and from the esthetic point of view it has every advantage over gold. The occlusal portion of bicuspids and molars may be restored with porcelain, but unless enough of the tooth is involved to make a large mass there will be insufficient strength in the porcelain to withstand the force of mastication.

The fact that inlays are held in position with cement has prevented many operators from placing confidence in them. The permanency of inlays depends on their close adaptation to the cavity walls, for it has been found that the solution of the thin film of cement around the inlay is only for a slight depth, leaving the cavity sealed so that there seems to be no recurrence of decay.

DISCUSSION OF PAPERS BY DRS. TULLER AND BYRAM

Dr. Shyrock:

Gentlemen: First, I wish to compliment Dr. Tuller on his paper, not simply because I am with him on the inlay question but because I think he is entitled to it.

Porcelain is certainly the ideal filling.

In regard to the strain on the patient in preparing the cavity for porcelain filling instead of gold, it seems to me it is entirely in favor of the inlay, as well as the placing of the same instead of the tedious introduction of gold foil.

With regard to inlays dropping out and other such matters, the essayist speaks of hearing of it. Now, that is in Chicago, but here with us, at least in Fort Wayne, if they drop out we don't hear of it only, but we come face to face with the man or woman and we know all about it.

With regard to the dentist taking up porcelain work with the idea that it is going to be easier to replace lost tooth tissue than with gold I want to say that, personally, I know that the porcelain inlay is a most difficult thing to handle, taking all things into consideration. That is my experience in the twenty-seven years I have come in contact with the work. And with regard to its being a fad, I have to question it. I think the inlay is no fad, but is a rational method of preserving teeth.

I believe, as the author of the paper says, "that a poor inlay is much better than a poor gold filling," and in many cases I would rather see a poor inlay than any gold filling. Now with regard to shaping cavities, the whole thing in a 'nut-shell' is, as with a filling, shape the cavity for the inlay so that it may be properly seated, but with either gold or porcelain inlays shape the cavity so that the inlay will draw, or rather the impression will come out, and the finished inlay will slip in. This is practically the opposite of preparation for gold or other fillings, but if good judgment has been used in fitting we can depend upon our cement to hold the work.

Dr. T. A. Goodwin:

Gentlemen: I have had some experience with porcelain and I have had some with gold inlays, and I think where you can mend a tooth with porcelain it is the best thing.

Dr. Morrison has my idea in regard to crowns. You may go anywhere now that you want to and look at the people and you will see any amount of gold shining in their mouths. I don't know of any-

thing that to me looks worse. It looks very bad. And there are not very many gold crowns when you come to examine them that are worn for a year or more that satisfies the dentist who put them on, or would be satisfactory to the patient if he realized its faults. It is a botch in every way, but you take a gold inlay, if it is made right and fits the cavity, I do not think there is anything better. But as to porcelain, the porcelain is a great deal harder to make and I think it takes longer. I think a gold inlay could be made very quickly, and I think it looks well and it answers all purposes in posterior teeth.

We all, I think, want to save the teeth.

You can get money from everybody, because nearly everybody has a little; but if you want to have good teeth you must save what God gave you; you cannot borrow, beg or buy them. And you know how it is, if one falls into the hands of some dentists, the first thing is to extract them, and when they are gone they are gone forever.

I like what Dr. Brown told me one time. He said he would like to live long enough to save every tooth of his patients and never have to extract one.

But there are teeth that come to us in such condition that we have to take them out; we can't help ourselves. That is the fault of the patients; they don't look after them in time.

I think porcelain inlays are good, and I think gold inlays are good, and as Dr. Tuller has said in his paper, even a bad fitting inlay as a good deal better than a bad or leaky gold filling. That is very true. In inlay work you put in something that stops decay, and you put on top of that something that protects the cement and will stand mastication, and you have got something that is more valuable, in my estimation, than anything else in the way of a filling.

There is another thing that I hate to see, and that is the badly decayed teeth in the mouth filled with amalgam. There is nothing more disgusting to me. I think there are a good many dentists who use amalgam where gold should be used. Of course they must save the teeth in some way, either by cement, amalgam, gold, or inlays, and better amalgam than nothing, but it is too often sloppy work. In my estimation the best thing is to learn how to save the teeth to the best advantage so that when a tooth is filled it is filled, perhaps not forever, but for good and reasonable service. There is never a machine made so strong that it will not wear out in time, and we want

to impress that on our patients, and let them understand that fillings are subject to considerable wear and tear and they should be frequently examined and repaired as well as teeth that have not been filled. Unless inlays are dislodged by force of mastication, which will not happen if properly seated, their wearing qualities should be better than any other kind of fillings.

Dr. Hunt: Would you be willing to become the patient of the man that would not allow himself to put in anything but porcelain inlay?

The Speaker: There has always been a condition of self-sacrifice in this country and what is true of the nation is true of the community, and what is true of the community is true of the family, and what is true of the family is true of the individual; there are always people who are willing to have the new. There are always individuals ready to have an experiment tried.

Dr. Hunt: Would you want to be the one?

The Speaker: The patient should leave himself in the dentist's hands; I don't want my patients to dictate to me. And if the dentist recommends the patient should approve.

Dr. S. M. White: One question. I would like to ask a question. What is the best thing to mix the cement with? We have been told by some men one kind of material and by some another.

Dr. Cook: I have found that a glass or platinum spatula is the best. If you can mix it and handle it with a glass instrument, I think you get better results. I don't know whether you can always do that, but platinum was the next best thing that I was able to mix it with.

Dr. McCurdy, Fort Wayne: I don't know that I have anything to say. I probably have been classed with the enthusiasts of porcelain, but I am not, I think. I put in gold right along every day. I try to select my cases and put them in where I think they will stand.

Dr. J. P. Buckley, Chicago: I do not know that I care to discuss these papers, as the hour is late. However, since I have taken the floor I might say a few words in regard to adding water to cement.

I am really glad to know that some dentists, at least, are beginning to realize that water plays an important part in the crystallization of cement.

We have three forms of phosphoric acid—ortho, meta and pyro. A great many dentists have been led to believe that our cement liquid

is the meta or glacial phosphoric acid. It is not. It is undoubtedly a mixture of the meta and ortho. We can take ordinary or ortho-phosphoric acid and by adding or subtracting water we can produce either of the other two acids. By leaving the stopper out of the bottle containing the liquid, these acids will change from one to the other. This accounts partially for the difference in the mixing and crystallization of the same brand of cements.

I am discussing the cement question rather than the inlay, which, by the way, is an important question in inlay work. If it were possible for us to know the exact chemical composition of our liquid and then add just enough zinc oxide to make a definite chemical compound when mixed and crystallized, we would obtain the best results. This is difficult to do. It cannot be accomplished by weighing, as we do not know the exact chemical composition of the liquid. It is quite correct, chemically, that water is essential to the crystallization of cement. If this water is not present in sufficient quantity in our liquid, it must be added to the mix while crystallization is taking place.

Dr. J. Q. Byram, Indianapolis: I believe that porcelains have their application. I have not had the same amount of experience with low fusing bodies that I have had with the high fusing. If I were located where I had to depend on gas or gasoline I would rely mostly on low fusing bodies. I believe with simple inlays one can obtain just as good results with low fusing bodies, both as to adaptation and color.

I will exhibit a patient to-morrow with a low fusing inlay, and if there is any dentist present with a labial or buccal cavity I will be very glad to make an inlay with Jenkins' enamel, for I would rather make one for a patient than over a model. If I may have a few minutes before beginning the clinic I will be glad to again take up the subject of porcelain.

Dr. Hartman: I agree with Dr. Clark, but I am confident that we get packages of cement that are not good, and we get packages of cement from the same manufacturer that are all right.

Now I keep a register of cements and I know I have packages of certain cements that are all right but we often get packages from same manufacturers that are not as good, and I think a great deal of the failures come from cement not properly prepared in the hands of the manufacturer, and that in the preparations we don't get the proportion right, or in the mixing it don't come out right. And very

often we saddle it onto the mixing of the cement when I think perhaps that is not the case, but it is back in the hands of the manufacturer.

Dr. B. J. Cigrand, Chicago: In this discussion of porcelain I rather agree with Dr. Cook that the question is not so much the cements as the inability to properly mix them.

I think it was Dr. Hesse, a German dentist, who wrote a long article on the question of cements, in which he said that they must be mixed in a given temperature. Dr. Hesse has studied for some years on this problem and he said that the temperature must be about 70 F. This would lead us to say that cement fillings put in in the winter always last longer than cement fillings put in in the summer.

This may seem strange, but then I have become a convert and am decidedly in favor of the theory. He bases his theory on this particular item: In the summer the temperature is warm and the cements quickly crystallize before we are able to lodge them where we wish them. In other words we mix the cement for the cavity and before we are through moulding or fashioning it into the cavity the cement has set and he says if you work on your cement while it is setting you have disturbed its capacity for resisting all fluids; he also stated that in the summer he mixed his cement on a glass slab, never allowing the sunlight on the cement, and in the winter he mixes his cements on an oiled piece of paper. He also recommended mixing cement on a four-sided bottle and said that it should be mixed invariably at a temperature of 70°. In the winter, when it is very cold, he says he prepares his bottle by putting into it hot water, and in summer he puts into it cold water, and consequently has the temperature entirely under his control.

At any rate he has given us a number of things to think about, and he laid stress upon the fact that the temperature was a prime factor.

Now as regards inlays, I rather believe the gold inlay will be the one that will last the longer, and in this great tempest of enthusiasm the gold inlay, I believe, is going to come out best, and for two reasons:

First, gold is congenial to the mouth; secondly, you always have a certainty in shade.

We have been educated to the point that a gold filling properly placed and perfectly formed and contoured is esthetic in appearance. With porcelain you nearly always have the shade wrong. I think

that is where the great difficulty is in connection with porcelain inlays. I think it is a question of shades; the thing we are after is the shade, and where we have to just use the primary colors we are apt to be mistaken, and because of this fact I believe the gold filling or the gold inlay will be the one that will be a part of good practice. The matrix is also retained in a gold inlay and hence fits the cavity perfectly.

Enthusiasm is an excellent thing, and I believe enthusiasm is a good thing in this work. As Emerson has well said there has never been any great advancement without enthusiasm. Let's have enthusiasm. It was through enthusiastic, well guided and directed, that we finally came to understand the principles of crown and bridge work.

I am glad we have enthusiasts, because, perhaps, by their failures, we may profit. I would rather hear men say they would put porcelain inlay everywhere, than to have them sit here and say nothing. That pricks the others up and they say "Is that so? Is it true?" Extreme remarks frequently arouse antagonism, and the bulk of the profession gain by it, in that conservativeness guides the masses. I am glad for this enthusiasm and I am glad the bulk of the profession stand and hold onto the conservative. I am glad that this enthusiasm will push us forward, and I don't like to see any man called down because he is enthusiastic when this enthusiasm is curbed by good judgment. If you would keep down the enthusiasm of the American people it would stop nearly every field of progress.

I want to call your attention to a book I received a few days ago from Dr. Peck of Minneapolis. He has just written a magnificent work on porcelain inlays. I just received the work a few days before I came to this meeting. It has magnificent illustrations, and he is sufficiently conservative in the book to allow it to appeal to our better judgment.

I have only this to say again in closing, that I am glad there is enthusiasm, because if there is enthusiasm there is life and this means progress.

Dr. Tuller, Chicago (closing): I shall endeavor to be brief in what I have to say in closing the discussion.

In regard to a gold inlay being more satisfactory than porcelain, it is so in some respects. In the first place, when you make a gold inlay there is no layer of metal to be stripped off as in making porcelain inlays, and in consequence the gold inlay fits just that much

closer. The close fit is what we want. The rule holds good in fitting a pin in a root in crown work. If the pin fits the canal with a reasonably firm contact along its length, the cement does the rest and holds indefinitely. On the contrary, if a pin is too small and wobbles around in the root canal, you can be very sure the crown will in due time come off. The same holds good on gold shell crowns; if they are made to fit the roots on which they are placed they will stay when cemented, but if loose fitting the cement will hold them but a short time.

The gold inlay, on account of not having to strip off anything, fits just a little closer than a porcelain from which ordinarily two one-thousandths of an inch of platinum has been stripped. (The platinum used is usually one one-thousandth of an inch thick. Coming up on two sides of the porcelain doubles the thickness; of course that is taken away.)

Some operators, however, make porcelain inlays by taking an impression of the cavity in cement and imbedding this when hard in sealing wax or modeling compound, and are thus enabled to swage and burnish the platinum over the impression, and then the porcelain when the metal is stripped off is a closer fit to the cavity than when the metal is burnished into the cavity or burnished or swaged into a model of the same.

As has been recited in the paper, the gold inlay has every requirement of strength, and especially so more than porcelain when we wish to make an attenuated but strong reach over into the occlusal area for anchorage in the case of approximal cavities. In many mouths, even in molars, the color of gold is always an objection with persons aesthetically inclined so where the porcelain may be well seated, well fitted to walls that afford some frictional hold, and where there is bulk enough for strength, they will be found eminently satisfactory in both bicuspids and molars.

Dr. Cigrand said some things in regard to enthusiasm and how it encourages others to try new fields or persist more diligently in repeated effort where their first efforts have not been satisfactory. That is one thing I had in mind in writing the paper. I *know* that inlays properly made and properly inserted in properly formed cavities under good, common-sense conditions and rules are something far in advance of average gold fillings for preserving the human teeth and preserving the esthetic conditions which nature established in our mouths. The inlay may not fulfill every requirement in the

way of stopping cavities of decay in the teeth, but thousands of fillings are being daily placed where either gold or porcelain inlays would be many times better and often more easily made. I believe inlay work should be encouraged. The more general their use the more perfect will become principles and methods and fewer and fewer will be the failures.

EVENING SESSION.

Joint papers by Dr. B. J. Cigrand and Dr. G. W. Cook were read, the lateness of the hour preventing discussion.

The above papers by Drs. Cigrand and Cook will appear in our next issue.

The Wednesday morning session was taken up by clinics, as follows:

CLINICS.

Local Anæsthesia, Dr. W. W. Waite, Jackson, Mich.; Extracting Under the Influence of a Local Anæsthetic, Dr. L. O. Green, Chicago; Gold Filling—Watts Gold, Dr. Clarence F. Williams, Terre Haute; Jenkin's Porcelain Enamel, Dr. J. Q. Byram, Indianapolis; Suppurative Cleft Palates and Obturators, Dr. H. J. Jaulucz, New York City; Pressure Anæsthesia, Dr. A. T. White, Newcastle; Porcelain Inlays and Porcelain Crown Work, Dr. W. W. Shryock, Fort Wayne; The Cogswell Crown Tooth, The Cogswell Crown Tooth Co., Chicago; Porcelain Inlays, Dr. J. S. McCurdy, Fort Wayne; Pressure Anæsthesia, Dr. F. R. Henshaw, Middletown; Combination Filling, Gold and Amalgam, Dr. T. A. Goodwin, Warsaw; Seamless Crowns, Rydman & Reed, Toledo, Ohio; Drugs and Some of Their Dental Uses, Dr. J. P. Buckley, Chicago; Root-Canal Filling and Logan-Crown Cement, Dr. A. C. Hewitt, Chicago.

Dr. Tuller gave a clinic illustrating the manner of using the Tuller Pressure Cataphoric Instrument.

WEDNESDAY AFTERNOON.

*Paper by Dr. Buckley.

Dr. A. C. Hewitt then read a paper as follows:

SUCCIMUM AND ITS CONGENERS.

By Dr. A. C. Hewett, Chicago, Ill.

Gentlemen of Northern Indiana Dental Society:

After I sent your secretary the title of this paper to which I shall

*Published in the November issue. Discussions in current issue.

ask your attention for sixty minutes, more or less, if I had forgotten both topic and wording, I think I should have followed the subject name as closely as I have now done. I have not sought to follow the rules of rhetoric or logic; I have made no call upon the arts or the orator, sought to display no attainments of scholarship, but have attempted to give you some plain practical truths that appeal to me most forcefully thus, just as the statue of the Greek slave appealed to my perception of beauty in woman's form; best clothed when nude.

These truths are from the garnerings of the toil and thought by nights and days of the years more than sixty guided and turned into the trend along which I invite you to follow, by a big-brained, logically hard-headed father; and an enthusiastic, literary loving woman my mother.

At the commencement of a week late in winter, my father said to me, "Lets set out a row of trees in front of the house." Men and boys worked with a will and at the end of that week more than half a hundred hard maples were transplanted into a row, straight, upright and in my eyes *beautiful.* In digging up the trees some of the larger roots *"Bled"* from the severed ends nearest the trunk. I noted the fact. In working with a hatchet I wounded one of my thumbs. It bled. I noted that fact. Father said: "Do not wash it. Do it up in the blood and it will heal." Best so, by "First intention" I *thought,* and wondered if the severed bleeding roots would heal.

At the close of the week's hard work, after supper, we had gathered around the evening lamps father said: "My son, get your violin and sing for us. I am tired, but the music will rest us." I asked: "What will you have?" Father replied: "Woodman spare that tree." I sang with a will the first verse of which is:

"Woodman spare that tree
  Touch not a single bough
In youth it sheltered me
  And I'll protect it now,
'Twas my forefather's hand
  That placed it near his cot.
There Woodman let it stand
  Thine axe shall harm it not."

I sang it in my then unchanged mezzo soprano voice, with a

pathos thrilling *me* through and through:—I remember it distinctly, for young as I was I thought those planted trees were not so much for my father as for those following after.

Three years later, home from my academic course of study, I saw some of those severed roots that in transplanting had "been done up in their blood." Earth had been washed from their ends by a flood. The severed ends were not decayed; healing had taken place and numerous rootlets had been thrown out from them. I learned the truth. "Dame nature weeps at wounds, nor rests, but weeping still she strives to heal."

During leisure hours of my literary course I became chummy with an ingenious dentist. One of his operations attracted my attention. He sought with the aid of "Fish Glue" (so-called) to make "soft gold" (the only form of gold foil then known) *stick* in the cavity of a front tooth; not a bad idea had his cavity lining been impervious to moisture, which it was not. That was as early as 1849.

My father was an expert in transplanting and shaping tree growth. He loved trees; grew eloquent in speech of them. That fact, together with my mother's poetic talk of flowers, trees, and plants and her teachings of botany early filled my mind with admiration for all things greening, blossoming and seeding that grow out of the earth; and it is with more pleasure than I can express that I invite you to go with me and view God's Acre above ground; go with me to the Pacific coast of America's glen-valley-wonderland, Maraposa; stand with me at the foot of one of the giant Sequoia; look up and up two, three, four hundred feet; reflect that thousands of perpendicular tubes of that soft wood are filled with water drawn through absorbing rootlets into and along huge roots, foot arms of the giant, under tons of rock and earth; thence up, and higher to the topmost cone-laden, needle decked boughs; what lesson can we learn? What property of nature is there to support life in the bark, wood, frond and blossom, seed and cone of that immense body up to such a height? I answer moisture. Water-brewed on the mountain side where the red deer wanders and the for-get-me-not blossoms.

What force draws this "brew" of the All Mighty through rootlet and foot-arm, tree trunk, out reaching branches, themselves huge trees, to boughs, sighing leaves, and whistling cones? I answer, *Capillary attraction.*

"What have we as dentists to do with capillary attraction?" You ask? I answer it is a factor with which you have to deal every time you fill a cavity, set a crown, place an inlay, or treat a putrescent pulp. You wish to exclude moisture, bar oral fluids? You have to do and deal with natural philosophy; physics, and if you ignore Capillary attraction, your records in gold and amalgam fillings will read something like this: "Time of average of perfectly preservative gold fillings securing against recurrent decay at border, angle or margin five years and a fraction. Time do. of amalgam as aforesaid, a fraction less than four years."

Such were the averages shown by records kept of my own work and of the best operators whose fillings came under my observation. Of course many gold and amalgams last longer and many fail sooner. Some of my gold fillings that I did over forty-five years ago are still doing service. Then I used non-cohesive gold. We all know that copper alloyed amalgams last almost indefinitely but tooth and filling turns black or greenish brown. Can any members of this convention show a better record? Then I congratulate him and say consciously or otherwise he has met and conquered this almost resistless force. Such was my record untill about fourteen years since I gave heed to capillary attraction, and by a very simple device which I shall give you was able to give a better one. Since that time I have not found a recurrent decay under a gold amalgam, guttapercha, or cement filling placid as I advocate or so filled by others.

Fourteen years is but a short period I know in which to test material or method, but it gives clear indication and encouragement.

WHAT IS CAPILLARY ATTRACTION?

Webster gives it, "Attraction causing a liquid to rise, in capillary tubes or interstices, above its level outside, as in a very small glass tube, or sponge, or any porous substance, when one end is inserted in the liquid; it is a condition of cohesive attraction." He does not, nor does any other Lexicographer, measure its tremendous, almost resistless force; nor show how cunningly the great Artificer has devised valves, cut-offs and anastimoses to aid its exercise of resistlessness. Listen to your memories as you turn the leaves of your "advanced" natural philosophy and recall the hydrostatic pressure of a column of water a half inch in diameter and 100 feet in height.

Answer me, is there not method and power nearing the illimitable in capillary attraction? Do you believe for a moment that the hydrostatic force of the heart-muscle drives the red and white blood of the human supply through miles of arteries, veins and capillaries into tubules of dentin along enamel rods of teeth, medullary, and cancellated osseous tissues, synovial membranes and ligaments, into nails and hairs among reticulae of glands, follicles and nerves, unaided by capillary attraction?

You all know without special experiment that if you wish to pare your toe or finger nails easily, a warm foot or hand bath will soften the nails and render the cutting easier. To get an "easy shave" a good lathering (soaking) for the beard will aid the barber's dull razor and prevent profanity. Do nails and hairs "leak" as we say a poorly executed filling does?

After these experiments read the directions of the best operators and I will not forbid my earlier articles. Place them beside the teachings of scientists who aver that when moisture foreign to dentinal structure penetrates, microbes abound and decay is imminent and wonder if you can at recurrent decay.

I frankly confess to you that in view of my experience gained by my failures and by other investigations, the deepest sympathy of my nature goes out to the young man battling with the seemingly impossible. I am astonished, not at his failures, but at his success.

Let us reason upon this point for a few moments and see why success is so difficult to attain. Take for instance a distal cavity in an inferior molar, right side, extending from occlusal border to gingiva, buccal and lingual walls perpendicular or nearly so, cavity extending below symphysis of enamel and cementum. You have of course to make extension for prevention (which I approve). You have to secure good anchorage for your filling, I need not suggest how, you are all read up on these points. You have to avoid too close proximity to the pulp. I need not dictate on this either. Now when you have beveled enamel borders, made extension, and anchorage what let me ask you is the condition of the cementum, tubule mouths, Canalliculi and Lacunae, enamel rods and cuticula-dentis. I answer, you have a trauma of enamel, and its outer enamel covering. You have a wounded condition of all the dentinal tissues. How do you go to work to heal those traumated surfaces? You drill a ditch (under cut) wound still deeper, then you mallet

home crystallized gold with its Rhombohedral stilettoes, and dagger points, and you build by much hammering what? A homogeneous dense nugget of gold, never a time. You build a sponge or at least a spongoid mass. Do you doubt it? Try the experiment to fill a matrix in the form of a cube, beat the cylinders down on to one another as you cannot in a tooth *in situ,* then apply hydrostatic pressure to its six sides, take micrometric measurement of it before and after pressure and see what you will see.

Again now that your tooth is filled *scumdem artem* have you built a perfect coffer dam that shall exclude oral moisture. Never once.

But suppose you had made the filling moisture proof at enamel margins and gingival borders. What of the tubule mouths, the canaliculi? Have you sealed them against the weeping exudate? Again never a time. Then what is to become of the exudate? What of the neural fluid that presses out among the prickles, spear-points and roughnesses of your crystalline mass? We all know what it will do when too near the pulp. Thermal changes will induce irritation ending in pulpitis, and no end of trouble.

I will tell you what will occur; the outflow of moisture will accummulate between the dentinal wall of the filling and the dentin, gradually spreading, pressing outwardly, till at some point along the border it meets oral moisture (if it has not loosened the plug from its bed, as it often does in approximal fillings of incisors). Who has not, after doing an elaborate piece of gold work in a front tooth, well anchored built down into artistic contour, been dismayed by seeing the tell-tale blue line along the symphysis of dentin and enamel, and the gold. If that did not appear to plague you, who has not after the lapse of a few months or one or two years on going over the lingual margins of some pattern filling with a sharp searcher felt it drop into a small depression giving to educated touch the leathery resistance only, telling all too certainly of recurrent decay.

Is there a man here with ten years' experience in operative work that has not had that experience? I have had those experiences quite too often for my peace of mind, and yet was said to be a fair gold worker. Thankful am I that no such cases occurred during the last fourteen years that came to my knowledge. Others may have seen them but none have told me.

Upon this point of exudates I wish to call your attention to an article in the Dental Cosmos for August, 1903, P. P. 623, et. Seq.

by Wm. Crenshaw, D. D. S., Atlanta, Ga. In reference to Exudates, Plasma, Hystiogenetics or body protoplasm holding elements appropriate for regrowth of a traumated part; leads me to belief that trauma of dentin is not alone an exception to other wounded tissues of the body. He mentions as first reasons of recurrent decay under cohesive gold, "the seeping or weeping of neural matter from the *Lacunae and Canaliculi* at the base of the filling." (Ibid P. 621.) Again: He says, "Non-cohesive" gold being non-crystalline or structureless in its molecular arrangement is more adaptable to cavity walls, and it is there susceptible of "such adaption as prevents seepage internally, and externally and bars capillary force, a factor to be reckoned with."

Dr. Crenshaw's enunciation of the doctrine of exudates from broken dental surfaces, so far as I know and believe, is the first and sole announcement on that subject. I was startled when I read it. It came soon after the reading of my paper at Vicksburg (to which he listened and gave generous praise). I wish to make a frank statement to him of my view consequent upon the very able presentation of his subject cited above. That he gave consent to my argument as to capillary attraction, and cavity lining and passed over what I said as to exudates as an aside, shows the logical workings of his brain, the keenness of his perception, and the generous chivalric courtesy of the southerner, as well as the courage of the true scientist, and teacher. Though many years my junior in age, I extend a grateful palm for this fact, and a glad hand in recognition of his fidelity to truth.

It is difficult to measure the importance and value of his pronouncement, as to exudates, seepage and weeping from tubule mouths. Given thus nature's assistance to consolidate and cover in the mouths of bleeding eacunae, and canaliculi, with an appropriate scar tissue, the dentinal walls of the filling will remain dry, and if oral margins are protected by a proper coffer dam, why may not the use by Dr. Crenshaw of the word "indefinitely be appropriate even though Dr. J. Foster Flagg flouts it in his disclaimer" (proclaimer); Vide Dental Cosmos, September, 1903, P. 719. It clearly explains a phenomena that heretofore has been a puzzle to myself and many others among the older class of dentists. Long-time non-cohesive gold fillings cupped out and rough on the occlusal face, when carefully removed revealed dry sub-layers of gold, and dry dentinal surfaces, seemingly glazed or enameled and immune from decay; an

appearance never seen under cohesive gold. Right your are, Dr. Crenshaw.

At one time it became the fashion or fad, to cut the interdentinal spaces of the teeth to simulate boot-jack jaws, or into V shapes; thus having no two teeth to touch approximately. The same fashion prevails among some of the tribes of Asia, and of Sea Islanders.

It was my privilege in the long ago of my professional life to see an entire set—28 teeth separated thus. The patient was a man about forty years old, who had an exaggerated, Roseveltian prominence of teeth, which when closed, with the lips apart, gave a very striking effect. The teeth seemed to have been divided each into thirds, bucco, labio, lingualy, and the cutting had been done so artistically (?) that about one-third of occluding surfaces met much as two bent saw-blades would come together teeth antagonizing. I held the notion then that when the enamel from teeth was removed the cementum and dentin became subject to decay; and I was astonished to see upon a careful examination, which was accorded me, that the filed surfaces had a uniformly glazed or enameled appearance. The cementum and dentin had been darkened by some coloring process, leaving the enamel borders one shade, and the dentin exposed another and darker, about the shade of Vandyke brown. Not a speck of decay was to be found, a fact that seemed to be of chief importance to the man, for he said that before the operation there were approximate cavities in nearly every interdentinal face.

During the Columbian World Exposition in Chicago I had the opportunity of seeing a swarthy Sea-Island woman who had had similar treatment given to her eight anterior-superior teeth. The shade of them suggested that they might have been treated with Arg. Nit.—and had a uniformly glossiness of surface, also free from decay.

It is within the knowledge of all of us that cavities occur in the teeth of individuals, progress to certain stage, and then without a known cause, and without professional interference become immune to further decay, and so remain for years.

Arguendo, why may there not be an exudate of plasma for the purpose among other functions that of repair, and prophylaxis from broken dentin? The dentin and enamel of the beaver, muskrat, ground-hog and some other animals *grow.* The bones of men, all animals, no matter how dense and hard, give out plasma of osseous and neural

repair, the tusks of the elephant, sea-horse, walrus, and wild boar when broken or wounded evince reparative processes; in the case of the elephant's tusks, even to enveloping and sequestering bullets, spear and javelin points. All structures of man, bones, tendons, nerves, nails, hair and cuticle are reparative and resupliative; then why should the structures of the teeth of man be a calamitous exception? I will close this part of my paper by giving you entire, a couple of letters from Dr. Crenshaw which, on their face, show I am violating no confidences of epistolary requirements.

Dear Dr. Hewett:—The alloy came safely to hand and am using it, my brother and I, right along. The cavity lining came also, and the paper. All received except the mortars, which I think must be valuable and I want you to send them.

I catch the idea of your matrix, and it is thoroughly good. I can't tell you how much I appreciate these things, particularly the paper, which you took the trouble to get off for me. I have read and reread the paper and am passing it around into good hands. I still think more than ever, your paper a tremendously valuable one, and I believe you have done a most valuable thing in bringing out the Sterion Alloy and the Succinite lining. I told my wife last evening I believed you had helped dentistry more than any man I know, in perfecting of the alloy and lining, and read the paper to her.

I have subjected the lining to a test—hot water of 120 degrees Fahrenheit for 24 hours, to see if the warmth, a condition to be met in the mouth, would affect it. It does not. I cut two saucer shaped cavities in opposite sides of a tooth as nearly alike as I could and put the alloy in each, putting the lining under one of them and placed the tooth in a bath of warm water. Next morning the filling placed in the unvarnished cavity had dropped out, showing what seepage of moisture beneath the filling would do. The other, of course, holds fast.

Of course the test of 120 degrees was far above the normal, and yet below the temperature which coffee, tea, and hot drinks would reach. I shall test it up to 150 degrees, which is the point at which water scalds. I can tell you now that the lining will stand it, although I have not tested that high.

Our college treasurer is away, but will remit you in a few days. With best wishes always.

(Signed.) WM. CRENSHAW.

Dear Dr. Hewett:—Your last letter with its generous praise received and noted.

As already indicated I shall have no objection to your using anything I have said in my letters or in the published articles. I find your quotation from your Vicksburg paper as it was in the paper.

I am sure there is leakage-seepage out of the dentin and cementum and while I have not demonstrated microscopically, I don't think we need to. Two things prove it to my satisfaction:—Resurrent decay beneath the filling in the dentin and cementum under cohesive gold and the decidedly slower decay between cohesive and enamel margins in the same teeth. The one has a large proportion of nerve tissues with the tubules abutting in the cavity wall, the other none.

I can't explain the phenomena any other way. No circulation in enamel, consequently no leakage, the decay must run laterally and very slow.

I hardly think I deserve such fine praise as you give me, but it is certainly very kind of you. If your paper is published please let me know. I shall want some copies.

I shall not be in Chicago earlier than the 21st or 22d of this month. Possibly one week later. But I will see you with much pleasure. Until then good-bye.

Your friend,

WM. CRENSHAW.

If there are dentinal exudates from broken and uncovered dentinal tubules and canaliculi, in decayed teeth, teeth ground down and excised, to be used as supports for fillings, crowns and bridges, or for inlays, then the importance of proper treatment of the wounded dentin cannot be over-estimated. I mean the treatment previous to placing the filling, as setting the crowns, or filling a pulpless root canal. What would be thought of a surgeon who in amputating a leg above the knee, should place a metal shell crown over the cut end of the femur, before covering it in with the soft tissues, I need not enlarge upon the thought suggested.

What treatment? Clearly one that shall bar the exudate, be moisture proof, antiseptic, and kindly tolerated by living tissues, proof against decay, that cannot be absorbed or digested and *Osmosed*, and one barring micro-organisms, and *easily, readily applied.*

To find this remedy let us hunt the succinite field. It is large enough for all. Now go with me from wilderness of the west to

Where mountainous glaciers grindingly move;
To the land where the glittering icebergs form
And thence start to furrow that mystical groove
Where beneath Baltic waters, in calm and in storm,
Securely hidden in sea-cave and *chambre;*
The red coral gleams beside graves of amber.

Those deep tombs where fossilated insects did hide,
And mosses and ferns are for ages embalmed
Secure and enshrined from the whirlwind and tide
If storm lashed to foam, or smoothly becalmed;
Pale succinite urns; heathen's fetish for ages,
Rare marvels for science, and wonder for sages

Let us seek out a method by which abraded, curetted or burred dentin and cementum, or dentine the abode of millions of micro-organinisms etched by acids poisoned by ptomaines diseased and malodorus, can be made surgically clean; let us search this Green acre of nature for oil and wine of healing.

Let us search for this progenitor of succinum (amber); look where to find the vanished forests of the grand old trees of the Northland, the Pinus Succinfer.

Imagine a titantic glaciered mass as it crept resistly on, carrying masses of earth and rock, into a vast valley of the northland; now the bed of the Baltic sea, burying insects, ferns, plants, shrubs and trees, beneath the morain furrows left on either side of its icy mould-board, vast charcoal-pits where nature chose instead of charcoal-carbon, to distill bitumen and mephitic gases, and to collect and pour from her alembic for our use, admiration and delight, this wonderful product Amber, a piece of which I hold in my hand and show you just as it came from one of those sea-caves or mines from the Baltic.

It was from this resin that was bottled in the vast cuvcubic and alembic of mother earth, heated by her fires, and distilled from the wood and bark of the *Pinus Succinfer*—a northern tree now extinct, but first kin to the Pinus Sylvestris that I have sought and found an antiseptic and preservative to reinforce and enhance the properties of

the gum (from the Pinus Sylvestris) to produce a dense, strong, clear, film to bar moisture and prevent recurrent decay.

Of amber alone an interesting paper could be written, but I will only say of it that it comes to us principally from the mines on the shores of the Baltic sea and it is of Pliocence or Cenozoic period. Of it Homer wrote: "The gold necklace (of the Queen) hung with its bits of Amber." Homer's Odyssey 15 460. A medical contemporary of its prophylactic power, writes:

"True it is, that a collar of amber beads, worn about the necks of young infants is a singular preservative to them against secret poison."

One of Illinois' first lawyers wears a string of amber beads about the size of a robin's egg as a preventive of hay fever. Certain it is that as a preservative from moisture and decay its powers are marvelous. One hundred and sixty-three species of plants and over six hundred species of insect life and growth, and portions of animal remains have been caught within its sticky grasp, and brought down to us perfectly preserved.

What substance in earth, air, or water is more nearly a perfect preserveative than amber. The hard resins have come down to us through tens of centuries with mummified kings and queens.

The soft tissues of the body are affectionately tolerant of succinite contact in burns, abrasions, and other trauma. All cavities in the teeth, and *all* solutions of continuity from loss of enamel, grinding and chiseling or removal of pulps should be covered in thus before setting post or shell, placing filling or inlay.

Succinite Inlay Cement.

Heretofore chemists and scientists laboring in the endeavor to supply a cement for dental uses in crown, bridge and inlay work have drawn their supplies from the mineral field and chemico-phosphoric adjuvants. How poorly they have succeeded might have been foretold had they noted and given weight to the *fact* that the bond between the minerals and phosphoric acids has been the waters of crystallization. It needs no argument to establish the proposition that wherever such waters of crystallization dominate the product will attract other waters, brought in contact. Hence *all of the Dental cements of Continental Europe or of America are permeable to moisture.* Not only that, but, they are not received with kindly welcome in contact with dermal or nerve tissues, bone or muscle. They are without exception irritant if not toxic in their effects.

Pondering upon these facts and giving heed to logical deductions, I was lead into the other half of God's acre,—the succinite field where are found inspissated juices, saps and gums, and among them the gutta serena and bedellium, clear drops of priceless value.

From Succinum and its congeners, relatives, there are gums moisture proof and miscible, gums pliable and elastic, sticky, oleaginous, gums transparent or opaque, gums fetid or fragrant, gums fusible or refractory, gums aromatic or non-odorous, gums terebinthinate or lactate, gums fosiliferous, achaic or recent, gums globulated or tear shaped, gums compatible or repellant, to say nothing of oral or animal or gums icteric.

Then there are gum resins, hard resins, and soft resins—products of hydro carbons.

The gum resins are so numerous, so widely distributed among the succus oozings of trees and plants appearing as natural, spontaneous exudates, and those appearing in consequence of wounds or bruises that I shall not attempt to name them, because to read the names of even an imperfect list would require more time than allotted to me for the entire paper. To give you an idea of their number, I relate that in passing from my residence in Chicago, only one short block and counting only on one side of the street, not pausing in my walk or slacking my speed, I numbered seventy-six distinct species of plant life, nearly or quite all of which were gum-yielding or containing inspissated juices.

As a familiar specimen of plant such as I mean, I may mention the asclepias, or milk-weed. Among trees not usually thought of I name the cherry, wild and cultivated, the walnut (ju glands), birch, horse chestnut, etc.

For lining and for cement, I have selected those absolutely impermiable to moisture. Amber as the first; first in beauty, first in density, and certainly eminently first in preservative effectiveness. No other substance known has for unnumbered centuries brought down to us, preserved with marvelous perfection more than a thousand species of insect and vegetable life. How marvelous is this perfection of preservation you can only comprehend by an examination of amber specimens found in museums and collections of archaic treasures containing mosquitoes, flies, ferns, mosses and twigs, as perfect as when life and growth were present.

This preservative quality should, with our profession, stand first in esteem, even if it possessed no other charm or virtue.

Result.

An easily placed (and removed) cavity lining, root canal filling, fillings for baby teeth, and inlay on cement; moisture proof, antiseptic, tissue tolerating, transparent strong; succinitic instead of mineral and chemical—a new compound valuable beyond price for what intended worthy of use and further study.

To avoid theoretical waste in cavities under gold and other fillings a hydro-carbon element is used that is absolutely resistant to digestive forces of mouth or stomach. Remember that the thickness of the lining is less than three ten-thousandths of an inch, and when spread over the cavity and dried the resistance to waste is not its best feature.

The diaphragm between moisture from oozing tubule of dentine on one side and oral moisture on the other face, being antiseptic and anti microzoic on both faces, and tolerated lovingly by the tissues on the dentinal face, allows nature to cicatrize, so to speak, on the dentinal face, arresting the flow of the dentinal exudate, and closing the mouths of the tubules, thus effectually doubling the coffer dam against tubule moisture, and oral invasion. Hence recurrent decay has not thus far been found where the lining has been interposed. So should digestion of the lining occur, later healing of abraided dentinal wound has been accomplished and if the filling is antiseptic and a bar to microzoa then the millennium is ushered in as to that cavity.

But some may say, the film of resin left by the alcohol evaporation is a friable one, brittle and has no strength. I grant it, but when you come to burnish down upon and among the resinous particles a filling, adapting itself closely to cavity surface even cohesive gold, then the weakness becomes strength by aiding to fill up the interstices of the crystalline mass superimposed, and the bar to moisture is perfect, the wall impregnable to microzoa! You may argue that a mortar of lime, sand and water is brittle when water is evaporated; so it is, and the laying of the bricks in such mortar is a very simple process, but none of you that thus argue would trust yourselves in a house builded of bricks without mortar.

What would you think of a hydrostatic or hydraulic engineer who, while constructing an aqueduct, should refuse to spread a film of Portland cement upon his granite blocks because it is a simple proceeding and cement thus used is not as strong as granite? You all know that his conduit would leak. So I know that gold, a solid

beaten down with ever so much care and skill on to dentine and enamel, leaves an interstice that leaks, so to speak.

Clay is a simple, very common material, but when driven down between two rows of planking, reaching to the river bottom, helps to form a coffer dam, impervious to water. Will you urge against its use, because clay is a simple substance, weaker than hemlock or oak? Wise builders choose materials and processes that lead to success and durability. Are dentists as wise?

In thus presenting this subject for your consideration I have, I fear, too much followed the example of some theatrical managers and play-writers, who select a name for a production, then use it as an attraction on which to string vaudeville. But if I have not strictly followed the lines of rhetoric and logic I have given you from a somewhat lengthened experience that which if adopted and improved upon, as you, fresh from the college halls and recent lecture rooms, have capacity for, may become of inestimaable value. Could I call down upon you the benediction of high resolve, incorruptible integrity and pertinacity in striving, symbolized by the glacier's sweep I have alluded to, then we will not need longer to discuss the causes of failure, or to seek new remedies; and I, and such as I am in age and attainment, may look back from the near lying sunset of our lives, our eyes with which we must soon, so soon, turn to the limitless beyond, radiant with joy even at parting, at your achievements and successes.

Note.—I have made generous quotations from my paper read at Vicksburg before the Mississippi State Dental Society in June last.

Because of the lateness of the hour discussion was dispensed with.

The committee on resolutions reported the following:

Resolved, That the Northern Indiana Dental Society tender their sincere thanks to the dentists of Wabash for the comfort and pleasure afforded all those attending the meeting, and especially to the retiring president, Dr. Payne, for his untiring efforts for the welfare of the meeting; also to the secretary, who has performed in such a satisfactory manner the duties placed in his hands. And to the executive committee and the supervisor of clinics for the satisfactory manner in which they have taken care of the meeting; and to the press of the city for the courtesy shown us, as also to Mayor Williams and Rev. Mr. Kemper, and particularly to the gentleman from Chicago, who aided very much in the instructive part of the meeting.

And we also tender our thanks to the exhibitors who so kindly aided by their displays as well as their financial aid to making this meeting a success.

(Signed) S. B. HARTMAN, President,
T. A. CONNER,
M. WILSON.

The resolution was unanimously agreed to.

The following officers were elected for the ensuing year: President, Dr. S. B. Hartman, Ft. Wayne; vice-president, Dr. J. A. Stoeckley, South Bend; secretary, Dr. Otto W. King, Huntington; members of executive committee, Drs. A. H. Wagner, Huntington; Matthew Wilson, Rochester; J. W. Stoge, Goshen; C. E. Redmon, Peru, and M. W. Strauss, Huntington.

Upon motion the society adjourned sine die to meet at Huntington, Ind., in 1904.

APPRECIATE THE AMERICAN DENTAL JOURNAL.

Frink & Young,

Dear Sirs: At the last meeting of the junior class of the Barnes' Dental College a motion was made, seconded and adopted that they extend to you a vote of thanks for the "American Dental Journal." Such favors are always highly appreciated by the class.

Sincerely yours,

WM. S. SYMS, President.
H. G. BAUGH, Secretary.

NOTICES OF MEETINGS

FOURTH INTERNATIONAL DENTAL CONGRESS.

St. Louis, Mo., August 29 to Sept. 3, 1904.

COMMITTEE ON STATE AND LOCAL ORGANIZATIONS.

J. A. Libbey, Chairman, 524 Penn Avenue, Pittsburg, Pa.

The Committee on State and Local Organizations is a committee appointed by the Committee of Organization of the Fourth International Congress with the object of promoting the interests of the Congress in the several states of the Union. Each member of the committee is charged with the duty of receiving applications for membership in the Congress under the rules governing membership as prescribed by the Committee on Membership and approved by the Committee of Organization. These rules provide that *membership in the Congress shall be open to all reputable legally qualified practitioners of dentistry.* Membership in a state or local society is not a necessary qualification for membership in the Congress.

Each state chairman, as named below, is furnished with official application blanks and is authorized to accept the membership fee of ten dollars from all eligible applicants within his state. The state chairman will at once forward the fee and official application with his indorsement to the chairman of the Finance Committee, who will issue the official certificate conferring membership in the Congress. No application from any of the states will be accepted by the chairman of the Finance Committee unless approved by the state chairman, whose indorsement is a certificate of eligibility under the membership rules.

A certificate of membership in the Congress will entitle the holder thereof to all the rights and privileges of the Congress, the right of debate, and of voting on all questions which the Congress will be called upon to decide. It will also entitle the member to one copy of the official transactions when published and to participation in all the events for social entertainment which will be officially provided at the time of the Congress.

The attention of all reputable legally qualified practitioners of dentistry is called to the foregoing plan authorized by the Committee of Organization for securing membership in the Congress, and the Committee earnestly appeals to each eligible practitioner in the United States who is interested in the success of this great international meeting to make application at once through his state chairman for a membership certificate. By acting promptly in this matter the purpose of the committee to make the Fourth International Dental Congress the largest and most successful meeting of dentists ever held will be realized, and the Congress will thus be placed upon a sound financial basis.

Let everyone make it his individual business to help at least to the extent of enrolling himself as a member and the success of the undertaking will be quickly assured. Apply at once to your state chairman. The state chairmen already appointed are as follows:

General Chairman—J. A. Libbey, 524 Penn avenue, Pittsburg, Pa.

STATES.

Alabama—H. Clay Hassell, Tuscaloosa.
Arkansas—W. H. Buckley, 510½ Main street, Little Rock.
California—H. P. Carlton, Crocker Bldg., San Francisco.
Colorado—H. A. Fynn, Denver.
Connecticut—Henry McManus, 92 Pratt street, Hartford.
Delaware—C. R. Jeffries, New Century Bldg., Wilmington.
District of Columbia—W. N. Cogan, The Sherman, Washington.
Florida—W. G. Mason, Tampa.
Georgia—H. H. Johnson, Macon.
Idaho—J. B. Burns, Payette.
Indiana—H. C. Kahlo, 115 E. New York street, Indianapolis.
Iowa—W. R. Clack, Clear Lake.
Kansas—G. A. Esterly, Lawrence.
Kentucky—H. B. Tileston, 314 Equitable Bldg., Louisville.
Louisiana—Jules J. Sarrazin, 108 Bourbon street, New Orleans.
Maryland—W. G. Foster, 813 Eutaw street, Baltimore.
Massachusetts—M. C. Smith, 3 Lee Hall, Lynn.
Michigan—G. S. Shattuck, 539 Fourth avenue, Detroit.
Minnesota—C. A. Van Duzee, 51 Germania Bank Bldg., St. Paul.
Missouri—J. W. Hull, Altman Bldg., Kansas City.
Nebraska—H. A. Shannon, 1136 "O" street, Lincoln.

New Jersey—Alphonso Irwin, 425 Cooper street, Camden.
New York—B. C. Nash, 142 W. 78th street, New York City.

North Carolina—C. L. Alexander, Charlotte.
Ohio—Henry Barnes, 1415 New England Bldg., Cleveland.
Oklahoma—T. P. Bringhurst, Shawnee.
Pennsylvania—H. E. Roberts, 1516 Locust street, Philadelphia.
Rhode Island—D. F. Keefe, 315 Butler Exchange, Provdence.
South Carolina—J. T. Calvert, Spartanburg.
Tennessee—J. P. Gray, Berry Block, Nashville.
Texas—J. G. Fife, Dallas.
Utah—W. L. Ellerbeck, 21 Hooper Bldg., Salt Lake City.
Virginia—F. W. Stiff, Richmond.
West Virginia—H. H. Harrison, 1141 Main street, Wheeling.
Wisconsin—A. D. Gropper, 401 E. Water street, Milwaukee.

For the Commttee of Organization,
EDWARD C. KIRK, Secretary.

Institute of Dental Pedagogics, Dec. 28-29, Buffalo, N. Y.

American Society of Orthodontists, Dec. 31, Jan. 1 and 2, Buffalo, N. Y. Secretary, Anna Hopkins, St. Louis, Mo.

National Dental Association, Southern Branch, Feb. 23, 24, 25, 1904, Washington, D. C. Corresponding Secretary N. D. A., So. Br., Carroll H. Frink, Fernandina, Fla.

Fourth International Dental Congress, Aug. 29 to Sept. 3, 1904. Secretary, Edward C. Kirk, D. D. S., Sc. D.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of Dental Pedagogics will be held at Buffalo, Dec. 28-29, 1903. An exceedingly interesting program is being arranged, details of which will be published in the different journals.

W. H. WHISTLAR,
Chairman Ex. Board, Cleveland, O.

ANNUAL CLINIC OF THE NORTHWESTERN UNIVERSITY.

Northwestern University Dental School's Annual Clinic, University Building, Lake and Dearborn streets, Chicago, Jan. 19, 1904. G. B. McFarlane, Secretary.

ANNUAL CLINIC OF THE CHICAGO COLLEGE OF DENTAL SURGERY.

The clinic of the Alumni Association of the Chicago College of Dental Surgery will be held at the College building, corner Wood and Harrison streets, Jan. 20, 1904. J. C. Y. MOORE.
Secretary.

INDIAN TERRITORY.

A number of the dentists of Indian Territory met at South McAlester and organized by the election of the following officers: President, J. E. Wright of South McAlester; vice-president, C. W. Day of Vinita; secretary, J. C. Abernathy of Ardmore; supervisor of clinics, A. E. Bonnell, Muskogee. The next meeting will be held at Muskogee May 4 and 5.

ST. LOUIS DENTAL SOCIETY.

The St. Louis Dental Society elected officers for the year at its monthly meeting held Dec. 1. The new officers are: President, Herman Prinz; vice-president, C. DeWitt Lukens; secretary, James F. Austin; treasurer, Joseph G. Pfaff; librarian, W. A. Roddy; corresponding secretary, DeCourcey Lindsely. The retiring president is T. E. Turner. Secretary J. F. Austin and Treasurer Joseph G. Pfaff were re-elected.

UTAH DENTAL SOCIETY.

The semi-annual meeting of the Utah State Dental Association was held at Ogden Nov. 8. Dr. Dalrymple of Ogden presided at the meeting and many interesting clinics were held. There were about forty-five present and six new members were admitted to the association. Among the clinics held was one on "Porcelain Inlays," by Dr. Will Ellerbeck of Salt Lake; "Porcelain Crowns," by Dr. Gates of Salt Lake; "Swedging Device for Metal Plates," by M. C. McClintock; "Test of Facings," by Dr. Terrell, and "Root Filling," by Dr. Dalrymple.

WISCONSIN STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Wisconsin State Board of Dental Examiners for examination of candidates desiring license to practice den-

tistry in Wisconsin will be held in Milwaukee, at Hotel Pfister, Jan. 25, 1904.

Application must be made to the secretary fifteen days before examination. Candidate must be a graduate of a reputable dental college, or have been engaged in the reputable practice of dentistry, consecutively for four years, or an apprentice to a dentist engaged in the reputable practice of dentistry for five years.

J. J. WRIGHT, D. D. S.
1218 Wells Bldg., Milwaukee, Wis. Secretary.

A GOLDEN ANNIVERSARY CELEBRATION.

Class of 1854, Philadelphia College of Dental Surgery.

The dental profession of Philadelphia, represented by all of its organizations, will celebrate on February 27, 1904, the fiftieth anniversary of the graduation of the Class of 1854 of the Philadelphia College of Dental Surgery by a complimentary banquet to the surviving members of the class, consisting of Drs. Louis Jack, James Truman, C. Newlin Peirce, and W. Storer How.

All dentists in good standing are invited to participate. The subscription price, including a banquet ticket and one copy of the souvenir historical volume to be published in commemoration of the event, has been fixed at ten dollars. The subscription list will be open until February 10, 1904.

The committee in charge of the celebration consists of the following members: Edwin T. Darby, Edward C. Kirk, R. H. D. Swing, Albert N. Gaylord, Earl C. Rice, I. N. Broomell, J. T. Lippincott, L. Foster Jack, G. L. S. Jameson, J. D. Thomas, Wilbur F. Litch, H. C. Register, Wm. H. Trueman, Robert Huey, Wm. L. J. Griffin, J. Clarence Salvas, D. N. McQuillen.

Applications together with the subscription may be forwarded to the chairman of the Invitation Committee.

ROBERT HUEY, D. D. S.,
330 S. Fifteenth street, Philadelphia.

OBITUARY

DR. J. FOSTER FLAGG.

Dr. J. Foster Flagg died Nov. 25 at his home in Swarthmore, Pa., after a short illness. He was 76 years old. He was born in New England, and when gold was discovered in California went west with the "Forty-niners." For twenty years he had an office on Eleventh street, above Arch. When the Philadelphia Dental College was organized in 1863 he was called to the chair of dental pathology and therapeutics, which he held till 1870, when the chair was abolished. In 1879 it was re-established, and Dr. Flagg resumed its occupancy, continuing in it until 1896, when he retired from professional life.

DR. M. LUKENS LONG.

Dr. M. Lukens Long, who for more than forty years practiced dentistry in Germantown, Pa., died at his home Dec. 1, aged 77 years. He was one of the oldest surviving graduates of the Philadelphia Dental College and contributed much to the work of the Alumni Society of the college. A native of Warrington township, Bucks county, he was a descendant of one of the first families to settle in that section of the state. He was an honorary member of the College of Stomatology. A widow and one son survive him.

At the thirty-eighth annual meeting of the Ohio State Dental Society, held at Columbus, Ohio, Dec. 1, 2 and 3, officers were elected as follows: President, J. F. Stephan, Cleveland; first vice-president, W. T. McLean, Cincinnati; second vice-president, H. L. Ambler, Cleveland; secretary, S. D. Ruggles, Portsmouth; treasurer, C. T. Keely, Hamilton; board of directors, Drs. W. A. Barber, Toledo; W. H. Todd, H. C. Brogn and A. O. Ross of Columbus.

DR. W. J. KEENAN.

Dr. William J. Keenan, aged 88, a well-known dentist of Cambridge, Mass., passed away at his home Nov. 4.

THOMAS N. M'GUIRE.

Thomas N. McGuire died Nov. 30 at New London, Conn., after an illness of about six months. He graduated from a New York school and spent three or four years in the metropolis practicing his profession.

Returning to New London, he entered the employ of Dr. J. L. Linsley, with whom he remained until a few months ago, when ill health compelled him to give up business.

DR. A. S. HODGE.

Dr. A. S. Hodge, an old and respected resident of Maquoketa, Iowa, passed away Nov. 13. He had been in dental practice for a great many years, from which he retired about two years ago on account of poor health. He was a greater sufferer from asthma, but was able to be out on the streets nearly every day up to the time of his death, which came without warning. He leaves a wife and two sons to miss his presence.

PERSONAL AND GENERAL

MARRIED.

DR. C. W. HALL of Newcastle, Ind., to Miss Olive Bond.

DR. R. D. THOMAS of Walworth, Ill., to Miss Emma Crosby of Beloit, Wis., November 10.

DR. B. H. BIGELOW of Rockford, Ill., to Miss Bessie Baker, Evansville, Wis.

DR. B. HERBERT DRENTLINE of Akron, Ohio, to Miss Fern Allum, same place, November 25.

DR. OTTO ALEXIS GOETZ of Naperville, Ill., to Miss Mabel Leah Gilver, November 25.

DR. ROBERTSON of Havana, Cuba, to Miss Bessie Tyler, formerly of Moline, Ill., November 11.

DR. W. T. TRIPLETT of Mendon, Ill., to Miss Emma Fletcher, October 28.

ROBBERIES.

H. B. Randall, a dentist of Erie, Pa., was robbed December 1 by sneak thieves of $50 worth of materials.

The Dental Supply Company's store at Denver, Colo., was broken into by burglars November 14 and a large quantity of instruments and materials stolen.

Burglars entered the office of Dr. H. C. Pence at Taylorville, Ill., and stole $50 worth of material.

SLIGHTLY TWISTED.

Mr. and Mrs. Dr. Beebe spent several days at Chappell this week. The doctor was doing dental work while the latter was visiting friends.—Sidney (Neb.) Telegraph.

DENTIST INJURED BY EXPLOSION.

W. F. Buchanan, a dentist at Washington, D. C., was painfully burned about the face and eyes by the explosion of a vulcanizing machine in his office November 20. He was taken to the emergency hospital for treatment.

ONLY TWO MEMBERS LEFT.

Dr. J. B. Beauman of Columbus and Dr. H. A. Smith of Cincinnati are the only living charter members of the Ohio State Dental association.

DIED IN THE DENTAL CHAIR.

Mrs. Daniel Kleinfelter, 33 years of age, of Mendota, Ill., died while under the influence of an anaesthetic administered by a physician. She had sixteen teeth extracted and did not recover from the influence of the chloroform.

ANOTHER.

Mrs. Henry Carter of Allen Grove, Wis., died in a dentist's chair at Sharon, Wis., in October. She had been given chloroform and did not rally.

DENTIST DEFENDS LADY PASSENGER.

Dr. Arthur I. Porges of Chicago was ejected from a street car for defending a lady passenger from insolence on the part of the conductor. The latter was fined $50.

INSANE.

Joseph J. Dusch, a dentist at Chicago, was sent to the Elgin institution for the insane. He had been a persistent reader of religious works, and of late has imagined he was Christ. He is 28 years old.

BANKRUPTCY.

Josiah Hellyer, a dentist, filed a voluntary petition in bankruptcy at Brooklyn, N. Y. Liabilities, $69,743; assets, $14,000.

Arthur A. Palmer, a dentist of Pasadena, Cal., is a bankrupt. Debts, $20,000; assets, $1,409.

FIRES.

AT ADA, MINN.

Dr. Borin's dental office was almost entirely destroyed by fire November 15 at Ada, Minn. The blaze was discovered shortly after 7 o'clock, when it had gained considerable headway. Prompt work on the part of the firemen saved the buildings, not, however, before the interior of the upper portion was pretty well scorched.

AT JOHNSTOWN, PA.

Dr. M. C. Kohler suffered a loss of $2,500, with insurance of $250, and Dr. W. C. Griffith $800, no insurance. Both had offices in the Opera House building at Johnstown, Pa., which was destroyed October 31.

AT BATAVIA, N. Y.

The office of Dr. Burkhart, dentist and mayor of Batavia, N. Y., was almost entirely destroyed by fire November 20.

Dr. B. H. Reid of Anderson, Ind., suffered a loss by fire December 6.

DENTIST TREATING KAISER.

Since the recent operation on his throat the emperor has had considerable attention from his American dentist, Dr. A. H. Sylvester. Dr. Sylvester is a

prime court favorite and has been honored with membership in the Royal Yacht club. He is the only member not of royal birth.

DENTIST KILLS WIFE, DAUGHTER, AND SELF.

Dr. Eugene W. Light, a prominent dentist of Saginaw, Mich., realizing that he was going insane, shot his wife and daughter and committed suicide. His object in slaying his family was to save them from want, he explained in a letter to R. B. Taylor, an intimate friend in Bay City. The physician's daughter, Ruby, was attending the Michigan Agricultural college, and she was summoned home by the father in order that he might kill her.

ARTIFICIAL TEETH REMOVED FROM STOMACH.

Frederick C. Smith has had two false teeth removed from his stomach. Smith swallowed a plate with the teeth on it during a fit of coughing. He went to Buffalo, where friends advised an operation, and Dr. Roswell Park, who attended President McKinley on his death bed, was called in. Two operations were performed, the second being successful. The X ray was used to locate the teeth. The stomach was then cut open and the foreign matter removed. Mr. Smith is doing well.

FILLED TOOTH CAUSES AGONY.

Nashville, Ind., Nov. 2.—William King, near Pikes Peak, suffered such intense agony from a tooth that had been "filled" that he became delirious, and his family was compelled to flee to a neighbor's for safety. The wife afterward returned with two men, King was overpowered and a physician was summoned. For several hours it was thought that he would not recover, his head being swollen to large proportions, while his jaws were locked. A lance was used to secure relief, but he is still unable to open his jaws, and his condition is pitiful.—Muncie (Ind.) Star.

AMERICAN DENTIST FINED IN GERMAN COURT.

An American named Henry Ruppel of Chicago, and who is now a dentist in Dantzic, has been sentenced at that place to pay a fine of 300 marks for calling himself a doctor of dental surgery. Ruppel claimed that he had received his degree from a German medical college in Chicago, but the German consul stationed in the Windy city declared that "college" was only an unscientific commercial undertaking and under the direction of a retired barber. The consul also stated that the degrees obtained from the "college" were paid for. Upon reading this testimony the higher court confirmed the sentence of the lower court.

DENTIST FINED.

Dr. Andrew S. Walsh of the New York and Union Dental college, Omaha, Neb., who was arrested upon the complaint of Secretary Dorward of the state board of health for practicing without a certificate, was found guilty before Judge Berka. He was sentenced to pay a fine of $35 and costs.

DENTIST IS HELD FOR COURT.

A case which has attracted considerable attention in Washington is that of the commonwealth against Dr. O'Neil and W. J. Cook, who were given a preliminary hearing before Justice J. R. Forrest. The prosecution was brought against the two young men who are employed at the Red Cross Dental Parlors and accused of having practiced dentistry illegally. Dr. O'Neil was released as there was no evidence against him, while Cook was held for court in the sum of $200 bail.

ANCIENT DENTISTRY.

It is certain that the ancients had some acquaintance with the dental art, yet it is difficult to determine by whom artificial teeth were introduced. Herodotus, in his accounts of the ancient Egyptians, mentions a "dentist for the teeth." The British museum contains interesting dental instruments discovered among the ruins of Pompeii (destroyed A. D. 79); and Galen in the second century describes the operation of drawing teeth with a forceps. Belzzoni establishes the fact that the ancients were acquainted with the art, for he found artificial teeth in their catacombs and tombs. It is generally accepted, however, in modern dentistry, that Albucasis first taught the true art of making teeth at the end of the thirteenth century, and in his work "Al Tarif" he gives drawings of several dental instruments then in use.

FLAMES DO $35,000 DAMAGE TO NORTHWESTERN UNIVERSITY BUILDING, FORMERLY THE TREMONT HOUSE.

A blaze which gave the fire department two hours' work destroyed three floors of the south wing of the Northwestern University building at Dearborn and Lake streets, occupied as a dental college. The loss on the structure, formerly the Tremont house, is placed at $35,000. Considerable damage also was done to the decorations and furnishings, valued at $150,000. Before the firemen had ceased their work the students began to arrive for their classes. The police refused to allow them to enter the building, but the crowd swept the guards away and ran to the fifth and sixth floors, where they sought to save their books and apparatus, kept in lockers there. Much of this property was burned or ruined by the water. The origin of the fire is unknown, but the blaze is believed to have been caused by an explosion of chemicals on the seventh floor or in a laboratory below. The flames were kept above the fourth floor.

DISADVANTAGE OF TEETH.

Chicago, Sept. 4.—I am informed that the late pontiff had lost almost all his teeth before Dr. Lapponi became his physician. One day he surprised that judicious attendant by announcing that he had contracted for a new denture. Dr. Lapponi surprised the already elderly patient by objecting. His reason was a still greater surprise. He feared that with a new set of molars and incisors Leo might return to a dietary abstention from which had a potent influence in preserving his health and prolonging his life.

Luxury, it is declared by the sociologists, is gradually depriving man of his eyebrows, eyelashes, locks, beard and organs of mastication. As to the last, I suppose it is not an undivided misfortune. Leo ate little meat. As teeth are indispensable to the carnivorous, an obvious deduction follows. The less meat the more years. VEGETARIAN.

ECONOMIZING.

A successful young physician who used to board in a house at $8 a week eighteen years ago has returned to it after a rather bitter experience in Wall street. A majority of professional men speculate in one way or another as a relaxation. Dentists are particularly fond of a little gamble. On the race course you will bump against many a physician in the betting ring and legions of them send commissions to pool rooms. There is hardly a Wall street broker but has his clientele of doctors. The young physician in question has enjoyed a lucrative practice among the elect-select of Murray Hill and beyond, and ought to be worth $500.000. He has returned to his old boarding house for economy's sake. The recent slump in stocks caught him, tossed him madly about, prostrated him, sat on him, knocked him silly, and he has given up his fine apartments temporarily. Same old trouble. Bought at the top. He is in the same boat with others.—*New York Press.*

MUST PAY THE DENTIST.

Leavenworth, Kan., Nov. 14.—A jury of twelve men in the district court held that Dr. C. S. Nichols should have $70 for constructing for Mrs. Mary Jordan two sets of false teeth. The evidence in the case occupied the entire morning and afternoon sessions of the court and then the jury took charge of it at 4:05 o'clock. At 4:25 o'clock that body returned to the court room with a verdict in favor of Dr. Nichols, which means that Mrs. Jordan will not only have to pay the $70, but also the costs in the case, the total amount being no less than $125. Dr. Nichols made two sets of false teeth for Mrs. Jordan. It was claimed that she took the first set home and scratched them up with a knife in an attempt to make them fit and then returned them to the dentist, who then made a second set. This set also, it was claimed, Mrs. Jordan tried to fit to her mouth herself, but being unable to do so, returned them to the dentist and refused to pay for either set. Dr. Nichols demanded pay for the teeth; Mrs. Jordan refused. The dentist filed suit in the city court and got a verdict for $38, and Mrs. Jordan took the case to the district court.—Topeka Kansas State Journal.

PULLS TEETH TO PUNISH.

Kansas City, Mo., Nov. 7.—Cruelty to charity patients in Missouri state institutions was disclosed here to-day at the annual conference of the Missouri conference of charities and corrections by Professor C. A. Elwood of Columbia, Mo., who has been investigating the almshouses of the state. Professor Elwood recited one instance of a woman patient in the insane ward of one of the almshouses who had bitten the superintendent one day while in a paroxysm. The superintendent, he said, had thereupon ordered all the

woman's teeth extracted, and this was done. Dr. E. C. Runge, president of the conference, and who is superintendent of an asylum at St. Louis, followed Professor Elwood. "We shall not handle this subject with gloves," he declared. "We can not say too much." An investigation will probably be ordered.—Chicago Chronicle

PENNSYLVANIA'S CHAMPION MEAN MAN.

Every city, town and village in the country has doubtless at one time or another put in a claim for the possession of the meanest man, and if it came to a test, Chicago, by trotting out some of her smoke producers, could make a remarkably strong showing. But, after all, the prize would probably go to Pennsylvania. At Selins Grove in that state N. Kanter is a dentist. A few days ago a man from a neighboring village called at Dentist Kanter's office and exhibited a set of gums that had known better days. The dentist took their measure and went to work on a set of false teeth, naming a time when the patient was to return and try them on—or in.

At the appointed hour the man returned and called for the teeth. The dentist poised them in his fingers for a moment, viewing them as an artist does his finished masterpiece. Then they were handed over to the mean man, who put them in his mouth, gulped hard once or twice and mumbled that he had just remembered that he had forgotten something outside. Having closed the door of the dentist's office behind him, he jumped into his buggy and drove away. He still has the teeth, and what is worse they are probably serving him just as well as if he had paid for them.

It is such instances as this that make men sometimes doubt. If that man were to swallow his teeth and consequently be choked to death, we might go bravely forward believing that there is such a thing as just retribution. If such a thing were to happen it would serve as one of the most powerful texts for a sermon on virtue that could be found. But, alas! the fellow probably takes the precaution to sleep with his teeth in a goblet of water, and the punishment that he merits is not likely, therefore, to overtake him.

With cases of this kind going upon the records is it any wonder that so many people turn to sin through the mere belief that righteousness doesn't pay?—*Chicago Record-Herald.*

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1904

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Hermann, A. W. ..... Philadelphia, Pa.
Hert, B. S. ..... Rochester, N. Y.
Hertz, E. F. ..... Minneapolis, Minn.
Hiatt, N. W. ..... Marion, Wis.
Hicks, H. S. ..... Indianapolis, Ind.
Hillyer, Ellison. ..... New York, N. Y.
Hinckley, B. C. ..... Keokuk, Iowa
Hodge, L. D. ..... Arkansas City Kan.
Hofheinz. R. H. ..... Rochester, N. Y.
Hoffman, C. H. ..... Des Moines, Iowa
Hoffmeister. Edw. ..... Baltimore, Md.
Hoff, N. S. ..... Ann Arbor, Mich.
Hooker, O. A. ..... San Jose, Cal.
Holland, Frank ..... Atlanta, Ga.
Hollingsworth, J. G. ..... Baltimore, Md.
Holmes, M. J. ..... Brookland, D. C.
Hooper, A. O. ..... San Jose, Cal.
Hopkins, R. L. ..... Sterling, Ill.
Hosford, Wm. S. ..... Iowa City, Iowa
Howard, H. D. ..... Pittsburg, Pa.
Howell, S. B. ..... Philadelphia, Pa.
Huber, E. E. ..... Philadelphia, Pa.
Hunt, F. M. ..... Des Moines, Iowa
Hunt, Geo. E. ..... Indianapolis, Ind.
Hunt, O. A. ..... Omaha. Neb.
Huntley, R. L. G. ..... Mason City. Iowa

Jack, Louis ..... Philadelphia, Pa.
Jackson, H. N. ..... Milwaukee, Wis.
Jameson, A. ..... Indianapolis, Ind.
Jeffrey, J. A. ..... San Francisco, Cal.
Jenkins, J. H. ..... Liberty, Mo.

THE BREWSTER DENTAL COMPANY, CHICAGO

Johnson, A. G.....Chicago, Ill.
Johnson, A. H.....Rochester, N. Y.
Johnson, C. N.....Chicago, Ill.
Jones, E. X.....Chicago, Ill.
Jones, H. C.....Richmond, Va.

Keefe, J. E.....Chicago, Ill.
Keefer, J. B.....Portland, Ore.
Kellogg, A. E.....Cresco, Iowa
Kelsie, H. E.....Baltimore, Md.
Kennerly, J. H.....St. Louis, Mo.
Ketcham, A. H.....Denver, Colo.
Kettig, E. M.....Louisville, Ky.
Kimball, A. H.....Chicago, Ill.
Kirk, E. C.....Philadelphia, Pa.
Knowles, I.....Chicago, Ill.
Kretschmann, E. A....Philadelphia, Pa.

Lancaster, H. N.....Chicago, Ill.
Latham, H. E.....Philadelphia, Pa.
Lauderdale, C. F.....Milwaukee, Wis.
La Veine.....Kansas City, Mo.
Lawrence, W. F.....St. Louis, Mo.
Leake, C. W.....Chicago, Ill.
Le Cron, D. O. M.....St. Louis, Mo.
Leggett.....Chicago, Ill.
Letord, J. S.....Kansas City, Mo.
Lewis, E. H.....Washington, D. C.
Lindsley, C.....St. Louis, Mo.
Litch, W. F.....Philadelphia, Pa.
Lodge, E. B.....Cleveland, Ohio
Lord, Chas.....Colon, Mich.
Lukens, C. De Witt.....St. Louis, Mo.
Lush, F. A.....Cincinnati, Ohio

Major, S. M.....Kansas City. Mo.
Mallory, F. R.....Toronto, Ont.
Marshall, M. C.....St. Louis, Mo.
McAlpin, A.....Bradford, Pa.
McCandless, A. W.....Chicago, Ill.
McCurdy, J. S.....Ft. Wayne, Ind.
McDonagh, A. J.....Toronto, Ont.
McElroy, W. Z.....Atlanta. Ga.
McGehee, W. H. O.....Richmond, Va.
McLean, W. T.....Cincinnati, Ohio
McMillen, D. J.....Kansas City, Mo.
McWhinney.....Elgin, Ill.
Merrill, C. A.....Birmingham, Ala.
Metzer, O. J.....New York, N. Y.
Millard, W. R.....Philadelphia, Pa.
Miller, H. C.....Portland, Ore.
Milner, M. B.....Baltimore, Md.
Mitchell, G. B.....Rochester, N. Y.
Mitchell, W. F.....London, Eng.
Molyneaux, G.....Cincinnati, Ohio
Mongomery, W. S.....Lexington, Ky.
Moore, E. C.....Detroit, Mich.
Moore, T. E.....Columbia, S. C.
Morgan, D. H.....Muskegon, Mich.
Morgan, H. W.....Nashville, Tenn.
Morgan, J. B.....Davenport, Iowa
Mummery, N. J.....Milford, Mich.
Murray, Robert.....Buffalo, N. Y.

Neubauer, Frank....San Francisco, Cal.
Nichols, J. P.....Philadelphia, Pa.
Noble, H. D.....San Francisco, Cal.
Noel, L. G.....Nashville, Tenn.
Nones, R. H.....Philadelphia, Pa.
Northrop, A. L.....New York, N. Y.
Noyes, E.....Chicago, Ill.
Nyman, J. E.....Chicago, Ill.

Oakly.....Chicago, Ill.

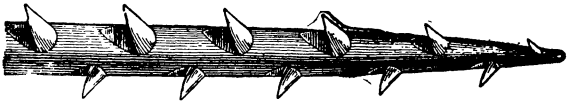
Paine, A. M.....Chicago, Ill.
Parker, F. M.....Los Angeles, Cal.
Parr, H. A.....New York, N. Y.
Partmentier, H. A....New York, N. Y.
Patterson.....Geneva, Switzerland
Patterson, J. D.....Kansas City, Mo.
Pearsall, Dr.....Dublin, Ireland
Pearson, M. W.....St. Louis, Mo.
Peck, A. E.....Minneapolis, Minn.
Perry, E. J.....Chicago, Ill.
Perry, G. B.....Chicago, Ill.
Pfaff, G. J.....St. Louis, Mo.
Pierrepont, E.....London, Eng.
Piper, A. O.....Macomb, Ill.
Piper, J. R.....Boston, Mass.
Pond, V. S.....Boston, Mass.
Prinz, H. H.....St. Louis, Mo.
Protheroe, J. H.....Chicago, Ill.
Pruyn, C. P.....Chicago, Ill.
Purtell, J. E.....Milwaukee, Wis.

Raiche, F. C.....Oshkosh, Wis.
Raymond, H. C.....Detroit, Mich.
Reeves, W. T.....Chicago, Ill.
Register, H. C.....Philadelphia, Pa.
Reid, H. M.....Minneapolis, Minn.
Risinger, H. R.....Chicago, Ill.
Roach, F. E.....Chicago, Ill.
Robinson, C. H.....Wabasha, Minn.
Robinson, E. G.....Norwood, Minn.
Roe, W. R.....Philadelphia, Pa.
Rohland, C. B.....Alton, Ill.
Ross, J. F.....Toronto, Ont.
Rowland, W. T.....Bentonville, Ark.
Royce, E. A.....Chicago, Ill.

Salter, C. B.....Chicago, Ill.
Salvas, J. C.....Philadelphia, Pa.
Sarrazin, J. I.....New Orleans, La.
Schaffer, C. A.....Iowa City, Iowa
Schumann.....Chicago, Ill.
Sharp, W. F.....San Francisco, Cal.
Sherwood, Jas. A.....Buffalo, N. Y.
Shidle, G. R.....Pittsburg, Pa.
Shryock, W.....Ft. Wayne, Ind.
Shultz, F. H.....Washington, D. C.
Simonds, G. H.....Medina, N. Y.
Simpson, G. L.....Pittsburg, Pa.
Skeen, P. A.....Texerkana Texas
Skinner, F. H.....Chicago, Ill.
Small, B. A.....Iowa City, Iowa
Smith, A. J.....Providence. R. I.
Smith, E. H.....Boston, Mass.
Smith, E. S.....Washington, D. C.
Smith, G. J.....Baltimore, Md.
Smith, H. A.....Cincinnati, Ohio
Smith, H. T.....Cincinnati, Ohio
Smith, T. V.....Philadelphia, Pa.
Spencer, W. R.....Vancouver, B. C.
Snow, Geo. B.....Buffalo, N. Y.
Stark, W. T.....Kansas City, Mo.
Starr, W. R.....Philadelphia, Pa.
Staufer, H.....Pittsburg, Pa.
Steel, C. L.....Richmond, Va.
Stephan, L. J.....Milwaukee, Wis.
Stephan, T.....Chicago, Ill.
Stern, H. S.....San Francisco Cal.
Stewart, L. K.....Chicago, Ill.
Stilwell, W. H.....Philadelphia, Pa.
Stith, W. M.....Petersburg, Va.
Stoddard G. C.....So. Berwick, Me
Stubblefield, D. R.....Nashville, Tenn
Sutherland.....Baltimore Md

Taft, J.....Ann Arbor, Mich.
Taggart, C. C.....Pittsburg, Pa.
Taggart, W. H.....Chicago, Ill.
Taylor, B. S.....Washington, D. C.
Tees. Ambler.....Philadelphia, Pa.
Tenney.....Chicago, Ill.
Thomas, G. A.....Chicago, Ill.

The Monogram EH Broaches Are O. K.



WHY? BECAUSE—

Having made Broaches in various factories for the last sixteen years, in Europe as well as in this country, I have acquired a thorough knowledge of the wants of the profession in this line of instruments and will guarantee every EH Broach of my manufacture to be perfect as to barbs, being uniform in angle and shape, very sharp and prominent, which gives the operator the greatest satisfaction.

My Extra Fine Broaches are almost hair-like, very flexible, and there is absolutely no danger of breaking when used with ordinary care; in fact, they are the perfection of mechanical skill in broaches.

The prominent features of my EH Broaches are the high quality and temper and fine gauges in which they are made. Extra fine, medium, coarse and assorted. Price $1.00 per dozen, $5.50 per half gross, $10.00 per gross. Dealers will please ask for quotations. Sample packages will be sent to dealers on request.

None genuine without this EH on the inside and outside of every package.

If you cannot get the EH Broaches from your dealer, please send your order with name and address direct to—

EH

EMIL C. HANSEN

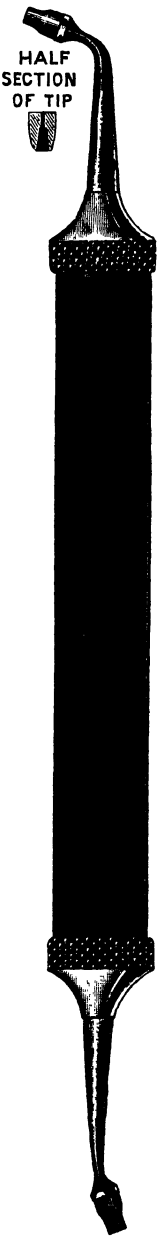
Manufacturer and Repairer of Dental Instruments

1199 N. 41st Ave., Chicago, Ill.

THIS IS... Dr. R. B. Tuller's Instrument

AND METHOD FOR THE PAINLESS EXTIRPATION OF LIVING SENSITIVE PULPS OF TEETH BY PRESSURE ANAESTHESIA THAT DOES NOT FAIL.

PATENT APPLIED FOR.



Open the cavity freely so as to allow the rubber tip to be placed exactly over the area of exposure.

A minute quantity of anaesthetic goes a long ways when made to go exactly where wanted. As shown by the cut the little rubber tip to the instrument is hollowed out.

Into this chamber a SMALL pellet of cotton is placed, saturated with the anaesthetic. Don't allow cotton to extend out over edges of the cup.

Place the cup over exposure and begin pressure gently, gradually increasing to considerable force. The cup edge will fit around exposure so closely that the fluid is confined while the steel point of the instrument compresses the cotton forcing fluid surely into the pulp. Anaesthesia should be complete in about three minutes. If tooth is large take longer time and recharge the cotton in the tip the second or third time.

If pulp is found sensitive when penetrated with a fine broach as a test, manipulation has in some way been faulty. Repeat with more care and see that rubber is pressed squarely down. Tilting to one side may allow medicine to escape.

Use a few crystals of cocaine or Parke, Davis & Co.'s cocaine pellets, prepared for hypodermic use, dissolved with two or three drops of water, or Dr. Green's Acestoria, which is ready for use, and if instrument is operated correctly confining liquid to area of exposure, failure will not occur. Infiltration occurs with the precision almost equal to the hypodermic needle.

Tips wear, become hard in time, and sometimes split. They are then useless. Examine before using to see that they are soft and perfect. An extra supply goes with each instrument; a new supply in packages of 50, fifty cents.

The instrument is double ended, the shank straight in one instance, and curved in the other to admit use in distal cavities. The handle is hard rubber, and all metal parts nicely nickel plated. A handsome instrument. The cut shows full size, also plan of tip.

This instrument will be found also very serviceable in pumping medicaments into and through putrescent root canals by filling the root with the liquid and placing the tip over opening, working with a rapid churning motion which relieves obstructing particles often wedged into the apical foramen and permits passage of medicine.

Think of time saved in a single operation, and satisfaction to patients.

Used by leading dentists of Chicago and elsewhere with success.

PRICE $2.00, PREPAID, BY MAIL.

(Send P. O. or Express Order; Checks cost exchange.)

R. B. TULLER Suite 1111, 100 State St., CHICAGO.

Twentieth Century

TEETH

CAREFUL TESTS with specially devised dynamometer prove that the "TWENTIETH CENTURY" Teeth are more than twice as strong as some makes of teeth; at least 20 per cent stronger than the very best competitive article and that the general average superiority as compared with all other leading makes is more than 84 per cent greater. In translucency of porcelain, life-like appearance of shades and moulds, "TWENTIETH CENTURY" Teeth are unexcelled.

PRICE LIST OF "TWENTIETH CENTURY" TEETH, JULY 1st

PLAIN AND GUM RUBBER

Per Set of 14	$ 1.00
Partial Sets, Per Tooth	.08
11 Sets	10.00
28 Sets	25.00
58 Sets	50.00
116 Sets	100.00

"TWENTIETH CENTURY" CROWNS

Per Crown	$ .40
100 Crowns	35.00

FLAT BACK LONG-PIN PLATE TEETH

Per Tooth	$ .10
110 Teeth	10.00
295 "	25.00
1335 "	100.00

CASH DISCOUNTS

Three (3) per cent discount on bills of	$5 to $25
Five (5) per cent. on bills of	$25 to $100
Ten (10) per cent. on bills of	$100 and over

WE CARRY A FULL LINE OF PARTIALS AND ODD SINGLE TEETH

FOR SALE BY

FRINK & YOUNG

JUST OUT

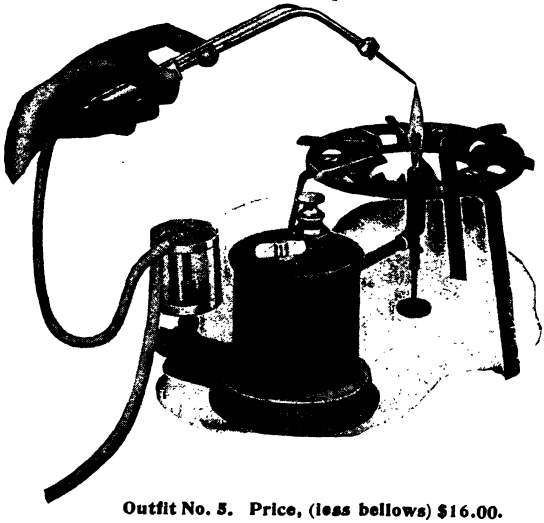
DR. R. C. BROPHY'S

LATEST IMPROVED

GASOLENE LABORATORY APPARATUS

NOS. 5 AND 2

THERE IS NOTHING QUITE AS SAFE AS ABSOLUTE SAFETY.



WHY are these Apparatus safe? Because they are made of Iron.

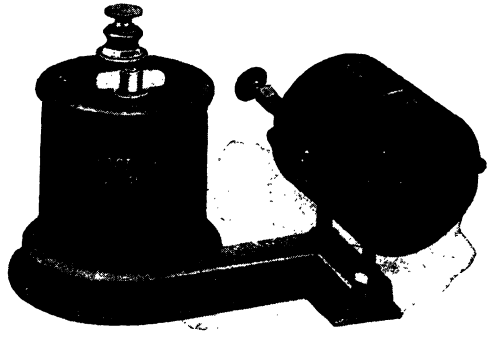
There is no solder used in their construction. Joints are avoided as far as possible. They can not become jammed or broken. They will stand 25 times as much air pressure as is required. They are practically indestructible.

Outfit No. 5. Price, (less bellows) $16.00.

WHY SHOULD DENTISTS DEMAND THIS APPARATUS?

Because they are safe in construction. They are durable in construction. They are permanent in finish. They are adapted to all requirements. They do what they are designed to do perfectly. They are sold at a fair, reasonable price.

Dentists who are in need of *anything* in the line of laboratory heating apparatus should investigate our goods; they are sold by all the leading dealers with a positive guarantee.



Outfit No. 2. Price, complete, $21.00.

Our Outfit No. 1 is a combination of Nos. 5 and 2. Price, (less bellows).....$30.00

MANUFACTURED BY THE

CHICAGO DENTAL SPECIALTY COMPANY,

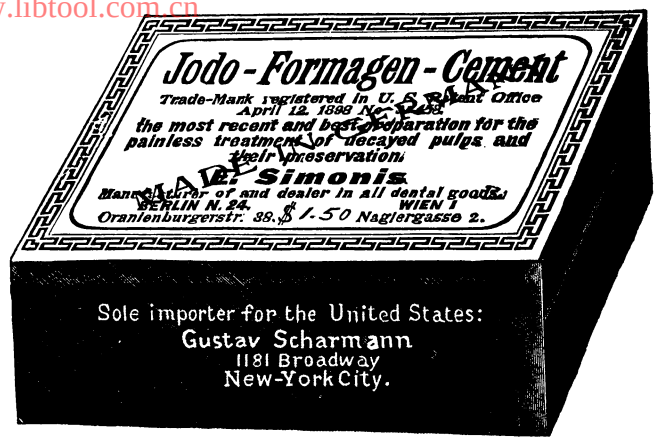
No. 9 S. HALSTED STREET, - CHICAGO, ILL.

...JODO-FORMAGEN CEMENT...

Trade Mark Registered in U. S. Patent Office, April 12, 1898. No. 31458.

DIRECTIONS IN EACH PACKAGE

WRITE FOR PAMPHLET



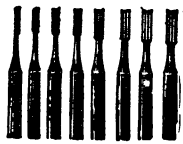
In acute and chronic pulpitides this preparation is astoundingly efficacious. It is in its essential parts a combination of Jodine salts and Formaldehyde on the one part and Eugenol, Carbolic, Lysol on the other, in form of a quickly hardening cement.

NO MORE ARSENIC NO MORE EXTRACTION

PRICES: Regular Package, $1.50; Double Package, $2.50

ENAMEL FISSURE BURS AND CROSS-CUT BURS.

PER DOZEN, - - $2.00



All instruments stamped with this

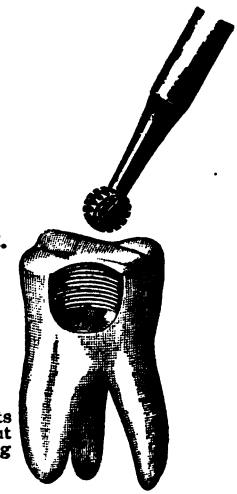
TRADE ← DAZF MARK.

Write for Catalogue.

For Sale by

All Dental Depots and Dealers.

The illustration at the right represents a cavity cut by a Cross-Cut Bur. The cut grooves are of immense value for fixing or holding whatever stoppings are used.



ENAMEL-FISSURE BURS.

CROSS-CUT BURS

GUSTAV SCHARMANN

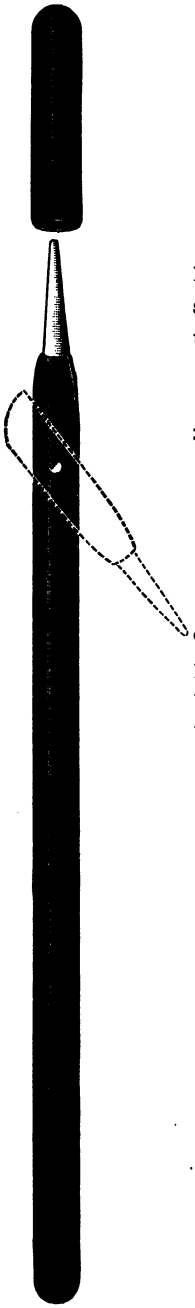
1181-1183 BROADWAY, Corner 28th Street

Baudouine Building

SOLE U. S. AGENT FOR
B. SIMONIS, BERLIN.
A. MEISINGER, DUSSELDORF.

NEW YORK

By mentioning the AMERICAN DENTAL JOURNAL when writing to Advertisers you will confer a favor upon both the Advertiser and the Journal.



Nitrate of Silver Pencils.

Nitrate of silver has many uses in dentistry and has been limited in its use by a lack of means of applying to distal surfaces, etc. This objection is obviated by the use of a pencil that can be placed at any angle necessary. See cut.

USES:

For checking caries in deciduous teeth; for sensitive dentine; should be used on all cervical and gingival margins to prevent recurrence of caries; to remove sensitive condition of tissues due to recession of the gums and for various other uses, in which as a remedial agency it is invaluable.

Price.....75c
Extra Nitrate of Silver Points, each.....10c

THE A. PETROF CO.

85 Fifth Avenue, CHICAGO

THOMAS J. DEE & CO'S.

Gold Plate and Gold Solders.

IN THE EYE OF THE PUBLIC

THE easy working gold plate and **Improved Gold Solders,** made by us for dental purposes, have so simplified the making of gold crowns and bridgework that it is easy for the dentists to turn out good work now, when heretofore it was difficult for an expert to do it. There are several features about the working qualities of our Solders which place them way ahead of any other solders on the market today:

1.—They never ball up or oxidize under the blow pipe.

2.—They flow like water—leaving a bright, smooth surface when melted, no humps or rough places to grind away—work can be finished with a sand paper disc, easily, thereby saving time, labor, and waste of gold.

3.—In point of quality, in point of price, in assurance of satisfaction, we lead our numerous competitors.

PRICE LIST:

14 Kt. Solder	$0.65	Dwt.
16 "	.75	"
18 "	.85	"
20 "	.95	"
22 "	1.00	"
18 Kt. Gold Plate	.85	"
20 " "	.95	"
22 " "	1.05	"
24 " "	1.10	"

5% discount on 22 Kt. gold plate and solders in one ounce lots.

Orders reach us by one mail,
Goods reach you by next mail.

Thomas J. Dee & Co.

Gold and Silver Refiners.

67-69 Washington St. - Chicago

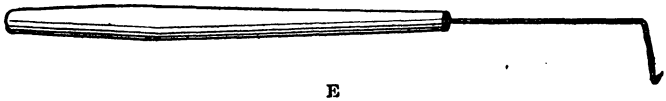
Set of Inlay Instruments

This set of instruments is designed by Dr. F. E. Roach, for burnishing the matrix for porcelain inlays. With this set you can reach all margins. The engine burnishers are especially effective in removing wrinkles and securing exact adaptation of the matrix to the margins of the cavities.

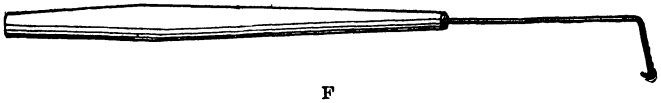
The matrix hooks are designed for removing the matrix from the cavity without change of form, and must be used to be appreciated.

Made for No. 7, and right angle, three sizes in each,

D



E



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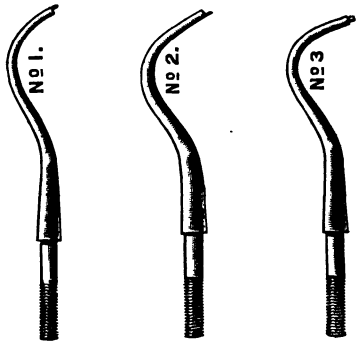


PRICES.

C. S. burnishers, each	50c
Octagon ebony handles for same, each	25c
Engine burnishers, each	15c
Matrix hooks, each	20c

Complete outfit, consisting of three hand burnishers, six engine burnishers (three right angle), three matrix hooks and three ebony handles, $3.00.

Frink & Young

607-8-9 Masonic Temple CHICAGO

TWENTIETH CENTURY TEETH

WE are the Western Agents. The demand is remarkable. The quality and durability of these teeth is now undisputed. They are twice as strong as some makes and at least twenty per cent stronger than the best competitive article. These figures we are prepared to verify at any moment.

WE ask your attention to the recent reduction in the price of TWENTIETH CENTURY TEETH for cash. Please notice the cash discount. We carry a very large stock and all orders will have prompt and careful attention.

PRICE LIST OF "TWENTIETH CENTURY TEETH" JULY 1.

Plain and Rubber Gum.

Per Set of 14	$ 1 00
Partial Sets, per tooth	08
11 Sets	10 00
28 Sets	25 00
58 Sets	50 00
116 Sets	100 00

Twentieth Century Crowns

Per Crown	$ 40
100 Crowns	35 00

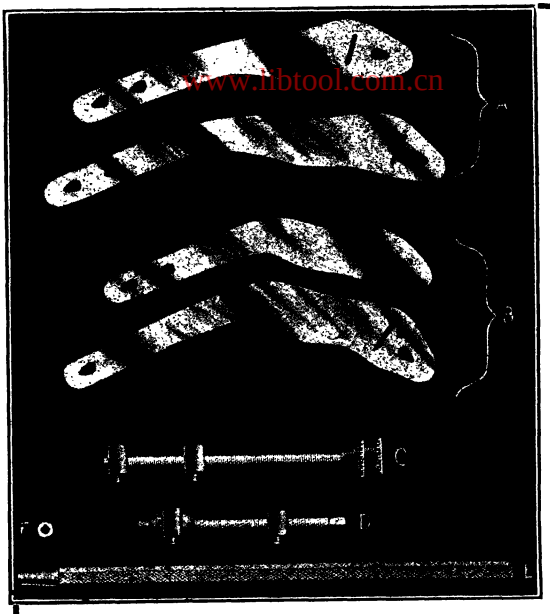
Flat Back Long-Pin Plate Teeth

Per Tooth	$ 10
110 Teeth	10 00
295 Teeth	25 00
625 Teeth	50 00
1335 Teeth	100 00

Cash Discounts

3 per cent	on bills of $ 5 00 to $ 25 00
5 per cent	on bills of 25 00 to 100 00
10 per cent	on bills of 100 00 up

FOR SALE EVERYWHERE



The Lodge Band Matrix

Patented May 11, 1897.

Thousands already in use.....

In this instrument are embodied the elements which constitute an ideal instrument. It is almost universal in its application. It fits the teeth at the gingival margins, thereby preserving the interdental space, and by the natural contour afforded, insuring a good knuckling with the reverse tooth.

Difficult cavities are made simple and from one-half to one-third the time of filling is saved by the use of this instrument.

Complete in neat case with eight assorted bands for bicuspids and molars and screw appliances as seen in cut.

For Sale by

E. B. LODGE

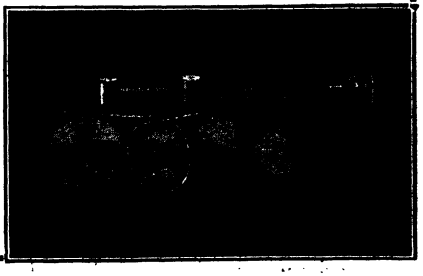
432 Rose Bldg. **Cleveland, Ohio**

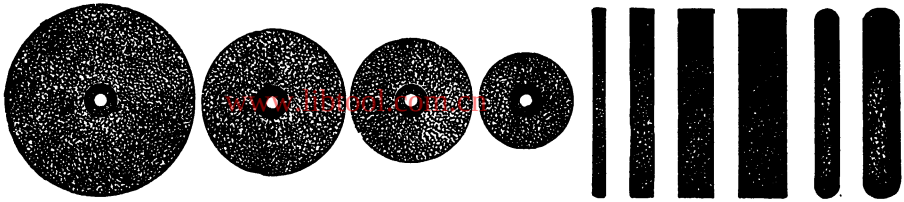
Price per set.....$3 00
Additional bands, per dozen..... 1 00

Sent to any address on receipt of price. Postage paid.

Materials for bands are the finest selected German silver, well polished and nickeled on both sides.

The screws and wrench are of steel, also well nickeled.



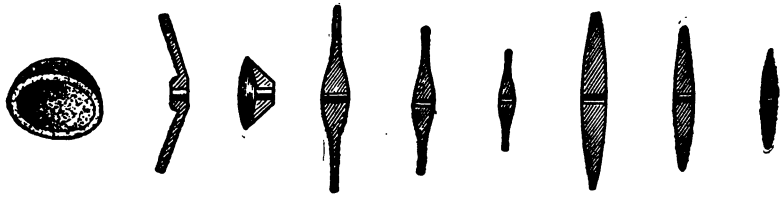


MILLER'S
Carborundum Wheels
...CUT QUICK...

Time is money. They save lots of it. Nothing in their composition is gummy or sticky. They do not glaze or fill in. Made of the sharpest abrasive known. Cutting material throughout. They MUST cut.

ASK YOUR DEALER

for Stumps, Discs, Points, Plain Points, Lathe Wheels, Plate Trimmers, Hones, etc., etc.



MADE BY

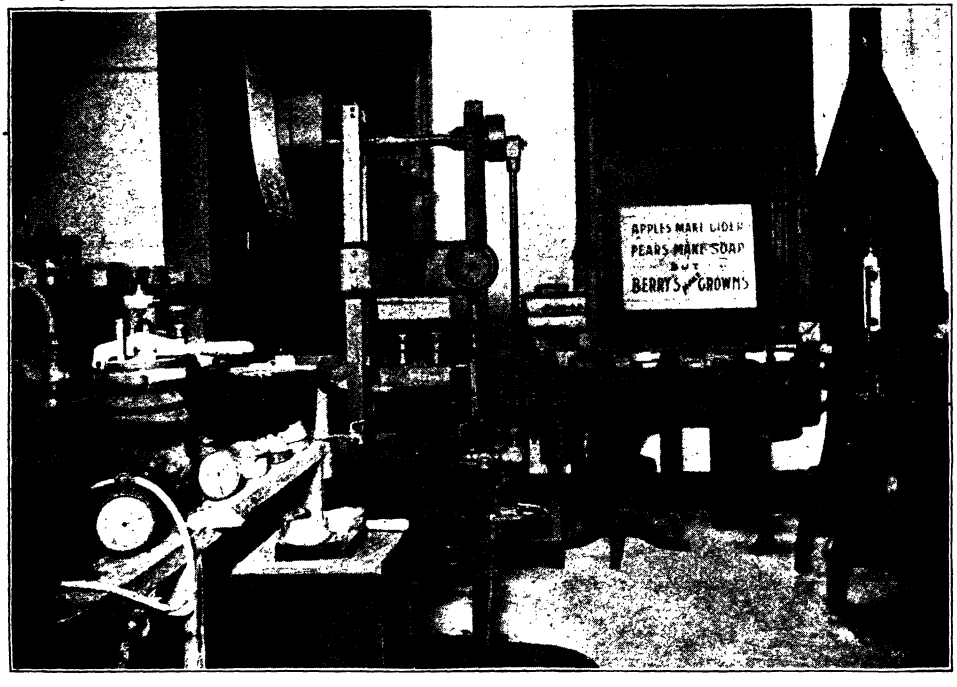
Chicago Wheel and Manufacturing Co.

Dept. D, 38-46 W. Randolph St.

CHICAGO, U. S. A.

By mentioning the AMERICAN DENTAL JOURNAL when writing to Advertisers you will confer a favor upon both the Advertiser and the Journal.

A corner of our Laboratory, showing the 25 ton press used in swaging all metal plates and in making the Berry Improved Seamless Tooth Crowns.



FREE!

Over 4,000 crowns given away since the first of February, 1903. Have you received one? If not, why not?

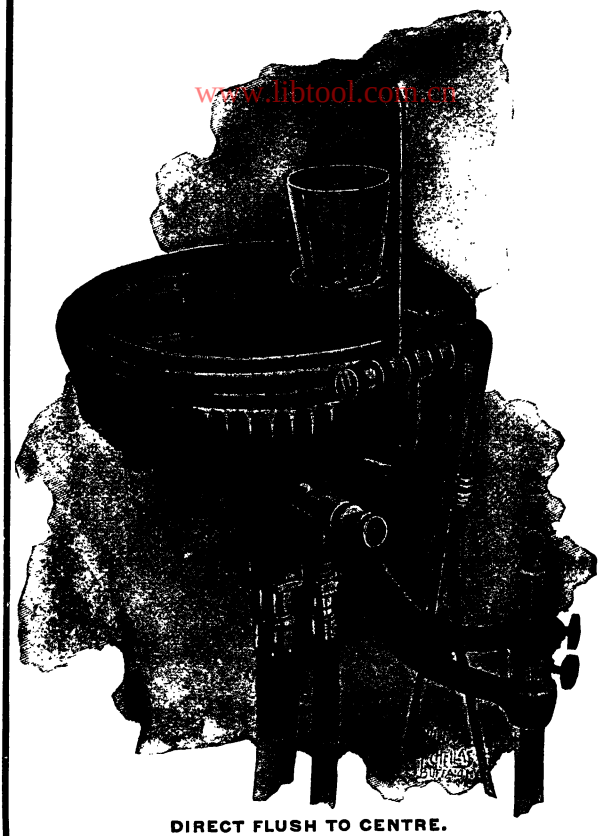
Send in a two-cent stamp for postage and we will send you, free of cost, a beautiful seamless crown for an office sample. These crowns are hand carved, made of thirty gauge copper and gold plated. This liberal offer is made to demonstrate the superiority of our system over any other known to the Dental Profession.

All crowns and plates are swaged under a hydraulic pressure of 14 tons.

The Berry System of Improved Seamless Tooth Crowns and Bridges is controlled exclusively by this Company, and has never been placed on the market by any one, either as a whole or in part.

BERRY IMPROVED SEAMLESS TOOTH CROWN CO. Inc.

35-37 Randolph Street, Chicago, Ill.



DIRECT FLUSH TO CENTRE.

The IDEAL FOUNTAIN Spittoon

In presenting this spittoon to the profession, attention is called to a few of its many good qualities. In the following points, it is believed to be superior to any of the fountain spittoons in the market.

1 Because it is simplicity itself
2 Because its operation is not hindered, if it is set out of level
3 Because it will operate with less water than any other fountain spittoon
4 Because it is not necessary to take it apart to clean it
5 Because it is absolutely noiseless

PRICES AND TERMS

Ideal Fountain Spitton, with Porcelain or Glass Bowl, complete, any chair - -	$40.00
Foot Stand, Gould or Crown Chair attachment (extra) - - - - -	5.00

Boxed F. O. B. Buffalo. Terms, $15.00 down, $5.00 per month. Discount for cash.

SEND FOR DESCRIPTIVE CIRCULAR

THE WEBSTER DENTAL CO.

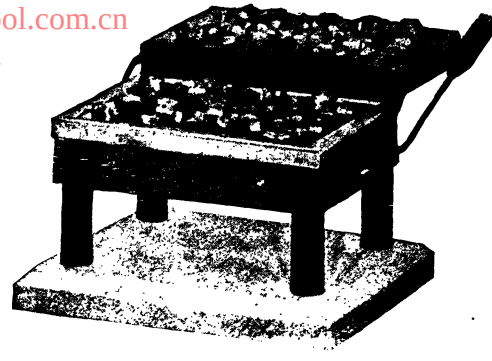
SOLE AGENTS

566 Main Street **BUFFALO, N. Y.**

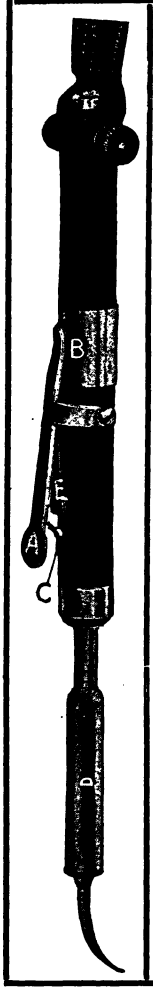
FOR SALE BY FRINK & YOUNG AND OTHER DEALERS

GARHART ANNEALER

OVER 1,200 SOLD



Note the great convenience of the PARALLEL MOVING Cover, serving as a TABLE for holding a RESERVE STOCK of gold, ready for annealing. The cover when in open position will keep your gutta percha in a plastic condition. THE SMALL HANDLE at the side of annealer will OPEN and CLOSE the cover WITHOUT BURNING YOUR FINGERS. It is fitted with an easily REMOVABLE AND INTERCHANGEABLE HEATING COIL. IN CASE OF ACCIDENT IT CAN BE REPAIRED WITHIN A MINUTE'S TIME. POSITIVELY WILL NOT MAR OR SCORCH your office furniture. It is permanently mounted on a heavy glazed porcelain plate, and furnished with a PLAIN OR CORRUGATED heating surface. For either alternating or direct current, voltages of 50 to 120. Cord and attachment plug furnished with each outfit. For sale by depots, **Price $8.00.**



GARHART HOT-AIR SYRINGE

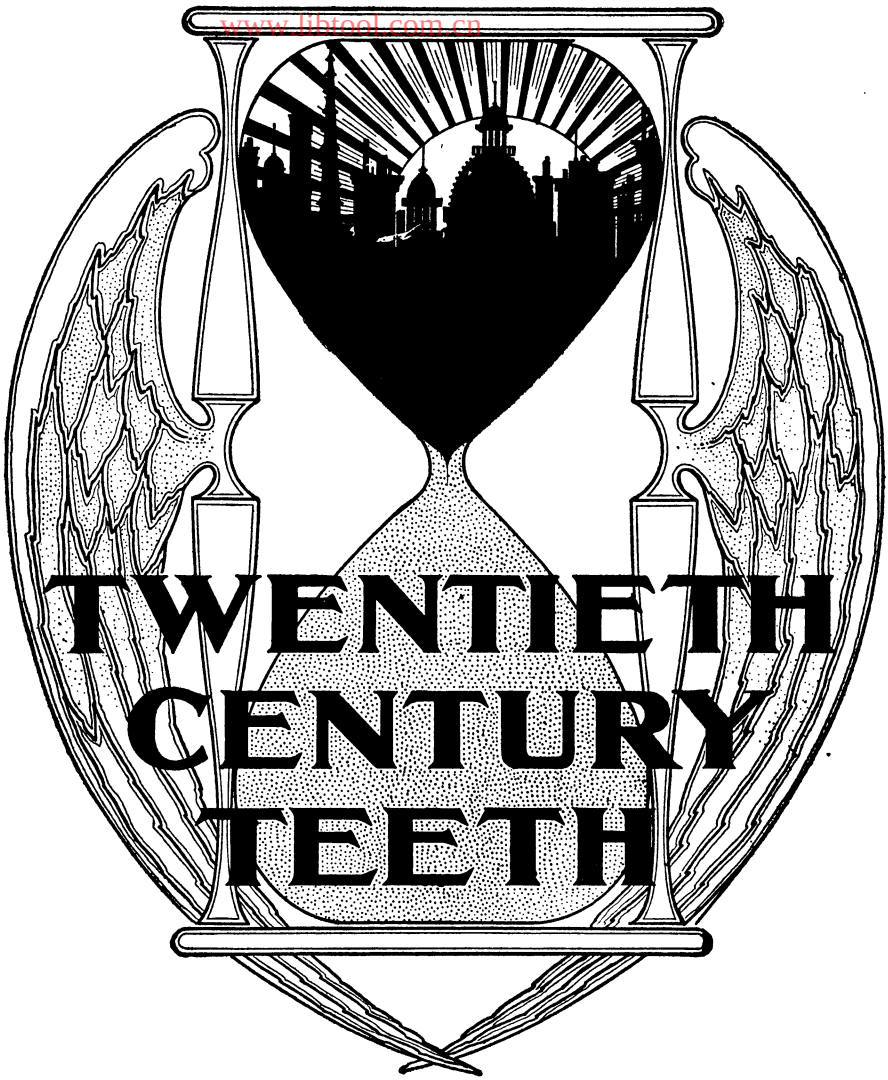
SEE THAT LEVER! By pressing it with the forefinger or thumb, it will instantly deliver a constant stream of hot or cold air. When the pressure on the lever is released, it automatically shuts off both compressed air and electric current supply.

Pressing the lever part way down, cold air is produced; pressing it full down, hot air is produced. It is the only automatic syringe that has ever been invented. It is the smallest hot-air syringe on the market at the present time. Only ½-inch in diameter and 8-inches in total length. It positively CANNOT BURN OUT. Very ECONOMICAL in the consumption of current, only two 16 C. P. lamps are required to operate it. We furnish with each outfit a small, handsomely polished board, wired and fitted with the necessary binding posts and mountings for attaching the two lamps and delivery wires. We also furnish with each syringe complete, seven feet of silk covered tubing and conducting cord. Price complete for alternating or direct current of voltages from 50 to 220, **$15.00.** For Sale by Depots. *Write us for a copy of our booklet.*

GARHART DENTAL MFG. CO.

INDIANAPOLIS, IND.

The Best Porcelain Texture
—— The Strongest Pins



THE MOST NATURAL FORMS AND SHADES

For Sale Everywhere