

[54] **SKI BOOT**

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[58] Field of Search 36/2.5 R, 2.5 AL; 280/11.35

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[57] **ABSTRACT**

Release device for reception into the sole of a ski boot. An engaging unit is provided for location in the sole of a ski boot and same cooperates with upstanding means fixedly related to the upper surface of a ski. When the ski boot is parallel with the longitudinal axis of the ski, the holder operates in a normal manner to resist forces tending to urge the ski boot directly upwardly. However, when the ski boot is partially turned with respect to the center line of the ski, then the latching mechanism is moved partway toward its release position and a less total force is required to effect the safety release. Thus, in a twisting or diagonal fall, when the bone of the skier is subjected to both bending and torsional forces, the release takes place at lesser force and the skier's safety is thereby enhanced.

12 Claims, 9 Drawing Figures

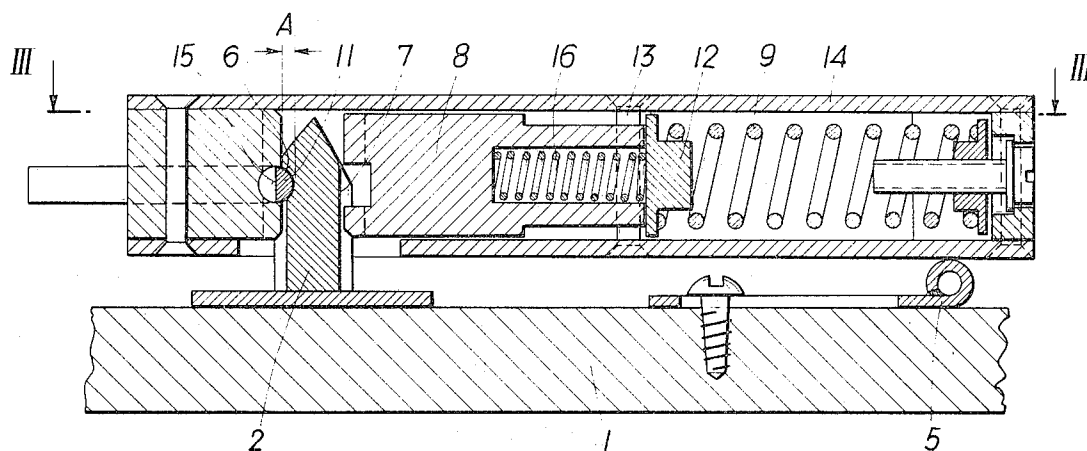


FIG. 1

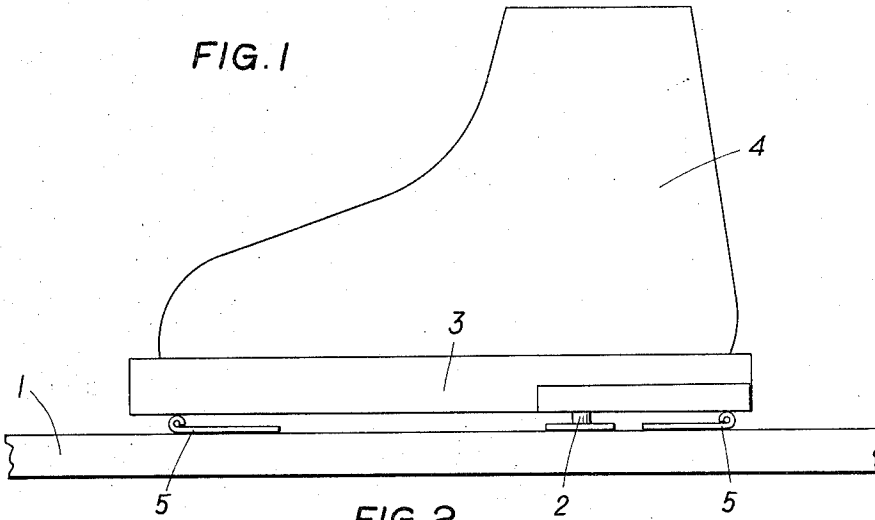


FIG. 2

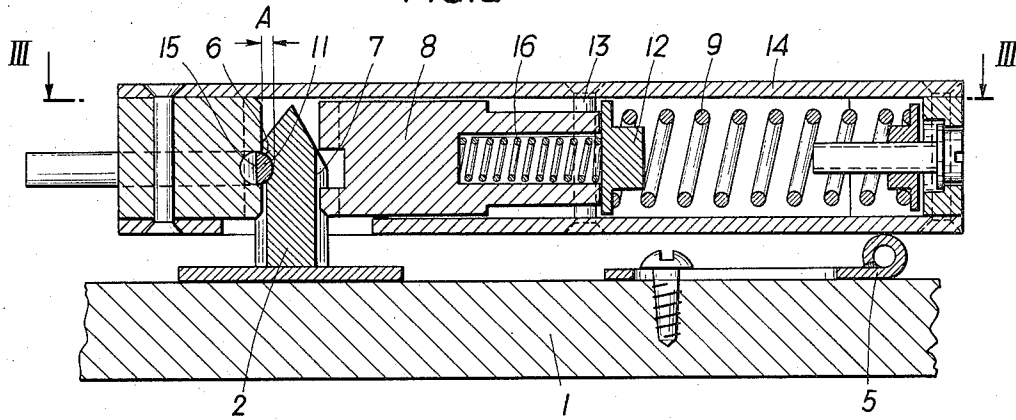


FIG. 3

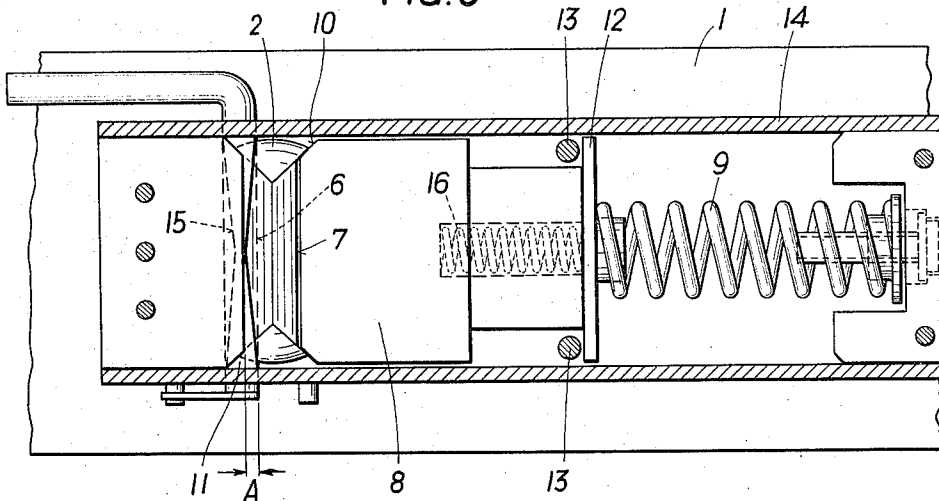


FIG. 4

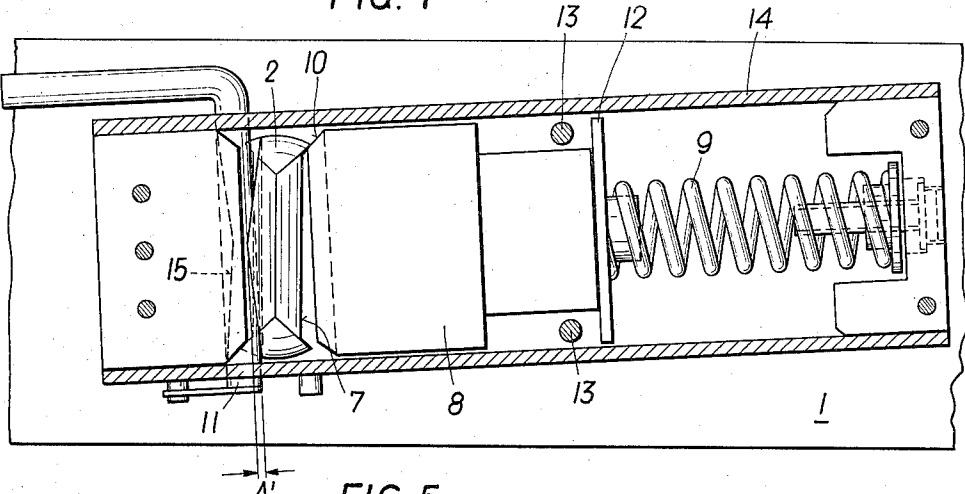


FIG. 5

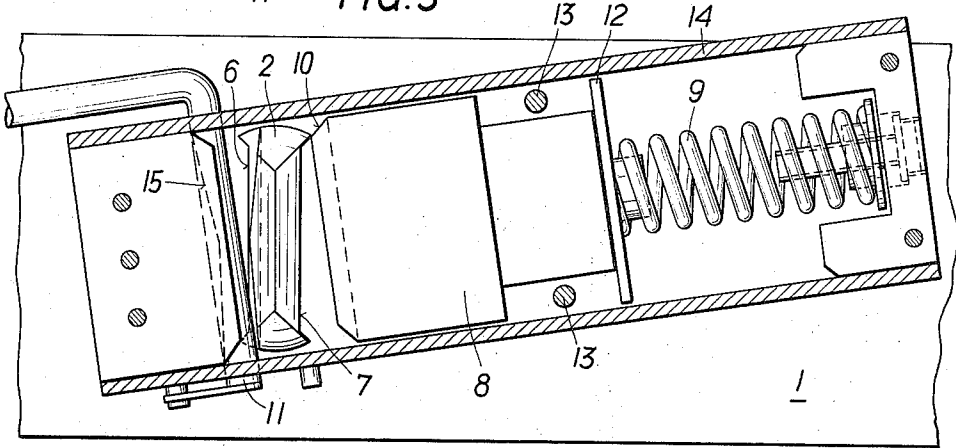


FIG. 6

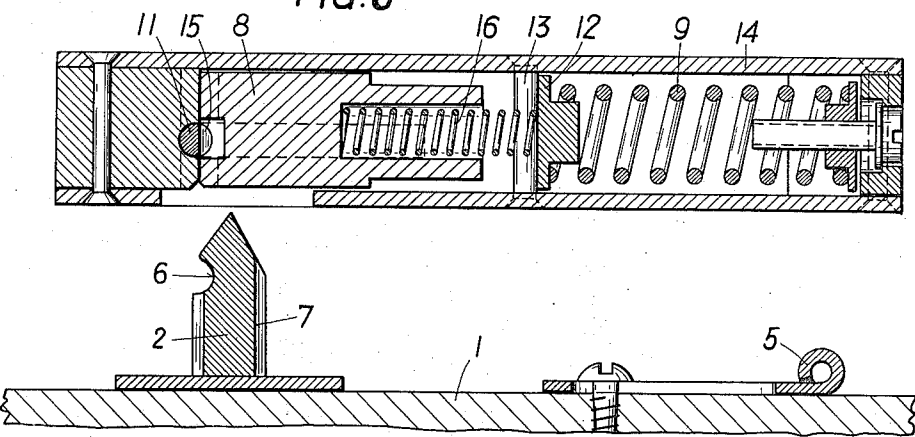


FIG. 7

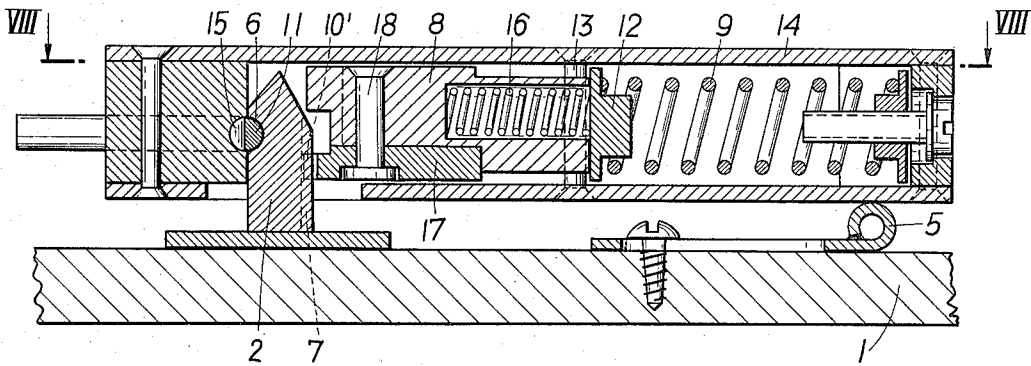


FIG. 8

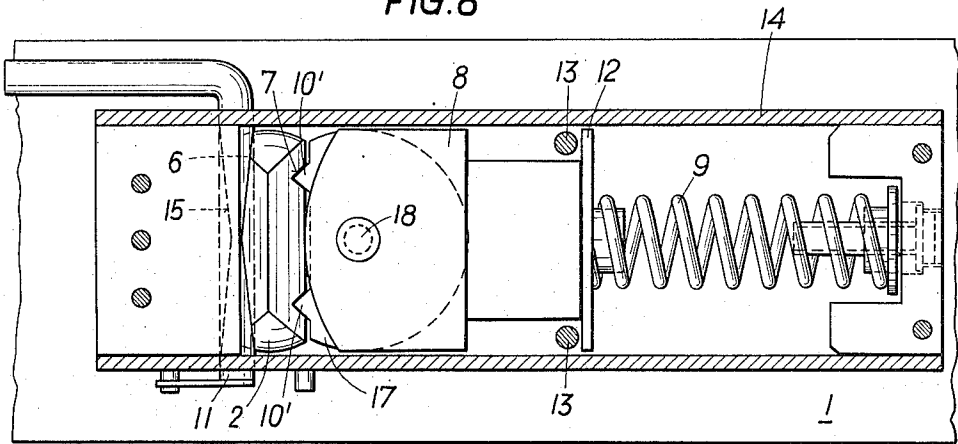
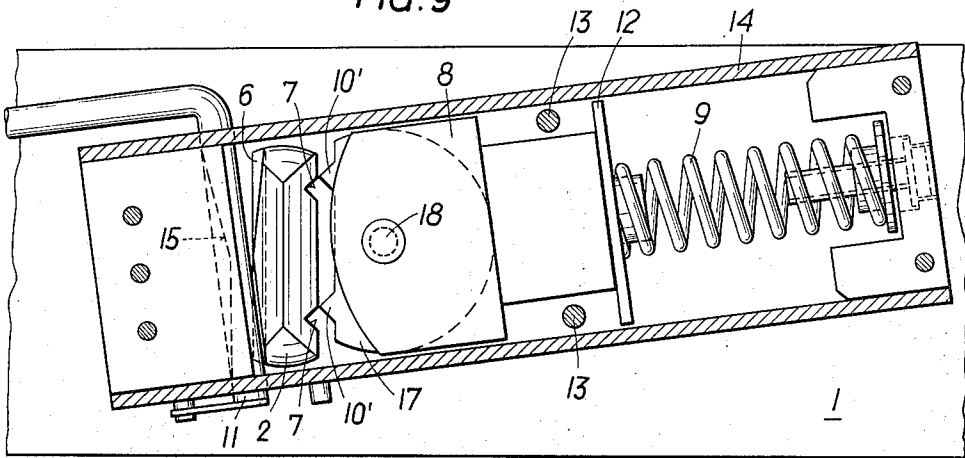


FIG. 9



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SKI BOOT

The invention relates to a ski boot in the sole of which is arranged at least one spring-loaded locking element movable in the longitudinal direction of the ski, 5 which locking element engages suitable cooperative means in a lock carrier secured on the ski.

Ski boots are known in the sole of which spring-loaded locking elements are supported which engage a locking recess located in extension means mounted on the ski. However, such a holding mechanism has the disadvantage that it is impossible to control with any reasonable accuracy forces which will effect release, particularly in the case of diagonal falls.

As is known, the permissible stress, particularly bending stress for any structural member, including human bones, decreases if a torsional stress should occur at the same time. Thus, during a diagonal fall there occurs a torsional stress which, depending on its magnitude, requires that the force needed to effect a forward fall release must be correspondingly diminished. The diagonal forces required to effect release show in a diagram an approximately elliptical curve between the force required for release during a fall forwardly and the force so required during a twisting fall. The same is true also during a diagonal fall backwardly in relation to a twisting fall.

The purpose of the invention is to produce a release mechanism which takes into consideration these relationships and the invention is characterized in its provision of a lock carrier which has in a conventional manner locking recesses on its mutually remote sides in which the upper surface of one locking recess engages a projection arranged within the sole of the boot, which engagement is reduced in relation to the action of a second locking means and further characterized in that the spring-loaded locking element has surfaces which are inclined in the direction of movement and same engages by these surfaces the second locking recess on the lock carrier.

By diminishing the extent of engagement as above mentioned, the force required for release in an upward direction is also diminished during a diagonal fall in relationship to the torsion stress then also appearing. If only one stress in an upward direction occurs, then the projection must overcome a substantial magnitude of engagement. However, if a twisting release occurs, the ski boot, after the inclined surfaces of the spring-loaded locking element have disengaged the associated locking recess, can release easily since now not only the twisting resistance has been reduced considerably but also at the same time the engagement of the projection is diminished.

The subject matter of the invention is illustrated by several exemplary embodiments in the drawings, in which:

FIG. 1 illustrates the arrangement of a ski boot on a ski.

FIG. 2 is a central cross-sectional view of the holding and release mechanism of the ski boot.

FIG. 3 is a cross-sectional view along the line III—III of FIG. 2.

FIGS. 4 and 5 illustrate the same cross-sectional view as FIG. 3 in two different release positions.

FIG. 6 is the same cross-sectional view as FIG. 2, wherein, however, the ski and boot are separate.

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FIG. 7 is a central cross-sectional view of a further embodiment.

FIG. 8 is a cross-sectional view along the line VIII—VIII of FIG. 7, and

FIG. 9 is the same cross-sectional view as FIG. 8, however, in a rotated position.

As will be seen in FIG. 1, the post 2 is arranged on the ski 1, which post is engaged by a mechanism which is provided in the sole 3 of the boot 4. The boot 4 is herein not directly positioned on the ski 1 but on supports 5 which are adjustable in the longitudinal direction on the ski. Due to this adjustability of the supports 5, the lever arm can be changed in relation to the upwardly extending post 2 and thus the release moment can be changed during a fall in forward or backward direction and also a suitable adjustment to the size of the boot can be made.

According to FIGS. 2 and 3, the post 2 comprises a lock carrier which has on its oppositely positioned sides locking recesses 6, 7. The locking element 8 is urged by the locking spring 9 into the locking recess 7 so that its surfaces 10, which are inclined to the direction of movement, engage the adjacent surfaces of the post 2. The locking spring 9 also causes the rod part 11 to be pulled into the locking recess 6. In the illustrated position, the locking element 8 is supported directly on a slide 12 which is loaded by the spring 9. This slide 12 is thus in its operating position spaced from the two bolts 13 which serve as stops.

During a forward or backward fall, the boot is pulled upwardly and thus also pulls upwardly the housing 14 which contains the release mechanism. In this manner, the rod 11 pulls the housing 14 against the force of the spring 9 sufficiently forwardly to release its engagement with the locking recess 6. Now the housing 14 and with it the boot can be pulled off upwardly since after releasing the lock members 6, 11 it is necessary only to overcome the friction between lock carrier 2 and the bolt 6 and also between the locking member 8 and the locking recess 7.

As already mentioned, a diagonal fall consists essentially of a twisting and also of either a forward or backward fall. In FIG. 4 the boot and thus the housing 14 which contains the mechanism is slightly rotated relative to the ski 1. This diminishes the engagement A' between the rod 11 with recess 6 as compared to the corresponding engagement A in FIG. 3. Thus corresponding to the requirements during a diagonal fall, depending on the amount of angle between the direction of fall and the center line of the ski, the force required for release of the rod 11 is correspondingly diminished.

FIG. 5 illustrates a twisting release. The surfaces 10 of the locking element 8 will in such a case slide out from the locking recess 7 of the lock carrier 2. A wedge-shaped effect is obtained through the inclination of the surfaces 10 through which the force of the locking spring 9 is increased. As soon as one of the inclined surfaces 10 disengages the associated locking recess 7, the wedge action is no longer effective through which at this point a substantially easier twisting becomes possible. At the same time the rod 11 is completely released from the locking recess 6.

According to FIG. 6, the lever-like extension of the rod 11 has been pivoted for approximately 180°. The rod 11 has a flat part 15 which in this position is so related to the locking recess 6 that during an upward movement, for example when the skis are to be taken

off, the rod no longer provides any obstacle. If the boot and thus the housing 14 is moved upwardly, the lock carrier 2 moves out of the housing 14. The locking spring 9 now presses the slide 12 against the stops 13 and the relatively weak spring 16 moves the locking element 8 forwardly sufficiently that no opening remains in the downward direction and thus the penetration of ice, snow, dirt and the like is prevented. The force of the spring 16 should be only enough that it can move the locking element 8 and can hold same in the position shown in FIG. 6.

The embodiment of FIGS. 7 to 9 corresponds in its basic structure and in the operation substantially to the first exemplary embodiment. Therefore the same parts have the same reference numerals. A difference exists substantially only in that a locking disk 17 is supported pivotably about a bolt 18 on the locking element and has two extensions which are provided with inclined surfaces 10', which extensions engage two locking recesses 7'. During a twisting release or during a partial twisting release, as takes place during a diagonal fall, there again occurs the wedge-shaped effect of the inclined surfaces 10' of the extensions. Thus as has been mentioned above the same effect as in the construction according to FIGS. 1 to 6 is obtained.

The invention is not limited to the illustrated embodiments. A number of further embodiments exist which lie within the scope of the invention. For example, the locking spring could also be exchanged if desired to change the force required for release.

The range of pivoting of the rod between the position of use and the position of nonuse can of course be increased or decreased. Further there exists the possibility of installing a warning device which sends out a signal as soon as the skier has stepped into the binding if the lever of the rod remains in the nonuse position.

In place of the illustrated supports it is of course also possible to use other supports, for example rollers with axes which are parallel to the ski or disks with axes which are vertical to the ski or slightly vertically inclined to same. It is also possible to construct the supports to form a radius of curvature with respect to the lock carrier. A further possibility consists in curving the supports in such a manner that with an increasing twisting of the ski boot relative to the ski the lever arm is reduced in relation to the lock carrier. The latter is thus adjusted appropriately in response to diagonal falls.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A releasable ski binding for releasably securing the sole of a ski boot to a ski, comprising:

post means fixedly secured to said ski and extending upwardly therefrom and having means defining a pair of locking recesses thereon each facing in opposite longitudinal directions relative to said ski; housing means mounted on the sole of said ski boot; abutment means mounted on said housing means; first locking means mounted on said housing means and adapted to move longitudinally of said ski boot toward and away from said abutment means, an opening being defined between said abutment means and said first locking means when said first locking means is moved away from said abutment means for receiving said post means therein, said first locking means being adapted to engage said

post means, while in said opening, in one of said locking recesses;

second locking means mounted on said housing means and adapted to releasably engage said post means in the other of said locking recesses when said first locking means is engaged with said post means and effecting a coupling of said housing means to said post means when the longitudinal axis of said sole of said ski boot is parallel to the longitudinal axis of said ski; and

means for effecting a separation of said second locking means from said post means to thereby effect a decrease in the coupling force holding said ski boot on said ski whenever said longitudinal axis of said sole of said ski boot is twisted out of parallel relationship with the longitudinal axis of said ski.

2. A releasable ski binding according to claim 1, wherein said second locking means comprises a cylindrical rod rotatably mounted on said housing means about a substantially horizontal axis and positioned adjacent said abutment means; and

wherein said other of said locking recesses comprises a semicircular recess opening outwardly of said post means, the axis of which extends perpendicular to the vertical axis of said post means and is of a diameter adapted to receive said rod therein.

3. A releasable ski binding according to claim 2, wherein said abutment means includes means defining a recess therein opening outwardly of said abutment means in a direction facing said post means and aligned with said semicircular recess, said recess having said rod rotatably mounted therein.

4. A releasable ski binding according to claim 3, wherein said rod has means defining a flat part on one side thereof, said flat part, when in a first position facing said post means, permitting an obstacle free relative vertical movement between said post means and said housing means and when said flat part is rotated to a second position 180° from said first position, the cylindrical part of said rod being received in said other of said locking recesses to define an obstacle to resist any relative vertical movement between said post means and said housing means.

5. A releasable ski binding according to claim 1, wherein said first locking means comprises a locking element, means supporting said locking element for sliding movement on said housing means in the longitudinal direction of said ski boot and resilient means for urging said locking element toward said abutment means.

6. A releasable ski binding according to claim 5, wherein said one of said locking recesses comprises a first vertically extending channel having a pair of horizontally spaced sidewalls; and

wherein said locking element is urged into said first channel between said sidewalls by said resilient means.

7. A releasable ski binding according to claim 6, wherein said other of said locking recesses comprises a second vertically extending channel having a pair of horizontally spaced sidewalls; and

wherein said abutment means is adapted to be received in said second channel between said sidewalls.

8. A releasable ski binding according to claim 5, wherein said first locking means further comprises a slide member separate from said locking element and

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adapted to slide on said housing means in said longitudinal direction and stop means for limiting the longitudinal sliding movement of said slide member toward said abutment means; and

wherein said resilient means comprises a first spring positioned between said housing means and said slide member to urge said slide member toward said stop means and said abutment means and a second spring positioned between said slide member and said locking element.

9. A releasable ski binding according to claim 8, wherein said second spring is weaker than said first spring.

10. A releasable ski binding according to claim 1, including a pair of supports slidably secured to said ski on opposite longitudinal sides of said post means and slidable in the longitudinal direction of said ski and clamp

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means for fixedly clamping said supports into a desired position on said ski relative to said post means.

11. A releasable ski binding according to claim 10, wherein each of said supports includes a surface spaced upwardly from the upper surface of said ski; and

wherein said supports are positioned inwardly from the toe and heel of said sole of said ski boot to support said ski boot in a vertically spaced relation from said ski boot.

12. A releasable ski binding according to claim 11, wherein the longitudinal spacing between said supports and said post means defines a leverage arrangement and thereby the moment required to effect a release of the engagement between said post means and said second locking means.

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