United States Patent

Payrhammer

[15] **3,698,732**

[45] **Oct. 17, 1972**

[54] **TOE IRON FOR SAFETY SKI BINDINGS**

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[22] Filed: **June 16, 1970**

[21] Appl. No.: **46,759**

[30] **Foreign Application Priority Data**

July 23, 1969 Germany.....P 19 37 479.9

[52] **U.S. Cl.** .....**280/11.35 T**

[51] **Int. Cl.**.....**A63c 9/00**

[58] **Field of Search** .....280/11.35 T

[56] **References Cited**

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[57] **ABSTRACT**

A baseplate or an intermediate plate is provided with at least one vertical pivot pin. Said pivot pin or each of said pivot pins is provided with a pivoted member, which is pivotally movable on the respective pivot pin against the force of a spring and carries a soleholder member. Said spring is disposed in a plane that is parallel to the ski. The spring extends in the longitudinal direction of the ski when the toe iron is in normal position. The spring bears at one end on an abutment which is rigid with the baseplate or intermediate plate and at its other end cooperates by means of a bridge member with the pivoted member or pivoted members. The bridge member is rotatable about the axis of the spring and has two legs, which are diametrically opposite to each other and equally spaced from the axis of the spring and bear on the pivoted member or pivoted members.

3 Claims, 6 Drawing Figures

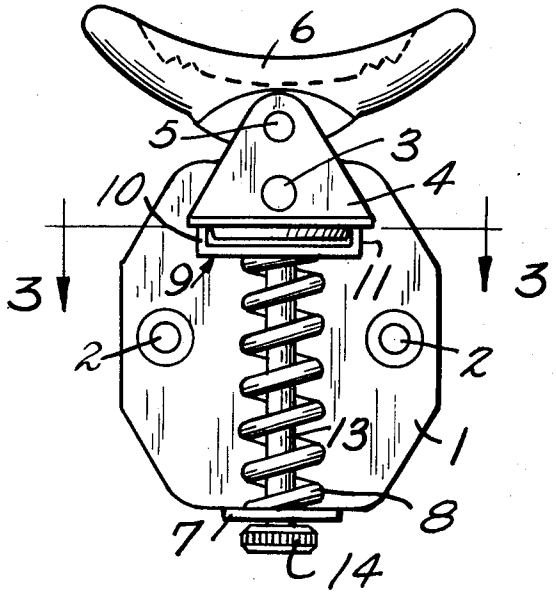

Fig. 1.

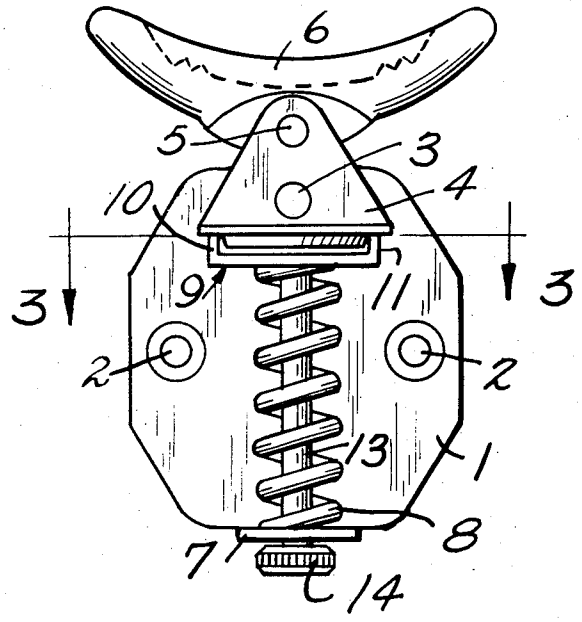

Fig. 2.

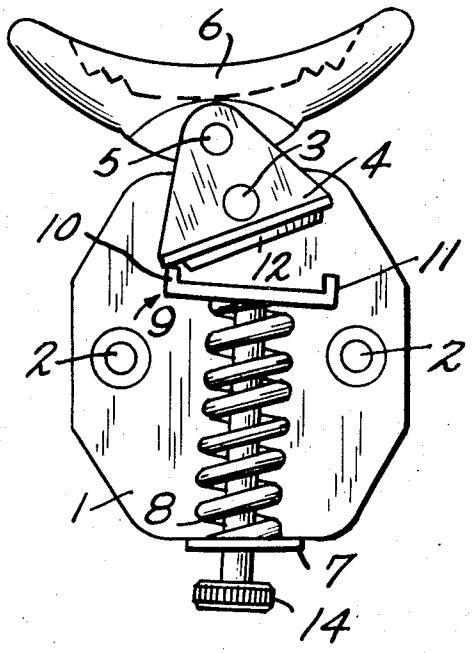

Fig. 3.

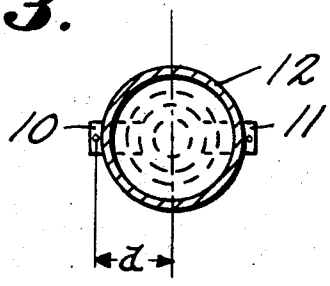

Fig. 4.

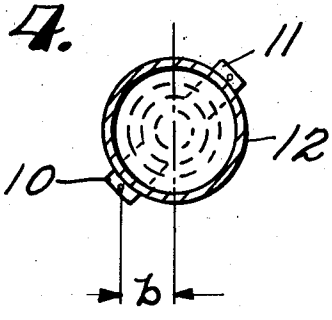

Fig. 5.

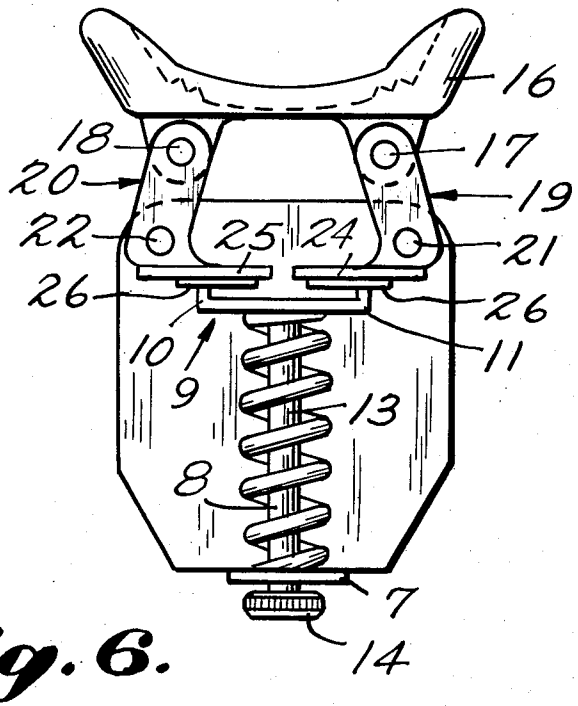
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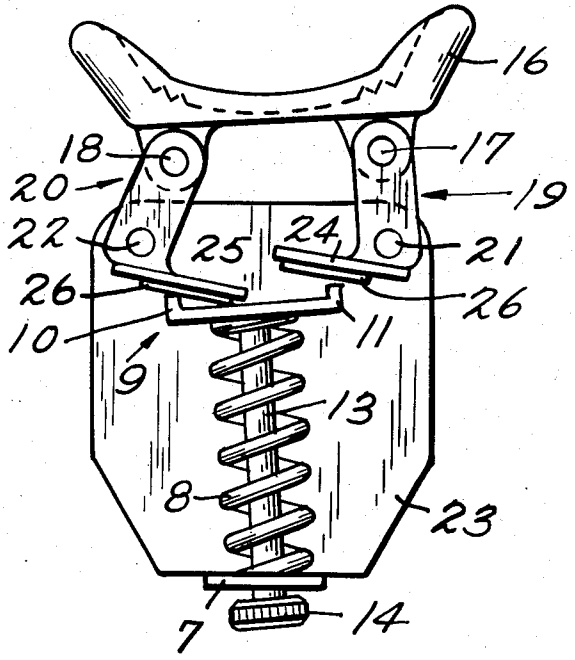
Fig. 6.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TOE IRON FOR SAFETY SKI BINDINGS

The present invention relates to toe irons for safety ski bindings, which toe irons comprise a baseplate or an intermediate plate provided with at least one vertical pivot pin, said pivot pin or each of said pivot pins is provided with a pivoted member, which is pivotally movable on the respective pivot pin against the force of a spring and carries a soleholder member, and said spring is disposed in a plane that is parallel to the ski, the spring extending in the longitudinal direction of the ski when the toe iron is in normal position.

These known toe irons are often preferred to other known toe irons because they can be made relatively easily and at low cost and are not likely to be deranged. On the other hand, they have the disadvantage that the force required for a release can be varied by a change of the initial stress of the helical compression spring which is employed. A change of the initial stress of the spring which ensures that the toe iron has a certain resilience means an undesired change of the resilience, in practice a decrease thereof. A considerable effort is required to increase the initial stress of the spring. A power thread or the like is required for this adjustment.

It is an object of the present invention so to improve and design a toe iron of the kind described first hereinbefore that the disadvantages of the known toe irons of the same kind can be avoided in a simple manner.

In a toe iron for safety ski bindings, which toe iron comprises a baseplate or an intermediate plate provided with at least one vertical pivot pin, said pivot pin or each of said pivot pins is provided with a pivoted member, which is pivotally movable on the respective pivot pin against the force of a spring and carries a soleholder member, said spring is disposed in a plane that is parallel to the ski, and said spring extends in the longitudinal direction of the ski when the toe iron is in normal position, the object set forth is accomplished in accordance with the invention in that the spring which at one end bears on an abutment which is rigid with the baseplate or intermediate plate and at its other end cooperates by means of a bridge member with the pivoted member or pivoted members, and that the bridge member is rotatable about the axis of the spring and has two legs, which are diametrically opposite to each other and equally spaced from the axis of the spring and bear on the pivoted member or pivoted members.

To minimize the area in which force is transmitted between the bridge member and the pivoted member, the legs of the bridge member are suitably tapered toward their free end.

In a development of the invention, it has been found desirable to use in a manner known per se a spring consisting of a helical compression spring and to provide the bridge member with an actuating pin, which extends through the spring and its abutment.

Two embodiments of the invention are shown by way of example in the accompanying drawings and will be fully described hereinafter:

FIG. 1 is a top plan view showing a first embodiment of the toe iron in normal position,

FIG. 2 is a top plan view which is similar to FIG. 1 but shows the toe iron in another instantaneous position,

FIG. 3 is a sectional view taken on line III—III of FIG. 1,

FIG. 4 is a sectional view which is similar to FIG. 3 but shows the bridge member in a position which is different from that of FIG. 3,

FIG. 5 is a top plan view showing a second embodiment of the toe iron in the normal position, and

FIG. 6 is a top plan view which is similar to FIG. 5 but shows the toe iron in another instantaneous position.

The toe iron shown in FIGS. 1 to 4 has a baseplate 1, with which it can be screwed, e.g., to a ski. For this purpose, the baseplate has two screw holes 2. The baseplate carries a vertical pivot pin 3, on which a pivoted member 4 is mounted. A soleholder member 6 is pivoted by a vertical pivot pin 5 to the pivoted member. At its end which is opposite to the soleholder member, the baseplate 1 has an upwardly angled lug 7, which serves as an abutment for a helical compression spring 8. The latter acts by means of a bridge member 9 on the pivoted member 4. The bridge member is U-shaped so that in the normal position of the toe iron both legs 10, 11 of the bridge member contact the pivoted member 4. The pivoted member has a frustoconical extension 12, which extends between the legs of the bridge member to hold the same in position. The bridge member and the helical compression spring are so related to each other that the legs 10, 11 are equally spaced from the axis of the spring. The legs are diametrically opposite each other. As is apparent from FIGS. 3 and 4, the legs of the bridge member 9 taper towards their free end to minimize the area in which force is transmitted between the bridge member and the pivoted member. A pin 13 is firmly connected to the bridge member and extends through the helical compression spring 8 and its abutment 7 and carries an actuating knob 14 at its end protruding from the abutment.

In this toe iron, the force required for a release is varied by a rotation of the bridge member 9 by means of the actuating knob 14 rather than by a change of the initial stress of the spring. By a rotation of the bridge member 9, the points of contact between the legs 10, 11 and the pivoted member can be varied and with it the lever arm of the torque which is exerted by the spring force on the pivoted member. This is clearly apparent from FIGS. 3 and 4. FIG. 3 shows the largest arm *a* whereas FIG. 4 shows the bridge member after a pivotal movement so that only the lever arm *b* has been left.

FIG. 2 shows the toe iron in an instantaneous position which results from the action of a force which is directed transversely to the longitudinal direction of the toe iron and to the left in the drawing and which acts on the soleholder member 6 and overcomes the initial stress of the helical compression spring 8. The force is transmitted from the soleholder member by means of the pivoted member 4 and the bridge member 9 to the helical compression spring to compress the latter. Upon a decrease of the force, the helical compression spring returns the previously moved parts to their normal position. If a force which exceeds the predetermined force required for a release acts on the soleholder member 6 nor merely as a shock, the toe portion of the skiing boot will be released by the soleholder member when the same has performed a predetermined pivotal movement. This operation will

not be described more fully because it is known per se. The previously moved parts then return also to their normal position so that the toe iron is again ready for skiing.

FIGS. 5 and 6 show a toe iron which embodies a different basic concept. In this embodiment, the soleholder member 16 forms the coupling link of a four-bar linkage and is pivoted at points 17, 18 to two pivoted members 19, 20. The latter consist of bell-crank levers, which have mirror symmetry and are held by respective vertical pivot pins 21 and 22 to an intermediate plate 23. Compared to the embodiment described hereinbefore, a four-bar linkage affords the advantage that the soleholder member 16 is moved along an arc which is at least approximately centered on the imaginary center of rotation of the skiing boot so that the pivotal movement of the skiing boot will not result in a component of force directed toward the tip of the ski under the action of the compressive force which is exerted on the heel of the skiing boot and urges the latter against the toe iron.

As regards the essential features of the invention, the baseplate or intermediate plate 23 corresponds to the baseplate 1 of the first embodiment. For this reason, like reference characters are used for like parts. The intermediate plate has also a lug 7, which is angled upwardly and serves as an abutment for a helical compression spring 8. The helical compression spring acts again on a bridge member 9, which with its two legs 10, 11 bears on those arms 24, 25 of the pivoted members 19, 20 which do not carry the soleholder member 16. Each arm 24, 25 is provided with a portion 26 which corresponds to a portion of a circular-section torus and serves to hold the bridge member in position.

The force required for a release of this toe iron can also be adjusted by a rotation of the bridge member 9, which has a pin 13 carrying an actuating knob 14. As this embodiment comprises two eccentric pivot pins 21, 22 rather than a central vertical pivot pin, the smallest rather than the largest lever arm will be obtained when the bridge member is in the position shown in FIG. 3.

The intermediate plate 23 is pivoted on a baseplate, which is fixed to the ski, and a locking device is provided which normally holds the intermediate plate against a pivotal movement. The pivotal connection between the intermediate plate and the baseplate and the locking means for the intermediate plate are not shown because they are not significant for the present invention. The locking means may be constituted, e.g., by the four-bar linkage and will not be released until the soleholder member 16 has performed a predetermined pivotal movement to the right or left from its normal position so that the intermediate plate is then movable relative to the baseplate to enable a release of the toe portion of the skiing boot by the soleholder member.

Just as FIG. 2 for the first embodiment, FIG. 6 shows the instantaneous position assumed by the toe iron in response of a force which acts on the soleholder member 16 and is directed transversely to the longitudinal direction of the toe iron and to the right in the drawing and overcomes the initial stress of the helical compression spring 8. The force is transmitted from the soleholder member by means of the pivoted member 20 and the bridge member 9 to the helical compression spring. Upon a decrease of the force, the helical compression spring returns the four-bar linkage to its normal position. If a force which exceeds the predetermined for required for a release acts on the soleholder member 16 not only as a shock, the locking device normally preventing a pivotal movement of the intermediate plate 23 will be disabled, as has been described hereinbefore, so that the intermediate plate performs a pivotal movement and the soleholder member releases the toe portion of the skiing boot. It will be sufficient to swing back the intermediate plate by hand in order to restore the toe iron to a position in which it is ready for skiing. Thereafter, the helical compression spring will automatically return the four-bar linkage to its normal position. Alternatively, a design may be adopted in which the intermediate plate is automatically restored after a safety release operation of the toe iron.

What is claimed is:

1. A toe iron for safety ski bindings, which toe iron comprises: a baseplate; a spring mounted adjacent said baseplate; at least one vertical pivot pin fixedly positioned relative to said baseplate; a pivoted member mounted on said pivot pin and pivotally movable about the pivot pin against the force of the spring; a soleholder member carried by said pivoted member; said spring being disposed with the spring axis in a plane substantially parallel to the ski, and said spring extending in the longitudinal direction of the ski when the toe iron is in a normal position; an abutment rigid with respect to the baseplate, one end of said spring bearing on said abutment; a bridge member positioned to be rotatable about the axis of the spring and having two legs diametrically opposite to each other and equally spaced from the axis of the spring and bearing on the pivoted member, a second end of the spring cooperating with said bridge member and said pivoted member; and means in operative relationship for selectively rotating the bridge element about the spring axis so that movements of the soleholder member and of said pivoted member may be controlled.

2. A toe iron according to claim 1, characterized in that the legs of the bridge member taper toward their free ends.

3. A toe iron according to claim 1, characterized in that the spring comprises a helical compression spring and wherein the bridge member comprises an actuating pin which extends through the spring and the abutment.

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