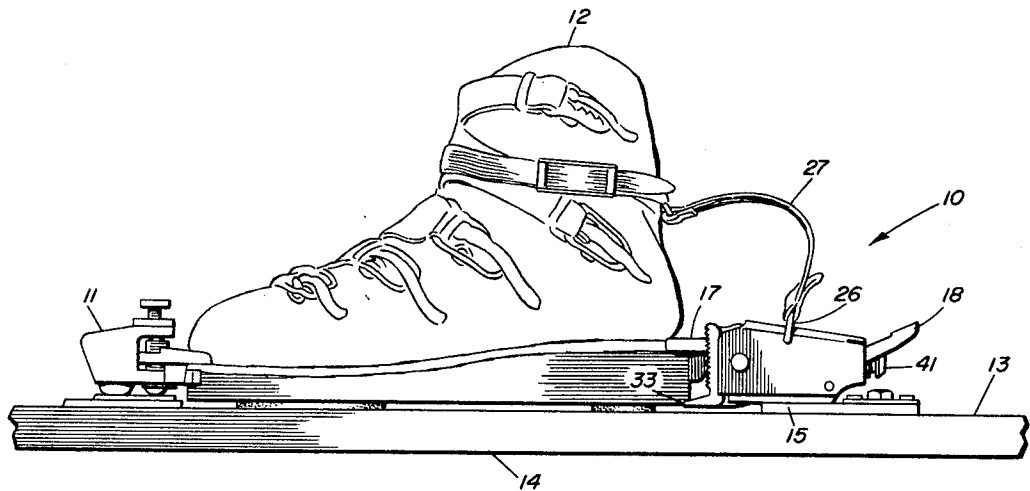


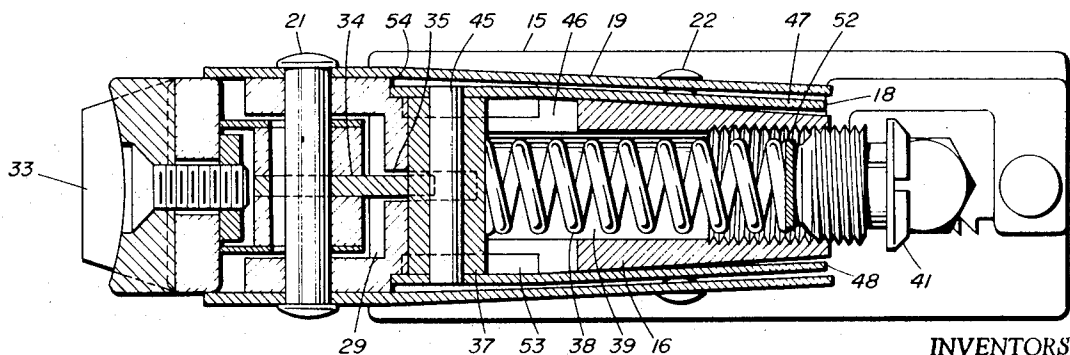
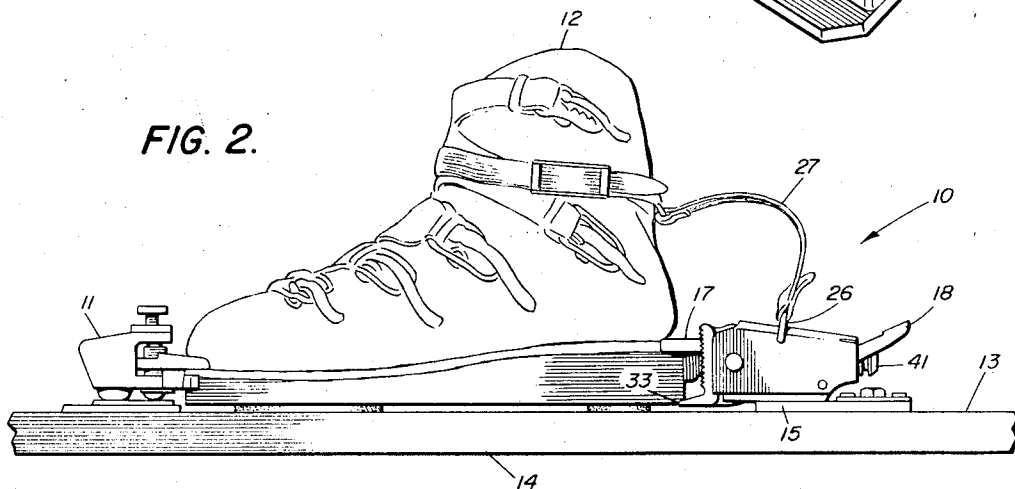
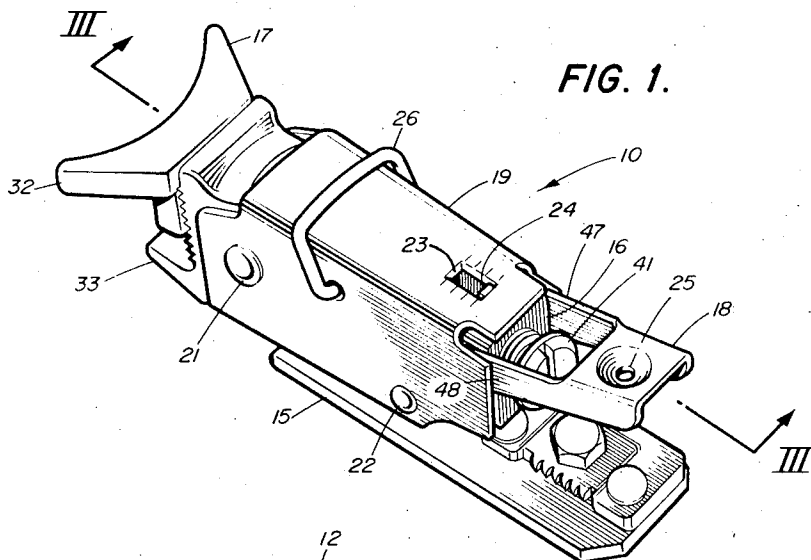
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[22] Filed **Sept. 23, 1968**
[45] Patented **Jan. 19, 1971**
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[54] **SKI BINDING**
5 Claims, 7 Drawing Figs.
[52] U.S. Cl..... **280/11.35**
[51] Int. Cl..... **A63c 9/084**
[50] Field of Search..... **280/11.35,**
11.35HA, 11.35H, 11.35AA, 11.35A, 11.35AB

ABSTRACT: An automatically releasable step-in type ski binding having a heel engaging clamp provided on its forward side with upper and lower heel engaging protuberances and on its rearward side with means engageable by a spring loaded roller to hold the heel engaging clamp in boot engaging or boot releasing positions. A notch is formed in the rearward side of the heel engaging clamp for engagement by the roller and a cam lever is provided to move the roller out of the notch to provide for manual release to the binding. Additional spring means assists in moving the clamp to heel releasing position.

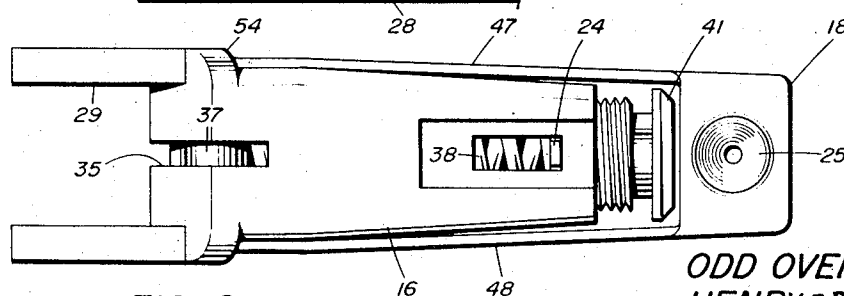
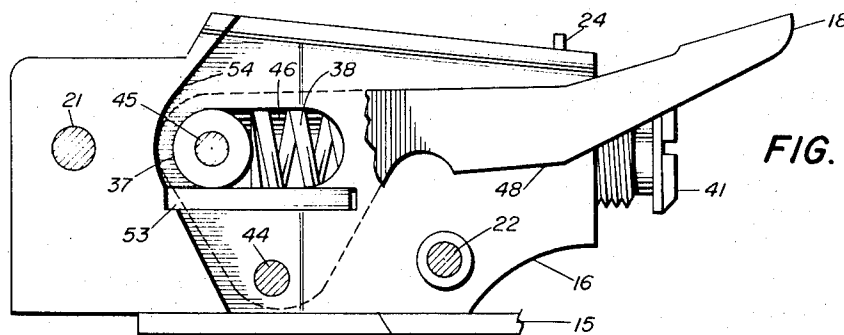
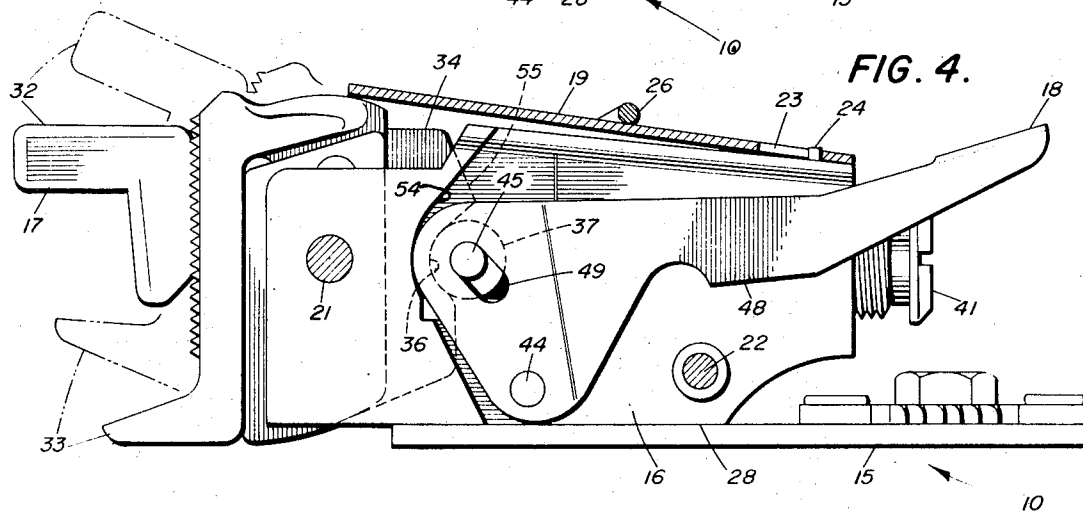
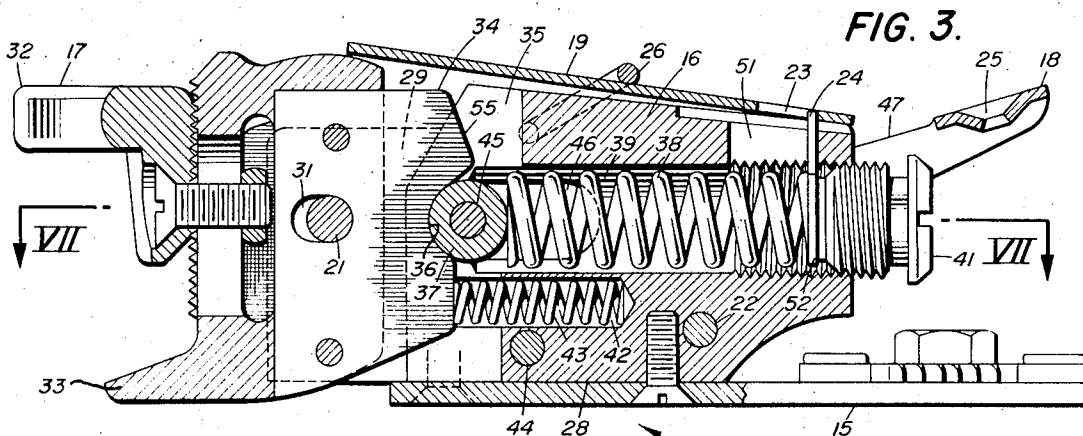




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1

SKI BINDING

BACKGROUND OF THE INVENTION

In the sport of skiing, it is quite important that the binding which attaches the boot to the ski hold the boot on the ski very firmly, so that slight movements of the skier's foot result in similar movements of the ski. However, it is also important that the binding be capable of releasing at the time of an overload so that the boot can leave the ski before the skier is hurt in the case of an accident. It has become customary, therefore, to provide a toe-piece to engage the front end of the boot and a heel release to engage the rear of the ski boot. In order to facilitate fastening and unfastening the skis from the boots, it has become common practice to provide a so-called "step-in" heel release, so that the skier simply inserts his boot into the bindings and they automatically clamp the boot. Most of these heel releases, however, have been complicated and expensive and they have had protruding elements which become dangerous when the ski releases. In this regard it should be noted that, although the skier wishes his boots to become free of the binding, he does not wish the ski to become free of him, so he uses a runaway strap which attaches his boot to the ski in a loose manner. In some accidents, the ski becomes free and flays about, so that protruding sharp elements on the bindings can cause damage to the skier. The step-in release ski bindings of the past have had difficulty in maintaining their adjustment; that is to say, the adjustment of the force that is necessary for them to release. This is because the elements become coated with ice, become rusted, or other wise deteriorate from their original manufactured tolerance. A skier may suddenly find that a ski binding, which was perfectly adequate for release when it was first manufactured, has become inoperative to the point where he can get hurt. Furthermore, the prior art step-in heel release ski bindings have been very difficult to adjust for the release point; that is particularly a problem when more than one person is using a set of skis on which the bindings have been mounted. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a ski binding of the step-in heel release-type in which the release pressure is readily adjustable and which when adjusted remains in that adjustment for a long period of time.

Another object of this invention is the provision of a step-in ski binding which is simple in construction and which is capable of a long life of useful service without maintenance and without losing its effectiveness.

A further object of the present invention is the provision of a ski binding having a low silhouette and no protruding parts to injure a skier.

It is another object of the instant invention to provide a ski binding of the rear heel release-type having a built-in and reasonably proportioned forward pressure to hold down pressure ratio.

A still further object of the invention is the provision of a step-in heel release ski binding requiring only light down-pressure of the boot to latch the unit, regardless of the release pressure setting.

It is a further object of the invention to provide a heel release which provides a degree of shock absorption permitting quite low settings with high retention of the boot.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

SUMMARY OF THE INVENTION

In general, the present invention consists of a ski binding having a main body with a flat undersurface adapted to be fastened to the upper surface of the ski and having a boot clamp mounted on the body for pivotal movement about an axis parallel to and spaced from the said undersurface. The

2

clamp has a protuberance located on one side of the clamp facing away from the body below the axis and a protuberance also on the said one side located above the axis and having a notch formed on the other side of the clamp. A spring-loaded roller is mounted in the body in engagement with the notch. The body has a horizontal main bore which extends longitudinally through the body with its axis slightly above the said clamp axis. A coil spring lies in the bore and engages the roller at its forward end, an adjusting screw being set into the bore to engage the rearward end of the spring.

BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 is a perspective view of a ski binding built in accordance with the present invention,

FIG. 2 is a side view of skiing apparatus with the binding in place,

FIG. 3 is a vertical sectional view of the binding taken on the line III-III of FIG. 1,

FIG. 4 is a side view of the binding with a cover removed,

FIG. 5 is a view of the binding similar to FIG. 5 but with a lever removed,

FIG. 6 is a plan view of the binding, and

FIG. 7 is a horizontal sectional view of the binding.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 2, wherein are best shown the general features of the invention, the ski binding, indicated generally by the reference numeral 10, is shown in use with a toe-iron 11 in holding a ski boot 12 on the upper surface 13 of a ski 14. In the description which follows the adjectives of direction have to do with those directions as they are normally applied to a ski; that is to say, the word "longitudinal" means in the direction of the length of the ski; the expression "forward" in the direction of the front of the ski, and the expression "rearward" applies to the direction of the rear of the ski.

In FIG. 1 it can be seen that the ski binding is of the step-in heel release-type that operates on the heel of the ski boot. It is provided with a mounting plate 15, a main body 16, bolted on the plate, a boot clamp 17, operating lever 18, and a cover 19. The boot clamp is pivotally attached to the main body 16 by a rivet 21 which also holds the cover 19 in place. Another rivet 22 also extends through the cover and the body to hold them together. Formed in the cover 19 is a window 23 in which can be seen a finger 24 which indicates the amount of release tension in the apparatus. Located on the lever 18 is a dimple 25 which permits the lever to be operated by the skier using the point of his ski pole.

In FIG. 2 it can be seen that the cover 19 has been provided with a bail 26 to which is attached one end of a runaway strap 27, the other end of which is attached to the ankle of the skier around the boot 12.

Referring now to FIG. 3, it can be seen that the main body 16 has a flat undersurface 28 to which the plate 15 is fastened, the plate, in turn, being fastened to the upper surface 13 of the ski. A boot clamp 17 is mounted on the main body 16 in a vertical slot 29 (see FIG. 7) provided therefor. The rivet 21 passes through a horizontally-elongated slot 31 extending transversely through the boot clamp 17 to provide for pivotal movement about a horizontal transverse axis which is parallel to and spaced from the undersurface 28. The boot clamp 17 has an upper adjustable protuberance 32 which is located on the side of the clamp away from the body 16 above the axis provided by the rivet 21. It is also provided with a lower protuberance 33 located on the said one side of the clamp below the axis provided by the rivet 21. The boot clamp 17 is provided with a rearwardly-directed thin vertical plate 34 which extends into a narrow vertical slot 35 formed in the body 16 and is provided with a notch 36 having a circular periphery. This notch engages a roller 37 which is pressed forwardly by a coil

spring 38 which, in turn, resides in a bore 39 extending longitudinally through the body 16. Threaded into the other end of the bore 39 is an adjusting screw 41. The body 16 has a smaller bore 42 in which resides a small coil spring 43 which engages the plate 34 of the boot clamp 17 below the notch 36 and below the axis of the rivet 21. A pin 44 extends transversely through the body 16, while a similar pin 45 passes through the roller 37 and extends outwardly on either side of the body 16.

The roller 37 extends transversely of the bore 39 whose axis is slightly above the axis of the rivet 21. The roller resides in transverse guide apertures 46 which are horizontally and longitudinally elongated to receive the roller.

Referring now to FIG. 4, the operating lever 18 is shown as having a generally U-shape with a sideplate 47 and a sideplate 48 joined by a web in which the dimple 25 is located. The pin 44 extends through the side plates 47 and 48 and acts as a pivot for the lever 18. Each of the side plates is also provided with a slot 49 in which the pin 45 associated with the roller 37 resides. The slot has a camlike surface which extends at an angle, the line of which passes somewhat to the right of the pin 44.

Referring to FIG. 3, the body 16 is provided with a vertical passage or slot 51 extending upwardly from the main bore 39. An indicator plate 52 is provided with a circular portion which lies in the bore 39 between the spring 38 and the adjusting screw 41 and this carries the finger 24 which extends through the vertical slot 51 to show the position of the screw and, therefore, the amount of compression of the spring 38.

FIG. 5 shows the body 16 with outer coverings removed; that is to say, with the removal of the boot clamp 17, the cover 19, the actuating lever 18, and the plate 15. This view shows the manner in which the guide aperture 46 is formed to allow the roller 45 to move back and forth and it shows that the lower edge of the aperture is provided with a hardened metal insert 53. This also shows the manner in which the sides of the body 16 are formed with recesses in which the legs 47 and 48 of the lever 18 may lie. The shoulder 54 of the recess acts as a stop member for the leg 48 of the lever 18 in its pivotal action about the pin 44.

In FIG. 6, which is the top view of the apparatus similar to FIG. 5 but with the lever 18 in place, it can be seen the manner in which the large slot 29 which carries the main part of the boot clamp 17 is formed as well as the narrow slot 35 which carries the plate 34 associated with the clamp. Recesses on either side which carry the legs 47 and 48 of the lever 18 are shown as well as the opening or slot through which the finger 24 protrudes.

The operation of the invention will now be readily understood, in view of the above description. With the apparatus in the condition shown in FIG. 5, let it be assumed that the skier wishes to insert his boot 12 onto the ski, so that it will be held there by the toe-iron 11 and the ski binding 10, which is the subject of the present invention. He presses downwardly on the dimple 25 of the lever 18 with his ski pole and this causes the lever 18 to pivot about the pin 44. The leg 48 (having the slot 49) is moved in a clockwise direction and its edge carries the pin 45 with it; that is to say, rearwardly of the body 16. Movement of the pin rearwardly causes the roller 37 to move out of engagement with the notch 36 of the boot clamp 17. The boot clamp is, therefore, free to rotate about the rivet 21. The spring 43 pushes on the lower portion of this clamp and causes it to rotate in a clockwise direction to the position shown in dotted lines. The skier first inserts the toe of his boot 12 into the toe iron 11 and then moves his heel downwardly until it contacts the protuberance 33. He pushes downwardly with the heel of his boot and this rotates the clamp 17 about the pivot 21. The boot moves downwardly until it contacts a pad on the ski surface 13 which is especially provided for it and, at the same time, the rotation of the clamp 17 causes the upper protuberance 32 to press downwardly on the upper surface of the sole of the boot, as is shown in FIG. 3. This causes the toggle formed by the clamp 17 and the body 16 to pas-

sover dead center and throw the operating lever 18 upwardly so that it is returned to the position shown in FIG. 4. The boot cannot be removed from the ski binding unless the upper part of the plate 34 is able to cam itself over the roller 37, which the roller resists doing because of the pressure of the spring 38. Nevertheless, in a stressed condition when sufficient forward rotation is provided on the boot, it will force the ski binding to snap up into the dotted position and release the boot from the ski, this being the desired action. The amount of compression of the spring 38 is adjustable by rotating the screw 41 and this is indicated by the finger 24 moving back and forth in the opening in the cover 19 provided for it. Suitable calibration markings on the sides of the slot 23 in the cover 19 assist in making such adjustments.

To understand the operation of the invention, the geometric relationship of the various pivot points must be clearly understood. When one presses down on the outer free end of the lever 18, it, of course, cams the roller 37 rearwardly so that its spring pressure is not felt on the boot clamp 17. The boot clamp, therefore, is free to rotate about its rivet 21 under the impetus of the spring 43. Once it has done this, the straight upper edge 55 is in a lower position and presses against the roller. It prevents the roller from returning to its original position at the left-hand end of the aperture 46. The counterrotation of the clamping member 17 (because of the pressure of the ski boot 12 on the lower protuberance 33) removes this locking surface 55 from the end of the roller 37 and allows the roller to again operate against the notch 36 in the plate 34.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

The invention having been thus described, what is claimed as new and desired to secure by Letters Patent is:

We claim:

1. A ski binding, comprising:

- a. a main body having a flat undersurface adapted to be fastened to the upper surface of a ski,
- b. a boot clamp residing in a vertical slot formed in the body and capable of pivotal movement about an axis parallel to and spaced from the said undersurface, the clamp having a protuberance located on one side of the clamp facing away from the body below the axis and a protuberance also located on the said one side above the axis and having a notch formed on the other side of the clamp, the clamp being provided with a rearwardly-extending plate in which the notch is formed, the body being provided with another slot extending beyond the first-mentioned slot to receive and embrace the plate,
- c. a spring-loaded roller mounted in the body in engagement with the notch, and
- d. a horizontal pivot pin extending across the slot in the main body and passing through a slotted aperture in the clamp.

2. A ski binding, comprising:

- a. a main body having a flat undersurface adapted to be fastened to the upper surface of a ski,
- b. a boot clamp mounted on the body for pivotal movement about an axis parallel to and spaced from the said undersurface, the clamp having a protuberance located on one side of the clamp facing away from the body below the axis and a protuberance also located on the said one side above the axis and having a notch formed on the other side of the clamp, a horizontal main bore extending longitudinally through the body with its axis slightly above the said clamp axis,
- c. a coil spring lying in the bore and engaging the roller at its forward end,
- d. an adjusting screw threaded into the bore to engage the rearward end of the spring, and

e. a spring-loaded roller mounted in the body in engagement with the notch, the roller residing in transverse longitudinally-elongated guide apertures through the body on either side of the bore.

3. A ski binding as recited in claim 2, wherein a first pin extends through the axis of the roller and protrudes from either side of the body, wherein a second pin extends through the body and protrudes from either side, and wherein a lever of U-shaped cross section embraces the body, is pivoted on the second pin, and has a cam edge which engages the first pin to draw the roller away from the notch.

4. A ski binding, comprising:

- a. a main body having a flat undersurface adapted to be fastened to the upper surface of a ski,
- b. a boot clamp mounted on the body for pivotal movement about an axis parallel to and spaced from the said undersurface, the clamp having a protuberance located on one side of the clamp facing away from the body below the axis and a protuberance also located on the said one side above the axis and having a notch formed on the other side of the clamp, a horizontal main bore extending longitudinally through the body with its axis slightly above the said clamp axis,
- c. a spring-loaded roller mounted in the body in engagement with the notch,
- d. a coil spring lying in the bore and engaging the roller at its

forward end,

e. an adjusting screw threaded into the bore to engage the rearward end of the spring, the body being provided with a vertical slot extending upwardly from the main bore, and

f. an indicator plate provided having a circular portion which lies in the bore between the spring and the adjusting screw and has a finger which extends through the last-mentioned vertical slot to show the position of the screw and, therefore, the amount of compression of the spring.

5. A ski binding, comprising:

- a. a main body having a vertical slot having a flat undersurface adapted to be fastened to the upper surface of a ski,
- b. a boot clamp residing in the slot mounted on the body for pivotal movement about an axis parallel to and spaced from the said undersurface, the clamp having a protuberance located on one side of the clamp facing away from the body below the axis and a protuberance also located on the said one side above the axis and having a notch formed on the other side of the clamp, and
- c. a spring-loaded roller mounted in the body in engagement with the notch, the body having a bore located below the roller extending rearwardly from the first-mentioned slot and carrying a spring which engages the clamp below the notch.

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