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THE TIGHTENING OF
LOOSE TEETH

WITKOWSKI

NEUMANN — GABRIEL

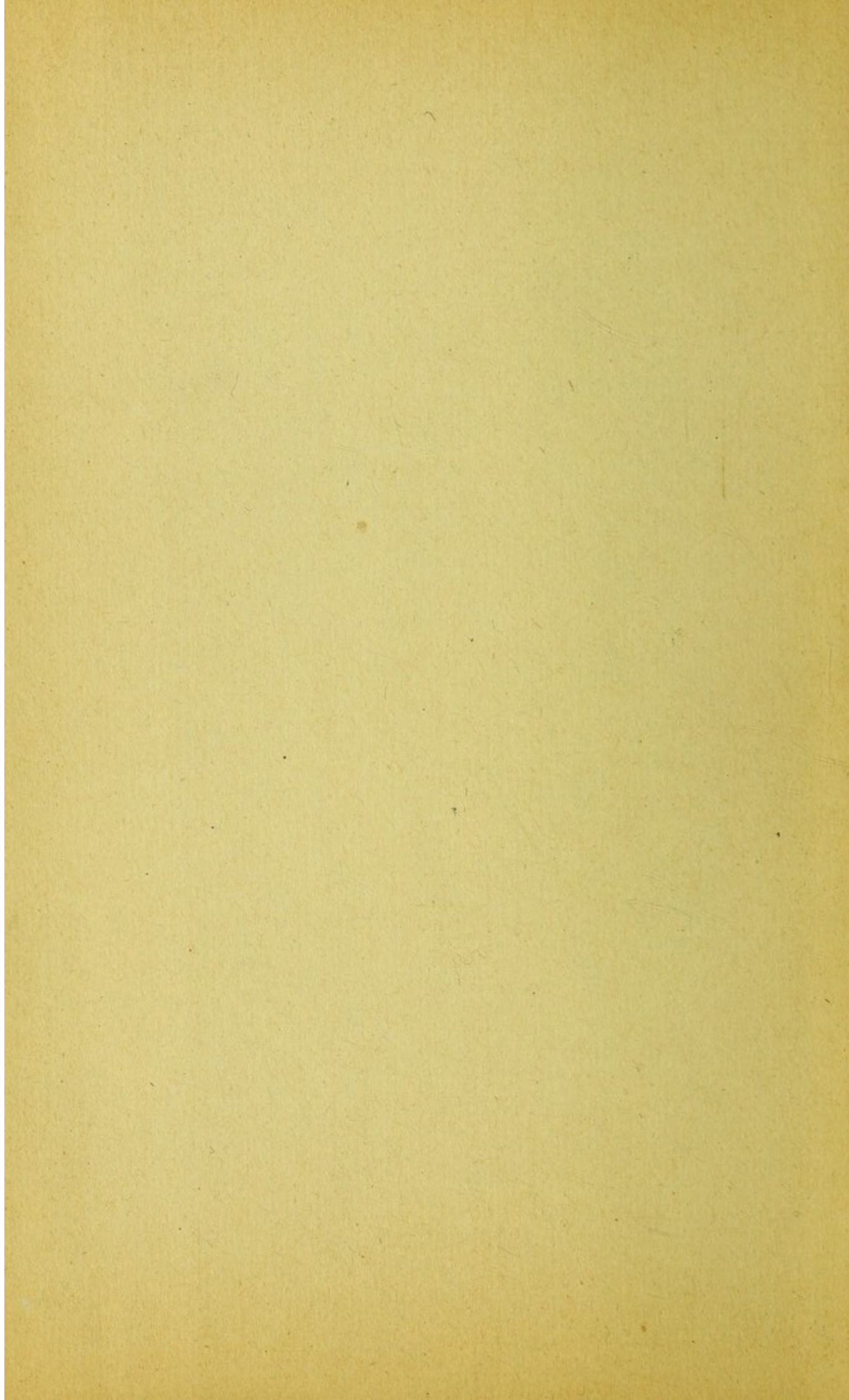
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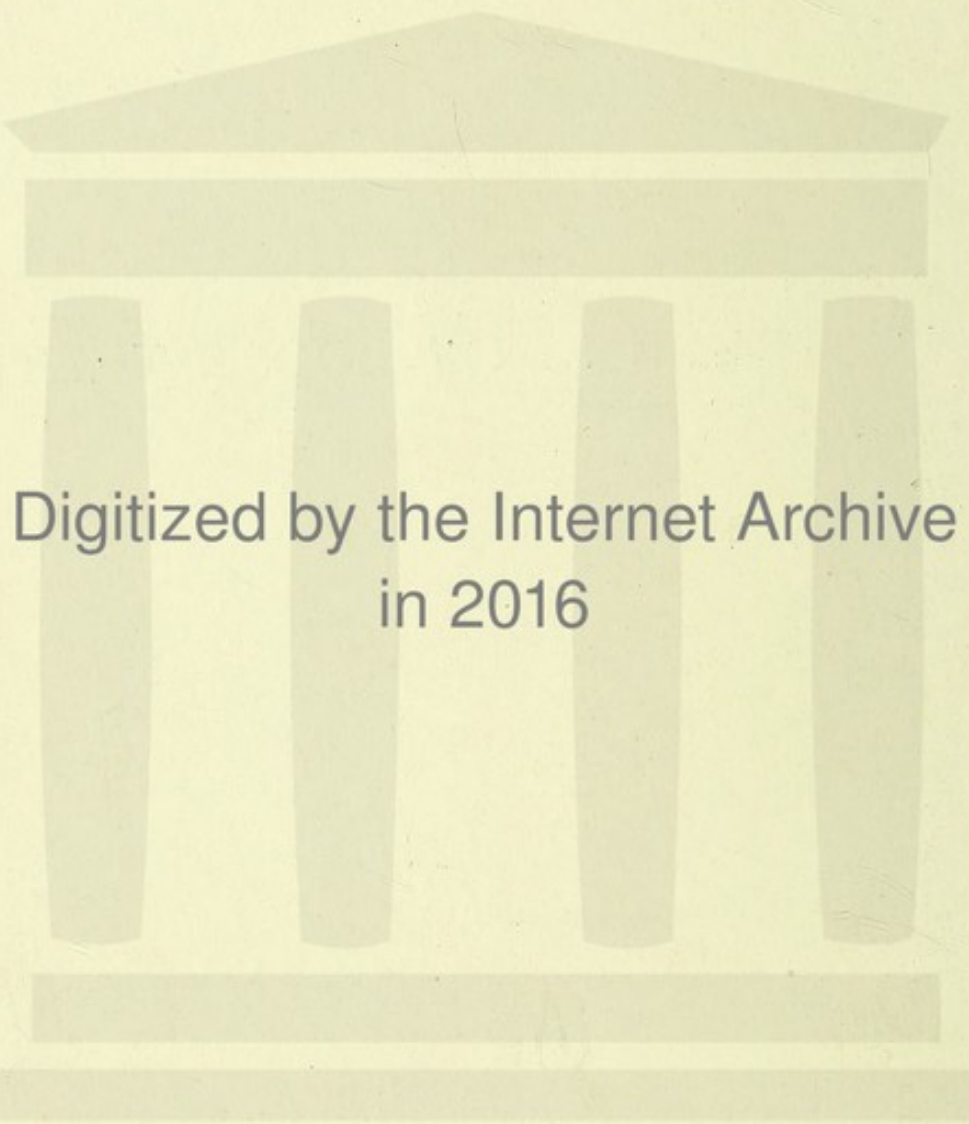
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THE TIGHTENING OF LOOSE TEETH



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THE TIGHTENING OF LOOSE TEETH

SOME TECHNICAL INNOVATIONS

BY

SURGEON-DENTIST WITKOWSKI

(BERLIN)

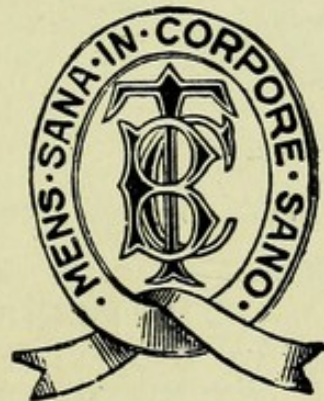
TRANSLATED FROM THE FIRST GERMAN EDITION

BY

EDGAR NEUMANN, M.D.

AND

WILLIAM M. GABRIEL, M.R.C.S., L.D.S. ENG.



LONDON

BAILLIÈRE, TINDALL AND COX

HENRIETTA STREET, COVENT GARDEN

1912

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TRANSLATOR'S PREFACE

THERE are a good many dental surgeons who hold that in cases of pyorrhœa alveolaris, when the teeth are very loose, connecting them together with bridge-work steadies them in their sockets, and consequently permits more effective treatment.

On the other hand, it is maintained by an equally large, if not greater, number, that the employment of a bridge is quite unjustifiable where the patient's teeth are loosening. Though, consequently, expert opinion upon the merits of the methods expounded herein by the author is likely to be somewhat varied, it is nevertheless well for every dental surgeon to be acquainted therewith, as with every device, if only for the reason that he can never be certain that a patient on whom they have been practised at some time or other will not come into his hands for his temporary or regular services.

At the same time, as already suggested, considerable objection is likely to be taken by some dentists, and possibly patients also, to some of the operative treatment eulogized and advocated by the author.

In the first place, a good deal of weighty opinion in this country is verging to the view that the evils of

oral sepsis are such that no matter how the mouth and teeth be cleansed, fixed apparatus of any kind is absolutely out of place there. On the other hand, there are many, even here in England, who as strenuously contend that few more serious disasters can befall a patient than for him to lose a tooth and be forced to have it replaced by a plate artificial denture.

Secondly, the author holds, it will be observed, that the destruction and removal of the pulp of a tooth affected with pyorrhœa is undesirable, and his devices are accordingly designed with the view of avoiding this. In this his opinion is distinctly at variance with that of those who claim that pulp-removal has some mysterious beneficent, though never properly explained, influence on the peridental membrane, as also with that of the followers of Dr. J. P. Buckley of Chicago. By him it has been well pointed out that "there are many cases wherein the removal of the pulp is clearly advocated—not, however, because of the supposed stimulation which results, but because of its low state of vitality and ultimate death—in which case the pyorrhœal condition is likely to be complicated by the presence of an alveolar abscess." Further, in the case of the incisors, after pulp removal, advantage is generally taken by such operators of the presence of the root-canal, and they accordingly adapt thereto a post connected with some form of supporting apparatus.

The author indicates how natural teeth may in certain circumstances be removed and replaced in their sockets, fixed to a sustaining apparatus, and

even artificial roots made; but it seems hardly likely that such devices will find much favour with practitioners in this country, highly ingenious as they undoubtedly are.

Another instance of what some may regard as ultra-conservatism is the adaptation of crowns to the divided and separate roots of a molar. Instances of malignant disease following, even if not demonstrably consequent upon, such extreme conservative methods are not unknown.

It will be observed that the author is in favour of retaining-apparatus being applied as soon as teeth begin to show signs of loosening. In many such cases, however, it will in all probability be extremely difficult, even when the operator conscientiously believes the drilling through of live teeth to be indicated, to succeed in persuading the patient to submit to this, no matter what method of anæsthesia be adopted. When, on the contrary, the teeth are really very loose, and such a procedure might be welcomed by the despairing patient and operator alike, it is obvious that its execution can hardly be always free from serious difficulty.

With these few and necessarily brief prefatory remarks, I commend the ensuing pages to the careful attention of the reader, who cannot fail to be interested therein.

WILLIAM M. GABRIEL.

LONDON, E.C.

November, 1911.

AUTHOR'S PREFACE

WHEN, about fifteen years ago, I began my first experiments in the tightening of loose teeth, I was influenced solely by pity for my patients. Even eminent scientists in the dental art had paid but trifling attention to this branch of dentistry, and the patient was ever given the stereotyped sorrowful answer : "Lost labour ! loose teeth must drop out."

When from such a humane feeling I first undertook the treatment of loose teeth, the literature of the subject was very meagre, and the timid beginner vainly sought advice and counsel from any more experienced master. Subsequently, after many failures, I obtained gratifying results, and I accordingly desire to bring before the profession the result of my many years' researches and work.

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THE TIGHTENING OF LOOSE TEETH

General Suggestions.

BEFORE undertaking the mechanical fixation of loose teeth, it may be advisable to clear up the etiology of loosening, and the condition of both the teeth and the underlying jaw. Such a mental picture is arrived at by radiography, by the induced current, and by the thorough examination of every individual tooth.

Some confusion has been occasioned by reason of the fact that a multiplicity of causes have been put forward to account for the loosening of teeth, and since many authors have advocated principles no one of which is applicable to all the conditions and phenomena present.

While, in removing an unsuitable crown, in shortening an antagonist, and in correcting the bite, we recognize strain as being one of the factors in the etiology of loosening, there are cases where loosening may be due to either tartar or constitutional disease.

Topical reagents should be applied and all calcareous

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deposits removed ; but this treatment will be useless until mechanical fixation is secured.

I have treated a great many cases of loosening, due to pyorrhœa alveolaris, with topical applications and cauterization, without obtaining any satisfactory result.

After the application of radiography, neither gums nor teeth have been relieved, while mechanical fixation, combined with topical applications, has brought about notable improvement.

As the result of experimental studies, I have been more and more convinced that mechanical fixation ought not to be based upon special principles. It is a matter of no importance whether fixation is secured by the use of wires, ligatures, or celluloid splints, or whether loose molars are fixed by connecting collars or by inlays.

In bringing before the profession my system of retaining loose teeth, I shall indicate my own method of procedure ; but there are besides, I believe, other ways that will attain the results I have secured after many trials.

Special Rules for Preparatory Treatment and Fixation.

It would appear to be good practice to operate in the first incipient stages of loosening, and not to wait to see whether the condition will improve or get worse. Even in cases where only one or two teeth are loose,

the whole row should be supported—*e.g.*, in the case of one or two loose bicuspid, all the bicuspid; in the case of one loose incisor, all the front teeth.

In the fixation of a loose incisor or molar by the aid of the neighbouring tooth alone, we cause loosening of the latter also.

In supporting front teeth, these should be connected with the bicuspid, to produce a continuous row, so as to relieve strain and prevent the front teeth from giving way.

Canines should be fastened to bicuspid.

Teeth with dead pulps, and those with great sensitiveness that cannot be put into good position, should be extracted.

No complicated treatment of a loose tooth ought to be performed unless its preservation is necessary for the application of the retaining appliance.

Extracted teeth, and those which have dropped out, may be reimplanted and fastened to the retaining appliance.

Teeth are cut off at the apex, cleansed through the foramen, filled, and laid in a normal solution of common salt until reimplanted.

Badly broken down teeth, which have been out of the mouth for a long time, regain their normal condition, thanks to the revivifying influence of the saliva.

If the teeth are extracted, immediate reimplantation should be performed; if not, the wound must be kept in an aseptic condition. The necks are to remain un-

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covered ; caps, collars, and crowns ought not to extend to the gingival margins.

In case commencing atrophy of the gums is present, gold collars will accelerate this process, and the margins of the supporting collars will be uncovered after a short time.

Topical treatment of the gums and permanent control of calcareous deposits at the gingival margins cannot be performed if a ring extend below the gum.

Should a collar be too large, so as to fit loosely, it



FIG. 1.

may be rendered tight by means of a gold wedge pushed in underneath it.

Elongated molars with denuded and sensitive necks should be protected by pure gold collars (Fig. 1).

For securing the immobility of the retained teeth within the collars, caps and collars should be adjusted with pivots and screws.

The following may serve as a cardinal rule :

When supporting loose teeth that ought to remain

in the mouth, preserve the vitality of the pulp and protect the enamel.

I have found that the gum in the vicinity of living teeth is far firmer and less inclined to atrophy than round dead ones. Moreover, that teeth which at a previous radiography had shown but trifling connection with either jaw or connective tissue have acquired a firmer connection after being fixed by the retaining appliance.

Tightening Loose Teeth.

1. Take an impression of both upper and lower jaws.

Examine each tooth carefully; take written notes of the degree of looseness, of decay, and of sensitiveness.

Clear up, by radiography, doubtful conditions in the jaw, as to their kind and extent.

In both pyorrhœa alveolaris and doubtful cases of loosening make urinary tests (albumen, sugar).

2. Decayed teeth are to be filled, painless teeth, refractory to any treatment, being extracted, to prevent the patient from becoming impatient during the preparatory treatment.

Badly loosened teeth should be fixed by means of silk ligatures, to be applied like a figure of eight bandage.

Visible gaps in the front are to be removed by the temporary setting of tube teeth (Fig. 2).

3. *Cleansing Teeth.*—The first thing to do, in all cases, is to put the teeth in as first-class condition as

6 THE TIGHTENING OF LOOSE TEETH

possible, and to remove tartar, in order to prevent loosening or to tighten loosened teeth.

According to some authors, loosening is caused only by tartar, the removal of which constitutes the sole and sufficient treatment; but cases not uncommonly occur where teeth have become loose without showing any calcareous deposits, though tartar may have passed through the softened gum prior to the loosening of the teeth.

Besides, loosened teeth are instinctively relieved from contact with their antagonists, and are not care-

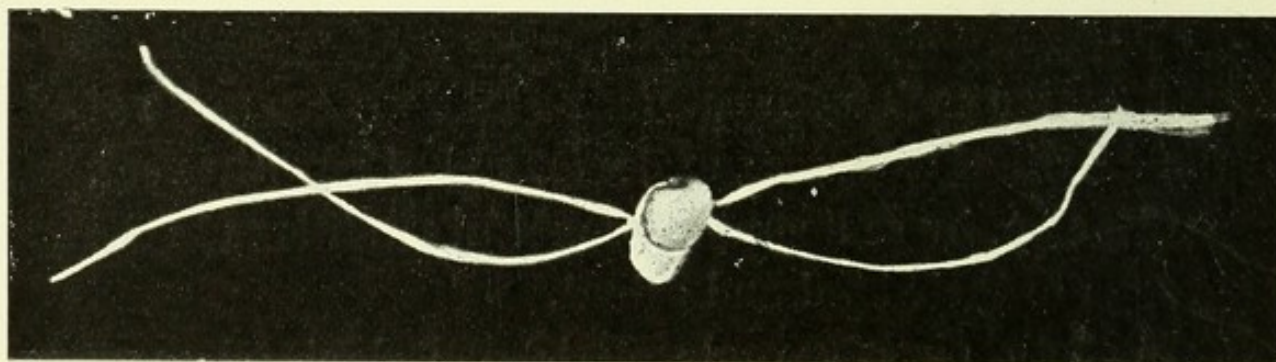


FIG. 2

fully cleansed; on them, of course, tartar may easily be deposited.

Finally, there are often present large calcareous deposits when looseness cannot be said to exist. Again, there are cases without any predisposition to loosening, such as those resulting from constitutional diseases, dystrophia, and great strain.

Cleansing should be done as carefully as possible.

There is one point which I wish to bring out here. Nearly all operators remove tartar by pushing the

instrument downwards, thus causing pain, without succeeding in removing hard calcareous deposits.

Inorganic and organic acids are to be used—viz., sulphuric and hydrochloric, formic, lactic, and trichloroacetic.

When acting for some minutes, acids cause decalcification or dulness of the enamel.

Influenced by this fact, I endeavoured to dissolve the tartar by prolonged action of a harmless drug capable of dissolving tartar.

A chemist, Dr. Richter, has succeeded in making a preparation likely to fulfil the requirements enumerated above. It is enclosed in ampoules, and is to be introduced along the necks into the pockets.

The liquid at once forms an adherent film, which contains the active ingredient, distributed, as it were, in a sponge, and is washed out by the saliva.

After the mouth has been rinsed the remedy begins its action, which lasts from one and a half to two hours, the saliva dissolving small quantities of the substance from the film, and the solution acting as a tartar solvent.

After a few hours the calcareous deposits are softened, and may be removed, together with the film, by means of the usual scalers.

The preparation has a favourable action in gingivitis and pyorrhœa alveolaris, thanks to its disinfecting and astringent properties. Besides, it lessens sensitiveness, and facilitates the painless removal of tartar.

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It is free from the usual tartar solvent acids, and absolutely innocuous in its action upon the enamel and the surrounding parts.

The tartar thoroughly removed, I polish both the tooth and the root with pumice-stone mixed with peroxide of hydrogen, and with quills, the elastic nature of which keeps them close to the neck, and permits penetration without any destruction of the soft tissues.

4. Loose teeth, if displaced, should be straightened and retained by means of ligatures, celluloid caps, or splints.

In case a tooth is inclined, owing to the absence of its neighbour, it should be held up by interposing gutta-percha, so that it may be drilled for securing retention, and by means of ligatures fastened to the neighbouring teeth.

Loose front teeth, if inclined, may be held in an erect position by tube teeth tied between them.

In case a row of erected teeth are loose, they may be held in a fixed position by means of strong silk ligatures.

Molars showing sensitiveness during the preparatory treatment are protected by a magnalium cap that retains the analgetic remedy.

Lately we have obtained gratifying results by the use of Calxine, put on the market by De Trey.

Noxolithe, the drug referred to, mixed with eugenol, after instillation, forms a valuable protective substance for denuded painful necks, as hardening takes place even in the presence of saliva.

In cases of pyorrhœa alveolaris, besides the most careful cleaning, preparatory treatment, both topical and operative, is to be performed.

In slight cases the pockets should be scraped, washed out with peroxide of hydrogen, and filled with a paste of 1 part carbolic acid and 2 parts camphor. Instillations of noxolithe have proved successful. In grave cases deep cauterization should be performed. This preparatory treatment should be carried out only a few times, as I am convinced that the treatment of pyorrhœa gives more favourable results when performed after the careful fixation of the loosened teeth.

By joining loose teeth, by removing the irritation caused by looseness, and by obtaining a closed row which cannot give way, given proper occlusion, pain, interdental spaces, and pockets, may disappear.

Necessary Instruments and Materials.

For taking impressions : S. S. White's Perfection impression composition ; marble plaster for hard casts.

For the drilling of the teeth : Lancet burrs ; fissure burrs ; thin pins (Fig. 3).

For swaging : Moldine and Melotte's metal.

For retaining appliances : Gold-plate, 24 carat 0·15 ; gold-plate, 22 carat 0·4.

For crowns and collars : Gold-plate, 22 carat 0·4.

For pins : Coin-gold wire.

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For splitting pins : Fret - saws ; ribbon - saws (Fig. 4).

For riveting : Witkowski's riveting-pliers.

Interior teeth, bridge and pivot teeth : S. S. White's dowel crowns.

Front teeth for bridge-work and retaining appliances : dowel crowns, or Ash tube teeth with platinum tubes.

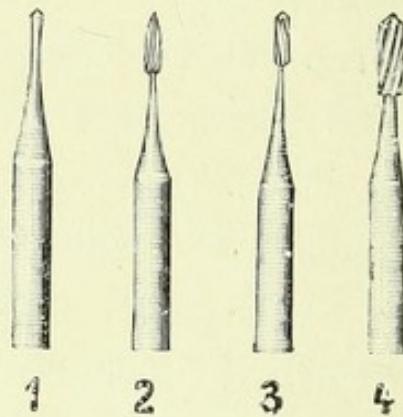


FIG. 3.

For soldering : Borax dissolved in alcohol.

Wire splint for bridge-work : 17-carat gold wire, oval No. 1, c. Ash No. 5.

As a wire splint one may also use a strong round wire of 18 carat (platinum alloyed). When driven into zinc it becomes half-round in section.



FIG. 4.

For ligatures : Pure platinum wire.

For gilding : A gold bath.

For plating : A platinum bath, according to Dr. Thiersch.

For finishing and polishing : Carborundum-stones ; sandpaper and cuttlefish discs ; perforated articulating-paper.

The Mechanical Fixation of Loose Teeth.

A higher degree of looseness most commonly occurs in the lower front teeth. Even if only two or three incisors are affected, the retaining appliance should include the canines.

At the first sitting I drill all the front teeth through their upper third by means of a fine lancet burr.

The drilling is to be done about the centre of the retaining-plate, without irritating the pulp or weakening brittle teeth near their cutting edges.

Begin with drilling through one central incisor ; pass a pin through so as to stand out partly from the mouth, while the point is in the mouth. In the case of timid patients, the point of the pin should be covered with a pellet of wax or gutta-percha.

When drilling, the left hand holds the loose tooth, while the right keeps the lancet burr parallel to the floor of the oral cavity. The burr is to be frequently taken out and lubricated.

Very sharp burrs are a cardinal necessity.

In the case of the second incisor the first pin serves as a guide, the one half standing out from the mouth for the hand-piece, the other half, being in the oral cavity, for the lancet burr. Like the first, the second is also fitted with a pin after it has been drilled.

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Thus there are at last six pins, parallel, directed into the mouth (Fig. 5).

In case a canine is much rotated, so that parallel drilling would weaken it unduly, it should be drilled across independently of its direction, and must be retained separately.

The first step in applying the retainer: The parallel drilling being difficult, the impression made

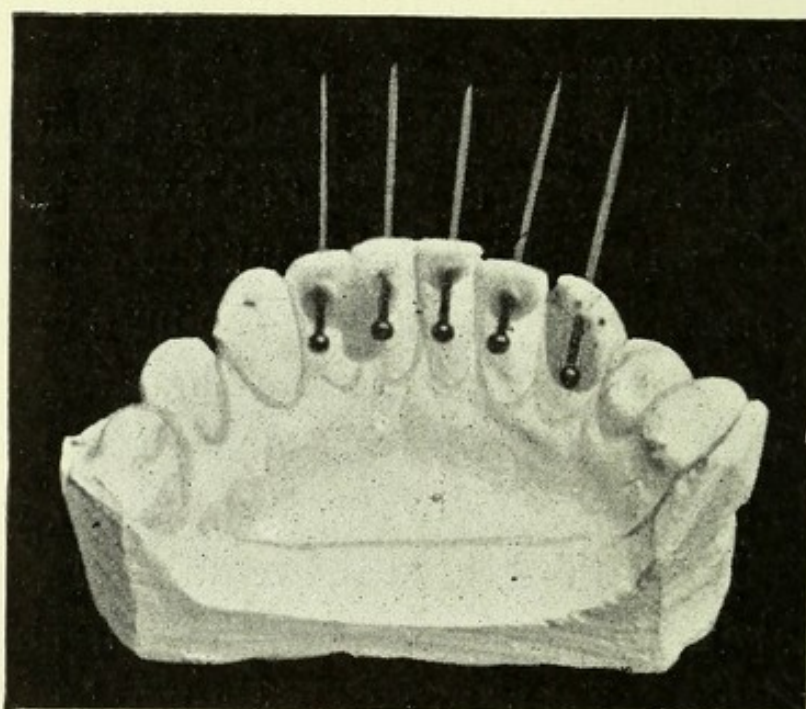


FIG. 5.

In practice the pins must be turned round.

at the first sitting should be used as a model for parallel drilling (Fig. 6).

In case drilling is painful—in spite of the above-mentioned remedies—injection or ethyl chloride may be resorted to.

After having removed the pins, I take an impression with Perfection composition, on which the holes are marked (Fig. 7).

With a pencil line I mark on the model the extent of the retaining appliance, the lower part of which extends to about the foramen cæcum of the lateral

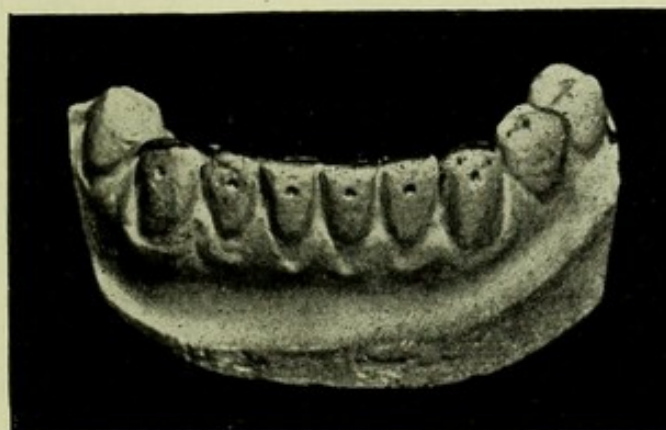


FIG. 6.

incisors. Its upper margin covers the lingual wall of their cutting edges.

In normal occlusion, where only the buccal half of

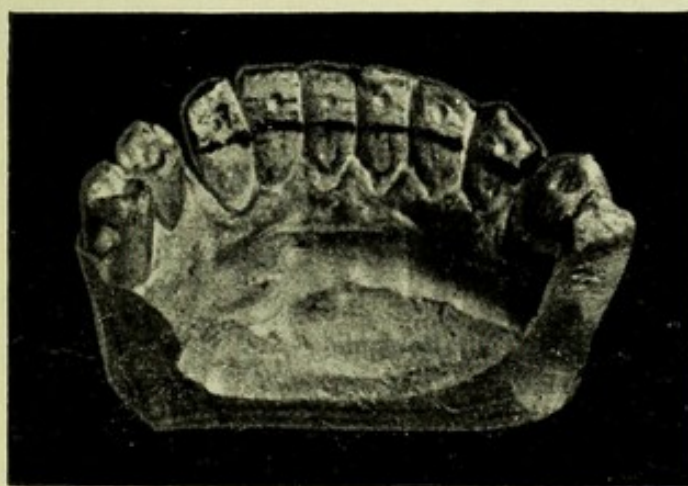


FIG. 7.

the cutting edges is in contact with the upper teeth, this gold bar will not be annoying.

In case of edge to edge bite, the cutting edges are

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to be ground off, or the upper margin of the retaining appliance should extend to the cutting edges only. Too much grinding may either weaken the upper part of the tooth or cause breaking of an edge.

The grinding of the cutting edges of teeth of unequal size should be done only after drilling.

Next a die is cast on the plaster model by covering the bottom of the oral cavity with moldine up to the pencil line. On the side teeth two vertical walls should be produced, and the front teeth invested up to their

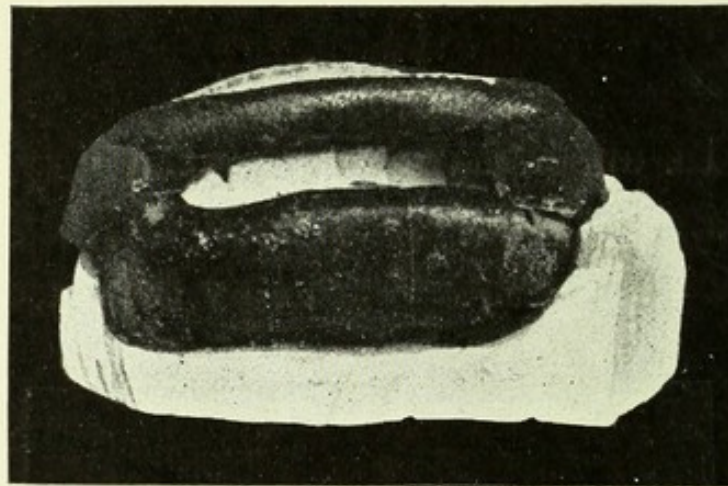


FIG. 8.

edges. The model must be placed perpendicularly upon the investing material, so as to insure immobility of the metal to be swaged. Finally, a wall is erected in a direction parallel to the bottom of the oral cavity. Thus is built up a quadrangular box of moldine, in which only the teeth are visible.

Large interdental spaces also should be filled with moldine, in order to prevent overhanging places in the matrix from being formed (Fig. 8).

Now cast Melotte's fusible metal into the box of moldine. Temper and invest the die (Fig. 9) in moldine up to the backs of the teeth (Fig. 10).

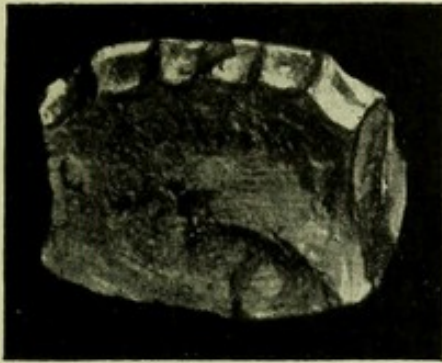


FIG. 9.

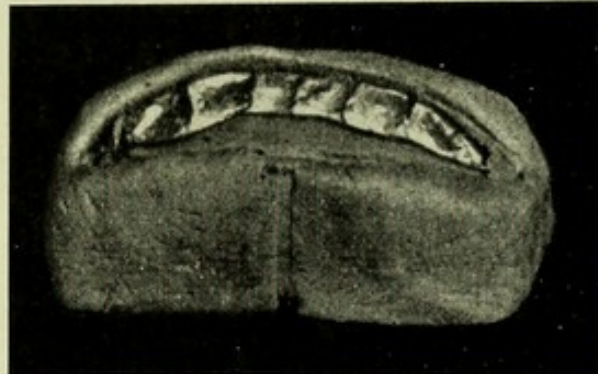


FIG. 10.

Next oil, sprinkle with French chalk, blow it away, place a ring-shaped sandpaper strip round it, and pour on more melted, but not overheated, fusible metal upon it. Thus the counter-die is obtained (Fig. 11).

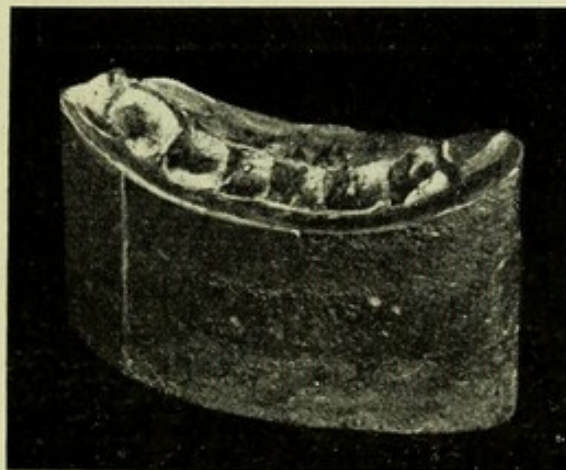


FIG. 11.

Place a narrow strip of annealed pure gold on the die, turn the corners over, press on firmly with the fingers (on deeper contours use a round wooden stick or agate polishing-point), and swage. Place a layer of

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cotton between the pure gold and the counter-die to protect the die, and to avoid cracking of the thin pure gold-plate.

Now place a smaller band of 22-carat gold-plate on the pure gold, and swage once more. Cut the 22-carat gold-plate to the size of the appliance to be made, and file. Allow the pure gold to overlap 1 millimetre.

Next place both on the plaster model, and by means of steel burnishers burnish them firmly. To secure a perfect fit, it may be found advisable to press the swaged pure gold-plate separately into place in the mouth.

Hold both stamped gold-plates together by means

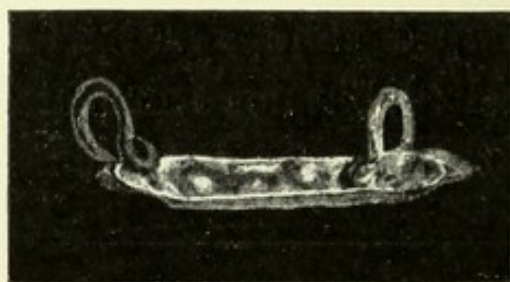


FIG. 12.

of spring clamps, place small pieces of gold solder on the larger pure gold margin, and solder until the solder flows evenly (Fig. 12).

The retaining-wall ground and trimmed, place it in the patient's mouth, and with the lancet burrs, as before, drill through the holes of the teeth.

Begin with drilling through a canine; pass a pin through, but so that, the head being inwards, it may fix the retaining-wall.

Be careful not to displace the retaining-wall in drilling. To avoid this, press with the left hand the

tooth to be drilled firmly towards the gold retaining-wall. The pin, when put through, is kept in place by an assistant with pliers. Next, drill through the opposite canine, again pass a pin through this, the entire retaining appliance being thus fixed for further drilling. To avoid any inexactitude in the drilled canals, pass a fissure-burr through each hole.

The six teeth drilled, take another impression, removing in one impression both the retaining-wall

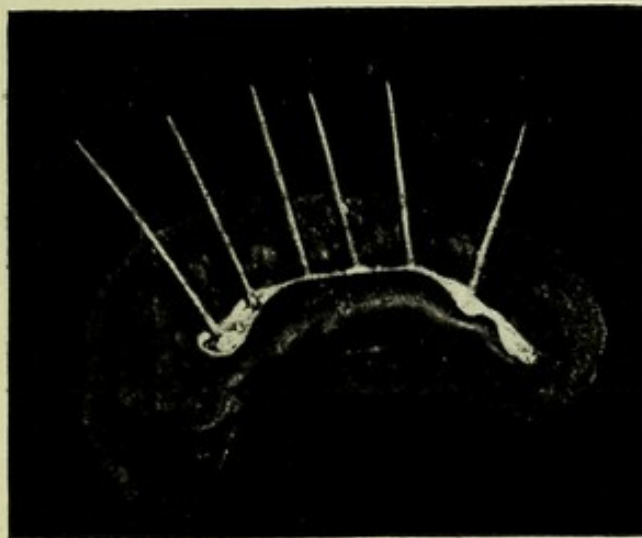


FIG. 13.

and pins. At the internal wall press the compound over the retaining appliance, but at the external wall only as far as the pins, and remove the impression (Fig. 13).

In case the compound passes between the pins, remove it carefully, and press any displaced pins back into the grooves that are visible in the compound. The model shows the retaining appliance with six

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pins (Fig. 14). These are drawn out and replaced by gold-wire pins of the same size, extending on both sides about 2 millimetres. By cutting the solder into narrow strips, small rings are obtained which should be placed on the gold wire. On the model the gold wires are soldered to the retaining-wall, which should be boiled in dilute sulphuric acid.

Overhanging portions of the pins should be cut off, finished, and polished.

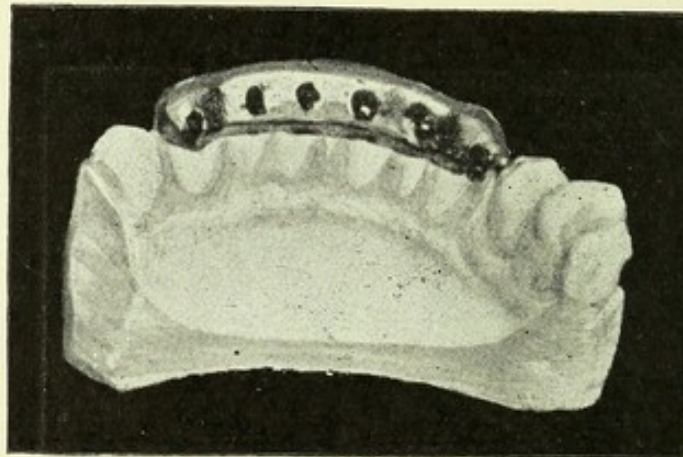


FIG. 14.

The retaining appliance should be again inserted in the mouth, and the points where the pins emerge from the teeth-holes marked with a sharp excavator.

Take care that the loose teeth are not displaced by the appliance. Apply, therefore, a tight ligature from bicuspid to bicuspid before drilling through the retaining-wall. When removed from the mouth the pins should be cut off about 1 millimetre beyond the marked place, and split for about 1.5 millimetres. Exact splitting is to be attained by marking the

middle with a fine fret-saw, and sliding a fine ribbon-saw (Fig. 4) through with long strokes. Try after every stroke whether the saw be really in the middle of the pin.

Before inserting the appliance, press the forked tips together with pliers, in order that they may more easily pass through the holes without being put out of shape by the cement.

Apply the rubber dam, insert the appliance covered with a thin bed of cement, spread the forked tips of

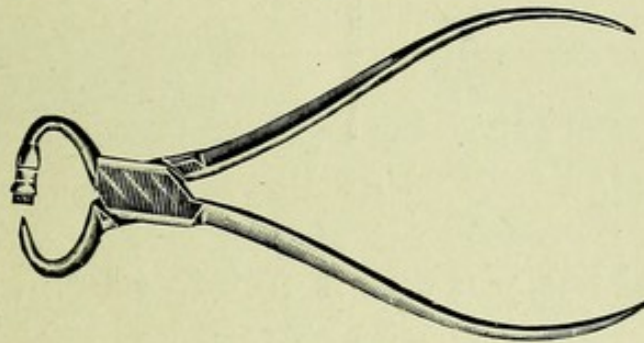


FIG. 15.

the pins with a fine enamel chisel, and press them firmly to the tooth by means of riveting-pliers. (Fig. 15).

To protect the lips from being hurt by the visible tips, make previously a small cross groove on either side of the holes, by means of either a diamond or fine carborundum disc (see Plate I.).

The use of the burr No. 4 (Fig. 3) may also be advised; by means of this burr the anterior part of the hole is given a conical form. Into this groove force the split gold-wire tips, and trim with sandpaper discs. Remove the cement between the tips, and substitute silicate cement.

20 THE TIGHTENING OF LOOSE TEETH

In order to retain a single front tooth, make a small post the size of the pins (Fig. 16). Dip the warmed gold wire in borax, and keep it perpendicular in the flame for an instant until its ends are covered. Grind it to an exact rivet-head that fits the enlarged hole of the gold wall.

Pass the post through the drilled tooth that is to be supported, mark the point where it comes out, split the pin above this, and fasten it like the other pins (see Plate I. *b*).



FIG. 16.

The ends of the pin ought not to extend far beyond the tooth.

Very short tips sustain a loose tooth perfectly, and will not be damaged in brushing and cleaning the teeth.

Having surrounded it with cement, drive in the rivet-head pin firmly with an electric gold mallet.

To insure that the thickened end of the post "goes home," and to prevent the rivet-head from standing out beyond the retaining-wall, enlarge the retaining-wall opening a little by means of a fissure burr (Fig 3). Trim the fixed rivet-head with carborundum stones until it is closely united with the retaining-wall, and forms a smooth surface.

In lieu of a rubber-dam holder I use a celluloid holder, the patient's ears serving as supports (Fig. 17).

The rubber-dam should be pressed on the moist teeth. Thus holes can be punched at correct distances, a point which is of value in case there are gaps in a row.

The rubber-dam is removed by cutting it across.

When either a dead or a painful tooth has to be removed, place it on the plaster model, drill through it at the same height as the other teeth, and make the retaining-wall as though there were no tooth missing—

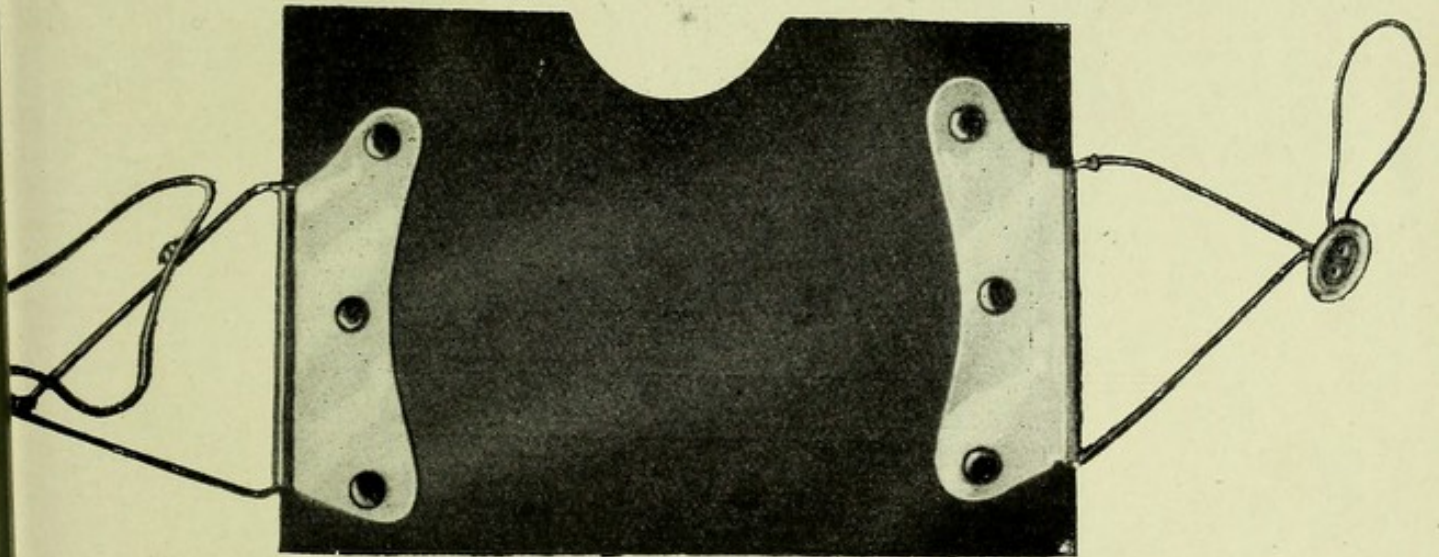


FIG. 17.

that is to say, a cross-pin is soldered to it for the missing tooth also.

The retaining appliance introduced into the mouth, cleanse the tooth—as described above—and after resection is performed, place it on the retaining appliance so that the root has to extend into the open wound.

Like the other teeth, it is retained by a split pin (Fig. 18).

22 THE TIGHTENING OF LOOSE TEETH

A missing front tooth may be replaced by a tube tooth before the retaining-plate is made.

Grind the tube tooth, cast the model as if it were a natural tooth; the hole shows up in the swaged wall.

Pass a pin through the hole, fix it with wax, cover with plaster after removal of the tube tooth, and solder the horizontal pin vertically to the retaining-wall (Fig. 19).

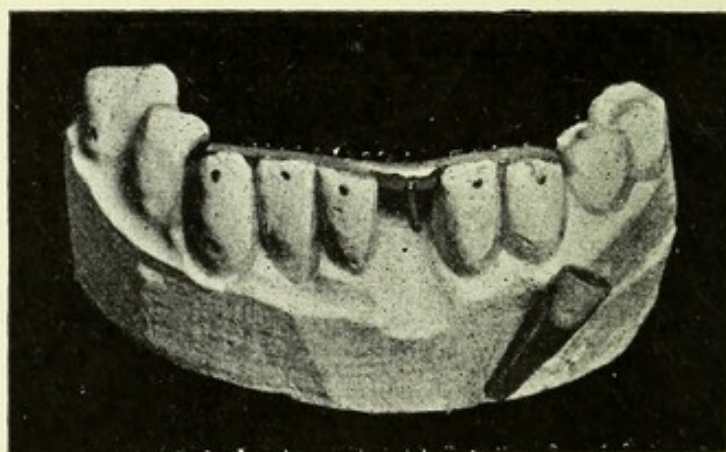


FIG. 18.

In this case the artificial teeth should be cemented in the retaining appliance before its insertion. In case several of the front teeth are missing, they should be substituted as above.

When fixing loose teeth in the upper jaw great attention should be paid to the occlusion.

In case an abnormally close bite would not admit of the placing of a gold wall and the drilling of the teeth, the pins must pass through the lingual cusps and the retaining-wall must be lowered. In this case devitalization of pulps is not to be avoided.

Take an impression with the pins reaching into the root canals, swage a wall, solder, and insert. But if the articulation permits of the high wall, or if we can correct the bite, it is better to save the pulps. The single loose front teeth should be drilled and then fixed by the split wire-ends.

It is good practice to perform the drilling on the model a day before.

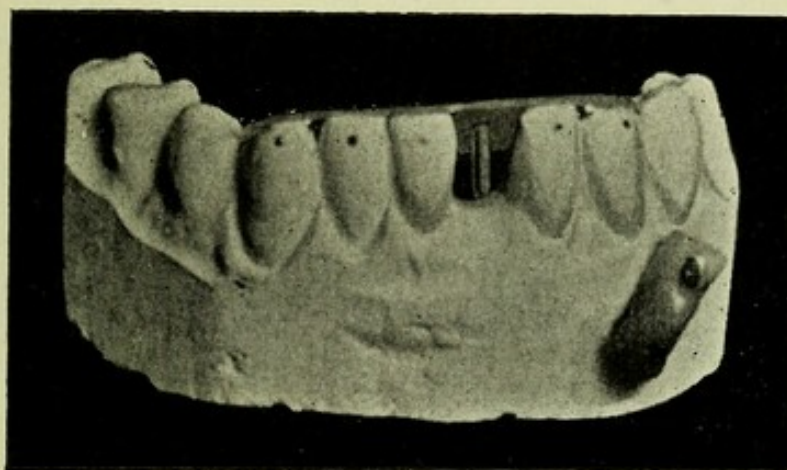


FIG. 19.

When drilling, the head of the patient should be in an upright position, in order that the drilling may be performed in a horizontal direction.

Don't stop to think that the gold tips may be annoying from the æsthetic point of view. By means of small cross-grooves, to be placed on each side of the hole, the tips may be embedded and covered with silicate cement.

In case several teeth in a row are lost, the substitutes are placed on the model, and the retaining-wall made as if all the teeth were present.

24 THE TIGHTENING OF LOOSE TEETH

In the case of natural teeth that are to be substituted, drilling should be done and fixation secured by split pins, as in the lower jaw.

If artificial tube teeth are to be applied, they should be previously cemented and fastened in the mouth, together with the retaining appliance.

In cases of projecting teeth and retroversion of the jaw, it is sometimes difficult to introduce both appliance and tube teeth at the same time.

In this case the teeth should be fastened to the pins, but after the retaining appliance has been inserted.

The tube teeth should be ground on the palatal surface, in order that they may be enabled to pass the processus alveolaris.

For rendering the drilling of upper teeth less painful, apply cocaine, painting it on the nasal mucous membrane.

Fixation of Loose Bicuspid and Molars.

In cases where the anterior or posterior bicuspid are loose, and there are gaps in the teeth, strong pure gold collars should be put round the teeth, and the interdental spaces connected by strong soldering and strengthening wire. Case, Evans, Bryan, and Thiersch have devised useful appliances of this kind.

If there be caries on the grinding surfaces of molars and bicuspid, inlays should be made and soldered together.

In filled teeth the fillings should be removed, and replaced by inlays that are connected by soldering.

If there is a space, in loosened molars I raise the bite by mounting crowns; in the case of bicuspids, a Carmichael crown is advised. By means of a carborundum disc, I cut a groove both across the fissures of the tooth and vertically on both sides (Fig. 20). Next I swage a pure gold cap, fit it in the mouth, press the gold firmly into the groove, and twist a ligature firmly round the crown for securing a perfect fit of the pure



FIG. 20.



FIG. 21.

gold crown. The groove filled with solder, a thin wire should be let in and soldered.

For strengthening, a strong gold-plate is soldered to the side of the pure gold (Fig. 21), but only so far as not to extend beyond the lower margin of the pure gold.

In case the bite does not admit of the use of a Carmichael crown, it may be modified. No gold-plate should be placed on the buccal cusp, but a strong gold wire embedded in the transverse groove for stiffening the crown, like a stirrup.

In case only the molars are decayed on their grinding surfaces, but the bicuspid are in good condition, the cavity in each molar should be prepared as for the insertion of an inlay, the mesial wall being deepened in order to be continued for a bicuspid rim, and a deep cross-groove cut in the premolar. Then a complete impression of the prepared upper jaw is taken and mounted on the articulator.

Make the wax inlay of the necessary height, insert it in the mouth without allowing firm closure of the bite, and cast. Molar inlay and cast cross-groove of bicuspid should be soldered together.

In case the molars and bicuspid are loose and stand in close contact, grind the lingual cusps according to the thickness of the thin gold layer. The bicuspid retaining-wall is to be made in the same manner as that for front teeth. Upon a hard cast plaster model a pure gold-foil and 22-carat gold-plate should be swaged (Fig. 22), so as to extend in a narrow strip to the place where the bicuspid crowns begin to be reduced.

This retaining-wall passes in its upper part over the inner surfaces of the lingual cusps.

Their anterior margins may be placed a little more deeply, so as to avoid any break in the gold.

For fastening the posterior molars, a thin gold wire (as thick as ligature wire) is soldered on to the extremity of the retaining-wall, and, likewise, a second ligature between the last and the penultimate tooth (Fig. 23).

Introduce the retaining appliance into the mouth, hold the ligature ends with a pair of pliers, and twist them round the last tooth, just as ligatures are to be

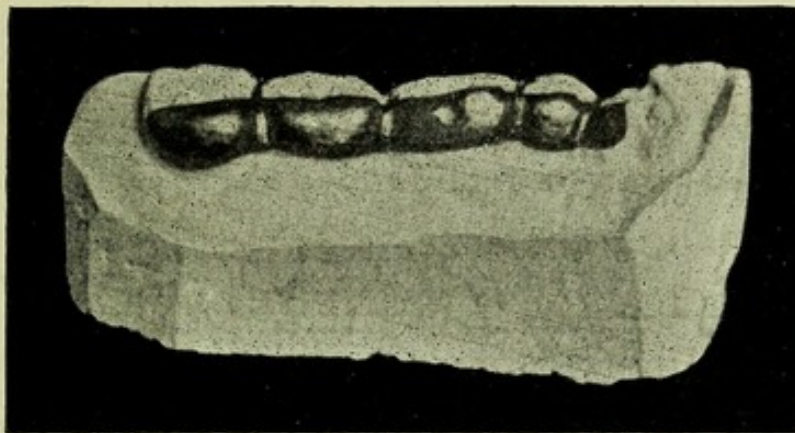


FIG. 22.

adjusted according to Angle. The short cut-off ends of the wires should be pressed in between the teeth, but ought to neither trouble the articulation nor hurt the soft parts of the cheek.

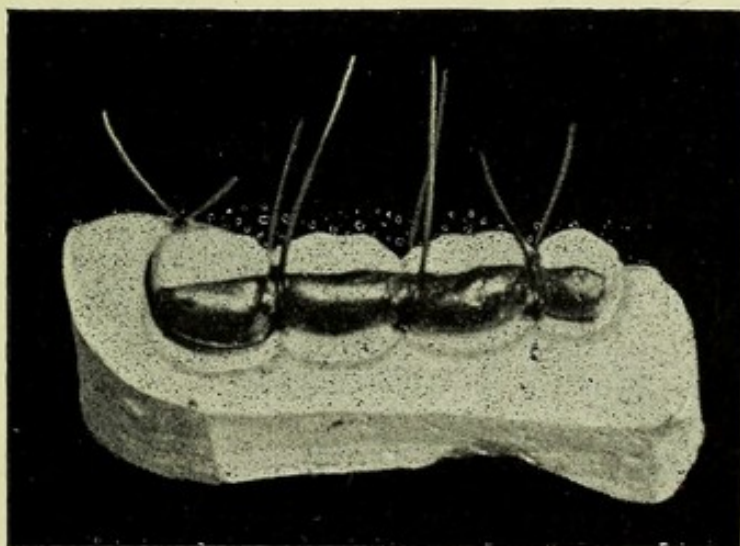


FIG. 23.

The rear end of the retaining appliance fixed, fasten its anterior extremity by means of a wire, to be

put through the V-shaped space of the teeth around the retaining-wall.

The other teeth should be fixed in the same manner (see Plate I.).

In case the last molar is loose or leaning backwards, so that ligation in the mouth would offer difficulties, put a narrow, strong collar round it; then make the retaining-wall, and solder.

The other teeth should be fixed by means of wires, as described above.

If a tooth in a row of this kind must be previously extracted, it should be fixed to the wall by means of a strong cross-pin, after root resection has been performed. The appliance cemented on, the tooth should be inserted.

In case the perfect fixation of the teeth is deteriorating, the ligatures should be tightened and made as effective as possible at intervals (see Plate I., upper figure).

The gold wire on the market being brittle, the casting of softer wire is advisable.

This may be obtained by pressing a broken burr into cuttlefish bone, and by funnel-shaped enlargement of the hole formed.

This use of the burr facilitates the drawing down into wire. In case several back teeth are lost, bridge-work is to be advised.

The anterior extremity of the retaining appliance of the back teeth must be anchored to the front teeth.

Some years ago I used to perform an anchorage of this kind, separate from the retaining appliance, making a little "spider" between canine and bicuspid. So I call the two pure gold caps over the canine and bicuspid, strengthened with solder and with little pieces of gold soldered on (see Plate I.).

Now I connect this "spider" firmly with the retaining appliance, like the connecting of the retaining appliances I have described above.

In case several teeth in a row are lost, the substituted teeth are again placed on the model, and the retaining-wall made as if all the teeth were present.

The pins for the substituted teeth must be kept free, and on to these the tube teeth are to be cemented, after the retaining appliance has been inserted in the mouth.

Tube Teeth Bridge-Work.

There are three important advantages to which is due the superiority of tube teeth bridges over all other bridges for the fixation of loose teeth: They relieve the strain on the abutments when properly fitted to the jaw; they are lighter and more elastic; and by means of their wires they form useful appliances for retaining regulated and supported teeth.

Besides, their appearance is by far a more natural one, and the operation of fitting or repairing requires neither time nor labour. Because of their inconspicuous appearance, tube teeth are less noticeable in

the patient's mouth, and the porcelain surface on the lingual side is decidedly more agreeable to the tongue than metal.

As abutments there may serve crowns, caps, collars, and inlays. In preparing teeth to act as supports of bridges also, the principle should be observed of preserving the vitality of the pulp, and taking care of the enamel. Only in case the crown of the tooth is weak, decayed, or too short, should a shell crown be adapted.

Shell crowns on bicuspid teeth ought to be adapted with a porcelain or silicate facing on the facial side, for obtaining a more natural appearance. By means of a round burr a window is cut out of the crown, the edges bevelled with a carborundum wheel, and an impression taken as for a porcelain filling. In the case of a very flat face, silicate cement is to be preferred.

In arched molars where there is much undercut a strong gold collar should be made, that may be burnished beyond the margin into the fissures of the grinding surfaces, at places where the articulation may permit it, and filled with solder. The collar is put round the plaster tooth, cut at the four corners, bent over, burnished, and soldered. Only on the buccal face does the collar extend to the gingival margin.

Shorter molars where there is not much undercut should be fitted with a collar extending beyond the margins, and burnished into the fissures to prevent its sinking.

If the grinding surface be defective, a hole is drilled

vertically into the tooth, for receiving a short post, a deep cap is swaged of pure gold and 22-carat gold-plate, a short post put in the hole, an impression taken, and the pin soldered to the cap: thus a perfect bridge abutment may be obtained.

In the same manner canines or bicuspids should be prepared. Drill a hole, and, after an impression is taken, swage a lingual cap and solder at its lower margin a thin wire for strengthening it. The lower pure gold margin should be kept free and carefully burnished in the mouth.

Caps of this kind also extend from the most prominent to the reduced part of the tooth. Thus, the fitting of collars, caps, and crowns, may be secured without injuring the tooth. The tooth necks, on which, when fitted with deeply extending collars or caps, caries develops, remain free; they can be cleansed by the patient, and the dentist can inspect them and guard against the frequent development of secondary caries. Irritation by pressure on the gum does not take place.

In case a reduced tooth (commonly a canine) serves as an abutment and has to be fitted with a collar, being the sole support, grind a narrow groove round the neck and fill with an inlay. The tooth presents a form which will be thicker at the root; the band made over this fits at all parts, and cannot sink into the gum.

For taking impressions of single abutments, use the hollow glass-stopper of an Ash cement bottle, to prevent the compound from moving away.

32 THE TIGHTENING OF LOOSE TEETH

The abutments prepared, take a plaster impression and mount the whole on the articulator.

The tube teeth are ground, crowded together with contact points and V-shaped openings for rinsing. This done, make through the tubes of the teeth little holes on the plaster model with a pointed burr.

After removal of the teeth, these marked dots indicate the position of the splint that is to be made. The wire, which has been made half-round, or if necessary oval, is bent so as to lie on the jaw along the dotted line.

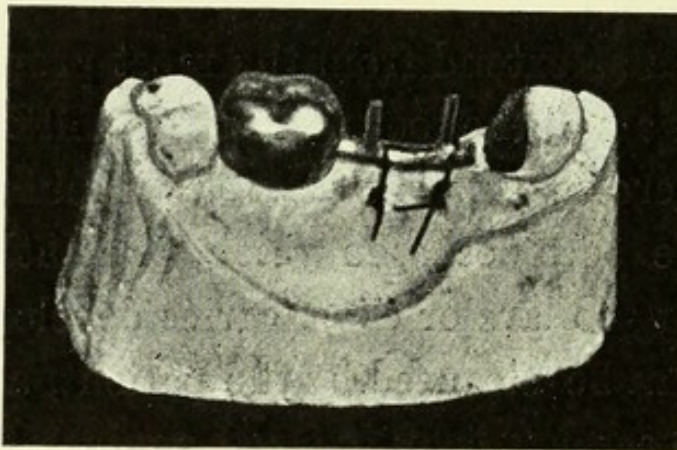


FIG. 24.



FIG. 25.

Bend up the wire ends to the abutments at right angles, and flatten them so that they may lie on the abutments. These places serve later as rinsing openings for the patient to keep it clean (Fig. 24).

With sticking-wax fix the wire on the abutments.

To place the tube teeth again in their previously ground places, deepen them by making a groove so that they sit saddle-like on the half-round or oval wire.

With sticking-wax fix the teeth, examine the articulation, and through the tubes of the teeth mark on the splint the points for the pins.

In the case of dowel crowns, the place where the splint is to be placed should be covered with a thin layer of wax, into which the dowel crowns should be pressed, after having been ground and moistened.

Remove the teeth, and drill the marked spots of the wire with a round or lancet burr of smaller gauge than the pins.

Pass through each hole of the splint a pin, according to the length of the tooth, put a ring of solder round it, hold it with the soldering tweezers, and solder in the Bunsen burner.

After the wire, covered with pins, has been put on the articulator, try the teeth again, and grind down.

To find out the points of contact, long strips of articulating-paper should be perforated and slipped over the pins.

In case one of the teeth is not in its correct position, bend its pin ; but it may be advisable to again flow a little solder on the pin after it is bent, as the soldering may have been weakened in the bending.

A short tooth should be lengthened by applying Jenkins's prosthetic compound. A tooth is in correct position when it fits well palatally and buccally. Fitted thus, it will never cause any irritation.

The plaster model should be drilled through crossways in several places with a lancet burr below the wire on the approximal contact surfaces; binding wire is passed through the V-shaped space of the artificial teeth, and the bent-up wire fixed on the model.

34 THE TIGHTENING OF LOOSE TEETH

Thin platinum wire must be used. Iron wire may cause much trouble by rendering the platinum-gold wire friable by oxidation. Now the teeth should be removed from the pins (see Fig. 24).

All the parts, except the ends of the wire splint that are to be soldered, should be covered with Paris red, and splint and abutments soldered together very strongly on the plaster model.

This is necessary, as weak soldering cannot offer sufficient resistance to the biting strain, and as, further, the collar of an abutment might tear away at such a place.

The collar must therefore be strengthened by adding thin metal at this place.

The bridge is boiled, carefully finished, and electro-gilded. A plain bowl may be used, and a hot bath prepared of 12 parts of cyanide of potassium solution and 100 parts of water.

A small piece of pure gold or a coin is put on the negative pole, and allowed to boil for ten minutes. Then the object to be electrogilded is put on the positive zinc pole, and kept immersed in the fluid for some minutes.

After deposition has taken place, the object is cleansed with a glass brush.

The bridge adapted and the teeth replaced on the pins, the root surfaces should be smoothed with keen sandpaper discs, in order to prevent them from irritating the processus alveolaris.

Small bridges may be immediately cemented on,

together with the teeth, but both in these and in large bridges it may be good practice to cement only the abutments, the teeth being temporarily fixed with gutta-percha and cemented on only after these are perfectly set in the mouth. Thus we are easily and quickly enabled to avoid irritating edges in the mouth as also incorrect articulation.

At visible points the openings where the pivots emerge should be covered with silicate cement.

For preventing the gold from irritating the gum, both the wire and the lower margins of the collars may be covered with a plating of platinum.

According to Dr. Thiersch, the following method may be used to platinize :

Roll 5.3 grms. of platinum into the shape of a plate as thin as possible, cut it into small pieces, and dissolve in 50 c.c. of nitro-muriatic acid. The surplus acid having been removed in the water-bath, there are obtained about 10 grms. of chloride of platinum, a dry, crystalline, yellow- or brown-coloured mass.

Now prepare two solutions, the first consisting of 1 litre of distilled water, 20 grms. of phosphate of ammonia, 100 grms. of phosphate of soda, and 4 grms. of chloride of platinum; the second solution consisting of 4 grms. of chloride of platinum dissolved in 100 grms. of distilled water, 20 grms. of phosphate of ammonia in 200 grms. of distilled water. On mixing both solutions and stirring up, a yellow precipitate will be formed. Add to this mixture

a third solution, consisting of 100 grms. of phosphate of soda dissolved in 700 grms. of distilled water. Boil the whole until the precipitate disappears, and on stirring there is no ammoniacal smell. Replace the evaporated water, and boil the mixture down to about $1\frac{1}{2}$ litres.

For platinizing heating is required, but satisfactory results may also be obtained at a lukewarm temperature. A point of importance is that those parts of the bridge which are not to be platinized ought to be covered with sticking-wax. By means of this method, the most complicated saddle-bridge can be made in half the time that would be required for swaging a platinum saddle. Within ten minutes the parts are covered with an absolutely dense and beautiful coating of platinum.

If the processus alveolaris be badly absorbed, it may be sometimes better practice to substitute an extension bridge of the saddle-bridge kind.

A very strong wire splint is laid horizontally from one abutment to the other, and very heavily soldered.

The tube teeth are placed on the splint with regard to the articulation, and the pins marked through the tubes of the teeth. Dowel crowns are pressed into the wax to mark the pins. The lower margins of the teeth extend to the splint, in order that the tongue be not irritated (see Fig. 26).

Extension bridges with very divergent abutments should be adjusted with caps which will not project

beyond the most prominent part of the tooth, the undercuts thus remaining uncovered.

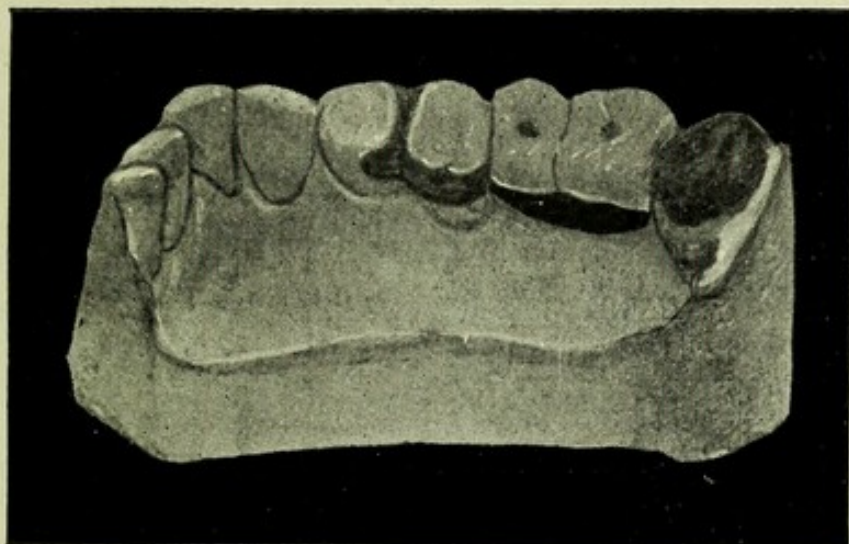


FIG. 26.

A heavy wire splint is to be fixed across on the most prominent margin of the caps and soldered in a very strong manner.

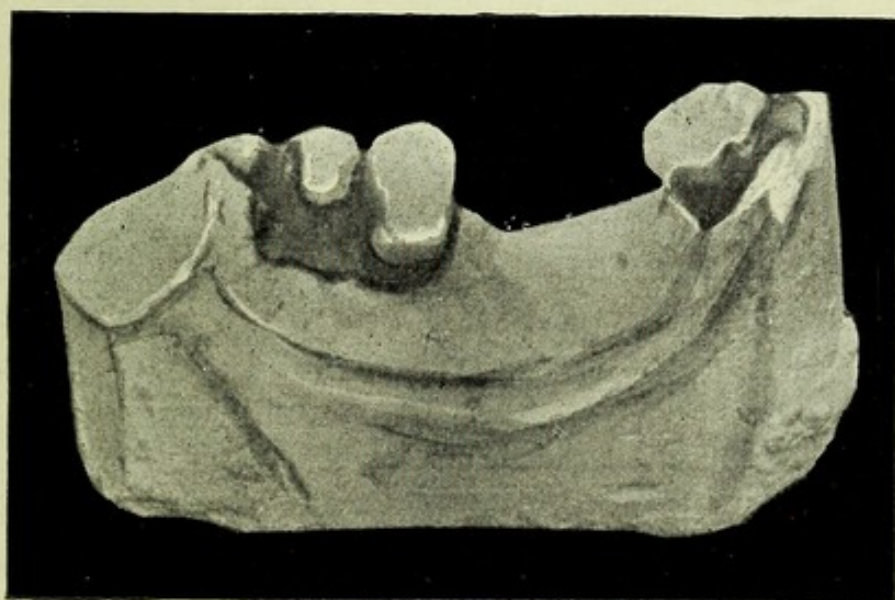


FIG. 27.

The final setting of an extension bridge of this kind is the same as before (Figs. 26 and 27).

38 THE TIGHTENING OF LOOSE TEETH

If in this case the wire splint be bent when introduced, it is a matter of no importance.

The bridge placed in the mouth, strong pressure on the splint by means of pliers may restore the tension as it was before.

If the abutments to be connected are an inclined molar and a root, which would render impossible the setting of a bridge without material destruction of the molar, make over the inclined tooth a half-cap

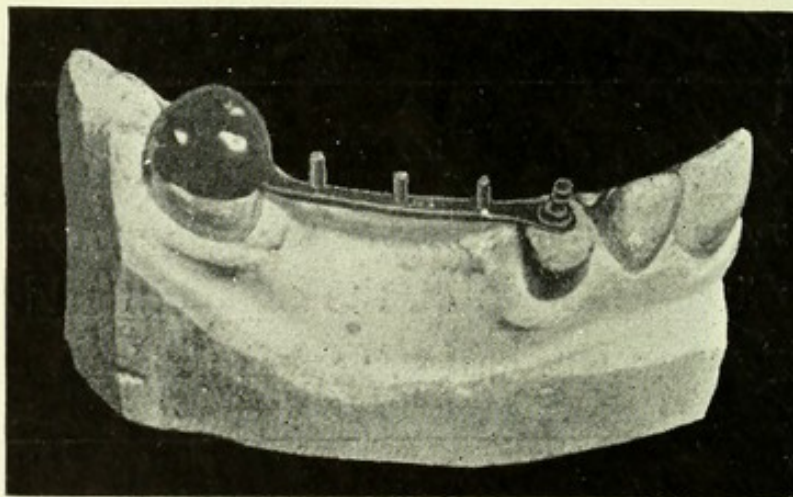


FIG. 28.

with a pin. After first tying it on, allow the wire end to extend over the root, and drill the flattened wire above the opening of the root so that the pivot-plate fits in exactly. Then the pin is to be placed in the opening for its final closure (Fig. 28).

For preserving short loose roots, either for the sake of the arch or to prevent absorption, the pins for the tube teeth may be allowed to reach through the half-round wire into the nerve canals of the roots.

If the roots be in so bad a condition that they cannot be preserved, and if their loss might affect the arch, they should be replaced by artificial roots, into which the lower ends of the pivots of the teeth extend.

Roots of this kind may be obtained by cutting off the lower ends of tube teeth, and building up roots by means of prosthetic compound.

Single Pivot Teeth and Crowns.

For fastening front and single pivot teeth the use of S. S. White's plate-pins are the most suitable.

As to durability, no difference has been noted by me between pure platinum and base metal pivots.

A root is prepared for these pivots so as to give it the form of a dowel crown. Only when the root is very weak should a gold collar be fitted.

As a rule, collarless roots are of greater durability than those fitted with collars, a point which is due to the irritation of the soft tissues collars may cause. It will therefore be better not to grind off the root above the gum.

In case of extensive decay in a root, the tooth should be cut at this place, and by fusing on to the tooth the root is given a dovetail-shaped support; on the opposite surface the same operation should be performed (Fig. 29).

The length of the pivot is a factor of less importance than the exact grinding of the plate and its perfect fit to the root. This may be obtained by putting per-

40 THE TIGHTENING OF LOOSE TEETH

forated articulating-paper on the root, and pressing the pivot into the opening where the margin of the plate will be marked.

Sometimes shortening of the pivot within the tooth to be inserted may be required, or deepening of the opening in the artificial tooth in which the pivot is to be introduced.

This may be done by means of carborundum (Butler's points) dipped in oil of turpentine.

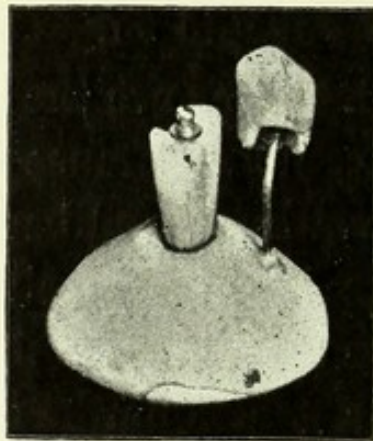


FIG. 29.

If the tube of a detached crown tooth be ever badly weakened by having been ground, and breaking be imminent, the part in question should be covered with Jenkins's prosthetic as far as the bite may permit.

In case the whole tooth is ground off too thin, put platinum wire round, countersink it a little in the tooth, invest and cover with prosthetic; or swage the pure gold-plate backing of the artificial tooth beyond the cutting edge, put prosthetic compound on the artificial tooth, stick the pure gold wall on it, and fire

in the furnace. Polish the gold-plate close to the tooth by means of cuttlefish discs.

In case a tooth is considered likely to be forced out of its position by the strain of mastication, grind its mesial and distal surfaces concave until it is embraced by the neighbouring teeth.

If a single tooth has to be prevented from being forced outwards, melt a prosthetic pivot to its palatal surface, for fixing the tooth to both neighbours and for supporting it. These porcelain pivots may be reinforced by platinum wire when firing.

In case a root is too thin for a pivot to be introduced, cast both the root part and the pivot for the artificial tooth in one piece.

This may be done quite as easily as making a gold inlay.

Take an indirect impression, as commonly taken for a pivot tooth, grind the tooth, try the prepared wax-pin and the pivot made for receiving the crown again in the patient's mouth, obtaining thus an exact impression of the gold inlay which has to be made.

Taking an impression of the internal parts of a root may frequently present difficulties, as the short inlay wax cannot be pressed into all the grooves. An exact impression may be obtained by placing gutta-percha round a wire point and pressing it into the root. Now add a little more gutta-percha, and ask the patient to bite. On the following day the gutta-percha filling shows the exact impression of the interior of the root.

A practical hint for taking an indirect impression of a root-filling I found in a dental journal.

A long and strong wire, covered with impression compound, is firmly pressed into the root canal. A hole is punched in a dish-shaped piece of German silver plate, filled with impression compound put over the wire, and, after the first mass is warmed, again firmly pressed. As the mass cannot give way, an exact impression may be obtained.

Single particularly narrow teeth I replace by cast teeth.

The tube for the pivot should be kept patent by a graphite pin.

In case a gold tooth of this kind is visible, an open face-shaped depression should be made in the wax before being pressed in the mouth, then cast and filled with Jenkins' porcelain.

In case of a bite so extremely strong that the durability of tube teeth would be endangered, I advocate the casting of front teeth and setting of porcelain facings.

In the case of an athlete all the front teeth had to be made in this manner, because he bit the porcelain teeth to pieces. The cast teeth were likewise cemented on the pins.

The need for this but rarely occurs, as in such circumstances it may be advisable to raise the bite.

Even the smallest molar roots may do good service, as I intend to show by the following suggestions.

Cut a groove across both roots, put in each a separate pivot, and take an impression.

Now make a small splint of half-round wire fitting the groove to connect the pivots.

In the centre of this cross-splint the pin for the artificial molar crown is placed (Fig. 30).

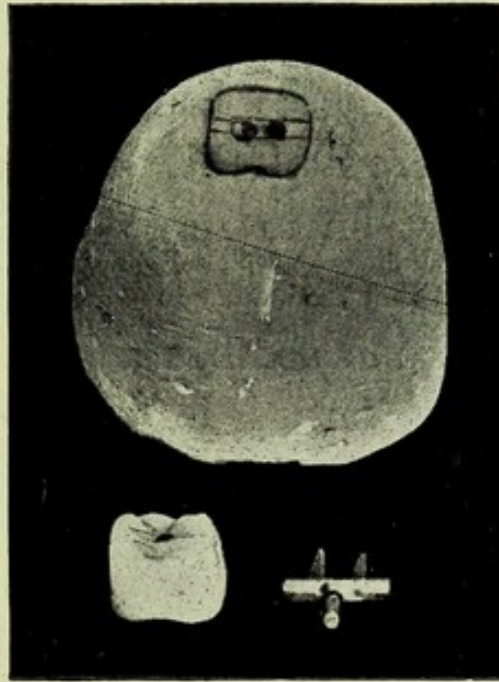


FIG. 30.

In case of the breakage of a tooth, where the joining of the parts is still possible, twist a platinum wire round, and once more fire the whole with prosthetic.

In case the pin is broken off, perforate the wire splint in the mouth, reduce the tip of the pivot, and cement on.

For removing the layer of cement with which the broken-off pivot is covered, leave the tooth in spirits of salammoniac for twenty-four hours.

In case a crown is loose, bore a hole through the

centre of the masticating surface, and force in soft cement until it flows out on both sides.

For injecting I make use of Belger's cement syringe, lengthened according to my directions for more convenient holding.

In case afterwards it is necessary to give the crown greater firmness, by means of a spherical burr drill the tooth 2 millimetres, and place a small screw in the soft cement.

To produce a screw of this kind I solder a little piece of thin sheet on to screw-wire, or file strong screw-wire; or, lastly, hold the screw-wire perpendicularly in the flame so that a ball is formed, and with a fret-saw transform it into a screw-head.

Cross-Splints.

To protect large bridges adjusted in the molar region against being loosened by lateral pressure, the use of a Bryan splint is required in the upper jaw.

Across the hard palate mark a narrow lead-pencil curve, about 2 to 3 millimetres wide, on the plaster model. Deepen the margins about $\frac{1}{2}$ millimetre from the palatal suture. Now make a swaging as before when making the retaining appliance.

Swage a narrow pure gold strip, and on to it bend the strongest gold wire, either half-round or oval.

Wire and gold-plate being firmly connected by platinum wire, place a large quantity of solder on both sides of the gold-plate up to the extreme pure gold

margin, which is to be left free. This will render the whole splint symmetrical and protect it from being bent.

This splint must be very firmly connected with the lateral splint (see Plate V.).

Both where the ends of the splint are connected with the bridge and on the teeth to be retained, reinforcing cross-arms and wire splints should be placed, so that the whole, acting like a ship's frame, may lessen the strain exercised on the teeth that are to be retained.

In the lower jaw place a semicircular connecting-splint at a distance of about $\frac{1}{2}$ millimetre from the arch, to prevent the bow from pressing too much on the jaw.

Neither in the lower nor in the upper jaw are splints of this kind likely to cause irritation of the underlying tissue; but even in cases where galling edges occurred (as in a case of diabetes), never have I observed destruction of the tissues to such a degree that the removal of the splint seemed to be required.

Connection of Retaining Appliances.

Appliances retaining front teeth and those retaining back teeth should be connected as follows :

The anterior retaining appliance firmly placed, allow the appliance for retaining molars and premolars to extend to the canine of the same side.

As the double overlapping at the canine might make it too thick, grind off the first layer of the anterior appliance a little.

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The front appliance set, drill through the thin gold lying upon the canine in the mouth.

The place where drilling is to be done is marked in the impression for the back teeth.

In the side retaining appliance the centre of the place where drilling is to be done is fitted with a tongue or with a little thin gold-plate.

The side appliance also inserted, drill in the mouth through the tongue over the canine, and connect both appliances by a post.

If the bite be too much raised owing to too great an elevation over the canine, cut off from the anterior appliance over each canine a window, that, soldered to the posterior appliance, forms a connection between the anterior and posterior appliances.

The cut-out window remains in the impression taken for the back teeth, and is soldered with these appliances respectively to the bridge.

The post for connecting both appliances is best driven in with the tapered upper end first; thus it fits tightly, disturbs the articulation as little as possible, and offers no annoyance to the tongue (see Plate I., upper figure).

Such a post will also do excellent service in cases where a badly broken down corner in a front tooth has to be repaired without devitalizing the pulp.

Grind off the broken tooth a little with a carborundum disc, sloping it to the labial wall; drill through it to the side, and take an impression.

Make up the broken tooth on the plaster model with

wax, invest it palatally up to the incisive edge, and cast in Melotte. Swage the back of platinum plate, drill through it and through the hole of the natural tooth, pass a platinum pin through, tack it firmly in the mouth, and solder both pin and cap with pure gold (Fig. 31).

After placing goldfoil below the cap on the plaster model as for every porcelain corner, the corner is fired according to the model; insert the whole, split the pin, and bend the ends apart.

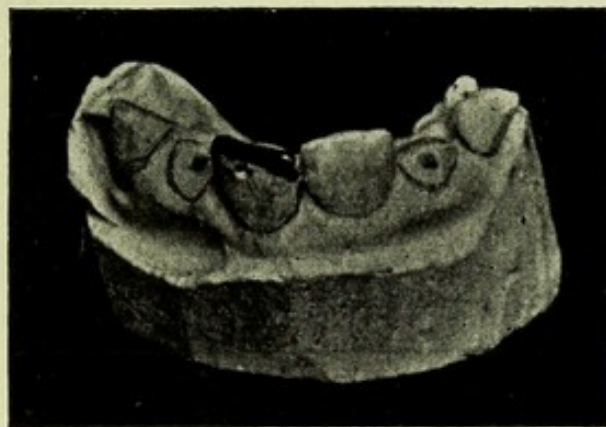


FIG. 31.

The use of a rivet-head is advised also in fastening a bridge, and in case a weak canine serves as an abutment.

The canine is drilled, and a post of this kind or a rivet-head applied to secure firmer anchorage of the retaining-cap.

In all cases where caps ought to reach only to the enamel neck, it may be good practice to allow them to extend beyond the incisive edges, the cap thus securing a firm hold, even if the tooth is not drilled.

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Badly broken down bicuspids should be restored with porcelain. The following method affords most satisfactory advantages, both for æsthetic reasons (conspicuous appearance of a gold inlay) and because it does not require devitalization of the pulp.

I adapt a narrow platinum band to the tooth, its buccal part being narrow and inconspicuous; on the lingual and approximal sides it can be wider.

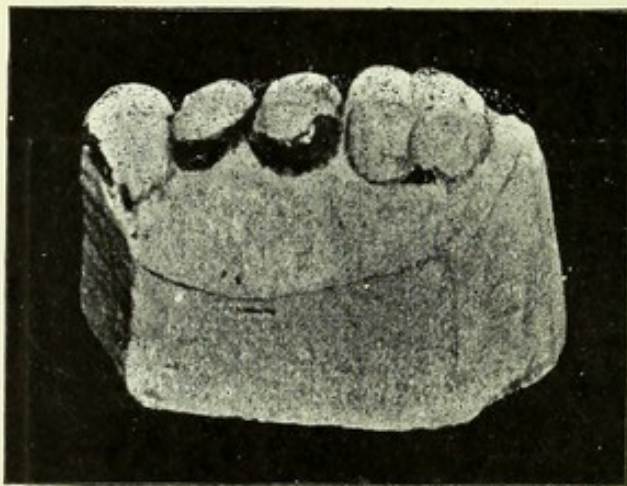


FIG. 32.

On the decayed part of the tooth cut the band, and turn it inwards for securing the insertion of the porcelain to be fused on. The band fitted, take a pure gold impression of the cavity, put on the band, attach both with wax, withdraw carefully, invest and fire (Fig. 32).

Selection of Teeth.

In selecting teeth both colour and form are factors of little importance. It is advised to select teeth indifferently, and adapt them to the case in hand.

The great advantage of bridges as described above is that they afford the dentist the opportunity to secure the harmonization of teeth in size, in form, in shade, and in alignment with the neighbouring teeth, after they have been set.

The best results may therefore be obtained by fitting the teeth to the patient's mouth.

Slight openings for rinsing the mouth should be present between the supports and the neighbouring teeth.

The patient is given a glass syringe, for syringing thrice a day through the retaining appliance and bridges.

In ordering a daily massage of the gums with a cotton pellet dipped in a mixture of peroxide of hydrogen, alcohol, and tepid water, we shall be doing all that is possible.

In spite of the firm fit of bridges, cases of *foetor ex ore* have never been observed by me in only moderately cleanly patients, because the water passes through all the parts, and both bridges and appliances may be easily cleansed.

Colouring Teeth.

For colouring artificial teeth, S. S. White's mineral stains (brown, green, blue, and white), and most commonly Ash's Italian brown, may be used. Mixing these colours, we are enabled to produce even the lightest shades of natural teeth.

To give teeth a natural and lifelike appearance, a slight covering with Italian brown will be sufficient.

If the artificial tooth be too long and unnatural, level the natural teeth, and grind a small groove, the Italian brown that is deposited there during the firing giving the tooth a shortened and interrupted appearance.

In case there are fissures in the enamel of natural teeth, a slight perpendicular stroke should be drawn over the artificial tooth with the edge of a needle-file, and the application of Italian brown colour will imitate the fissure on the artificial tooth.

In the case of smokers, the neck of the teeth must be coloured a little more deeply; the same may be done wherever dark deposits occur at the gingival margin. Darker deposits may be obtained by mixing green and brown; chalky spots in the enamel by little dots of white colour.

Erosions should be ground in with a sharp wheel.

Cutting edges, when worn down, may be imitated by drawing little brown-coloured rings on the artificial tooth.

If in artificial teeth denudation of the root, due to gingival atrophy, is to be imitated, Jenkins' brown-coloured prosthetic can be fused on.

The colour is mixed with water, laid on more or less thickly, and fired in the furnace until the tooth becomes red-hot.

Whoever has seen artificial teeth adapted in this

manner will never again insert them without giving them the natural appearance thus obtainable.

As in making bridge-work the conspicuous appearance of gold cannot be avoided, artificial teeth should be given a less formal appearance by gold fillings.

By the use of my gold enamel a little corner or the neck of an artificial tooth may be provided with a gold filling of natural appearance.

Such gold fillings, especially when set on the necks of the teeth, give extremely long teeth a very short appearance.

When making retaining appliances, the small bent-apart pins may be visible or show through. When artificial teeth are set between them, the smooth surfaces of these may show plainly that they are artificial. Drawing the pin in gold enamel provides an efficient imitation.

Artificially cast gold fillings may be produced as follows :

The whole tooth having been coloured, except the place which has to be filled with gold, lay on there, by means of a camel's-hair brush, a trifling quantity of gold enamel.

The enamel flows at about 900° C. At this the tooth becomes red-hot and the gold enamel does not disappear from the colour of the tooth.

The tooth being cool, and the filling burnished with fine cuttlefish discs, lay on gold enamel again.

At last, polish with cuttlefish discs and agate burnishers.

When polished with fine sandpaper discs, the gold fillings acquire a dull appearance.

If teeth are to be fired or to have gum added, this may be done after they have been coloured, the colours having a higher melting-point than prosthetic or enamel.

A great many porcelain fillings in natural front teeth can be imitated by grinding a small groove in them and melting in Jenkins' porcelain.

Artificial porcelain fillings like these should be dark-coloured, to stand out from the surface of the artificial tooth.

I never use the pure low-fusing enamel; it is generally better practice to mix two-thirds of prosthetic with one-third of Jenkins' enamel. Fillings are thus given a valuable hardness.

Breakage of the vitreous and fissured margins has not been observed.

It is only in the last baking that the filling gets the corresponding colour of Jenkins' low-fusing enamel.

The colour of the prosthetic is to be in accordance with the total colour. In a yellowish filling I mix 2 parts of yellow prosthetic, in a white filling, 2 parts of white prosthetic with 1 part of the corresponding filling colour.

Casting.

For our purposes we make use of casting—

To make inlays and root pivots ;

To cast bars for fastening loosened bicuspid
and molars ;

For single tube teeth, if porcelain be not strong
enough.

Inlays that have to serve as abutments or appliance-supporters should be fitted with pivots.

The making of approximal inlays may be facilitated by putting a greased celluloid strip round the tooth to be filled.

Cut into the strip where it extends beyond the grinding surface, put it on the occlusal surface for getting correct articulation by bite-closure while the wax is yet soft.

A cavity in the wax inlay may be secured by dropping Calxine into the cavity before taking the impression.

Before inserting the gold inlay the Calxine should be removed.

For removing the overhanging wax, rub the margins of the wax filling with benzine.

As investing material I use either " River-sand compound " (Sachs) or Nagel's compound, that never shows fissures, but hardens slowly.

Boedecker's inlay wax will render good service.

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To avoid air-bubbles, coax the plaster over the surfaces of the impression with a brush.

As to a casting apparatus, I have constructed parallel casting-pliers* (Fig. 33) which are to be preferred to Solbrig's, the parallel pressure being more equal and reliable than lateral.

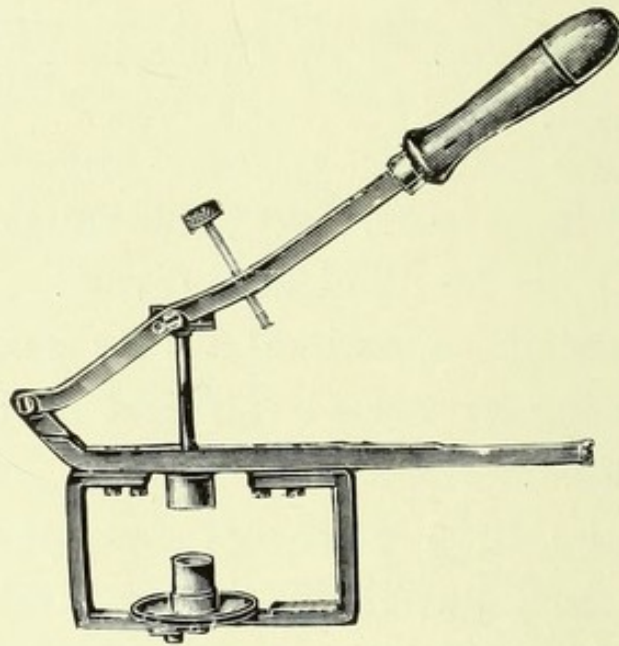


FIG. 33.

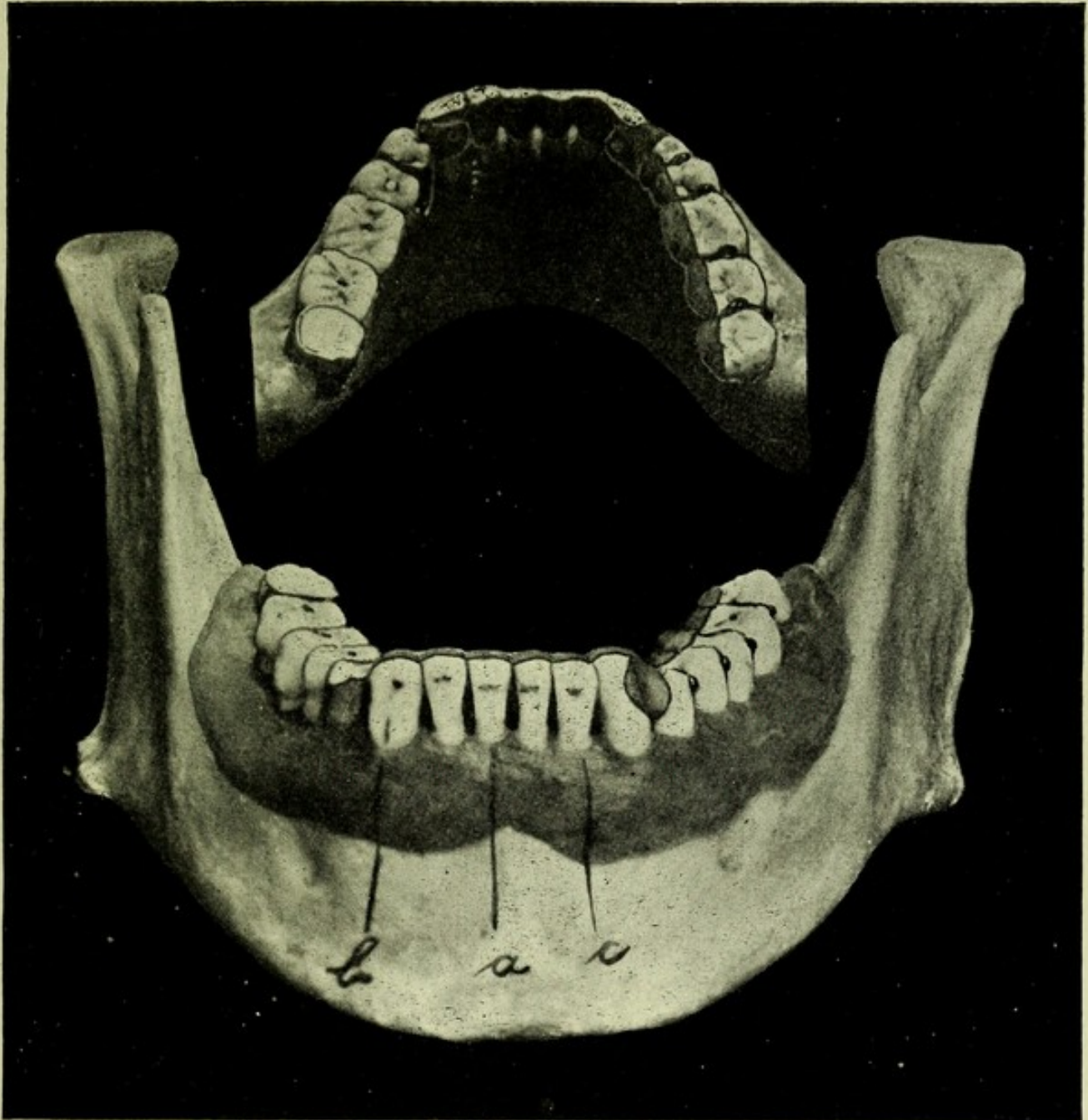
Slight pressure is sufficient to force the molten gold into the mould. Hence the plaster model shows neither fissures nor any deformity.

The pliers stand firmly, and may be heated in a short time.

* The pliers will be found described in the *Deutsche Dental-Gesellschaft*.

ILLUSTRATIVE CASES IN PRACTICE

PLATE I



COMPLETE RETAINING APPLIANCE FOR LOWER TEETH.

Upper Figure : Inside view. *Lower Figure* : Outside view.

The appliance consists of retaining appliance running from one canine to the other. *b* for receiving a rivet-head. *a* and *c* showing cross-grooves in the tooth and wire ends spread apart.

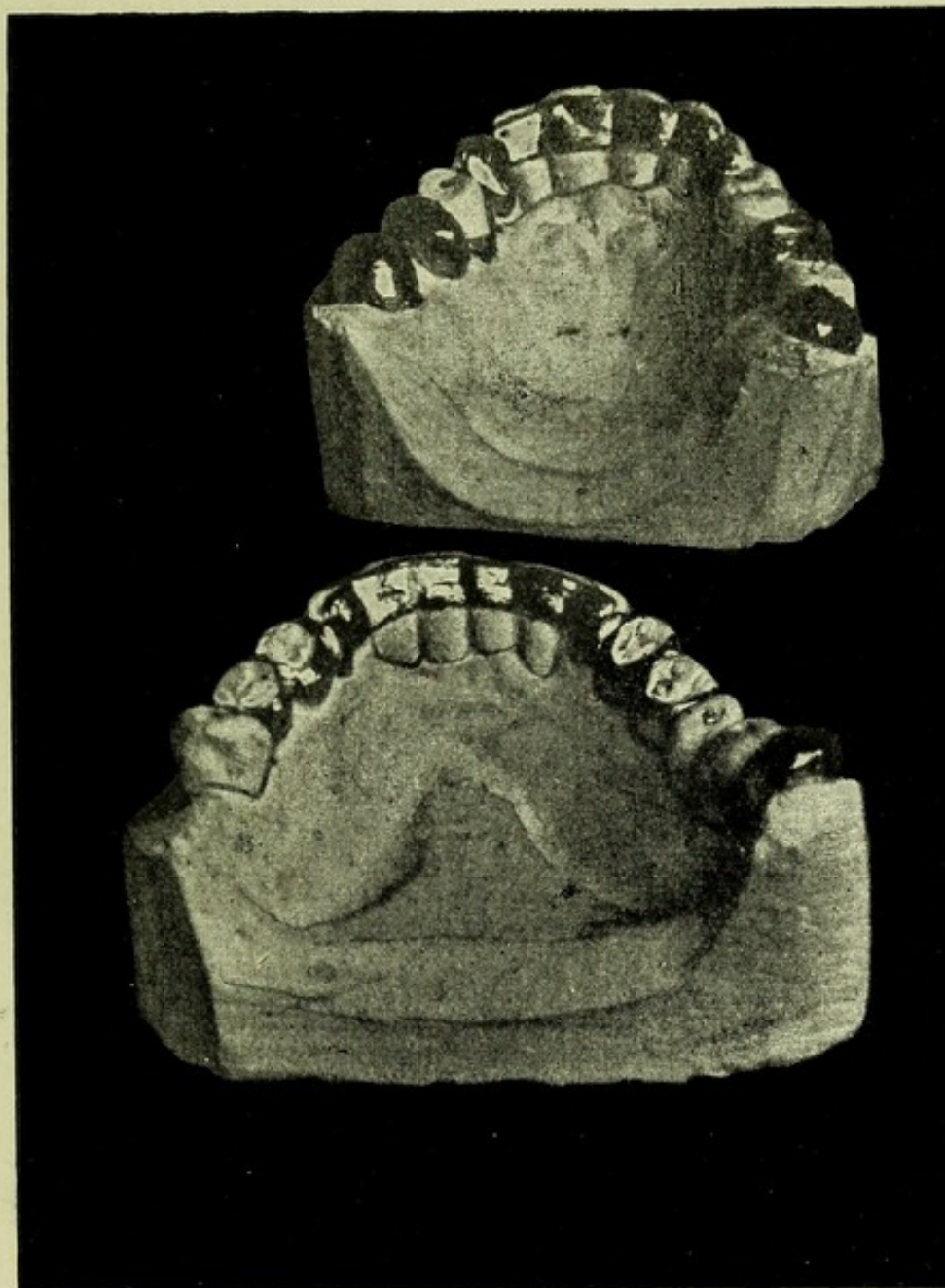
Left { Side retaining appliance, supported by means of wire ligatures.
{ "Spider" connecting C. and Bic.

Right : Tube-teeth bridge.

The upper figure shows the connection between bridge and anterior retaining appliance.

A tongue soldered to the bridge is connected with the canine appliance by means of a pivot.

PLATE II



UPPER AND LOWER JAW: TEETH LOOSENED BY PYORRHŒA
ALVEOLARIS.

(Retaining appliance in the mouth for three years.)

PROCEDURE.—All teeth to be retained. Bite to be raised.

Upper Jaw.—From canine to canine. Retaining appliance with teeth drilled across.

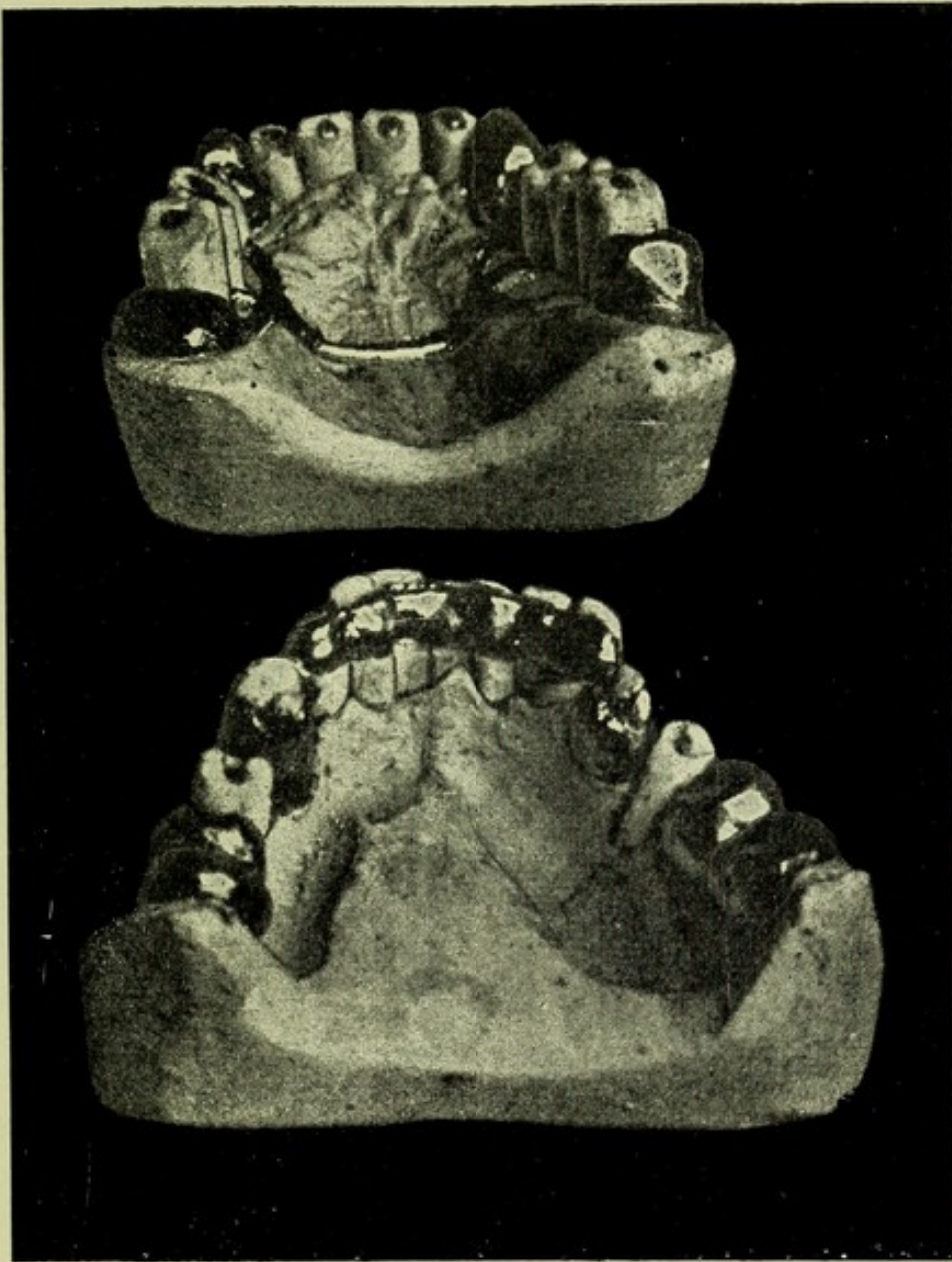
Left: Tube teeth, with pins reaching into roots.

Right: Tube-teeth bridge connected by means of crowns. Combination of bilateral spiders soldered to bridges.

Lower Jaw.—Retaining appliance for the front teeth.

Right: Crown, two tube teeth, two collars, connected by a “spider” soldered to the posterior bridge.

Left: Tube tooth, two collars and “spiders,” similar to that on the right.



UPPER AND LOWER JAW OF A MOUTH: TEETH DESTROYED BY
PYORRHŒA ALVEOLARIS.

(Retaining appliance three and a half years in the mouth.)

PROCEDURE.—All teeth to be retained.

Upper Jaw in three parts. Bite raised by crowns on both sides.

1. *Right*: Molar crown to canine; teeth between all tubes.

2. *Left*: Molar crown to canine; teeth between all tubes.

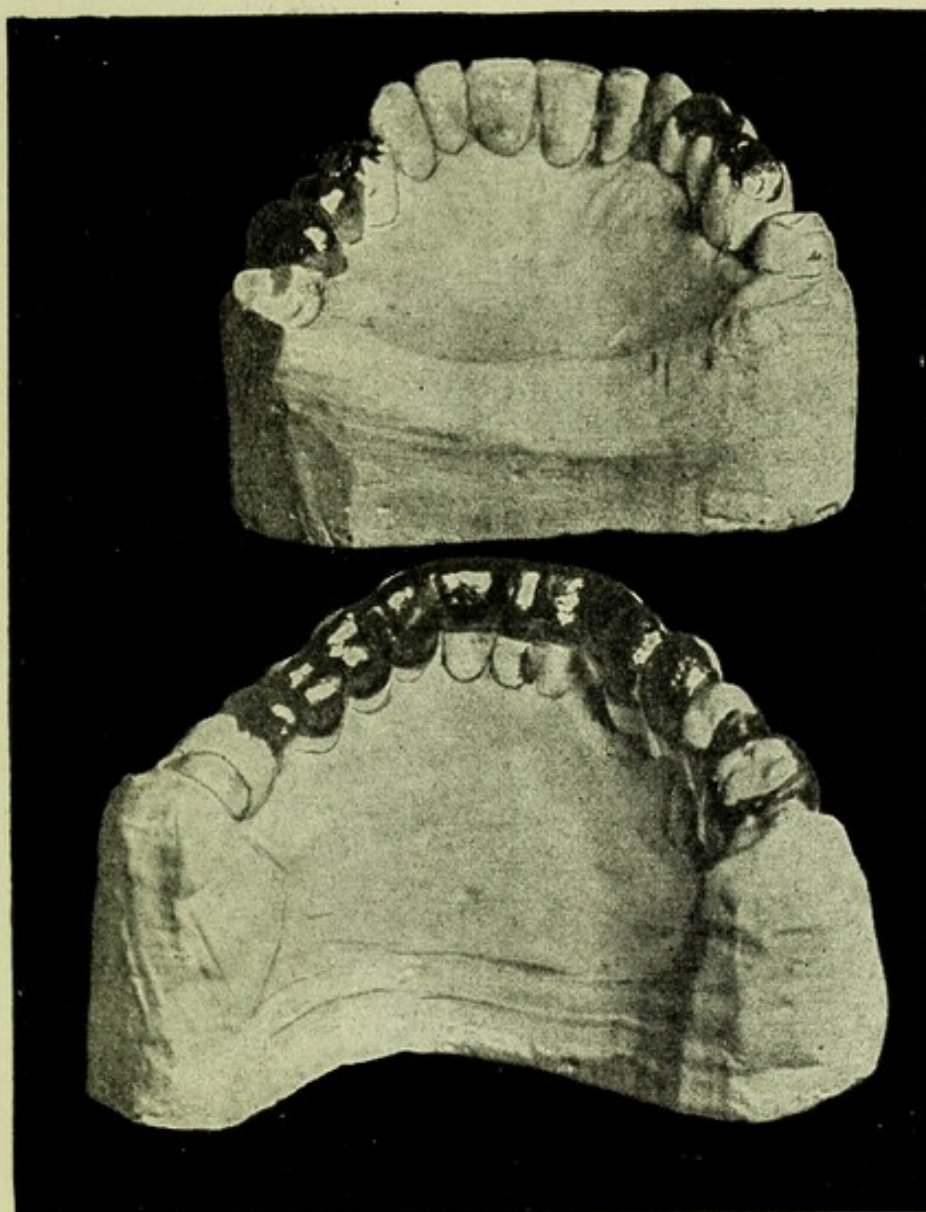
Combination Bryan splint, with cross-arms connecting the lateral parts.

3. *Front*: Tube-teeth bridge running from canine to canine. Both canine caps fixed by spring collar.

Lower Jaw.—*Front*: Retaining appliance, with two artificial teeth, right and left.

Buccal: Molar crowns between bridge-parts, encompassing molars with strong forked clamps, and bicuspids with half pure gold caps, which, strengthened with wires, cover the anterior end of the retaining appliance.

PLATE IV



UPPER AND LOWER JAW: LOOSENING OF NEARLY ALL THE TEETH,
PARTIAL PYORRHOEA ALVEOLARIS.

(Cause : Strong bite and incorrect articulation, caused by bridge
and crown. One year in the mouth.)

PROCEDURE.—Bite raised.

Upper Jaw.—*Right*: Molar inlay, cast crossbar extending
from over bicuspid to over the canine root.

Left: Molar crown, Carmichael crown on bicuspid.

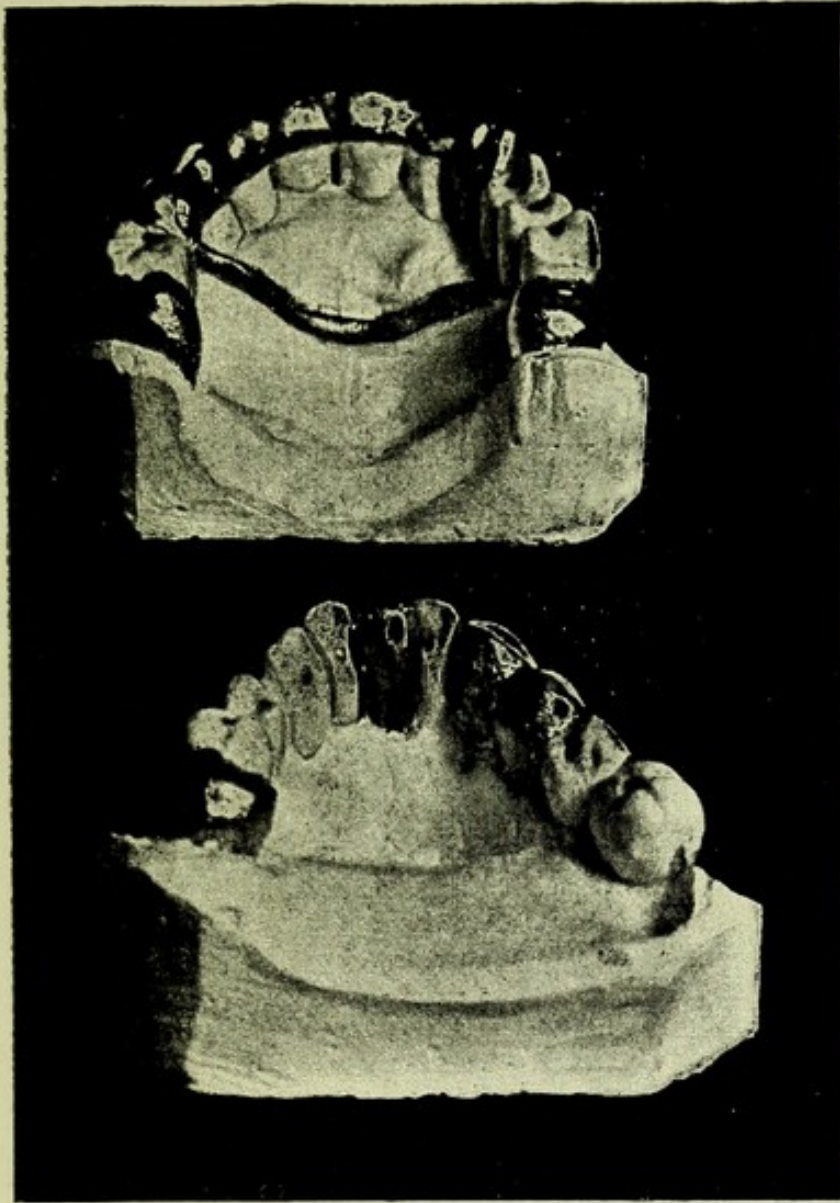
Front: Tube teeth, ending partly in roots, partly in artificial
teeth. Front and lateral appliance connected by canines.

Lower Jaw.—Front retaining appliance.

Right: Pure gold collar over molar crown, with porcelain
facing over bicuspid. Tongue on lateral appliance on canine
and tongue of the front appliance fastened with countersunk
rivet-heads.

Left: Molar inlay, Carmichael crown on bicuspid, connected
as right.

PLATE V



UPPER AND LOWER JAW TEETH DESTROYED BY SEVERE
PYORRHOEA ALVEOLARIS.

PROCEDURE.—

Upper Jaw.—*Right*: Molar crown, bridge with tube teeth, open-faced crown on canine.

Left: Molar crown, tube teeth, bicuspid crown, supported by Bryan splint.

Both sides connected with front appliance by open-faced crown on canine, and fixed by pins in the canine.

Front appliance: right central incisor tube tooth.

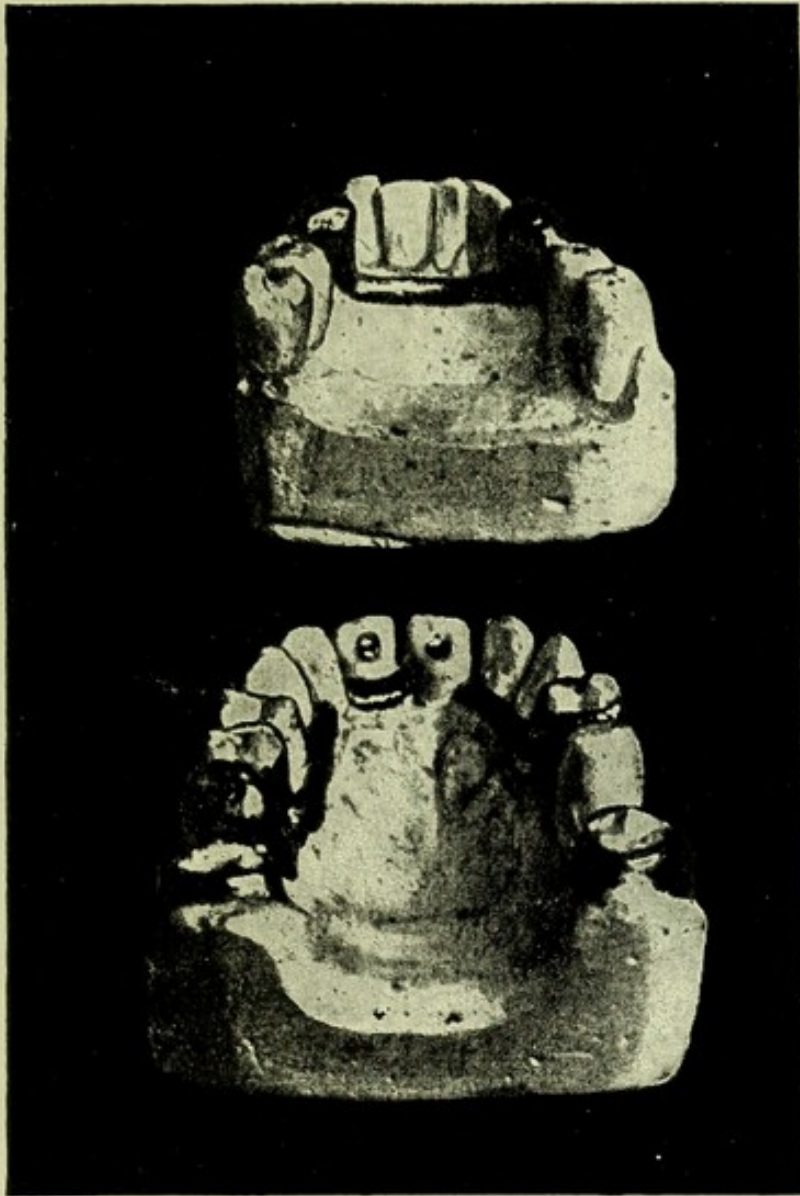
Lower Jaw.—*Right*: All bicuspid artificial. On first bicuspid a half-crown with pivot. Canine half capped with pin.

Left: Molar crown, after having retained the tooth that was inclined lingually, and had caused hypertrophy of the sub-maxillary gland.

All side teeth artificial.

Left central incisor cap with pin.

PLATE VI



LOWER AND UPPER JAW OF A MOUTH BADLY DEFORMED BY
OBLIQUITY OF THE TEETH.

(In the mouth for three years.)

PROCEDURE.—

Upper Figure, Lower Jaw.—Half double-capped canines connected by means of splint ; right and left bicuspid tube teeth.

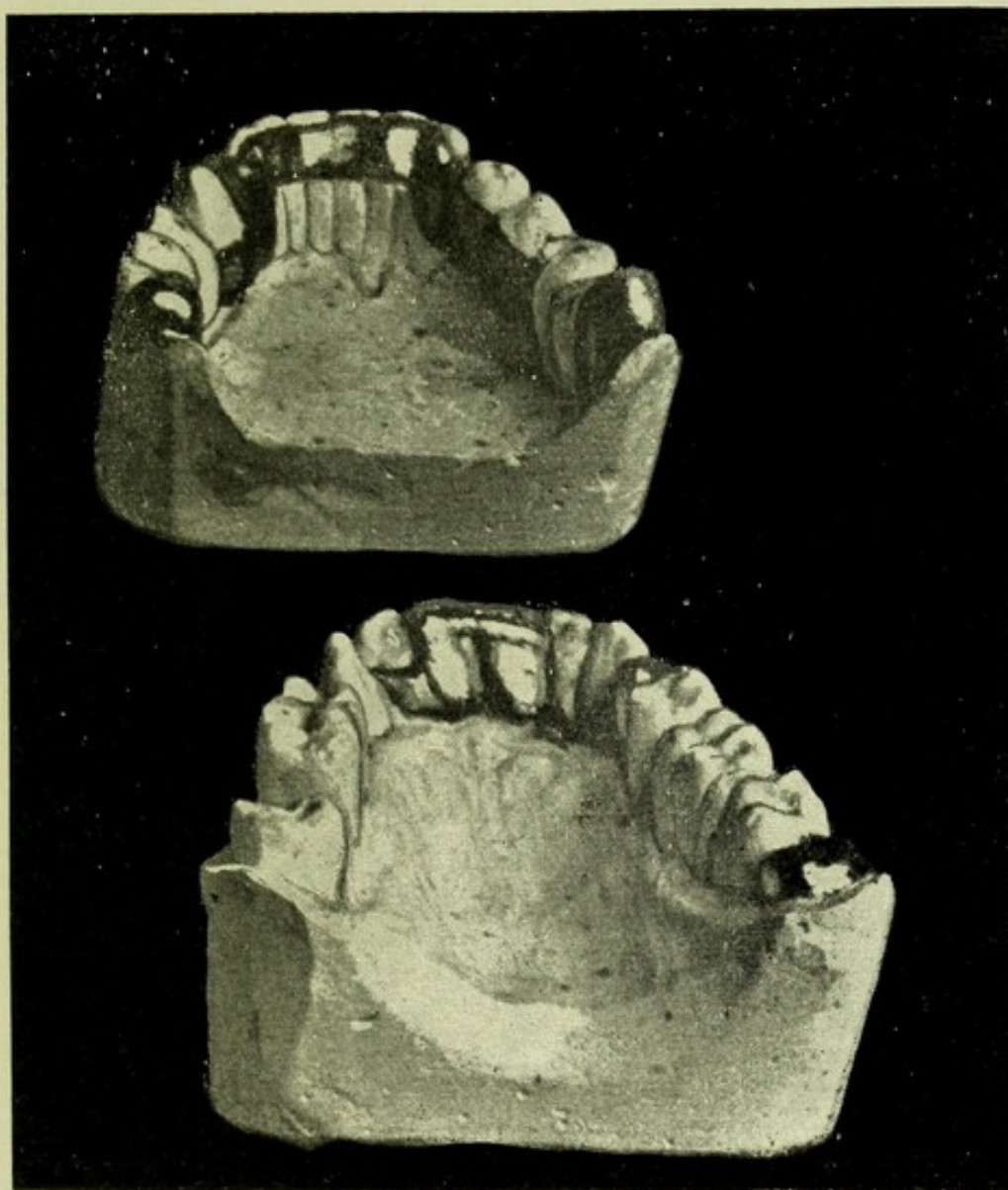
Lower Figure, Upper Jaw.—After previous regulation, bridges serving as retaining appliances.

Right : Pure gold collar, tube tooth, collar on bicuspid.

Left : Collar, crown, bicuspids, tube teeth.

Front : Tube teeth.

PLATE VII



LOWER AND UPPER JAWS: LOOSENING OF TEETH DUE TO
UNCLEANLINESS AND POWERFUL BITE.

(Two and a half years in the mouth.)

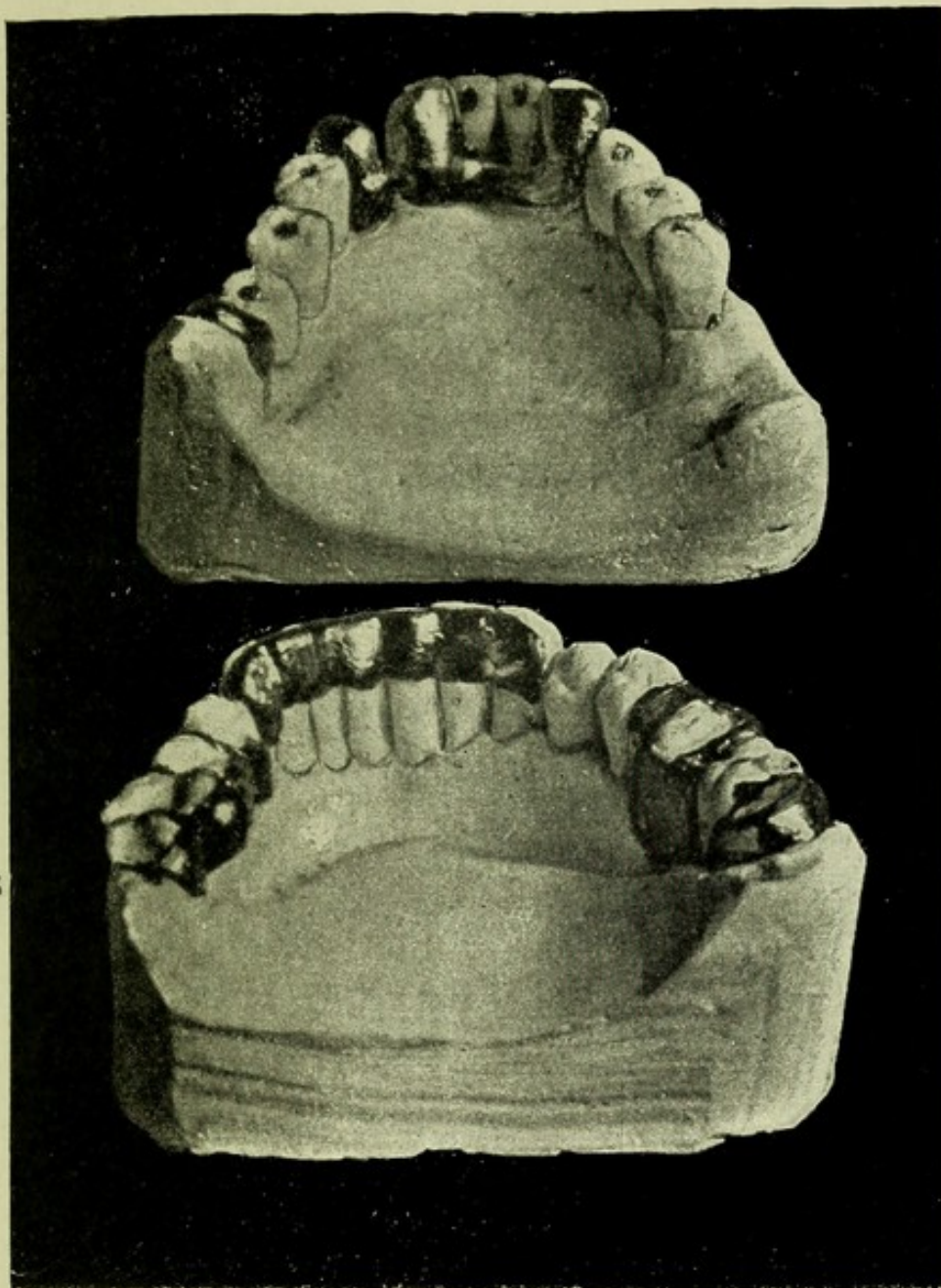
PROCEDURE.—Appliance for retaining front teeth; left lateral incisor reimplanted.

Lower Jaw.—*Right*: Molar crown, tube tooth, bicuspids with collars.

Left: Molar crown, side teeth all artificial. Connected by being soldered to “spiders.”

Upper Jaw.—Front teeth and side roots connected by retaining appliance, extending above the canine to the bicuspid, artificial lateral incisors serving as both supports.

A



B

A. LOWER JAW, WITH EIGHT ARTIFICIAL TEETH RETAINED BY FOUR SUPPORTS.

(One and a half years in the mouth.)

PROCEDURE.—Loose front teeth connected by half-double caps with pins.

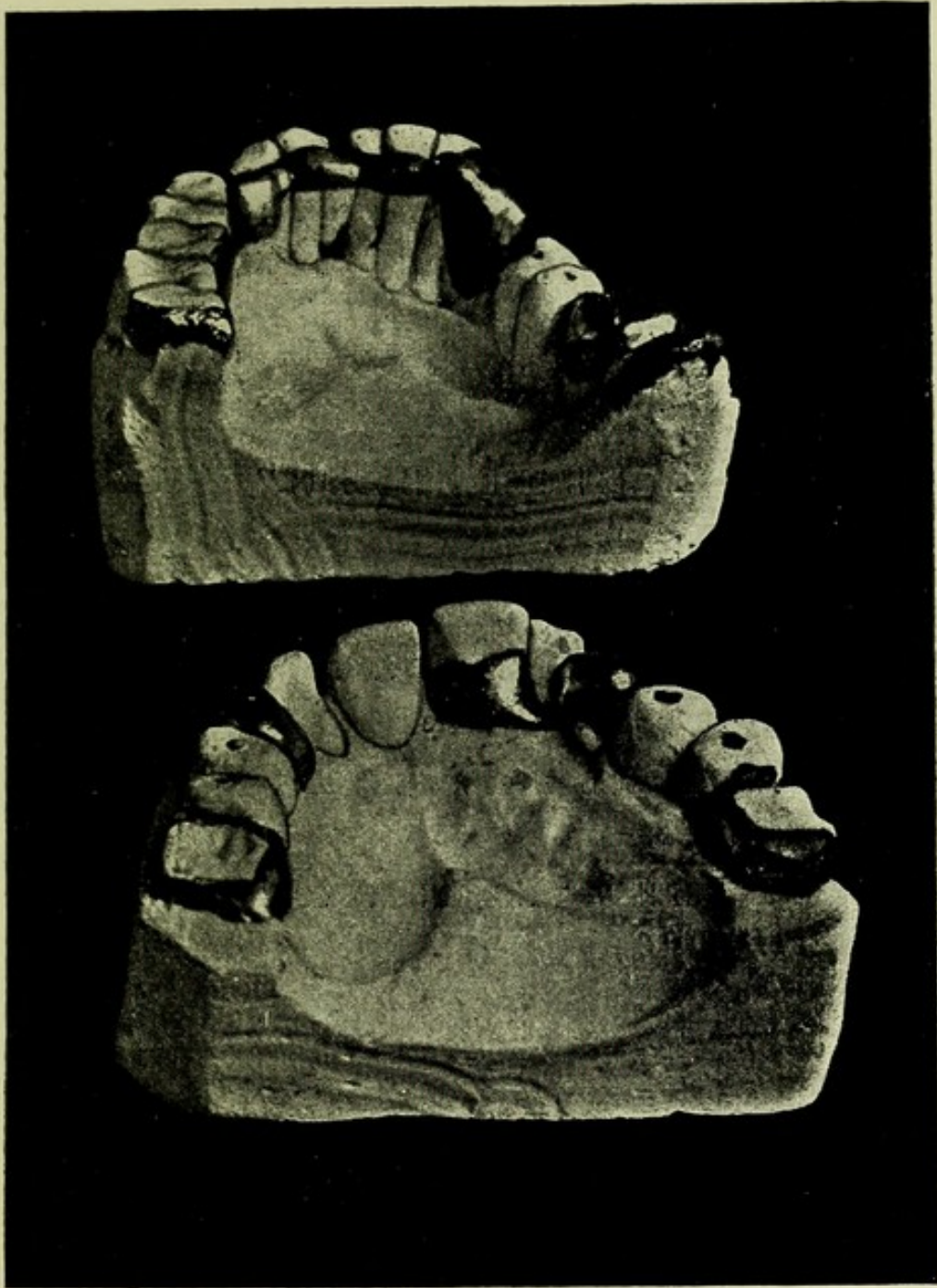
Left: Double capsule with screw; bridge running from left molar to right molar.

B. LOWER JAW.

(In the mouth for two years.)

Loose front teeth; the central incisors lost on the right, reimplanted on the left. Retaining appliance: *Left*, a retaining-wall fastened with ligatures; on the *right*, collar fastening with bridge.

PLATE IX



LOWER JAW : RETAINING APPLIANCE.

(In the mouth for eight years.)

PROCEDURE.—Retaining appliance over front teeth.

Left : Pure gold collars with interposed tube teeth connected by being soldered to “spiders.”

Right : Bridge with pure gold connection over canine.

Upper Jaw.—Bridge with five natural teeth supported and connected by wires. All teeth and caps adjusted with pins. Tube teeth between.



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