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(54) **Title:** WINTER SPORTS FOOTWEAR DEVICE

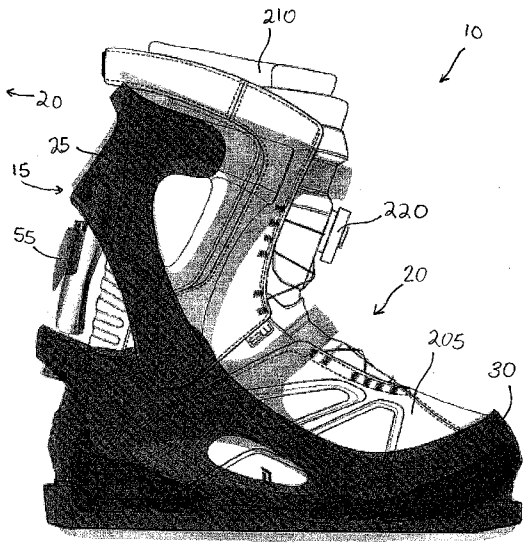


Figure 1B

(57) **Abstract:** Disclosed are sports boots that can be used with alpine skis, snowboards and the like. In one embodiment, there is disclosed a sports boot (10) that couples to a board that includes a rigid outer frame (15) and a flexible inner boot (20) having an upper positioned on a walking sole, the inner boot sized to be removably retained within the rigid outer frame. The rigid outer frame (15) includes a highback(25) and a base (30). The base comprises a toe region, a heel region and a longitudinally adjustable beam extending between the toe and the heel.regions. The flexible inner walking boot can be released from the frame and comfortably worn by a user for walking on surfaces when not in use with the board.

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# WINTER SPORTS FOOTWEAR DEVICE

## REFERENCE TO RELATED APPLICATION

**[0001]** This application claims the benefit of priority of co-pending U.S. Provisional Application Ser. No. 61/024,821, filed January 30, 2008. Priority of the aforementioned filing date is hereby claimed and the disclosure of the provisional patent application is hereby incorporated by reference in its entirety.

## BACKGROUND

**[0002]** Modern sports boots, such as ski boots, snowboarding boots, climbing boots, boots for ice skates or in line skates, etc., usually comprise an outer shell of a relatively firm and rigid plastic material and an inner lining that can be inserted into this outer shell. The inner lining consists of a comparatively softer cushioning material, where the inner lining fixes the foot relative to the outer shell, and where the cushioning material also contributes significantly to the wearing comfort by protecting the foot from cold temperatures and from developing pressure points.

**[0003]** Most alpine boots are hard-shell boots which combine a relatively hard, inflexible outer plastic shell and a padded inner lining. Hard-shell boots provide an acceptable support for the foot in all directions and are mostly used in connection with a so-called plate binding that overlaps the projections arranged within the toe and heel region of the boot with a bracket. The excellent support of this boot can only be attained by accepting the disadvantage of low flexibility, high weight, and poor wearing comfort. The boots are also extremely difficult to maneuver about in when not attached to skis. They are heavy, cumbersome and slippery on most surfaces and limit one's ability to simply "walk away" after skiing.

**[0004]** Snowboard boots, in contrast, can be either hard-shell or soft boots. Soft boots are generally configured to have a flexible upper which is relatively deformable so as to allow leg movements and comfortable wearing. The upper is associated with a walking sole that is also relatively flexible and deformable so as to allow for natural walking motions.

## SUMMARY

**[0005]** There is a need for a ski boot that retains the support and performance of a traditional alpine boot while providing greater comfort and convenience of a snowboard soft boot. There is also a need for a more cost-effective way to manufacture and stock parts for boots that are more highly adjustable and accommodate a wider variety of boot sizes.

**[0006]** Disclosed are sports boots that can be used with alpine skis, snowboards and the like. In one embodiment, there is disclosed a sports boot that couples to a board that includes a rigid outer frame and a flexible inner boot having an upper positioned on a walking sole, the inner boot sized to be removably retained within the rigid outer frame. The rigid outer frame includes a highback and a base. The base comprises a toe region, a heel region and a longitudinally adjustable beam extending between the toe and the heel regions.

**[0007]** Other features and advantages of the present invention should be apparent from the following description of various embodiments, which illustrate, by way of example, the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0008]** Figures 1A and 1B illustrate an embodiment of a boot including an outer frame member and walking boot;

**[0009]** Figure 2 is an exploded view of an embodiment of the suspension system;

**[0010]** Figure 3 illustrates an embodiment of the walking boot shown in Figures 1A and 1B;

**[0011]** Figure 4A is an exploded view of an adjustable sole assembly;

**[0012]** Figure 4B is a side, cross-sectional view of the adjustable sole assembly shown in Figure 4A;

**[0013]** Figure 5 is an exploded view of an embodiment of a boot including an outer frame member and walking boot;

**[0014]** Figure 6 is an exploded view of another embodiment of a boot including an outer frame member and walking boot.

## DETAILED DESCRIPTION

**[0015]** Disclosed is a sports boot that can couple to skis or a sports board, for use in snowboarding, snow skiing, snowshoeing, and other winter sports activities. Figures 1A and 1B illustrate an embodiment of a boot 10. The boot 10 is made of at least two completely separate component parts that fit together into a single functional unit but with independent characteristics. The two parts collectively form a footwear device comprised of a boot that is suitable for alpine skiing and can also be used with snowboards. A first part of the boot is a rigid outer frame member 15 made of a predetermined material, such as molded carbon fiber-like material, that provides the appropriate transfer of power between the user and the equipment. The second part of the boot is a flexible inner walking boot 20 that is sized and shaped to be removably positioned within the outer frame member 15. The walking boot 20 is a durable, insulated boot constructed with a walking sole. The walking boot 20 can be completely removed from the outer frame member 15 and is designed as a "walk-away" boot and worn comfortably by the wearer after finishing the activity.

**[0016]** Outer Frame Member

**[0017]** The outer frame member 15 can have various configurations that are adapted to receive the walking boot 20 and to provide characteristics suitable for use in winter sports. In an embodiment, the outer frame member 15 includes at least two pieces that couple to one another to collectively form the outer frame member 15. The outer frame member 15 can include a pivoting upper cuff or highback 25 and a base 30 that surrounds the heel, toe and sides of a foot when wearing the boot 10. The highback 25 and the base 30 are attached to one another, such as at each side of the ankle region of

the wearer's foot. It should be appreciated that the highback 25 and the base 30 can be formed of a single unitary body or they can be separate structural components that are attached together.

**[0018]** Various mechanisms can be used to attach the highback 25 and the base 30 together. For example, the attachment may be in the form of a pure freely rotating hinge member that hinges about a hinge point 35 or a fixation offering certain resistance to flexation. The hinge point 35 can be positioned at various locations. In an embodiment, the hinge point 35 is located at approximately ankle joint level to approximately coincide with the natural forward rotation movement of a foot inside the boot.

**[0019]** In an embodiment, the hinge point 35 of the hinge member is fitted with an adjustable lateral canting mechanism that has been used in similar cuff attachments in prior boots. The lateral canting adjustment mechanism allows for alignment of the highback 25 of the outer frame member 15 to the user's leg.

**[0020]** The outer frame member 15 desirably provides enough room to slip the inner walking boot 20 into the outer frame member 15 without requiring the walking boot 20 to flex excessively, or having the highback 25 open rearward. The outer frame may be closed around the inner walking boot using various types of straps that are flexible and adjustable by the user.

**[0021]** Each piece of the outer frame member 15 can be manufactured separately (such as through a molding process or extrusion). Each piece of the outer frame member 15 can also be made of a material that is suited for use in the types of conditions in which ski boots are used. In this regard, the material is desirably suited for use in low temperature and other extreme weather conditions. In an embodiment, the outer frame member 15 is made of carbon fiber-like material because it is a very rigid structure at all temperatures under which ski boots are used. Elastomeric thermoplastic materials comprise a vast majority of ski boot shells on the market today. The stiffness of these materials and therefore the flexibility of the shell in use varies highly with the ambient temperature. The carbon fiber frame used in

the outer frame member 15 disclosed herein is adapted to retain a more stable flex characteristic (with respect to elastomeric thermoplastic materials) throughout all operating temperatures. The carbon fiber-like frame is also considerably lighter in weight for a given dimension than traditional thermoplastic shell materials. Moreover, due to its woven characteristics, the carbon fiber-like frame has a greater flex modulus than polyurethane plastic materials.

**[0022]** As shown in Figures 1A and 1B, the highback 25 can be held in place relative to the base 30 with a suspension system 55 of the boot 10. The suspension system 55 is attached near the back of the boot 10 near the Achilles' tendon such as along the centerline of the boot, between the base 30 and the highback 25. The suspension system 55 allows for the adjustment of the neutral, or starting forward lean position of the highback 25. In an embodiment, the suspension system 55 includes a preload adjustment component that permits control of the flex curve within a relatively small deviation for a wider range of temperatures.

**[0023]** Figure 2 shows an exploded view of an exemplary embodiment of a preload adjustment component comprised of a suspension system 55. The suspension system 55 has a preload adjustment mechanism which can change the resistance curve to forward lean and a bumper 56 to dampen the movement when the highback 25 moves back to the neutral position. A major deficiency of existing polyurethane boots is the deviation of flex through a range of temperatures. The result is a compromise in boot performance.

**[0024]** Still with reference to Figure 2, the suspension system 55 includes a main body 57 having a pair of openings 59 and 61. An elastomeric spring element 63 fits within the opening 59. The spring element 63 can be made of various materials that provide desired stiffness capabilities. For example, the elastomeric spring can be made of a stiffer material or softer flexing material to satisfy the flex requirements of a given skier. Components of the suspension system 55 may be exchangeable or adjustable by the user.

**[0025]** The spring element 63 is retained within the opening 59 by coupling with one or more retention elements 65 that extend through a bore in the spring element 63 and also extend through a central bore in the main body 57. In this manner, the retention elements maintain an interfering engagement between the main body 57 and the spring element 63 to maintain the spring element 63 within the opening 59 in the main body 57. The position of at least one of the retention elements 65 may be adjusted relative to the spring element 63 to vary an amount of force on the spring element.

**[0026]** A lower bumper member 65 is threadedly attached to a lower spring element 66 within the lower opening 61 of the main body 57. The lower bumper member 65 is also attached to a retention elements 67 that can be varied in position relative to the lower spring element 63.

**[0027]** Inner Walking Boot

**[0028]** As mentioned above, the boot 10 described herein includes a flexible inner walking boot 20 that is sized and shaped to be removably positioned within the outer frame member 15. The walking boot 20 is constructed with a walking sole 215 (See Figure 3). The walking boot 20 can be completely removed from the outer frame member 15 for walking after the wearer is finished an activity. The outer frame member 15 desirably provides enough room to slip the inner walking boot 20 into the outer frame member 15 without requiring the walking boot 20 to flex excessively, or having the highback 25 open rearwardly.

**[0029]** Figure 3 illustrates an embodiment of the walking boot 20, but it should be appreciated that the walking boot 20 can be formed according to various configurations. In this embodiment, the walking boot 20 is generally formed of two pieces that couple to one another collectively form the walking boot 20. The walking boot 20 generally includes an upper 205 and an inner liner 210. The upper 205 is configured to be positioned on the wearer's foot for walking and includes a walking sole 215 that can be made of a hard rubber material having treads or other gripping elements molded into it. The inner liner 210 can be custom conformable to the wearer's foot and removably fits

within the upper 205 of the walking boot 20. The inner liner 210 can be heat moldable for custom fitting to a user's foot. Inner and outer boot may be combined at the manufacturing level into a "single body" design, making the inner non-removable from the outer.

**[0030]** The walking boot 20 can include a variety of fastening mechanisms 220 as are known in the art. In an embodiment, the fastening mechanism 220 includes a lace, braided cable, high strength plastic, fabric or other types of material. In the embodiment shown in Figure 3, the fastening mechanism 220 can include an external closure system of metal laces or braided cable of a reel type closure system.

**[0031]** The walking boot 20 can also include external pressure deflectors 225 incorporated into the design of the walking boot 20 in such a way that pressure from the fastening mechanism 220 and/or frame 15 pressure is moderated for the foot. The location of the deflectors 225 can be fixed to the tongue (not shown) or other parts of the walking boot 20 permanently, temporarily (such as with a hook and loop attachment) or may be free floating to assume a desired position automatically. In one embodiment, the metal laces of a reel type closure system 220 traverse over and through the deflectors 225 in such as way as to protect the softer tongue of the walking boot 20 from lace pressure as well as to position the deflectors 225 in their desired position. The deflectors 225 can vary in position and structure. The pressure deflectors 225 can be molded to a desired shape. The deflectors 225 can be continuous from toe to shin area, can be independent, can overlap, or can be hinged together. The deflectors 225 can also be attached to and positioned by a portion of the frame 15 or external fastening mechanism 220, independent of the walking boot 20. The deflectors 225 can also be located between the upper 205 and inner boot liner 210 of the walking boot 20.

**[0032]** Since the walking boot 20 must be inserted by the user into the outer frame member 15, careful attention must be paid to the geometry of these two mating components. Even with a predictable fit between these components, high friction areas of upper 205 of the walking boot 20 can make

insertion difficult for the wearer. For this purpose, one or more low friction "skid plates" 230 (such as molded of a hard plastic or composite material) may be securely attached to the upper 205 of the walking boot 20. The strategic placement of these molded low friction skid plates 230 reduces friction between the outer frame member 15 and upper 205 during entry of the walking boot 20 into the outer frame member 15.

**[0033]** The walking boot 20 can be secured into the outer frame member 15 by one or more closures 647, 649 fitted on the outer frame member 15 (see Figure 6). The closures 647, 649 secure the walking boot 20 into the outer frame member 15 and provide means for further securing the foot inside of the walking boot 20 in addition to the fastening mechanism 220 of the walking boot 20 itself.

**[0034]** Additionally, a variety of convoluted engagement surfaces are contemplated between the walking sole 215 of the walking boot 20 and inner surface of the frame 15 which further act to secure the two components together into a single functional unit. One embodiment makes use of a track and rail system between the walking sole 215 of the walking boot 20 and the base 30. For example, the upper surface of the base 30 can include a longitudinally oriented channel or channels that engages with reciprocally-shaped elements in the lower surface of the walking sole 215 of the walking boot 20. The engagement is readily reversed, for example, when the user has finished the activity and needs to walk normally on the ground wearing only the walking boot 20.

**[0035]** Adjustable Sizing

**[0036]** As shown in Figures 4A and 4B, the outer frame member 15 of the boot 10 can include a sole 401 that can be engaged by board bindings known in the art. The sole 401 makes use of a carbon (composite material) beam 405 that is constructed of a wrapped low density core 410 which is molded into the interior of the sole 401. This core 410 creates a monocoque structure which can be made to not flex and still remain relatively light in weight. The beam 405 may also be fabricated using a thermo-set resin filled

with glass microspheres or similar material in order to maintain its light weight. In another embodiment, separate structures 412, 414, extrusions made of metal, rigid plastic, resin infused cardboard, aluminum honeycomb, or any other stiff light weight structural element is encased into the carbon structure of the sole 401. These extrusions 412, 414 would be bonded within or onto the sole 401.

**[0037]** In an embodiment, the length of the sole 401 can be adjusted such that a single boot 10 can be adjusted for several foot sizes. Still with respect to Figures 4A and 4B, the outer frame member 15 can also include a heel portion 420 and toe portion 425 of two pieces separated by a very stiff beam. In an embodiment, one of these pieces can be extended to form the bottom of the sole 401 and the other one could be extended to form the top of the sole 401. The two pieces 420, 425 could then be bonded together with a foam core separating them which would provide the very stiff beam to span between the heel and the toe. Either piece could form the top or bottom of the sole 401. This configuration makes length adjustment of the sole 401 possible, for example by trimming the beam or another piece of the sole 401 to different lengths post-manufacturing. This results in components that are more universal in their use with a variety of foot sizes.

**[0038]** Figure 5 illustrates another embodiment of a boot 500 that also includes an adjustable sole 501. As described in the previous embodiments, the boot 500 includes an outer frame member 515 and an inner walking boot 520 that fit together into a single functional boot that can engage with bindings of boards known in the art. The outer frame member 515 in this embodiment, generally includes an instep strap 525, a highback 527 pivotably attached to a molded heel unit 530, an instep strap 532 attached to the heel unit 530, and a molded toe unit 535 linked to the molded heel unit 530 by a beam 540.

**[0039]** The heel unit 530, toe unit 535 and the beam 540 along with a molded footboard ramp angle 545 form the adjustable sole 501 that can engage a board binding such as an alpine ski binding or a snowboard binding. The beam 540, toe unit 535 and heel unit 530 can be molded or extruded and are configured for length adjustment of the outer frame member 515 in order

to receive a variety of walking boots 20 in a variety of sizes. In an embodiment, the beam 540 can include the use of an extruded piece of metal, rigid plastic, etc. and connect near one end with the heel unit 530 and connect near the opposite end with the toe unit 535. It would then be possible to cut the beam 540, which can be for example an extrusion, to different lengths and provide a variety of sizing with a single boot 500. In a further embodiment, it also would be possible to have two different extrusions that slide into each other overlapping to provide adjustable sizing between the heel 530 and toe 535 units. In a further embodiment, it also is considered to have three different extrusions that can each be longitudinally adjusted and that can slide into each other, for example a toe unit 535 and a heel unit 530 that slideably engage the beam 540 to collectively form a sole 501. The longitudinal adjustability of the sole 501 allows for the boots described herein to receive flexible inner boots of a variety of sizes.

**[0040]** Figure 6 illustrates another embodiment of a boot 600 that includes an adjustable sole. As described in the previous embodiments, the boot 600 includes an outer frame member and an inner walking boot 620. The outer frame member in this embodiment, generally includes instep straps 622, 624, 626, a highback 627 pivotably attached to a molded heel unit 630, and a molded toe unit 635 linked to the molded heel unit 630 by a beam 640 and rail system 642.

**[0041]** The heel unit 630, toe unit 635, beam 640 and rail system 642 along with a molded footboard ramp angle 645 form the adjustable sole. The beam 640 is configured for length adjustment of the outer frame member in order to receive a variety of walking boots 20 in a variety of sizes. As with the previous embodiment, the beam 640 can include the use of an extruded piece of metal, rigid plastic, etc. and connect near one end with the heel unit 630 and connect near the opposite end with the toe unit 635. It would then be possible to use different lengths of extrusion for the beam 640 and provide a variety of sizing of the entire outer frame member.

**[0042]** One embodiment of these methods is to have separate coverings of the toe and heel which encase the fibrous structure and provide

the means to connect the frame components together into a single unit. In an embodiment, the separate coverings are molded of a relative hard plastic resin, either cast or injection molded. Alternatively, certain portions of the outer frame member 15, such as the three dimensionally curved areas of the toe and/or heel may be made of a molded polymer, which is then attached to various carbon-like frame elements. This approach has the benefit of simplifying the forming of the carbon-like components while retaining the structural strength and light weight of carbon-like materials for the majority of the frame's surface.

**[0043]** Although embodiments of various methods and devices are described herein in detail with reference to certain versions, it should be appreciated that other versions, embodiments, methods of use, and combinations thereof are also possible. Therefore the spirit and scope of the invention should not be strictly limited to the description of the embodiments contained herein.

## CLAIMS

What is claimed is:

1. A sports boot that couples to a board, comprising:

a rigid outer frame comprising a highback and a base, wherein the base comprises a toe region, a heel region and a longitudinally adjustable beam extending between the toe and the heel regions; and

a flexible inner boot comprising an upper positioned on a walking sole, wherein the flexible inner boot is sized to be removably retained within the rigid outer frame.

2. The sports boot of claim 1, wherein the rigid outer frame at least partially surrounds the walking sole and at least partially surrounds the upper.

3. The sports boot of claim 1, wherein the flexible inner boot can be comfortably worn by a wearer for walking on surfaces.

4. The sports boot of claim 1, wherein the walking sole comprises a tread.

5. The sports boot of claim 1, wherein the sports boot can couple to an alpine ski binding.

6. The sports boot of claim 1, wherein the sports boot can couple to a snowboard binding.

7. The sports boot of claim 1, wherein the flexible inner boot can couple to a snowboard binding.

8. The sports boot of claim 1, wherein the highback and base of the outer frame comprise a single unitary body.

9. The sports boot of claim 1, wherein the highback and base are separate structural components.

10. The sports boot of claim 9, wherein the highback and base are pivotably attached.

11. The sports boot of claim 9, wherein the outer frame comprises a suspension mechanism attached to the outer frame connecting the base and the highback.

12. The sports boot of claim 11, wherein the suspension mechanism controls forward lean of the highback relative to the base.

13. The sports boot of claim 11, wherein the suspension mechanism comprises a preload adjustment.

14. The sports boot of claim 10, wherein the pivotable attachment comprises a lateral canting adjustment mechanism.

15. The sports boot of claim 10, wherein the pivotable attachment between the highback and base can be adjusted by a suspension system.

16. The sports boot of claim 1, wherein the toe region and the heel region can slideably engage the beam.

17. The sports boot of claim 16, wherein the toe region, heel region and beam collectively form a sole.

18. The sports boot of claim 17, wherein the sole is configured to engage a board binding.

19. The sports boot of claim 17, wherein the sole is sized to receive a flexible inner boot of a first size.

20. The sports boot of claim 19, wherein an end of the beam can be trimmed such that the toe region, heel region and beam collectively form a sole sized to receive a flexible inner boot of a second size.

21. The sports boot of claim 1, wherein at least one of the toe region, heel region or beam is molded

22. The sports boot of claim 1, wherein at least one of the toe region, heel region or beam is extruded.

23. The sports boot of claim 1, wherein the flexible inner boot includes a removable inner liner.

24. The sports boot of claim 23, wherein the inner liner is heat moldable.

25. The sports boot of claim 1, wherein the upper of the flexible inner boot comprises at least one low friction element that contacts the outer frame when the inner boot is positioned within the outer frame.

26. The sports boot of claim 1, wherein the upper of the flexible inner boot comprises a fastening mechanism.

27. The sports boot of claim 26, wherein the fastening mechanism comprises a reel type closure system.

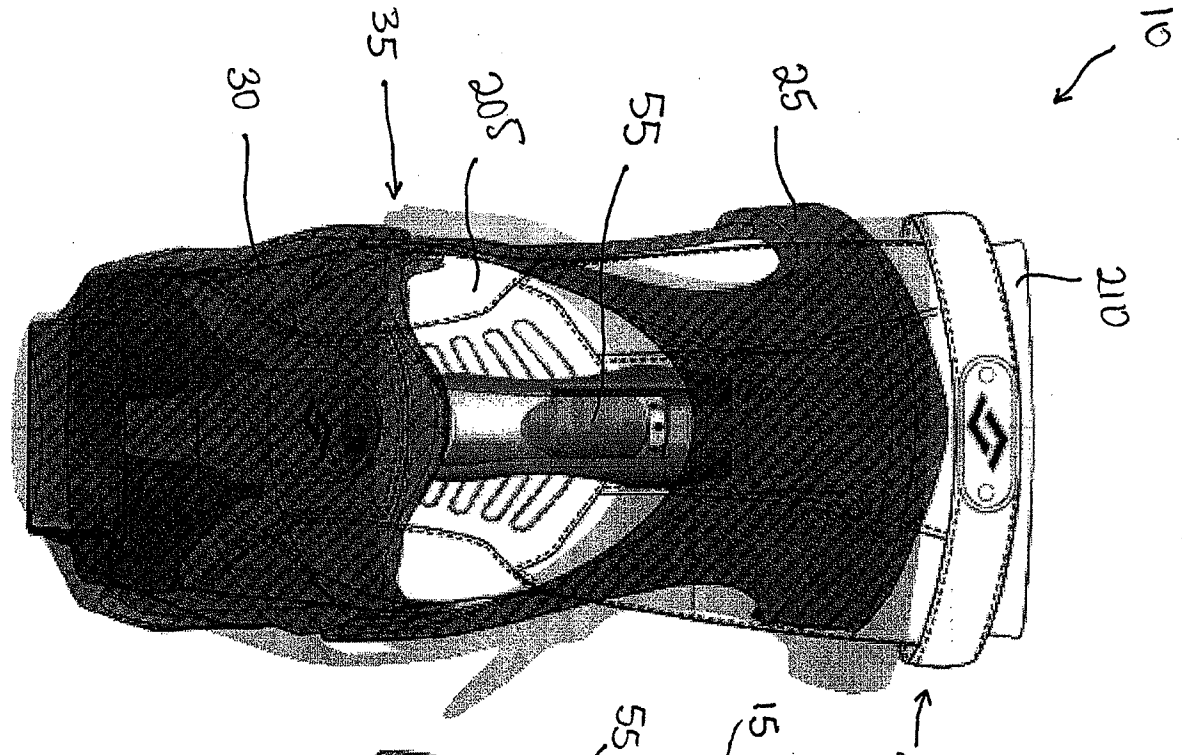


Figure 1A

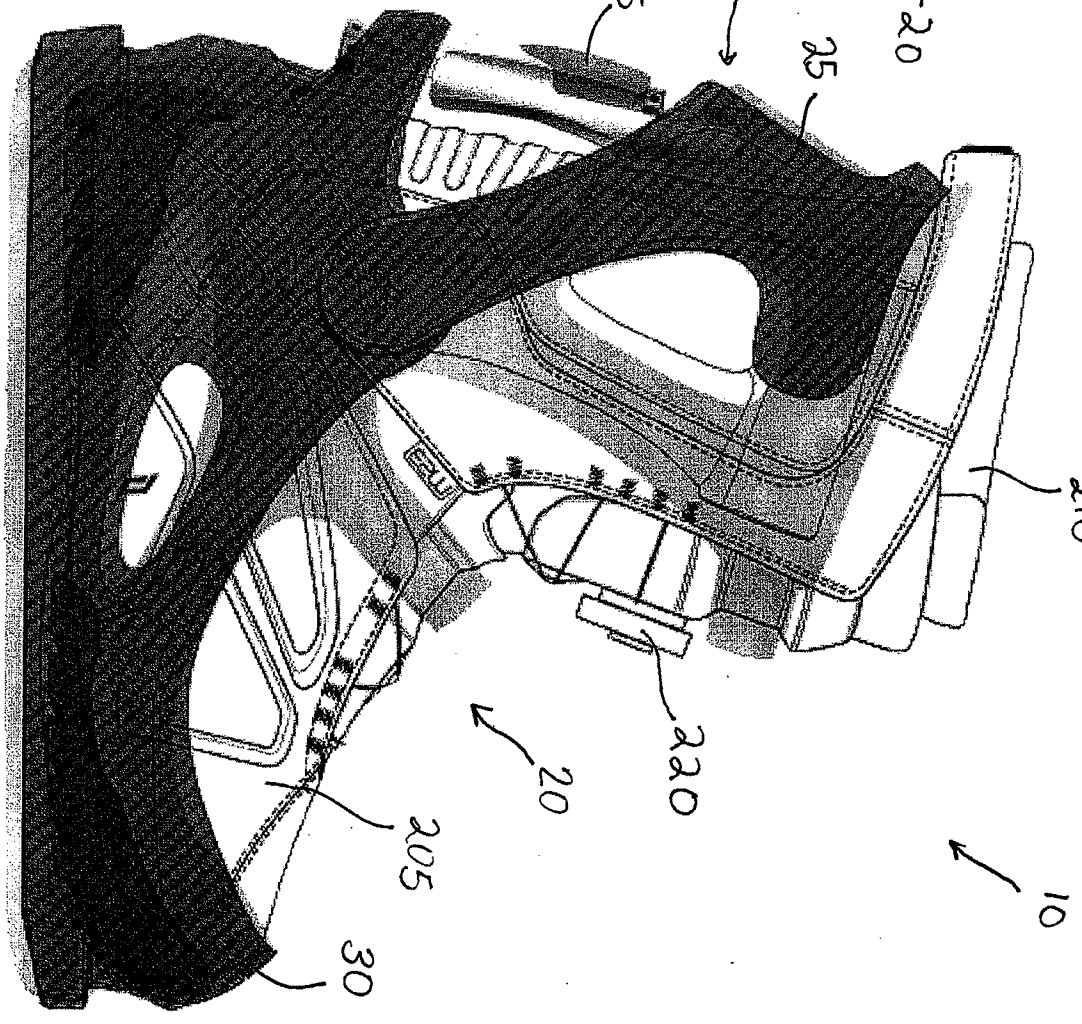


Figure 1B

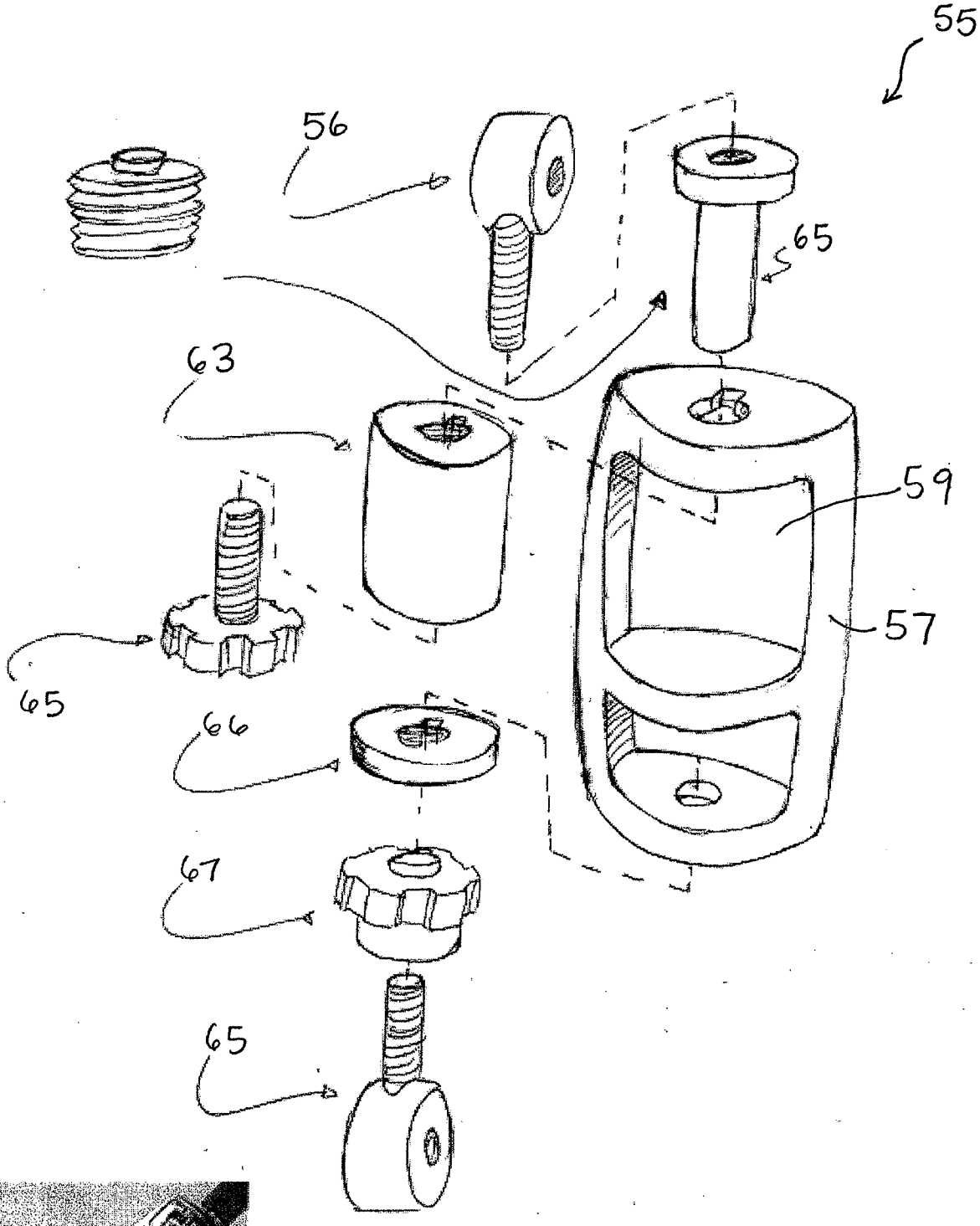


Figure 2

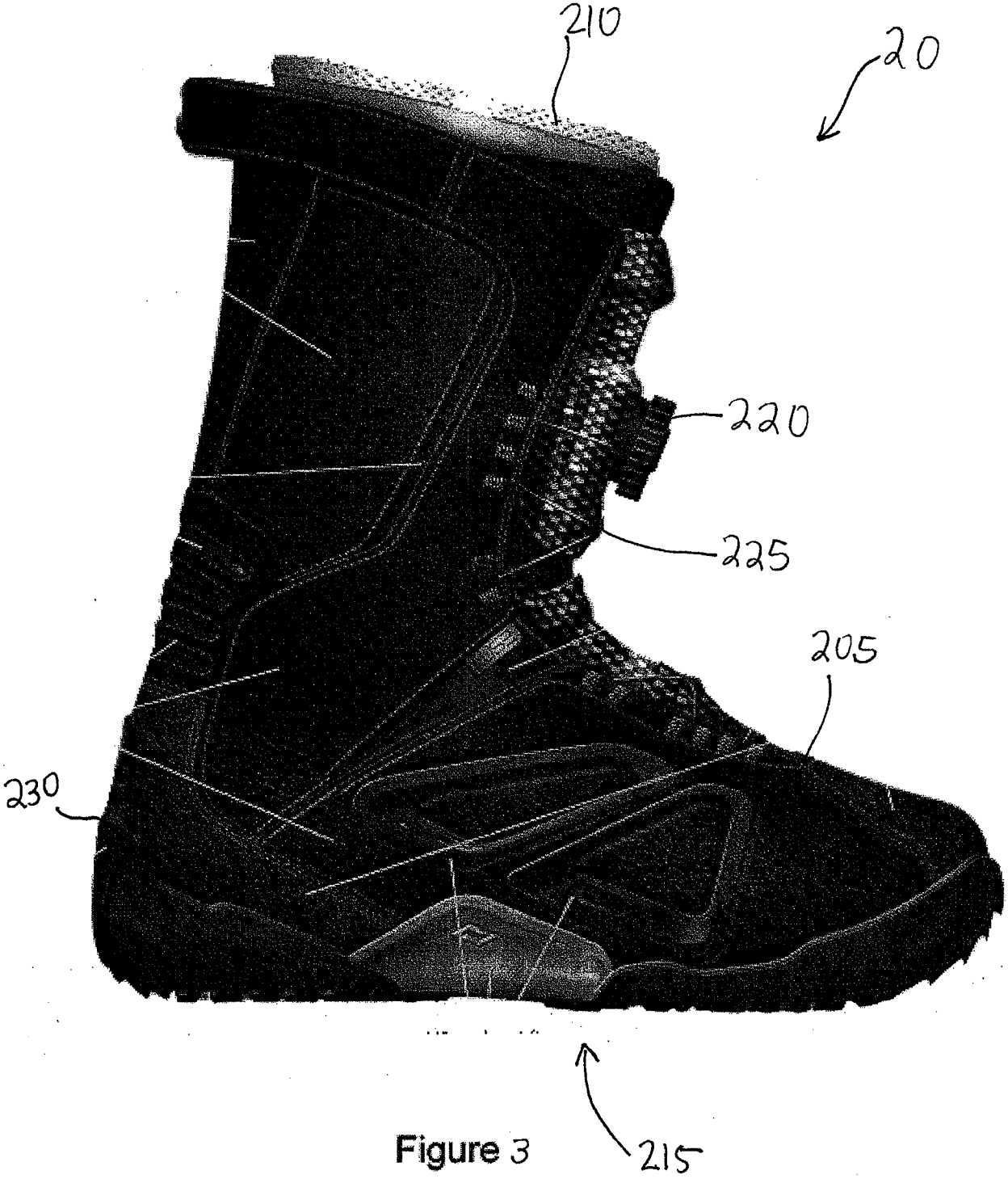


Figure 3

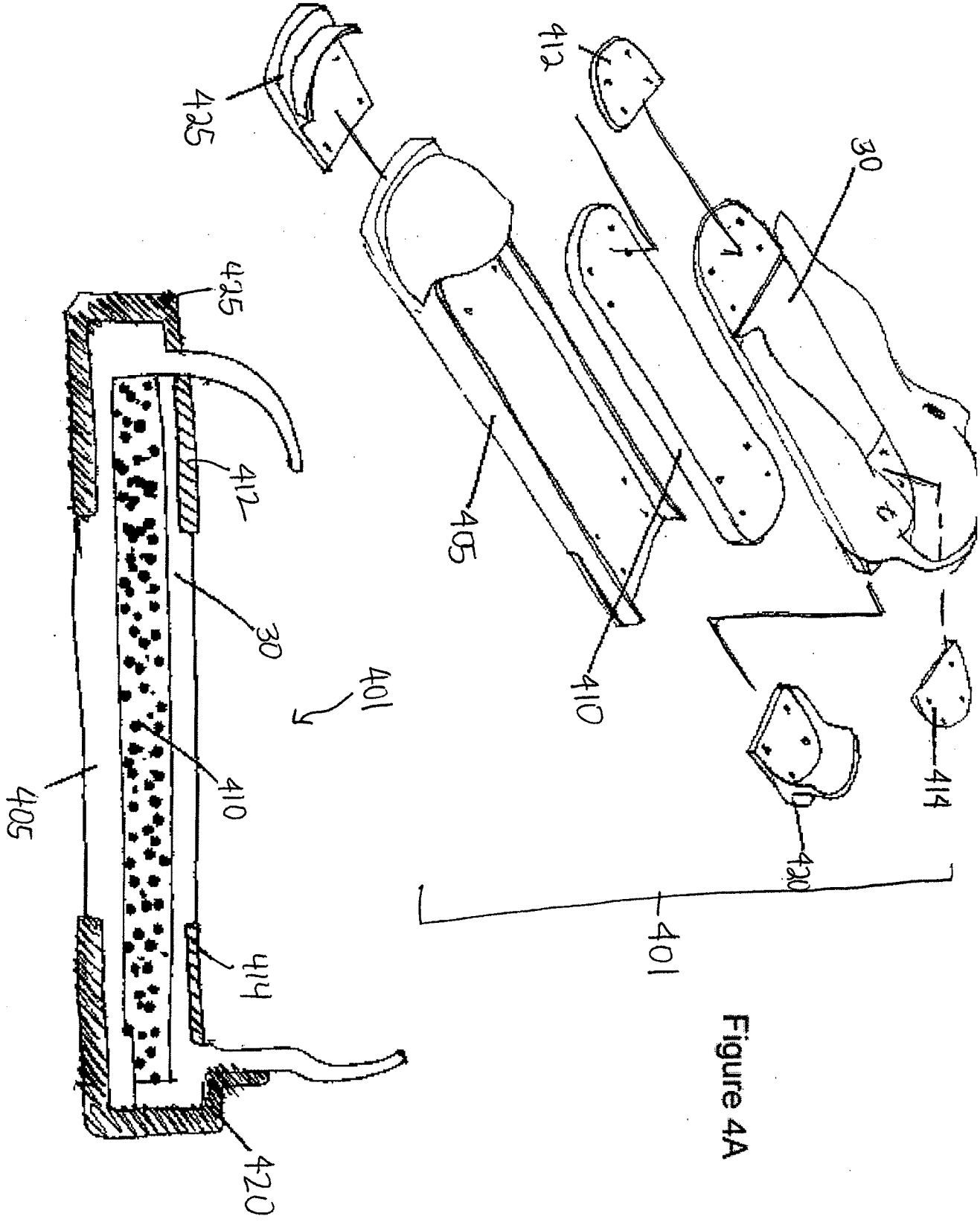


Figure 4A

Figure 4B

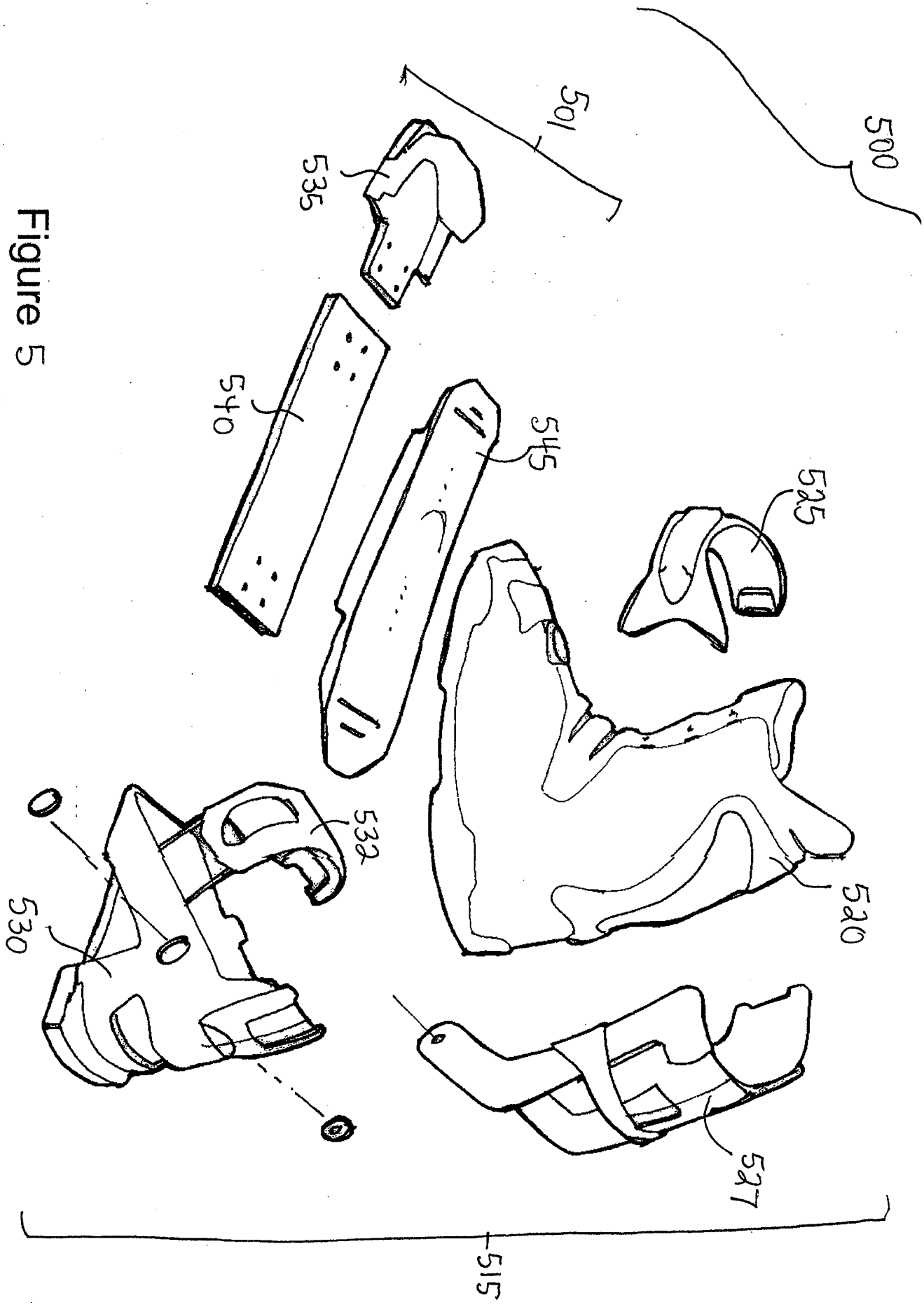


Figure 5

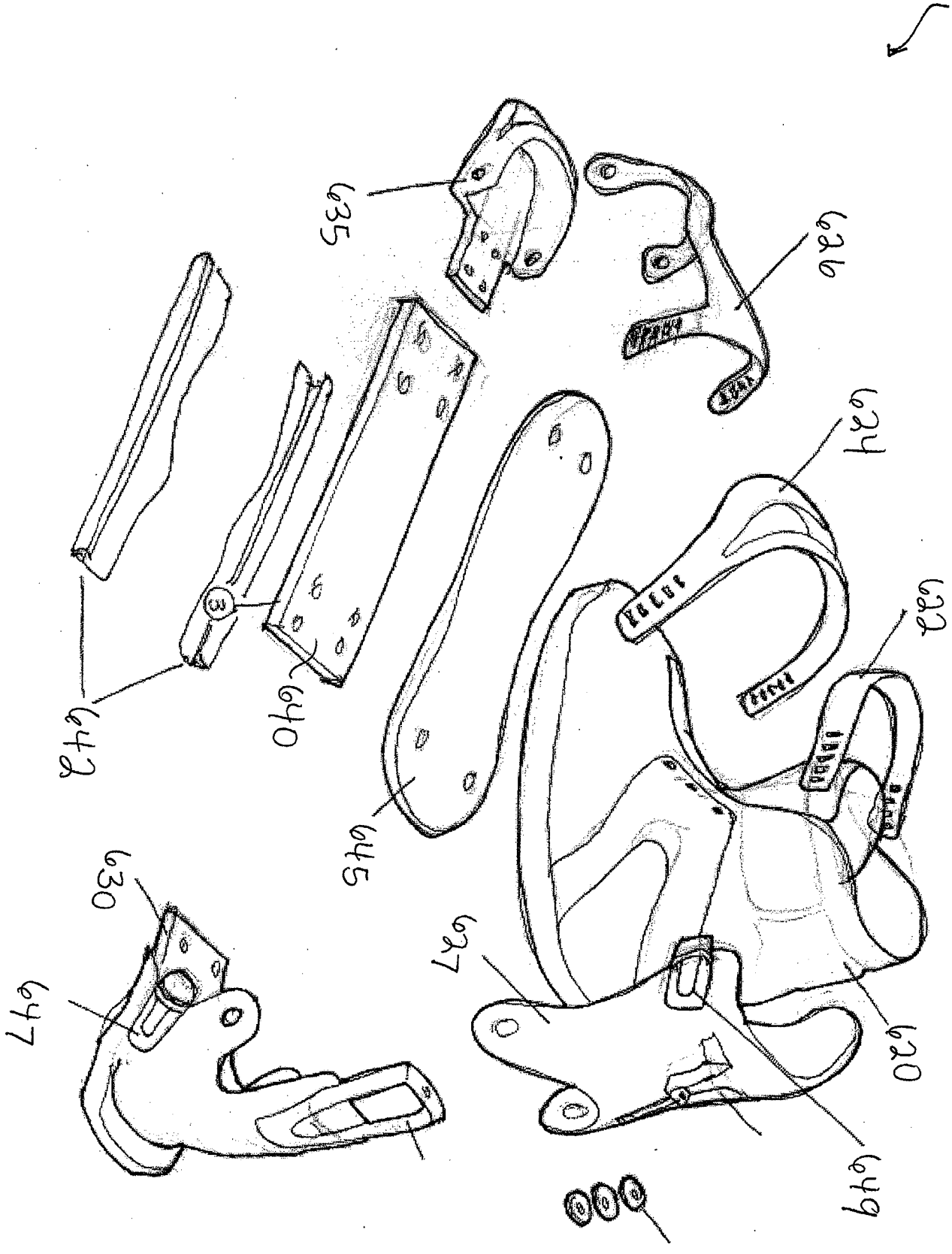


Figure 6

# INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/032680

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43B5/04 A43B5/18 A43B3/26

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br>Y | US 3 854 743 A (HANSEN H)<br>17 December 1974 (1974-12-17)<br>the whole document | 1-7,<br>9-13,<br>15-20,26<br>8,14,<br>21-25,27 |
| Y | US 5 815 953 A (KAUFMAN WILLIAM H [CA] ET AL) 6 October 1998 (1998-10-06)<br>the whole document | 8,14,<br>21-25,27 |
| A | FR 2 774 604 A (SALOMON SA [FR])<br>13 August 1999 (1999-08-13)<br>the whole document | 1-27 |
| A | EP 1 034 713 A (HTM SPORT SPA [IT])<br>13 September 2000 (2000-09-13)<br>the whole document | 1-27 |

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Schölvinck, Thérèse |

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International application No
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