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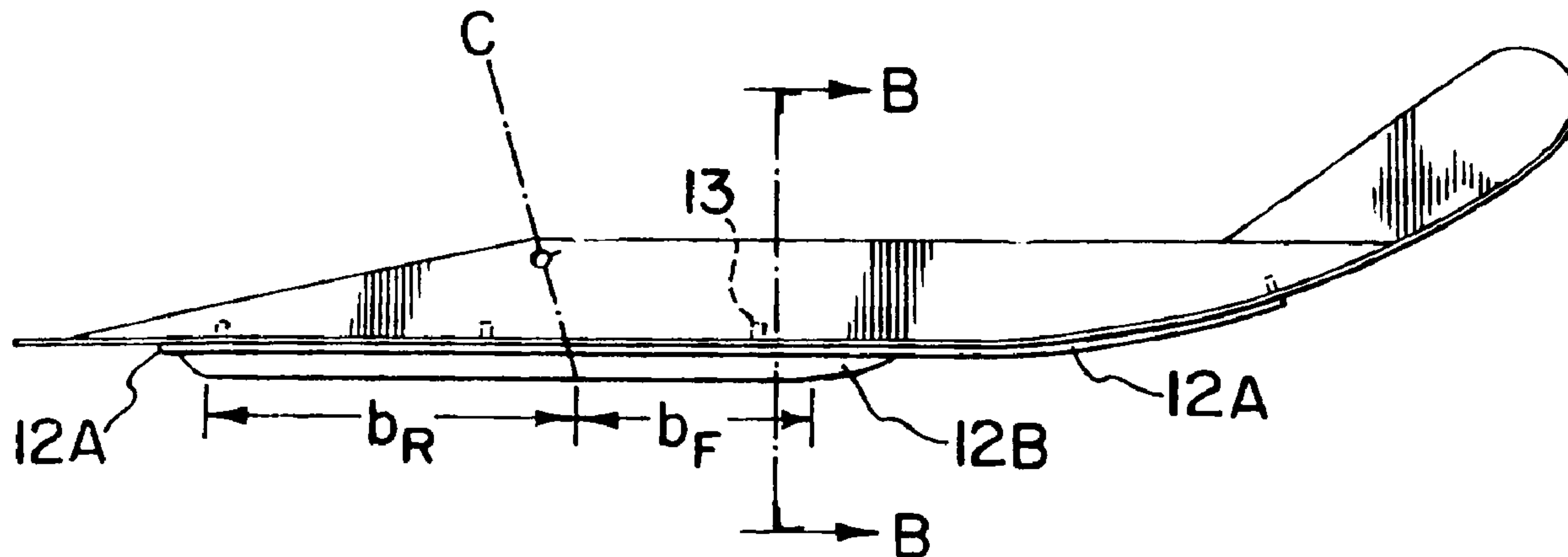
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(54) Title: WEAR ROD FOR SNOWMOBILE SKI AND SIMILAR VEHICLES



(57) Abrégé/Abstract:

A wear rod for steering skis for snowmobiles and similar vehicles. The wear rod in cross section is comprised of a horizontally orientated component forming a base and a vertically oriented component forming a snow-engaging wear element. The base extends in a lateral direction by a greater extent than the wear element. The base fits against the lower surface of the ski with the wear element projecting downwardly. The base is preferably of sufficient length to protect the ski from excessive wear. The wear element is preferably of sufficient length, width and height to provide the desired steering ability. The position of the wear element can be varied to achieve optimum steering stability and behaviour characteristics. This wear rod provides the designer with a much greater range of adjustment of steering behaviour.

## ABSTRACT

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## WEAR RODS FOR SKIS OF SNOWMOBILES AND SIMILAR VEHICLES

## Field Of The Invention

5           The invention is directed to improvements in wear rod design to better control the steering behaviour of snowmobiles and similar vehicles.

## Background Art

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Prior art provides very little design range to change steering effort or control. Traditional wear rod design consists of a round rod performing two functions - turning and wear protection of the ski base.

15           The steering bias in this system is uncontrollable. The length of wear rod in front of the turning centre of the ski is greater than that which is behind. This allows self energizing behaviour or wander.

20           The only way a traditional wear rod can increase its turning ability is to go longer to the rear or larger diameter. The lengthening far from the turning centre makes extreme additions to turning effort because of the leverage. If a larger rod is used then steering effort again increases as does self energizing problems.

25           One attempt marketed today uses a separate flat carrier with an added round conventional rod in a shortened form. This has the obvious problem of inadequate turning ability. It is also difficult in this system to provide different options of round rod length with existing bolt  
30 patterns.

All round rods have problems of penetration into hard snow with wear because the contact width increases. It

then requires more weight to penetrate properly.  
Snowmobiles are very sensitive to this problem.

#### Summary Of The Invention

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This invention comprises improved wear rods for snowmobiles. They consist of cross sectionally rectangular components to separate the protective and steering functions of the wear rods to enhance their abilities. The horizontal component of the rod allows the protection of the ski base without creating any steering ability and bias problems. It allows the adaptation to any bolt pattern for mounting to the ski. It also provides improved strength to resist lateral bending with much better mechanical advantage and that strength is much less affected by wear. The horizontal component also allows the mounting bolts and vertical component to be offset for ease of access to mount bolts and better structural support from the ski for the vertical component.

20 The vertical rectangular component of the rod allows the contact width of the rod to remain the same with wear. This provides consistent penetration without having to adjust ski bearing pressure. The height and length selections for the vertical component can be chosen based on rider preferences and demand. The position of the vertical component front and rear can be controlled to achieve desired bias relationship.

30 Traditional skis have steering engagement surfaces incorporated into their bases. These longitudinal keels are un-adjustable and create bias problems for designers. Because the mount bolt or load application point for the ski must be to the rear to the ski centre, this keel

creates self energizing steering behaviour. A wear rod of the present invention needs no such keel.

Greater steering control by the wear rod and not the keel allows for a much wider range of adaptability with  
5 simple wear rod change.

Wear resistant carbide inserts are of critical importance to control wear rates on hard surfaces with this design.

According to one aspect of the present invention,  
10 there is provided a wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski and a generally vertical wear element projecting downwardly from the horizontal base, wherein said base extends in a lateral  
15 direction by a greater extent than said wear element.

According to another aspect of the present invention, there is provided a wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski, a generally  
20 vertical wear element projecting downwardly from the horizontal base, and at least one bolt upstanding from said base forming an attachment for mounting said wear rod said ski, wherein said base and said bolt are offset laterally from a vertical longitudinal plane of said base on opposite  
25 sides of said plane.

According to yet another aspect of the present invention, there is provided a steering ski for a snowmobile or similar vehicle having a ski element and a wear rod attached to a lower surface of said ski element,  
30 said wear rod comprising a generally flat horizontal base for engaging said lower surface of said ski element and a generally vertical wear element projecting downwardly from

the horizontal base, wherein said base extends in a lateral direction of said ski by a greater extent than said wear element.

According to yet another aspect of the invention,  
5 there is provided a wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski and a generally vertical wear element projecting downwardly from the horizontal base, wherein said base has dimensions of about  
10  $1/8 \times 1 \times 28$  inches and said wear element has dimensions of about  $1/8 \times 3/4 \times 22$  inches.

#### Description Of The Drawing

15 Fig. 1 shows a traditional ski and wear rod configuration;

Fig. 2 is a cross section at A-A of Fig. 1;

Fig. 3 is a side elevation of a ski having a wear rod according to one form of the present invention;

20 Figs. 4A and 4B are cross sections of right and left skis of the type shown in Fig. 3 taken along line at B-B;

Fig. 5 shows a traditional wear rod cross section provided with a carbide wear insert;

25 Fig. 6A is a cross section of a wear rod according to one form of the present invention;

Fig. 6B is a cross-section similar to that of Fig. 6A showing an alternative wear rod according to the present invention;

30 Fig. 7A and Fig. 7B show cross sections of wear rods according to the present invention in offset forms making left and right wear rods; and

Fig. 8 is a cross-section of a traditional ski and wear rod showing collapse above the wear rod.

#### Description Of The Preferred Embodiment

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Figure 1 shows a traditional ski 10 and wear rod 12. Dotted line C represents the turning centre of the ski with a common caster angle. Point b is the point of contact from which bias is measured.  $b_f$  is the front length of the wear rod and  $b_r$  is the rear length of the wear rod. Note that  $b_f$  can change depending on snow conditions and ski flotation depth but it invariable changes for the worse. In order for a ski to behave properly  $b_f$  should be shorter than  $b_r$  which they are not. This creates wander and dangerous self energizing behaviour.

Figure 2 is a cross section of the ski and wear rod of Fig. 1 taken along line A-A. Note the ski mount bolt 13 location in Figure 1 which must be to the rear of centre to have the ski perform properly by floating up in the snow. This requirement is a major problem with Figure 2 type cross sections.

Figure 3 is a ski having a wear rod design according to the present invention. Note the flat horizontal component 12A extends to the front to the ski without imparting any turning ability or bias problems. It serves as a protective surface. Note also the favourable bias relationship of  $b_f$  to  $b_r$ .

Figure 4 is a view of the system in Figure 3 in cross section along the line B-B. This Figure shows the cross section of a pair of skis in their normal orientation as seen from the rear. The wear rod mount bolts 13 are readily accessible along the inner edge of the ski and the

vertical wear rod component 12B is well supported by the vertical structure 15 on the top side of the ski. This is an important feature to prevent collapse of the ski base upwardly when hard impact forces are encountered.

5 Figure 5 shows a conventional wear rod.

Figures 6A shows one form of a wear rod according to the present invention in cross section with top mount bolt 13, horizontal rectangular component 12A and vertical rectangular component 12B. In this embodiment, the vertical component is thin and generally rectangular. In an alternative form shown in Fig. 6B, the vertical component 12B is generally triangular as shown.

Figures 7A and 7B are cross sections of an opposing pair of another form of the invention where the mount bolts 13 and vertical components 12B are offset to allow better bolt access and better support of the vertical component.

Figure 8 shows a conventional cross section of a ski 10 and wear rod 12 showing collapse of the ski keel 18 over the wear rod due to impact with hard objects such as rock. This drastically reduces the wear rod's function.

The cross sectional dimensions of the components of the wear rod of the invention are preferably: horizontal 1/8 x 1 x 28 inches and vertical 1/4 x 3/4 x 22 inches with 2 inches of rear bias.

## Claims

1. A wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski and a generally vertical wear element projecting downwardly from the horizontal base, wherein said base extends in a lateral direction by a greater extent than said wear element.
2. A wear rod according to claim 1 wherein said base has an area large enough to protect said ski in use from collapse around said wear element upon impact of said wear element with stationary objects.
3. A wear rod according to claim 1 wherein said wear element has a generally rectangular cross-section having a height and width suitable in use to impart stable steering characteristics to said ski.
4. A wear rod according to claim 1 wherein said base extends in a longitudinal direction of said ski by a greater length than said wear element.
5. A wear rod according to claim 1 further comprising an attachment for mounting said wear rod to said ski.
6. A wear rod according to claim 5 wherein said attachment comprises at least one bolt upstanding from said base.
7. A wear rod according to claim 1 having a wear resistant insert at a lower end of the wear element.

8. A wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski, a generally vertical wear element projecting downwardly from the horizontal base, and at  
5 least one bolt upstanding from said base forming an attachment for mounting said wear rod said ski, wherein said base and said bolt are offset laterally from a vertical longitudinal plane of said base on opposite sides of said plane.

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9. A steering ski for a snowmobile or similar vehicle having a ski element and a wear rod attached to a lower surface of said ski element, said wear rod comprising a generally flat horizontal base for engaging said lower  
15 surface of said ski element and a generally vertical wear element projecting downwardly from the horizontal base, wherein said base extends in a lateral direction of said ski by a greater extent than said wear element.

20 10. A wear rod for skis of snowmobiles and similar vehicles, comprising a generally flat horizontal base for engaging an underside of a ski and a generally vertical wear element projecting downwardly from the horizontal base, wherein said base has dimensions of about  $1/8 \times 1 \times 28$  inches and  
25 said wear element has dimensions of about  $1/8 \times 3/4 \times 22$  inches.

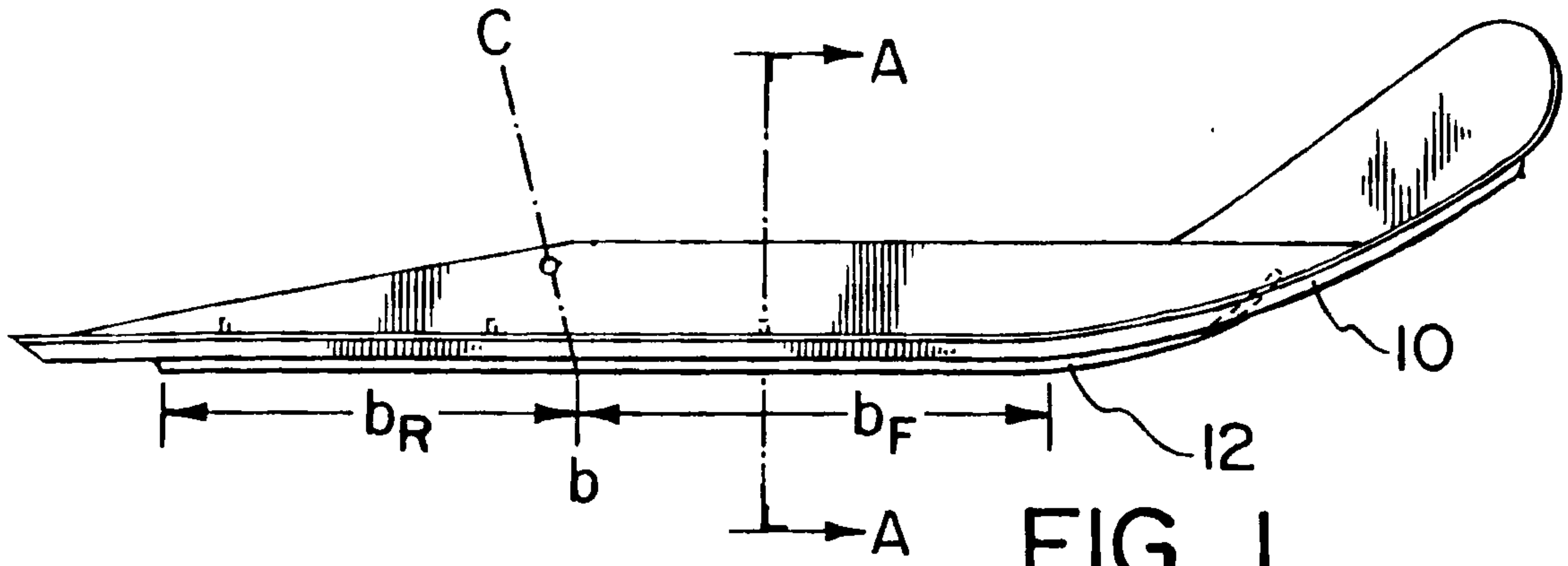


FIG. 1

(PRIOR ART)

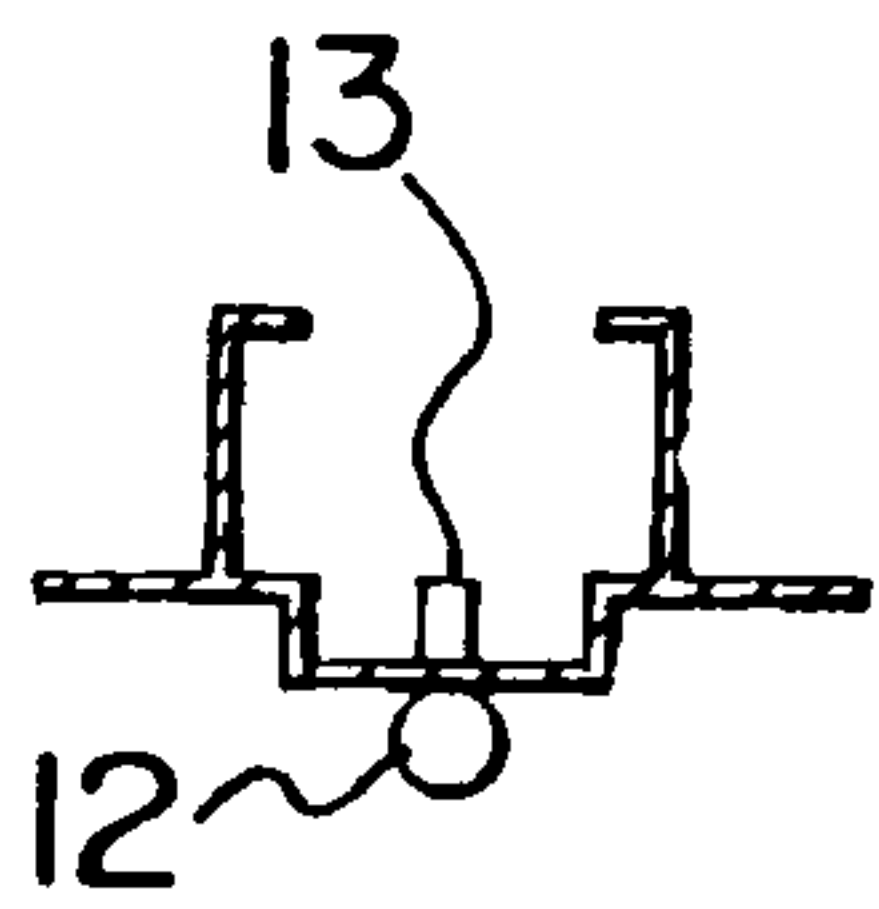


FIG. 2 (PRIOR ART)

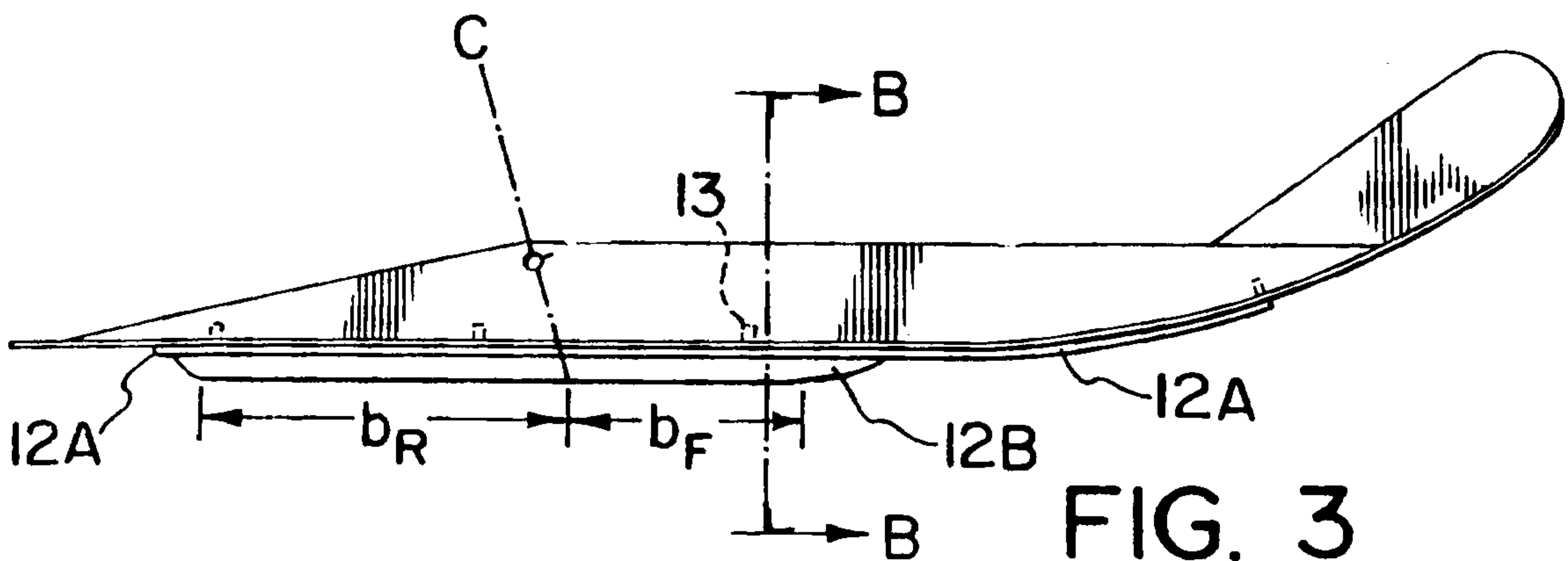


FIG. 3

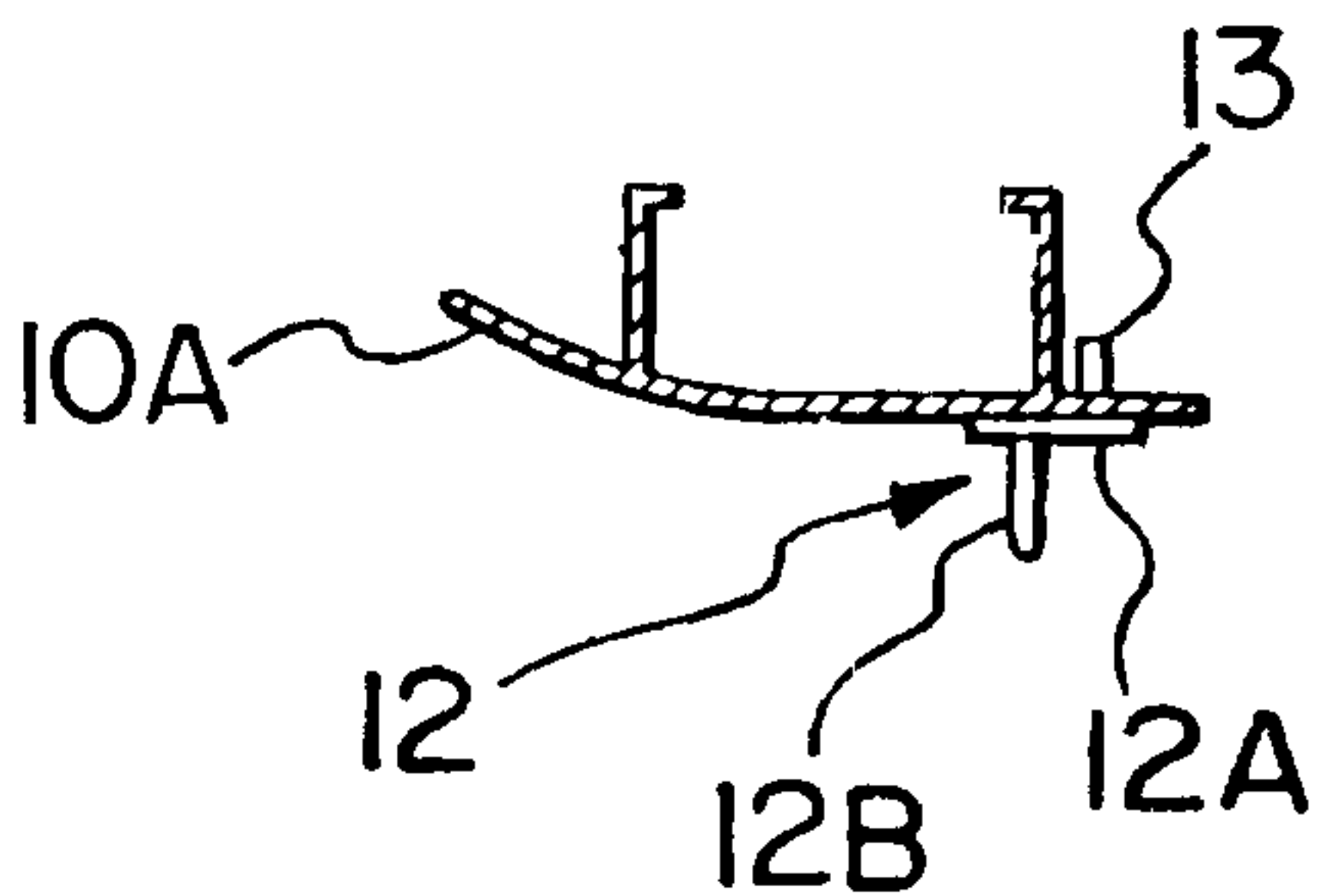


FIG. 4A

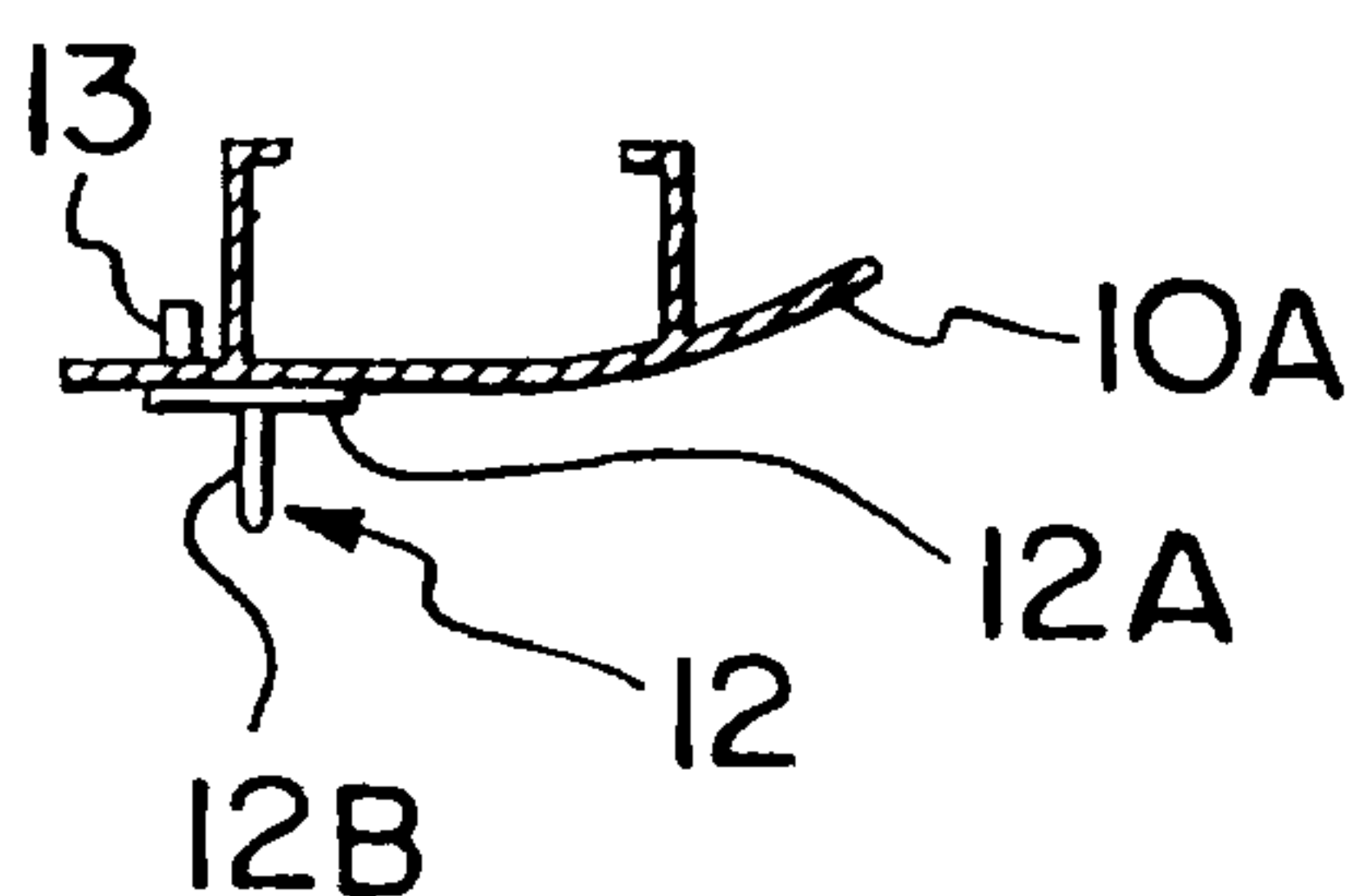
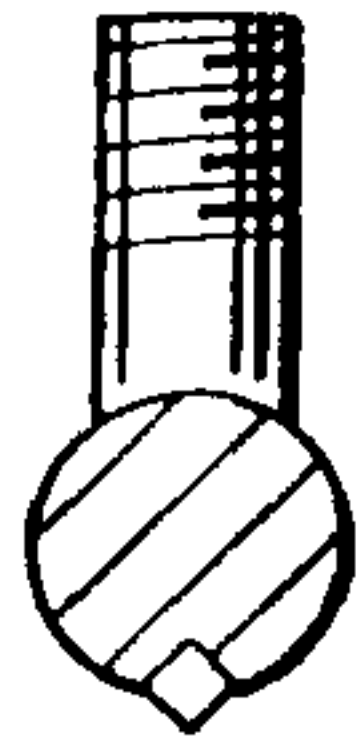
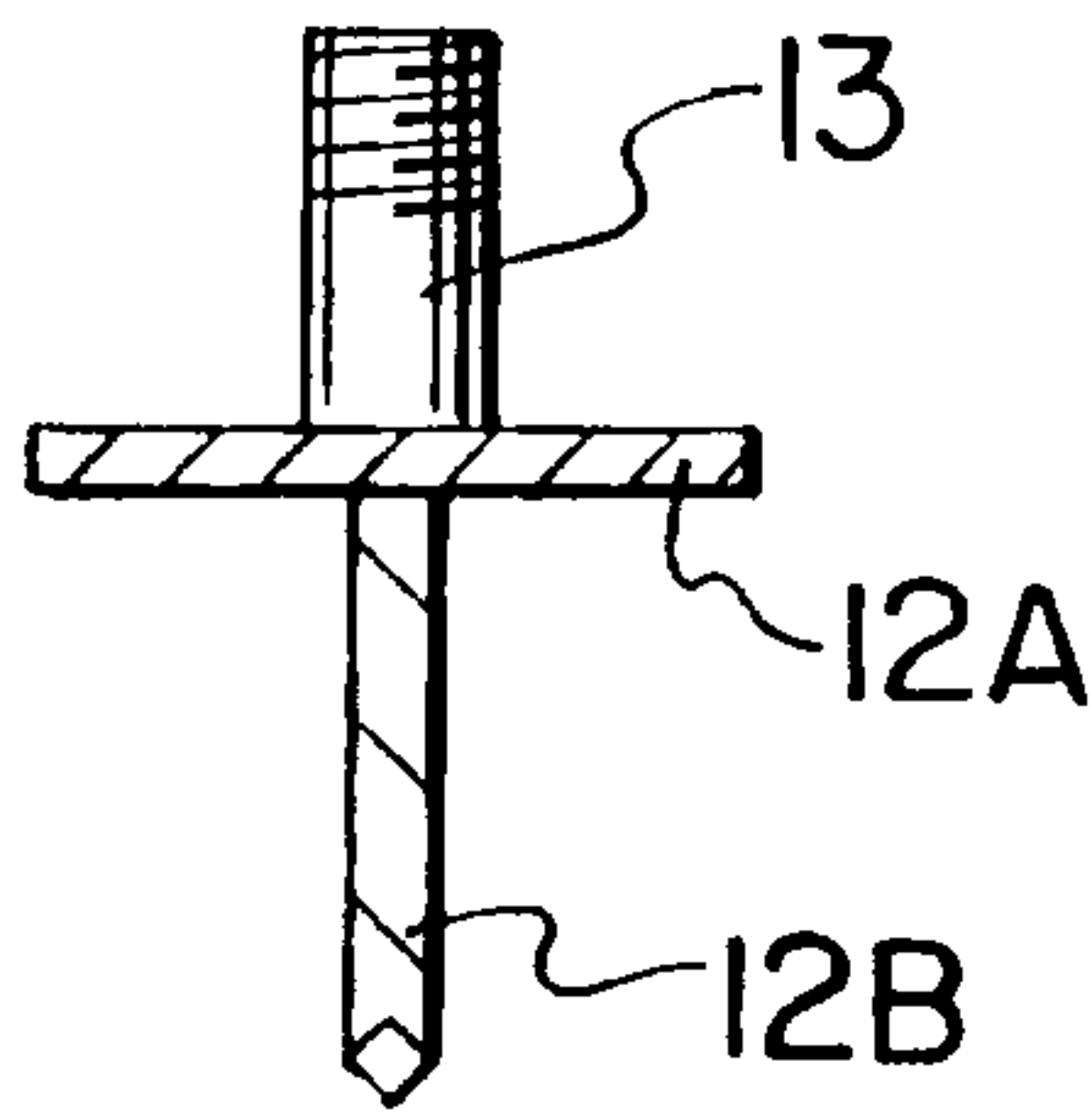


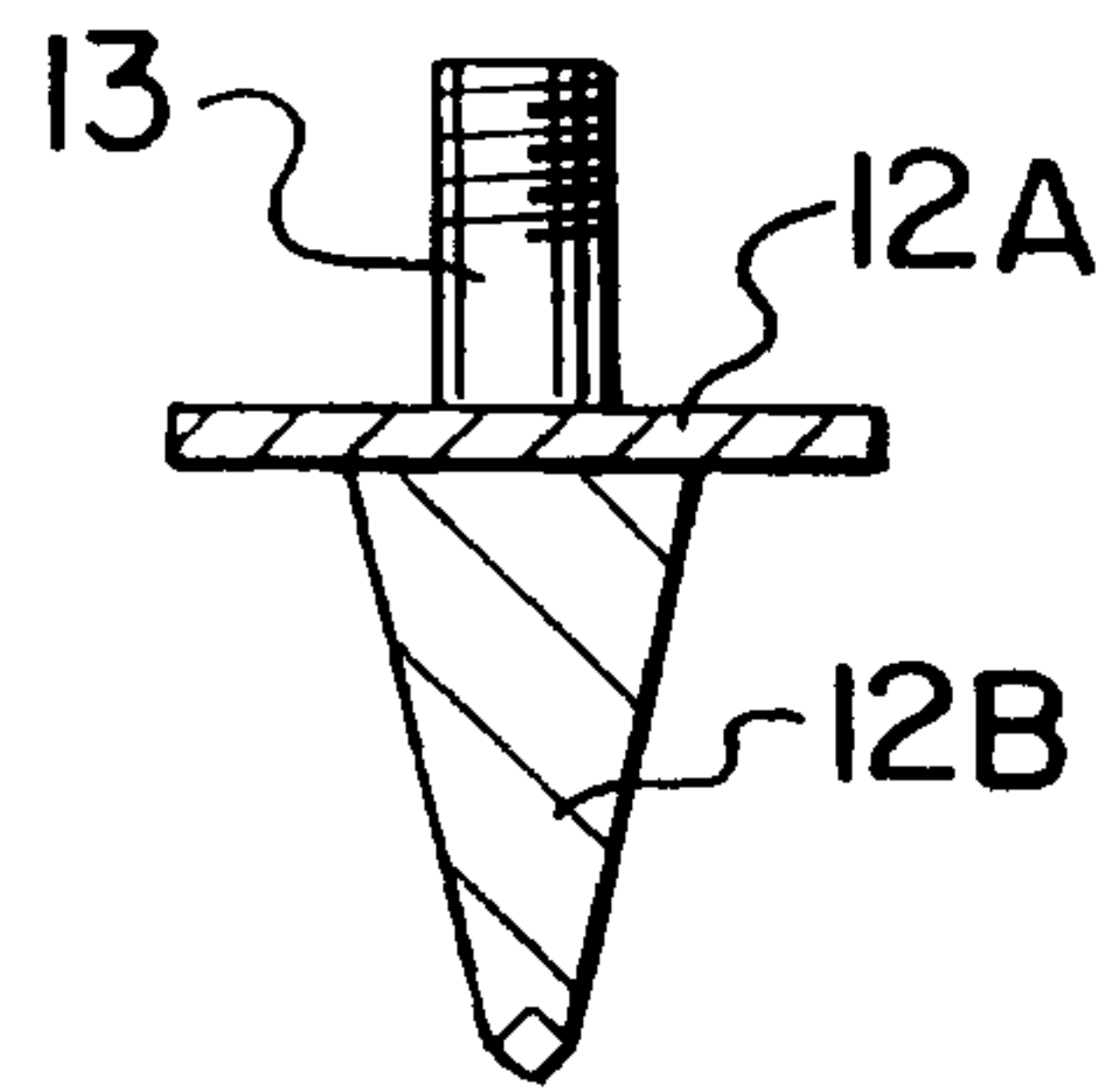
FIG. 4B



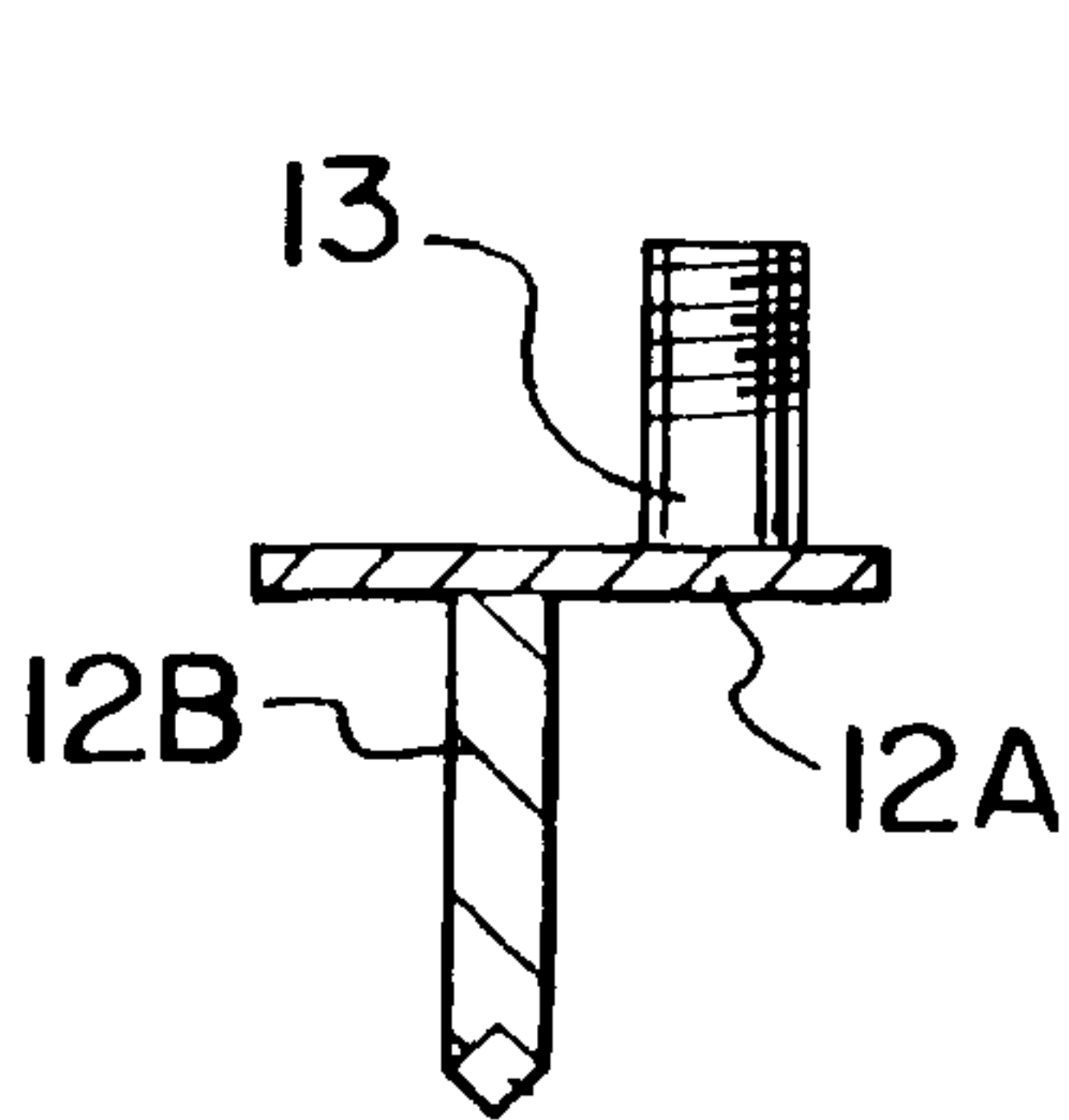
**FIG. 5**  
(PRIOR ART)



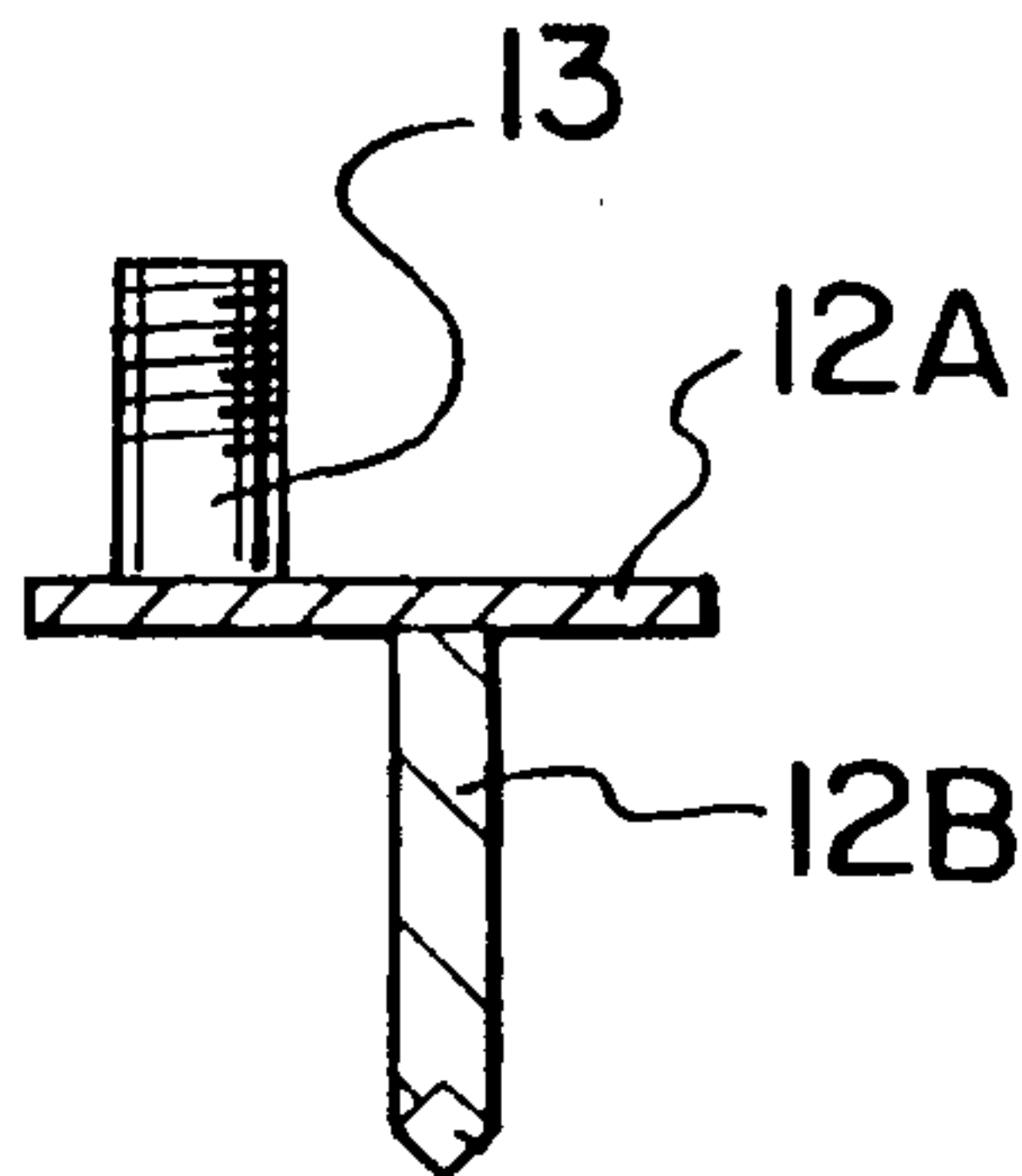
**FIG. 6A**



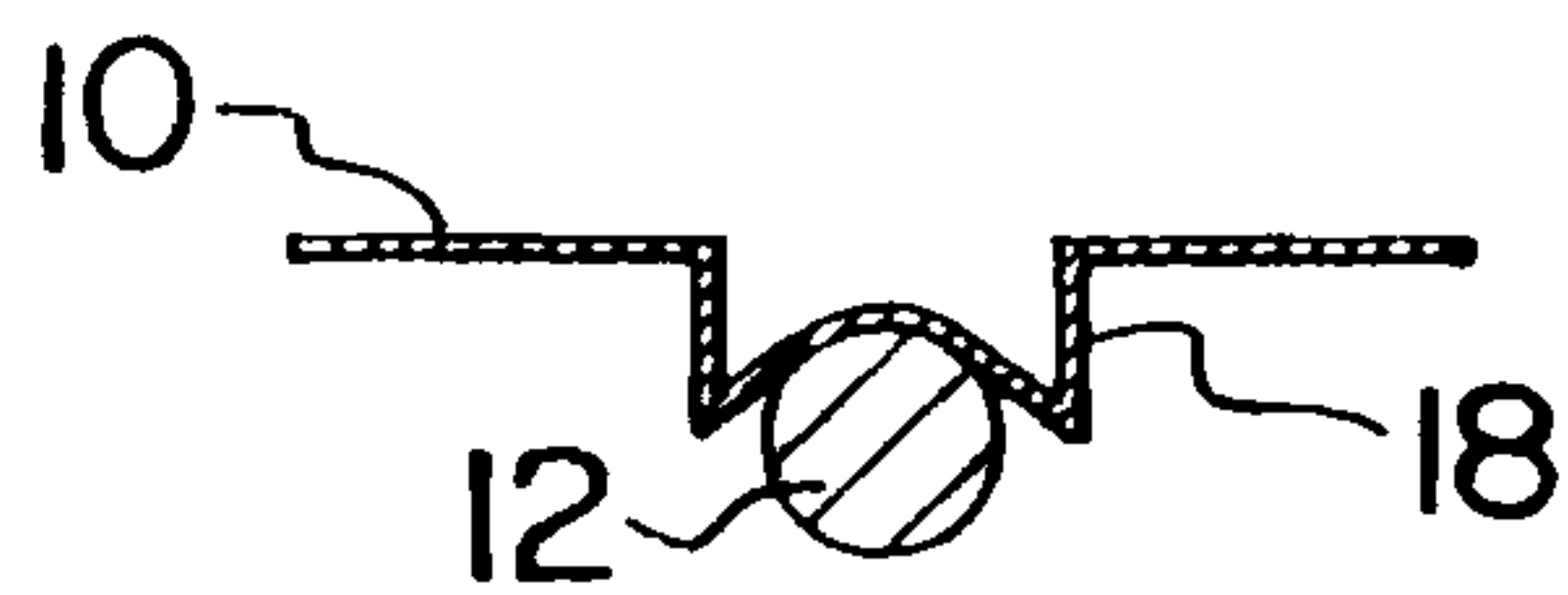
**FIG. 6B**



**FIG. 7A**



**FIG. 7B**



**FIG. 8**  
(PRIOR ART)

