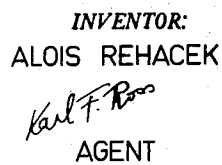


A. REHACEK

TOE CLAMP FOR SKI BINDING

2 Sheets-Sheet 1



Jan. 6, 1959

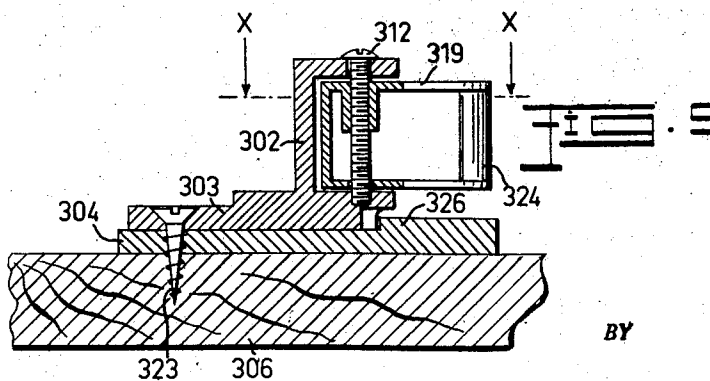
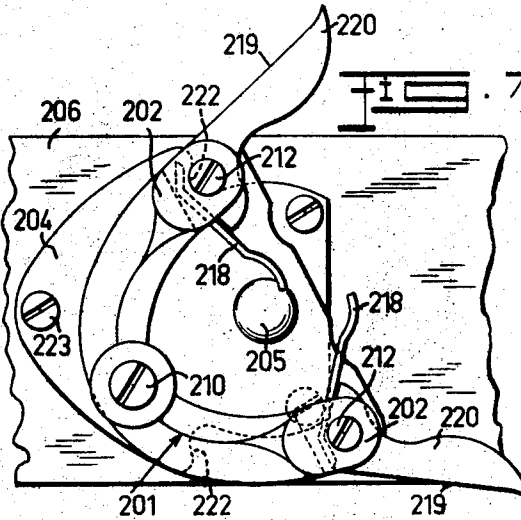
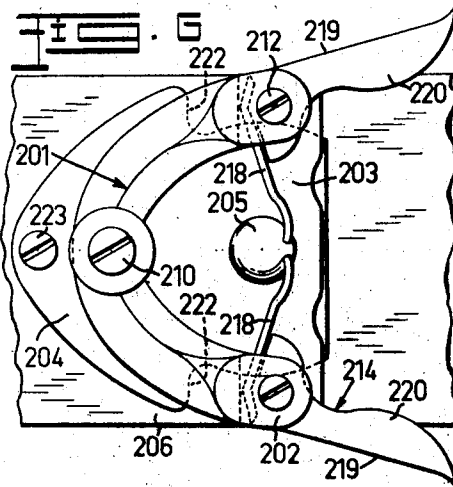
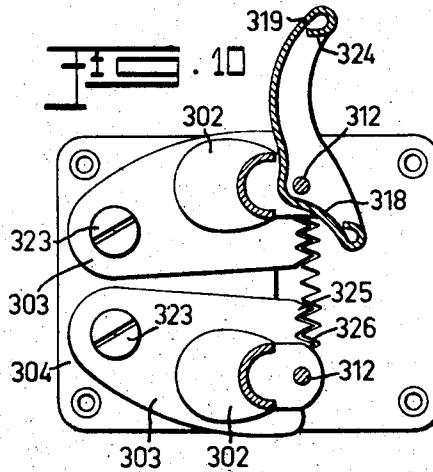
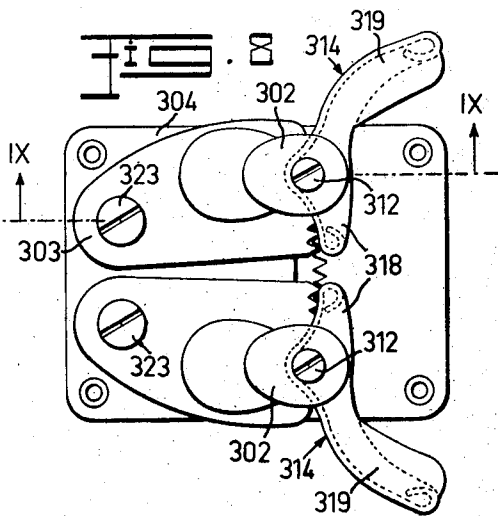
A. REHACEK

2,867,446

TOE CLAMP FOR SKI BINDING

Filed Aug. 23, 1954

2 Sheets-Sheet 2



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2,867,446

TOE CLAMP FOR SKI BINDING

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11 Claims. (Cl. 280—11.35)

The present invention relates to ski bindings, more particularly (but not exclusively) those of the type in which a toe piece is adapted to yield to excessive lateral pressure, such as may be caused by a fall, for the purpose of releasing the shoe of the skier from the binding and, thereby, lessening the danger of a fracture.

Known constructions of this type comprise toe irons which engage the shoe only from the front, thus requiring a tightly drawn tension cable to ensure the necessary gripping action. Thus, normal lateral stresses arising, for example, on turns or in climbing might occasionally suffice to dislodge the shoe from the binding, to the great inconvenience and discomfort of the user.

An important object of the present invention is to provide, in a ski binding of the character referred to, means for exerting sufficient lateral and frontal pressure upon the toe portion of a shoe to keep the latter attached to the ski under all normal conditions of use.

Another object of this invention is to provide a toe clamp as set forth above which will readily adjust itself to different shoe sizes.

A feature of my invention resides in the provision of a pair of bell-crank levers mounted on a suitable support with their pivots on a line substantially transverse to the ski, each lever having a pair of arms adapted to bear upon the skier's shoe laterally and frontally, respectively.

Another feature of my invention resides in the provision of a swivel plate which is normally indexed in a predetermined position, relative to the ski, by a spring-pressed detent member enabling pivotal movement of the plate in response to excessive lateral stresses, this plate serving as a support for the pivots of the aforementioned bell-crank levers. These pivots may be mounted on the swivel plate directly, in which case the plate is preferably rigid with a roughly horseshoe-shaped mount for the bell-crank levers, or through the intermediary of a further pivoted member designed to impart still greater flexibility to the binding and to accelerate the release of the shoe in an emergency.

The above and other objects, features and advantages of my present invention will become more fully apparent from the following detailed description of certain embodiments, reference being had to the accompanying drawing in which:

Fig. 1 is an elevational view, in longitudinal section, of a toe clamp according to the invention;

Fig. 2 is a top plan view of the clamp of Fig. 1;

Fig. 3 is a view similar to Fig. 2 but showing the clamp in off-normal or emergency position;

Fig. 4 is a sectional view similar to Fig. 1, showing a modified form of clamp;

Fig. 5 is a sectional view, similar to Fig. 1, of yet a further embodiment;

Figs. 6 and 7 are top plan views of the clamp of Fig. 5 in normal and off-normal position, respectively;

Fig. 8 is a top plan view of still another toe clamp according to the invention;

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Fig. 9 is a sectional elevational view taken substantially on the line IX—IX of Fig. 8; and

Fig. 10 is a view similar to Fig. 8 but taken partly in section, on the line X—X of Fig. 9, and with one of the bell-crank levers removed.

Throughout the drawing, similar elements have been designated by like reference numerals preceded, in all embodiments except the first, by different hundreds digits.

Referring first to Figs. 1, 2 and 3, there is shown part of a ski 6 bearing a toe assembly according to the invention co-operating with a cable-tensioned, longitudinal movable heel assembly of conventional design (not shown). The toe assembly comprises a base plate 4 screwed onto the ski 6 by means of wood screws 23, a swivel plate 3 connected with the plate 4 by a pivot screw 5, and a bracket 2 mounting the pivot 12 of a swingable holder member 13 to the extremities 15 of which, in turn, a pair of bell-crank levers 14 are pivotally attached by means of respective pins 16. The bracket 2 is preferably integral with the plate 3, these two elements thus constituting part of a single casting generally designated by the numeral 1.

Under normal conditions, i. e. in the absence of an emergency, the plates 3 and 4 register with each other as shown in Fig. 2. The swivel plate 3 is retained in this normal position by a detent mechanism comprising a pair of balls 8 in plate 3 which are pressed by springs 9 into respective bores 11 of plate 4. Adjusting screws 10, housed in respective wings 7 of bracket 2, serve to regulate the pressure of the springs 9 and, thereby, the resistance which the swivel plate 3 will oppose to any rotary displacement relative to base plate 4.

It will be noted that the extremities 15 of holder 13 project somewhat beyond the inner tips of bell-crank levers 14, whereby these extremities will serve as vertical retaining means for the sole of the shoe (not shown). Since the forward portion of the shoe sole usually has a slight upward curvature, it is desirable to incline the upper and lower flanges of the holder to a slight extent toward the horizontal; for this purpose the pivot 12 is shown held in bracket 2 at a small angle to the vertical. The height of holder 3 above the ski 6 is preferably adjustable, as by providing pivot 12 with screw threads as shown and engaging it with a threaded hub 17 on the holder.

If the impact of a fall exerts strong lateral pressure upon the assembly, plate 3 is dislodged from its normal position to occupy, for example, the position shown in Fig. 3 in which the elements 13 and 14 disengage the shoe, whereby the danger of a broken or sprained bone or ankle is materially reduced.

Whereas in the embodiment just described the tilting of pivot screw 12 is accomplished by a slight beveling of the upper flange of bracket 2, the same result is accomplished in the embodiment of Fig. 4 by making base plate 104 wedge-shaped, whereby the casting 101 including swivel plate 103 and bracket 102 will be bodily inclined with respect to the running surface of ski 106. Pivot 105 is in this case parallel to pivot 112, enclosing a small angle with the vertical; adjusting screws 110 are similarly inclined.

In Figs. 5, 6 and 7 the clamp has been simplified by the omission of the holder 13 of Figs. 1—3. Here again, base plate 204 is secured to ski 206 by screws 223 and is engaged by a stud 205 serving as the fulcrum for swivel plate 203. A generally horseshoe-shaped mount 201, rising integrally from the plate 203, has its extremities formed into brackets 202 each of which holds a pivot screw 212 for a respective bell-crank lever 214. At the center of mount 201 there is provided a boss 207 housing the adjusting screw 210 of a single ball detent 208 which

normally enters a bore 211 in plate 204 and whose springs have been indicated at 209.

Each bell-crank lever 214 has a front arm 218 and a side arm 219 extending substantially at right angles to each other. With this arrangement it has been found desirable to position the three pivots 212 and 205 in substantially one straight line, as shown, whereby a dislodgment of the swivel plate 203 in response to minor, normally occurring lateral impacts is avoided.

Each side arm 219 is provided with an upper flange 220, serving as an upper stop for the sole of the shoe, and with a shorter, lower flange 221, the two flanges being threadedly engaged by the associated pivot screw 212 so as to enable vertical adjustment to accommodate different sole thicknesses.

In order to limit the extent to which the plate 203 can rotate under off-normal conditions, base plate 204 is formed with a pair of shoulders 222 each serving as an abutment for the associated pivot screw 212, whose lower end has been extended beyond flange 221, in a respective extreme position. This has been clearly shown in Fig. 7.

It will be noted that the detent mechanism 208—210 is positioned at the apex of an isosceles triangle whose base is formed by the line interconnecting the pivots 212, 205, 212.

In Figs. 8, 9 and 10 each bell-crank lever 314 is mounted, by means of an individual bracket 302 engaging its pivot 312, on a separate foot plate 303 overlying a common base plate 304. Wood screws 323 serve to attach the foot plates 303 as well as the base plate 304 to the ski 306. Teeth 325 on each of the plates 303 engage similar teeth of a rack 326 on plate 304, whereby the relative distance of the pivots 312 may be preselected prior to the tightening of wood screws 323. The inner arms 318 and the outer arms 319 of bell-crank levers 314 are provided with inturned ends 324, to afford better grip of the sole, as well as with upper and lower flanges serving as vertical sole-retaining means.

Since the toe clamp of Figs. 8—10 lacks the safety feature of the preceding embodiments, the same may be used advantageously in bindings having other conventional types of safety devices, e. g. at the heel assembly.

The invention is, of course, not limited to the specific embodiments described and illustrated. Thus, features illustrated in different views of the drawing may be combined (as by applying the inclined pivots of Fig. 1 or 4 to some other embodiment), and various modifications and adaptations will readily occur to persons skilled in the art without constituting a departure from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a ski binding, in combination, a plate, a first pivot on said plate, an elongated holder fulcrumed substantially at its center on said first pivot, a second pivot on each of the two extremities of said holder, and a pair of bell-crank levers fulcrumed on said second pivots, respectively, each of said levers having two arms adapted to engage laterally and frontally, respectively, the toe portion of a shoe.

2. The combination according to claim 1, wherein said

holder is provided with flange means adapted to engage the sole of the shoe.

3. The combination according to claim 2, wherein said first pivot is provided with thread means for adjusting the distance of said flange means from said plate.

4. The combination according to claim 2, wherein said first pivot encloses an angle slightly less than 90° with said plate.

5. In a ski binding, in combination, a base plate, a swivel plate, a first pivot rotatably securing said swivel plate to said base plate, a pair of second pivots, supporting means for said second pivots on said swivel plate, a pair of levers respectively fulcrumed on said second pivots and adapted to engage the toe portion of a shoe, and detent means for releasably maintaining said plates in a normal relative position.

6. The combination according to claim 5, wherein said detent means comprises a spring-pressed indexing member on one of said plates, the other of said plates being provided with a recess engageable by said indexing member in said normal relative position.

7. The combination according to claim 5, wherein said second pivots flank said first pivot and are positioned approximately on a straight line with it.

8. The combination according to claim 7, wherein said detent means is positioned at the apex of a triangle whose base is represented by said straight line.

9. The combination according to claim 5, wherein said base plate is provided with stop means for limiting the displacement of said swivel plate upon release of said detent means.

10. The combination according to claim 5, wherein each of said levers has two arms on opposite sides of its pivot adapted to engage said toe portion laterally and frontally, respectively, substantially in a horizontal plane.

11. In a ski binding, in combination, a base plate, a swivel plate, a first pivot rotatably securing said swivel plate to said base plate, a second pivot on said swivel plate, an elongated holder fulcrumed substantially at its center on said second pivot, a third pivot on each of the two extremities of said holder, a pair of levers respectively fulcrumed on said third pivots and adapted to engage the toe portion of a shoe, and detent means for releasably maintaining said plates in a normal relative position.

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