



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 616 783 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.01.2006 Bulletin 2006/03

(51) Int Cl.:
B63B 35/81 (2006.01) **B63B 35/79** (2006.01)
A63C 9/00 (2006.01)

(21) Application number: **05015071.3**

(22) Date of filing: **12.07.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(30) Priority: **13.07.2004 US 587049 P**

(71) Applicant: **MOTION WATER SPORTS, INC.**
Redmond WA 98073 (US)

(72) Inventor: **Crumrine, Scott**
Encinitas, CA 98073 (US)

(74) Representative: **Paul, Dieter-Alfred et al**
Patentanwalt,
Hellersbergstrasse 18
41460 Neuss (DE)

(54) **Molded heel and toe piece for a wakeboard binding and method of making**

(57) A toe and heel piece (3) for a wakeboard binding are formed as free standing three dimensional shapes prior to binding assembly. The toe piece (3) has a center body portion (5) that extends from a front edge (7) to a rear edge (9), the body center body portion (5) including a curvature that approximates the curvature between the top part of the user's foot and a shin part of the user's

leg. The toe piece also has a pair of opposing flaps (13), each flap curving downward from the center body portion. The flaps can terminate in a flange (15), and the toe piece (3) can include means for binding it to hardware of the wakeboard. The heel piece tapers in width from a bottom portion to a top portion, and is molded to follow the contour of the user's calf, ankle, and/or heel.

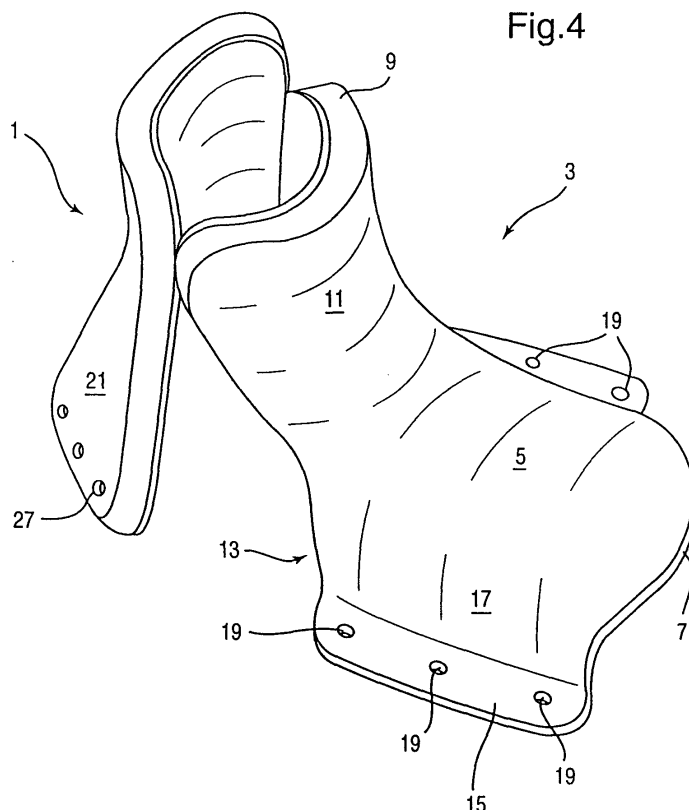


Fig.4

EP 1 616 783 A2

Description

[0001] This application claims priority under 35 USC 119(e) based on provisional patent application no. 60/587,049, filed on July 13, 2005.

FIELD OF THE INVENTION

[0002] The present invention is directed to an improved wakeboard binding, and in particular to a binding that utilizes molded toe and heel pieces to provide more comfort to a user, and ease of entry of a user's foot into the binding.

BACKGROUND ART

[0003] In the art of making wakeboard bindings, the heel and toe pieces are molded in flat pieces, which are then curved during binding manufacture. United States Patent No. 6,036,561 to Fletcher, herein incorporated by reference in its entirety, is one example of a wakeboard binding wherein heel and toe pieces are used as part of the binding. Figures 1 and 2 illustrate the flat toe piece design of the prior art. In Figure 1, a toe piece is designated by the reference numeral 60, and is T-shaped. Referring to Figure 2, segment 61 is designed to conform to a user's shin 67, with segment 63 wrapping around a user's arch 69. Segment 63 also has a plurality of openings which allows the toe piece to be secured as part of the wakeboard binding.

[0004] A prior art heel piece is shown in Figure 3 and designated by the reference numeral 70, with segment 71 designed to wrap around the back of a user's calf with segment 73 intended to wrap around the user's heel. Openings 75 along a lower portion of the heel piece 70 facilitate attachment to a binding component.

[0005] Referring back to the Fletcher patent and Figures 2 and 3 thereof, the toe piece 16 has flaps 28 which are designed to wrap around the sides of the user's foot. The vertical portion 32 bends up against the user's leg. The heel portion 18 has flaps 44 which are designed to bend around the user's foot to form a heel pocket.

[0006] The prior art wakeboard bindings utilize these two-dimensional ethylene vinyl acetate (eva) or rubber heel and toe pieces by bending them into the assembled position to form a "boot" which is used to secure the foot. These pieces are then usually surrounded by an "overlay" to provide more support and a tighter fit to the foot. However, since these heel and toe pieces are two-dimensional shapes that are bent into shape by the assembly to the binding base or plate, they do not effectively fit the natural contours of the foot. In regards to the toe piece, this results in uncomfortable pressure points around the top of the foot and the ankle, primarily over the transition from the top of the foot up and into the lower shin. Also, regarding the heel piece, since it does not adequately conform to the contours of the heel, ankle, and calf area, this design does not allow sufficient heel hold-down while

riding. Figure 2 illustrates how the prior art toe piece does not readily conform to a user's foot. That is, because the toe piece is made of a sheet material, a crease is formed where the foot merges into the shin, thus creating a zone of discomfort to the user. Likewise, the sheet heel piece makes no accommodation for the contour of the heel, calf and/or ankle, thus providing a less-than-tight fit in this area of the foot, and compromising the holding power of the binding during wakeboard use.

[0007] United States Patent No. 5,997,375 to Vukelic, also incorporated herein in its entirety by reference, discloses a wakeboard binding typical of the prior art types. Vukelic describes the heel and toe piece as being made from sheet material, e.g., an elastomeric metallocene rubber bonded to a foam sheet. Vukelic suffers from the same drawbacks as the Fletcher design, i.e., the formation of creases or ridges when the toe and heel pieces are assembled into the binding; thereby resulting in pressure points on portions of a user's foot.

[0008] In light of the deficiencies in heel and toe pieces of prior art wakeboard bindings, a need has developed to provide improved bindings that offer better comfort and ease of use. The present invention solves this need by providing heel and toe pieces, each being molded into a three dimensional shape that follows the contour of a foot, thereby easing entry into the binding, facilitating removal, and offering better comfort during use.

SUMMARY OF THE INVENTION

[0009] It is an object of the invention to provide an improved wakeboard binding.

[0010] Another object of the invention is to provide improved heel and toe pieces that are used in wakeboard bindings.

[0011] One other object is an improvement in the method of making wakeboard bindings, particularly, the manner in which the heel and toe pieces are attached to binding hardware.

[0012] Other objects and advantages will become apparent as a description of the invention proceeds.

[0013] In satisfaction of the foregoing objects and advantages, the present invention is an improvement in the field of wakeboard bindings. Typically, these bindings use separate and flat toe and heel pieces, each of which being manipulated and creased or folded when assembled into the binding. The invention eliminates this folding step and the resultant problems in fit and comfort caused thereby by providing a toe piece that is molded in a permanent three dimensional shape to generally follow the contours of the top part of a user's foot, and the curvature between the top part of the user's foot and a shin part of the user's leg. The heel piece is also molded in a permanent three dimensional shape to generally follow the contours of a user's heel, ankle, and/or calf.

[0014] The heel piece can be made of a polymeric material and be tapered in width from a bottom portion to a top portion. The toe piece can also be made of a poly-

meric material and include a center body portion that extends from a front edge to a rear edge of the toe piece, the center body portion including a curvature that approximates the curvature between the top part of the user's foot and a shin part of the user's leg. The toe piece can also include a pair of opposing flaps, each flap curving downward from the center body portion and terminating, if desired, in a flange.

[0015] Means for attaching the heel piece and the toe piece to hardware of the wakeboard binding are provided, and these means preferably include the flanges, if present, and/or openings in the heel and toe pieces to facilitate attachment.

[0016] The present invention is also an improvement in the method of making wakeboard bindings. Contrary to the prior art technique which creased or folded the toe and heel pieces to form the binding, the invention method eliminates this step in its entirety. That is, each of the heel and toe pieces are formed as part of their manufacture with a free standing three dimensional shape that follows the contour of the portion of the user's foot or leg in contact with the thus-formed piece. The formed heel and toe pieces can then be assembled into the wakeboard binding using known techniques and means for this assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Figure 1 is a view of a prior art flat toe piece prior to assembly;

[0018] Figure 2 is a perspective view of the toe piece of Figure 1 in relation to a lower leg of a user

[0019] Figure 3 is a view of a prior art flat heel piece prior to assembly;

[0020] Figure 4 is a perspective view of one embodiment of the heel and toe pieces of the invention;

[0021] Figure 5 is a top view of the toe piece of Figure 4 covering a foot of a user;

[0022] Figure 6 shows a side view of the toe piece in use on a user's foot;

[0023] Figure 7 shows a front view of the toe piece of Figure 4;

[0024] Figure 8 shows a rear or inside view of the toe piece of Figure 4;

[0025] Figure 9 shows a side view of the heel piece of Figure 4; and

[0026] Figure 10 shows a rear view of the heel piece of Figure 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] The present invention offers significant advantages over the prior art toe and heel pieces used in wakeboard bindings. Unlike the essentially flat construction of the prior art pieces, the heel and toe pieces of the invention are molded to follow the contour of the user's foot prior to assembly of the wakeboard binding. In this way,

the creases or ridges that are formed when assembling the flat heel and toe piece into the wakeboard binding are eliminated, and the user has a much more comfortable binding for wakeboarding.

[0028] According to the invention, the prior art two-dimensional heel and toe pieces shown in Figures 1-3, are molded or otherwise shaped into a three-dimensional shape before assembly to the binding. Figure 4 shows one embodiment of the invention, wherein the heel piece is designated by the reference numeral 1 and toe piece is designated by the reference numeral 3, both molded in a three dimensional molded. This molding or shaping can be done such that the heel and toe pieces closely match the contours of the foot and lower leg. As a result, uncomfortable pressure points are eliminated. Moreover, the fit of the binding is improved, and as a result of these features, the user experiences more overall comfort and support of the binding. In addition, this innovation provides for easier entry of the foot into the binding, since the three-dimensional shape of the toe piece allows for a more natural bending motion of the ankle during entry into the binding.

[0029] Still referring to Figure 4, the toe piece 3 includes an upper foot segment 5 that extends from a front edge 7 and is molded to follow the contours of the upper part of a user's foot. The toe piece 3 includes a shin segment 11 that curves upwardly from the upper foot segment 5 to contact the user's shin or leg, and terminates in edge 9. The two segments 5 and 11 join at a natural curve, which eliminates the pressure point created by the use of a sheet material that is creased when the binding is mounted or assembled on a wakeboard. The upper foot segment 5 is molded with a pair of flaps 13, each flap terminating in a flange 15. The flaps 13 are contoured to follow the side of the foot, with each flange 15 angled with respect to a side surface 17 of the flap 13. The flanges 15 facilitate attachment of the toe piece 3 to the binding hardware (not shown). The flanges 15 also include openings 19 to facilitate attachment to a binding component.

[0030] Figures 5 and 6 show the toe piece more closely conforming to the curves of the foot and lower leg, especially in the area where the top of the foot transitions into the lower shin, the curve of the toe piece shown as reference numeral 32.

[0031] Figures 7 and 8 show the front and rear views of the toe piece 3, respectively, with Figure 7 more clearly showing how the upper foot segment 5 and flaps 13 contour to follow the top and sides of a user's foot. Figure 8 shows more detail concerning the toe piece, and specifically its inner surface 34. This figure also illustrates the contour of the toe piece, including the curve 32 where the upper foot segment 5 transitions to the shin segment 11.

[0032] The molded heel piece 1 is best seen in Figures 4, 9 and 10, wherein the heel piece 1 has a rear surface 21 which is convex as it extends from a lower portion 23 to an upper portion 25. The toe piece 1 also has openings 27 at the lower portion 23 for binding attachment purposes.

es. The lower portion 23 is wider than the upper portion, so that the heel piece is tapered, the lower portion width accommodating the need to provide lateral support around the side of the heel of the foot. Because of its curved configuration, the heel piece also has a concave inner surface, an upper portion 26 adapted to contact a user's calf, with a lower portion 28 adapted to surround the user's heel and ankle, see Figure 9..

[0033] These three-dimensional heel and toe piece shapes can be manufactured in a variety of ways, including any ways that are known in the art of molding polymeric materials in three dimensional shapes. The method employed to make the illustrated toe piece 1 and heel piece 3 involves first forming the pieces into two dimensional shapes by cutting a sheet of polymeric material into the desired dimensions. The cut sheet shapes are heated, and then placed under pressure in a cooled three-dimensional mold such that the three-dimensional shape is then permanently imparted onto the heel and toe pieces.

[0034] The shaping step, depending on the material, can be achieved by other methods. For example, rubber pieces can be compression molded (this is the most common manufacturing process for molded rubber parts), with the compression mold designed with the three-dimensional shape such that the rubber part has this shape when it is removed from the mold. Alternatively, the pieces can be injection molded directly into the three-dimensional shape. Such a process can be used with eva (ethylene vinyl acetate) foam materials, polyethylene foam materials, or any other injection moldable foam or suitable plastic materials (such as phylon foam, or medium-durometer PU, PVC, or TPU plastic materials).

[0035] The actual material used for the toe and heel pieces can be any polymeric material, either as a single material, a laminate made up of different materials, a composite material, or the like. The material chosen should be capable of being formed into the desired three dimensional shape, as well as meet the other requirements known in the art for wakeboard binding components, flexibility, resistance to degradation due to the elements, etc.

[0036] While the heel and toe pieces are not illustrated as part of a wakeboard binding, the non-illustrated binding components are well known as shown in the aforementioned patents, and a detailed description of the binding hardware or other components is not deemed necessary for understanding of the invention.

[0037] It should also be understood that the flange on the toe piece is but one way to facilitate attachment of the toe piece to the binding. As another option, the toe piece could be formed without the flange such that the lower portion of the toe piece sides 17 would have openings to facilitate attachment to a binding component such as a binding plate. Of course, other means as would be within the skill of the art can be employed to attach the toe piece and heel piece to the binding hardware.

[0038] As such, an invention has been disclosed in

terms of preferred embodiments thereof which fulfills each and every one of the objects of the present invention as set forth above and provides a new and improved heel and toe piece for wakeboard bindings.

5 **[0039]** Of course, various changes, modifications and alterations from the teachings of the present invention may be contemplated by those skilled in the art without departing from the intended spirit and scope thereof. It is intended that the present invention only be limited by
10 the terms of the appended claims.

Claims

15 1. In a wakeboard binding including a separate heel piece and toe piece, the improvement comprising:

a toe piece molded in a permanent three dimensional shape to generally follow the contours of the top part of a user's foot, and the curvature between a top part of the user's foot and a shin part of the user's leg; and

a heel piece molded in a permanent three dimensional shape to generally follow the contours of a user's heel.

25 2. A heel and toe piece combination for a wakeboard comprising:

a heel piece made of a polymeric material and having a free standing three dimensional shape, the heel piece tapering in width from a bottom portion to a top portion, the heel piece molded to generally follow the contour of the heel of a foot; and

a toe piece made of a polymeric material and having a free standing three dimensional shape, the toe piece including:

a center body portion that extends from a front edge to a rear edge of the toe piece, the center body portion including a curvature that approximates the curvature between the top part of the user's foot and a shin part of the user's leg, and
a pair of opposing flaps, each flap curving downward from the center body portion and terminating in a flange; and
means to attach the heel piece and the toe piece to hardware of the wakeboard binding.

3. The binding of claim 1, further including means to attach the heel piece and the toe piece to binding hardware of the wakeboard.

4. The combination of claim 2, wherein the attaching means further comprises a plurality of openings in

the flanges of the toe piece and the bottom portion of the heel piece.

5. The binding of claim 3, wherein the attaching means further comprises a plurality of openings in flanges located at opposing sides of the toe piece and a plurality of openings in a bottom portion of the heel piece. 5
6. A toe piece for a wakeboard comprising a free standing three dimensional shape made of a polymeric material, the toe piece including: 10
a center body portion that extends from a front edge to a rear edge, the body center body portion including a curvature that approximates the curvature between the top part of the user's foot and a shin part of the user's leg, and a pair of opposing flaps, each flap curving downward from the center body portion and terminating in a flange; and 20
means to attach the toe piece to binding hardware of the wakeboard.
7. A heel piece for a wakeboard comprising a free standing three dimensional shape made of a polymeric material, the heel piece tapering in width from a bottom portion to a top portion, the heel piece molded to follow the contour of the heel of a foot; and means to attach the heel piece to binding hardware of the wakeboard. 25 30
8. In a method of making a wakeboard binding wherein a two dimensional heel piece and a two dimensional toe piece are attached to binding hardware of the wakeboard, said attaching step imparting a shape to the toe and heel pieces, the improvement comprising, first forming the heel piece into a three dimensional shape and the toe piece into a three dimensional shape, and then attaching the three dimensional-shaped toe and heel pieces to binding hardware of the wakeboard, wherein the three dimensional shape of the toe piece includes a curvature generally matching the curvature between the top part of the user's foot and a shin part of the user's leg, and the three dimensional shape of the heel piece is contoured to generally match the contour of a heel, calf, and ankle of a foot of a user. 35 40 45
9. The method of claim 8, wherein the toe piece is made of a polymeric material and further comprises: 50
a center body portion that extends from a front edge to a rear edge, the body center body portion including said curvature; and 55
a pair of opposing flaps, each flap curving downward from the center body portion and terminating in a flange; and

means to attach the toe piece to binding hardware of the wakeboard.

10. The method of claim 8, wherein the heel piece further comprises a free standing three dimensional shape made of a polymeric material, the heel piece tapering in width from a bottom portion to a top portion, the heel piece molded to follow the contour of the heel of a foot; and means to attach the heel piece to binding hardware of the wakeboard.
11. The method of claim 9, wherein the heel piece further comprises a free standing three dimensional shape made of a polymeric material, the heel piece tapering in width from a bottom portion to a top portion, the heel piece molded to follow the contour of the heel of a foot; and means to attach the heel piece to binding hardware of the wakeboard.

Fig.1
PRIOR ART

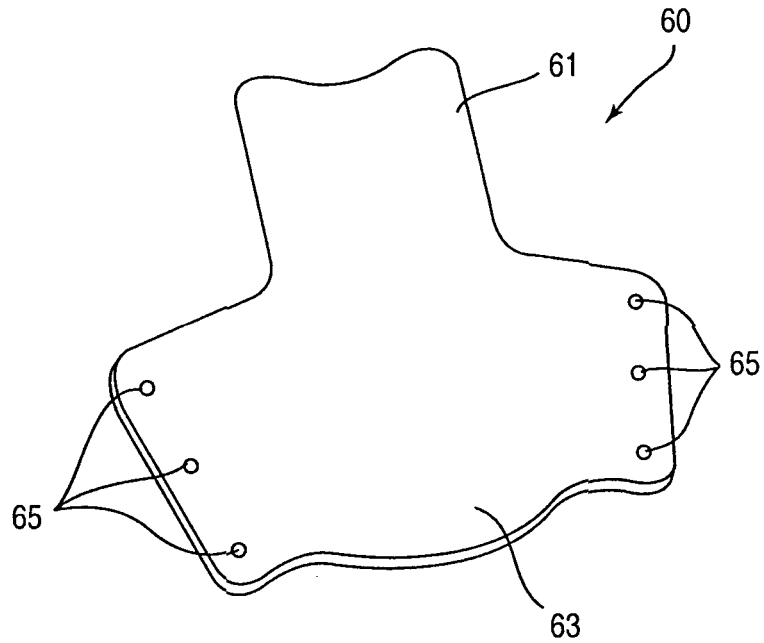


Fig.2
PRIOR ART

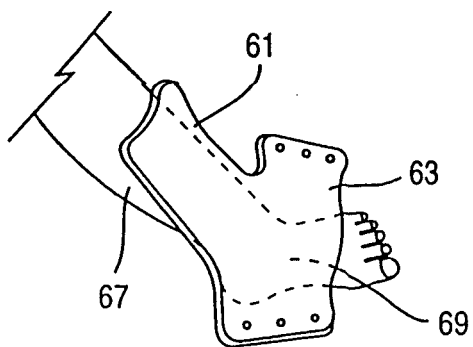


Fig.3
PRIOR ART

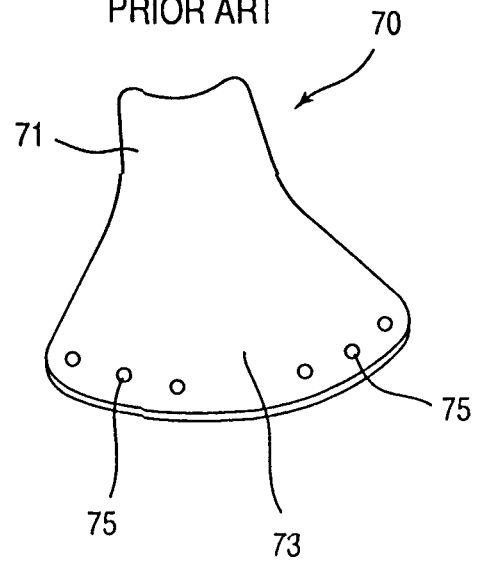


Fig.4

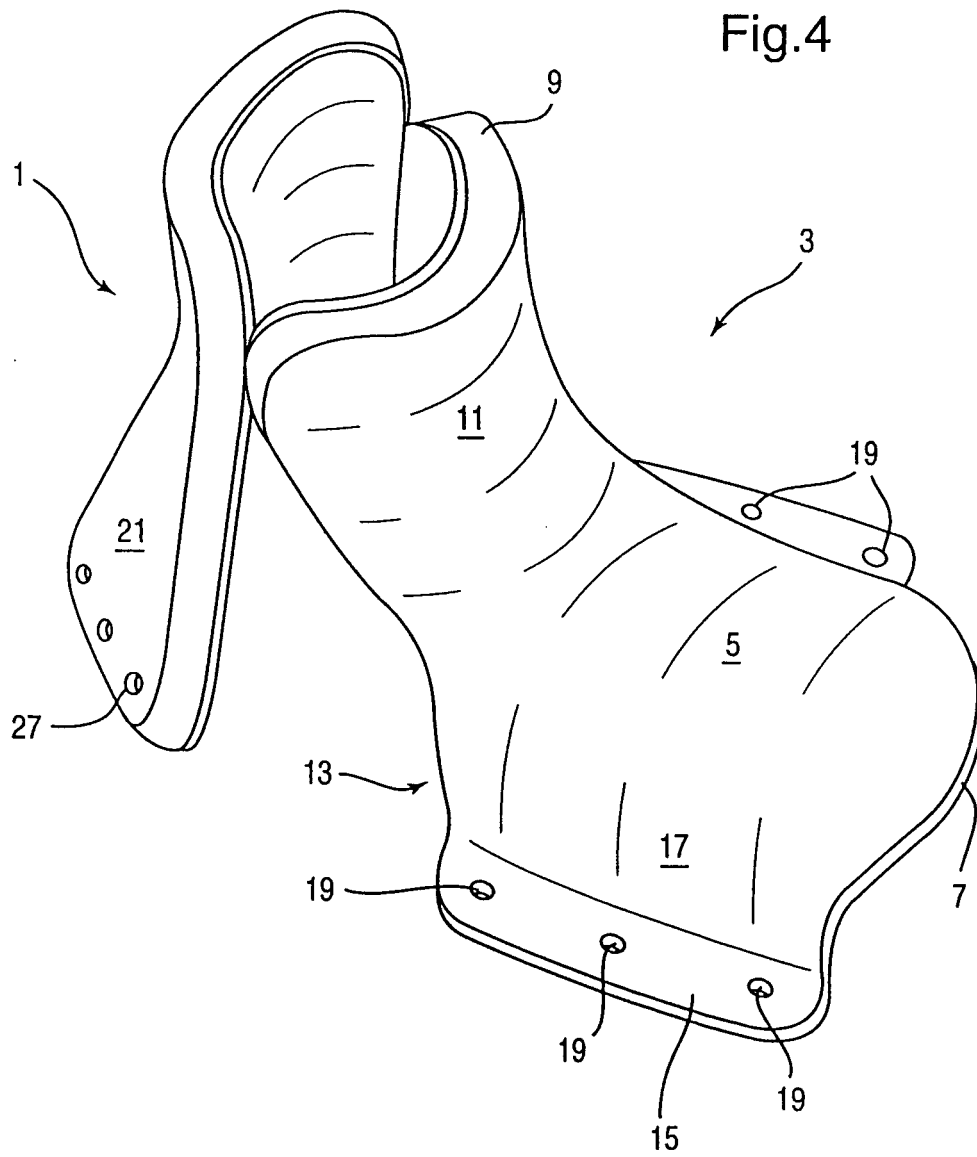


Fig.5

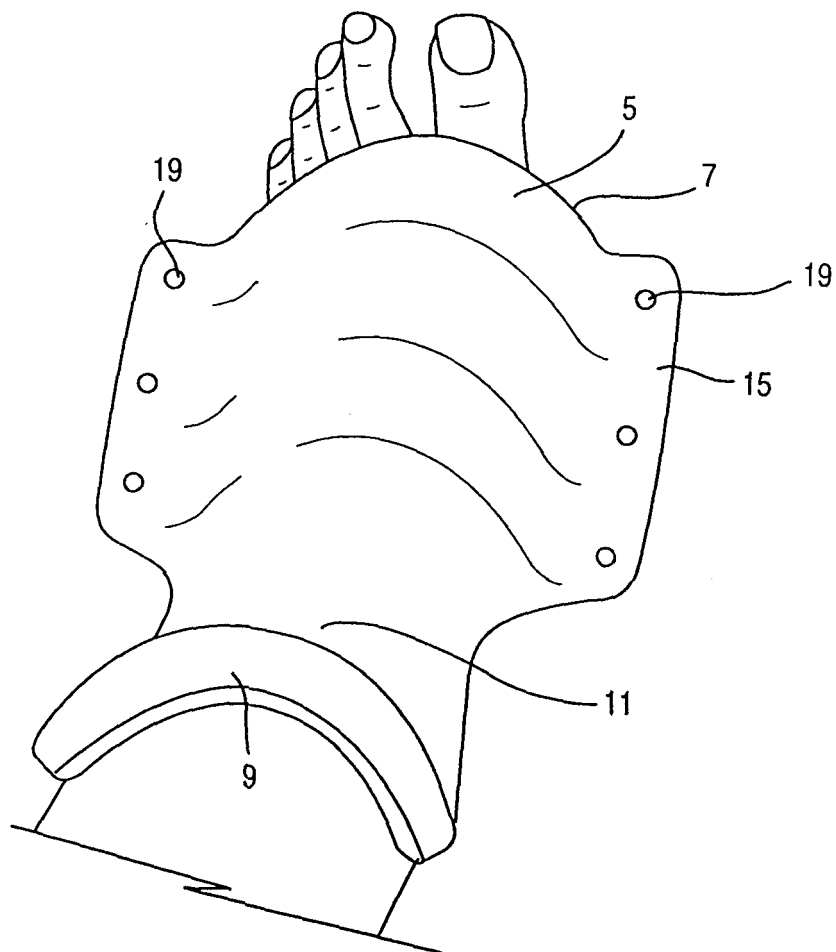


Fig.6

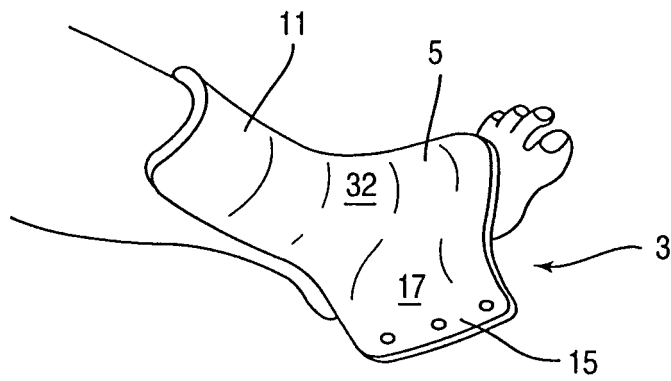


Fig.7

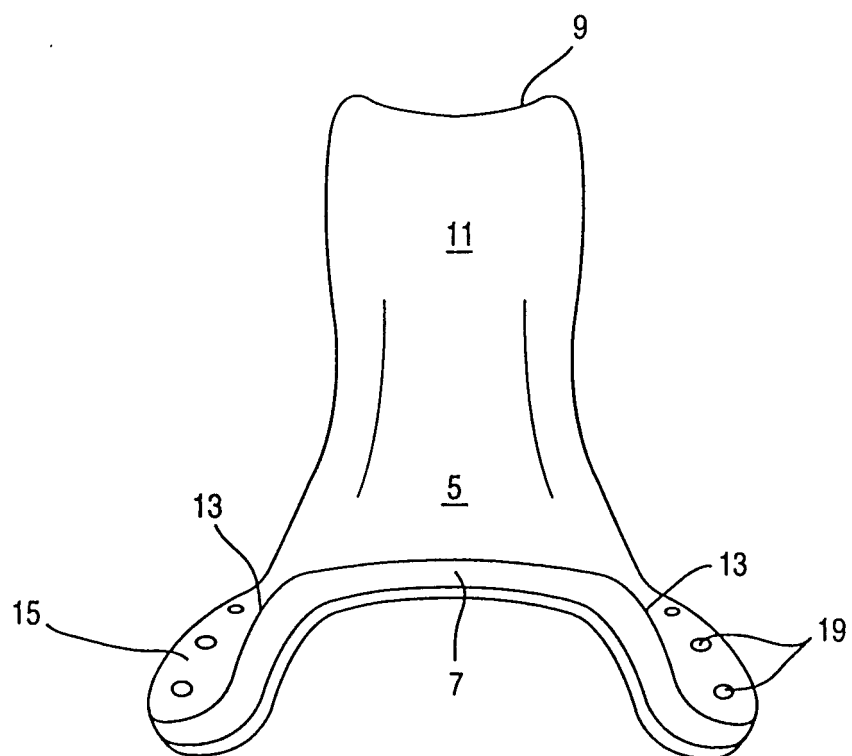


Fig.8

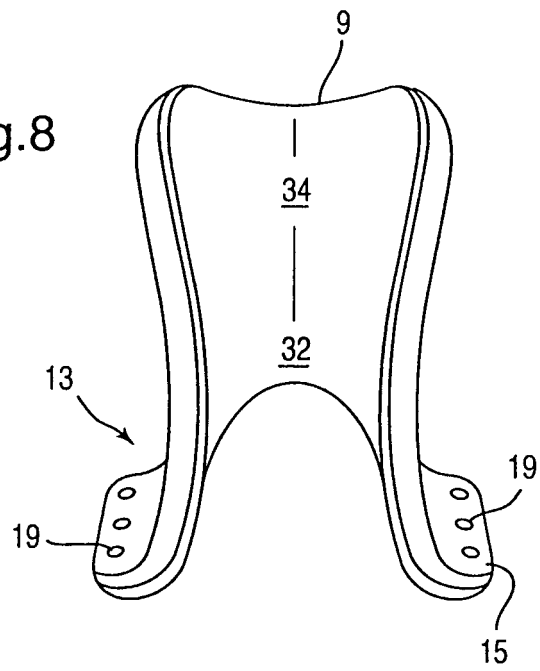


Fig.9

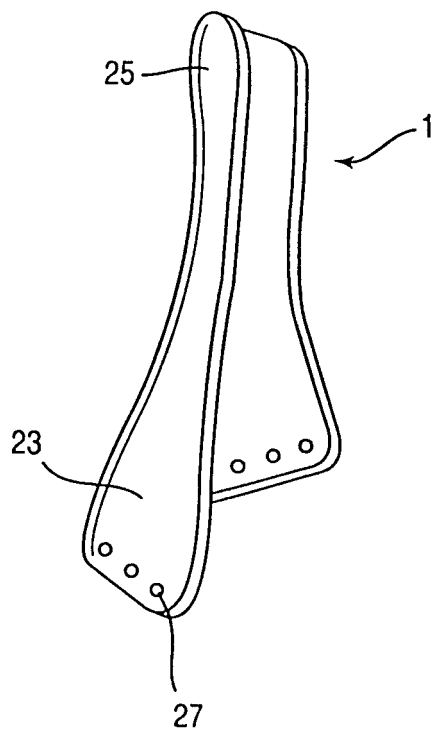


Fig.10

