United States Patent

Salomon

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[54] **SKI BOOT**

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[52] **U.S. Cl.**.....**36/2.5 AL**

[51] **Int. Cl.**.....**A43b 00/00**

[58] **Field of Search**.....36/2.5 R, 2.5 AL

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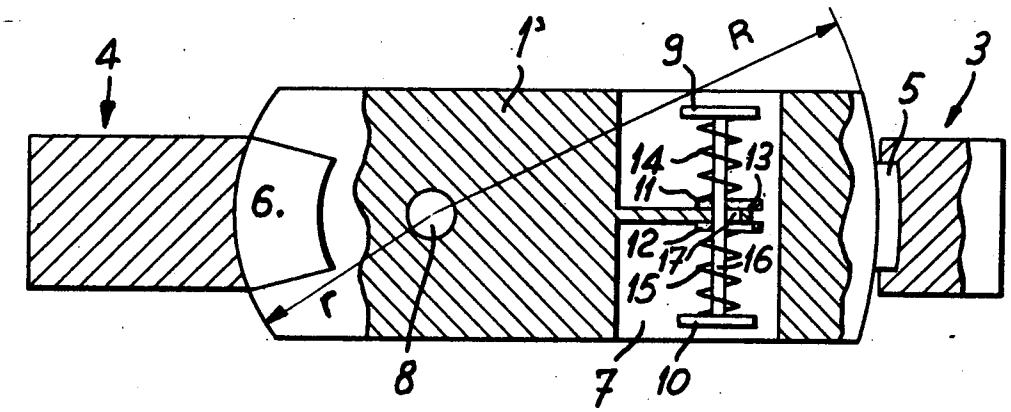
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[57] **ABSTRACT**

The sole of a ski boot comprises a part movably mounted in relation to the rest of the sole and upper of the boot, and elastic means tending to maintain the movable part in a rest position. The movable part protudes from the upper and forms means for cooperation with a binding device, so that the remainder of the boot can elastically move to absorb shocks prior to release of the binding.

10 Claims, 8 Drawing Figures



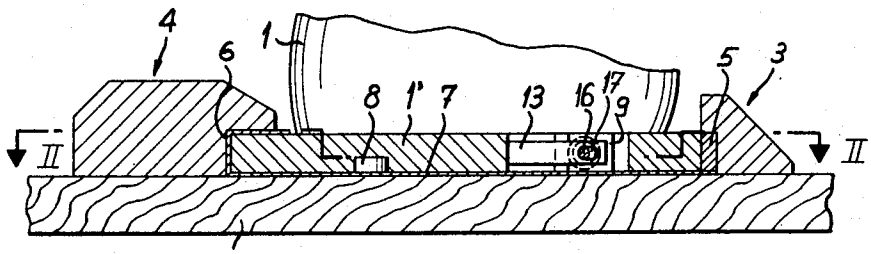


FIG. 1

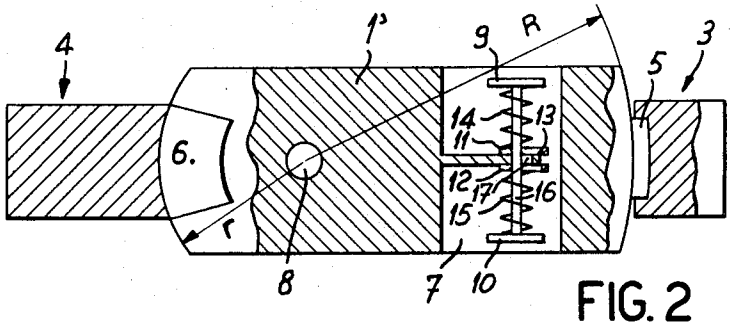


FIG. 2

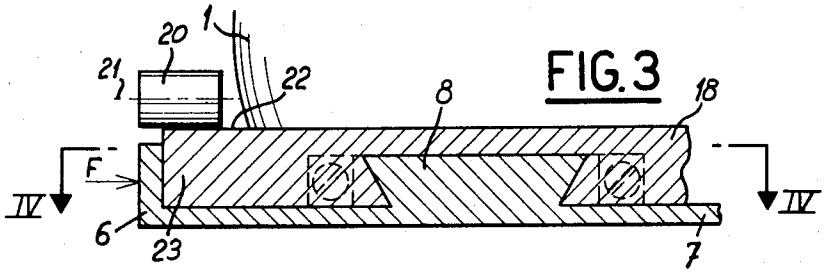
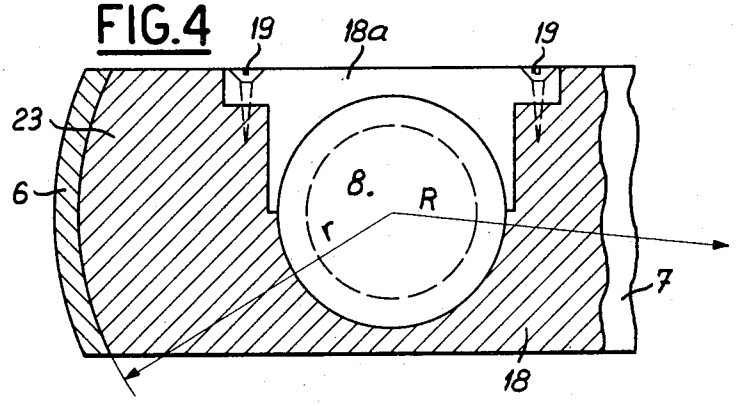


FIG. 3

FIG. 4



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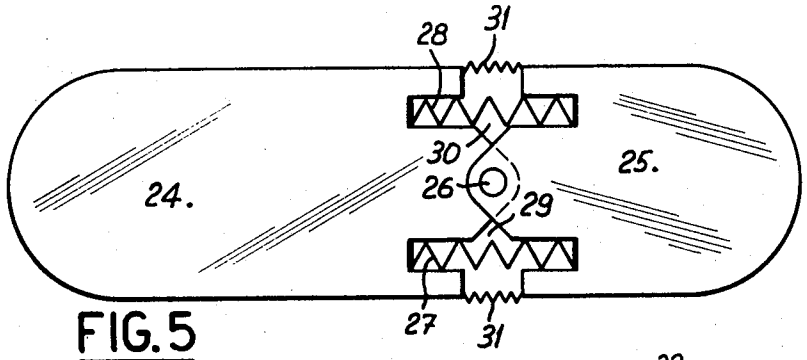


FIG. 5

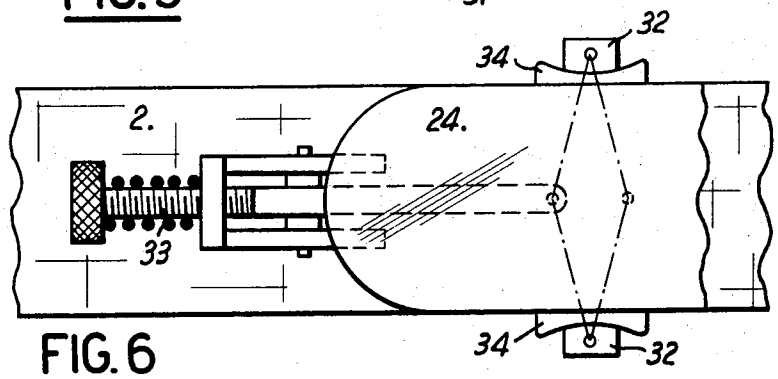


FIG. 6

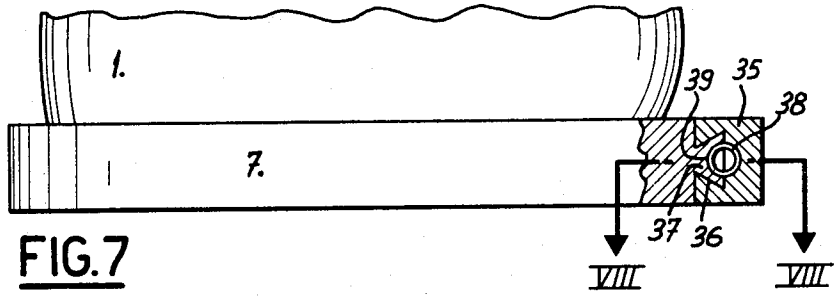
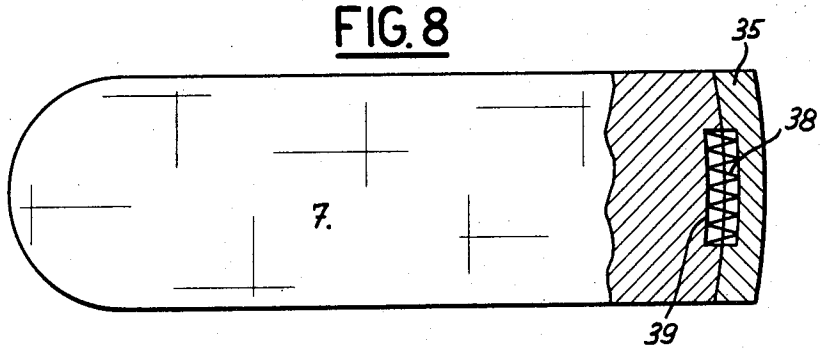


FIG. 7

FIG. 8



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SKI BOOT

Certain known ski bindings incorporate a release mechanism which releases the boot after an elastic displacement during which the boot is urged back towards its normal rest position.

For example, toe bindings of this type thus allow a certain elastic play of the boot transversally of the ski, and act as a shock absorber for small amplitude shocks below a certain limiting value. Toe bindings of this type are thus considered to be more comfortable than the non-elastic types. However, the main advantage of "elastic" binding is that it is possible to safely ski while the binding is regulated with a lower release effort than for the non-elastic type of binding. Consequently, elastic bindings are much safer in use, particularly for falls when the skier is moving at low speeds.

It has also already been proposed to incorporate a safety binding mechanism in the ski boot sole, this mechanism cooperating with a fixed member on the ski. Considering, however, the relatively complex and bulky mechanisms employed in known toe and heel bindings, it is clear that difficulty must arise in housing such mechanisms in the relatively limited volume of the boot sole, especially as the available volume has a substantially flat elongated shape.

Moreover, safety binding mechanisms must be adjustable, and consequently accessible from the exterior, which leads to complication of structure and is detrimental to watertightness which is an important factor in the fidelity and maintenance of correct operation.

The system generally in use at the present time of locating all of the safety release mechanism elements outside of the boot has been found to give satisfactory results, but no advantage is made of the available volume of the boot sole. Indeed, since ski boots and bindings are generally designed and made by entirely independent manufacturers having different requirements and criteria in view, the boots and bindings are not in every respect designed to give an optimum overall performance; for example, the anti-skid sole provided by the boot manufacturer must be modified or completed (for example by the use of an anti-friction plate) so as to have an appropriate transversal slip over the ski to ensure correct operation of the binding.

The converse system, namely locating the entire binding mechanisms in the boot sole, is complex and cannot be considered as a practical proposition.

It is therefore an object of the invention to provide an improved ski boot which, in cooperation with extremely simple ski bindings, gives an overall performance comparable to that obtained with very elaborate binding mechanisms.

According to the invention, there is provided a ski boot comprising an upper and a sole, at least a first part of said sole being secured to the upper, and at least a second part of said sole being movably mounted in relation to said first part and upper, said second part at least partially protruding laterally from the upper so as to form means for cooperation with a binding device, and elastic means tending to maintain said second part in a rest position.

The accompanying drawings show, schematically and by way of example, several embodiments of ski boots according to the invention. In the drawings:

FIG. 1 is an elevational view, partly in cross-section, of a first embodiment of boot according to the invention attached to a ski;

FIG. 2 is a cross-section along line II—II of FIG. 1;

FIG. 3 is a partial cross-section through a longitudinal vertical plane of a second embodiment;

FIG. 4 is a cross-section along line IV—IV of FIG. 3;

FIG. 5 is a schematized horizontal cross-section through the sole of a third embodiment of boot;

FIG. 6 is a schematic plan view showing attachment of a boot according to the invention to a ski by means of a particular type of binding device;

FIG. 7 is an elevational view, partly in longitudinal cross-section, of a fourth embodiment of boot according to the invention; and

FIG. 8 is a cross-section along line VIII—VIII of FIG. 7.

Referring to FIGS. 1 and 2, a ski boot 1 is shown fixed onto a ski 2 by means of a toe binding member 3 and a heel binding member 4 engaging respectively on protruding parts 5 and 6 of a lower part 7 of the sole of boot 1. The binding members are shown in a purely schematic manner, and the lower part 7 of the boot sole can rest on the surface of the ski 2, as shown, or can rest or be supported above the surface of the ski, or can be supported on an anti-friction plate. The lower part 7 of the boot sole carries a pin 8 which is located substantially under the center of the heel portion of the boot, and aligned approximately along the axis of the lower part of skier's leg. A main part 1' of the boot sole, to which the upper or shell of the boot 1 is secured, is pivotally mounted to the lower part 7 of the sole about pin 8. The lower part 7 of the sole also carries two external stops 9 and 10 and two internal stops 11 and 12, these stops being housed in a recess in the main part 1' of the sole. The stops 11 and 12 have the general shape of a letter U the branches of which are horizontal and open in the direction of the pin 8, the U-shaped stops 11 and 12 being of sufficient dimensions to allow passage therethrough of a projection 13 extending forwardly from the rear of the main part 1' of the sole. Projection 13 is thus angularly solid with the upper or shell of the boot 1. A spiral compression spring 14 is fitted between the stops 9 and 11, and a like spiral compression spring 15 between the stops 10 and 12. A rod 16, passing through the springs 14 and 15, joins the stops 9 and 10 and serves to hold the springs 14 and 15 in place. Projection 13 is provided with an elongated aperture 17 for the passage of rod 16, aperture 17 being of a sufficient cross-sectional size to allow displacement of the projection 13 along the rod 16 upon angular movement of the main part 1' of the sole relative to the lower part 7 by pivoting about pin 8.

As shown on the left hand part of FIG. 1, the protruding part 6 of the lower part 7 of the sole is upturned and covers the protruding rear edge of the sole, which serves to vertically fix the lower part 7 onto the main part 1' of the sole. The protruding part 6 and the part of the heel binding member 4 cooperating therewith are both curved in the horizontal plane (see FIG. 2) about a radius r centered on the pivot pin 8, whilst the front protruding part 5 and the part of the toe binding member 3 cooperating therewith are curved in the horizontal plane about a radius R also centered about the pivot pin 8.

In the case of a torsional effort acting on the skier's leg and tending to turn the boot **1** about the ski **2**, the upper or shell of the boot **1** together with the main portion **1'** of the sole can pivot elastically in one direction or the other about pin **8**, projection **13** passing through one of the stops **11** or **12** and bearing against the spring **14** or **15** which is compressed towards the stop **9** or **10** respectively.

The upper or shell of the boot **1** has no direct contact either with the heel binding member **4**, since the part **6** is upturned to cover part **1'** of the sole, or with the toe binding member **3**, since only the protruding part **5** joined to the lower part **7** of the sole is in engagement with member **3**.

Of course, the toe binding member **3** can be a fixed stop, in which case the heel binding member **4** is of a type allowing safe release of the boot in all directions, i.e., vertically or laterally. Since neither toe nor heel binding member need allow elastic movement of the boot in the horizontal plane prior to release, they can be of particularly simple construction. Moreover, friction during the elastic displacement is localized between the main part **1'** and the lower part **7** of the sole, which is a zone in which the friction can easily be arranged at a desired fixed value, in comparison, for example, with the bottom of the sole which may be covered with snow, ice or mud. Moreover, the binding members **3** and **4** only engage with stationary parts **5** and **6** respectively of the boot **1**. Consequently, there is no unwanted friction between the binding members and the boot sole or between the boot sole and the ski during elastic displacement prior to release of the boot **1** when the binding mechanisms release to free the boot. Therefore, not only is the amount of "uncontrollable" friction reduced, but the path of movement of the lower part **7** of the boot sole during release can limited.

FIGS. **3** and **4** show a variant of the embodiment according to FIGS. **1** and **2** in which holding of the lower part **7** of the sole to the main part **18** of the sole, in the vertical direction, is obtained by providing the pivot pin **8** with a special shape. This pin **8** is formed integral with the part **7** with an outwardly upwardly flaring truncated-conical shape and is housed in a corresponding recess of the main part **18** of the sole. To enable fixing of the pin **8** and part **7**, part **18** is provided with a section **18*a*** removably fitted thereto by means of screws **19**. Moreover, the heel binding member (not shown) is provided with an upper jaw formed, for example, by a roller **20** capable of rotation about a horizontal axis **21**. Such a roller **20** enables reduction, and practically elimination, of friction between the heel binding member and the surface **22** of the main part **18** of the sole with which it engages.

Arrow F represents the thrust or reaction of the binding on the end part **6** of the lower part **7** of the boot sole. Of course, as for the embodiment of FIGS. **1** and **2**, the end parts **5** (not shown) and **6** of the lower part **7** of the sole as well as the corresponding ends (for example **23**) of the main part **7** of the sole are shaped with curvatures of radii *r* and R respectively about the pin **8**.

FIG. **5** shows a third embodiment in which the sole of the boot **1** comprises two portions **24** and **25** articulated together about a vertical pin **26**. The portions **24** and **25** of the sole are maintained aligned by ealstic means constituted by two springs **27** and **28** lodged in housings **29** and **30** respectively, provided between the two portions **24** and **25**. After any torsional urging, the springs **27** and **28** ensure elastic return of the portions into alignment. Packing members or joints **31** are disposed between the portions **24** and **25** to ensure fluid and dust tightness to thereby protect the articulation mechanism.

The upper or shell of a boot is fixed to such a sole, for example with the toe part of the upper rigidly fixed to the portion **25** which therefore forms the toe part of the sole; the portion **24** of the sole being capable of elastic displacement in relation to the rest of the boot by pivoting about pin **26**.

The above-described embodiments of boot are not limited to use in conjunction with any particular type of binding or set of bindings. Use with the preferred set of bindings described with reference to FIG. **1**, and one member of which is of a type allowing an non-elastic lateral release, is not necessary. Such a boot could be used, for example, in conjunction with a binding of the gripper-clip type. Such an arrangement is schematically shown in FIG. **6** in which a ski **2** is provided with a gripper-clip type of binding **32** the control of which is provided by a lever **33**. A piece **34**, preferably of metal, is fitted on either side of the portion **24** (for a sole of the type of FIG. **5**) or under the part **7** of the sole (for a boot of the type shown in FIG. **1**).

FIGS. **7** and **8** show a fourth embodiment of boot **1** provided with a rigid sole **7** which is the same as a conventional sole over the greater part of its length. However, a part **35** forming the toe end of the sole is mounted so as to be able to slide transversally in relation to the rest of the boot against the action of elastic means tending to keep the part **35** centered. Part **35** has a groove **36** of dovetail cross-section engaged on a rib **37** of corresponding shape protruding from the forward edge of sole **7**. Both groove **36** and rib **37** are curved, as shown in FIG. **8**. A housing **39** is provided in the central part of the groove **36** and rib **37** and contains a compression spring **39** which tends to center the part **35** on the sole **7**.

The elasticity of fixation of the boot **1** onto the ski **2** is thus provided by this spring **39**, while any type of binding with a non-elastic lateral release mechanism is used to releasably retain the part **35** of the boot on the ski, and any appropriate type of heel binding is employed.

It should be noted that the strength and tension of the springs located inside the sole to allow elastic displacement of a part thereof are chosen such that the skier will not be hampered or inconvenienced when walking with the boots on.

I claim:

1. A ski boot comprising an upper and a sole, at least a first part of said sole being secured to the upper, and at least a second part of said sole being movably mounted in relation to said first part and upper, said second part at least partially protruding laterally from the upper so as to form means for cooperation with a binding device, and elastic means tending to maintain said second part in a rest position.

2. A boot according to claim **1**, in which said second part of the sole extends over the lower surface of the sole, and comprising means pivotally mounting said

second part to an upper first part of the sole about a vertical axis.

3. A boot according to claim 2, in which said second part of the sole comprises abutment means for limiting the angular pivoting of said first part in relation thereto.

4. A boot according to claim 3, in which said abutment means comprise two first stops housed in a recess in said first part of the sole, said second part of the sole comprising a projection extending between said first stops, two second stops located between the first stops and on either side of said projection when said second part is in a rest position, and a spring between each adjacent pair of first and second stops, said projection being able to pass through the second stops upon relative angular displacement of the first and second parts to move the second part away from the rest position and move towards a first stop against the urging of one of said springs.

5. A boot according to claim 2, in which said vertical axis extends through a heel portion of the boot and substantially along a central axis through the lower part of a leg of a wearer.

6. A boot according to claim 2, in which an end of said second part of the sole extends around and over an edge of said first part protruding laterally from said upper, said edge and said end of the second part being curved about said vertical axis to allow relative angular displacement of said first and second parts.

7. A boot according to claim 2, in which said means for pivotally mounting said first and second parts of the sole comprises a trunco-conical pin flaring outwardly and upwardly from said second part, and a recess in said first part pivotally accommodating said pin.

8. A boot according to claim 1, in which said second part forms one end of said sole, cooperating means are provided on the first and second parts to allow said second part to be transversally slidable in relation to said first part, and said elastic means tend to maintain said second part in a centered rest position.

9. A boot according to claim 8, in which said elastic means comprise a spring housed in facing recesses in the first and second parts.

10. A boot according to claim 1, in which said first and second parts form first and second end parts of the sole, means are provided for pivotally mounting said first and second parts about a vertical axis, and said elastic means tend to maintain the first and second parts in an aligned rest position.

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