

[54] **SKI BINDING**

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335/219

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[58] Field of Search ..... 280/11.35 M, 11.35 R;  
292/251.5, 144, 201; 70/282; 46/243 M;  
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[57] **ABSTRACT**

Ski binding adapted for emergency release. A ski binding is provided with a pair of mechanical parts which are arranged to separate during release of the binding. A permanent magnet is affixed to one of said parts and an electromagnet is affixed to the other thereof, the electromagnet being energizable either at the will of the skier or by remote control. Same is energized under normal skiing conditions and holds the binding closed with a relatively high level of force which can be overcome under emergency conditions to effect release of the binding. However, if a condition of danger is anticipated, the electromagnet can be de-energized, whereupon the holding force remaining is only that of the permanent magnet and the holding force thereupon is reduced to a lesser level. This, while not opening the bindings, makes it possible for same to open under the impact of a lesser opening force. Control of the electromagnet may be manually in response to a switch controlled by the skier or by remote control, such as impulses received from a transmitter which in turn is responsive to bio-chemical electrical impulses derived from the muscles of the skier.

**13 Claims, 5 Drawing Figures**

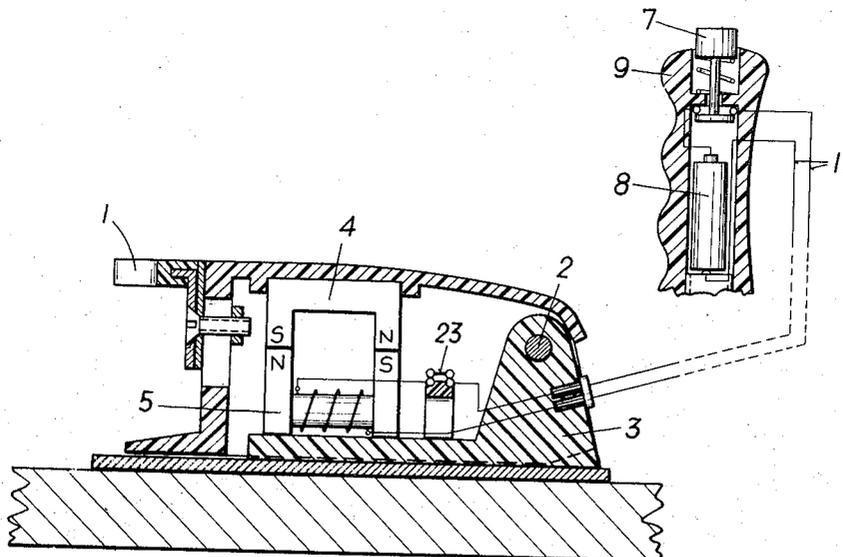


FIG. 1

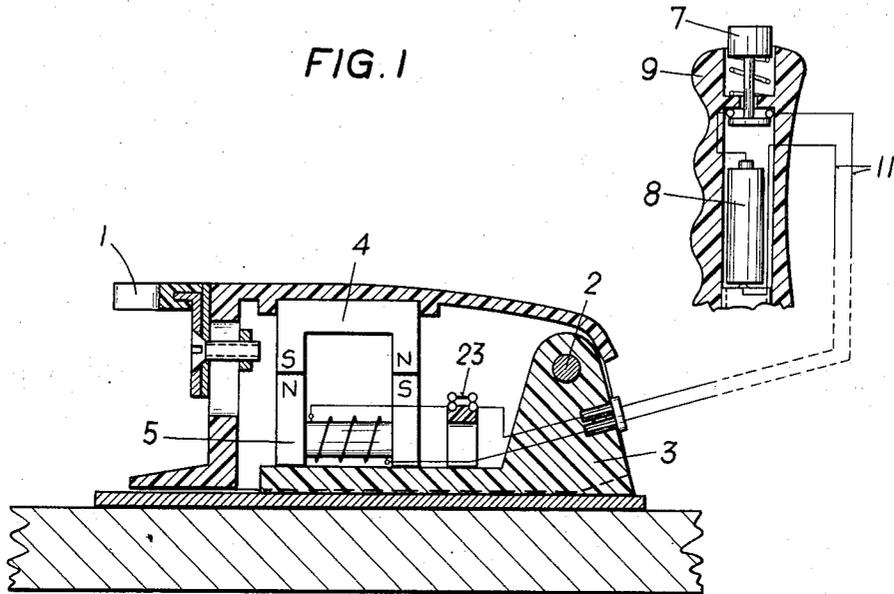


FIG. 2

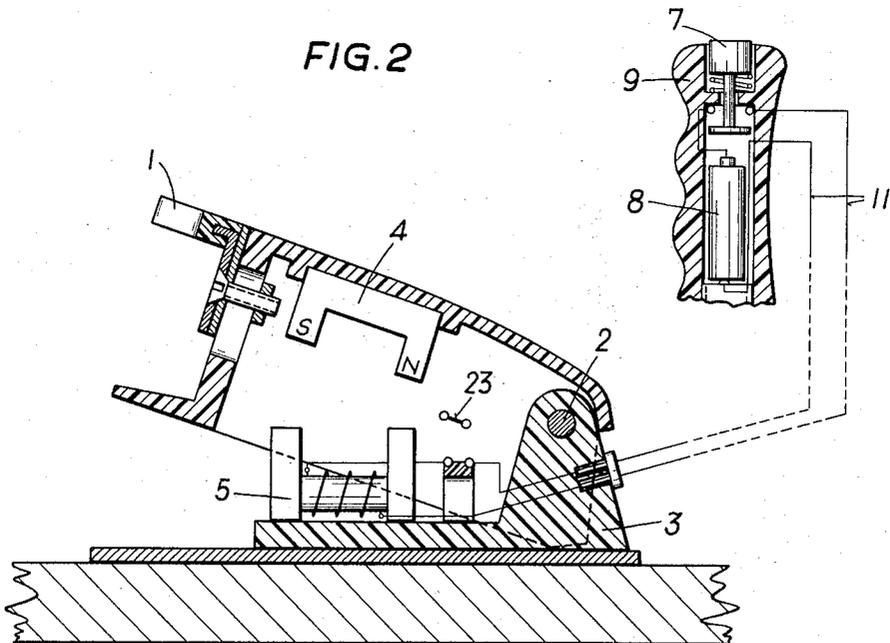


FIG. 3

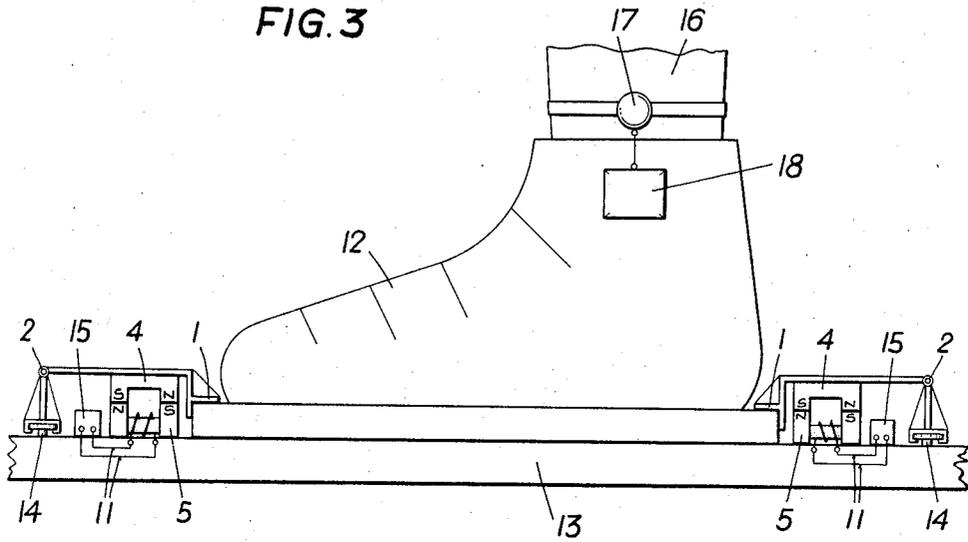


FIG. 4

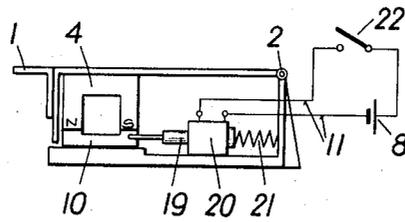
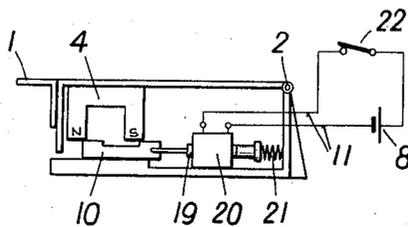


FIG. 5



## SKI BINDING

The invention relates to a ski binding with a selectably or automatically operable remote control.

Ski bindings are known which in case of danger can be opened by the skier during skiing by operating a remote-controlled opening mechanism. In this type of equipment, the skier must at all times determine whether the danger is of such magnitude that release of the ski bindings is required. Thus, decisions must always be made which present, of course, the possibility of wrong decisions. This can result in still greater danger of injuries.

The purpose of the invention is to avoid these disadvantages and the invention is characterized in that the holding power of the binding can be reduced by the remote control in the case of danger. That is, if a danger occurs, the holding power of the binding is either automatically or selectably reduced to a lower value. If now a force is applied in the opening direction on the binding, for example if the skier falls, the binding will release the ski boot even in response to a very small stress. Thus, in the case of danger, the binding can assume a ready position for opening.

The subject matter of the invention is illustrated in several exemplary embodiments in the drawings, in which:

FIGS. 1 and 2 illustrate a selectably operable binding according to the invention and shown in two positions.

FIG. 3 is an embodiment with an automatic operation.

FIGS. 4 and 5 schematically illustrate in two positions a further possible embodiment.

According to FIGS. 1 and 2, the sole holder 1 is supported pivotably about the axis 2 on the base member 3. A permanent magnet 4 is connected to the sole holder 1, which permanent magnet abuts with its poles faces the poles faces of an electromagnet 5. The electromagnet 5 is arranged in a circuit which is fed by the battery 8 and is closed by the switch 7. Battery 8 and switch 7 will advantageously be arranged in the ski pole handle 9. The electric cables 11 are in this embodiment advantageously provided inside the clothes of the skier.

In the normal condition of use, the sole holder 1 is held through the holding power of the permanent magnet and the electromagnet. If the skier believes a danger is ahead, he presses the switch 7 downwardly through which the circuit of the electromagnet 5 is disconnected. The sole holder is now only held in the position of use by the holding power of the permanent magnet 4. If the skier has estimated the danger correctly and a force is applied in opening direction on the binding, for example due to a fall, the binding is opened by overcoming the relatively small power of the permanent magnet 4. If no danger existed, the binding remains in the ready position for opening until the skier closes the circuit again by releasing the switch 7. The holding power now responds to the force of the two magnets 4, 5. If the binding should be opened, the circuit 11 is disconnected at the contact bridge 23 which, when the sole holder is swung upwardly, moves with same upwardly.

In FIG. 3, the ski boot 12 is held on the ski 13 between a front and a rear binding part which are both constructed in the same manner. Each of these bind-

ings has a permanent magnet 4 which is secured on the sole holder 1 which can be pivoted about the axis 2 upwardly and about the axis 14 sidewardly parallel to the plane of the ski. The permanent magnet 4 is positioned with its poles engaging the poles of an electromagnet 5 which is coupled with a radio, sonic, or other impulse receiver 15. Both the electromagnet 5 and the permanent magnet 4 maintain the binding in the position of use.

One or more sensors 17 are arranged at the foot 16 or on any other part of the body of the skier, which sensors absorb the bio-electrical currents of the muscles and send through the transmitter 18, if needed, an impulse to the receiver 15. When such an impulse is received, the circuit of the electromagnet 5 through the lines 11 is broken. The binding is now held in the closed position only by the power of the permanent magnet 4. If now a relatively small stress is exerted onto the sole holder 1 through the boot, the binding can open since, as stated above, only the permanent magnet 4 is effective.

In FIGS. 4 and 5, the holding power of the binding results only because of a permanent magnet 4 which, of course, is constructed of suitable strength and is connected to the sole holder 1. Said sole holder, as in previous embodiments, is pivotable about the axis 2. The permanent magnet 4 is positioned on a flux plate 10 which is coupled to the core 19 of an electromagnet 20. A spring 21 urges the core 19 and thus also the flux plate 10 into the position which is illustrated in FIG. 4. The electromagnet 20 is fed by a battery 8 and is connected in a circuit 11 which is broken by a switch 22.

If the switch 22 is operated, the magnet 20 is exposed to current and the core 19 is pulled in against the force of the spring 21. The flux plate assumes then a position with respect to the permanent magnet 4 as can be seen from FIG. 5. Now only a small portion of the pole surfaces is short-circuited through the flux plate 10 and thus again the sole holder 1 is held with a substantially smaller force in the position of use. Thus the binding is still closed and functioning but it can be opened even in case of a small stress. If the circuit 11 is again broken by the switch 22, the spring 21 urges the core 19, and thus the flux plate, forwardly into the position according to FIG. 4.

The invention is not limited to the illustrated exemplary embodiments. A number of further embodiments exist which lie within the scope of the invention. For example in the case of the embodiment according to FIGS. 4 and 5, in place of the movable flux plate 10 a second, movable permanent magnet could be provided. To adjust the holding power of the electromagnet 5, for example, a variable resistor can be provided within the circuit 11.

The embodiments of the invention in which an exclusive property or privilege are defined as follows:

1. In a releasable ski binding for holding a ski boot on a ski, said releasable ski binding having a base secured to said ski, a ski boot engaging member supported for movement relative to said base between a boot engaging and a boot release position and a permanent magnet including a first pole member secured to at least one of said base and said ski boot engaging member for holding said ski boot engaging member in said boot engaging position at a first holding force, the improvement comprising:

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means defining an electromagnet secured to the other of said base and said ski boot engaging member and electrical power source means for supplying electrical power thereto, said electromagnet means including a second pole member engaged with said first pole member when said ski boot engaging member is in said boot engaging position to effect said holding of said ski boot engaging member in engagement with said ski boot at said first holding force; and

switching means for controlling the supply of said electrical power to said electromagnet means, said switching means, when effecting an energization of said electromagnet means, effecting one of an increase and a decrease in the magnetic holding force between said first and second pole members holding said ski boot engaging member in said boot engaging position to a second holding force greater or lesser than said first holding force;

whereby one of an energization and a deenergization of said electromagnet means effects a decrease in the holding force holding said ski boot engaging member in said boot engaging position to said lesser holding force and without effecting a release of said ski boot engaging member from engagement with said ski boot.

2. The improvement according to claim 1, wherein said electromagnet means comprises an electromagnet for generating a magnetic field at said second pole member and having a polarity opposite to that of said first pole member of said permanent magnet to effect said increase of said magnetic force holding said ski boot engaging member in said boot engaging position to said greater holding force;

whereby a deenergization of said electromagnet means effects a decrease in the holding force holding said ski boot engaging member in said boot engaging position to said lesser holding force and without effecting a release of said ski boot engaging member from engagement with said ski boot.

3. The improvement according to claim 2, wherein said power source means is a battery; and wherein said switching means comprises a normally closed switch for electrically connecting said battery to said electromagnet means.

4. The improvement according to claim 1, wherein said electromagnet means comprises an electromagnet having a reciprocal core reciprocable between first and

second positions, said second pole member being slidably mounted on said base and in direct alignment with said first pole member when in said first position and connecting means for connecting said second pole member to said core, an energization of said electromagnet effecting a reciprocation of said core and said second pole member to said second position out of direct alignment with said first pole member to thereby effect a decrease of the magnetic holding force to said lesser holding force.

5. The improvement according to claim 4, wherein said electromagnet means includes resilient means for urging said second pole member into said first position and in alignment with said first pole member.

6. The improvement according to claim 4, wherein said second pole member is defined by a flux plate.

7. The improvement according to claim 4, wherein said power source means is a battery; and wherein said switching means comprises a normally open switch for electrically connecting said battery to said electromagnet means.

8. The improvement according to claim 1, wherein said electromagnet means is secured to said base.

9. The improvement according to claim 1, wherein said switching means comprises a transmitter for generating an electrical signal in response to a fall condition and receiver means responsive to said signal to change the electrical connection of said power source means to said electromagnet means.

10. The improvement according to claim 1, wherein said permanent magnet and said electromagnet means both have pole faces; and wherein said pole faces engage each other.

11. The improvement according to claim 1, wherein said ski boot engaging member includes first means for pivotally securing same to said ski about a generally horizontal axis transverse of the longitudinal axis of said ski.

12. The improvement according to claim 11, wherein said ski boot engaging member includes second means for pivotally supporting same for movement about a generally vertical axis perpendicular to the plane of said ski.

13. The improvement according to claim 1, wherein said ski boot engaging member includes means for pivotally supporting same for movement about a generally vertical axis perpendicular to the plane of said ski.

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