

CHAPTER XX.  
OPERATIVE DENTISTRY.

INSTRUMENTS USED IN PREPARATION OF CAVITIES.

WE are here introduced to a department of Oral Surgery familiar under the name of dental art, a department which considers the mechanical treatment of carious cavities and other physical defects found in relation with the teeth.

Fig. 104 is re-introduced as illustrative of a perfect denture; to find a set of teeth so complete in construction and relation is an experience of exceeding rarity. Teeth so arranged and free from irregularities seldom decay.

FIG. 104.—SUPERIOR DENTAL ARCH.

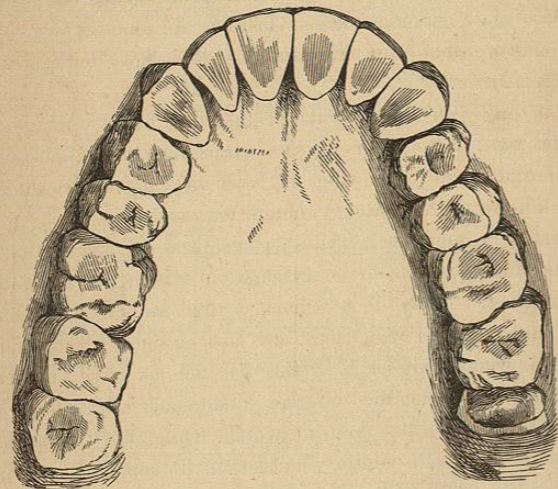
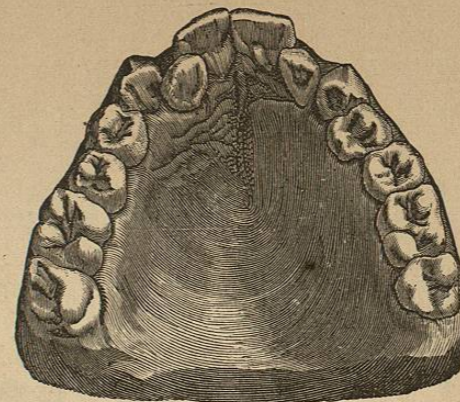


Fig. 105 represents the typical American mouth; the imperfection of face of the organs illustrated, combined with overcrowding of the arch and deficiency in the inorganic constituents of the dentine and enamel, render such teeth the easy prey to disease.

Cavities found in teeth are of every variety as regards size, shape, and location; dental art exposes, cleanses, and fills, with metal or other material, these cavities. Understanding of the instruments used, manner of preparing cavities, processes of making fillings, together with associative treatment required in the conduct of cases, implies comprehension of operative dentistry.

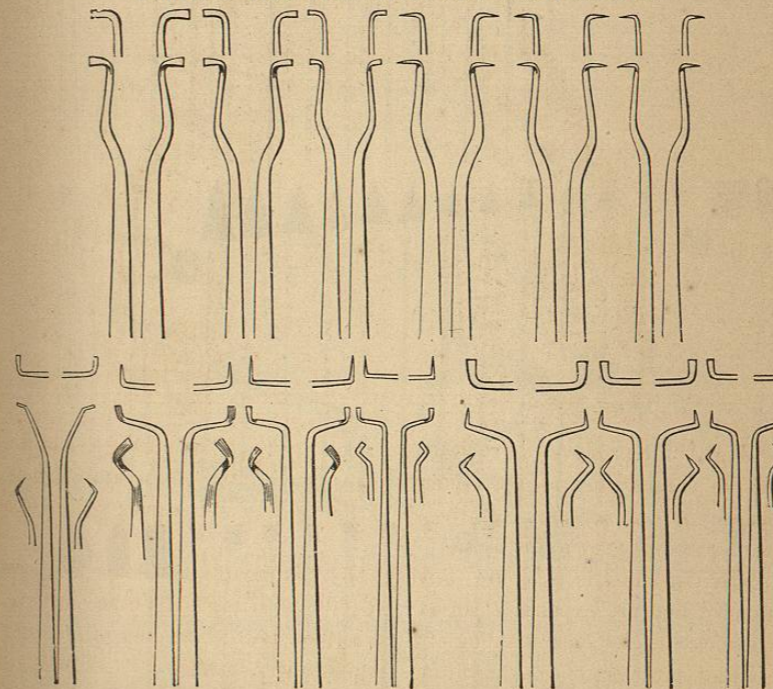
The subject opens with a view of means employed for the exposure and excavating of cavities; these means appropriate various instruments known as excavators, drills, the dental engine, chisels, files, saws, disks, chip-blower, and water-syringe.

FIG. 105.—SUPERIOR DENTAL ARCH.



**Excavators.**—An excavator is an instrument designed to excavate, or clean out, a cavity. Excavators, while variously modified, are founded on two

FIG. 106.—HOE EXCAVATORS AND MODIFICATIONS.



elementary styles: one, hoe-like in shape, cuts as it is drawn toward the operator, the other represented by the relation of the edge of the ordinary hatchet to its shaft or handle, cuts with lateral motion.

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FIG. 107.—HATCHET EXCAVATORS AND MODIFICATIONS.

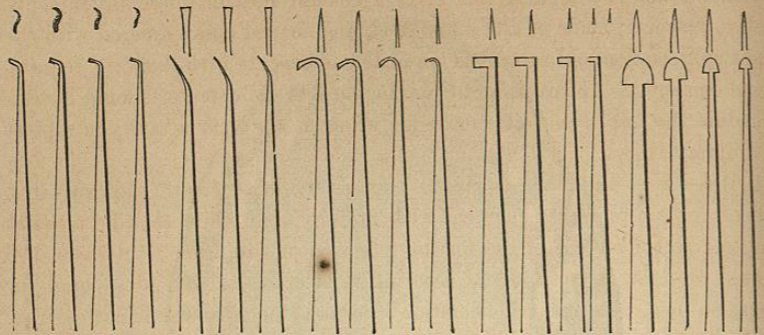
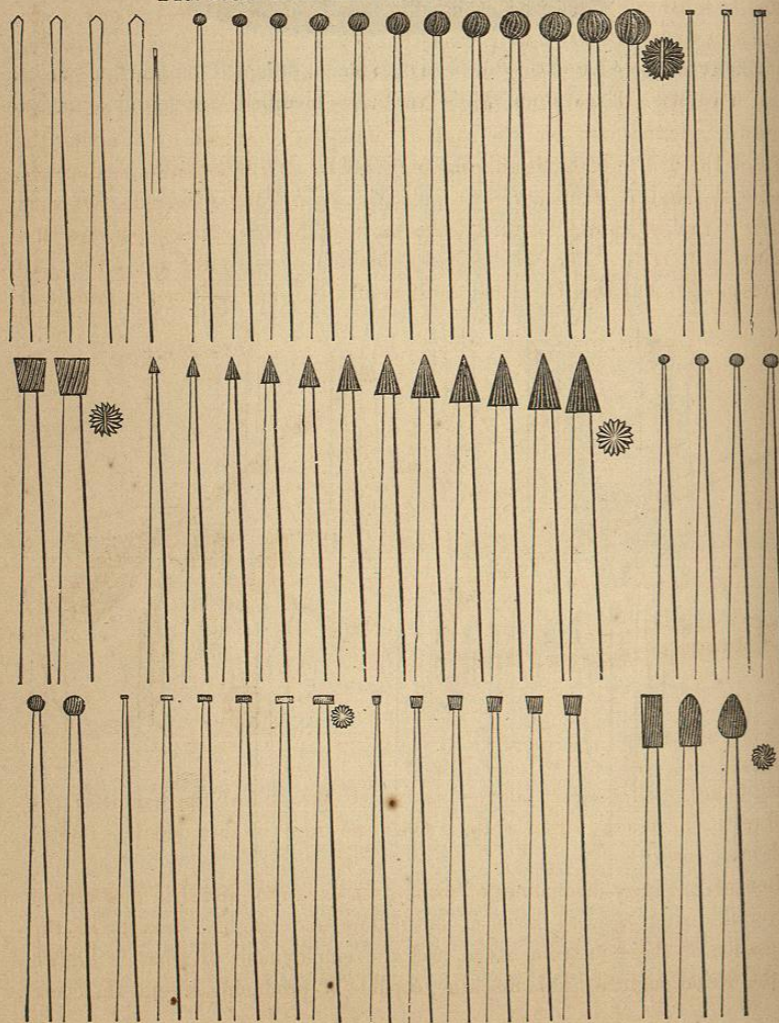


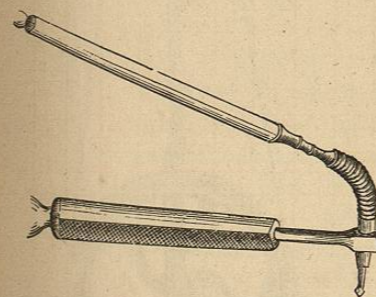
FIG. 108.—ROSE DRILLS AND SPEAR DRILLS.



Examination of the diagrams gives a general idea of these instruments. Unless, however, made of the finest steel, and shaped and tempered with the nicest appreciation and care, it is impossible to execute with them the requirements demanded. Excavators fit for the hand of an operator should be able to endure the test of an unturned edge when used to cut a cavity in a piece of ordinary ivory.

**Drills—Rose and Spear.**—These express modifications of the excavator. When properly tempered they cut with rapidity, and while clearing a cavity tend to give convenient shape for the retention of the filling; the spear-drill is used also for the purpose of securing what are called retaining-points for plugs,—a matter to have consideration in connection with particular cavities. Drills, like excavators, are made with handle and point in one piece, or are fitted to separate handles, which handles may be made of steel, ebony, pearl, or more expensive material, to please the taste; the single piece is, however, commonly preferred, as being the most convenient form. To use this instrument it is only necessary to rotate it between the thumb and finger, or, where pressure is found desirable, the palm of the hand is spared by receiving the butt of the drill in a socketed ring or thimble. Drills are also used associated with handles, which allow of application at any angle desired. Of such stocks there are quite a variety, the most simple of which is perhaps that known as Merry's. Fig. 109 exhibits this drill as ready for use. Fig. 110 represents the bur thimble: this consists of an open ring for the middle or

FIG. 109.



Merry's Drill, ivory handle.

FIG. 110.



Bur Thimble.

index finger, with a socket attached, in which the end of the handle of the drill rests: it saves the hand, while at the same time the instrument is rotated with more ease.

**Dental Engine.**—A manner of using both excavator and drill now almost universal, being a great saver of both time and trouble, consists in the adaptation of these instruments to, and the employment of what is known as, the dental engine. This machine, capable of producing several thousand

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FIG. 111.—THE WHITE DENTAL ENGINE.

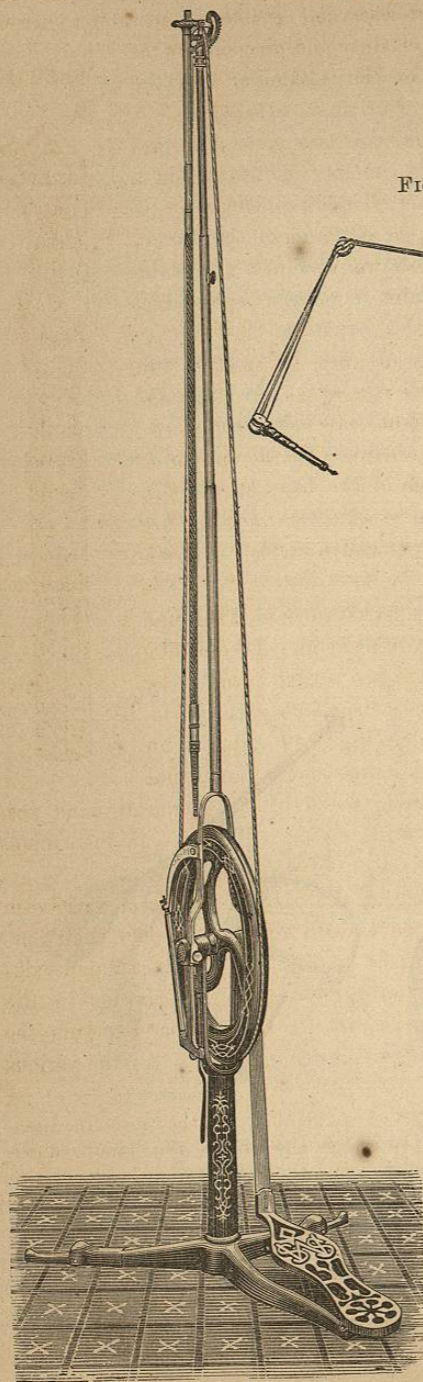
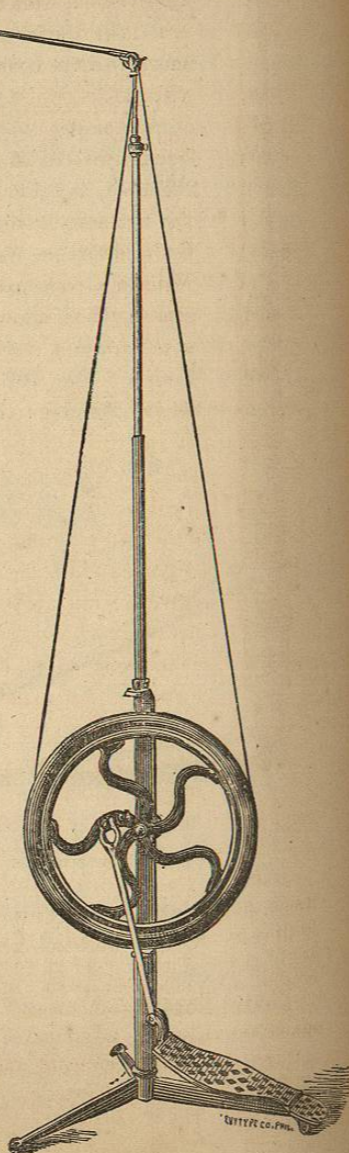


FIG. 112.—THE BONWILL INSTRUMENT.



revolutions of a mandrel in a minute, carrying at the same time a bit with such steadiness that motion is not observable, enables an operator to accomplish his end with a certainty and precision to be appreciated only by him who is familiar with the work; it is a great saver of time and trouble.

FIG. 113.

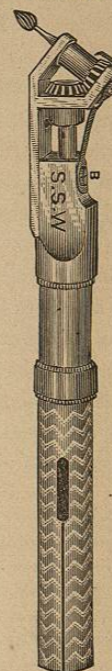


Of these engines there are two general forms: one, known as White's, has its individuality in a flexible shaft; the other, Bonwill's instrument, is constructed after the type of a human arm. Several modifications on the two principles are in the market, each laying claim to peculiar and special virtues.

A capability to act in any direction is given the hand-pieces of these engines by means of attachments. Fig. 113 represents a straight hand-piece; the action of it will be recognized by the mechanic. G, spindle, or bit-holder; D, sleeve-bearing, to which the front and rear portion of the casing are attached; H, adjustable collar, by which any end-wise movement of the collar is taken up. The rose drill, seen in place, is fixed or loosened through means of the slot at its terminal end. The relation of this drill to the hand-piece is that occupied by the very great variety of instruments used in connection with the engine. Fig. 114 exhibits an attachment acting at an obtuse angle. A dental engine is to be looked on in the light of a duplicate hand possessed of an ability to work rapidly; it is not an instrument necessary to the accomplishment of dental operations.\*

**Chisels.**—Chisels used in dentistry are of great variety in form. Although not employed with a former freedom, their purpose being superseded in part by disks, they are yet found valuable adjuncts to every operating-case. All cavities in the approximal faces of teeth require for their proper exposure the employment of chisels or of something representing them. As the various

FIG. 114.



\* While Fig. 113 illustrates perfectly the action and meaning of a hand-piece, the attention of a student is to be directed to the existence of quite a variety as to forms and pretension; the latest is known as the cone journal hand-piece. Dental catalogues, obtainable by application to the dental depots, keep one informed of the improvements, real and so called. Advantages claimed for the cone instrument are,—

*First.* It has an absolutely SECURE and TRUE bur-fastening. When locked, the bur and spindle become like one STRAIGHT and SOLID piece.

*Second.* The working parts are readily exposed for oiling, cleaning, or inspection, without disturbing the adjustment of the bearings of the spindle.

*Third.* The bit can be changed while the engine is in motion, the spindle running as

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forms possessed by the cutting faces of these instruments have evolved out of experience, so a very little use of them suffices to show an operator which are to be selected to meet a purpose.

Fig. 115 shows styles and forms of chisels in ordinary use. A modification on these is known as Jack's double-end enamel-cutters. Six instruments constitute a set of these last, such set being designed to furnish all the forms needed for freely cutting the enamel in separating teeth. Fig. 116 exhibits these chisels.

Other varieties of the same instrument are designed for opening fissures, making retaining-points, and also for enamel-cutting wherever applicable. Fig. 117 shows chisels of this kind designed by Dr. Forbes and Dr. Jack. Nos. 1, 2, 3, 7, 8, and 9 are known as gouges. Nos. 4, 5, 6, 10, 11, and 12 illustrate paraboloid chisels.

A chisel of late device, the invention of Dr. E. P. Brown, is three-edged; it is designed for opening fissures, trimming down walls of enamel, dressing the cervical parts of cavities, and to assist in removing calcareous deposits.

**Files.\***—Fig. 118 represents a simple straight file, which is to be viewed as the base from which all others digress. A file of such form will at once be accepted as well adapted to separating approximating surfaces; as, for example,

free with the lock released as when the bur is clamped,—a very desirable feature, especially when a motor is used.

*Fourth.* The facility with which one bit is substituted for another without changing the position of the hand-piece in the hand.

Hand-pieces require continuous attention in order that they work properly. Rust is a difficulty. Blood or water when allowed to remain upon the bit quickly rusts it into solid attachment with the holder. Oil is a necessity. A hand-piece is to be taken apart at the end of each day's operations, and after being wiped thoroughly clean is to be lubricated with sewing-machine oil. Where a bit is found rusted, an easy plan to remove the incrustation is to rub with oil and lay by for a few days, after which a scouring of quicklime restores the original brightness. Mercurial ointment is recommended as a protection against rust; to be used by coating instruments with a thin film.

Absolute dryness is to be esteemed an essential in the preservation of instruments, no other care compensating for lack in this.

A matter to be borne in mind in the use of all surgical tools is danger in carrying disease. As a guard in this direction disinfection is never wisely omitted. Such guard is found in the free use of very dilute carbolic acid. In the Hospital of Oral Surgery phénol sodique is used.

\* Files require to be kept very clean, not only as disinfection is concerned, but in order that they cut properly. At the conclusion of an operation it is well to throw such as have been used into a vessel containing soap-water, and after allowing them to remain for a few minutes to thoroughly cleanse by means of an ordinary nail-brush.

Files are instruments which particularly demand fine tempering. Many makes or individual lots are, in this respect, absolutely worthless, either bending or breaking at the moment of application. Of the two faults the former is the worse.

A perfectly tempered file will accomplish an amount of work that is quite surprising; and when met with is to be treasured as a something that is not easily to be replaced.

Considering the many makes of these instruments offered for sale and carrying large recommendation, it is to be suggested as a judicious plan that samples of the different kinds be tried with a view of the student possessing himself of the desired practical information. Manufacturers, with an idea to economy in the purchases, put up the straight files of different numbers in a common package.

FIG. 115.—SOME FORMS OF CHISELS USED IN DENTISTRY.

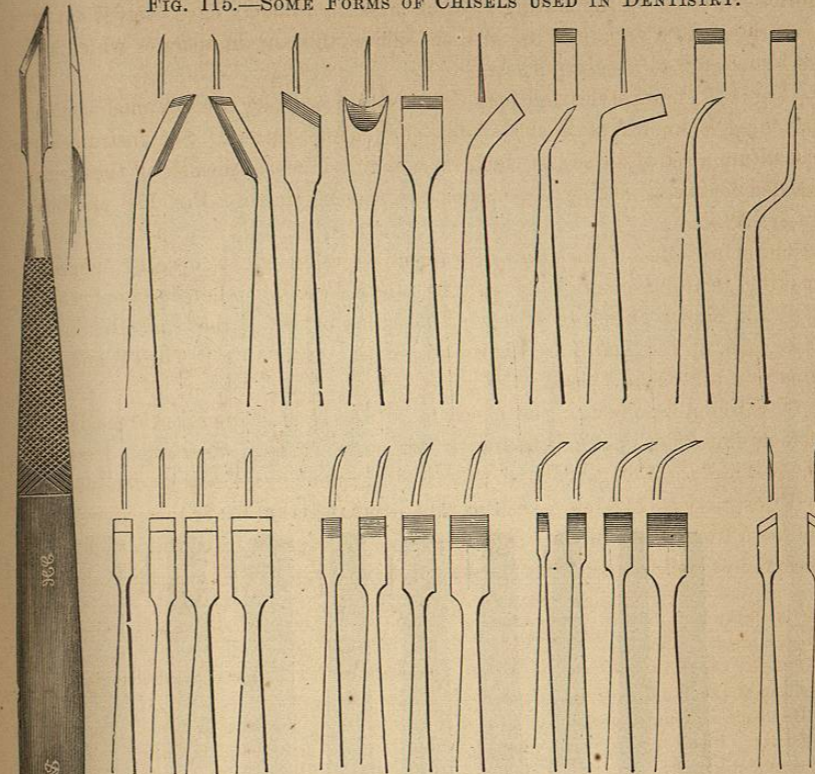
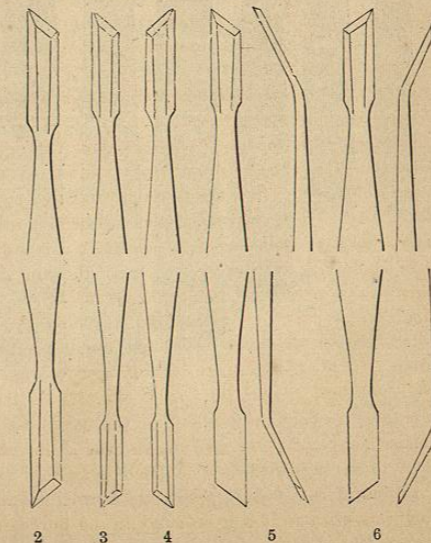


FIG. 116.—JACK'S DOUBLE-END ENAMEL CHISELS.



the incisor teeth. Simple or, as they are more commonly called, separating, files are supplied of different gauges, some being not thicker than ordinary writing-paper; the thickness and variation in size are shown by the cut. Nos. 00 to 4 and 6 have one safe side; Nos. 5, 7, and 8 are cut all over.

FIG. 117.

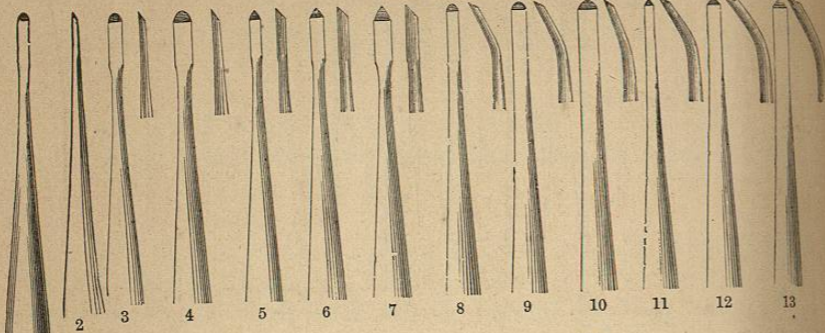
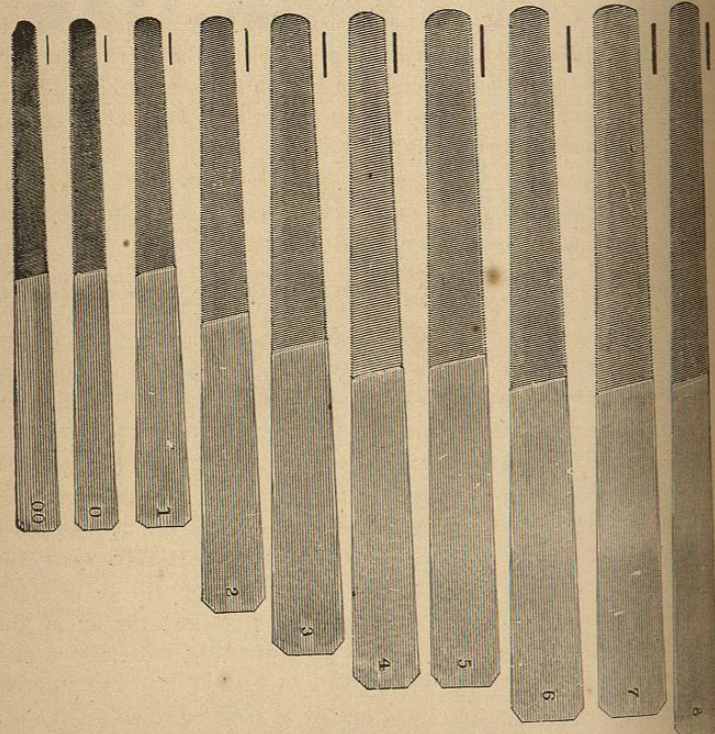
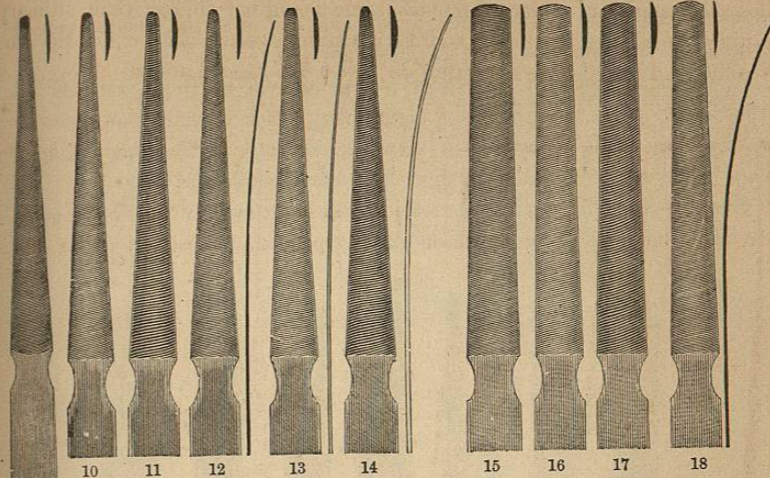


FIG. 118.—SEPARATING FILES.



Files—flat, oval, blunt, and pointed—are in favor for separating quite as much as for purposes of plug-finishing. Fig. 119 shows such files. Made to succeed the straight in the disjoining of all

FIG. 119.



teeth anterior to the molars, perfect attainment can be secured. Nos. 13 and 15 are good grades for beginners to employ.

Another general modification is shown in Fig. 120. The forms of this apply to the separation of molar teeth. A student is to select Nos. 78, 80, and 87.

Carriers designed to render easier the use of files have been devised in great variety. The basal idea of such adjuncts is found in that one known as the Forbes carrier. The cut (Fig. 121) showing this carrier is half the size of the instrument. The files used are three inches in length and from one-eighth to three-sixteenths of an inch in width, and of various thicknesses and cuts. The shaft of the carrier extends through the handle, and can be adjusted at any point by a thumb-screw at the end. Files of shorter lengths can be used and held firmly.

Fig. 122 shows a carrier designed by Dr. W. G. Miller, which is in much favor with operators. This appliance, with the different frames and heads shown, will hold and carry files and saws in any position desired for operations on the teeth. Frame No. 1 is jointed, so that the head can be passed on to the top of it and carry the file at any slope, as seen in No. 3. No. 1 head is also notched, so that, when in a direct line, the top of file drops in the notch, as seen in No. 2, which greatly adds to its rigidity in place. No. 2 frame carries the file or saw rigidly in a straight line, and also at an angle; besides which, its shape at one end allows the head to pass to the place shown in No. 3 and hold the frame at any slant desired.

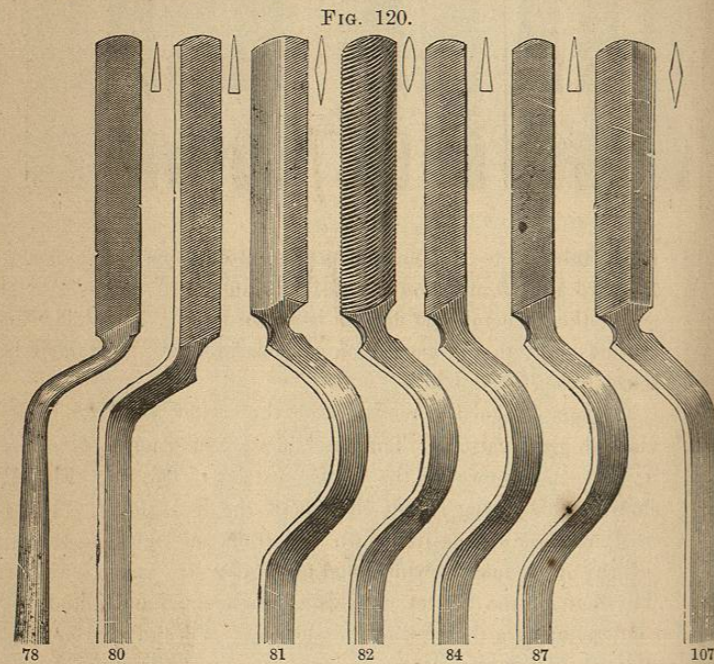
This carrier, with its three heads, as shown, admits of changing direction and slant very quickly. With either the No. 1 or No. 2 it is complete for use. The No. 3 is desirable for holding files to cross-cut and separate;

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rigidity is gained by the bow-spring form of frame. A friction-block in the cavity of the head, between the frame and end of screw, insures very firm holding of the frames, so that they will not slip.

A still later design of file-carrier is one devised by Dr. J. Edward Line; a particular virtue lying with this instrument is that it enables an operator to utilize what would otherwise go to waste, namely, the best part of broken files. The carrier is met with figured in dental catalogues.

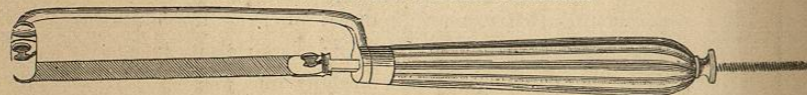
**Saws.**—Saws for separating teeth are an outgrowth of the dental engine. Delicately handled by the experienced, they meet the indications with a degree



of perfectness which, so far as molar teeth are concerned, make them favorites with all. These saws are circular in form.

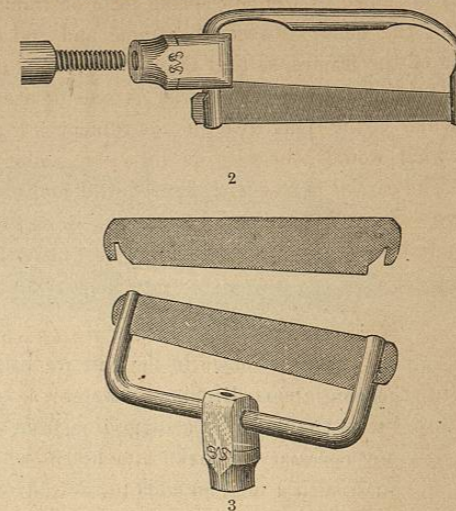
**Corundum Disks.**—Disks made of corundum, used with the engine, are in general use as a means of separating teeth. Fig. 124 represents a side

FIG. 121.—FORBES'S FILE CARRIER.



view of the instrument. To apply a disk of this brittle material requires a delicacy of manipulative tact to be gained alone out of experience. One unfamiliar with its use breaks the piece almost at the moment of application. Students are to master chisel and file before passing to disk and engine; the latter are luxuries, not necessities, in practice. It is not to be overlooked

FIG. 122.—MILLER'S FILE CARRIER.



that some of the best art work accomplished to-day is done by operators owning neither disks nor engine.

The object both of saws and corundum disks is to overcome difficulties and disadvantages residing undeniably in the file and chisel for the purpose in view. This they do in an effectual manner.

Advantages claimed for the corundum disks over

FIG. 123.—KNIFE EDGE. FIG. 124.—SIDE VIEW OF DISKS.

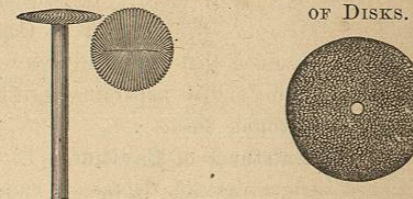
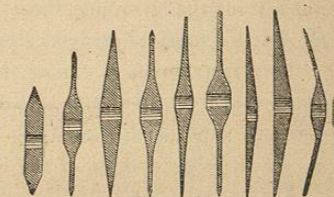


FIG. 125.—DISKS OF CORUNDUM.



other means now known for the purpose of separating are,—1st. By their use the requisite cuttings are made in a manner least disagreeable and painful to

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