

Sept. 15, 1970

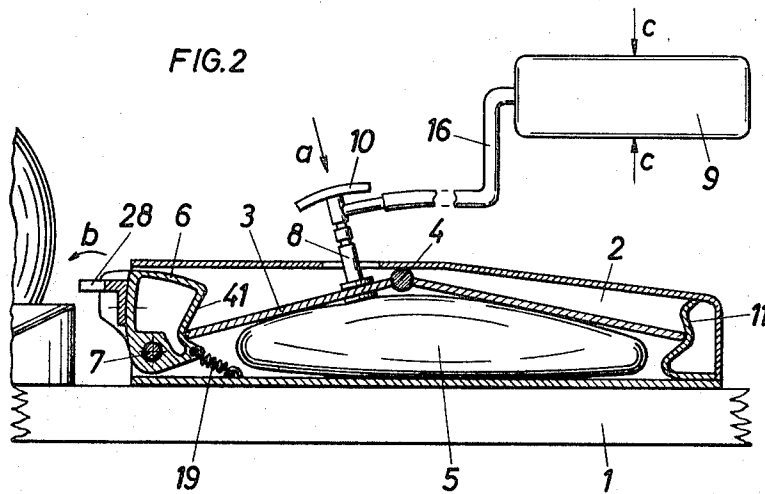
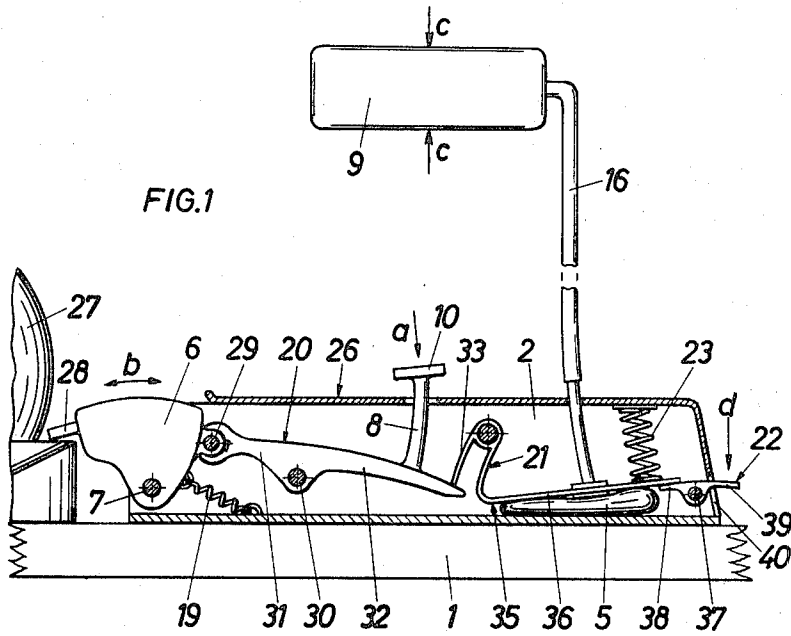
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3,528,672

SAFETY SKI BINDING

Filed June 5, 1968

3 Sheets-Sheet 1



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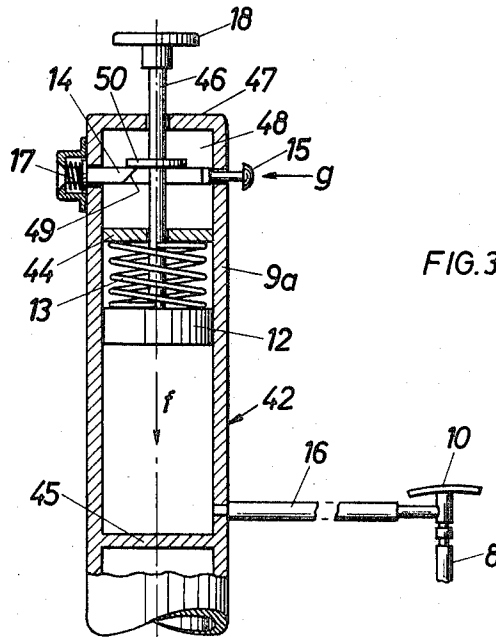


FIG. 3

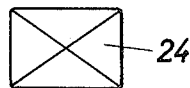
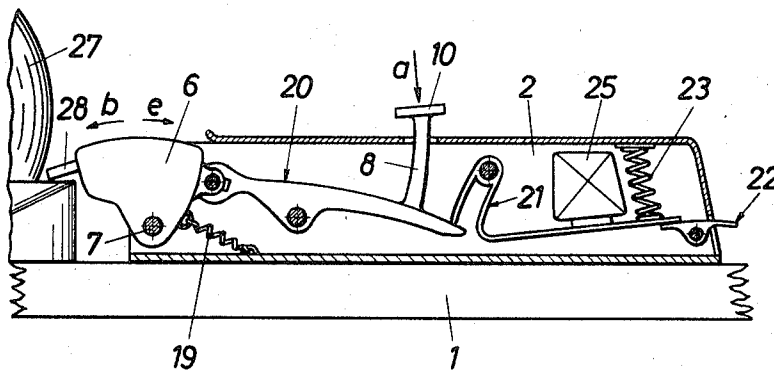


FIG. 4



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FIG. 5

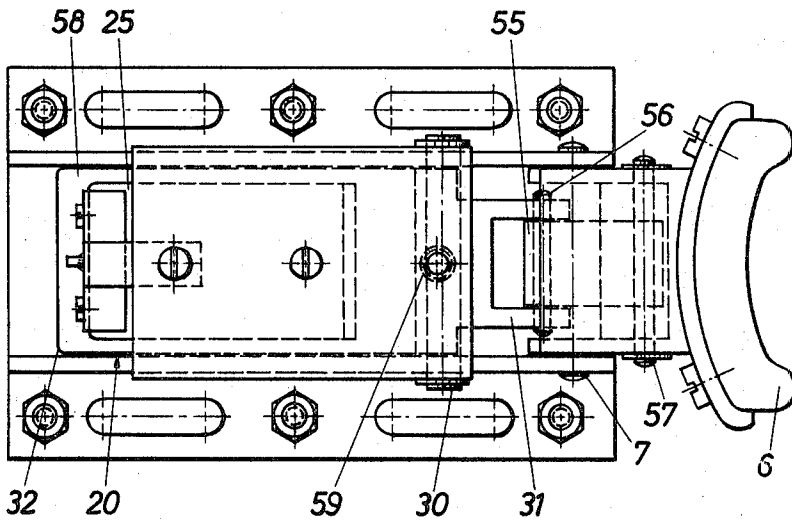
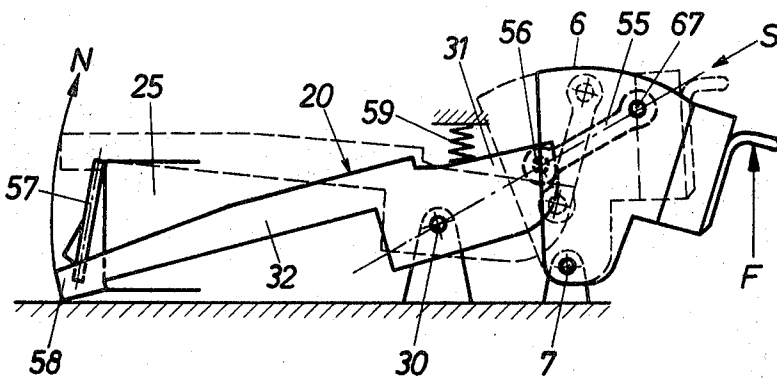


FIG. 6



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SAFETY SKI BINDING

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Int. Cl. A63c 9/00

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15 Claims

ABSTRACT OF THE DISCLOSURE

A safety ski binding is released by human actuation and comprises means which are remotely controlled by the skier and serve to open the gripping member which co-operates with the sole of the boot.

SUMMARY OF THE INVENTION

A safety ski binding is releasable by human actuation and comprises a gripping member, which is pivoted on a horizontal axis. The gripping member is connected to a return spring, which tends to move the gripping member into an initial position in which the gripping member releases the boot. The gripping member is urged into its gripping position by a linkage. Means for releasing parts of the ski binding so as to open the gripping member are provided within grasping reach of the skier and actuable by him.

This invention relates to a safety ski binding which is releasable by human actuation.

The main object of the invention is to provide a safety ski binding which is released in a case of danger at the personal discretion of the skier.

To this end, the invention provides according to a further feature a safety binding comprising a gripping member, which is pivoted on a horizontal axis and connected to a return spring, which tends to move the gripping member into an initial position, in which the gripping member releases the boot, a linkage which urges said gripping member into its gripping position, and remotely controlled means which are actuable by the skier and serve to release ski binding parts for opening the gripping member.

Finally it is a feature of the invention that the remote control means consist of a battery-fed transmitter, which is disposed within grasping reach of the skier, and a battery-fed receiver, which is disposed adjacent to the release-initiating device and initiates the operation of the mechanical system.

The fact that the safety ski binding is released by human actuating affords the technical advantage that rugged ski binding parts can be used, which ensure a reliable locking action and can be released only by a certain effort so that the release will be absolutely reliably effected in the case of danger.

Whereas the invention will be described by way of example with reference to five embodiments, these indicate only basic arrangements, which can be varied in numerous ways in practice.

FIG. 1 of the drawing is a diagrammatic longitudinal sectional view showing a release-initiating device,

FIG. 2 shows another embodiment,

FIG. 3 shows a releasing member in the form of a ski stick handle,

FIG. 4 is a diagrammatic longitudinal sectional view similar to FIG. 1 with an electric control system,

FIG. 5 is a top plan view showing another embodiment of the release-initiating device, and

FIG. 6 is a side elevation showing the release-initiating device of FIG. 5 with the gripping member housing removed.

The release-initiating device shown in FIG. 1 is connected to a safety gripping device 26, which serves in the present embodiment as a heel holder for holding down the heel and is mounted on the ski 1 behind the skiing plate 27. The heel holder comprises a gripping member 6, which is pivotally movable in the direction of the arrow *b* about a horizontal pivot 7, which is carried in the housing 2. The gripping member 6 carries a soleholder 28 at its end facing the boot and is pivoted at its end remote from the boot at 29 to one arm 31 of a two-armed shift lever 20. The latter is pivoted at 30. One arm 33 of a pivoted control member 21 engages the top of the other arm 32 of the lever 20 and has an angled second arm 35, which has a generally longitudinal portion 36. A spring 23 tends to depress the portion 36, which rests on a resilient air receiver 5, which is connected by a conduit 16 to a pneumatic cushion 9. The latter is disposed within grasping reach of the skier, e.g., on the ski stick or on the body of the skier or in his garments. The gripping member 6 is also biased by a diagrammatically indicated return spring 19, which may consist of a torsion spring, leaf spring etc.

A hand knob 10 protrudes upwardly from the housing 2 and is connected to a stem 8, which engages the arm 32 of the shift lever 20.

The described heel holder operates as follows. When the knob 10 is depressed in the direction of the arrow *a*, the shift lever 20 is moved from an initial position to its operative position, shown in FIG. 1. In the latter position the gripping member 6 having moved in the direction of arrow *b* causes the soleholder 28 to exert a gripping force on the sole of the boot. When the skier desires to be released by the ski binding in a case of danger, he will compress the pneumatic cushion 9 in the direction of arrows *c* so that the air receiver 5 is inflated and applies pressure to the control member 21 to move the same against the action of the compression spring 23. The shift lever 20 and gripping member 6 are thus released to move to the release position.

As has been mentioned hereinbefore, the hand knob 10 can be depressed to compress the air receiver 5 and return the gripping member 6 to its gripping position.

In a special embodiment, a release member, e.g., the control member 21, cooperates with a release trigger 22, which consists of a two-armed rocker lever. This lever is pivoted on a horizontal axis at 37 and has one arm 38, which engages the end of the angled arm 36 from below. The other arm 39 of the rocker lever 22 extends outwardly through a slot 40 in the housing 2. With this design, the control member 21 can be moved to its release-initiating position not only by pneumatic actuation but also by a different action, in the present case by pressure applied to the release trigger 22 in the direction of arrow *d*.

In the embodiment shown in FIG. 2, the lever 20 and the control member 21 of the design of FIG. 1 are replaced by a toggle joint plate 3, which can be folded about a hinge 4 and under which the resilient air receiver 5 is disposed. The latter is connected by the hollow stem 8 of the hand knob 10 to the conduit 16. The toggle joint plate 3 is loosely inserted between an abutment 11 carried by the housing at that end thereof which is remote from the boot, and another abutment formed by the rear wall 41 of the gripping member 6.

The heel holder is shown in FIG. 2 in its inoperative or release position, in which the toggle joint plate 3 is upwardly deflected. The application of downward pressure to the hand knob 10 will straighten the toggle joint plate 3 bearing on the abutment 11 and the gripping member 6, which is thus swung in the direction of the arrow *b* until it reaches and grips the sole of the boot 27. While the toggle joint plate 3 is being straightened,

the air receiver 5 is compressed so that the air contained in it escapes. In the gripping position of the gripping member 6, the toggle joint plate 3 is depressed beyond its neutral position and the receiver is substantially flattened.

When danger arises, the skier applies pressure to the pneumatic cushion 9 in the direction of the arrow *c*, just as in the preceding embodiment, so that the resilient air receiver 5 is suddenly inflated via the hose extending on the body of the skier. As a result, the toggle joint plate 3 is suddenly forced back to its inoperative position shown in FIG. 2 and the gripping member 6 is released at the same time to swing back opposite to the direction of arrow *b* to the release position shown in the drawing.

Within the scope of the invention, compressed air or a vacuum produced in the ski stick handle may be used rather than a pneumatic cushion 9 for a release in the case of danger. To this end, the cylindrical handle of the ski stick constitutes an air pump, which is diagrammatically indicated in FIG. 3. Part of the upper end portion of the ski stick 42 forms a pump cylinder 9a, which is bounded by the cylinder end members 44, 45 and contains a piston 12. The piston 12 is biased by a spring 13, which bears at one end on the cylinder end member 44 and at its other end on that face of the piston which faces the cylinder end member 44. The spring 13 tends to move the piston in the direction of arrow *f*. A piston rod 46 extends through the cylinder end member 44 and the top 47 of the ski stick 42 and is provided at its outer end with a hand knob 18. A locking device 14 is contained in the chamber 48 between the cylinder end member 44 and the top 47 of the ski stick 42 and is urged against the piston rod by a spring 17. On its side facing the piston rod, the locking device has a bevel 49, which is upwardly inclined toward the piston rod 46. The locking device 14 cooperates with a collar 50 on the piston rod. Besides, the locking device 14 is provided with a trigger 15, which is disposed outside the stick and is movable in the direction of the arrow *g* to move the locking device out of the range of the collar 50.

In the initial position shown in FIG. 3, the locking device 14 engages the collar 50 from below to hold the piston 12 in its top position, in which the piston compresses the spring 13. In a case of danger, the skier compresses the trigger 15 so that the locking device releases the collar 50 and the spring 13 can move the piston 12 in the direction of the arrow *f*. The air which is thus compressed flows through the conduit 16 and any hollow rod 8 into the air receiver 5, which cooperates with a linkage such as is shown in FIG. 1 or 2. The piston 12 is returned by the hand knob 18. In this operation, the collar 50 acting on the bevel 49 of the locking device 14 displaces the latter against the force of the spring 17 shortly before the top position is reached. The collar can then move past the locking device, which subsequently snaps into its initial position to retain the piston 12 in its raised position.

It has been found that the devices described hereinbefore for a release of a safety ski binding can also be operated by other than pneumatic signals. A signal for actuating the mechanical release-initiating device may be generated by a battery-fed transmitter, which is disposed on the body of the skier or in the ski stick, and a battery-fed receiver, which is disposed adjacent to the housing of the release-initiating device and actuates the mechanical device. FIG. 4 shows a release-initiating device which is structurally similar to that of FIG. 1 but designed for an electric or electronic signal-transmitting system rather than a pneumatic system. To this end, a battery-fed transmitter 24 is disposed on the body of the skier or in the ski stick and can be actuated by the skier for a short time in the case of danger to transmit a corresponding pulse to the battery-fed receiver 25, which is provided in or on the housing and actuates the control member 21 with the aid of known means. This

results in the release of the shift lever 20 and of the gripping member 6.

In the release-initiating device shown in FIGS. 5 and 6, the double-armed shift lever 20 is connected to the gripping member 6 by a link 55, which is pivoted at one end at 56 to the lever arm 31 facing the boot and at its other end to the gripping member 6 at 67. That arm 32 of the double-armed lever 20 which is remote from the boot has the form of a frame, which surrounds a receiver comprising a solenoid coil 25. The same is provided with an armature 57. When the coil 25 is de-energized, the armature 57 protrudes from the coil. In the gripping position of the gripping member 6, shown in solid lines in FIG. 6, the armature engages the top of the rear crossmember 58 of the lever arm 32. A spring 59 bears from above on the arm 31 of the lever 20 to bias it in the opening sense. The compression spring 59 must only be so strong as to move the lever 20 reliably from its position when the binding is locked.

In the best design, the pivots 30, 56 and 67 are aligned in the locked position, shown in solid lines in FIG. 6. In this case the force *F* by which the gripping member 6 depresses the boot acts via the gripping member 6 and the link 55 and lever 20 on the pivot 30 thereof in the direction of arrow *S*. As a result, the lever 20 can very easily be held in its position by a small solenoid armature 57 when the parts are in the position shown in solid lines because only the torque produced by the spring 59 about the fulcrum 30 acts in this direction *N*. For this purpose, the distance of the fulcrum 30 from the point acted upon by the torque produced by the spring 59 is small. When a transmitter, not shown, supplies a current pulse to the receiver coil 25, the armature 57 is pulled from its position of rest toward the coil 25 to release the crossmember 58. The spring 59 can now swing the lever 20 in the direction of the arrow *N*. This movement is accelerated by the force *F* as soon as the lever 20 has left its zero position. The position assumed by the levers when the device has been released is indicated in dotted lines.

In the embodiment last described, a very large force *F* can be suddenly applied in response to a simple pulse supplied to a solenoid coil.

The mechanical release-initiating device shown in FIG. 2 can similarly be actuated by an electric or electronic signal. The functions according to the invention may be initiated by pulses which are other than pneumatic or electric. Any desired wireless control system may be used, including one which responds to acoustic pulses.

It is also a preferred embodiment according to the invention to transmit the signals by means of the piezoelectricity, which is used in this case as sender. The said system works without the use of a battery. The reaction of pressure produces electro-magnetic waves, the radiation of which gives the impulse for releasing the device.

The mechanical release-initiating devices which have been described are particularly suitable for a wireless electric signal transmission because only a relatively small actuating force is required to release the inherently strong gripping device from its operative position in engagement with the heel of the skiing boot. The gripping member may be, e.g., pivoted and holds the heel of the boot with considerable force. A relatively small force acting on the free portion of the pivoted control member (21 in FIG. 1) is sufficient for a release.

In addition to the embodiments which have been shown and described by way of example, the invention may be embodied in numerous other forms. Instead of a production of compressed air or a vacuum with the aid of a pneumatic cushion 9 or an air pump 9a, a compressed air (or vacuum) reservoir may be employed, which is carried by the skier and has a valve, which is actuable by the skier in the case of danger. In all embodiments, the pneumatic signal may be replaced by a different signal. The present invention may be embodied in a known

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safety binding consisting of a toe iron or a heel holder or the like.

The invention is not restricted to any specific parts of the ski binding (toe iron, heel holder) but may be used at any point of a ski binding, such as the gripping members, the tightener cable or other elements of a safety ski binding.

What is claimed is:

1. A safety ski binding which is releasable by human actuation, comprising a gripping member engageable with a portion of a boot and which is pivoted on a horizontal axis, a return spring which tends to move the gripping member to an initial position, a fixed member, a linkage reactingly supported by said fixed member and which forces the gripping member into its gripping position by reacting against said fixed member when the linkage is moved in one direction, and remotely controlled means which are actuable by the skier and serve to release ski binding parts for opening the gripping member by moving the linkage in an opposite direction under the influence of said spring.

2. A safety ski binding as set forth in claim 1, characterized in that said linkage comprises a two-armed shift lever, which is connected to a pivoted control member acted upon by the remotely controlled means.

3. A safety ski binding as set forth in claim 2, characterized in that the control member connected to the two-armed shift lever is provided with an additional actuating member for a transmission of a signal which is independent of the remote control means.

4. A safety ski binding as set forth in claim 1, characterized in that a part of the ski binding is tiltable in the longitudinal direction of the ski and is connected to a toggle joint plate, which is connected to the remote control means and adapted to be depressed beyond its neutral position to force the gripping member into position for use, whereas the gripping member is released in response to an upward movement of the plate.

5. A safety ski binding as set forth in claim 1, characterized in that the remote control means consist of a battery-fed transmitter, which is disposed within grasping reach of the skier, and a battery-fed receiver, which is disposed adjacent to the release-initiating device and actuates the mechanical system.

6. A safety ski binding as set forth in claim 1, characterized in that the remote control means consist of a pneumatic system, which is controlled by an actuation by the skier.

7. A safety ski binding as set forth in claim 1, characterized in that the remotely controlled means consist of a pneumatic system, which is controlled by an actuation by the skier and comprises a resilient air receiver, which is disposed adjacent to said linkage and inflatable to swing the linkage to its release-initiating position.

8. A safety ski binding as set forth in claim 7, characterized in that said resilient air receiver is connected to a reservoir for producing a differential air pressure.

9. A safety ski binding as set forth in claim 1, characterized in that the remotely controlled means are provided with a signal generator, which is accommodated in the stick and comprises an actuating means disposed on the outside of the ski stick handle.

10. A safety ski binding as set forth in claim 1, characterized in that a solenoid coil acts by means of an armature on a double-armed lever, which is biased by the

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return spring and is articulated by a link to said gripping member, and the pivots of the link connected to the gripping member and the fulcrum of the double-armed lever are aligned when the binding is locked.

11. A safety ski binding which is releasable by human actuation, comprising a gripping member which is pivoted on a horizontal axis and connected to a return spring, which tends to move the gripping member to an initial position, a linkage which forces the gripping member into its gripping position, and remotely controlled means which are actuable by the skier and serve to release ski binding parts for opening the gripping member, said remotely controlled means being provided with a signal generator, a ski stick having a cylindrical handle, said signal generator being accommodated in said ski stick and comprising an actuating means disposed on the outside of said ski stick handle, a piston guided in said handle and movable therein against the action of a return spring, said handle comprising an air pump, and the piston automatically interengaging in its spring-stressing position with a locking device, which is released by the skier in the case of danger so that a differential air pressure is suddenly produced.

12. A safety ski binding which is releasable by human actuation comprising a housing means adapted to be secured to the ski, a jaw for holding down one end of a boot, said jaw being under the influence of a return spring which tends to move the jaw to a clamping position, a linkage with a two-armed shift lever cooperating with the jaw to enable snapping of the jaw into a release position and movement into a clamping position, locking means for locking the linkage to hold the jaw in the clamping position, and wireless remotely controlled means including an electrical power source connected with a transmitter actuated by the skier, and a receiver connected with said locking means and adapted to move said locking means into a position in which said spring returns the jaw into the release position.

13. A safety ski binding as set forth in claim 12, wherein said jaw is swingably mounted on a fixed axis.

14. A safety ski binding as set forth in claim 12, wherein the arm of the two-armed shift lever which is remote from the boot supports said receiver, said receiver including a solenoid coil which cooperates with an armature engaging said arm when the coil is de-energized.

15. A safety ski binding as set forth in claim 12, wherein said two-armed lever is connected to said jaw by a link which is aligned with the fulcrum of the said lever when the binding is in locked clamping position.

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