

CHAPTER XXV.  
OPERATIVE DENTISTRY.  
ARTIFICIAL CROWNS.

BROKEN teeth, when not contoured, are to be repaired by substitution. Plans of meeting the indications are by use of metal cap crowns, by pivoting, and by replacement with scales of porcelain.

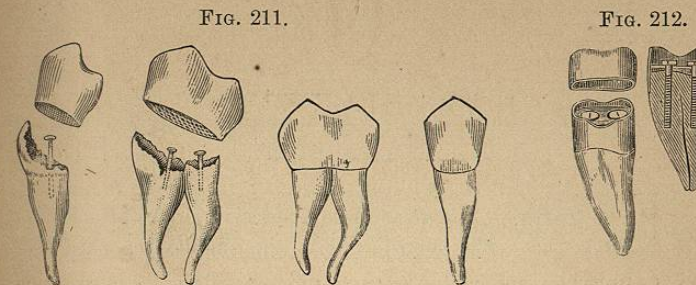
**Cap Crowns.**—A metal crown is a hollow cap made to represent accurately a part to be replaced. To make such a crown an operator begins by recognizing that there is to be enough of the broken root proposed to be covered standing above the gum to permit of being encircled by a band of gold. Such accommodation existing, a first step consists in taking an impression in wax of the broken part to which it is proposed to adapt a crown, and in making an articulation. An impression is taken by softening a piece of common beeswax and moulding it over the part. Articulation is secured by shutting the teeth together upon this wax, thus getting the relation in which the artificial crown is to stand to teeth biting upon it. To make practical this bite, plaster-of-Paris paste is to be run over both surfaces of the wax, the paste being associated back of it. When dry, separation by section is to be made in such manner as shall preserve the relative positions of bite and root. The space left between is that to be occupied by the new crown.

Articulation secured, a succeeding step takes a strip of flat gold, and, laying it upon a piece of lead, strikes with a punch into its centre; this secures resemblance to the front face of an anterior tooth. Next anneal and bend the two ends round the root requiring a crown; when this is satisfactorily accomplished, solder the two ends together. The articulating pieces are now to be put together, and the superior face of the tube filed into a shape that permits proper closure with the tooth antagonizing. To finish, bend and fit a crown surface to correspond with the face of the articulating tooth and with the filed surface of the tube; the soldering together of the two completes the operation.

The above directions apply only to restoration of teeth anterior to the molars. To fit a crown to a molar base, the operator commences by striking up in a piece of lead a gold crown; this he stiffens by running solder into it. The crown ready, a succeeding step encircles the root with a stout gold band; crown and band are next soldered together, and the work is done.

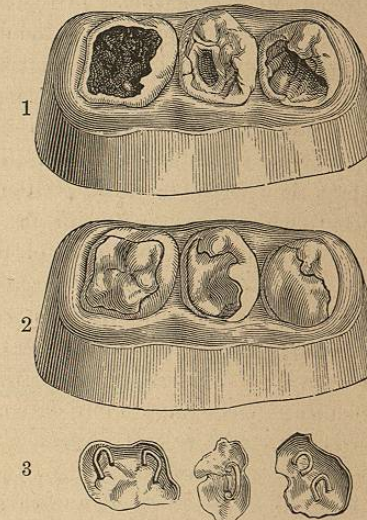
Fig. 211 furnishes illustration of the manner of relating crown and root. A root upon which it is proposed to graft a gold crown should be healthy.

To apply a crown, if the root stand but little above the free surface of the gum, it is found necessary, in order not to irritate the tissue, that it be forced



away from the tooth; this is conveniently accomplished by using an ordinary gum lancet, or, more expeditiously, the instrument exhibited by Fig. 159. Next the cavity of the root is fully cleaned, as for the ordinary process of filling with a plastic. One or more pins, as deemed necessary, are now placed in the cavity, and secured in a desired position by means of gutta-percha or oxychloride of zinc. The same material being filled into the crown, relation of the parts is to be made during the state of plasticity. German os artificiel is highly commended by the inventor of the gold crown for making the relation.

FIG. 213.



A means of fixing a gold crown where the root is decayed upon either side or in the centre nearly to the alveolar process is to be practised with much success after the following plan: Cut down until a firm base is secured; trim and put the rough edges in good condition; next separate the gum from the neck of the root as low down as the alveolar process; fit and solder the band, and proceed as before to secure a crown. The artificial part made ready, the operator reams out the pulp-cavity or cavities, and, fixing in these headed screws, grafts his crown as before described. Fig. 212, after a cut by Dr. E. S. Talbot, affords idea of the manipulations.

A manner of capping a broken tooth with gold is the device of a Dr. Bing, of Paris. The operation, more ingenious than promising, is accomplished as illustrated in the series of three accompanying drawings (Fig. 213). 1 shows molar teeth badly decayed and broken. These teeth are first to be excavated

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as for ordinary plugging, the parietes of the cavities being made smooth and solid. Next an impression is to be taken in wax, out of which a die is gotten. Upon this die caps are to be struck up. A succeeding step tries these caps over the teeth, finishing them to suit. A next step solders rings to the bottom of them, as seen in 3. Teeth and caps ready, the cavities of both are filled with gutta-percha, and, being related, a warm iron applied to the surface of the caps melts the two together. Cold water is now applied, and, the gutta-percha being made resistive, the operation is finished by burnishing the edges of the gold about the parietes of the teeth.

**Pivot Teeth.**—A pivot tooth is a porcelain crown attached to a natural root. We commence with the simplest expression of the subject.



A pivot tooth is a crown of porcelain having a hole in its centre for the accommodation of a piece of rounded wood or metal; this wood or metal fits a hole of corresponding size reamed into the root of a tooth; the joining of the two, crown and root, constitutes the operation of pivoting. Fig. 214 shows a crown and root associated. Pivot teeth of every form, kind, and character are to be procured at the dental depots.

A case presenting itself as a pivoting operation will commonly be found in the condition of a half-destroyed crown with a pulp dead, or, it may be only semi-devitalized. The latter condition of the pulp found to exist, a first step resides in its full destruction. To accomplish this, as little disturbance as possible is to be provoked. If the pulp be exposed, the very best plan to pursue is to prick into it, with any convenient needle-pointed instrument, arsenic and morphia, equal parts of which have been rubbed up in creasote. (See *Nerve Paste*.) This is accomplished without pain, and is a simple operation, to be done by any person who possesses sufficient delicacy of touch. A pulp so treated limits irritation to the closest confines. When the pricking instrument is felt to strike against the foramen of the root and sensibility is lost, it is only necessary to introduce a barbed broach,—being careful to keep close to the tooth wall, and by a few turns in the canal the mangled pulp is caught and withdrawn.

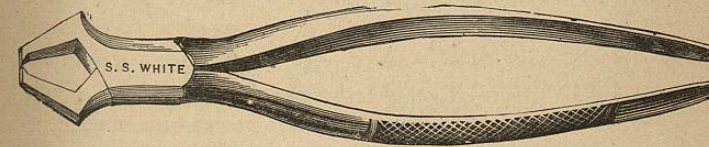
In a broken tooth where the cavity of decay does not expose the pulp, such exposure is to be made by delicate manipulation with drill or excavator, otherwise the case is treated by the introduction of an arsenical preparation into the existing cavity, and the sealing up of the same for a period varying from twelve to twenty-four hours, according to the density of the tooth. A piece the size of an ordinary pin-head will be found sufficient to destroy a pulp. The pulp killed, the crown of the tooth may be cut off as now to be described. Previous reference, however, is to be made to accidents, not uncommon, which may have caused the fracture of a perfectly healthy tooth. If in such cases, as is most likely, the shock has excited pulpitis, and, it may be, periodontitis, a first attention is to be directed to the resolution of such

conditions; no immediate attempt is to be made to destroy the pulp, unless indeed it be exposed, when it is to be pricked as before described; but a local vigorous antiphlogistic treatment is to be instituted and continued until the practitioner is satisfied that resolution is not to be effected. Accepting resolution to be secured, the broken tooth is allowed to remain strictly at rest until all irritability has subsided, when a spear drill is to be used for the production of a receiving cavity, into which the arsenious paste is to be applied as before directed. Another way to employ the paste with such broken teeth is to build about the edges of the fracture a ring of gutta-percha, this to be accomplished by trailing a solution which has been made by covering parings of the plastic with chloroform; the chloroform, quickly evaporating, leaves the gutta-percha firmly adherent to the parts upon which it has been laid. Within a ring thus secured the paste is to be laid and covered in by the same solution. Teeth, from the accident of fracture, are sometimes made so sensitive as to render it impossible to use the drill. The means just suggested will meet the indication.

If gutta-percha be found not to adhere with sufficient tenacity by this method, it will be necessary to excavate a groove in the face of the organ, and, after thoroughly drying the parts, build on, piece by piece, the ring of "Hill's Stopping," or red gutta-percha, when the paste may be placed in position and covered with a portion of the same material.

Sometimes it happens that nodules of secondary dentine exist in the pulp interfering with the absorption of the arsenic; in such cases it is commonly found necessary to repeat the application a number of times, or else expose

FIG. 215.—EXCISING FORCEPS.



the organ and prick it. Resistance to arsenical applications is quite diagnostic of the presence of pulp-stones. (See chapter on *Odontalgia*.)

To cut the crown of a tooth from its root, the first instrument required is the excising forceps. This is used in anticipation of file or disk, the crown being cut away little by little until the neck is uncovered. This extent of excision being accomplished, it is prudent to give the part a rest of a day or

FIG. 216.—SAW FOR EXCISING CROWN.



two; it is a safe plan, although certainly not in all cases, or indeed even in the majority, a necessity.

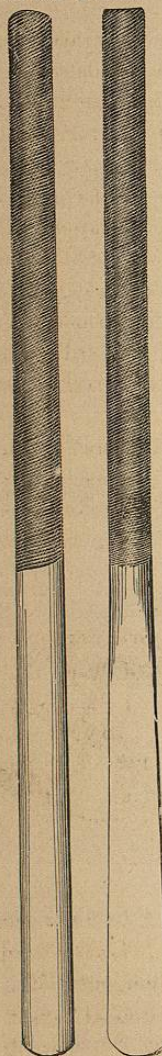
In place of the forceps some operators prefer the saw for excising a crown;



this will not, as a rule, be found so convenient of employment, and is more apt to provoke inflammatory response. It is not amiss, however, to have such an instrument, as occasionally it is found useful.

Following the excising forceps is the pivot file. This instrument, being half round, cuts a concave face on the neck of the root, which aspect of face is seen to correspond with the accommodation required by the neck face of the artificial crown, which, as it comes from the depot, and is used, is convex.

FIG. 217.  
PIVOT FILES.



In filing down a natural root, a judicious gentleness is to be combined with a necessary dispatch. The file first used is to be sharp, so as to accomplish the required work with the least irritation, and should be used until the gum is fairly reached; the sharp file is then to be exchanged for one comparatively dull, with which the now concave face of the root is to be smoothed until marked bleeding occurs from the abraded gum. The object of this abrasion is to insure an accurate covering of the joint between root and pivot tooth by means of new granulation-tissue. It is sometimes, though very rarely, the case, that with previously irritated roots this preparatory operation is profitably to be divided into several sittings, meanwhile an antiphlogistic treatment being pursued; but the cutting with the dull file which is to take off the root below the gum is to be the step immediately preceding the attachment of the new crown, otherwise the soft tissue is found to fall over the root and partially cover its surface.

During the process of cutting down a natural crown, or, to make a rule, we may say at that stage which is to employ the dull file, the preparation of the canal is to claim attention. To effect the requirements here demanded, rose, or bur, drills of various sizes are employed, commencing with one received into the natural canal, and increasing, seriatim, until a sufficient diameter is secured, such diameter being in correspondence with the size of the pivot used. The depth to which a canal may be reamed, and also the diameter, depend upon the size and density of the root; a rule applicable to all cases cannot be given: it is to be deemed necessary, however, that sufficient circumference and depth be secured to insure the retention of the pivot; half the length of a root may commonly be reamed with impunity.

The process of reaming completed, a delicate spear drill is to be passed into the continuation of the canal, and the parts cleansed to the apex. This secondary canal is then to be filled with gold

(see *Filling Pulp-Canal*); when accomplished, the root is ready for the crown.

The introduction of the engine has done much to simplify the preparation of roots for reception of artificial crowns. Instead of the hand file, burs of corundum, barrel-shaped, used with the engine, are now almost universally employed by the experienced. These burs accomplish the concaving of a root with absolute accuracy and certainly with great dispatch. Drills for slotting and reaming are also used.

The selection of a crown for a root considers—first, shade, or color, this refers to correspondence with neighboring teeth; second, shape and adaptability, this being recognition of form. By having in one's possession a few hundred artificial crowns, it is quite possible to find among them many of such perfect match as to render the slightest alteration unnecessary. Third, it is requisite to have the pivot canal in the crown and that in the root so in correspondence that when jointure is made the two shall occupy a proper relation. To be satisfied of such proper relation of parts, the crown and root are to be put together for the moment with a pivot of round match-stick. It is suggested, and practised by some, that where there is lack of natural correspondence in the canal of the root, a required direction shall be given by the drill: this, however, is to be condemned as bad practice; it is much better to seek a new crown.

To have an accurate adaptation of crown and root is most desirable; this may require some grinding of the crown; and to know just where to grind makes it necessary that the touching points be recognized. Such information is to be secured by coating the surface with a film of wax; putting the parts now together, the wax overlying the points implicated will, of course, be found indented and displaced. A plan even better than that just described is, immediately upon having a root prepared, to take an impression of it and the contiguous teeth in wax (see *Taking Impressions*), and, having made a model of plaster of Paris, fit the crown to the model.

To grind the natural tooth, a stick of corundum is used by many. Such a stick is to be procured at the furnishing depots for a few cents. A better means is found of course in the employment of a lathe or the engine; of lathes used for dental purposes the greatest variety is offered; the smallest hand-lathe, however, is commonly found sufficient to meet requirements. Fig. 218 represents such a one: it may be attached temporarily to any stand conveniently at hand. This lathe is entirely noiseless. Having neither cog-wheels nor belt, it is free from oil, dirt, and the trouble of adjustment. The motive-power is communicated by friction gained by covering the small wheel, or

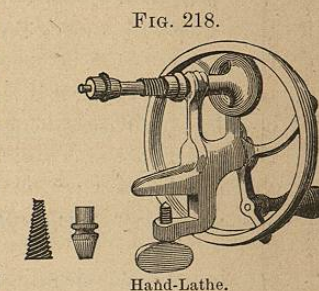


FIG. 218.

Hand-Lathe.

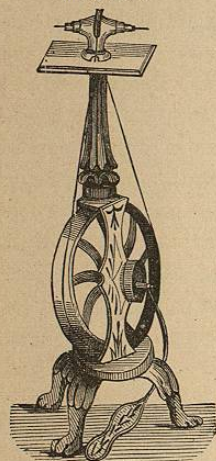
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pulley, with a rubber ring which comes in contact with the inner surface of the driving-wheel. The driving-wheel is six and a half inches in diameter; the small wheel, two inches in diameter; and the weight of the lathe is two and three-quarter pounds.

A form of lathe which, being worked by the foot, leaves both hands at liberty, is represented in Fig. 219. Such a lathe is in many respects preferable to the first; it is certainly more convenient to the operator. This

FIG. 219.



Foot-Lathe.

lathe has a movable column and table, and is capable of being elevated eight inches; it is made to accommodate the user in either a sitting or a standing posture.

As the grinding instrument, wheels of corundum are used on these lathes; the operator is to provide himself with five or six of varying sizes.

Crown and root prepared, a pivot is the next consideration.

A pivot is either of wood or of metal. A wood pivot is to be made only of thoroughly-seasoned and firmly-compressed hickory: a box of such pivot sticks, which are to be purchased at a depot at a cost of twenty-five cents, will set hundreds of teeth; it is best thus to provide one's self. To use a wood pivot, the operator commences by securing the exact length required; this he learns with least trouble from his temporary fixture of match-stick. One end of this

pivot is now fitted into the crown, the other being of a size corresponding with the canal in the root. Everything being thus prepared, it only remains to put the two together, and the operation is complete.

Occasionally, however, it is found that, in defiance of the nicest care which may have been exercised, there is slight fault in the articulation of the cutting edge of the new crown with the corresponding tooth of the other jaw: this is commonly easily remedied by filing away the impinging point on the natural tooth, or, using the corundum stick, it may be taken from the artificial crown.

A second and more serious complication is periodontal inflammation, the root becoming sore and painful. When such inflammation supervenes all mechanical manipulations are to cease at once and the parts are to be treated until recovered.

Metal pivots are variously used. A common plan is to make a delicate tube of gold of such size as permits its introduction into a drilled opening of the root (which opening in these cases, is to be somewhat larger than is required for wooden pin pivoting, and is to be bell-mouthed), leaving sufficient space between tube and cavity for a packing of cohesive gold; a wire fitted into the tube prevents its compression. The tube fixed in place, the wire is

to be withdrawn, and the tube refilled either with wood or gutta-percha to prevent its injury, and the face of gold filed concave as though it were tooth structure; this leaves only a ring of cementum exposed, thus securing, from the exceeding durability of this substance, a permanent and desirable result. Next an impression taken in wax, a plaster cast is made, and from this metal dies. A thin plate of gold is now struck between these dies, which is to fit accurately the face of the root, being filed to the exact shape of the face and outlines of circumference. Following, the plate of gold—the cap having a hole drilled through its centre corresponding with the tube in the canal—being laid in place, a piece of gold pivot-wire is passed through it into its place in the tube, and secured with a small piece of adhesive wax. Cap and pin are now removed, are invested in plaster of Paris, and the two soldered firmly together. The tooth here to be used is what is known as a plate tooth,—a tooth having pins of platina in its back. Selecting one of this class to suit the case, the cap and pivot are slipped into place, and the crown, being held in the exact position required, is fixed by a particle of wax. The whole piece thus cemented together is now removed from the mouth; this last is accomplished by inserting the blade of an excavator beneath the plate, and thus lifting it. The tooth is next backed with a plate of gold having holes punched for the passage of pins. Backing, tooth, and cap are now soldered together, and the fixture stands complete, requiring only to be cleaned and introduced into the tube. If all is as desired, the gold pivot is then to be tapped laterally very gently with a pivoting hammer, when it will be found, upon introduction, to remain with all necessary firmness.

An improvement, as it is thought by some, on the plan just described consists in the replacing of the root tube by a hollow screw, a screw-tap being used to cut the thread on its inner wall; this screw, fixed in its place, is to be levelled with the face of the root and the operation completed as already described.

In roots having canals out of correspondence with the position demanded for the new body, the mode of using caps for the attachment of the crown seems to afford all that can be desired, inasmuch as when teeth are thus pivoted correspondence between the cavities of root and crown is of no importance.

A condition indorsing fully the employment of the tube is found in roots somewhat decayed. Here, the tube being in place, after excavation of the part, as in any case of caries, the seat of disease is occupied by gold placed on the principle of ordinary plugging.

A manner of pivoting which is to be esteemed a combination of the plans just described consists in passing through the centre of a wood pivot, which pivot has been drilled for the purpose, a second one of gold wire; such wire is found materially to strengthen the wood, and is thought by many to be the most desirable support that can be employed.

Still another plan is the employment of what is known as the vulcanized pivot. This process is as follows. The root being prepared by tubing as