

previously described, a wire of length sufficient to protrude one-eighth of an inch or more beyond this tubing is flattened at one end and inserted into the tube; next a tooth (usually one made for vulcanite plate purposes) is fitted to suit and placed in position; wire and tooth being joined with adhesive wax. The wax cold, the adherent tooth and pin are carefully withdrawn. Moulds are next made of plaster, as for vulcanite work, the wax is removed, vulcanizable rubber is introduced in its place, and the pin and tooth are united by the vulcanizing process. This is a very neat, easy, and, as thought by many, an altogether desirable operation.

A means of setting a pivot tooth founded on the ease with which the Mack screws can be worked, and applicable particularly to bicuspid and molar teeth, consists in inserting into the filed face of the root three or more of the screws, and, having a tooth prepared for the purpose, of a box-like character, the chamber is filled with cement plombe, or any of the oxychloride preparations, and while the material is soft the tooth is put into place, being retained by the fingers until the cement hardens about the pins. A box tooth may easily be made by soldering a metal chamber to the pins of an ordinary plate tooth.

Another plan, pertaining, however, only to the treatment of a root where this has been weakened by decay, consists in first making proper excavation of the diseased dentine and replacing it with oxychloride or with amalgam. The material used having set, a pivot canal is reamed in its centre, and the operation completed by the use of the wood or wire-wooded pivot.

Flagg's method of pivoting anterior teeth is as follows: Select an ordinary plain plate tooth to suit. Grind and bevel the neck face. For the pin use platinum wire No. 14, U. S. gauge. Hammer this flat at end,—tooth end. Through this flattened end punch holes for tooth-pins. Rivet into union tooth and wire by means of the pins, and complete by soldering.* To attach to the root the artificial piece thus made ready, the operator bars the pin and drills out the canal bell-muzzle fashion. Next dryness is to be secured, and the barbed wire being thrust into the root (the crown being related exactly as desired), a quick-setting amalgam is packed until not only the canal is solidly filled, but a posterior face built to the tooth.

A method of setting a plate tooth on a root, and giving an additional support by a rim of gold, is practised thus by Dr. H. E. Dennet:

First cut off the crown; then tunnel out the root, by enlarging the pulp-cavity, making it very large at the orifice, and smaller as it goes in, cutting retaining-points at proper places. Solder a platina pivot to a suitable plate tooth, the pivot being large where it is soldered, and a gradual taper bring-

* Soldering is a process accomplished by means of blow-pipe and a metal cement; in this case pure gold is used. Lay upon charcoal and partially imbed in sand and plaster. Next smear the parts to be united with a cream of borax. Place in this cream small pieces of gold, and direct over the imbedment, by means of a gas blow-pipe, the flame from a spirit-lamp until the metal melts and runs.

ing it nearly to a point; then make it barbed or rough, so that it will not pull out after the crown is set.

Having prepared the root and the tooth, put on the rubber dam; fill the root to the point where the end of the pivot will meet it; put on the tooth and fill around the pivot (turning the tooth in and out, and laterally, as convenience requires, the pivot being easily bent without danger of breaking); build out to the natural form of the tooth, using first soft gold, then that which is partly cohesive, then cohesive.

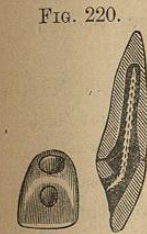


FIG. 220.

Tooth-pivoting has found very lately marked impetus through the inventive efforts of W. G. A. Bonwill, D.D.S., Marshall Webb, D.D.S., M. H. Cryer, M.D., and others. Fig. 220 shows a pivot operation as practised by the first of the operators named. The principle consists in fixing a barbed, screw-headed pivot of platinum into a root-canal, using for the purpose of fixation a preparation of amalgam; the crown, previously fitted to the root, is placed upon this pivot and retained immovably in place by means of a gold nut. Fig. 221 exhibits the components of the operation separated.

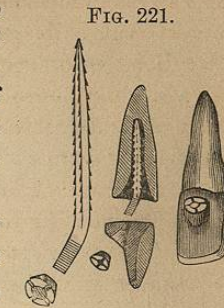
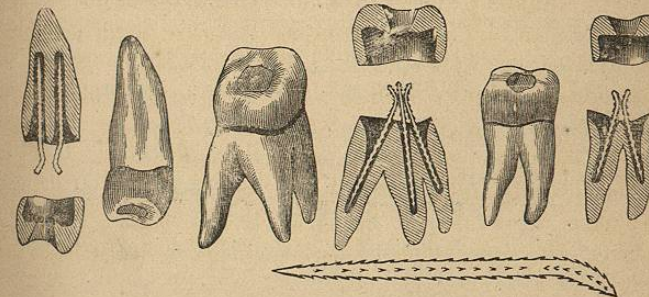


FIG. 221.

A second method of this same practitioner, and one preferred by him, consists radically in a plug of amalgam capped with porcelain. Fig. 222 furnishes the idea. In the diagram sections of bicuspid and molar roots are shown into which are impacted the platinum barbed pins. Sections are also shown of crowns made hollow, an opening existing through the face surface. Placing one of these peculiarly-constructed crowns over a root surface prepared to receive it by means of a coating of amalgam, it will be seen that to make a perfect joint and strong bond of union the operator needs alone to

FIG. 222.



proceed by filling in at the crown opening a continuation of the amalgam already begun over the face of the roots.

Amalgam being a discolorer, attention is to be directed, in the use of this means, to a necessity for nice discrimination in the matter of shade.

In the immediately preceding cuts the cases shown relate, all alike, with the supposition of a dead pulp; the canal or canals being the place of anchorage.

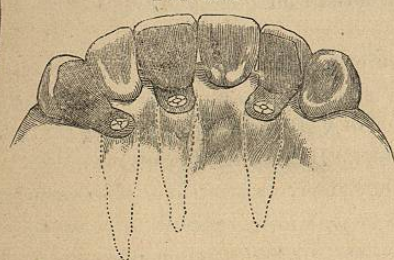
A reverse to this is expressed in Fig. 223, which shows, perfectly outlined, a mode of procedure in living roots; a procedure not, however, to be indorsed or recommended.

FIG. 223.



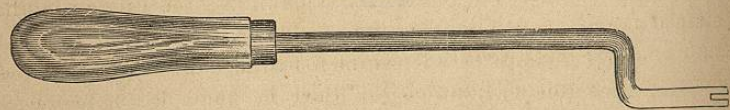
The adaptation of the plan of pivoting to the correction of deforming irregularity finds illustration in Fig. 224. Here, as will be inferred, the natural crowns are first to be cut off and the pulps destroyed. Next, plate teeth are to be backed with stays of gold, the metal reaching to the location of the different roots and being fitted to them. From this point the procedure finds modification as in illustration, save that the manner of fixing is by means of nut and screw. Fig. 225 shows

FIG. 224.



forked screw-driver. The plan is commendable, the pulps being first destroyed and the canals used for the pivot.

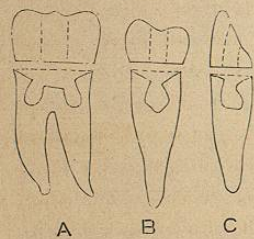
FIG. 225.



A manner of pivoting crowns of porcelain known as the Gates method is about the same as that by Bonwill; indeed, credit for the common invention seems to lie with the two.

Still another manner, closely corresponding, is shown in Fig. 226. Here, as in the previous operation, slots are cut which receive amalgam fillings.

FIG. 226.

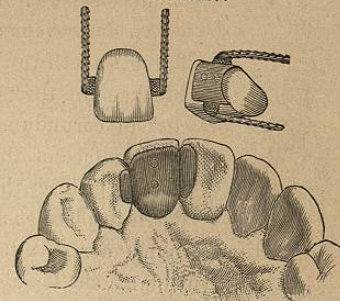


The diagram fully illustrates the manner of putting on the crown. A, molar; B, bicuspid; C, lateral incisor. Pivoting may be done even where there is absence of root. A drawing, after Marshall Webb, Fig. 227, illustrates the procedure. First, suitable cavities are to be formed in the approximating faces of the two teeth adjoining the toothless space to be filled. An impression of the parts is next to be taken, and a plain porcelain crown selected of a form and shade corresponding with requirements. This tooth is to be backed, which backing is to extend about one and one-half lines from each

side the crown for insertion in cavities prepared in the adjoining teeth. To these wings barbs are to be soldered for introduction into the pulp-canals.

A next step considers an impression of the parts which secures the ability to prepare a delicate cast of gold accurately fitting the gum upon which the porcelain tooth is to rest. Everything thus made ready, the parts are respectively placed in position, and secured in relation by means of a piece of wax. Being next carefully lifted from the mouth, all are included in a matrix and soldered. The operation is completed and made permanent through fixing the barbs by means of fillings made of cohesive gold. To secure temporary fixedness for his pins, Dr. Webb uses first a packing of oxychloride, cutting most of this subsequently away, replacing it with gold.

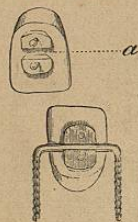
FIG. 227.



What is termed "grafting crowns" is an operation attracting at the present time considerable attention. The principle of the performance is the same as that just described. To illustrate it reference may be made to a mouth where the first and second molars, say of the upper right side, have been lost. The abutting, or adjoining, teeth—that is, the second bicuspid anteriorly and the wisdom-teeth posteriorly—are to be supposed to have cavities in their approximal faces, the first in the distal, the latter in the mesial, face. An operator preparing these cavities for plugs of amalgam, concludes to use them as abutments to a bridge of the plastic, which he builds in the intervening space, moulding and shaping it nicely to fit the gum and to articulate with the teeth of the inferior jaw. Grafting is nothing different from replacing amalgam with teeth. Different manners are practised in securing the organs. One way consists in taking crowns that represent fully the teeth to be replaced. These crowns possess double longitudinal perforations for the accommodation of a stiff gold wire which is to occupy them, stringing as it were the teeth together. Before being placed on this double string the base of the crowns are to be ground into accurate fit with the gum upon which they are to rest, and as well so fitted as to fill the space to be occupied, leaving, however, room for the necessary side, or anchoring, attachments. Mode of attachment will be understood by glancing at Fig. 227. To the extremities of the horizontally placed wire of either side vertically placed roughened gold wires, or wings, are soldered, and these, as understood, are accurately fitted and plugged into cavities existing or prepared for their reception in the adjoining teeth. Another mode consists in attaching the crowns to a delicate plate, fitted through impression and swedging (see *Prosthetic Dentistry*), to the face of the gum, precisely as ordinary plate teeth are manipulated, and in turn relating the fixture with the natural teeth, as understood.

The plan embraced in these various manipulations is mechanical rather than surgical; it is ingenious but not to be commended except as special cases are concerned; experience will safely venture where sciolism would meet with nothing but disaster.

FIG. 228.



An improvement, so considered, on the above manner of fixing a tooth to the backing,—a manner tending to prevent breakage of the porcelain face,—consists in cutting, with a disk of corundum, a groove along each side and across the cutting face of the tooth and another between the pins. A wire to connect the barbs is now laid in the groove and soldered in place as shown by cut, Fig. 228.

Ferruling.—A manner of attaching an artificial crown to a natural root is done by means of a gold ferrule. This is a suggestion by Dr. Buttner, of New York; the procedure as discussed by the inventor is as follows. Counter-reamers with counter-pins to level the root, and trephines with centre pins to turn a shoulder on the exposed end of the root, are used.

The instruments prepare the root as required, hence nothing prevents applying ferruling, which is recognized in mechanics as the most accurate and reliable system for combining two parts.

The ferrule used is of stiff plate gold, struck up on steel dies. It is a single piece of gold, closed at one end with a pivot soldered in its centre. The accuracy and strength of a ferrule constructed in this manner insures double the strength needed.

The first step in the practical application of the method is to enlarge the pulp-canal with one of the drills. The next is to level the root by aid of the counter-reamer, the centre pin of which fits the hole in the root. The trephine is used to turn a round shoulder on the exposed end of the root. This completes the preparation of the root. An accurately fitting straight wire is now inserted into the canal, and an impression taken; the impression cup is to be open opposite the root so as to allow the wire to protrude through impression material and cup. Next withdraw the wire, then remove the impression from the mouth, and return the wire to its hole in the impression.

A set of brass root models accompany the set of instruments, which correspond with the trephine and gold caps in size. These represent the prepared end of the root on the plaster model, and serve to guide the gold cap in being placed on the model. One of these models, corresponding in size with the trephine used, is placed over the pin in the impression; now the model is passed in plaster-of-Paris.

In removing the impression material from the model, the root model is found accurately in place of the root, representing the prepared root end. The corresponding gold cap is now placed on the root model, a porcelain crown prepared for the cap, and waxed into the same in such a way as to cover the gold in front. The united parts are now withdrawn from the model, imbedded in plaster and sand, and are soldered and finished.

The operation is completed by forcing the cap, with pivot and crown combined, upon the root by repeated blows with a suitable mallet.

Porcelain Facing.—A porcelain face is a scale or full tooth-surface of the material used for correcting a dental deficiency. Fig. 229 furnishes an illustration. A crown, *b*, is fitted to a root; *a* represents an open tube which has been soldered to platinum pins. On either side grooves are seen, cut by means of corundum disk into the substance of the porcelain. This crown, consisting of an ordinary plate tooth, is made to take the place of a lost tooth-face by closing the tube, slipping it over a pin fixed in the root, and building up the back surface in cohesive gold.

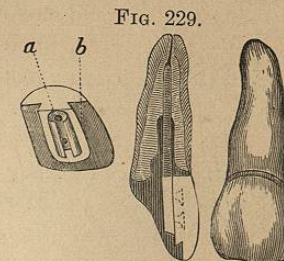


Fig. 230 shows another class of operations. The centre drawing exhibits a square of porcelain built into a broken tooth-face, being retained in its

FIG. 230.



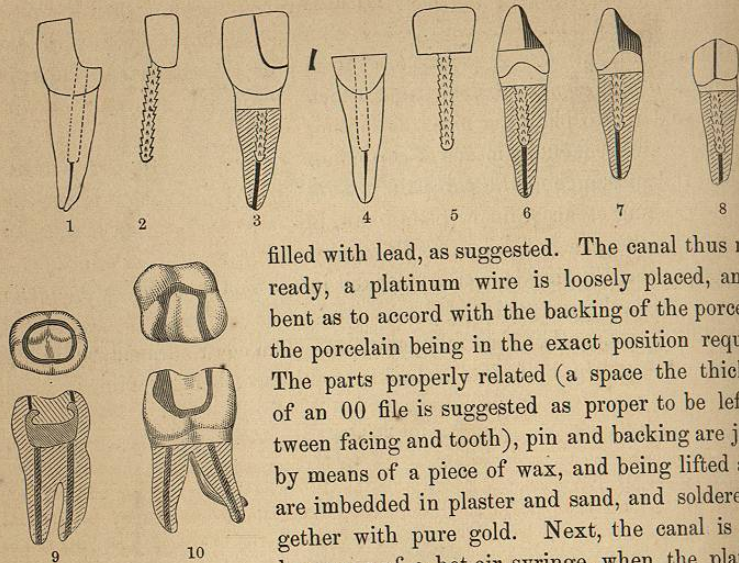
position by means of a pivot combined with a circumferential rim of gold worked into place by the impacting qualities of an automatic mallet.

A very pretty, and as well commendable performance in this direction relates with incisor teeth, where, for example, the mesial angles of, say the two centrals are broken away. Here, after cutting a square into the two faces, or, if preferred, curving the surfaces, scales, having pins burnt into them, are nicely ground, and are related with these surfaces so as to constitute an accurate fit, and restore as well the lost contour. Next, an impression being taken, dies are prepared and delicate backings are fitted to the teeth. Succeeding this, the scales are put in place, and being attached by means of the pins to the backings,—soldered,—the contrivance is fixed by drilling countersunk holes through the backings, making slots in the teeth, and in uniting the two by rivets made of cohesive gold.

Subfigs. 1 to 10 (Fig. 231) illustrates operations in porcelain facing, all of which explain themselves. Dr. S. D. Rambo, whose practice furnishes the drawings, fills the extreme end of the pulp-canals with lead. The facings used are simply cut artificial plate teeth, selected with regard to shade and fitness. A piece or pieces being ground into absolute adaptation, the pins

are backed with platinum; the backing being held in place by splitting the pins. Next, the canal of the tooth to be fitted is reamed out, the apex being

FIG. 231.



filled with lead, as suggested. The canal thus made ready, a platinum wire is loosely placed, and so bent as to accord with the backing of the porcelain, the porcelain being in the exact position required. The parts properly related (a space the thickness of an 00 file is suggested as proper to be left between facing and tooth), pin and backing are joined by means of a piece of wax, and being lifted away, are imbedded in plaster and sand, and soldered together with pure gold. Next, the canal is dried by means of a hot-air syringe, when the platinum pin, being well enveloped in heated gutta-percha or with oxychloride, is thrust into the cavity to which it had been fitted. Later, the plastic is cut from about the joint to the extent of about two lines, and that material is replaced with gold.

No. 4 represents a central incisor with parallel break of crown. No. 5 shows piece of porcelain tooth pivoted and made ready for the repair. No. 6 is a side view of the restored crown. Nos. 7 and 8 show operations where nearly the full crowns have been restored. Nos. 9 and 10 show a bicuspid and a molar tooth where portions of the crowns are replaced with porcelain. If, in these cases, the pulp lies dead, it is recommended to pivot as in the previous examples, and fill in with plastic and gold; but if the pulp be vital, the porcelain is to be fitted with a view to its sole retention by a circumferential packing of gold.

The placing of diamonds in the front faces of the teeth as ornaments has been accomplished with a great deal of satisfaction to the possessors. To do this, using cohesive gold, little more skill is required than in making common crown plugs.

Plastic Facings.—The use of the plastics as a facing material, in the repair of deficient labial walls, is at the present time attracting a good deal of attention. A zinc amalgam accomplishes this work excellently well. (See *Amalgams*.) In such a situation the material keeps peculiarly clean, the moving lips acting as a constant cleanser and polisher. A happy manner of

making a facing consists in building up the deficient part with a tough, sharp-edged amalgam, standard alloy, for example, and while it is in the act of setting cutting away this material on the face surface until none is left except a delicate rim leading to an undercut. When setting is accomplished the place of the removed amalgam is to be occupied by facing alloy. With skill, and patience to secure shade, a tooth may be faced after this manner to the satisfaction of all concerned. When the less dense plastic fails it is replaced with little trouble.

Another manner of facing relates with the use of oxychloride as a material. This preparation is not very permanent, as is understood, but then it is easy and convenient of re-application. A tooth defective on its anterior face is improved wonderfully in appearance by a skilful employment of oxychloride.

Examples illustrating facing with the plastics would need to be given alone in connection with the preparation of special cavities. To accomplish himself in such directions a student is to give much time to practical studies made out of the mouth.*

* As an addendum concerning the use of plastics, more properly in place, however, in the article relating to the use of amalgam for tooth-plugging purposes, the author calls attention to an ingenious carrier of the alloy designed to take the place of cup and file-flat; see Figs. 162 and 163. The apparatus consists of a tube attached to the end of a shank, which tube, being filled with amalgam, is carried to the cavity to be occupied; arrived at which it is emptied, and the material partially packed into the cavity by a simple act of pressure which calls a spring into motion. Two or three forms are to be found figured in dental catalogues.

DENTAL CATALOGUES.—For the benefit of students it is to be mentioned that dental catalogues, to which reference is frequently made in this work, are book-like issues, to be obtained free of charge by addressing a postal to any of the various dental depots. These contain drawings and descriptions of all instruments used in dentistry, and by means of them the practitioner keeps himself informed as to new devices.

CHAPTER XXVI.

OPERATIVE DENTISTRY.

IRREGULARITIES OF THE TEETH.

ORTHODONTIA.

TEETH irregularly related to the common arch are, under favorable conditions, capable of having the malposition corrected without ill results.

Conditions to be appreciated are: 1st, general and local health; 2d, age of patient; 3d, nature of alveolar process.

A patient of extreme nervous temperament, or one laboring under a dyscrasia, is scarcely a proper subject for the endurance of details necessary for the correction of misplaced teeth: the latter, by reason of a degenerating inflammatory action almost certain to be provoked; the former, because of nervous excitability aroused, which involves a risk to the health at large, of greater import than any local good to be attained.

A patient over twenty-five years of age may, as a rule, be deemed to have attained a solidity and fixedness of stature which render the risk of change overbalancing the promise of good. The period intervening between twelve and seventeen years of age is found by experience to be the time of election for this class of operations.

An alveolar process of loose structure is more capable of affording response to a mechanical impression than is one of solid character. In the first, a tooth may be quickly changed in its position; in the second, not only is more time required, but great increase in the moving force.

Treatment which pertains to regularity and harmony in the second denture commences with the first, the rule being that a deciduous tooth is not to be extracted, save by compulsion, until a successor is ready to take its place. (See *Anomalies of Dentition*.)

A tooth is to be changed in its position by the application of force drawing in the required direction. The physiological changes induced in the alveolar process are, first, absorption of the parietes of that aspect of plate pressed upon; second, the exudation and organization of plasma in the part relieved. Change too rapidly effected excites inflammation, or otherwise draws the tooth from its cavity; haste in the correction of an irregularity is never safe.

In orthodontia, as in every other department of art, familiarity simplifies practice. To move teeth, but few means are really requisite. Complexities in appliances commonly signify lack of skill.

A full consideration of the associations of a case is to precede operation upon it. Such consideration embraces, first, age. As a rule, it is not found good practice to attempt the moving of an undeveloped tooth, the parts being too susceptible and irritable. (See *Dentition*.) Second, condition. Not only are dyscrasic and nervous conditions adverse to operation, but the more immediate expressions are to be taken into account. Teeth, from the shape and direction of their crowns, are sometimes to be recognized as possessed of peculiarities of fangs, which, in a proposed change, must compel the piercing of the alveoli. Again, teeth of bulky crown may have stumpy roots of such limited relation to their alveoli that very slight traction will drag them from their sockets. A tooth out of the arch may be a supernumerary; it may in every respect simulate the true teeth and yet not belong to the denture. Here, to avoid error, it is alone necessary to possess proper familiarity with the characteristics of the common denture. Mention as well is to be made of retained deciduous teeth which deny proper place in the arch to their successors. The writer has often met with such retentions in persons of advanced years.

The inferior anterior teeth of the second set are in nearly all instances found, in the earlier stages of the eruptive act, more or less irregular in the manner of their eruption; if not unduly crowded from narrowness of the arch it will be the exception to a rule where they do not prove self-correcting. Also is it found the case that in nearly every instance where accommodating space exists, irregularly developing teeth, wherever situated, will of themselves seek proper relation. Early interference is therefore, because of such natural tendency to self-correction, to be deprecated, except where it is evident that mechanical relations render such self-correction impossible. A single example may illustrate. Suppose a case where the superior central incisors develop with their cutting faces so inclining inward that in occlusion of the jaws the inferior teeth close against the labial surfaces: here it must be seen that time, instead of serving to correct the deformity, will only increase it. In such a condition, correction as immediate as possible is desirable; judgment must direct the means and the manner: the superior teeth should certainly be placed outside of the inferior: if this be done without provoking inflammatory resistance, however accomplished, the means employed have necessarily been judicious. (See illustrative cases.)

Instances, again, are met where certain teeth have completely changed position: a lateral incisor appearing in the situation of the central, the central occupying the place of the lateral. Here there is no correction possible, except it be found in transplantation, in the pivoting process, or in extraction of the teeth and their rearrangement upon a plate.

Teeth irregular to the arch, being held in the false position only by pressure from articulating teeth, find easy correction; forced into proper place, the same teeth which continued the deformity will prove the instruments of permanency to the new relation.