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(54) Title: CLIP PUSHING MECHANISM FOR SURGICAL CLIP APPLICATOR

(57) Abstract: A clip pushing mechanism used in a surgical clip applicator for loading and pushing clips that are arranged in series with a clip pitch defined between each two adjacent said clips is disclosed to include a clip holder bar including an accommodation channel for accommodating the clip in a series, a clip feeding ladder member including a clip pushing portion and a plurality of driven portions spaced along the length thereof with a pitch defined between each two adjacent driven portions, and a clip pusher including a body, a front pusher for pushing the leading clip and a rear pusher for pushing each driven portion of the clip feeding ladder member.



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## CLIP PUSHING MECHANISM FOR SURGICAL CLIP APPLICATOR

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

5           The present invention relates to medical instruments and more particularly, to a clip pushing mechanism for surgical clip applicator.

**2. Description of the Related Art**

          Conventional clip pushing mechanisms for surgical clip applicator are commonly designed to push clips from the top to the end, thus, the clips can be  
10   squeezed to shorten the pitch between each two adjacent clips. Further, these conventional clip pushing mechanisms use two different driving members, having the drawbacks of complicated structure and inaccurately pushing the clips forward, and the leading clip can be inaccurately positioned for clipping.

          Therefore, conventional clip pushing mechanisms for surgical clip applicator  
15   are still not satisfactory in function and have room for improvement.

**SUMMARY OF THE INVENTION**

          The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a clip pushing  
20   mechanism for surgical clip applicator, which has a simple structure, facilitates operation, and can accurately push clips to a forward step position.

          To achieve this and other objects of the present invention, the present invention provides a clip pushing mechanism for surgical clip applicator for loading and pushing clips that are arranged in series with a clip pitch defined between each two  
25   adjacent clips. The clip pushing mechanism comprises a clip holder bar comprising an

accommodation channel for accommodating the clip in a series, a clip feeding ladder member comprising a clip pushing portion and a plurality of driven portions spaced along the length thereof with a pitch defined between each two adjacent driven portions, and a clip pusher comprising a body, a front pusher for pushing the leading  
5 clip and a rear pusher for pushing each driven portion of the clip feeding ladder member.

Thus, when the front pusher of the clip pusher the leading one of the series of clips, the driven portions of the clip feeding ladder member are pushed by the rear pusher of the clip pusher so that the clip pushing portion of the clip feeding ladder  
10 member accurately pushes the clips to a forward step position, achieving the objects of the present invention.

Preferably, the clip pitch is equal to the pitch between each two adjacent driven portions.

Preferably, the clip pushing mechanism further comprises a lower tube half  
15 that defines therein a sliding groove for accommodating the body of the clip pusher in an axially slidable manner.

Preferably, the clip holder bar comprises a one-way stopper for stopping against one driven portion of the clip feeding ladder member for allowing the clip feeding ladder member to be moved forward and prohibiting the clip feeding ladder  
20 member from backward displacement.

Preferably, the clip holder bar comprises a baffle stoppable between at least one driven portion of the clip feeding ladder member and the rear pusher of the clip pusher.

Other advantages and features of the present invention will be fully  
25 understood by reference to the following specification in conjunction with the

accompanying drawings, in which like reference signs denote like components of structure.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

5           FIG. 1 is an oblique top elevational view of a surgical clip applicator embodying the present invention.

          FIG. 2 is an exploded view of a clip pushing mechanism for surgical clip applicator in accordance with the present invention.

          FIG. 3 is an exploded view of a part of the clip pushing mechanism for  
10 surgical clip applicator in accordance with the present invention.

          FIG. 4 is an exploded view of another part of the clip pushing mechanism for surgical clip applicator in accordance with the present invention.

          FIG. 5 is an exploded view of still another part of the clip pushing mechanism for surgical clip applicator in accordance with the present invention.

15           FIG. 6 is an exploded view of still another part of the clip pushing mechanism for surgical clip applicator in accordance with the present invention.

          FIG. 7 is an exploded view of still another part of the clip pushing mechanism for surgical clip applicator in accordance with the present invention.

          FIG. 8 is an assembly view of a part of the clip pushing mechanism for  
20 surgical clip applicator in accordance with the present invention.

### **DETAILED DESCRIPTION OF THE INVENTION**

Referring to the annexed drawings in detail, a clip pushing mechanism for surgical clip applicator in accordance with the present invention is adapted for loading

and pushing clips 1 wherein each adjacent two clips 1 define therebetween a clip pitch P1.

The clip pushing mechanism comprises:

a clip holder bar 10 comprising accommodation channel 12 for  
5 accommodating the clips 1 in series, a one-way stopper 13 located at a middle part thereof for abutment against one driven portion 23 of a clip feeding ladder member 20 for allowing the clip feeding ladder member 20 to be moved forward and prohibiting the clip feeding ladder member 20 from backward displacement, and a baffle 14;

a clip feeding ladder member 20 comprising a clip pushing portion 21, a  
10 plurality of driven portions 23 spaced along the length thereof and stoppable by the one-way stopper 13 of the clip holder bar 10 for allowing the clip feeding ladder member 20 to be moved forward and prohibiting the clip feeding ladder member 20 from backward displacement, and a pitch P2 defined between each two adjacent driven portions 23 and equal to the clip pitch P1;

15 a clip pusher 30 comprising a body 31, a front pusher 33 for pushing the leading one of the loaded series of clips 1, and a rear pusher 32 for pushing each driven portion 23 of the clip feeding ladder member 20;

a lower tube half 40 comprising a sliding groove 43 for accommodating the  
body 31 of the clip pusher 30 in an axially slidable manner;

20 an upper tube half 50 mated with the lower tube half 40;

a pair of jaws 60 connected to the upper tube half 50;

a jaw bundle 70 for controlling the jaws 60 to open and close;

a clip presser 80 mounted to the upper tube half 50 and mating with the jaws 60 and the jaw bundle 70 to create a clip clamping set 6; and

an outer tube 90 attached onto the lower tube half 40 and the upper tube half 50.

5 Further, the baffle 14 of the clip holder bar 10 is stopped between one driven portion 23 of the clip feeding ladder member 20 and the rear pusher 32 of the clip pusher 30. The baffle 14 can stop the rear pusher 32 for at least one pitch P2 so that when the clip pusher 30 is moved through two pitches P2, it simply pushes the clip feeding ladder member 20 to move through one pitch P2.

10 With the above structure, the baffle 14 of the clip holder bar 10 enables the rear pusher 32 to move the clip feeding ladder member 20 through one pitch P2 when the clip pusher 30 moves through two clip pitches P1.

Thus, when the front pusher 33 of the clip pusher 30 pushes the leading clip, the driven portions 23 of the clip feeding ladder member 20 are pushed by the rear  
15 pusher 32 of the clip pusher 30, causing the clip pushing portion 21 of the clip feeding ladder member 20 accurately pushes the clips to a forward step position, achieving the objects of the present invention.

The clip pushing mechanism can be configured comprised of a part of the aforesaid component parts to achieve the same effects. In an alternate form of the  
20 present invention, a clip pushing mechanism is provided for loading and pushing clips 1 that are arranged in series with a clip pitch P1 defined between each two adjacent clips 1. The clip pushing mechanism comprises:

a clip holder bar 10 comprising accommodation channel 12 for accommodating the clips 1 in series;

a clip feeding ladder member 20 comprising a clip pushing portion 21, a plurality of driven portions 23 spaced along the length thereof, and a pitch P2 defined  
5 between each two adjacent driven portions 23 and equal to the clip pitch P1; and

a clip pusher 30 comprising a body 31, a front pusher 33 for pushing the leading one of the loaded series of clips 1, and a rear pusher 32 for pushing each driven portion 23 of the clip feeding ladder member 20.

The various embodiments of the present invention have one or multiple of  
10 the following technical features:

The clip pitch P1 is equal to the pitch P2 between each two adjacent driven portions 23.

The clip pushing mechanism further comprises a lower tube half 40 comprising a sliding groove 43 for accommodating the body 31 of the clip pusher 30 in  
15 an axially slidable manner.

The clip holder bar 10 comprises a one-way stopper 13 for abutment against one driven portion 23 of the clip feeding ladder member 20 for allowing the clip feeding ladder member 20 to be moved forward and prohibiting the clip feeding ladder member 20 from backward displacement.

20 The clip holder bar 10 further comprises a baffle 14 stoppable between at least one driven portion 23 of the clip feeding ladder member 20 and the rear pusher 32 of the clip pusher 30.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

## WHAT IS CLAIMED IS:

1. A clip pushing mechanism used in a surgical clip applicator for loading and pushing clips that are arranged in series with a clip pitch defined between each two adjacent said clips, the clip pushing mechanism comprising:

a clip holder bar comprising an accommodation channel for accommodating said clip in a series;

a clip feeding ladder member comprising a clip pushing portion and a plurality of driven portions spaced along the length thereof with a pitch defined between each two adjacent said driven portions; and

a clip pusher comprising a body, a front pusher for pushing a leading said clip, and a rear pusher for pushing each said driven portion of said clip feeding ladder member.

2. The clip pushing mechanism as claimed in claim 1, wherein said clip feeding ladder member comprises a plurality of openings; each said driven portion is disposed between two said openings; said clip pusher is abutted against one said driven portion of said clip feeding ladder member.

3. The clip pushing mechanism as claimed in claim 2, wherein said clip pitch is equal to the pitch between each two adjacent said driven portions.

4. The clip pushing mechanism as claimed in claim 1, wherein said clip pitch is equal to the pitch between each two adjacent said driven portions.

25

5. The clip pushing mechanism as claimed in claim 1, 2, 3 or 4, further comprising a lower tube half defining therein a sliding groove for accommodating said body of said clip pusher in an axially slidable manner.

5           6. The clip pushing mechanism as claimed in claim 5, wherein said clip holder bar comprises a one-way stopper for stopping against one said driven portion of said clip feeding ladder member for allowing said clip feeding ladder member to be moved forward and prohibiting said clip feeding ladder member from backward displacement.

10

7. The clip pushing mechanism as claimed in claim 1, 2, 3 or 4, wherein said clip holder bar comprises a one-way stopper for stopping against one said driven portion of said clip feeding ladder member for allowing said clip feeding ladder member to be moved forward and prohibiting said clip feeding ladder member from  
15 backward displacement.

20

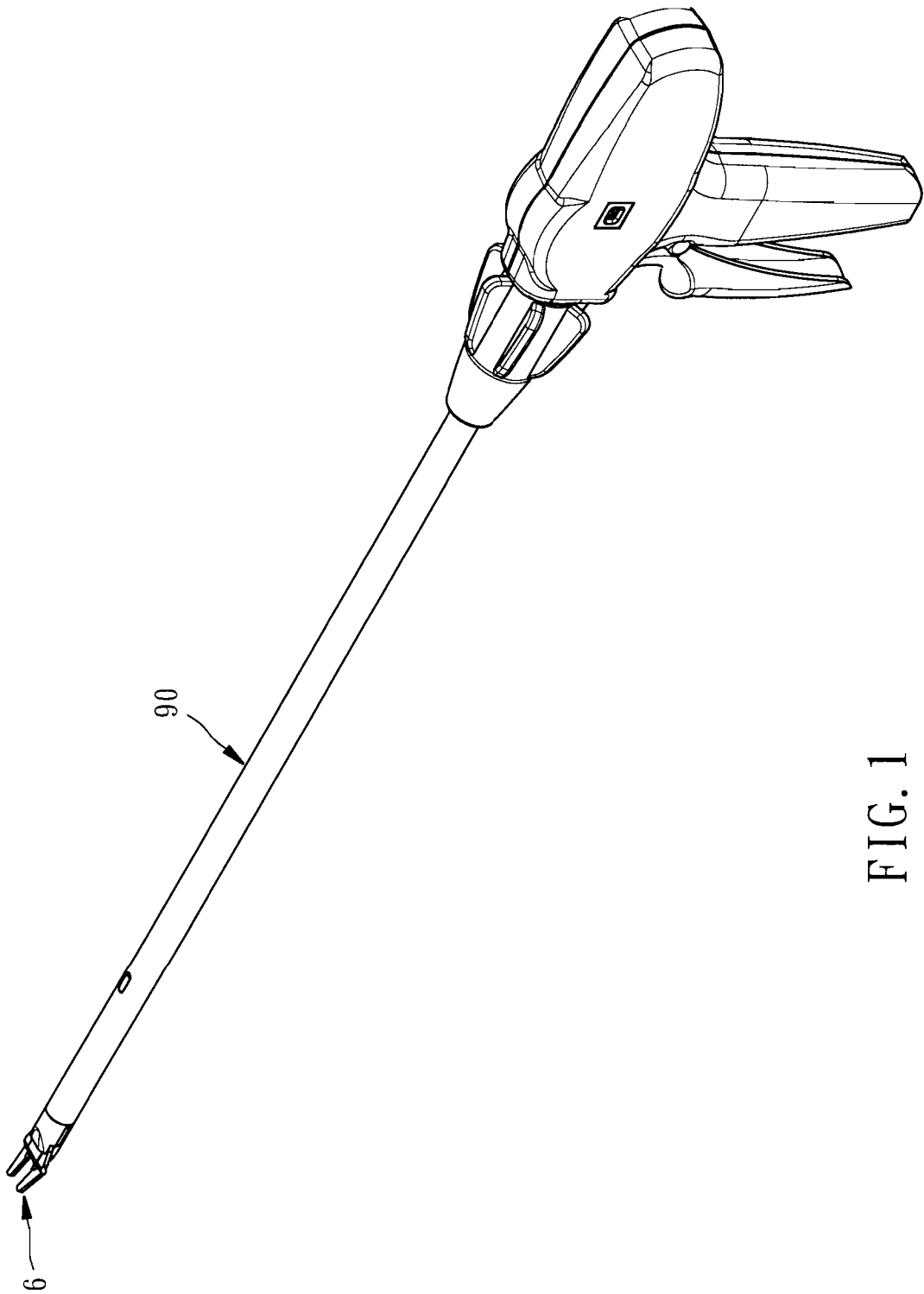
8. The clip pushing mechanism as claimed in claim 7, wherein said clip holder bar comprises a baffle stoppable between at least one said driven portion of said clip feeding ladder member and said rear pusher of said clip pusher.

9. The clip pushing mechanism as claimed in claim 5, wherein said clip holder bar comprises a baffle stoppable between at least one said driven portion of said clip feeding ladder member and said rear pusher of said clip pusher.

25

10. The clip pushing mechanism as claimed in claim 1, 2, 3 or 4, wherein

said clip holder bar comprises a baffle stoppable between at least one said driven portion of said clip feeding ladder member and said rear pusher of said clip pusher.



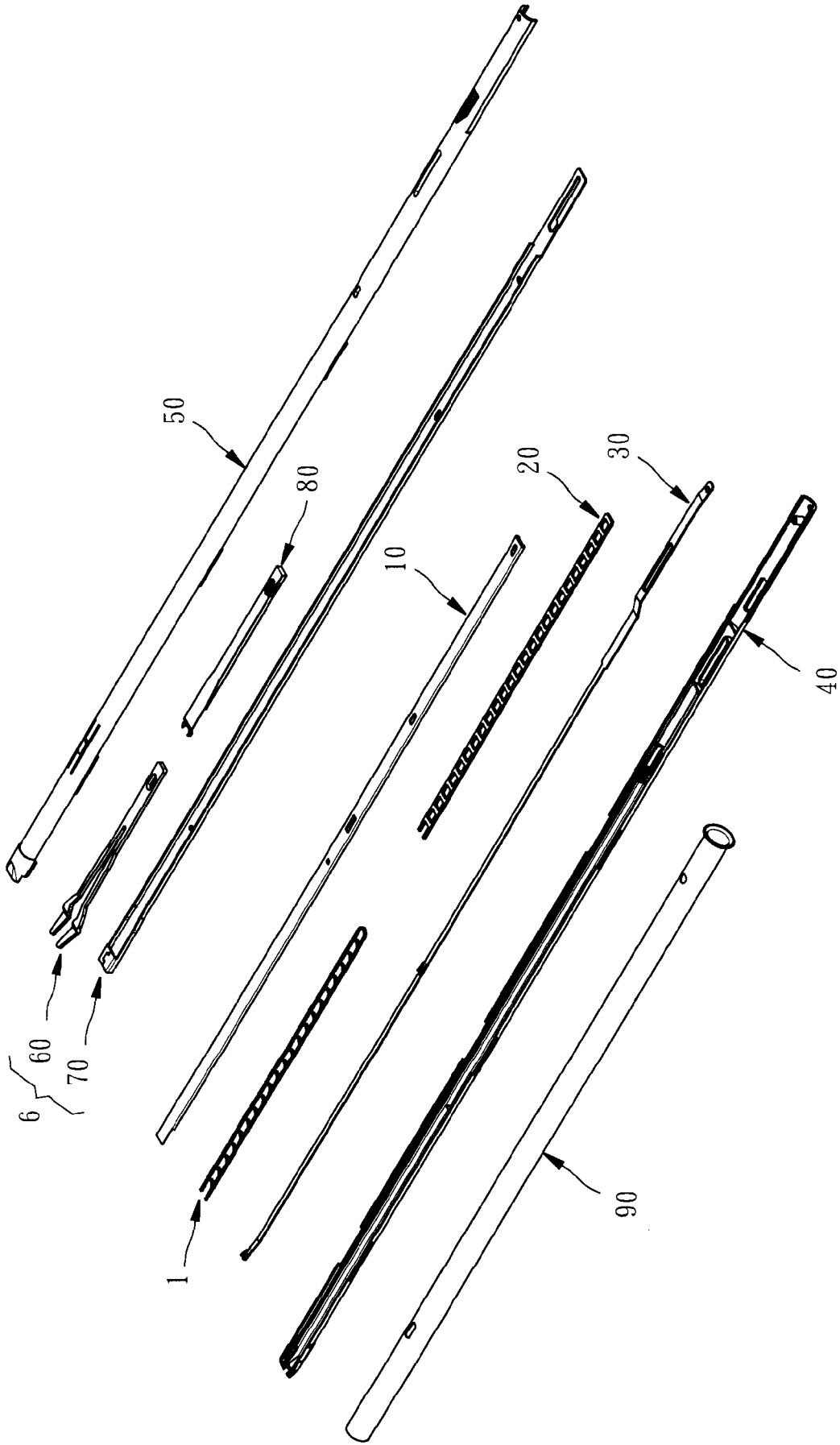


FIG. 2

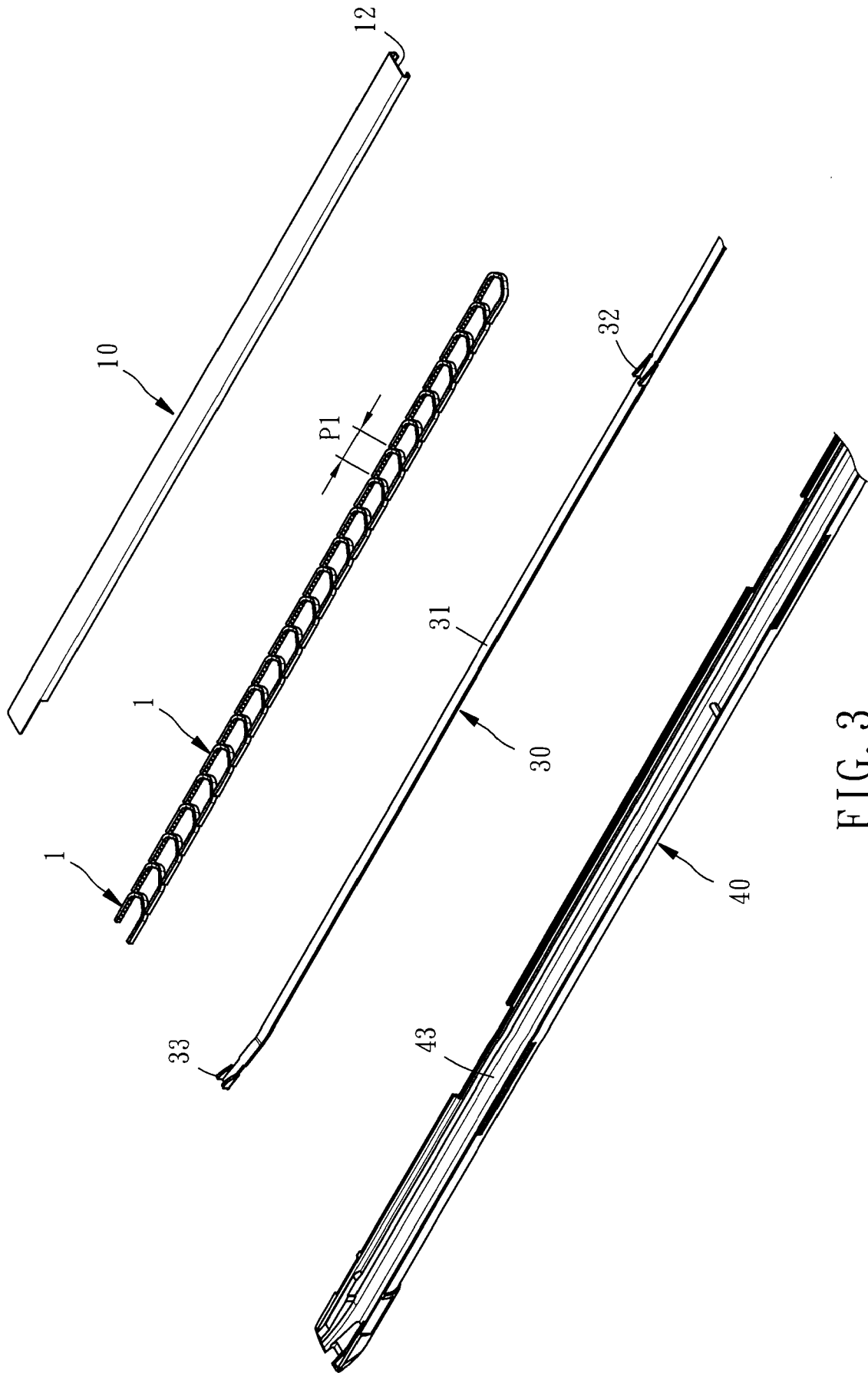


FIG. 3

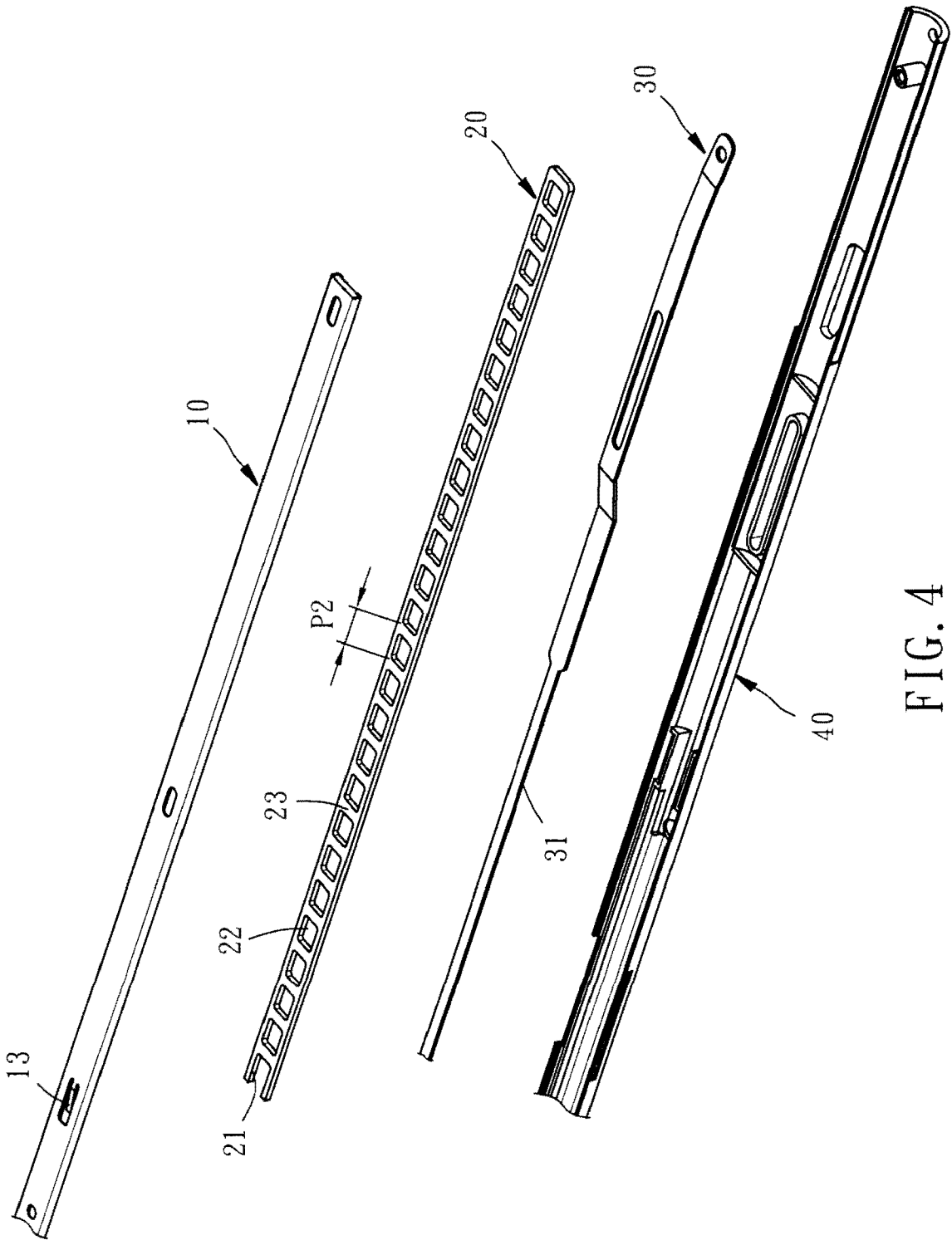


FIG. 4

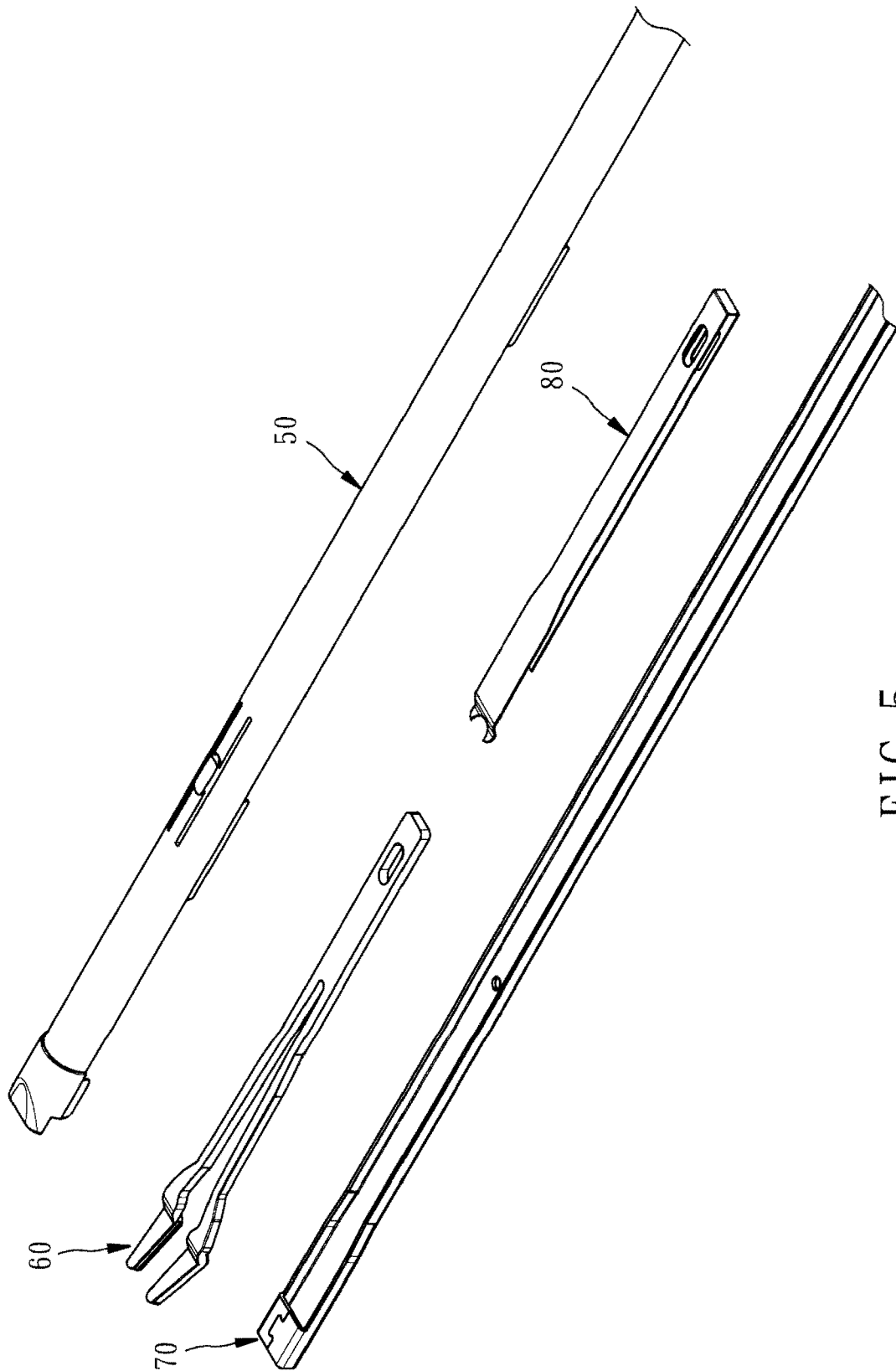


FIG. 5

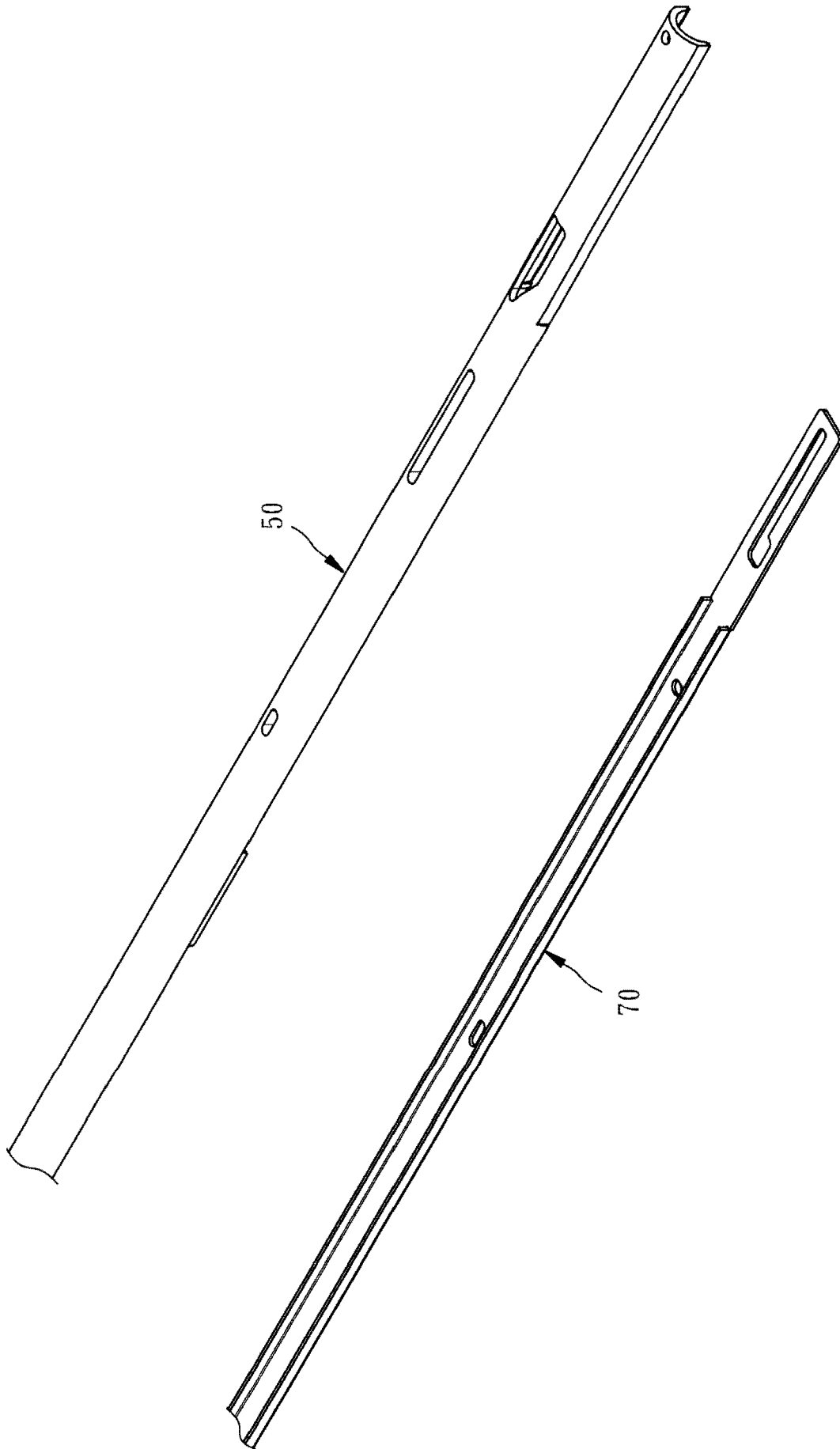


FIG. 6

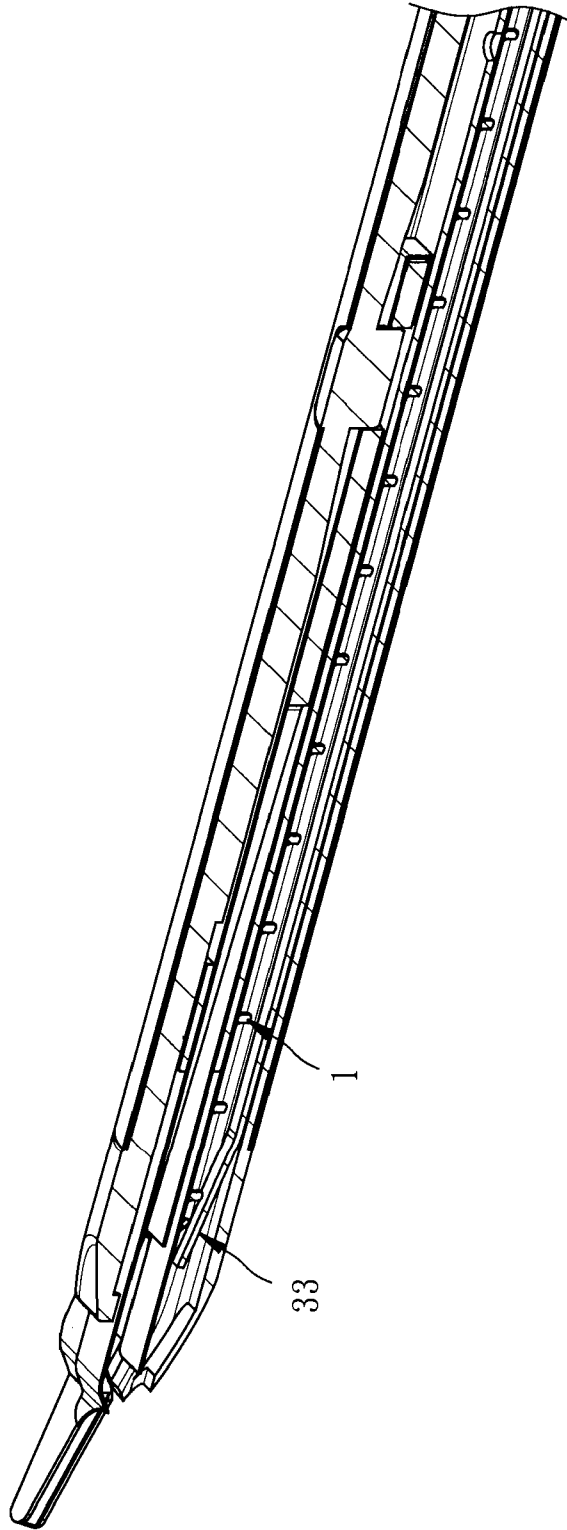


FIG. 7

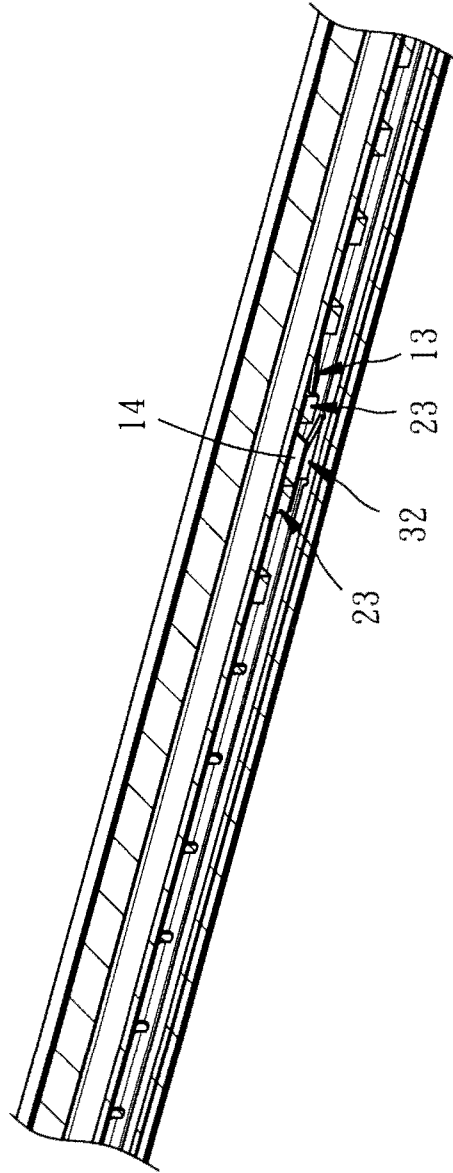


FIG. 8