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(54) **SHOCK ABSORBING AND ENERGY RETURN SYSTEM FOR BOARD SPORTS**

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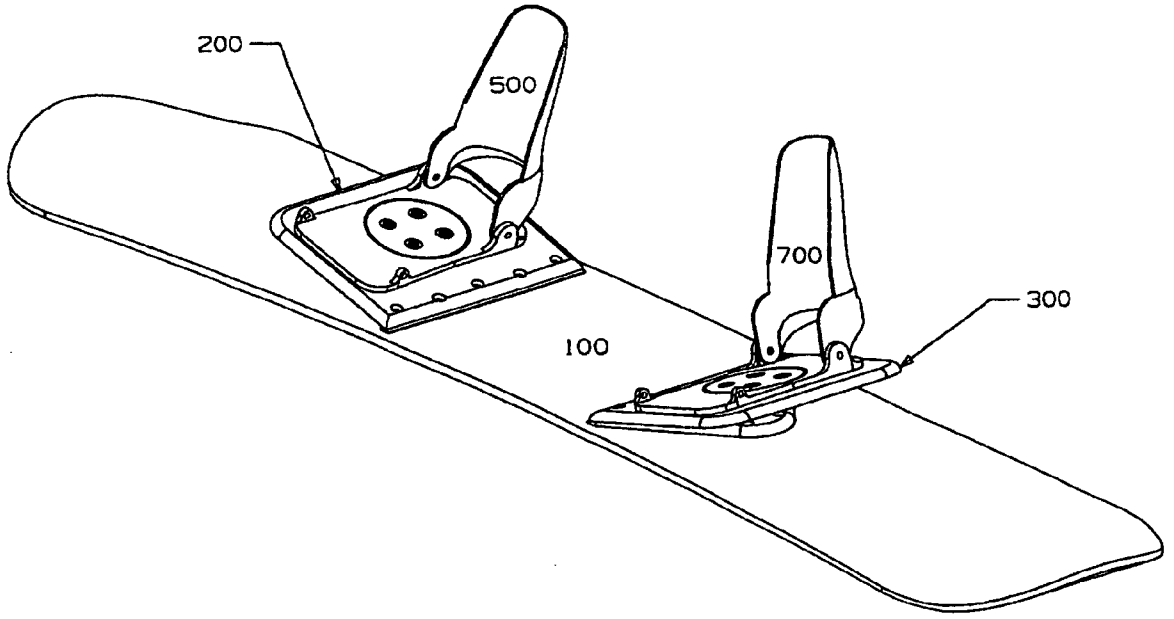
(57) **ABSTRACT**

A skiing mechanism comprises an elongated board, a first plate and a second spring plate, comprised of two separate & fastened material(s), one continuous material, or one spring plate integrated with board at manufacture. The first spring plate includes an angled section with a first predetermined cant directed toward the tip of the board. This angled section is separated from the board by a first distance. Furthermore, the second spring includes a section angled according to a second predetermined cant directed toward the tail of the board. This section of the second spring plate is separated from the board by a second distance.



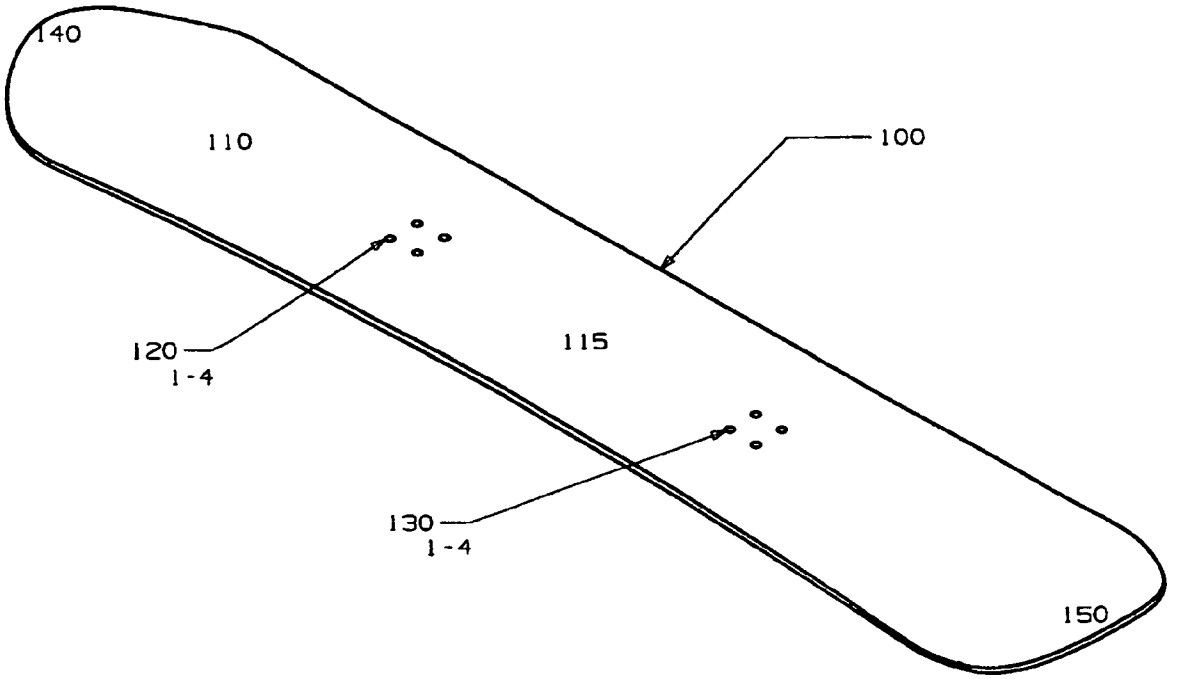


Figure 1

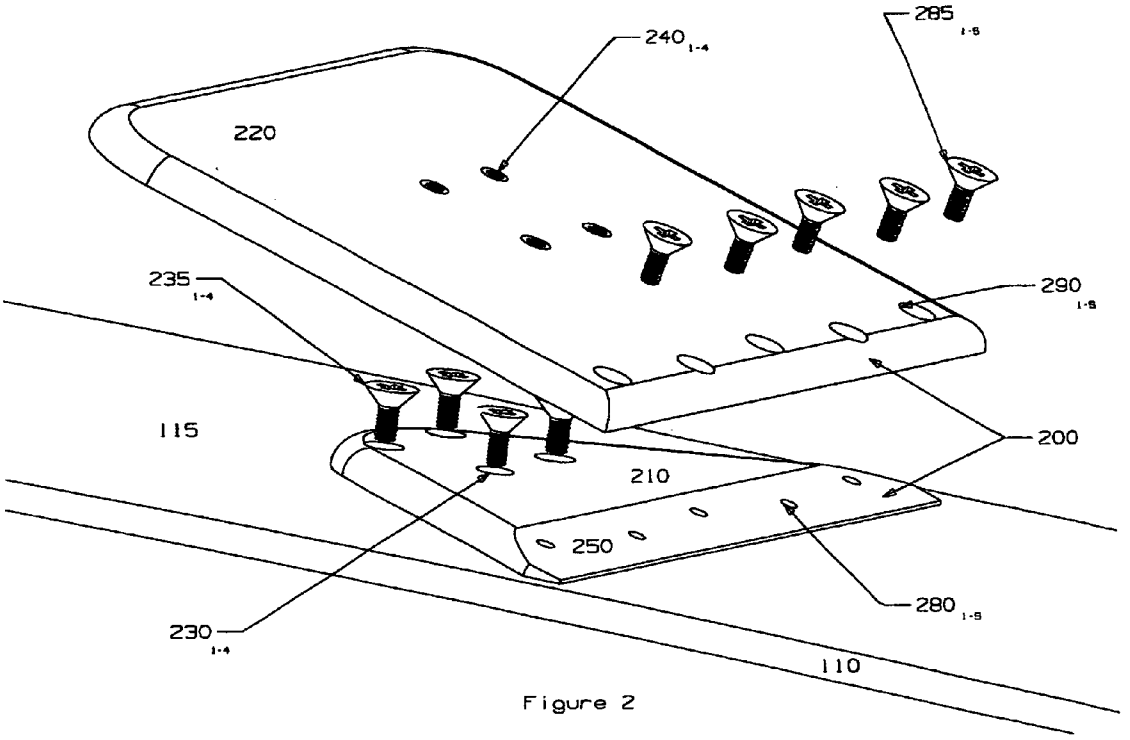


Figure 2

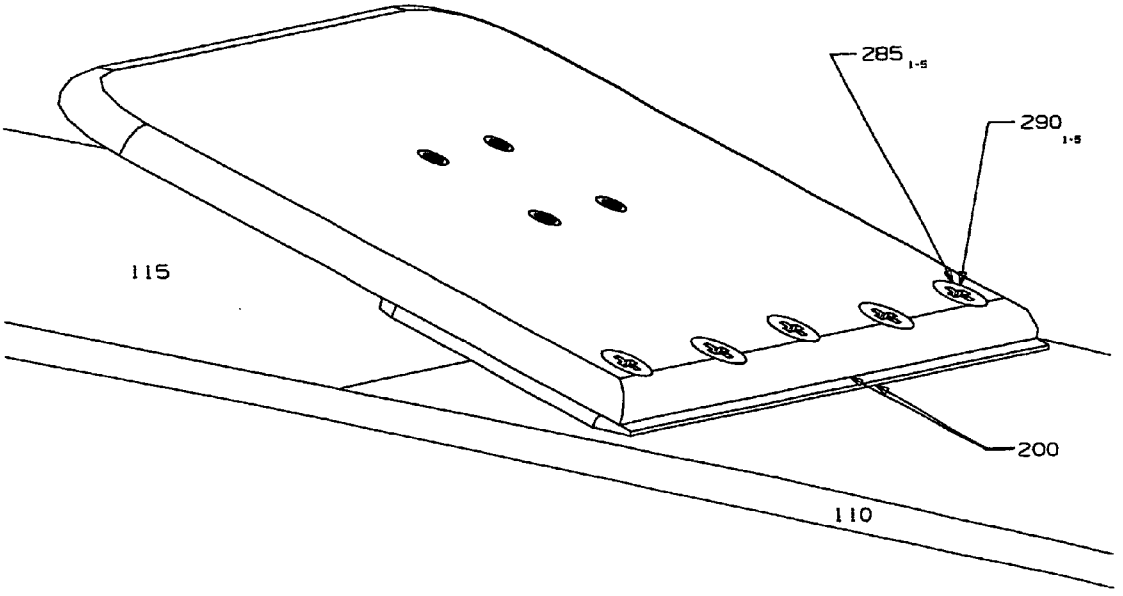


Figure 3

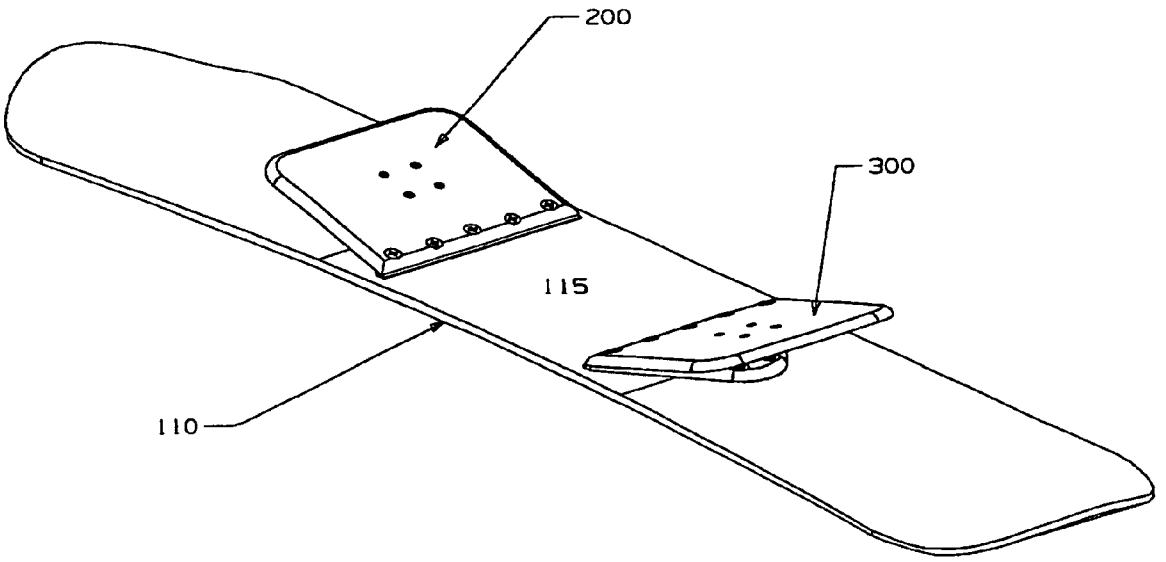


Figure 4

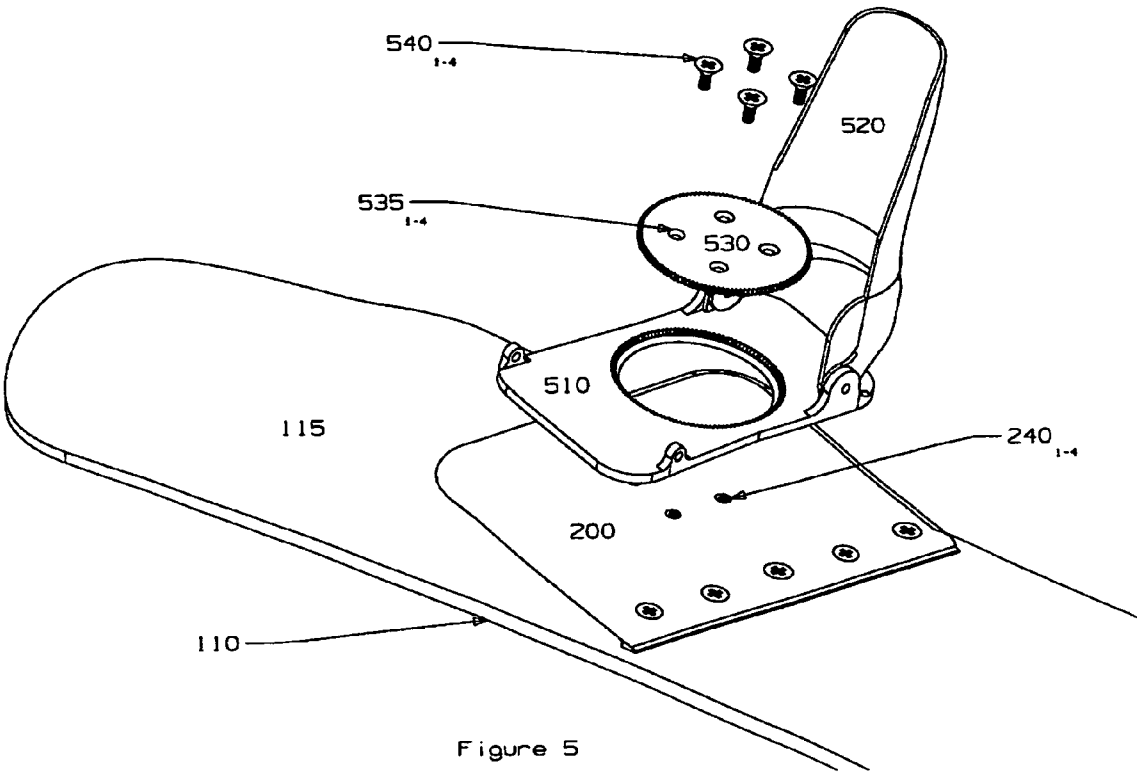


Figure 5

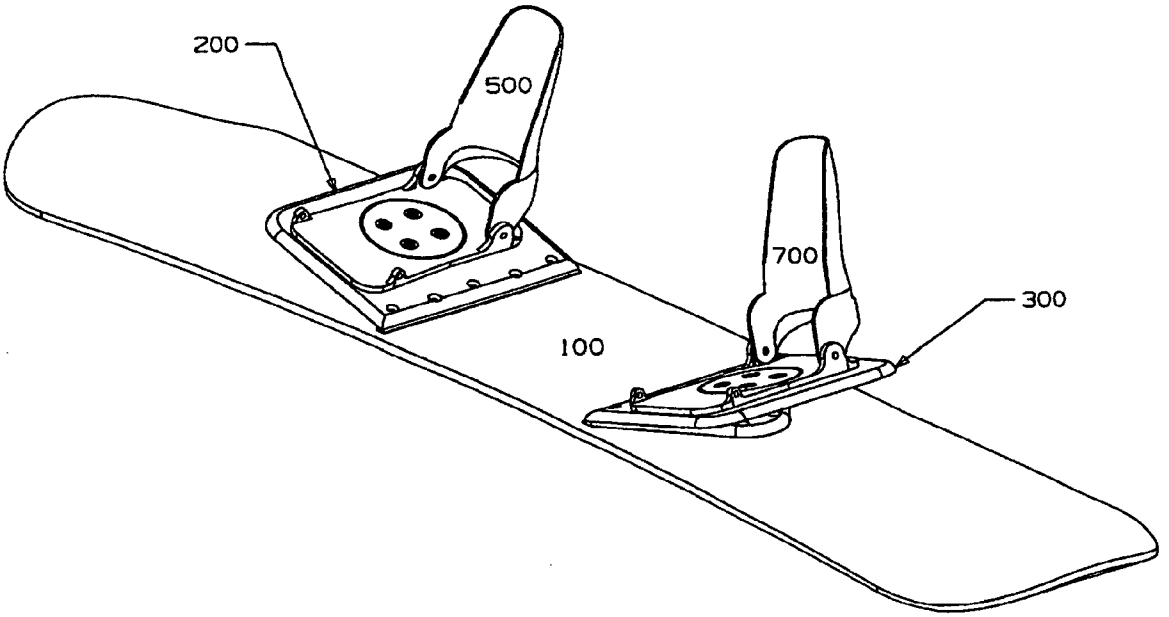


Figure 6

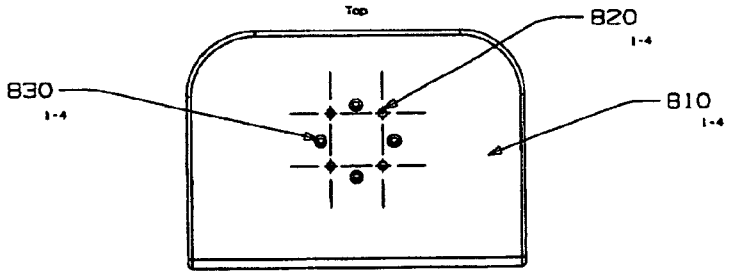


Figure 7A

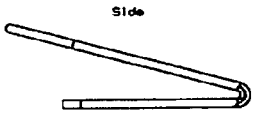


Figure 7B

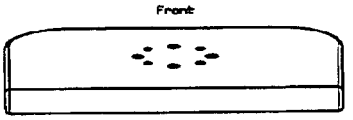


Figure 7C

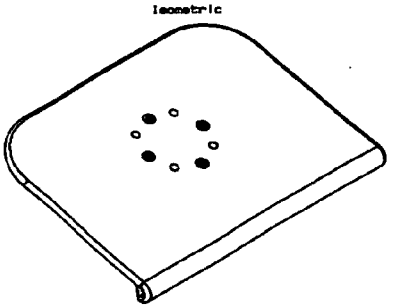


Figure 7D

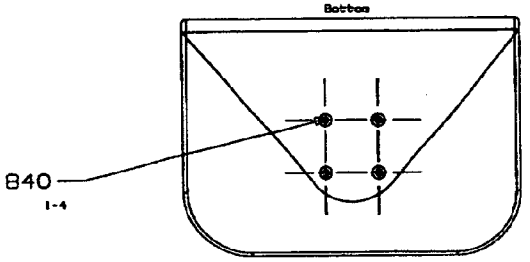


Figure 7E

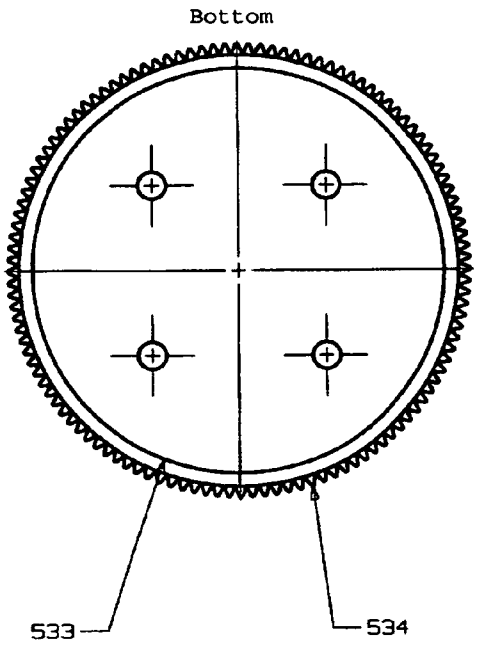


Figure 8A

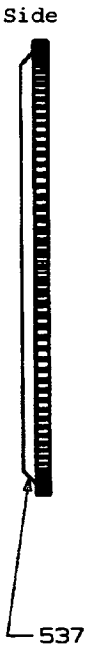


Figure 8B

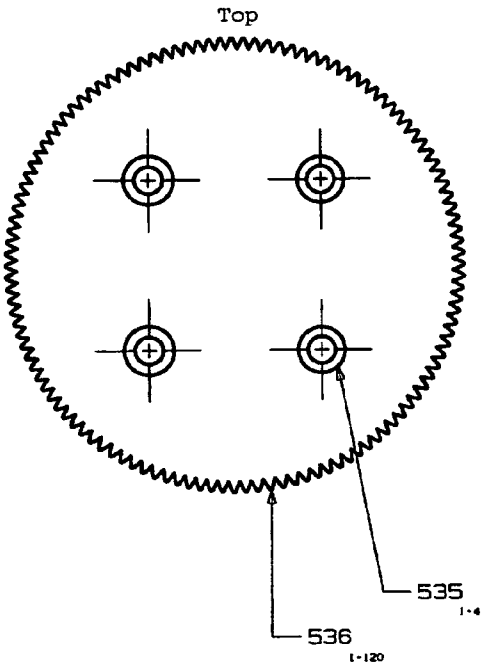


Figure 8C

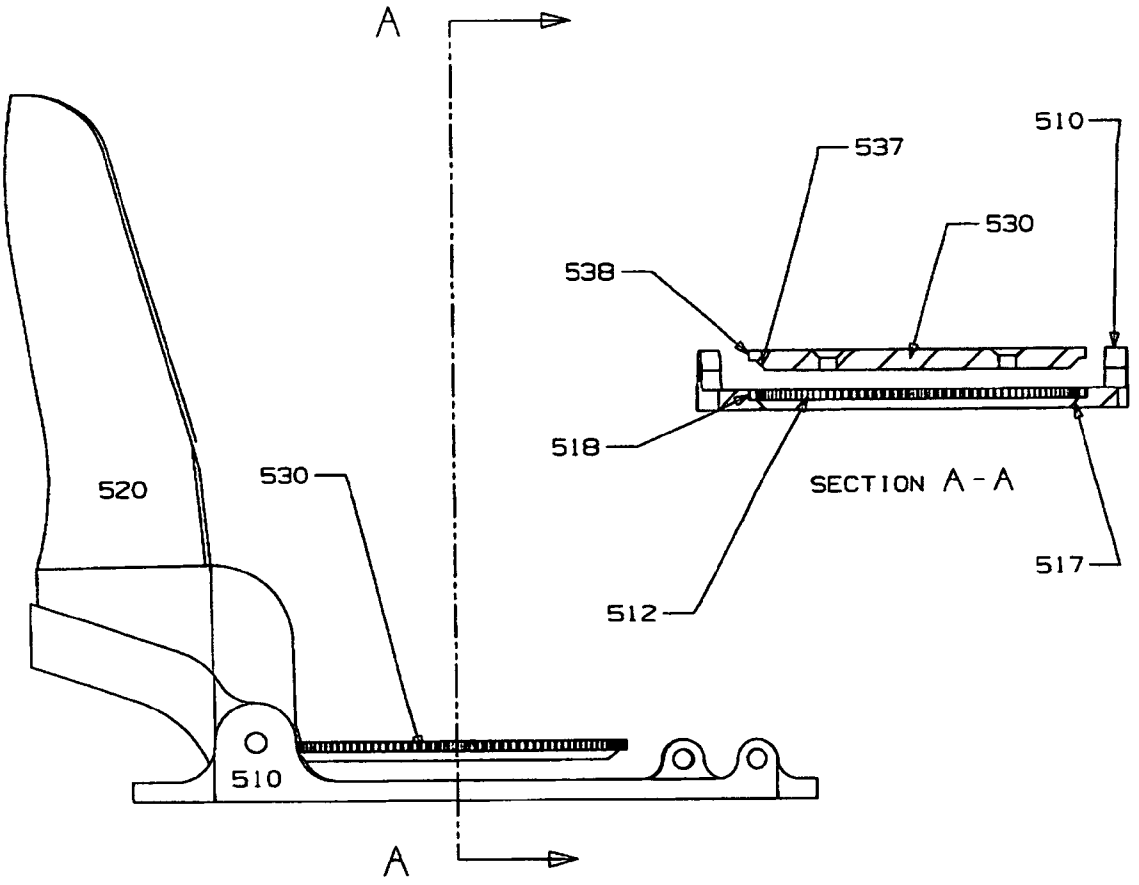


Figure 9

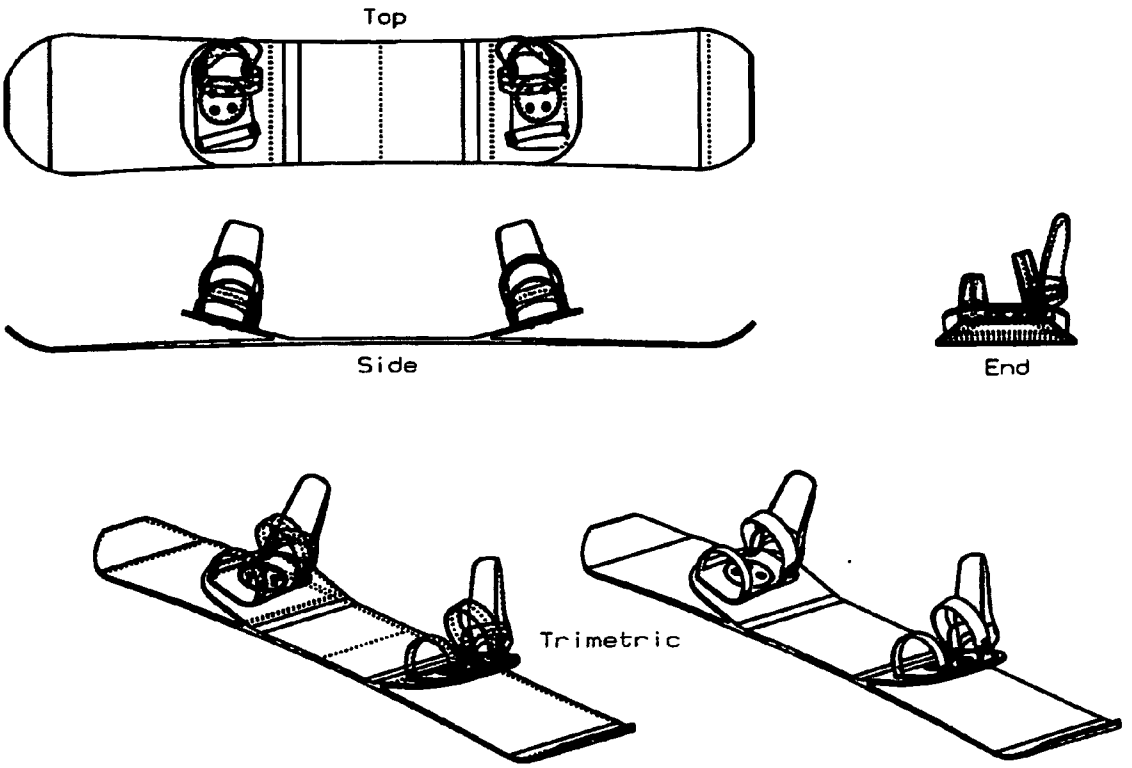


Figure 10

SHOCK ABSORBING AND ENERGY RETURN SYSTEM FOR BOARD SPORTS

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/055,892 filed on 23, May 2008.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to the field of sporting equipment. More particularly, the present invention relates to a binding attached to a ski mechanism that allows for increased vertical jumping capability, reduced impact on the rider, and overall performance enhancement.

[0004] 2. Description of Related Art

[0005] Snowboards, wakeboards and similar devices are being used with increasing popularity. A snowboard is a single-ski mechanism that is typically longer than a skateboard, designed for riding on snow. A wakeboard is a single-ski mechanism of similar size for riding on water. Currently, most snowboards & wakeboards ("boards") are provided with a pair of bindings that are attached diagonally across the top surface of the board. Before riding, a boot (for snowboards) or bare foot (for wakeboards) of the rider is placed within each binding and held in a fixed position. Unlike snow skis, snowboards & wakeboards do not have automatic release capability. The reason is that a rider needs to laterally transfer or to longitudinally transfer his or her center of gravity in order to change directions of the snowboard. This allows the snowboard to carve through the snow instead of sliding over it, without fear of an inadvertent release.

[0006] During use, the board yields substantial forces on the bindings as a rider performs turns, lands jumps and the like. These forces reverberate to the rider, which can cause an uncomfortable experience. For example, some riders may experience pain in the feet, ankles, knees, hip joints & lower back.

[0007] To provide a more comfortable experience, in prior designs, pads of resilient material have been placed between the bindings and the board. These pads provide some shock absorbing "give" in the binding when the rider performs turns or jumps. However, it is not uncommon for these pads to become dislodged during the activity. In the event that a pad becomes dislodged and the rider is unaware of this mechanical failure, the rider may experience loss of control during a run due to the current, flexible state of the binding. This could cause the rider to loose control during the run and suffer a severe injury. Other designs (Ref's. 1,2,3,4) have incorporated shock-absorbing features into a binding, or have incorporated extra curved surfaces into the board itself (Ref's. 5,6) to absorb shocks. These designs require the rider to purchase an entirely new binding system (Ref's. 1,2,3,4) or new board (Ref's. 5,6) thus increasing the cost.

[0008] It is desirable to produce a lightweight binding interface that not only provides a smoother, all-around riding experience, but also increases the performance characteristics of the system, without increasing the rider's risk of injury. It is also desirable to produce a design, which accomplishes the above goals without necessarily requiring the rider to replace existing equipment.

BRIEF SUMMARY OF THE INVENTION

[0009] Briefly, one embodiment of the present invention comprises a snow or waterskiing mechanism comprising an elongated board, a first plate and a second cantilevered spring plate. The first plate includes a first section attached to the board and a second section angled from the first section according to a first predetermined cant and directed toward the tip of the board. The second section of the spring plate is separated from the board by a first angle. Furthermore, the second spring includes a first section attached to the board and a second section angled from the first section according to a second predetermined cant and directed toward the tail of the board. The second section of the second spring plate is separated from the board by a second distance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The features and advantages of the present invention will become apparent from the following detailed description of the present invention in which:

[0011] FIG. **1** is an isometric view of a wire frame illustrative embodiment of a snowboard featuring binding mounting inserts, grouped in two sets of four.

[0012] FIG. **2** is an illustrative embodiment of a 2-piece spring plate being mounted to a snowboard.

[0013] FIG. **3** is an illustrative embodiment of a 2-piece spring plate after being mounted on a snowboard.

[0014] FIG. **4** is an illustrative embodiment of a snowboard featuring a pair of 2-piece spring plates.

[0015] FIG. **5** is an illustrative embodiment of a typical binding in the process of being mounted to one of the 2-piece spring plates shown in FIG. **4**.

[0016] FIG. **6** is an illustrative embodiment of a pair of bindings mounted to the 2-piece spring plates, which are mounted to a typical snowboard.

[0017] FIGS. **7**A, &B, **7**C, **7**D an **7**E are an illustrative embodiment of five views of a 1-piece spring plate.

[0018] FIGS. **8**A, **8**B and **8**C are illustrative embodiments of a disc which attaches the binding of FIG. **6** to the spring plate.

[0019] FIG. **9** is a detailed illustrative embodiment of the disc and binding base enabling angular adjustability of a typical binding.

[0020] FIG. **10** is an illustrative embodiment of a snowboard with integrated spring plates and attached bindings, shown in 4 views.

DESCRIPTION OF THE INVENTION

[0021] The present invention relates to a skiing mechanism that provides improved jumping and cushioning effects on the rider. It is contemplated that the "skiing mechanism" includes a snowboard, water ski or any other surface-riding device. Herein, a snowboard implementation of the skiing mechanism is described. The exemplary implementation should be broadly construed as illustrative in nature in order to represent the spirit of the invention.

[0022] Referring to FIG. **1**, an isometric view of an illustrative embodiment of a snowboard is shown. Snowboard **100** includes an elongated board **110** made of wood, metal and/or coated with fiberglass, plastic or any other waterproof material. Board **110** typically includes four, six, eight (or more) metallic machine-threaded mounting inserts, which in this embodiment are grouped in two sets **120** and **130**. As shown, each set of mounting inserts **120** or **130** is arranged in accordance with an industry-standard 4 cm×4 cm pattern. Of course, the mounting inserts may be arranged to be compatible with other patterns such as a triangular formation (e.g.,

using 3 machine-threaded inserts, each insert approximately 2 inches apart from a neighboring insert) or a slotted configuration.

[0023] As shown, mounting inserts **120** and **130** are placed on board **110** equidistant from its tip **140** and tail **150**. However, for different conditions and riding preferences, it is contemplated that other mounting inserts may be placed at different locations of board **110** with optional caps fastened to the unused mounting inserts. This would mitigate water collection and damage to the unused mounting inserts. Alternatively, a manufacturer may produce boards without inserts to allow the rider to select the placement of mounting insert patterns **120** and **130**.

[0024] Referring to FIG. **2**, a detailed view of a wire frame illustrative embodiment of a 2-piece spring plate **200** is shown. Designed for attachment to one of the sets of mounting inserts (e.g., inserts **120** of FIG. **1**), spring plate **200** is made of a lightweight, climate resistant material. For example, spring plate **200** may be made of a carbon fiber composite (e.g., graphite), titanium or any other material with similar strength, fatigue resistance, thickness and memory properties as described below. The memory property is sufficient so that cantilevered spring plate **200** returns to its unloaded position during its useful life, even after experiencing repeated downward acting impact, bending and torsion loads.

[0025] As further shown, the 2-piece design spring plate **200** comprises first section **210** and second section **220**. To accommodate the above-mentioned forces, a second section **220** is appropriately sized. Of course, the thickness, material and even the sections of spring plate **200** themselves may be varied, depending on the normal weight of the rider, the desired response and the desired cost. For example, more aggressive riders might want a stiffer (thicker) configuration for a given weight.

[0026] Spring plate **210** includes at least a first and second set of holes **230** and **280**, which are situated in flat and angled sections **210** and **250**, respectively. In particular, holes **230** are drilled out in a pattern matching mounting inserts **120** or **130** of board **110** to snugly retain a plurality of fasteners (e.g., machine-threaded screws, etc.). These fasteners **235** would be attached to inserts **120** or **130** for fastening first section **210** securely to a top surface **115** of board **110** of FIG. **1**. Inserts **240** may be tapped with machine threads to accommodate fasteners that attach a binding to second section **220** as shown below. Holes **290** are located on second section spring plate **220** and aligned with threaded holes **280** in first section **250** to provide a secure interface between spring plate **220** and plate **210**.

[0027] Referring to FIG. **3**, a detailed view of an illustrative embodiment of the mounted 2-piece spring plate **200** to board **110** is shown. First section **210** is constructed to receive fasteners **235** (hidden in this view) through countersunk holes **230** that are pre-drilled at manufacture or produced after manufacture. In this embodiment, holes **230** are arranged into a pre-installed "4×4" hole pattern for alignment with inserts **120** or **130** of board **110** in FIG. **1**. Herein, fasteners **235** are 4×¼-20 (SI) or 4×M6 (metric) machine-threaded inserts arranged in a square formation approximately 4 centimeters (1.575 inches) apart from neighboring inserts. Fasteners **285** pass through holes **290** of section **220** and thread into holes **280** in section **250** of first section **210**, providing a rigid structure with respect to snowboard **110**.

[0028] Referring back to FIG. **2**, second section **220** of spring plate **200** includes inserts **240** (e.g., a group of ¼-20, 6 mm Metric or similar machine-threaded metal inserts to which any standard binding can be attached). Second section **220** of spring plate **200** is constructed with a cant angle **250** when first section **210** of spring plate **200** is flush against top surface **115** of board **110**. Cant **250** normally ranges from five (5) degrees to fifteen (15) degrees from top surface **115** of snowboard **110**. As shown, cant **250** is approximately ten (10) degrees. The cant associated with a spring plate attached to the other insert **120** or **130** of board **110** may be identical to cant **250** of spring plate **200** or vary slightly therefrom. As an option, a flexible, waterproof material may be applied between a bottom side of second section **220** of spring plate **200** and top surface **115** of board **110**. This material would prevent snow and other foreign objects from getting lodged under second section **220**.

[0029] Referring to FIG. **4**, a trimetric view of two spring plates **200** and **300** are shown, mounted to top surface **115** of snowboard **110**. During a typical snowboarding run, the weight from a rider would cause the relative angle of second section **220** of spring plate **200** and **300** to decrease by only a few degrees. When turning and landing jumps, however, forces are applied to a rider which by design may cause the angle between second section **220** and first section **210** to be almost negligible.

[0030] Referring to FIG. **5**, an isometric view of an illustrative embodiment of snowboard **100** with a spring plate **200** mounted to top **115** of board **110**. In particular, fasteners **540** are inserted through holes **535** of disc **530**, by which binding base **510** is fastened to top surface of spring plate **200** by means of inserts **240**.

[0031] Second section **220** of spring plate **200** is designed to accommodate all existing types of bindings, including traditional "racing" and "based" style bindings, as well as the more modern "step-in" designs.

[0032] Referring to FIG. **6**, an isometric view of the illustrative embodiment of traditional "based" bindings **500** and **700** are shown mounted to second section **220** of a spring plate (e.g., spring plate **200**). Binding **500** is equipped with a base **510**, a highback **520** and a disc **530**, but for clarity does not include standard straps for securing a foot of the rider. It is anticipated that in some configurations, bindings **500** and **700** may be integrated with second section **220** during manufacture.

[0033] Referring to FIG. **7**, it is anticipated that the spring plate may alternatively be comprised of one continuous section, which performs in a similar manner as two fastened sections. Consideration for access to holes **840** is provided by rotating inserts **830** by a set angle, (45 degrees in this embodiment) about the center of section **810** with respect to the 2-piece design, and providing thru holes **820**. A binding would be mounted to top surface of section **810** in the same manner as described above.

[0034] Referring to FIGS. **8**A, **8**B, and **8**C, in most manufacturers designs, there is usually a male/female interlocking pattern **536** placed on the outside edge of top side **534** of disc **530**. The repeated pattern **536** allows for incremental rotation of binding **500** relative to board **110**. With the described fasteners **540** of FIG. **5** passing through holes **535** and partially tightened, binding **500** can be centered and rotated to a comfortable position, at least ranging up to 25 degrees in either a clockwise or counter-clockwise rotation. The pattern gives a range of options to suit the rider's desired stance angle.

This pattern typically comprises approximately sixty (60) pre-manufactured ridges. These ridges or teeth typically radiate from the center of disc **530** and are prevented from passing through binding base **510** by contact of 45-degree walls **537**, meeting at a generally 45-degree angle with mating walls **511** of FIG. **9**.

[0035] When tightened, these teeth or ridges interlock with offset mirror image grooves pre-manufactured into the centered aperture of base **510**, thereby fixating base **510** of binding **500** to second section **220** of spring plate **200** at the prescribed stance angle. However, other interfaces, such as (i) small squares along the edge of disc **530** which are less thick than base **510**, and (ii) mating sets spaced equidistant along the center aperture, could be manufactured and fastened with the same method. The size of this interface dictates the incremental rotational precision.

[0036] Designs using sixty ridges would provide adjustability in six (6) degree increments, while designs with 180 ridges would provide two (2) degree increments. By rotating base **510** before placing disc **530** thereon, the rider is able to adjust his or her stance angle, within the limits of their bindings. As shown, once the desired angle has been obtained, fasteners **540** are inserted through holes **535** of disc **530** and disc **530** is lowered into base **510** of binding **500**. Then, fasteners **540** are attached to inserts **240** of top face of spring plate **200**. Thus, binding **500** is hard-mounted to second section **220** of spring plate **200**.

[0037] Referring to FIGS. **8**A, **8**B, **9**C and FIG. **9**, customarily base **510** is as thick as disc **530**, and is configured with a centered aperture **517** of binding **500** angled in a generally conical form so that the size of the aperture **517** in base **510** is the same as face **537** in disc **530** as shown in FIGS. **8**A-**8**C. Likewise, a bottom side of disc **530** features (i) a bottom edge-to-edge diameter **533** corresponding in size to bottom diameter of the aperture and (ii) a top edge-to-edge diameter **538** slightly larger than bottom edge-to-edge diameter **533** and corresponding to the top diameter of binding base **518**. Disc **530** is typically manufactured with radial teeth or ridges **536** sized for insertion into corresponding grooves **512** along sides of the aperture of base **510**.

[0038] While certain exemplary embodiments have been described and shown in the accompanying drawings, FIGS. **8**A, **8**BB, **8**C & FIG. **9**, it is to be understood that such embodiments are merely illustrative of and not restrictive on the broad invention, and that this invention not be limited to the specific constructions and arrangements shown and described, since various other modifications may occur to those ordinarily skilled in the art.

[0039] Referring to FIG. **10**, it is contemplated that the spring plate **220** from FIG. **2** could also be integrated into the snowboard at manufacture, negating the need for the second section **210** from FIG. **2**. Bindings would be attached in a similar manner to that discussed above and in FIG. **5**.

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[0040]

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6) U.S. Pat. No. 6,394,483	May 2002	Donald P. Stubblefield

What is claimed is:

1. A skiing mechanism comprising:

an elongated board having a tip and a tail; and

a first spring plate coupled to the board, the first spring plate including a first section attached to the board and a second section angled from the first section according to a first predetermined cant and directed toward the tip of the board, the second section is separated from the board by a first distance; and

a second spring plate coupled to the board, the second spring including a first section attached to the board and a second section angled from the first section according to a second predetermined cant and directed toward the tail of the board, the second section is separated from the board by a second distance.

2. The skiing mechanism of claim **1**, wherein the board includes a first set of mounting inserts for the first spring plate and a second set of mounting inserts for the second spring plate.

3. The skiing mechanism of claim **2**, wherein the first section of the first spring plate includes a plurality of inserts and the second section of the first spring plate includes a boot or foot binding.

4. The skiing mechanism of claim **3**, wherein a plurality of fasteners are inserted through the plurality of inserts and attached to the first set of mounting inserts.

5. The skiing mechanism of claim **1**, wherein both of the first and second predetermined cants are typically less than twenty degrees.

6. The skiing mechanism of claim **1** further comprising a waterproof material inserted within the first distance between a bottom side of the second section of the first spring plate and a top surface of the board.

7. The skiing mechanism of claim **1**, wherein the first and second spring plates are made of a flexible material having substantial properties to return to its unloaded, steady-state position after additional forces applied to the spring plates are discontinued.

8. The skiing mechanism of claim **1**, wherein a nominal thickness of the first and second spring plates is sized to approximately one-quarter of an inch when the spring plates are made of a graphite composition and sized for an average weight rider.

9. A skiing mechanism comprising:

an elongated board having a first set of mounting inserts and a second set of mounting inserts approximately equidistant from the first set of mounting inserts and a tail of the board;

a first spring plate coupled to the board, the first spring plate including (i) a first section having a plurality of inserts corresponding to the first set of mounting inserts for attachment to the board, and (ii) a second section angled from the first section according to a first predetermined cant increasing in separation distance from the board; and

a second spring plate coupled to the board, the second spring including (i) a first section having a plurality of

inserts corresponding to the second set of mounting inserts for attachment to the board and (ii) a second section angled from the first section according to a second predetermined cant and directed toward the tail of the board, the second section is separated from the board by an increasing distance.

10. The skiing mechanism of claim **9**, wherein the second section of the first spring plate includes a boot or foot binding.

11. The skiing mechanism of claim **10**, wherein the second section of the second spring plate includes a boot or foot binding.

12. The skiing mechanism of claim **10**, wherein a plurality of fasteners are inserted through the plurality of inserts and the first set of mounting inserts.

13. The skiing mechanism of claim **11**, wherein a plurality of fasteners are inserted through the plurality of inserts and the first set of mounting inserts.

14. The skiing mechanism of claim **9**, wherein both of the first and second predetermined cants are less than twenty degrees.

15. The skiing mechanism of claim **9** further comprising a waterproof material inserted within the first distance between a bottom side of the second section of the first spring plate and a top surface of the board.

16. The skiing mechanism of claim **9**, wherein the first and second spring plates are made of a flexible material having substantial properties to return to its unloaded, steady-state position after additional forces applied to the spring plates are discontinued.

17. Attached to a snowboard, a spring plate comprising:

a first section including a plurality of inserts corresponding to a first set of mounting inserts placed within the snowboard; and

a second section angled from the first section according to a predetermined cant increasing in separation distance from the snowboard, the second section including a boot binding.

18. The spring plate of claim **17**, wherein the predetermined cant is approximately 10 degrees.

19. The spring plate of claim **17**, wherein the first and second sections are made of a flexible material having substantial properties to return to its unloaded, steady-state position after additional forces applied to the spring plate are discontinued.

20. The spring plate of claim **17** further comprising a plurality of fasteners inserted through the plurality of inserts for attachment to the first set of mounting inserts.

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