CHAPTER XXI.

OPERATIVE DENTISTRY.

EXCAVATION, OR PREPARATION, OF CAVITY FOR FILLING.

HAVING considered the kinds of instruments used in the process of preparing a cavity for its plug, or filling, we pass to the subject itself.

First we treat of simple cavities,—*i.e.* holes more or less round, situated in the grinding faces of molar teeth. Fig. 128 shows such cavities.

Caries, as seen in the cut, varies as to the extent and character of the hole. In teeth of solid structure the orifice commonly represents the extent of circumferential involvement. On the contrary, where tooth structure is loose and disposed to degeneration, a small orifice is not infrequently found leading to extensive underlying disorganization. To prepare such cavities for filling, an operator may use either excavator or drill; the most simple means, certainly the most expeditious, is found in the drill. Selecting a size suited to the opening, the operation consists simply in reaming out the hole, the single precaution being observed of having the common diameter of the cavity as large as the outlet; to have it a trifle larger is even better, as thus a filling is retained with greatest security.

FIG. 128.

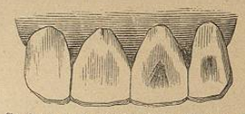
Simple cavities on grinding face of molars.

In cases where, after breaking through the entrance, a large cavity is seen to exist, drill after drill of increasing sizes is to be employed, thus making it correspond with the cavity being made within. Or, in such cases as present a resisting enamel, the orifice is to be most conveniently enlarged through the use of a chisel. Selecting such chisel of suitable size, the operator, little by little, chips away the operculum until the circumference of the diseased dentine is exposed; this accomplished, it remains only to refer to the drill or the excavator. In using a rose drill precaution is taken to avoid evolvement of discomforting heat ensuing from rapidity of rotation, which is done by careful drilling, or otherwise through the frequent dipping of the instrument in cold water, or still else by the use of a drop tube.

Fig. 129 represents cavities of a kind frequently found on the posterior face of incisor teeth. Such cavities correspond closely in their mode of preparation with those just described. A peculiarity occasionally observed

exists in the tendency of a delicate line of disease to start from the bottom of the common cavity, making its way directly toward the pulp-chamber. Where such line is found, it is neither necessary nor desirable to associate it with the first cavity otherwise than by a reaming correspondent with its own diameter: should it be found to increase greatly in sensibility as it approaches the pulp, experience has demonstrated that it is the best plan to allow a portion of the diseased dentine to remain; harm is not apt to ensue from its presence if it be disinfected and put in a state of neutrality. Rose drills are commonly used, to the exclusion of other instruments, in the preparation of these cavities, although the occasional convenience of the excavator is not to be denied. Great care is to be exercised in these cases, as, indeed, in all others, to have the orifice of the cavity sharply defined in its circumference; if it is strictly round so much the better, as thus the material used in filling can be made the more easily to associate harmoniously with it, such union being an absolute essential to the integrity of a plug.

FIG. 129.



Cavities on posterior face of incisors.

FIG. 130.

Cavities at neck—anterior face—of incisors.

FIG. 131.

Cavities found in the midst of imperfect enamel.

FIG. 132.

Cavities on buccal face of molars.

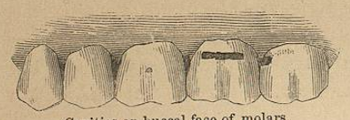
Fig. 130 represents what is to be described as the third class of cavities; these being very frequently met with in the position shown in the cut. A more common location, however, is on the buccal face of the molar teeth in a sulcus about midway of the face. (Fig. 132.)

When a cavity is situated as seen in the drawing (Fig. 130), part of it being overlaid by the gum, it is found most convenient to remove a portion of the carious dentine by the use of an excavator, and to stuff the hole thus secured with a cotton filling, which cotton is to be allowed to project to some little extent; this filling, as it absorbs moisture and swells, naturally throws the gum from off the roof of the cavity, thus allowing the completion of the excavation as described in previous cases. The cotton is to remain in a cavity over-night.

Fig. 131 represents a condition of imperfect enamel, in which frequently is found a number of pits: if examination, made with a sharp excavator, show the bottom of such pits to be enamel-covered, they need not be filled; if, however, the point of the instrument is found to stick, or wedge, then it is best to ream out with a spear or rose drill and plug: not to treat such cavities is to allow caries to destroy the teeth. Unless of themselves running into each

other, these cavities are not to be associated; situated on the buccal faces of the molars, such holes are to be reamed out with the rose drill. A complication frequently found to exist is where, starting from such a point, it may be in an abrasion near the neck of the tooth, the disease extends laterally, scooping out, as it were, a cavity (Fig. 133): here the excavator is found most convenient, while the employment of the chisel to uncover the caries is most likely made necessary. In excavating cavities of this aspect, it is common to make a slight undercut immediately beneath the enamel, this being necessary for the support of the filling.

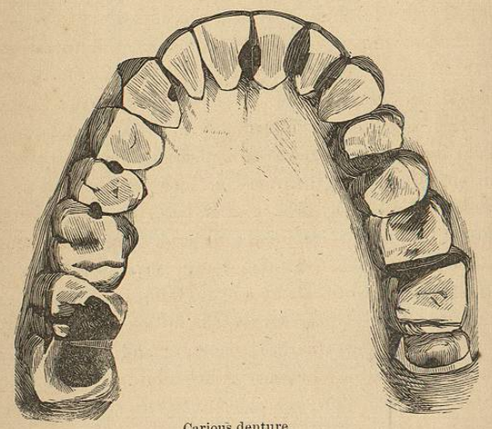
FIG. 133.



Cavities on buccal face of molars.

From cavities situated as described, we pass to the consideration of others so related as to demand for their exposure not only the exercise of considerable ingenuity, but also such clinical data as shall show what extent of chiseling, filing, or pressure is permissible; not alone as the endurance of the teeth is concerned, but as reference is had to appearance and where possible, to self-cleansing surfaces.

FIG. 134.



Carious denture.

The denture seen in Fig. 134 is a type of many. On the left hand are shown teeth as involved by the caries when a patient presents himself. On the opposite side are represented the same cavities when made ready to receive the fillings. The second and third molars of left side, however, are utilized to exhibit cavities prepared for what are known as contour plugs.

Approximal cavities are to be exposed by V-shaped filing. This is the common rule, yet having exceptions, as hereafter to be explained. A central incisor tooth, decayed upon a surface concealed by its neighbor, the relation of the teeth being as exhibited in the diagram, the operation of exposure is commenced by passing a delicate separating file between the two teeth, a shoulder being left at the neck, which is to prevent the future falling together of the cut faces. Space for the play of the file being thus secured, the first instrument is replaced by a second, this latter being curved in its blade (Fig. 119, Nos. 10 to 14), and having a single cutting surface, which is slightly convex.

Using a convex file, it is plainly seen that it is only necessary to incline the free face against the tooth not to be cut, that an inclined plane looking inward shall be made upon the affected one. When the decay is common to both teeth, double filing is seen to make a V-cut with the base backward. Looking at the central incisor on the right of the diagram, the cavity (shown on the right incisor) is found placed on an inclined plane, all its parietes being exposed and easy to get at. This desirable exposure has been the result of the filing. The tooth, while widely separated from its fellow behind, affording plenty of room for operating, shows in front but the space made by the passage of the delicate straight file. This mode of separating applies to the six anterior teeth.

After making the primary cut, with a separating file, between the teeth from the front, it is a habit with many operators to rely for the back separation principally on the chisel. If handled delicately, there is perhaps little doubt that this instrument is found less disagreeable to patients, and, when used very sharp and of proper curvature, it assuredly will satisfactorily accomplish the work: the file, however, is commonly employed to finish the separation, affording, as it does, a smoother surface than that left by the chisel.

An approximal cavity, without complications, thus exposed (see central, lateral, and cuspid teeth in diagram), nothing remains but to treat it as the simple cavities before described,—that is, cut away the carious dentine, and form the hole of a shape to retain the filling. Such excavating is generally done with hoe and hatchet instruments, the head of the patient being thrown backward. The rose and spear drills, however, at times are found convenient of use, particularly where, the cavity being of a saucer-shape, requires what are called retaining-points.

FIG. 135.

Complications.—The cavities just described are those of such limited size as to have made little alteration in the front or back faces of the teeth. From the consideration of such we pass to a class represented in Fig. 135, where, as seen, the labial face is markedly affected.

In examining these teeth, let the student draw a transverse line midway between the cavities and the gum. From this first line let him drop vertically others which shall just include the carious breaks on the faces of the teeth.

Where the cavities are no more extensive than exhibited in the diagram, it is found that the file, removing all between his lines, will yield no deformity, but afford, on the contrary, a space possessed of healthy look and not unbecoming singularity. As a next step, let the convex-faced file be used, cutting wider the space posteriorly, so as to allow the cavity to be seen only from that surface. He has thus his cavities in the same position and relation as exist in the cases previously described.

A second complication on such order of cavities is where the affected teeth are so related with each other and to the arch, and the holes of so extensive a character, as to make any alteration in the outlook impossible. Cases of this kind are found where caries has extended its ravages over half the anterior face of a tooth, or where a tooth has such position in the arch that what should be the approximal surface is found looking almost directly forward, the tooth being twisted, as it were. Conditions of such expression are commonly treated by excavating in any manner found convenient, the original contour of the tooth being restored by the filling; otherwise such teeth may be filed in front until resisting parietes to the cavities are found, and then treated precisely as in the case of the posterior V. Outlooks having the base of the V presenting forward are of course objectionable, but many teeth so treated—the fillings being of gold and highly finished—are far from unsightly. (See *Contouring.*)

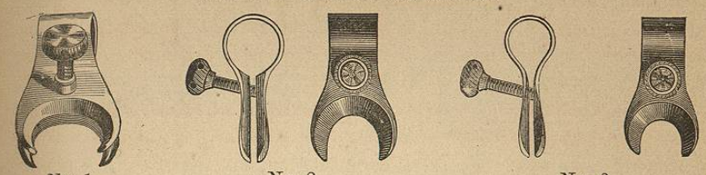
Another class of complications exists in teeth related as in Fig. 136, the central incisors being the organs considered. In cases of this kind it is scarcely probable, by reason of the overriding, that either file, chisel, or disk will be found admissible; it is plainly seen that no expedient will apply to prevent the cut surfaces falling again together. In exposing the cavities in these cases,—if found, as is usual, on the covered surface,—the means employed is that of pressure, either a wedge of some soft wood or a section of tough rubber tubing being employed.* Of the two means, the immediate wedging by wood is found to produce least pain, a wedge of the proper size being driven delicately between the teeth until sufficient room to work at the cavity has been secured. Where the india-rubber is used, it is common to exert the pressure gradually, pieces of increasing size being introduced day after day until the desired separation is obtained. Objection to this latter means of separating teeth lies in a soreness provoked, the subsequent operation of

Fig. 136.

* An instrument lately introduced with a view to disparting is known as "Jarvis's Separator." Two forms are shown by the cuts; of the first there are three sizes, Nos. 1, 2, and 3, No. 1 being the largest. Nos. 4 and 5 show forms of compound signification; these are deemed particularly applicable to the incisor teeth, and are freely used for the assistance rendered by them in the application of the rubber dam. The employment of such instruments is to be commended only to experienced practitioners.

filling being at times rendered so painful as to be nearly if not quite unbearable. In using a wedge of wood, the separating, excavating, and filling

Fig. 137.—Jarvis's Separators.



No. 1. No. 2. No. 3.

No. 4. No. 5.

are to be done at the same sitting. To introduce such a wedge, orange or pine being employed, it is found most convenient to cut it on the end of a stick of some length, nicking deeply at the base of the wedge. It is thus easily thrust by the hand between the teeth, or allows of the convenient application of the required blows from a mallet. When got into place, the wedge is cut or broken off at the nick.

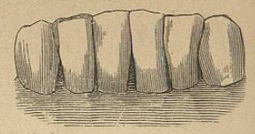
Referring again to the diagram, Fig. 136, another modification is found in the relation of the lateral incisor of the right side to the central. As in the case of the central with its fellow, this is seen also to override, but it differs from the first in possessing an impinging surface, continuing from cutting edge to neck. Teeth so related are to be separated, first, by a wedge introduced at the neck; and, second, space thus secured is to be increased by the file, the cutting, however, to be so directed as to leave at the neck an unfiled portion which shall prevent the parts falling again together after the removal of the wedge. To excavate and fill a cavity in such a situation would seem to be a very difficult matter, and, indeed, will be found so, unless the operator forces for himself sufficient space, and which in all instances is to be effected, wedges of wood or india-rubber and the file or disk being used as found necessary. It is to be accepted as a rule that file or disk is used where after-changes are not to bring cut surfaces in contact.

Still another modification is exhibited in Fig. 138. Here the soft parts are found somewhat receded, the necks of the teeth being exposed. In the approximal surface of each tooth near the gum is a cavity of decay. To get at such a cavity, the space made by nature in the V-spaces seen in the diagram may be all-sufficient. If this should not be the case, then the wedge is employed, being driven midway between the cavity and the cutting

edge. Such cavities being excavated and filled, the teeth are allowed to fall together. It must be seen that the misfortune of fillings so placed lies in

Fig. 138.

Fig. 139.



absence of self-cleansing properties, compelling thus continual care for the preservation of the teeth. To obviate such objection, the use of reamer or chisel has been advocated, scooping out a V-space which is to extend from the neck to the cutting edge ; treating such teeth, indeed, precisely as described with the uncomplicated cases,—a plan undoubtedly to be preferred where no lateral pressure exists to force the cut surfaces together.

In Fig. 139, representing the six inferior anterior teeth, the same condition is exhibited as shown in previous cut. The plan of treatment is, of course, the same.

Other modifications connected with the anterior teeth are not infrequently encountered, but with the general ideas here given the ingenious student will find in his own skill, after a little experience, all the directions required.

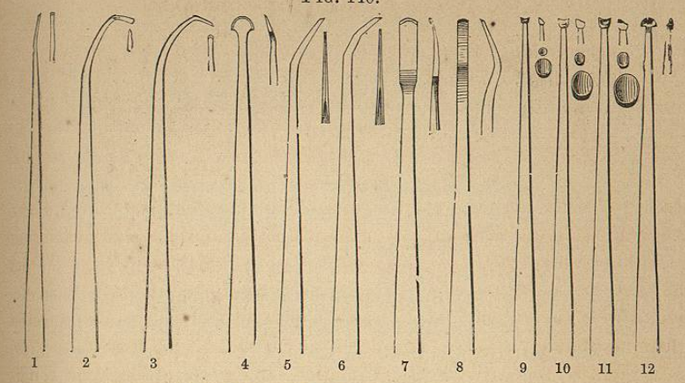
In deciding on a mode of separating teeth, a practitioner finds constant demand for the exercise of judgment. It is to be laid down as a rule that never more than two teeth are to be undergoing the process in the same mouth at the same time. When rubber is used, it is also to be accepted as proper practice that plenty of time be allowed for the operation, from two to five days being the average required ; that when soreness arises no increase in the thickness of the rubber is to be made until the pain has subsided. Further, it is to be accepted that young teeth endure displacement better than old ones ; indeed, it seems to be a common conclusion that separation of the teeth in persons over forty years of age is to be made with safety by means of file or disk alone.

A modification of excavators, exhibited in Fig. 140, will be found invaluable for excavating ; indeed, than the forms 1, 2, 3, 5, and 6 none better are to be bought ; they cannot be too highly commended, being recognized to apply to almost every form and position of cavity.

We pass now to bicuspid teeth. Fig. 134 exhibits approximal decay of these organs involving both of the left side. Teeth presenting lateral cavities extending to the grinding face, as here seen, are invariably found scooped out, the carious part being overhung by unsupported enamel. To fully uncover such cavities, no instrument applies better than the chisel ; the operator simply cuts away the operculum, directing, where possible, the greatest breadth of the cut inward ; such manner of exposure is expressed upon

the opposite side of the diagram, where, as is seen, the cavities are fully opened upon the sides of inclined planes, while the anterior faces of the teeth

Fig. 140.



are not at all disturbed, the cavities being put into a position and aspect in which they may be esteemed as simple and without complication.

Complications in Cavity Relations.—A first complication is to be described as an approximal cavity associated with a second occupying a sulcus on the grinding face of a tooth. Here a plan pursued by many consists in exposing the first cavity, as just directed, and this accomplished, preparing the second precisely as any simple crown hole. If the two be entirely separate, healthy dentine lying between, each is to be treated as a distinct cavity ; if, on the contrary, there be found the slightest association, the two are joined by cutting out the septum which relates them.

A second complication is found in the existence of that extent of decay which has so weakened the front or back wall of a tooth as to make the removal of the wall necessary. Such condition is unfortunate, as it renders the operation of filling more difficult,—except, indeed, to the experienced, who are able to adopt the plan of making a contour filling,—that is, building up with metal the part lost. To prepare such a tooth for its plug, the operator finds himself compelled to cut wherever the disease leads. This he does, using the chisel,—chipping away the weak parts little by little, desisting only when evidences of disease are passed. Commonly, teeth so decayed are found with pulps exposed ; if this prove not the case in any particular instance, the question of how the required filling is to be retained becomes of all consideration in the cutting of the cavity, the answer mostly existing in the formation of retaining points. Retaining points are slots cut out of the dentine, acting as places of anchorage ; fillings in such teeth being made—when gold is used—of that form of the metal known as cohesive ; it being understood that gold so prepared can, with all facility, be attached piece to piece until any desired form is built up. (See *Cohesive Gold.*)

Another complication, met with occasionally, consists in cavities meeting in the middle from either approximal surface. Such cavities are treated by cutting away the overlying grinding surface, thus making a common hole, which hole occupies, perhaps, the whole body of the tooth. Thus exposed, this common cavity is excavated and cleansed precisely as though it were, what indeed it has been made, a deep crown decay. (See *Matrices.*) Such a cavity necessitates contour work.

The most common form of decay found in bicuspid teeth, the approximal excepted, is that situated in the sulcus between cusps. Where this is simple, it is prepared for filling by reaming it out at either extremity with a delicate spear drill, and connecting the two drill-holes by the employment of excavator, chisel, rose bur, or other convenient means.

A modification on this single groove is frequently met with in a middle point of division that is entirely healthy. If such septum be of reasonable size, it may be allowed to remain, and each cavity be reamed out separately. When, however, the slightest doubt exists as to the integrity of this intermediate portion, it is the safer plan to remove it, thus making the two cavities one.

We refer now again to diagram, Fig. 134, and observe the relation of the approximal faces of the first and second molars as seen on the left side. These teeth, while presenting at the angles a healthy aspect, are yet found to have cavities midway of this face, which cavities, as thus situated, have only been discovered by the insinuated point of a delicate excavator, or, what is more likely, the passage of a silk thread. Referring now to the opposite side, the cavities are found prepared. The exposure has been accomplished by the use either of chisel, disk, or files. The cavities, before unseen, now exhibited upon the sides of the inclined planes, are recognized to have surfaces that allow fillings placed in them to be self-cleansing.

Passing to the grinding faces of these same teeth, cavities of decay are seen running out over the lateral walls. The excavation of these is accomplished simply in following the sulci wherever they lead, bearing in mind that said excavation is to be of such character as provides for the retention of the filling; that is, that at all aspects the cavity is to have a wall slightly concave. Sometimes, when much depth has been attained by that portion of the decay situated in the crown, and perhaps as well that upon the side, —the connecting sulcus being of slight signification,—it is good practice to scoop out this intervening portion, without regard to the shape of the walls, and to carry the gold, arch-like, into and over it from one plug to the other.

Referring now to the approximal faces of the second and third molars, left side, attempt has been made by the artist to represent cavities in these teeth prepared for contour fillings,—a plan of excavating all approximal cavities of any extent in the bicuspidati and molars growing rapidly in general favor, and certainly contributive to an ability to make beautiful operations. First, it is seen that a separating file or disk, slightly V-shaped, has been passed between the teeth. Next, the cavities have been excavated, being cut directly down from the crown surface, and have been so shaped that in putting in the metal the operator finds himself able to work directly from this crown surface. These teeth are so prepared that when filled the operation restores fully the portion lost.

The excavation of teeth—molars or others—for contour plugging is to find direction in experience. It is to be recognized that the idea and intention are to repeat in metal what has decayed or been cut away. In proportion as the part removed has been extensive, so is it to be recognized that proportionate difficulty will exist in securing fixedness for the plug. Contour fillings, save in exceptional cases, are to possess reasonably inclined surfaces; a filling which represents the surface of an inclined plane has been amply demonstrated by experience to be the best kind.

In excavating cavities of any class, certain general rules are to be observed and practised:

1. A cavity is to have such exposure as affords room to introduce the filling properly.

2. Walls are to be made as perpendicular as a case admits of, and the margin of a cavity is to be at right angles with the surrounding surface.

3. The orifice of a cavity is to be without fissures or irregularities wherever these may be avoided; it must have firm decided margins, and must be supported solidly by underlying dentine. Roughness or brittleness in the edges of a cavity is most objectionable.

4. In excavating a tooth, regard is to be had to the proximity of the pulp. This organ is not unnecessarily or carelessly to be exposed, nor to be too closely approached; for if the first, the case is immediately changed from simple to complicated; if the latter, the pulp is apt eventually to become chronically inflamed, and to die as a result of the thermal irritation arising from the presence of the filling. It is not permissible to file or chisel or disk a tooth too freely, except where regard is had to density. A tooth of loose texture not infrequently has an irritation of the dentine and pulp provoked by the removal of even a slight portion of its enamel; on the contrary, one of dense structure is commonly to be cut with considerable impunity.

5. In cavities having radii running from a common centre, which radii may not with propriety, on account of their extent, be included in a single round hole, care is to be observed that the extremities be rounded; never being allowed to retain their natural sharpness or fissure-like aspect.

In the process of excavating teeth, a practitioner finds it necessary to employ freely the water-syringe for washing away the débris. A mouth-mirror, used for casting additional rays of light, or for showing more conveniently the cavity at which one is working, is found of much service.

Tact yields the largest measure of success in the process of preparing cavities. Rules, while well as a means for general direction, are always wisely laid aside by him who finds in his own ingenuity better means for accomplishing ends. A student gains much advantage in studying, and in cutting, teeth out of the mouth, and such practice is not to be over-sufficiently commended to a learner.

CHAPTER XXII.

OPERATIVE DENTISTRY.

RELATIONS OF MOISTURE.

No tooth is filled perfectly that has not been operated upon under absolute exclusion of moisture.

A tooth is protected against the salivary flow, and against moisture from the breath, through various means now to be considered.

1. **Napkin.**—Answering in all ordinary cases we have the napkin. A dental napkin is an oblong square of linen, varying in size to suit the idea of the operator; dimensions found convenient are: length, twelve inches; breadth, three. In applying this napkin to the upper denture, it is folded upon itself in part obliquely, until one end is brought to a point. Beginning with this point, the linen is laid delicately and smoothly between the gum and cheek, being carried backward or forward according as the initial end may have been placed, until turned into the mouth at a convenient distance from the organ to be operated upon, it is made thus to envelop it, being supported on either side of the arch by the fingers of the operator's left hand.

Applied to a lower denture, the napkin is first folded upon itself into a ribbon shape of an inch in width; second, the initial extremity is back-folded until a pad is made which corresponds in length to its width; that is, being an inch each way. This pad is to be laid upon the floor of the mouth directly back of the incisor teeth, thus covering the orifices of the ducts of both the submaxillary and sublingual glands, which orifices it is the design to compress; from this point it is carried around the arch into the vestibule as required.

To hold the floor pad firmly in place, as is demanded, various plans are adopted. A common one, where the tooth to be filled is upon the right side of the jaw, is for the operator himself to fix it by the thumb of the left hand while the index finger is extended over the part occupying the vestibule. Where the tooth to be shielded is upon the left side, the index finger of the right hand of the patient is employed, the three remaining fingers being flexed out of the way beneath the chin.

As encroachment of the saliva constitutes about the most troublesome offence in dental operations, ingenuity has been extensively exercised for its control. Fig. 141 represents a tongue-holder devised by Dr. J. Foster Flagg.

It will be found that the use of this instrument insures additional facility