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(54) **Skate boot having a tendon guard with a recess**

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a skate boot having a tendon guard with a recess for receiving an insert and wherein the flexibility of the tendon guard may be adjusted by a skater between different flexion modes.

BACKGROUND OF THE INVENTION

[0002] Tendon guards are known to be used on hockey skates to protect the Achilles heel of the skater from being cut from another ice skate blade or from any other type of impact from another skater. Document EP 1 716 771 discloses a skate boot with a tendon guard according to the preamble of claim 1.

[0003] While tendon guards are capable of providing protection, the implementation of the tendon guard could result in a loss of flexibility of the skater's foot. More specifically, tendon guards which are too rigid can be obstructive to the extension of a skater's foot which regularly occurs during skating maneuvers. Such an obstruction is uncomfortable and undesirable for a skater as it can substantially affect performance.

[0004] As such, some tendon guards have been constructed with substantially flexible material in order to accommodate the flexing action of a skater's foot. However, a skater is often limited by the design of the manufacturer in terms of the flexibility provided by the tendon guard. As such, skaters may be more likely to omit the use of the tendon guard than to search for a skate or tendon guard providing the desired level offlexibility.

[0005] Furthermore, it can be understood that a variety of different skaters are likely to have different needs (and preferences) with regard to the level of flexibility of the tendon guard. For example, some skater's may prefer a tendon guard which exhibits a high level of flexibility while other may prefer a more rigid tendon guard. In addition, individual preferences may change over time, thereby further highlighting the deficiency of prior art tendon guards which are produced with a predefined flexibility.

[0006] Otherwise, U.S. Publication 2005/0229436 discloses a skate boot having an upper that includes a deformable region for facilitating the elastic dorsiflexion of the upper between an initial upper configuration and a dorsiflexed upper configuration. The deformable region is substantially more elastically deformable than adjacent portions of the upper and provides an elastic force biasing the upper towards the initial configuration.

[0007] U.S. Patent 4,655,465 discloses a skate boot having a diamond shape cut-out in the back region of the skate boot for allowing forward and rearward flexing of the skate boot about the ankle joint, a cover placed over the cut-out to close it and a reinforcing member that covers the cover and cut-out and that is stitched to the skate boot. The reinforcing member has a number of generally horizontal slits.

[0008] Accordingly, there is an ongoing need in the industry for an improved skate boot structure which overcomes the aforementioned problems and which can accommodate a plurality of different skating styles, modes, types or fashions, as well as the need to provide a skate boot wherein the skater may adjust the flexibility of the tendon guard between different flexion modes.

SUMMARY OF THE INVENTION

[0009] In accordance with an aspect of the present invention, there is provided a skate boot for enclosing a human foot when in use, the foot having a heel, an ankle with a medial malleolus and a lateral malleolus, an Achilles tendon having an upper part and a lower part that projects away from the upper part, the lower part merging with the heel, a plantar surface, medial and lateral sides and toes. The skate boot comprises an outer shell comprising a heel portion for receiving the heel of the foot; an ankle portion for receiving the ankle, the ankle portion comprising a rear portion for facing at least partially the lower part of the Achilles tendon; and medial and lateral side portions for facing the medial and lateral sides of the foot respectively. The skate boot also comprises a tendon guard extending upwardly from the ankle portion of the outer shell for facing at least partially the upper part of the Achilles tendon, the tendon guard allowing backwards flexion of the ankle when the foot moves towards full extension. The tendon guard comprises a recess for receiving an insert being adapted to be removably mounted in the recess. The tendon guard has a first flexion mode when no insert is received in the recess and a second flexion mode when the insert is received in the recess, the second flexion mode being different from the first flexion mode.

[0010] These and other aspects and features of the present invention will now become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] A detailed description of examples of embodiments of the present invention is provided hereinbelow with reference to the following drawings, in which:

Figure 1 is a side view of a right human foot with the integument of the foot shown in dotted lines and the bones shown in solid lines;

Figure 2 is a front view of the human foot of Figure 1;

Figure 3 is a perspective view of an ice skate in accordance with the present invention;

Figure 4 is an exploded view of the ice skate of Figure 3;

Figure 5 shows a skater in a first skating position;

Figure 6 shows the skater of Figure 5 in a second skating position;

Figure 7 shows the skater of Figure 5 in a third skating position;

Figure 8 is an enlarged view of the right skate of Figure 7;

Figure 9 is a partial side elevational view of the ice skate of Figure 3 showing a bent position of the tendon guard in dotted lines and an unbent position of the tendon guard in solid lines;

Figure 10 is a top perspective view of a tendon guard in accordance with the present invention;

Figure 11 is a bottom perspective view of the tendon guard of Figure 10;

Figure 12 is a front view of the tendon guard of Figure 10;

Figure 13 is a rear view of the tendon guard of Figure 10;

Figure 14 is a perspective view of an insert in accordance with the present invention;

Figure 15 is a front view of the insert of Figure 14;

Figure 16 is a side view of the insert of Figure 14;

Figure 17 is a cross-sectional view of the tendon guard of Figure 12 taken along cross-sectional lines 17-17;

Figure 18A is a side view of the tendon guard of Figure 10 with a first insert positioned therein, showing the tendon guard in an initial position in solid lines and in a first bent position in dotted lines;

Figure 18B is a side view of the tendon guard of Figure 10 with a second insert positioned therein, showing the tendon guard in an initial position in solid lines and in a second bent position in dotted lines;

Figure 19 is a rear view of a tendon guard in accordance with the present invention;

Figure 20 is a side view of the tendon guard of Figure 19, showing a portion of the tendon guard exhibiting out-of-plane bending; and

Figure 21 is a rear view of the tendon guard of Figure 19, showing the tendon guard exhibiting in-plane bending.

[0012] In the drawings, embodiments of the invention are illustrated by way of example. It is to be expressly understood that the description and drawings are only for the purposes of illustration and as an aid to understanding, and are not intended to be a definition of the limits of the invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0013] To facilitate the description, any reference numerals designating an element in one figure will designate the same element if used in any other figures. In describing the embodiments, specific terminology is resorted to for the sake of clarity but the invention is not intended to be limited to the specific terms so selected, and it is understood that each specific term comprises all equivalents.

[0014] Unless otherwise indicated, the drawings are intended to be read together with the specification, and are to be considered a portion of the entire written description of this invention. As used in the following description, the terms "horizontal", "vertical", "left", "right", "up", "down" and the like, as well as adjectival and adverbial derivatives thereof (e.g., "horizontally", "rightwardly", "upwardly", "radially", etc.), simply refer to the orientation of the illustrated structure. Similarly, the terms "inwardly," "outwardly" and "radially" generally refer to the orientation of a surface relative to its axis of elongation, or axis of rotation, as appropriate.

[0015] Shown in Figures 1 and 2 is a typical right human foot F that includes toes T, a plantar surface PS, a medial side MS and a lateral side LS. In addition, the human foot F includes a heel H, an Achilles tendon AT and an ankle A having a lateral malleolus LM and a medial malleolus MM, the lateral malleolus LM being at a lower position than the medial malleolus MM. The Achilles tendon AT has an upper part UP and a lower part LP projecting away from the upper part UP, the lower part LP merging with the heel H.

[0016] Shown in Figures 3 and 4 is an ice skate 1 that comprises a skate boot 10 suitable for enclosing the foot F. Although the skate boot 10 shown in the figures is being used for an ice skate 1, it is understood that the skate boot 10 can be used for a roller skate.

[0017] The ice skate 1 has an outer shell 12 for receiving the foot F, a toe cap 14 made of rigid molded plastic for facing the toes T, a tongue 16 extending upwardly and rearwardly from the toe cap 14 for covering a forefoot of the foot F, a rigid insert 18 for providing more rigidity around the ankle A and heel H, an inner lining 20, a footbed 22, an insole 24, an outsole 26, an ice skate blade holder 28 and a blade 30. The rigid insert 18 may be glued to an inner surface of the outer shell 12. It is understood that the rigid insert 18 is an optional component and may be eliminated if the outer shell 12 is sufficiently rigid for supporting the ankle A and heel H. Similarly, the

insole 24 and outsole 26 are optional components and may be eliminated if the outer shell 12 is sufficiently rigid for receiving the blade holder 28.

[0018] The inner lining 20 is affixed to an inner surface of the outer shell 12 and it comprises an inner surface 32 intended for contact with the heel H, ankle A and medial and lateral sides MS, LS of the foot F in use. If the skate boot 10 comprises the rigid insert 18, such rigid insert 18 is sandwiched between the outer shell 12 and inner lining 20 and such inner lining 20 may be glued to the inner surfaces of the outer shell 12 and rigid insert 18 and stitched along its periphery to the outer shell 12. The inner lining 20 is made of a soft material and can be a fabric made of 100% NYLON® fibers. The footbed 22 is mounted inside the outer shell 12 and it comprises an upper surface 34 for receiving the plantar surface PS and a wall 36 projecting upwardly from the upper surface 34. The wall 36 partially cups the heel H and extends up to a medial line of the foot F.

[0019] The skate boot 10 also comprises bands 38 secured to upper side portions of the outer shell 12. The bands 38 may be made of fabric, textile or leather and comprise apertures 40. Eyelets 42 are punched into each of the bands 38, outer shell 12 and inner lining 20 vis-à-vis apertures 40.

[0020] The outer shell 12 may be made of a thermoformable material. As used herein, the expression "thermoformable material" refers to a material that is capable of softening when heated and of hardening again when cooled. Some non-limiting examples of different types of thermoformable material comprise ethylene vinyl acetate (EVA) foam, polyethylene foam, polystyrene foam, polypropylene foam and thermoformable materials sold under the trade-marks MEGABIX®, SURLYN®, SONTARA®, FORMO500®, BYLON®, MOSOCA® and NYLON® 66.

[0021] The outer shell 12 comprises a heel portion 44 for receiving the heel H, an ankle portion 46 for receiving the ankle A and medial and lateral side portions 48, 50 for facing the medial and lateral sides MS, LS respectively. These components form a foot receiving cavity that conforms to the general shape of the foot F.

[0022] The heel portion 44 may be thermoformed such that it is substantially cup shaped for following the contour of the heel H.

[0023] The ankle portion 46 comprises medial and lateral ankle sides 52, 54. The medial ankle side 52 has a medial cup-shaped depression 56 for receiving the medial malleolus MM and the lateral ankle side 54 has a lateral cup-shaped depression 58 for receiving the lateral malleolus LM. The lateral depression 58 is located slightly lower than the medial depression 56, for conforming to the morphology of the foot F. The ankle portion 46 further comprises a rear portion 60 facing the lower part LP of the Achilles tendon AT. The rear portion 60 may be thermoformed such that it follows the lower part LP of the Achilles tendon AT. The medial and lateral side portions 48, 50 extend forwardly from the heel and ankle portions 44, 46.

[0024] The outer shell 12 also comprises a tendon guard 43 for facing at least partially the upper part UP of the Achilles tendon AT. The tendon guard 43 allows backwards flexion of the ankle A when the foot F moves towards full extension. The tendon guard 43 may be made of silicone or may be made by injection molding using polyester (e.g. polyester HYTREL®) polyurethane, polyamide, or other suitable thermoplastics. The selected material may have enough flexibility to allow the tendon guard 43 to flex rearwardly when pressure is applied on it while it should also have enough resiliency to allow the tendon guard 43 to return to its initial position when pressure is no longer applied on it.

[0025] Figures 5 to 7 show a skater in different skating positions.

[0026] In Figure 5, the right foot of the skater begins the pushing action against the ice. As shown in this figure, a flexing portion 80 of the tendon guard 43 faces at least partially the upper part UP of the Achilles tendon AT but does not contact the upper part UP.

[0027] In Figure 6, the right foot of the skater continues its pushing action until the flexing portion 80 of the tendon guard 43 eventually abuts against the upper part UP of the Achilles tendon AT.

[0028] As shown in Figures 7 and 8, when the right foot of the skater continues its pushing action and reaches full extension, the flexing portion 80 allows backwards flexion of the ankle A when the foot F of the skater moves towards full extension.

[0029] After reaching full push extension, the foot F of the skater moves forwardly without touching the ice and another pushing motion of the foot F will begin once the skate touches the ice again. It is understood that the tendon guard 43 should return to its initial position shown in Figure 5 once the full push extension of the foot is completed.

[0030] As shown in Figure 9, in its initial position shown in full lines, the tendon guard 43 is in a generally vertical position. When the ankle A flexes backwards and pressure is applied against the flexing portion 80 of the tendon guard 43, the tendon guard 43, as shown in dotted lines, is then capable of flexing rearwardly of an angle θ which may be up to 90º.

[0031] The tendon guard 43 will now be described in further detail with reference to Figures 10 to 21. The tendon guard 43 includes a bottom portion 74 and the flexing portion 80 that projects upwardly from the bottom portion 74 for facing at least partially the upper part UP of the Achilles tendon AT. The bottom portion 74 of the tendon guard 43 is affixed to the ankle portion 46 as will be described in further detail below. The tendon guard 43 may also comprise medial and lateral side portions 76, 78 extending forwardly from the bottom portion 74 and being affixed to the respective medial and lateral ankle sides 52, 54 of the ankle portion 46.

[0032] As best shown in Figures 11 and 17, the bottom portion 74 of the tendon guard 43 acts as an attachment

portion for attaching the tendon guard 43 to the outer shell 12. More specifically, the bottom portion 74 of the tendon guard 43 has a substantially U-shaped groove defined by a front wall 77 and a rear wall 79. The front and rear walls 77, 79 are at least partially receiving therebetween the top edge portion of the rear portion 60 of the ankle portion 46 when the tendon guard 43 is positioned onto the outer shell 12. As such, the tendon guard 43 can be easily attached to the outer shell 12.

[0033] Although a specific embodiment is depicted in the figures, other arrangements can be envisioned for affixing the tendon guard 43 to the skate boot 10. For example, the bottom portion 74 of the tendon guard 43 can form a single wall made of one or more layers that are attached to the inner or outer side of the top edge portion of the rear portion 60 of the ankle portion 46 or that are inserted and glued and/or affixed within layers of the outer shell.

[0034] The tendon guard 43 can be fixedly attached to the ankle portion 46 via stitching, over molding, thermal bonding, high frequency welding, vibration welding, piping, zipper, adhesive and staples, among other possibilities known in the art.

[0035] It is understood that the tendon guard may alternatively form an integral part of the outer shell or the upper part of the ankle portion.

In another embodiment, the tendon guard may be removably attached to the outer shell such that the skater can replace the tendon guard should the tendon guard be damaged or can select among different tendon guards.

[0036] The tendon guard 43 has an inner surface 90 and an outer surface 92. As shown in Figure 12, the inner surface 90 may have a projection 96 for increasing attachment bonding between the tendon guard 43 and the outer shell 12. The inner surface 90 may be covered by the inner lining 20 such that the inner surface of the outer shell 12 shows a uniform lining surface. The outer surface 92 may have a series of reinforcement elements defined by regions of increased thickness (as depicted by projections 98) and/or a series of regions of decreased thickness (as depicted by recesses 99). As such, specific regions of the tendon guard 43 can be made thicker to rigidify the tendon guard 43 in those regions, while other regions can be made thinner to increase the flexibility of the tendon guard 43 in those regions. The tendon guard may also have projections and/or recesses that are for aesthetic value.

[0037] The tendon guard 43 has a substantially symmetrical arrangement and could be used to protect the Achilles tendon of either of the right or left legs. However, the tendon guard can be shaped to specifically fit a given one of the right or left legs. For example, different tendon guards can be shaped to have an additional protective portion which at least partially wraps around a lateral portion of the respective leg in order to provide further protection. As such, although the tendon guards of such an embodiment will be symmetrical with respect to one another, a given tendon guard may not be symmetrical along its longitudinal axis.

[0038] As shown in Figures 7 and 8, as the tendon guard 43 bends, the lower region of the flexing portion 80 acts as a flexible hinge. As such, it may be desirable to increase the thickness of the tendon guard 43 in the lower region to enable the tendon guard 43 to sustain tensile and compressive forces incurred during bending and to avoid plastic deformation of the tendon guard 43.

[0039] Thus, the flexibility of the tendon guard 43 can be selectively designed based on different parameters such as its thickness, shape, material and the presence of projections and/or recesses.

[0040] However, in order to allow the skater to adjust the flexibility of the tendon guard 43, the tendon guard 43 comprises a recess 100 for receiving an insert 102 (shown in Figures 14 to 16).

[0041] The recess 100 may be a longitudinal recess that extends in a direction generally transverse to a longitudinal axis A-A of the tendon guard 43.

[0042] The inserts 102 have a core 102A and connection means permitting removable connection between a given insert 102 and the tendon guard 43. The insert 102 may have connection means including protrusions 102B, 102C, 102D and 102E.

[0043] The recess 100 of the tendon guard 43 may comprise a housing portion 100A with upper and lower walls 100F, 100G provided in the tendon guard 43 and the recess 100 may also comprise grooves extending upwardly and downwardly in the tendon guard 43 (only grooves 100B, 100C are shown in Figure 17). The main housing portion 100A of the recess 100 receives the core 102A of the insert 102 while the grooves of the recess 100 cooperate with corresponding protrusions 102B, 102C, 102D, 102E of the insert 102. In an alternative embodiment, instead of grooves, the tendon guard may include protrusions while the inserts may include respective grooves. In other embodiments, the insert can be mounted to the tendon guard 43 by being press-fit or snap-fit into the recess.

[0044] While the recess 100 is shown as having a substantially rectangular shape, the recess can have any shape suitable to receive a correspondingly shaped insert.

[0045] In order to facilitate placement and removal of the inserts into the recess, the flexing portion 80 of the tendon guard 43 can be bent in a forward direction (i.e.: opposite to the bending shown in Figures 18A and 18B). The recess of the tendon guard 43 will therefore open by a substantial amount, thereby permitting a skater to more easily place or remove a given insert into the recess. The natural resiliency of the tendon guard 43 will bias the flexing portion 80 of the tendon guard 43 to its initial position, thereby snugly holding the insert in place and avoiding that the insert become undesirably dislodged from the recess during use of the tendon guard 43.

[0046] The core 102A of the insert 102 may be made of a resilient material to permit compression of the core 102A when the upper and lower walls 100F, 100G abut

against respective upper and lower surfaces 102F, 102G of the insert 102. As such, when the tendon guard 43 bends, the upper and lower walls 100F, 100G will compress the core 102A of the insert 102 by pressing against the upper and lower surfaces 102F, 102G. The resilient material of the core 102A permits such a compression. For example, the core 102A can be made of rubber such as natural rubber, isoprene rubber, polychloroprene, styrene butadiene rubber, etc.

[0047] Depending on the material, the insert 102 and/or core 102A of the insert 102 may have hardness values between 20 Shore A and 70 Shore D. For example, a very hard insert may have a hardness value between 60 and 70 Shore D, a hard insert may have a hardness value between 40 and 50 Shore D, a medium insert may have a hardness value between 20 and 30 Shore D, a soft insert may have a hardness value between 5 and 15 Shore D, and a very soft insert may have a hardness value between 15 and 25 Shore A. It is also understood that the insert may comprise a frame, skeleton or armature made of a relatively rigid material being covered or overmolded by a material having a hardness value lower from the one of the rigid material.

[0048] The protrusions 102B, 102C, 102D, 102E of the inserts 102 can be made of a more rigid material in order to be fixedly secured into their corresponding grooves. For example, the protrusions can be made of plastic such as polyvinyl chloride, polytetrafluoroethylene, polyethylene (low density or high density), polypropylene, etc.

[0049] With continued reference to Figures 14 to 16, it can be seen that the core 102A of the insert 102 has a length L, a height H and a thickness T. While the core 102A of the insert 102 is not of exact rectangular geometry, dimensions of length L, height H, and thickness T are used for simplicity. It is nevertheless understood that the core 102A of the insert 102 can have a variety of shapes while remaining within the scope of the present invention. For example, the core 102A of the insert 102 can be generally triangular or can have a curved periphery.

[0050] Different inserts can therefore be manufactured with different dimensions and different material in order to provide different levels of flexibility to the tendon guard 43 when inserted in the recess 100. For example, for a plurality of inserts with cores made of the same material, the height H and thickness T of the core may largely determine the amount of flexibility permitted by the tendon guard 43. Alternatively, the cores of the inserts can be made of different material but may have the same dimensions of length L, height H and thickness T. In yet other embodiments, the dimensions and the material can be changed from one insert to another. It can therefore be understood that a variety of different inserts can be manufactured to provide different levels of flexibility for the tendon guard 43.

[0051] Accordingly, a skater is able to adjust the flexibility of the tendon guard 43 as desired. This allows the skater to experiment with several different types of inserts in order to achieve a desired level of flexibility. On the other hand, if the skater determines that the natural resiliency of the tendon guard 43 without an insert is adequate, the tendon guard 43 can simply be used with the recess 100 being free of any inserts.

[0052] Figures 18A and 18B illustrate a tendon guard 43 having two different flexion modes. While it is understood that, during use, the tendon guard 43 is likely to experience bending under a pressure exerted on its inner surface, an equivalent force vector F is depicted in the figures for simplicity of illustration. In addition, the terms "flexion force" or "pressure" can be understood to represent any type of physical force or pressure capable of bending the tendon guard 43.

[0053] In each of Figures 18A and 18B, the tendon guard 43 is shown in an initial position in solid lines and in a bent position in dotted lines.

[0054] In Figure 18A, a first insert 102^1 is positioned in the recess 100 of the tendon guard 43 while in Figure 18B, a second insert 102^2 different from the first insert 102^1 is positioned in the recess 100 of the tendon guard 43.

[0055] Force vector F, which schematically depicts a flexion force which would be exhibited by the skater's leg, is the same in both cases and is applied at the same point on the tendon guard 43 in order to represent equivalent pressures in each of Figures 18A and 18B. While force vector F is shown as being applied along a particular line of action, it can be understood that other forces can be applied to the tendon guard 43 along any line of action to cause the tendon guard 43 to experience a backwards bending motion (flexing motion).

[0056] In experiencing the same flexion force (or pressure), the tendon guard 43 with the first insert 102^1 (Figure 18A) defines a first flexing angle θ_1 (a first bent position of the tendon guard 43 shown in dotted lines), while the tendon guard 43 with the second insert 102^2 (Figure 18B) defines a second flexing angle θ_2 (a second bent position of the tendon guard 43 shown in dotted lines), the second flexion mode being different from the first flexion mode because each of the inserts 100^1, 100^2 has different specifications.

[0057] As indicated previously, the tendon guard 43 has the flexing portion 80. When the first insert 102^1 is received in the recess 100, the flexing portion 80 flexes from its initial position to a first bent position being at a first angle θ_1 from its initial position (Figure 18A), and when the second insert 102^2 is received in the recess 100, the flexing portion 80 flexes from its initial position to a second bent position being at a second flexing angle θ_2 from its initial position (Figure 18B), the first angle θ_1 being different from the second flexing angle θ_2 because each of the inserts 100^1, 100^2 has different specifications.

[0058] Hence, for a given force or pressure exerted on the tendon guard 43, a first backwards flexion of the skater's ankle A is permitted when the first insert 102^1 is received in the recess 100 of the tendon guard 43, which then has a first flexing mode, while a second backwards

flexion of the skater's ankle A is permitted when the second insert 102^2 is received in the recess 100 of the tendon guard 43, which then has a second flexing mode, the second flexing mode being different from the first flexing mode.

[0059] Moreover, because of the different specifications of the inserts 100^1, 100^2, when the flexion force is no longer applied to the tendon guard 43, this tendon guard 43 may return to its initial position shown in solid lines according to different counter-forces because each of the inserts 102^1, 102^2 produces a determined force which counters the backwards bending of the tendon guard 43. More specifically, the upper and lower walls 100F, 100G will compress the inserts 102^1, 102^2 when the flexing portion 80 is bent. As such, the different inserts 102^1, 102^2 (which have different specifications) will exert different amounts of counter-force on the upper and lower walls 100F, 100G.

[0060] The term "specifications" may refer to any mechanical property or dimension of a given insert (such as hardness, density, shape, thickness, etc.).

[0061] In this example, at least one specification of the first insert 102^1 is different from the corresponding specification of the second insert 102^2. For example, it is possible that the first insert 102^1 is made of a material which has a greater hardness value than the material of the second insert 102^2. For instance, the first insert 102^1 may have a hardness value higher than 30 Shore A while the second insert 102^2 may have a hardness value lower than 30 Shore A, or the first insert 102^1 may have a hardness value higher than 40 Shore A while the second insert 102^2 may have a hardness value lower than 40 Shore A, or the first insert 102^1 may have a hardness value higher than 50 Shore A while the second insert 102^2 may have a hardness value lower than 50 Shore A, etc.

[0062] In other embodiments, it is possible that the first insert 102^1 has a different physical dimension (such as a greater height H) than the second insert 102^2. In a further embodiment, the first insert 102^1 may have a full body while the second insert 102^2 may have a slit, groove or opening provided therein. In another embodiment, the shape and/or dimension of the first insert 102^1 is designed such that the first insert 102^1 is substantially confined in the recess when received therein while the shape and/or dimension of the first insert 102^2 is designed such that the second insert 102^2 is slightly smaller than the recess thereby creating a gap between the insert 102^2 and the walls of recess when the second insert 102^2 is received in the recess.

[0063] The presence of a given insert in the recess 100 of the tendon guard 43 thus modifies the overall resiliency of the tendon guard 43.

[0064] Figure 19 to 21 show a tendon guard 243 with a central slit 245 in order to facilitate the placement and removal of the inserts 102^1, 102^2 in the recess 100. The slit 245 extends from the bottom portion of the tendon guard 243 in a direction towards the flexing portion of the tendon guard 243 and is generally parallel to the longitudinal axis A-A of the tendon guard 243. As shown, the slit 245 crosses the recess 100, and generally splits the tendon guard 243 into two portions (namely, a left portion 243A and a right portion 243B) thereby allowing a skater to bend the tendon guard 243. While the two portions 243A, 243B are shown to be of substantially similar size, it can be understood that the slit 245 can be cut onto the tendon guard such as to create left and right portions of different sizes and dimensions.

[0065] The tendon guard 243 may be seen as being within a plane P. The tendon guard 243 is capable of experiencing out-of-plane bending (as shown in Figure 20) as well as in-plane bending (as shown in Figure 21). More specifically, the out-of-plane bending allows one portion (243B) to move relative to the other portion (243A) such that they define an angle α between one another (Figure 20). In addition, the in-plane bending allows the portions 243A, 243B to define an angle β (Figure 21). Depending on the dimensions of the slit 245 and the material properties of the tendon guard 243, angle α can have a value between 0° and 45° and angle β can have a value between 0° and 30°. In addition, the dimensions of the slit 245 can also determine the possible ranges of angles α and β. It is understood that the slit 245 may be replaced by a recess or groove generally extending along the longitudinal axis A-A for allowing the in-plane bending only.

[0066] The ability of the portions 243A, 243B to exhibit in-plane and out-of-plane bending facilitates the placement and removal of the inserts into the recess 100. For allowing the out-of-plane and in-plane bending, it is also understood that the tendon guard would be removably attached to the outer shell 12 such that the skater is able to remove the tendon guard 243 from the outer shell 12 if he or she desires changing the insert.

[0067] Any feature of any embodiment discussed herein may be combined with any feature of any other embodiment discussed herein in some examples of implementation. Various embodiments and examples have been presented for the purpose of describing, but not limiting, the invention. Various modifications and enhancements will become apparent to those of ordinary skill in the art and are within the scope of the invention, which is defined by the appended claims.

Claims

1. A skate boot (10) for enclosing a human foot when in use, the foot having a heel, an ankle with a medial malleolus and a lateral malleolus, an Achilles tendon having an upper part and a lower part that projects away from the upper part, the lower part merging with the heel, a plantar surface, medial and lateral sides and toes, the skate boot comprising (a) an outer shell (12) comprising a heel portion (44) for receiving the heel of the foot; an ankle portion for receiving the ankle, the ankle portion (46) comprising

a rear portion for facing at least partially the lower part of the Achilles tendon; and medial and lateral side portions (52; 54) for facing the medial and lateral sides of the foot respectively; and (b) a tendon guard (43) extending upwardly from the ankle portion of the outer shell for facing at least partially the upper part of the Achilles tendon, the tendon guard allowing backwards flexion of the ankle when the foot moves towards full extension, **being characterized in that** the tendon guard (43) comprises a recess (100) for receiving an insert (102) being adapted to be removably mounted in the recess, the tendon guard having a first flexion mode when no insert is received in the recess and a second flexion mode when the insert is received in the recess, the second flexion mode being different from the first flexion mode.

2. A skate boot as defined in claim 1, wherein the tendon guard extends along a longitudinal axis and wherein the recess (100) extends transversally to the longitudinal axis of the tendon guard.

3. A skate boot as defined in claim 1 or 2, wherein the second flexion mode is dependent on specifications of the insert (102), the specifications comprising dimensions, shapes, densities, thicknesses or hardness values.

4. A skate boot as defined in claim 3, wherein the insert (102) has a hardness value between 20 Shore A and 70 Shore D.

5. A skate boot as defined in any one of claims 1 to 4, wherein the insert (102) is made of at least one of natural rubber, isoprene rubber, polychloroprene, or styrene butadiene rubber.

6. A skate boot as defined in any one of claims 1 to 5, wherein the insert (102) is capable of being press-fit into the recess.

7. A skate boot as defined in any one of claims 1 to 5, wherein the insert (102) is capable of being snap-fit into the recess.

8. A skate boot as defined in any one of claims 1 to 5, wherein the insert (102) includes at least one protrusion (102B; 102C; 102D; 102E) shaped to cooperate with a corresponding groove on the tendon guard.

9. A skate boot as defined in any one of claims 1 to 8, wherein the tendon guard (43) is made by injection molding.

10. A skate boot as defined in any one of claims 1 to 9, wherein the tendon guard (43) comprises a bottom portion (74) affixed to the rear portion of the ankle portion and a flexing portion (80) projecting upwardly from the bottom portion for facing at least partially the upper part of the Achilles tendon, the flexing portion being capable of flexing rearwardly from an initial position when pressure is applied on it and returning to the initial position when pressure is no longer applied on it.

11. A skate boot as defined in claim 10, wherein the bottom portion (74) of the tendon guard (43) has a U-shaped groove and wherein the U-shaped groove at least partially receives a top edge of the rear portion of the ankle portion.

12. A skate boot as defined in claim 1, wherein the tendon guard (43) is removably attachable to the ankle portion of the outer shell.

13. A skate boot as defined in any one of claims 1 to 9, wherein, in use, the first insert (102^1) is selected among a plurality of inserts (102^1, 102^2).

14. A skate boot as defined in claim 13, wherein the plurality of inserts comprises the first insert and a second insert (102^1; 102^2), the first insert (102^1) having a different hardness from the one of the second insert (102^2).

15. A skate boot as defined in claim 14, wherein the first insert (102^1) has a hardness value below 50 Shore A and the second insert (102^2) has a hardness value above 50 Shore A.

16. A skate boot as defined in claim 13, wherein the plurality of inserts comprises the first insert and a second insert (102^1, 102^2), the first insert (102^1) having a different dimension, shape, density or thickness from the one of the second insert (102^2).

17. A skate boot as defined in claim 16, wherein the first insert (102^1) has a full body and the second insert (102^2) has a slit.

18. A skate boot as defined in claim 16, wherein the first insert (102^1) is substantially confined in the recess when received therein, and the second insert (102^2) is slightly smaller than the recess thereby creating a gap when the second insert is received in the recess.

19. A skate boot as defined in claim 13, wherein the plurality of inserts comprises the first insert and a second insert (102^1, 102^2) and wherein the tendon guard (43) has a flexion portion (80), the flexing portion flexing from an initial position of the flexing portion to a first bent position being at a first angle θ_1 from the initial position when the first insert (102^1) is received in the recess, the flexing portion flexing from the initial position of the flexing portion to a second bent position being at a second flexing angle θ_2 from

the initial position when the second insert (102^2) is received in the recess, the first angle θ_1 being different from the second flexing angle θ_2.

Patentansprüche

1. Schlittschuh (10) zum Umschließen eines menschlichen Fußes im Gebrauch, wobei der Fuß eine Ferse, einen Fußknöchel mit einem Innenknöchel und einem Außenknöchel, eine Achillessehne mit einem oberen Teil und einem vom oberen Teil weg ragenden unteren Teil, wobei der untere Teil in die Ferse übergeht, eine plantare Oberfläche, mediale und laterale Seiten und Zehen aufweist, wobei der Schlittschuh (a) eine Außenschale (12), die einen Fersenabschnitt (44) zur Aufnahme der Ferse des Fußes; einen Fußknöchelabschnitt zur Aufnahme des Fußknöchels, wobei der Fußknöchelabschnitt (46) einen hinteren Abschnitt zum zumindest teilweisen Weisen zu dem unteren Teil der Achillessehne; und mediale und laterale Abschnitte (52; 54) zum Weisen zu der medialen bzw. lateralen Seite des Fußes, umfasst; und (b) einen Sehnenschutz (43), der sich von dem Fußknöchelteil der Außenschale nach oben erstreckt, um zumindest teilweise zu dem oberen Teil der Achillesferse zu weisen, umfasst, wobei der Sehnenschutz ein Nachhintenbeugen des Fußknöchels gestattet, wenn sich der Fuß zu seiner vollständigen Streckung bewegt, **dadurch gekennzeichnet, dass** der Sehnenschutz (43) eine Aussparung (100) zur Aufnahme eines Einsatzes (102) umfasst, der zum lösbaren Anbringen in der Aussparung ausgeführt ist, wobei der Sehnenschutz einen ersten Biegungsmodus aufweist, wenn kein Einsatz aufgenommen ist, und einen zweiten Biegungsmodus, wenn der Einsatz in der Aussparung aufgenommen ist, wobei sich der zweite Biegungsmodus von dem ersten Biegungsmodus unterscheidet.

2. Schlittschuh nach Anspruch 1, wobei sich der Sehnenschutz entlang einer Längsachse erstreckt und wobei die Aussparung (100) quer zur Längsachse des Sehnenschutzes verläuft.

3. Schlittschuh nach Anspruch 1 oder 2, wobei der zweite Biegungsmodus von Spezifikationen des Einsatzes (102) abhängt, wobei die Spezifikationen Abmessungen, Formen, Dichten, Dicken oder Härtewerte umfassen.

4. Schlittschuh nach Anspruch 3, wobei der Einsatz (102) einen Härtewert von zwischen 20 Shore A und 70 Shore D aufweist.

5. Schlittschuh nach einem der Ansprüche 1 bis 4, wobei der Einsatz (102) aus Naturkautschuk, Isoprenkautschuk, Polychloropren oder Styrol-Butadien-Kautschuk hergestellt ist.

6. Schlittschuh nach einem der Ansprüche 1 bis 5, wobei der Einsatz (102) durch Presspassung in der Aussparung angeordnet werden kann.

7. Schlittschuh nach einem der Ansprüche 1 bis 5, wobei der Einsatz (102) durch Einrasten in der Aussparung angeordnet werden kann.

8. Schlittschuh nach einem der Ansprüche 1 bis 5, wobei der Einsatz (102) mindestens einen Vorsprung (102B; 102C; 102D, 102E) enthält, der zum Zusammenwirken mit einer entsprechenden Nut am Sehnenschutz geformt ist.

9. Schlittschuh nach einem der Ansprüche 1 bis 8, wobei der Sehnenschutz (43) durch Spritzgießen hergestellt ist.

10. Schlittschuh nach einem der Ansprüche 1 bis 9, wobei der Sehnenschutz (43) einen unteren Abschnitt (74), der an dem hinteren Abschnitt des Fußknöchelabschnitts befestigt ist, und einen Biegungsabschnitt (80), der von dem unteren Abschnitt nach oben ragt, um zumindest teilweise zu dem oberen Teil der Achillessehne zu weisen, umfasst, wobei sich der Biegungsabschnitt aus einer Ausgangsposition nach hinten biegen kann, wenn Druck daran angelegt wird, und in die Ausgangsposition zurückkehren kann, wenn kein Druck mehr daran angelegt wird.

11. Schlittschuh nach Anspruch 10, wobei der untere Abschnitt (74) des Sehnenschutzes (43) eine U-förmige Nut aufweist und wobei die U-förmige Nut einen oberen Rand des hinteren Abschnitts des Fußknöchelabschnitts zumindest teilweise aufnimmt.

12. Schlittschuh nach Anspruch 1, wobei der Sehnenschutz (43) lösbar an dem Fußknöchelabschnitt der Außenschale angebracht werden kann.

13. Schlittschuh nach einem der Ansprüche 1 bis 9, wobei im Gebrauch der erste Einsatz (102^1) zwischen mehreren Einsätzen (102^1, 102^2) ausgewählt wird.

14. Schlittschuh nach Anspruch 13, wobei die mehreren Einsätze den ersten Einsatz und einen zweiten Einsatz (102^1, 102^2) umfassen, wobei der erste Einsatz (102^1) eine andere Härte als die des zweiten Einsatzes (102^2) aufweist.

15. Schlittschuh nach Anspruch 14, wobei der erste Einsatz (102^1) einen Härtewert von unter 50 Shore A aufweist und der zweite Einsatz (102^2) einen Härtewert von über 50 Shore A aufweist.

16. Schlittschuh nach Anspruch 13, wobei die mehreren

Einsätze den ersten Einsatz und den zweiten Einsatz (102^1, 102^2) umfassen, wobei der erste Einsatz (102^1) eine andere Abmessung, Form, Dichte oder Dicke als die des zweiten Einsatzes (102^2) aufweist.

17. Schlittschuh nach Anspruch 16, wobei der erste Einsatz (102^1) einen Vollkörper aufweist und der zweite Einsatz (102^2) einen Schlitz aufweist.

18. Schlittschuh nach Anspruch 16, wobei der erste Einsatz (102^1) in der Aussparung, wenn er darin aufgenommen ist, im Wesentlichen eingeschlossen ist und der zweite Einsatz (102^2) etwas schmaler als die Aussparung ist, wodurch ein Spalt erzeugt wird, wenn der zweite Einsatz in der Aussparung aufgenommen ist.

19. Schlittschuh nach Anspruch 13, wobei die mehreren Einsätze den ersten Einsatz und den zweiten Einsatz (101^1, 102^2) umfassen und wobei der Sehnenschutz (43) einen Biegungsabschnitt (80) aufweist, wobei sich der Biegungsabschnitt aus einer Ausgangsposition des Biegungsabschnitts in eine erste gebogene Position, die sich in einem ersten Winkel θ_1 von der Ausgangsposition befindet, biegt, wenn der erste Einsatz (102^1) in der Aussparung aufgenommen ist, wobei sich der Biegungsabschnitt aus der Ausgangsposition des Biegungsabschnitts in eine zweite gebogene Position, die sich in einem zweiten Biegungswinkel θ_2 von der Ausgangsposition befindet, biegt, wenn der zweite Einsatz (102^2) in der Aussparung aufgenommen ist, wobei sich der erste Winkel θ_1 von dem zweiten Biegungswinkel θ_2 unterscheidet.

Revendications

1. Chaussure de patin (10) pour enfermer un pied humain durant l'utilisation, le pied possédant un talon, une cheville avec une malléole interne et une malléole externe, un tendon d'Achille possédant une partie supérieure et une partie inférieure qui fait saillie en éloignement de la partie supérieure, la partie inférieure fusionnant avec le talon, une surface plantaire, des côtés interne et externe et des orteils, la chaussure de patin comprenant (a) une coque extérieure (12) comprenant une portion talon (44) pour recevoir le talon du pied ; une portion cheville pour recevoir la cheville, la portion cheville (46) comprenant une portion arrière pour faire face au moins partiellement à la partie inférieure du tendon d'Achille ; et des portions latérales interne et externe (52 ; 54) pour faire face aux côtés interne et externe du pied respectivement ; et (b) un dispositif de protection de tendon (43) s'étendant vers le haut à partir de la portion cheville de la coque extérieure pour faire face au moins partiellement à la partie supérieure du tendon d'Achille, le dispositif de protection de tendon permettant la flexion vers l'arrière de la cheville lorsque le pied se déplace vers l'extension complète, **caractérisée en ce que** le dispositif de protection de tendon (43) comprend un évidement (100) pour recevoir un insert (102) adaptée pour être montée de façon amovible dans l'évidement, le dispositif de protection de tendon possédant un premier mode de flexion lorsqu'aucun insert n'est reçu dans l'évidement et un second mode de flexion lorsque l'insert est reçu dans l'évidement, le second mode de flexion étant différent du premier mode de flexion.

2. Chaussure de patin selon la revendication 1, dans laquelle le dispositif de protection de tendon s'étend le long d'un axe longitudinal et dans laquelle l'évidement (100) s'étend transversalement à l'axe longitudinal du dispositif de protection de tendon.

3. Chaussure de patin selon la revendication 1 ou 2, dans laquelle le second mode de flexion dépend de caractéristiques techniques de l'insert (102), les caractéristiques techniques comprenant des dimensions, formes, densités, épaisseurs ou valeurs de dureté.

4. Chaussure de patin selon la revendication 3, dans laquelle l'insert (102) possède une valeur de dureté entre 20 Shore A et 70 Shore D.

5. Chaussure de patin selon une quelconque des revendications 1 à 4, dans laquelle l'insert (102) est fait d'au moins un de caoutchouc naturel, caoutchouc isoprène, polychloroprène, ou caoutchouc styrène butadiène.

6. Chaussure de patin selon une quelconque des revendications 1 à 5, dans laquelle l'insert (102) est capable d'être ajusté avec serrage dans l'évidement.

7. Chaussure de patin selon une quelconque des revendications 1 à 5, dans laquelle l'insert (102) est capable d'être ajusté par encliquetage dans l'évidement.

8. Chaussure de patin selon une quelconque des revendications 1 à 5, dans laquelle l'insert (102) comprend au moins une protubérance (102B ; 102C ; 102D ; 102E) formée pour coopérer avec une rainure correspondante sur le dispositif de protection de tendon.

9. Chaussure de patin selon une quelconque des revendications 1 à 8, dans laquelle le dispositif de protection de tendon (43) est fait par moulage par injection.

10. Chaussure de patin selon une quelconque des re-

vendications 1 à 9, dans laquelle le dispositif de protection de tendon (43) comprend une portion basse (74) fixée à la portion arrière de la portion cheville et une portion flexible (80) faisant saillie vers le haut à partir de la portion basse pour faire face au moins partiellement à la partie supérieure du tendon d'Achille, la portion flexible étant capable de fléchir vers l'arrière à partir d'une position initiale lorsqu'une pression est appliquée sur elle et de retourner à la position initiale lorsque la pression n'est plus appliquée sur elle.

11. Chaussure de patin selon la revendication 10, dans laquelle la portion basse (74) du dispositif de protection de tendon (43) comporte une rainure en forme de U et dans laquelle la rainure en forme de U reçoit au moins partiellement un bord haut de la portion arrière de la portion cheville.

12. Chaussure de patin selon la revendication 1, dans laquelle le dispositif de protection de tendon (43) est fixé de façon amovible à la portion cheville de la coque extérieure.

13. Chaussure de patin selon une quelconque des revendications 1 à 9, dans laquelle, durant l'utilisation, le premier insert (102^1) est sélectionné parmi une pluralité d'inserts (102^1, 102^2).

14. Chaussure de patin selon la revendication 13, dans laquelle la pluralité d'inserts comprend le premier insert et un deuxième insert (102^1 ; 102^2), le premier insert (102^1) possédant une dureté différente de celle du deuxième insert (102^2).

15. Chaussure de patin selon la revendication 14, dans laquelle le premier insert (102^1) possède une valeur de dureté inférieure à 50 Shore A et le deuxième insert (102^2) possède une valeur de dureté supérieure à 50 Shore A.

16. Chaussure de patin selon la revendication 13, dans laquelle la pluralité d'inserts comprend le premier insert et un deuxième insert (102^1, 102^2), le premier insert (102^1) possédant une dimension, forme, densité ou épaisseur différente de celle du deuxième insert (102^2).

17. Chaussure de patin selon la revendication 16, dans laquelle le premier insert (102^1) présente un corps entier et le deuxième insert (102^2) comporte une fente.

18. Chaussure de patin selon la revendication 16, dans laquelle le premier insert (102^1) est sensiblement confiné dans l'évidement lorsqu'il est reçu dans celui-ci, et le deuxième insert (102^2) est légèrement plus petit que l'évidement, créant ainsi un espace lorsque le deuxième insert est reçu dans l'évidement.

19. Chaussure de patin selon la revendication 13, dans laquelle la pluralité d'inseiis comprend le premier insert et un deuxième insert (102^1, 102^2) et dans laquelle le dispositif de protection de tendon (43) possède une portion flexible (80), la portion flexible fléchissant d'une position initiale de la portion flexible à une première position fléchie qui est à un premier angle θ_1 par rapport à la position initiale lorsque le premier insert (102^1) est reçu dans l'évidement, la portion flexible fléchissant de la position initiale de la portion flexible à une seconde position fléchie qui est à un second angle de flexion au par rapport à la position initiale lorsque le deuxième insert (102^2) est reçu dans l'évidement, le premier angle θ_1 étant différent du second angle de flexion θ_2.

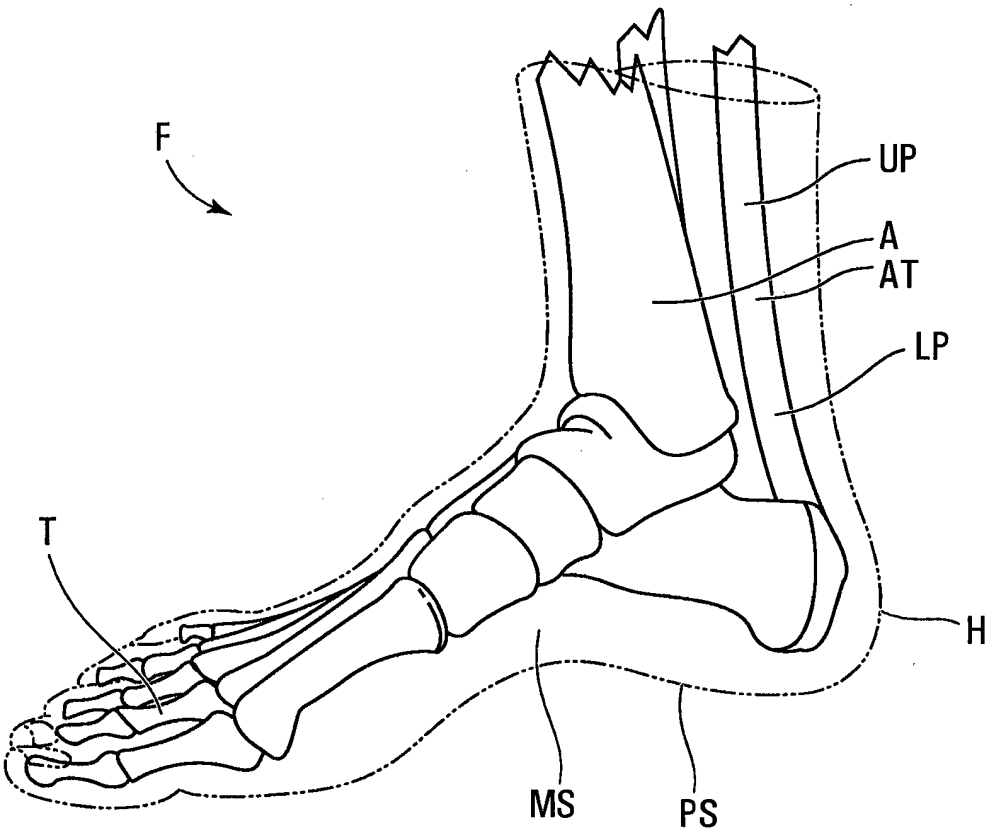


FIG. 1

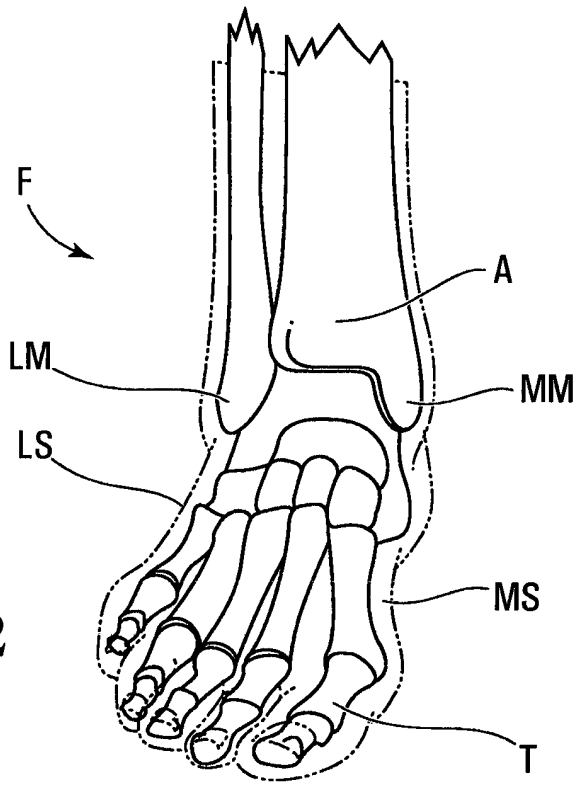


FIG. 2

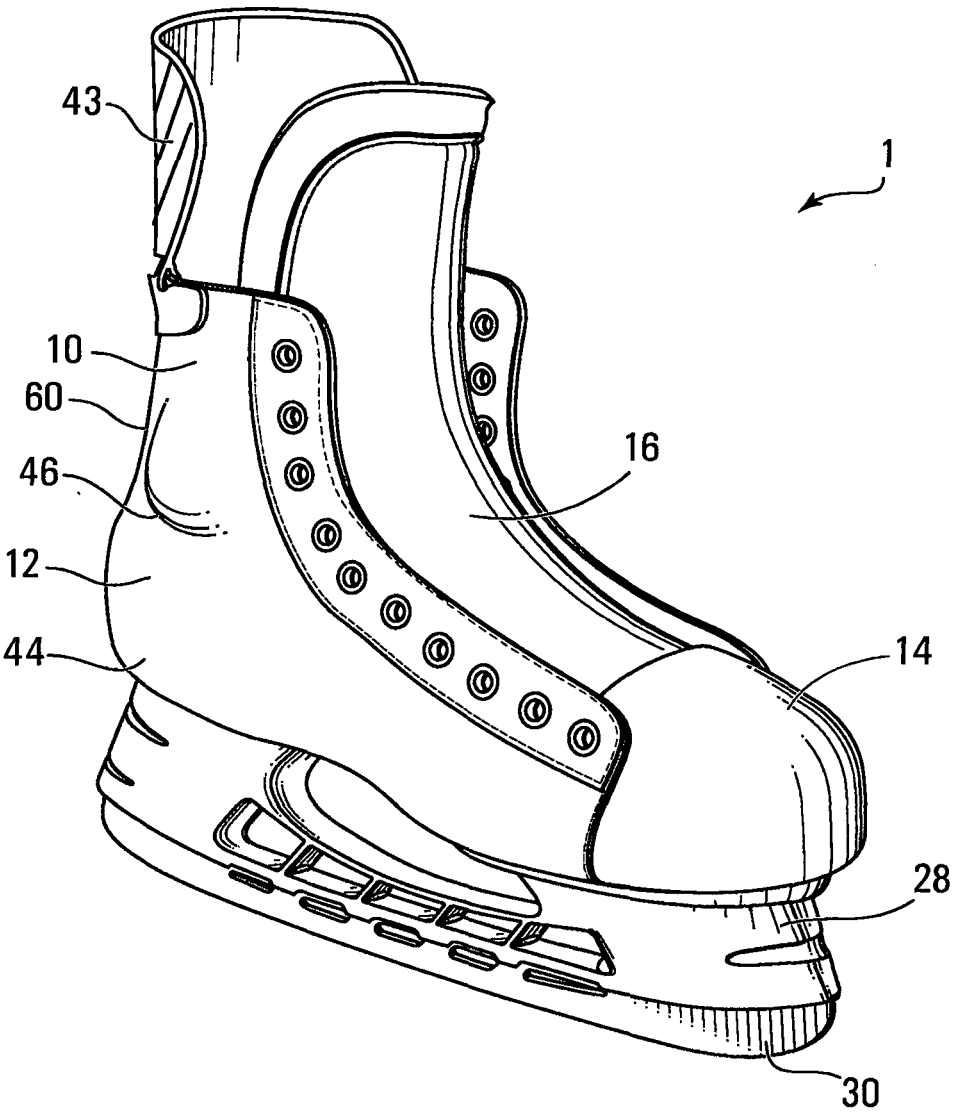


FIG. 3

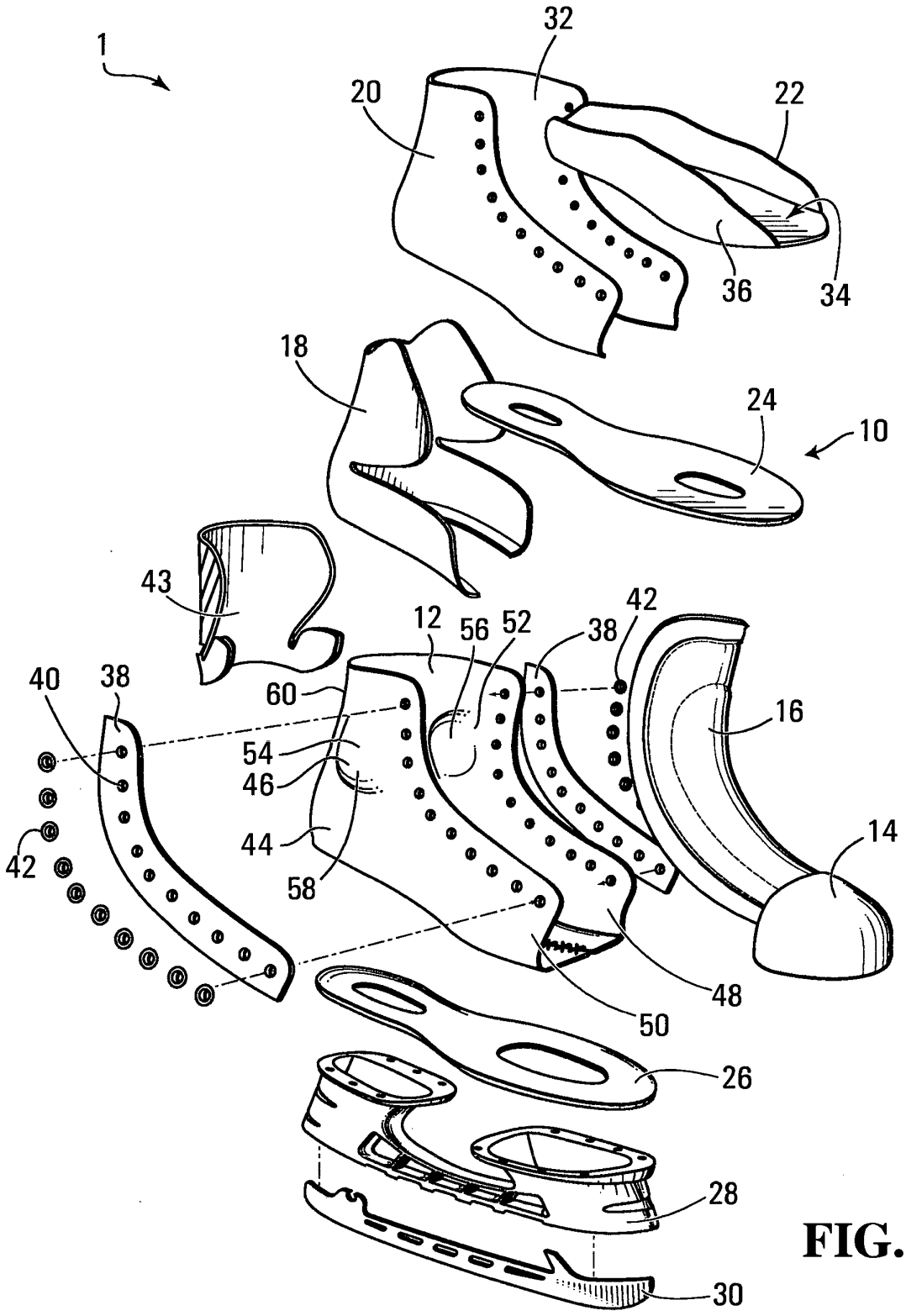

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FIG. 4

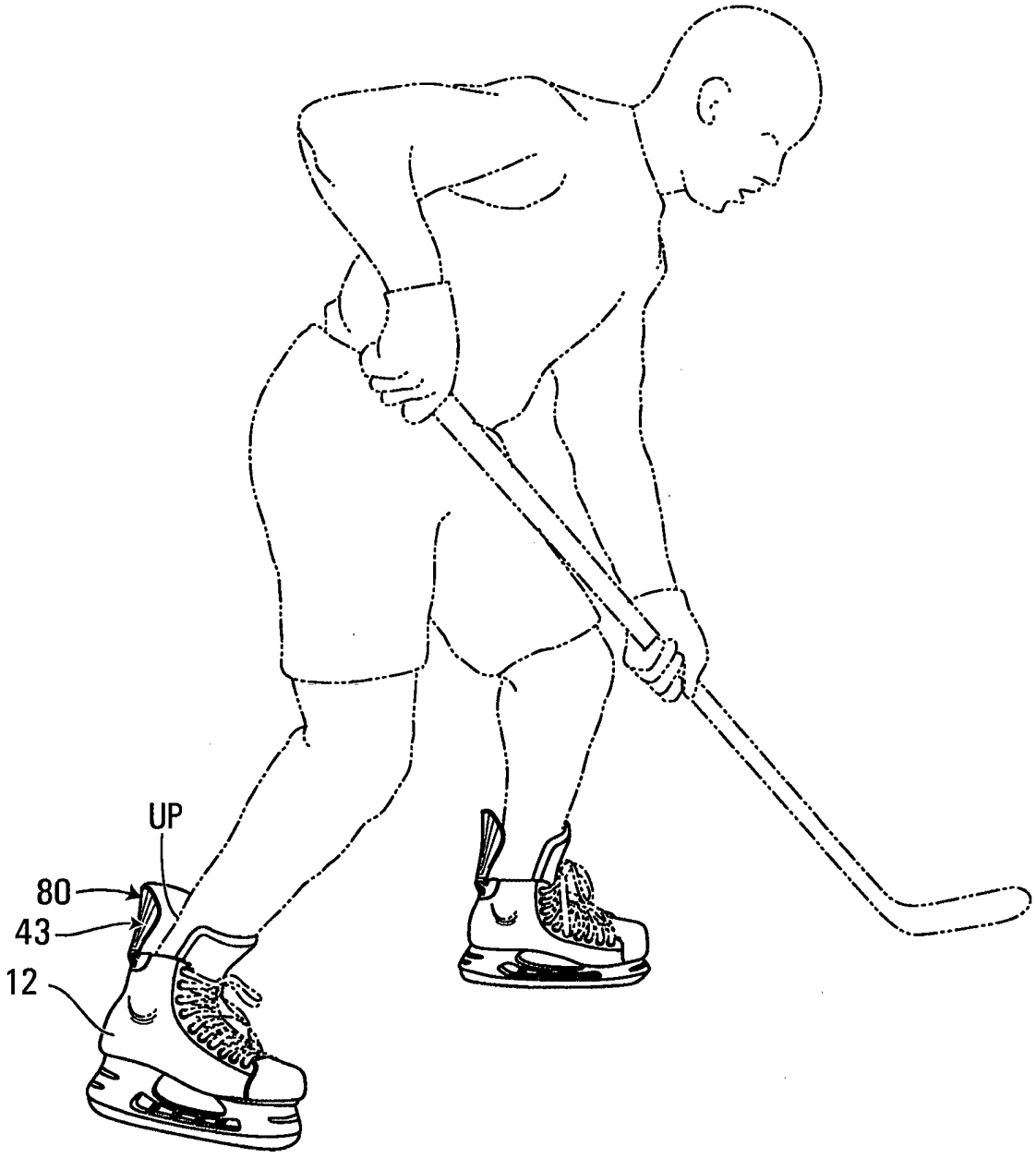


FIG. 5

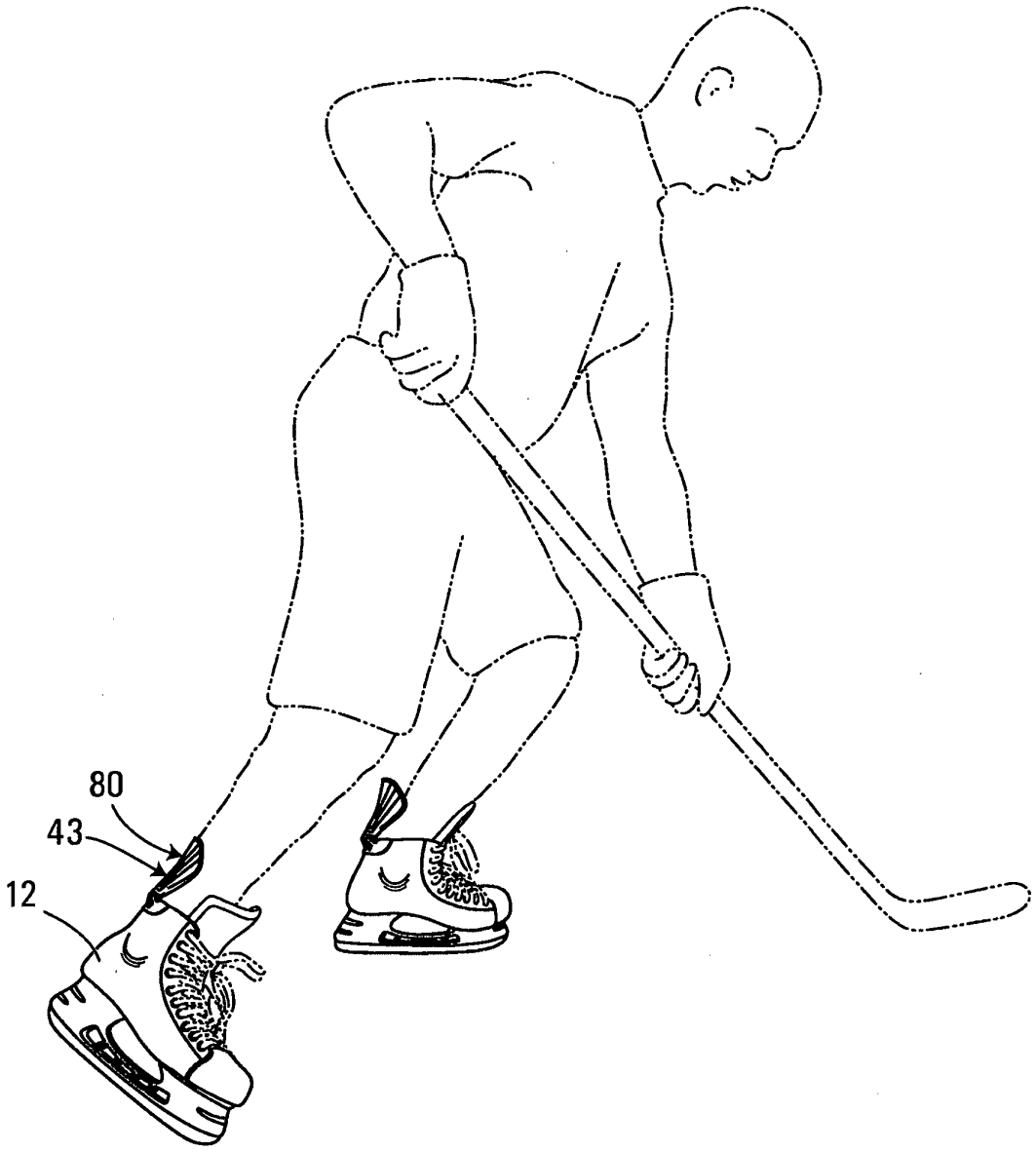


FIG. 6

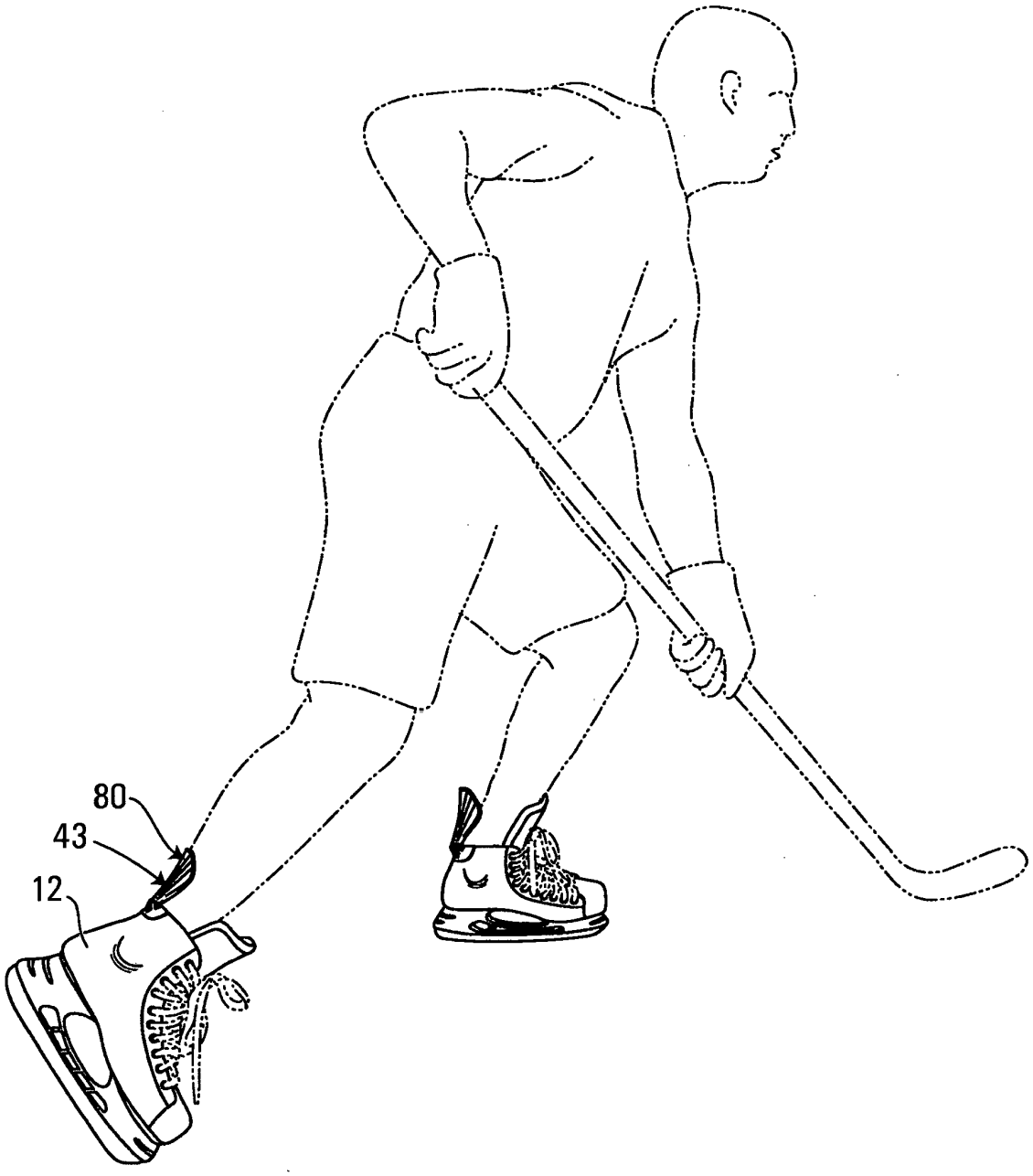


FIG. 7

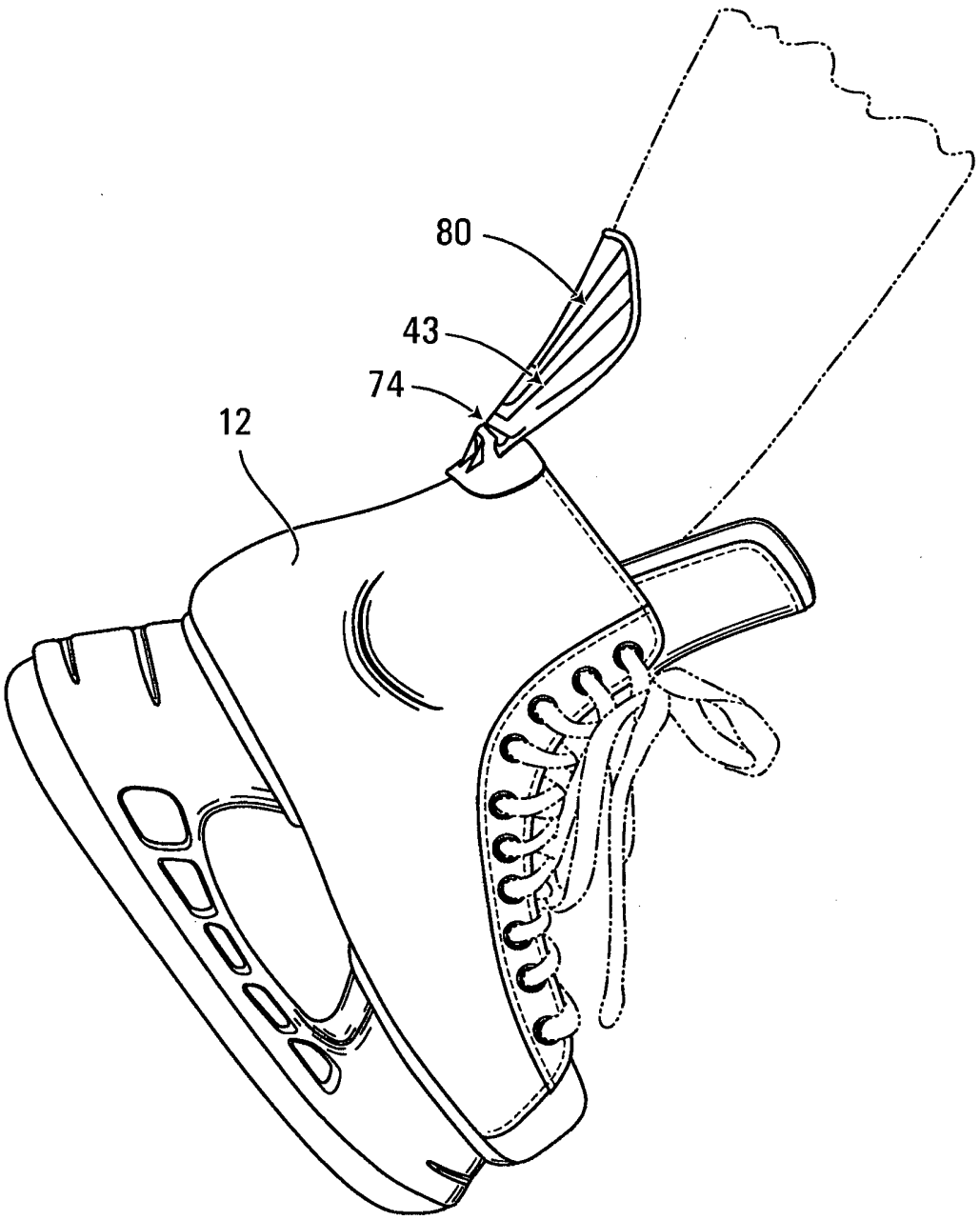


FIG. 8

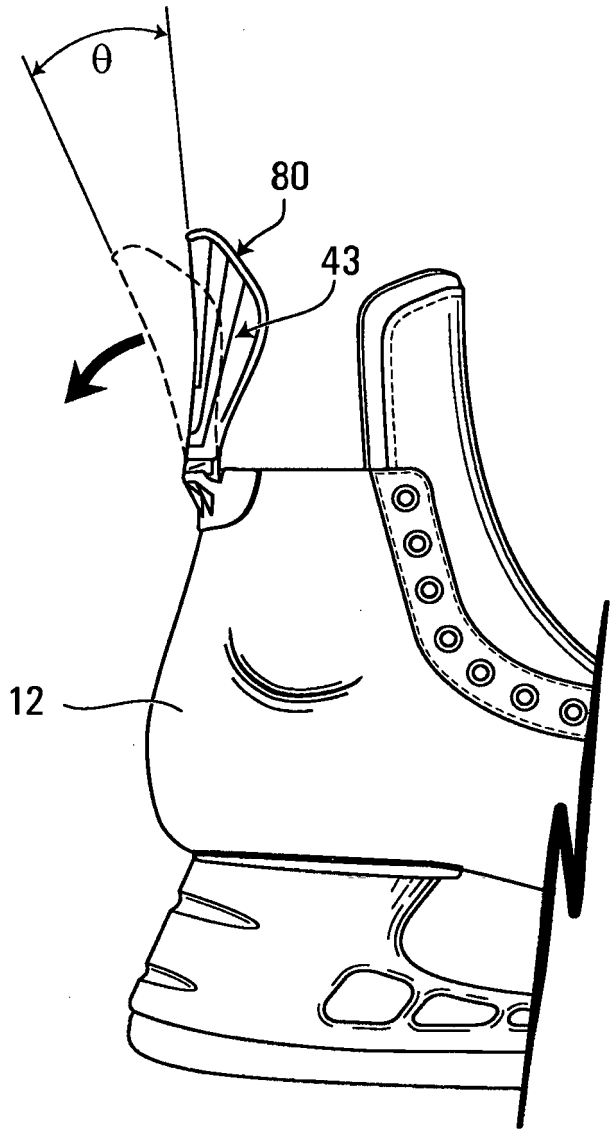


FIG. 9

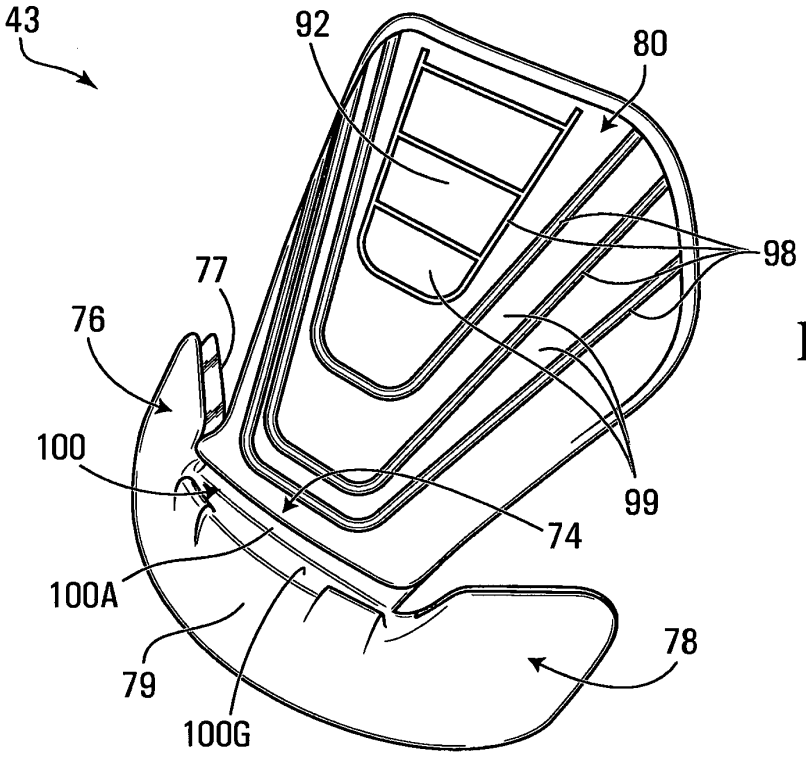

43
92
80
98
77
76
100
99
74
100A
78
79
100G

FIG. 10

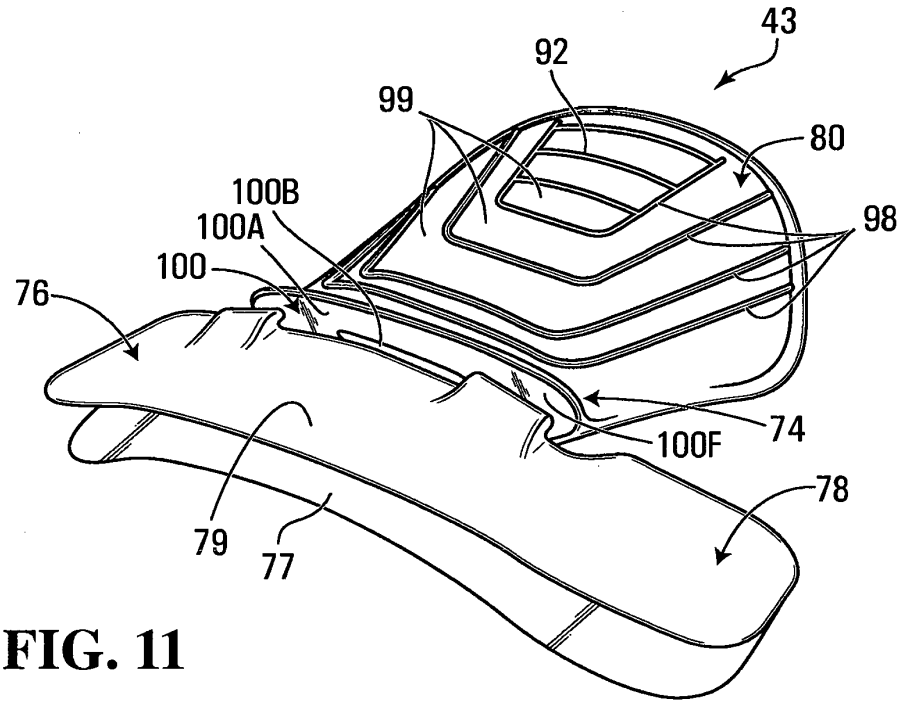

43
92
99
80
100B
100A
98
100
76
74
100F
78
79
77

FIG. 11

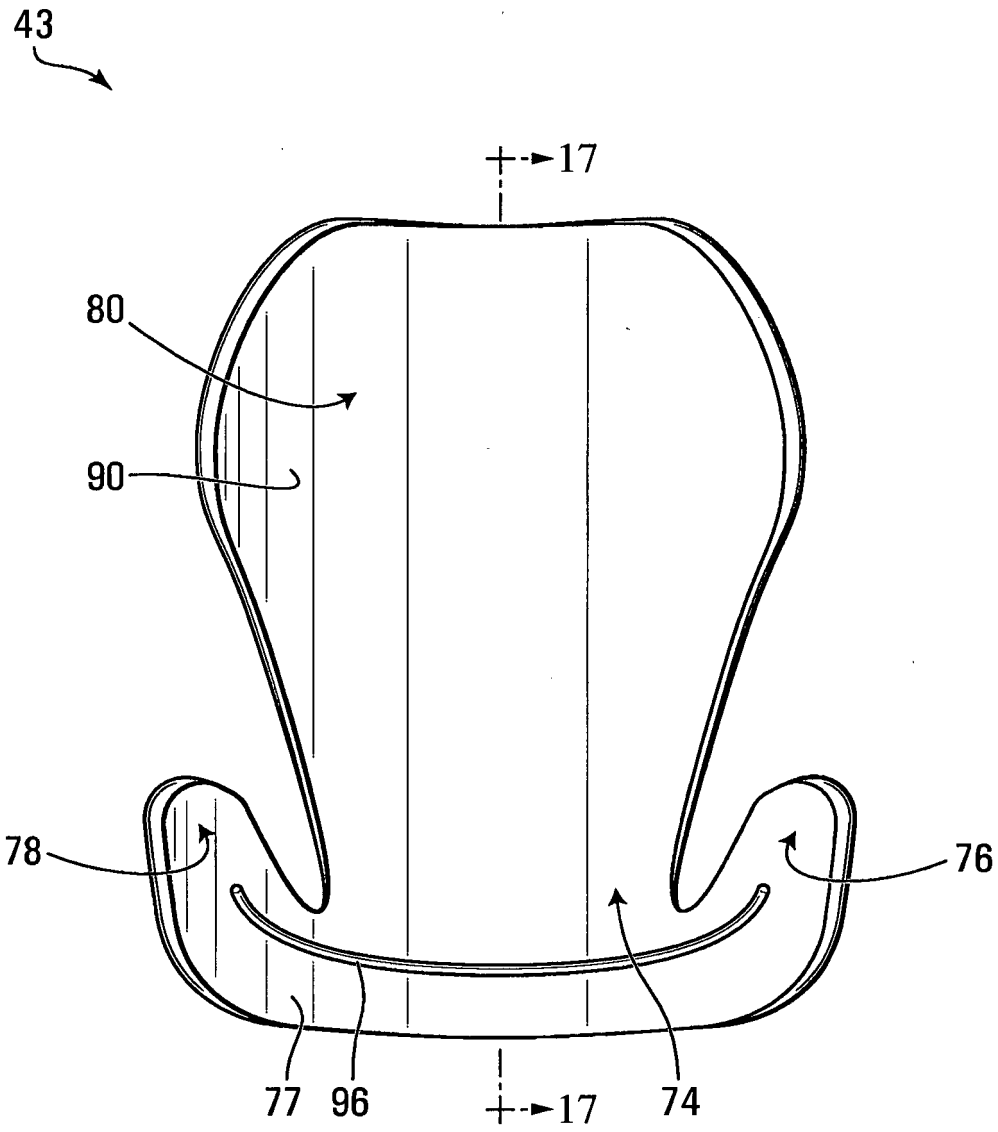


FIG. 12

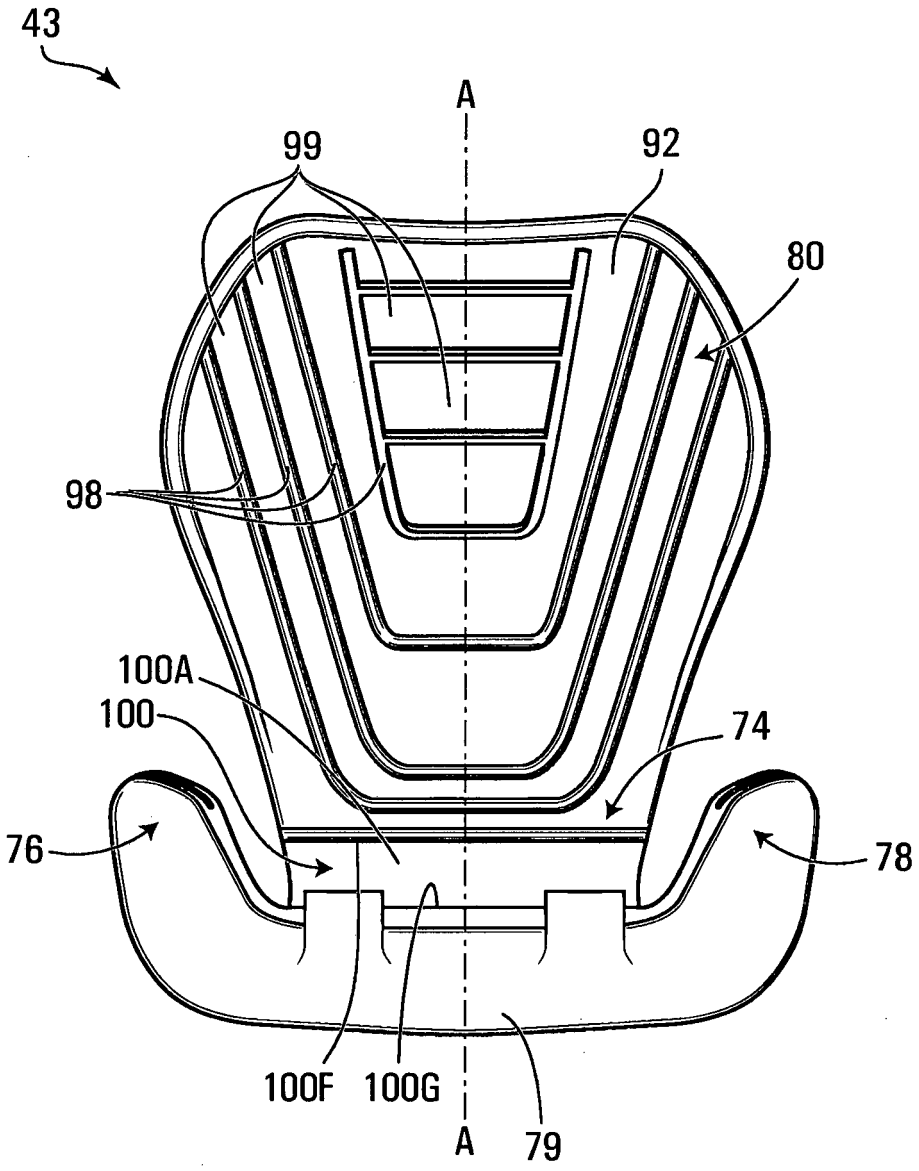


FIG. 13

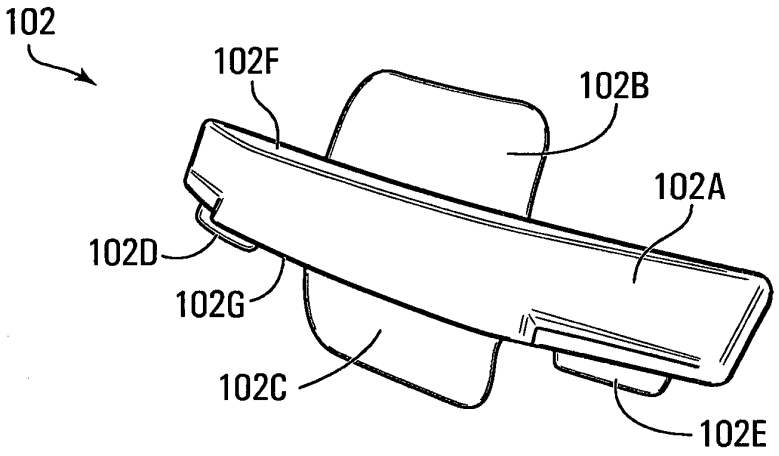


FIG. 14

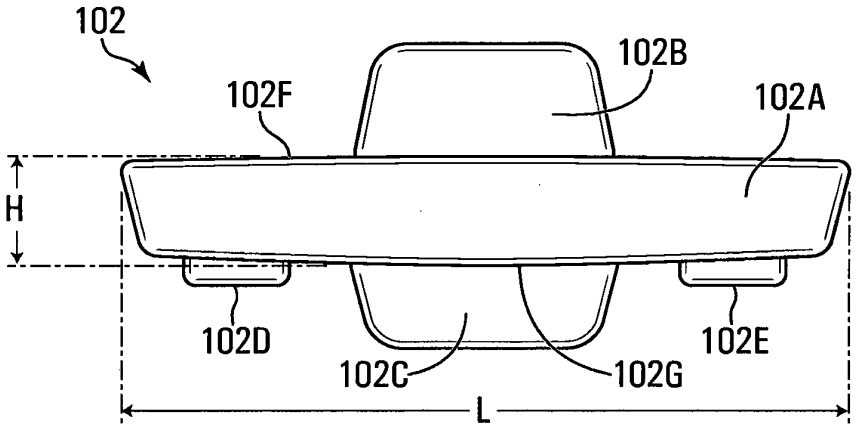


FIG. 15

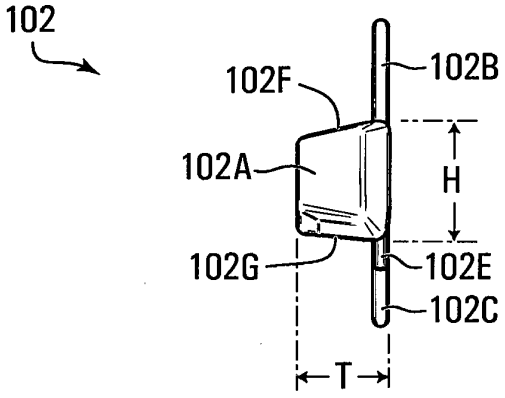


FIG. 16

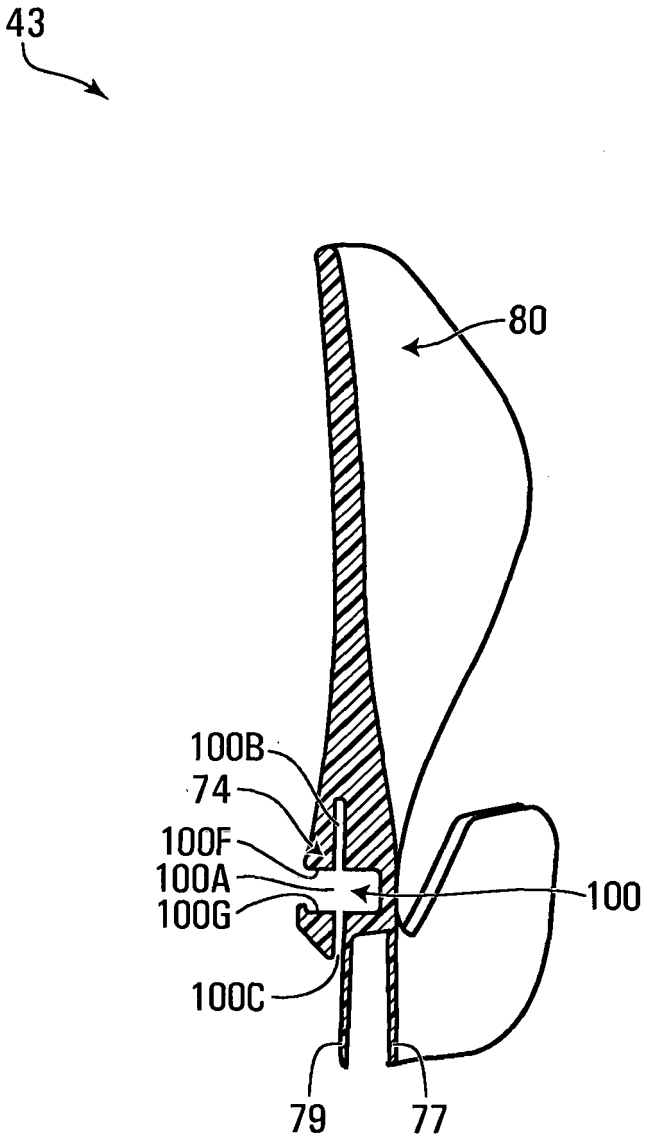


FIG. 17

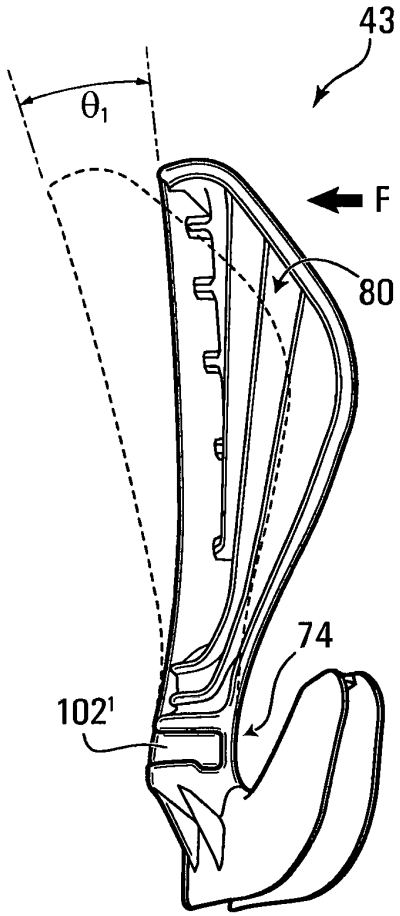


FIG. 18A

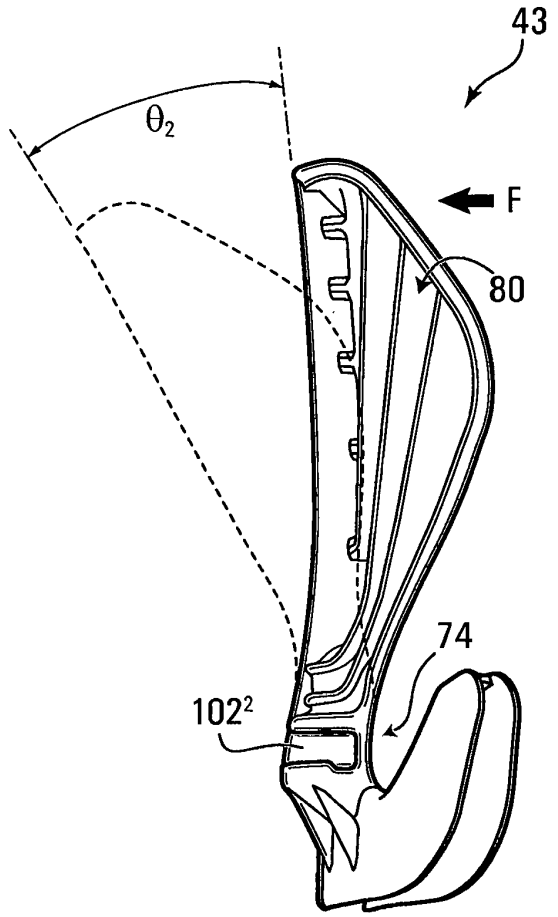


FIG. 18B

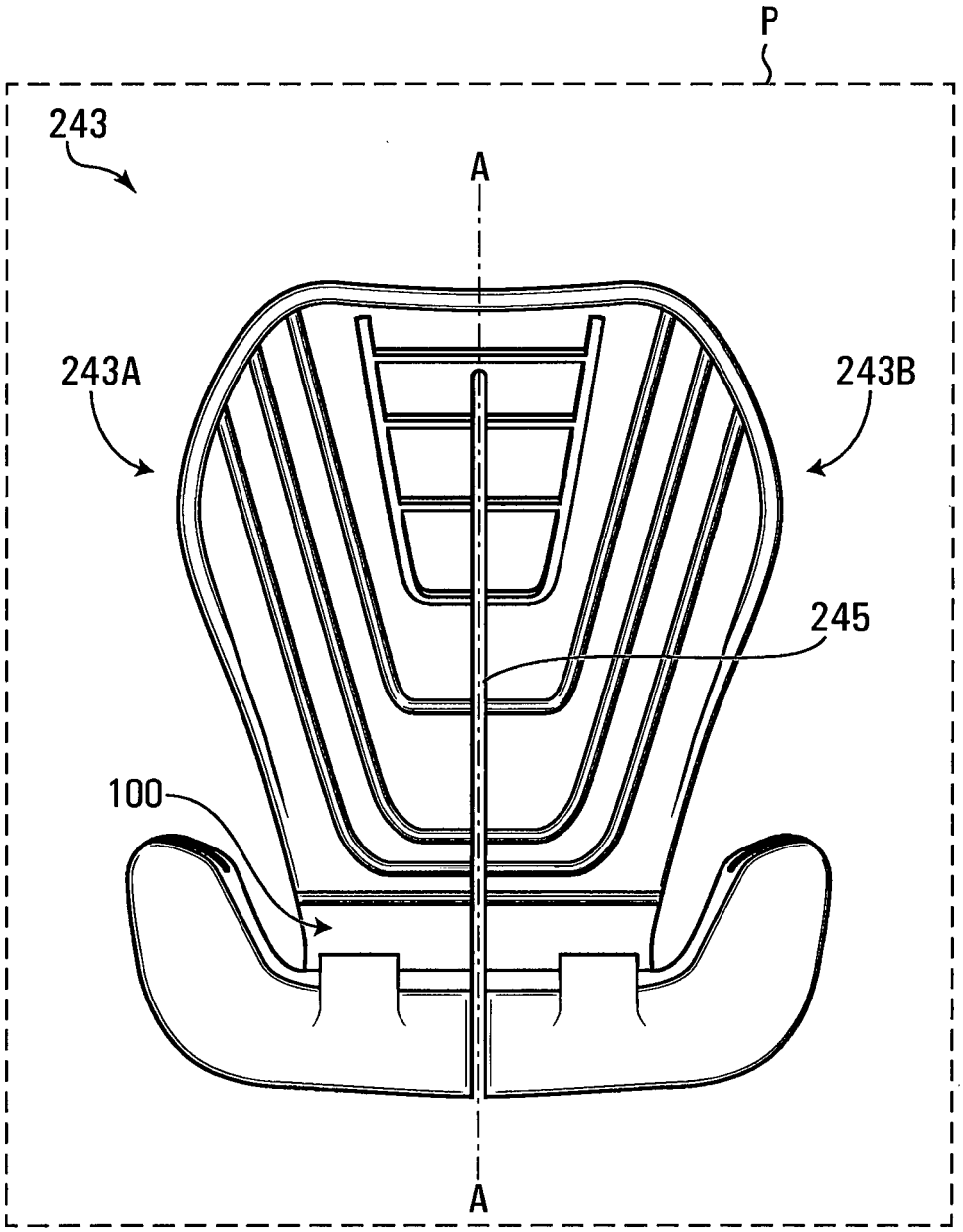


FIG. 19

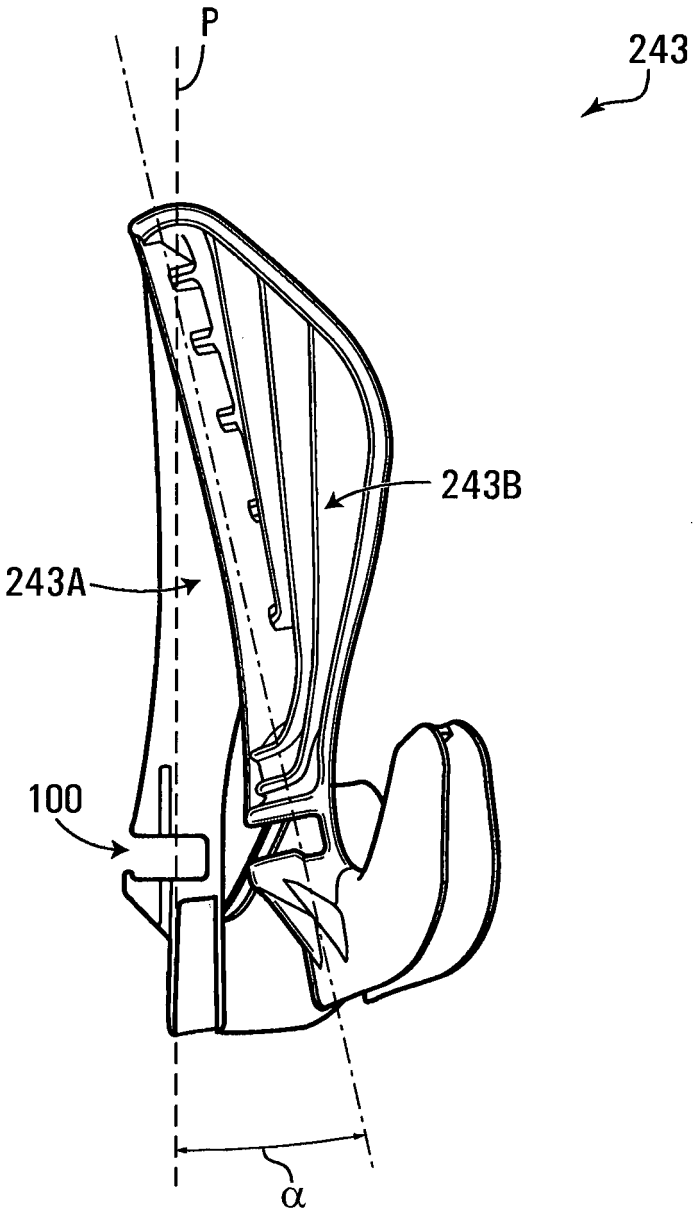


FIG. 20

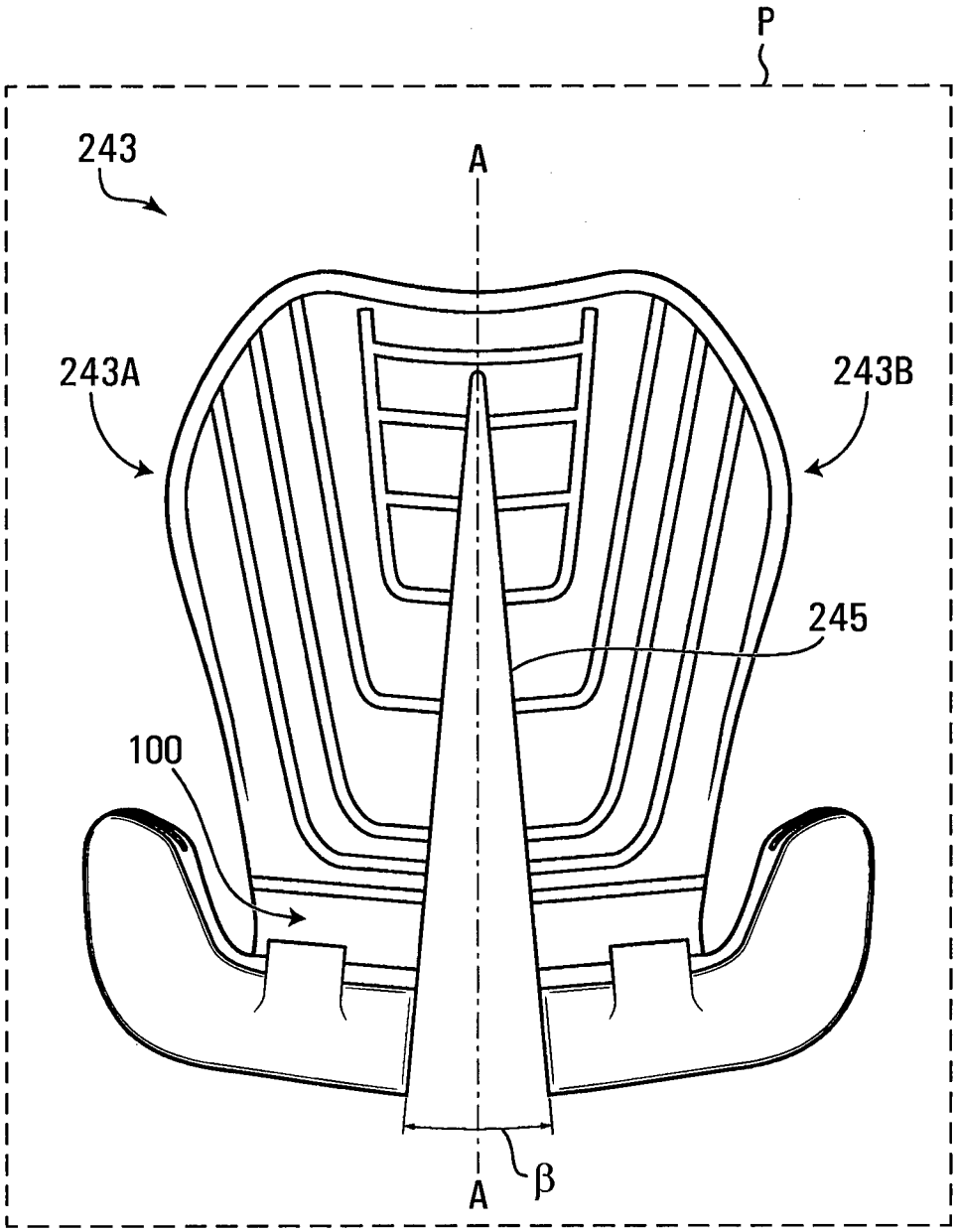


FIG. 21

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1716771 A **[0002]**
- US 20050229436 A **[0006]**
- US 4655465 A **[0007]**