United States Patent

[11] 3,625,535

[72] Inventor **Albert Gustav Oehlmann**
Garmisch-Partenkirchen, Germany

[21] Appl. No. **862,335**
[22] Filed **Sept. 30, 1969**
[45] Patented **Dec. 7, 1971**

[73] Assignee **Hannes Marker**
Garmisch-Partenkirchen, Germany

[32] Priority **Oct. 4, 1968**
[33] **Germany**
[31] **P 18 01 314.4**

[54] **TOE IRON FOR SAFETY SKI BINDINGS**
5 Claims, 3 Drawing Figs.

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

[51] **Int. Cl.** **A63c 9/00**
[50] **Field of Search** ..... 280/11.35 T

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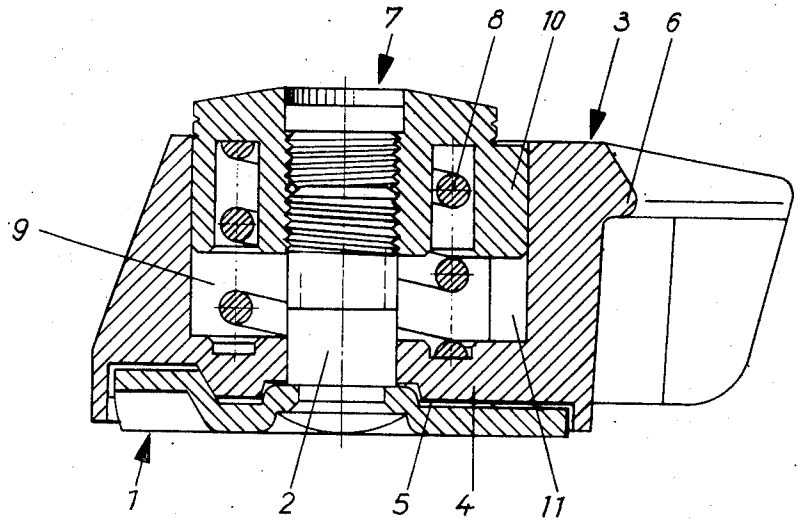
Primary Examiner—Benjamin Hersh
Assistant Examiner—Robert R. Song
Attorney—Fleit, Gipple & Jacobson

ABSTRACT: A baseplate has a vertical pivot pin on which a pivoted member is rotatably mounted, which is releasably interlocked with the baseplate and biased by a spring, which is concentric with the pivot pin and opposes a rotation of the pivoted member in both senses beyond an angle which is limited by the interlock. A spring abutment is in screw-threaded engagement with the free end portion of the pivot pin and is held against rotation relative to the pivoted member but axially slidable relative thereto.



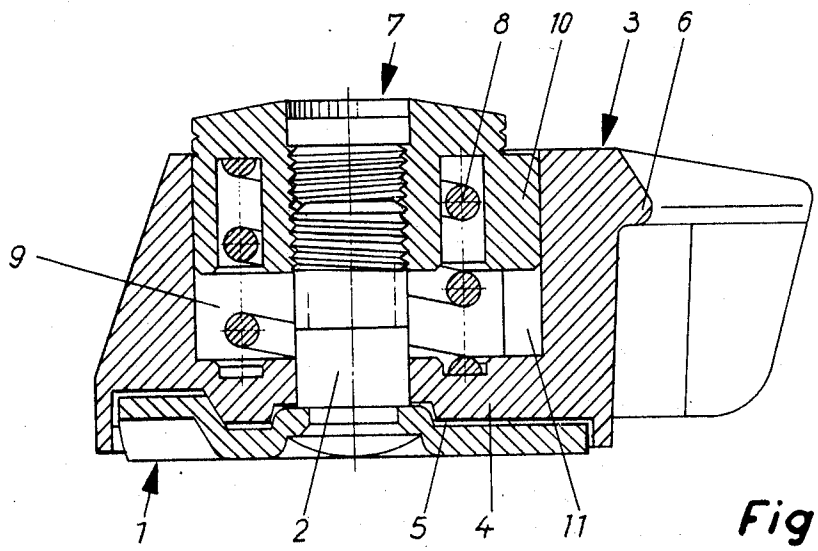


Fig. 1

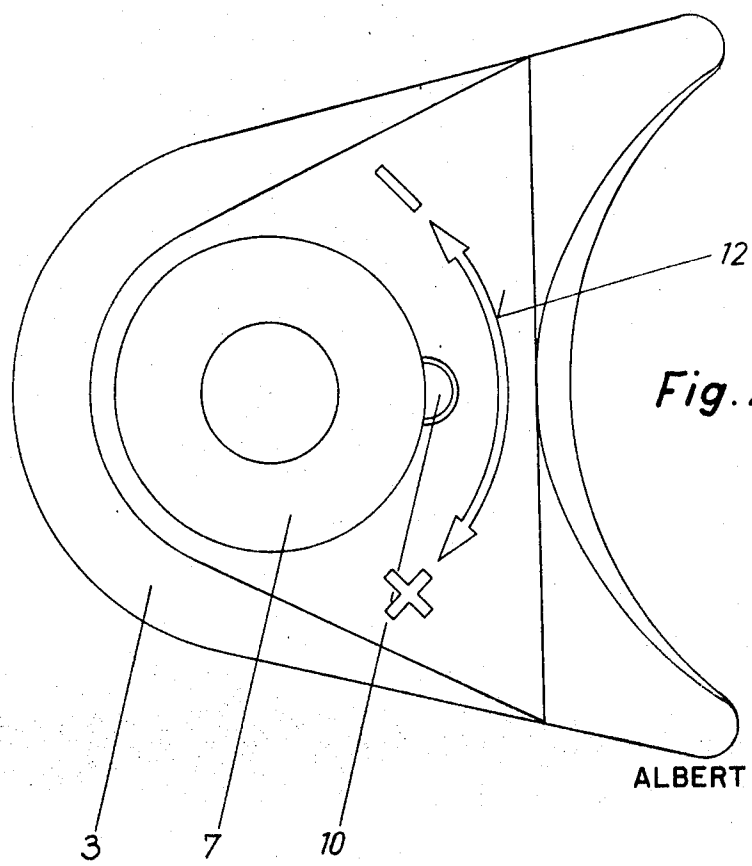
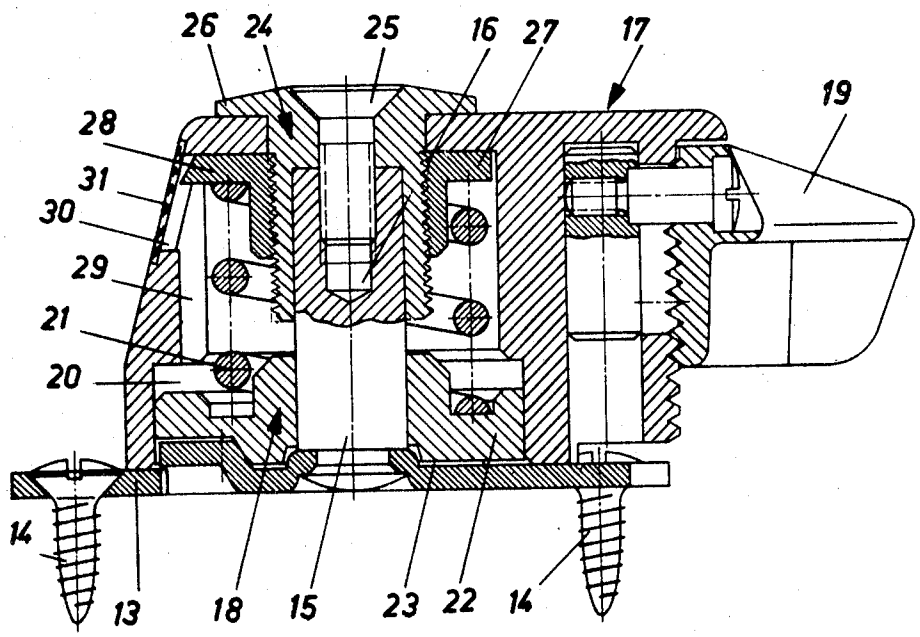


Fig. 2

INVENTOR
ALBERT G. OEHLMANN

BY Fleit, Gipple & Jacobson
ATTORNEYS

FIG. 3



TOE IRON FOR SAFETY SKI BINDINGS

This invention relates to a toe iron for safety ski bindings, which toe iron comprises a baseplate having a vertical pivot pin, on which a pivoted member is rotatably mounted, which releasably interlocks with the baseplate and is biased by a spring which is concentric with the pivot pin and opposes a rotation of the pivoted member in both senses beyond an angle which is limited by the interlock.

In the known toe irons of that kind, the force required for a release is varied by a change of the initial stress of the spring. For this purpose, the pivot pin consists of a screw-threaded bolt, which has a head and is held in the baseplate so as to be displaceable in its axial direction. The shank of the bolt extends through the baseplate and the pivoted member. The end portion of the screw thread protrudes from the pivoted member and carries a nut, preferably a cap nut, and the head is accommodated in a recess on the underside of the baseplate. The head forms a spring abutment for one end of the spring. The other end of the spring bears on the bottom of the recess. The nut which bears on the pivoted member can be turned to move the screw-threaded bolt in the axial direction so as to change the stress of the spring.

These known toe irons have the disadvantage that a tool, such as a screwdriver or a coin, is required to turn the nut.

It is an object of the present invention to provide a toe iron which is so designed and improved that the disadvantage of the known devices can be avoided in a simple manner.

In a toe iron for safety ski bindings, which toe iron comprises a baseplate having a vertical pivot pin on which a pivoted member is rotatably mounted, which releasably interengages with the baseplate and is biased by a spring, which is concentric with the pivot pin and opposes a rotation of the pivoted member in both senses beyond an angle which is limited by the interlock, this object is accomplished according to the invention in that a spring abutment is in screw-threaded engagement with the free end portion of the pivot pin and is held against rotation relative to the pivoted member but axially slidable relative thereto, and the pivot pin is riveted in the baseplate as is known from other types of toe irons.

When it is desired to change the force required for a release of such toe iron, the initial stress of the spring can be changed in a simple manner in that the pivoted member is rotated through 360° about the pivot pin in the clockwise or counterclockwise sense, depending on whether the force required for a release is to be increased or decreased. The pivoted member is large enough so that it can be turned by hand without need for a separate tool.

In the simplest embodiment of the toe iron according to the invention, the pivoted member is lifted during a pivoted movement eliminate the interlock.

In a development of the invention, this lifting can be eliminated in that the pivoted member consists of two parts, one of which serves as a spring abutment and is nonrotatably mounted in the other part to be slidable in the direction of the pivotal axis and provided with at least one male detent, which cooperates with a corresponding female detent of the baseplate.

To eliminate the need to measure the force required for a release whenever the device has been adjusted, the spring abutment is suitably provided with means for indicating a set force required for a release. The indicating means may consist of the surface of the pivoted member and the spring abutment, which is spaced a larger or smaller distance from the pivoted member, which distance is a measure of the force required for a release.

Alternatively, the spring abutment can be held against rotation by a nose, which is guided in a groove formed in the pivoted member and parallel to the axis thereof, which nose has a free end formed as a pointer, whereas the groove is formed as a slot in the range in which the spring abutment is adjustable, and said slot is provided with a scale at one longitudinal side. To render an ingress of water and snow into the pivoted member more difficult, the slot may be covered by a transparent cover.

Two embodiments of the subject matter of the invention will be described more fully hereinafter with reference to the accompanying drawings, in which

FIG. 1 is a central longitudinal sectional view showing a toe iron according to a first embodiment,

FIG. 2 is a top plan view of FIG. 1 and

FIG. 3 is a central longitudinal sectional view showing a second embodiment of the toe iron.

FIGS. 1 and 2 show one embodiment of a toe iron according to the invention. That toe iron comprises a baseplate 1, which is adapted to be screw-connected to a ski. The baseplate 1 may consist of a sheet metal stamping, into which a pivot pin 2 is riveted. A pivoted member 3 is rotatably mounted on the pivot pin 2 and, in its normal position, releasably interlocks with the baseplate. For this purpose, the pivoted member comprises, for example, three equally spaced-apart male detents 4, which are received by corresponding female detents 5 of the baseplate 1. The pivoted member 3 may desirably consist of a suitable plastics material and serves directly as a soleholder. For this purpose its end portion which is on the right in FIG. 1 is concave to embrace the toe portion of the sole and is provided on top with a projection 6 for engaging the edge of the sole from above. A cap 7 is in screw-threaded engagement with the screw-threaded free end portion of the pivot pin 2 and serves as an abutment for a helical compression spring 8. This helical compression spring lies in a recess 9 of the pivoted member 3 and is coaxial with the pivot pin 2. The cap 7 has a nose 10, which enters a groove 11, which is formed in the pivoted member and is parallel to the axis thereof. The cap is thus held against rotation relative to the pivoted member but axially movable relative thereto.

If the pivoted member 3 is under the action of a sufficiently large force which is transverse to the longitudinal axis of the ski, the pivoted member will perform a pivotal movement against the force of the helical compression spring and is constrained to move upwardly owing to its interlock with the baseplate. If the force does not reach the value required for a release or if a larger force acts only for a very short time, for example, as a result of shocks encountered during skiing, the interlock will not be eliminated so that the helical compression spring 8 can return the pivoted member 3 to its initial position when the force has decreased. On the other hand, if a force which would be dangerous to the leg of the skier acts on the pivoted member 3 for more than a very short time, the male detents 4 will slide out of the female detents 5 so that the interlock will be eliminated. The pivoted member can then be pivotally moved in the same direction as the force by an amount which is sufficient to release the toe portion of the skiing boot. When the skiing boot has been released, the pivoted member 3 can be returned by hand to its initial position, in which it is interengaged with the baseplate.

When it is desired to change the initial stress of the spring 8 and with it the force required for a release, it is sufficient to rotate the pivoted member through 360°. The pivoted member is so large that a relatively long effort arm is available for this operation so that the same rotation can be performed by hand without need of a tool. The double arrow 12 shown in FIG. 2 and provided with the symbols + and − indicates the directions in which the pivoted member must be rotated to increase or decrease the helical compression spring 8. These symbols will be applicable if the pivot pin 2 is provided with a right-hand screw thread.

That end of the cap 7 which protrudes from the pivoted member 3 may serve to indicate the set force required for a release. It will normally be sufficient for the toe iron to enable a selection between four settings. FIG. 1 shows the toe iron as set for the lowest force. Annular grooves are formed in the cap to indicate this setting and the next higher setting. The third setting is indicated by the top edge of the cap. The fourth setting will be obtained if the central horizontal end face portion of the cap is flush with the surface of the pivoted member 3.

FIG. 3 shows a second embodiment of the toe iron according to the invention. Just as the one described before, the toe iron comprises a baseplate 13, which is adapted to be connected to a ski by screws 14. A pivot pin 15 is riveted into the baseplate. Different from the embodiment described before, the pivot pin does not have an external screw thread but a tapped hole 16. The pivoted member consists of the two parts 17, 18. Part 17 carries a soleholder 19, which in known manner, which will not be described in detail, is vertically adjustable for adaptation to soles differing in thickness. A recess 20 of the part 17 of the pivoted member accommodates the part 18 of the pivoted member. The part 18 is mounted on the pivot pin 15 to be freely rotatable and axially slidable thereon, and is nonrotatably held in the recess relative to the part 17 of the pivoted member but axially movable relative thereto. The part 18 of the pivoted member serves as a spring abutment for a helical compression spring 21. Just as the pivoted member in the embodiment of FIGS. 1 and 2, the part 18 of the pivoted member has, for example, three male detents 22, which are normally received by three female detents 23 formed in the baseplate.

A sleeve 24 is fitted on the free end of the pivot pin 15 and is held thereon by a flathead screw 25. The sleeve 24 is provided with a collar 26, which holds the part 17 of the pivoted member against axial displacement. The sleeve 24 is also provided with an external screw thread in screw-threaded engagement with a spring abutment 27. This spring abutment is nonrotatably mounted in the part 17 of the pivoted member because it has a nose 28, which is guided in a groove 29, which is formed in the part 17 of the pivoted member and extends parallel to the axis thereof. The upper end of the groove forms a slot 30, which is covered by a transparent cover 31. The free end portion of the nose 28 of the spring abutment 27 serves also as a pointer, which on a scale, not shown, that is provided along one longitudinal side of the slot, indicates the set force required for a release.

This toe iron has basically the same mode of operation as the toe iron according to FIGS. 1 and 2. For this reason, that mode of operation is not described once more. The only difference between the two embodiments resides in that the pivoted member 3 which forms at the same time the soleholder moves also upwardly during a pivotal movement whereas the part 17 of the pivoted member, and the soleholder 19 carried by said part 17 are not axially moved during a pivotal movement.

In the toe iron according to FIG. 3, the force required for a release is also changed in that the pivoted member 17, 18 is rotated through 360°. FIG. 3 shows the toe iron in the lowest setting. A rotation of the pivoted member causes the spring abutment 27 to be screwed down. This is apparent through the cover 31.

What is claimed is:

1. A toe iron, particularly for safety ski bindings, said toe iron comprising: a baseplate; a pivot pin vertically mounted on said baseplate; a pivot member rotatably mounted on said pivot pin and releasably interengaged with said baseplate; a spring biasing said pivot member, said spring being concentric with said pivot pin; and a spring abutment cooperating with said biasing spring, in threaded engagement with the free end of said pivot pin, and axially slidable and nonrotatable relative to said pivot member.

2. A toe iron as set forth in claim 1, wherein said spring abutment is provided with means for indicating a set force required for a release.

3. A toe iron as set forth in claim 2, wherein the position of said spring abutment relative to the said pivoted member provides a means for indicating said set force.

4. A toe iron as set forth in claim 2, wherein said spring abutment has a nose guided in a groove formed in the pivoted member which groove extends parallel to the rotational axis thereof, said nose having a free end formed as a pointer, said groove being formed as a slot in the range in which the said spring abutment is adjustable, a scale defined on the longitudinal side of said slot against which said pointer is read.

5. A toe iron as set forth in claim 1, wherein said pivot member comprises a first part and a second part, said first part serving as a spring abutment; at least one male detent on said first part, at least one female detent on said baseplate cooperating with said male detent, said first part being mounted in said second part, and being nonrotatable but axially slidable with respect to said second part.

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