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(54) ROTATIONAL INTERFACE FOR SNOWBOARD BINDINGS

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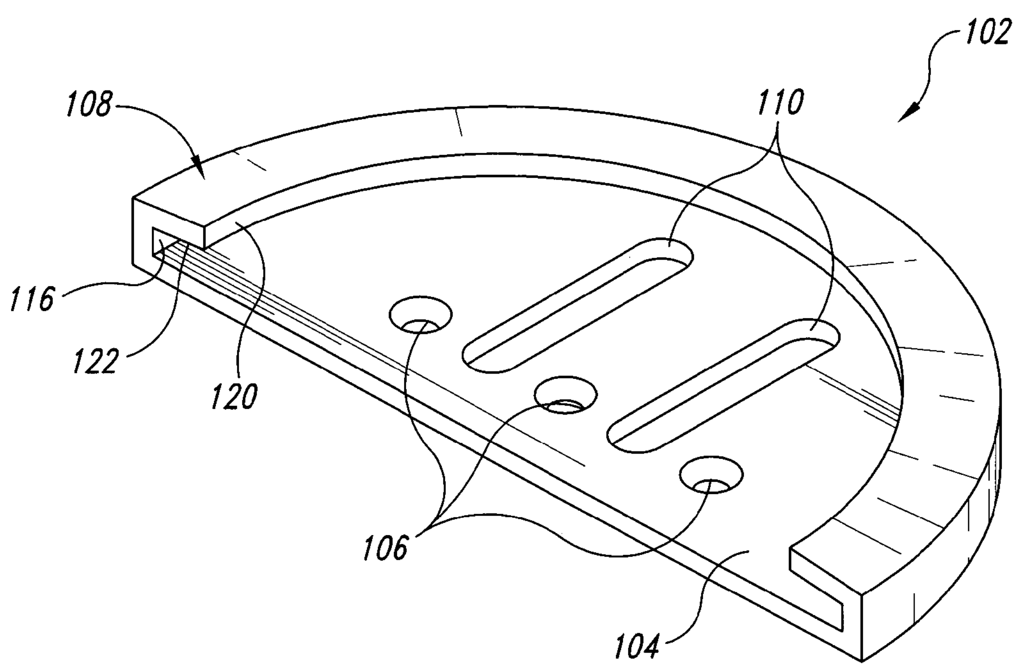
(57) **ABSTRACT**

A snowboard binding interface and methods of making the same are disclosed herein. The snowboard binding interface can be used to provide a quick and simple way of changing the orientation of a snowboarder's feet relative to the snowboard. In one embodiment, an interface includes a single rotational unit in a front binding interface and a non-rotational unit in a back binding interface that matches the height of the rotational unit. The rotational unit can move 360° so that a snowboarder can change position of one foot relative to the snowboard. The binding interface reduces boot heel and toe drag during edging on snow because the binding is elevated above the surface of the board, and the force to the edges of the snowboard is increased due to the leverage generated by the additional distance between the snowboard and the binding.



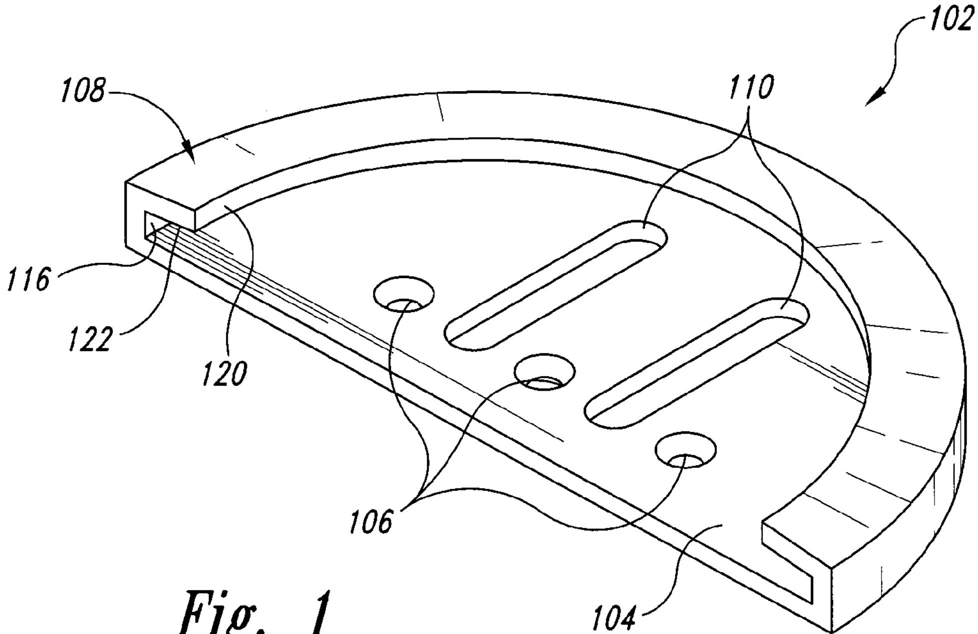


Fig. 1

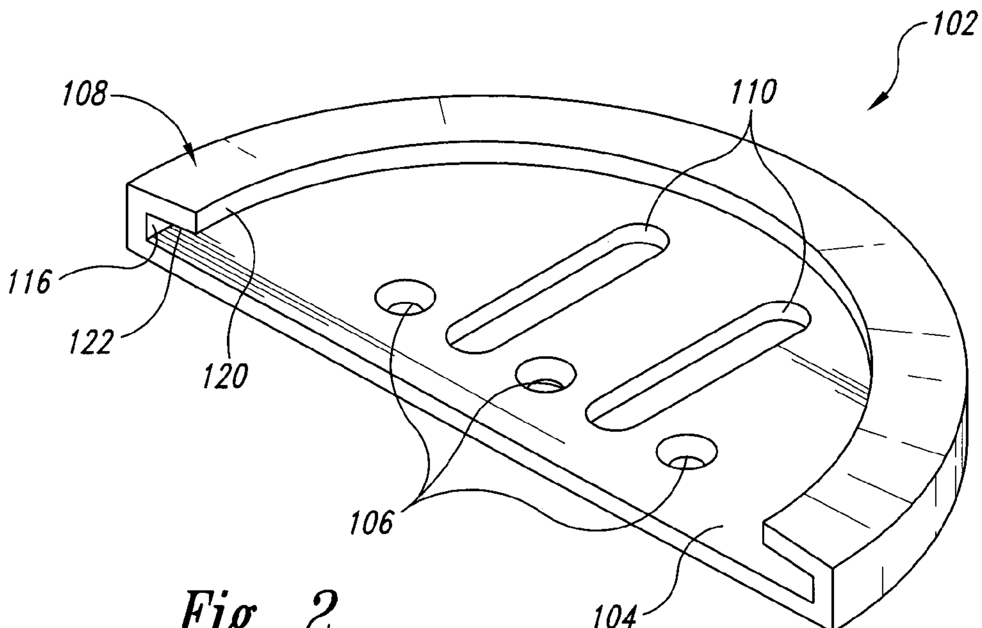


Fig. 2

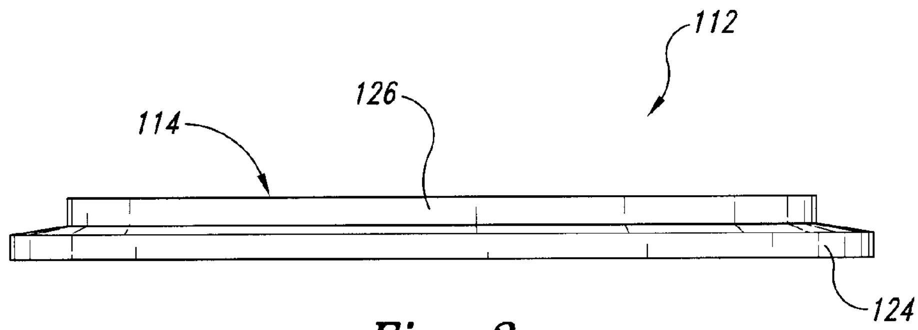


Fig. 3

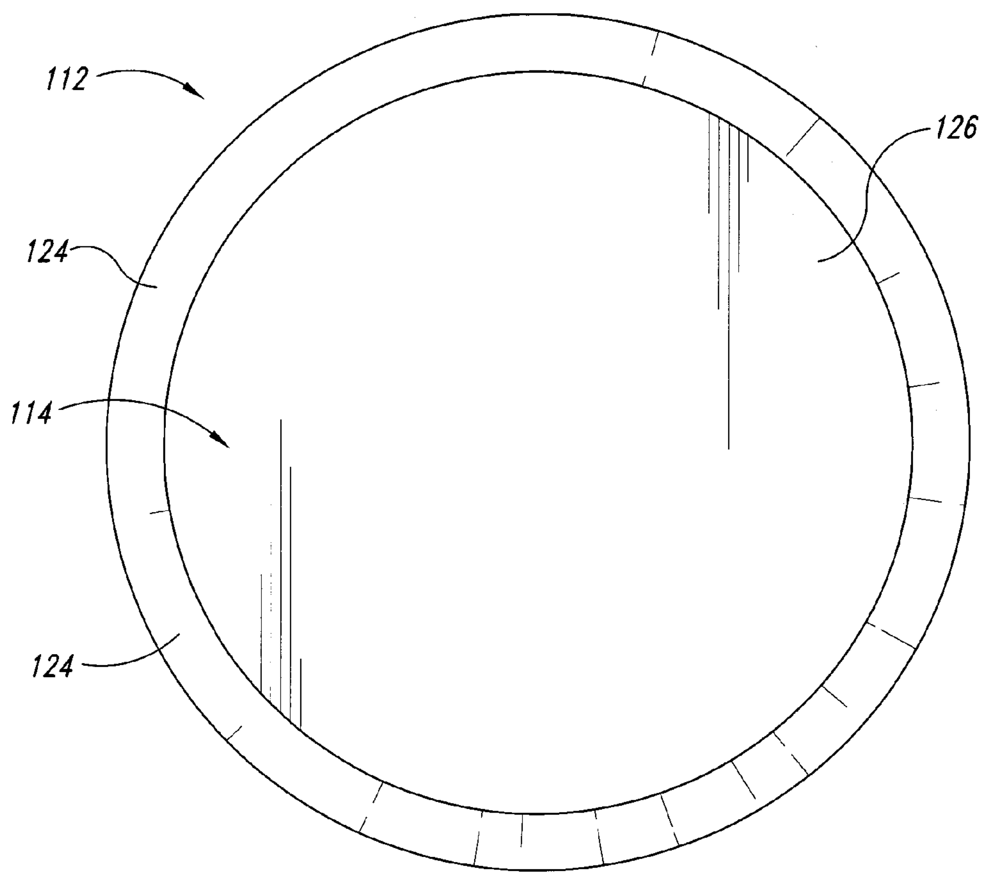


Fig. 4

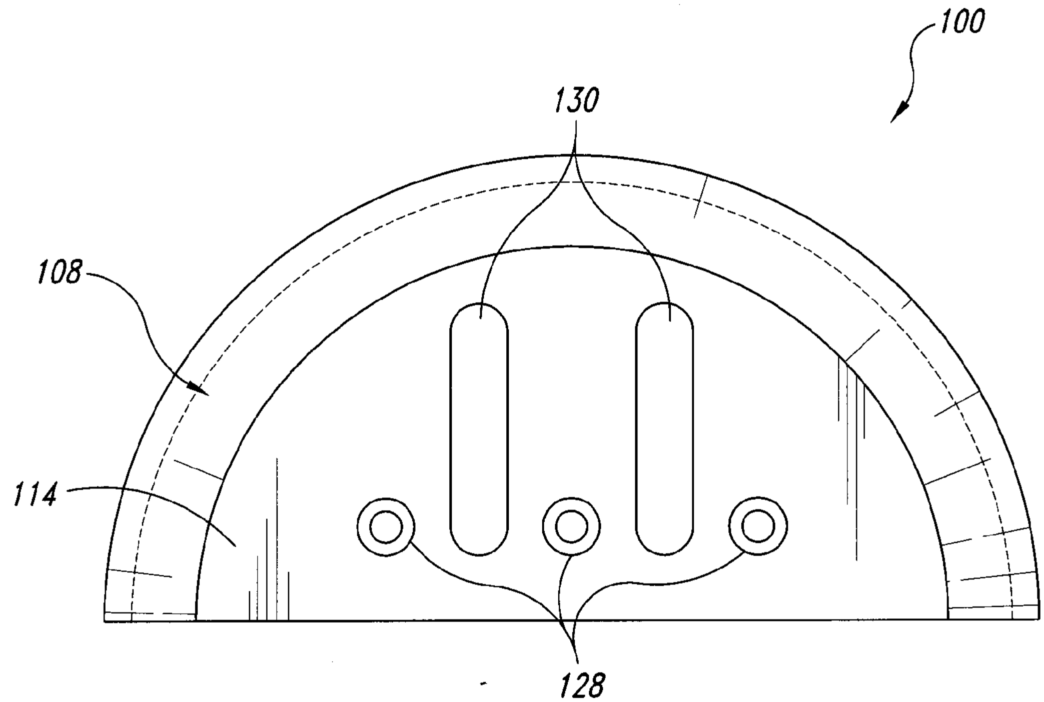


Fig. 5

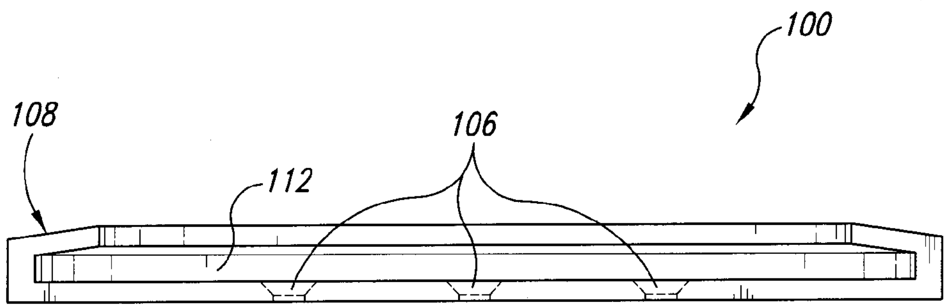


Fig. 6

ROTATIONAL INTERFACE FOR SNOWBOARD BINDINGS

TECHNICAL FIELD

[0001] The disclosed technology relates to bindings and, in particular, to snowboard bindings including rotational interfaces.

BACKGROUND

[0002] Snowboarding generally does not allow as much variation in foot, ankle, and leg positions as skiing provides, which tends to fatigue snowboarders' muscles and ligaments. If a snowboarder's forward foot could be oriented along the longitudinal axis of the snowboard, the weight of the board would put less stress on his/her knee. For example, a snowboarder may want to change his/her foot orientation to align with the longitudinal axis of the snowboard when standing in a lift line, gliding on flatter ground getting to the lift, riding a lift, and/or hiking out of backcountry areas not serviced by lifts. Additionally, a snowboarder may want to change his/her foot position so that both feet oriented positively (i.e., facing forward) when snowboarding more aggressively and carving. Under other conditions, a snowboarder may want to have his/her forward foot oriented positively and his/her rear foot oriented negatively (i.e., one foot facing forward and one foot facing rearward), or in another combination of foot positions dictated by slope conditions and snowboarder preference. When resting on a steeper slope in a sitting position, a snowboarder may wish to have one or both feet oriented at zero degrees to the board so that the snowboard can face perpendicular to the fall line with the snowboarder's feet, ankles, and legs in the most relaxed position. However, snowboarders currently do not have the option of easily changing the position of one or more feet secured in the snowboard binding.

SUMMARY

[0003] A snowboard binding interface in accordance with the new technology can be used to provide a quick and simple way of changing the orientation of a snowboarder's feet relative to the snowboard. In one embodiment in accordance with the new technology, a binding includes a single rotational unit in a front binding interface and a non-rotational unit in a back binding interface that matches the height of the rotational unit. The rotational unit can move 360° so that a snowboarder can change position of one foot relative to the snowboard, and a locking mechanism can be used to lock the rotational unit in a desired position. In another embodiment, a binding interface can include two rotational units for more foot variations. Both embodiments provide two additional advantages: (1) boot heel and toe drag during edging on snow are lessened because the binding is elevated above the surface of the board, and (2) force to the edges of the board is increased due to the leverage generated by the additional distance between the board and the binding. Embodiments in accordance with the new technology can also provide easy operation so that a snowboarder can quickly adjust a rotational unit on a binding interface when on a slope. The locking mechanism can be hands free and the binding interface can include multiple preset adjustment positions.

[0004] Additionally, embodiments in accordance with the new technology can include a mounting hole and/or slot pattern that provides the ability to adjust stance position of a snowboarder in a continuous, infinite number of positions along the longitudinal and transverse axis of the snowboard. In one embodiment, mounting slots in a base of a shell of a binding interface allow infinite positional movement along the length of the board, instead of incrementally jumping between sets of mounting holes. An embodiment in accordance with the new technology can also include infinite positional movement of the slot in the binding which attaches to the top of the interface (e.g., rotational unit, non-rotational unit) and allows precise positioning of heel and toe overhang on the board. The position of the rotating interface unit is also infinite (360 degrees). The new technology allows infinite stance adaptability along the long axis of the snowboard, across the long axis of the board as well as rotation, which is a unique feature.

[0005] Advantageously, the new technology can be combined with existing equipment on the market and can be used or adapted for use with a wide variety of bindings and boards.

[0006] Binding interfaces in accordance with the new technology can also have the added benefits of being durable, water resistant, corrosion resistant, relatively lightweight, and requiring minimal maintenance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** is an isometric view of a section of a binding interface shell in accordance with an embodiment of the new technology.

[0008] FIG. **2** is an isometric view of a section of a binding interface shell in accordance with an embodiment of the new technology.

[0009] FIG. **3** is a schematic cross-sectional side view of a binding interface rotational unit in accordance with an embodiment of the new technology.

[0010] FIG. **4** is a schematic top view of a binding interface rotational unit in accordance with an embodiment of the new technology.

[0011] FIG. **5** is a schematic top view of a section of a binding interface in accordance with an embodiment of the new technology.

[0012] FIG. **6** is a cross-sectional side view of a binding interface in accordance with an embodiment of the new technology.

[0013] Appendix A includes additions color images of one or more embodiments of the assembly and components of the assembly.

DETAILED DESCRIPTION

[0014] The present disclosure is directed to a binding interface that provides height and rotational changes in binding position as well as simultaneous infinite longitudinal and horizontal stance adjustments, and methods of making the same. Certain specific details are set forth in the following description and FIGS. **1-6** to provide a thorough understanding of various embodiments of the disclosure. For example, embodiments of snowboard bindings are described in detail below. The disclosed technology however may be used in a variety of bindings including wakeboard bindings, ski bindings, and other suitable bindings. Additionally, the term disc is used below to describe a rotational unit, but the rotational unit can be any suitable shape including a sphere, hexahedron, or another shape. In addition, any dimensions, angles and other specifications shown in the figures are merely illustrative of particular embodiments of the invention. Accordingly, other embodiments of the invention can have other dimensions, angles and specifications without departing from the spirit or scope of the present disclosure.

[0015] Well-known structures, systems, and methods often associated with such apparatuses have not been shown or described in detail to avoid unnecessarily obscuring the description of the various embodiments of the disclosure. In addition, those of ordinary skill in the relevant art will understand that additional embodiments of the new technology may be practiced without several of the details described below.

Rotational Interface:

[0016] In the figures that follow, identical reference numbers identify identical or at least generally similar elements. FIGS. **1-6** illustrate different views of a rotational interface **100** for a binding in accordance with the new technology. For example, FIG. **1** is an isometric view of a section of a binding interface shell **102** in accordance with an embodiment of the new technology. The binding interface **100** can include the shell **102** comprising a base **104**, a plurality of holes **106**, and a rim **108**. An upper surface of the snowboard (not shown) can be directly in contact with the base **104** of the shell **102**. The base **104** of the shell **102** may be partially or completely coated with a thin cushioning material that contacts the board. The cushioning material (e.g., urethane or another suitable material) can aid in shock absorption and allow slightly more board flex in contact areas.

[0017] The base **104** of the shell **102** may be flat, multi-planed, curved up on the edges, or another suitable shape that provides enough surface area contacting the snowboard surface to allow for the transfer of force to the board and its edges. The shell **102** may be made of any material that provides sufficient strength and rigidity to allow the shell **102** to withstand occasional extreme stress and violent use of the snowboard without failure between the shell **102** and the snowboard. The shell **102** can be rigid enough to allow transfer of force quickly and forcefully to the snowboard and its edges. The shell material can also be relatively light, resistant to water damage and corrosion, resistant to permanent distortion, and low maintenance.

[0018] The shell **102** can include the plurality of holes **106** and/or a plurality of slots **110** in the base **104** that allow the shell **102** to be fixed to a snowboard by any means that prevents the shell from moving anteroposteriorly, laterally, or vertically relative to the snowboard once it is attached in a desired location. The shell **102** can be moved to different positions on the snowboard by selecting different attachment points in the snowboard. Attachment means for the shell **102** can include screws, wires, and other suitable attachment means. The shell can be made of a rigid material, such as metal, plastic, composite or other suitable materials.

[0019] FIG. **2** is an isometric view of a second section of a binding interface shell **102** in accordance with an embodiment of the new technology. The shell **102** can be identical to the shell **102** described in FIG. **1**, and can be combined with the shell in FIG. **1** to secure a rotational unit. In alternative embodiments, the shells **102** in FIGS. **1** and **2** can differ, and in further embodiments, the shells **102** can be a single unit.

[0020] The shell **102** can also include a locking device (not shown). The locking device can interact with a rotational unit, such as a disc **112** shown in FIGS. **3-6**, to prevent movement of the disc **112** relative to the shell **102** when the disc **112** is in a desired position. Desired positions can be selected in advance by a snowboarder or by a manufacturer. The lock can be released manually and/or by a wireless remote to allow the disc to rotate. The lock can also be configured to release and relock without the need for a snowboarder to remove his/her foot from the binding (not shown).

[0021] In one embodiment, the lock device can be spring loaded and can include a plurality of indents, slots, and/or holes along the shell **102**. This embodiment allows the disc **112** to lock in a position by simply rotating the disc **112**, without manual intervention (e.g., using hands to lock the disc **112**) until an indent, slot, and/or hole in the disc **112** is encountered. The plurality of indents, slots, and/or holes can be positioned along any portion of the rim **108** that contacts the disc **112** or on another suitable position on the shell **102** (e.g., the base **104**).

[0022] In another embodiment, the lock device may be configured so the disc **112** and an attached binding (not shown) are locked relative to the shell **102** so that the disc **112** is oriented in a neutral position, along the longitudinal axis of the snowboard. The neutral position is the most favorable position for a snowboarder's leading foot, ankle, and knee for all snowboard related activities (e.g., walking to the lift, riding a chair, riding a t-bar or rope toe, gliding on substantially flat terrain, hiking out of back country areas) other than actually snowboarding down mountain runs. The advantage of this position is that it puts the foot, ankle, and knee in the most natural, unstrained position relative to the snowboard. Eliminating ligament and muscle stress, strain, and fatigue in the foot, knee, ankle, and leg is advantageous for an athlete because it decreases possible injuries. Additionally, providing a neutral position allows a snowboarder to use a footrest on a chairlift and decreases a snowboarder's interference with others using the footrest.

[0023] This embodiment may further include a locking device having one or more non-neutral positions that a snowboarder can choose from while riding downhill. In this embodiment, the locking can be released using any of the methods described above allowing the disc **112** to rotate to a desired position.

[0024] In an embodiment in accordance with the new technology, the disc **112** can rotate freely within the shell **102** when the disc **112** not in the locked position. The disc **112** can be rigid to allow transfer of force quickly to the shell **102**, which in turn transfers force to the snowboard and its edges. The disc **112** can also be strong enough to secure screw attachments (not shown) without breaking under forces applied during snowboarding. Additionally, the disc **112** can comprise a water resistant material, a material light enough to make the overall weight of the binding interface **100** practical to use in conjunction with a binding and snowboard, a material resistant to distortion, and/or a low maintenance material. The disc **112** can also comprise a material that can be cut accurately to allow for interfacing with the locking device. The disc **112** can be repairable if a cut area needs to be filled in to restore the disc **112**.

[0025] Additionally, an embodiment in accordance with the new technology includes a disc **112** that is multileveled. As shown in FIG. **3**, the disc **112** can be multileveled, and can be configured to fit partially inside the shell **102**. In the embodiments shown in FIGS. **5** and **6**, the only portion of the disc that is visible is the top surface **114** of the disc **112**. The bottom layer of the disc **112** can provide a contact patch that can act in conjunction with the base **104** of the shell **102** to transfer force vertically onto the snowboard.

[0026] The disc **112** can be securely positioned within the shell(s) **102**. A vertical inner wall **116** of the shell **102** can prevent the disc **112** from moving horizontally. For example, the inner rim **108** of the shell **102** can have a vertical rim wall **120** that can also prevent horizontal movement of the disc. The rim **108** of the shell **102** can form a continuous circle, or can have another suitable shape. The underside **122** of the rim **108** can prevent the disc **112** from moving vertically away from the board. As shown in FIGS. **3** and **4**, the disc **112** can further include a ledge portion **124** that extends from an edge of the disc **112** under the rim **108** of the shell **112** to a raised portion **126** in the center of the disc **112**, abutting the rim **108**. The ledge portion **124** can extend around the circumference of the disc **112** and can contact the underside **122** of the rim **108** and the base **104** of the shell **112** simultaneously. The ledge portion **124** can provide leverage for the disc **112** to transfer force to the shell **102**. The ledge portion **112** can also transfer force in an upward direction to the rim **108** and force in a downward direction to the base **102** of the shell making the transfer of force to the snowboard and its edges quicker and more forceful.

[0027] As shown in FIG. **5**, the disc **112** can further include a first plurality of holes **128** and/or slots **130** that provide access screws that attach the shell **102** to the snowboard.

[0028] Additionally, the disc **112** can include a second plurality of holes (not shown) to attach the binding to the disc. The second plurality of holes can have any suitable arrangement for attaching the binding and can be configured the same as or different from the first plurality of holes **128** and/or slots **130**. The binding can be attached using any method that can secure the binding to the disc **112** and allow adjustment. In one embodiment, the attachment method includes T-nuts within the disc **112**. The T-nut can be recessed away from the upper and lower surfaces of the disc **112** to decrease friction or interference with either the shell **102** or the binding. When attaching the binding using T-nuts, the disc must be comprised of a material that has sufficient strength to resist pulling forces from the binding on the screws inserted into the T-nuts.

[0029] In an additional embodiment, the disc **112** can be elevated in the center of the disc **112**, above the level of the ledge portion **124**. The elevation can be greater than the height of the top of the rim **108** of the shell **102** so that the attached binding does not bind against the shell **102** when the disc **112** rotates within the shell **102**. In further embodiments in accordance with the new technology, the height of the top surface of the disc **112** relative to the top surface of the rim **108** of the shell **102** may vary according to the materials being used for the disc **112**, the shell **102** and the binding.

[0030] Advantageously, the binding interface **100** increases force applied to the edges of the snowboard because the height of a binding attached to the binding interface **100** is higher than a typical mounting height for a binding. This increases the lever arm from the binding to the snowboard and its edges.

[0031] In another embodiment in accordance with the new technology, the binding interface **100** is symmetrical when attached to the snowboard, so the force delivered to the snowboard is more evenly distributed than it would be when an asymmetrical binding is mounted to a snowboard.

[0032] In an additional embodiment in accordance with the new technology, a channel or a plurality of channels on the snowboard can be used to attach the snowboard to the shell. The channel(s) may have an attachment that protrude slightly above the inner surface of the base of the shell, so the bottom of the disc can be relieved to allow free movement of the disc without interference from the attachment.

[0033] Another embodiment includes a shell that can be one piece instead and the rim of the shell can be separate from the base. The rim and base of the shell can be connected using screws, bolts, or another suitable attachment mechanism. The disc can be positioned between the shell and the rim during attachment. This embodiment can further include a slot or slots on the bottom of the shell for acceptance of the attachment bolts or screws. Advantageously, no special channel style bindings would be required with the interface which attaches to the channel style snowboard. In another embodiment, a disc can be made of different materials for variations on board flex and pressure transfer to the snowboard. The disc can be made of a harder material for quicker edge response or a softer internal material can be used to allow more board flex. The disc having a softer flexing material can include a slight "v" shape where two halves of the shell meet at the inner edges, thereby allowing the two halves of the shell to flex towards each other to a limited extent as the snowboard flexes. The components of the binding interface assembly can be made of a variety of suitable materials. For example, some components can be metallic components, such as aluminum, alloys, stainless steel, or the like, or the compontents may be made from other materials, such as plastic, nylon, composites, etc. In some embodiments, components may be made of other materials, such as acetal copolymer or delrin type materials.

Non-Rotational Interface:

[0034] Snowboarders may select to use the rotational interface **100** described above with only one foot (e.g., the front foot), and combine the rotational interface **100** with a non-rotational interface on the other foot (e.g., the rear foot). The non-rotational interface provides a pedestal for the rear foot that matches the height of the rotational interface **100** so that both feet have similar leverage properties. In one embodiment, the non-rotational interface does not have a shell, a disc, or a locking device as described above. The non-rotational interface may include a plurality of holes (as described above) to secure the non-rotational interface between the binding and the snowboard.

[0035] An additional embodiment in accordance with the new technology can include two non-rotational interfaces to provide greater leverage and/or raise the height of the binding above the snowboard.

[0036] An additional embodiment in accordance with the new technology can include two rotational interfaces to provide additional advantages: Foot position adjustment options that may be preferred by the snowboarder. Different slope conditions may require a variety of different front and back foot position combinations. In addition, while riding a chairlift, if a front facing rear foot unit is use with a rear entry binding, the weight of the snowboard can be supported by slipping the rear foot into the binding and lifting to take strain off the front knee and leg. The rear foot can also be slipped into a front facing rear entry binding when getting off the chairlift to add more control to the snowboard. From the foregoing, it will be appreciated that specific embodiments of the invention have been described herein for purposes of illustration, but that various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

I claim:

1. A binding interface assembly for use with a SNOWBOARD and a binding assembly, comprising:

an interface shell that mounts atop the snowboard, the interface shell having a base and a rim, the base having a plurality of apertures therein that receive fasteners for attaching to the snowboard, the apertures in the base having a selected pattern wherein at least a portion of the apertures align with mounting apertures in the snowboard, the rim defining an interior area within the shell above the base, the rim having a sidewall, a bottom portion connected to the interface shell, and a top portion extending radially inward from the sidewall;

a binding disc rotatably disposed in the interior area of the interface shell, the binding disc having a bottom surface adjacent to the base of the interface shell, a perimeter portion adjacent to the sidewall of the rim, and a top surface facing away from the base, at least a portion of the top surface being intermediate the top portion of the rim and the base, wherein the top portion of the rim blocks the binding disc from moving out of the interior area, the top surface of the binding disc connects to the binding, the binding disc having a plurality of connection portions the engage connectors of the binding to retain the binding on binding disc, wherein the binding disc and the binding are rotatable as a unit relative to the interface shell, the binding disc having a plurality of lock engagement portions in spaced apart relationship on the perimeter portion; and

a lock device connected to the interface shell and engageable with the lock engagement portions, the lock device being moveable between an unlocked position and a locked position, in the unlocked position the lock device is out of locking engagement with the lock engagement portions of the binding disc and the binding disc is free to rotate relative to the interface shell, and in the locked position the lock device engages the lock engagement portions of the binding disc and the binding disc is prevented from to rotating relative to the interface shell and the snowboard.

2. The assembly of claim **1** wherein the interface shell is unitary structure.

3. The assembly of claim **1** wherein the interface shell includes a cushioning material that directly engages a top surface of the snowboard.

4. The assembly of claim **1** wherein peripheral portion of the binding disc has a radially inwardly sloped surface that corresponds to a mating shape defined by the sidewall and top portion of the rim of the base.

5. The assembly of claim **1** wherein the lock engagement portions of the binding disc are positioned to allow the binding disc to be locked in any one of a plurality of selected positions relative to the interface shell.

6. The assembly of claim **1** wherein the lock device is biased toward the locked position.

7. The assembly of claim **1** wherein the lock engagement portions of the binding disc are at least one of an indent, slot, hole and depression.

8. The assembly of claim **1** wherein the lock device is a spring loaded pin device with a first end that engages the binding plate and a second end that is engaged by a user to move the lock device between the locked and unlocked position.

9. The assembly of claim **1** wherein the binding disc and interface shell are positioned to allow the binding disc to rotate at least 360 degrees relative to the interface shell when the lock device is in the unlocked position.

10. The assembly of claim **1**, further comprising the binding removeably mounted to the top surface of the binding disc.

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