United States Patent

[11] 3,612,559

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[54] **TOE BINDING**
23 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **280/11.35 T**
[51] **Int. Cl.** **A63c 9/00**
[50] **Field of Search** ..... 280/11.35 HA

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ABSTRACT: A toe binding for skis which is made to reliably release the boot of a skier laterally and also in upward direction. The binding retains the boot solely under spring force so it will absorb shocks, and will store energy to keep the boot in the binding at lower loads and will return the boot to a centered position if the boot moves but is not completely released. Because of the ability to provide a resetting force and permit some boot movement, the binding can be set at a lower ultimate release force to provide greater safety to skiers.

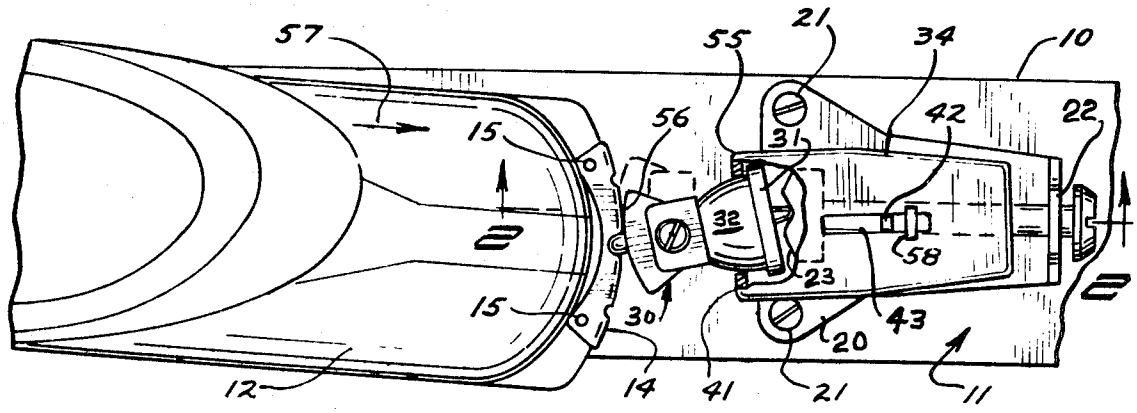


FIG. 1

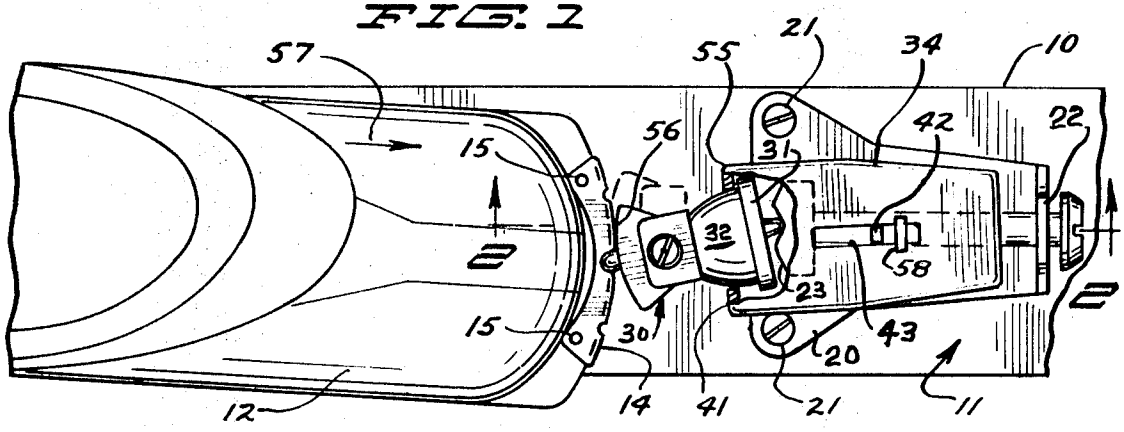
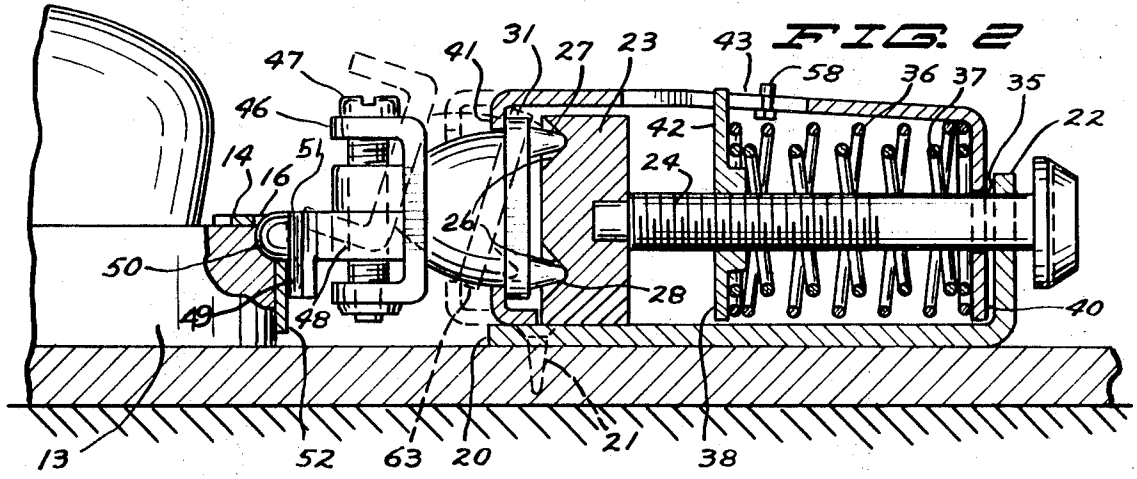


FIG. 2



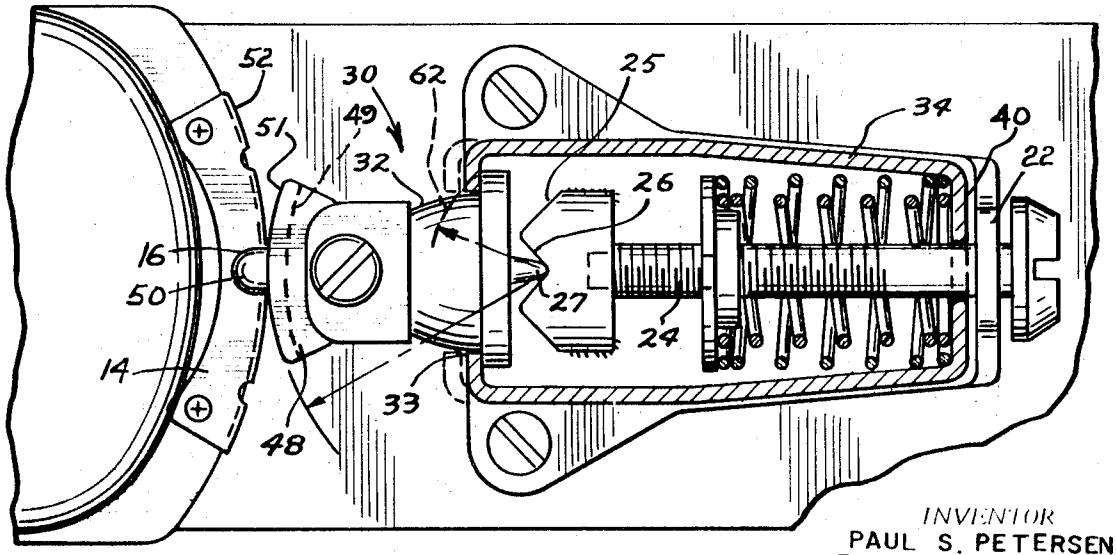


FIG. 3

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TOE BINDING

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a lateral release toe binding for skis for holding ski boots on the skis.

2. Prior Art

The great interest in skiing has brought about many different types of releasing toe bindings in order to release the skier's foot if a fall occurs to prevent breaking bones or causing severe sprains.

One of the problems is that the toe binding has to be set at a high enough retaining force to prevent the foot from coming out during jarring and bumps that occur in normal skiing and still release when a high force is applied to the leg. This becomes extremely difficult and in many instances the lateral release toe bindings are of little practical value because the setting has to be so high in order to keep the foot in for ordinary impact loads that when high sustained loads are encountered (as sometimes encountered in a slow twisting fall) a leg will break before the binding will release.

SUMMARY OF THE INVENTION

The present invention relates to a lateral (and upward) release toe binding for skis which will positively release a retained boot when a certain force is exceeded, and which will provide accommodation of shocks or impact loads which occur when the skier is traversing rough or rutted snow.

The toe binding is made so that it can be preloaded so that it will not move until a known force is exerted, and is designed so that it will not tend to continue to open once it has moved from its center position even if a forward thrust is placed onto the boot in the binding.

The binding will return the boot it is retaining to center if the boot shifts slightly laterally or upwardly (but does not fully release) because the binding is constructed to store energy to provide a positive returning force. The binding is designed so that the boot does not have to move forwardly or backwardly as it moves laterally, and the binding is not dependent on friction holding force or a detent. Spring force is the retaining force, and this force is reliable and repeatable under most conditions.

The toe binding is simple to manufacture, can be readily changed in holding force, is not adversely affected by ice or snow, and will release in both lateral and upward directions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing a fragmentary portion of a ski with a portion of a ski boot and the toe binding made according to the present invention installed thereon;

FIG. 2 is an enlarged sectional view taken as on line 2—2 in FIG. 1; and

FIG. 3 is a top plan view of the device in FIG. 2 with parts in section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A ski shown fragmentarily at 10 used for snow skiing has a toe binding assembly illustrated at 11 mounted thereon, and a ski boot 12 is shown on the ski. The boot is shown partially released in FIG. 1. The ski boot 12 has a sole 13 which protrudes outwardly from the boot upper along the front toe portion of the boot, and a toe clip 14 is attached to the forward end of the toe of the boot sole. The toe clip is a metal part, usually hardened, which as shown in FIG. 2 is angularly shaped, and fastened to the boot sole with suitable screws 15 or other fastening devices. At the center of the toe clip, right along the longitudinal axis of the boot, there is a ball receptacle 16 defined. This receptacle 16 extends partially into the forward upper corner of the sole of the boot as shown in FIG. 2. The toe binding assembly 11 has a base member 20 that is fixed to the top of the ski with suitable screws 21, or in other suitable ways, and as shown a plate portion of the base

member has ears through which these screws 21 extend. The base member includes an integral upright leg 22 at the forward end thereof. Adjacent to the rear of the base member there is a post 23 which is fixedly attached to the plate portion of the base member. The post 23 rotatably supports a screw 24 on the forward side thereof, as shown in FIG. 2, and this screw extends substantially horizontally or parallel to the upper surface of the ski 10 and passes through a provided opening in the leg 22 of the base member 20. The screw has a little endpiece that is rotatably mounted in the post. The screw is prevented from moving axially in direction toward the post by a shoulder formed by the endpiece.

The rearward side portions of the post 23, as shown, have tapered surfaces 25 which are actually relief corners to get other parts to move in conjunction with the post 23. The post 23 has a pair of substantially conical pockets or sockets 26 defined in the rearward surface thereof, one adjacent to the top of the post and one adjacent to the bottom of the post. These pockets are of size to pivotally receive pivot pins 27 and 28. The pivot pins 27 and 28 pivotally mount a boot retaining unit 30 which includes a lever plate 31. The pins 27 and 28 and the recesses 26 are vertically aligned (their axes lie in a common vertical plane) and are spaced apart in vertical direction. Lever plate 31 has a type of swivel guide member 32 fixedly attached thereto. This swivel member 32 is a solid member having a circular transverse cross section and thus is very much like a three dimensional truncated elliptical member and it is made so that it will pass through an opening indicated at 33 defined in an actuator case or housing 34. The case or housing overlies the base member, the post, the lever plate, and a major portion of the screw 24. As shown, the screw 24 passes through an opening 35 at the forward portion of the case or housing 34, and this case is not secured to the base member and can slide along the screw. The case or housing acts as a retainer means for the lever plate 31. The entire assembly is held by compression coil springs (as shown there are two to give the desired force) 36 and 37. The springs act against a nut 38 which is threadably mounted over the screw 24 on the interior of the case. The springs exert force between this nut and a front or forward wall 40 of the case. This forward wall is the wall through which the opening 35 is defined. The opening 33 is defined in a rear wall 41 of the case. The nut 38 has a small tip 42 that extends upwardly through a slot 43 in the top wall of the case 34. This tip prevents the nut from rotating, and also provides a visual indication of how far compressed the springs are. The compression of the springs 36 and 37 against the forward wall 40 of the case acts through the case and the rearward wall 41 against the lever plate 31 to hold the pivot pins 27 and 28 firmly against the inner surfaces of the receptacles 26 on the post 23 and in this manner the entire assembly is held together under compression. The force of the springs is the sole means for holding the boot retaining unit from pivoting.

A bracket 46 is joined to the swivel member 32 that is fixed to the lever plate 31, and this bracket is "U"-shaped as shown. It has a screw 47 rotatably mounted therethrough. The screw 47 threadably mounts a boot retaining sector member 48. When the screw 47 is adjusted, sector 48 can be moved up and down to give proper adjustment for the toe piece of a particular boot being used. The sector member 48 has a short headed pin 50 which has a ball-shaped head that fits within the receptacle 16 defined in the boot clip 14 and in the upper part of the sole of the boot.

As shown in top view, the sector member 48 has a vertical curved surface 51, the radius of which corresponds substantially with the radius of movement of the sector 48 when it pivots about the tips of pins 27 and 28 in lateral direction as shown. It is well known that a holddown heel binding can be provided for ski boots. Heel bindings retain the heel of the boot. When lateral toe movement of the boot occurs, the boot will pivot about a pivot point at the heel binding. This pivot point may change but generally is near the rear center of the boot sole. The radius of the forward surface 52 of toe clip 14 is

substantially the same as the pivotal radius of the boot, so that when the boot pivots out of the binding as shown partially in FIG. 1, the surface 51 and the forward surface 52 of the toe clip remain in contact. They more or less roll along each other. The contact line between these two surfaces remains on the centerline of thrust of the boot or along the centerline of the toe binding member. Stated another way, the effective line of force is along a plane passing through the pivot axis so there is no sector exerted on the boot retaining unit by forward pressure of the boot. This prevents any forward thrust that may be exerted by the boot from tending to pivot the sector member 48 farther laterally to more or less throw the boot out of the binding.

OPERATION

When a boot is in the binding, as shown in FIG. 3, in normal position, the heel binding for the boot will hold the toe clip up tight against the sector 48 with the ball head 50 in the receptacle 16 of the toe clip 14. The screw 24 can be adjusted through its head until the springs 36 and 37 are compressed a desired amount which will vary with the ability of the skier, and the skiing conditions. This spring force is transferred from the front wall 40 of the case 34 to the rear wall 41, and then to the mating surfaces of the lever plate 31. This lever plate 31 can be square or rectangular in cross section, so that there is some contact surface between the inner side of the wall 41 and the lever plate 31. The force of the springs is then transferred through the lever plate 31 to the pivot pins 27 and 28 then to the surfaces of the post 23 defining the pockets 26 for the pins. The spring force, then holds the unit together, and before any movement of the toe retaining unit and lever plate 31 is possible, the spring force has to be overcome.

When a lateral force is exerted on the boot, the boot would move to position shown in FIG. 1 for example, before it is fully released. In doing so, an edge surface 55 of the lever plate 31 (as shown in FIG. 1) will bear against the inner surface of the wall 41 and the entire toe retaining unit 30, which includes the lever plate, the pivot pins, and the parts joining the boot, will pivot about the vertical axis at the tips of the pivot pins 27 and 28 with respect to the post. Because the post 23 is fixed to the base member, the pivoting of the lever plate will force the case to move rearwardly from its normal position shown in FIG. 2 to the solid line position shown in FIG. 1. The lever plate is therefore an actuator means for the case 34. The case 34 cocks slightly, as it is held only by screw 24 and the member 32. The case movement compresses the springs 36 and 37, of course, and a force or moment tending to return the lever plate (and the boot retaining member) to its centered position on the pivot pins is exerted. It should be noted that when a lateral force is encountered the pivoting takes place about both pins 27 and 28 because they are aligned in a vertical plane, and the transverse movement causes pivoting about an axis formed by both of the pins. As also can be seen in FIG. 1, the line of contact 56 between the sector 48 and the clip 14 has moved on the two parts from the initial position. However, the line of force exerted by a heel binding stays centered on the ski and toe binding so that any forward thrust, for example a force acting in the direction as indicated by the arrow 57 caused by the heel binding on the boot, will not tend to cause a continued pivoting of the lever 31. The force will merely be transferred in a straight line fashion through the pivot pins and the post. Thus there will be no tendency for a force in forwardly direction from the boot or heel binding to cause increased movement of the boot retaining unit. In some bindings this occurs and once the boot moves a slight distance laterally, any forward thrust will make it continue to release. This situation is not present in the design of the present invention.

The energy required to compress the springs is stored in the springs 36 and 37 and this energy will be tending to cause the lever plate 31 to rotate in opposite direction or in other words return the boot retaining unit to its normally centered position under the urging of the springs 36 and 37. If the lateral force is reduced or stops before the boot has completely released, then the boot will be centered automatically with the spring force. When in the centered position the force on the lever plate 31 is balanced and the plate is resiliently retained in this centered position.

When the skier is going across rough terrain or the like the boot sometimes can swivel sideways and still reset without releasing the binding. This increases safety, accommodates shock and makes it possible to have a lower ultimate release setting on the binding.

Once the leverage assembly 30 pivots sufficiently far laterally so that the pin 50 clears the socket 16, the whole boot will be released. When the lever plate pivots, the case 34 moves to compress the springs against the nut 38. This movement indicates the amount of force necessary to release the boot, and if desired a small plastic clip 58 can be mounted into slot 43 to frictionally ride along the upper and lower surfaces of the top member of the case. This plastic clip 58 is moved by the tip 42 of the nut during movement of the case and the position of the plastic clip will indicate the spring compression during skiing. This helps the skier to know whether the binding is properly set. The little plastic indicator would remain at the position to which it was moved by the tip 42 when the case retracted as the boot moved. For example, if, during a hard run with no fall, the plastic clip moved one-half the distance to the known release position, the skier would know the release setting was low enough so that the energy storage feature was being utilized. This feature might be used to adjust the binding to the user's requirement: If the clip moves the required distance during normal maneuvers, then the setting is correct. Also, upon release, the clip will remain at the released position.

It should be noted from FIG. 3 for example that as the lever plate pivots about the pins 27 and 28 in a lateral direction, the end portion 51 will move along an arc indicated at 62. The amount of longitudinal movement of the case per degree of rotation of the lever plate along this arc reduces rather substantially after some initial movement of the lever plate. Thus, increased lateral displacement of the boot retaining unit does not cause a corresponding increase in force after the device has pivoted a certain number of degrees.

The greatest leverage advantage tending to retain the boot in place is present during the initial stages of pivoting, and this of course is when the spring force is lowest. A fairly uniform force is thus achieved for lateral release. For upward release, as can be seen in FIG. 2, the leverage occurs from pivoting about the upper pin 27 down along the lower edge indicated at 63 of the lever plate. This gives about 1¾ times the leverage for spring force than that for laterally pivoting, and a greater upward force is required for initial movement than for lateral movement. This is in accordance with good skiing practice, where you do not want to release in an upward direction except under greater forces.

The toe sector 48 has a lower projection or lip 49 which acts as an ejection lever against the toe clip 52 during upward boot release and which moves the boot rearwardly against the action of the heel binding during upward release. Many heel bindings accommodate this rearward movement. This lever 49 will cause the boot to be released sooner (with less movement upward) during upward release. This is done so the springs 36 and 37 of the toe binding do not compress excessively during complete upward release. The springs compress about 1¾ times as fast for each increment of movement of the boot during upward release as they do during lateral release. The ejection (rearward) action of the lever 49 on the boot ejects the boot from pin 50 before excessive spring deflection occurs, and the added leverage of the lever plate 31 permits selection of the proper force relationship to get proper initial holding power for upward release without excessive deflection ultimately.

The case again moves when releasing in upward direction to compress the spring. The pivot pins actually permit pivotal movement in any direction, up or sideways or any place in between.

The toe unit is relatively free from ice jamming. The pivot pins and their pockets are always under load so snow and ice cannot enter to jam the pivots up as is possible with a pin.

The toe bindings that use a detent ball or member permit only a small movement of the toe before full release is achieved. For example, if a detent ball moves one-eighth inch or so, it will release fully. In the present invention binding movement of one-half to five-eighth inch is possible before full release. During this travel, energy is stored by the springs and is available for resetting if the ultimate release load is not reached.

Only one pivot pin may be used if the height adjustment is on the toe clip instead of in the binding toe sector as shown.

In some instances, the projection **42** can be eliminated but the position of the nut **38** can still be observed through a slot or window so the setting of the binding can easily be seen.

What is claimed is:

1. A lateral release toe binding for holding the toe portion of a ski boot on a ski comprising a support member, means to fixedly secure said support member to said ski, boot engaging means mounted for pivotal movement about at least one axis with respect to said support member, said boot engaging means including lever means, retainer means yieldably mounted with respect to said support member acting against said lever means on a side of said lever means toward the toe portion and bias means acting on said retainer means and urging said lever means toward a first normal position, whereby any movement of said lever means about said one axis causes said retainer means to move and said bias means to increase in force and tend to return said lever means to its first position through said retainer means.

2. The combination as specified in claim 1 wherein said boot engaging means is mounted for pivotal movement about at least one axis by structure including a socket defined in said support member, and a pivot member fitting in said socket and engaging the surfaces defining said socket only under the force of said bias means.

3. The combination as specified in claim 1 and a clip mounted onto the toe portion of said boot, said clip member having a forward surface, and wherein said boot engaging means has a surface having a radius substantially equal to the radius of movement of the boot engaging means about said one axis and mating with the forward surface on said clip member, said toe binding being placed so that any force exerted on said boot in direction toward the toe binding is transferred through a line of contact between said mating surfaces, said boot engaging means being positioned so that upon lateral movement of said boot and pivotal movement of said boot engaging means, the line of contact between said mating surfaces remains substantially along the line of force toward the toe binding between the boot and the axis of pivotal movement of said boot engaging means.

4. A releasable toe binding for retaining a boot on a ski comprising a base member adapted to be fastened onto the ski, said base member including a first portion extending substantially parallel to the upper surfaces of a ski on which it is mounted and an end upright member integral therewith, a post fixedly attached to said base member adjacent the position of the toe of a boot held by the toe binding, a boot retaining member pivotally engaging said post member for movement in at least two mutually perpendicular pivotal planes, a first plane being parallel to the first portion of the base member, means to retain said boot retaining member in pivoting position on said post comprising a housing having a forward wall, a rear wall and a top wall, a screw member rotatably mounted on said post and extending on an opposite side of said post from said boot retaining member, said screw member being rotatably mounted through the upright member of said base member and the forward wall of said housing, a nut threadably mounted on said screw, compression coil spring means positioned between the forward wall of said housing and said nut on the interior of said housing, said boot retaining member having lever plate means positioned on the interior of said housing and adapted to contact the inner surface of said rear wall of the housing and having a portion passing through the rear wall of the housing and being in position to engage the toe of a boot, said spring means exerting a retaining force on said lever plate means through said housing to retain the boot retaining member in pivoting position on said post, said lever plate means acting between said post and the rear wall of said housing to move said housing against the action of said spring means whenever said boot retaining member moves from a normal centered position in either direction in the first plane, said lever plate means having a second portion adapted to contact a second portion of said rear wall of said housing and to move said housing against the action of said spring means when said lever plate pivots in a second plane of pivoting, and means on said boot retaining member adapted to engage the toe portion of a boot until the boot retaining member has pivoted a preselected amount from its normal position.

5. The combination as specified in claim 4 wherein said means on said boot retaining member to engage the toe portion of a boot comprises a pin member adapted to fit within a socket on a boot.

6. The combination as specified in claim 4 and means positioning a first pivot axis and the first portion of said lever means so that upon movement of said boot retaining member in said first plane, the resulting movement of said housing tending to further increase the force from said spring becomes less for each degree of pivoting of the boot retaining member as the boot retaining member moves farther from its normal position.

7. The combination as specified in claim 4 wherein said effective lever arm acting on said housing when the boot retaining member moves in said first plane is substantially less than the effective lever arm acting on said housing when the boot retaining member moves in said second plane.

8. The combination as specified in claim 4 wherein said nut mounted on said screw has a projection thereon, a slot defined in the top wall of said housing, said projection passing through said slot so said nut is retained from rotation by said wall and moves in said slot when said screw is rotated to change the force exerted by said spring.

9. A release binding for holding a ski boot on a ski comprising a support member, means to fixedly secure said support member to the ski, boot engaging means, said boot engaging means being mounted for unpinned pivotal movement on the support member for pivotal movement in at least two directions of pivoting in a first plane from a first normal position, said boot engaging means including lever means, bias means positioned on a side of said support member opposite from the lever means, retainer means yieldably mounted with respect to said support member and coupling said bias means to the lever means to exert a force on the lever means urging the boot engaging means against said support member and urging said boot engaging means toward said first normal position about its pivot whereby pivotal movement of said boot engaging means in said first plane from its first normal position causes said bias means to increase in force tending to return said boot engaging means to its first normal position, said boot engaging means being otherwise unrestrained from pivoting in said first plane.

10. The release binding of claim 9 wherein said boot engaging means are mounted for pivotal movement on the support member with a pivot member and a receptacle therefor on the boot engaging means and the support member respectively.

11. In lateral release bindings for releasably retaining a ski boot on a ski and permitting release laterally when said ski boot pivots laterally, the improvement comprising a toe binding having a support member, means to fixedly secure said support member to a ski, boot engaging means mounted for pivotal movement about at least one substantially upright axis with respect to said support member, means to normally retain said boot engaging means in a first normal skiing position, said boot engaging means having a first curved boot engaging surface having a radius of curvature substantially equal to the

radius of movement of said boot engaging means about said one axis, means defining a second curved surface on a forward surface of said ski boot engaging the the first curved surface and curving in opposite direction, said second curved surface having a radius of curvature substantially equal to the radius of lateral pivoting of the forward portion of said ski boot when said ski boot is laterally moved relative to said ski for release of said toe binding.

12. The lateral release binding of claim 11 wherein said first and second curved surfaces are substantially normal to the upper surface of the ski.

13. The lateral release binding of claim 12 and means positioning said toe binding on said ski with respect to the normal placement of said boot in skiing position so that any force exerted on said boot in direction toward said toe binding is transferred along a line of contact between said second surface and said first surface, said boot engaging means being positioned so that upon lateral movement of said boot and pivotal movement of said boot engaging means the line of contact between said first and second curved surfaces remains substantially along the line of force between the boot and the pivotal mounting of said boot engaging means.

14. A lateral release binding for holding a ski boot on a ski comprising a base member adapted to be fastened to a ski; a support member fixedly secured to said base member; boot engaging means mounted for pivotal movement about at least one axis with respect to said support member, said boot engaging means including lever means; retainer means comprising a housing overlying said base member, said support member, and a portion of said lever means; said housing having a surface mating with and bearing against said lever means to keep said lever means in a normally centered position; and bias means urging said housing against the lever means to hold said lever means in its normally centered position; and whereby any movement of said lever means about said one axis causes housing to move and said bias means to increase in force and to tend to return said lever means to its centered position through action of said housing against said lever means.

15. The binding of claim 14 wherein said lever means comprises a plate having portions extending outwardly on opposite sides of a plane bisecting the boot engaging means and having the one pivot axis lying therein, said housing surface bearing on the plate portion and exerting a balanced load on the lever means when the lever means is in its centered position.

16. The binding of claim 14 wherein said boot engaging means bears against the support member on a first side of said support member and said bias means is on a second side of said support member.

17. A lateral release binding for holding a portion of a ski boot on a ski comprising a base member adapted to be fastened to a ski, a support member fixedly secured to said base member, an upright member fixed to said base member and spaced from the support member in direction away from said boot, boot engaging means mounted for pivotal movement about at least one axis with respect to said support member, said boot engaging means including lever means, retainer means having a first wall portion engaging said lever means and acting against said lever means, and a second wall portion positioned between the upright member and the support member, bias means acting against said second wall portion of said retainer means to urge said lever means toward a normal position through said retainer means, a threadable member rotatably mounted through said upright member and said second wall portion and being rotatably supported by said support member on a side thereof opposite from said lever means, a nut threadably mounted onto said threadable means, said bias means comprising a spring mounted over said threadable means between said second wall portion of said retainer means and said nut, whereby movement of said nut will cause the force exerted by said spring against said second wall portion of said retainer means and thereby against said lever means to change, said bias means increasing in force when said lever means moves about said one axis from its first position.

18. A lateral release binding for holding a portion of a ski boot on a ski comprising a support member, means to fixedly secure said support to said ski, boot engaging means, pivot means for mounting said boot engaging means with respect to said support member, said pivot means comprising contacting unsecured members which permit pivoting of said boot engaging means about at least two axes with respect to the support member, said boot engaging means including an actuator means, a retainer means yieldably mounted with respect to said support member and acting against said actuator means and including bias means urging said actuator means toward a first normal position, whereby any movement of said boot engaging means about one of said pivot axes causes said bias means to increase in force and tend to return said boot engaging means to its first position through said retainer means.

19. A lateral release binding for holding a portion of a ski boot on a ski comprising a support member, means to fixedly secure said support member to said ski, boot engaging means, means to mount said boot engaging means for pivotal movement about at least one axis with respect to said support member, said means to mount said boot engaging means comprising a stud member, a receptacle for said stud member defined on said support member to support said stud for unpinned pivotal movement, said boot engaging means including an actuator means thereon, retainer means yieldably mounted with respect to said support members and acting against the actuator means and including bias means urging said boot engaging means toward a first normal position and urging said stud toward said receptacle, whereby any movement of said boot engaging means about said one axis causes said bias means to increase in force and tend to return said boot engaging means to its first position through said retainer means, said boot engaging means being held in its first position only from force from the bias means acting through said retainer means.

20 The release binding of claim 9 wherein said boot engaging means is pivoted to the support member with two pivot pins and mating sockets on the relatively pivoting members, said pins being spaced apart in upward direction form the ski.

21. A lateral release binding for holding a portion of a ski boot on a ski comprising a support member, means to fixedly secure said support member to said ski, boot engaging means mounted for pivotal movement about at least one axis with respect to said support member, on a side of said support member toward the boot engaging means yieldably mounted with respect to said support member including lever means, retainer means, bias means acting on said retainer means, said retainer means having a first wall portion engaging said lever means and acting against said lever means to balance the force on the lever means with respect to said one pivot axis and urge the lever means toward a normal position, and a second wall portion positioned on an opposite side of the support member from the boot engaging means and spaced from the support member, and means to mount said bias means in position to act between the support member and said second wall portion to exert a force tending to move the second wall portion away from the support member and thereby urging the first wall portion against said lever means.

22. The release binding of claim 21 wherein said means to support said bias means includes a member mounted on said support means, and an adjustable element on said last mentioned member engaging said bias means to change the force exerted on said second wall portion by said bias means.

23. The release binding of claim 22 wherein said bias means comprises a compression coil spring.

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,612,559 Dated October 12, 1971

Inventor(s) Paul S. Petersen et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8, line 8, (Claim 18, line 3) after "support" insert--member--; Column 8, line 31, (Claim 19, line 11) "members" should be--member--; Column 8, line 49 (Claim 21, line 6) after "means" insert--, including lever means, retainer means; Column 8, lines 50 & 51 (Claim 21, lines 7 and 8) delete "including lever means, retainer means".

Signed and sealed this 25th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents