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# (54) Blade assembly.

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**WO-A-83/03072**
**FR-A- 2 457 155**
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## Description

This invention relates to a blade assembly. More specifically the invention relates to a dynamic shaving system and particularly a shaving system in which the span of the blade changes with forces exerted during shaving.

It has long been recognized that shaving a flexible complex surface like the face with an immovable system such as the conventional razor produces nicks, cuts and lack of uniformity of shaving due to the varying face profile of the shaver. Closeness of the shave is dependent upon, among other factors, the angle of contact between face and blade as well as the flow of skin immediately preceding contact with the blade. One of the factors controlling this flow of skin is the distance between the blade edge and the surface of the blade assembly which contacts the face immediately prior to the blade edge. This distance is measured by the tangential line between the face engaging points of the blade and the leading surface, and is known as span. In a two blade system, each blade has a separate span. The leading or bottom blade has a span determined by the tangent line drawn between its edge and the leading edge of the guard bar which is part of the razor frame and designed to, at least in part, direct skin flow to the blade. The second blade has a span measured by a tangent line drawn between the first and second blade. In the case of the two blade system the first or bottom blade determines the skin flow to the second blade.

Several attempts have been made in the past to control the shaving properties of the blade assembly by providing the blade assembly with flexible or movable components in various combinations. US-A-4,516,320 discloses a blade assembly with flexible blades and spacer which move downward in response to shaving forces and a guard bar which flexes inward and upward.

US-A-4,443,939 describes a blade assembly in which a cap and guard bar as well as blades and spacer are flexible and tend to conform to the facial curves of shaving pressures applied.

US-A-4,069,580 and US-A-4,409,735 disclose a flexible razor produced by utilizing a flexible guard bar and flexible cap as well as flexible blades and spacers. A series of ten patents issued to Chester F Jacobson of which US-A-4,587,729 is the latest, describe a blade assembly with blades which are individually biased and move linearly reciprocally in response to shaving forces. In several of these patents, the same type of movement is disclosed for a guard bar.

In EP-A-45879 there is disclosed a razor blade assembly having the features of the precharacterising clause of Claim 1.

According to one aspect of the present invention there is provided a blade assembly comprising a blade supporting means for supporting first and second blades, and a guard bar, said blade supporting means comprising a first blade support adapted to support the first blade and a second blade support adapted to support the second blade characterised in that the blade supporting means further includes a frame with a substantially flat bottom portion, a front portion and a back portion both portions extending upward from said bottom portion, a hollow central portion defined at either side by inner faces of said front and back portion, and said front portion includes the guard bar which is formed on the top of said front portion, said first blade support is mounted on said bottom portion and extends upward to support said first blade, said blade support including pivoting means including a finger portion to which said first blade is securely attached which allows pivotal movement of the first blade along a predetermined path in a direction towards the back portion and reversely to change the span of said first blade in response to pressures exerted during shaving, and said second blade support is mounted on said bottom portion and extends upward to support said second blade, second blade support including pivoting means including a finger portion to which said second blade is securely attached which allows pivotal movement of the second blade along a predetermined path in a direction towards the back portion and reversely to change the span of the second blade independently of the change in span of the first blade.

Preferably the fingers are adapted to bias the blades to a predetermined position, preferably a position at which the span is a minimum.

Preferably the shaving edges are substantially parallel to one another when not subjected to shaving forces.

Desirably the blades are mounted on the blade supports by staking.

In one embodiment a first and second stop depend from the sides of said frame to limit pivotal movement of said first and second blades. The first and second stops may limit the minimum span of the blades.

Advantageously, the first and second blade supporting means includes a leaf spring projecting upwardly from the bottom portion.

Advantageously also, the span of the first and second blade can vary between substantially 0.040 in. (0.1 cm) and substantially 0.090 in. (0.229 cm) in response to shaving pressure.

In addition, at least one further stop may extend from said bottom of said frame to surround a major portion of the length of each of said leaf springs.

The or each further stop may comprise an

abutment provided on a shoulder which mounts the leaf springs to the bottom portion of the frame. The or each further stop may also limit the maximum span of the blades.

The finger portions are preferably L-shaped.

Furthermore, the finger portions preferably have reduced width portions forming the leaf springs which connect the blade supporting means to the frame.

Reference is now made to the accompanying drawings, in which:-

Figure 1 is a side view of a blade assembly according to the invention partially in cross-section;

Figure 2 is a top plan view of the blade assembly shown in Figure 1; and

Figure 3 is a side view partially in cross-section of the blade assembly shown in Figures 1 and 2.

In the drawings a razor blade assembly 10 is mounted upon a handle 19. The blade assembly 10 has razor blade supporting means in the form of a frame comprising a bottom portion 14, a front portion 15 and a back portion 12 with both the front and back portions 15 and 12 upstanding from the bottom portion 14. The frame further includes an upper portion 13 which extends from the front portion 15 to the back portion 12. First and second stops 16 and 16' extend outward from opposite side portions 17.

The blade supporting means also includes first and second blade supports in the form of fingers 21 and 21'; razor blades 24 and 24' are mounted on the fingers 21 and 21' resepectively by means of stakes 25 and 25'.

The fingers 21 and 21' are connected to the bottom portion 14 by means of leaf springs 22 and 22'. The movement of the leaf springs 22 and 22' is restricted by matching shoulders 23 and 23' which extend upward from the bottom portion 14. The leaf spring 22 is allowed to flex to "open" the space between guard bar 18 and blade 24; this is shown in Figures 1 and 2. The leaf spring 22' is allowed to flex to "open" the space between the blades 24 and 24'; this is shown in Figure 3.

Conventionally, razor spans for each blade tend to vary between 0.040 in. (0.1 cm) and 0.065 in. (0.165 cm) depending upon the desired predetermined setting. According to a preferred embodiment of this invention each individual span can vary between substantially 0.040 in. (0.1 cm) and substantially 0.090 in. (0.229 cm) in response to the pressure exerted during shaving. The pressure acts sequentially against the first blade 24 and then the second blade 24' to increase the distance of the span by exerted forces against the biasing action of the springs 22 and 22'.

As can be seen by reference particularly to Figures 2 and 3, each of the blades 24 and 24' are held in place by the stakes 25 and 25' which extend to the underlying fingers 21 and 21'. The blades 24 and 24' are staked separately.

It should be noted that a razor cap is not shown in Figure 2, but that with both blades 24 and 24' closed, the plan view of the razor shown in Figure 2 is similar to others currently available. As shown in Figure 2, the guard bar 18 extends toward the blades 24 and 24' and is connected to the bottom portion 14 by means of ribs 26.

While only a single embodiment is depicted in the drawings, variations will readily suggest themselves to those skilled in the art. For example, a conventional spacer can be used as stop 16' for maintaining the minimum span of second blade 24'. Also, the shoulders 23 and 23' can be extended to form abutments for fingers 21 and 21' to control the span. In particular, the abutments may limit the maximum span of the blades 24 and 24'.

It should be noted that in response to shaving pressure the blades move only toward the rear to expand the span and return to their original non-pressured position in the forward direction after shaving forces have been removed. This invention, therefore provides a simple mechanical means of altering the skin flow of each blade of a multi-blade system in response to pressure during shaving generated by the user.

The razor shown in the drawings is a disposable razor in which the razor blade assembly 10 is integral with the handle. However, the present invention is equally applicable to blade assemblies in the form of cartridges which can be removed from the handle.

## Claims

1. A blade assembly (10) comprising a blade supporting means for supporting first and second blades (24,24'), and a guard bar (15), said blade supporting means comprising a first blade support adapted to support the first blade (24) and a second blade support adapted to support the second blade (24'), characterised in that the blade supporting means further includes a frame with a substantially flat bottom portion (14), a front portion (15) and a back portion (12) both portions extending upward from said bottom portion (14), a hollow central portion defined at either side by inner faces of said front and back portion (15,12), and said front portion (15) includes the guard bar which is formed on the top of said front portion, said first blade support is mounted on said bottom portion (14) and extends upward to support said first blade (24), said blade support including pivoting means including a

finger portion (21) to which said first blade (24) is securely attached which allows pivotal movement of the first blade (24) along a predetermined path in a direction towards the back portion (12) and reversely to change the span of said first blade in response to pressures exerted during shaving, and said second blade support is mounted on said bottom portion (14) and extends upward to support said second blade (24'), second blade support including pivoting means including a finger portion (21') to which said second blade (24') is securely attached which allows pivotal movement of the second blade (24') along a predetermined path in a direction towards the back portion (12) and reversely to change the span of the second blade (24') independently of the change in span of the first blade (24).

2. A blade assembly (10) according to Claim 1 characterised in that the shaving edges of the blades (24,24') are substantially parallel to each other when not subjected to shaving forces.

3. A blade assembly (10) according to Claim 1 or Claim 2 characterised in that the blades (24,24') are mounted on said blade supports by staking (25,25').

4. A blade assembly (10) according to any preceding claim characterised in that a first and second stop (16,16') depend inward from the sides of said frame to limit pivotal movement of said first and second blades (24,24').

5. A blade assembly (10) according to any preceding claim, characterised in that the first and second blade supports each include a leaf spring (22,22') projecting from the bottom portion (14).

6. A blade assembly (10) according to Claim 5 characterised in that stops (23,23') extend from said bottom portion (14) of said frame to surround a major portion of the length of each of said leaf springs (22,22').

7. A blade assembly (10) according to any preceding claim, characterised in that the span of said first blade (24) and the span of said second blade (24') can vary between substantially 0.040 in. (0.10 cm) and substantially 0.090 in. (0.229 cm) in response to shaving presssure.

8. A blade assembly (10) according to any preceding claim, characterised in that the finger portions (21,21') have reduced width portions forming leaf springs (22,22') which connect the blade supporting means to the frame.

9. A blade assembly (10) according to any preceding claim characterised in that the finger portions (21,21') are L-shaped.

## Revendications

1. Une cartouche ou un ensemble de lames (10) comprenant des moyens de support de lames pour le support d'une première et d'une seconde lames (24, 24') et une barrette de garde (15), lesdits moyens de support comprenant un premier support de lame adapté à supporter la première lame (24) et un second support de lame adapté à supporter la seconde lame (24'), caractérisée en ce que les moyens de support de lames comprennent en outre un cadre avec une partie de fond sensiblement plate (14), une partie frontale (15) et une partie arrière (12), les deux parties s'étendant vers le haut à partir de ladite partie de fond (14), une partie centrale creuse définie de chaque côté par des parois intérieures desdites parties frontale et arrière (15 et 12) et ladite partie frontale (15) comprend la barrette de garde qui est formée sur le sommet de ladite partie frontale, ledit premier support de lame est monté sur ladite partie de fond (14) et s'étend vers le haut pour supporter ladite première lame (24), ledit support de lame comprenant des moyens de pivotement incluant un doigt (21) auquel ladite première lame (24) est solidement fixée, et qui permet un mouvement de pivotement de ladite première lame (24) selon un parcours prédéterminé dans la direction de la partie arrière (12) et, inversement, pour modifier la portée de ladite première lame en fonction des pressions exercées en cours de rasage, et ledit support de seconde lame est monté sur ladite partie de fond (14) et s'étend vers le haut pour supporter ladite seconde lame (24'), le support de seconde lame comprenant des moyens de pivotement incluant un doigt (21') auquel ladite seconde lame (24') est solidement fixée, et qui permet un mouvement de pivotement de la seconde lame (24') selon un parcours prédéterminé dans la direction de la partie arrière (12) et, inversement, pour modifier la portée de la seconde lame (24') indépendamment de la modification de portée de la première lame (24).

2. Une cartouche de lames (10) selon la revendication 1, caractérisée en ce que les bords de rasage ou fils des lames (24, 24') sont sensi-

blement parallèles entre eux lorsqu'aucune force de rasage ne s'exerce sur eux.

3. Une cartouche de lames (10) selon la revendication 1 ou la revendication 2, caractérisée en ce que les lames (24, 24') sont montées sur lesdits supports de lame par des ergots (25, 25').

4. Une cartouche de lames (10) selon l'une quelconque des revendications précédentes, caractérisée en ce qu'une première et une seconde butées (16, 16') partent vers l'intérieur des côtés dudit cadre pour limiter le mouvement de pivotement desdites première et seconde lames (24, 24').

5. Une cartouche de lames (10) selon l'une quelconque des revendications précédentes, caractérisée en ce que les supports de première et seconde lames comprennent chacun un ressort (22, 22') à lame faisant saillie à partir de la partie de fond (14).

6. Une cartouche de lames (10) selon la revendication 5 caractérisée en ce que les butées (23, 23') s'étendent à partir de ladite partie de fond (14) dudit cadre pour entourer une partie principale de la longueur de chacun desdits ressorts (22, 22') à lame.

7. Une cartouche de lames (10) selon l'une quelconque des revendications précédentes, caractérisée en ce que la portée de ladite première lame (24) et la portée de ladite seconde lame (24') peuvent varier entre sensiblement 0,01 cm et sensiblement 0,229 cm en fonction des pressions exercées lors du rasage.

8. Une cartouche de lames (10) selon l'une quelconque des revendications précédentes, caractérisée en ce que les doigts (21, 21') ont des parties de largeur réduite formant des ressorts (22, 22') à lame qui relient les moyens de support de lames au cadre.

9. Une cartouche de lames (10) selon l'une quelconque des revendications précédentes, caractérisée en ce que les doigts (21, 21') ont la forme de L.

**Patentansprüche**

1. Rasierklingenanordnung (10) mit einer Klingentrageinheit zum Haltern erster und zweiter Klingen (24, 24') und einer Schulzleiste (15), wobei die Klingentrageinheit einen ersten Klingenträger zum Haltern der ersten Klinge (24) und einen zweiten Klingenträger zum Haltern der zweiten Klinge (24') aufweist, dadurch gekennzeichnet, daß die Klingentrageinheit ferner einen Rahmen mit einem im wesentlichen flachen Bodenteil (14), einem Vorderteil (15) und einem Rückteil (12) aufweist, von denen die beiden letzteren Teile vom Bodenteil (14) aufwärts abgehen, wobei ein hohler zentraler Teil an jeder Seite durch Innenflächen von Vorderteil und Rückteil (15, 12) festgelegt ist und der Vorderteil (15) eine an seiner Oberseite geformte Schutzleiste aufweist, der erste Klingenträger am Bodenteil (14) angebracht ist und sich zur Halterung der ersten Klinge (24) aufwärts erstreckt, der Klingenträger ein Schwenkmittel mit einem Fingerteil (21) aufweist, an dem die erste Klinge (24) sicher befestigt ist und das eine Schwenkbewegung der ersten Klinge (24) längs einer vorbestimmten Bahn in einer Richtung zum Rückteil (12) und in Gegenrichtung zuläßt, um die Stützweite oder den Vorstand der ersten Klinge in Abhängigkeit von den beim Rasieren ausgeübten Drücken zu ändern, und der zweite Klingenträger am Bodenteil (14) angebracht ist und sich zur Halterung der zweiten Klinge (24') aufwärts erstreckt, der zweite Klingenträger ein Schwenkmittel mit einem Fingerteil (21') aufweist, an dem die zweite Klinge (24') sicher befestigt ist und das eine Schwenkbewegung der zweiten Klinge (24') längs einer vorbestimmten Bahn in einer Richtung zum Rückteil (12) und in Gegenrichtung zuläßt, um die Stützweite oder den Vorstand der zweiten Klinge (24') unabhängig von der Änderung der Stützweite bzw. des Vorstands der ersten Klinge (24) zu ändern.

2. Rasierklingenanordnung (10) nach Anspruch 1, dadurch gekennzeichnet, daß die Rasier- bzw. Schneidkanten der Klingen (24, 24') im wesentlichen parallel zueinander liegen, wenn sie den Rasierkräften nicht unterworfen sind.

3. Rasierklingenanordnung (10) nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Klingen (24, 24') an den Klingenträgern mittels Verstemmzapfen (25, 25') angebracht sind.

4. Rasierklingenanordnung (10) nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß von den Seiten des Rahmens ein erster und ein zweiter Anschlag (16, 16') zur Begrenzung der Schwenkbewegung von erster und zweiter Klinge (24, 24') einwärts abstehen.

5. Rasierklingenanordnung (10) nach einem der vorangehenden Ansprüche, dadurch gekenn-

zeichnet, daß erster und zweiter Klingenträger jeweils eine vom Bodenteil (14) (aufwärts) vorspringende Blattfeder (22, 22') aufweisen.

6. Rasierklingenanordnung (10) nach Anspruch 5 dadurch gekennzeichnet, daß Anschläge (23, 23') vom Bodenteil (14) des Rahmens abstehen und einen Hauptabschnitt der Länge jeder Blattfeder (22, 22') umschließen.

7. Rasierklingenanordnung (10) nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Stützweite oder der Vorstand der ersten Klinge (24) und die Stützweite oder der Vorstand der zweiten Klinge (24') in Abhängigkeit vom Rasierdruck zwischen praktisch 0,040 Zoll (0,1 cm) und praktisch 0,090 Zoll (0,229 cm) veränderbar sind.

8. Rasierklingenanordnung (10) nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Fingerteile (21, 21') Abschnitte verringerter Breite aufweisen, die Blattfedern (22, 22') zur Verbindung der Klingentrageinheit mit dem Rahmen bilden.

9. Rasierklingenanordnung (10) nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Fingerteile (21, 21') L-förmig sind.

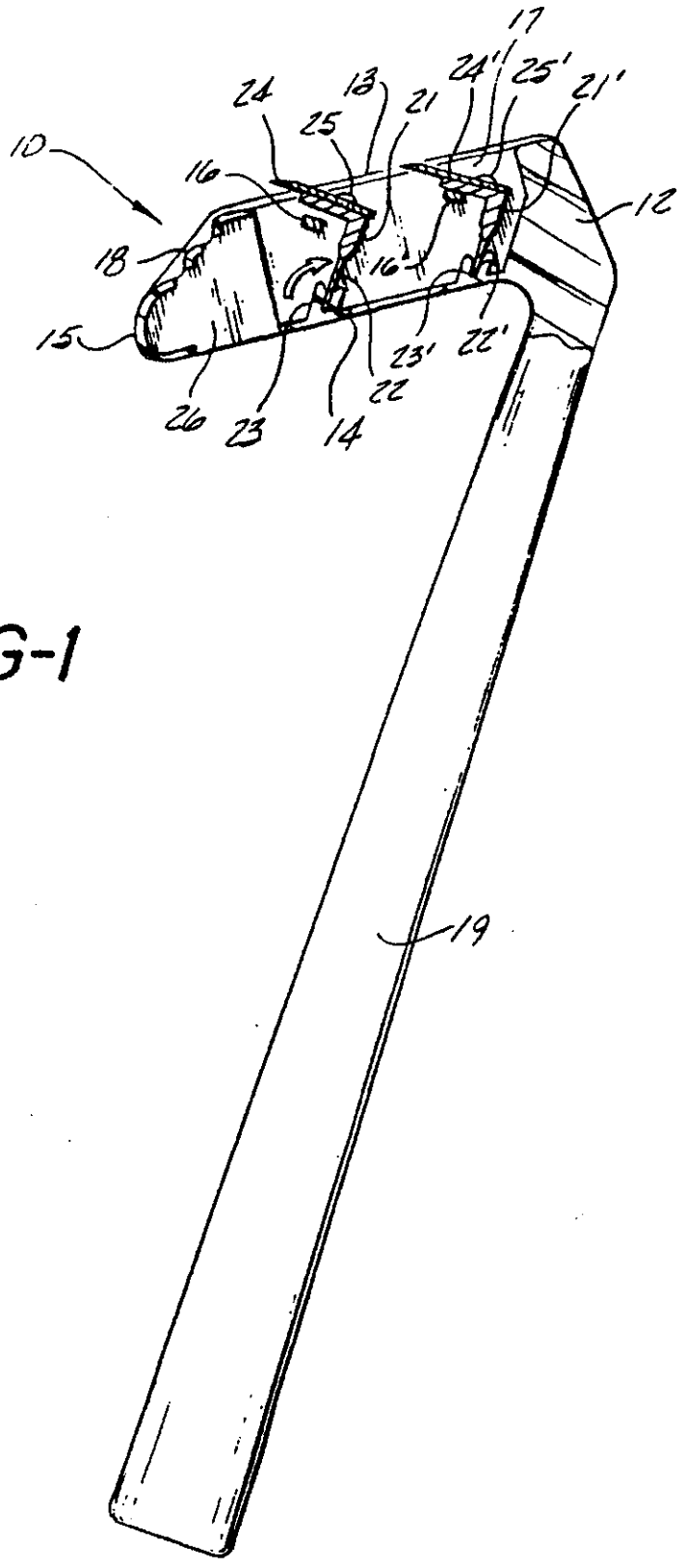
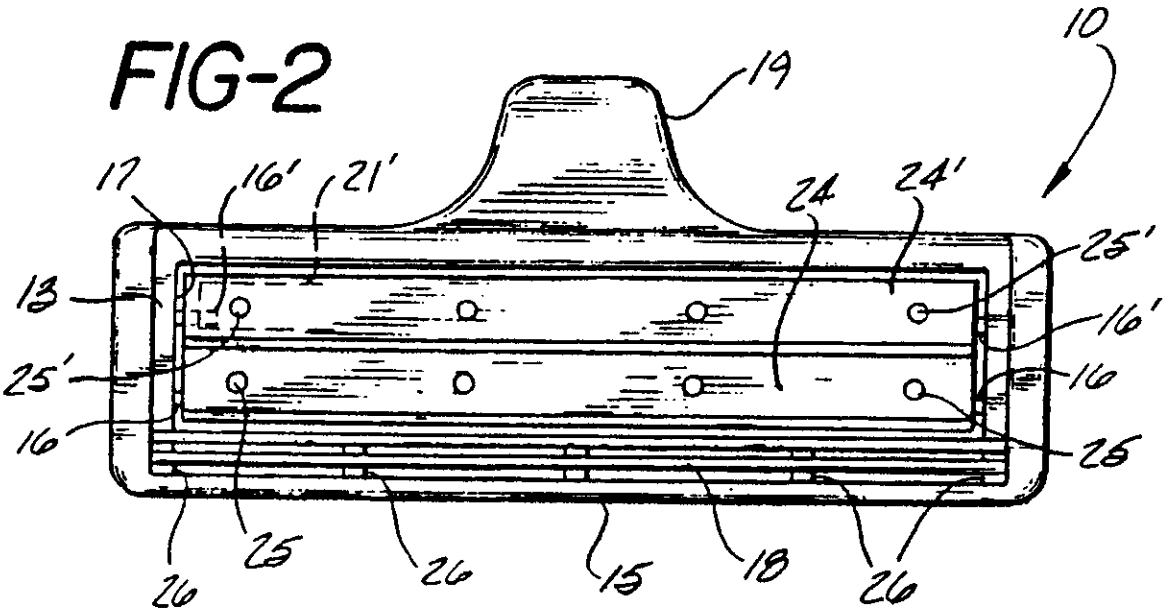



FIG-1

FIG-2


10
19
17
16'
21'
24
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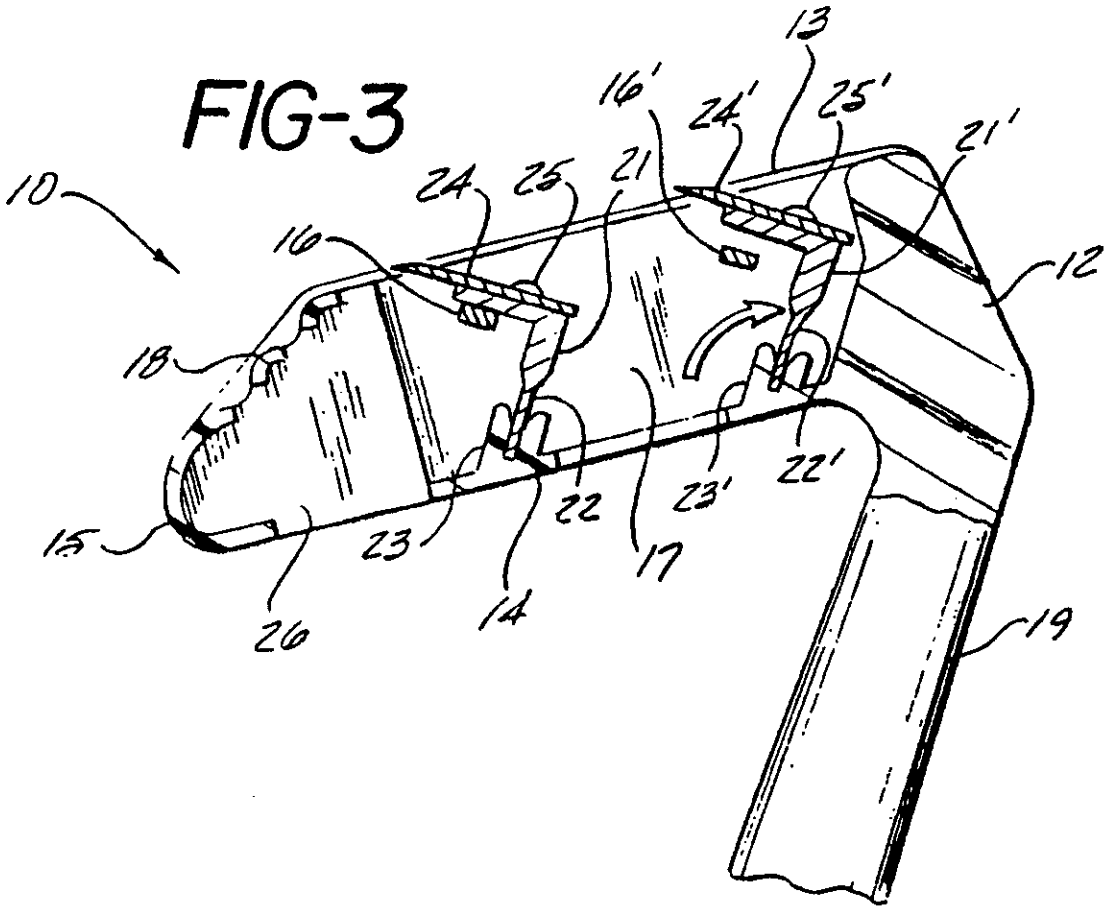
25'
13
16'
25'
16
16
26
26
25
26
15
18
26

FIG-3


13
16'
24'
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21
16
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18
22'
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