SAFETY HEAD FOR SKI BINDING

INVENTOR
WERNER ZIMMERMANN

ATTORNEYS
SAFETY HEAD FOR SKI BINDING

Werner Zimmermann, Eulerstrasse 30, Basel, Switzerland

3,396,987
Filed Aug. 4, 1966, Ser. No. 570,343
Claims priority, application Switzerland, Aug. 7, 1965, 11,165/65
11 Claims. (Cl. 280—11.35)

ABSTRACT OF THE DISCLOSURE

A safety head for a ski binding wherein a baseplate is fixed on the ski having a pivot pin. A pivoting member is pivotally mounted on the pin and at each flank of the pivoting member a lug iron is independently mounted to pivot about a vertical axis. A separate securing means cooperates with the front edge of the boot sole maintaining each of the lug irons in normal position. The lug irons are slideable in opposite directions and substantially parallel to the longitudinal axis of the ski under a force from the ski boot so that at least one of said lug irons can swivel laterally about its axis to disengage the boot. The ski boot sole has a notch and each of the lug irons has a tip cooperating with such notch. The lug irons are held together by an elastic member.

My present invention relates to a safety head for ski bindings, which is combinable with any desired circumferential components, heel clamps and automatic heel restraining means.

Such safety heads, as known, shall allow of an automatic boot release in the case of a plunge or fall or other extraordinary stresses and thereby prevent a torsional stress of the skier's foot or leg which easily might lead to fractures. In most of the safety heads known so far it has been tried to attain such object by accommodating the front sole-edge of the boot in a too lug iron which on exceeding a certain force is adapted to yield laterally as well as axially in the skier's direction of movement and thereby release the skier's boot.

In an execution available on the market such simultaneous lateral and axial yield or elusion is attained by mounting the toe lug iron that serves for accommodating the boot toe portion, pivotable on an intermediate member that in turn also is mounted pivotable on the ski. The toe lug iron in such known construction is secured on the intermediate member by means of a ball closure against unintentional pivotal movement. Only when a certain adjustable force is exceeded, the lug snaps away from the resiliently mounted ball and may then be swung out laterally. Such known construction is tainted by the considerable disadvantage that the lateral swinging movement will only take place under a certain force. The magnitude of the force required for release, which depends, not only on the body weight of the skier but also substantially on the snow conditions, is adjustable only very roughly. In the case of a long descent in which the skier for example meets first with powdery snow and then with wet snow of continually increasing water content, a continual readjustment would be required. Further, the accurate release force solely may be found by experimentation which, of course, already is risky.

In another known safety ski-binding the detent lug of the head is mounted on a plate which in turn is pivotally mounted by two depending pins in arculate elongated slots of a second plate. But here also, first the force required for releasing a ball-lock has to be set up before the lug can be laterally pivoted. Also in this known binding, the correct and appropriate adjustment of the releasing force is an unsolved problem, and the binding in many cases will respond either too frequently or too late.

In a third known safety binding are provided two separate lugs which may be pushed aside against the pressure of a helical spring. As the counterpressure of the helical spring increases with the increasing extent of pivotal movement, the risk of a torsional stress of the foot or leg still is relatively great.

The safety binding disclosed by my present invention does not have any of the disadvantages mentioned above. This invention is characterized by a member pivotable in a horizontal plane, to each of the two flanks of which is pivoted a too lug iron on a substantially vertical axis, said two lug irons being equally spaced from the pivotal axis so that they are axially movable in opposite directions and also laterally pivotable.

The safety head disclosed herein responds at once to a torsional movement of the foot since there is practically no force opposing a lateral pivotal movement. A premature release, however, is altogether out of question, since the two too lug irons in the normal boot position are held together by the boot itself and can only separate from each other after a pivotal movement of the boot tip.

The binding head disclosed by my present invention may be used with or without extensions, since the torsional safety will only be improved by such extensions.

One form of my present invention is shown by way of example in the drawing, in which:

FIG. 1 is a top plan view of the safety head,
FIG. 2 is a section on the line II—II of FIG. 1,
FIG. 3 is a sideview of the binding,
FIG. 4 shows a detail of the head,
FIGS. 5 to 7 show structural details, and
FIGS. 8 and 9 illustrate the mode of operation of the safety head.

The safety head shown in its totality in FIGS. 1 to 3, omitting the parts irrelevant in the present correlation, comprises a baseplate 1 that is provided with two holes 2 through which extend two fixing screws (not shown) into the ski 3 and thus hold plate 1 rigidly on the ski. Plate 1 substantially has the form of a horseshoe (FIG. 4) and at its two corners comprises a recess 4 and 5 respectively, the purpose of which will be explained later. Through a hole 6 disposed on the axis of symmetry of the plate, extends from below a threaded stud 7 in the form of a conventional flat-head screw of which the head fits in a counterbore of hole 6. In a variant (not shown) stud 7 is integral with base plate 1. Stud 7 serves for centering and fixing a balance beam 8 which through its underside is seated on the top side of base plate 1 and is pivotable thereon about stud 7. Balance beam 8 is adapted to the shape of the base-plate front portion, and comprises a central indentation 9 which lies essentially with stud 7 and serves for receiving a nut 10. By screwing down the nut 10 on stud 7, the balance beam 8 thus can be pressed down on the base plate 1.

The balance beam 8 comprises two lateral projections 8a (FIGS. 1 and 3) which protrude horizontally from the balance-beam body and which are engaged in the forklike connection portions 11a of two toe lug irons 11. Each of the two projections 8a has a bore 8b, and these two bores are equally spaced from the longitudinal axis of the binding and are in registry respectively with two bores 11b (FIG. 3) provided in the forks 11a so that the toe lug irons 11 through their connecting portions 11a may be rotatably anchored to the projections 8a. The rearwardly pointed central part 12 of balance beam 8 (FIGS. 1 and 2) is forked. In the horizontal recess 13 is an elastic tensile element 14 which by means of two pins 15 engages the two toe lug irons 11 and tends to pull same continually towards each other.
The mutual contact faces 16 of the lug irons 11 are so formed that the two lug irons may be axially moved relatively to each other whereby the contacting faces 16 slide on each other.

The endfaces of the lug irons 11, which are opposite to or remote from the axes 16, are adapted in shape to the front portion of a ski boot. Each of the two toe lug irons 11 further comprises a tip 17 (FIG. 4) adjacent to the axis of the binding, so that when the two lug irons 11 contact each other, there is produced a break like prominence towards the ski boot. FIG. 4 shows the base plate by itself, only one of the two toe lug irons being indicated by dots and dashes. The two rear corner portions of the base plate, which face the ski boot (not shown), are recessed at 4 and 5. Each of the two lug irons 11 comprises a stop 19 (FIG. 3) at its exterior bottom edge, which is engaged in the recess 4 or 5 and thereby prevents the lug iron from being swung beyond the axis of the binding.

As indicated in FIG. 4, the sole 20 of the ski boot is slided underneath the projecting top portions of the two lug irons 11. To fit the lug-iron height to ski boots of different sole thicknesses, there may be used an auxiliary device (see FIGS. 5 to 7). This device substantially comprises an angular clamping member 21 (FIG. 7) of which the vertical portion has an elongated hole 22 and a lateral serrated edge 23. The latter may be brought into engagement with a similar serration provided in the two lug irons 11 and be fixed in any height desired by means of a screw 24. To fit another sole thickness, screw 24 only has to be loosened somewhat and clamping member 21 fixed again at the desired height.

The mode of operation of the safety ski binding described shall now be explained with reference to FIGS. 8 and 9. FIG. 8 depicts the binding gear in its normal position. The lug irons 11 pivoted to balance beam 8 are disposed exactly symmetrical as to the longitudinal axis of binding and ski. Boot 20 provided with a frontal notch 25 holds the toe lug iron on their tips 17. As the boot in its normal position can transmit only axial forces in direction of the arrow 26, the assembly comprising balance beam 8 and toe lug irons 11 is statically determined and cannot move. Smaller forces slightly deviating from the direction of the arrow are taken up by the friction existing between beam 8 and base plate 1 and, therefore, cannot lead to a pivotal movement of the assembly. An accurate adjustment of said friction is possible by means of nut 10 according to the body weight of the skier, the snow conditions and the like.

As soon as the skier's foot has to accommodate any extraordinary stress which tends to twist the foot and thus might readily lead to leg fractures, the foot turns for example to the position shown in FIG. 9 in which the axis of the boot deviates from the longitudinal axis of the ski. Through such pivotal movement of boot 20, the toe lug iron 11 positioned on the left in FIG. 9 will be slightly displaced in the direction of arrow 27 while the right-hand lug iron 11 executes a movement (arrow 28) in the opposite direction. The two tips 17 have become separated during this movement so that only the tip associated with the right-hand lug iron is still in contact with the base plate 1.

The assembly described will also function positively if the two toe lug irons are not provided with tips 17. The axial thrust exercised by boot 20 in its normal position (FIG. 8) generally will already suffice for holding together the lug irons 11, assuming that the spacing between the pivotal axes 80 and the axis of threaded stud 7 has been chosen accordingly. Also the pressure exerted by the nut 10 has, as already mentioned, an influence on the movement of release. By tightening the nut more or less, there may be attained a "harder" or "softer" release respectively.

Of special importance is the fact that the lateral swinging-out movement of the toe lug iron in the direction of arrow 29 requires only an extremely slight laterally directed force, since for such purpose only the tension of the tensile element 14 has to be overcome. As soon as the two toe lug irons 11, therefore, have become axially displaced with respect to each other (FIG. 9) one of said irons will be free and may be swung out by very small lateral forces already. The elastic tensile element 14 may either be a rubber band, a spring or any other resilient spring means. It may be omitted too, since its function is not necessarily necessary for the positive and reliable operation of the binding and since the axial pressure of the boots holds the toe lug irons together if same are formed correspondingly.

If desired, extensions may be mounted on the toe lug irons 11, which in no way will impair the readiness for release of the safety head disclosed, but which will improve same. Such extensions may be made integral with the lug iron or removable. As already mentioned, the sensitivity of response of the safety head may be lowered by tightening the nut 10. In order to prevent this nut, which is very important for holding together the binding-head, from becoming loosened unintentionally or from falling out, the front portions of the toe lug irons are lengthened somewhat so that they partly cover the nut 10 (FIG. 1). It also would be readily possible to provide on each of the two toe lug irons 11 a notch on the face opposite the boot, in which were engaged, in the normal position of the boot, a tip that projects from the.boot-sole front edge. Further, the lug-iron faces adjacent to the boot could be provided with a friction lining, for example of rubber vulcanized thereto. Further it would be entirely within the scope of the present invention to provide the lug-iron faces and, if desired, also the boot-sole front edge with a serration, at least within the range of the horizontal binding-axis.

In order to attain a smoother and more frictionless sliding motion of the ski over counter-running ground ridges and similar obstacles, the safety head may be provided with an auxiliary device which is indicated in FIGS. 2 and 4 by dots and dashes. The threaded stud 7 in this case is connected to a small plate 18 that is capable of executing an axial displacement in a recess 30 by a measure a. Said plate on the side facing the ski tip has a horsehoe-like recess 31 with which it engages, from one side, an elastic bumper 32 that is anchored in baseplate 1.

On the occurrence of shocks and bumps in the skier's course, plate 18 which through stud 7 is connected to balance beam 8, presses against bumper 32 and slightly compresses same, depending on the intensity of the shock or bump. Such buffer action thus permits to elastically take up any sudden shock stresses and allows of a less tiring travel. Such buffer action, furthermore, allows of a quicker travel, as the friction of the ski on the snow also will be decreased somewhat.

Bumper 32 may be made of any suitable elastic material such as rubber or plastic.

I claim:

1. A safety head for a ski binding for a boot having a boot sole comprising a baseplate fixed on a ski, a pivot pin mounted on said base plate, said pivot pin being pivotally mounted on said pivot pin, a lug iron independently mounted to pivot about a substantially vertical axis on each flank of said pivoting member at the same distance from its pivoting axis, a separate securing means on each lug iron cooperating with the front edge of the boot sole maintaining each of said lug irons in its normal position, said lug irons being slidable in opposite directions and substantially parallel to the longitudinal axis of the ski.
under the influence of a unilateral force emanating from the ski boot, so that at least one of said lug irons can swivel laterally about its axis.

2. A safety head for a ski binding as set forth in claim 1 wherein the ski boot sole has a notch, and each of said lug irons has a tip on its marginal portion adjacent said boot sole, said tips being independent from one another and adapted to be engaged in the normal position of the boot in said notch.

3. A safety head for a ski binding according to claim 1, wherein a tip protrudes from the boot-sole front edge, and each of said lug irons on the face adjacent the boot has an indentation in which in the normal position of the boot said tip engages.

4. A safety head for a ski binding according to claim 1, wherein said lug-iron faces adjacent the boot on one hand and the boot-sole front edge on the other have a serration.

5. A safety head for a ski binding as set forth in claim 1, in which said lug-iron faces adjacent the boot have a serration.

6. A safety head for a ski binding according to claim 1, wherein said lug irons are held together by an elastic tension member.

7. A safety head for a ski binding according to claim 1 wherein said lug irons are held together by a rubber band.

8. A safety head for a ski binding according to claim 1 wherein said lug irons are held together by a helical spring.

9. A safety head as set forth in claim 1 wherein said pivot pin is a threaded stud having a nut so that the friction arising between said pivoting member and the support thereof is adjustable by adjusting said nut.

10. A safety head as set forth in claim 9 wherein a plate is mounted axially movable fixedly connected to said threaded stud and a buffer element is anchored in said base plate to serve as a resilient stop for said plate.

11. A safety head as set forth in claim 1, wherein a buffer element is provided that permits an elastic displacement of said pivoting member in the longitudinal axis of the ski with respect to the body of the ski.

References Cited

UNITED STATES PATENTS

3,105,696 10/1963 Rehacek
3,282,599 11/1966 Huam
3,298,703 1/1967 Marker

BENJAMIN HERSH, Primary Examiner.

J. A. PEKAR, Assistant Examiner.