

April 30, 1940.

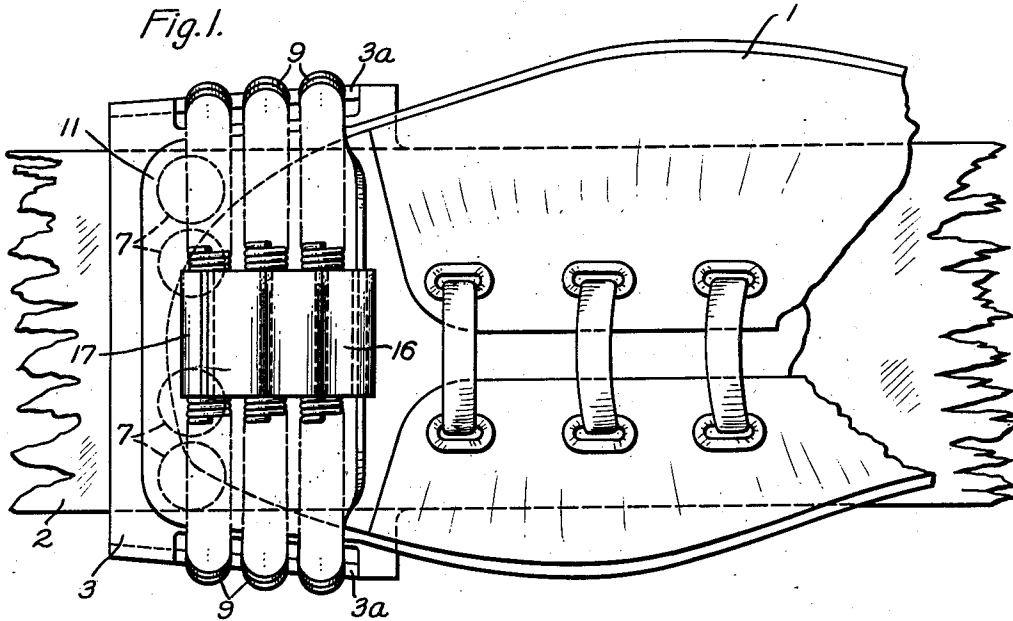
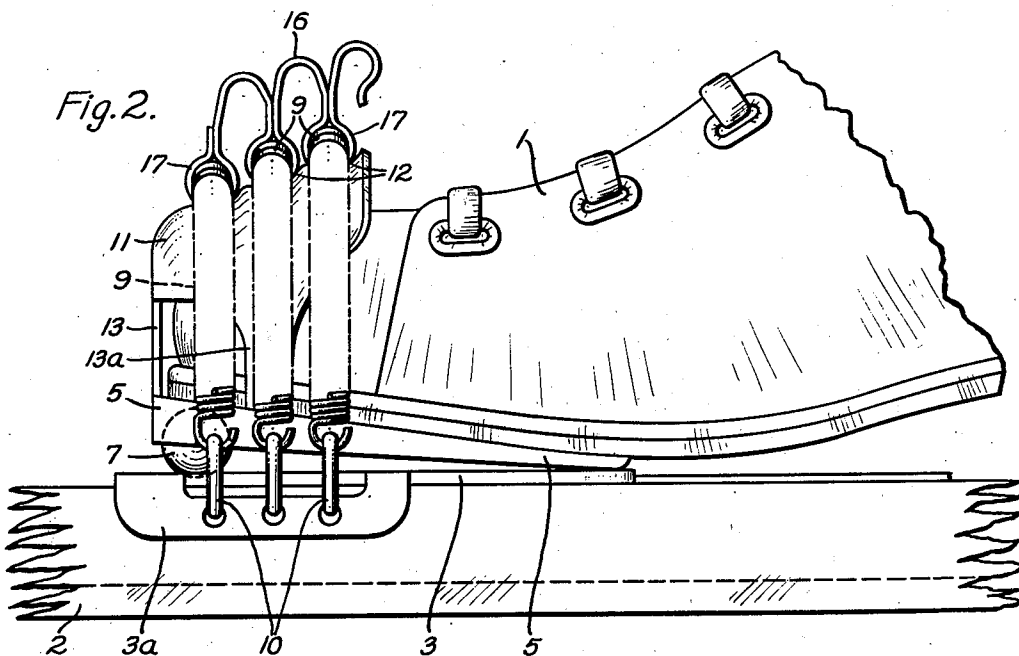
H. D. ELSE

2,199,153

SKI BINDING

Filed Aug. 29, 1936

3 Sheets-Sheet 1



WITNESS

Wm. C. Groome.

INVENTOR

Harry D. Else.

BY

BY
William R. Coley
ATTORNEY

ATTORNEY

April 30, 1940.

H. D. ELSE

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3 Sheets-Sheet 2

Fig. 3.

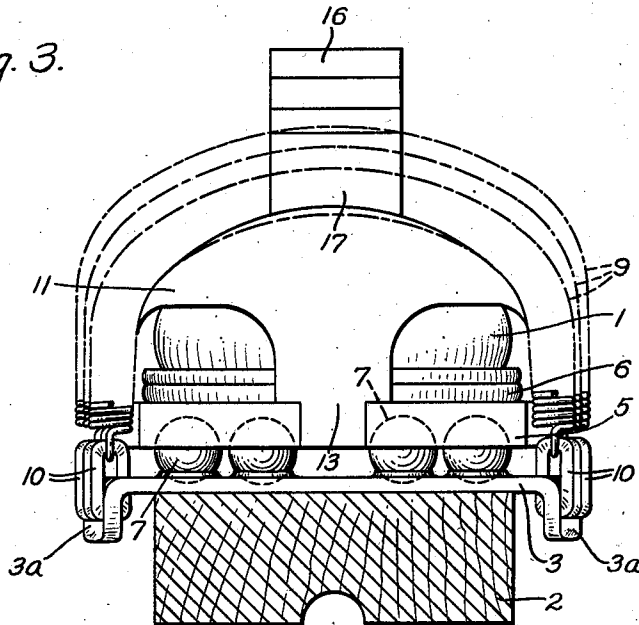


Fig. 4.

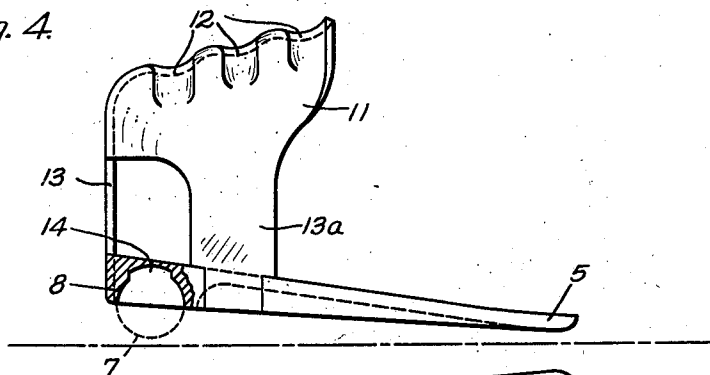
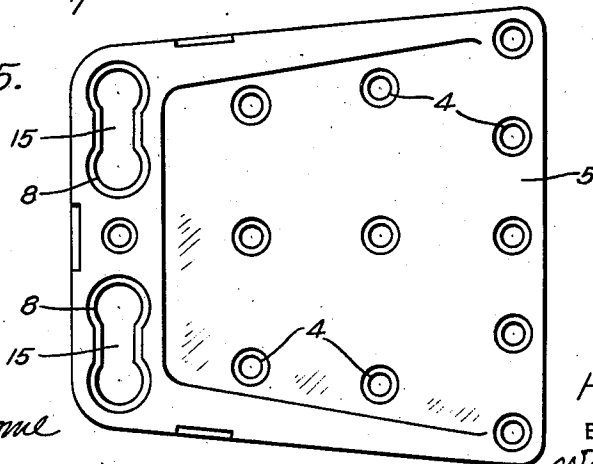


Fig. 5.



WITNESS.

Wm. C. Groome

INVENTOR

Harry D. Else.

BY

William R. Coles
ATTORNEY

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H. D. ELSE

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Fig. 6.

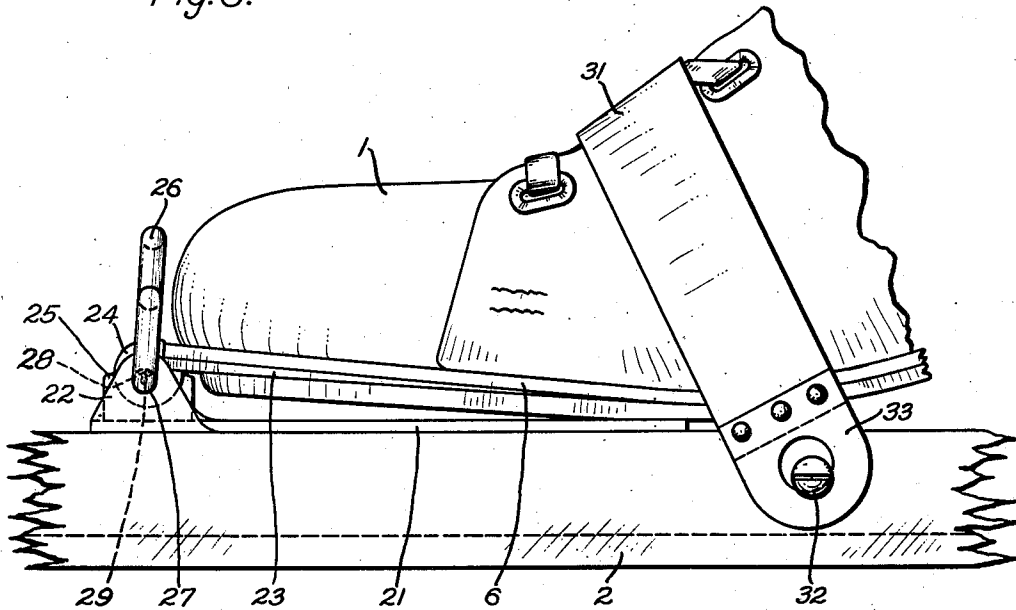


Fig. 7.

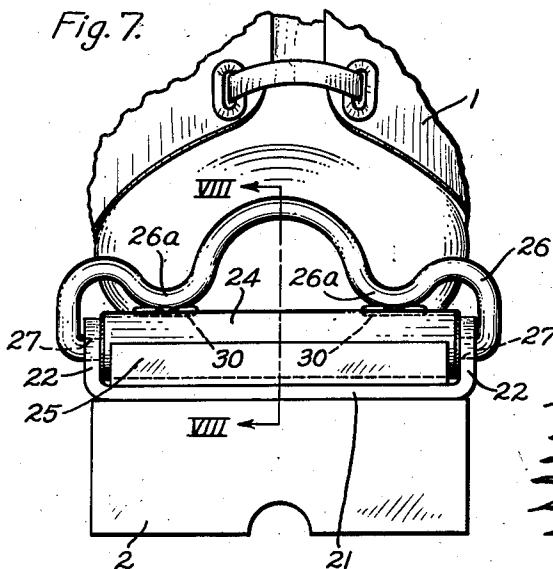
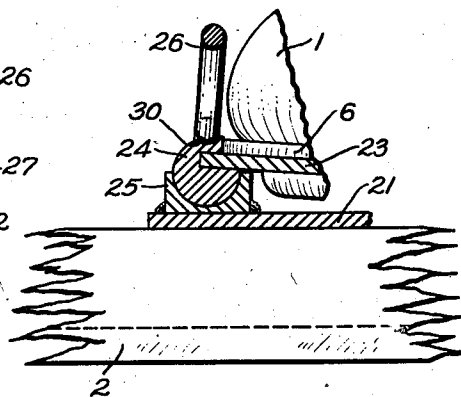


Fig. 8.



WITNESS

Wm. C. Groome

INVENTOR

Harry D. Else.

BY
William R. Coley
ATTORNEY

UNITED STATES PATENT OFFICE

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SKI BINDING

Harry D. Else, Springfield, Mass.

Application August 29, 1936, Serial No. 98,452

9 Claims. (Cl. 280—11.35)

My invention relates to bindings for a ski and boot.

An object of my invention is to provide means for attaching skis to boots that will enable the operator to maintain positive control of the position of the skis whether they are sliding on the surface of the snow or raised therefrom.

A further object of my invention is to provide a binding which permits the operator to quickly and easily release the foot from the ski at will, and which automatically releases the foot when the operator takes a particularly dangerous type of fall.

Other objects of my invention are to provide a binding offering little resistance when passing through soft snow and to provide a binding consisting of a small number of rugged parts requiring no adjustment and suitable for accurate and economical fabrication by mass production methods.

Other objects of my invention will become evident from the following detailed description, taken in conjunction with the accompanying drawings, wherein:

Figures 1, 2 and 3 show a plan view, side elevation and front elevation, respectively, of a preferred form of my invention;

Figures 4 and 5 show details of this arrangement;

Figure 6 and 7 show a side elevation and front elevation of a modified form of my invention; and

Figure 8 is a sectional view taken along the line VIII—VIII of Fig. 7.

Referring to Figs. 1 to 5, reference character 1 indicates the boot and 2 the ski. A metal plate 3 having downwardly extending flanges 3a spaced from the sides of the ski is firmly attached to the ski by wood screws or other means (not shown). A rigid, backwardly tapering plate 5 of metal or a molded material, such as a Bakelite composition, is firmly attached to the sole 6 of the boot by rivets, small screws or other suitable means extending through holes 4 (Fig. 5).

On the top of the ski plate 3 in a line at substantially right angles with the principal axis of the ski, I provide a journal or substantially arcuate bearing surface which may comprise a cylinder, but preferably two or more (preferably four) balls 7 welded or brazed in position through suitable holes in the plate. In the bottom of the boot plate 5 and near the forward tip, I provide substantially hemispherical sockets 8 properly spaced to engage the balls in the ski plate 3. These sockets, constituting a pivotal axis or hinge, are located close to the tip of the boot which is especially advantageous from the standpoints of ease of control by and comfort of the operator, as hereinafter more fully set forth.

To hold the boot plate 5 in engagement with the ski plate 3, I provide one or more springs 9,

preferably of helically wound music wire. These springs I attach at both ends to holes in the sides or flanges 3a of the ski plate 3 by means of heavy wire links 10.

I have found that a total downward pressure of approximately 100 pounds gives good results in the use of my binding. To avoid a spring of large diameter which would be necessary if only one were used, I have employed three springs loaded at approximately 17 pounds each to obtain the desired total pressure.

To prevent damage to the toe of the boot from the action of these helical springs, I provide a guard plate 11, preferably of formed sheet metal, extending over the tip or toe of the boot. This guard plate is rigidly attached, integrally or otherwise, to the boot plate 5, and has three depressions 12 (Fig. 4) to readily seat the three springs 9. It is of open construction, having a central upwardly-extending tongue 13 disposed forward of the boot, and side tongues 13a, to permit easy removal of snow which tends to accumulate between the toe of the boot and the inner surfaces of the guard plate.

The elements described above constitute in effect, a hinge pivoting about the axis of the line of balls 7. I locate the springs 9 so that the resultant of their pressures is to the rear of the line of balls. By this means I cause the rear end of the boot plate 5 which is located under the ball of the foot to be held in yielding engagement with the ski plate or the ski proper. I have found that good results in the use of my binding are obtained by locating the springs sufficiently to the rear of the pivot point to produce a lifting effect of approximately one pound at the rear tip of the ski.

As noted above, I provide depressions or grooves 12 along the top of the guard plate 11. The three helical springs 9 seat in these grooves. Their depth and contour are such that when the toe of the boot is raised by pivoting about the axis of the line of balls to a considerable angle, say 60°, with respect to the ski, the helical springs will slip forward and release the foot from the binding.

The feature just described is of great importance from the point of view of safety. At the will of the operator the foot can be released by merely raising it to the required angle. The fact that in the more dangerous types of falls, forward falls and falls in which the skis become crossed, one or both feet naturally assume this position, makes this safety feature automatic. With the conventional type of binding, the toe of the boot is wedged between side plates by means of a strong strap passing around the heel of the boot and is held down by cleats over the sole of the boot or a strap across the toes. Severe

cramping and broken bones may result from a forward fall when using such a binding.

Experienced skiers insist on the use of the heel strap set up tightly in order to wedge the boot firmly between such side plates. Otherwise they do not have good control of the skis. Novices frequently try to ski with only a plain toe strap in order that they may be able to remove their feet quickly. My binding provides the safety desired by the novice without sacrificing the control demanded by the expert.

The control provided by my binding is superior to that obtained with conventional bindings. With the conventional side-plate type of binding, some play develops due to crushing of the sides of the boot sole. My binding permits no lateral or angular play whatsoever between the boot and the ski in a plane parallel to the running surface. This horizontal control, moreover, is not lost when the foot is raised to any angle up to the releasing angle. This feature is of particular importance in flat surface running and in making a "Telemark" turn in which the trailing foot is raised to an angle of approximately 30°.

The "heel lift" which I obtain by pivoting at the toe of the boot and placing the spring members to the rear of the pivot line to hold the ski in yielding engagement with the ball of the foot is of importance in climbing, step turning, and any maneuver involving lifting one or both skis from the surface of the snow. With conventional bindings the sole of the boot forms contact with the ski plate over a relatively narrow surface lengthwise of the ski. This surface is located under the ball of the foot and there is vertical play under the toe. In attaching conventional bindings to skis some experts recommend placing the balance point of the ski slightly in advance of the cleats or toe strap on the binding so that the heel of the ski will tend to stay up when the foot is raised. Others use rubber bands or a coil spring attached to a strap around the ankle and a hook on the rear of the ski.

With my binding it is not necessary to compromise the location endwise to obtain "heel lift." No encumbrances at the ankles are required and the vertical position of the skis when in air is independent of the position of the heels of the boot.

Jumping offers a peculiarly difficult problem in binding design. As the jumper leaves the take-off he leans far forward which necessitates raising his heels. The toes of the skis, however, must be raised or the wind acting on the top surfaces would pull him down, shorten the jump and might cause a forward spill. Just before landing, the toes of the skis must be brought down so that the running surfaces make only a slight angle with the surface of the snow.

Jumpers usually employ a "low hitch" of the heel strap. By this it is meant that the forward ends of the heel strap are attached to the sides of the ski below the ball of the foot. This gives the operator some degree of control in a vertical plane since the cleats or toe strap are located forward of the ball of the foot. This binding arrangement is particularly dangerous in case of a forward fall as the pressure of the heel strap builds up enormously if the heel is raised to any considerable angle. If yieldable heel straps are employed, lateral control of the ski is sacrificed. To withstand the pressure of the heel strap, ski boots, whether for jumping or general purpose

work, must have extremely heavy soles usually braced by a metal insert under the arch.

The conventional combinations described above provide very uncertain control in jumping. My binding permits of a more flexible boot sole. With the ski held in engagement at both toe and ball of the foot, the position of the ski in the air can be very accurately controlled by flexure of the toes. The shock of landing can be partly taken in the arches of the foot.

The use of a more flexible boot sole, which is made possible by the elimination of heel straps, is of importance in ordinary skiing as it enables the operator to utilize the arches of the foot rather than maneuver in a flat foot manner.

In the manufacture of my binding I prefer that the boot plate 5 be made of drop forged steel with a setting operation to insure uniformity of spacing and depth of the sockets. The balls 7 which may be of steel or bronze are placed in a holding fixture and the ski plate 3 is held in a position not necessarily touching any of the balls. Any clearances between balls and plate are filled in by the brazing or welding material.

Referring to Figures 4 and 5, it will be noted that I provide clearances 14 at the bottom of each ball socket and 15 between each pair of sockets. This permits snow or ice which may accumulate in the sockets when walking to be forced out when the foot is placed in position on the ski. The exact shape of the clearances or reliefs is of no particular importance, but some form is desirable.

To assist in drawing the springs into position, I provide a strap 16 of light leather or webbing with loops 17 around each spring. The spacing between the loops is such that the springs can be drawn on one at a time.

A number of variations of my binding are possible. If large "heel lift" is desirable, the rear spring may be made exceptionally strong. If small "heel lift" is desired, the forward spring is made heavy and the other two may be omitted.

Certain variations in construction are illustrated in Figures 6, 7 and 8. As in the first five figures, reference character 1 indicates the foot, and 2 the ski. A ski plate 21 having upturned ears or lugs 22 at its forward end is suitably secured by screws (not shown) or otherwise to the ski. In this construction, I have shown a boot plate 23 imbedded between two layers of the boot sole 6.

To the forward end of the boot plate I attach a three-quarter round piece of metal bar or rod 24. This bar engages a semicircular slot in another metal bar 25 which is welded or otherwise secured to the ski plate 21. These two bar members 24 and 25 form an open hinge or pivot similar to that formed by the balls and sockets in my preferred arrangement illustrated in Figs. 1 to 5, 60 inclusive.

Ears 22 on the sides of the ski plate engage the ends of bar 24 and thus prevent lateral motion thereof.

To hold the two members of the pivot in engagement, I provide a relatively rigid clamp or guard 26 of strong spring wire. The clamp or guard 26 preferably takes a form having three upwardly extending loops—a large center one and two smaller end ones—separated by reversely curved clamping portions 26a. The ends of this clamp or guard are journaled in holes 27 in the ears 22 described above. I may locate these holes with their centers on the axis 28 of the pivot. In this case it would be difficult to spring the clamp

or guard 26 sufficiently to bring the two pivot members into engagement. I prefer, therefore, to locate the centers 29 of the clamp journals and of holes 27 below and slightly forward of the pivot axis 28, as shown in Fig. 6. By this means I obtain complete release of the clamping action when the top of the clamp or guard is pressed forward. Likewise, when the boot is carried up and forward about the pivot, the clamp, which moves with the boot, releases the engagement of the pivot members.

To locate the "set-up" position of the clamp or guard 26, I provide small dents 30 in the top of the bar 24 for engaging portions 28a of the clamp. To provide heel lift I have shown a band 31 of elastic material, preferably live rubber, passing across the top of the boot and attached to screws 32 extending from the sides of the ski 2 by means of metal eye tabs 33 riveted to the ends of the band.

It will be seen that I have thus provided a simple ski binding, not requiring a heel strap, capable of ready and effective control and adapted to automatically release itself and the ski from the boot under certain conditions.

I do not wish to be restricted to the particular structures or arrangement of parts herein set forth, as various other modifications thereof may be made without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed thereon as are indicated in the appended claims.

I claim as my invention:

1. In a ski binding, a rigid member attached to the ski, a rigid member attached to the boot adapted to form pivotal engagement with the rigid ski member at or near the toe of the boot, yielding means acting on the rigid boot member adapted to hold it in engagement with the rigid ski member when the boot is resting on or tilted to a small angle with respect to the principal surface of the ski and automatically releasing the boot member when the boot is tilted at a large acute angle with respect to the principal surface of the ski.

2. In a ski binding, a rigid member attached to the ski, a rigid member attached to the boot adapted to form detachable engagement with the rigid ski member at or near the toe of the boot, and yielding means acting on the forward part of the boot biasing the pivotally related parts together and also biasing the boot into contact with the ski at some point to the rear of the pivotal engagement, means maintaining the pivotal engagement when the boot is in contact with the ski or raised at a small angle thereto but automatically releasing the pivotal engagement when the boot is raised to form a substantial acute angle with respect to the principal surface of the ski.

3. A ski, a boot, one or more substantially spherical projections from the one adapted to seat in one or more substantially hemi-spherical recesses in the other, the projections and recesses forming a bearing with its axis at or near the toe of the boot, at substantially right angles to the principal axis of the ski and boot and parallel to the principal surface of the ski, and yielding means located to the rear of the bearing axis biasing the projections and recesses into engage-

ment and biasing the boot into contact with the ski at the ball of the foot.

4. In a ski binding, a ski plate attached to the ski, a boot plate attached to the boot one or more journal projections from the one plate adapted to engage a corresponding recess or recesses in the other plate and forming a bearing with its axis at or near the toe of the boot at substantially right angles to the principal axis of the boot and ski and substantially parallel to the running surface of the ski, and yielding means maintaining engagement of the bearing members when the boot is in position on the ski or tilted at a small angle thereto but automatically releasing engagement when the boot is tilted to a large acute angle.

5. In a ski binding, a ski plate attached to the ski, a boot plate attached to the boot one or more substantially spherical projections from the one plate adapted to engage a corresponding recess or recesses in the other plate and forming a bearing with its axis at or near the toe of the boot at substantially right angles to the principal axis of the boot and ski and substantially parallel to the running surface of the ski, and one or more springs of helically wound wire passing over the top of the boot, and arranged to bias the boot into engagement with the ski at the bearing members and at the ball of the foot.

6. In a ski binding, a ski plate arranged to engage the toe of the boot, a guard member extending thereover, and a coiled spring arranged to pass over said guard member and to bias the boot into engagement with the ski plate, said guard member being shaped to cause the coil spring to slip forward and release the boot when the boot is tilted forward to a considerable angle with respect to the ski.

7. A boot, a ski, two or more ball and socket engagements formed by projections and recesses of the boot and ski, the engagements being located to constitute a pivot with its axis at or near the toe of the boot and crosswise with respect to ski and boot, spring means adapted to be set up by the operator for biasing the boot into engagement with the ski at the toe and at the ball of the foot, said spring means being arranged to release the boot when it is tilted to a large angle with respect to the ski, the recess engagements being provided with relieved portions to permit egress of foreign material.

8. A binding for a ski and boot comprising a pivotal mounting for the boot disposed on the ski, a guard member extending over the tip of the boot and having a depression therein, and a helical spring seated in said depression for joining said guard and said ski.

9. A ski, a boot, one or more substantially spherical projections from the one adapted to seat in one or more substantially hemi-spherical recesses in the other, the projections and recesses forming a bearing with its axis at or near the toe of the boot, at substantially right angles to the principal axis of the ski and boot and parallel to the principal surface of the ski, and yielding means located to the rear of the bearing axis and passing over the top of the boot, said yielding means biasing the projections and recesses into engagement and biasing the boot into contact with the ski at the ball of the foot.

HARRY D. ELSE.