April 12, 1949. B. F. TOFFLEMIRE 2,466,830

MATRIX BAND FORMER AND CUTTER

Filed June 4, 1946 2 Sheets-Sheet 1

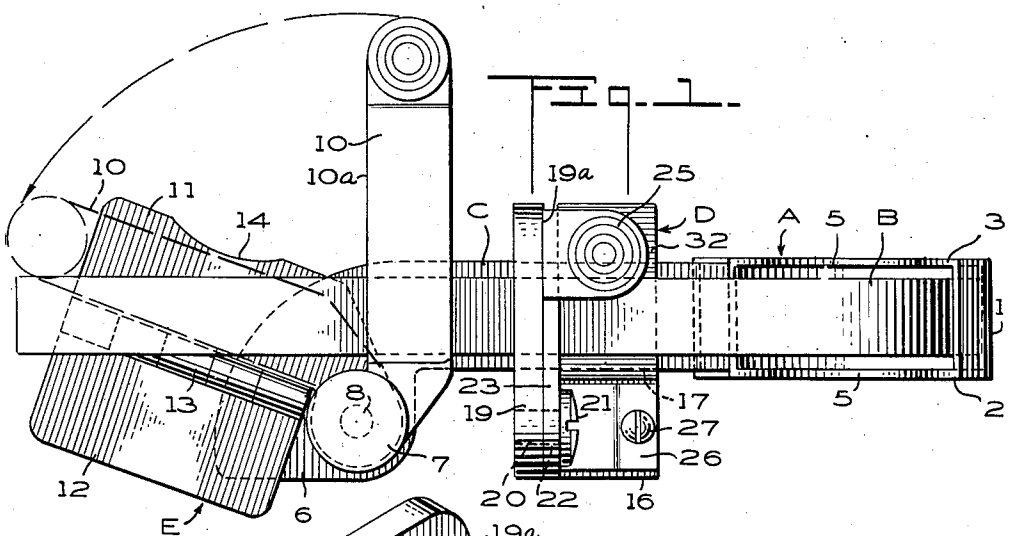


FIG. 1.

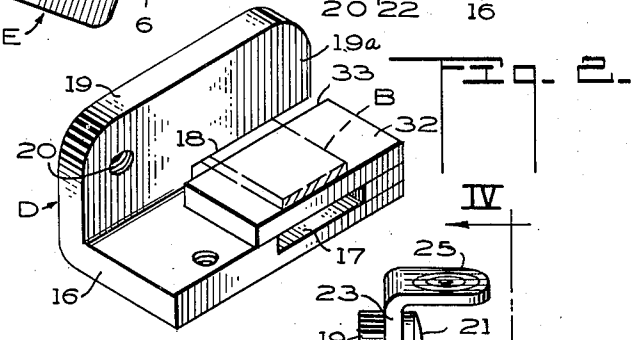


FIG. 2.

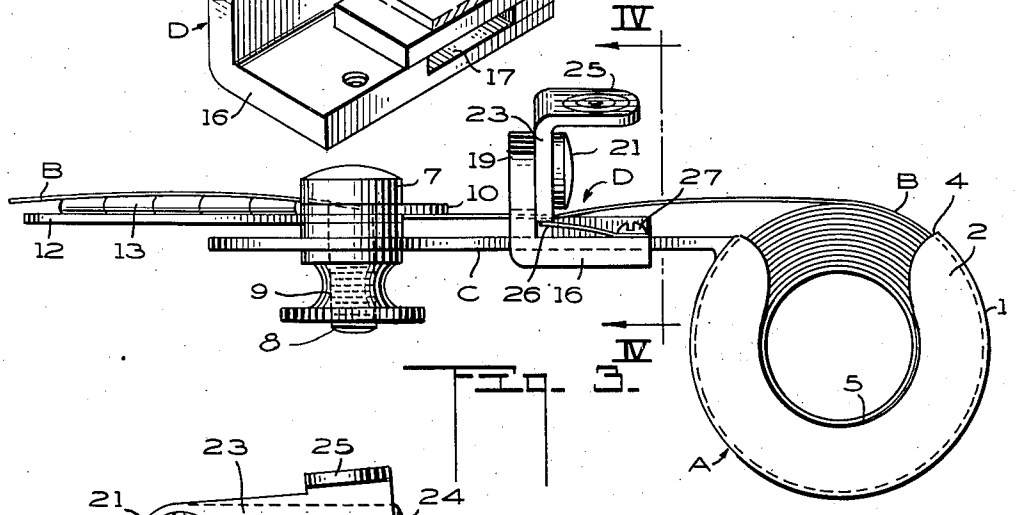


FIG. 3.

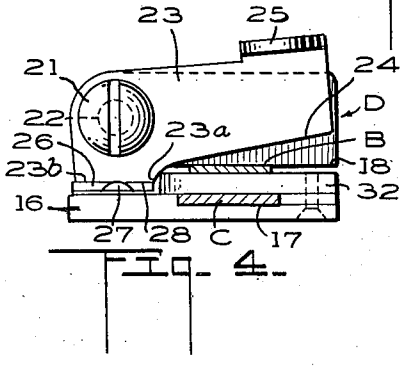


FIG. 4.

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MATRIX BAND FORMER AND CUTTER

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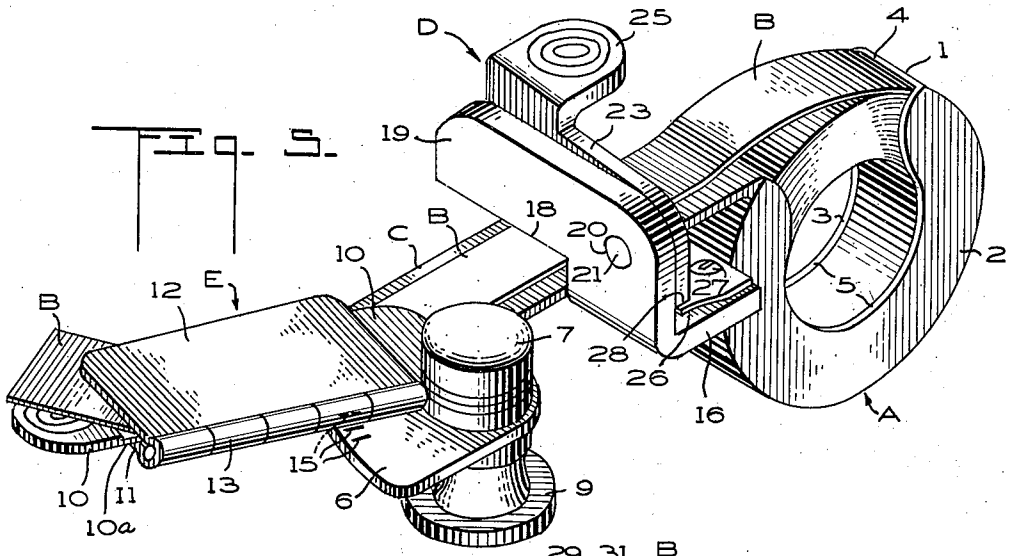


FIG. 5.

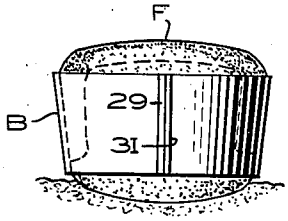


FIG. 6.

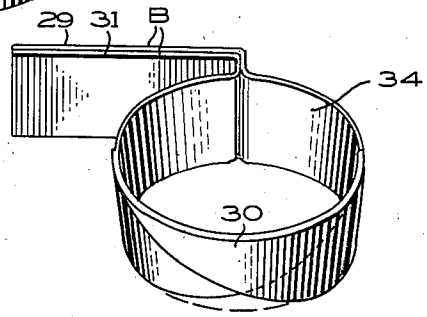


FIG. 7.

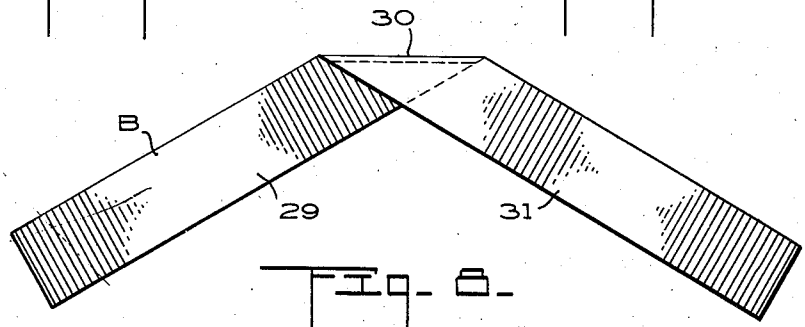


FIG. 8.

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MATRIX BAND FORMER AND CUTTER

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Application June 4, 1946, Serial No. 674,354

10 Claims. (Cl. 153—2)

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An object of my invention is to provide a matrix band former and cutter which incloses the matrix band material and is compact. It is possible to form a matrix band with the device that is individually adapted to the tooth to be treated and properly contoured so as to be form fitting to the tooth. The matrix band former can accurately, quickly and inexpensively fashion a matrix for a tooth from a roll of the conventional dental matrix band material.

A further object of my invention is to provide a matrix band former and cutter that can handle rolls of matrix band material of different widths at the option of the operator. The rolls are interchangeable and may be readily inserted into the device when needed.

The invention does away with the need of using pre-formed, expensive and necessarily inaccurate bands. Furthermore, the matrix band material may be cut off at any length desired. The peripheral adaptation of the matrix band when formed with my device causes the matrix to be conical in shape and conform to the particular shape of the tooth enclosed by the band. The operator can build up properly condensed and well contoured restorations with my matrix band much more easily, quickly and precisely than is possible with other known methods.

A still further object of my invention is to provide a matrix band former and cutter in which the matrix band formed by the device will eliminate gingival overhanging margins and at the same time provide firm contact points between the filling and the adjoining teeth. One of the most frequent causes of paradentosis and life-time dental suffering with the possible premature loss of the teeth, is prevented by the elimination of gingival overhang. The invention is simple in construction, durable and efficient for the purpose intended.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the claims.

My invention is illustrated in the accompanying drawings forming a part of this application, in which:

Figure 1 is a top plan view of the matrix band former and cutter on a greatly enlarged scale;

Figure 2 is a perspective view of the movable bracket for supporting the matrix band cutting knife;

Figure 3 is a front elevation of Figure 1;

Figure 4 is a transverse section taken along the line IV—IV of Figure 3 and shows the matrix band cutter;

Figure 5 is a perspective view of the device;

Figure 6 illustrates how the formed matrix band is disposed around a tooth;

Figure 7 is a perspective view of the matrix band prior to its being placed around a tooth; and

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Figure 8 illustrates a folded matrix band that has been prepared and cut by the device.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the claims without departing from the spirit and scope of the invention.

In carrying out my invention, I provide a matrix band container indicated generally at A, and this container has a cylindrical wall 1 with perforate side walls 2 and 3. The cylindrical wall 1 is open at 4 for permitting a roll of matrix band material B to be placed in the container. The walls 2 and 3 have central recesses 5 that communicate with the opening 4 and these recesses and opening permit the roll of matrix band material to be placed in the container or removed therefrom at the will of the operator.

The width of the cylindrical wall 1 is such as to receive the widest type of matrix band B, and it is possible to place a band material of less width in the container. The resiliency of the material causes the outer surface of the coiled portion to frictionally engage with the inner surface of the cylindrical wall 1 at all times and in this way the coil is kept in a compact form within the container. The opening 4 not only permits the coil to be placed within the container, but it also permits the material to be fed from the container as required.

In Figure 5, I show an integral arm or support C projecting from the exterior surface of the cylindrical wall 1 of the container and disposed parallel with a line that is tangent to the outer circumference of the matrix band coiled portion. The support C receives the end of the band B and Figure 5 clearly shows how the band can be moved along the support as required. I provide novel cutting means for the band and this is indicated generally at D. Before describing the cutting means in detail, however, it is best to set forth the construction of the matrix band folder which is indicated generally at E.

Referring to Figure 1, it will be seen that the support C has an enlarged quadrant-shaped integral and 6 which receives a pivot post 7. The post has a threaded shank 8 which receives a clamping nut 9. In Figure 3 I show the post as extending through one end of a forming blade 10 so that the blade can be swung about the post as a pivot. A matrix band supporting lower member 11 is also pivotally mounted on the post 8 and this member has a cover or upper member 12 that is hinged to the lower one at 13. The lower member 11 has a recess 14 along one edge for permitting the upper member 12 to be grasped and swung into the open position shown in Figure 1. Both members 11 and 12 are of the same size.

In Figure 5, I show the quadrant portion 6 provided with a plurality of graduations 15 on its upper surface which extend radially from the axis of the shank 8. These graduations determine the angle which the hinge 13 assumes with respect to the longitudinal axis of the support C. It is this angle that determines how the band material B is to be bent or folded as shown in Figure 8. For a normal tooth, the hinge 13 is brought into alignment with the central one of the three graduations 15 illustrated.

Before describing how the matrix and material is bent by the matrix band folder E, I will describe the construction of the cutter D. Figure 3 discloses the cutter as comprising a bracket 16 that has a slot 17 for slidably receiving the support C, see Figure 4. The matrix band material B overlies an anvil portion 32 of the bracket 16 and it passes through a recess 18 formed at the lower edge of a vertically extending portion 19 of the bracket. The upstanding portion 19 has a threaded opening 20 for receiving a pivot screw 21 and the latter extends through an opening 22 in a band cutting blade 23. The blade slides against the wall 19*a* of the upstanding portion 19 and has a cutting edge 24 that is designed to be pressed downwardly by a thumb rest 25, so that the edge will cut through the band material. A leaf spring 26, see Figure 5, is secured to the bracket 16 by a screw 27 and the free end of the leaf spring engages with the lower edge 28 of the knife 23 for acting on the knife and yieldingly holding it in raised position above the band material. When the knife is depressed for cutting the band, the corner 23*a* will depress the leaf spring. The knife is held from swinging upwardly beyond the position shown in Figure 4, by the other corner 23*b* contacting with the spring.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

It is possible to form a length of band material B into the shape shown in Figure 8 by the device illustrated in Figures 1, 3 and 5. The desired length of band material is fed from the container A and is passed through the recess 18 and then is extended over the lower member 11 of the matrix band folding member E. The band B is fed under the forming blade 10 when the blade is in the full line position shown in Figure 1. The band material projects beyond the former E sufficiently to provide the length 29 from the fold 30 shown in Figure 8. The fold 30 is formed at the portion of the band extending adjacent to the hinge 13, so in reality the band B shown in Figure 1 will extend to the left of the former E a considerable distance beyond that illustrated.

The forming blade 10 is now swung over the band material as shown by the dash line position in Figure 1 and the edge 10*a* will parallel the hinge 13. The upper leaf 12 is now manually swung over the lower leaf 11 while the forming blade 10 is held in the dash line position. The result is that the band will be folded at 30 and the fold will take place around the edge 10*a*. The blade 10 may now be swung back into its full line position and the upper leaf 12 pressed down firmly upon the lower leaf 11 for making a flat fold at 30.

The cutting means D may now be moved along the support C so that the right hand length 31 of the band shown in Figure 8 will substantially equal the left hand length 29, both lengths being measured from the common fold 30. The blade 23 may now be manually depressed and the band material B will be cut adjacent to the recess 18. It will be seen that the bracket 16 has the anvil portion 32 on which the band B is placed. The edge 33 of the anvil is spaced from the adjacent face 19*a* of the upright portion 19 so that the cutting edge 24 of the blade 23 will pass down between the edge 33 and the face 19*a* to sever the band material. As soon as the cut has been made and the thumb rest 25 freed, the leaf spring 26 will return the cutting knife 23 to the position shown in Figure 4. The cut and folded matrix band may now be removed from the former E and will assume the position shown in Figure 8.

If now the two ends 29 and 31 of the folded band are brought into parallel and abutting relation, the fold 30 will cause the circular band portion 34, see Figure 7, to take a conical shape. The portion 34 is then mounted over a tooth F and the ends 29 and 31 are clamped together by a matrix retainer shown in my United States Letters Patent No. 2,439,703, granted April 13, 1948 (application Serial No. 677,577, filed June 18, 1946).

One of the principal objects of the invention is the provision of a matrix band per se, as shown in Figures 6, 7, and 8. The folding of the matrix band at 30 intermediate of its ends by my former produces two sections 29 and 31 extending in diverging relation with one another when the strip is flat (see Figure 8). The strip thus folded produces a conical-shaped tooth-embracing matrix band when the strip is arranged in encircling relation with a tooth F (see Figure 6) and the free ends 29 and 31 of the band are brought into parallel and approximate relation with each other, as disclosed in Figure 7.

My matrix band former and cutter makes it possible to fold the band so that the extensions, or end sections, are inclined to each other at the proper angle and to cut the band so that the extensions will be of the proper length.

It will be noted from Figure 6 that the width of the band B is dimensioned to extend substantially from the occlusal surface of the tooth to the gingival line at the mesial and distal surfaces of the tooth. The folded-over portion 30 of the band may be arranged on the lingual surface of the tooth when the band ends 29 and 31 extend from the labial surface of an anterior tooth, or the buccal surface of a posterior tooth.

I claim:

1. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adjustable along the support and adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open and lie in a plane paralleling the plane of the support, the hinge extending at an oblique angle to the strip sides and positioned partially under the strip, whereby a swinging of one leaf over upon the other will fold the strip so that strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band.

2. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adjustable along the support and adapted to receive a

strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open and lie in a plane paralleling the plane of the support, the hinge extending at an oblique angle to the strip sides and positioned partially under the strip, whereby a swinging of one leaf over upon the other will fold the strip so that strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band and a thin forming blade movable over the strip and adjacent to the hinge for aiding in forming the strip fold at the hinge when one leaf is swung over upon the other, the blade being removable to permit a close compressing of the leaves against each other for completing the fold.

3. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adjustable along the support and adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open and lie in a plane paralleling the plane of the support, the hinge extending at an oblique angle to the strip sides and positioned partially under the strip, whereby a swinging of one leaf over upon the other will fold the strip so that strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band, said folder being pivotally carried by the support, and markings on the support extending radially from the point of pivot and indicating the position of the hinge for different types of band folds.

4. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adjustable along the support and adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open and lie in a plane paralleling the plane of the support, the hinge extending at an oblique angle to the strip sides and positioned partially under the strip, whereby a swinging of one leaf over upon the other will fold the strip so that strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band, said folder being pivotally carried by the support, and markings on the support extending radially from the point of pivot and indicating the position of the hinge for different types of band folds, and a thin forming blade pivoted to the same support as the folder and swingable over the strip and into a position adjacent to the hinge for aiding in forming the strip fold at the hinge when one leaf is swung into a superimposed position over the other.

5. In a device of the type described, a support for a strip of dental matrix band, a matrix band folder pivoted to said support to one side of the band, the band folder being adjustable laterally into various angular positions of crossing relative to the planes of the support and strip, the band folder comprising two leaves hinged together and

adapted to lie in an open flat plane that parallels the plane of the support, the hinge extending at an angle to the strip and underlying a portion of it, one leaf being swingable into a superimposed position over the first leaf to fold the band so that the extensions from the fold will be oblique to one another.

6. In a device of the type described, a support for a strip of dental matrix band, a matrix band folder pivoted to said support to one side of the band, the band folder being adjustable laterally into various angular positions of crossing relative to the planes of the support and strip, the band folder comprising two leaves hinged together and adapted to lie in an open flat plane that parallels the plane of the support, the hinge extending at an angle to the strip and underlying a portion of it, one leaf being swingable into a superimposed position over the first leaf to fold the band so that the extensions from the fold will be oblique to one another and a thin forming blade swingable about the same pivot as the band folder and having an edge adapted to be brought into parallel and close relation to the hinge when the blade is swung over the strip, whereby the blade will aid the hinge in making the proper fold when one leaf is brought into a superimposed relation over the other leaf.

7. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open, the hinge extending at an oblique angle to the strip sides, whereby a swinging of one leaf upon the other will fold the strip so that the strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band.

8. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open, the hinge extending at an oblique angle to the strip sides, whereby a swinging of one leaf upon the other will fold the strip so that the strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band, and a thin forming blade movable over the strip and adjacent to the hinge for aiding in forming the strip fold at the hinge when one leaf is swung over upon the other, the blade being removable to permit a close compressing of the leaves against each other for completing the fold.

9. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open, the hinge extending at an oblique angle to the strip sides, whereby a swinging of one leaf upon the

other will fold the strip so that the strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band, said folder being pivotally carried by the support, and markings on the support indicating the position of the hinge for different types of band folds.

10. A matrix band shaper and cutter comprising a matrix band container adapted to hold a roll of matrix band material, a support extending from the container, a matrix band cutter adapted to receive a strip of matrix band material that projects from the container, and a matrix band folder carried by the support, the folder comprising two hinged leaves adapted to receive the projecting strip when the leaves are open, the hinge extending at an oblique angle to the strip sides, whereby a swinging of one leaf upon the other will fold the strip so that the strip portions will extend diagonally away from the fold, the cutter being adapted to sever the folded strip from the remaining matrix band, said folder being pivotally carried by the support, and markings on the support indicating the position of the hinge for different types of band folds, and a thin forming blade pivoted to the same support as the folder and swingable over the strip and into a position adjacent to the hinge for aiding in forming the strip fold at the hinge when one leaf is swung into a superimposed position over the other.

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