Dec. 12, 1950 A. B. LANZ 2,534,038

SAFETY SKI BINDING

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Fig.1

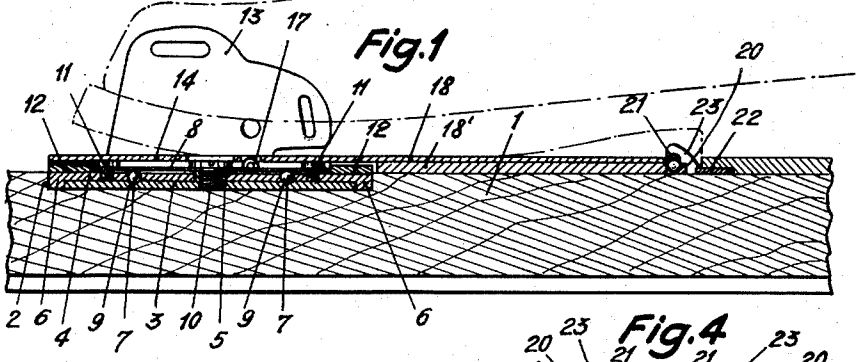


Fig.2

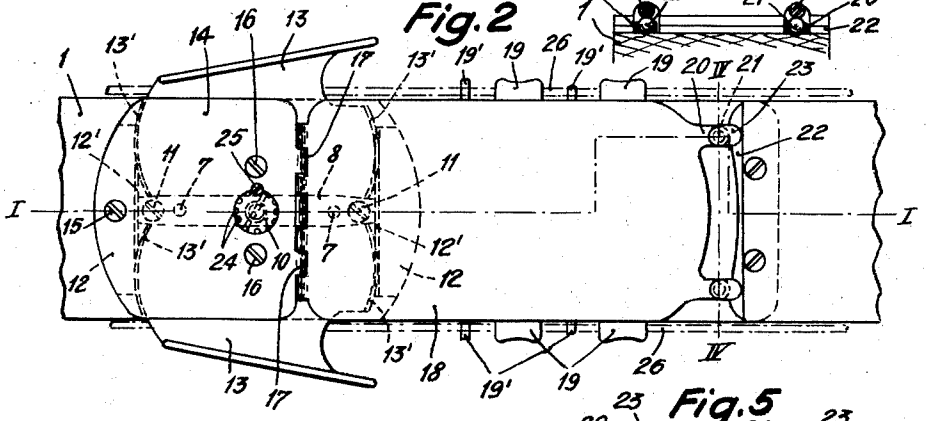


Fig.4

Fig.5

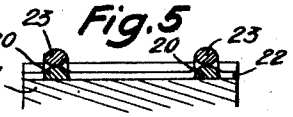


Fig.3

Fig.6

INVENTOR:

A.B. Lanz

By Bryant & Lowry

Attys

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Fig. 7

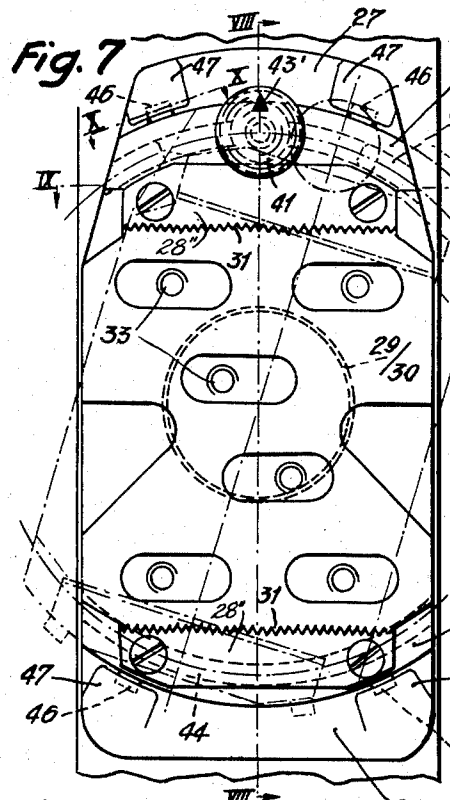


Fig. 8

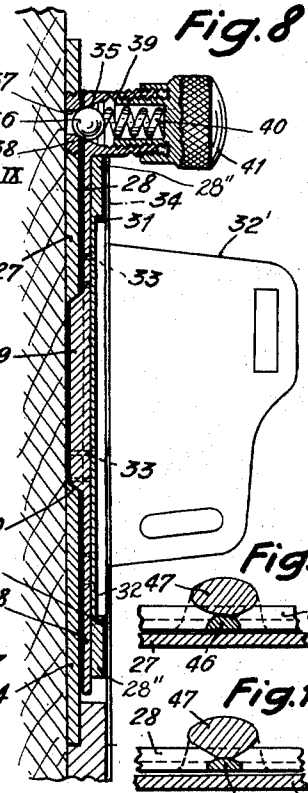


Fig. 10

Fig. 11

Fig. 12

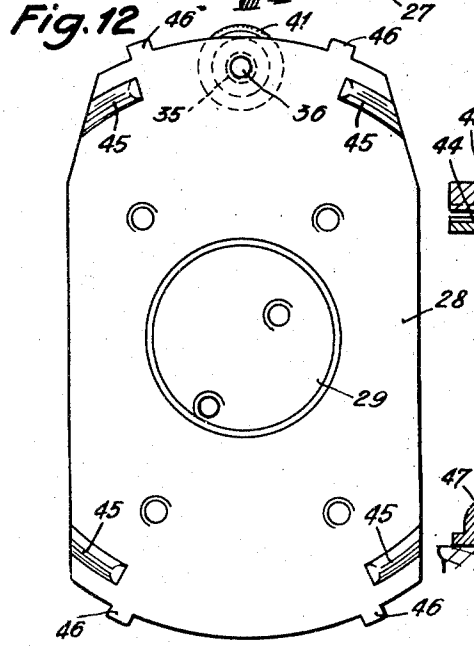


Fig. 9

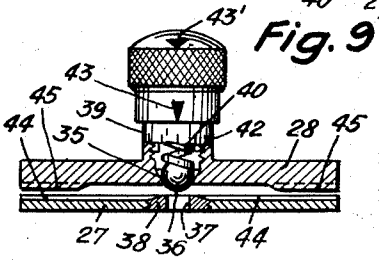
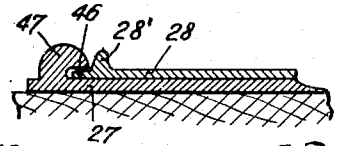


Fig. 13



INVENTOR:
A.B. Lanz
By Bryant & Powers Attys.

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SAFETY SKI BINDING

Adrian Berchtold Lanz, Montreux, Switzerland

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Patent expires March 8, 1964

11 Claims. (Cl. 280—11.35)

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Nearly all the leg fractures and knee and ankle sprains that happen to ski-runners are caused by the foot being gripped so tightly by the toe irons that in the event of a fall it is forced into a position in which the limit of articulation of knee or ankle, or the resistance of the leg bones, is exceeded. This in turn depends on the rigidity of the binding in relation to a rotation of the foot round a vertical axis. A fall caused by the skis crossing results in a more or less serious sprain, to say the least, only because the binding does not yield.

Suggestions have already been put forward for ski bindings expressly designed to avoid accidents due to falls. In these types of binding the toe irons are fixed on a plate which pivots on a base-plate. A spring presses the turnable plate against the base-plate and checks hold them loosely together. The resistance of a spring stop must be overcome before the pivoted plate can turn. The corresponding spring is lodged in a vertical cavity which is drilled in the ski and which is bound to weaken the ski itself. Moreover, a binding of this type is not suited for use with modern diagonal traction systems.

The present invention relates to a ski binding so designed as to be fastened to the ski without in any way weakening the latter, while being suited for use with the most popular types of binding.

The invention consists in the toe-iron base, which is turnable in a horizontal plane, being fitted on a plane parallel to the foot plate and held fast in its normal position in such a way that, when a certain force is brought to bear on the binding the toe-iron base is released and the foot, at least as regards swivelling, freed from the ski. Neither toe-iron base nor base-plate has parts projecting downwards which must be countersunk into the wood of the ski.

The accompanying drawings show, by way of example, specific embodiments of the invention.

Fig. 1 is a longitudinal section of the first embodiment along the line I—I in Fig. 2.

Fig. 2 is a top plan view of same.

Fig. 3 is a top plan view with binding swivelled outwards.

Fig. 4 is a section on line IV—IV of Fig. 2.

Fig. 5 is a corresponding section in alternative design.

Fig. 6 alternative cable guide on sole plate.

Fig. 7 is a top plan view of toe-iron base of second embodiment.

Fig. 8 is a longitudinal section on line VIII—VIII in Fig. 7, but with the toe-irons and foot plate attached.

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Fig. 9 is a section of the toe-iron base and the corresponding base plate on the line IX—IX in Fig. 7.

Fig. 10 is a section through X—X in Fig. 7.

Fig. 11 alternative design of Fig. 10.

Fig. 12 toe-iron base from below.

Fig. 13 section through retaining claw.

In the first example base-plate 3 is screwed into a shallow hollow 2 in the upper part of ski 1. On this base-plate is pivoted a disc 4 which is centered by means of a hole on central collar 5 of base-plate 3 which it embraces with its downward projecting rim 6 thus also rendering the construction more sturdy. Two ball checks 7 are lodged in two holes in swivel-plate 4 and pressed by leaf spring 8 against corresponding seats 9 in base-plate 3. The pressure of the spring on the ball checks can be adjusted by the action of regulator screw 10 engaging internally threaded collar 5 and two adjustment screws 11 screwed into threaded holes on opposite sides of swivel-plate 4. Two toothed jaws 12 are placed opposite each other, the teeth 12' of which engage with corresponding toothed segments 13' of toe-irons 13. Cover plate 14 is fastened by easily loosened screws 15 and 16 to swivel-plate 4 and secures the toe irons in place. To the cover plate 14 there is articulated by means of hinge 17 sole plate 18 that is stiffened underneath by reinforcing plate 18'. Sole plate 18 has on each side hooks 19 the plate also being provided with a pair of spurs 20 protruding at the rear a certain distance apart, and in each of these latter is lodged a ball check 21 projecting upwards. Bearer plate 22 is fixed to ski 1 behind sole plate 18 which it holds down with the help of two slender catches 23 that engage with spurs 20 as long as sole plate 18 remains in its normal position. The head of central regulating screw 10 has deep notches 24 in its rim in which the easily loosened stop screw 25 engages, thus maintaining regulating screw 10 in its predetermined position. In the alternative design (Fig. 5), spurs 20 and retention catches 23 have convex adjacent surfaces to allow sole plate 18 to rise as soon as it begins to swivel with toe-iron base 4. Base plate 3 and swivel plate 4 are cut off flush with the ski edges so that they do not project laterally beyond them. Pins 19' are fitted out of alignment with respect to hooks 19 and serve to maintain diagonal traction cable 26 in position in the hooks. Since cable 26 runs over these retention pins 19', the latter may be affixed to the ski itself. Diagonal traction hooks 19, being themselves affixed to sole plate 18 allow cable 26 to

follow the movement of the binding when this swivels outwards (see Fig. 3).

In the middle of hinge 17 there is a gap whose width corresponds to that of leaf spring 8, so that the latter is guided by the inner edges of the hinge. The pressure of leaf spring 8 is set by adjustment screws 11 and can afterwards be precisely regulated as required with the help of central regulating screw 10. It is preferable to cast the various parts of the binding in a light metal such as "avional."

According to the modification shown in Fig. 6, at least one hook 19*a* for guiding diagonal traction cable 26 can be fitted on each side of sole plate 18. In order to prevent these hooks from colliding with the upper edges of the ski when the binding swivels, they are only 2–3 mm. long. As such short hooks would not suffice to hold the cable in place during actual skiing, a stop 19*b* bent upwards and outwards is affixed to each side of the ski beneath each of the hooks 19*a*. As long as the safety binding lies in its normal position, cable 26 is lodged between hooks 19*a* and stops 19*b*. When the binding swivels and sole plate 18 is released to move both vertically and horizontally, the diagonal traction cable 26', which according to Fig. 6 is disposed between the parts 19*a* and 19*b*, is released in the same manner for movement both in a horizontal and in a vertical direction.

The second model of the safety binding has a base-plate 27 screwed on to the ski. Underneath toe-iron base 28 is solidly fixed a truncated cone 29 which engages in a corresponding cavity 30 in base-plate 27 and has the function of providing a vertical pivot around which toe-iron base 28 can rotate. The toe-irons consist of a pair of L-shaped members 32, 32' each comprising an upright jaw portion 32' and a horizontal portion 32 whose end edges are toothed for engagement with teeth 31 of the plate 28'' forming part of base 28, and can be loosened or tightened by means of screws operating in threaded holes 33 of plate 28. Foot plate 34 is screwed onto plate 28'' of toe-iron base 28 and covers toothed base 28, 28'' of toe irons 32.

Toe-irons base 28 is maintained in its central (normal) position by means of a spring check. This is formed by ball 36 partially protruding downwards through conical aperture 35 in toe-irons base 28 into seat 37 drilled in bushing 38 fitted in base-plate 27. Cylinder 39 on toe-iron base 28 directly above conical seat 35 of ball check 36 holds spiral spring 40 which presses down wall 36. This pressure can be regulated by means of screw 41 as reqired. It is indicated by the position of pointer 43 or 43' of screw 41 on graduated scale 42 engraved on cylinder 39. In base-plate 27 there are arcuate grooves 44 concentric with conical cavity 36. Guide projections 45 fixed to the under side of toe-iron base 28 extend into the arcuate grooves 44.. When the toe-iron base lies in its normal position these projections 45 close the lateral mouths of arcuate grooves 44 and keep them free of snow. On front and rear edges of toe-iron base 28 there are protrusions 46 less thick than the rim of the plate itself. Retention claws 47 are fitted to base-plate 27 opposite these protrusions and engage with them when plate 28 is in its normal position, thus preventing the latter from being raised from base-plate 27. Protrusions and claws have convex contact faces somewhat flattened towards the centre. This ensures a more secure retention of the base-plate in its normal position, while at the same time a rotation of a few millimetres suffices to free it. The axis of arcuate grooves 44 passes through the centre of seat 37, so that ball 36 on leaving its seat engages in adjacent groove 44. In Fig. 7 the swivelled position in which toe-iron base 28 is freed from base-plate 27 is indicated by dot-dash lines.

Front and rear rims of toe-iron base 28 (see Fig. 13) should be shaped to prevent the plate from catching under retention claws 47 while swivelling. For this purpose toe-iron base 28 is fitted with thickening rib 28'. Moreover, its rims are rounded off so that ribs 28' are not retained by claws 47 during swivelling.

The safety binding above described functions as follows: Swivelling of toe-iron base 28 to free position is only possible after resistance of ball check 36 in seat 37 has been overcome. This resistance is so adjusted by screw 41 in proportion to the individual skier's weight and build that he can perform all kinds of turns without danger of swivelling toe-iron base 28, while at the same time check 36, 37 is released before the limit of resistance of bones or articulations is reached. Freeing of toe-iron base 28 from ski after swivelling is facilitated by the convex or oblique faces of parts 46 and 47 (see Figs. 10 and 11), as well as by cone 29 forming the pivot. After swivelling toe-iron base 28, and with it the whole binding, is completely freed from the ski.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred example, it is to be understood that same changes may be made in the arrangement, construction and combination of the various parts of my invention, and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. In ski binding assemblies, a toe-iron assemblage and a base plate having its under face planar and secured and supported by a complemental face of the ski, a mounting between the toe-iron assemblage and the base plate, said mounting comprising vertical swivelling pivot and complemental seat means in said toe-iron assemblage and said base plate, said mounting being located wholly above the bottom plane of the base plate, and adjustable means normally retaining the toe-iron assemblage against swivelling activity, said means being active to establish a predetermined resistance against swivelling and being yieldable under abnormal lateral forces acting on the toe-iron assemblage, whereby the toe-iron assemblage normally maintains a definite relation between the boot of the user and the ski while providing emergency relief from this normal definite relation between boot and ski and preventing application of excessive twisting stresses to the limb of the user.

2. An assembly as in claim 1, the mounting between the toe-iron assemblage and the base plate comprising means to permit swivelling activity within a limited arcuate range and complete separation of assemblage and plate in presence of an excess range of movement in the direction of swivelling activity.

3. An assembly as in claim 2 characterized in that the toe-iron assemblage is provided with a depending zone of circular contour and of conical depth co-operative with a complemental seat formed in the base plate, the axis of said seat providing the swivelling axis of the assemblage.

4. An assembly as in claim 3 characterized in

that the toe-iron assemblage carries normally active, yieldable means cooperative with a complemental seat carried by the base plate and positioned remote from the swivelling axis, said means being operative to normally maintain the assemblage against swivelling activity and yieldable in presence of abnormal lateral forces to permit swivelling activity.

5. An assembly as in claim 4 characterized in that the means is in the form of a spring supported ball with the spring controllably adjustable as to its tension value.

6. An assembly as in claim 5 characterized in that the upper face of the base plate carries arcuate ways symmetrically disposed relative to the swivelling axis, with one of said ways positioned to form a travel path for the ball during swivelling activity, the toe-iron assemblage carrying additional members cooperative with the ways in the control of the swivelling action and to normally form closures for the ways to prevent the entrance of snow into the ways.

7. An assembly as in claim 1, the mounting between the toe-iron assemblage and the base plate comprising means to permit swivelling activity within a limited arcuate range and complete separation of assemblage and plate in presence of an excess range of movement in the direction of swivelling activity, said toe-iron assemblage including spaced tongues adapted to cooperate with complemental spaced claws carried by the base plate for normally retaining the assemblage and base plate against separation with the claw length determining the length of the limited range of swivelling action, the spacing of the claws permitting such separation by ending the claw restraint when the range limit of swivelling action has been reached.

8. An assembly as in claim 7 characterized in that the co-operating faces of a tongue and its claw are relatively formed to retain the assemblage and base plate firmly held against separation when the tongues are in a predetermined normal position, said faces permitting gradual lessening of such firmness during swivelling activity development and continuance.

9. An assembly as in claim 1 characterized in

that the toe-iron assemblage includes a toe plate carrying the swivelling pivot means, and a sole plate hingedly connected thereto in rear of such pivot means, said sole-plate carrying rearwardly-extending spurs cooperative with a bearer plate carried by the ski to retain the sole plate in a normal firm position, the bearing plate and tongues having complemental means for maintaining the firm condition in the absence of swivelling action with the means operative to permit gradual rise of the sole plate during swivelling activity.

10. An assembly as in claim 9 characterized in that the adjustable means for producing resistance to swivelling activity is in the form of a spring extending in fore and aft direction in intersecting relation to the swivelling axis, said spring being adjustable as to tension and having a length to extend across the hinging axis of the toe and sole plate connection to thereby render the spring active with respect to both toe and sole plates.

11. An assembly as in claim 10 characterized in that the sole plate additionally carries side hooks cooperative with diagonal traction cable elements, said sole plate and its tongues and side hooks together with the cable elements being bodily swingable with the toe-plate during swivelling activity.

ADRIAN BERCHTOLD LANZ.

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