

Nov. 8, 1960

D. WALDMAN

2,958,945

MULTIPURPOSE ORTHODONTIC BRACKET

Filed Aug. 13, 1959

3 Sheets-Sheet 1

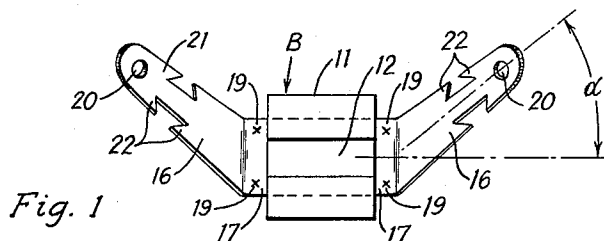


Fig. 1

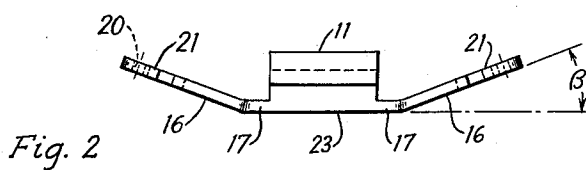


Fig. 2

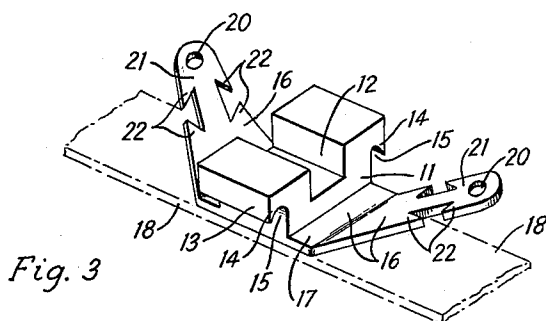


Fig. 3

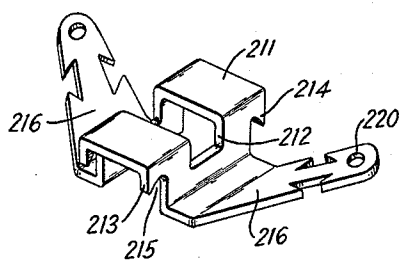


Fig. 4

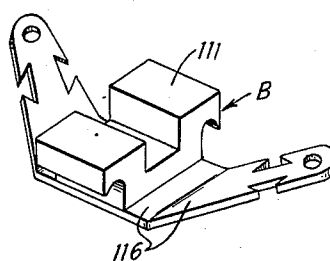


Fig. 5

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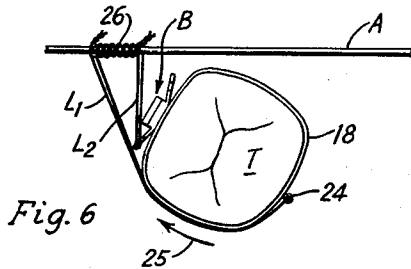


Fig. 6

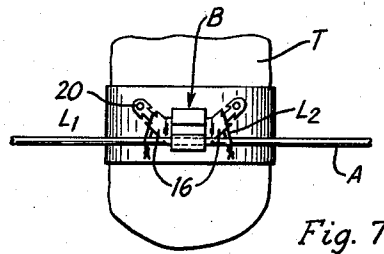


Fig. 7

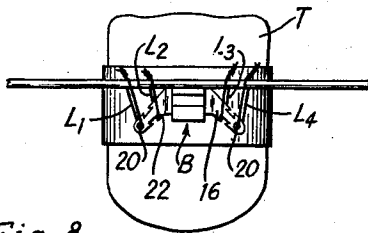


Fig. 8

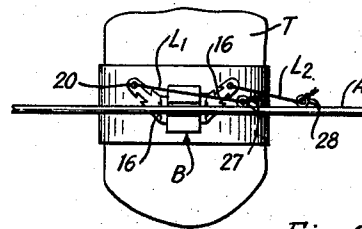


Fig. 9

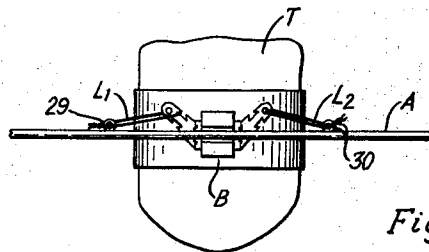


Fig. 10

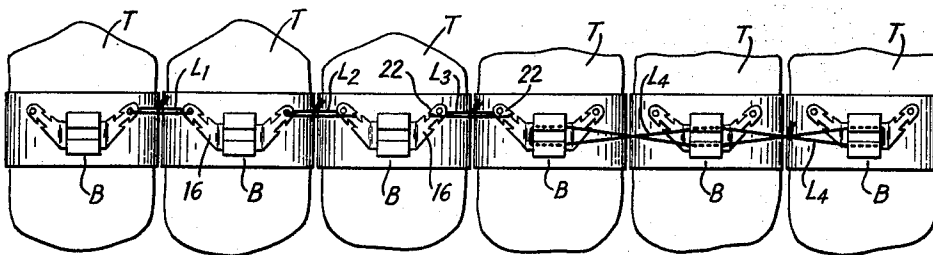


Fig. 11

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3 Sheets-Sheet 3

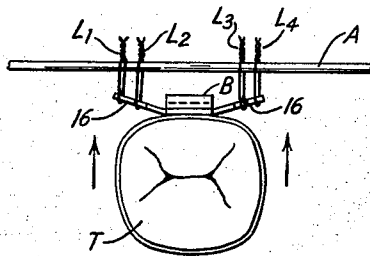


Fig. 12

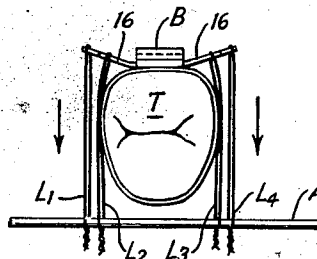


Fig. 13

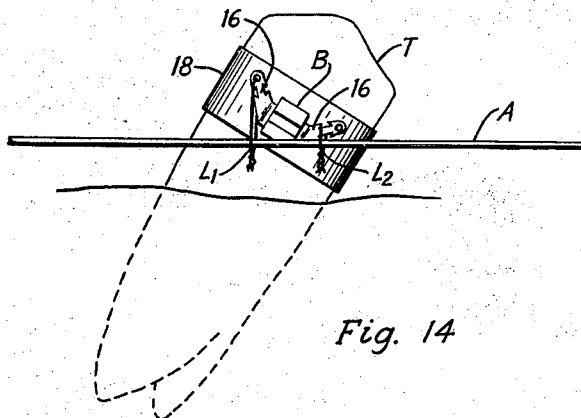


Fig. 14

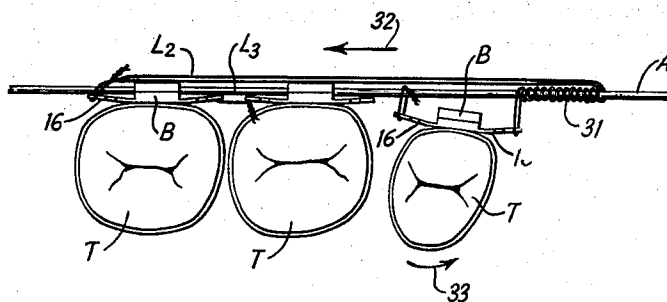


Fig. 15

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MULTIPURPOSE ORTHODONTIC BRACKET

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11 Claims. (Cl. 32—14)

This invention relates to improvements in orthodontic appliances for correcting the position of malposed teeth.

The treatment of malposed teeth involves basically a corrective movement of the respective tooth in relation to an established reference with respect to which the tooth is rotated, depressed, elevated, moved towards, or away from, tilted, etc., the corrective treatment comprising one, or a combination of the aforementioned adjustments.

The reference in relation to which the corrective movements take place is a so-called arch wire extending across the front of the teeth. The tooth whose position is to be corrected is provided with a harness and a corrective force is then exerted between the harness and the arch wire which gradually causes the tooth to assume its corrected position.

The harness, according to conventional practice, comprises a metal band fitted around, and cemented to, the tooth, and means on the band generally in the form of a so-called bracket and individual eyelets brazed or welded to the band. Ligature or tie wire is threaded through the eyelets and applies, either alone, or in combination with helical springs, a corrective force between the arch wire and the band.

The band which is fitted around the tooth may be seamless, but far more frequently is initially a strip of rolled stainless metal and according to conventional practice is fitted as follows: The band is placed around the tooth and the ends of the band are pinched at the rear of the tooth so that the ends lie face to face and extend in a substantially radial direction away from the more or less circular tooth embracing portion of the band. This procedure establishes the proper circumferential length of the band which is then permanently fixed in annular form as follows. The band is removed from the tooth, the ends which lie face to face are spotwelded together in that position, excess length is cut off and the spotwelded portion is then bent flat over the annular portion and spotwelded thereto. The result is an annular band of single thickness except at the welded portion where it is of triple thickness.

According to an alternative practice, the ends of the band are cut off after establishing the proper peripheral length and a bridge of the band material is welded across the approximately abutting ends to join the ends together.

The central portion of the band, overlying the front of the tooth is provided with a so-called bracket which has a transverse channel in its front, adapted to receive the arch wire. The arch wire is placed into the channel of brackets on properly or nearly properly positioned teeth, but is out of register with the channels in the case of malposed teeth.

In order to apply a corrective force on malposed teeth it is common practice to weld, in the case of stainless steel, or braze in the case of gold, eyelets on the band through which eyelets the ligature wire is then threaded. Eyelets are available to the practitioner in the form of small rings, but are most commonly supplied in the form of strips of undulated wire which are weakened at each undulation and can be broken or otherwise separated into individual eyelets, each roughly having the

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shape of a horseshoe or U. The ends of the U are spotwelded to the band requiring two spotwelds per eyelet or four spotwelds per tooth.

The use of eyelets adjacent the bracket is disadvantageous for several reasons, and it is for this reason an object of the present invention to dispense with such eyelets entirely. Spotwelding eyelets is a tedious and time consuming procedure. The eyelets are quite small and there is danger of accidentally damaging the band by burning. Spotwelding of eyelets further tends to distort the shape of the band which has been fitted to conform to the curvature of the tooth, and it is frequently necessary to refit or readapt the band before the band can be cemented to the tooth.

During cementing the eyelets tend to pick up cement which clogs them and makes subsequent threading of the ligature wire through the eyelets difficult.

It is therefore readily seen that an elimination of welded eyelets, involving an elimination of between 70 and 96 spotwelds per mouth, would be a welcome advance and improvement to the practitioner.

The present invention provides an improved orthodontic bracket which not only eliminates the need for eyelets but greatly facilitates the application of force applying means such as ligature wire, helical springs and others.

The various objects, features and advantages of this invention will appear more fully from the detailed description which follows accompanied by drawings showing, for the purpose of illustration, embodiments of this invention. The invention also resides in certain new and original features of construction and combination of elements hereinafter set forth and claimed.

Although the characteristic features of this invention which are believed to be novel will be particularly pointed out in the claims appended hereto, the invention itself, its objects and advantages, and the manner in which it may be carried out may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part of it in which:

Fig. 1 is a plan view of a bracket embodying the invention;

Fig. 2 is an elevational view of the bracket of Fig. 1;

Fig. 3 is a perspective view of the bracket shown in Figs. 1 and 2;

Fig. 4 is a perspective view of a bracket made from a single piece of sheet metal;

Fig. 5 is a perspective view of a bracket made from a solid central portion attached to a sheet metal portion; and

Figs. 6 to 15 are diagrammatic views illustrating applications of the invention in the correction of malposed teeth.

In the following description and in the claims various details will be identified by specific names for convenience. The names, however, are intended to be generic in their application. Corresponding reference characters refer to corresponding parts in the several figures of the drawing.

The drawings accompanying, and forming part of, this specification disclose certain specific details of construction for the purpose of explanation of broader aspects of the invention, but it is understood that structural details may be modified in various respects without departure from the principles of the invention and that the invention may be incorporated in other structural forms than shown. More particularly, the shape of the central bracket portion may be modified to suit individual requirements.

The bracket B shown in Figs. 1 to 3 comprises a central body portion 11 having a transverse channel 12 in its front adapted to receive an arch wire which accord-

ing to conventional practice may either be of substantially square cross section or may be composed of four individual wires to produce a substantially square shape in cross section. The body portion may be provided with overhanging shoulders 13 and 14 forming rearward channels 15 into which ligature wire may be placed in the use of the bracket, as will later be explained by reference to specific examples.

A pair of wings 16 extend from the central portion in the nature of a V at an angle α of the order of 30 to 60 degrees, preferably 45 degrees. Each wing has a flat attachment portion 17 adjacent the body substantially even with the base 23 of the body and the ends or tips 21 of the wings preferably extend at an upward slant with respect to the base, as indicated by the angle β in Fig. 2. The attachment portion 17 permits the bracket to be spot-welded to a tooth encircling band 18 indicated in dash-dot lines in Fig. 3. Suitable points for spotwelds are indicated by x marks 19 in Fig. 1.

The are of sheet metal thickness and have holes 20 through them produced by either drilling or punching. Ligature wire may be threaded through these holes in the use of the bracket. The wing tips 21 are further notched or recessed at their lateral edges in preferably dove tail fashion to provide hooks or projections 22 over which ligature wire may be looped without the necessity of threading the wire through small holes. The dove tail shape of the recesses permits a pulling force to be exerted either towards or away from the central body portion 11, as well as up or down.

The bracket of Fig. 3 is a one piece bracket and may be manufactured for example by starting with a piece of milled, drawn, or extended contoured stock corresponding to the contour of the body portion 11, flattening the ends and then blanking and trimming excess material to produce the desired shape of the wings.

The bracket may also be manufactured by superimposing a central block 111 of contoured stock upon a stamped sheet metal base 116 as shown in Fig. 5 and joining the two parts together by welding or brazing.

A one piece bracket may further be produced by stamping from sheet metal stock. Such a bracket is shown in Fig. 4. It comprises a central body portion 211 from which wings 216 extend. The general configuration of the bracket corresponds to that of the brackets shown in Figs. 3 and 5. A transverse channel 212 is produced by blanking, and overhanging shoulders 213 and 214 are produced by a similar operation, all the blanking being preferably done prior to the stamping operation which bends the central portion into U shape and bends the wings at the desired slope angle.

Figs. 6 to 15 illustrate specific applications of the bracket.

Fig. 6 shows a tooth T which is to be rotated in the direction of the arrow 25. The tooth T is fitted with a band 18 to which an eyelet 24 is welded. A bracket B is secured to the band 18. The arch wire is identified by A and carries a compressed helical spring 26 between ligature wires L_1 and L_2 . The ligature wire L_1 is fastened to the eyelet 24, is looped around the arch wire A and is acted upon by one end of the spring 26 which tends to expand. The second ligature wire L_2 extends from one wing of the bracket B and is looped around the arch wire A to be acted on by the other end of the spring 26. As a result, a torque is applied to the tooth T in a clockwise direction tending to turn the tooth to turn the bracket B towards the arch wire A.

Fig. 7 illustrates a procedure for depressing the tooth T. The tooth is fitted with a band 18 to which the bracket B is welded. Ligature wires L_1 and L_2 extend from the wings 16 of the bracket to the arch wire. In the illustrated example the ligature wires are looped over the dovetail shaped notches in the wings but may equally be threaded through the holes 20, the latter procedure requiring more time inasmuch as the wire must be threaded

through aperture S. The force exerted by the ligature wires L_1 and L_2 , which may progressively be tightened, depresses the tooth T.

Fig. 8 illustrates a procedure for elevating the tooth T. The bracket B is secured to the band 18 upside down with respect to the position in which it was shown in Fig. 7. The wings 16 of the bracket therefore extend downwardly and are tied to the arch wire A by wires L_1 , L_2 , L_3 and L_4 , of which L_1 and L_4 are threaded through the apertures 20 in the wings and L_2 and L_3 are looped over the dovetail notches.

Fig. 9 illustrates a procedure for moving a tooth T either mesially, i.e. to the front or center, or distally, towards the back. The arch wire A is provided with eyelets 27 and 28 from which ligature wires L_1 and L_2 extend to the left and the right wing 16 of the bracket B, respectively. As a result of the pulling force of the wires aided by the resiliency of the wings 16 which act like flat springs, the tooth T moves towards the eyelets. Assuming that Fig. 8 illustrates a mesial movement, a distal correction would be obtained if the eyelets 27 and 28 were placed on the left of the tooth instead of on the right. In either instance the wires may be threaded through the holes 20 in the wing tips or be looped over the dovetailed recesses.

Fig. 10 illustrates a procedure for stabilizing a tooth T to prevent it from drifting. Eyelets 29 and 30 are welded to the arch wire A, and ligature wires L_1 and L_2 extend from the eyelets to the wings of the bracket B where they may be threaded through the holes 20 in the wing tips or be looped over the dovetail notches.

The bracket B may also be used for lashing teeth together. Fig. 11 illustrates a row of 6 teeth. Beginning at the left, the first tooth is lashed to the second by a ligature wire L_1 extending from eyelet to eyelet. The second tooth is lashed to the third by a ligature wire L_2 extending from a hole of one bracket to a notch in the next bracket. The third tooth is lashed to the fourth tooth by a ligature wire L_3 extending from notch to notch. The last three teeth are lashed together by a ligature wire L_4 extending in figure eight fashion over the central body portions of the brackets which have rearwardly extending channels 15 (see Fig. 3).

Fig. 12 illustrates a buccal adjustment in which the tooth T is pulled towards the arch wire A by four ligature wires L_1 , L_2 , L_3 and L_4 .

A lingual adjustment may be made with a lingual appliance comprising an arch wire A' extending on the lingual side of the tooth T as shown in Fig. 13. The wings 16 of the bracket B are pulled toward the arch wire A' by ligature wires L_1 , L_2 , L_3 and L_4 . In this, as well as in the last example, the resiliency of the wings 16 is of advantage.

Fig. 14 illustrates the correction of the axial inclination of a tooth T by means of the bracket B on the band 18. Ligature wires L_1 and L_2 extending between the wings of the bracket and the arch wire A apply a corrective torque tending to right the inclined tooth.

Fig. 15 illustrates the use of the bracket for the prevention of rotation of a tooth moved either mesially or distally. The tooth T is under the action of a helical spring 31 urging the tooth in the direction of the arrow 32. Being acted upon off-center, the tooth T tends to rotate in the direction of the arrow 33. This rotation is prevented by tying the wing 16 remote with respect to the spring to the arch wire A by a ligature wire L_1 . The far end of the spring acts upon a ligature wire L_2 extending across the two teeth on the left lashed together by a wire L_3 .

It is readily apparent that brackets incorporating the principles of the invention save much time by eliminating not only the welding of eyelets to the bands, but also in applying ligature wires which in most instances can quickly be looped over the dovetailed notches and do not require threading through small apertures. The danger of clogging of eyelets by cement is likewise eliminated.

The resiliency of the wings is of considerable aid in applying corrective force on the malposed tooth.

As the examples indicate, the bracket lends itself to a great variety of individual correction movements and a far greater number of combinations of corrections.

In working with the improved bracket it is of great advantage to the practitioner that the points to which the ligature wire is applied are of uniform position. This was difficult to attain by the practice of individually welding eyelets to the band. The points of application of the ligature wire at the wings are offset with respect to the arch wire, thereby removing the previously existing difficulty of obstruction by the arch wire.

Once the band is fitted and adapted to the tooth it is not necessary to readapt it thereafter since no welding operation need be performed which would distort the shape of the band.

In the case of buccal adjustments no eyelets are needed since the bracket itself provides points of application for the ligature wire by its apertures 20 and hooks 22. The operator has a choice of using one or the other and has also option of using first one and, after partial adjustment, the other in order to utilize the respective leverages to best advantage.

Finally, the wings are more comfortable and less irritating to the patient's lips and cheek than the previously employed welded eyelets.

What is claimed is:

1. A multipurpose orthodontic bracket comprising, a pair of flat wings disposed at an angle with respect to each other in the nature of a V and a central body portion between the wings, the body portion being integral with the wings and having a transverse channel formed therein open to the front and adapted to receive an arch wire, said wings extending from the back of the body portion at an angle to the channel axis, the wing tips being perforated for threading a tie wire therethrough, the perforation due to the angular arrangement of the wings being out of register with the axis of the channel.

2. A multipurpose orthodontic bracket comprising, a pair of flat wings disposed at an angle with respect to each other in the nature of a V and a central body portion between the wings, the body portion being integral with the wings and having a transverse channel formed therein open to the front and adapted to receive an arch wire, said wings extending from the back of the body portion at an angle to the channel axis, the wings being notched at their edges for hooking engagement with a tie wire, there being at least one such point of engagement in each wing which due to the angular disposition of the wings is out of register with the axis of the channel.

3. A multipurpose orthodontic bracket comprising, a central body portion having a transverse channel in it adapted to receive an arch wire, and a pair of lateral wing portions extending from said body portion angularly with respect to said channel, said wing portions representing the arms of a V, the central body portion representing the apex of the V, the wing portions having a hole therethrough through which a tie wire may be threaded, the location of the hole being out of register with an arch wire passing through said channel.

4. A multipurpose orthodontic bracket comprising, a central body portion having a transverse channel in it adapted to receive an arch wire, and a pair of lateral wing portions extending from said body portion angularly with respect to said channel, said wing portions representing the arms of a V, the central body portion representing the apex of the V, each wing having at least one hook shaped recess in its edge for hooking engagement with a tie wire.

5. A multipurpose orthodontic bracket comprising a central body portion having a transverse channel in it adapted to receive an arch wire, and a pair of lateral wing portions extending from said body portion angularly with respect to said channel, said wing portions being of sheet

metal thickness and representing the arms of a V, the central body portion representing the apex of the V, each wing having at least one substantially dove tail shaped recess in its edge for hooking engagement with a tie wire, the recess being out of register with an arch wire passing through said channel.

6. A multipurpose orthodontic bracket comprising, a pair of flat wings disposed at an angle with respect to each other in the nature of a V, and a central body portion between said wings, the body portion being integral with the wings and having a transverse channel therein open to the front and adapted to receive an arch wire, said wings being flush with the back of the body portion, the wing tips being perforated for threading a tie wire therethrough, at least one of the edges of each wing having a dove tail shaped notch in it between the said body portion and the wing tip for hooking attachment to the wing of a tie wire.

7. A multipurpose orthodontic bracket made from sheet metal stock comprising a central body portion bent substantially in the shape of an inverted U and having a transverse channel in its front adapted to receive an arch wire, and a pair of lateral wing portions extending from said body portion angularly with respect to the channel axis, said wing portions representing the arms of a V, the central body portion representing the body of the V, the plane of the U being substantially normal to the plane of the V, each wing having at least one substantially dove tail shaped notch in its edge for hooking attachment to the wings of a tie wire.

8. A multipurpose orthodontic bracket made from sheet metal stock and comprising a central body portion bent substantially in the shape of an inverted U and having a transverse channel in its front adapted to receive an arch wire, and a pair of lateral wing portions extending from said body portion angularly with respect to the channel axis, said wing portions representing the arms of a V, the central body portion representing the body of the V, the plane of the U being substantially normal to the plane of the V, each wing tip having a hole therethrough and each wing having at least one substantially dove tail shaped notch in its edge between said body portion and said hole for hooking engagement of the bracket by a tie wire.

9. A multipurpose orthodontic bracket comprising, a sheet metal base substantially in the shape of a V, the ends of the V constituting wings, and a central body block secured to said base at the apex of the V, said central body block having a transverse channel in its surface remote from said base, adapted to receive an arch wire, the tip of each wing having a hole therethrough for attaching a tie wire, the hole being out of register with a tie wire passing through said slot.

10. A multipurpose orthodontic bracket comprising, a sheet metal base substantially in the shape of a V, the ends of the V constituting wings, and a central body block secured to said base at the apex of the V, said central body block having a transverse channel in its surface remote from said base adapted to receive an arch wire, at least one of the edges of the wings having a dove tail shaped notch in it between said body block and the wing tip for hooking attachment to the wing of a tie wire.

11. A multipurpose orthodontic bracket comprising, a sheet metal base substantially in the shape of a V, the ends of the V constituting wings, and a central body block secured to said base at the apex of the V, said central body block having a transverse channel in its surface remote from said base, adapted to receive an arch wire, the tip of each wing having a hole therethrough, and at least one of the edges of the wings having a dove tailed shaped notch in it between said body block and said hole for hooking attachment to the wing of a tie wire.

References Cited in the file of this patent

UNITED STATES PATENTS

2,854,747 Lewis Oct. 7, 1958

UNITED STATES PATENT OFFICE
CERTIFICATION OF CORRECTION

Patent No. 2,958,945

November 8, 1960

David Waldman

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 20, after "The" insert -- wings --.

Signed and sealed this 25th day of April 1961.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents