ABSTRACT OF THE DISCLOSURE

A vertical support bolt is secured to a mounting plate on the ski. A closed housing toe piece is mounted on the bolt. The bolt has a transverse bore in which is provided a spring and ball locking device normally locking a catch plate under normal torque conditions. During a spill, the spring is compressed, and toe piece is released and swings out. A second spring is provided to return the toe piece to its initial position.

Background of the invention

The invention relates to a front toe piece for safety ski bindings, which braces the shoe sole towards the front and which is swingably supported on a vertical bolt and is held in its middle position by means of a ball locking device.

The object of the invention is to provide a front toe piece which is distinguished from known front pieces of this type in that it locks outwardly the mechanically actuated parts of the toe piece in order to protect it from the influence of water, snow, ice and dirt, to thus protect it from corrosion and trouble and to make possible a lasting lubrication. The front toe piece must likewise meet all its requirements. The toe piece and likewise the swingable sole lug must return to their initial position automatically, after they swing out; the sole lug must be adapted to the thickness of the shoe sole and the safety factor must suffice to protect against spills by the skier. The toe piece should have a compact construction and a pleasing outer shape, should be capable of being used with any desired rear pieces with or without a cable line and should finally be constructed of units which are not dependent on their functions and can be simply assembled.

The solution of these problems is substantially achieved by the provision of a closed housing swingably mounted on the support bolt, which forms the toe piece and a ball lock device arranged therein in such a manner that a sleeve or bushing, in which are received the lock spring and locking ball, extends transversely to the bolt and a locking member is secured at the housing and engages with the locking ball.

Two embodiments of the invention are illustrated in the drawing while other modifications will become apparent from the description.

FIG. 1 shows a front toe piece for safety ski-bindings, in central longitudinal section;
FIG. 2 is a section on line II—II of FIG. 1;
FIG. 3 is a section on line III—III of FIG. 1;
FIG. 4 is a plan view of the device;
FIG. 5 is a further embodiment of the toe piece, in central longitudinal section;
FIG. 6 is a section on line IV—IV of FIG. 5;
FIG. 7 is a section on line VII—VII of FIG. 5;
FIG. 8 is a front elevation of the device of FIG. 5;
FIG. 9 is a plan view thereof and FIG. 10 is another modification of said device, shown in central longitudinal section.

The front toe piece according to FIGS. 1-4 is constructed as follows:

On the mounting 1, which secures the toe piece to the ski, there is secured a support bolt 2 and a closed housing is swingably mounted on the latter. The housing consists of an upper part 3 and a ground plate 4 which encloses the open bottom of the housing, which is secured to the upper part by three screws 5. The supporting bolt has a horizontal transverse bore in which is displaceably mounted a sleeve 6.

A spring 7 and a ball 8, are provided in the sleeve and are braced at its forward end, the ball 8 extending into an angular cutout 9 of a plate shaped lock or catch member 10.

The catch member is mounted horizontally in a slot of the housing and is rigidly secured by a pair of screws 5 with the housing. The rear end surface of the housing forms an arc about the swivel axis of the toe piece and is provided with vertical teeth 11, which press themselves into the forward edge of the boot sole and hold firmly the boot against lateral movement. The boot is secured in a downward direction by a sole holder 12 extending over the shoe sole, and which consists of a plate and is arched at the rear end against the shoe sole. The sole holder is pivotally supported with an insert 13 on a graduation of the support bolt 2 and is braced upwardly with its holding part 12, since this holding part 12 is swingably supported by its circular segment, extending along the entire width of the housing, in a slot of the housing.

The slot in the housing is only of small width, so that the sole holder covers the slot opening even when said sole holder is in a swung out position. In order to return the sole holder to a central position after it has been swung out, a spiral spring 15 is provided on an upper circular projection of the housing into which extends a bolt 16 screwed into the sole holder and braced against the ribs of the housing.

The ball stays rigidly the front toe piece in its central position when the torque is normal. Should the torque on the toe piece be exceeded, the bracing member 10 connected with the housing will compress the spring; the bracing member 10 with the cutout 9 through the ball 8, and the toe piece will swing out sideways and release the boot, whereby the shoe sole at the arched rear end of the housing will roll off like a pair of gears. Since the support member crosses the article of the toe piece has swung out, it is provided at the rear end with a horizontal slot. Due to the shape of the cutout 9 which engages with the ball, the dependence on the swinging angle results in a torque which places the toe in its middle position. In order not to restrain the release of the boot by the sole holder, it is adapted to the boot cap when the toe piece swings back.

The torque and thus the factor of safety against spills by the skier can be varied by setting the tension of the spring. For this purpose an adjusting member 17 is pivotally mounted in an axial bore extending transversely to the support bolt 2 and which is provided with Archimedean spiral type cam plate at the lower end and which is disposed against a strike formed by a flattened portion resting against the spring's sleeve 6. The tension of the spring is varied linearly by the setting member and thus the rotational moment of the toe piece. By forming the plate 18 in a different manner, it is also possible to change other than a linear dependence between the angle of rotation of the setting member and the releasing torque of the toe piece by using a double ball stay 19 between the adjusting member and the supporting bolt. The tension of the spring may be set in five steps which are marked by five numerals on the upper side of the housing. In order to make the adjustment, it is only necessary to use a coin which fits into the slot 20.
In FIGS. 5-9 there is shown a further embodiment of the front toe piece, in which the sole holder is adjustable to fit the thickness of the shoe. Similarly, the sole piece is constructed for simplicity of production in such a manner that it consists of individual independent functional units which may be easily assembled.

The support bolt 2 is rigidly secured to the fastening 1 and the housing is swingably mounted thereon, said housing consisting of the upper part 3, and the base plate 4 which is connected with the upper part by three screws 5. The sleeve passing through the cross bore of the support bolt in the longitudinal direction of the toe piece consists in this embodiment of two parts, namely a part 6a, which is disposable in the support bolt in which a spring 7 is secured and part 6b on whose end there is provided a ball 8. The fixed sleeve part is made as one piece with the support bolt but may however be welded thereto. By dividing the sleeve into a movable and a fixed part, it is possible to dispose the bolt further back and increase its lever arm towards the swinging axis, because contact with the stays member during a passage of the movable sleeve is obliterated. The ball extends into the angularly formed cutout 9 of the plate-shaped stay member 10 which is secured to the base plate 4 of the housing because it is riveted with the interposition of spacer pieces. The swinging mechanism is thus formed as a unit which may be pre-assembled.

The back part of the housing's upper part 3, provided with 11 teeth for holding the shoe sole is designed as a separate piece 21 with which the plate-shaped sole member 12 is connected in the following manner:

The housing part 21 is provided with two side projections which extend into a corresponding in the housing. The ends of the projections are bridged by a pair of metal plates disposed on the upper and lower sides of the housing and which are riveted to the projections. The housing part has a slot extending its entire width in which the sole holder with the circular segments 14 is slidable. The sole holder is provided at its center with a lug 13 which extends into the housing through the slot extending between the projections, into the housing and ends between the plates 24. The sole holder is pivotally mounted with this lug through a bolt 25 in the metal plates, whereby the projections limit its swinging movement. In order to return the sole holder into its central position after it has swung out, there are provided springs 26 which cooperate with a sheet metal double-armed lever 27 which is riveted to the extension 13. The springs lie in the unloaded central position of the sole holder, against the uncut edge portions of the plate 24 which form slots for receiving the lever 27.

In order to adapt the sole holder to the thickness of the sole, the upper part 3 of the housing part 21 is adjustable in height, being connected with the upper part by cross teeth on both parts and secured thereto by means of screws 23. The housing at the same time, covers the opening in the housing at each position, so that the housing always covers and protects the mechanical parts. The connection with the housing part and the sole holder permits to manufacture the toe piece as a unit. To assemble the toe piece it is only necessary to secure both units and the upper part of the housing. Similarity, the toe piece may be disassembled with ease for cleaning, lubricating or changing the individual parts. The adjusting member 17 is pivotal in the axial bore and the cam plate 18 at its end engages with the striker of sleeve 6a.

The tension of the spring and the factor against spills by the skier is adjustable by means of double ball stays between the bolt in five steps which are marked by a point and five numerals on the toe piece. The slot 20 on the adjusting member is used for such an adjustment, using a coin.

In a similar manner it is possible to adjust the sole holder by means of a separate housing part in the embodiments of FIGS. 1-4 in order to adapt it to the thickness of the sole. A further embodiment is shown in FIGS. 5-9. The swinging mechanism which forms, together with the base plate, a constructional unit closed by means of an upper plate 28 which releases the upper support of the housing on the support bolt and thereby the housing upper part 3 from the forces arising during the swinging of the toe piece and an adjusting function. The upper plate is riveted to the base through a housing part 29 and mounted with a socket covering 30 on the bolt 2. The upper part of the housing is secured to the upper plate by means of screws 31 accessible from above.

The engaging member is interrupted in the middle, in order to provide room for the screw 23 which is secured against loss, to the toe piece by means of a riveted-washer.

I claim:

1. Front toe piece for a safety ski binding comprising a base plate secured to the ski, a supporting bolt vertically secured to said base plate, a closed housing mounted on said bolt, a sleeve extending transversely through said bolt, a plate member secured to the interior of said housing and having a cutout portion and ball and spring means in said sleeve engaging with said cutout portion.

2. Front toe piece according to claim 1, wherein said sleeve is displaceably mounted in said bolt, an adjusting member in said housing for adjusting the position of the sleeve relative to said plate member, said adjusting member being mounted axially of said bolt and provided with a spiral-shaped cam engaging with said sleeve.

3. Front toe plate according to claim 1, wherein said sleeve comprises a member rigidly secured to said supporting bolt for permitting said spring.

4. Front toe piece for a safety ski binding comprising a base plate secured to the ski, a supporting bolt vertically secured to said base plate, a closed housing mounted on said bolt, a sleeve extending transversely through said bolt, a plate member having a V-shaped cutout portion and ball and spring means in said sleeve engaging with said cutout portion and ball and spring means in said sleeve engaging with said cutout portion, said sleeve being displaceably mounted in said bolt, an adjusting member in said housing for adjusting the position of the sleeve relative to said plate member, said adjusting member being mounted axially of said bolt and provided with a spiral-shaped cam engaging with said sleeve.

5. Front toe piece according to claim 4, further provided with a plate-shaped sole holder slidably and swingably supported in said housing, said housing having a slot in its rear portion through which said sole holder extends.

6. Front toe piece according to claim 5, wherein said sole holder is adjustable in height and teeth means for adjusting said sole holder relative to the housing.

7. Front toe piece according to claim 4, wherein said sole holder is swingably mounted on said support bolt and said spring means is secured to said housing.

8. Front toe piece according to claim 5, wherein said sole holder is supported on a yoke, said housing being adjustable in height.

9. Front toe piece according to claim 8, wherein said housing comprises a base plate and an upper part, said upper part including means for swinging said toe piece.

References Cited

UNITED STATES PATENTS


FOREIGN PATENTS

708,866 5/1965 Canada.

609,529 9/1960 Italy.

BENJAMIN HERSH, Primary Examiner

JOHN A. PEKAR, Assistant Examiner