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Frechin

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[45] **Oct. 28, 1975**

[54] **SAFETY BINDING FOR SKIS**

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[30] **Foreign Application Priority Data**

Feb. 1, 1973 France 73.03589

[52] **U.S. Cl.** ..... **280/11.35 T**

[51] **Int. Cl.²** **A63C 9/08**

[58] **Field of Search** ..... 280/11.35 T

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Attorney, Agent, or Firm—Robert E. Burns; Emmanuel J. Lobato; Bruce L. Adams

[57] **ABSTRACT**

A ski binding comprises a base and a jaw pivotally mounted on the base for engaging a ski boot. A releasable locking mechanism locks the jaw from pivoting to secure the ski boot to a ski and releases the jaw to pivot to release the ski boot if a lateral force having a magnitude greater than a selected predetermined magnitude of a break away force is applied thereto. The releasable locking mechanism is adjustable by a user of the ski binding to set the break away force and the ski binding is provided with an indicator mechanism to indicate the break away force for which the binding is set. The indicator mechanism includes a marker moveable relative to indicia indicating the break away force and the marker and indicia are disposed for viewing thereof by the user of the binding at a surface of the jaw or the base opposite the ski.

1 Claim, 6 Drawing Figures

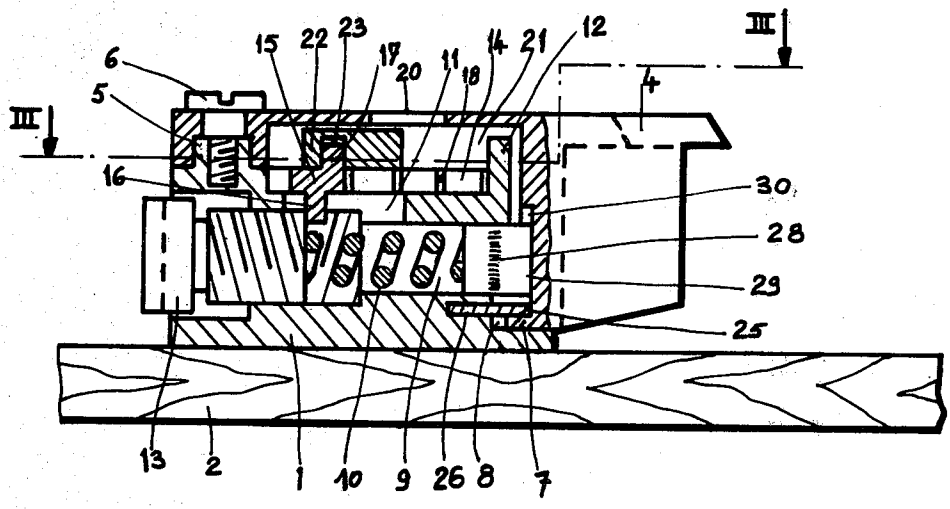

FIG. 1

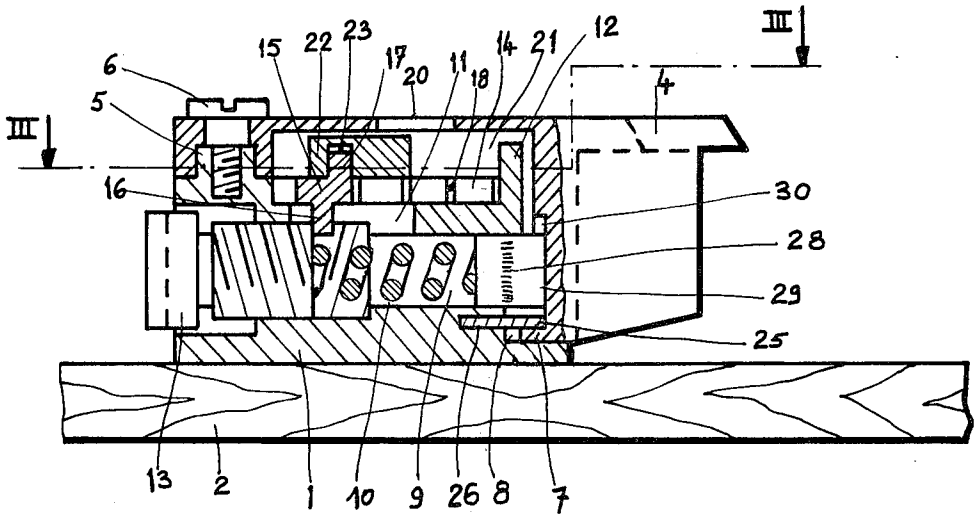
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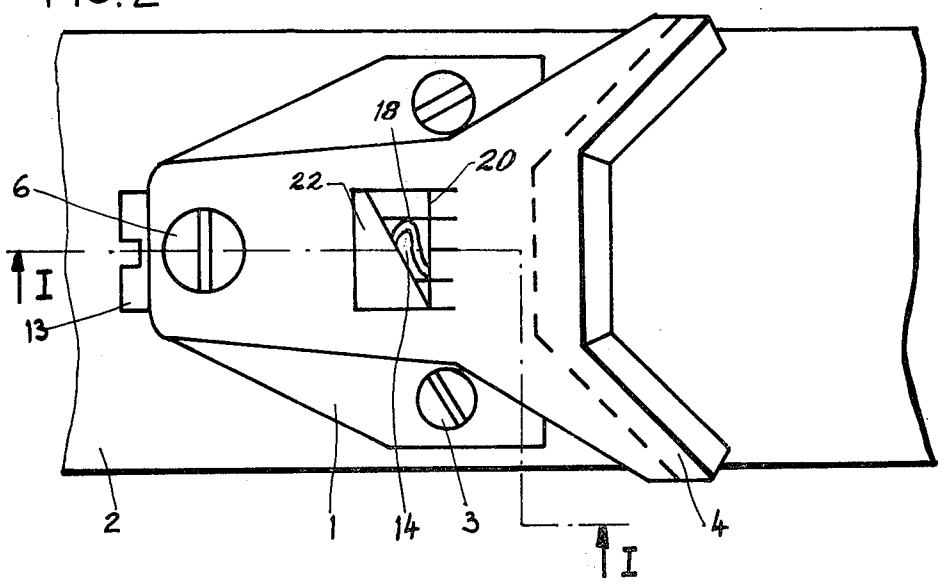
FIG. 2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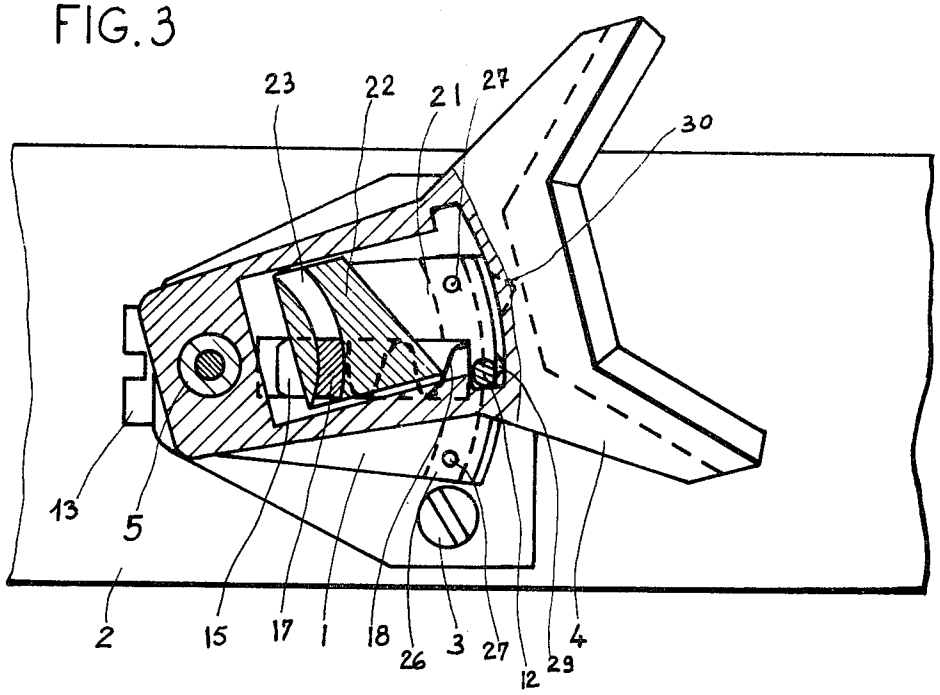
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FIG. 4

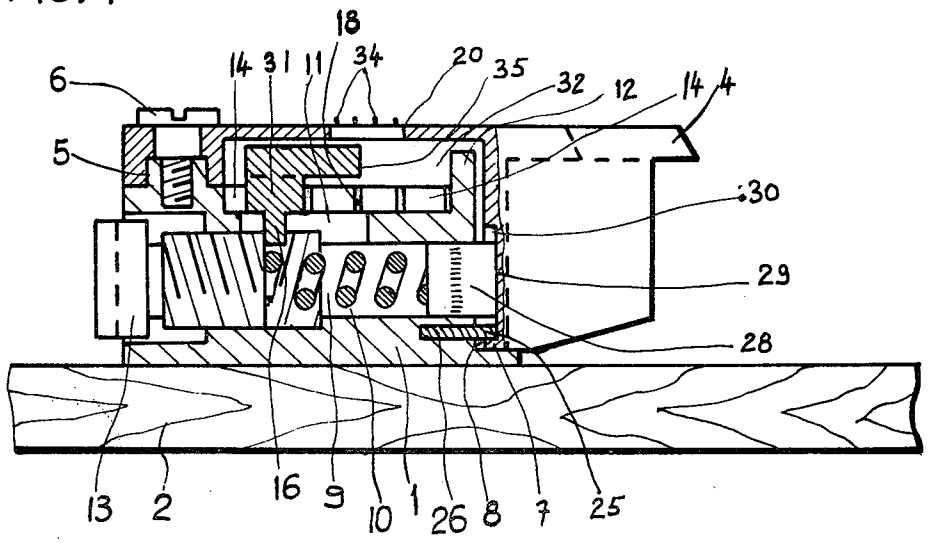
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FIG. 5

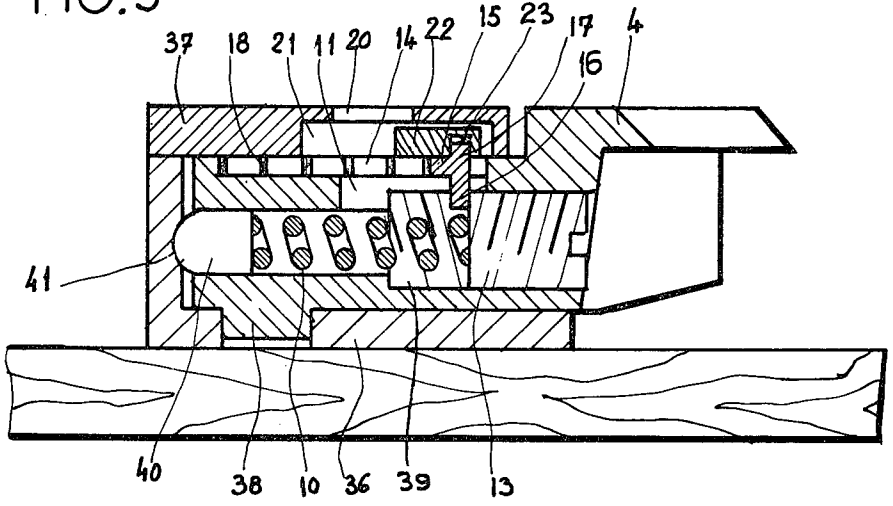
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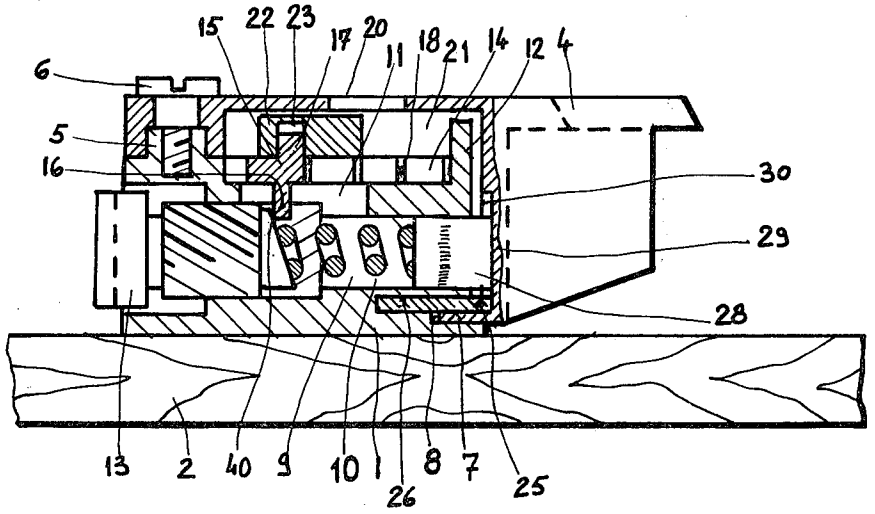
FIG. 6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SAFETY BINDING FOR SKIS

BACKGROUND OF THE INVENTION

This invention relates generally to ski bindings for securing a ski boot to a ski and more particularly to a new and improved adjustable ski binding.

A ski boot is secured to a ski by a safety binding that will release the ski boot from the ski if an excessive lateral force is applied between the boot and the ski. The magnitude of the force that is deemed excessive is dependent upon the weight of the skier and the conditions under which he is skiing. In order to prevent injury to a skier using a particular binding, ski bindings are generally adjustable to allow the skier to set the magnitude of the lateral force or break away at which the binding will release the ski boot.

These ski bindings generally comprise a base which is attached to a ski and a jaw pivotally mounted on the base for engaging the ski boot. The jaws are normally locked in a central position to attach the ski boot to the ski until a lateral force having a magnitude greater than the break away force of the binding is applied between the boot and the ski. The jaw then pivots to release the boot and allow it to separate from the ski.

In order to allow a binding to be used by skiers of varying weights and under different conditions, the binding may be adjusted to set the break away force thereof. An indicator integral with the binding is provided to indicate to the skier the break away force to which the binding is set.

In known ski bindings of this type, for example the ski bindings described in French patents Nos. **1,447,799** and **2,051,049,** an end of the jaw opposite the boot it engages pivots on a vertical shaft and is disposed overlying a base of the binding. The base has a releasable locking mechanism for holding and releasing the jaw according to the magnitude of a lateral force applied thereto. Because the jaw is disposed overlying the base of the binding, an indicator for indicating the magnitude of lateral force at which the ski boot will be released is disposed on a lateral face of the binding. Therefore, it is difficult for a skier to read the indicator when he is wearing skis.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide a new and improved safety binding for skis that can be conveniently and accurately adjusted.

Another object is to provide a new safety binding for skis which may be accurately adjusted by a skier while skis are being worn and is readily readable as to indications thereon.

In accordance with the invention, an adjustable ski binding is provided with an indicator for indicating a magnitude of an applied lateral force at which the binding will release a ski boot. The ski binding of the present invention comprises a base having a jaw pivotally mounted thereon for engaging a ski boot. Releasable locking means maintains the jaw in a locked position to secure the ski boot to a ski, and releases the jaw to pivot to release the ski boot if a lateral force or a break away force, having a magnitude greater than a selected predetermined magnitude, is applied between the ski boot and the ski. The releasable locking means comprises adjusting means for manually setting the predetermined lateral force at which the jaws of the binding will pivot to release the ski boot.

Indicator means cooperate with the adjusting means and comprise a marker moveable relative to indicia indicating the magnitude of applied lateral force at which the binding will release the ski boot. In one embodiment of the invention, a portion of the jaw overlies the base of the binding and is provided with an opening therethrough. The marker of the indicator means is disposed between the jaw and the base of the binding and opposite the opening through the jaw, and is displaced in response to setting changes of the adjusting means.

The marker has a straight edge which meets an edge of the opening in the jaw. A point at which the straight edge of the marker meets the edge of the opening changes as the marker is displaced in response to setting changes of the adjusting means. Indicia along the edge of the opening allow a user to determine a position of the marker and to determine displacements of the marker as the break away force is adjusted.

In another embodiment of the invention, the indicator has an arcuate edge which is viewed through the opening in the jaw and indicates the setting of the adjusting means.

In still another embodiment of the invention, a portion of the jaw overlies a lower portion of the base and an upper portion of the base overlies the portion of jaw. The portion of the base overlying the jaw is provided with an opening therein and the marker is disposed opposite the opening between the upper portion of the base and the jaw. As in the previously described embodiments, the marker is displaced in response to setting of the adjusting means to indicate the break away force to which the binding is set. The position of the marker is read against indicia provided on the upper portion of the base adjacent the opening to indicate setting of the adjusting means.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the safety bindings in accordance with the present invention will be better understood as described in the following specification and appended claims, in conjunction with the following drawings in which:

FIG. **1** is an elevation view of a first embodiment of the invention partially in section;

FIG. **2** is a plan view of an embodiment of the invention illustrated in FIG. **1** with the jaw in the locked position;

FIG. **3** is a plan view of the embodiment of the invention illustrated in FIG. **1** partially in section with the jaw illustrated pivoted away from the locked position;

FIG. **4** is an elevation view of a second embodiment of the invention partially in section;

FIG. **5** is an elevation view of a third embodiment of the invention partially in section;

FIG. **6** is an elevation view of a fourth embodiment of the invention partially in section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiment of the invention illustrated in FIGS. **1–3** is a ski binding comprising a base **1,** shown fastened to a ski **2** by screws **3.** A jaw **4** for releasably engaging and holding a ski boot is pivotally mounted on a cylindrical boss **5** rigidly connected, for example integral with, the base **1** and disposed at an end of the base

remote from the ski boot. Jaw 4 is secured to the base 1 by a screw 6 and by a tongue 7 integral with the jaw 4, which engages a corresponding groove 8 in the base 1 opposite the tongue 7. The groove 8 is defined by the base 1 and a rim 25 of a plate 26, disposed in a corresponding recess in the base 1, and held in place by pins 27.

The base 1 is provided with a bore 9 extending longitudinally therethrough. A releasable locking mechanism is disposed within the bore or conduit 9 and may be of any suitable or convenient structure as it is not the object of the present invention. In this embodiment of the present invention, the releasable locking mechanism comprises a cam 28 having a V-shaped end 29 which engages a corresponding V-shaped recess 30 in a surface of the jaw 4 when the jaw is in a central locked position wherein a longitudinal axis of symmetry of the jaw 4 is colinear with a longitudinal axis of symmetry of the base. A face of the cam 28 opposite the V-shaped end 29 is in contact with a compression spring 10, held in compression by an adjusting screw 13. The compression spring 10 applies a force against the cam 28 which maintains the V-shaped end 29 of the cam 28 engaged with the corresponding recess in jaw 4. The force which the spring 10 applies to the cam 28 may be varied by screwing or unscrewing the adjusting screw 13 to vary the compression of the compression spring 10.

The face of the jaw 4 opposite the base 1 is provided with a recess 21. A stop 12 rigidly connected with the base 1, for instance integral therewith, extends into the recess 21 and limits lateral displacement of the jaw 4 if a lateral force of sufficient magnitude to disengage the cam 28 from the jaw 4 is applied between the jaw 4 and the cam 28. In operation, this force is applied to the jaw 4 by the ski boot.

A longitudinal channel 14 disposed in a surface of the base 1 opposite the jaw 4 is in communication with the bore 9 through opening 11. A sliding element 15 comprising a lower finger 16 and an upper finger 17 is disposed in the longitudinal channel 14. A compression spring 18 is also disposed in the channel 14 and applies a force to the sliding element 15 to maintain the lower finger 16 against an end of the adjusting screw 13 adjacent the compression spring 10. Without going beyond the present invention, the contiguous arrangement of the adjusting screw 13 and the lower finger 16 could be maintained by some other means, for instance by providing a circumferential groove in the threaded surface of the screw 13, into which the finger 16 would extend. The compression spring 18 would then be unnecessary.

The upper finger 17 of the sliding element 15 projects into the recess 21. A marker or indicator 22 having a groove 23 with a cross section corresponding to that of the upper finger 17, is disposed in the recess 21 with the upper finger 17 extending into the groove 23. Groove 23 is arcuate (see FIG. 3) and substantially concentric with a longitudinal axis of symmetry of the boss 5 which is an axis of rotation of the jaw 4. When the jaw 4 pivots from its central locked position, the indicator 22 pivots with it. Because the groove 23 is substantially concentric with the axis of rotation of the jaw 4, the indicator 22 is not displaced longitudinally within the recess 21 as the jaw 4 rotates.

An opening or window 20 is provided between the recess 21 and a surface of the jaw opposite the base 1. On the surface of the jaw 4 opposite the base 1, indicia are disposed along one edge of the window 20. An edge of the marker 22 meets the edge of the window along which the indicia are disposed, and the point at which the two edges meet can be read as a position of the indicator 22 within the recess 21.

To understand the operation of the binding, consider it first with the jaw 4 in the central locked position as illustrated in FIG. 2. The jaw 4 is maintained in the central locked position by a cam 28 which is forced by the compression spring 10 to bear against an opposing surface of jaw 4 so that the V-shaped end 29 of the cam 28 engages the corresponding V-shaped recess 30 in the jaw 4 and maintains it in the central locked position. The force with which the cam 28 bears against the jaw 4 determines the magnitude of the break away force at which the cam 28 disengages from the jaw 4 and the jaw 4 pivots away from the central locked position. The force with which the cam 28 bears against the jaw 4 is developed by compressing the compression spring 10 between the cam 28 and the adjusting screw 13. By turning the adjusting screw 13 to displace it inwardly or outwardly the degree of compression of spring 10 is varied and hence the break away force of the jaw 4 is varied and variably set.

Compression spring 18 maintains the lower finger 16 of the sliding element 15 against an end of the adjusting screw 13 as it is longitudinally displaced during setting of the break away force. The sliding element 15 is displaced an equal distance and in the same direction along the longitudinal channel 14. As the sliding element 15 is displaced, the indicator 22 which engages the upper finger 17 of the sliding element 15, is also displaced. This displacement of the marker 22 may be observed through the opening or window 20 and indicates how much the break away force has been changed. The displacement can be accurately determined by observing the change of the point where the edge of the indicator 22 crosses the edge of the window 20 having indicia disposed along its edge.

Because the groove 23 of the indicator 22 in which the upper finger 17 engages is arcuate and substantially concentric with the axis of rotation of the jaw 4, the position of the indicator 22 within the recess 21 will be substantially unchanged as the jaw 4 pivots away from the central locked position. Thus, the indicator indicates the break away force at which the binding is set both when the ski boot is in place and locked by the binding, or when the ski boot has been released by the binding and the jaw 4 is in an unlocked position. This latter condition is illustrated in FIG. 3.

A second embodiment of the present invention is illustrated in FIG. 4. In order to simplify description of the second embodiment, corresponding parts of the first and second embodiments of the present invention are identified by the same reference numerals. In this embodiment, the sliding element 15 is replaced by a marker 31, which slides in the longitudinal channel 14, and a recess 32, which corresponds to the recess 21 of the embodiment of the invention illustrated in FIGS. 1–3, is sufficiently wide to allow the jaw 4 to pivot without engaging the marker 31. An edge 35 of the marker 31 has the shape of a circular section (not shown) centered on the axis of rotation of the jaw 4 and having a radius substantially equal to a distance between the axis of rotation of the jaw 4 and the center of the edge 35. The edge 35 is disposed opposite the window 20 which, in this embodiment, is provided with indicia 34 along

a lateral edge thereof on a surface of the jaw 4 opposite the surface adjacent the base 1. All of the other elements of this embodiment are identical to those of the first embodiment illustrated in FIGS. 1–3.

The operation of the second embodiment of the invention is similar to the operation of the first embodiment of the invention described hereinabove. The degree of compression of the compression spring 10 is set by rotating adjustment screw 13. The marker 31 is urged by compression spring 18 to maintain the lower finger 16 in contact with an end of the adjusting screw 13 and to slide along the longitudinal channel 14 as the adjusting screw 13 is longitudinally displaced.

The recess 21 in the jaw in the first described embodiment of the invention is replaced by an expanded recess 32 in the second embodiment of the invention. The recess 32 is sufficiently large to allow the jaw 4 to pivot from its central locked position until its displacement is limited by stop 12, without contacting the marker 31. However, because the edge 35 of the indicator 31 is a circular section concentric with the axis of rotation of the jaw 4, the position of the edge 35 relative to the window 20 does not change as the jaw 4 pivots. When a lateral force, greater than the break away force to which the binding is set, is applied between the binding and the ski, the jaw 4 pivots to release the ski boot in the same manner as in the first described embodiment of the invention. The marker 31 indicates the break away force to which the binding is set independently of a position of the jaw 4.

A variation of the second embodiment of the invention illustrated in FIG. 4 includes a marker 31 wherein the circular edge 35 is replaced by a straight edge (not shown) perpendicular to a lateral edge of the window 20 along which the indicia are disposed. In this variation, the indicator correctly indicates the break away force to which the binding is set only when the jaw 4 is in the central locked position. When the jaw 4 is pivoted away from the central locked position, the straight edge of the indicator will not maintain the same relative position to the edge of the window 20 and will give a different setting indication than when the jaw 4 is set to the central locked position. In another variation of the second embodiment of the ski binding, the circular edge 35 of the indicator 31 is replaced by a straight edge inclined with respect to the edge of the window 20 along which the graduations are disposed in a manner similar to that shown in FIG. 2. In this variation of the second embodiment of the ski binding also, the correct break away force setting of the binding is indicated only when the jaw 4 is in its central locked position.

A third embodiment of the ski binding is shown in FIG. 5. In order to simplify description of the third embodiment, corresponding parts of the first and third embodiments of the present invention are identified by the same reference numerals. The base comprises a lower base element 36 and an upper base element 37. The lower base element 36 has a recess for receiving a shaft 38 integral with the jaw 4, about which the jaw 4 pivots, after the upper base part 37 overlies a portion of the jaw 4. The jaw 4 is provided with a cylindrical longitudinally disposed bore 39 for receiving a cam 40, a compression spring 10 and an adjusting screw 13. An end 41 of the cam 40 remote from the compression spring 10 cooperates with a correspondingly shaped recess, for instance spherically shaped, to maintain the jaw 4 in a central locked position.

The jaw 4 is provided with a longitudinal groove or channel 14 for receiving a sliding element 15 which has a lower finger 16 and an upper finger 17. An opening 11 between the longitudinal channel 14 and the cylindrical bore 39 receives the lower finger 16 of the sliding element 15. The compression spring 18 urges the sliding element 15 in a direction so that the lower finger 17 of the sliding element 15 remains in contact with the adjusting screw 13. A face of the upper base portion 37 adjacent the holding jaw 4 is provided with a recess 21 into which the upper finger 17 of the sliding element 15 extends. An indicator 22 having a groove 23 is disposed in the recess 21 overlying the sliding element 15 so that the upper finger 17 of the sliding element 15 engages the groove 23. The geometry of the upper finger 17 and the groove 23 are identical to the corresponding elements of the first embodiment of the ski binding illustrated in FIGS. 1–3 and described hereinabove.

The operation of the embodiment of the ski binding illustrated in FIG. 5 differs from the embodiment illustrated in FIG. 1 in that when the holding jaw 4 pivots from the central locked position, the marker 22 remains stationary within the recess 21, while the upper finger 17 of the sliding element 15 rotates about the pivotal axis of the jaw 4 as the jaw 4 pivots away from the central locked position. It should be noted that the marker 31 of the second embodiment of the invention shown in FIG. 4 and the variations of the marker 31 described hereinabove may be applied to the third embodiment of the invention shown in FIG. 5.

A fourth embodiment of the invention, shown in FIG. 6, comprises an adjusting mechanism which can be incorporated in any of the embodiments of the invention described hereinabove. This adjusting mechanism amplifies the displacement of the adjusting screw 13 to facilitate reading changes in the break away force setting. In order to simplify description of the fourth embodiment, corresponding parts of the first, and fourth embodiments of the present invention are identified by the same reference numerals.

A shown in FIG. 6, a fourth embodiment of the invention comprises an adjusting screw 13 having a cam 40 disposed at one end thereof and rigidly connected to the adjusting screw 13. Adjusting screw 13 is threaded with threads having such a large pitch that one turn of the adjusting screw 13 displaces it over its entire range of adjustment. Cam 40 is provided with a face inclined with respect to a longitudinal axis of the adjustment screw 13, and which bears against compression spring 10. Lower finger 16 of the sliding element 15 is held against the inclined face of cam 40 by compression spring 18, and is displaced as the adjusting screw 13 is adjusted. The adjustment screw 13 is disposed so that when the compression spring 10 is maximally compressed, the cam 40 displaces the sliding element 15 a maximum distance. The other elements of this embodiment of the ski binding are identical to those shown in the first embodiment and have corresponding reference numerals. The operation of this embodiment, however, differs from that of the first embodiment in that the displacement of the indicator 22 is not equal to the displacement of the screw 13, but is greater than and proportional to the displacement of the screw 13.

It should be noted that all of the embodiments of the ski binding described herein were rigidly attached to the ski at the base thereof. However, the base of the

binding could have been pivotally attached to the ski without going beyond the scope of the present invention.

The ski binding of the present invention can be used for both "front stops" and for "heel stops", that is, it is well suited for securing a toe or a heel of a ski boot to a ski.

What I claim and desire to secure by Letters Patent is:

1. A ski binding for holding a ski boot to a ski, comprising;

a base attachable to a ski; a jaw mounted on said base for pivotal movement about a pivot axis for normally engaging a ski boot, a portion of said jaw overlying said base;

releasable locking means for selectively (A) preventing said jaw from pivoting to secure the ski boot to the ski and (B) releasing said jaw to pivot to release the ski boot if a lateral force greater than a predetermined force is applied between the ski boot and the ski, said releasable locking means having adjusting means for manually setting said predetermined lateral force at which said jaw releases said ski boot;

said base having a channel disposed in a longitudinal direction thereof in a surface of said base adjacent said portion of said jaw overlying said base, said jaw having a recess disposed in a surface of said portion of said jaw overlying said base and adjacent to said base; and

indicator means for indicating said predetermined lateral force, comprising, means on said jaw defining a window in said jaw, a slider disposed in said channel, a spring biasing said slider in said channel, and a marker disposed in said recess overlying said slider and opposite said window, said marker being mounted for slidable displacement in and longitudinally of said recess, and having an arcuate groove concentric with said pivotal axis and disposed in a surface of said marker adjacent said slider, and said slider having (1) a finger narrower than said arcuate groove and engaging said arcuate groove to limit the longitudinal slidable displacement of said marker and to allow said marker to copivot with said jaw, and (2) means cooperating with said adjusting means to displace said marker in said recess in response to setting said predetermined lateral force.

* * * * *