United States Patent [19]

Nagasaki

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[54] **HEEL-HOLDING DEVICE FOR SAFETY SKI BINDINGS**

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[30] **Foreign Application Priority Data**

July 21, 1971 Japan 46-54470

[52] **U.S. Cl.** ..... **280/11.35 T**

[51] **Int. Cl.** **A63c 9/00**

[58] **Field of Search** ..... 280/11.35 T

[56] **References Cited**

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Primary Examiner—Robert R. Song

[57] **ABSTRACT**

A heel-holding device for a safety ski binding comprises a rotatable member provided with a pedal and a heel clamping projection and having an aperture. A pair of stationary shafts each having a roller therearound are extended into the aperture with the rollers in contact with the aperture wall. The aperture has a pair of deeply concaved walls and other walls contiguous thereto and so shaped as to allow the rotatable member to rotate about both of the shafts respectively. A constantly acting force is exerted against the rotatable member to hold it in any rotated position.

In a boot-clamped state, one of the shafts is engaged into one of the deeply concaved walls, and when a force exceeding the above-mentioned force is applied to release the boot, the rotatable member is rotated about said one of the shafts and then further rotated about the other of the shafts, so that the heel clamping projection is raised apart from the heel.

11 Claims, 4 Drawing Figures

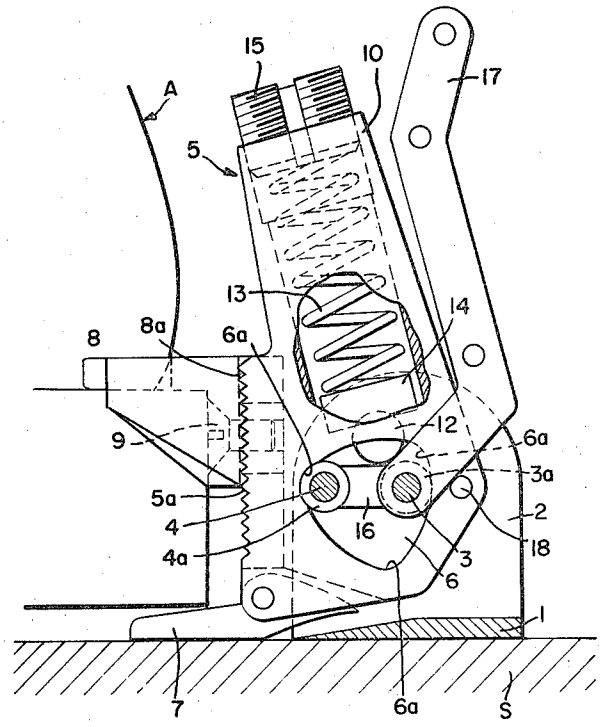

FIG. 1

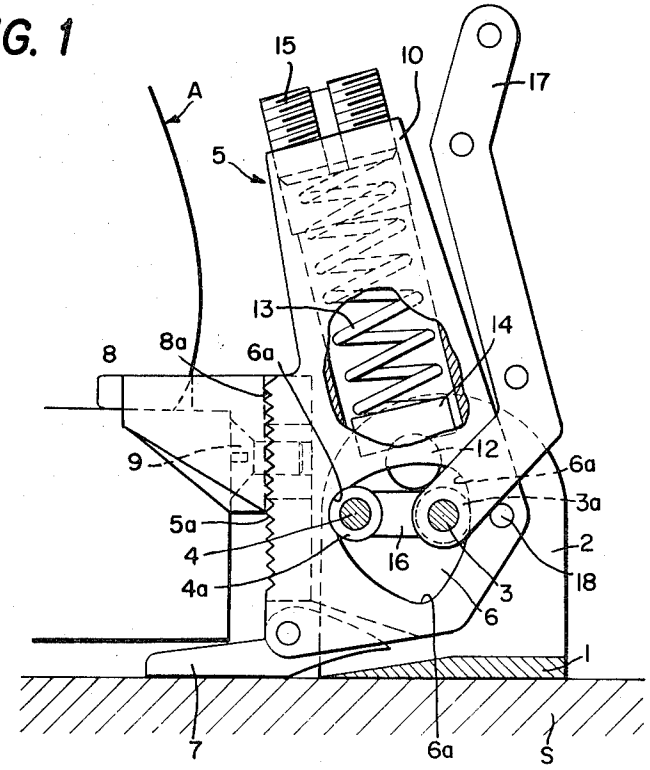
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FIG. 2

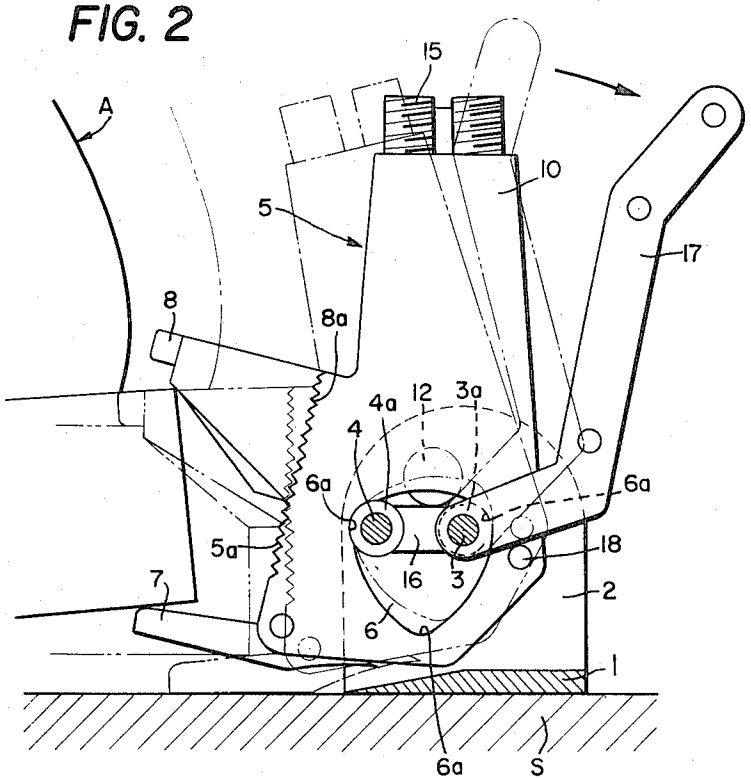
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FIG. 3

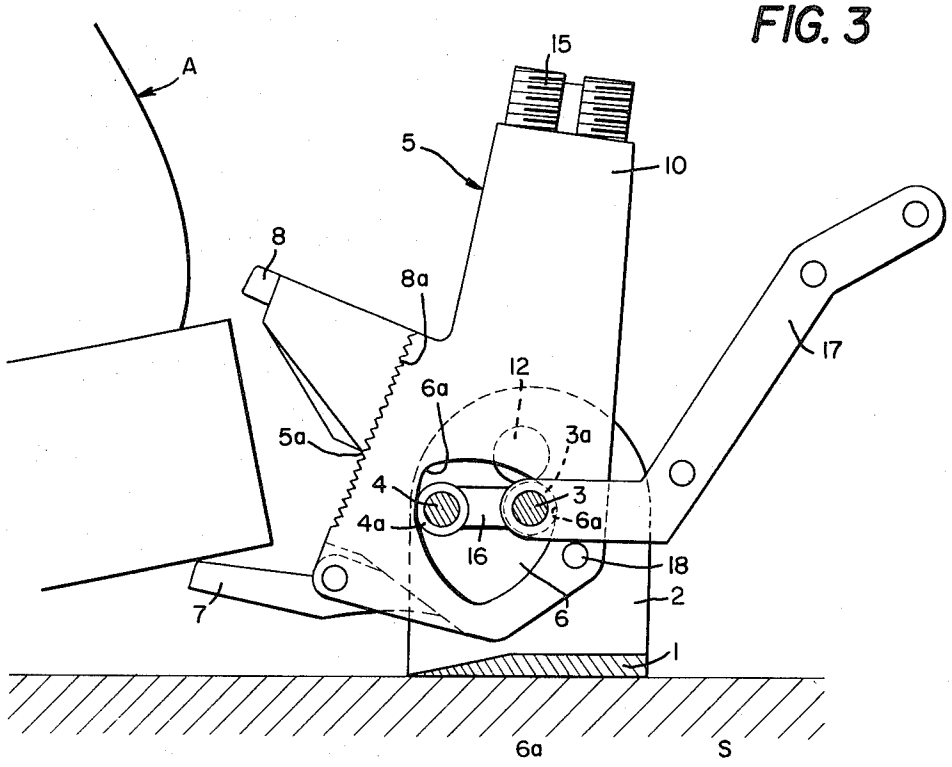
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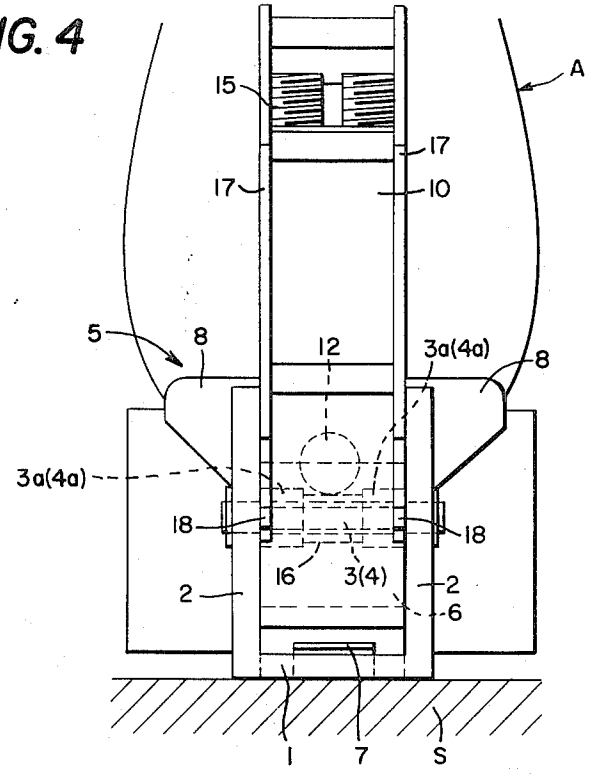
FIG. 4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HEEL-HOLDING DEVICE FOR SAFETY SKI BINDINGS

BACKGROUND OF THE INVENTION

The present invention relates to a heel-holding device for a safety ski binding of the type in which a boot-engaging clamp can be easily locked only by a step-in motion of a skier.

Further the invention relates to a heel-holding device for a safety ski binding having a simple and dependable construction combining a novel escapement mechanism, in which the boot of a skier can be released without fail in response to an abnormal stress in the event of a fall of a skier.

In the conventional type ski binding, the boots are to be engaged with it by a lever operation which is somewhat troublesome for the skier. Therefore, in recent years, a ski binding of the type in which the boots of a skier can be engaged easily only by a step-in motion of the skier without the necessity of the lever operation. However, in such ordinary device, a long time and frequent uses with dependable safety performances and easy operation with regard to the safety mechanism thereof cannot be expected.

SUMMARY OF THE INVENTION

An object of the present invention is to propose a novel heel-holding device for a safety ski binding in which the boot-clamping operation can be carried out easily only by a step-in motion of the skier.

Another object of the invention is to propose a heel-holding device in which the construction thereof is simple and durable, while the performance thereof is quick and dependable.

Further object of the invention is to propose a heel-holding device in which the boot of a skier can be released without fail in response to an abnormal stress thereto in the event of a fall of the skier.

Pursuant to the above-mentioned objects of the present invention, the heel-holding device for safety ski binding of the invention comprises: supporting means fixed on a ski; rotatable means provided with a pedal and a heel clamping member, either of the supporting and rotatable means having at least one aperture, the other of said means having a pair of shafts passing through the aperture, the aperture having a pair of deeply concaved walls and being so shaped as to allow the rotatable means to rotate about both of the shafts respectively, the pair of shafts being engageable with the pair of deeply concaved walls respectively; and means for holding the rotatable means in any rotated position.

These and other features of the present invention will become more fully apparent from the following detailed description of the embodiment with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS.

FIG. 1 is a schematic partly sectional and fragmentary elevation of a heel-holding device for safety ski binding according to the invention in the normal state of the device clamping a ski boot;

FIGS. 2 and 3 are schematic partly sectional elevation of the device as shown in FIG. 1 in which the relation of the parts when the ski boot is disengaged by a release lever are shown; and

FIG. 4 is a schematic back view of the device as shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Now referring to the drawings, the structure of the heel-holding device according to one embodiment of the present invention will be explained.

A support member 1 fixed on a ski body S has a pair of spaced and parallel-extended upright plates 2, 2 as is clearly shown in FIG. 4. A pair of stationary shafts 3 and 4 having, respectively, rollers 3*a* and 4*a* therearound is bridged between the plates 2, 2. A rotatable member generally indicated by reference numeral 5 is rotatably supported about the stationary shafts 3 and 4. The rotatable member 5 has an aperture 6 which is defined by three symmetrically arranged deeply concaved walls 6*a*, 6*a* and 6*a* and by three other walls 6*b*, 6*b* and 6*b* each contiguous to the adjacent deeply concaved walls and forming an arc of a circle having a center at the opposite deeply concaved wall 6*a*, or more precisely at the shaft 3 or 4 engaged in said wall 6*a*. The shafts 3 and 4 are extended into the aperture 6, so that the rollers 3a and 4a of the shafts 3 and 4 are in contact with the aperture walls. The rollers 3*a* and 4*a* are engageable into two of the deeply concaved walls 6*a*, 6*a* and 6*a*. Thus the rotatable member 5 can be rotated about both of the shafts 3 and 4 respectively.

The rotatable member 5 is provided with a pedal 7 at its lower portion and with a heel clamping projection 8 at its upper portion. The pedal 7 is pivotally supported by the rotatable member 5, and the depression of the pedal causes the rotation of the member 5. A ski shoe or boot A can be held between the pedal 7 and the heel clamping projection 8. The heel clamping projection 8 is fixed to the rotatable member 5 in such a manner that the fixing position of the projection 8 is adjustable according to the thickness of the shoe or boot A. That is, the rotatable member 5 has a surface 5a corrugaged with the same pitch, which mates with the corresponding surface 8*a* of the projection 8 similarly corrugated with the same pitch. The corrugated surface 5*a* of the member 5 is made longer than that of the projection 8 so that the projection 8 can change its position relative to the member 5. The projection is fixed to the member 5 by means such as a screw 9.

The rotatable member 5 has an upward projection 10 integrally formed therewith and extended therefrom. The upward projection 10 is bored to form a housing 11 which communicates with the aperture 6. Into the housing are inserted first a ball 12 and then a coiled spring 13 having a piston-like member 14 at its tip end, in such a manner that the piston-like member 14 presses against the ball 12. Entrance of the housing 11 is closed by an adjusting screw 15 the external thread of which engages with internal threads formed on the inside of the bore or housing 11. The coiled spring 13 is thus interposed between the adjusting screw 15 and the ball 12 in a compressed state, giving a biasing force to the ball 12. The ball 12 is rested on a bridge 16 connecting the stationary shafts 3 and 4, so that the biasing force is transmitted in turn to the bridge 16. The biasing force of the coiled spring 13 serves to hold the rotatable member 5 in any rotated position. The biasing force constantly acting on the bridge 16 may be adjusted by turning the adjustable screw 15.

On the stationary shaft 3 is pivoted a heel releasing lever 17 which is rotatable about the shaft 3 and which is interlockable with a pin 18 projecting from both sides of the rotatable member 5 in a crossing direction with respect to the lever 17.

Now the function and operation of the heel-holding device of the above-mentioned construction according to the present invention will be described in the following:

FIG. 1 shows the heel of the shoe or boot A rigidly held by the heel-holding device of the invention. In this state, the upward projection 10 is somewhat tilted forward and the heel clamping projection 8 is pressing the heel downward to clamp it between the projection 8 and the pedal 7. The roller 4*a* of the stationary shaft 4 is at this time engaged snugly into one of the deeply concaved walls 6*a*, 6*a*, and 6*a*, with the roller 3*a* of the other shaft 3 in contact with the wall 6*b* located opposite to said one of the deeply concaved walls. The position of the rotatable member 5, as described avove, relative to the stationary shafts 3 and 4 is maintained by the biasing force of the spring 13 acting between the bridge 16 and the member 5, as long as any force exceeding the biasing force is not exerted on the rotatable member 5 to tend to rotate it.

If it is desired to release the heel from the heel-holding device, the heel releasing lever 17 is manipulated. When the lever 17 is turned to the rearward (to the direction indicated by the arrow in FIG. 2) about the shaft 3, the pin 18 is depressed downward and the rotatable member 5 is forced to rotate about the shaft 4 against the biasing force of the coiled spring 13, until the shaft 3 is fitted into another of the deeply concaved walls 6*a*, 6*a*, and 6*a* as shown in FIG. 2. At this moment, the shafts 3 and 4 are engaged into the two of the deeply concaved walls 6*a*, 6*a* and 6*a*, respectively. Simultaneously with the movement of the rotating member 5, the heel clamping projection 8 is raised upward as indicated by an arrow in FIG. 2, releasing the heel clamping power thereof.

By further manipulating the lever 17, the rotatable member 5 is rotated from the state indicated in FIG. 2 to the one in FIG. 3. That is to say, the rotatable member 5 is rotated about the shaft 3, and the contacting point of the member 5 with the shaft 4 is shifted from the wall 6*a* to the other wall 6*b* as shown in FIG. 3. With this movement of the rotatable member 5, the heel clamping projection 8 is further raised, making easier the disengagement of the heel from the clamping device.

If it is desired, on the contrary, to clamp the heel with the heel-holding device of the present invention, the clamping operation starts from the state shown in FIG. 3. In this state, when the pedal 7 is pushed down with the heel of the boot A by the stepping of a skier, the rotatable member 5 is turned forwardly without requiring a operation of the lever 17, in which case the member 5 is first rotated about the shaft 3 until the other shaft 4 is engaged into the deeply concaved wall 6a as shown in FIG. 2, and thereafter the member 5 is further rotated about the shaft 4, with the contacting point of the member 5 with the shaft 3 shifted from the deeply concaved wall 6*a* to the wall 6*b* contiguous thereto as shown in FIG. 1. At this state, the spring 13 is exerting a force between the member 5 and the bridge 16, and the heel holding state is retained. In the operations of the heel-holding device, the rollers 3*a* and 4*a* are effective for decreasing the frictional resistance caused when the rotatable member 5 is rotated, resulting to actuate to release or to lock smoothly. The heel holding power of the device of the invention is easily released, especially when a sudden shcok or force exceeding the biasing force of the spring 13 is given to the heel clamping projection 8 to tend to rotate the member 5.

Although in the above-mentioned embodiment the stationary shafts 3 and 4 are fixed to the support member 1, and the aperture 6 is perforated in the rotatable member 5, this relationship may be reversed in another embodiment, namely, a pair of apertures like the aperture 6 may be formed in the plates 2, 2 of the support member 1, and the shafts 3 and 4 may be fixed to the rotatable member 5, in which case the same function and effect can be expected as those shown in the drawings.

As is explained in the above, the mechanism of the heel-holding device of the present invention is such that, in the usual releasing of the boots, it is only necessary to turn the releasing lever backward, and when the boot is to be engaged with the device, only the stepping in motion of the boot into the device is sufficient. Thus, the device of the present invention is very simple and easy to handle. Further, the safety mechanism of the heel-holding device of the present invention is such that when the force in excess of the biasing force of the spring 13 is exerted on the heel clamping projection 8 the locking relation between the two parallel shafts and the rotatable member 5 is changed. Therefore, when an accident such as a tumbling or a bumping is caused to happen, the safety device acts instantly and without fail, and the heel of the ski boot is easily released from the ski; therefore the risks such as the sprain and fracture of the ankle can be minimised.

What is claimed is:

1. A heel-holding device for a safety ski binding comprising supporting means fixed on a ski; a rotatable means provided with a heel clamping member and pivotally mounted with respect to said supporting means, either of said supporting and rotatable means having at least one aperture, the other of said supporting and rotatable means having a pair of shafts passing through the aperture and extending transversely with respect to the longitudinal axis of the ski, said aperture being defined by at least a pair of deeply concaved walls and so shaped as to allow the rotatable means to rotate about both of the shafts respectively, said pair of shafts being engageable with the pair of deeply concaved walls respectively, said aperture being further defined by at least a pair of other concave walls each contiguous to the adjacent one of said deeply concaved walls and each forming an arc of a circle having a center at the shaft engaged with the other of said deeply concaved walls, and means for holding the rotatable means in any rotated position; a first shaft of said shafts being in contact with a first deeply concaved wall of said aperture and a second shaft being in contact with the wall located opposite to said first deeply concaved wall, when said rotatable means is in its operative heel-holding position, and said rotatable means being capable of rotating about both said shafts to move said rotatable means into its heel-disengaging position.

2. A heel-holding device for a safety ski binding as claimed in claim 1, wherein said holding means comprises a spring exerting a biasing force between said rotatable means and said support means.

3. A heel-holding device for a safety ski binding as claimed in claim 2, wherein said rotatable means comprises a projection having a hole formed therein, one end of said hole being closed by an adjusting screw, the other of said hole communicating with the aperture, said spring being housed in said hole with one end of the spring received by the adjusting screw and the other end thereof by the support means.

4. A heel-holding device for a safety ski binding as claimed in claim 3, wherein said spring is received by said support means through a ball.

5. A heel-holding device for a safety ski binding as claimed in claim 1, further comprising a lever pivoted on one of said shafts, and a member provided on the rotatable means in an interlocking relation with the lever so that the rotatable means can be rotated with said lever.

6. A heel-holding device for a safety ski binding as claimed in claim 1, wherein said rotatable means and said heel clamping member have a corrugated surface respectively, and are fixed together with the corrugated surfaces thereof mated with each other.

7. A heel-holding device for a safety ski binding as claimed in claim 1, further comprising a pedal attached to said rotatable means with a space left between the pedal and the heel clamping member, so that a heel of a ski shoe or boot is clamped therebetween.

8. A heel-holding device for a safety ski binding as claimed in claim 10, wherein said aperture is further defined by another deeply concaved wall, said three deeply concaved walls being arranged symmetrically with respect to one another, and linked by three other concave walls each contiguous to the adjacent ones of said deeply concaved walls and located in a position opposite to each of said deeply concaved walls, each of said three other concave walls forming an arc of a circle having a center at the shaft engaged with the deeply concaved wall opposite thereto.

9. A heel-holding device for a safety-ski binding as claimed in claim 1 wherein said shafts are fixed to said supporting means and said aperture is formed in said rotatable member.

10. A heel-holding device for a safety ski binding as claimed in claim 1 wherein said aperture is formed in said supporting means and said shafts are fixed to said rotatable member.

11. A heel-holding device for a safety ski binding as claimed in claim 10 wherein said supporting means comprises a pair of support members each having an aperture formed therein.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,795,407 Dated March 5, 1974

Inventor(s) YOICHI NAGASAKI

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

Column 3, line 20, "avove" should read -- above -- .

Claim 1, line 2, "a rotatable" should read -- rotatable -- .

Claim 8, line 2, "10" should read -- 1 -- .

Signed and sealed this 13th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.