

[54] **SKI BINDING** 3,647,233 3/1972 Martin..... 280/11.35 T
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Wash., a part interest to each 3,603,607 9/1971 Marker..... 280/11.35 T

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Related U.S. Application Data

[63] **Continuation-in-part of Ser. No. 73,893, Sept. 21, 1970.**

[52] **U.S. Cl.**..... 280/11.35 T, 280/11.35 C
[51] **Int. Cl.**..... **A63c 9/00**
[58] **Field of Search** 280/11.35 T, 11.35 C,
280/11.35 H

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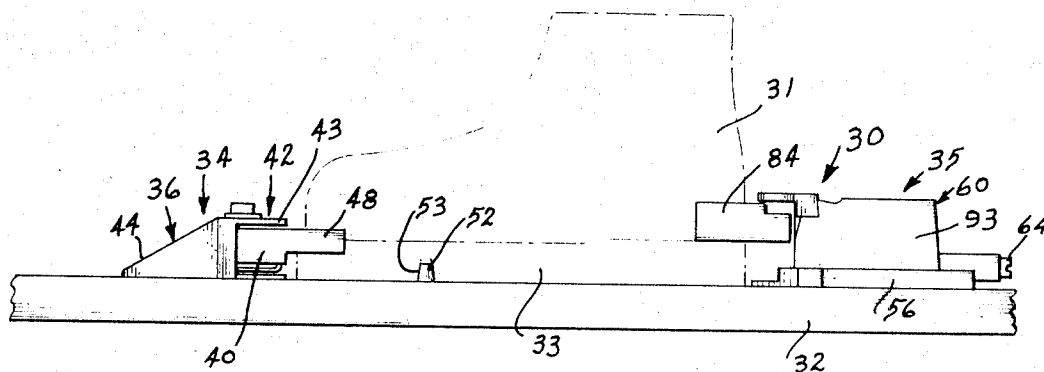
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[57] **ABSTRACT**

A ski binding that includes a toe and heel clamping means, as well as a pivot mounting for the ski boot, and wherein there is provided a safety release construction as a part of the ski binding.

11 Claims, 12 Drawing Figures



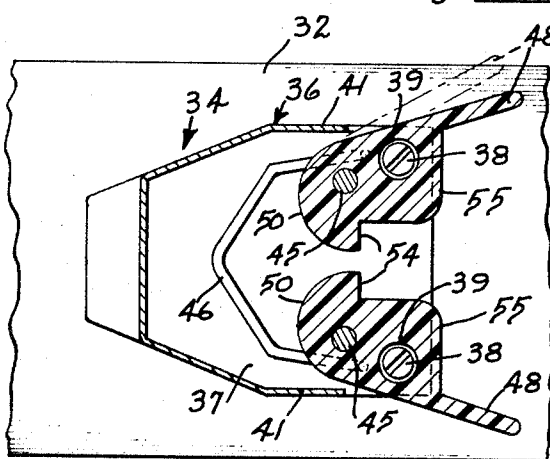
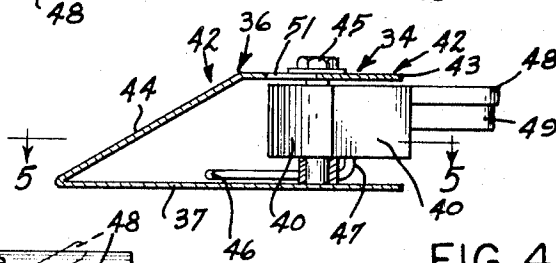
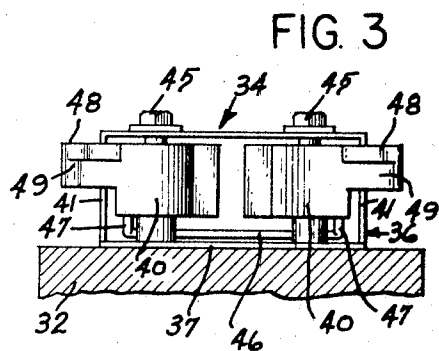
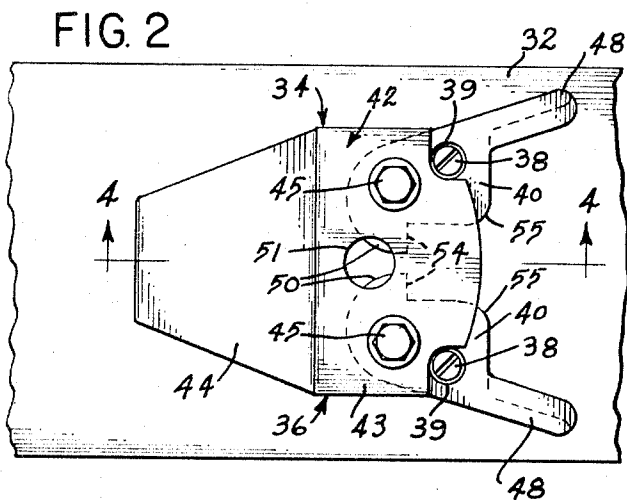
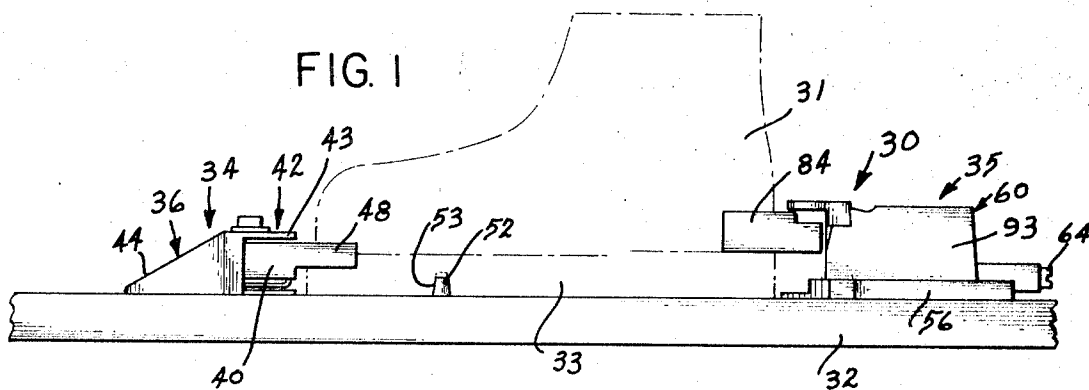


FIG. 5

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FIG. 6

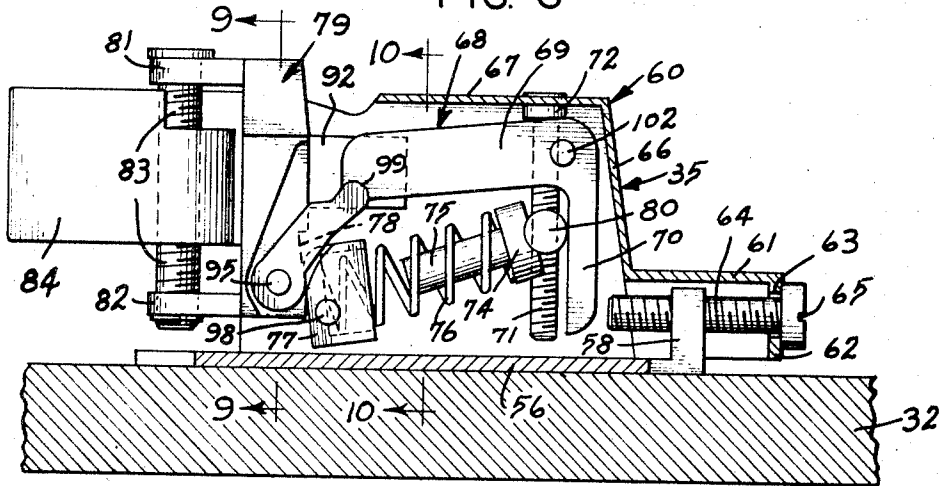


FIG. 7

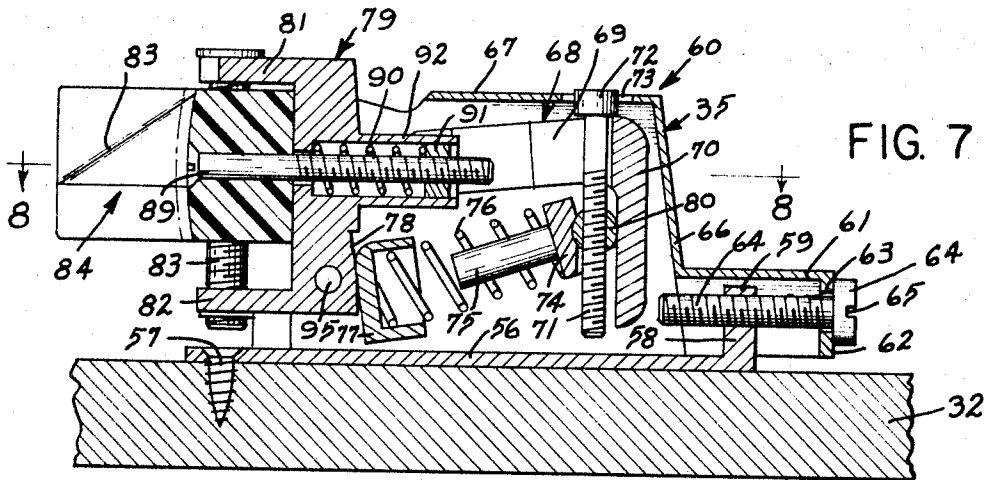
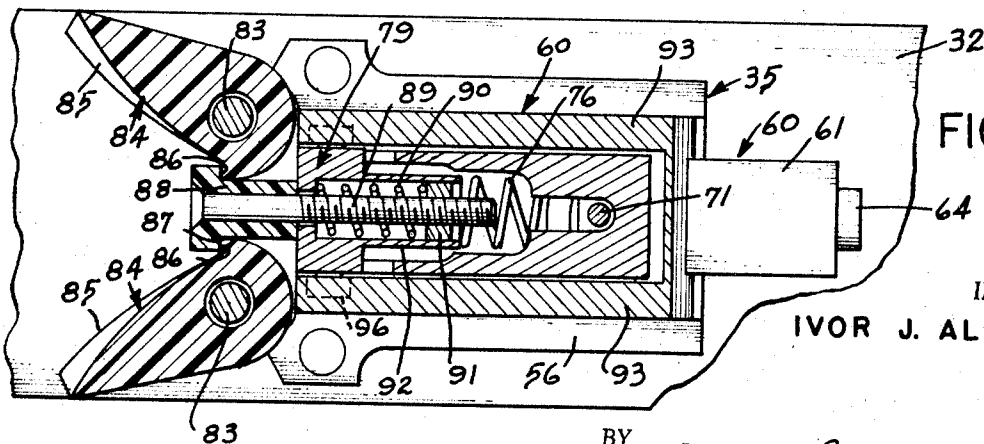


FIG. 8



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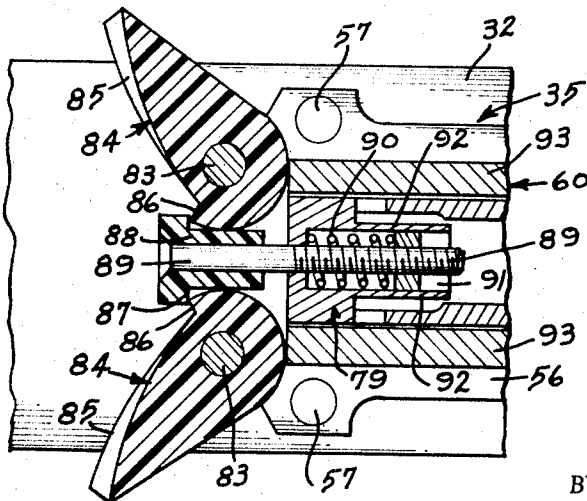
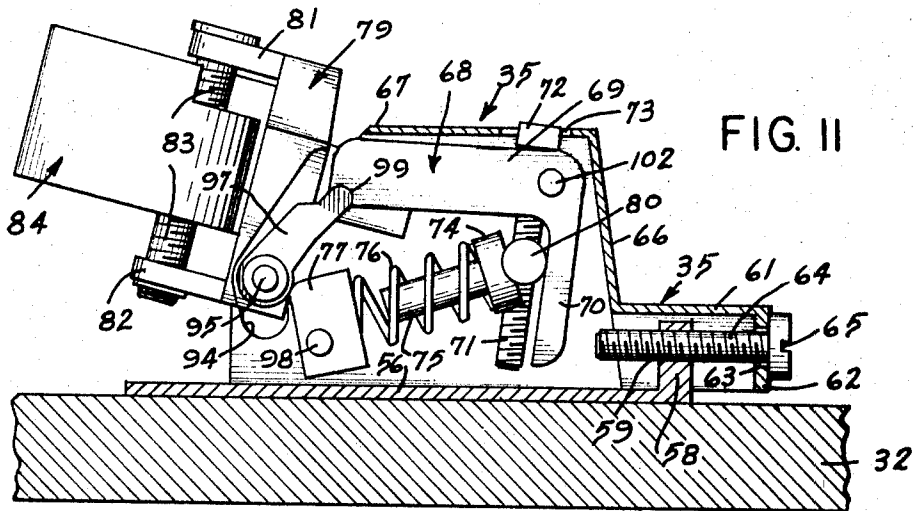
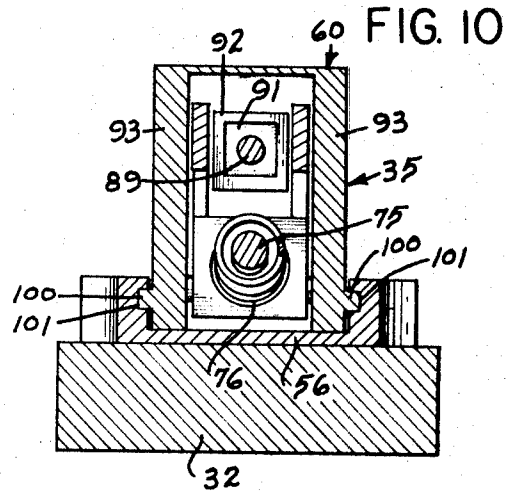
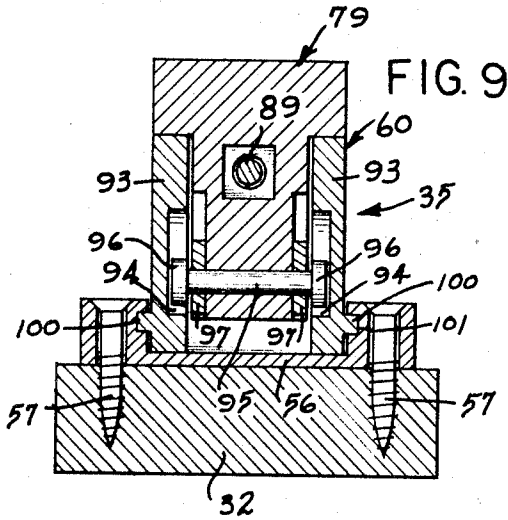


FIG. 12

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SKI BINDING

This invention relates to ski equipment, and more particularly to ski binding and the present invention is a continuation-in-part of patent application Ser. No. 73,893 filed Sept. 21, 1970.

An object of the present invention is to provide a safety ski binding that provides maximum convenience and safety, and wherein the binding does not have to be cut.

Another object of the present invention is to provide a ski binding that has a configuration easy release at the toe that operates without the necessity of stopping or fumbling around behind the user, and wherein the present invention is convenient to use or mount with one template for the foot, heel and toe pieces.

Another object is to provide a ski binding that is not unsightly, and wherein the ski binding permits fixtures to be easily mounted in place, the device being easily and accurately adjusted in place.

Further objects and advantages are to provide improved elements and arrangements thereof in a device of the character described that is relatively economical to produce, durable in form, and conducive to the most economical use of materials and uniformity of members formed therefrom.

Still further objects and advantages will become apparent in the subsequent description in the specification.

In the drawings:

FIG. 1 is a side elevational view illustrating one application of the present invention.

FIG. 2 is an enlarged top plan view of the toe clamp.

FIG. 3 is an end elevational view of the toe clamp.

FIG. 4 is a sectional view, taken on the line 4—4 of FIG. 2.

FIG. 5 is a sectional view, taken on the line 5—5 of FIG. 4.

FIG. 6 is a side elevational view of the heel clamp with one side removed for clarity of illustration.

FIG. 7 is a vertical sectional view, taken along the center thereof.

FIG. 8 is a sectional view, taken on the line 8—8 of FIG. 7.

FIG. 9 is a sectional view taken on the line 9—9 of FIG. 6.

FIG. 10 is a sectional view, taken on the line 10—10 of FIG. 6.

FIG. 11 is a view similar to FIG. 6, but showing the device in another position.

FIG. 12 is a view similar to FIG. 8, illustrating the jaws in open position.

Referring in detail to the drawings, the numeral 30 indicates the ski binding of the present invention, which is adapted to be used for connecting ski boots 31 to the skis 32, FIG. 1, and the ski binding 30 of the present invention includes a toe clamp 34, as well as a heel clamp 35. The numeral 33 indicates the sole of the ski boot 31, and the numeral 52 indicates a pivot pin on the ski 32 for engaging a recess or opening 53 in the sole 33 of the ski boot 31.

As shown in the drawings, the toe clamp 34 includes a hollow housing 36 that includes a horizontally disposed bottom wall 37 that is adapted to be secured in place on the ski 32 by means of securing elements or screws 38. The numeral 39 indicates openings in pivotally mounted jaws 40, whereby a screw driver or the

like can be inserted in the openings 39 in order to rotate the screws 38.

The housing 36 further includes side portions 41, as well as a top portion 42, and the top portion 42 includes a horizontal section 43, as well as an inclined portion or section 44. The numeral 45 indicates pivot pins for the pair of jaws 40. A spring member 46 is provided for exerting the proper pressure or bias on the jaws 40, and the spring member 46 includes upstanding portions 47 that are arranged in engagement with the pair of jaws 40. The jaws 40 are provided with a rearwardly disposed lip or flange 48 that is recessed as at 49, FIG. 4. In addition, the jaws 40 have curved or rounded surfaces 50 thereon which define or provide cam surfaces whereby a tip of a ski pole can be inserted down through the openings 51 in the top of the housing 36 in order to cause the tip of the ski pole to bear against the cam surface 50 in order to provide a convenient means for releasing the jaws 40. The jaws 40 are cut away or recessed as at 54, and the jaws 40 are also provided with shoulders or flat surfaces 55 thereon, FIG. 5.

Referring to FIGS. 6 through 12 of the drawings, there is illustrated in detail, the heel clamp 35, where it will be seen that there is provided a base plate 56 that is adapted to be secured to the ski 32 by screws or securing elements 57. The base plate 56 has an upstanding lug 58 on the rear portion thereof, and the lug 58 is provided with a threaded opening 59 therein. The numeral 60 indicates a casing or housing, and the casing 60 includes a horizontally disposed first portion 61 that has a depending flange or lip 62 on its rear end and the lip 62 is provided with an opening 63 through which extends a screw member or bolt 64, and this construction permits fine adjustments to be made to accommodate different sizes of ski boots and the like. The screw member 64 has a slotted head 65 to permit a tool such as a screw driver to be arranged in engagement therewith to effect the desired adjustment of the casing 60 and associated parts. The casing 60 further includes an upstanding second portion 66 as well as a horizontally disposed third portion 67.

The numeral 68 indicates an L-shaped bracket that includes a generally horizontal portion 69 as well as a vertical portion 70. A screw member or bolt 71 is vertically disposed, FIG. 7, and the screw member 71 has a head 72 on the upper end thereof, and the head 72 extends through an opening 73 in the top 67 of the casing 60. The screw member 71 is arranged in threaded engagement with a cross piece 80, and the cross piece 80 is secured by welding to a head 74 of a bolt or pin 75, there being a coil spring 76 that is circumposed on the bolt or pin 75, FIGS. 6, 7 and 11. One end of the coil spring 76 engages a retainer 77, and the retainer 77 bears against a surface 78 of a body element 79. The body element 79 is provided with upper and lower flanges 81 and 82, FIG. 6, and pivot pins 83 extend through the flanges 81 and 82 to provide a pivot mounting for the pair of heel latches or jaws 84. The jaws 84 are cut away or recessed as at 85, FIG. 12. In addition, portions of the jaws 84 are recessed or cut away so as to define shoulders 86 that are engaged by a shoulder 87 of a bushing 88. Numeral 89 indicates a screw member or bolt that extends through the bushing 88, and the screw member 89 has a coil spring 90 mounted thereon, FIG. 12, there being a square shaped nut or fastener 91 that threadably engages the rear por-

tion of the bolt or screw member 89. The nut 91 is snugly arranged or positioned in a hollow extension 92 that projects rearwardly from the body element 79, FIG. 7. As shown in FIG. 9, the casing 60 includes spaced parallel vertically disposed side walls or side portions 93 that are recessed or cut away as at 94, and the numeral 95 indicates a shaft or pin that has rollers 96 on the ends thereof, and the recesses 94 in the side walls 93 provide clearance for the rollers 96. The numeral 97 indicates links that have a rocking or pivotal connection as at 99 with the front end of the L-shaped bracket 88. The numeral 98 indicates pivot pins for the retainer 77, FIG. 11.

As shown in the drawings, FIGS. 9 and 10, dismetrically opposed ribs 100 are arranged on the outer surfaces of the side walls 93 for sliding engagement with groove 101 in the base plate 56, whereby when the screw member 64 is rotated or adjusted, the parts can be properly adjusted, so that they will remain in their proper aligned position.

From the foregoing, it will be seen that there has been provided a ski binding, and in use, with the parts arranged as shown in the drawings, a ski boot such as the ski boot 31 is adapted to be positioned so that its toe portion is clamped by the mechanism 34, while the heel portion of the ski boot is clamped or held in place by the heel mechanism 35. The sole 33 has a recess 53 in the lower portion thereof for receiving a pivot pin 52 that is mounted on the ski 32, and, if desired, a disk or the like can be arranged adjacent the pivot pin 52 to permit swivelling of the ski boot. The pair of jaws 40 clamp and hold the toe portion of the ski boot in place, and the jaws 40 are maintained in their proper position by means of a spring member 46. It will be noted that the toe clamp 34 has the release mechanism therein which consists of the opening 51 in the housing 36, whereby the tip of a ski pole can be conveniently inserted down through the opening 51 to engage the cam surfaces 50 so as to exert pressure on the jaws 40, in order to release the toe portion of the ski boot when desired or required. The jaws 40 are provided with the flanges 48 that are recessed as at 49, so that the jaws snugly and properly engage and secure the toe portion of the sole of the ski boot in its proper location.

The heel clamp 35 is provided with a pair of jaws or latches 84 that are pivotally connected in place on the pivot pins 83, and the jaws 84 are recessed or tapered as at 85 to properly engage the heel portion of the ski boot. A screw member 64 can be adjusted by arranging a screw driver or other tool in engagement with the head 65, whereby the screw member 64 can be rotated to shift or move the entire casing 60 and its associated parts in a forward or backward direction so that a firm adjustment is provided for permitting the device to accommodate or receive ski boots or different shapes or sizes.

With further reference to the toe clamp 34, the pair of jaws 40 are pivotally mounted on pins 45 and these jaws are arranged or biased into their proper position by means of a spring member 46.

As to the rear clamp 35, the bell crank 68 and the spring 76 exert a rearward force on the bell crank 68 about an axis extending through the pivot pin 102, FIGS. 6 and 11, and the bell crank or bracket 68 will selectively exert a downward force on the links 97. The spring member 76 can be adjusted by rotating the screw member 71, and this can be conveniently accom-

plished by gaining access to the slotted head 72, due to the provision of the opening 73.

The ski binding will not release during normal use of the skis, but in the event that the user falls forward, for example, then the upward force of the heel against the jaws 84 will cause the links 97 to push the bell crank 68 up against the tension of the spring 76, so that the body element 79 will rest on top of the housing or casing, as shown in FIG. 9. The recesses 94 in the sides of the casing receive the rollers 96 so that sufficient clearance is provided for the rollers to move therein, and thus the recesses 94 act as guide surfaces for the rollers. As soon as the parts reach a position such as that shown in FIG. 11, the ski boot will be safely released from the heel clamp so that the ski will not be locked onto the ski boot, whereby the user's foot with the ski boot thereon will safely come loose from the ski, and thus the present invention serves as a safety release to prevent broken bones, such as a broken leg, and the like. Thus, the ski boot comes loose when sufficient pressure is applied to the mechanism.

In addition, the device has a cocking action and also includes the fine adjustment consisting of the member 64 that engages the lug 58. The spring 90 serves to provide proper tension or pressure on the jaws 84 so that the jaws 84 are normally pulled backwardly and inwardly, and thus the spring 90 helps take up slack in the mechanism.

In the event of a fall, the entire unit, including the body element 79 is raised upwardly from a position such as that shown in FIGS. 6 and 7 to a position such as that shown in FIG. 11, so that the spring 76 is compressed, and the bracket or bell crank 68 can pivot about the pivot pin 102.

When inserting the ski boot in the present invention, initially, the toe of the ski boot is placed in the toe clamp 34, and the heel is forced downwardly and this causes the heel to engage the jaws 84 to return the parts from the position such as that shown in FIG. 11 to a position such as that shown in FIGS. 6, 7 and 8, so that the ski boot will be properly clamped in position.

As previously stated, in the event of a forward fall, the entire body element 79 and associated parts lift upwardly to the position shown in FIGS. 11, and the number 68 can pivot about the pin 102 against the tension of the spring 76, so that the heel can clear the mechanism including the jaws 84, and for a forward fall, the jaws 84 do not have to spread apart.

In the event that the user falls sideways, one or both of the jaws 84 can pivot outwardly about the pivot pins 83 so that the ski boot will come free of the mechanism.

The ski binding of the present invention provides maximum safety as well as maximum ski control and maximum convenience. Maximum safety is assured because the present invention eliminates the possibility of hang up between the toe of the boot and the ski. In addition, it changes the pivot point in releasing the skier from the heel to the front of the toe, to from the ball of the foot to the heel, that is it has a shorter lever, thereby decreasing the leverage of the twist against the leg. It decreases the friction under the foot from that required to move the toe across the ski while pivoting at the heel to the pivot under the ball of the foot to the mean distance to the outside of the ski, which is approximately 1 inch against approximately 1 foot or approximately a 12 to 1 improvement. Because this is where most breaks are caused, it is estimated that an

improvement in this of 2 to 1 would prevent approximately 90 percent of the breaks, and the improvement of 12 to 1 would eliminate all breaks caused by this friction. Further, the pivot point gives a direct mechanical tie between the boot and the ski and absorbs the shock and chatter of skiing and eliminates the necessity of using the release mechanism to absorb the same. It eliminates unwanted release and relieves the fear of breaking the leg by twisting.

As to maximum ski control, this is accomplished due to the provision of the pivot point which locates the ski sideways, forward and backwards within 2 or 3 thousandths of an inch. It eliminates unwanted release from the chattering or hitting objects on the side of the boot such as salom poles or ruts or mogul. It gives much improved edge control because the ski boot is securely fastened to the ski with 3 contact points along each edge. The boot is more securely fastened because the user can actually pry the sole over the pad at the ball of the foot giving tremendous security without causing the release. Further, the binding releases only in a twist at a predetermined pressure or in a straight forward fall, and does not release in unwanted directions.

The present invention also provides maximum convenience, because it is a true step-in, needs no cocking, and has a convenient easy release at the toe without stooping or fumbling behind the user.

The device is very convenient to mount with one template for boot, heel and toe pieces. Also there are no unsightly or hard to mount fixtures on the boot, and the device is light in weight and simple and easy to adjust and test.

An important aspect or feature of the present invention is the pivot 52 under the ball of the foot, and this pivot does several things, mainly, it fastens the user on mechanically in a lateral position. The present invention helps absorb shock and chattering of skiing as well as the eliminating of twisting action, and with the present invention, the ski is actually maneuvered by balancing the weight forward and backward and setting the edge. The boot is fastened to the ski in a very efficient manner. Also, there is provided a unique means for releasing the skier from the ski by inserting a ski pole through the opening 51. The toe piece essentially operates as a guide to guide the foot on the center of the pin. The boot is released in the event of a twisting action. The toe piece requires no adjusting, and has just sufficient spring action to hold the toe in position and guide the foot in place. The pin, such as the pin 52 helps hold the ski in position both forward, backward, and laterally, and as the ski bends, the distance is shorter.

The present invention provides improved safety features, as well as improved operation. The device is easy to install, and has elasticity, and the device does not release prematurely or accidentally. The binding is easy to get into and out of, and the device will release at predetermined pressures. The heel mechanism can be adjusted forward and backwards.

It will not be clear that there is provided a device which accomplishes the objectives heretofore set forth. While the invention has been disclosed in its preferred form, it is to be understood that the specific embodiment thereof as described and illustrated herein is not to be considered in a limited sense as there may be other forms or modifications of the invention which

should also be construed to come within the scope of the appended claims.

I claim:

1. In a ski binding for connecting a ski boot to a ski, a pivot pin on the ski engaging a recess in the sole of the ski boot, a toe and heel clamp, said toe clamp comprising a housing including a bottom wall, securing elements connecting said housing to said ski, said housing further including a top portion that includes a horizontally disposed section and an inclined front section, a pair of spaced apart jaws having pivot pins extending therethrough, said jaws having cut away portions that define shoulders, a spring member operatively connected to said jaws, there being an opening in the top section of the housing for selectively receiving the top of a ski pole; said heel clamp comprising a base plate affixed to the ski, a casing mounted above said base plate, and said casing including a horizontally disposed first section, an upstanding second section and a horizontally disposed third section, and said casing further including vertically disposed side sections, a vertically disposed lug on the rear of the base plate, a flange depending from the rear of the casing, a screw member extending through said flange and engaging said lug, an L-shaped bracket mounted in said casing, a vertically disposed screw element extending through said bracket and having a cross piece affixed thereto, a securing element having a head on its rear end connected to said cross piece, a coil spring circumposed on said last named securing element, a retainer engaging the front of said last named coil spring, a movable body element engaged by said retainer, a pair of jaws pivotally connected to said body element, a screw member extending through said body element and having a bushing on the front portion thereof and said bushing engaging the jaws of the heel clamp, a coil spring on said last named screw member, a fastener on said screw member, links having their upper ends engaging said bracket, a shaft connected to said links, and rollers on said shaft engaging recessed portions in the sides of the casing.

2. As a new article of manufacture, a safety ski binding for connecting a ski boot having a sole to a ski, comprising a pivot member fixedly mounted on the ski for engaging a recess formed at the bottom of the sole of the ski boot, a toe clamp including a housing and spring pressed jaws mounted therein, said housing having an opening in the top thereof, means for selectively releasing the jaws by inserting a ski pole in said opening, a heel clamp comprising a pair of pivotally mounted jaws having spring means operatively connected thereto.

3. In a ski binding for connecting a ski boot to a ski, said boot having a recess in the sole thereof, a pivot pin for engaging said recess, a toe and heel clamp connected to said ski for engaging the toe and heel of the boot; said toe clamp including a housing having an opening in the top thereof for selectively receiving the tip of a ski pole; a pair of spaced apart jaws pivotally connected to said housing, resilient means connected to said jaws; said heel clamp including a base plate adjacent to said ski; casing means mounted above said base plate; a screw member operatively connected to said casing means for adjusting said heel clamp; a vertically disposed element connected to said casing means, a securing element having means thereon operatively connected to said screw element, said heel clamp further including a pair of pivotally mounted jaws.

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4. The structure as defined in claim 3, wherein the resilient means that are connected to the jaws of the toe clamp comprise spring means.

5. The structure as defined in claim 3, and further including resilient means operatively connected to the screw member of the heel clamp.

6. In a ski binding for connecting a ski boot to a ski, said boot having a recess in the sole thereof defining a socket, a pivot peg permanently fixed to the ski for fitting in and engaging said socket; a toe unit and heel unit connected to said ski for engaging the toe and heel of the boot; said toe unit including a housing having an opening in the top thereof for selectively receiving the tip of a ski pole; a pair of spaced apart jaws pivotally connected to said housing, resilient means connected to said jaws; said heel unit having a release mechanism and including a base plate adjacent to said ski, casing means mounted above said base plate; a screw member operatively connected to said casing means for adjusting said heel unit, said heel unit further including a pair of pivotally mounted jaws.

7. The structure as defined in claim 6, wherein said peg serves to absorb the shocks generated by skiing without loading the release mechanism.

8. The structure as defined in claim 6, wherein the peg serves to absorb the shocks generated by skiing without loading the release mechanism so that much lighter settings can be used without inviting inadvertent releases.

9. The structure as defined in claim 6, wherein the toe unit acts primarily as a boot hold-down and centering device since turning forces are transmitted to the ski between the pivot peg and the heel unit.

10. The structure as defined in claim 6, wherein the major functions of the pivot peg when release is required are to reduce the length of the lever acting against the leg and to produce a point of rotation so that the boot can twist out of the binding.

11. The structure as defined in claim 6, wherein once the limits of anti-shock travel have been released the heel-retaining jaws snap open to free the boot.

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