May 8, 1928. 1,669,231

J. J. CURRAN

MATRIX BAND STRUCTURE

Filed Aug. 9, 1926

Fig. 8.

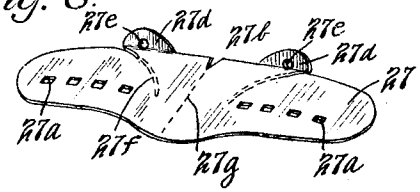


Fig. 9.

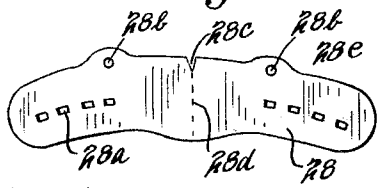


Fig. 11.

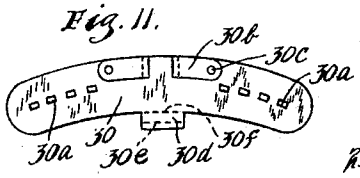


Fig. 10.

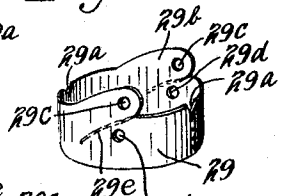


Fig. 12.

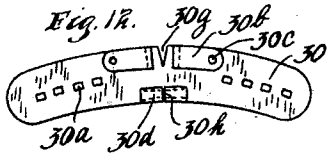


Fig. 1.

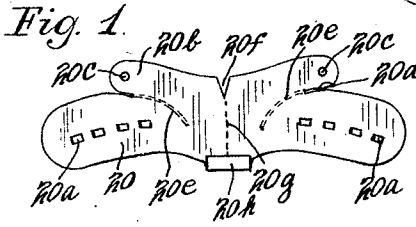


Fig. 2.

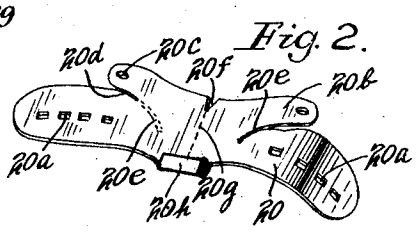


Fig. 3.

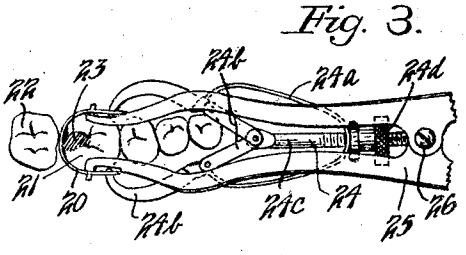


Fig. 5.

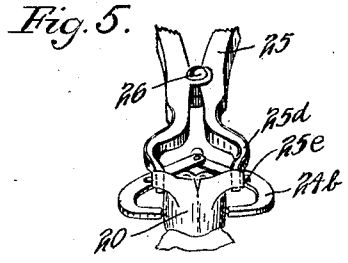


Fig. 4.

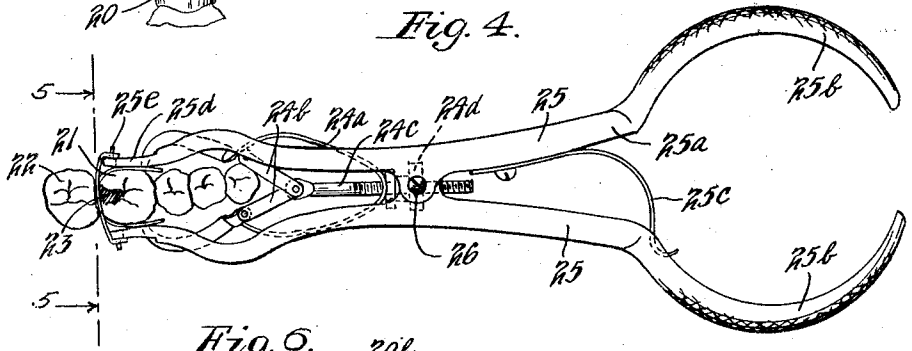


Fig. 6.

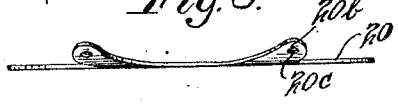


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MATRIX-BAND STRUCTURE.

Application filed August 9, 1926. Serial No. 127,982.

This invention relates to a matrix band for the use of dentists. Matrix bands are now commonly used during the process of placing fillings in approximal cavities in teeth, also in getting impressions of these cavities for inlays. Such cavities are open at one side of the tooth, and the band, which is a thin band of sheet metal, is placed around the tooth and across the cavity so as to form a wall against which the filling may be pressed while it is being placed and packed into the cavity. Difficulty has been experienced with such matrix bands in removing the same without distorting the filling. Another difficulty in the use of such bands has been that of securing a tight contact point between the proximal teeth. Difficulty has also been experienced in securing a well opened proximal space gingival to the contact point. It is desirable to have the filling correspond to the correct shape of the tooth and to have the surface thereof flush with the surface of the tooth.

It is an object of this invention, therefore, to provide a matrix band so constructed that the dentist may form the filling so that a contact point will be had directly against the adjacent tooth after the matrix band has been removed.

It is a further object of the invention to provide a matrix band having a thin or weakened area at or adjacent the contact point so that the band may be torn or broken within the interproximal space and thus removed without distorting the filling.

It is still another object of the invention to provide a matrix band having a thickened or lapped portion at or adjacent to the gingival edge thereof adapted to rest against the adjoining tooth during the process of filling and thus keep the interproximal space well opened and prevent the amalgam or other filling material being forced over the gingival margin and under the gum.

It is another object of this invention to provide a matrix band having portions outlined for wings to be formed thereon adapted to be engaged by a suitable instrument, said band having weakened lines outlining these portions so that the band can be torn or severed by said instrument to form these wings and the band removed after the filling is properly in place by further pulling stress of said instrument on said wings. The matrix band is broken without first removing the matrix holder.

It is also an object of the invention to provide a novel method of making and manipulating a matrix band and placing a filling.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a plan view of a matrix band embodying the present invention;

Fig. 2 is a perspective view of the band showing the same partly torn;

Fig. 3 is a plan view showing a matrix band around one of several teeth and showing the band holding instrument and a portion of the band breaking instrument ready to tear the band at outlined areas to form the wings;

Fig. 4 is a plan view showing the matrix band around one of several teeth with the band holding instrument and also the matrix breaking instrument, the latter being engaged with the wings on the band, and in position to break the band in the interproximal space;

Fig. 5 is a perspective view of the parts shown in Fig. 4 as seen from line 5—5 of Fig. 4;

Fig. 6 is an edge view showing a slight modification of the band shown in Fig. 1;

Fig. 7 is an edge view of a slightly modified form of matrix band;

Fig. 8 is a perspective view of a modified form of matrix band;

Fig. 9 is a plan view of a further modification;

Fig. 10 is a perspective view showing an endless form of matrix band;

Fig. 11 is a plan view of a modified form of band; and

Fig. 12 is a plan view of a still further modified form of matrix band.

Referring to the drawings, in Fig. 1 a matrix band 20 is shown formed of thin sheet metal or other suitable material, the same being of elongated form with rounded ends and having at each side rows of alined holes 20^a. The band 20 is formed at one side with wing portions or tabs 20^b also illustrated as having rounded ends and as having formed therein small holes 20^c. The tabs at their outer ends are separated from the main part of the band 20 by the

narrow slots 20^d and grooves or weakened portions 20^e extend inward from the ends of the small slots 20^d in a curved direction toward the opposite side or gingival edge of the band 20. The grooves 20^e may be pressed in the band or formed therein with an edged tool. The band 20 may also have a notch 20^f formed in its occlusal side or a grooved depression or weakened portion may take the place of this notch and also a grooved depression or weakened portion indicated by the dotted line 20^g may be formed in the band extending from the inner end of the notch 20^f to the bottom of band 20 substantially at the center thereof. If desired, however, the grooved portion 20^g may be omitted. Also 20^f may be omitted in manufacture and may be cut by the dentist to suit the case. The band also has a portion 20^h folded over on itself to form a thickened area at the gingival edge.

When the band shown in Fig. 1 is used, it is placed around the teeth as shown in Fig. 3, the same being placed around a tooth 21. The tooth 21 is shown as having a cavity therein extending to the side thereof adjacent the tooth 22, which cavity is shown as having therein a filling 23 indicated by the shaded area. The band 20 is placed around the tooth in the manner shown, with the side having the flaps 20^b adjacent to the biting surface. The band is held in place on the tooth by an instrument indicated generally as 24. While this instrument is well known and forms no part of the present invention it may be briefly described as comprising a bow-spring 24^a having formed thereon the jaws 24^b having points adapted to engage in the holes 20^a of the matrix band 20. The sides of the bow-spring are pivotally engaged by a pair of links 24^b, each of which has its end pivoted to the inner end of a plunger or stem 24^c which extends through the end and substantially the center of the bow-spring 24^a and is threaded to receive a knurled operating nut 24^d. When the nut 24^d is screwed inwardly on the stem 24 the stem is pulled outwardly and the jaws 24^b are moved together. The instrument 24 is placed in the patient's mouth and lies along the gingival portions of the teeth as clearly shown in Fig. 3, thus holding the band 20 in position. The filling 23 is now placed in the tooth and the same can be placed against the walls of the cavity and the band 20 which forms the outer wall or confinement for the filling. The notch 20^f will be disposed at the occlusal third of the filling and at the nearest proximate point of the tooth 22. The filling can extend outwardly through the notch 20^f and be made to contact with the tooth 22 thus insuring a good firm contact point. After the filling is properly in place, the band breaking instrument 25 will be used. The tool 25 comprises a simple pair of forceps having the jaws or pivot portions 25^a with the semi-circular handle portions 25^b. The handle portions 25^b normally are held apart by the sear spring 25^c. The jaws or portions 25^a are connected by the pivot 26 and forwardly of said pivot are formed with the comparatively thin jaws 25^d which are usually offset gingivally somewhat. The jaws 25^d have outwardly extending small pins 25^e. The pins 25^e are now engaged in the holes 20^c of the band 20 and pressure is applied upon the handles 25^e moving the same together. This initial pressure moves the tabs 20^d apart and said tabs and band tear along the line of the grooves 20^e, this tear extending to the end of said grooves as shown on the right hand side of Fig. 2. After the band has torn to the end of the grooves 20^e, it appears substantially as shown in Fig. 4. Further pressure is now exerted on the handle portion 25^b and the forward jaw portions 25^d are moved further apart and the band now tears or breaks from the end of slot 20^f along the line 20^g and the portions thereof are moved laterally from between the teeth 21 and 22. The matrix band is thus moved out from between the teeth and does not in any way disadvantageously affect the filling 23. The portion extending to tooth 22 and forming the contact point is not disturbed. It will be seen that it would be impossible to remove the band vertically from between the teeth and still retain the contact portion of the filling. By removing the portions of the band laterally there is very little or no tendency to distort the filling or break it. The ends of the tabs 20^b fold around over the vertical edges of the jaws 25^d so that all of the strain or breaking or tearing the band does not come on the holes 20^c. Any danger of the holes pulling out, therefore, is avoided.

In Fig. 6 the band 20 has the tabs 20^b bent in away from the band in one direction and disposed slightly out of the plane of the band as shown. In Fig. 7 the band 20 is shown as having the tabs 20^b offset from the plane of the band and extending substantially parallel thereto, otherwise the structure is the same as shown and described for the bands in Figs. 1 and 2. This gives greater access for the beaks of the forceps 25^d.

In Fig. 8 a band 27 is shown which is also of elongated shape with rounded ends and has therein the rows of holes 27^a similar to the holes 20^a in the band 20 already described. The band 27 also will have a notch 27^b in its occlusal side. The band 27 has the tabs 27^d at its occlusal side having therein the holes 27^e, the band having the grooves or weakened portions 27^f extending from the space or slot between the tabs and taking a

course inwardly or gingivally in a curved direction toward the opposite side of the band, the grooves being similar to grooves 20^e already described in connection with band 20. The tabs 27^d are shown as having the portions lying beyond the occlusal side of the band bent substantially at a right angle to the body of the band.

In the use of such a band of Fig. 8, the process already described will be performed except that the tabs 27^d and the holes 27^e therein will be engaged by a breaking forceps having pins extending gingivally in a vertical direction instead of laterally or horizontally as do the pins 25^e on the tool 25. It will be understood that the band holding tool 24 will engage in the holes 27^a.

In Fig. 9 another form of band 28 is shown, also of elongated shape with rounded ends and having at each side and substantially close to the gingival edge thereof the rows of holes 28^a. The band 28 instead of having separate wings or tabs formed thereon has merely the rounded projecting portions 28^e having formed substantially concentrical with their outer portions the holes 28^b. The band 28 will when ready for use have a notch 28^c at its occlusal edge and it will be noted that this is substantially in horizontal alinement with the holes 28^b. The band 28 may also, if desired, be provided with a groove, mark or indentation 28^d extending from the inner end of notch 28^c transversely across the band. In the use of the band shown in Fig. 9 the same will be placed around the teeth and held in position as already described in connection with band 20, band holding instrument 24 engaging in the holes 28^a. When the band is to be broken the holding instrument 24 will be removed and the breaking instrument will be fixed with its points 25^e engaged in the holes 28^b and the jaws 25^d of the breaking instrument will be separated and the band will be torn or broken along the line 28^d. In both the bands shown in Fig. 8 and Fig. 9 the contact point with the next tooth may be formed by the filling passing through the notches 27^b and 28^c respectively, or a short groove or cut through the band at this point instead.

In Fig. 10 a matrix band 29 of endless type is shown. This band is also of thin metal and substantially cylindrical in form. The same has formed in its occlusal edge at opposite sides the notches 29^a. If for a two surface filling, a notch will be cut at only one side. The band 29 is also shown as having tabs 29^b formed therein and grooves, indentations or weakened lines 29^c are formed on the band extending from the end of the slots separating the band and tabs 29^b gingivally in a curved direction toward the center or interproximal portion of the band. The tabs 29^b have holes 29^c formed therein. The band 29 also has a pair of holes 29^d formed in opposite sides thereof gingival to the tabs 29^b. Such a band will be placed down over the tooth and the contact point with the next tooth may be made through one of the notches 29^a. Such a band as shown in Fig. 10 needs no holding tool, or instrument, for retaining it in position. When the band is to be removed, the instrument 25 will have its point 25^e engaged in the holes 29^c. The jaws of the instrument will be separated and the band will tear along the grooves 29^c to the end thereof. Further outward pressure on the tabs 29^b will now cause the band to tear or break from the gingival portion of the notch 29^a across the band. The sides of the band thus can be removed laterally from between the teeth. If work should be done on the other side of the band, as in a Mesio-occluso-distal filling, the band would be broken in two places. After being broken by the tabs 29^b the breaking instrument 25 would be inserted in the holes 29^d and the band would then break along the line extending from the gingival edge of notch 29^a across to the opposite edge of the band. The band would then be drawn laterally from between the teeth, thus leaving the filling unaffected.

The matrix band 30 shown in Figs. 11 and 12 is of elongated shape with rounded ends having nearly parallel sides which are convex and concave respectively. The same has rows of square holes 30^a at each side thereof and disposed substantially on the center line of the gingival half thereof. At its occlusal portion the band has tabs 30^b superposed thereon, said tabs being rectangular in shape at one end and having their other ends semi-circular. The tabs 30^b have their occlusal sides flush with the occlusal edge of the band 30 and are provided at their rounded ends with holes 30^c. The bands 30^b are secured to the band 30 at their rectangular ends and will be secured in any suitable manner as by spot-welding or soldering. The band 30 at its lower side has a projection 30^d shown as rectangular in form. The projection 30^d will be folded over upon itself along the dotted line 30^e and the same will then be folded over onto the body of the band along the line 30^f, as shown in Fig. 4. However, this projection 30^d may be omitted. The band will also be made up to allow for a V-shaped notch 30^g in its occlusal portion between the tabs 30^b. The folded over projection 30^d may also be formed with a cut or groove 30^h extending transversely at its central portion in line with the point of the notch 30^g. When the band 30 is used, it will be placed around the tooth in the manner shown in Figs. 3 and 4 and will be held in position by the tool 24 which will engage in the holes 30^a. When the band is

to be removed, the prongs of the forceps 25 will be inserted in the holes 30^e. The jaws of the breaking tool will thus be separated and the band will tear or break along a line extending from the point of the notch 30^g to the line 30^h on the opposite edge of the band. The parts of the band will then move laterally from between the teeth. The projection 30^d forms a thickened portion on the matrix band which will engage the gingival portion of the next tooth. This will prevent the band being moved away from the tooth being filled and prevent the filling from bulging out at the gingival portion of the tooth or a crowding out of the filling into the interproximal space and under the gum.

From the above description it is seen that applicant has provided a simple and efficient structure of matrix band and one which can be separated so as to be removed from between the teeth without objectionally affecting the filling. The bands are easily and inexpensively made and can be made shaped to fit several types of matrix holders, and can be quickly and conveniently operated. The device and method of using the same have been amply demonstrated in actual practice and found to be very successful.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the apparatus and in the steps and sequence of steps of the method, without departing from the scope of applicant's invention, which generally stated, consists in a method and apparatus capable of carrying out the objects above set forth, such as disclosed and defined in the appended claims.

What is claimed is:—

1. A dental matrix band comprising a thin elongated piece of sheet material, said band being formed with a portion at one longitudinal edge and adjacent each side of the longitudinal center, having means adapted to be engaged by a breaking instrument, whereby said band may be pulled apart along an intermediate line and thus removed laterally from between the teeth.

2. A dental matrix band comprising a thin elongated piece of sheet material having spaced tabs formed thereon with means therein adapted to receive a breaking instrument and a notch or recess formed in the occlusal portion of said band substantially at the center thereof through which the filling may extend and which will form a starting point for the breaking of the band being pulled apart by said tabs.

3. A dental matrix band comprising an elongated piece of sheet material having spaced tabs formed thereon adapted to be disposed at opposite sides of the tooth and having means adapted to receive an instrument for breaking said band along a transverse line between said tabs.

4. A dental matrix band comprising an elongated piece of sheet material having spaced tabs formed thereon adapted to be disposed at opposite sides of the tooth and having means adapted to receive an instrument for breaking said band along a transverse line between said tabs, said band having weakened portions extending from the occlusal side of said tabs into said band.

5. A dental matrix band comprising an elongated piece of sheet material having spaced tabs formed thereon adapted to be disposed at opposite sides of the tooth and having means adapted to receive an instrument for breaking said band along a transverse line between said tabs, said band having a thickened portion at its gingival area and substantially centrally thereof, adapted to engage the gingival portion of the tooth adjacent the tooth being filled.

6. A dental matrix band comprising an elongated piece of sheet material, said band being formed with spaced tabs at one side thereof and having weakened lines extending from the ends of said tabs transversely partially across said band, adapted to tear to form wings for a breaking instrument, said wings being constructed and arranged to be engaged by a breaking instrument, whereby said band may be broken along a transverse line between said tabs.

7. The structure set forth in claim 2, said band having a weakened line extending from said recess transversely of said band.

8. The method of manipulating a dental matrix band which consists in placing the same in the interproximal space and about the tooth to form the supporting wall for the filling, holding the same in place, and after the filling is in place, engaging the band at each side of the tooth and breaking the same in the interproximal space by pressure exerted outwardly at each side of the tooth.

9. A dental matrix band having weakened portions therein along which the band is adapted to be torn to form tabs on said band, said tabs having means to be engaged to exert pressure thereon so that the band will be broken in the interproximal space.

10. A dental matrix band having weakened portions on which the band is adapted to be torn to form tabs having means for engagement by a suitable instrument to exert pressure on the band, whereby the same will be broken in the interproximal space, said band having a cut-out therein at a point to provide contact of the filling material with the adjoining tooth, and to insure a starting of the break at that point.

11. A dental matrix band comprising an elongated piece of thin flexible material having a portion partially defined by weakened

lines and having means for engagement therewith of a spreading instrument adapted to tear said band along said weakened lines and partially separate said portion from the body of the band after the filling has been inserted and after said portion has served its purpose for forming a supporting wall for the filling, said portion being adapted to form two winged projections, one on each side of the tooth and interproximal space, adapted to be pulled upon to break said band in the interproximal space.

12. The method of manipulating a matrix band having wings formed adjacent each end thereof and placing a dental filling which consists in cutting a notch in the occlusal edge of said band, placing the same in the interproximal space and about the tooth to form the supporting wall for the filling, with said notch adjacent the adjoining tooth, whereby said filling may extend through said notch to make contact with said adjoining tooth, and then tearing said band in two in the interproximal space by a pressure exerted outwardly on said wings at each side of the tooth and removing the parts thereof laterally from the interproximal space.

13. The method of manipulating a dental matrix band and placing a dental filling which consists in placing the same in the interproximal space and about the tooth to form the supporting wall for the filling, holding the same in place by a holding implement and, after the filling is in place, engaging the band at each side of the interproximal space with a spreading instrument and breaking the band in the interproximal space while the same is still held by the holding implement.

14. The method of manipulating a dental matrix band and placing a dental filling which consists in placing the band in the interproximal space, holding the same about the tooth to form the supporting wall for the filling and, after the filling is in place, engaging said band at opposite sides of the interproximal space, partially tearing said band to form pulling tabs thereon and then breaking said band in the interproximal space by pressure exerted outwardly in opposite directions on said tabs.

15. The method of making and manipulating a dental matrix band and placing a dental filling which consists in forming weakened lines in said band at each side of its longitudinal center, cutting a portion out of the edge of said band opposite the gingival edge, placing the band in the interproximal space and around the tooth with said cut-out portion adjacent the adjoining tooth, whereby the filling may extend through said cut-out portion to form a contact point with said adjoining tooth, holding said band in position and after the filling is in place exerting pressure on said band at opposite sides of the interproximal space to tear the same along said weakened lines to form pulling portions and exerting outward pressure in opposite directions on said pulling portions to tear said band in two in the interproximal space while said band is still held in position, whereby said band is removed without interfering with the contact point with said adjoining tooth.

16. The structure set forth in claim 5 said band having a cut substantially at the central portion thereof and having means to insure breakage therethrough directly to the gingival edge.

In testimony whereof I affix my signature.

JOHN J. CURRAN.