Sept. 22, 1970 HIROAKI KANNO 3,529,845

SAFETY BINDING METAL FOR HEEL OF SKI BOOTS

Filed Nov. 4, 1968

FIG. 1

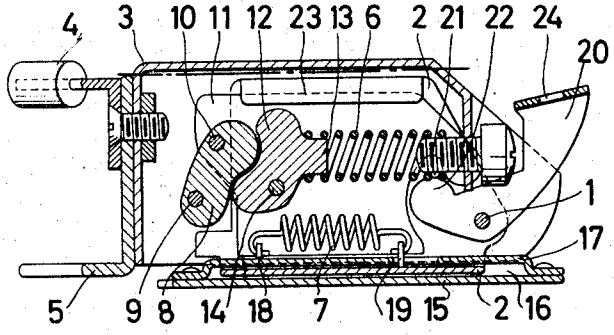


FIG. 5

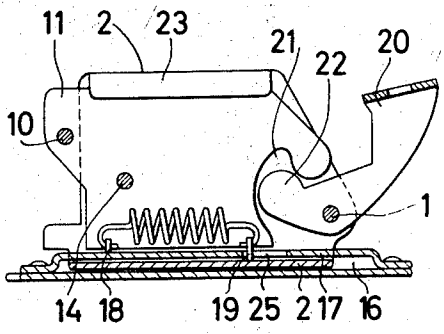


FIG. 2

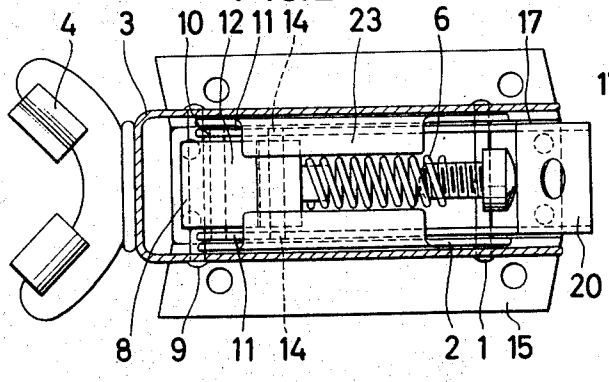


FIG. 6

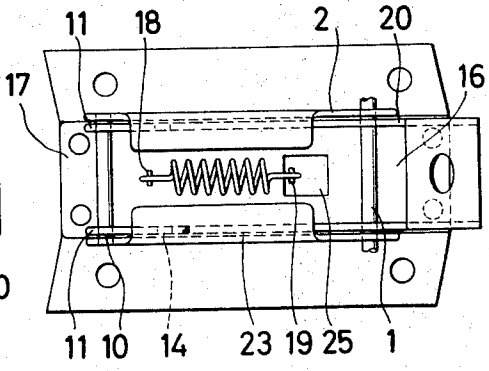


FIG. 3

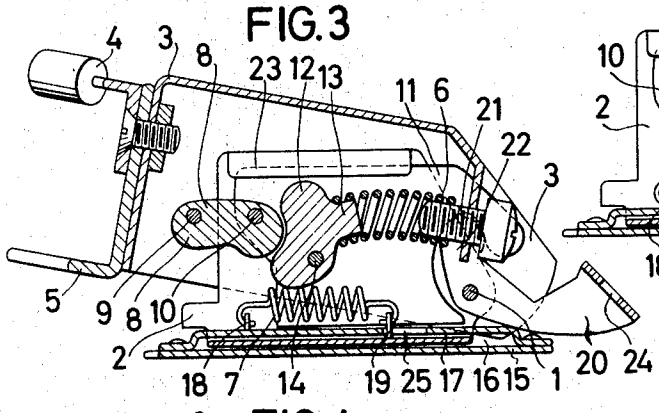


FIG. 7

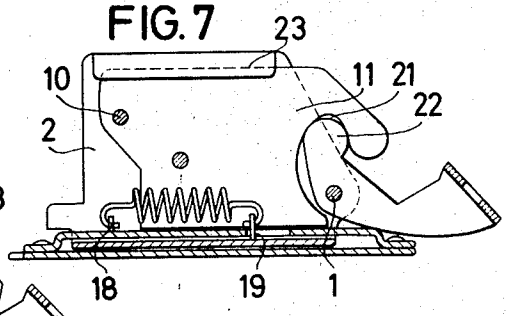
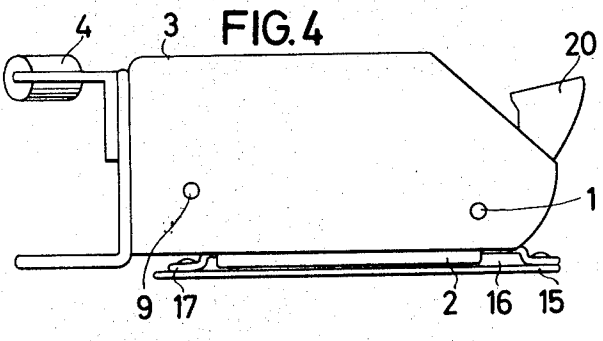


FIG. 4



INVENTOR.
HIROAKI KANNO

BY McGlew and Toren
ATTORNEYS

United States Patent Office 3,529,845 Patented Sept. 22, 1970

3,529,845

SAFETY BINDING METAL FOR HEEL OF SKI BOOTS

Hiroaki Kanno, 4–17 3-chome, Machiya Arakawa-ku, Tokyo, Japan

Filed Nov. 4, 1968, Ser. No. 773,009
Claims priority, application Japan, Nov. 10, 1967, 42/94,351
Int. Cl. A63c 9/00
U.S. Cl. 280—11.35 8 Claims

ABSTRACT OF THE DISCLOSURE

A binding for the heels of ski boots includes a base plate and a cover plate secured together in spaced relation to provide guide means for the base of a channel-shaped slidable member whose upper edges are provided with downwardly turned flanges. An exterior casing is pivoted at its rear end to a first pivot on this member and its forward end carries a heel bracket and an angle for engagement by the heel of a ski boot. A pair of slidable plates are mounted against the flanges of the channel-shaped member, being retained by the down turn upper edges. An operating lever is pivoted to the first pivot and has a convex end engaged in concave recesses in the two slides. A convex cam is pivoted, at a second pivot, to the exertior casing and, at a third pivot, to the two slides. This cam engages a concave cam pivoted at a fourth pivot to the two slides and having a projection engaged in a compression spring whose other end is engaged with a rear portion of the exterior casing. A second spring is secured between the cover plate of the guide means and the base of the channel-shaped member to exert a tension stress moving the channel-shaped member forwardly. The convex cam and the concave cam, together with the first-mentioned spring, operate in the nature of a toggle mechanism.

SUMMARY OF THE INVENTION

The present invention relates to a safety binding for the heels of ski boots.

The object of the present inventtion is to provide a safety binding for the heels of ski boots having a structure wherein an exterior casing, comprising a heel bracket and an angle, is pivoted to a first slidable member at a first point of contact, and is normally operative to be rotated about said first contact point, through some medium against the power of compression effected by a first spring. Moreover, to effect clamping of the ski boots, the binding itself is operated to press the ski boots forwardly by the tensile stress of a second spring and through the medium of the heel bracket. A convex cam member is pivoted movably to the exterior casing at a second point of contact, as well as pivoted at a third point of contact between second sliding members on both of the right and the left hand sides, a concave cam member engages with said convex cam member is fitted within the first spring by means of a projection thereof, as well as being pivoted at a fourth point of contact between both of said second slidable or sliding members or slides. Additionally, space is provided for the first slidable member to be displaceable both in the forward and rearward directions by guide means in which the bottom of siad member is interposed. The second spring is mounted between a boss of the covering plate of the guide means and a boss projecting from the bottom part of the first slidable member for geneating tensile stress. Both second slidable are inserted by sliding action to be in engagement with respective down turned flanges or lips provided on the upper edges of the first slidable member, and are mounted between said flanges and the covering plate so as to be movable at the first point of contact, relative to the first slidable member as well as to be slidable both in the forward and rearward directions responding to rotation of a lever engageable therewith by means of a boss, which causes tensile stress engaged with concave portions formed in both second slidable members.

In order to afford a clearer understanding of the present inveniton, a typical exemplary form of an embodiment thereof will now be described with reference to the attached drawings in which:

FIG. 1 is a vertical longitudinal sectional view of a heel binding for ski boots relating to the present invention showing the fastened condition thereof and taken along the longitudinal center line of FIG. 2.

FIG. 2 is a horizontal longitudinal sectional view of the binding taken along the chain dotted line of FIG. 1.

FIG. 3 is a vertical longitudinal sectional side view of the binding showing the released condition thereof.

FIG. 4 is a side elevation view of the binding in the fastened condition.

FIG. 5 is a fragmentary vertical longitudinal sectional view, showing the fastened condition thereof.

FIG. 6 is a partial plan view, corresponding to FIG. 5, but showing the parts in the fastened condition; and

FIG. 7 is a view, similar to FIG. 5, but showing the parts in the released condition.

As shown in the drawings, the present invention is directed to a safety binding for heels of ski boots, wherein an exterior casing **3**, comprising a heel bracket **4** and an angle **5**, is pivoted to a first slidable channel member **2** at a first point of contact or pivot axis **1**, is normally operative to rotate about said first contact point **1**, through some medium, against the power of compression effected by the first spring **6**. Moreover, for clamping ski boots, the binding device itself is operated to press the ski boots forwardly through tensile stress of a second spring **7** and through the medium of the heel bracket **4**. Furthermore, a convex cam member **8** is pivoted movably to the exterior casing **3** at a second point of contact or pivot axis **9**, as well as pivoted at a third point of contact or pivot axis **10** movably between second slidable members **11** on the right hand side and the left hand side, respectively. A concave cam member **12** engaging with said convexed cam member **8** fits within a first spring **6** at a projection **13** as well as being pivoted at a fourth point of contact or pivot axis **14** to be movably inserted between slidable members **11** on the right hand side and on the left hand side. A space **16** is provided, as shown in FIGS. 5 and 6, for the member **2** to be displaceable both in the forward and the rearward directions with its base held between the plates **15** and **17**. A second spring **7** is connected between a boss **18** of the covering plate **17** and a boss **19** projecting from the base of member **2**, for generating tension on the latter. Second slidable members or slides **11** are positioned adjacent the right and the left hand sides of member **2** and are inserted by sliding action to be in engagement with the down turned lips **23** provided on the upper edges of member **2**. Slides **11** are mounted between lips **23** and the covering plate **17** to be movable, at the first point of contact **1**, relative to rearward directions responsive to rotation of a lever **20**. Lever **20** is engaged with both slides **11** to the medium of a convex end or boss **22** engageable with concave recess portions **21** formed in both slides **11**.

The safety binding for heels of ski boots according to the present invention operates in a manner which will now be described. When the heel of the ski boot is pressed downwardly against angle **5**, in the released position of the binding as shown in FIG. 3, exterior casing **3** is rotated

about the first pivot axis 1 simultaneously with rotation of convex cam 8 about pivot axes 9 and 10 and in contact with concave cam 12. In combination with the pressure exerted by the first spring 6, this coaction of cams 8 and 12 results in a toggle action snapping the parts to the position shown in FIG. 1, wherein cam 8 is in full engagement with cam 12. Slides 11 are displaced forwardly, sliding along the inner surfaces of inturned lips 23 of member 2. The movement of cam 8 is terminated by its full engagement with cam 12, as shown in FIG. 1, to limit the downward movement of angle 5. As a result of the movement of cam 8, the first pivot axis 9, which was about level with the second pivot axis 10 in FIG. 3, is moved to a point substantially lower than the second pivot axis 10, as will be apparent by examination of FIG. 1. This occurs in part due to the compressive force exerted by the first spring 6.

The compressive force is transmitted to the heel bracket 4 through the medium of the cam members 8 and 12 for pressing the ski boots held by said bracket 4 simultaneously with the stepping-in action previously described. The position of a toe support or binding relative to the associated heel binding, for a ski boot, is so selected that the ski boot is properly clamped, by pressing the heel against angle 5, when angle 5 has been moved, by rotation of casing 3, to the position shown in FIG. 1. The second spring 7, the member 2 and cover plate 17, shown in FIGS. 1, 2, 5 and 6, serve important functions during the described operation of the binding. If the heel of the ski boot were continuously displaced further, a counter force on the binding from the ski boot heel is naturally generated, so that no further movement of the parts in a clamping direction occurs.

According to the illustration shown in FIGS. 1, 2, 5 and 6, the foregoing power influences the member 2 to be displaced through the maximum range of the space 16 by means of the base of member 2 being interposed between covering plate 17 and plate 15. Moreover at this time the second spring 7, connected between the boss 18 of the covering plate 17 and the boss 19 projecting from the base of member 2, is naturally stretched causing tensile stress so as to act against the foregoing displacement movement of member 2 and is further stretched to the maximum thereof upon completion of the step-in movement and termination of sliding movement. Thereby strong tensile stress is generated between the covering plate 17 and the member 2, which results in a similar tensile stress between the base plate 15 connected to the former and the exterior casing 3 connected to the latter. All these tensile stresses act as reaction forces to press the ski boots forward, resulting in conversion into a force for clamping and binding action.

The binding in the fastened condition shown in FIGS. 1, 2 and 5 is illustrated in its inactive condition, having no ski boots actually installed thereon, so that the slides 11 are nearer to the boss 18 of the covering plate 17 by means of the tensile stress exerted by second spring 7. Consequently, a space 25 is performed in plate 17 for limited movement of boss 19 extending from the base of member 2. In cooperation with the space 16, this provides for backward sliding movement of slides 11 when the ski boot is engaged with the binding device.

In such a manner as mentioned above, the heel clamping and binding device for the ski boots is able to fulfill its function completely through cooperation with the associated toe bindings of the ski boots. In case the binding device is to be released as an optional occasion demands, the metal lever 20 is pushed manually or with a stock at an aperture 24 provided on the front end thereof. The lever 20 is rotated about the first pivot axis 1 so that its end 22, facing the recesses 21 in slides 20, is swung clockwise. This draws slides 11 rearwardly along the respective down turned lips 23, as shown in FIGS. 5 and 6, in such a manner as to effect relative sliding movement between member 2 and covering plate 17. By this process, the

convex cam member 8 is subjected to rotation at the third pivot axis 10. Accordingly the exterior casing 3 is caused to start to swing upwardly about the first pivot axis 1. When cam member 8 is moved to the position where the second pivot axis 9 thereof is raised to a position above alignment with the axis of spring 6, the rotational moment influencing cam member 8 changes so that exterior casing 3 is made to move abruptly upwardly. This is simultaneously accompanied with displacement of heel bracket 4, causing the ski boot to be released from clamping and to be freed.

Furthermore the foregoing function makes it possible for the above-mentioned releasing action to be very easily and simply carried out with high dynamic efficiency through the multually assisting movement of interconnection caused by the interaction of both of metal lever 20 and slides 11 which latter move in translation between member 2 and the covering plates 17.

According to the foregoing, when the heel of the ski boot is subjected to stresses such as to effect injury to the skier, by accidental and unexpected trouble during skiing, heel bracket 4 is released by the strong shock and without any dynamic supplement by the mechanism. This causes rotation of exterior casing 3 about first pivot axis 1, as well as the release of cam member 8 from cam member 12 against the compression stress of first spring 6. The release is in such a manner as to force spring 6 upwardly, resulting in effecting instantaneouly the release movement previously explained.

In such a manner, the exterior casing 3 is widely opened and the ski boot is released from the clamped and bound condition in an emergency, for protecting the human body from injury.

From the standpoints of clamping and binding functions, releasing action and safety protection, the heel binding of the invention is very efficient and advantageous, as well as being simple in construction. Thus, the heel binding comprises the interacting parts including covering plates 17, channel-shaped member 2, the inturned lips 23 of member 2, the slides 11, and the lever 20 cooperable with the recesses 21.

It will be appreciated that the plate 15 is formed with suitable apertures so that it may serve as a mounting plate for securement to the upper surface of a ski, thereby mounting the heel binding and clamping device on the ski.

What is claimed is:

1. A safety binding for the heels of ski boots comprising, in combination, a mounting plate for securement to a ski; a cover plate secured to said mounting plate and spaced from the latter between its ends to define, with said mounting plate, guide means; a channel member having its base slidably engaged in said guide means and having relatively elongated down turned lips along the upper edges of its flanges; a pair of substantially planar slides juxtaposed to the inner surfaces of respective flanges and slidably retained between the associated lips and said cover plate; an exterior casing having side walls embracing respective flanges of said channel member and carrying, on its forward end, a step for engagement with a ski boot heel and bracket means for clamping such heel; means pivotally mounting said casing on said channel member for pivoting about a first substantially horizontal pivot axis adjacent the rear end of said casing; toggle mechanism operable to bias said casing to either a heel release position or a heel clamping position, said toggle mechanism including cam means pivoted to said casing and to said slides about spaced pivot axes, and a compression spring engaged between said cam means and the rear end of said casing; and means selectively operable to move said slides rearwardly to release said binding.

2. A safety binding for the heels of ski boots, as claimed in claim 1, in which said cam means includes a first cam pivotally connected to said casing about a

second pivot axis and pivotally connected to said slides about a third pivot axis; and a second cam engaged with said first cam and pivotally connected to said slides about a third pivot axis, said second cam being engaged with said compression spring.

3. A safety binding for the heels of ski boots, as claimed in claim 2, in which said first cam has a pair of convex ends and a concave recess in its side surface between said convex ends; said second cam being provided with a concave recess engaged with the convex end of said first cam pivoted to said slides, and a convex portion adjacent said concave recess engageable in the concave recess of said first cam.

4. A safety binding for the heels of ski boots, as claimed in claim 2, in which said second cam has a projection engaged within said compression spring, which latter is a coil spring.

5. A safety binding for the heels of ski boots, as claimed in claim 1, including a second spring, in the form of a tension coil spring, connected between said cover plate and said channel member and biasing said channel member in forward direction.

6. A safety binding for the heels of ski boots, as claimed in claim 1, in which said selectively operable means comprises a lever pivoted intermediate its ends to said channel member for pivoting about said first pivot axis; said lever having an operating end projecting from said binding and a second end engageable with said slides.

7. A safety binding for the heels of ski boots, as claimed in claim 6, in which said second end of said lever is convex and said slides are formed with recesses arranged to receive said second end upon pivoting of said lever.

8. A safety binding for the heels of ski boots, as claimed in claim 3, in which said casing is moved to the heel clamping position by pressure of a heel on said step; said second pivot axis, in the clamping position of said casing, being disposed below the center line of said coil spring and, in the released position of said casing, being disposed substantially on the level of said center line of said coil spring.

References Cited

UNITED STATES PATENTS

3,125,349	3/1964	Schweizer.
3,317,217	5/1967	Poiger.
3,325,178	6/1967	Reuge et al.
3,366,394	1/9168	Shimizu.
3,391,944	7/1968	Shimizu.
3,447,812	6/1969	Kato.

LEO FRIAGLIA, Primary Examiner

M. L. SMITH, Assistant Examiner