

Sept. 8, 1964

H. HVAM

3,147,986

FRONT THROW RELEASE

Filed May 31, 1962

FIG. 1

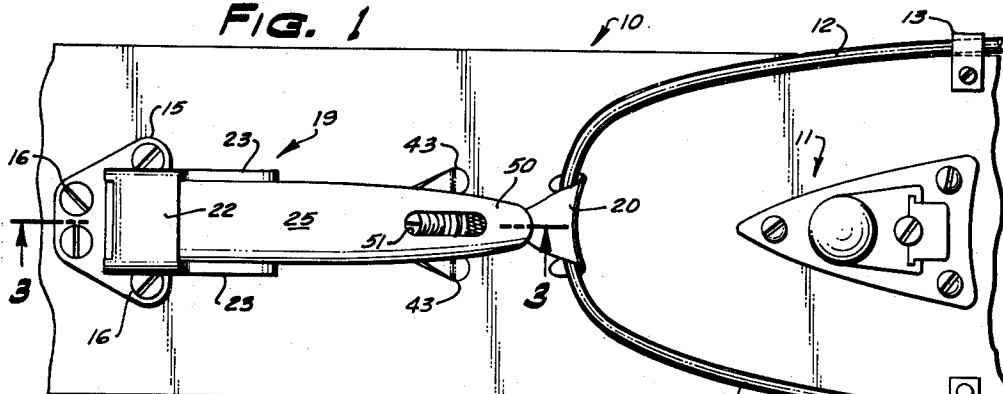


FIG. 2

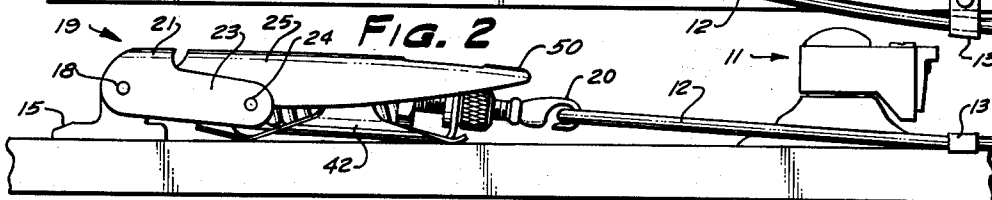


FIG. 3

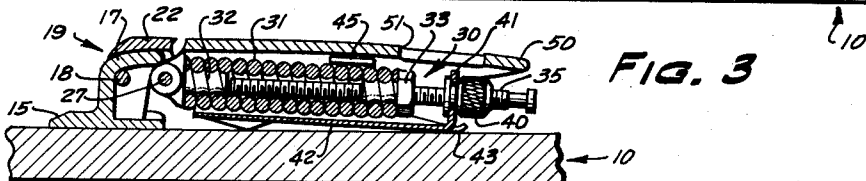


FIG. 4

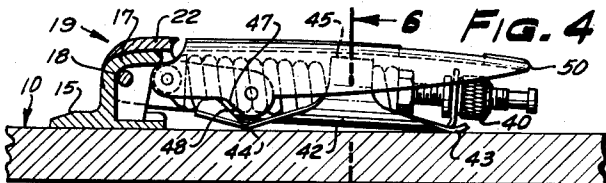


FIG. 6

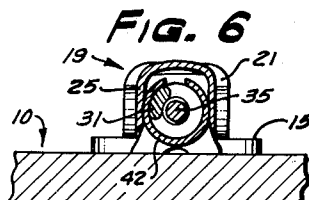


FIG. 5

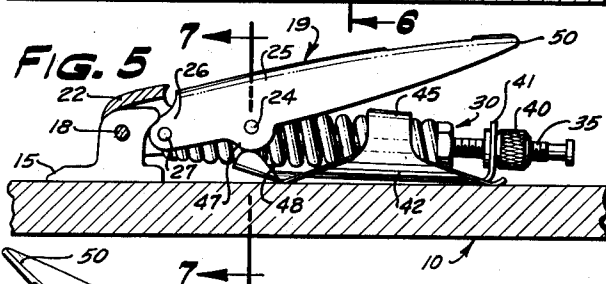


FIG. 7

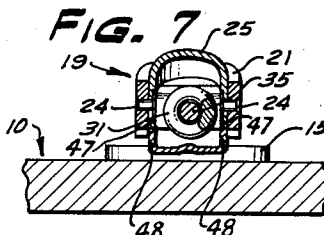
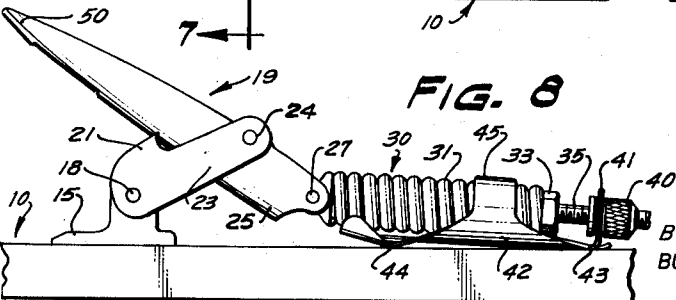


FIG. 8



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3,147,986

FRONT THROW RELEASE

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15 Claims. (Cl. 289-11.35)

My present invention comprises an improvement in ski bindings, specifically being an improved form of front throw release for such bindings. The object of the present invention is to provide means for holding a skier's boot in position upon the ski during normal maneuvers, but which will release the boot from the ski in the event the skier's heel is raised from the surface of the ski beyond a safe position. Such raising may occur when the skier is falling forwardly while the ski remains against the snow surface and pointed in the direction of forward movement. If a skier's boot were held immobile with respect to the ski under such conditions, something would have to break, and what usually breaks is the skier's leg. For this reason the skier wants to have his foot released before a bone snaps, a tendon is pulled, or a sprain is incurred. At the same time the skier does not want to have his foot released until the critical danger point is reached, since he may wish to lean far forwardly with respect to the ski, such as during the execution of a jump. Obviously, if his boot should be released during such a normal maneuver the binding would cause a serious accident rather than protect him from injury due to an accident caused by some other event. The present invention accomplishes the foregoing by releasing the boot when necessary, but holding it to the ski during violent but well executed maneuvers.

An object of the present invention is to provide means of the foregoing character which may be assembled upon a ski in fixed position, and yet may be adjusted to different boot lengths without decreasing the efficiency thereof.

A further object of the present invention is to provide means of the foregoing character which is easily assembled of easily manufactured parts and yet will be sturdy and safely withstand normal using shocks.

A further object of the present invention is to provide means of the foregoing character which may be rapidly adjusted to safely release the skier's boot for persons of widely varying physical structure. The foregoing object is accomplished by providing toggle release means which may be easily adjusted to cause the release to occur when a relatively light tensioning force is applied to a tension spring assembly when the ski is used by a slightly built person, or rapidly adjusted in the other direction to increase the amount of spring tension required to release the boot of a heavy person.

The foregoing and other objects and advantages of the present invention will be more readily apparent from inspection of the following specification taken in connection with the accompanying drawings wherein like numerals refer to like parts throughout, and in which a preferred form of the present invention is illustrated and described.

In the drawings,

FIG. 1 is a plan view of a portion of a ski having the present invention applied thereto and illustrated in operative condition;

FIG. 2 is a side view of FIG. 1;

FIG. 3 is a partial vertical section taken substantially along line 3-3 of FIG. 1;

FIG. 4 is a view similar to FIG. 3 with certain parts shown in full;

FIG. 5 is a view similar to FIG. 4 showing the initiation of a releasing action of the device;

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FIG. 6 is a vertical section taken substantially along line 6-6 of FIG. 4;

FIG. 7 is a vertical section taken substantially along line 7-7 of FIG. 5; and

FIG. 8 is a side elevation of the releasing means in fully released condition.

In the drawings the numeral 10 represents a ski and 11 indicates a toe-engaging means such as disclosed and claimed in my prior Patent No. 2,994,543, issued August 1, 1961. It is to be appreciated that any other suitable toe-engaging means may be utilized in the combination. As is usual in this type of construction, a flexible binding 12 such as a steel cable is provided, the cable being formed into an endless loop, the forward portion of which extends across the top of the ski forwardly of the toe-engaging means 11 and the rear portion of which extends around the heel of the ski boot (not shown). The opposite side flights of the cable pass through guide members 13 fixed to the ski respectively at opposite sides thereof, such guide members slidably engaging the binding so that it may move longitudinally with respect to the ski, and the guide members preventing upward movement of the forward portion of the binding with respect to the upper surface of the ski. The rear portion of the binding, however, may raise quite a distance from the surface of the ski as the skier rises on this toes, thus lifting the heel of the ski boot from the surface of the ski.

The present invention comprises an anchor member 15 secured to the upper surface of the ski along the longitudinal center line thereof as by means of screws 16. The anchor member comprises a hook portion 17 which extends upwardly and then rearwardly in spaced relation to the surface of the ski. A first transverse pivot 18 is mounted on the anchor member within the bight of the hook member 17 and a toggle assembly including a toggle generally indicated at 19 is pivotally mounted on the first pivot 18 and extends rearwardly from the anchor member into engagement with the forward end of the binding 12 through the medium of a separable binding hook 20. When the toggle is in operative condition as illustrated in FIGS. 1 to 4 inclusive, the binding 12 is drawn forwardly to force the boot forwardly and hold the boot toe against the toe-engaging means 11.

The toggle comprises a first toggle link 21 including a central portion 22 operatively overlying the hook portion 17 and a spaced pair of link arms 23 which extend rearwardly from the anchor member. A second pivot comprising a pair of pivot studs 24 is mounted at the free end of the first link and a second link 25 is pivotally supported thereby. The link 25 comprises a trough-shaped member having forwardly extending spaced arms 26 which extend forwardly with their ends when in operative position engaged beneath the hook member 17, whereby the front end of the toggle is held against vertical separation relative to the surface of the ski. A third transverse pivot 27 spans the space between the arms 26, the pivot 27 operatively lying overcenter above the centerline between the first and second pivots when the toggle is in operative condition. The tension of the binding against the skier's boot is thereby held by the toggle during normal maneuvers.

A spring assembly generally indicated at 30 is pivotally mounted upon the third pivot 27 and extends rearwardly therefrom past the end of the toggle and terminates in the binding hook 20. The spring assembly comprises a tension spring 31 which extends longitudinally rearwardly from the pivot 27, in the forward end of which there is engaged a threaded plug 32 threaded into the convolutions of the spring and providing a pivot journal. A second threaded plug 33 is engaged with the convolutions of the rear end of the spring 31, this plug comprising a faceted head which may be engaged by a wrench for

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holding the plug immobile when desired, or for firmly tightening the plug in position so that it will hold itself immobile at most times. The plug 33 has a longitudinally extending threaded bore therethrough in which there is threadedly engaged a long adjusting screw 35, the forward end of which extends forwardly within the spring 31 and terminates closely adjacent the inner end of the plug 32 when the device is adjusted for a short boot. The screw 35 may be rotated to lengthen the spring device so that the ski may accommodate longer boots. The rear end of the screw has an unthreaded, reduced portion into which is clamped the swivel neck of the claw member 26 so that the claw member is rotatably mounted upon the screw. When the toggle device is thrown open as in FIG. 8, there is no tension exerted and the screw 35 may be rotated by the fingers for longitudinal adjustment.

The exposed threaded portion of the screw 35 threadedly supports a knurled adjusting nut 40 which may be rotated by the fingers when the toggle device is open and thereby moved longitudinally along the screw 35. The forward end of the nut is provided with an annular groove in which is engaged the upwardly extending follower end portion 41 of a slide 42 resting on the surface of the ski. The slide is in the form of a metal sheet formed into an upwardly facing trough, the bottom of which is held spaced from the upper surface of the ski by a pair of rearwardly extending wings 43 at the rear, and a pair of forwardly extending wings 44 at the front, which wings provide four spaced points of contact so that friction is minimized. The intermediate portion of the plate is bent upwardly to provide a pair of curved portions 45 overhanging and slidably embracing the spring 31 whereby the slide is held in operative position. Each of the arms 26 of the link 25 is provided with a downwardly facing cam 47 which lies forwardly of the pivot 24. Each of the wings 44 is provided with an upwardly extending second cam 48 which is operatively positioned slightly forwardly of the cam 47 (FIG. 4). The operative spacing of the cams may be adjusted by rotating the nut 40 so that they may be placed close together for releasing the toggle under slight extension of the spring 31, or may be spaced farther apart so that a greater tensioning force is required to release the toggle. Obviously if the length of the spring assembly is adjusted by rotating the screw 35 so that the device may accommodate boots of different length, the nut 40 must be thereupon rotated to adjust the operative spacing of the cams 47 and 48.

The link 25 is provided with a rearwardly extending portion 50 which provides an operating lever for setting or opening the toggle. The operating lever is preferably provided with a slot 51 in its upper surface through which the nut 40 may be observed.

The operation of the device is as follows. When the toggle is opened as seen in FIG. 8, the binding 12 is slackened so that the skier may place his boot on the ski with the toe of the boot engaged against the toe-retaining means 11, and then engage the binding with the heel of the boot. The lever 50 may now be thrown rearwardly to set the toggle and place the binding under tension of the spring 31, forcing the toe of the boot against the toe-engaging member 11. During normal maneuvers the skier may raise his heel from the surface of the ski without releasing the front throw release, to an extent depending upon the adjustment of the screw 35 longitudinally and the adjustment of the spacing of the cams. However, when the heel is raised beyond a safe position the spring 31 is tensioned to bring the cams into engagement and thereby throw the pivot 24 up beyond the centerline extending through the pivots 18 and 27, opening the toggle so that the binding is slackened and the boot released from the ski. The engagement of the forward portions of the arms 26 of link 25 beneath the hook portion 17 of the anchor member holds the forward end of the link 25 down so that the toggle will open as the cam 48 moves rearwardly beneath the cam 47.

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Having illustrated and described a preferred embodiment of the invention, it should be apparent to those skilled in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the following claims.

I claim:

1. In a ski having toe-engaging means fixed thereto for preventing forward movement of a ski boot with respect to the ski and a flexible binding encircling said toe-engaging means and extending rearwardly for engaging the heel of the boot and forcing the toe of the boot against said toe-engaging means;
 - a front throw release means comprising
 - an anchor member fixed to the ski forwardly of the forward end of said flexible binding,
 - a toggle pivotally connected at one end to said anchor member and extending rearwardly therefrom,
 - a tension spring pivotally connected to the other end of said toggle, extending rearwardly therefrom and connected to the forward end of said binding,
 - said toggle when in operative relation overlying said spring and placing said spring under tension to force the toe of the boot against said toe-engaging means,
 - said toggle comprising a downwardly facing cam,
 - an upwardly facing cam connected to the rear end of said spring and lying forwardly of said downwardly facing cam when said toggle is in operative relation,
 - and guide means fixed to said ski and slidably engaging said binding to hold the forward end thereof adjacent the upper surface of the ski whereby raising of the heel of the boot beyond a safe position with respect to the surface of the ski tensions said spring to bring said cams into engagement whereby to open said toggle, thus releasing the binding from the boot.
2. A ski having toe-engaging means fixed to the ski for preventing forward movement of a skier's boot with respect of the ski,
 - a flexible binding encircling said toe-engaging means for engagement with the heel of the boot,
 - an anchor member fixed to the surface of the ski forwardly of and spaced from the forward end of said binding,
 - a first transverse pivot mounted on said anchor member,
 - a toggle mounted on said anchor member,
 - said toggle comprising a first link pivotally mounted on and extending rearwardly from said first pivot,
 - a second transverse pivot mounted on the free end of said first link,
 - a second toggle link mounted on said second pivot and operatively extending therefrom forwardly toward said anchor member,
 - a third transverse pivot mounted on the free end of said second link and operatively lying overcenter with respect to said first and second pivots above the centerline therebetween, and
 - a tension spring assembly pivotally mounted on said third pivot, extending rearwardly beyond said second pivot and engaged with the forward end of said binding,
 - said spring assembly including a tension spring operatively under tension yieldably to urge the toe of the boot against said toe-engaging means,
 - said second toggle link including a downwardly facing first cam between said second and third pivots,
 - said spring assembly including a slide member connected to the rearward end of said spring assembly, extending forwardly beyond said second pivot and resting on the surface of the ski,
 - said slide including an upwardly facing second cam operatively lying forwardly of said first cam and engageable therewith upon extension of said spring,
 - and guide means fixed to the ski and restraining the forward portion of said binding from raising with

respect to the ski while permitting longitudinal movement thereof with respect to the ski whereby upon lifting the heel of the boot from the ski beyond a safe position said cams are engaged to throw said toggle open and release the heel of the boot from said binding.

3. The construction set forth in claim 2 wherein said second link comprises a portion extending beyond said second pivot to provide a lever for setting said toggle in operative relation when the binding is engaged with a boot.

4. The construction set forth in claim 2 wherein said spring assembly comprises a longitudinally extending screw extending coaxially into and rearwardly from the rear end of said tension spring,

and a nut fixed to the rear end of said tension spring and threadedly engaging said screw whereby the length of said spring assembly may be adjustably determined.

5. The construction set forth in claim 2 wherein said spring assembly comprises a longitudinally extending screw extending coaxially into and rearwardly from the rear end of said tension spring,

a first nut fixed to the rear end of said tension spring and threadedly engaging said screw whereby the length of said spring assembly may be adjustably determined,

a second nut threadedly engaged with the rearwardly extending portion of said screw,

and means on said slide rotatively engaging said second nut whereby the operative spacing of said cams may be adjusted.

6. The construction set forth in claim 2 wherein said anchor means comprises a rearwardly facing overhanging portion,

and the forward end of said toggle when in operative relation is snugly engaged beneath said overhanging portion.

7. In a ski having toe-engaging means fixed thereto for preventing forward movement of a ski boot, a heel-binding extending forwardly of the toe-engaging means,

a front throw release means comprising an anchor member fixed to the ski forwardly of the toe-engaging means,

a tension spring having a rear end connected to the heel-binding,

a toggle connected to the anchor member and the other end of the spring and adapted to tension the binding through the spring,

the toggle having an overcenter joint,

and cam means fixed to the rear end of the spring and adapted to be pulled backwardly along the ski by excess tension on the heel-binding for engaging the overcenter joint and pushing the overcenter joint to a position collapsing the toggle,

the cam means being slidable along the ski and positively connected solely to the spring.

8. In a front throw release for a ski including a toe-engaging means and a flexible binding for holding the heel of a ski boot,

an anchor member adapted to be fixed to the ski in a position ahead of the toe-engaging means,

a toggle having a breakable joint and connected to the anchor member and adapted to lie along the ski when in operative condition,

tension spring means having a front end connected to the toggle and also having a rear end connected to the flexible binding,

and cam means slidable along the ski and positively connected to the rear end of the spring means in a position such that when the spring means is stretched to a predetermined extent the cam means breaks the toggle joint,

the cam means being positively connected solely to the spring means.

9. In a heel binding,

cable means extending along a ski and having a rear portion adapted to engage a heel of a ski boot on the ski,

a tension spring extending along the ski forwardly of the cable means,

coupling means connecting the front end of the cable means to the rear end of the tension spring,

a post means fixed to a portion of the ski ahead of the tension spring,

link means pivoted at the forward end thereof to the post means,

a lever pivotally connected at a first portion thereof intermediate the ends thereof to the rear end of the link means,

the lever also being pivotally connected at a second, end portion thereof to the forward end of the spring and movable between a releasing position in which the first portion thereof is positioned above the centerline of the spring and a locking position in which the first portion thereof is positioned below the centerline of the spring,

the lever also being provided with a cam follower portion projecting downwardly therefrom when the lever is in its locking position,

a cam slidable on the ski by the coupling means between the lever and the ski from a retracted position to a releasing position engaging the cam follower to move the first portion of the lever overcenter from its locking position to its collapsing position,

and means for holding the second, end portion of the lever against upward movement while the first portion of the lever is moved by the cam to its collapsing position,

the extent of movement of the rear end of the spring away from the front end of the spring being limited solely by the tension of the spring.

10. In a heel binding,

cable means extending along a ski having a rear portion adapted to engage a heel of a ski boot on the ski,

tension spring means extending along the ski forwardly of the cable means,

coupling means connecting the front end of the cable means to the rear end of the tension spring means,

a post means fixed to a portion of the ski ahead of the tension spring means and having a rearwardly projecting hook portion spaced above the ski,

link means pivoted at the forward end thereof to the post means,

a lever pivotally connected at a first portion thereof intermediate the ends thereof to the rear end of the link means,

the lever also being pivotally connected at a second, end portion thereof to the forward end of the spring means and movable between a releasing position in which the first portion thereof is positioned above the centerline of the spring means and a locking position in which the first portion thereof is positioned below the centerline of the spring means,

the lever also being provided with a cam follower portion projecting downwardly therefrom when the lever is in its locking position,

and a cam slidable on the ski by the coupling means between the lever and the ski from a retracted position to a releasing position engaging the cam follower to move the first portion of the lever overcenter from its locking position to its collapsing position,

the second, end portion of the lever being held by the hook portion against upward movement while the first portion of the lever is moved upwardly by the cam to its collapsing position.

11. In a heel binding,

cable means for engaging a heel of a ski boot on a ski,

tension spring means,

coupling means coupling the cable means to one end of the spring means,
 a lever coupled at a first point thereof to the other end of the spring means,
 post means adapted to be fixed to the ski and provided with a rearwardly extending hook portion spaced upwardly from the ski,
 link means connecting a second point of the lever spaced along the lever from the first point to form a toggle-joint-linkage with the lever and the spring means and movable between a collapsed position and a locked position,
 the second point of the lever being positioned farther from the post means than the first point of the lever when the toggle-joint-linkage is in its locked position and also being positioned below the line of force between the spring means and the first point of the lever when the toggle-joint-linkage is in its locked position,
 and a cam member slidable along the ski by the coupling means from a retracted position to a position pushing the second point of the lever upwardly to an overcenter, collapsing position when excessive force is applied to the cable means,
 the hook portion serving to engage and hold against upward movement the first point of the lever as the cam means moves the second point of the lever upwardly to said overcenter, collapsing position.
 12. In a heel binding,
 a cable extending along a ski and having a rear portion adapted to engage the heel of a ski boot on the ski,
 anchor means positioned on the ski in front of the ski boot,
 an arm pivotally secured to the anchor means in a position extending rearwardly from the anchor means,
 a link having a free end portion and connected pivotally at a pivot point spaced substantially from the end portion thereof to the rear to the rear end of the arm and movable between a folded position in which the free end portion of the link is positioned forwardly along the ski from the pivot point and an extended position in which the free end portion of the link is positioned rearwardly along the ski from the pivot point,
 a tension spring connected at a forward end thereof to the free end portion of the link and connected at the rear end thereof to the cable,
 holding means normally holding the link in the folded position thereof,
 and cam means carried by the rear end of the spring in a position under the link when the link is in its folded position for actuating the holding means to permit movement of the link to its extended position and movable freely for an indefinite distance with the rear end of the spring relative to the arm and the link.
 13. In a heel binding,
 a cable extending along a ski and having a rear portion adapted to engage the heel of a ski boot on the ski,
 an anchor post positioned on the ski in front of the normal position of the ski boot on the ski,
 an arm pivotally secured to the anchor post in a position extending rearwardly from the anchor post,
 a channel-shaped lever connected pivotally at a pivot point thereon to the rear end of the arm and movable between a folded position in which a portion of the lever is positioned forwardly along the ski from the pivot point and the channel-shaped lever faces downwardly and an extended position in which said portion of the lever is positioned rearwardly along the ski from the pivot point and the channel-shaped lever faces upwardly,

a tension spring connected at a forward end thereof to said portion of the lever and connected at the rear end thereof to the cable,
 holding means normally holding the lever in the folded position thereof,
 and cam means carried by the rear end of the spring in a position covered by the lever when the lever is in its folded position for actuating the holding means to permit movement of the lever to its extended position and movable with the rear end of the spring relative to the arm and the lever without any positive restraint by the arm and the lever,
 the cam means having a generally tubular guide portion extending loosely around the spring.
 14. In a heel binding for a ski having a cable looped over the heel of a ski boot and extending ahead of the toe of the ski boot,
 an anchor post secured to the ski,
 a tension spring connected at its rear end to the cable, a lever having a handle portion at one end connected at its other end to the front end of said tension spring,
 a link connected at its front end to the post and connected pivotally at its rear end to the central portion of the lever to form an overcenter toggle movable between a folded, contracted condition and an extended condition,
 a cam slide connected at its rear end to the rear end of the spring and having a cam adapted to push the joint between the lever and the link upwardly and overcenter to collapse the linkage when maximum safe tension is applied to the spring,
 and an overhanging member fixed against upward movement relative to the post and serving to hold down the end of the lever connected to the spring to aid the cam in pushing the joint between the lever and the link to its overcenter releasing position.
 the cam serving when the toggle is in the folded, contracted condition thereof to engage the underside of the lever at a point sufficiently far forward from the joint of the link and the lever to prevent downward movement of the forward end of the lever to an extent releasing the toggle when the ski is subjected to vertical jars or shocks.
 15. The heel binding of claim 14 in which the overhanging member is a rearwardly extending hook on the post adapted to overhang the end of the lever which is connected to the tension spring to keep that end of the lever from moving upwardly with the central portion of the lever when the cam pushes the central portion of the lever upwardly to break the locked condition of the toggle.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,147,986

September 8, 1964

Hjalmar Hvam

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 38, for "of" read -- to --; column 5, line 56, for "th" read -- the --; column 7, line 38, strike out "to the rear", second occurrence; line 62, for "ski." read -- ski, --.

Signed and sealed this 5th day of January 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents