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[54] **SAFETY FRONT JAW FOR SKI BINDINGS**

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[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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[57] **ABSTRACT**

This releasable front hold-down device or toe clamp for ski binding has a boot-engaging jaw adapted to shift laterally within a predetermined range of displacement beyond which the toe end of the ski boot is released. It comprises to this end at least one pair of links dispersed symmetrically on either side of the pivot pin of the body of the device and formed with cam-shaped front ends engaging corresponding rollers carried by the base plate of the device; inner projections are also formed on these links for engagement by a ball through a spring of adjustable pressure, this spring and ball being received in a longitudinal bore of the body.

5 Claims, 7 Drawing Figures

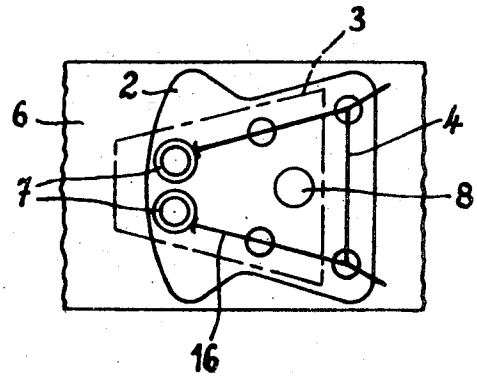

FIG. 4

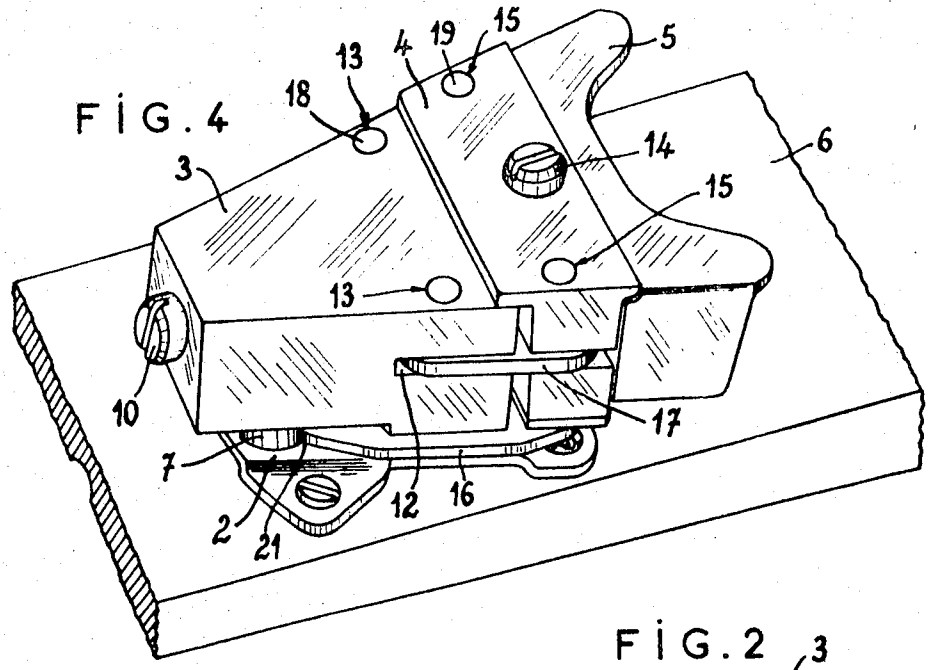

FIG. 2

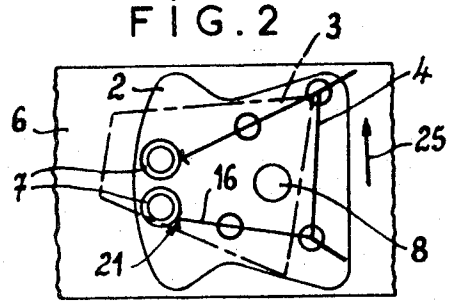

FIG. 1

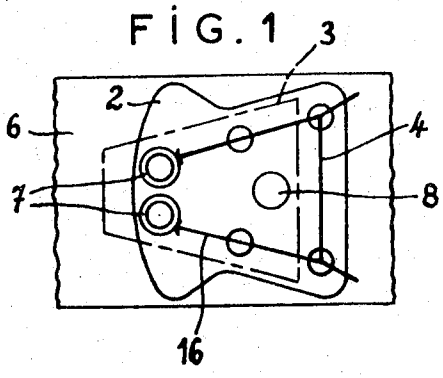

FIG. 3

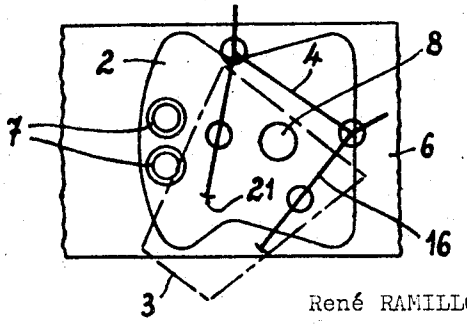

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FIG. 5

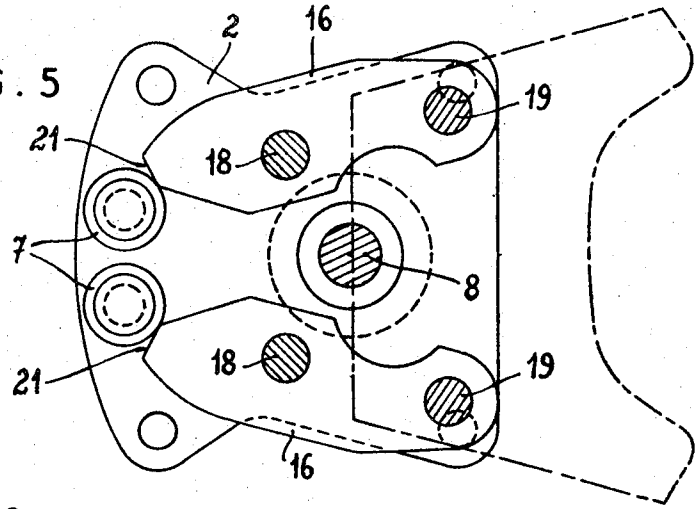


FIG. 7

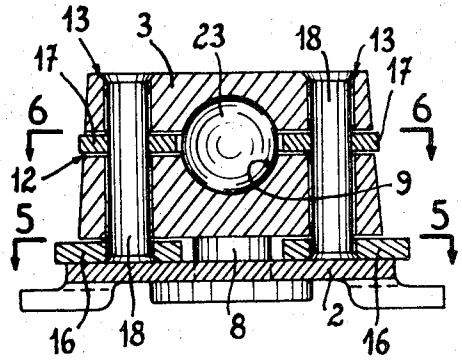
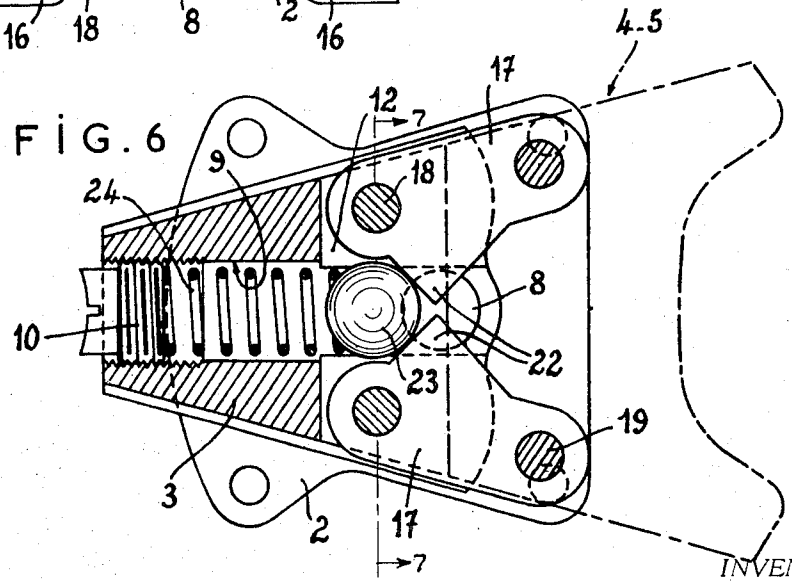


FIG. 6



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SAFETY FRONT JAW FOR SKI BINDINGS

FIELD OF THE INVENTION

The present invention relates in general to ski bindings and has specific reference to a safety front jaw of the type adapted releasably to hold the toe end of a ski boot.

DESCRIPTION OF THE PRIOR ART

As a rule, ski bindings comprise a clamp or rear hold-down device and a front retaining jaw or toe clamp, both clamps contributing to safely retaining the skier's boot on the ski. However, these heel and toe clamps are so constructed that they will release the boot from the ski if a force exceeding a predetermined, adjustable value is exerted on the skier's leg. Thus, in most ski bindings the front jaw is adapted to pivot, swing or move by translation in a plane parallel to the ski in case an abnormal torsion stress is exerted on the skier's leg.

OBJECTS OF THE INVENTION

It is the principal object of the present invention to provide a safety front hold-down device for ski bindings, and more particularly a releasable toe clamp of the swingable type, adapted resiliently to return the toe end of the ski boot to its normal running position as long as the lateral force exerted on the skier's leg remains below a value likely to have dangerous consequences for the skier.

More particularly, my invention aims at providing an improved safety toe clamp of the type wherein the body of the device is pivotally mounted on a base plate and connected through a pair of links to a boot-retaining jaw so as to form therewith a shiftable linkage.

SUMMARY OF THE INVENTION

According to this invention, the pivot pin pivotally connecting the body of the device to the base plate lies within the quadrilateral defined by that body, said pair of links and the boot-retaining jaw, these links extending beyond the pivot pins connecting them to the body so as to coact with abutments rigid with the base plate in such a manner that the jaw can move generally parallel to itself while compressing a spring constantly urging the assembly to its initial position as long as the lateral stress exerted on the jaw remains below a predetermined, adjustable maximum value beyond which the jaw movement is such that the link extremities are disengaged from the stationary abutments of the base plate, whereby the body oscillates freely and is no longer urged automatically to its initial or operative position.

According to a specific and preferred feature of my invention, the extremities of the pair of links interconnecting the body and the boot-retaining jaw are each provided with a cam-shaped front end adapted to engage a respective abutment-forming roller carried by the base plate, the movement of the edge of either of these extensions on the corresponding roller determining the distance along which the jaw can move and return automatically to its initial or centered position under the pressure of said spring. The amplitude of the permissible movement of the jaw is determined by the length of the cam-forming portions of the front ends of the two link extremities.

To ensure the automatic return of the jaw to its normal or centered operative position when the lateral stress exerted thereon remains below the value necessary for causing its complete release, a coiled compression spring is used; this spring, housed in a longitudinal bore formed in the body of the jaw, bears with one end against the inner end of an adjustable screw accessible from the front end of the body and with the opposite end against a ball also housed freely in that bore and urged by the spring against a pair of inner confronting lateral projections each formed on the pair of links connecting the body to the clamp jaw.

The assembly of my improved toe clamps may be simplified considerably while increasing its strength by dividing the two links into four arms interconnecting the body and jaw, namely a pair of lower arms formed with the cam-shaped front ends determining the mode of operation of the device, and a pair of upper amrs parallel thereto, the latter being provided with the confronting lateral projections engageable by the spring-urged ball.

BRIEF DESCRIPTION OF THE DRAWING

A representative embodiment of a safety toe clamp according to this invention will now be described by way of example with reference to the accompanying drawing, in which :

FIGS. **1**, **2** and **3** are diagrammatic plan views from above given for explaining the mode of operation of the device of the present invention;

FIG. **4** is a perspective view of the device;

FIGS. **5** and **6** are horizontal sections taken along the lines **5—5** and **6—6** of FIG. **7**, respectively; and

FIG. **7** is a vertical cross-section taken along the line **7—7** of FIG. **6.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

The releasable front clamp or boot-retaining device illustrated in FIGS. **4** to **7** comprises essentially the following component elements : a base plate **2**, a clamp body **3**, a jaw support **4** and a toe-engaging jaw **5.**

The base plate **2** is secured by means of screws to the top surface **6** of the ski. It carries in its front portion a pair of rollers **7** having their axes perpendicular to the ski surface and in its rear portion a vertical pivot pin **8** defining a swing axis for the body **3** of the device.

The body **3** has formed therein a longitudinal throughgoing bore **9** whose front end is tapped for receiving a headless adjustable screw **10.** In the rear portion of the body **3** a pair of horizontal coplanar slots **12** open into the centrally extending bore **9.** Finally, the body **3** has a pair of lateral, symmetrical vertical holes **13** extending throughout its height and also through the slots **12,** as shown.

The jaw support **4** comprises conventional means for fastening the jaw **5** and permitting the vertical movement thereof for setting same in the vertical position consistent with the thickness of the boot sole; these means consist notably of a screw **14** shown in FIG. **4.** Furthermore, a pair of lateral, symmetrical vertical holes **15** pass through the jaw support **4.**

The body **3,** fulcrumed on to the base plate **2** through the pivot pin **8,** and the jaw **5,** rigid with its support **4,** are interconnected through a pair of links each consisting of a lower arm **16** and an uper arm **17.** To this end, each arm **16, 17** has formed therein a pair of holes aligned with the holes **13** and **15** present on the same

side in the body 3 and the jaw support 4, and vertical pins extend through these holes, as follows :

a first pair of pivot pins 18 extend through the holes 13 of body 3 as well as the corresponding holes of arms 16 and 17;

another pair of pivot pins 19 extend through the holes 15 of jaw support 4 as well as the corresponding holes of arms 16 and 17.

As clearly shown in FIG. 5, the lower pair of arms 16 comprise integral forward extremities or extensions projecting well beyond the pins 18; their front ends 21 are cam-shaped and each adapted to coact with a corresponding roller 7 carried by the base plate 2. On the other hand, as shown in FIG. 6, the pair of upper arms 17 comprise confronting or inner lateral lugs with sloping edges 22 together forming a cradle engageable by a ball 23 disposed freely in the rear portion of the bore 9 of body 3 and pressed against these lugs by a compressive coil spring 24 bearing against adjustment screw 10.

Thus, the two pairs of link pins 18 and 19 constitute the pivots interconnecting the four sides of a quadrilateral linkage comprising the body 3, the two pairs of arms 16, 17 and the jaw support 4; furthermore, the central pivot pin or fulcrum 8 of the body 3 is disposed within the outline of the quadrilateral defined by pivots 18 and 19.

Under these conditions, when the device is in its normal operative position it is aligned with and symmetrical to the longitudinal centerline of the ski, i.e., in the position shown in FIGS. 4, 5 and 6, and held in this position by the force of spring 24.

The operation of this device will now be described with reference to FIGS. 1, 2 and 3 consituting very diagrammatic views wherein the pair of links are represented by a single pair of arms 16.

When the device is in its normal operative condition, these component elements are in the positions illustrated in FIG. 1. If, now, the skier's boot exerts a lateral force on the jaw 4 in, say, the direction of the arrow 25 (FIG. 2), the quadrilateral linkage comprising the body 3, links 16 and jaw 4 assumes the shape shown in FIG. 2; this movement is controlled by the specific contour of the cam-shaped ends 21 of the pair of links 16 which resist lateral shifting of jaw 5 as long as these cams remain in engagement with the rollers 7; the four-sided horizontal linkage 3, 4, 16 can automatically regain its initial symmetric (i.e. trapezodial) shape shown in FIG. 1 if the lateral force exerted on the jaw 4 by the ski boot ceases before exceeding a predetermined maximum value. This automatic return to the initial position is due to the spring pressure applied to the links at the cradle 22 (FIG. 6).

Moreover, the resistance of the jaw to these lateral movements is determined by the loading pressure of spring 24 bearing upon the spherical member 23. The greater the spring compression, the greater that resistance. The force of spring 24 is adjustable by varying the position of screw 10 (FIGS. 4 and 6).

Thus, the component elements of the device are constantly biased into their normal operative position as long as the lateral force exerted on the jaw, for example in the direction of the arrow 25 of FIG. 2, remains inferior to the aforementioned maximum.

However, in case the exerted force exceeds this predetermined value, the jaw will swing out beyond its limiting safety position and thus release the skier's boot. This is illustrated in FIG. 3. The pivotal movement takes place instantaneously when the cam-shaped ends 21 of links 16 are no longer in engagement with the respective abutment rollers 7.

The operating characteristics of the device may be modified by using links 16 having different cam contours 21 at their front ends.

These and other modifications and variations may be resorted to without departing from the basic principles of the invention as set forth in the appended claims.

What I claim is :

1. A toe clamp for a ski binding, comprising:

a horizontal base plate fasten able to the upper surface of a ski;

a body formed with a central horizontal bore and pivotally secured to said base plate at a fulcrum defining a vertical swing axis, said bore being provided with a tapped end;

a boot-engaging jaw adjacent a rear part of said body;

a pair of links each articulated to said body at a first pivot and to said jaw at a second pivot, thereby forming with said body and said jaw a four-sided horizontal linkage enabling a shifting of said jaw generally parallel to itself from a substantially centered normal position, said fulcrum lying within the outline of the quadrilateral defined by said first and second pivots, said links being provided with confronting projections;

stationary abutment means on said base normally engaged by extremities of said links projecting forwardly beyond said first pivots to resist a shifting of said jaw in response to lateral forces;

a member movably received in said bore;

a loading spring for said member in said bore urging said member into engagement with said projections for biasing said links into said normal position; and

a screw threaded into said tapped end in engagement with said loading spring for varying the pressure thereof.

2. A toe clamp as defined in claim 1 wherein said abutment means comprises a pair of rollers, said extremities being provided with cam-shaped ends contacting said rollers.

3. A toe clamp as defined in claim 1 wherein said projections are a pair of lugs with sloping edges forming a cradle for a spherical surface of said member.

4. A toe clamp as defined in claim 1 wherein each of said links comprises two parallel arms, one pair of said arms being provided with said extremities, the other pair of said arms being provided with said projections.

5. A toe clamp for a ski binding, comprising:

a horizontal base plate fastenable to the upper surface of a ski;

a body pivotally secured to said base plate at a fulcrum defining a vertical swing axis;

a boot-engaging jaw adjacent a rear part of said body;

a pair of links each articulated to said body at a first pivot and to said jaw at a second pivot, thereby forming with said body and said jaw a four-sided horizontal linkage enabling a shifting of said jaw generally parallel to itself from a substantially centered normal position, said fulcrum lying within the outline of the quadrilateral defined by said first and second pivots, each of said links comprising two parallel arms;

stationary abutment means on said base normally engaged by extremities of one pair of said arms pro-

jecting forwardly beyond said first pivots to resist a shifting of said jaw in response to lateral forces, the other pair of said arms being provided with confronting projections; and

a spring-loaded member guided in said body for horizontal motion along a centerline thereof, the other pair of said arms being provided with confronting projections engaged by said member for biasing said links into said normal position.

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