SAFETY TOE-END DEVICE FOR SKI BINDING

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ABSTRACT

A safety toe-end abutment device for ski binding, of the type comprising an abutment body pivotally mounted on a shaft extending at right angles to the main ski surface and carried by a support secured to the ski, this abutment body comprises in combination a resilient thrust member acting in a plane parallel to the ski main surface and at least two rollers or like members rotatably mounted on shafts perpendicular to said main ski surface, two of these rollers being engaged by said thrust member carried by said support or by said abutment body, said rollers being carried by said abutment body or said support, respectively.

6 Claims, 6 Drawing Figures
SAFETY TOE-END DEVICE FOR SKI BINDING

BACKGROUND OF THE INVENTION

The present invention relates in general to ski bindings and has specific reference to a safety toe-end ski binding therefor.

Toe-end ski bindings or abutment members, comprising means for releasing the ski boot from the binding action of the complete mechanism in case of abnormal effort or in any case of an effort dangerous to the skier's leg, are generally adapted to pivot laterally, i.e., about an axis perpendicular to the main ski surface or plane. However, it is advantageous that the movement of this toe-end abutment device from the boot-locking position to the complete-release position does not occur whenever a lateral stress at the wrong time is exerted on the device.

DESCRIPTION OF THE PRIOR ART

To avoid this known inconvenience, various so-called "elastic" abutment devices have been devised. In fact, these devices consist of abutment members adapted to accomplish an angular movement of moderate amplitude and to resume automatically their boot-locking position when the lateral effort applied thereto exceeds the predetermined, normal value without attaining however a value likely to endanger the skier. Moreover, these abutment devices, by undergoing an angular movement depending on the lateral stress applied thereto, permit of releasing the foot in case of slow torsional movements dangerous to the skier, in contrast to conventional type toe-end devices designed to open only in case of sudden, fierce shock. Therefore, a toe-end binding device of this character improves the user's safety.

SUMMARY OF THE INVENTION

It is the chief object of the present invention to provide an improved toe-end abutment device of this character for a ski binding.

In the arrangement according to the present invention the toe-end device is of the type comprising an abutment body pivotally mounted on a shaft extending at right angles to the main ski surface and carried by a support secured to the ski. This abutment body comprises in combination a resilient thrust member acting in a plane parallel to the ski main surface and at least two rollers or like members rotatably mounted on shafts perpendicular to the main ski surface, two of these rollers or like members being engaged by one end of the thrust member carried by the support member or by the abutment body or member, the rollers or like members being carried by the abutment body or the support, respectively.

In a first embodiment of the device of this invention, this abutment device comprises a support and an abutment body which, being pivotally mounted to the support about an axis perpendicular to the main plane of the ski, carries a pair of rollers or like members also rotatably mounted on shafts perpendicular to the ski surface, the rollers being engaged by the rear end of said thrust member which, being slidably mounted in a bore extending horizontally and longitudinally in the support, is responsive to a compression spring reacting against a screw plug to permit the easy adjustment of the force of the spring.

Moreover, the pair of rollers or like members are housed in a cavity formed in the front face of said abutment body, and on either side of the pair of rollers the front face constitutes a cam face connecting said front face to the lateral faces or wings of the jaw engaged by the toe end of the ski boot, said cam face being slidably engaged by the operative end of said thrust member during the release and re-engagement movements of the abutment body.

In a second embodiment the abutment device comprises an abutment body pivotally mounted about a fixed pivot member rigid with a base plate constituting the support; the pivot member comprises at least three rollers or like members perpendicular to the main plane of the ski, and at least two of these rollers or like members are engaged by the rear end of said thrust member which, being slidably mounted in a horizontal and longitudinal bore formed in the abutment body, is responsive to a compression spring reacting against a screw plug adapted to modify the force of said spring.

BRIEF DESCRIPTION OF THE DRAWINGS

A clearer understanding of this invention and of its various features and advantages will now be described by way of example with reference to the attached drawings, in which:

FIG. 1 is a perspective view of a first form of embodiment of the toe-end abutment device for ski binding according to this invention;

FIGS. 2 and 3 are horizontal sectional views showing the same device in its operative position and in its release or open position, respectively;

FIG. 4 is an exploded perspective view showing a second form of embodiment of the device of this invention;

FIGS. 5 and 6 are horizontal sectional views showing the device of FIG. 4 in the momentary open position and in the fully open position, respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings, the reference numeral 2 designates the fixed support of the device, which is rigid with a base plate or flange 3 for securing the device to the top surface of a ski. This support 2 carries a pivot shaft or pin 4 extending at right angles to the base 3, so that this shaft 4 extends vertically when the ski is horizontal. The function of this pivot shaft 4 is to permit the pivotal mounting of a plate 5 covering the support 2, said plate 5 being rigid with an abutment body 6 of which the rear portion constitutes a jaw 11 adapted to be engaged by the toe end of a ski boot (not shown). Of course, the device also comprises means for adjusting at will the level of said jaw 11 as a function of the thickness of the boot sole to be engaged thereby, but these means are now shown since they are well known to those skilled in the art.

Centrally of its front portion and abutment body 6 has formed therein a cavity 7 in which a pair of rollers 8a, 8b, are mounted for loose rotation about a pair of shafts 9 parallel to each other and to the shaft 4 to which the jaw is pivotally mounted.

These rollers 8a, 8b are slightly spaced from each other to permit the bearing engagement, against and between them, of the rear end or head 10 of a thrust member 12 slidably mounted in a longitudinal bore 13.
formed in the support 2 of the abutment device. At its front end this bore 13 is tapped to permit the engagement of a screw plug 14 contacting one end of a compression spring 15, the opposite end of this spring engaging the thrust member 12, as shown.

In connection with the cavity 7 in which the pair of roller 8a, 8b engaged by the head of said thrust member 12 are housed, it will be seen that the lateral portions of its front face constitute cam faces 16 merging into the lateral faces of the abutment body 6. FIGS. 1 and 2 illustrate the device in its normal operative position, i.e., in the locking or boot-retaining position. In this position, the abutment body 6 is aligned with the body 2, since the head 10 of said thrust member 6 is urged against and between the pair of rollers 8a, 8b. The longitudinal force applied by the thrust member 12 urged by spring 15 will thus properly hold the abutment body 6 in its aligned or locking position.

However, assuming that a lateral effort is exerted against one of the wings of jaw 11, for example in the direction of the arrow 17 of FIG. 2, the assembly comprising the abutment body 6 and its rollers 8a, 8b will tend to pivot in the same direction about the shaft 4 and during this movement the roller 8b will roll on the head 10 of thrust member 12 while pushing this member backwards and thus increasing the compression of spring 15.

If the effort thus exerted on the jaw 11 exceeds a predetermined limit or threshold value, the roller 8a will push back the head of thrust member 12 sufficiently to cause the foremost generatrix of this roller to overstep the point of said head 10, so that the device will move immediately to its release position shown in FIG. 3. In this position the rollers 8a, 8b are no more in contact with the head 10 of thrust member 12, and the abutment body 6 is in such angular relationship to the support 2 that the skier's boot is fully released laterally.

Alternatively, assuming that the effort exerted in the direction of the arrow 17 against one of the wings of jaw 11 is not sufficient to reach the aforesaid limit or threshold value for which the device was adjusted initially, the abutment body 6 will resume automatically and resiliently its initial or locking position by virtue of the expansion of spring 15. To produce this automatic return to the normal operative position, it is only necessary that the effort exerted on the jaw 11 be inferior to that required for causing the foremost generatrix of roller 8a or 8b to overstep or clear the point or head 10 of thrust member 12.

As will be readily understood, the release point or hardness of operation and release of this device is adjusted by simply screwing in or out the screw plug 14 engaged by the compression spring 15 acting against the thrust member 12.

It will also be noted that when the device has been released, it is very easy to return same to its initial or normal operative position; in fact, the user has simply to pivot the abutment body 6 towards its alignment position, in the direction opposite to that having cause the release. To this end, the skier pulls or pushes the abutment member 6; this return movement takes place without difficulty for the head 10 of thrust member 12 engage on slides on the cam face 16 of the corresponding side, and this cam face exerts a progressive pressure against the head 10 of said thrust member, until the latter is reset automatically and resiliently between the pair of rollers 8a, 8b.

In the alternate form of embodiment illustrated in FIGS. 4 to 6 of the drawings the reference numeral 22 designates a ski to which the toe-end abutment safety device comprising essentially a base plate 23 and an abutment body 24 is secured by means of screws. The base plate 23 secured by means of screws 25 to the top surface of a ski 22 carries four parallel pivot pins 26 perpendicular to said surface and disposed at the corners of a square. Pivoted mounted on these pins 26 are four rollers 27 inscribed in a common cylinder or bore 28. These four rollers 27 are so disposed that none of the cylindrical segments formed by the tangents common to said roller 27 and to the cylindrical bore 28 has an angle greater than 180°.

This cylindrical bore 28 is formed in the abutment body 24 and another bore 29, perpendicular to said bore 28, opens with one end into the latter and with the other end into the front end of the abutment body 24. The front end portion of this horizontal bore 29 is tapped as shown at 30.

At its rear portion the abutment body 24 is shaped to receive or constitute a jaw 31. Means such as a screw 32 may advantageously be provided, notably if the abutment body and jaw consist of separate elements, for adjusting the vertical position of this jaw with respect to the abutment body.

The bore 29 formed in the abutment body 24 is adapted to receive a thrust member consisting in this example of a ball 32, and also a coil compression spring 33 of which the force is adjustable by means of a screw plug 34 engaged in the tapped end portion 30 of this bore 29. In fact, the ball 32 projects somewhat into the vertical bore 28 of the abutment body 24 and is pressed by said spring against a pair of rollers 27, as shown in FIG. 4. This ball 32 exerts a longitudinally pressure against this pair of rollers designated by the reference numerals 27a and 27b, thus constantly retaining, both automatically and resiliently, the abutment body 24 in its normal operative position, i.e., the position in which the toe end of the ski boot is retained on the ski by the jaw 31.

However, assuming that a torsional stress is applied to the skier's boot, the abutment body 24 will tend to move angularly and laterally, for example in the direction of the arrow 35 (FIG. 5). Thus, the ball 32 moves away from one of the two rollers previously engaged thereby, for example roller 27a, so as to bear only against the other roller 27b, while comprising the spring 33 within the bore 29.

If this torsional movement is discontinued, the spring 33 expands and the abutment member 24 resumes by itself its locking or boot-retaining position.

If on the other hand the torsion attains a value likely to jeopardize the skier's foot or leg, the abutment body 24 will continue its lateral angular movement, with the ball 32 bearing against the roller 26b until the amplitude of this movement is such that the spring 33 can expand as the ball 32 engages both rollers 27b and 27c, as shown in FIG. 6. Thus, the abutment body 24 and therefore the complete device is in its fully open position, the angle formed by the center line of the movable portion of the device with respect to the longitudinal center line of the ski permitting a complete release of the skier's foot. The normal boot-retaining position of the device can be obtained very easily by simply caus-
ing the abutment body 24 to pivot in the opposite direction. To this end, the skier pulls or pushes the abutment body 24 in the proper direction. Then the ball 32 re-engages the roller 27b alone, which acts as a ramp or cam face, while compressing the spring 33; finally the device is locked automatically and resiliently as the ball 32 is again pressed against and between the pair of rollers 27a and 27b.

As already explained in the foregoing, the amplitude of the angular movement necessary for releasing the skier’s foot is adjustable by simply screwing in or out the screw plug 34 engaging the tapped portion 30 of bore 29, so as to more or less compress the spring 33.

As will readily appear from the foregoing, this abutment device affords a high degree of safety for the skier. In fact, it has the peculiar characteristic features of conventional resilient toe-end abutment devices of the type resuming automatically their locking position after a moderate torsion and also the advantageous features of conventional devices which, by being adapted to assume a fully open position, permit a full release of the skier’s foot.

Of course, this invention should not be construed as being strictly limited by the specific forms of embodiment of the toe-end abutment device described and illustrated herein by way of example, since many modifications may be brought thereto without departing from the basic principles of the invention as set forth in the appended claims. Thus, inter alia, the rear portion of the thrust member may have a shape other than that illustrated, for example an ogival, part-spherical, or wedge shape; or alternatively a ball may be substituted therefor, as in the case illustrated in FIGS. 4 to 6 of the drawings.

What is claimed is new:

1. A safety toe-end device for a ski binding comprising a support member mounted upon the upper surface of a ski; a shaft carried by said support member and extending perpendicular to said surface of said ski; an abutment member pivotally mounted on said shaft for swinging movement about an axis perpendicular to said surface and engageable with the toe of a ski boot; a thrust element mounted in one of said members for movement parallel to said surface and perpendicular to said axis; resilient means on said one of said members for urging said thrust element yieldably in one direction; and a pair of rollers having axes parallel to the pivot axis of said abutment member and extending perpendicular to said surface while being mounted on the other of said members, said thrust element having an end bearing upon said rollers for yieldably indexing said abutment member in one angular position whereby said abutment member engages said toe of said boot.

2. The device defined in claim 1 wherein said support member is formed with a bore parallel to said surface and perpendicular to the axis of said shaft, said thrust element being received in said bore, said resilient means comprising a compression spring received in said bore and bearing upon said thrust element, and a screw plug threaded into said bore for adjusting the force of said spring exerted upon said thrust element.

3. The device defined in claim 2 wherein said abutment member is formed with a front surface confronting said support member, said front surface of said abutment member being provided with a cavity open toward said thrust element and receiving said rollers, said abutment member being formed on opposite sides of said cavity with cam faces leading to lateral surfaces of the abutment member forming a jaw engaged by said toe of said boot, said cam faces being engageable by said thrust element during release and re-engagement of the device with said toe.

4. The device defined in claim 1 wherein at least three rollers angularly spaced about the pivot axis of said abutment member are mounted upon said support member, said abutment member being formed with a bore parallel to said surface of said ski and perpendicular to the pivot axis of said abutment member, said thrust element being received in said bore and engageable between pairs of said rollers in different angular positions of said abutment member, said resilient means including a compression spring in said bore bearing upon said thrust element, and a screw plug threaded into said bore for adjusting the force with which said spring bears upon said thrust element.

5. The device defined in claim 4 wherein said thrust element is a ball.

6. The device defined in claim 1 wherein said thrust element has flanks straddled by said rollers in said positions which are divergent from one another away from said rollers.