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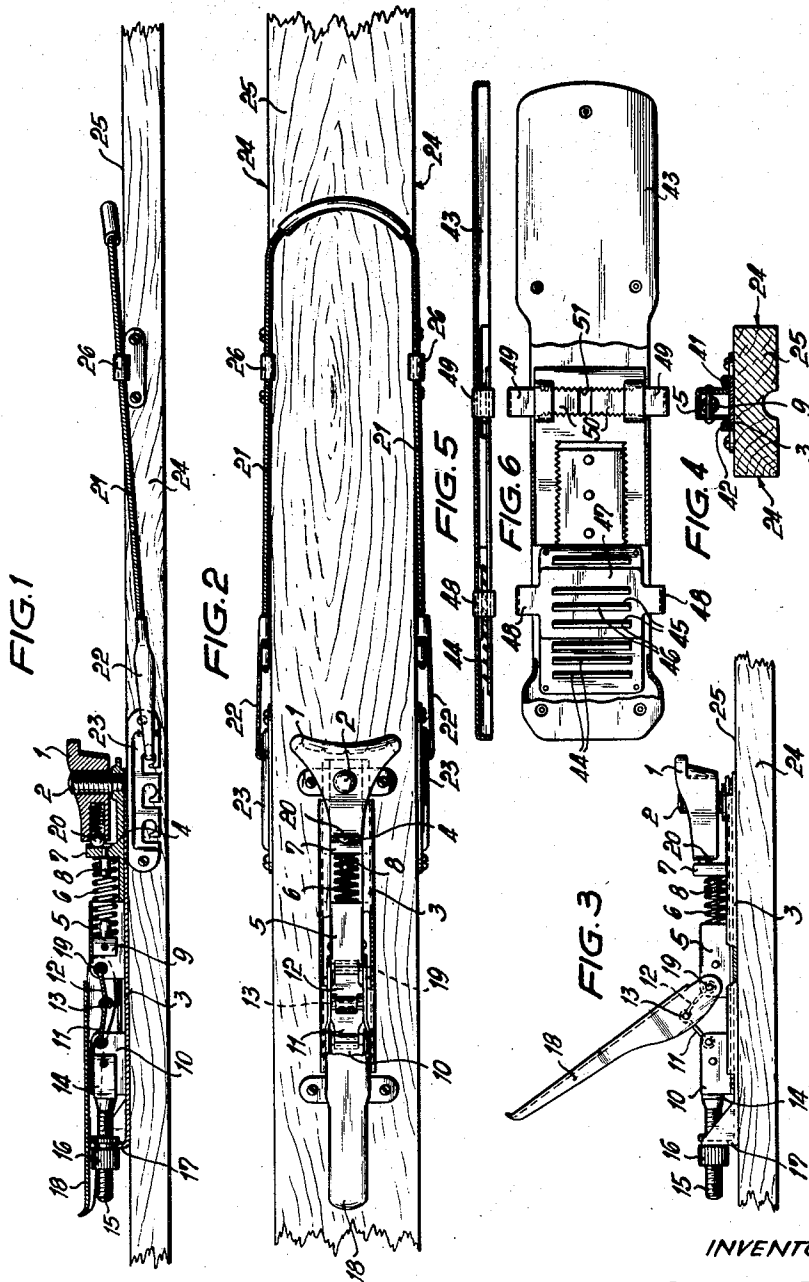
A. GEMBRÜCH

2,950,119

SKI BINDING

Filed Feb. 19, 1958

3 Sheets-Sheet 1



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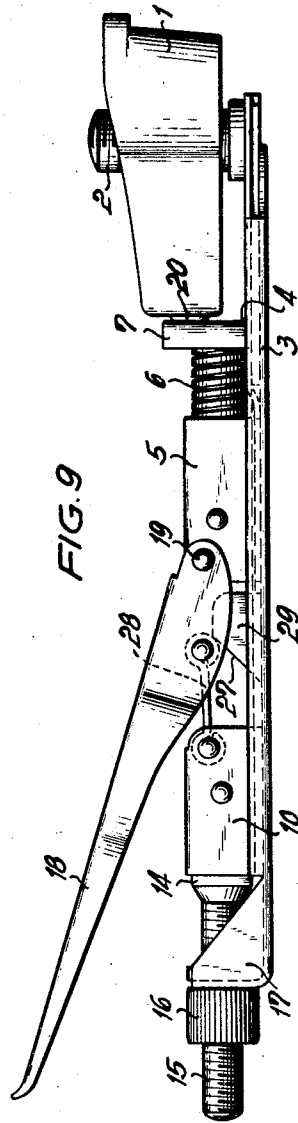
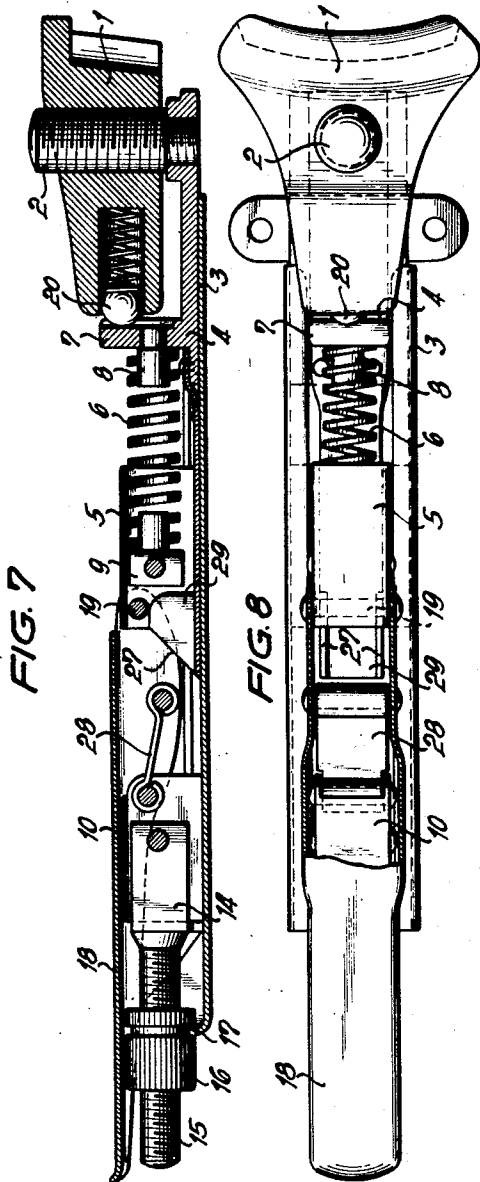
A. GEMBRÜCH

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3 Sheets-Sheet 2



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SKI BINDING

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7 Claims. (Cl. 280—11.35)

This invention relates to a ski binding with a forward lever assembly, which is distinguished from known types of binding more particularly in that the action of the forward lever tightens the skiing boot rearwardly on the ski, that very simple means are provided for the automatic lateral release of the binding when exceptional twisting forces occur and that in a forward fall a member is thrust against one of the links of a toggle mechanism and thus automatically throws up the forward lever, thus likewise releasing the binding and permitting the separation of the ski from the boot.

According to the invention these advantages are achieved in that the ski binding comprises a toe iron for holding the toe of the sole of the boot, which toe iron is vertically adjustable and adapted to swivel in a horizontal plane but normally held in its central position by arresting means, said toe iron forming an assembly with a forward lever mechanism in such manner that the forward lever is located in forward alignment with the toe of the boot.

The particular advantage offered by a ski binding of this kind is that it comprises few and extremely simple parts, and considering the fact that in known ski bindings side irons or draw hooks prevent the boot from rising, a releasable retention of the boot in the binding when running is an advantage that is extremely desirable. Furthermore, by providing a resilient cable for holding the heel, which is not attached to the forward lever but adjustably secured to the sides of the ski, the resultant binding affords the additional advantage of being adaptable to any size of skiing boot.

In a manner which as such is already known the proposed binding permits the forward lever to be adjusted by means of a screw linked to a sliding member and adapted to be adjusted as desired by means of a nut.

For securing the boot to the ski, the forward lever has the effect of tightening the binding in the rearward direction so that a bottom harness with a tightening spring is not required.

Ski bindings of various types are already known which comprise side irons between which the boot must be placed so that it can be held by a strap which connects one iron with the other.

Such known ski bindings also incorporate heel tightening springs which clamp the ski boot between the usually adjustable lateral grips of the irons, an arrangement which altogether precludes a lateral release of the boot as well as its release in the forward direction.

None of the binding heretofore known provide for the binding to release laterally as well as in the forward direction in case of a fall, or share the feature of a vertically adjustable toe iron which retains the toe of the sole of the boot and which is elastically connected with the forward lever mechanism.

Several preferred embodiments of the invention are illustrated by way of example in the accompanying drawings in which:

Fig. 1 is an elevational view, partly in section, of a

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ski binding including a forward lever assembly according to the invention;

Fig. 2 is the same binding shown in plan;

Fig. 3 is an elevational view of the binding with the forward lever in raised position;

Fig. 4 is a cross-sectional view of the binding;

Fig. 5 is a side view, partly in section, showing a boot supporting plate with adjustable elements;

Fig. 6 is a plan view of the same plate;

Fig. 7 is an alternative embodiment of the binding in elevational section on a larger scale;

Fig. 8 is a plan view, partly in section, of the same binding;

Fig. 9 is an elevational view of the same binding with the forward lever raised;

Fig. 10 is yet another form of construction of the binding, shown in elevation and partly in section;

Fig. 11 is the same binding in plan; and

Fig. 12 is an end view of the same binding seen from the right-hand side of Fig. 11.

With reference to Figs. 1, 2 and 3 a common base plate 3 on a ski 25 carries a toe iron 1 adapted to swivel horizontally on a pin 2, as well as a forward lever assembly 4, so that the toe cap 1 which holds the toe of the sole of a skiing boot from above is combined in one unit with the forward lever assembly 4.

The forward lever assembly 4 comprises a slidably displaceable sleeve 5 containing a compression spring 6 of which one end bears against a tight fitting but slidably displaceable support 7, the spring being held in position by a center pin 8. The other end of the compression spring 6 bears against a support 9 located in the sliding sleeve 5. The forward lever assembly 4 further comprises a sliding sleeve 10 connected with sleeve 5 by means of two hinged toggle plates 11 and 12, the hinge between the toggle plates being established by means of a hinge pin 13. Sleeve 5 as well as sleeve 10 are adapted to slide on the base plate 3 and fine adjustment of their position can be effected by means of a pin 14 pivotally connected with sleeve 10 and provided with a threaded shaft 15 for a nut 16 which is rotatable but non-displaceable in a bearing member 17 on base plate 3.

The forward lever assembly 4 is operated by a forward lever 18 which is arranged, together with the toggle 12, to hinge on a common fulcrum 19 in the sliding sleeve 5.

The binding is tightened in that the forward lever 18 is pressed forward and downward from its position shown in Fig. 3 and this causes the toggle plates 11 and 12 to be depressed slightly below their dead center to force sleeve 5 towards the toe iron 1, spring 6 bearing tightly against the slidably displaceable support 7.

The slidably displaceable support 7 acts on a spring-loaded arresting ball 20 mounted in a bore in the forward part of the toe iron 1 and hence presses it against the toe iron.

According to the invention this action tightens the boot on the ski by the rearward pressure exerted on the toe iron 1, the boot thus being tightened from the front to the back, and the heel being held by a resilient cable 21 which passes round the back of the heel. The resilient cable 21 has forward ends 22 detachably and adjustably connected to holders 23 on both sides 24 of the ski 25.

For positioning the resilient heel cable 21 additional locating hooks 26 may be provided at a suitable place on the sides 24 of the ski, as shown in Figs. 1 and 2.

The described cooperation of the forward lever assembly 4 and the toe iron 1, on the one hand, and the loose detachable resilient heel cable 21 permits the ski automatically to detach itself from the boot in case of a fall to the side or to the front.

Moreover, since the cable 21 is detachable at 26 this type of ski binding facilitates long distance running.

To aid in the automatic release of the binding in case of a forward fall, and as shown in Figs. 7, 8 and 9, a cam 29 with a forwardly inclined surface 27 may be provided on sleeve 5 below the fulcrum 19 upon which the forward lever 18 is pivoted to sleeve 5, said inclined surface cooperating with a link 28 connected both with the sleeve 10 and the forward lever 18. Thus, in a forward fall when the toe of the boot presses sharply against the toe iron 1 thus pushing forward support 7 on the lever assembly and compressing spring 6, sleeve 5 together with cam 29 will be likewise forced forward until the inclined surface 27 engages link 28 and raises the same, throwing up the forward lever 18 which is connected with link 28, and thus releasing the binding.

The described arrangement therefore provides for automatic release of the binding during a forward fall.

Another embodiment illustrated in Figs. 10, 11 and 12 provides simple means of securing the toe iron 1 which is arranged to swivel on a pin on the base plate 3 and also permits the toe iron to be easily raised, lowered, and adjusted to the required height. A pin 2¹ is secured to a sliding block 30 on the base plate 3 and is surrounded by a helical compression spring 31 which is held in a recess 32 in the toe iron 1. Vertical adjustment of the toe iron is effected by turning a screw 33 inserted in a threaded hole 34 in the pin 2¹ and engaging a pressure member 35. A liner or pad 36 consisting of some soft material such as rubber or the like is preferably provided for improving the grip of the toe iron 1 on the toe of the sole of the boot. To retain the toe iron 1 reliably in engagement with support 7, the bore provided for the reception of the arresting ball and its loading spring may be arranged to contain a wedge member 38 with a bevelled end 37 for cooperation with a thrust member 39 with a similarly bevelled end in such manner that by adjustment of a screw 40 the pressure of ball 29 against support 7 can be controlled through the two bevelled cooperating members 38 and 39.

In all the described forms of construction the toe iron 1 is arranged to swivel on base plate 3, and sleeve 5 is slidably displaceable thereon. To this end, base plate 3 is preferably provided with edges 42 embracing lateral flanges 41 of the sleeve 5, as shown in Fig. 4.

As illustrated in Figs. 5 and 6, a ski binding constructed according to the present invention may further comprise a supporting plate 43 for the boot to stand on, and a smaller plate is mounted on the forward end of the plate 43 and has transverse slots 44 adapted to be selectively engaged by downwardly projecting edges 45 of slots 46 in a slide 47. Both sides of the slide 47 carry downwardly directed locating hooks 48 for the resilient heel cable 21.

Furthermore, additional locating hooks 49 may be equipped with extensions 50 pointing inwards towards each other and provided with serrated edges 51 to permit the locating hooks 49 to be spaced apart in accordance with the width of the skiing boot that is being used.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. A ski binding, comprising in combination a vertically adjustable toe iron mounted for lateral deflection, arresting means for normally retaining said toe iron in a central position, a forward lever assembly yieldably connected with said toe iron, and a detachable and adjustable flexible heel cable, said forward lever assembly being adapted to cooperate with said toe iron to tighten a skiing boot rearwardly against said heel cable, said for-

ward lever assembly comprising a slidably sleeve, a compression spring having one end contained in said sleeve, a support for said toe iron engaged by the other end of said spring, a base plate displaceably carrying said support and said sleeve, a second sleeve slidably mounted on said base plate, toggle means connecting said second sleeve means to said first mentioned sleeve, said toggle means including a lever operatively connected to said first mentioned sleeve, said second sleeve including a threaded shaft and nut operatively connected to said compression spring through said sleeves and toggle means for biasing the same, and a bearing on said base plate in which said nut is journaled and retained against displacement.

2. A ski binding as claimed in claim 1, wherein the displaceable support is provided with a recess adapted to engage a spring-loaded ball carried on said toe iron for the purpose of arresting the toe iron in its central position while permitting the toe iron to disengage and swivel to one side for releasing the boot when unusual lateral torques occur.

3. A ski binding as claimed in claim 1, wherein the resilient heel cable has its ends adjustably and detachably connected to the ski, and locating hooks are provided on the sides of the ski for locating said cable.

4. A ski binding as claimed in claim 1, wherein adjacent one end of the first mentioned sliding sleeve a cam with a forwardly inclined edge is provided which by any unusual forwardly directed pressure is forced against a link member of said toggle means, thereby pushing said link member in upward direction and throwing up the lever to effect the automatic release of the binding.

5. A ski binding as claimed in claim 1, wherein the toe iron is provided with a rubber pad arranged to engage the skiing boot.

6. A ski binding as claimed in claim 1, wherein the toe iron is mounted on a fixed pivot pin with a centrally extending threaded hole, said pin being surrounded by a helical spring accommodated in a recess in the lower side of the toe iron, said arrangement permitting vertical adjusting of the toe iron by means of a screw received in said threaded hole and extending through a pressure member surmounting the toe iron, said pressure member carrying a second screw for adjusting the pressure of the arresting means that normally retains the toe iron in central position, said second screw engaging a thrust member having a bevelled end for cooperation with a similarly bevelled end of a second thrust member disposed in yieldable alignment with and acting on said arresting means.

7. A ski binding as claimed in claim 1, wherein a boot supporting plate is mounted on the ski and includes a portion at one end having transverse slots selectively engageable by downwardly projecting edges of similar transverse slots in a slide mounted on said boot supporting plate, said slide being adjustable in the longitudinal direction of the ski and carrying locating hooks for the heel cable, and further locating hooks spaced from said first-named locating hooks being provided on opposite sides of the supporting plate, said further locating hooks being adjustable transversely to the longitudinal direction of the ski by means of serrated edges on said hooks engaging in cooperating recesses on said boot supporting plate.

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