

Jan. 17, 1967

H. MARKER

3,298,703

TOE IRON FOR SAFETY SKI BINDINGS

Filed April 6, 1965

3 Sheets-Sheet 1

FIG. 1

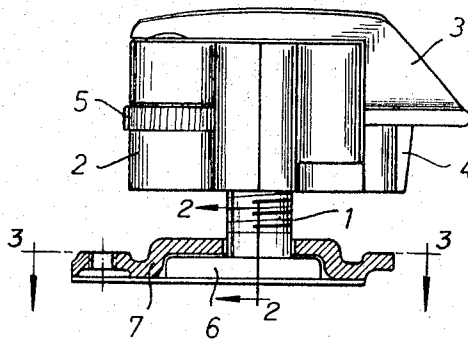


FIG. 2

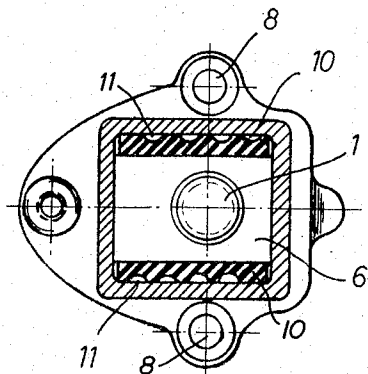
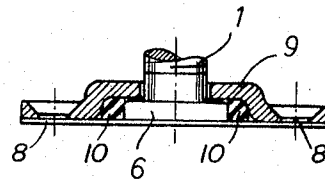


FIG. 3

Inventor

Hannes Marker

By Sterens, Davis, Miller & Mosher
Attorneys

Jan. 17, 1967

H. MARKER

3,298,703

TOE IRON FOR SAFETY SKI BINDINGS

Filed April 6, 1965

3 Sheets-Sheet 2

FIG. 4

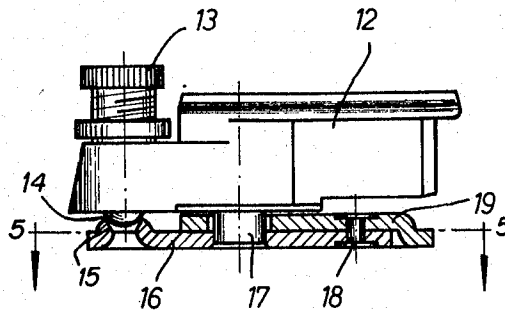
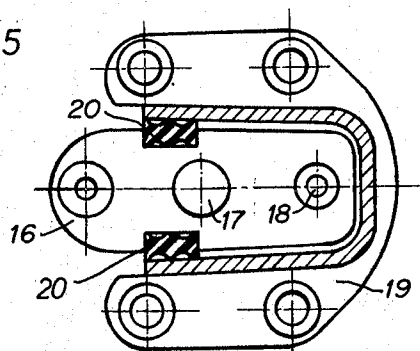


FIG. 5



Inventor

Hannes Marker

By *Stevens, Davis, Miller & Mosher*
Attorneys

Jan. 17, 1967

H. MARKER

3,298,703

TOE IRON FOR SAFETY SKI BINDINGS

Filed April 6, 1965

3 Sheets-Sheet 3

FIG. 6

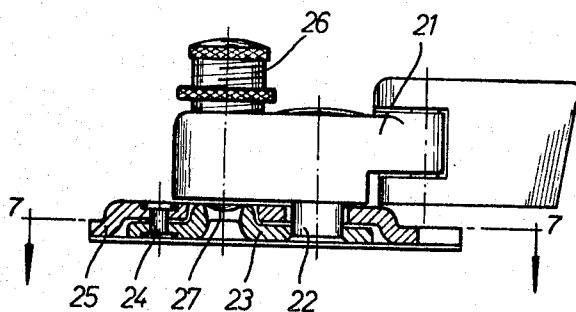
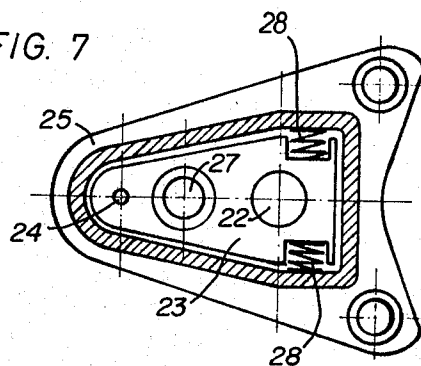


FIG. 7



Inventor
Hannes Marker
By Sterens, Davis, Miller & Mosher
Attorneys

1

3,298,703

TOE IRON FOR SAFETY SKI BINDINGS

Hannes Marker, Alpstizstrasse 37,

Garmisch-Partenkirchen, Germany

Filed Apr. 6, 1965, Ser. No. 445,940

Claims priority, application Germany, Apr. 17, 1964,

M 60,692

9 Claims. (Cl. 280—11.35)

It is often desirable to arrange the toe iron of safety ski bindings so that the toe iron is pivotally moved outwardly, in response to slight lateral thrusts acting on the foot, but is immediately returned to its initial position by resilient means without releasing the foot. That is to say, it will return if a turning moment which is dangerous for the foot is not reached. In the known safety toe irons, this object has been solved to a large extent by the provision of a toe iron having two articulated joints, a pivoted member being pivoted to a bolt which is secured to the ski, a backing and sole retaining member being pivoted to the pivoted member, and the ball detent mechanism which determines the resistance of the toe iron to release being provided between the pivoted member and the backing and sole retaining member rather than between the pivoted member and the ski. As a result, the toe iron can be pivotally moved as a whole in response to slight lateral thrusts without causing a disengagement of the detent ball. In this case the contact pressure applied against the boot in the longitudinal direction of the ski acts on the backing surface only on the right or left of the longitudinal center line and as a result subjects the toe iron to a turning moment which returns the toe iron to its normal position. The extent of the pivotal movement which is thus enabled without a disengagement of the detent mechanism depends mainly on the pressure applied by the skiing boot and to a certain extent on the deformability of the front edge of the sole of the boot. Measurements have shown that in the known toe iron arrangements, a return to the normal position is generally effected even after an outward pivotal movement of 10° whereas a larger pivotal movement results in a sudden disengagement of the detent mechanism and release of the boot.

In another known toe iron, a spring-loaded plunger is mounted in a bore which extends in the longitudinal direction of the ski, and the end face of this plunger cooperates with an axial flat of the pivot pin. In this case too, a slight outward deflection of the toe iron from its position of rest is succeeded by an automatic return caused by the spring-loaded plunger, which has been urged back by a side edge of the flat during the outward pivotal movement whereas the plunger fully abuts the flat during the return movement. This known toe iron has the disadvantage that the foot is not released immediately after a pivotal movement beyond that angle which corresponds to harmless lateral thrusts but a further rotation to an angle of about 30° is required for a release of the foot. This mode of operation is undesirable for various reasons, particularly because the pivotal movement may be terminated between the angle which corresponds to the small lateral thrusts and the release angle and in such cases neither a return movement nor a release results but a fall is induced by the very inclination of the foot caused by the safety binding.

In numerous other known toe irons, the detent ball is movably mounted in the pivoted member and co-operates with a detent socket in a baseplate, which lies on the surface of the ski and is secured to the latter. In this case the pivoted member remains unmovable until the turning moment exceeds the value at which the release of the binding is effected and the foot is released. This value is determined by the setting of the detent mechanism. These bindings cannot resiliently cushion slight lateral thrusts.

2

It is an object of the invention to enable a resilient return movement in response to short-time, slight lateral thrusts acting on the shoe even with toe irons of the last-mentioned kind. A further object of the invention is to ensure a resilient return movement of the toe iron independent of the contact pressure and the like even in bindings of the kind mentioned first hereinbefore. Yet another object is to provide a toe iron arrangement for safety ski bindings comprising a member which is pivoted on a baseplate secured to the ski, and a detent mechanism for releasing the pivoted member for a pivotal movement when, and only when, a predetermined turning moment acting on the pivoted member has been exceeded. The foregoing objects may be accomplished by providing a baseplate carrying the pivoted member capable of a limited movement against spring force relative to the ski in the transverse direction of the latter. This has the result that the resilient return movement after a slight lateral thrust is not due, or is not exclusively due, to a corresponding design of the usually pivoted elements of the toe iron, but is due to the fact that the entire toe iron, inclusive of its pivot pin and the baseplate, is movable transversely to the longitudinal center line of the ski and after the action of slight lateral forces is returned to the normal position by the resilient means acting on the moveable baseplate.

In an embodiment of the invention, the baseplate may be mounted in a recess of a mounting plate, which is secured to the surface of the ski and encloses the baseplate at least partly in its plane. Spring elements may be disposed between the lateral outside edges of the baseplate and the corresponding inside edges of the mounting plate. The baseplate may be pivoted on the mounting plate by a pivot pin which is at right angles to the surface of the ski. Alternatively, the baseplate may perform a rectilinear rather than a pivotal movement relative to the mounting plate. It is particularly desirable that the mounting plate enclose the baseplate partly from above and that the baseplate is accommodated in a depression of the mounting plate. In this case, the baseplate cannot be bent or come loose under the action of tilting forces on the toe iron.

Illustrative embodiments of safety toe irons which are mounted according to the invention will be explained more fully hereinafter with reference to the drawing, in which

FIG. 1 is a side elevation, partly in section, showing a safety toe iron according to the invention with a baseplate and mounting plate.

FIG. 2 is a fragmentary sectional view taken on line II—II of FIG. 1 and shows the mounting part of the toe iron of FIG. 1.

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

FIG. 4 is a side elevation, partly in section, showing a modified embodiment,

FIG. 5 is a horizontal sectional view taken on line V—V of FIG. 4.

FIG. 6 is another side elevation, partly in section, showing a further embodiment, and

FIG. 7 is a horizontal sectional view taken on line VII—VII of FIG. 6.

FIG. 1 shows a known safety toe iron. A pivoted member 2 is pivoted on the pivot pin 1 and has pivoted to it a backing and sole retaining member 3. By means of the tension cable, a heel tightener cable or the like, the boot is forced against the backing surface 4 of the member 3. Teeth provided on the backing surface 4 engage appropriate indentations formed in the front edge of the sole of the boot. A detent mechanism is provided between the pivoted member 2 and that portion of the backing and sole retaining member 3 which extends forwardly over the pivoted member 2. In known manner, this detent mechanism is disengaged in response to an

3

excessively high turning moment so that a relative rotation of members 2 and 3 and a free rotation of the pivoted member 2 about the pivot pin 1 is enabled. The value of the spring loading which resists a disengagement of the detent mechanism can be adjusted in known manner by the knurled or milled nut 5.

The pivot pin 1 is riveted in known manner into a baseplate 6. According to the invention, this baseplate is not rigidly secured to the surface of the ski but is capable of a limited movement transverse to the longitudinal direction of the ski. On all sides, which do not contact the surface of the ski, the baseplate 6 is enclosed by a mounting plate 7. A slot is provided in the mounting plate to allow passage of the pin 1 therethrough and allows the pin to move transversely to the longitudinal direction of the ski. The mounting plate 7 is provided with screw holes 8 so that the plate 7 can be screw-connected to the ski. Resilient means are provided between the baseplate 6 and the inside edges, extending in the longitudinal direction of the ski, of a depression 9 which is formed in the mounting plate and accommodates the baseplate. In the embodiment which is shown, these resilient means consist of inserts of rubber or synthetic elastomers. To improve the deformability of these inserts, their pressure surfaces are provided in known manner with recesses 11.

Slight lateral thrusts result in a slight lateral displacement of the entire toe iron, inclusive of the baseplate 6, transversely to the longitudinal direction of the ski. Immediately thereafter, the resilient rubber strip 10 returns the toe iron to its normal position. This enables a resilient cushioning of slight lateral thrusts or, in the present embodiment, improves the cushioning which is ensured by the special design of the pivoted member and the backing and sole retaining member.

In the embodiment which is shown in FIGS. 4 and 5 the safety toe iron 12 comprises a pivoted member, which has at its rear end the backing surface and a sole retaining projection. At the front end, a detent mechanism is provided, which comprises a knurled or milled screw 13, a compression spring, not shown, and a detent ball 14 urged into a detent socket 15 of the baseplate 16. The latter carries the pivot pin 17 of the toe iron 12 and is pivoted by a connecting pin 18 to the mounting plate 19. The latter has again a depression. As is particularly apparent from FIG. 5, this depression encloses the baseplate 16 only in part. When the toe iron 12 yields to a slight lateral thrust, a resilient cushioning is ensured by the rubber buffers 20, which are formed with recesses in their pressure faces, just as in the embodiment described with reference to FIGS. 1 to 3.

In the embodiment shown in FIGS. 6 and 7, the toe iron 21 is secured by its pivot pin 22 to a baseplate 23, which is pivoted to the mounting plate 25 at 24. Just as in the first embodiments, the mounting plate 25 completely encloses the baseplate 23 on the sides and on top. In this embodiment, the pivotal connection between the baseplate and the mounting plate is provided at the front end of the baseplate. The toe iron 21 has again an adjusting screw 26 for the detent mechanism, a detent ball 27, and a detent socket formed by an opening in the baseplate. This opening has upstanding edge portions, which extend through an appropriate elongated hole in the mounting plate 25. In this embodiment, the spring elements consist of coil springs 28, which are diagrammatically indicated in FIG. 7. In further embodiments,

4

these springs may be replaced by other spring elements, such as disc springs, leaf springs and the like.

What is claimed is:

1. A toe iron for safety ski bindings comprising a baseplate movably mounted on a ski, a pivot pin mounted on said baseplate at right angles to said ski, a pivoted member pivotally mounted on said pivot pin, a detent mechanism for releasing the pivoted member for pivotal movement when torque acting on the pivoted member exceeds a predetermined amount, a mounting plate substantially enclosing the baseplate, said mounting plate being fixedly attached to said ski, said pivot pin projecting through an opening in said mounting plate, resilient means disposed between said mounting plate and said baseplate which allows limited movement of the latter relative to the transverse direction of the ski.

2. A toe iron according to the claim 1 wherein said baseplate is mounted within a recess of said mounting plate, said mounting plate being secured to the surface of the ski and at least partially enclosing the first member in its plane, said resilient means comprising spring elements disposed between the lateral outside edges of said baseplate and the adjacent inside edges of said mounting plate.

3. A toe iron according to claim 1 wherein a second pivot pin is mounted on said mounting plate at right angles to the surface of the ski, said baseplate being pivotally mounted on said second pivot pin.

4. A toe iron according to claim 1 wherein the mounting plate encloses the said baseplate partly from above, and the baseplate is accommodated in a depression in said mounting plate.

5. A toe iron arrangement for safety ski bindings comprising a mounting plate secured to the upper surface of a ski, a baseplate movably mounted within said mounting plate so as to have limited movement in the transverse direction of the ski, a pivot pin mounted on said baseplate at right angles to the surface of said ski, a pivoted member pivotally mounted on said pivot pin, a portion of said pivoted member being adapted to engage the toe of a ski boot, resilient means disposed between said baseplate and said mounting plate for returning said baseplate to its initial position after minor lateral deflections.

6. A toe iron according to claim 5 wherein said mounting plate comprises a member substantially encompassing said baseplate, a slot in the upper portion of said mounting plate, said pivot pin passing through said slot.

7. A toe iron according to claim 6 wherein said baseplate is pivotally mounted within said mounting plate.

8. A toe iron according to claim 5 wherein said resilient means disposed between said baseplate and said mounting plate comprises spring elements.

9. A toe iron according to claim 5 wherein said resilient means disposed between said baseplate and said mounting plate comprises resilient rubber cushioning buffers.

References Cited by the Examiner

UNITED STATES PATENTS

60 3,224,786 12/1965 Tosalli 280—11.35

FOREIGN PATENTS

721,172 11/1965 Canada.

65 BENJAMIN HERSH, *Primary Examiner*.

J. H. BRANNEN, *Assistant Examiner*.