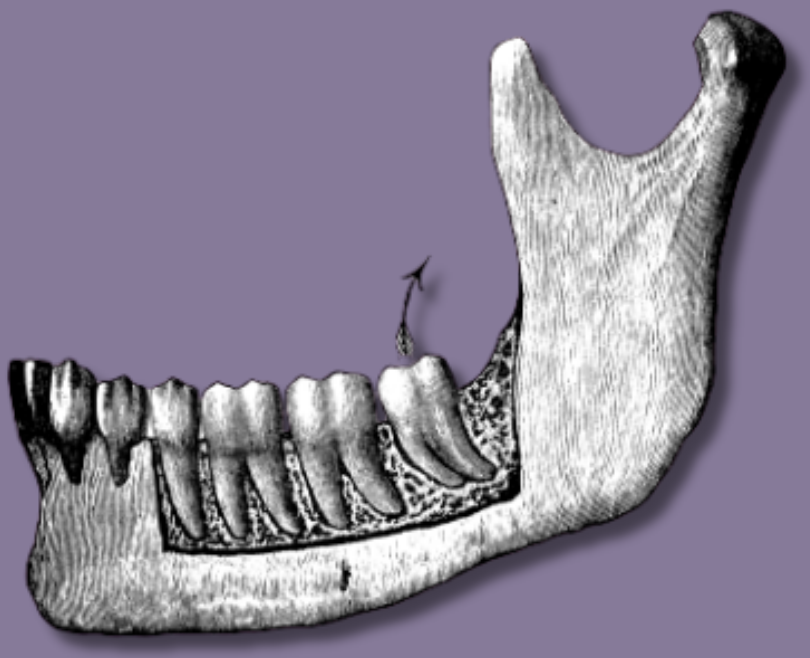
EXTRACTION OF THE TEETH

FRANK COLYER



Vizetek
Yayıncılık

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E-ISBN: 978-625-8725-40-7

Editor-in-Chief: Ferit RESULOĞULLARI
Cover and Page Design: Vizetek Publishing
Material Type: Electronic Book (Online / Web Based)
Electronic Publication Format: Adobe Ebook Reader

Seyranbağları Mah. İncesu Cad. 10/2 Çankaya/ANKARA
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Publisher Certificate No: 41575

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EXTRACTION OF THE TEETH.

CHAPTER I.

The General Principles of Extraction of the Teeth.

As an operation, extraction of teeth is fortunately becoming more rare, but even now large numbers are needlessly sacrificed, in many cases owing to ignorance on the part of the patient of the value of the teeth, at times to lack of knowledge on the part of both operator and patient of the modern methods of conservative dentistry. With the assistance of antiseptics in the treatment of root-canals, and the increase in knowledge of the methods of filling and crowning teeth, it is now possible to retain many which would in former days have been extracted—indeed it may be said with truth that all teeth and many roots are capable of being saved and rendered useful, with the exception of—

(1) Those teeth whose roots are much shortened by absorption.

(2) Those teeth from which the alveolar process has disappeared to such an extent as to leave them quite loose; and

(3) Those teeth attacked with chronic periodontitis, which, in spite of treatment, tends to become worse.

Special circumstances naturally alter cases; for instance, with patients the subjects of nervous prostration, or feeble in health, a lengthy operation is often contra-indicated, and under such conditions extraction may be preferable to the lengthy and tedious processes of conservative treatment. Another indication for extraction is in cases of teeth setting up or aggravating ulceration of the tongue, lips, or other soft parts of the mouth. Teeth fractured in a longitudinal direction should generally be removed, and the same rule applies to those which are so misplaced as to be incapable of being brought into the normal arch. In crowded conditions of the teeth extraction is often called for, and under such circumstances is really conservative treatment.

If extraction be determined upon, *a careful examination of the tooth* to be removed should be made. This will allow some idea to be formed of the amount of sound tissue present, and also of the force which will be necessary for the dislodgment of the tooth. In the case of roots, the edges must be defined, and for this purpose a blunt probe, similar in pattern to that shown in fig. 1 will be found useful.

FIG. 1.

Instruments.—The instruments in general use for the removal of teeth are forceps and elevators. *The Forceps* is an amplified pair of pincers or pliers. It is made up of three parts, namely, the blades or portions beyond the joint which are applied to the tooth, the joint itself, and the handles. Forceps should be made of fine steel, should be light and yet strong enough to withstand without bending any strain that may be put upon them.[1] The blades should be shaped to fit the tooth they are intended to remove, and they should be clear of the crown when applied. On longitudinal section a blade should present a thin wedge-shaped appearance. Two kinds of

joints are met with. In the first variety one half of the forceps passes through a slot in the other, the two being held together by a rivet passing through the centre (fig. 2). In the second variety (fig. 3) the two halves are held together side by side by a screw or pin which takes the entire strain. Most forceps of English manufacture are made on the latter plan, which has the advantage of permitting the instrument to be easily cleaned; it also allows a slight lateral movement of the two halves—a point of some practical importance. It is urged against this style of joint that it is weak; in practice, however, this is not found to be the case.

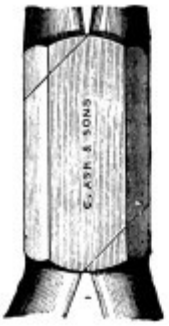

FIG. 2.

FIG. 3.

The handles should be of a size and shape to lie comfortably in the palm of the hand, and should be in such relation to the blades that when the latter are applied in the direction of the long axis of the tooth, the handles clear the lips.

As a general rule, in forceps designed for the removal of the anterior teeth in the maxilla, the blades and handles are in the same line (fig. 4),

FIG. 4.

FIG. 5.

while for the upper back teeth the handles form a curve of greater or less extent with the blades (fig. 5). In forceps for the lower teeth the blades are bent down from the handles to an angle of nearly ninety degrees. In one class, namely, the hawk's-bill, when the blades are applied to the tooth the handles are at right angles to the line of the arch (fig. 6), while in other classes the handles are in line with the arch (fig. 7).

FIG. 6.

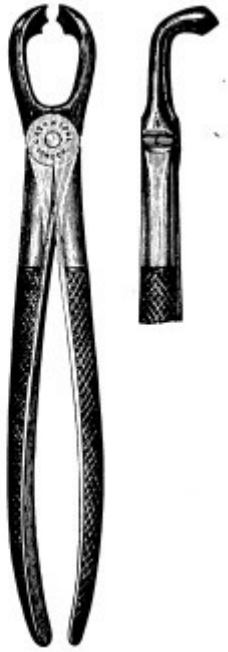

FIG. 7.

The manner of holding forceps is shown in figs. 8, 9, 10. The handles should rest comfortably in the palmar surface of the hand, and in such a manner that the end of one handle rests between the thenar and hypothenar eminences—a portion of the hand where force can be applied with advantage.

The thumb placed between the handles acts as a regulator to control the amount of pressure of the blades upon the tooth. As a precaution it is well to have the ball of the thumb well between the handles, so that the pressure is counteracted not only by the soft tissues, but also by the terminal bony phalanx of the thumb. If this precaution be not observed, any sudden crushing of the tooth may be accompanied by a severe and very painful contusion of the operator's thumb.

FIG. 8.
Mode of holding forceps for the removal of upper teeth.

The Elevator consists of two parts—the handle and the blade. The former, usually made of wood or ivory, is about four inches in length and of a shape suitable to allow a firm grip being obtained of it by the hand. The blade is made of fine steel, and is about two inches long. Elevators are of two varieties, straight and curved. In the first form the blade is thin, about one-fifth of an inch in breadth, one surface being made convex and the other flat. The point of the blade may be rounded as shown in fig. 11, or spear-shaped, as shown in fig. 12.

Fig. 9.
Mode of holding lower "hawk's bill" pattern forceps.

Fig. 10.
Mode of holding forceps of pattern shown in fig. 30.

In the curved variety, the terminal half inch of the steel portion of the instrument is bent at an angle with the shaft of the instrument (fig. 49). The edge of the blade of an elevator should always be kept sharp.

The method of holding an elevator is shown in fig. 13. The handle should rest comfortably in the palm of the hand, the first finger lying along the blade and being brought near the point so as to prevent the instrument slipping. When using the elevator for the removal of teeth on the right side of the mandible, the finger should lie along the curved side of the blade, and on the flat side when extracting teeth on the left side.

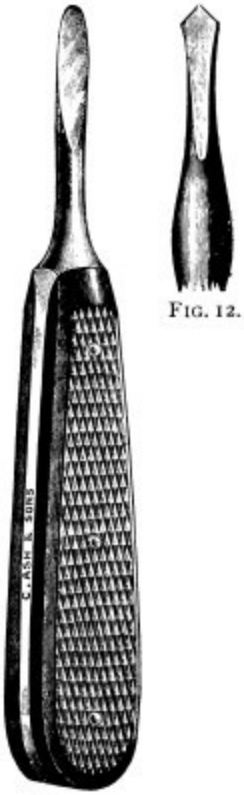

FIG. 12.

FIG. 11.

The Screw (fig. 14) is an instrument which on rare occasions is useful for the removal of deep seated roots.

After being used, instruments of every kind should be freed from all foreign matter and then carefully sterilised.

The next point which demands attention is the **position of the operator and patient**. The chair should be placed before a good light, and if a proper dental chair is not to hand an ordinary arm chair may be utilised; failing this, two ordinary chairs may be placed back to back, on one of which the left leg of the operator should be raised to form a rest for the patient's head. The patient should be placed in such an unconstrained position as will allow the operator to exert all necessary movements with freedom.

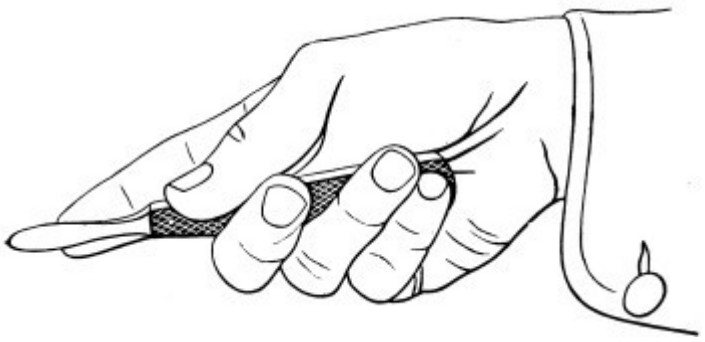

FIG. 13.

FIG. 14.

The operator should place himself so as to use his force to the greatest advantage. His left arm may be utilised, if necessary, for steadying the movements of the patient's head, while the fingers of the left hand can be employed—

(1) To keep the cheek and other soft parts away so as to obtain a clear view of the tooth to be

extracted and its immediate neighbours;

(2) To support the mandible;

(3) To grasp the alveolus and so allow some idea to be gained of the effect of the force employed.

The special positions for the removal of different teeth will be described in chapter ii.

It may be advantageous, before describing the steps of the operation of extraction, to refer briefly to a few **points in the anatomy of the teeth and jaws** which have a direct bearing upon the manner of carrying it out.

If the teeth be examined it will be noticed that they are capable of division into—

(1) Teeth with single, rounded tapering roots;

(2) Teeth with single roots more or less irregularly flattened or curved;

(3) Teeth with multiple roots.

Under (1) are included the upper incisors (temporary and permanent) and the lower bicuspids; (2) the lower incisors and canines (temporary and permanent), and also the upper canines and bicuspids; (3) the upper and lower molars (temporary and permanent) and frequently the first upper bicuspids.[2]

The shape of the roots, as we shall subsequently find, has an important bearing upon the manner in which force is to be applied when severing them from their attachments.

A correct acquaintance with the disposition of the alveoli of the teeth is of importance for skilful and successful operating. Fig. 15 gives a general idea of the appearance of the alveoli, but it is needless to say that a full knowledge can only be really obtained by a careful study of the bones themselves; by this means, too, some idea of the strength of different portions of the alveolar borders can be obtained—a matter of some moment when applying force in the process of removing a tooth from its socket. The points to be specially noted in the maxilla are the thinness of the outer alveolar wall as compared with the inner, the prominence of the canine socket, and the cancellous character of the bone in the region of the third molar. In the mandible the outer alveolar border will be seen to be thinner than the inner, with the exception of that portion in the region of the

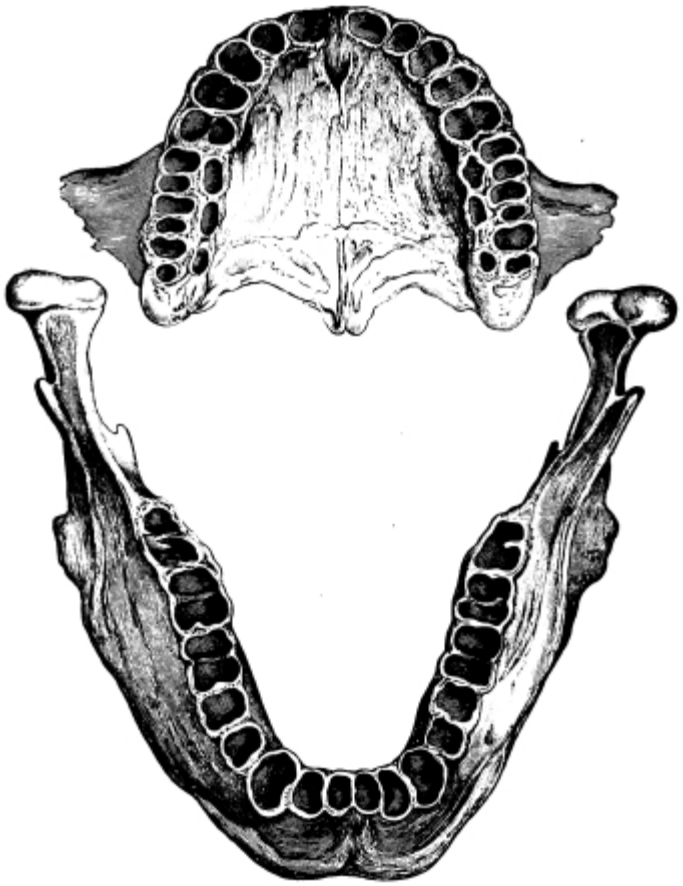

FIG. 15.
From the "American System of Dentistry."

third, and often of the second molar; another fact worthy of attention is that at the posterior portion of the socket of the third molar the bone is moderately dense.

When performed with forceps the operation of tooth extraction may be divided into three stages:—

(1) Adaptation of the forceps to the tooth.

(2) Destruction of its membranous connections with, and dilatation of, the socket.

(3) Removal of the tooth from the socket.

In the initial stage the *first step* is the application of the blades, and, in this connection, care must be taken to see that the points pass between the gum and the tooth, and also that they are applied parallel with the long axis of the root. It is, as a rule, best first to apply the blade on the side of the tooth most obscured from view, and then lightly to close the other upon the opposite side. The blades should then be forcibly pressed upwards or downwards, as the case may be, in the direction of the apex of the root; a slight rotary or wriggling motion will often be found of assistance in the process. This "pressing" movement should be continued until a firm hold of the root has been obtained—a point of great importance, as upon it the successful removal of the tooth in a large measure depends. The handles should next be firmly closed, so as to give the blades a good grip, and the amount of pressure applied should be such, that when movement has commenced the blades do not ride upon the surface of the root. The amount of pressure to be applied must naturally vary according to the character of the tooth to be removed, and the resistance offered by the alveolar process. The thumb placed between the handles of the forceps, as previously pointed out, should counteract the pressure applied to the root and prevent crushing, which, should it occur, may make the subsequent removal very difficult.

The *second stage*—the destruction of the membranous attachments and dilatation of the socket—is accomplished by employing force in either a rotary or a lateral direction. The movement to be employed depends upon the form of the root or roots to be removed and the resisting strength of the surrounding hard structures, and at this point it need only be remarked that rotary motion is alone admissible in the case of teeth possessing a single conical root.

The *final stage* is carried out by exerting extractive force in the direction of the long axis of the tooth, and also in that of least resistance; the latter is determined by a knowledge of the anatomy of the alveolar border, and by the sensation conveyed to the hand through the forceps.

The removal of a tooth with a straight elevator is accomplished in the following manner. The blade, with the flattened surface towards the tooth to be removed, is inserted between the root and the alveolus, the instrument being kept as far as possible parallel with the anterior surface of the crown. The blade is then forced downwards so as to reach the root at as low a point as possible; the handle of the elevator is then rotated away from the direction in which the tooth is to be removed. This has the effect of both raising the tooth in its socket and displacing it in the required direction. One such movement of the instrument rarely suffices for the removal of a tooth, a second, and sometimes a third grip, each time nearer to the apex of the root, having to be obtained.

The method of using a curved elevator will be described in dealing with the removal of the roots of lower molar teeth.

The wound resulting from the removal of a tooth is a lacerated one, and heals by "granulation." The socket immediately after the operation becomes filled with coagulated blood, which is eventually replaced by granulation tissue, followed at a later period by the formation of loose cancellous bone.

A varying amount of absorption of the alveolar border always follows the removal of a tooth, the continuity in the surface of the gum being restored by ordinary cicatricial fibrous tissue.

The wound is best treated by keeping the parts carefully cleansed as far as possible from all foreign matter, and for this purpose an antiseptic mouth-wash[3] should be used several times a

day. From the wound resulting from the extraction of an upper tooth the discharge drains away in a natural manner owing to the orifice being the most dependent part. From the wound caused by the removal of a lower tooth such is not the case, and should suppuration take place the socket must be frequently syringed with some antiseptic solution, and if necessary, packed.

The Extraction of the Temporary Teeth.—Although the actual details of the extraction of the temporary teeth do not differ from those of the permanent teeth, there are, nevertheless, one or two points to which attention may with advantage be directed. First and foremost, a child should not be deceived, and if it is necessary to extract a tooth, the child should be told and not taken unawares. When, too, a child resists having a tooth removed, the operation must not be forcibly carried out, for by a little patience and moral suasion on the part of the operator, the better side of a child's nature can generally be gained. It should also be remembered that anæsthetics are quite as needful for the extraction of the temporary as the permanent teeth, the pain to be borne by a child being quite as great as that to be endured by an adult.

CHAPTER II.

The Extraction of Individual Teeth.

(1)**UPPER TEETH.**—For the removal of teeth in the maxilla the patient should be placed at such a level that the arm of the operator can, if necessary, embrace the head of the patient with comfort. The operator should stand at the right side of the patient, and slightly in front, the first finger and thumb being placed on either side of the alveolus (fig. 16). In the event of the patient becoming restless, the arm should be shifted so as to encircle the head and hold it firmly.

(*a*) **Upper Incisors.**—The roots of both the upper central and lateral incisors are usually cone shaped, the anterior surface being the arc of a greater circle than that of the posterior. Forceps for the removal of these teeth ought therefore to have the blades made in a corresponding manner (see fig. 17). The lateral incisor is smaller than the central, and has at times a root somewhat flattened. In removing upper incisors the posterior blade is applied first, care being taken to

FIG. 16.

see that the edge of the instrument passes between the gum and the tooth. To dislodge these teeth a firm inward movement should be made in a direction towards the palate, this movement being followed by one in an outward direction. If this fails to dislodge the tooth from its attachments, a firm rotary motion, first to the right and then to the left, may be tried (the amount of rotation necessary being only about an eighth of the circle represented by the circumference of the root). Rotation is generally recommended in the first instance for the extraction of these teeth, but the inward movement is, I think, best, the teeth yielding more readily and with less laceration of the soft tissues.

The extraction of the roots of these teeth does not as a rule present much difficulty. When moderately sound the instrument shown in fig. 17 may be used, but in those instances where the root is much decayed, and lies well below the gum margin, a rather finer pair will be found more serviceable. The manner of removal is similar to that used when the crown is standing.

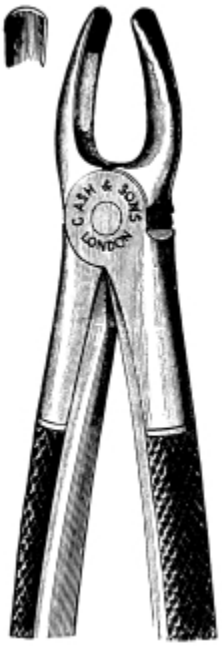

FIG. 17.

(*b*) **Upper Canines.**—These teeth, like the incisors, are single rooted, but the difference between the curve of the anterior and posterior surfaces is greater. The roots too are much longer, more firmly implanted, and hence require more force in their removal. Forceps similar in pattern to those used for incisors may be used, the severance of the tooth from its attachments being brought about by force applied in an inward, followed by an outward, direction. The root being more or less three sided, rotation cannot well be adopted.

The roots of canine teeth are to be removed in the same manner as that adopted for the whole tooth.

(*c*) **Upper Bicuspids.**—The first bicuspid has usually one root flattened and more or less longitudinally grooved on its mesial and distal surfaces. If this grooving is much marked, it results in a greater or less division of the root into two slender terminations. Whether such bifurcation exists or not can seldom be determined before operation and would not modify the method adopted, but the tendency to this variation should be borne in mind and the lateral movement be very gently applied. The internal and external surfaces of the root are for all practical purposes of equal curvature.

The second bicuspid has usually only one root, which is not so flattened in the antero-posterior diameter as the first. There is also not the same tendency to grooving or bifurcation of the root as there is in the first bicuspid.

The blades of forceps for the bicuspids should be equal segments of the same circle; they should also be bent at an angle with the handles, so that the latter may clear the lower lip. The forceps shown in fig. 18 is a useful pattern. In removing an upper bicuspid, the inner blade of the forceps should be applied first. For severing the tooth from its attachments a slight inward movement should first be made, followed by an outward one. If this fails to cause the socket to yield, the inward movement may again be made, followed by an outward one, and repeated if necessary. The removal of the tooth from its socket is to be carried out by force applied in a downward and outward direction. It is well to remember that the force applied to the inward should always be slight compared to that used in the outward direction. The removal of bicuspid roots is carried out in a manner similar to that for the whole tooth.

FIG. 18.

(*d*) **Upper Molars.**—The first upper molar has three roots, one internal towards the palate (palatine), and two external (buccal); of the three the palatine is the largest, sub-cylindrical in form, and often curved. The two buccal roots are placed in an anterior and posterior position, the latter being in a plane internal to the anterior one; both these roots are somewhat flattened, and of the two the anterior is the larger. The roots of the second molar are similar in shape to the first, but are usually smaller. The third molar, when normal, has three roots, but very frequently these are all fused together so as to form an abrupt tapering cone, the point of which is often curved.

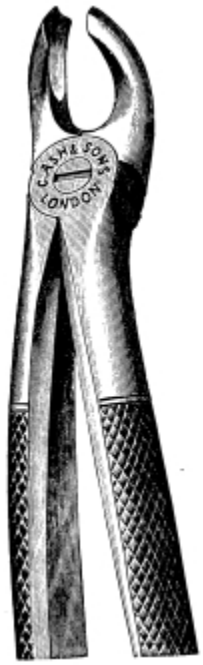

FIG. 19.

Owing to the disposition of the roots different forceps will be required for the removal of upper molars on the right and left side. Of the blades, the outer or buccal should possess two grooves, the anterior being the broader and placed in a more external plane. This blade should also have a slight projection between the grooved surfaces to adapt itself to the space between the buccal roots. The inner or palatal blade should possess only one groove. A well-made pair of upper molar forceps should fit the neck of a first upper permanent molar accurately. The blades should be bent at an angle with the handles, so that when in use the latter may clear the lower lip (fig. 19). The palatine blade should be applied first, and in bringing the outer blade into place the point should be

kept over the groove on the buccal side of the tooth, as this groove is a guide to the space between the outer roots. To sever these teeth from their attachments force must be applied first slightly inwards and then outwards, the movements being repeated if necessary, the removal of the tooth from the socket being carried out by exerting force in a downward and outward direction. Too much outward movement leads to undue bending or fracture of the external alveolar plate.

FIG. 20.

In removing the third molars it is advisable not to have the patient's mouth opened to the fullest extent, as the tension of the tissues of the cheek will thereby be lessened and a clearer view of the outer side of the tooth thus gained. The application of the forceps is of the utmost importance, as one is liable, unless care is taken, to include some of the soft tissue between the blades and the tooth and so cause a painful laceration. Force applied inwards and then outwards is generally sufficient to loosen these teeth, their removal being carried out by a downward and outward movement.

Forceps similar to those shown in fig. 19 may be used for the removal of the third molars, but most operators use patterns the blades of which are similar segments of the same circle (fig. 20).

FIG. 21.

(*a*) Normal upper first permanent molar.
(*b*) Oblique rooted upper first permanent molar.
(*c*) Normal upper second permanent molar.
(*d*) Oblique rooted second permanent molar.

There is *an abnormality of the upper molars* which may with advantage be mentioned here. In this deformity the posterior buccal root is situated in a plane much internal to the anterior—in other words, it is an exaggeration of the normal arrangement. Such teeth have been termed by Mr. Booth Pearsall "*oblique rooted*" (fig. 21). The abnormality is met with most frequently in the third molar, sometimes in the second, rarely in the first. The difficulty encountered in extracting these teeth is that the outer blade of the forceps tends to slip round. Oblique-rooted teeth can at times be diagnosed by noting an undue prominence of the alveolus over the anterior buccal root, and are best removed with forceps similar to that shown in fig. 20.

In cases where a portion of the crown remains and the decay extends well below the gum on either the palatal or buccal side, ordinary molar forceps should be discarded and root forceps

employed; useful patterns are shown in figs. 18, 22 and 23. The removal of teeth in this condition is carried out as follows, and for the sake of description it will be supposed that the decay extends deeply on the palatine side. One blade of the forceps should be first applied to the buccal side of the tooth and to the root which is considered the stronger; the inner blade should then be applied to the palatine root care being taken to insinuate it between the alveolus and the root. The forceps should then be pushed well upwards until a firm hold of the root is obtained. A firm inward movement should then be made, as this will allow the inner blade to pass still higher up the palatine fang and insure steadiness should the blades tend to ride upon the surface of the root. An outward movement should next be made, but to nothing like so great a degree as that used in extracting molars with the whole of the crown standing. This inward and outward movement is to be repeated until the tooth is freed, the force being principally applied in the inward direction.

Fig. 22.

Fig. 23.
For the removal of roots towards the back of the mouth.

When the more extensive decay has taken place on the buccal side the order of proceeding is slightly different. The first blade to be applied should be the palatine, the outer blade being closed upon whichever of the buccal roots is considered the stronger.

The extractive force should be applied first outwards and then inwards, these movements being repeated if necessary, the principal force being outwards, as the object in view is to prevent the instrument slipping off the more decayed side.

When a molar is so decayed that but little of the crown remains, but all the roots are still united , root forceps are indicated. In such a case the inner blade is to be applied to the palatine root first, the outer blade being closed upon the stronger of the buccal fangs. Inward followed by outward movement should be employed, the point to bear in mind being to use force towards the side of the tooth which is considered the weaker. In the majority of such cases the three roots come away together, but even if this does not happen, one or perhaps two will be removed, the remainder being subsequently removed with but little difficulty.

In cases where the resistance presented by the roots is very great and an unsuccessful

attempt has been made with ordinary root forceps, an instrument with a buccal blade similar to that shown in fig. 24 may be used. The inner blade is first applied, the outer one being brought so as to come, if possible, into the space between the buccal roots. A firm hold of the roots having been gained, an attempt to extract should be made by force applied in an inward and outward direction; this failing, sufficient pressure should be put upon the handles to split the roots asunder. The sharp outer blade of the forceps will then pass between the divided buccal roots on to the palatine root, which can thus readily be brought away. A pair of ordinary upper root forceps should be employed for removing the buccal roots.

If all the three roots of a molar are separate , their extraction presents but little difficulty, a slight rotary movement generally sufficing.

In all cases where there is a fear of a molar fracturing, root in preference to ordinary forceps should be used.

FIG. 24.

(2) **LOWER TEETH.**—For the removal of lower teeth the patient should be placed on a low level, the head being kept a little forward and the chin depressed. The position of the operator will naturally differ with the tooth to be removed

FIG. 25.

and also with the instrument to be used. With teeth on the right side, when hawk's-bill pattern

forceps or elevators are used, the operator should stand behind and to the right of the patient, the left arm being brought round the patient's head. The thumb of the left hand should be placed on the inner side and the first finger on the outer side of the alveolus of the tooth to be removed, and the three remaining fingers under and supporting the chin. In placing the fingers in the mouth, care should be taken to keep the wrist well down so as not to impede the entrance of light (fig. 25).

FIG. 26.

When removing the anterior teeth or those on the left side of the mouth, the operator should stand on the right side and slightly in front of the patient. The left hand should be placed as follows: the second finger on the lingual side, and the first on the labial side of the alveolus of the tooth to be extracted, the thumb being placed under the chin (fig. 26).

When employing forceps of the straight pattern shown in fig. 30, the operator should stand as shown in fig. 26, but it will be found difficult to place the fingers of the left hand on either side of the alveolus, indeed they can only well be used for retracting the cheek and supporting the jaw.

In removing teeth from the lower jaw, the operator should be careful, in raising the tooth from the socket, to guard against a sudden separation of the tooth from its attachments which might result in damage to the upper teeth.

FIG. 27.

(*a*) **Lower Incisors.**—These teeth each have a single root which is much flattened laterally. For their removal, forceps similar to those shown in fig. 27 should be used, the blades being equal segments of the same circle. The lingual blade should be applied first, the loosening movement being made by taking the tooth slightly inwards and then outwards, the final extractive force being upwards and outwards.

The removal of lower incisor roots is carried out in a similar manner.

(*b*) **Lower Canines.**—The lower canines have normally one root, which is flattened laterally. In comparison with the incisors, the root is stronger and longer. The removal of a lower canine is carried out in a manner similar to that employed for a lower incisor, but as the tooth presents more resistance, a greater amount of force is usually required.

(*c*) **Lower Bicuspids.**—The lower bicuspids have normally one root which is conical in shape. In the first bicuspid the conical shape of the root is not so marked as in the second, the outer aspect being the arc of rather a larger circle than the posterior. Forceps similar to those shown in fig. 27 may be used, the blades for all practical purposes being equal in size and shape. The lingual blade of the instrument should be applied first, the severing of the tooth from its attachments being carried out by a slight rotary movement around the long axis of the tooth first in one direction and then in the other; should this not succeed, a slight inward followed by an outward movement may be tried, the tooth being raised from its socket by force applied in an upward and slightly outward direction.

The roots of lower bicuspids are to be removed in a manner similar to that required for the extraction of a whole tooth. When the root lies much below the level of the gum the extraction is often troublesome owing to the difficulty in gaining a hold with the blades of the forceps; in such cases, if an attempt with forceps has failed, the straight elevator may be employed.

FIG. 28.

(*d*) **Lower Molars.**—Lower molars have two roots, placed anteriorly and posteriorly. The roots are much flattened and have a tendency to curve backwards, this being well marked in the second and especially so in the third molar; a fusion of the two roots is at times met with in the second and frequently in the third molar. A section of a lower molar at the neck shows both the buccal and lingual aspects to be composed of two segments of a circle touching each other at one

extremity; the anterior segment being slightly the larger (fig. 28). Each blade of the forceps used for these teeth should possess two grooves,

FIG. 29. FIG. 30.

separated by a projection which fits into the division between the anterior and posterior roots; for all practical purposes the blades may be made of the same size, so that one instrument will suffice for both sides of the jaw. The instrument best adapted for the removal of these teeth is shown in fig. 29, though some operators prefer the shape illustrated in fig. 30. The advantages of the former over the latter may be briefly summed up as follows:

(1) A clear view of the tooth and its surroundings can be obtained during the whole period of removal.

(2) Force can be applied with greater advantage.

(3) The alveolus can be easily embraced by the fingers, or by the finger and thumb of the left hand.

(4) In removing the tooth from the socket a slight backward movement can be employed.

One disadvantage of shape fig. 29 is that it is difficult to employ much inward movement, and therefore, for teeth lying inwards, namely, with the crown directed towards the tongue, hawk's-bill-shaped forceps cannot easily be used.

Another disadvantage is that the extent of inward movement is limited by the proximity of the upper teeth, and in case of trismus it is often better to use straight forceps (fig. 30). In cases where there are also much swelling and rigidity of the cheek the straight forceps cause less inconvenience to the patient.

In removing lower molars with forceps, the inner blade should be first applied and then the outer, care being taken to get the points of the blades between the interspace of the roots. For severing these teeth from their attachments, a slight inward movement should be first made, followed by one well outwards, this inward and outward movement being repeated if necessary. The removal of the tooth from its socket is carried out by force used in an upward and outward direction. The upward force exerted upon lower teeth should always be well under control, as not infrequently the resistance is very suddenly overcome, and, if such precaution is not taken, there is danger of striking the upper teeth with considerable force.

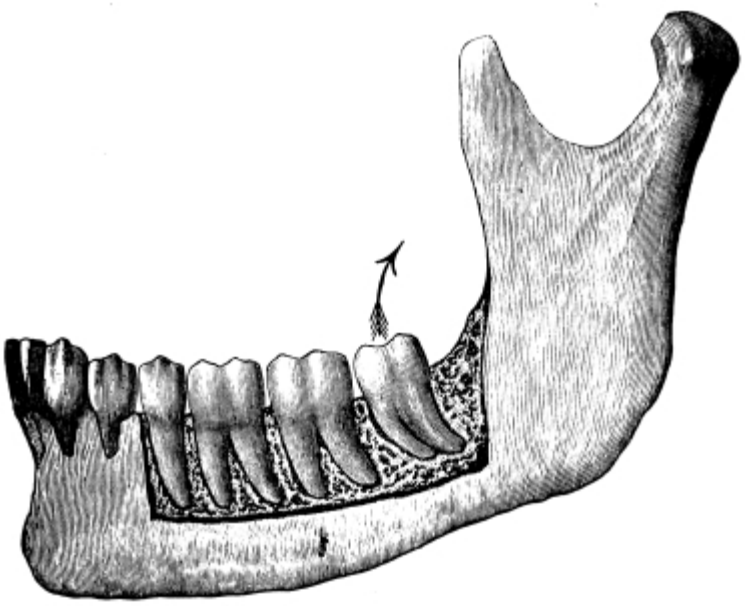

FIG. 31.

As previously pointed out, the roots of these teeth are at times curved a little backwards so that it is often needful in removing the teeth from their sockets to twist the forceps in a curved direction backwards.

In the removal of the second molar too much outward movement is not permissible, as the outer alveolus is often very dense.

The third molar is best removed with a straight elevator. A glance at the illustration of this tooth (fig. 31) will show that the roots have a well-marked curve backwards, in addition to which the bone forming the socket of this tooth is stronger than is the case with the anterior molars. The removal of the third molar has therefore to be accomplished by using force in a direction upwards and backwards, in other words, in a curve similar to the arc of the circle formed by the roots. This movement cannot well be carried out with forceps, but is easily accomplished with the elevator as follows (it being assumed that the second molar is in place):—Hold the elevator as shown in fig. 13, and insert the blade between the anterior surface of the root and the alveolus, keeping the flattened side of the instrument as far as possible parallel with the root surface. Then force the blade downwards in a direction towards the apex of the root; following this, rotate the handle away from the direction in which the tooth is to be moved. This has the effect of both raising the tooth in its socket and displacing it backward. The edge of the elevator which is to be brought into contact with the surface of the root should be sharp so as to cut somewhat into the cementum. Should this prove insufficient the handle should again be raised and the flattened surface of the instrument brought parallel with the anterior surface of the root and the extractive movement repeated until the tooth is completely raised from its socket.

In using the elevator, especial care must be taken to protect the tongue with the fingers or thumb of the left hand, so as to prevent a slip, which might result in puncture of the tongue, or of the operator's finger.

With the third lower molar there is a tendency for the gum to adhere tenaciously to the posterior part of the neck of the tooth. When this happens it is better to simply raise the tooth from its socket with the elevator or forceps, as the case may be, and then cut the gum away with a curved pair of scissors. By this method a severe laceration of the gum may at times be avoided.

When the third molar is isolated owing to the absence of the second molar, the elevator may still be employed for its removal, on the right side the first finger, and on the left side the thumb of the left hand being used as the fulcrum. In such cases, however, many operators prefer to use ordinary lower molar forceps.

The removal of lower molars when a portion of the crown is standing, but the decay has progressed below the gum on either the buccal or the lingual aspect, is carried out with root forceps of shape shown in fig. 27. A condition similar to this in upper molars and the method indicated for

their removal were referred to on page 27. The principles enumerated there apply equally to the removal of lower molars, so that it will not be necessary to repeat them. The main points to bear in mind are, to apply the blades of the forceps to the stronger root, and to use the principal force in the direction of the weaker wall.

Where the roots of molars are still united, root forceps should be used, the blade being first applied to the lingual surface of the stronger root. A firm hold having been obtained, the root may be removed by employing force in a manner similar to that employed with ordinary molar forceps. In this way both roots will usually come away together. If, however, only one root is extracted, the remaining one can easily be removed, either with the same forceps or a curved elevator. The curved elevator (fig. 49) may be employed either by placing it against the root, and so forcing it into the socket of the root already removed, or by placing the blade in the socket of the extracted root, forcing the point of the instrument through the intervening bone and then elevating the remaining root.

With roots of lower molars which present great resistance, forceps with cutting blades may be used (fig. 32). The blades are inserted on the lingual and buccal aspects of the arch in such a manner that the points pass into the space between the roots. The handles are then closed and an attempt is made to remove the roots in the ordinary way, but should this prove unsuccessful the handles must be forcibly closed, so as to divide the roots which can then, as a rule, be removed with ordinary root forceps.

The value of splitting roots in a case similar to that shown in fig. 33 is apparent, for, as will be seen, it allows each root to be removed in the line of its inclination.

FIG. 32.

In those cases where the roots are separated their removal is carried out with root forceps, an inward and outward movement being usually sufficient.

The roots of third molars are best removed with a straight elevator. The *modus operandi* is similar to that used in extracting the whole tooth.

a *b*

FIG. 33.

(*a*) Lower molar with divergent roots. (*b*) The dotted lines show the direction in which the root can be removed if the tooth is divided as suggested in the text.

At times the lower molar teeth are much tilted in such a way that the crown surface stands towards the tongue.—Under such conditions their removal is best carried out with instruments of the pattern shown in fig. 30, since the handles of forceps of the hawk's-bill pattern when applied would come in contact with the upper teeth, and thus impede the inward movement which is so necessary for the removal of teeth in this position.

The Temporary Teeth.—For the removal of upper incisors and canines, a small pair of straight forceps of the pattern shown in fig. 34 should be used. The first upper temporary molars are best removed with a pair of forceps like fig. 35.

The lower incisors and canines require a small pair of hawk's-bill forceps similar to the shape shown in fig. 27. For the lower temporary molars, a small pair of forceps similar to that illustrated in fig. 29 should be used.

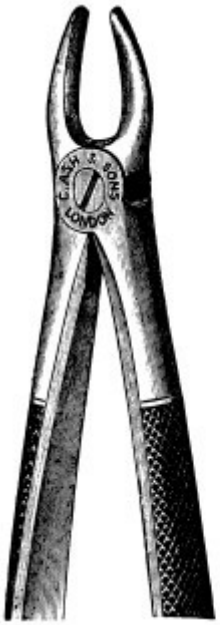

FIG. 34.

FIG. 35.

In removing the temporary teeth, care must be taken not to drive the forceps up too high, for fear of injuring the permanent teeth; this is more especially to be noted in connection with the temporary molars, as the roots of these teeth practically embrace the crowns of the bicuspids. Generally speaking, if a temporary molar fractures in the attempt to remove it, the portion of tooth remaining in the jaw should be left alone unless it can be brought away quite easily.

FIG. 36.

Roots in the condition shown in fig. 36 are best removed with an elevator as follows: the thumb of the right hand being placed on an adjacent tooth so as to gain a hold, the point of the elevator should be placed below the end of the root and force applied. In a few cases it may be necessary to cut the gum with a lancet before using the elevator.

Small pieces of the temporary teeth which persist and become wedged in between the permanent teeth can be best removed with an excavator or a similar suitable instrument.

CHAPTER III.

The Extraction of Misplaced Teeth.

NOTHING, perhaps, tests the skill of a good operator more than the extraction of a misplaced or impacted tooth, and although it is impossible to give anything like a complete list of the various malpositions met with, those most commonly seen will be mentioned, and the usual method for removing such teeth indicated.

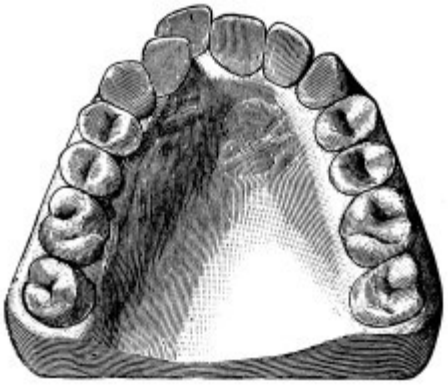

FIG. 37.

(*a*) **Upper Central Incisors.**—An irregularity of this tooth calling for removal is shown in fig. 37.

The extraction is best carried out with an instrument similar to that shown in fig. 38, the fine inner blade being applied on the palatal side and the broad blade on the labial. Extractive force should be applied principally in the outward direction, and if this is not sufficient, slight rotary movement should be tried. In cases where there is less room between the approximal teeth, the projecting tooth may be removed with a pair of straight forceps (fig. 17), the blades being applied to the mesial and distal aspects of the root. The blades should not be driven very far up, and the loosening of the tooth should be accomplished by slight rotary motion, in using which care should be taken to avoid loosening the approximal teeth.

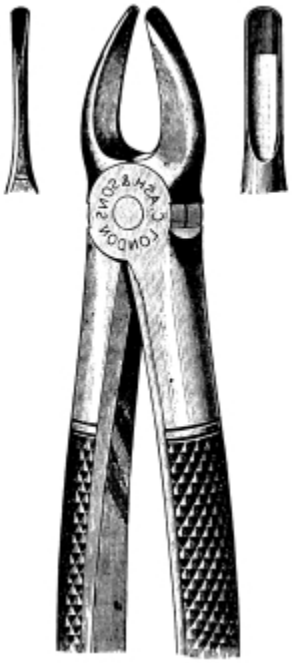

FIG. 38.

(*b*) **Upper Lateral Incisors** lying internal to the arch, as shown in fig. 39, can be removed

with the forceps shown in fig. 38, by placing the fine blade on the labial and the broad blade on the palatal side of the tooth. Extractive movement should be made inwards, followed by very slight outward movement; this failing, rotation should be tried, but as pointed out on a previous page, this form of movement is not so suitable for lateral incisors as for centrals.

FIG. 39.

(*c*) **Upper Canines** placed high in the arch, as shown in fig. 40, may be extracted with a straight pair of forceps (fig. 17), the blades being placed on the mesial and labial aspects of the root. Extraction of such teeth is very difficult. Slight but firm rotation may first be tried; if this fails to loosen the tooth, slight lateral movement may be attempted, the force being applied towards and then away from the median line of the mouth.

FIG. 40.

FIG. 41.

(*d*) **Upper Bicuspids** misplaced, as shown in fig. 41, can be removed with forceps, as shown in figs. 18 and 22, the blades being applied on the anterior and posterior aspects of the tooth. Force should be applied in a backward and forward direction, the movements being repeated and persevered with until the tooth is loosened in its socket.

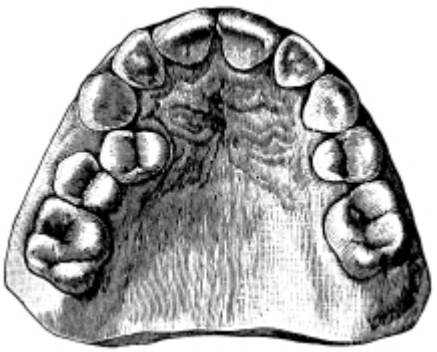

FIG. 42.

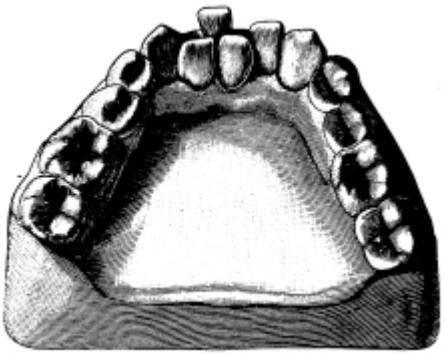

FIG. 43.

A bicuspid placed as shown in fig. 42 can be removed with forceps similar in form to those depicted in figs. 18 and 22, with the outer blade strong but narrow. The extractive movement should be made mainly in an inward direction.

FIG. 44.

(*e*) **Lower Central Incisors** placed similarly to that shown in fig. 43 may be removed with ordinary lower root forceps (hawk's-bill pattern), the blades being placed on the mesial and distal surfaces of the root, and movement applied in a direction to and away from the median line of the mouth. When the crowding is not so extreme as shown in fig. 44, forceps of the hawk's-bill pattern with a strong but narrow inner blade should be used (fig. 45), and the principal extractive movement made in an outward direction. For an incisor placed as shown in fig. 47, the narrow blade should be the outer one (fig. 46), and the principal force should be applied in an inward direction.

(*f*) **Lower Bicuspids** placed as in fig. 48 are

FIG. 45.

FIG. 46.

most difficult teeth to remove. One of the most useful instruments for their extraction is a pair of upper root forceps (Read's pattern, fig. 22), which should be held so that the curve of the blades is downwards. The blades should grasp the root on its anterior and posterior surfaces. Slight rotary movement may first be attempted, followed by lateral motion. These movements may be persevered with until the tooth is found to yield. Too much haste may lead to a fracture, which would be extremely difficult to deal with.

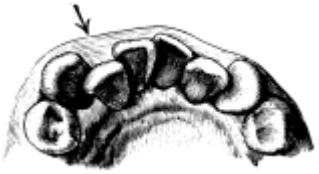

FIG. 47.

FIG. 48.

In cases where the crowding is not so great, and the tooth is more in the normal line of the arch, a forceps with a narrow outer blade will suffice (fig. 46). Extractive force should be used principally towards the median line of the mouth, and this may be combined with slight rotary movement.

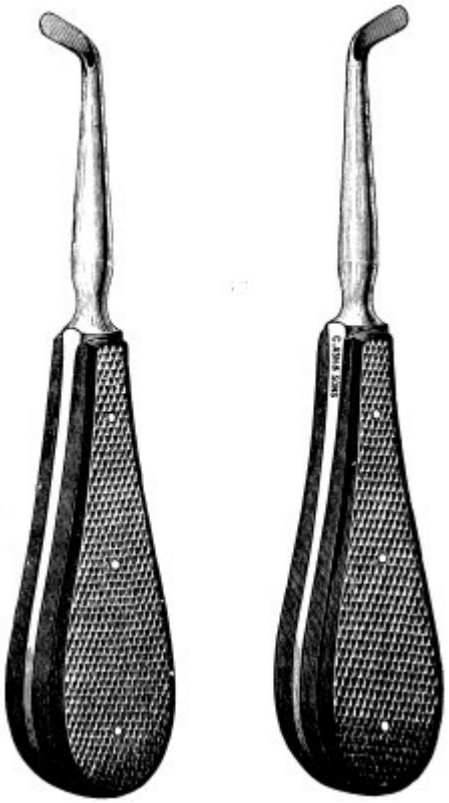

FIG. 49.

(*g*) **Impacted Lower Third Molars** are amongst the most difficult teeth to extract. Where the tooth is deep-seated, the gum should be pushed aside by careful packing, and as clear a view of the tooth as is possible obtained. For removing these teeth it is difficult to give any rules, as each case must be treated on its own merits.

As useful an instrument as any for their removal is a curved elevator (fig. 49), the blade of which can often be inserted under the crown, and assuming that good leverage is thus obtained, the tooth can be prised up. Sometimes the tooth is firmly embedded in the bone. In such cases a clear view of the tooth may be obtained by gradually packing the soft tissues apart, the periosteum covering the alveolus should then be raised, and the bone surrounding the tooth cut away with suitable instruments. The tooth, when freely exposed, should be removed with an elevator or forceps.

The wound resulting must be carefully packed and treated as described on page 85.

CHAPTER IV.

The Use of Anæsthetics during Extraction of the Teeth.

THE anæsthetics used during the extraction of teeth may be divided into two classes, viz.:— general and local. It is not proposed to make any allusion to the methods of administering general anæsthetics, as they hardly fall within the scope of this volume. There are, however, a few points which the operator should bear in mind when employing them and which may with advantage be briefly dwelt upon, but before considering these, a word or two may not be out of place with regard to the choice of the anæsthetic. In dental practice three agents are generally used, nitrous oxide alone or in combination with air or oxygen, ether and chloroform.

In the very large majority of dental operations nitrous oxide is to be preferred to ether and chloroform, and possesses the great advantage over them of being practically safe. In addition, the administration of nitrous oxide occupies a shorter period, and the recovery is rapid and complete. Within the last few years, combinations of nitrous oxide with oxygen and with air have been introduced by Dr. Hewitt and Mr. Rowell respectively, and both combinations possess advantages over nitrous oxide used alone.

The advantages of nitrous oxide and oxygen over nitrous oxide alone are :—

(1) The anæsthesia is quieter.

(2) The mucous membranes of the mouth do not swell to the same extent, and the operator therefore gains a clearer view of the tooth.

(3) The period of anæsthesia is lengthened, perhaps by only a few seconds, but the quieter condition of the patient assists indirectly in prolonging the period for operating.

The advantages of nitrous oxide with air over nitrous oxide alone are somewhat similar to those of nitrous oxide and oxygen, though less marked.

For operations requiring a long anæsthesia, such as the extraction of a difficult third molar, ether should be used, the administration being commenced with nitrous oxide. In such cases many operators prefer to use chloroform, but the regular employment of this agent in dental surgery is to be severely condemned, and the cases are rare indeed in which its use is called for. A most careful inquiry into this important subject has been made by Dr. Hewitt, and the results of his work were communicated in an exhaustive paper published in the *Journal of the British Dental Association* for November, 1895, which is well worthy the perusal of all those who are in the habit of administering chloroform.

Whenever a general anæsthetic is given for the removal of teeth, two people should always be present, one to confine his attention solely to the administration of the anæsthetic, the other to the removal of the tooth, as it is impossible for one person to operate and at the same time to observe the condition of the patient during the anæsthetic period. This rule should be strictly adhered to.

For extraction under nitrous oxide, and also to a great extent under ether, the positions of the patients should differ but little if at all from those already advocated, with this exception, it is advisable not to have the head too far back. Before the administration of the anæsthetic is commenced, any removable artificial teeth that may be in the mouth should be taken out; the operator should decide exactly what he intends to do; at the same time it is well not to attempt too much and to avoid pricking the gum during the examination of any roots that it may be necessary to extract. The prop should be placed on sound firm teeth in such a position that the operator can work without being hindered by it, and a final view of the mouth should be taken. Where several teeth have to be extracted at one sitting, their order of removal should be decided upon before the operation is commenced, and if any particular tooth is causing pain, it should be extracted first. The order of removal should also as far as possible be arranged so that changes of instruments are reduced to a minimum. As a rule, lower teeth should be extracted before upper teeth, because if the latter are removed first, the blood may pass down and so obscure the lower ones. Roots should be removed before whole teeth for the same reason. Each tooth or root must be cleared from the

mouth before any attempt is made to remove another except in cases where the gum is thoroughly adherent; under this condition the tooth or root may be left and freed from the gum when the patient has recovered. With teeth which have a liability to slip out from between the blades of the forceps, it is well as a precaution to keep a finger of the left hand behind the blades to prevent the tooth passing backwards should it slip out.

LOCAL ANÆSTHETICS.

(*a*) **Cocaine.**—The most efficacious of the local anæsthetics in use is cocaine. It is an alkaloid obtained from the dry leaves of Erythroxylon Coca, and in practice the hydrochlorate form is generally used. For the removal of teeth it is necessary to inject a solution of the drug into the tissues, a simple application to the gum being of little use. Cocaine has the reputation of not being thoroughly reliable in its action, but this in a great measure often arises from want of care in injecting it. Not more than half a grain should be injected for the removal of a tooth, and even then with people of feeble health, untoward symptoms may supervene.

Mode of Employment.—A fresh solution of the drug should be made each time its use is called for, by dissolving a tabloid weighing half a grain in 5 minims of distilled water. Half of the solution should be injected into the gum on each side of the alveolus. The gum being such a dense tissue, the solution should be injected slowly, otherwise the bulk of it will escape by the side of the needle into the mouth. As there is always a tendency for this to happen even when the solution is slowly injected, it is well to keep a finger of the left hand pressed on the gum where the needle is inserted.

Speaking personally, I usually occupy about eight minutes over the injection, and wait for four or five minutes after its completion before operating. As a local anæsthetic I have generally found cocaine satisfactory, so far as its anæsthetic properties are concerned, but the occasional appearance of toxic symptoms, especially in those of feeble health, should not be lost sight of. Tropacocaine has been recommended as possessing the anæsthetic properties of cocaine without giving rise to toxic effects, but in practice I have not found these statements fully borne out.

Toxic Effects.—The administration of cocaine, especially if given in large doses, may be followed by well-marked toxic effects of which the following are cited by Dr. Hewitt.[4]

“Headache; vertigo; pallor; a cold, moist skin; a feeble, slow, or rapid pulse, becoming imperceptible in grave cases; incoherence of speech; nausea; vomiting; unconsciousness; trismus and other muscular spasms; epileptiform attacks; dilated or unequal pupils; and disturbances of respiration, culminating in dyspnœa and asphyxia.” The treatment of cocaine poisoning should be directed first to restoring the circulation by the administration of a rapidly acting stimulant, such as sal-volatile, brandy, or the hypodermic injection of ether. The patient should be placed in the horizontal position, and the respiration watched for; should this tend to fail, artificial respiration must be immediately resorted to.

(*b*) **Freezing Agents.**—This group includes such preparations as *chloride of ethyl*, *coryl* (a mixture of chloride of ethyl and chloride of methyl in such proportions that the mixture boils at 0° C.) and *anestile*. Generally speaking, the anæsthesia produced is by no means satisfactory, and to use them to the greatest advantage, attention must be given to the following points:—

(1) The gums must be well dried, and as far as possible all neighbouring regions, such as the cheeks or tongue, protected by napkins or other suitable material.

(2) The gums must be thoroughly frozen before commencing to operate.

(3) The extraction must be carried out as quickly as is consistent with thoroughness.

(4) If possible the spray should be continued during the operation.

(5) Too great a jet should not be used.

Freezing agents can be employed much better for front than for back teeth, in fact it is found at times difficult to freeze the gums at all satisfactorily at the back of the mouth.

CHAPTER V.

Difficulties, Complications and Sequelæ of Extraction of the Teeth.

LIKE all other surgical operations, the extraction of teeth is at times attended with certain difficulties, complications and sequelæ which for the sake of description will be considered under the following headings:

(1) Difficulties, complications and sequelæ connected with the teeth themselves.

(2) Difficulties, complications and sequelæ connected with the jaws.

(3) Difficulties, complications and sequelæ connected with the soft parts.

(4) Difficulties, complications and sequelæ arising during extraction under anæsthetics.

(5) Miscellaneous complications, difficulties and sequelæ.

(1) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ CONNECTED WITH THE TEETH THEMSELVES.

(*a*) **Undue Resistance of the tooth and alveolus.**—Considerable resistance to our efforts to remove a tooth at times occurs. This is naturally most often, though by no means always, met with in those of strong physique. Teeth isolated are always firmer than those in series; this is accounted for by a consolidation of the bone around them. Experience will act as a guide, and it is to a certain extent possible, after a little observation, to gather from the general appearance of a tooth if it will give more than normal trouble in removal. Should undue resistance be met with, steady attempts to move the tooth slightly in different directions should be made and persevered with; if this precaution is not taken and too much force is used in any one direction, fracture of the tooth or alveolus is sure to result. It may, perhaps, be found impossible to remove the tooth; when this is the case it is best to dismiss the patient and to make a fresh attempt two or three days later; the tooth will then probably be loose, as a result of the inflammation which has been set up by the previous attempt at extraction, and can be easily removed.

The causes of undue resistance are:—

(i.) Abnormal density of the alveolar process.

(ii.) Divergent and twisted roots.

(iii.) Alteration in the shapes of the roots brought about by periodontal inflammation (exostosis).

(*b*) **Fracture of the tooth.**—The principal causes of this accident are:—

(i.) The use of badly fitting forceps.

(ii.) The use of unnecessary or wrongly applied force in attempting to loosen the tooth in its socket.

A tooth having been fractured, the patient should be made to rinse the mouth until the bleeding has ceased, the socket should be dried with cotton-wool, and the position and edge of the root defined with a probe before attempting to remove the fractured portion. It is neglect of these steps that so often leads to failure to remove the remaining portion of a fractured root. Too many attempts to remove a fractured root should not be made; if a second endeavour proves fruitless, the patient should be dismissed and a fresh attempt, if necessary, made after a period of one or two days, as the tooth will probably then be looser from inflammatory trouble, moreover, the hæmorrhage having ceased, it will be possible to obtain a clearer view of the root. Before, however, dismissing the patient, an anodyne mouth wash should be prescribed, and the pulp if exposed touched with carbolic or nitric acid. The lower third of a root may generally be left without fear of unpleasant consequences; but it is always well to inform the patient when any portion of a tooth is allowed to remain in the jaw, as such knowledge may be of assistance should any trouble arise at a subsequent date.

(*c*) **Crowded and irregular teeth.**—The removal of these has already been referred to in

(*d*) **The Removal of the wrong tooth.**—The removal of the wrong tooth may occur and is naturally due to carelessness on the part of the operator. Should this accident arise, the tooth must be immediately replaced and if necessary secured with a ligature. If the pulp subsequently shows signs of degeneration or inflammation it should be removed and the canal treated and filled.

(*e*) **Removal of a neighbouring tooth.**—This may occur and is generally due to a crowded arrangement of the teeth. The accident seems to occur most frequently with the removal of the first permanent lower molar, the neighbouring tooth usually involved being the second bicuspid which is simultaneously dislocated from its socket. This accident can be avoided by placing the thumb on the tooth which shows a tendency to move, and exerting only as much force in the removal of the tooth which is being extracted as can be controlled by the thumb. If a neighbouring tooth is removed it must be replaced and treated in the same manner as described above.

(*f*) **Removal of an unerupted bicuspid.**—This may be an avoidable or an unavoidable accident. At times the developing bicuspid is so firmly embraced by the roots of the deciduous molar that during the extraction of the latter tooth the bicuspid is removed—such an accident cannot be avoided. It is an avoidable accident when it occurs during the extraction of the roots of a temporary molar and arises from using too much force. As previously pointed out it is best to leave the fractured roots of temporary molars alone unless they can be easily removed.

(*g*) **Breaking one tooth in extracting another.**—In the extraction of lower teeth with hawk's-bill forceps the upper teeth may be fractured. This accident is most likely to occur to the inexperienced, and arises from the tooth leaving its socket suddenly, due frequently to the extracting force being used in an upward rather than an outward direction. It may, however, occur when a lower tooth has been more than normally resistant. In all such cases it is well for the operator to be on guard by keeping the thumb or a finger of the left hand over the joint of the forceps.

Also in using the elevator an adjacent tooth may be fractured.

(2) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ CONNECTED WITH THE JAWS.

(*a*) **Fracture.**—The fracture and removal of a small piece of the alveolus is not an unfrequent accident which is fortunately by no means serious. It is sometimes unavoidable but at other times is due to getting the blades of the forceps on the outer sides of the alveolus instead of between the bone and the root of the tooth.

Extensive fracture is sometimes seen, for instance in a case that came under my notice at the Dental Hospital of London an unqualified person in removing the first lower right permanent molar fractured the bone in a horizontal direction so that the second and first bicuspids with the canine were completely separated from the body of the bone. Mr. Salter[5] gives an account of an extensive fracture of the jaw which occurred in a lady æt. 35. The fracture occurred in connection with the removal of the superior central incisors. The right central incisor required some force for its removal, and when it came away the whole of the front of the alveolus was firmly attached to the root. In removing the left central incisor considerable force was required during the exertion of which the bone was fractured. On examination of the parts the mass of bone corresponding to the intermaxillary bone was found to be merely held in place by the soft tissues. "A vertical fracture extended from the side of the canine up to the root of the nose, then nearly horizontally across to the opposite side, being connected there with another vertical fracture. The lesion passed completely through the jaw from before backwards, and there was a wound in the palate three quarters of an inch from the alveolar border, through which was considerable hæmorrhage." A still more severe example of fracture during extraction of teeth is recorded by Mr. Cattlin,[6] where in an attempt to remove a third upper molar with an elevator the tuberosity of the maxilla, a portion of the floor of the antrum and part of the sphenoid were fractured.

Fracture of the maxilla tuberosity may occur during the removal of the third upper molar, and Mr. Nicol[7] records such an accident during the removal of the second upper permanent molar. In a case recorded by Mr. L. Matheson[8] a transverse fracture of the maxilla occurred in a line between the first and second permanent molars during the removal of the first-named tooth.

Direct transverse fracture of the horizontal ramus of the mandible due to extraction of the teeth has also been recorded.

Treatment.—In fracture of small portions of the alveolar process, no special treatment is called for except that all loose fragments should be removed. When the fracture is of a more extensive character, the fragments must be retained in position by a suitable form of splint, a description of which will be found in most works on dental surgery.

(*b*) **Necrosis** of the alveolus may result from extraction and is generally the result of undue violence or of some septic process occurring in the wound. The *treatment* to be followed consists of the use of antiseptic and deodorant mouth washes; the necrosed bone when quite separated from the living tissue should be removed with a pair of suitable forceps.

(*c*) **Dislocation of the mandible.**—The use of too much force in extracting a lower tooth and not at the same time counteracting the force by supporting the chin, may lead to unilateral or bilateral dislocation of the mandible. This accident may also be brought about by forcing the mouth open too much with a Mason's gag during the administration of an anæsthetic. It may likewise occur without the employment of undue force in those who have previously met with or are liable to dislocation.

Reduction may be brought about by placing the thumbs, carefully wrapped in a napkin, on the molar teeth and the palmar surfaces of the fingers below the chin. If downward pressure is then made with the thumbs, and upward pressure with the fingers, the condyles of the mandible will generally pass back easily into the glenoid cavity. In cases where more difficulty than this is experienced, the patient should be placed in a recumbent position, and corks should be inserted between the back teeth. Upward pressure should then be applied on the under surface of the chin. It is advisable, after reduction, for the patient to wear a four-tailed bandage for about a week.

(*d*) **Forcing a root into the antrum.**—This accident occurs mostly in connection with the extraction of the second upper bicuspid root and buccal roots of the first upper permanent molar. If a root has been so dislocated into the antral cavity as to still partly remain in its socket, the best course to pursue is to leave it alone and not to attempt removal as the attempt might only result in complete dislocation of the root into the antrum. The socket should be kept quite clean by the continual use of antiseptic washes. As a rule the root gives rise to no subsequent trouble.

When a root has been forced completely into the antrum, the latter should be enlarged and the antral cavity thoroughly syringed. For this purpose it is well to use an aural syringe of five or six ounce capacity. The rationale of this form of treatment is that the root may pass out with the return current from the antrum. If this treatment fails, an attempt may be made to remove the root with a little scoop of gutta-percha fixed on to a flexible wire. When it cannot be removed in this manner, the cavity should be thoroughly irrigated with an antiseptic solution and the root left alone, as it will in all probability become encysted and not give rise to any subsequent trouble. If, however, the patient has a history of epitheliomatous disease of the jaws further attempts should be made to remove it. A case where a tooth was forced into the antrum in a patient with a family history of epithelioma of the jaw is recorded in the Transactions of the Odontological Society, vol. ii., page 15, old series.

(*e*) **Forcing a tooth into an abscess cavity.**—This accident may occur; if it does, it requires similar treatment to the accident just described in connection with the antrum.

(*f*) **Trismus.**—Inability to open the mouth naturally renders extraction of the teeth more difficult than usual. When, however, the closure is the result of inflammatory trouble in connection with the lower molars, an anæsthetic should be given and the mouth opened forcibly with a Mason's gag. If the trismus is the result of tonic contraction of the muscles closing the jaw, ether should be used in order to overcome the resistance of the muscles, as nitrous oxide would not have the desired effect.

(3) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ IN CONNECTION WITH THE SOFT TISSUES.

(*a*) **Extensive laceration of the gum.**—In cases where a tooth has given rise to much trouble in removal, the soft tissues naturally suffer, but apart from this they may be severely lacerated when the gum is more than usually adherent to a tooth. This is most frequently seen in the removal of the lower third molar, but it is also sometimes met with in the removal of loose teeth. When the gum is found more than usually adherent the tooth should be left in the socket until the gum attachment has been divided with a pair of scissors or a lancet. Continued attempts to remove the tooth with the forceps before the gum has been divided will only lead to undue laceration.

In all cases where the gums have been badly lacerated, an anodyne mouth wash should be prescribed.

(*b*) **Wounding the tongue.**—This is most likely to occur under nitrous oxide, as the tongue during anæsthesia is generally swollen, and is, moreover, not under the control of the patient. Wounding the tongue is nearly always due to carelessness, and arises generally in using the elevator. When the tongue is *much lacerated*, the overhanging portions should be trimmed off with scissors and the surface kept clean with antiseptic mouth washes. If the *tongue is punctured and the wound does not involve a large branch of the lingual artery*, but yet bleeds freely, the tongue should be drawn forward; if this does not prove successful the insertion of a stitch will generally cause the hæmorrhage to cease. *If the tongue is punctured and a large branch of the lingual artery is involved*, the finger should be placed on the back of the tongue and the organ drawn forward; this compresses the lingual artery against the hyoid bone. The bleeding point must then be sought for and, if found, an attempt made to twist the wounded vessel. If this fails cauterisation may be tried, and as a last resource, if cauterisation does not stop the bleeding, the lingual artery must be tied.

(*c*) **Bruising the lower lips.**—This may occur in the removal of upper bicuspids and molars, and is due to having the mouth insufficiently opened, and using forceps of too straight a pattern.

(*d*) **Injury of the mandibular nerve.**—The mandibular nerve may be injured during the removal of the lower molars and bicuspids. Loss of sensation over the parts supplied by the nerve, with dribbling of saliva, generally follows the accident. Sensation is, however, usually restored, and in cases of laceration the nerve generally unites.

Mr. Sewill records a case in which “the roots of a lower wisdom tooth contained a groove and a foramen, through which the inferior dental nerve had evidently passed.”

(*e*) **Hæmorrhage following tooth extraction** is a most important complication, and one which needs prompt treatment. Hæmorrhage is predisposed to by a diathesis known as hæmophylia. Of its pathology but little seems to be definitely known. The blood in this condition is said by Walsham to be deficient in fibrin. Hæmorrhage may occur in people not predisposed to the above-named diathesis; in some instances it is probably due to pathological changes in the artery supplying the tooth, these changes being frequently induced by inflammation around the apex of the root, and the vessel becoming adherent to its bony surrounding, and thus prevented from contracting. Another condition, which may or may not have any practical bearing, is the occurrence of hæmorrhage during the menstrual period. I have, on two occasions, had under notice patients for whom teeth have been extracted during this period, and in whom hæmorrhage followed, but ceased at the termination of the period. Teeth had been extracted for both these patients on previous occasions, without undue hæmorrhage following.

Hæmorrhage is generally divided into three stages, viz.:—primary, intermediate and secondary. In the mouth we often find the primary running into the intermediate. The treatment of primary hæmorrhage, or that occurring at the time of the operation, is not of serious import. If it is at all sharp a useful plan is to give the patient some tincture of hamamelis in the water used for rinsing the mouth. At the same time about fifteen grains of gallic acid [9] should be given, and the patient should be ordered to take a similar quantity every two or three hours until the hæmorrhage ceases. The socket should also be loosely plugged with cotton-wool dipped in some styptic, such

as gallic acid.

Intermediate and secondary hæmorrhage is of a more serious nature, and generally sets in at night. When a case of intermediate hæmorrhage is first seen, these two important points should be ascertained before treating it:—first, whether the bleeding is coming from the gums or the socket of the tooth; secondly, whether the blood shows a tendency to coagulation. The latter point will act as a guide in the choice of drugs for internal administration.

In hæmorrhage from the gum search should be made for any small vessels that may be the cause of it, and if found they should be twisted or compressed. If the vessel is only partially divided it should be completely severed, as this will probably allow contraction to take place. If the bleeding is capillary in character, a pad of gutta-percha lined with lint dipped in some styptic and applied with firm pressure is usually sufficient to stop it.[10]

When the bleeding proceeds from the socket the following mode of procedure is adopted: some small cone-shaped pieces of non-absorbent cotton-wool are prepared (each about ⅓ to ½ inch long and ¼ inch broad at the base), also a pad of lint and a four-tailed bandage; a syringe, a pair of conveying forceps, some cold water and the chosen styptic are likewise placed ready for use. The socket is first freed from clot, then syringed, then dried out with a pledget of cotton-wool, and directly afterwards one of the cone-shaped pieces of cotton-wool dipped in the styptic (the most useful being tannin) is placed in the socket and forced to the apex, with a fair amount of pressure; the hæmorrhage is arrested far more by pressure than by the styptic. More pledgets of wool are inserted until the socket is quite full; a plug of lint is then placed over all and kept in position by antagonism with the upper teeth, a four-tailed bandage being used for this purpose. An excellent method of keeping the plug in the socket if the approximal teeth are standing is to wedge a piece of wood between them. Excellent as this plan is, however, if the hæmorrhage is at all sharp it is better to use the four-tailed bandage to make more certain of retaining the plug in position. The number of pledgets of wool inserted in the socket should be counted.

The general directions to be given to the patient, though apparently trivial, are most important and should never be forgotten. He or she should be advised to go home very quietly, to avoid all forms of excitement, to assume the sitting position usual during the day, and to use a high pillow at night. The patient should be fed through a bent tube, and all fluids should be given cold.

In addition to plugging the socket, hæmostatics should be administered internally.

In *cases where there is* a thin watery blood and *no tendency to coagulation* it may be fairly assumed that the cause of the hæmorrhage lies in the blood, and such drugs as gallic acid[11] and perchloride of iron[12] are indicated, *but when the blood shows a marked tendency to coagulate* in the mouth, as often happens, and the bleeding still continues, such drugs as ergot[13] are indicated; in this latter condition it may be assumed that the cause of the hæmorrhage lies in some want of contractility of the vessel wall, and ergot causes contraction of unstriped muscular tissue.

At the time of plugging the socket a dose of gallic acid, perchloride of iron or ergot should be given, and its administration continued at intervals until the bleeding ceases. Mr. Morton Smale prefers a hypodermic injection of ergotine.[14]

The patient should be seen within twenty-four hours after treatment, and if the bleeding has ceased the plugs may be removed and an antiseptic mouth wash prescribed. This course is not recommended when the hæmorrhage has been severe; under such circumstances the plugs should be allowed to work themselves out. If the hæmorrhage has not then ceased, the socket should be replugged tighter than before with a plug of wood wrapped in non-absorbent cotton-wool. Should this prove of no avail the actual cautery may be tried; if this fails, and the bleeding is from the mandible, the canal should be trephined and a plug of ivory inserted, so as to compress the artery against the inner plate of the bone. In uncontrollable hæmorrhage from the maxilla digital pressure on the common carotid opposite the transverse process of the sixth cervical vertebra may be tried; should this fail to stop the hæmorrhage, ligature of that vessel must be resorted to.

In one case of hæmorrhage from the region of the third right lower molar Mr. Boyd [15] divided the lip in the median line and reflected the cheek from the jaw. The mandibular canal was then laid open by excising the outer plate of the bone, and the bleeding was arrested by plugging the mesial and distal ends of the canal.

In extreme cases, with sign of collapse, normal saline solution[16] must be infused into the median basilic vein.

I n *patients predisposed to hæmorrhage* extraction should be if possible avoided; but, if the removal of the tooth be absolutely necessary, prophylactic treatment should be pursued for three or four days previous to the operation by the administration of one or other of the remedies previously mentioned.

A new styptic, consisting of fibrin ferment 1 to 10 to which 1 per cent. of calcium chloride has been added, is said by Walsham to act only on the blood, not on the tissues, and to be perfectly aseptic. It was found to be effectual in arresting hæmorrhage after the division of all the veins except the common jugular in a dog's neck.

The tooth should be extracted in the early morning, as we then have the day before us should hæmorrhage occur. Some hæmostatic should be administered at the time of the operation and the socket plugged at once; for it is most important to remember that in these cases it is far easier to prevent the hæmorrhage occurring than to arrest it when once it has commenced. The subsequent treatment will consist in the continued administration of hæmostatic drugs.

(*f*) **Injury of the arteries in the neighbourhood of the teeth.**—Wound of the *lingual* artery has been referred to under the heading of injuries to the tongue. Laceration of the *ranine*, *anterior and posterior palatine* arteries may also occur. Such accidents are usually the result of the forceps slipping and are therefore avoidable. Treatment consists in pressure or in twisting or tying the divided vessel. In the case of the *anterior or posterior palatine artery* it may be found necessary to plug the foramina which give passage to these vessels.

(*g*) **Pain following tooth extraction.**—The causes giving rise to pain following the extraction of a tooth are:—

(1) *Incomplete extraction of the tooth*, more especially when the remaining portion contains an exposed pulp.

(2) *Too rapid healing of the orifice of the socket.*—It sometimes happens that the margins of the wound left after extraction unite very early, and when this occurs the discharges which naturally come away from the granulating surface at the base of the socket, have no exit; the consequence is that they are retained and set up a local traumatic inflammation, leading to swelling of the surrounding tissue.

(3) *Suppuration in the tooth socket.*—This may be due in the first instance to the use of dirty forceps, and under such circumstances it may be classed as a poisoned wound. An examination will reveal the presence of greenish putrid pus, while the tissue around will be much inflamed, and the portion immediately bordering the wound will have a tendency to slough. A condition of this kind is often seen in hospital nurses and medical students and is no doubt due to infection met with in their daily duties.

Suppuration in the socket may be due to a lowered vitality of the tissue, produced by some such local causes as acute or chronic inflammation, and is especially well seen in cases of

extraction for the relief of periodontitis, or where the operation has been performed in patients suffering from general debility, syphilis, struma or in fact any of those systemic diseases which tend to lower the vitality of the organism.

(4) *Extensive laceration of the hard and soft tissues* in the neighbourhood of the socket; and

(5) *Necrosis of the socket of the tooth* are also fruitful sources of pain following tooth extraction.

(6) *The presence in the wound of a foreign body.*—A curious example of this came under notice a few years ago. A patient applied for the extraction of the left first permanent molar. During the operation a portion of one of the cusps disappeared; a search was made for it but, as it was not found, the natural supposition was that it had been removed in rinsing the mouth. The patient for the next three weeks complained of slight pain in the socket for which remedies were tried but proved of little use. Eventually the patient discovered the cusp on the top of the granulation tissue which had filled up the socket. In another case of the same character which came under notice, the offending material was a piece of an amalgam filling. A fractured blade of forceps may likewise act as the offending body.

(7) *Injury to the nerve.*—Direct injury to the trunk of the nerve is more likely to occur during extraction of the lower third molar than with any other tooth. It is more than probable that many obscure cases of pain following tooth extraction are due to exposure and irritation of the nerve at the apex of the socket. An interesting case of this character was lately reported by Mr. Storer Bennett.[17] The patient, a lady æt. 23, had had the third upper molar dislocated through the use of a Wood's gag, and, as it was considered hopeless to restore the dislocated tooth, it was extracted without difficulty. The socket in spite of treatment remained painful for the next twelve days, but in the meanwhile granulated healthily, except at its apex, where by the aid of a mirror and probe a spot about the size of a pin's head was noticed which caused the greatest agony on being touched. Incision of the nerve produced permanent relief.

Treatment.—The treatment naturally depends very much upon the cause. A thorough examination of the socket should be made with probe and mirror. When due to incomplete extraction, another attempt, if considered advisable, may be made to remove the tooth. This proving unsuccessful, the socket should be swabbed with an anodyne drug and, if there is an exposed pulp in the remaining portion of the tooth, the pulp should be touched with fuming nitric acid or strong carbolic acid. The patient should also be advised to use some poppy head fomentation.[18]

In *too rapid healing of the orifice of the socket*, the freshly healed surface must be separated, the socket syringed out, and a small tent of lint allowed to remain in the orifice for about twelve hours. An antiseptic mouth wash should also be prescribed.

In those cases *where the pus is putrid* and there is reason to suspect infection, the socket should be thoroughly syringed with some antiseptic such as hyd. perchlor. 1 in 1,000, carbolic acid 1 in 40; following this the parts should be carefully dried with cotton-wool. A small piece of chloride of zinc should then be introduced and allowed to dissolve in the socket, which must be subsequently kept aseptic by constant irrigation with some antiseptic solution.

Suppuration is most frequently seen after extraction of the lower teeth owing to the fact that drainage is less easily effected than in the upper, owing to the dependent position of the socket. In many cases it will be found necessary to plug the socket tightly with non-absorbent cotton-wool dipped in an antiseptic solution; this prevents the accumulation of *débris* which would act as an irritant. In cases of *suppuration occurring in patients of diminished vitality* a tonic form of treatment should be prescribed;[19] the dressing in the socket should be removed two or three times a day and the socket syringed.

Care must be exercised in applying escharotics to sockets to which the nerve may be in close proximity; this is especially necessary in dealing with impacted lower third molars. Two cases illustrating this point have come under my notice. In the first a second lower bicuspid with a long standing chronic abscess had been removed. The patient complained of pain, the socket was syringed out and a small piece of chloride of zinc inserted. Intense agonizing pain followed which all local anodynes failed to relieve. In the second case an impacted right lower third molar had

been removed. The socket suppurated, and the pain although severe was not intense. Treatment similar to that used in the first case was adopted with similar results. Since then in all cases where it is possible that the trunk of the nerve may be in close proximity to the socket, I have used non-irritating antiseptic injections and plugged the socket with cotton-wool dipped in tincture of opium with much more satisfactory results.

It is advisable to inform the patient of the possibility of pain following the extraction of a tooth, especially after periodontitis, and in all cases where a large number of teeth have been extracted a mouth-wash[20] should be prescribed; for, even if there is no pain, it will prevent the discharge from the sockets of the teeth undergoing putrefactive changes.

In pain due to necrosis of the socket deodorant antiseptic injections must be used, while in extensive laceration of the soft and hard parts an anodyne mouth-wash[21] may be tried. In all *obscure cases* an application should be made to the socket of some local anodyne such as tincture of opium or cocaine, and a mouth wash having similar properties should at the same time be prescribed.

(4) DIFFICULTIES, COMPLICATIONS AND SEQUELÆ ARISING DURING EXTRACTION UNDER ANÆSTHETICS.

(*a*) **Tongue slipping back.**—During extraction under anæsthetics the tongue not being under control may slip over the larynx, or may be forcibly pushed back by the fingers of the operator. Symptoms of difficult breathing or even arrest of respiration will follow this accident. It is not enough to watch the chest walls, as respiratory movement may continue without air entering the lungs. Treatment consists in pulling the tongue forcibly forward with a suitable instrument and forcibly extending the head on the spinal column.

(b) **Forcing out a tooth with a prop or a Mason's gag.**—With a prop this accident may arise from resting it upon teeth which are loose or from placing it in such a way that undue leverage is brought to bear on the teeth. It is an accident most likely to occur when the prop is fixed on the front teeth and the mouth opened to its widest extent. Under such conditions undue leverage at right angles to the long axis of the tooth is brought to bear upon the palatal surfaces of the upper teeth and they are consequently forced outwards. With a Mason's gag the accident is due at times to clumsiness; great care should therefore be exercised when using this very powerful instrument. If a tooth is forced out it should if possible be immediately replaced.

(*c*) **Passage of a foreign body through the isthmus of the fauces.**—A foreign body, such as a tooth, a broken piece of forceps or a prop, passing through the isthmus of the fauces may become impacted in either the air or food passages.

In the air passages it may lodge (1) over the entrance of the larynx, (2) in the larynx, (3) in the trachea or bronchus.

In the food passages it may lodge (1) in the pharynx, (2) in the œsophagus, (3) at the pyloric opening of the stomach.

In the air passages.—Should the foreign body lodge *over the entrance of or in the larynx* the patient will be seized with a violent fit of coughing which may expel it; but, should this not happen, symptoms of asphyxia will supervene. With regard to treatment; the head should immediately be brought forward and the finger inserted along the side of the mouth into the pharynx, and then given a forward sweeping movement; by this means the foreign body, if lodged at the back of the tongue, will probably be removed. This failing, the patient must if possible be inverted and a forcible slap given on the back. If the foreign body is not dislodged by this method, laryngotomy should be immediately performed. There must be no hesitation about the performance of this operation and it must be carried out promptly, for the longer it is delayed the less becomes the chance of saving the life of the patient.

A foreign body in the trachea or bronchus may give rise to no immediate symptoms, but generally a violent fit of coughing, with signs of impending asphyxia, takes place at the time of the accident. These signs pass away, to be followed at intervals by fresh attacks of coughing and

eventually by symptoms of collapse of the lung or lungs.

In a case recorded by Sir William MacCormac,[22] during the removal of an upper bicuspid the palatine blade of the forceps snapped off close to the joint and disappeared. The patient immediately suffered from great dyspnœa and appeared to be dying. The symptoms passed away, and for the following six weeks the patient's condition gave no great cause for anxiety, although she suffered from a constant hacking cough accompanied by bloody expectoration. Seven weeks after the accident she was admitted into St. Thomas's Hospital, the foreign body was with difficulty removed from the right bronchus, and the patient made an excellent recovery.

The diagnosis of a foreign body in one bronchus is made by an absence of signs of respiration over the whole or part of the lung on that side, with exaggerated sounds (puerile breathing) over the opposite side. Treatment consists in performing tracheotomy and removing the foreign body.

In the food passages.—A foreign body impacted in the pharynx will give rise to pain, symptoms of dysphagia and dyspnœa. A hacking cough is generally present.

Should a foreign body be suspected in the pharynx, its presence can usually be ascertained by digital exploration; this failing, the cavity should be examined by the aid of a laryngoscope.

An attempt should first be made to remove the body with the fingers, and if this is unsuccessful pharyngeal forceps must be called into use. In some cases where the impaction is very firm it may be necessary to perform pharyngotomy.

A foreign body in the œsophagus will cause dysphagia, and will probably give rise to constant pain; if it is situated in the upper part it will in all probability give rise to dyspnœa. On applying the stethoscope over the region of the œsophagus, a gurgling sound will be heard when the patient swallows fluids. The presence of a foreign body may be definitely ascertained by passing a bougie; this step will also enable the surgeon to determine the position in which the foreign body is lodged.

If impacted in the upper part of the œsophagus, an attempt may be made to remove the impacted body with forceps; this failing, œsophagotomy must be performed.

If lodged near the cardiac end of the œsophagus an attempt may be made with a bougie to push the foreign body into the stomach; this failing, gastrotomy should be performed.

If a foreign body becomes impacted at the pyloric opening of the stomach, it will give rise to gastric dilatation. Under such circumstances the stomach must be emptied of its contents, and gastrotomy then performed.

A foreign body going through the isthmus of the fauces will as a rule pass into the œsophagus, then into the stomach, and will give rise to no trouble.

The details of such operations as gastrotomy, œsophagotomy, &c., do not lie within the scope of this book, and should be sought for in works dealing with general surgery.

The necessity of being ready for such emergencies as the above cannot be too fully emphasised, and all who administer anæsthetics should be provided with the instruments necessary to perform laryngotomy. These should be kept in a little case, and no anæsthetic should be administered without the case being near at hand. Adherence to this rule is important.

(5) MISCELLANEOUS DIFFICULTIES, COMPLICATIONS AND SEQUELÆ.

(*a*) **Uterine pain.**—A case is quoted by Mr. Sercombe where extraction of a tooth was followed by paroxysmal uterine pain, followed by the cure of an obstinate leucorrhœa.[23]

(*b*) **Shock.**—The fact that *tooth extraction is a surgical operation*, and may be followed by shock, is often overlooked. The amount of shock which follows as a rule is practically *nil*, but at times, especially in the weak, it may be well marked. This is not taken sufficiently into account when a question arises as to the number of teeth to be extracted at one sitting, and it should be clearly borne in mind that what a strong, able-bodied person, can stand, one of weaker physique cannot bear. The *wholesale extraction of teeth at one sitting* which is carried out by some operators is not advisable, and the amount of prostration that follows is sometimes very severe.

Syncope at the time of the operation sometimes occurs. Should it supervene during the

extraction of the tooth the operator should immediately desist until recovery ensues. Fainting is best treated by bending the head down towards the knees, at the same time loosening anything tight about the neck and applying ordinary salts of ammonia to the nose. *In severe cases* the patient should be removed from the chair and laid on the floor, and the chest should be exposed and flipped with a towel dipped in cold water. *In more severe cases* it may be necessary to inject ether or some other stimulant, such as brandy. *Fatal syncope* following tooth extraction has occurred, and a case which took place at Marseilles in 1881 is mentioned by Tomes.[24] The patient was a female, and an attempt was made to remove a tooth, but was desisted in owing to alarming syncope. A second attempt was made, or rather about to be made, when fatal syncope ensued. *Post-mortem* examination showed nothing beyond a slight amount of cerebral congestion.

(*c*) **Epilepsy.**—In those pre-disposed to epilepsy an attack often commences immediately after the extraction of a tooth. In the event of a fit occurring the patient should be removed from the chair and placed on the floor, the clothes being at the same time loosened, and a wedge of wood or some suitable material placed between the teeth to prevent injury to the tongue.

(*d*) **Hysteria.**—Manifestations of this disorder at times follow tooth extraction, but do not call for any special treatment beyond that usually adopted for this disorder.

(*e*) **Septic and infective sequelæ.**—Scattered through dental literature will be found a large number of records of septic and infective diseases which have followed the extraction of teeth. In many of these cases it would be difficult to say that the infection was always the result of the operation; in a number of them the actual cause was due to the neglected condition of the tooth which called for extraction. Infection can, however, at times undoubtedly be traced to the operation, and once again attention cannot be too strongly drawn to the fact that antiseptic precautions should be carried out as far as possible.

Suppuration of the socket and its appropriate treatment has already been dwelt upon (page 82). Cases of syphilis having been acquired through the use of infected forceps are recorded, while septicæmia, sapræmia, cellulitis, osteitis, osteomyelitis, periostitis, pyæmia, tetanus, have all been known to follow the removal of a tooth, but the treatment of these conditions hardly lies within the scope of this book.

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ENGLAND.

FOOTNOTES:

[1] A description of the different instruments in general use for the removal of the various teeth will be found in chapter ii.

[2] A description of the form of each tooth, with respect to its bearing upon the construction of forceps and its removal, will be found in chapter ii.

[3] The following is a useful formula:—

℞ Liquoris potassæ ℥vi.
Acidi carbolici glacialis ℥ij.
Aquam ad. ℨviii.

M. One teaspoonful to be used with half a tumbler-full of warm water as a mouth wash.

[4] "A System of Surgery" (edited by Frederick Treves), vol. i., page 292.

[5] "Dental Pathology and Surgery," page 340.

[6] *Transactions Odontological Society*, vol. iii., page 138.

[7] *Transactions Odontological Society*, vol. xxviii., page 3.

[8] *Journal British Dental Association*, vol. xiv., page 727.

[9]

℞ Acidi gallici ℥ij.
Ft. pulv. viij.

One powder every two hours until the hæmorrhage ceases.

[10] Perchloride of iron should be avoided as a styptic, it nearly always contains some free acid, and is therefore detrimental to the teeth; in addition to this it leads to extensive clotting in the veins, as well as to a certain amount of sloughing of the gums.

[11]

℞ Acidi gallici ℥ij.
Ft. pulv. viij.

One powder every two hours until the hæmorrhage ceases.

[12]

℞ Liq. ferri perchloridi ♏xxv.
Aquæ chloroformi ℥ij.
Aquam ad ℨj.
Mitte ℨviij.

M. Two tablespoonfuls every three hours until the hæmorrhage ceases.

[13]

℞ Ext. ergotæ liquidi ♏xx.
Acidi sulphurici diluti ♏x.
Aquam rosæ ad. ℨj.
Mitte ℨviij.

M. Two tablespoonfuls every three hours until the hæmorrhage ceases.

[14] Injectio ergotini hypodermica B.P.: 1 of ergotine to 2 of camphor water. Dose 3 to 10 minims, made as required.

[15] *Dental Record*, vol. xi., p. 425.

[16] Common salt, ℥j., water 0j. at 99° F.

[17] *Transactions of the Odontological Society*, vol. xxvii., page 123.

[18] Two ounces of poppy heads should be placed in one pint of boiling water, the water being boiled down to half a pint.

[19]

℞ Ferri et quiniæ citratis gr. vi.
Aquæ chloroformi ʒij.
Infusum quassiæ ad. ʒi.
Mitte ʒviij.

M. Two tablespoonfuls three times a day after meals.

[20] The following will be found useful:—

℞ Boro-glyceride (Barff) | Eau de Cologne | Tinct. krameriæ — aa. ʒiv.
Spirit vini. rect. ad. ʒiv.
℥ Fiat lotio.

To be used with water as a mouth wash. Shake before using.

[21]

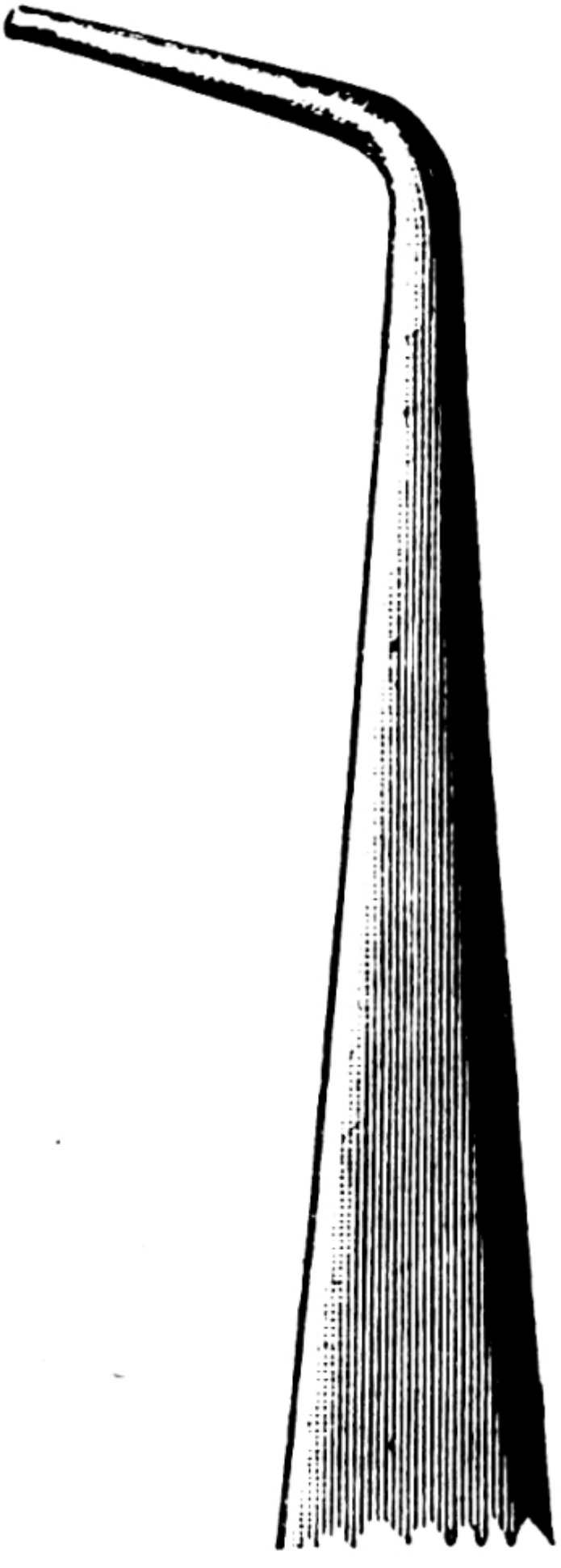
℞ Zinci sulphatis gr. viij.
Zinci chloridi gr. vi.
Morphinæ acetatis gr. ij.
Aquam ad. ʒviij.
℥ Fiat lotio.

To be used with an equal quantity of water as a mouth-wash.

[22] *The Journal of the British Dental Association*, vol. vii., page 32.

[23] *British Journal Dental Science*, vol. iii., page 221.

[24] "A System of Dental Surgery," 3rd edition, page 626.



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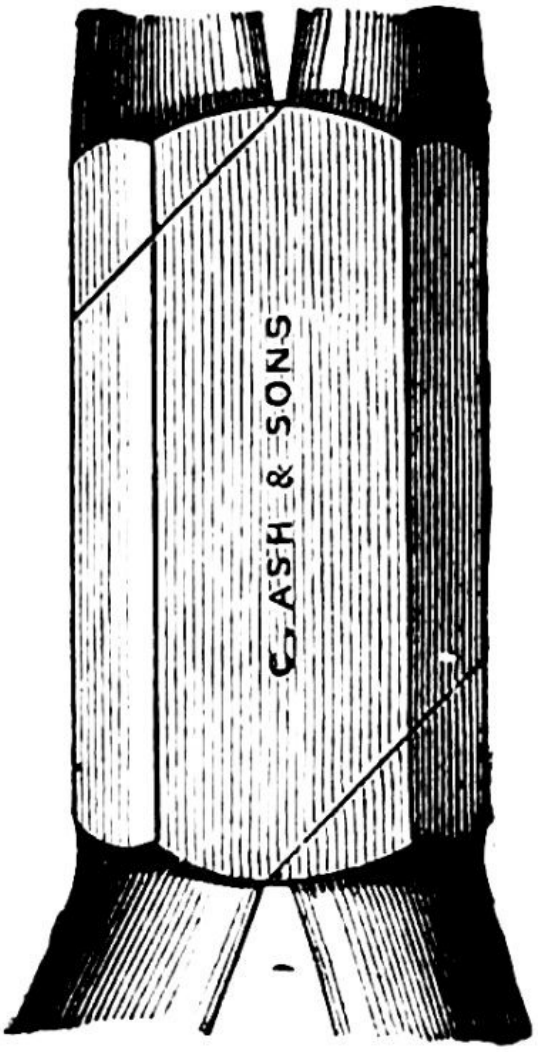

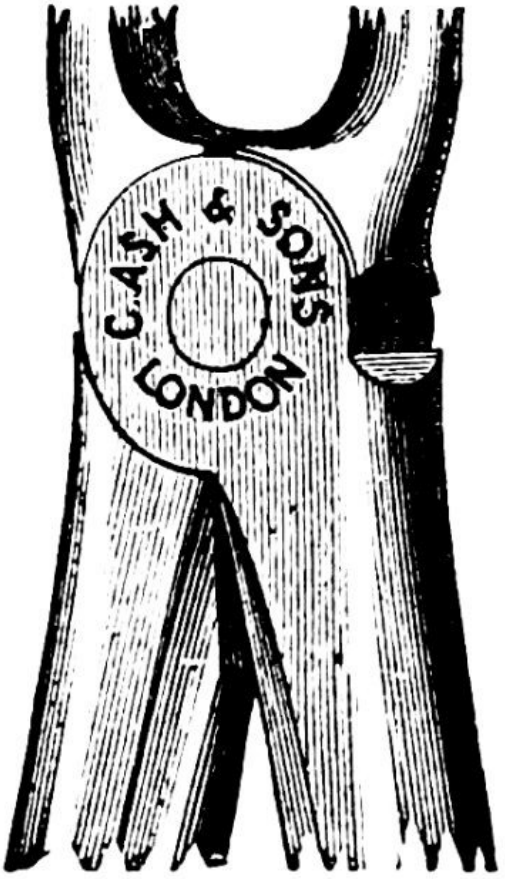

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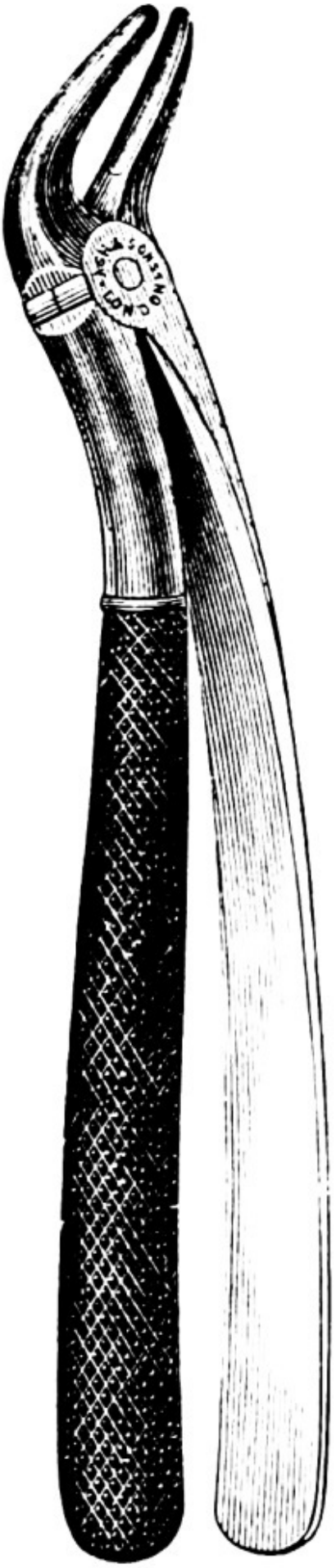

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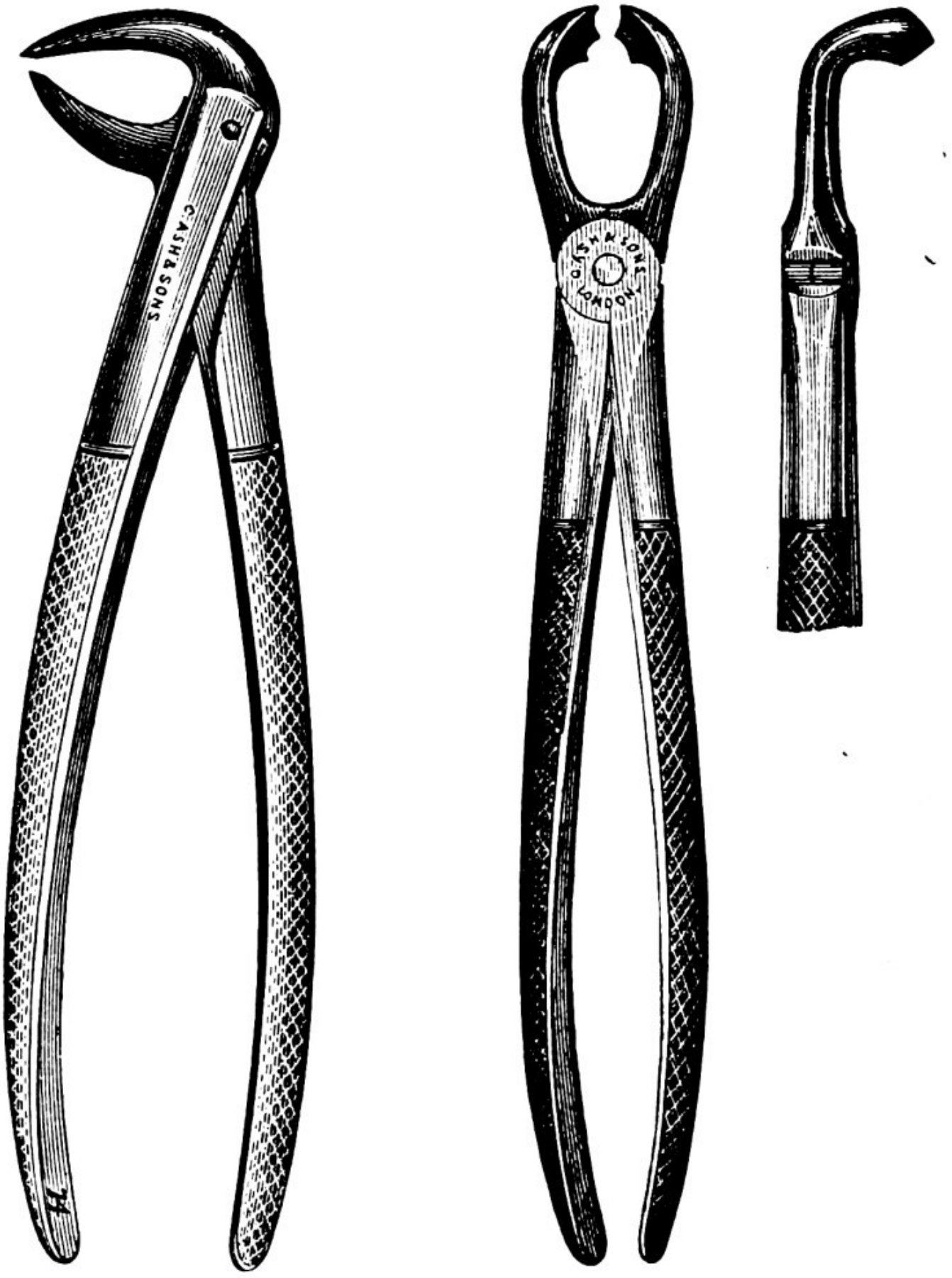

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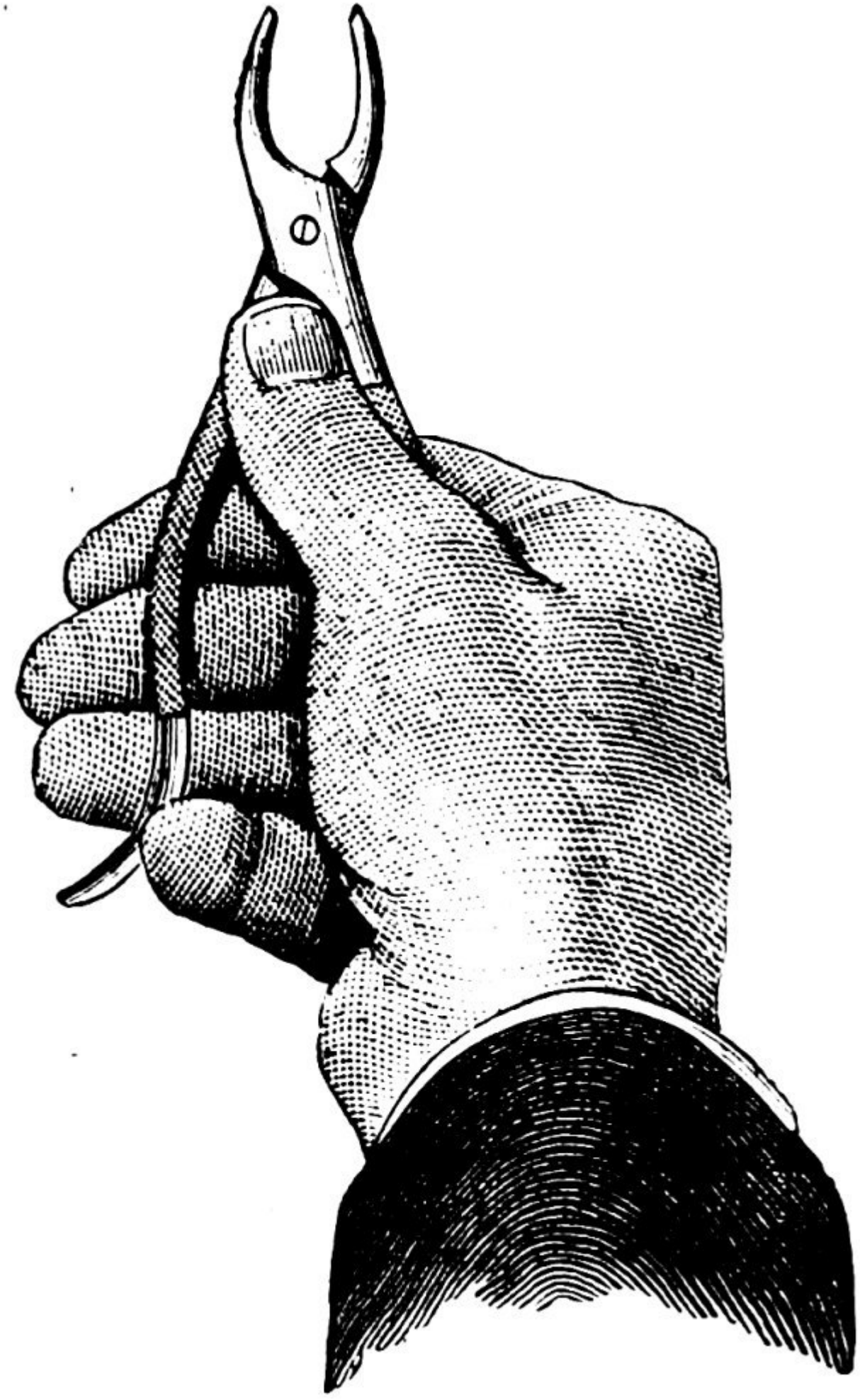

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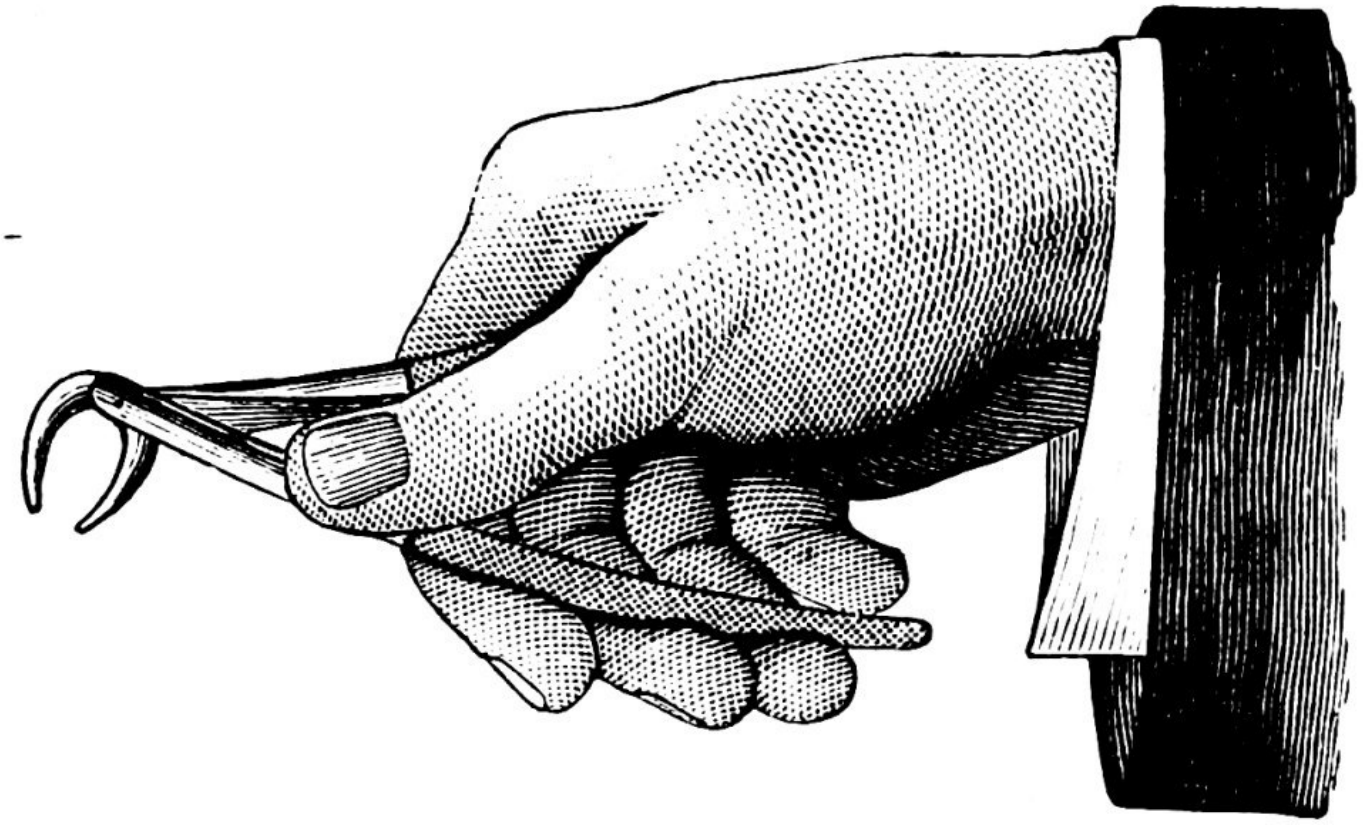

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FIG. 12.

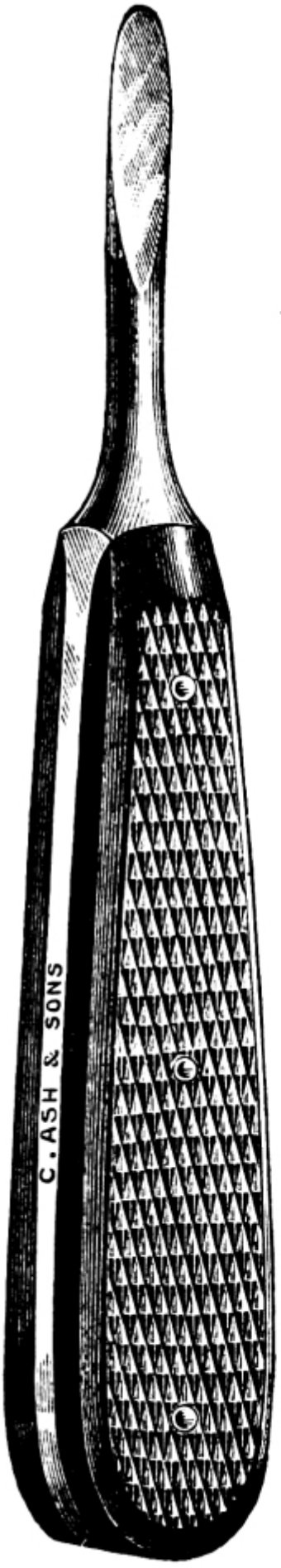

FIG. 11.

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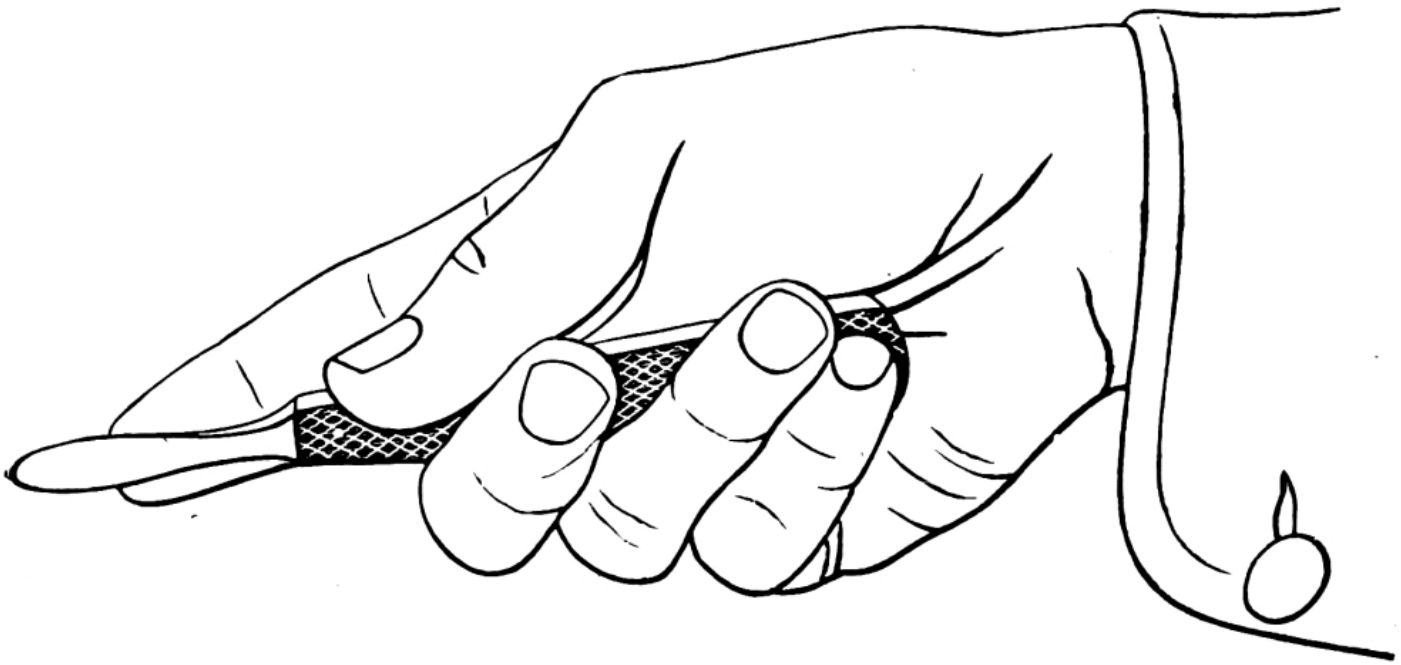

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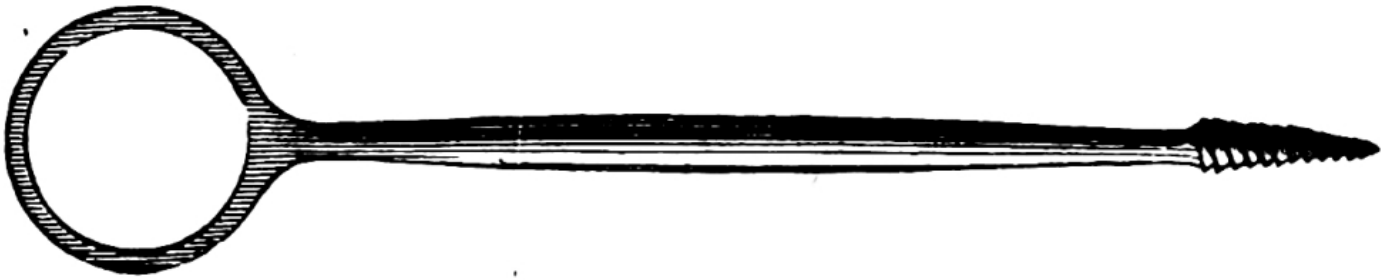

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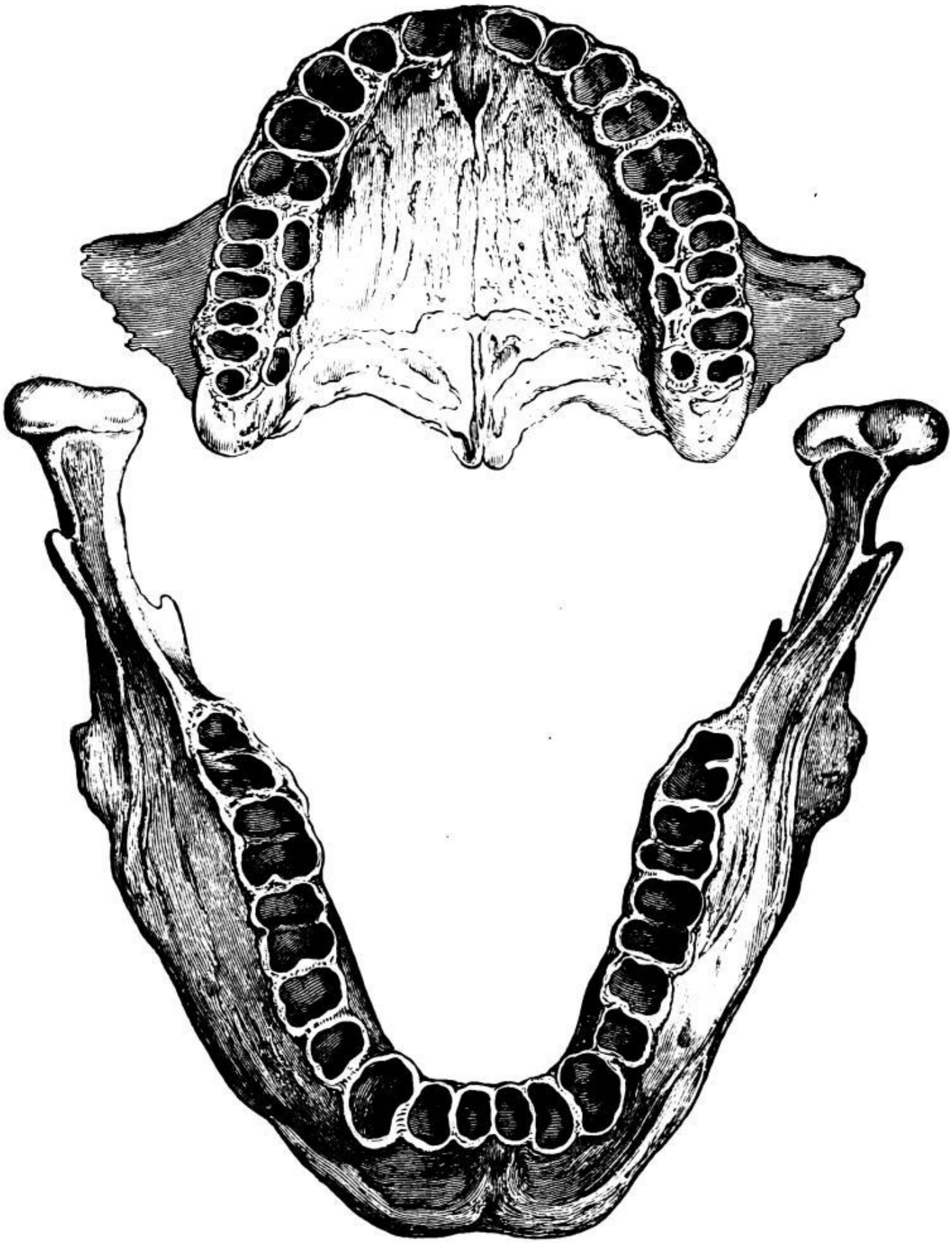

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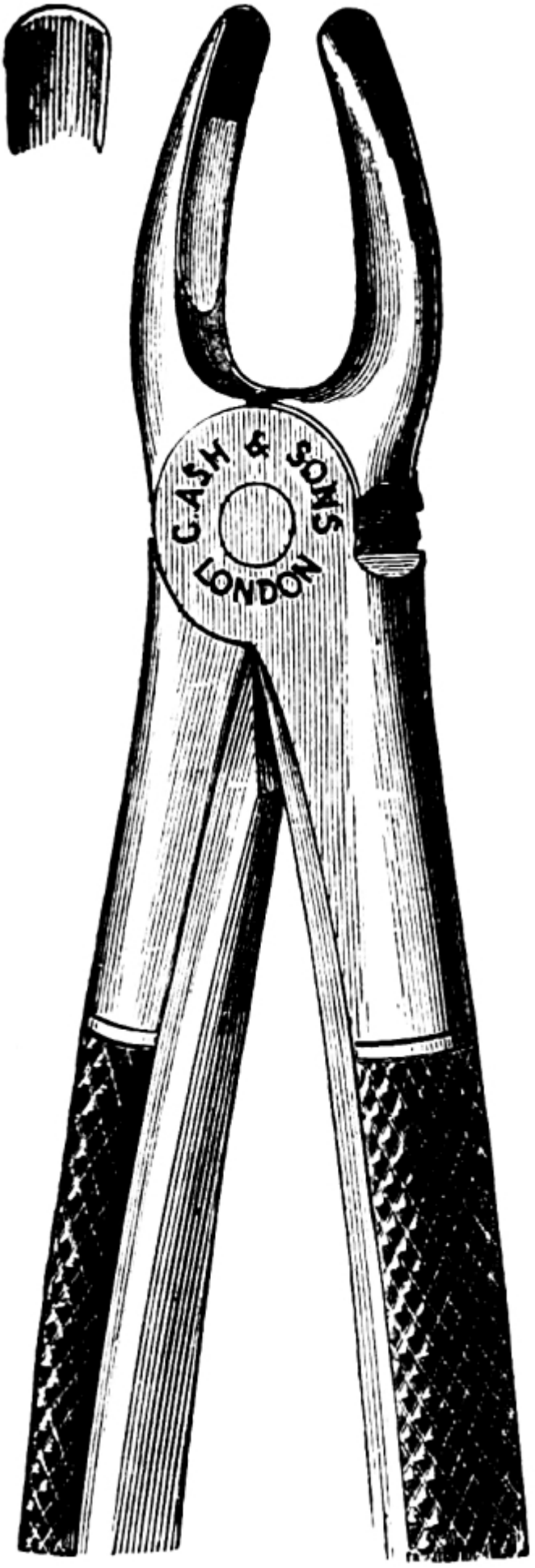

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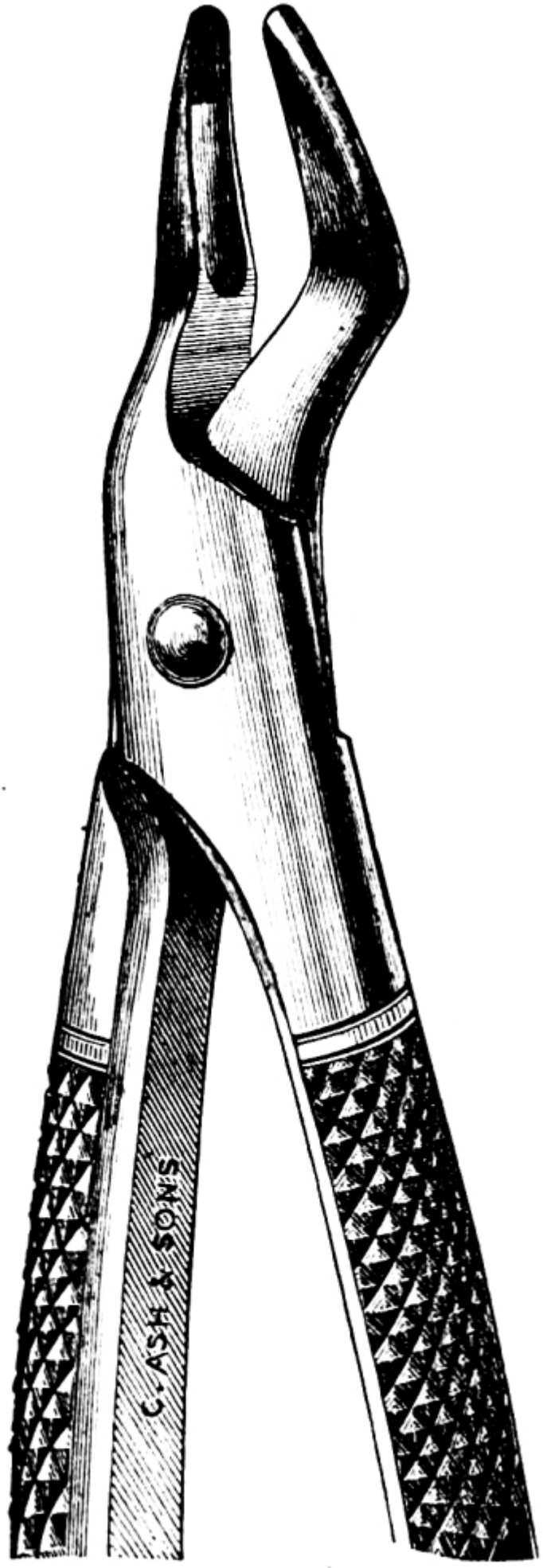

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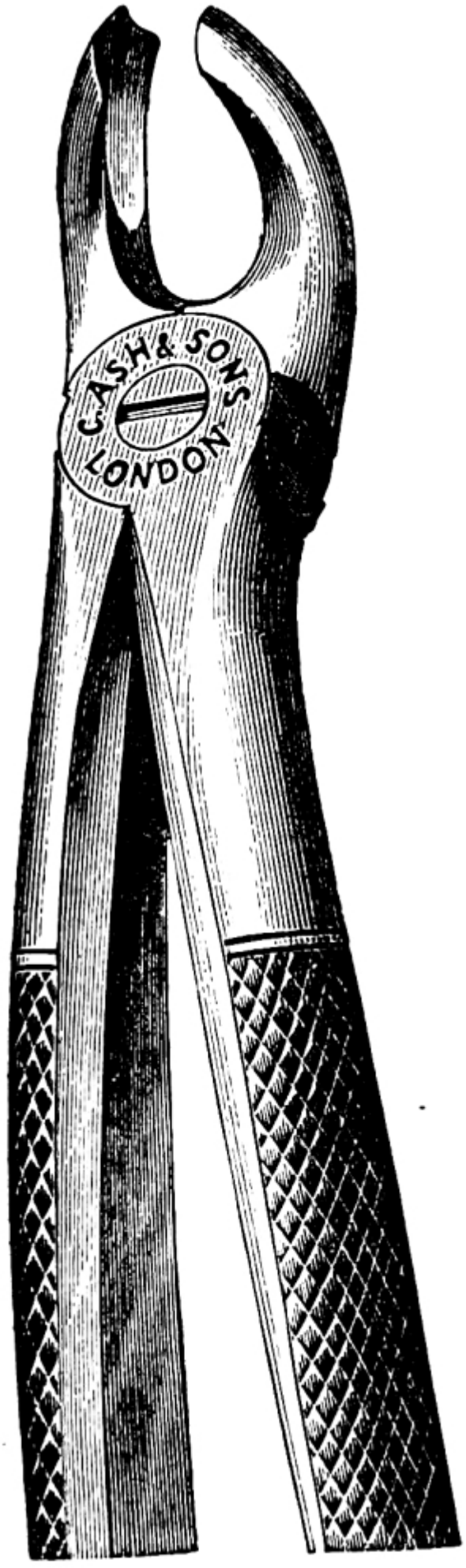

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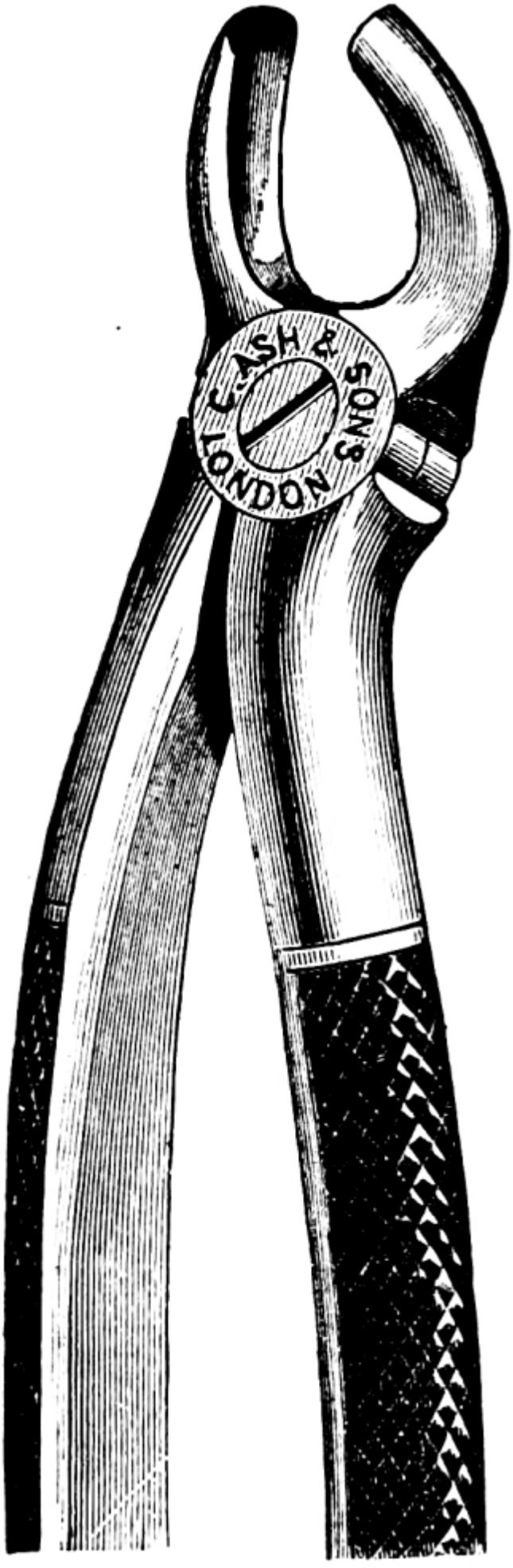

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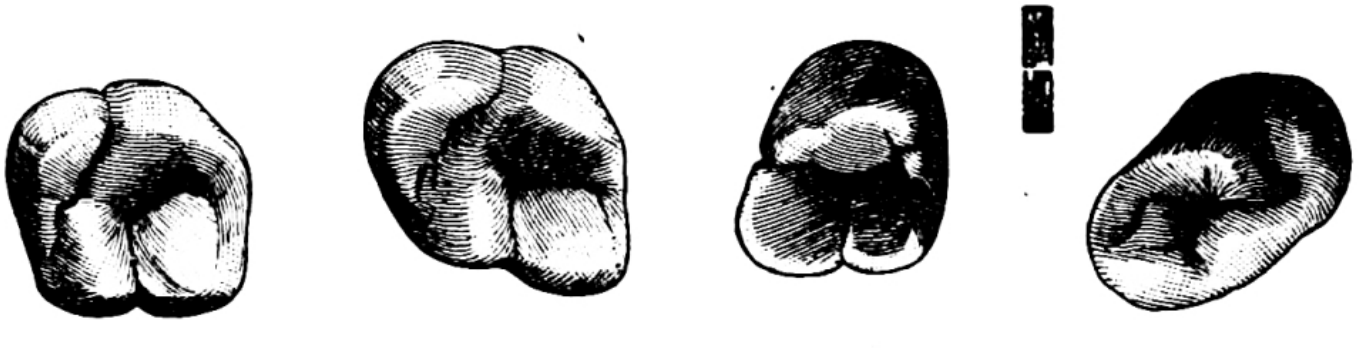

a *b* *c* *d*

FIG. 21.

(*a*) Normal upper first permanent molar.
(*b*) Oblique rooted upper first permanent molar.
(*c*) Normal upper second permanent molar.
(*d*) Oblique rooted second permanent molar.

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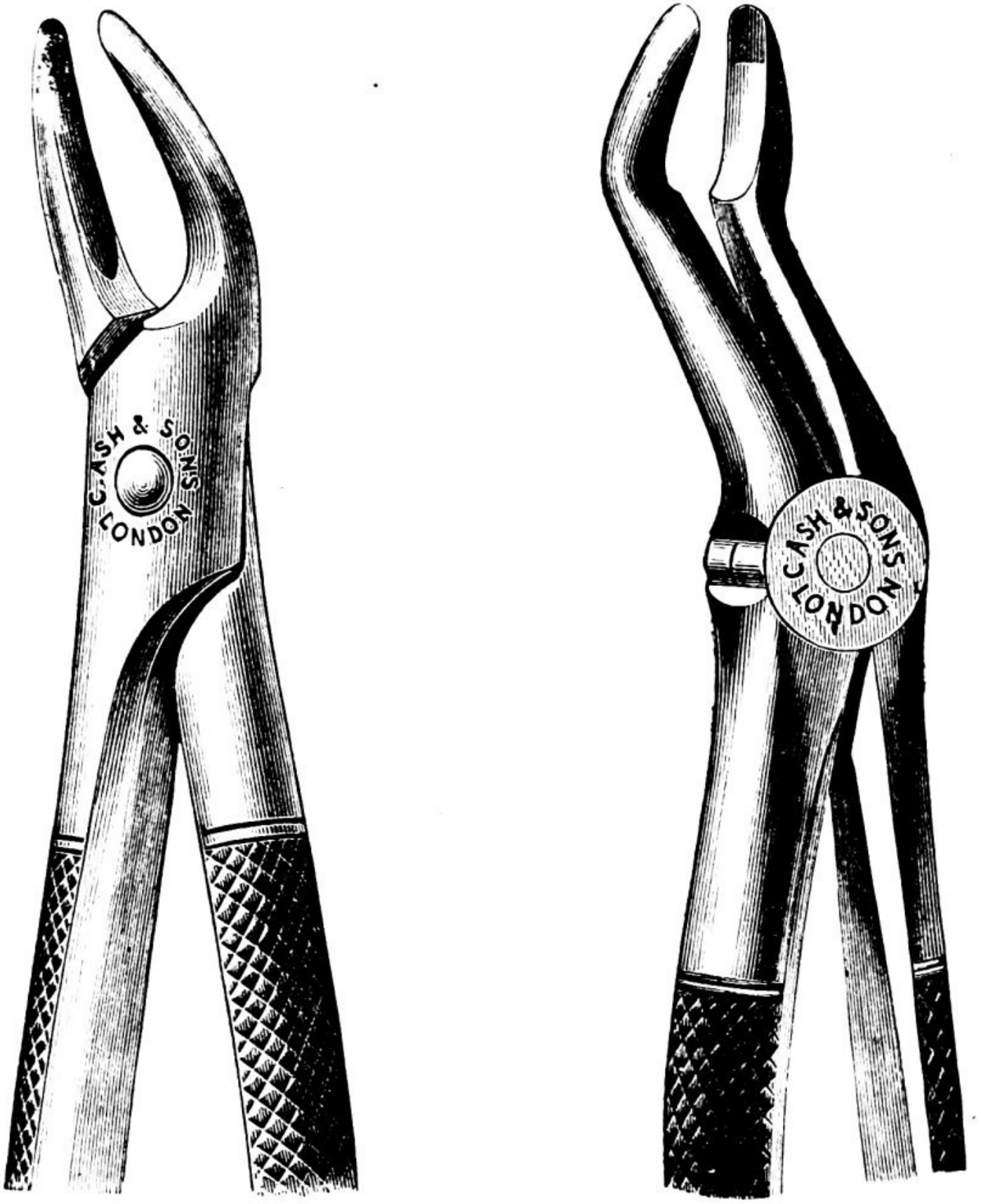

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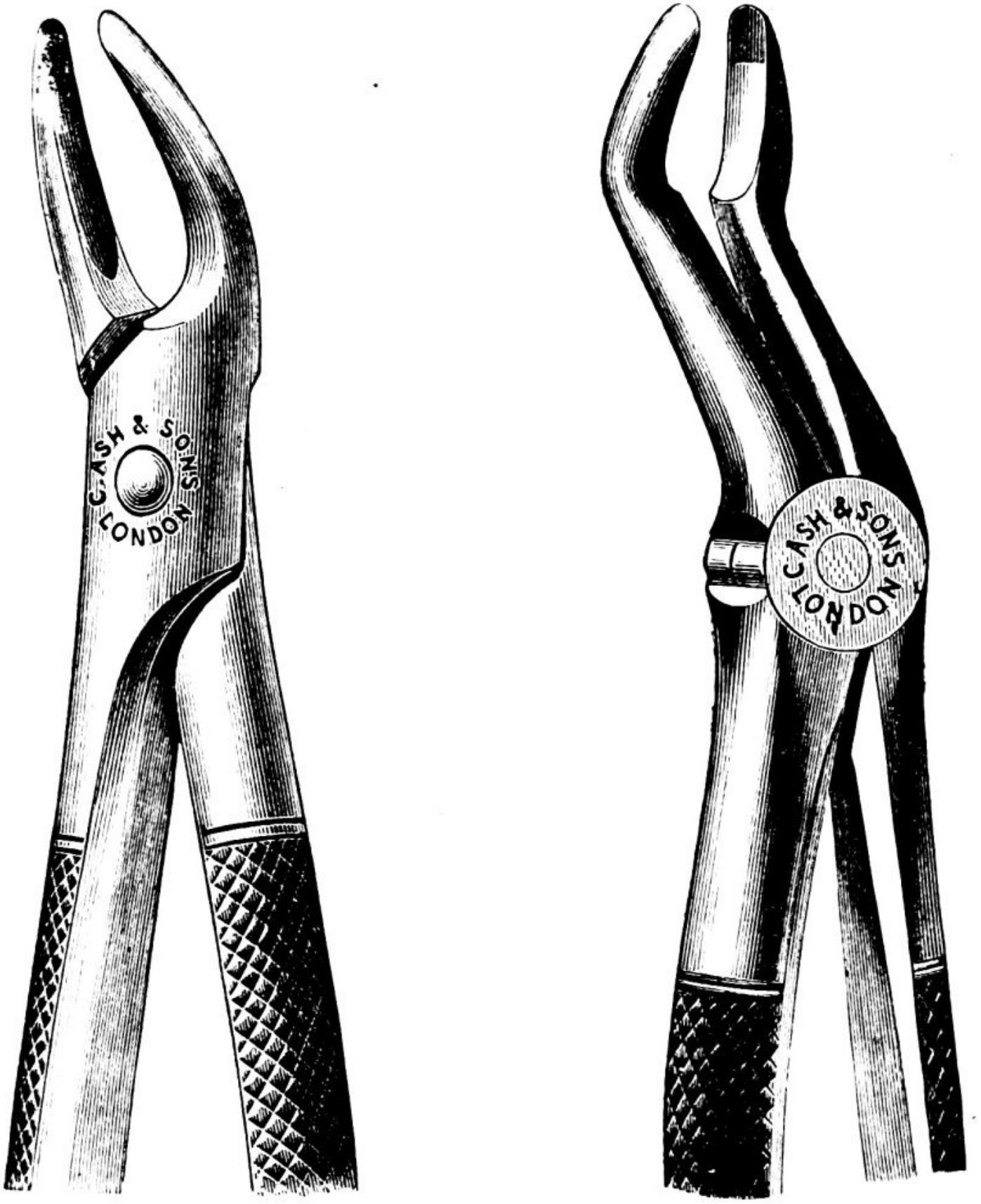

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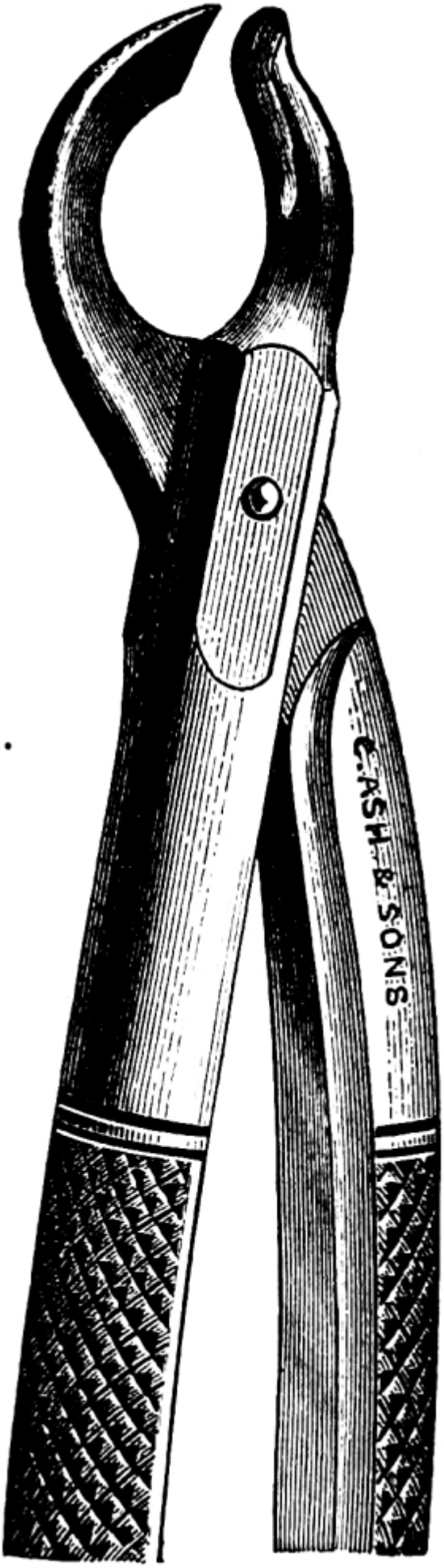

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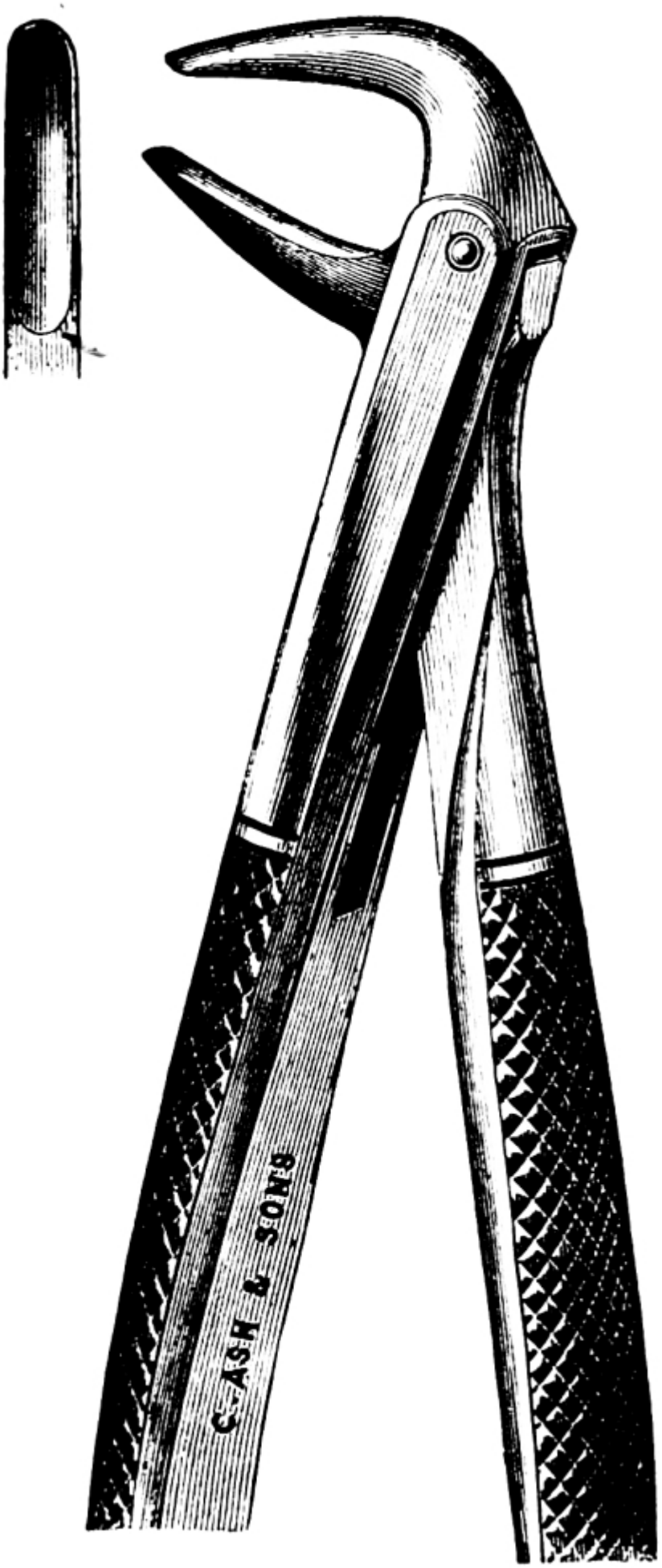

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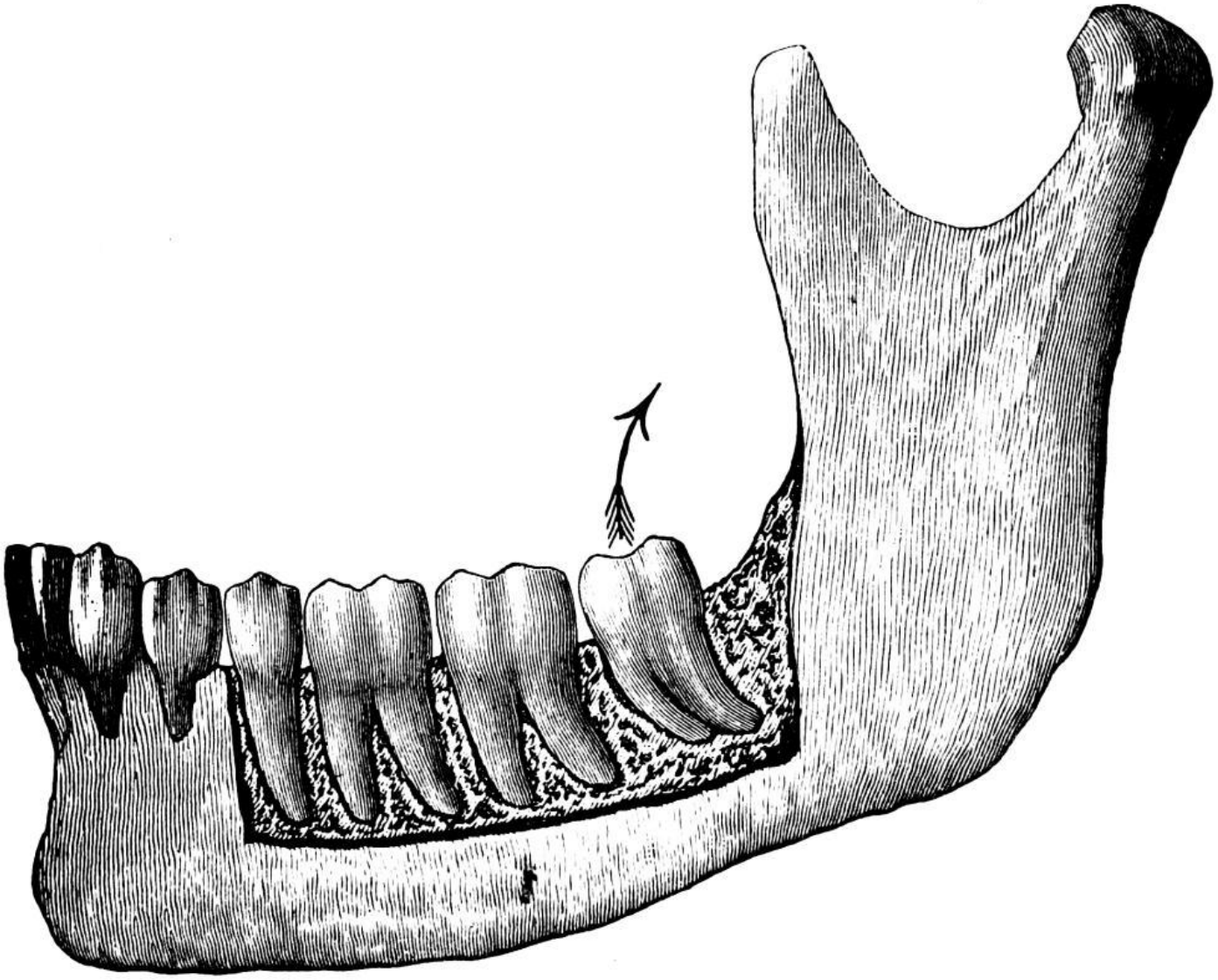

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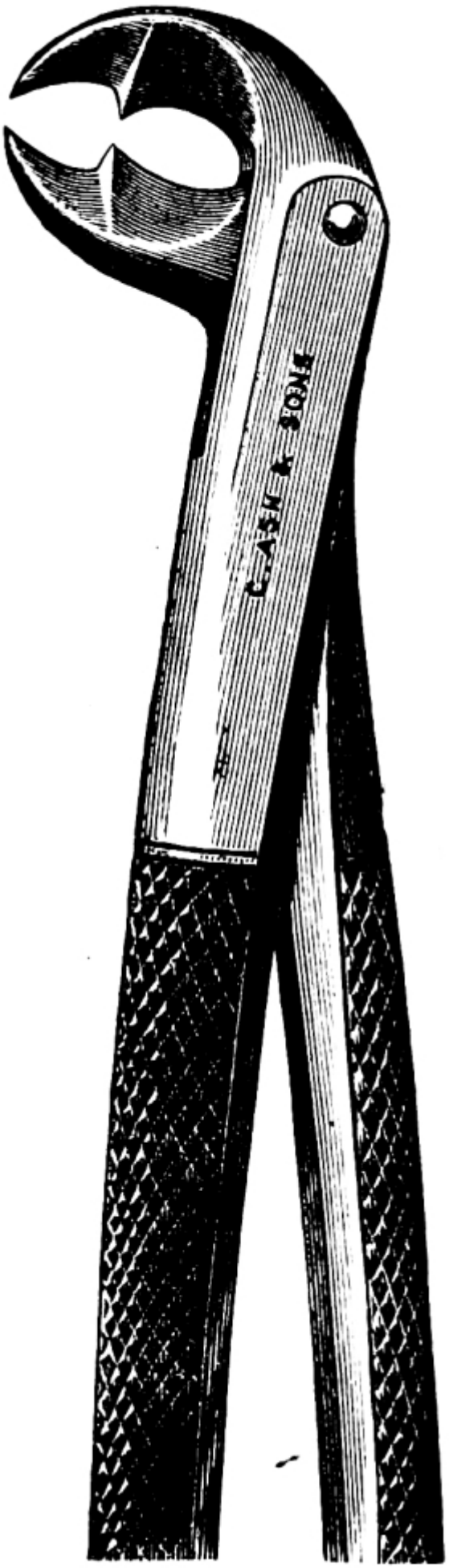

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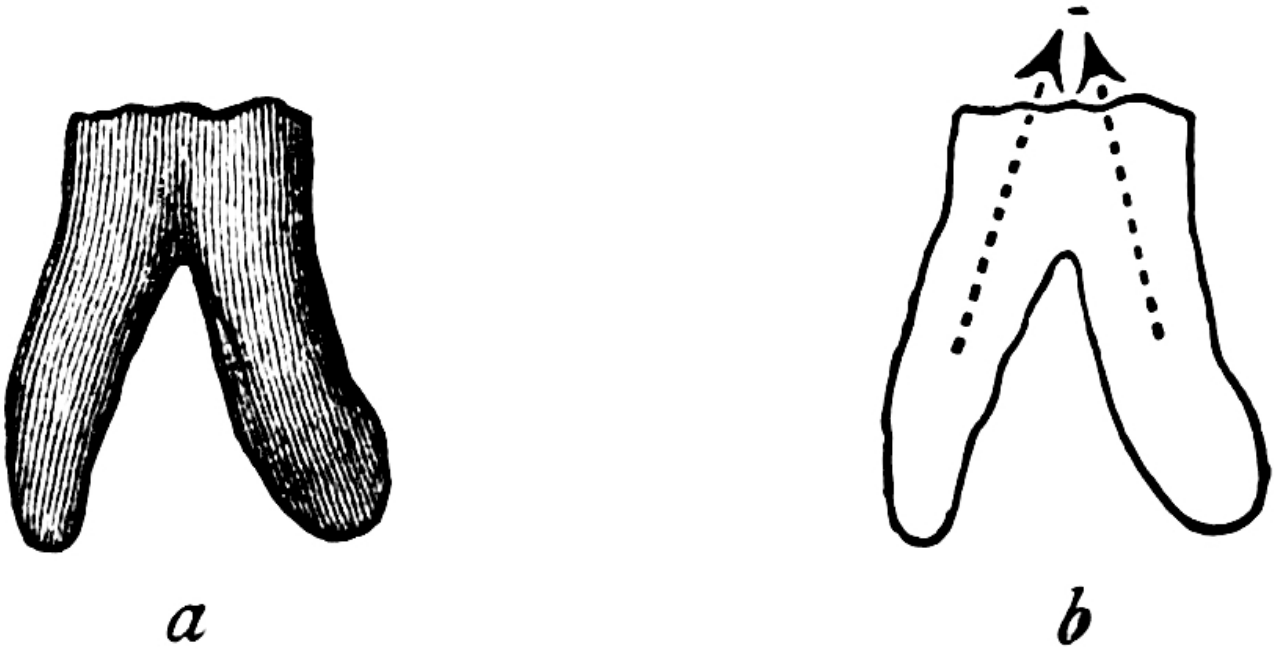

a *b*

FIG. 33.

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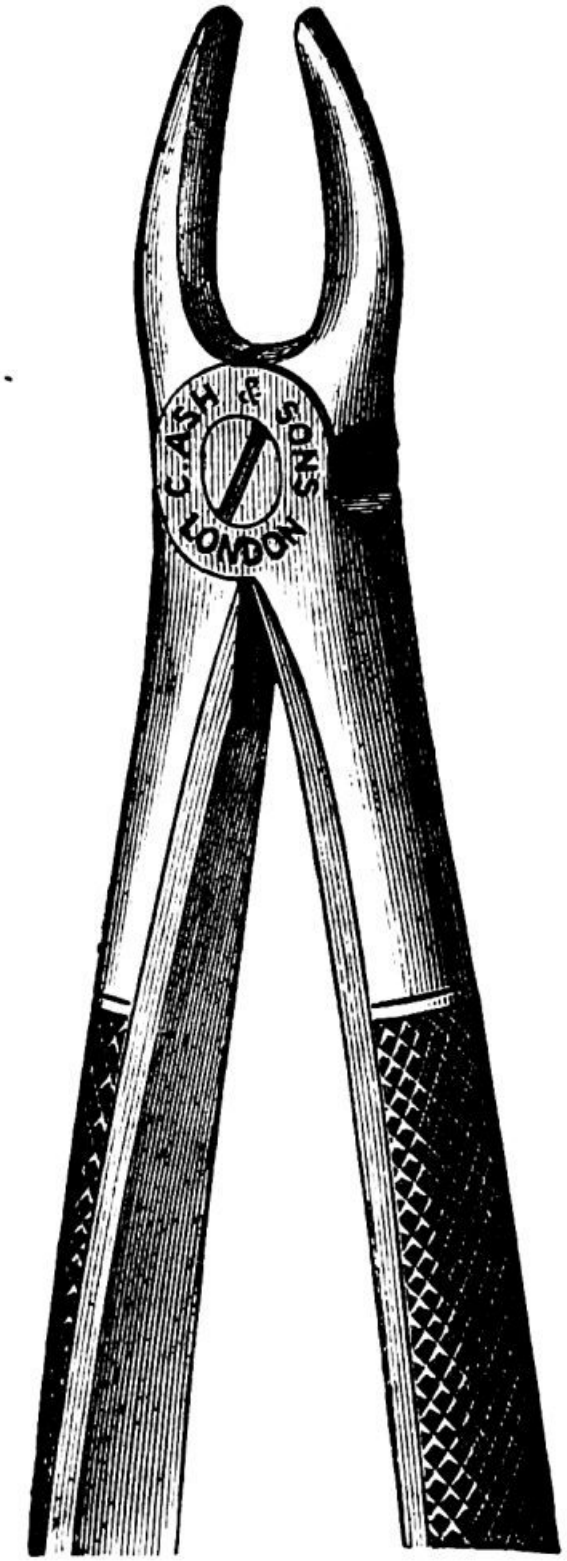

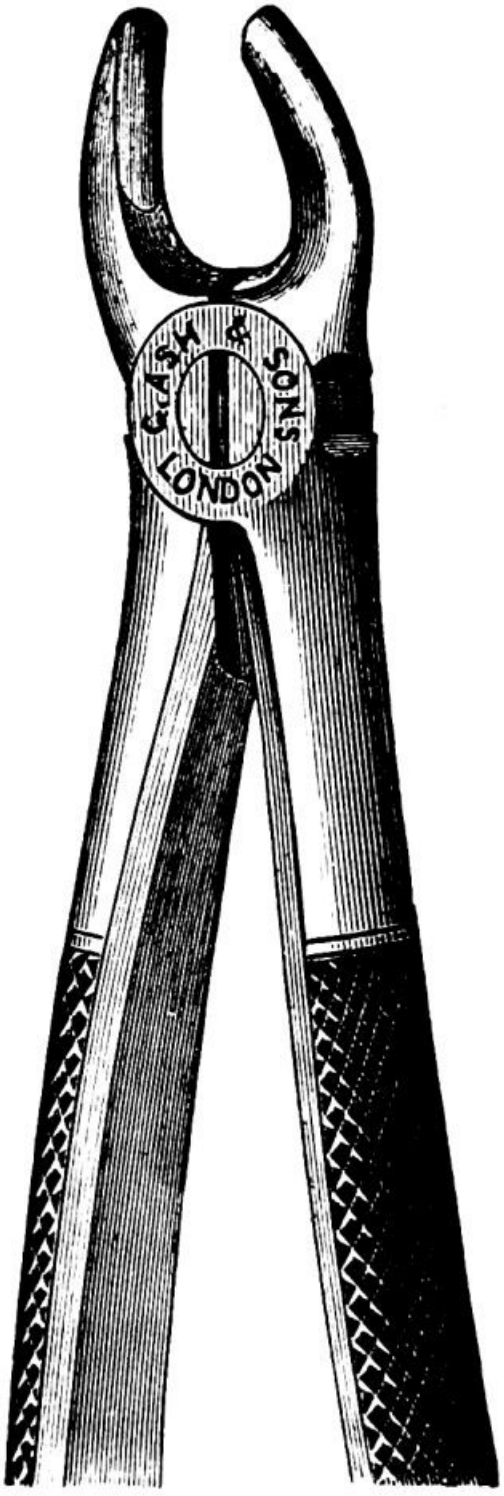

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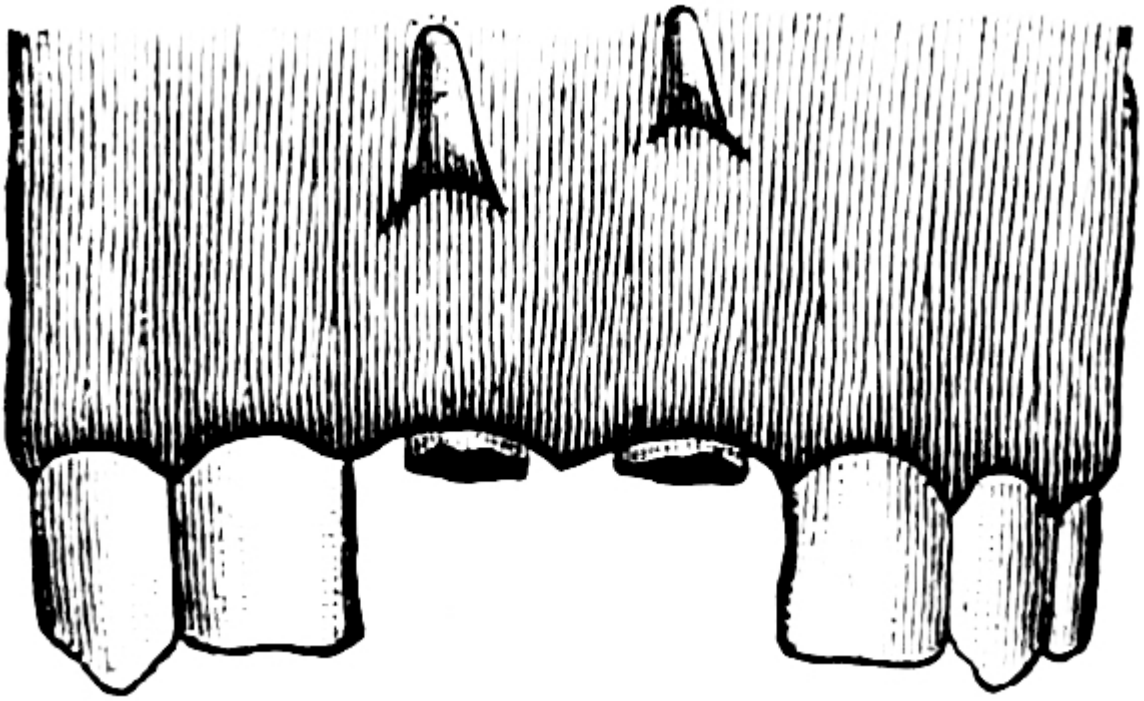

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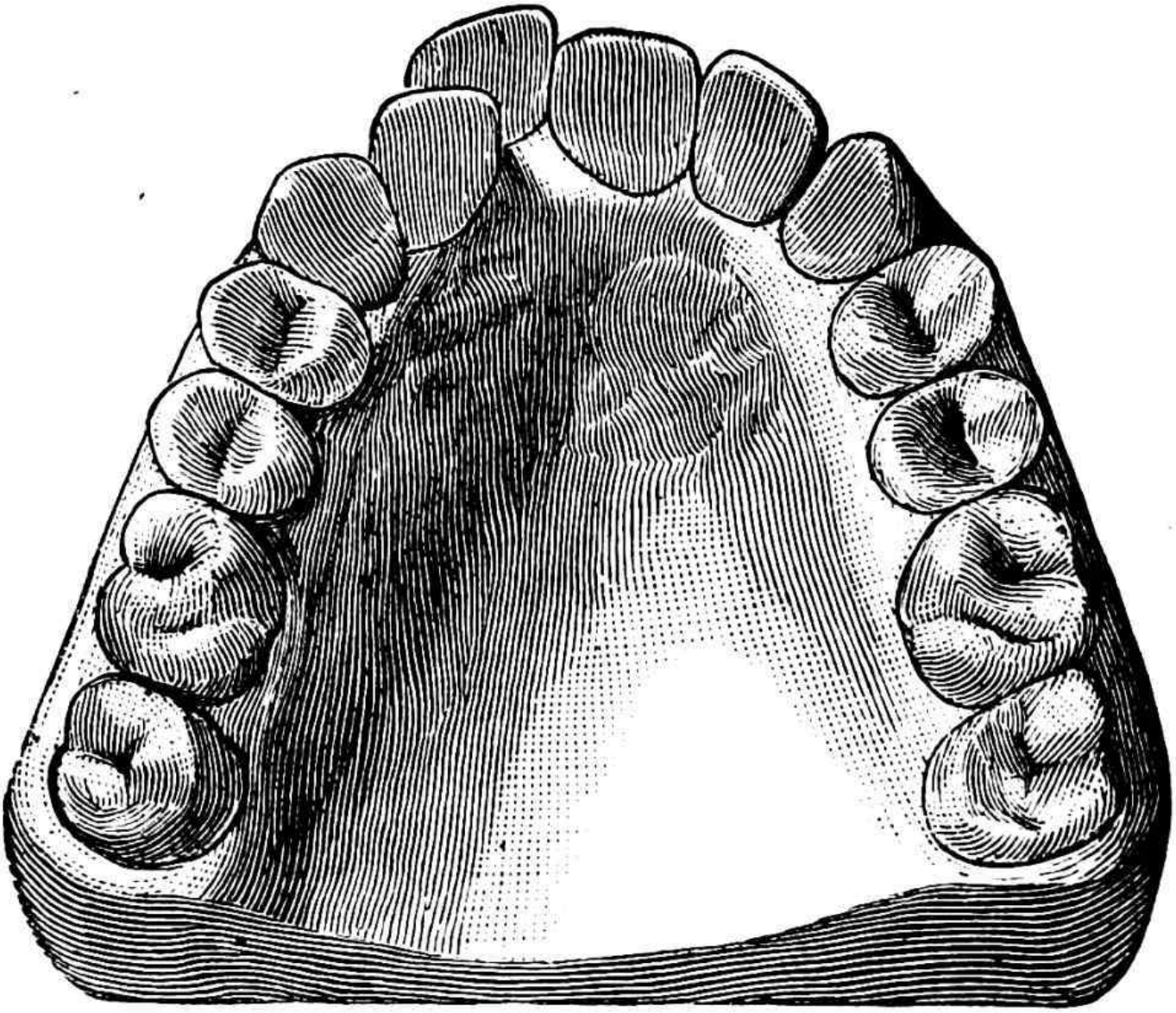

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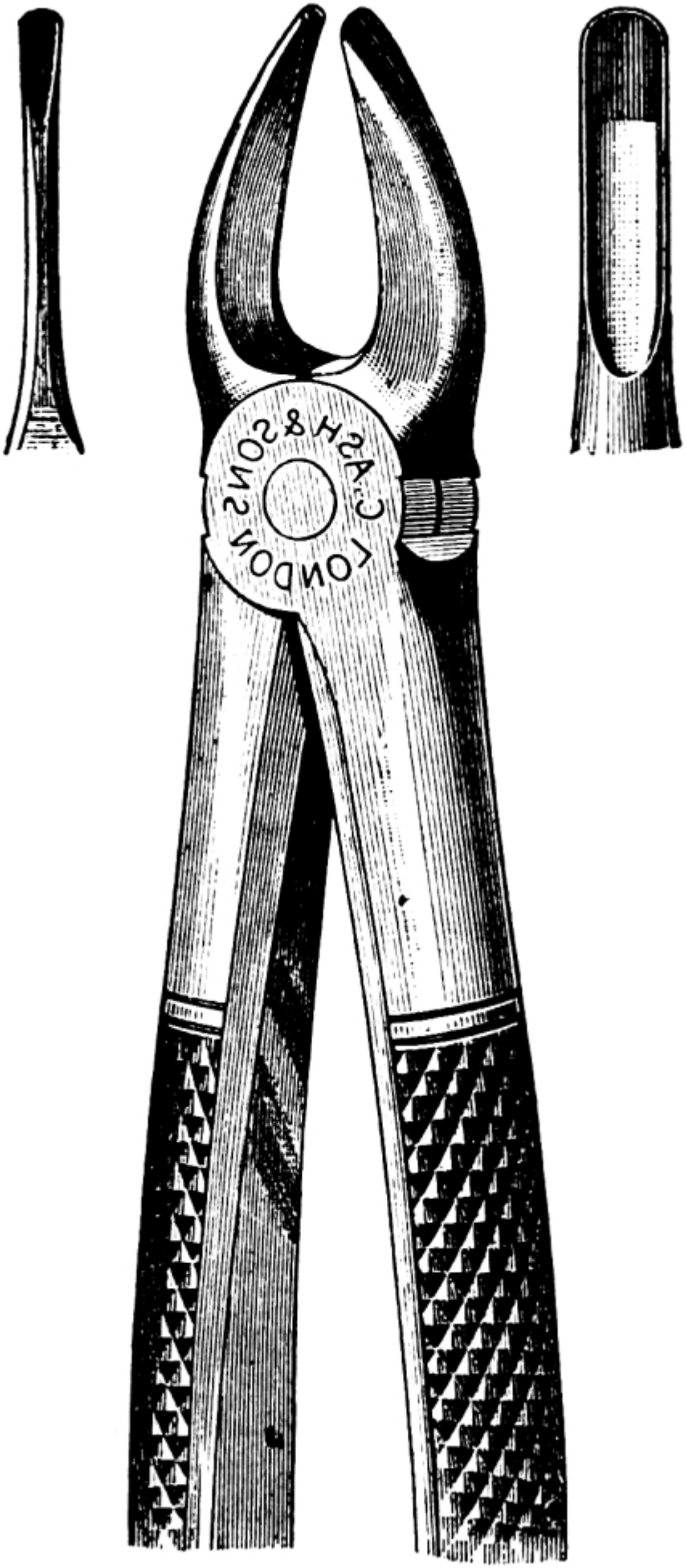

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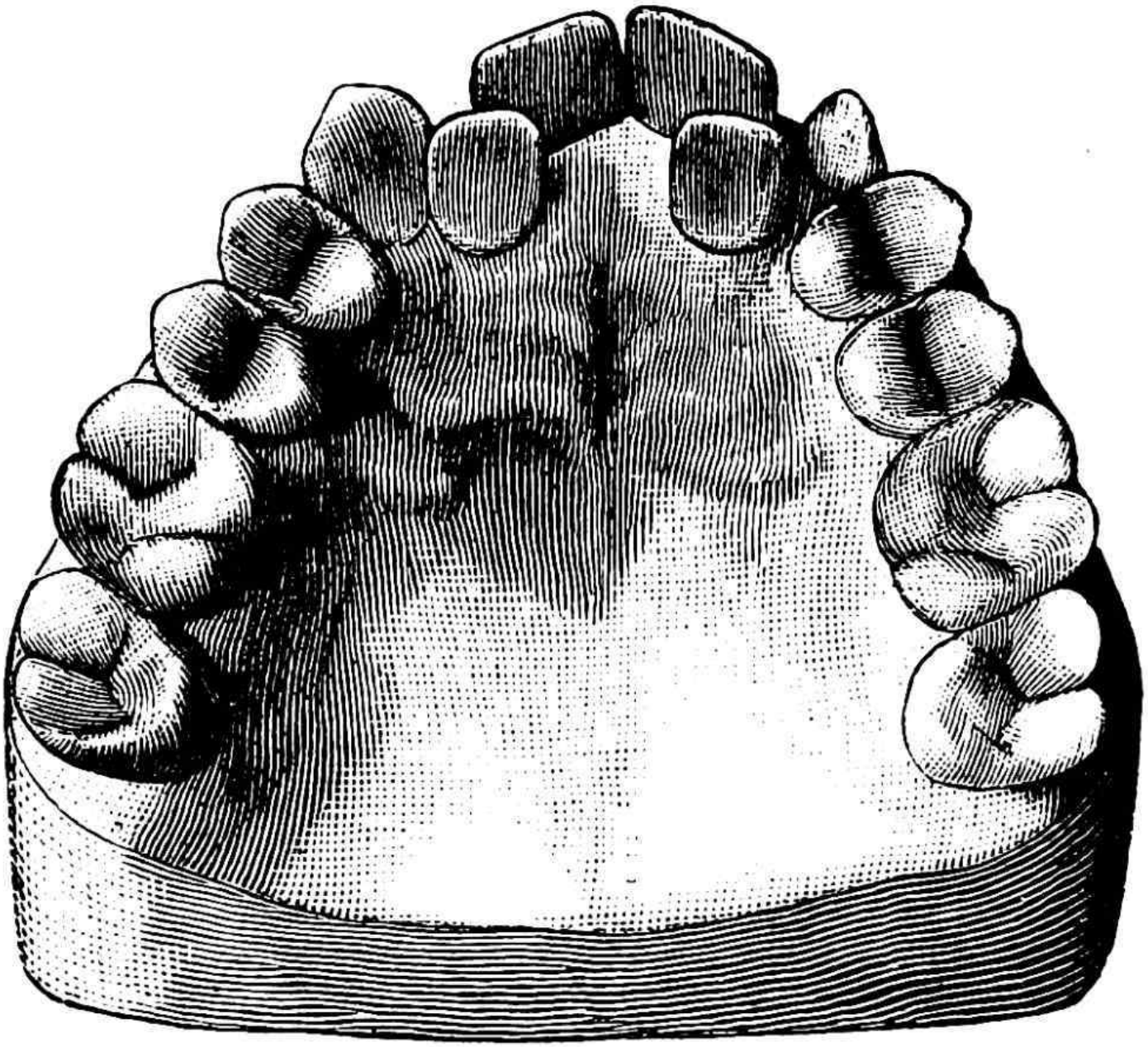

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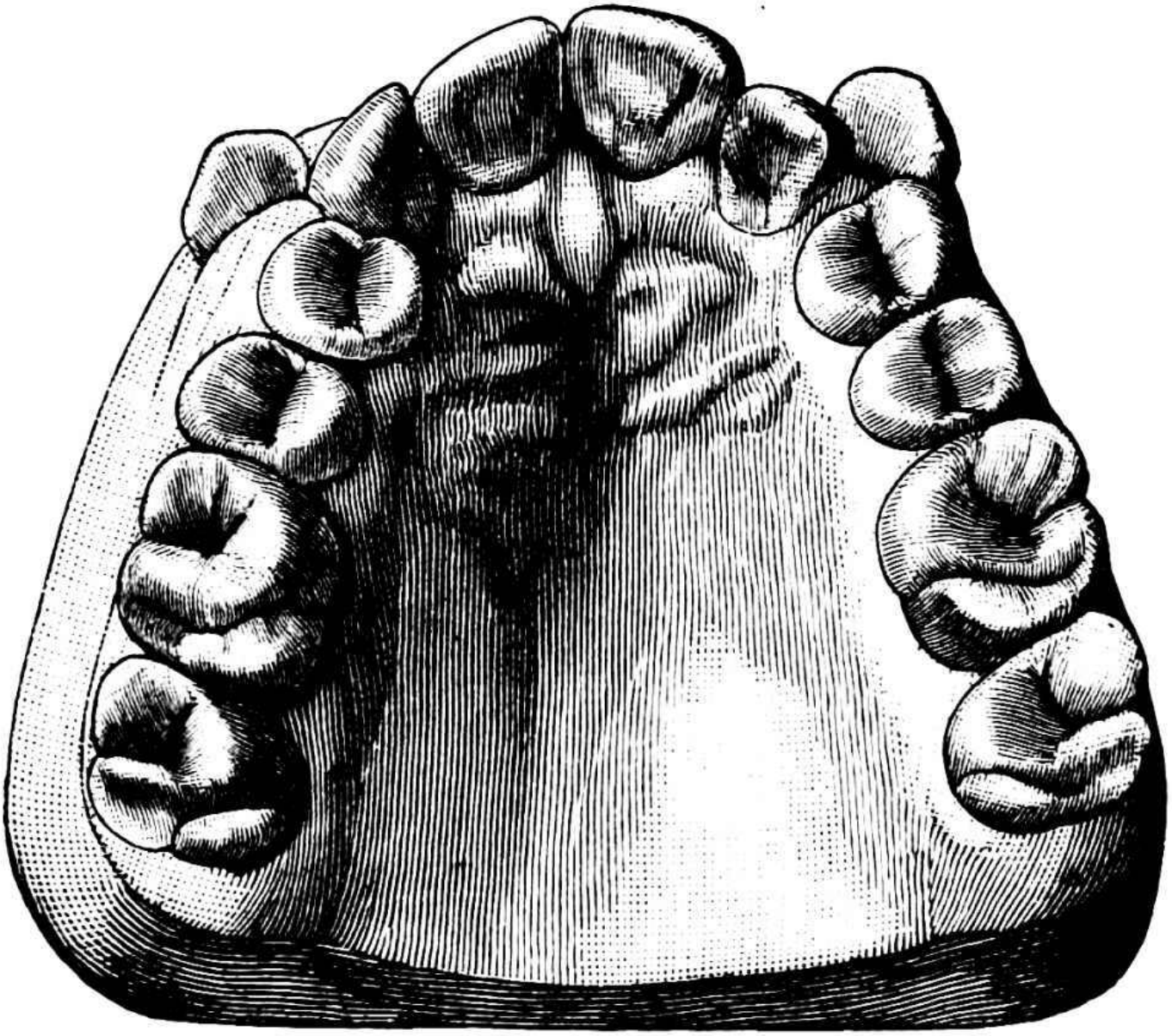

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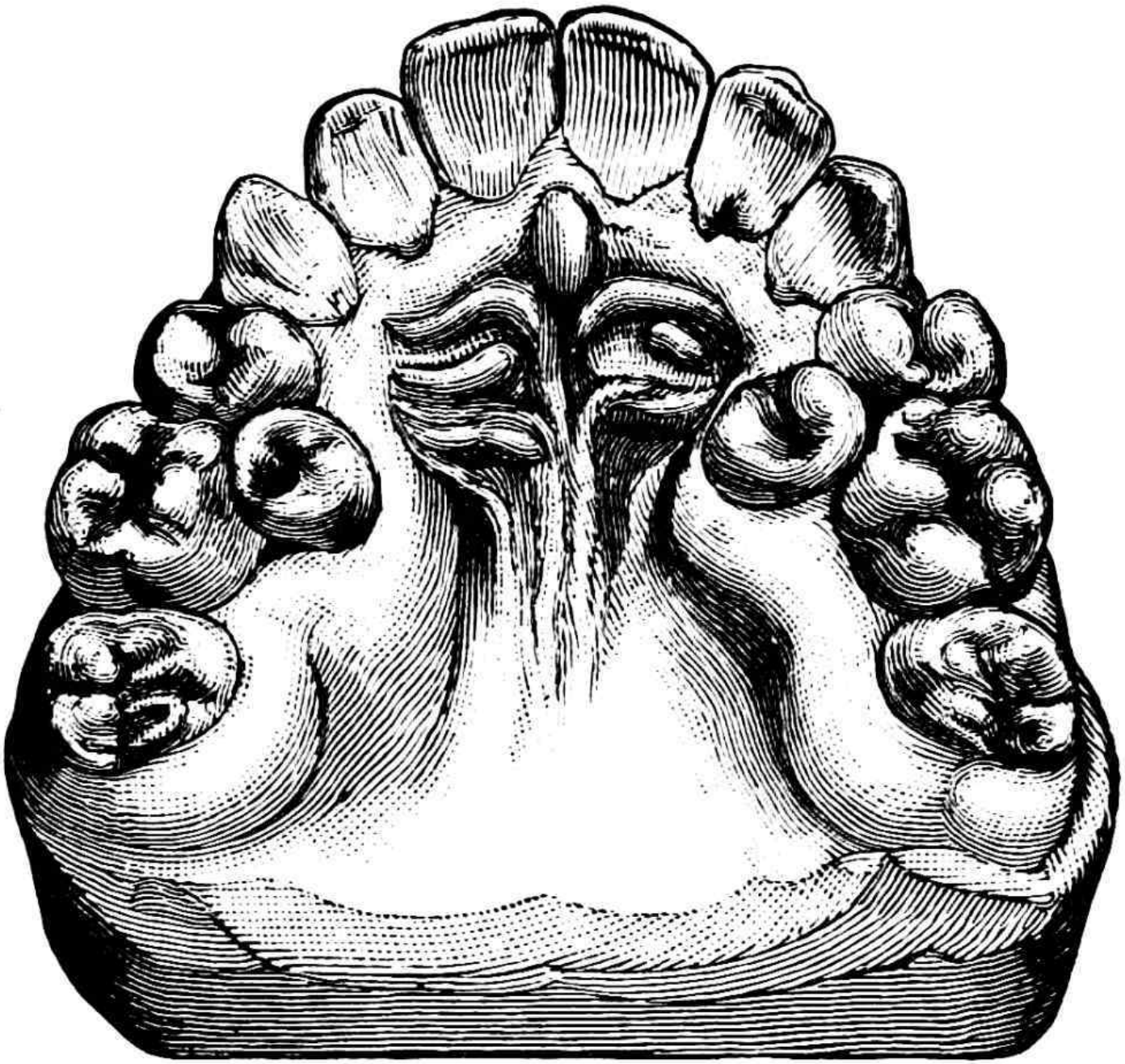

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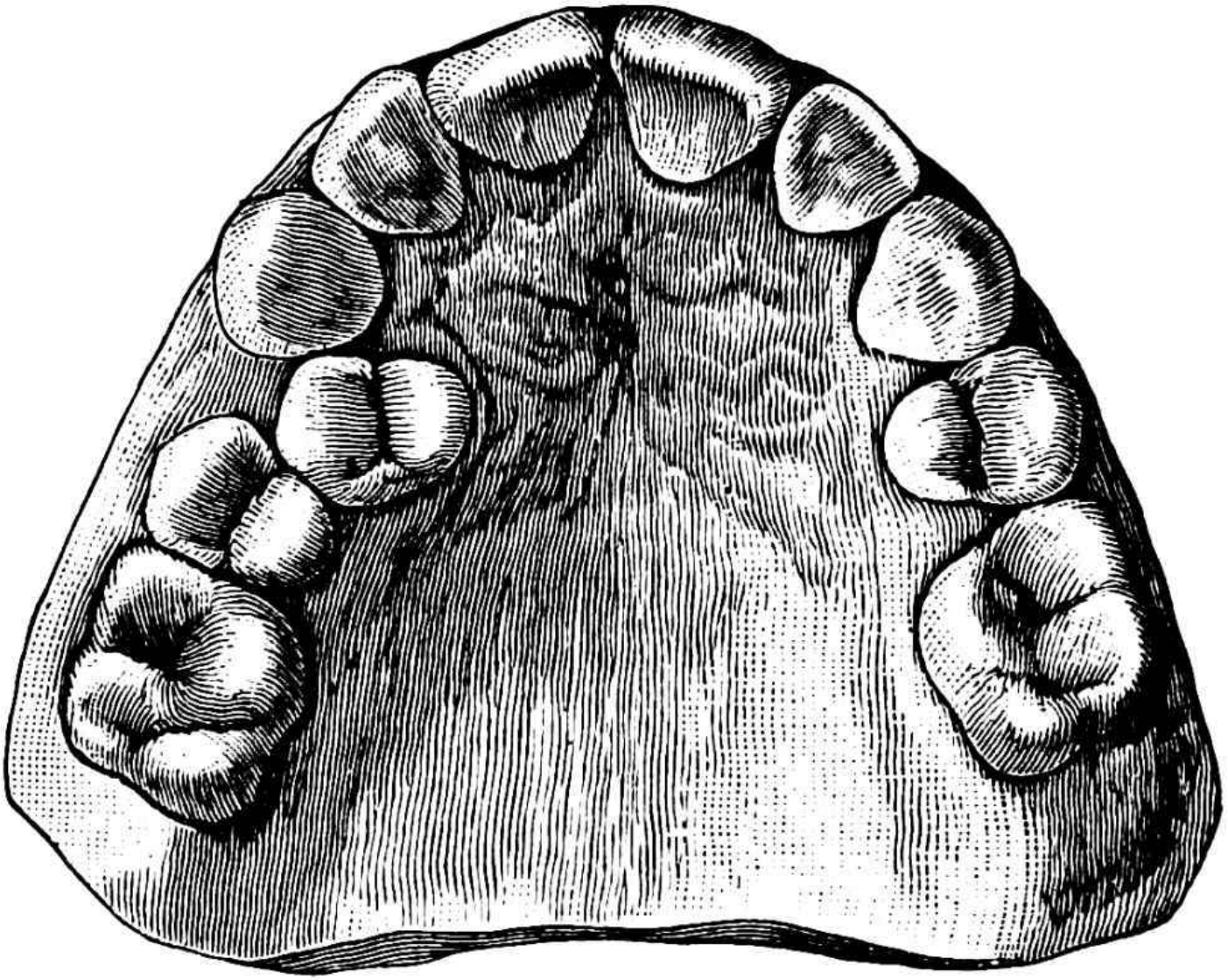

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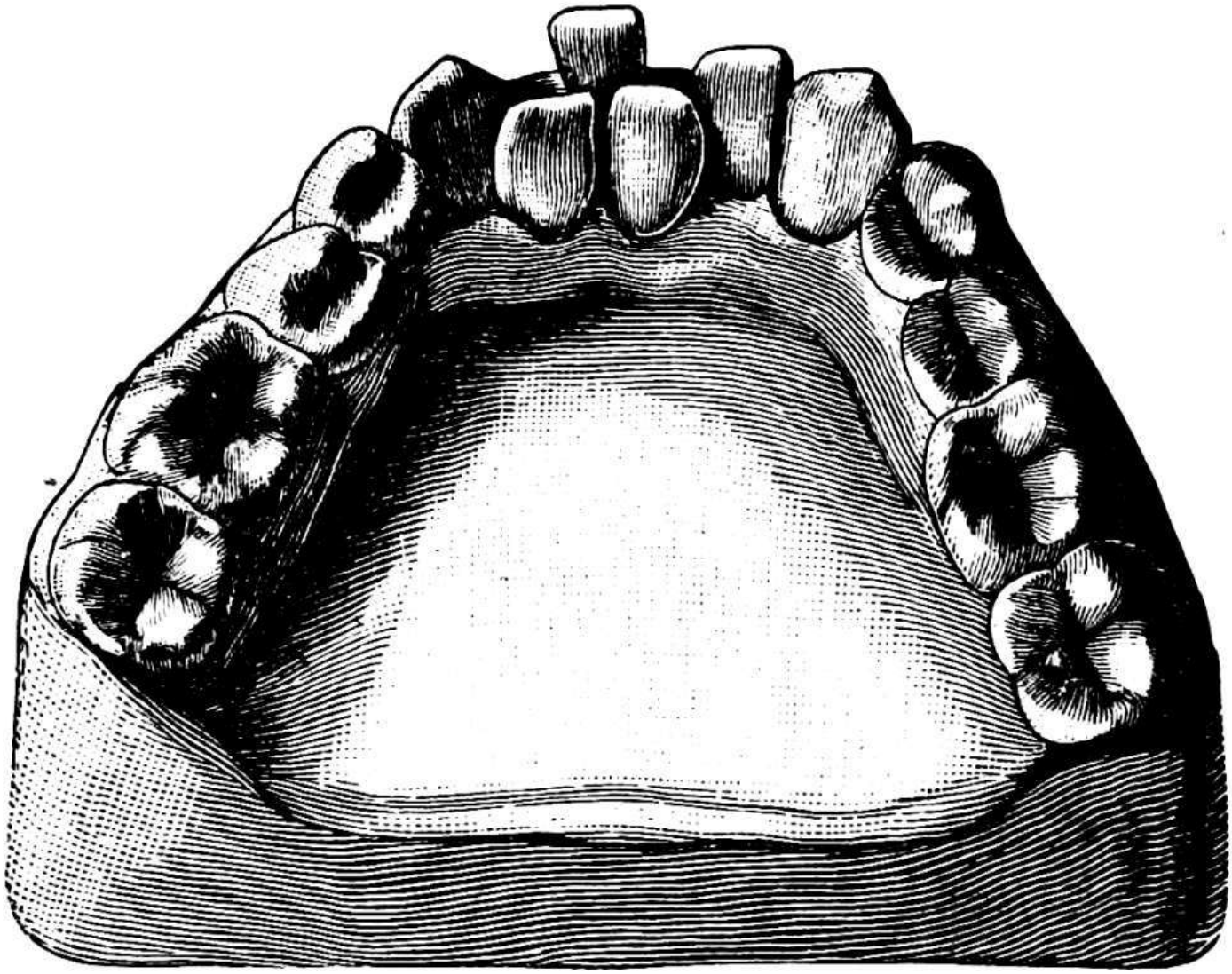

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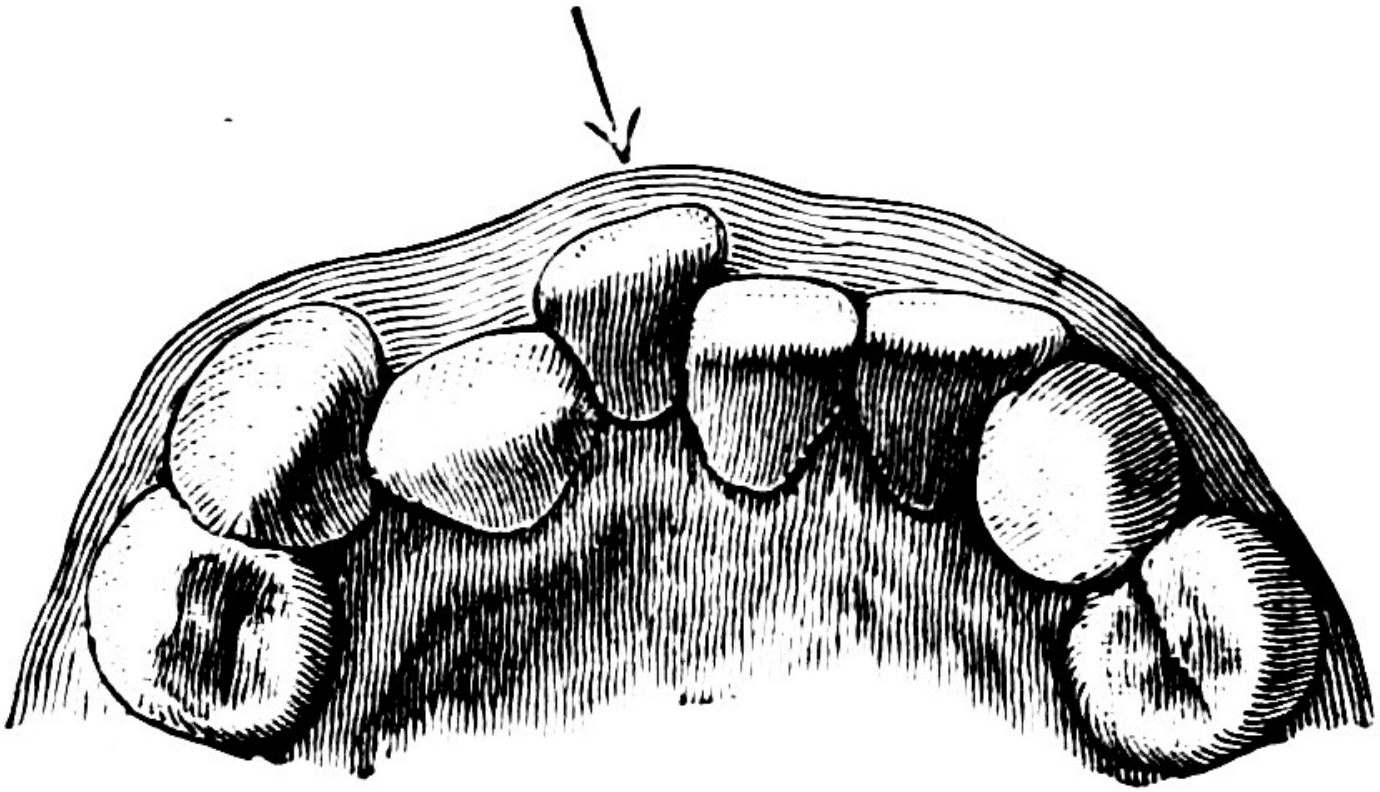

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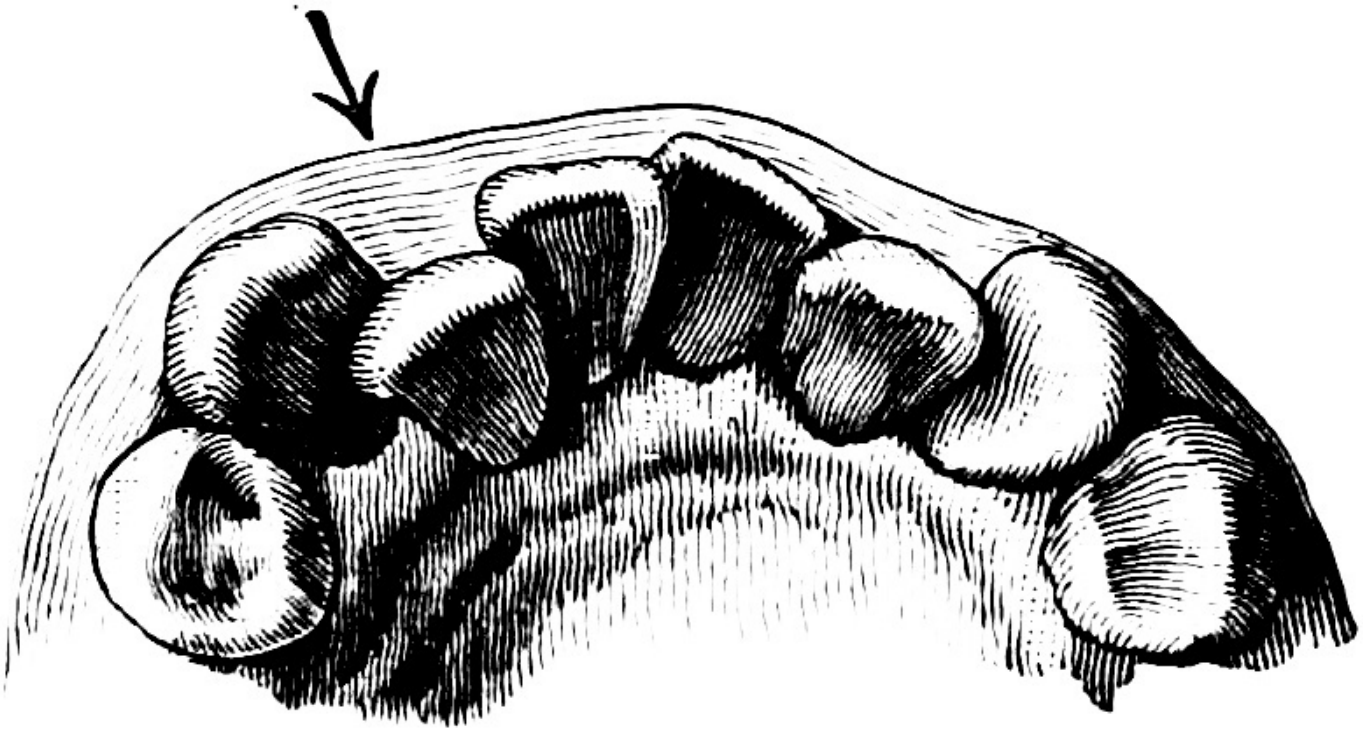

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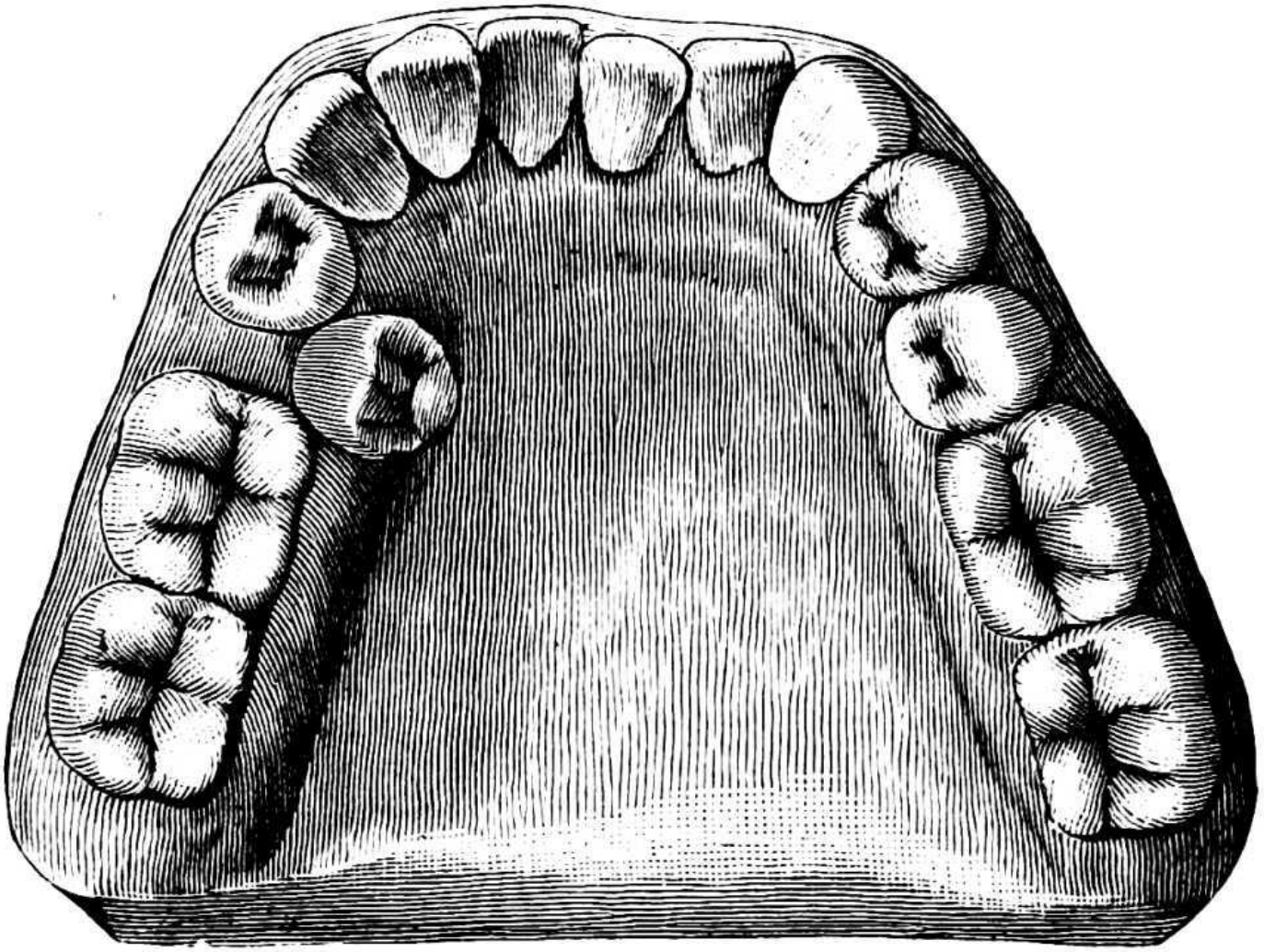

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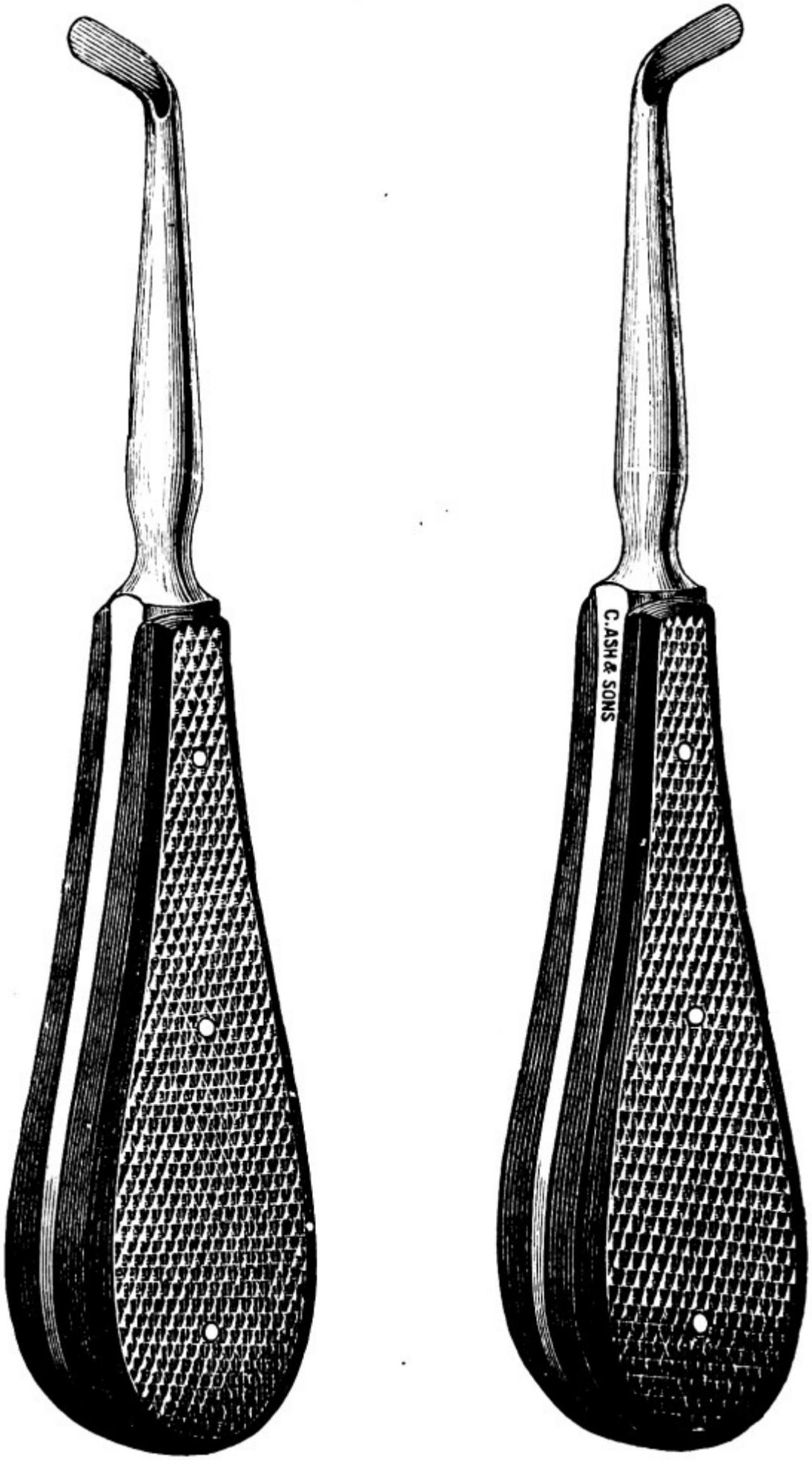

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