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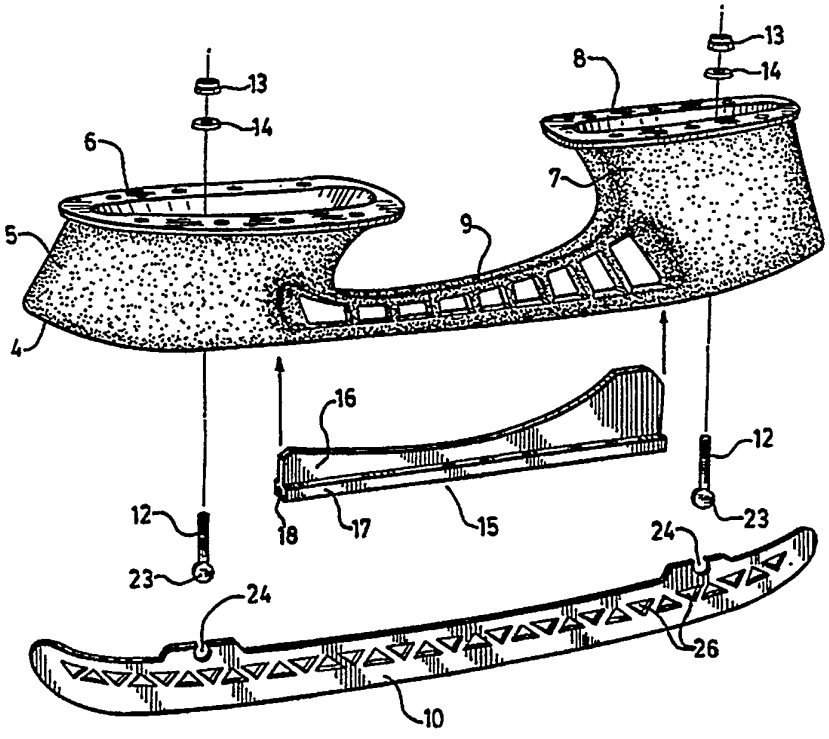
(54) Title: SKATE BLADE AND SKATE BLADE ASSEMBLY

(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.



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# 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 of the first aspect of the invention has an elongated blade holder having a front portion for attachment beneath the toe area of the skate boot, a rear portion for attachment beneath the heel area of the skate boot, and an integral neck portion between the front and rear portions. The blade holder has a longitudinal slot running along the bottom thereof to receive a blade or "runner", 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 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 areas. A second aspect of the invention, therefore, relates to a skate and skate blade assembly where the runner has a plurality of cutouts, spaced longitudinally along the runner, thereby reducing the weight of the runner 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 preferably are arranged in a central area between a solid upper area of the runner and a solid lower area of the runner, extending a substantial portion of the overall length 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.

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** which are pulled upwardly by nuts **13** which contact collars **14**. The pins have rounded, flattened heads **23** which fit into appropriately dimensioned rounded slots **24** in 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 runner being reduced in weight relative to conventional solid runners, by virtue of the cutouts **26**.

The cutouts are arranged in a central area between a solid upper area **28** of the runner and a solid lower area **30** of the runner, extending a substantial portion of the overall length 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.

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. 11, 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.

## INDUSTRIAL APPLICABILITY

The invention provides an improved ice skate blade and ice skate blade assembly.

## CLAIMS

1. An ice skate blade assembly (1) for attachment to a skate boot (3), said skate blade assembly comprising:

an elongated blade holder (4) having a front portion (5) for attachment beneath the toe area of the skate boot, a rear portion (7) for attachment beneath the heel area of the skate boot, and an integral neck portion (9) between said front and rear portions, said blade holder having a longitudinal slot (11) running along the bottom thereof to receive a runner (10); and

a runner (10)secured in said slot;

characterized by at least one rigid reinforcement member (15) running along said neck portion, within said slot and above said runner, said slot being enlarged at the location of said reinforcement member(s) in order to accommodate said member(s).

2. An ice skate blade assembly as recited in claim 1, further characterized by said at least one rigid reinforcement member comprising an elongated web (16) positioned in said slot above said runner, and following the shape of said runner.

3. An ice skate blade assembly as recited in claim 2, further characterized by a channel (17) integral with said elongated web and having a cross-section in the form of inverted U-shape comprising a base and two arms, the arms running alongside said runner within said slot, one on either side of said runner, and the base overlying the top of said runner and following the shape thereof.

4. An ice skate blade assembly as recited in claim 1, characterized by each said rigid reinforcement member being of a reinforced plastic composite material.

5. An ice skate blade assembly as recited in claim 1, characterized by said runner having a plurality of cut-out areas (26) spaced longitudinally therealong, to reduce the weight of said runner.

6. An ice skate runner (10) characterized by having a plurality of cut-out areas (26) spaced longitudinally therealong, thereby reducing the weight of said runner.

7. An ice skate runner as recited in claim 6, characterized by said cutouts being arranged in a central area between a solid upper area of the runner and a solid lower area of the runner, extending a substantial portion of the overall length of the runner, in such a fashion that the remaining runner material in the central area leaves a truss-like structure between said upper and lower areas.

8. An ice skate runner as recited in claim 7, characterized by said cutouts being triangular, each successive triangle being inverted relative to its predecessor, so as to define ribs between the cutouts, each successive rib angling forwardly or rearwardly in alternating fashion.

9. An ice skate runner as recited in claim 7, characterized by said cutouts including semi-circular cutouts of the same orientation, each pair of said semi-circular cutouts having a curved generally triangular cutout between them, leaving curved ribs between said upper and lower areas having a semi-circular look.

10. An ice skate blade assembly (1) for attachment to an ice skate boot (3), said skate blade assembly comprising:

an elongated blade holder (4) having a front portion (5) for attachment beneath the toe area of the skate boot, a rear portion (7) for attachment beneath the heel area of the skate boot, and an integral neck portion (9) between said front and rear portions, said blade holder having a longitudinal slot (11) running along the bottom thereof to receive a runner;

characterized by a runner secured in said slot having a plurality of cut-out areas (26) spaced longitudinally therealong, thereby reducing the weight of said runner and said blade assembly.

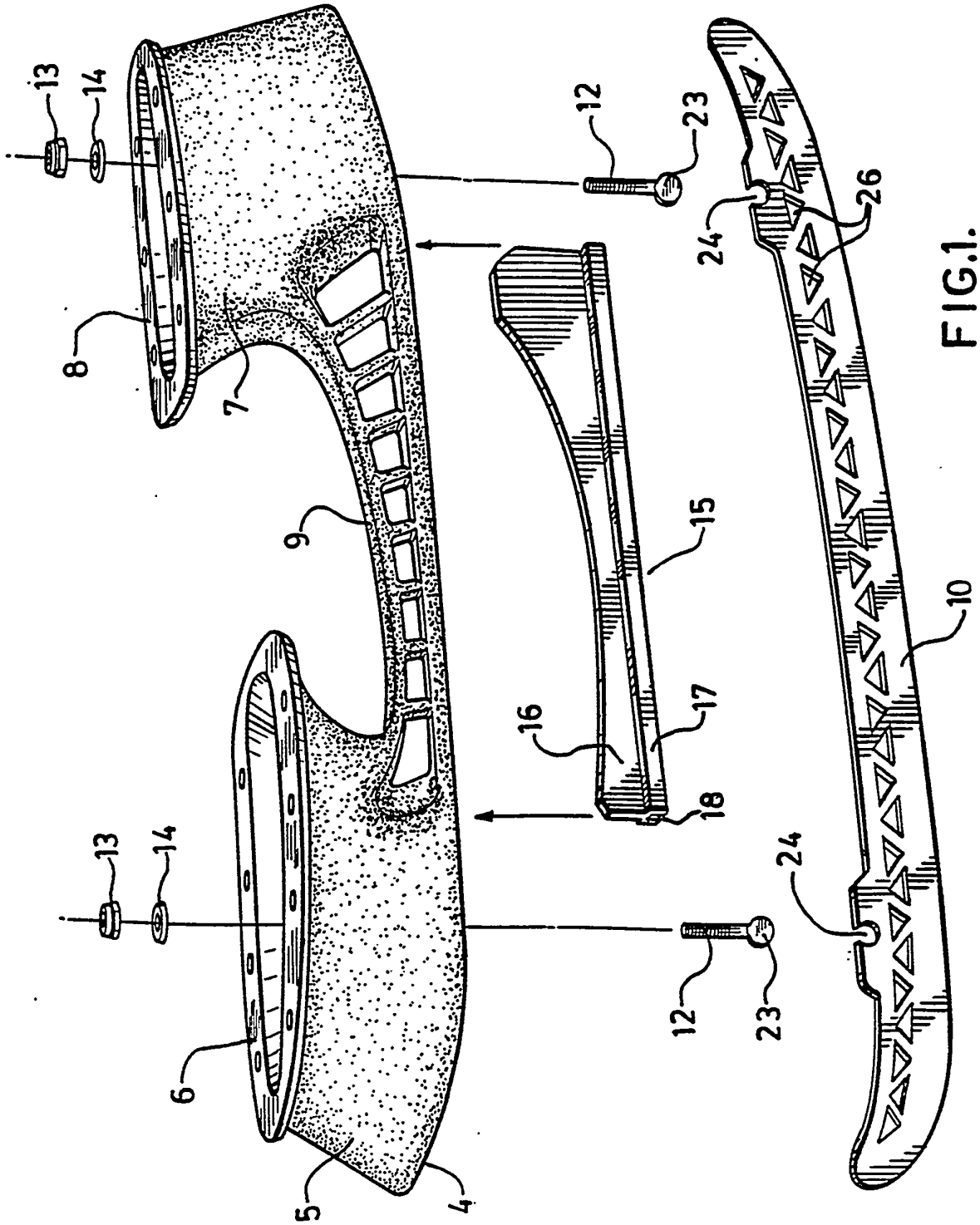


FIG.1.



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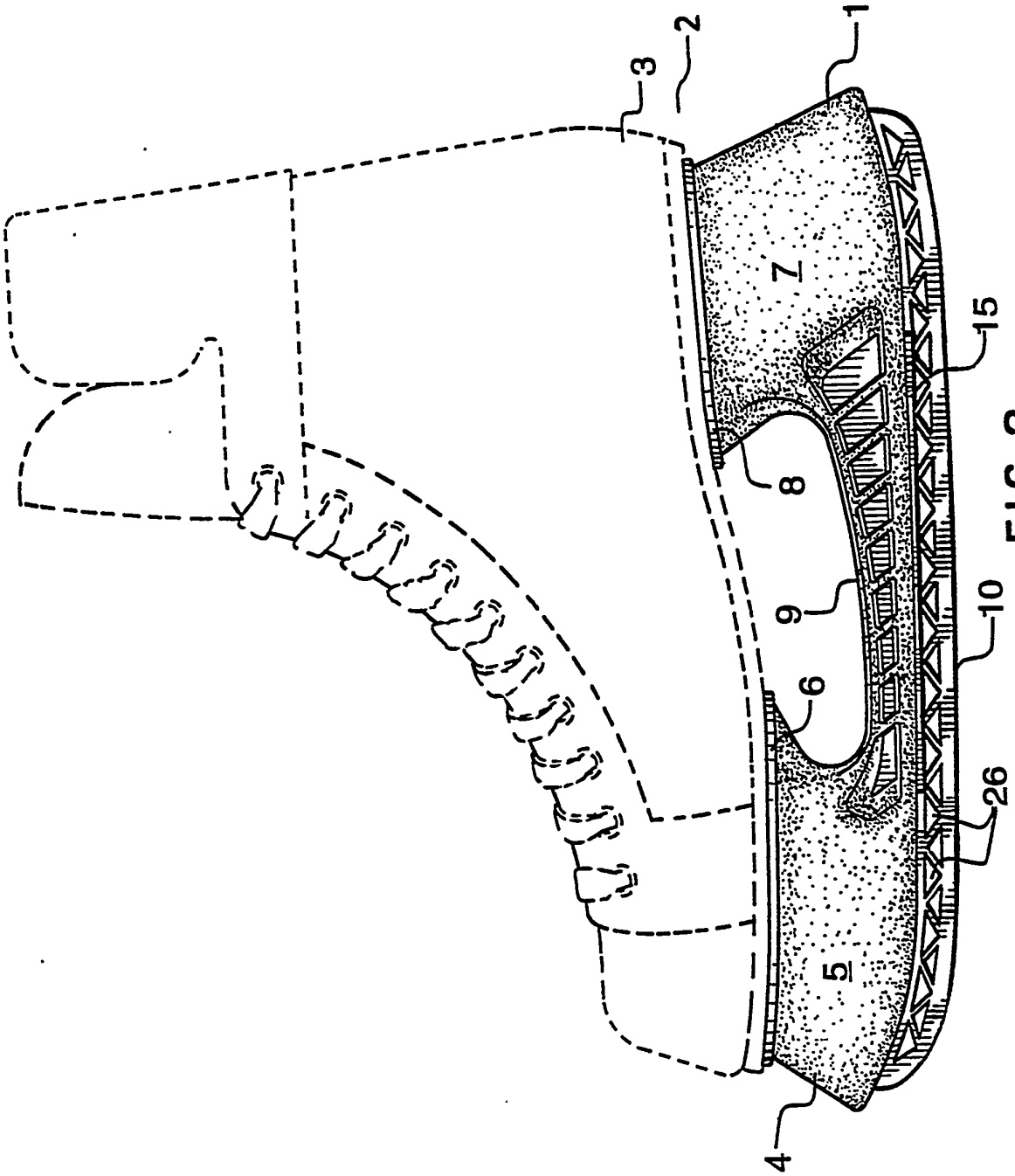


FIG.2.

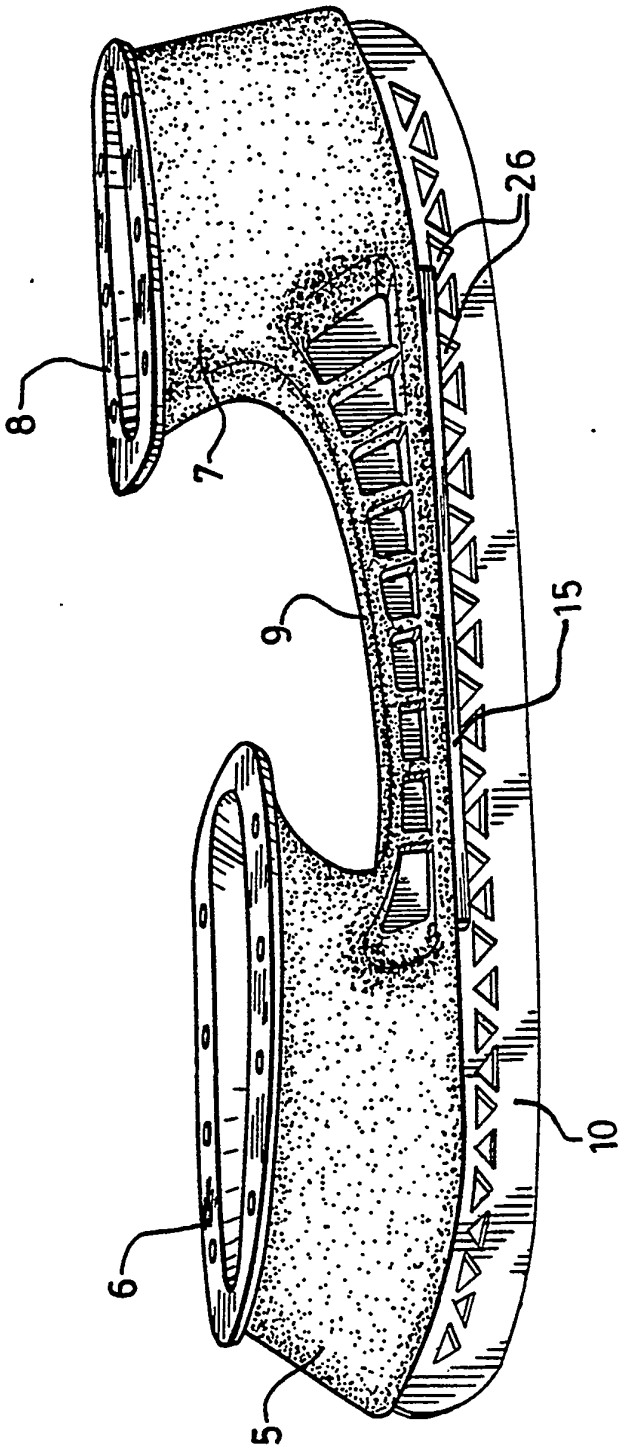


FIG.3.

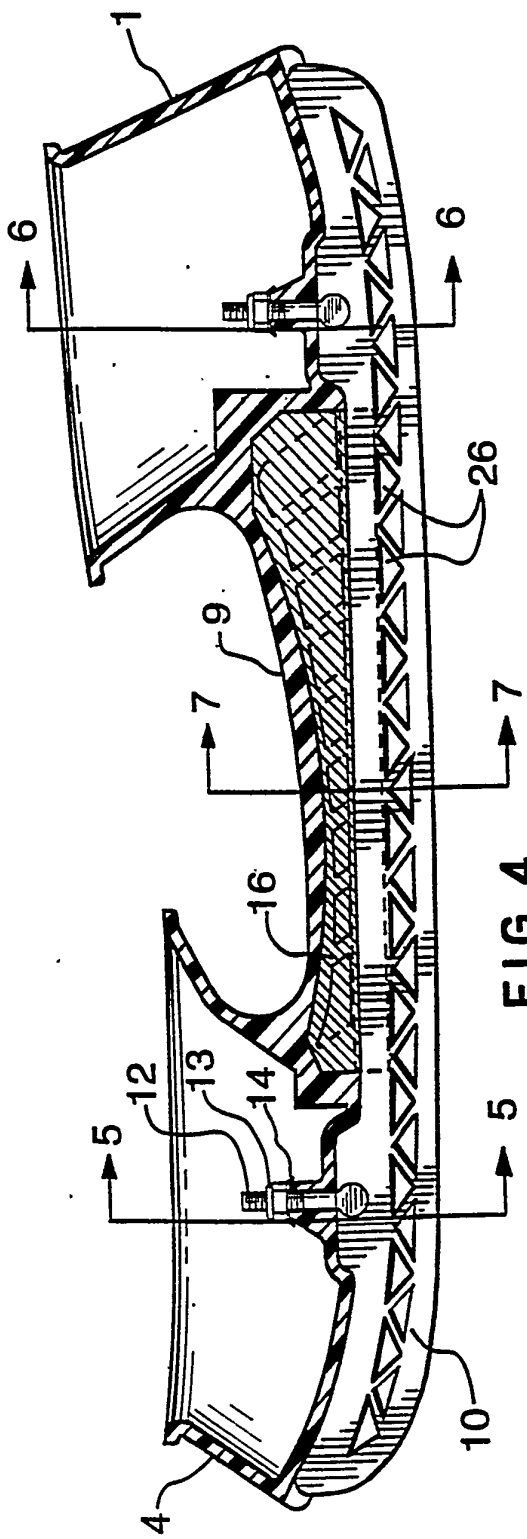


FIG.4.

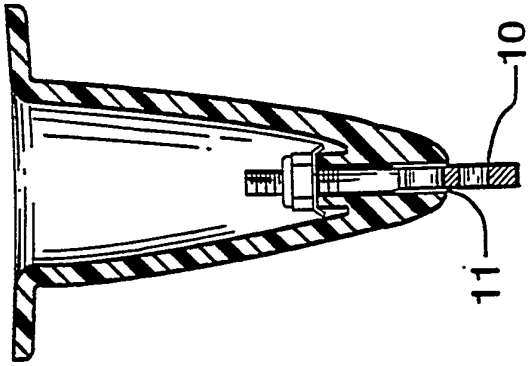


FIG.6.

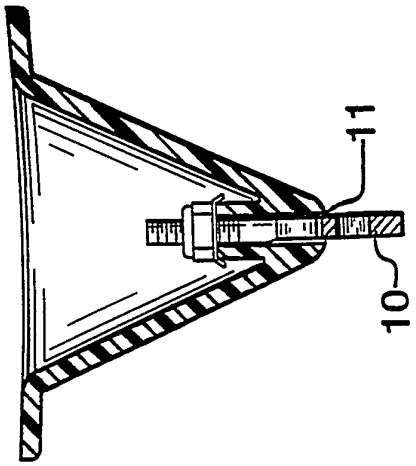


FIG.5.

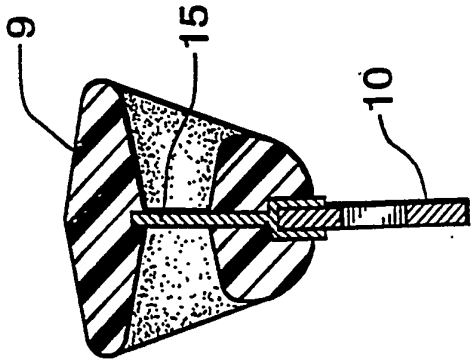


FIG.7.



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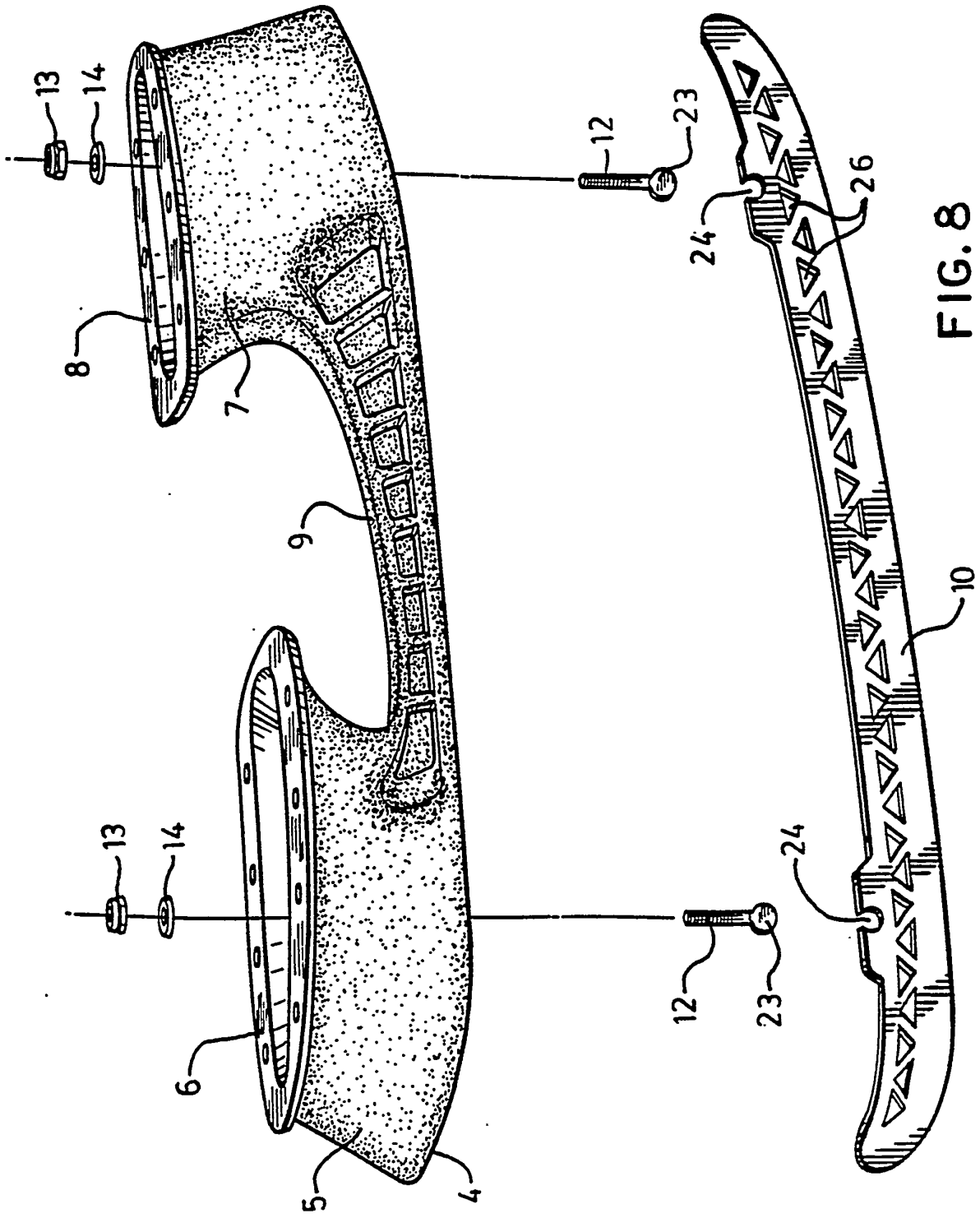


FIG. 8

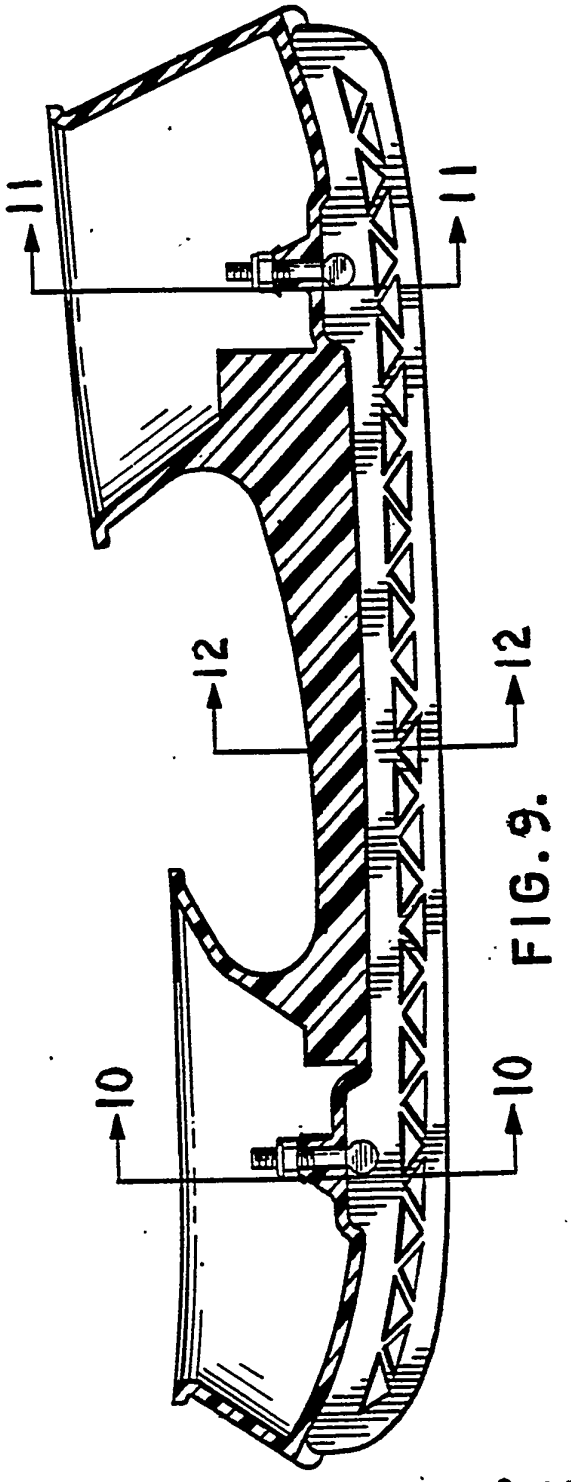


FIG. 9.

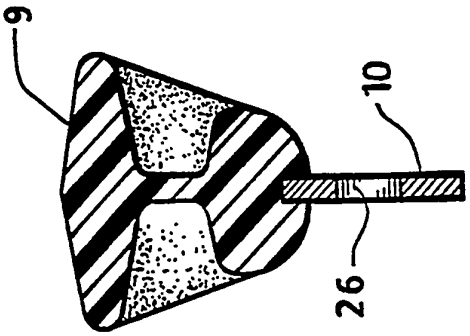


FIG. 12

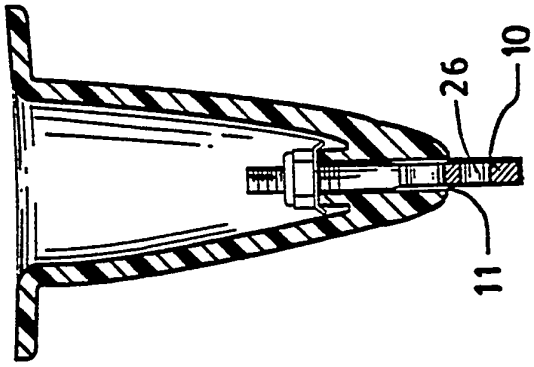


FIG. 11

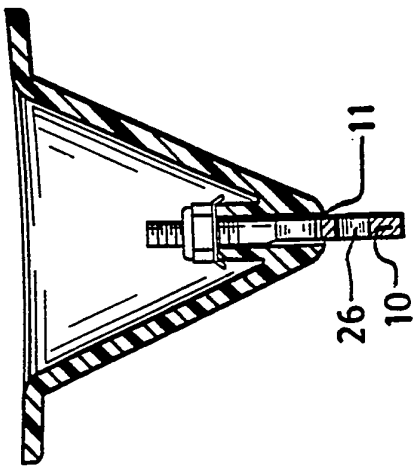


FIG. 10

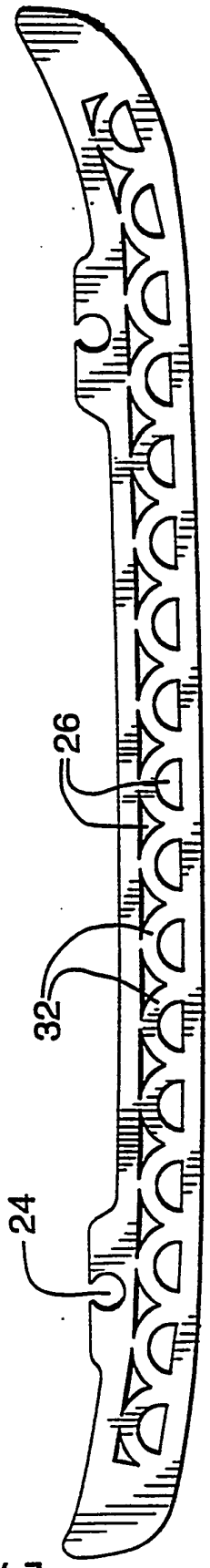


FIG. 13

# INTERNATIONAL SEARCH REPORT

Interr al Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A63C1/30

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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| A | US,A,4 074 909 (BAIKIE) 21 February 1978<br>see figures 1,3 | 1,2 |
| A | EP,A,0 311 196 (HOOGOVENS B.V.) 12 April 1989<br>see column 3, line 31 - line 40; figure 1 | 1,4 |
| A | US,A,4 139 209 (HUMPHREYS) 13 February 1979<br>see figures 1,2 | 1 |

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