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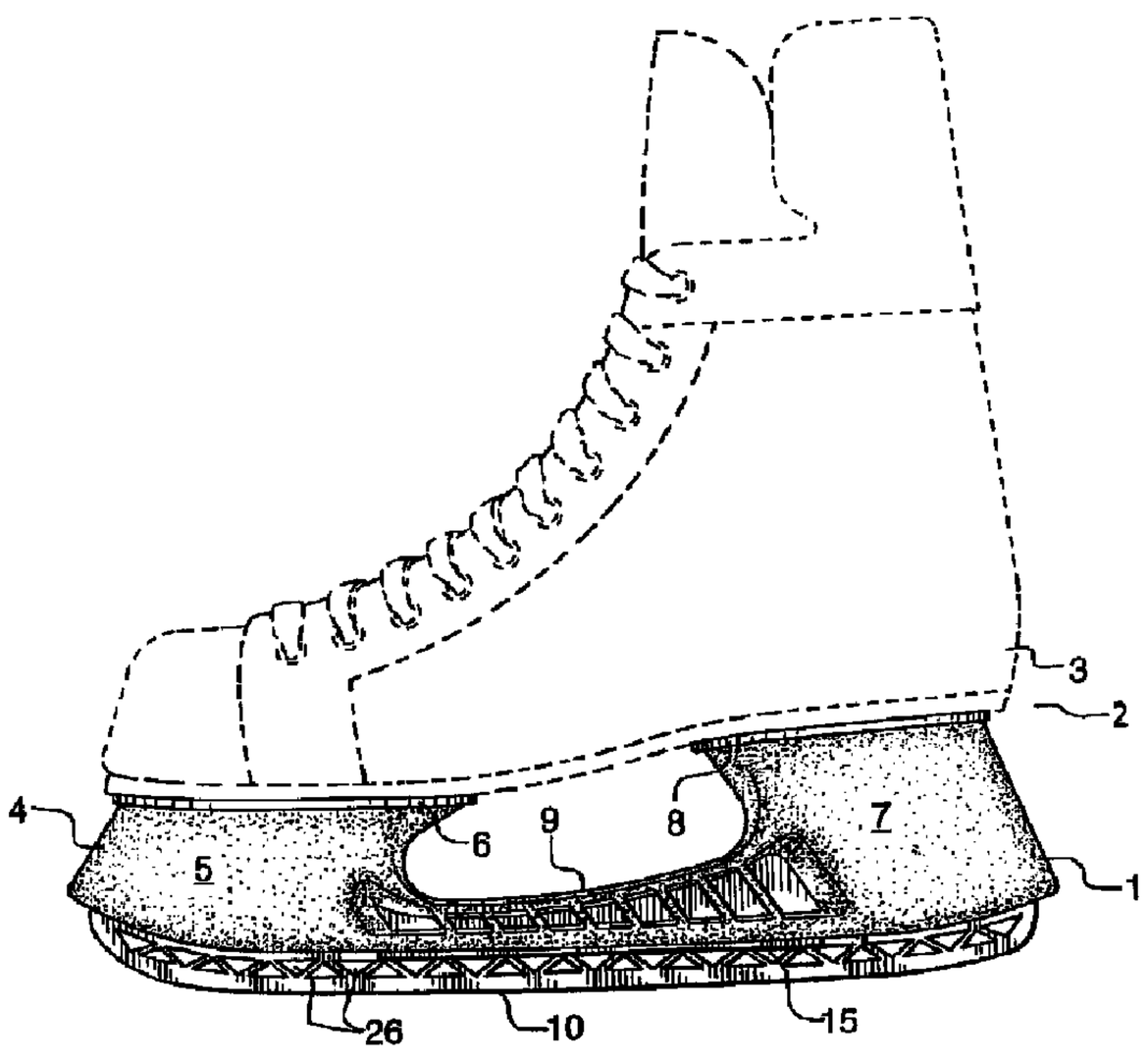
(54) Title: SKATE BLADE AND SKATE BLADE ASSEMBLY



(57) Abrégé/Abstract:
A rigid reinforcement member (15) extends longitudinally along the neck portion (9) of the skate blade holder (4), to reduce stress and improve force transfer. The blade holder has a longitudinal slot (11) running along the bottom thereof to receive a blade or runner (10), which is secured in the slot. At least one rigid reinforcement member runs along at least the neck portion, within the slot and above the runner, the slot being enlarged at the location of the reinforcement member(s) in order to accommodate the member(s). Preferably, the reinforcement member is in one piece, including an upper web portion (16) and an integral channel (17) with a cross section in the form of inverted U-shape beneath the upper web portion. The arms of U-shape run alongside the runner, one on either side of the runner, and the base of the U-shape lies against the top of the runner and follows the shape thereof. Preferably, the rigid reinforcement member is of a reinforced plastic composite material, although a metal could also be used. The increased rigidity of the blade holder permits the use of a lighter runner, which may be provided by using a runner with a number of cut-out areas (26). The cutouts are arranged in a central area between a solid upper area of the runner and a solid lower area of the runner, in such a fashion that the remaining metal in the central area leaves a truss-like structure between the upper and lower areas, the truss-like structure serving to retain most of the rigidity of the runner.

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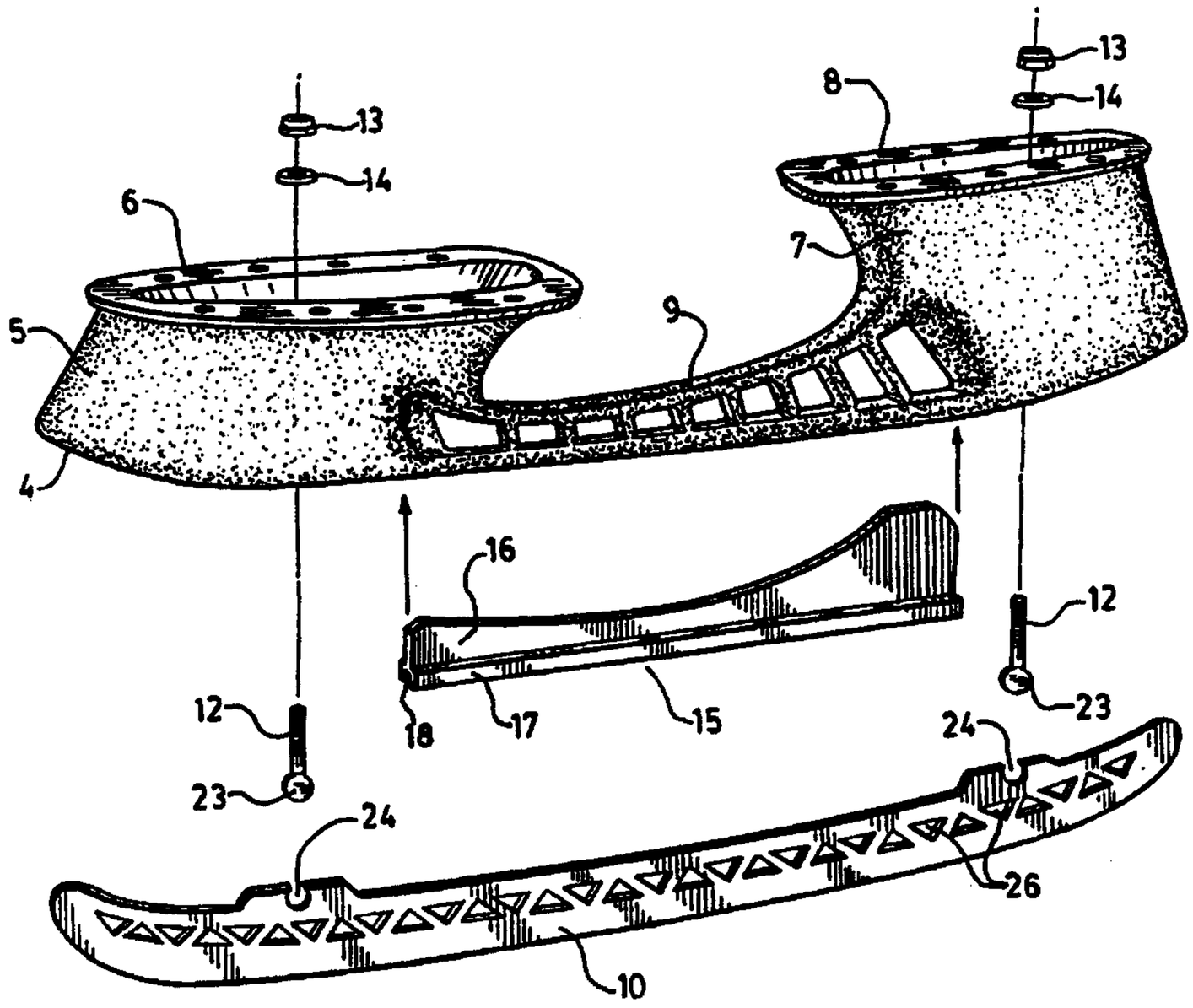
(54) Title: SKATE BLADE AND SKATE BLADE ASSEMBLY

(57) Abstract

A rigid reinforcement member (15) extends longitudinally along the neck portion (9) of the skate blade holder (4), to reduce stress and improve force transfer. The blade holder has a longitudinal slot (11) running along the bottom thereof to receive a blade or runner (10), which is secured in the slot. At least one rigid reinforcement member runs along at least the neck portion, within the slot and above the runner, the slot being enlarged at the location of the reinforcement member(s) in order to accommodate the member(s). Preferably, the reinforcement member is in one piece, including an upper web portion (16) and an integral channel (17) with a cross section in the form of inverted U-shape beneath the upper web portion. The arms of U-shape run alongside the runner, one on either side of the runner, and the base of the U-shape lies against the top of the runner and follows the shape thereof. Preferably, the rigid reinforcement member is of a reinforced plastic composite material, although a metal could also be used. The increased rigidity of the blade holder permits the use of a lighter runner, which may be provided by using a runner with a number of cut-out areas (26). The cutouts are arranged in a central area between a solid upper area of the runner and a solid lower area of the runner, in such a fashion that the remaining metal in the central area leaves a truss-like structure between the upper and lower areas, the truss-like structure serving to retain most of the rigidity of the runner.



SKATE BLADE AND SKATE BLADE ASSEMBLY

TECHNICAL FIELD

This invention relates to ice skates, and in particular to an improved skate blade and skate blade support.

BACKGROUND ART

In conventional skate blade assemblies such as those manufactured and sold by Canstar Sports Inc. under its TUUK trademark, a blade holder, which is secured to the skate boot, has a longitudinal slot into which the blade or "runner" is installed.

This blade assembly has been extremely successful. However, in the constant quest for improvement, it was determined that it would be desirable to provide greater rigidity along the central portion of the blade holder, i.e. along the neck portion between the heel and toe portions, since this greater rigidity would permit the use of a less rigid blade or runner, which would permit the overall weight of the skate to be reduced. This greater rigidity would also reduce the stress on the neck portion of the blade holder, which is desirable because the plastic of the blade holder is more brittle when under stress. Reinforcement would also provide better force transfer between the ice and the skate boot, via the attachments between the boot and the front and rear portions of the blade holder.

Reduced weight in skates, without sacrificing performance, is an ongoing goal in the industry. Generally, reducing the weight of the skate blade itself has not been considered to be a viable option, since it was assumed that this would reduce the required stiffness to an undesirable degree.

DISCLOSURE OF INVENTION

In view of the foregoing, one aspect of the invention provides a rigid reinforcement member extending longitudinally along the at least the neck portion of the blade holder, to reduce stress and improve force transfer.

More particularly, the skate blade assembly comprises an elongated blade holder having front and rear portions with respective top portions for attachment to a skate boot and a neck portion connecting said front and rear portions. The blade holder has a longitudinal slot running along the bottom thereof to receive a blade or "runner", which is made of metal and secured in the slot. At least one rigid reinforcement member runs along at least the neck portion, within the slot and above the runner, the slot being enlarged at the location of the reinforcement member(s) in order to accommodate the member(s).

Preferably, the reinforcement member is in one piece, including an upper web portion and an integral channel with a cross-section in the form of inverted U-shape beneath the upper web portion. The arms of the U-shape run alongside the runner, one on either side of the runner, and the base of the U-shape lies against the top of the runner and follows the shape thereof. Preferably, the rigid reinforcement member is of a reinforced plastic composite material, although a metal could also be used. The useful nature of the reinforced blade holder was verified in testing.

It was determined that the blade or runner could be reduced in weight accordingly, by providing it with a plurality of suitably-configured cutout cutouts that are free of metal for reducing its weight. The cutouts are located at least partially below the holder. The weight of the blade is reduced significantly, i.e. typically by about 41 grams. That is a significant weight reduction, representing about a 30 percent reduction in the weight of the runner, and about a 4 percent reduction in the overall weight of the skate.

The cutouts may be spaced longitudinally along a portion or the overall length of the blade. They may be arranged in a central area between an upper area of the runner and a lower area of the runner. The remaining metal in the central area leaves a truss-like structure between the upper and lower areas, the truss-like structure serving to retain most of the rigidity of the runner. The upper area has a top portion secured in the slot of the holder and the lower area has a bottom surface for contacting the ice.

Upon closer examination, it was realized that the runner with the suitably-configured cutouts was not significantly less stiff than a conventional solid runner, so that it could be used without necessarily using the reinforced blade holder aspect of the invention. Of course, it was also realized that the reinforced blade holder could be used without necessarily using a runner with cutouts, although the optimum blade assembly has the reinforcement, and uses the runner with cutouts.

Further features of the invention will be described or will become apparent in the course of the following detailed description, or from an examination of the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be better understood from the ensuing detailed description of the preferred embodiment, by way of example only. Reference will be made to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of the blade assembly, showing a conventional blade holder and runner, with the reinforcement insert of the first aspect of the invention;

Fig. 2 is a side view of the assembled blade assembly, with a skate boot shown in phantom lines;

Fig. 3 is a side perspective view of the assembled blade assembly;

Fig. 4 is a side cross-sectional view of the assembled blade assembly;

Fig. 5 is a cross-section of the blade assembly at 5-5 in Fig. 4;

Fig. 6 is a cross-section of the blade assembly at 6-6 in Fig. 4;

Fig. 7 is a cross-section of the blade assembly at 7-7 in Fig. 4.

Fig. 8 is an exploded perspective view of the blade assembly, showing a conventional blade holder and runner, with a blade or runner which is provided with suitably-configured cutout areas;

Fig. 9 is a side cross-sectional view of the assembled blade assembly of Fig. 8;

Fig. 10 is a cross-section of the blade assembly at 10-10 in Fig. 9;

FIG. 11 is a cross-section of the blade assembly at 11-11 in FIG. 9;

FIG. 12 is a cross-section of the blade assembly at 12-12 in FIG. 9; and

FIG. 13 is a side view of an alternative embodiment of the runner.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring to the accompanying drawings, the skate blade assembly 1 is part of a typical skate 2, which also includes a boot 3. The blade assembly includes an elongated blade holder 4 having a front portion 5 with a front pad 6 for attachment beneath the toe area of the boot, a rear portion 7 with a rear pad 8 for attachment beneath the heel area of the skate boot, and an integral neck portion 9 between the front and rear portions. A blade or "runner" 10 is secured in a longitudinal slot 11 running along the bottom of the blade holder, by pins 12 having external threads which are pulled upwardly by nuts 13 having internal threads and which contact collars 14. The pins have rounded, flattened heads 23 which fit into appropriately dimensioned rounded slots 24 each provided in an upper projection of the runner.

In the first aspect of the invention, at least one rigid reinforcement member 15 runs along at least the neck portion, within the slot and above the runner, the slot being enlarged at the location of the reinforcement member(s) in order to accommodate the member(s). Conceivably, there could be more than one such member. There could be two such members, for example, one on either side of the runner.

Preferably, though, the reinforcement member is in one piece, including an upper web portion 16 and an integral channel 17 with a cross-section in the form of inverted U-shape beneath the upper web portion. The arms of the U-shape run alongside the runner, one on either side of the runner, and the base of the U-shape lies against the top of the runner and follows the shape thereof, the runner being accommodated within the slot 18.

It is an advantage of the invention that the reinforced blade holder allows the runner itself to be slightly less rigid. The runner therefore can be reduced in weight, for example by a plurality of cutouts 26. This reduces the overall weight of the blade assembly as well, since more weight is removed from the runner than is added by the reinforcement member.

Preferably, the rigid reinforcement member is of a reinforced plastic composite material, such as an epoxy/graphite fiber mix, although a metal could also be used. The reinforcement member provides the desired greater rigidity along the neck portion of the blade holder, thereby reducing the stress on the blade holder. As mentioned previously, this is desirable because the plastic of the blade holder, typically of Zytel (trademark) nylon, is more brittle when under stress. The reinforcement member reduces the stress, and also provides better force transfer between the ice and the skate boot, via the attachments at the front and rear pads between the boot and the blade holder.

The first aspect of the invention has been described with particular reference to a preferred embodiment. Various modifications can be made, of course, without departing from the spirit of the invention, and such modifications are intended to be within the scope of the following claims whether or not expressly described in the above text or illustrated in the accompanying drawings. As one example of such modifications, it should be readily apparent that the reinforcement insert could extend for the whole length or substantially the whole length of the blade holder, not just along the neck portion.

The second aspect of the invention relates to the metal runner having cutouts 26 free of metal for reducing the weight of the runner. The cutouts 26 are located at least partially below the blade holder and may be arranged in a central area between solid upper and lower areas 28, 30 of the runner 10. The cutouts 26 may extend a substantial portion of the overall length of the runner 10, in such a fashion that the remaining metal in the central area leaves a truss-like structure between the upper and lower areas 28, 30, the truss-like structure serving to retain most of the rigidity of the runner 10. The upper area

28 has a top portion 29 secured in the slot 18 of the blade holder 4 and the lower area 30 has a bottom surface 31 for contacting the ice.

In the preferred embodiment of this second aspect, the cutouts are triangular, each successive triangle being inverted relative to its predecessor, so that there are ribs 32 between the cutouts, each successive rib angling in an opposite direction, i.e. one forwardly and the next one rearwardly.

An alternative is shown in FIG. 13, in which successive semi-circular cutouts of the same orientation could have curved triangular cutouts between them, in effect leaving curved ribs 32, themselves having a semi-circular look. Other similar shapes are clearly conceivable.

It should be clear that although the optimum blade assembly has the reinforcement, and uses the runner with cutouts, the reinforcement in itself is advantageous, and can be used without the cutouts, although the advantages of reduced weight may not be realized. Similarly, the cutouts may be used with the reinforcement, although increased stiffness may then not be realized.

The invention has been described with particular reference to preferred and alternative embodiments. Various modifications can be made, of course, without departing from the spirit of the invention, and such modifications are intended to be within the scope of the following claims whether or not expressly described in the above text or illustrated in the accompanying drawings.

CLAIMS

1. An ice skate blade assembly comprising:

(a) an elongated blade holder having front and rear portions with respective top portions for attachment to a skate boot and a neck portion connecting said front and rear portions, said blade holder comprising a bottom portion having a longitudinal slot; and

(b) an ice skate blade made of metal, said blade being secured in said longitudinal slot and comprising a plurality of cutouts being free of metal and spaced longitudinally along a portion of the length of said blade for reducing the weight of said blade, said cutouts being located at least partially below said elongated blade holder.

2. An ice skate blade assembly as defined in claim 1, wherein said blade comprises an upper area with a top portion secured in said longitudinal slot and a lower area with a bottom surface for contacting the ice.

3. An ice skate blade assembly as defined in claim 1 or 2, wherein said cutouts are spaced longitudinally along the overall length of said blade.

4. An ice skate blade assembly as defined in any one of claims 1 to 3, further comprising a pin passing though said longitudinal slot of said blade holder, said pin having a rounded flattened head, and wherein said blade comprises a rounded slot for receiving said rounded flattened head of said pin.

5. An ice skate blade assembly as defined in claim 4, wherein said pin has external threads and said blade assembly further comprises a nut with internal threads to engage with said external threads.

6. An ice skate blade assembly as defined in any one of claims 1 to 5, wherein the weight of said blade is reduced by about 30%.

7. An ice skate blade assembly as defined in any one of claims 1 to 6, wherein said cutouts are arranged in substantially continuous alignment along the length of said blade.

8. An ice skate blade assembly as defined in any one of claims 1 to 7, wherein said cutouts define a truss-like structure that allows retaining most of the rigidity of said blade while reducing its weight.

9. An ice skate blade assembly as defined in any one of claims 1 to 8, wherein said cutouts are triangular and wherein each successive triangular cut-out is inverted relative to its predecessor thereby defining ribs between the cut-outs, each successive rib angling forwardly or rearwardly in alternating fashion.

10. An ice skate blade assembly as defined in any one of claims 1 to 8, wherein said cutouts are generally semi-circular and having the same orientation and wherein an inverted curved generally triangular cut-out area is located in between two said successive semi-circular cutouts.

11. An ice skate blade assembly as defined in any one of claims 1 to 10 further comprising a rigid reinforcement member secured in said longitudinal slot, said member comprising a channel portion for receiving said blade.

12. An ice skate blade assembly as defined in claim 11, wherein said reinforcement member is secured in said neck portion.

13. An ice skate blade assembly as defined in claim 11 or 12, wherein said reinforcement member has an elongated inverted U-shaped portion comprising a horizontal portion having an upper surface and a lower surface and integral sidewall portions extending downwardly from said

lower surface and having an integral elongated web portion extending a substantial distance upwardly from a central longitudinal axis of said horizontal portion upper surface, said web portion and said U-shaped portion being snugly accommodated and secured in said longitudinal slot.

14. An ice skate blade assembly as defined in any one of claims 11 to 13, wherein said reinforcement member is made of a reinforced plastic composite material.

15. An ice skate blade assembly as defined in any one of claims 11 to 13, wherein said reinforcement member is made of metal.

16. An ice skate comprising a skate boot and a skate blade assembly as defined in any one of claims 1 to 15, said skate blade assembly being attached to said skate boot.

17. An ice skate blade assembly comprising:

(a) an elongated blade holder having front and rear portions with respective top portions for attachment to a skate boot and a neck portion connecting said front and rear portions, said blade holder comprising a bottom portion having a longitudinal slot; and

(b) an ice skate blade made of metal, said blade comprising an upper area with a top portion secured in said longitudinal slot, a lower area with a bottom surface for contacting the ice and a plurality of cutouts being free of metal for reducing the weight of said blade, said cutouts being located at least partially below said elongated blade holder.

18. An ice skate blade assembly as defined in claim 17, wherein said cutouts are spaced longitudinally along a portion of the length of said blade.

19. An ice skate blade assembly as defined in claim 18, wherein said cutouts are spaced longitudinally along the overall length of said blade.

20. An ice skate blade assembly as defined in claim 18 or 19 further comprising a pin passing though said longitudinal slot of said blade holder, said pin having a rounded flattened head, and wherein said upper area of said blade comprises an upper projection with a rounded slot for receiving said rounded flattened head of said pin.

21. An ice skate blade as defined in any one of claims 18 to 20, wherein the weight of said blade is reduced by about 30%.

22. An ice skate blade assembly as defined in any one of claims 18 to 21, wherein said cutouts are arranged in substantially continuous alignment along the length of said blade.

23. An ice skate blade assembly as defined in any one of claims 18 to 22, wherein said cutouts define a truss-like structure that allows retaining most of the rigidity of said blade while reducing its weight.

24. An ice skate blade assembly as defined in any one of claims 18 to 23, wherein said cutouts are triangular and wherein each successive triangular cut-out is inverted relative to its predecessor thereby defining ribs between the cut-outs, each successive rib angling forwardly or rearwardly in alternating fashion.

25. An ice skate blade assembly as defined in any one of claims 18 to 23, wherein said cutouts are generally semi-circular and having the same orientation and wherein an inverted curved generally triangular cut-out area is located in between two said successive semi-circular cutouts.

26. An ice skate blade assembly as defined in any one of claims 18 to 25 further comprising a rigid reinforcement member secured in said longitudinal slot, said member comprising a channel portion for receiving said blade.

27. An ice skate blade assembly as defined in claim 26, wherein said reinforcement member is secured in said neck portion.

28. An ice skate blade assembly as defined in claim 26 or 27, wherein said reinforcement member has an elongated inverted U-shaped portion comprising a horizontal portion having an upper surface and a lower surface and integral sidewall portions extending downwardly from said lower surface and having an integral elongated web portion extending a substantial distance upwardly from a central longitudinal axis of said horizontal portion upper surface, said web portion and said U-shaped portion being snugly accommodated and secured in said longitudinal slot.

29. An ice skate blade assembly as defined in any one of claims 26 to 28, wherein said reinforcement member is made of a reinforced plastic composite material.

30. An ice skate blade assembly as defined in any one of claims 26 to 28, wherein said reinforcement member is made of metal.

31. An ice skate comprising a skate boot and a skate blade assembly as defined in any one of claims 17 to 30, said skate blade assembly being attached to said skate boot.

32. An ice skate blade assembly comprising:

(a) an elongated blade holder having front and rear portions with respective top portions for attachment to a skate boot and a

neck portion connecting said front and rear portions, said blade holder comprising a bottom portion having a longitudinal slot;

(b) an ice skate blade made of metal, said blade comprising an upper area with a top portion secured in said longitudinal slot, a lower area with a bottom surface for contacting the ice and a plurality of cutouts being free of metal for reducing the weight of said blade, said top portion having an upper projection with a rounded slot and said cutouts being located at least partially below said elongated blade holder; and

(c) a pin passing through said longitudinal slot, said pin having a rounded flattered head received in said rounded slot.

33. An ice skate blade assembly as defined in claim 32, wherein said cutouts are spaced longitudinally along a portion of the length of said blade.

34. An ice skate blade assembly as defined in claim 33 or 34, wherein said cutouts are arranged in substantially continuous alignment along the length of said blade.

35. An ice skate blade as defined in any one of claims 32 to 34, wherein said cutouts are spaced longitudinally along the overall length of said blade.

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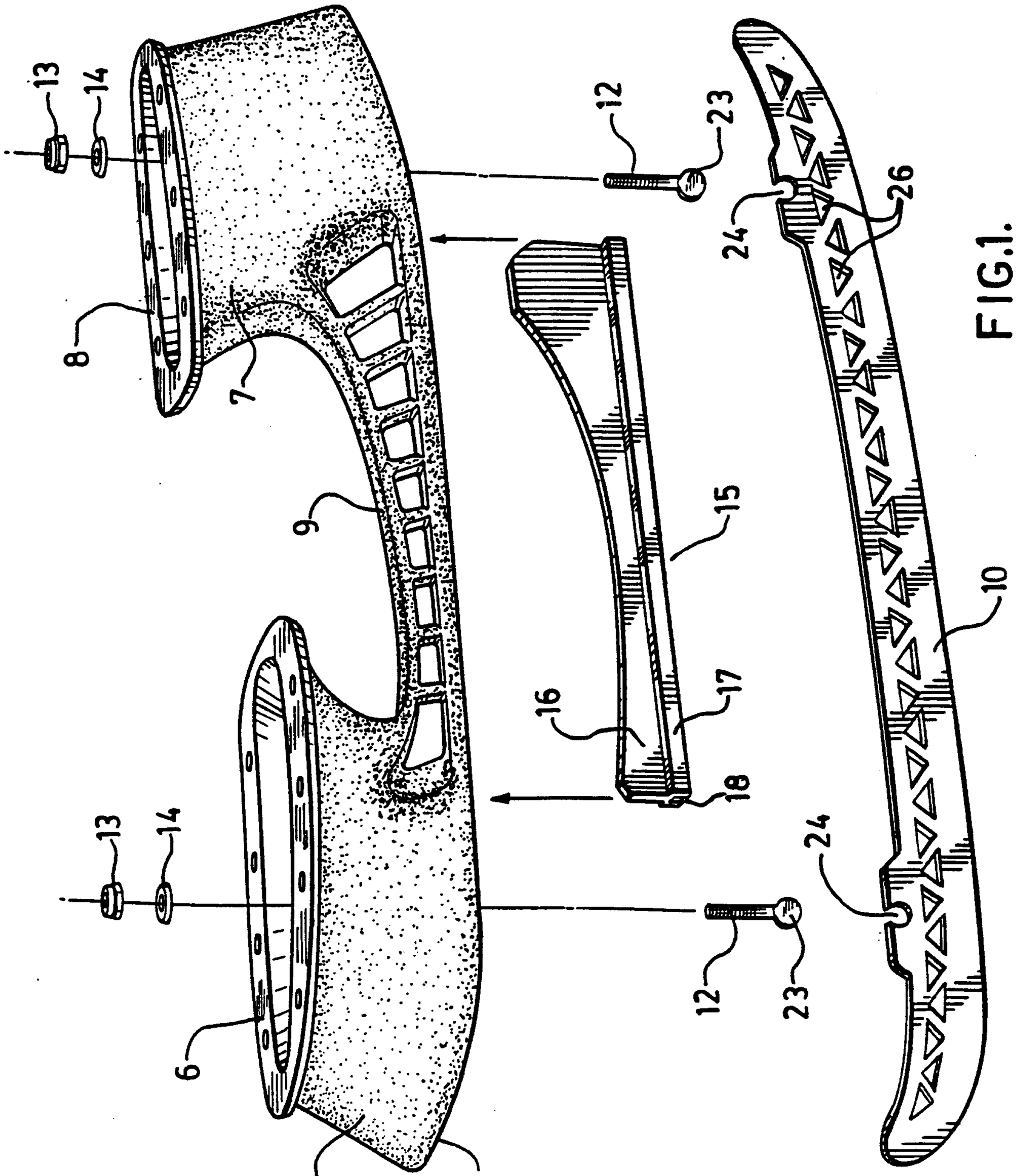

FIG.1.

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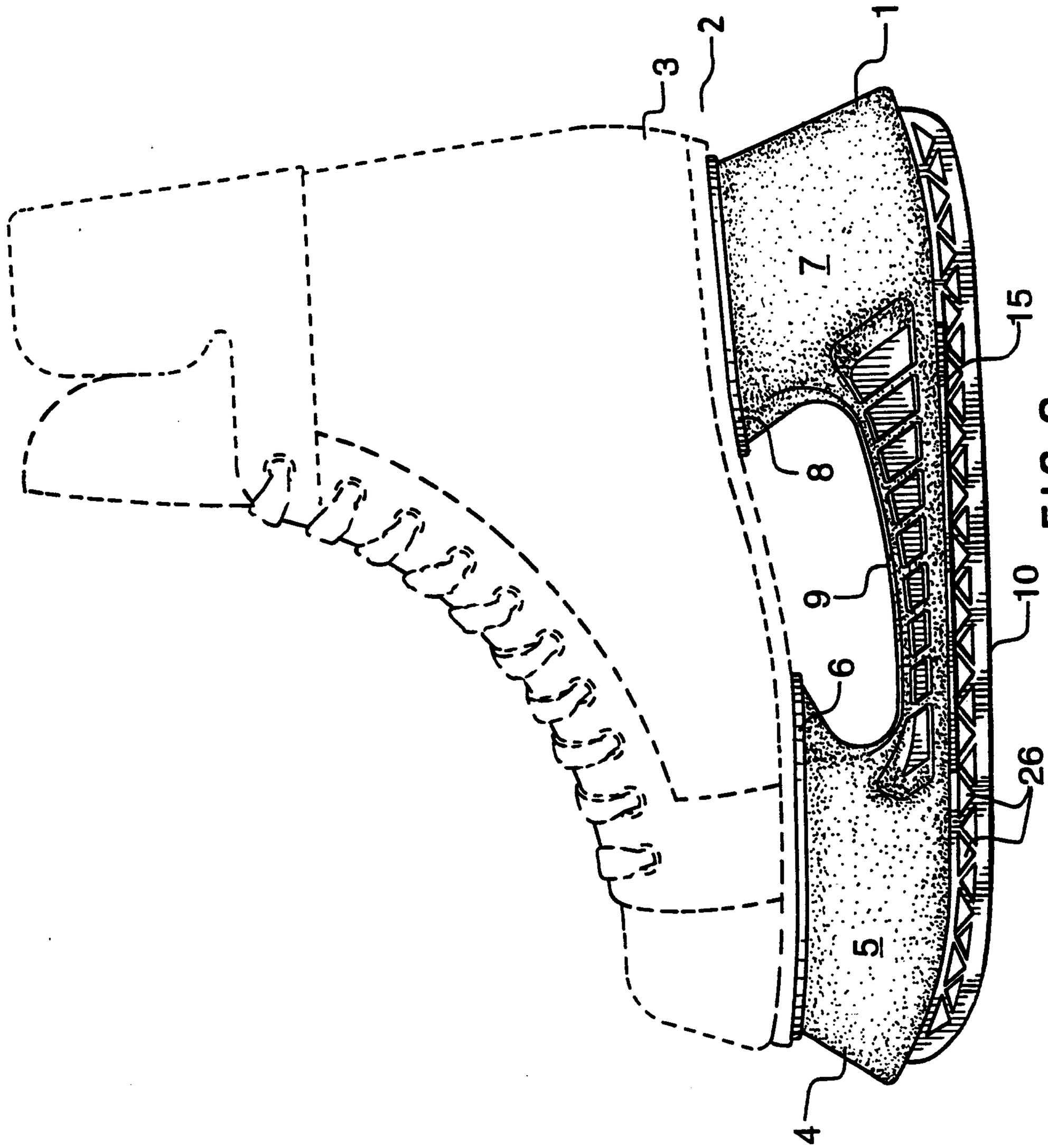

FIG.2.

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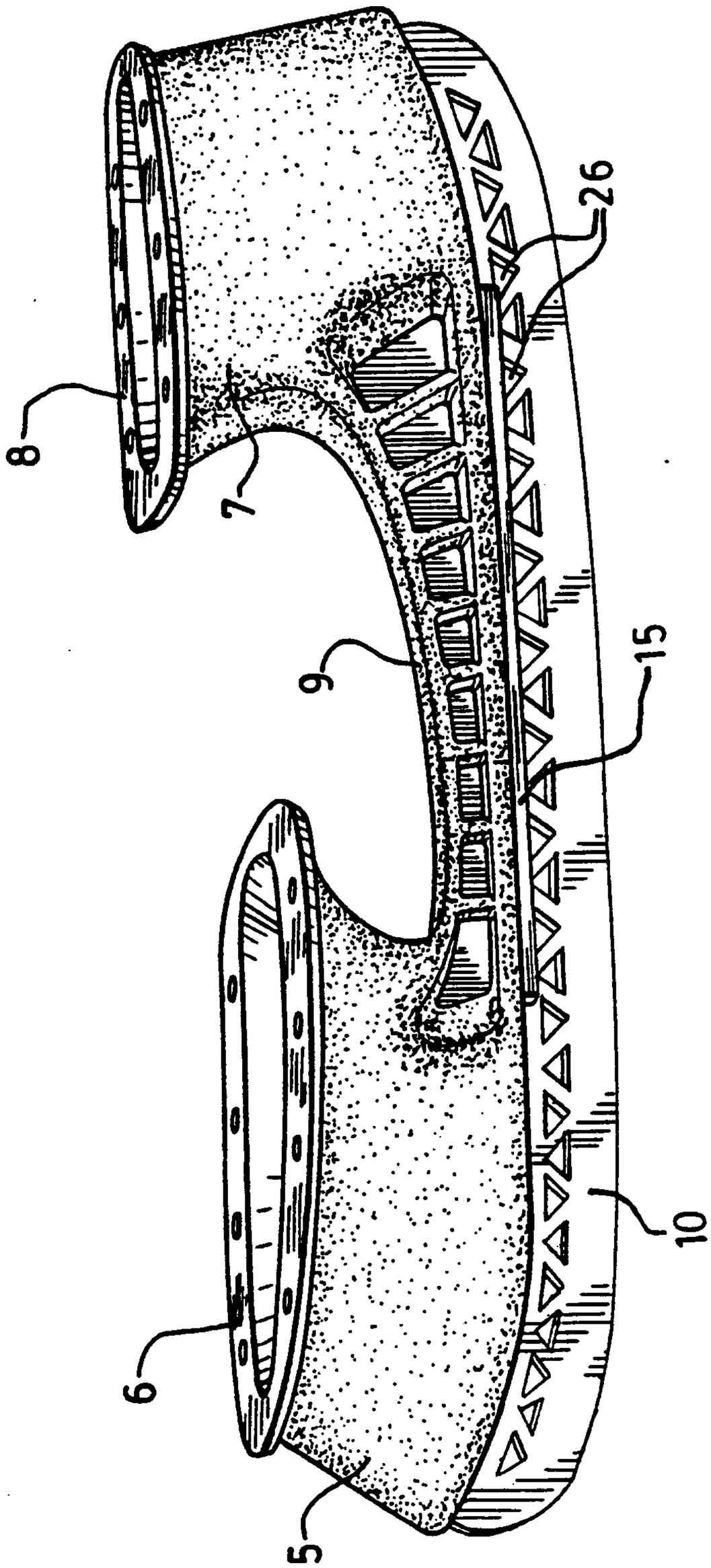

FIG.3.

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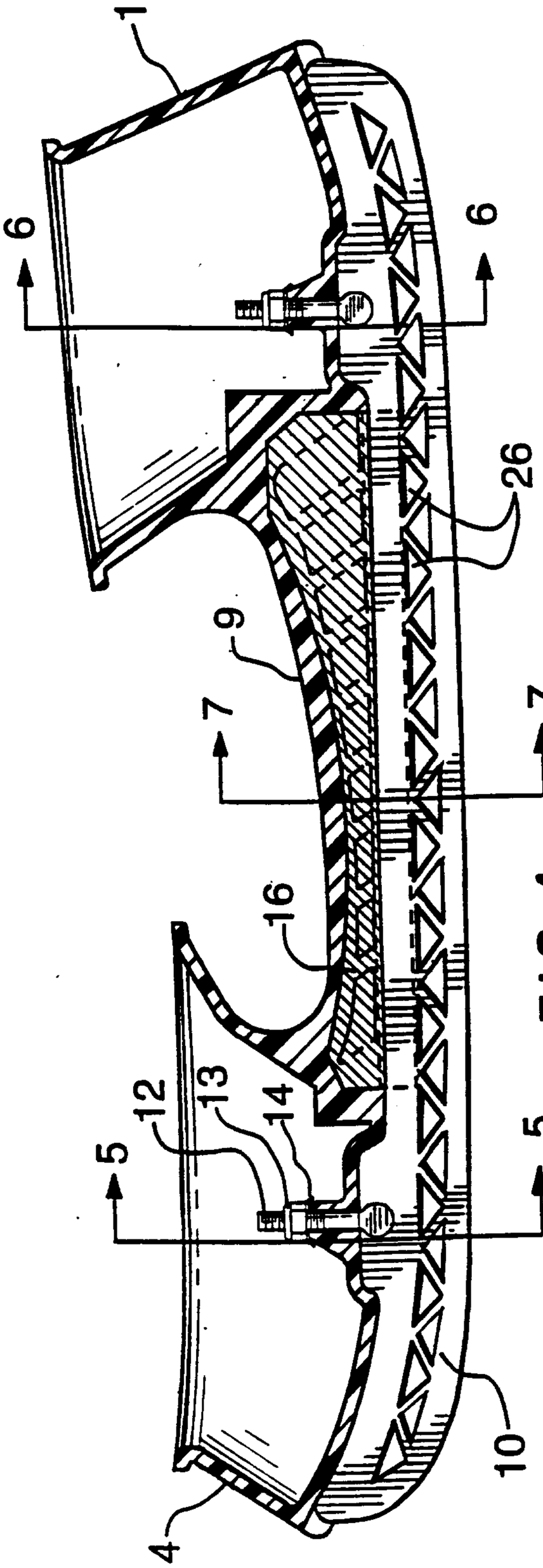

FIG.4.

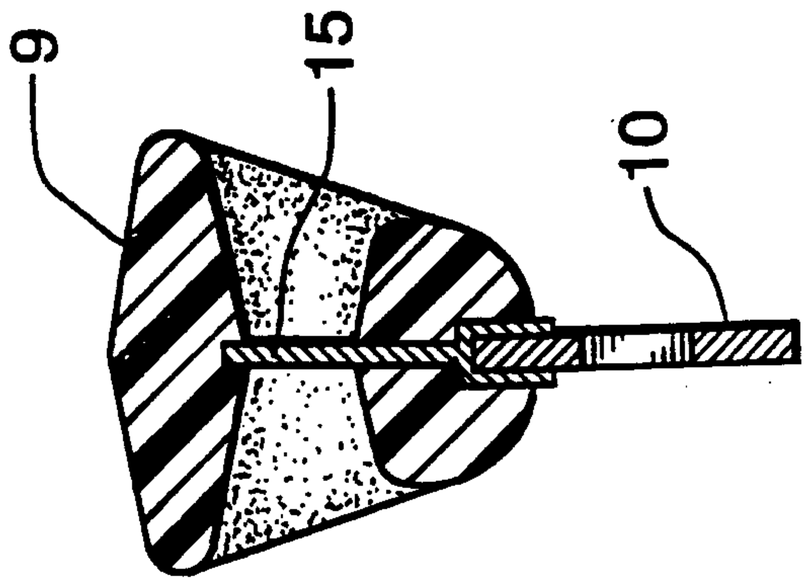

FIG.7.

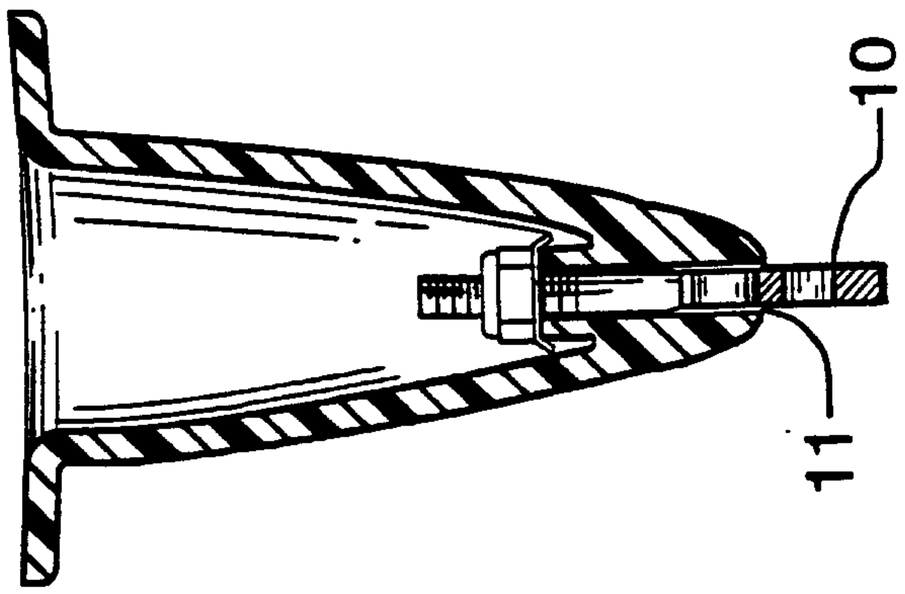

FIG.6.

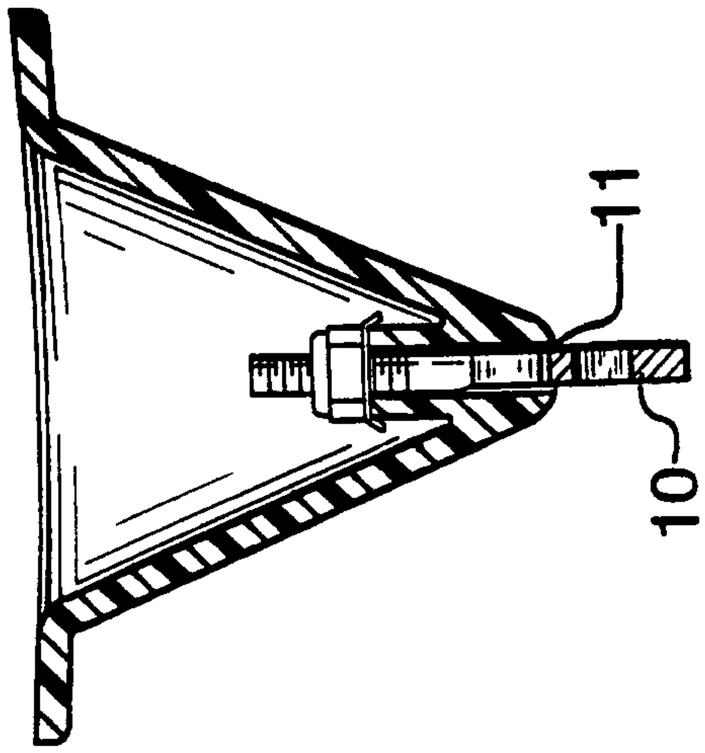

FIG.5.

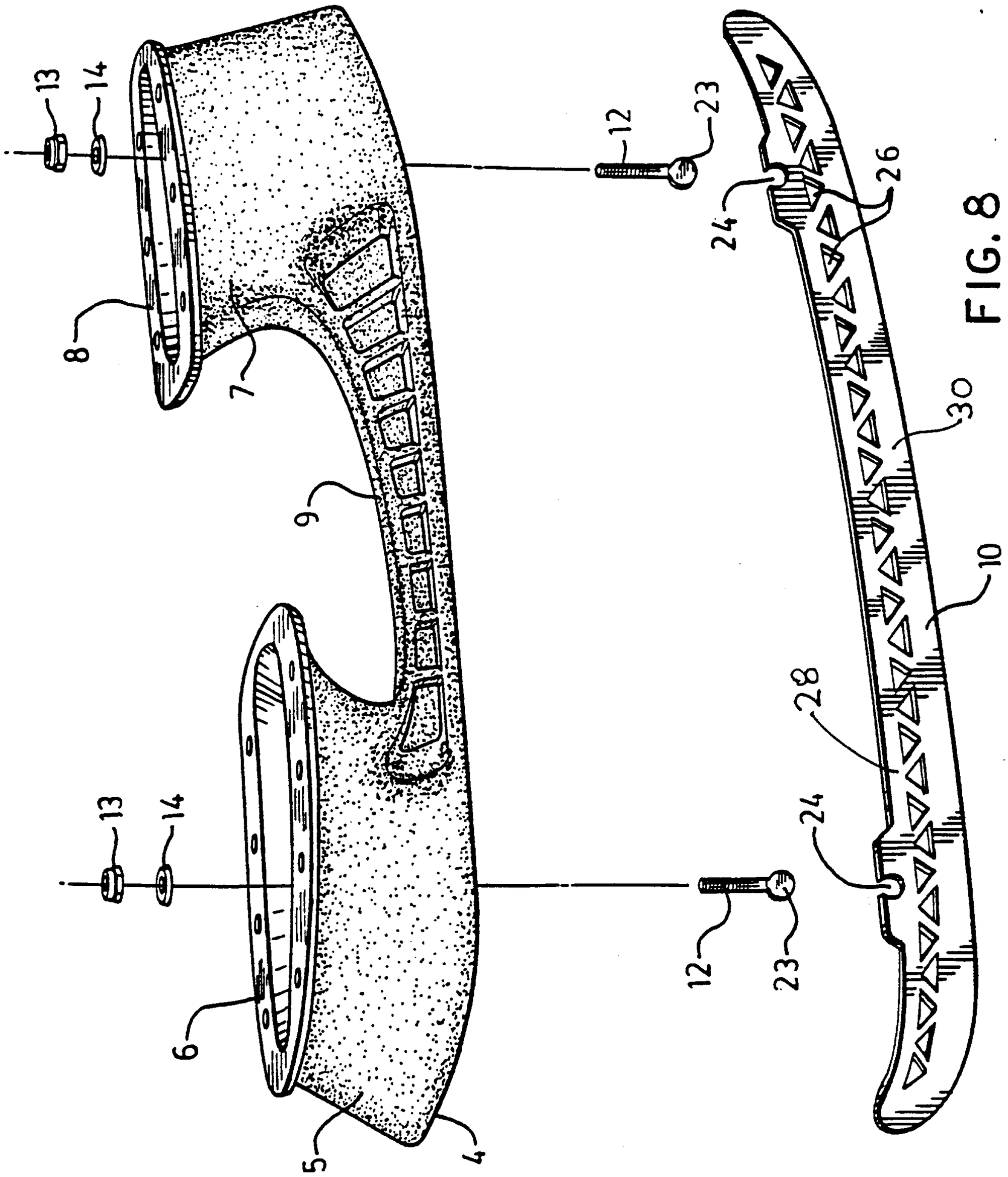

FIG. 8

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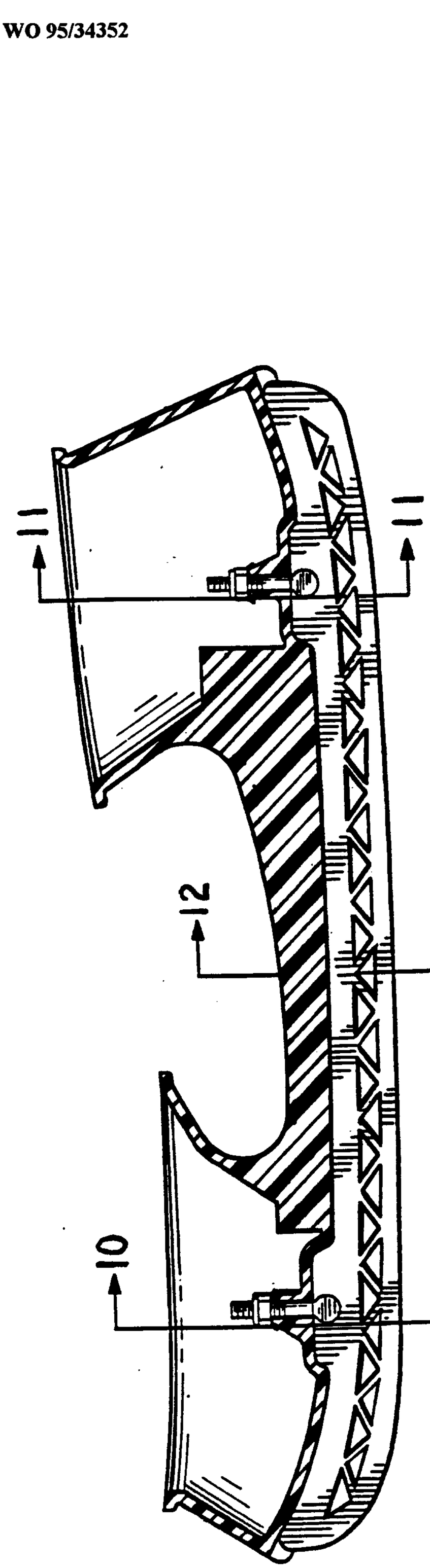

FIG. 9.

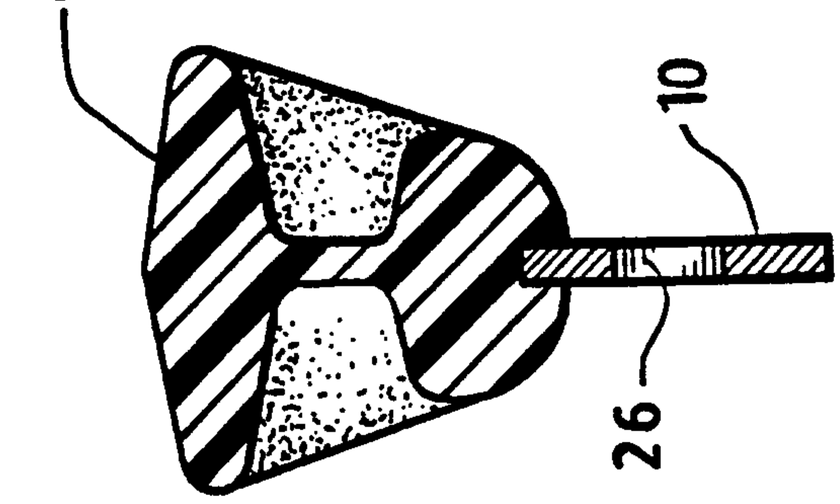

FIG. 12

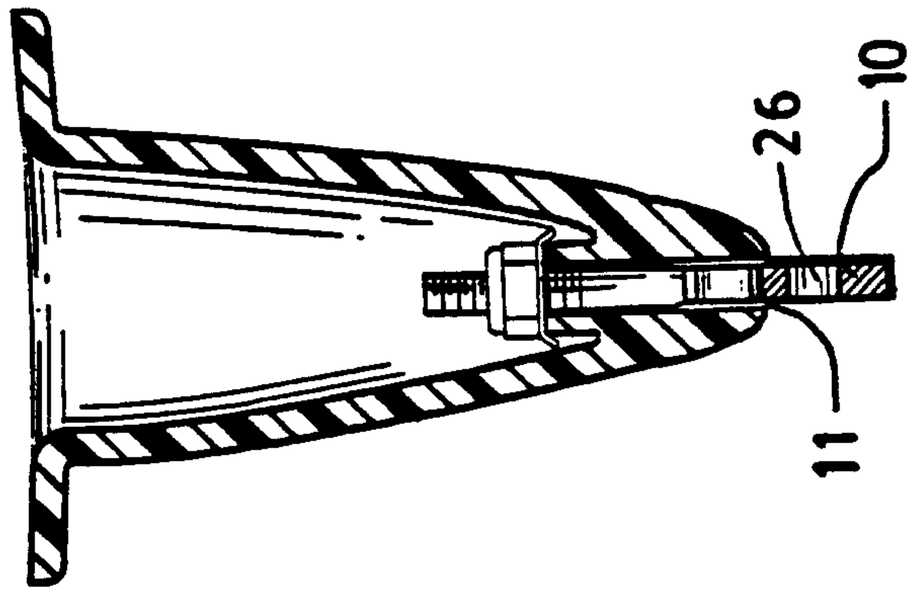

FIG. 11

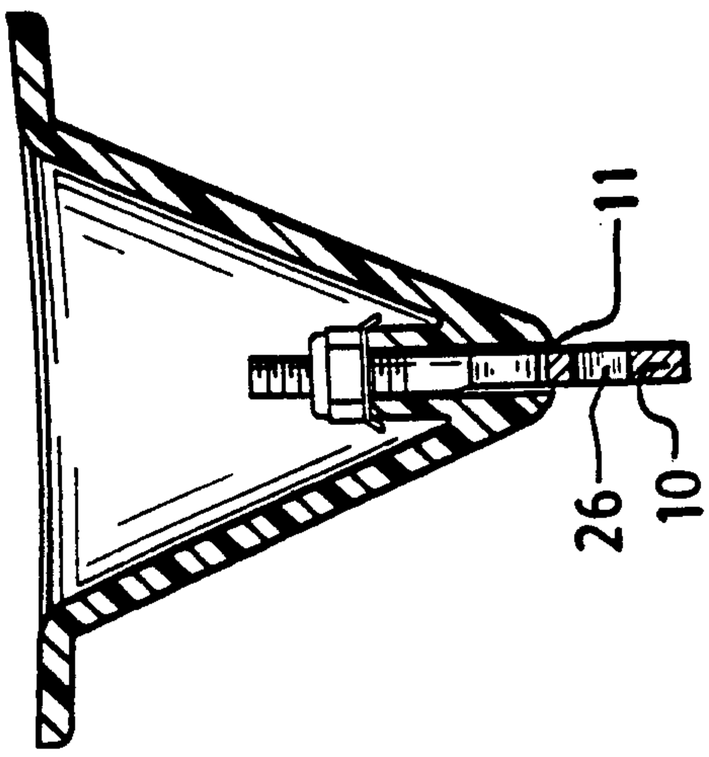

FIG. 10

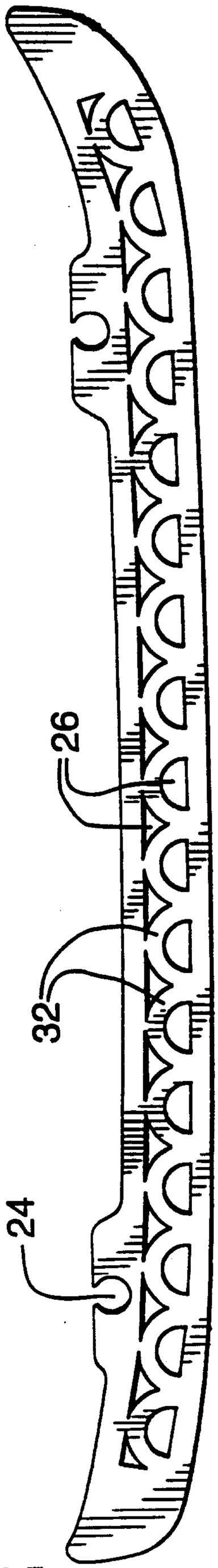

FIG. 13

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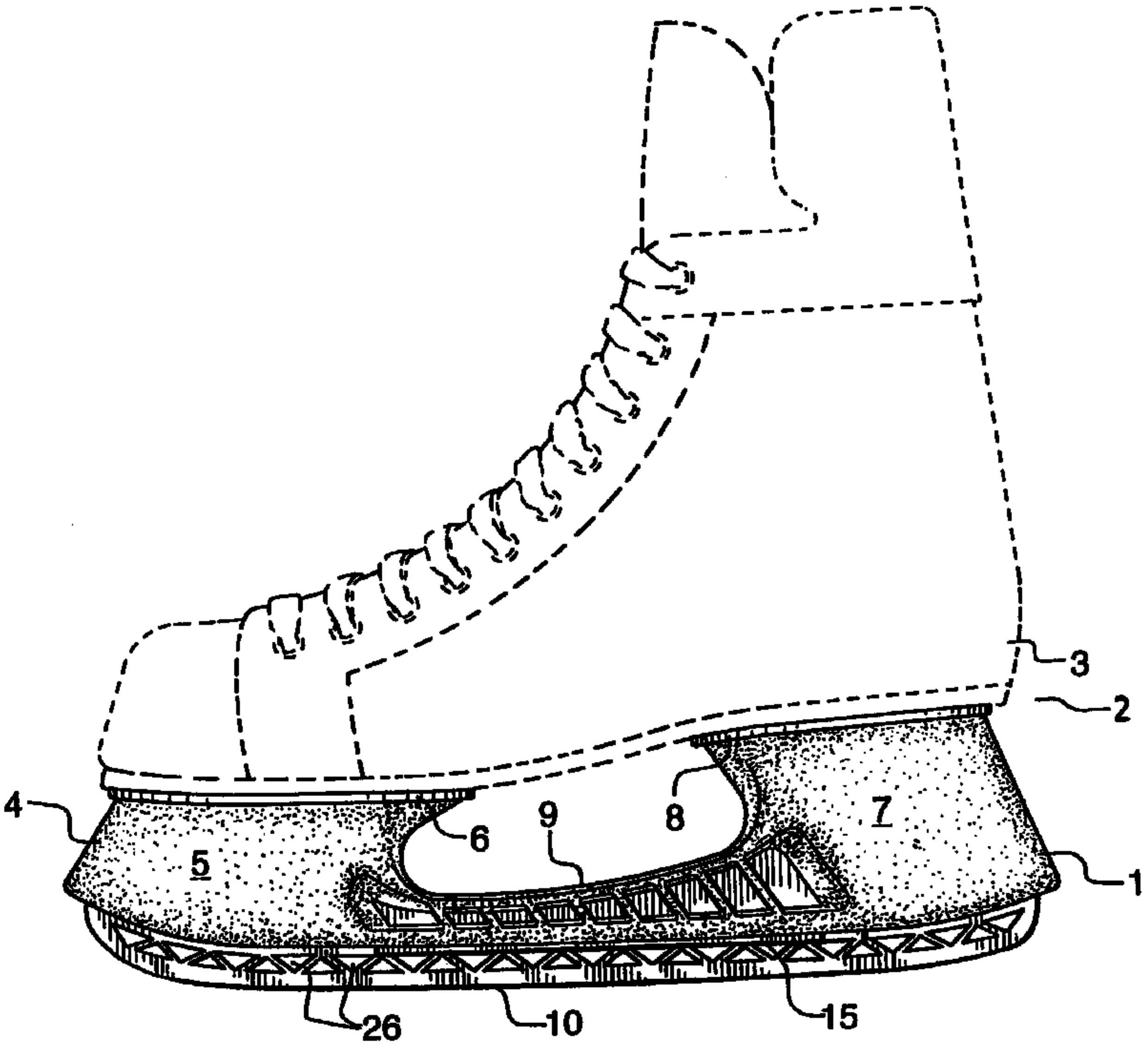
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