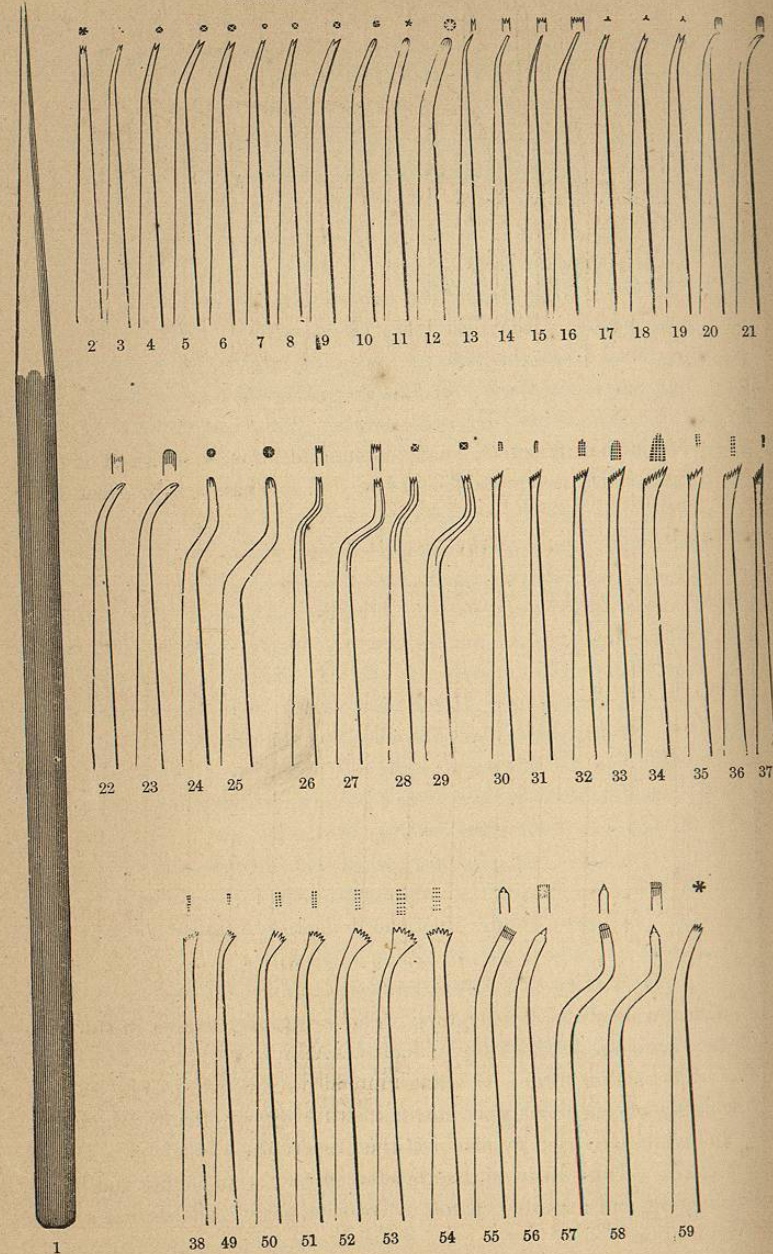
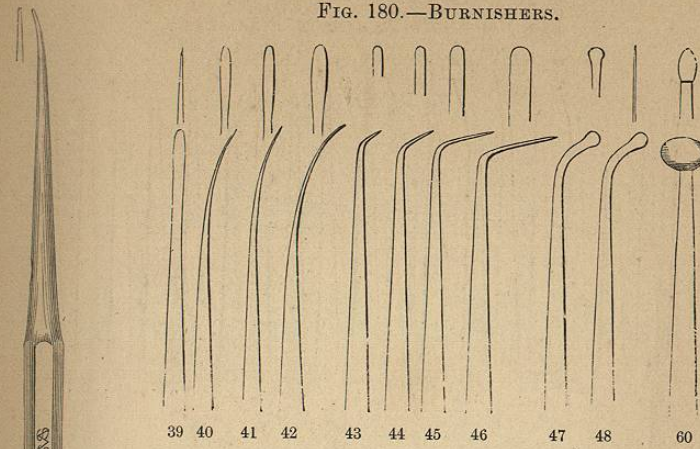


FIG. 179.—THE ATKINSON PLUGGERS.



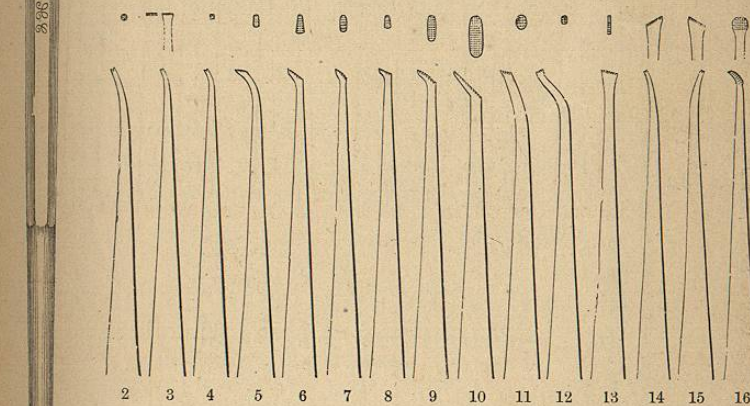
Accompanying the pluggers is a set of burnishers of designs corresponding with requirements. Fig. 180 exhibits these burnishers.

FIG. 180.—BURNISHERS.



A system of pluggers, composed of sixteen pieces, designed by C. R. Butler, M.D., is represented in Fig. 181. These are in great favor

FIG. 181.—THE BUTLER PATTERN.



with a wide circle of operators. The serrations, as seen in the cuts, are very fine.

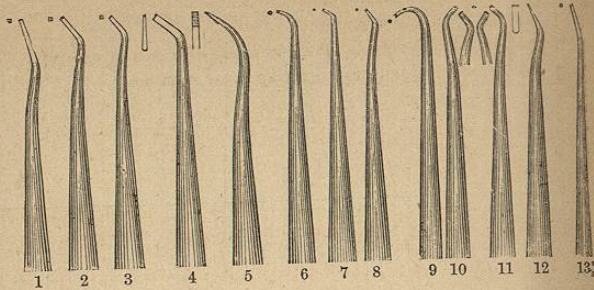
Still another form—"a student's set," as it is called (Fig. 182)—consists of selections and modifications made by Dr. D. D. Smith, and which are used by many of the class in the Philadelphia Dental College. These instruments are alike adapted to malleting and hand-plugging, and for use with soft or cohesive gold. The set has a wide reputation.

Another set, and which is the last that space permits to be shown, is exhibited in Fig. 183. These are known as the Abbott pattern. Like the others, these have many admirers; the forms of the points

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will certainly not soon be surpassed; it seems scarcely possible that an indication could present in shape or situa-

FIG. 182.—THE SMITH PATTERN.



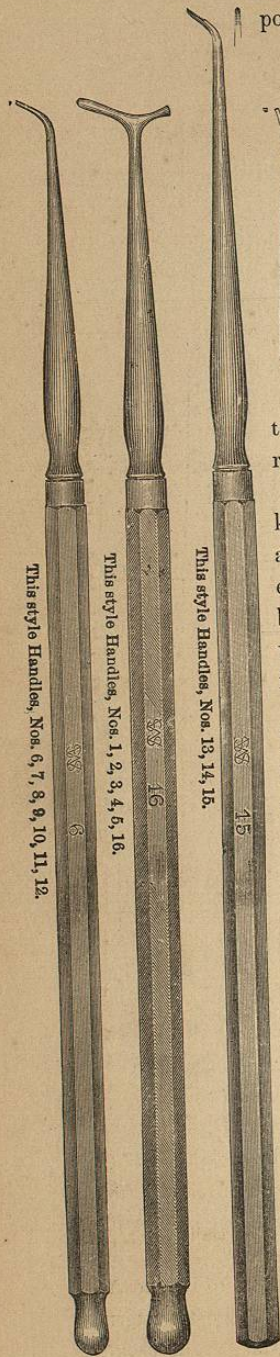
tion of a cavity that some one or other of these would not reach.

Other pluggers, well known and widely used, are sets known as Jack's, Ellis's, Goodwillie's, Forbes's, Darby's, and Head's. It is well, when visiting dental depots, to examine the many pronounced improvements constantly being issued, and to purchase accordingly. Students do well to buy carefully at the beginning; experience proving the most reliable supplier of wants.

A tray of instruments recommended to students of the Philadelphia Dental College, after their graduation, by a late Professor of Operative Dentistry in this institution is made up as follows:

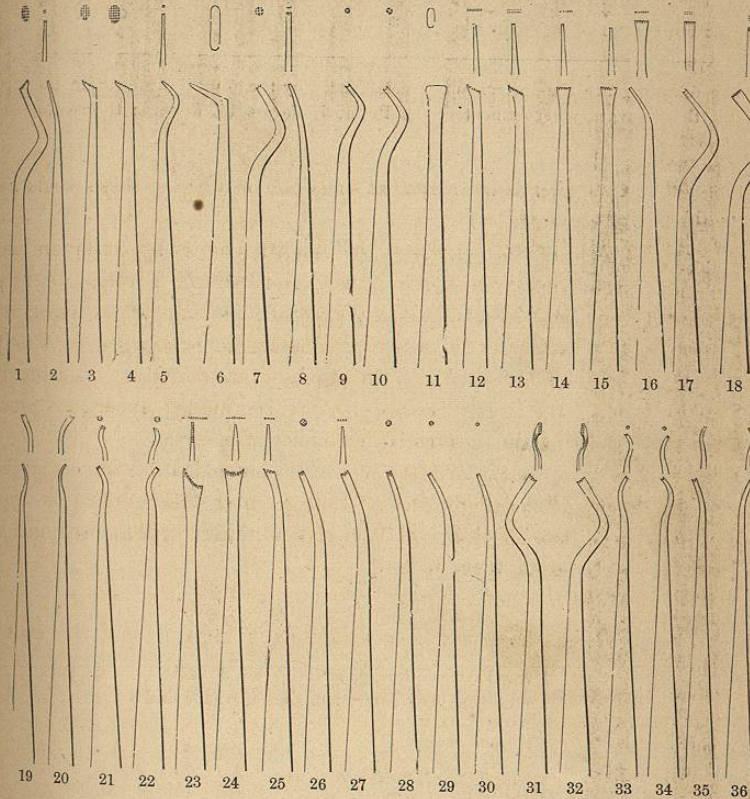
OPERATING CASE OF PHILADELPHIA DENTAL COLLEGE.

- 7 Head's excavators, 4, 7, 12, 17, 18, 20, 21.
- 1 Palmer's nerve instruments, each Nos. 2 and 3.
- 1 " " " No. 5.
- 1 " " " No. 15.
- 4 auger drills, two No. 3, 8, and 6.
- 2 retaining-point drills, Nos. 1 and 2.
- 8 wheel-burs, Nos. 1, 3, 5, 7, 12, 15, 18, 9.
- 7 round burs, Nos. 1, 2, 3, 4, 7, 9, 12.
- 1 cone head, odd No. 6.
- 1 Goodwillie's excavator, No. 32.
- 2 1/2 dozen standard excavator hatchets, Nos. 16, 15, 14, 12, 10, 9, 50, 49, 47, 99, 81, 82, 85, 86.
- 2 1/2 dozen standard excavator hoes, Nos. 27, 28, 91, 75, 78, 79, 80, 57, 58, 59, 60.
- 2 1/2 dozen standard excavator scoops, Nos. 65, 66, 67, 68.
- 7 1/4 inch f. c. pluggers N. Y., Nos. 127, 128, 101, 1, 4, 9, 99.
- 3 dozen S. S. W.'s small scalers, Nos. 1 and 8.
- 5 1/4 inch f. c. burnishers, S. S. W.'s, 8, 6, 2; Darby's, 31 and 32.



- 4 1/4 inch f. c. pluggers: Ellis's, 10, 11, 12, and Darby's, No. 3.
- 1 universal porte polisher.
- 1 box corundum points.
- 1 long handle wood magnifying mouth-mirror.
- 1 Cogswell rubber dam holder.
- 1 1/4 inch f. c. rubber dam punch.
- 1 glass syringe, silver-plated mountings, with one curved pipe.
- 1 1/4 inch f. c. plugger, bayonet-shaped, no number.

FIG. 183.—THE ABBOTT PATTERN.



- 2 1/4 inch f. c. scalers, R. L. Stellwagen's pattern.
- 1 3/8 inch bayonet-shape condenser.
- 1 octagon handle plain steel small scaler, No. 5.
- 1 set of six Jack's chisels, single-bladed, heavy handle.
- 1 lead mallet in gas-pipe, nickel-plated.
- 1/2 dozen five-sided drills, three faced.
- 1 set of ten mallet-pluggers. Nos. 1, 3, 4, 5, 6, 7, 8, 9, of the set of mallet-pluggers for sponge gold, No. 2 of Ellis's pluggers, and Atkinson's No. 32.
- 1/2 dozen Froid's separating files, Nos. 00 and 8, cut three sides.
- 8 Murphy's files, Nos. 12, 20, 14, 33, 40, 41, 42, 19.
- 3 " " Nos. 54, 99, 100.
- 2 " " Nos. 81, R. and L.

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- 2 Scotch stones.
- 1 box each pumice and polishing putty.
- ¼ dozen square handle probes, one foil-carrier and plugger combined.
- 1 abscess lancet.
- 1 student's large morocco case.
- 3 trays and instruments fitted.

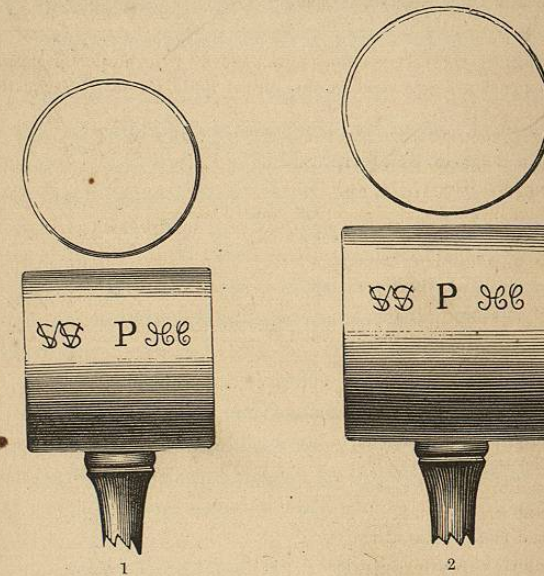
A set of instruments as designated above is to be recognized as full and complete for the purposes of filling teeth; they are to be purchased at once, or what is even better, the catalogue is to be accepted as a guide for the gradual collection of a desirable case.\*

\*The following are the instruments recommended by the clinical professor to students entering the dispensary department of the Philadelphia Dental College; the cost of the whole is \$27.31.

- 4 New York pluggers, Nos. 22, 23, 37, 50.
- 2 ¼ inch file-cut pluggers, Nos. 9 and 28.
- 3 Smith's pluggers, Nos. 14, 15, and 16.
- 4 Flagg's filling instruments, Nos. 1, 5, 7, and 12.
- 1 double-end amalgam plugger (nickel-plated).
- 1 octagon-handle wheel bur, No. 5.
- 1 " round " No. 7.
- 1 " cone " No. 8.
- 1 " inverted cone bur, No. 2.
- 1 " retaining-point drill (round).
- 8 " excavators, Nos. 5, 6, 7, 9, 28, 74, 141, 142.
- 1 " Head's excavator, No. 11.
- 2 plug-finishing burs, Nos. 2 and 7.
- 1 D. D. Smith's approximal trimmer, No. 1 (blue).
- 2 Chappell's scalers, Nos. 1 and 3.
- 1 Abbott's small scaler, No. 2.
- 2 ¼ inch file-cut chisels, Nos. 2 and 8.
- 2 Arrington's nerve instruments, Nos. 2 and 13.
- 3 Palmer's nerve instruments, Nos. 1, 15, and 20.
- 1 rubber syringe (with silver pipe).
- 1 chip syringe.
- 1 steel mallet.
- 1 wedge cutter (nickel-plated).
- 1 rubber dam holder (with buffalo guard).
- 1 Arkansas stone.
- 1 ebony-handle mouth-mirror.
- 1 ebony-handle gum lancet, No. 1.
- 1 pair college pliers.
- 1 pair foil scissors.
- 1 dozen nerve broaches (assorted).
- 1 bundle orange-wood.
- 1 ounce spunk.
- ½ quire Japanese bibulous paper.
- 1 skein gilling twine.
- 1 dozen emery strips.
- ½ dozen separating files.
- 1 mortar and pestle.
- 1 bottle sandarac varnish (with brush).
- 1 " nerve paste.

Fillings of cohesive gold are made either by hand-pressure or by the use of a mallet. Where the latter means is employed, experience certainly demonstrates the necessity for shallower serrations in the instruments. Mallet filling consists simply in condensing the gold by repeated taps from a hammer made of wood, lead, tin, or steel, applied to the head of the plugger. To employ a hand mallet, an assistant is commonly deemed necessary, although not by any means an indispensable adjunct, the operator being quite able to

FIG. 184.—PLUGGING MALLETS.



manipulate both plugger and mallet. Fig. 184 represents the size of mallets ordinarily used. No. 1 is made of metal,—lead, preferably; No. 2 is made of lignum-vitæ.

Provided with some selection of the serrated pluggers, the operation of fixing and packing cohesive gold, whether foil or crystal, may very well be practised to its appreciation by employing the perfectly clean surface of a metal dollar, either silver or gold being used.

First, that a hold be secured, the operator washes the coin thoroughly with sulphuric ether, and follows this by making a series of deep cross-scratches over a portion of the surface selected for the attachment of the foil. Taking up now with the serrated point a pellet of gold which has been prepared, it is laid upon the scratches, and by a very few manipulative touches is solidly attached to the coin. The building up of a cone to any desired height is simply a repetition of these attachments. Appreciating through such practice the principle upon which a plug of cohesive gold is to be constructed, the

experience is to be quickly enlarged by passing to the filling of simple crown cavities in teeth.

To fill a simple crown cavity with cohesive gold, the operator (after adoption of such means as insures to the end of the operation against the inroad of saliva) takes up a piece of metal of such size as being packed solidly in the bottom of the cavity shall give it fixedness; upon this first, piece after piece is to be attached, precisely as in the case of the coin. If the mallet be used, each second or third layer is to be condensed by its aid, although it is a habit with many operators to mallet every pellet,—a plan only permissible where the shallowest serrations are used, such frequent blows, where the instruments are at all deeply cut, quickly destroying the integrity of the plug.

Another mode of fixing the first piece of gold in such a cavity is to make at some convenient spot what is called a retaining-point: this is simply a slight undercut or slot: the first piece being worked into this slot, the remainder of the filling is attached to it.

A much more convenient, and certainly more expeditious, way of filling such a cavity is found in wedging into it the gold prepared as cylinders, mats, or the cut twist. When no more can possibly be thus introduced, the metal is to be hand-packed or malleted into solidity, foil, worked after the cohesive manner, being attached wherever a place invites addition, thus building up the required face.

As another study in the use of cohesive foil, reference may be had to the cavities seen upon the grinding faces of molar teeth, Fig. 134, running over into the lateral surface. With the cavity prepared as described, the operator commences by fixing in either extremity a pellet of gold. This being solidly malleted into place, pellet after pellet is attached upon it, until the irregular, sulcus-like place is filled.

We pass now to the approximal cavities—exhibited in the same figure—in the anterior teeth. Taking, as an example, the incisor tooth: the operation is commenced with a pellet of gold carefully and delicately worked into an undercut, the remainder of the plug, as before directed, is attached to this. A plan, however, which is exceedingly easy and convenient as to execution consists in first laying a mat, precisely as suggested in the use of uncohesive foil, against the neck-wall of the cavity; this is to be of such size that when consolidated into place its relation with the boundaries of the cavity makes it self-supporting. Against and into this wall of gold the cohesive pellets are worked with such serrated instruments as are found most conveniently to apply.

A third plan of filling such cavities consists in rolling into balls three suitable-sized twists of cohesive foil. Taking up the first ball, it is carried to the neck-wall and there partially condensed. The second ball is now placed in that part of the cavity which adjoins the cutting edge; the third ball is wedged between the first and the second, and the mass is condensed by the serrated pluggers against the labial wall. Having thus a support of gold immovably

fixed by its relations with the neck and base of the cavity, pellets are taken up, piece by piece, and worked into it until the cavity is full.

Still another plan, practised, after a little experience, with all satisfaction, consists in taking a single ball, prepared as just described, and, after carrying into place against the neck-wall, holding it in position by means of any convenient instrument until it is condensed and a sufficient addition made to render the mass self-supporting.

Yet another plan is found in the employment of the matrix. This, as before suggested, is to be extemporized out of almost anything. A very simple mode consists in casting first a ligature of heavy well-waxed silk about the neck of the tooth. Between the tooth and its neighbor a piece of soft silver is next thrust and wedged into place by a slip of match-wood. Into the cavity thus formed the initial of the plug is placed. A temporary matrix of this nature is also provided, by the introduction between the teeth of a lath-shaped plugger, the initial gold being supported by the instrument until fixed and condensed.

Heavy foils, even those high as No. 120, are used by some operators in filling front teeth, it being claimed for gold so prepared that from being rolled instead of beaten it is rendered softer and more cohesive. Such gold, after being cut into delicate strips, is attached across the surface of the cavity, retaining-points being first prepared and filled.

Cavities in bicuspid teeth, approximal surfaces, are filled according as they may have been excavated. Where the V-cut has thrown the hole into an upward outlook,—that is, has given it more or less the aspect of a common crown cavity,—no special suggestions are required to be added to directions already understood. In the contour fillings, however, each case possesses its own peculiar indications. In preparing a bicuspid tooth for such a contour filling it is to be remembered that the cavity is cut from the grinding face, the tooth being, as it were, scooped out. This necessarily makes an open, free cavity, which requires some special means of support for the first piece of gold introduced. To obtain this support, it is found convenient to take advantage of an undercut, such point of fixedness being secured at any convenient spot about the base of the cavity. A first piece being by this means attached, the remainder of the plug is built upon it, the gold in mass becoming finally self-supporting as the cavity is packed. The use of a matrix is here found most conducive to convenience and success. (Fig. 185.)

A second means of filling such cavities, and one which is found easier of accomplishment by the inexperienced, consists in using a series of blocks or mats. After making a slight retaining undercut around the parietes of the cavity, a first piece is laid against the neck surface and loosely condensed into place. A second and third are next placed against the lateral walls, these also being loosely pressed into the undercuts. A fourth, fifth, and sixth, as

FIG. 185.



Cavity cut from grinding surface.

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required, are now wedged into the centre, each wedge, as will be seen, tending more and more to consolidate and fix the first layers. Securing thus fixedness for the gold, the whole is to be carefully hand-worked or malleted solidly against the bottom; the upper part of the cavity (exposed by the condensation) is filled by working cohesive pellets into the anchored portion of the plug, precisely as in the case first described.

In filling lower teeth, it is common for an operator to be behind his patient, standing at such elevation as shall enable him to lean over the head or shoulder. Such a position is found to add immensely to convenience in manipulating. Another posture, practised and preferred by many, is to stand at the side, precisely as in operating upon the upper teeth,—a position that is found to answer a very good end where cavities to be operated upon occupy buccal face of the teeth, but which certainly cannot be compared for convenience to the first position for crown or approximal cavities. In manipulating upon a cavity in any part of the mouth, advantage is of course taken of the various movements permitted by an operating-chair or a head-rest.

Building up with gold the entire lost crown of a tooth is an operation frequently practised by expert workers with cohesive gold. Such operations, however, are too often to be viewed rather as exhibitions of nice smithery than as proper and judicious surgical performances, it being exceptional that the root built upon does not rebel against the treatment pursued. To practise operations of this class, the gold receives its fixedness either by anchorage in the pulp-canal,—the pulp having been removed of course,—or through means of gold screws roughened to attach and hold the metal worked into and about them. A plan that may be adopted with satisfaction is to ream out the root cavity precisely as for the accommodation of the tube of gold so frequently employed for the reception of artificial crowns, as in the process of pivoting. (See *Pivot Teeth*.) Into the canal, so prepared, is inserted a screw, which is to have close relation with it near the apex only. The screw is now built solidly into the canal, furnishing a support for the crown which the operator builds upon and about it.

In the case of molar teeth, the practice has been pursued of drilling several holes into the circumference of the surface to be built upon, making these act the part of slots for the fixing of bases of gold, or for the introduction of supports. Little gold retaining-screws known as Mack's answer here an admirable end.

**Contour filling.**—By contour filling is meant the building up of a carious or broken tooth into its original form after a general manner as just described. To do extensive contouring, gold being used, requires much endurance on the part of both tooth and operator. The practice, to be satisfactory, is to be measured by great good judgment. To do substantial contour work requires the perfection of operative dental skill; its understanding and practice is therefore to be commended to the student from an educational stand-point.

A tooth prepared for contouring is to stand with a cavity perfectly cleansed and of such form that every part is easily accessible by gold and pluggers. The walls are to be regular as possible, neither rounded nor absolutely sharp, while every edge is to be firm and resisting.

The tooth properly secured from moisture, even from that of the breath, an operation of contouring is commenced by anchoring immovably a first piece of gold in a retaining-slot prepared for it. (Fig. 198.) Then piece by piece the plug is built upon this into the required form. The manner of progress and performance, as suggested, is precisely that which one may familiarize himself with by practice on a gold or silver piece of money, and after such manner it is always to be first attempted.

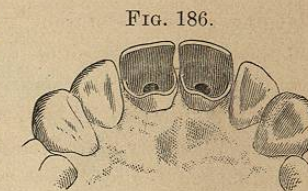
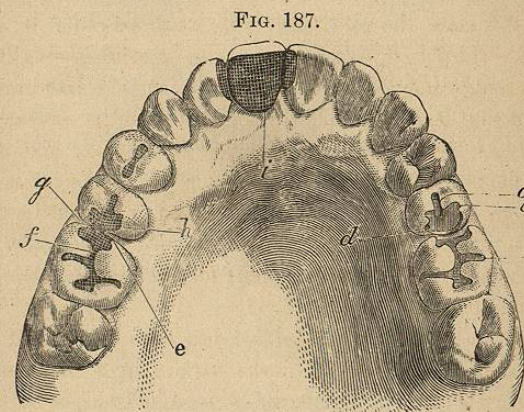


Fig. 186, after the late Dr. Marshall Webb, one of the most skilful of gold-workers, shows central incisor teeth prepared for contouring upon the palatal surface, the back and lateral faces of the organs being almost entirely lost. It is to be observed that absolute distinctness of outline distinguishes every point of the margins.

Fig. 187, also after Dr. Webb, shows, on one side, cavities made ready for contour plugs; on the other, plugs introduced and finished. The incisor

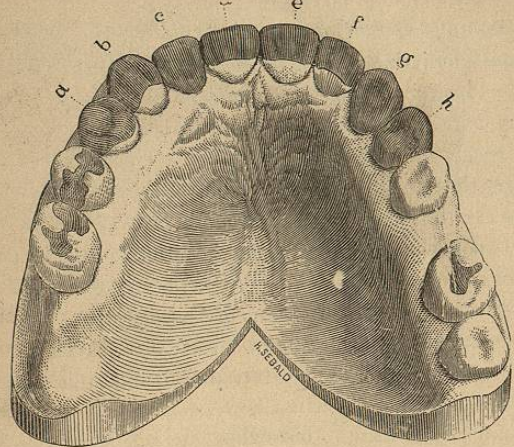


affords an idea of the completion of the operation, as one tooth is concerned, of that for which the cavity is seen prepared in the immediately preceding diagram. In the cut, *c* shows a groove made in the dentine, along each wall of the cavity; *a* and *b* show manner of treating fissures related with a main cavity; *d* shows a retaining-point. Upon the opposite side, *f* exhibits contouring to correspond with the anatomy of the tooth; *g*, the relation of two approximating gold surfaces, the metal being in contact,—a feature of approximal plugging insisted on by Dr. Webb,—shows also the strictly

defined surfaces of enamel as it should relate with gold; defines as well the original contour of the part. This same cut exhibits contouring of an approximal cavity in a lateral incisor. Also, a plug in the grinding face of a bicuspid defined as the metal should show in a perfect operation.

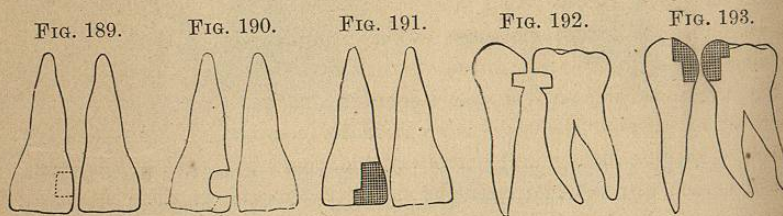
Fig. 188 exhibits a praiseworthy case of contouring done by Dr. Webb; it serves as an example of what is to be accomplished in this direction by skill

FIG. 188.



and patience. *A, b, d, f, g,* and *h* show pulpless teeth; *g*, a whole crown restored with gold; *a, f,* and *h*, almost entire gold crowns; the teeth *b* and *d* support the gold crown faced with porcelain, *c*; and fully one-fourth of the crown of each of these is restored with gold, as is also that of *e*, the pulp of which is living.

Figs. 189 and 190, after Dr. Weld, of New York, show studies where breaks extend on the continuity of the faces of the teeth, which breaks are

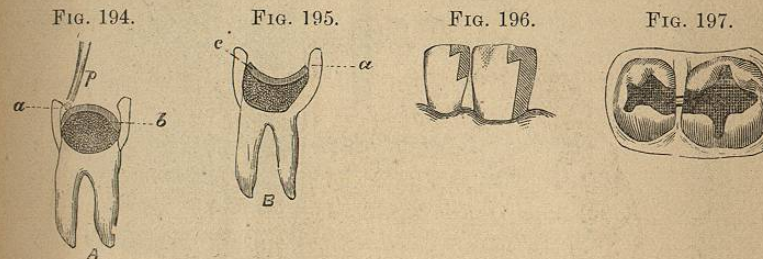


to be assumed, for our purpose, to affect both labial and palatal walls. To properly contour such teeth requires simply that they be cut and built up, as shown in Fig. 191.

Another illustration is furnished in Fig. 192; here the teeth affected are second bicuspid and first molar. Fig. 193 affords idea of the requirements.

A case commanding much skill is shown by Fig. 196. This exhibits front teeth decayed largely about their mesial faces. The procedure, securing result shown, lies in obtaining proper retaining-points, keeping the organ, while under operation, free from moisture, and, precisely as accomplished on the metal piece, building layer to layer until the lost parts are restored. Rubber-damming is an essential.

Figs. 194, 195 show contour work in progress. First, attention finds itself directed to shape of the cavity. Second, it is observed that in one the gold



(*b*) is being built of convex form; in the other the manner is concave. To the former mode is given the preference. The instrument with which the work is being done is *p*; the line of impaction is *a*.

Fig. 197, representing a bicuspid and molar, shows cavities which, to allow of the ends of contour work, are to have the grinding faces cut away until vertical walls exist. Teeth like these, being excavated as shown, and free from caries, are wisely filled with oxychloride, and when this has set secondary planes are prepared in the added material, the margins corresponding exactly with the enamel line. Such procedure affords a strength which it must be seen would be lost in cutting away the healthy operculum: the suggesting of an oxychloride lining implies, of course, that it be the case that the cavities are larger within than is measured by the margins; the zinc extends to the vertical plane.

Fig. 198 shows side view of an incisor crown almost destroyed by caries. The tooth is prepared for contouring,—nothing having been cut away that could be saved. Retaining-points, as seen, are slotted out in the dentine. In each of these slots is a twist of gold, the initial end of which is assumed to be firmly anchored. Upon these anchorages the original form of the tooth is to be restored.

Contouring is done by hand or by mallet, preferably by the latter, as through such instrumental means the work is accomplished more easily and decidedly more firmly.

Automatic mallets used in contouring are of three general forms: 1. Hand



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