

[54] TOE IRON FOR SAFETY SKI BINDINGS

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

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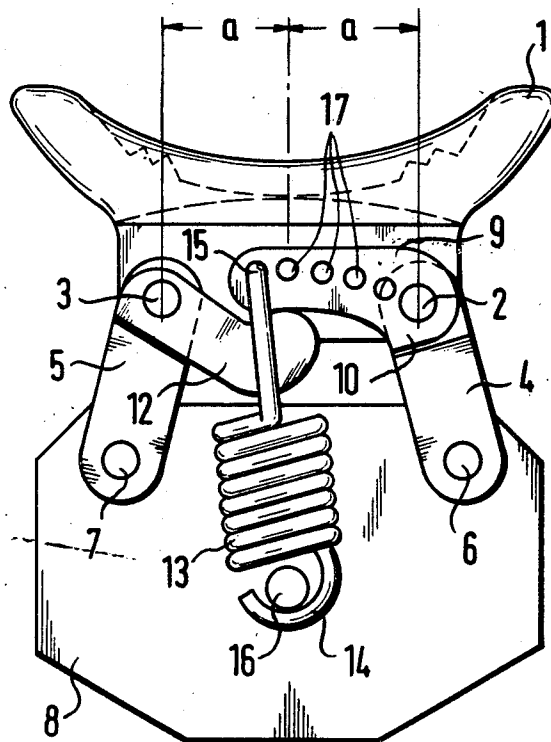
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[57] **ABSTRACT**

A soleholder member constitutes a coupling link of a four-bar linkage, which is movable from its normal position against the force of a spring and which comprises levers that are pivoted to a carrying plate which constitutes or is pivoted to a baseplate to be secured to the ski. One of the pivot pins which connect the coupling link to the levers and which in the normal position of the toe iron are symmetrically disposed with respect to the longitudinal center line of the toe iron carries an arm which is capable of a limited pivotal movement and which in the normal position of the toe iron assumes an end position in which the free end of said arm overlaps and in one point disposed on the longitudinal center line of the toe iron contacts the free end of another arm, which is connected to the lever that carries the other pivot pin. The spring is held at one end on the carrying plate or on the coupling link and at its other end engages the first-mentioned arm. This arm is provided with a series of spring-connecting means, which are selectively connectable to the spring and which do not influence the initial stress of the spring.

7 Claims, 3 Drawing Figures



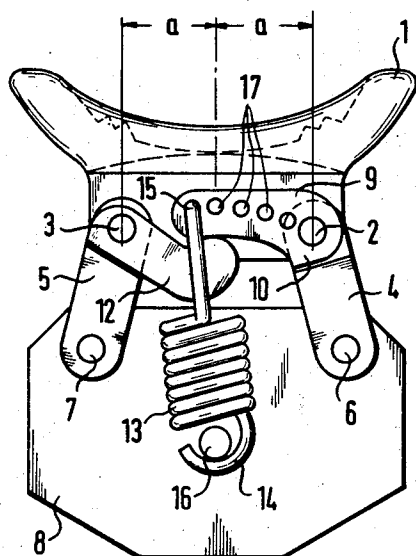


Fig. 1

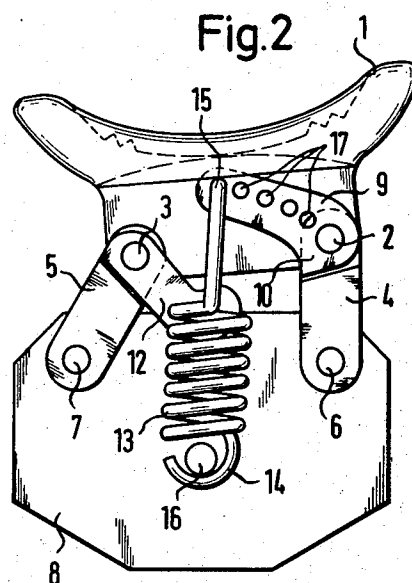


Fig. 2

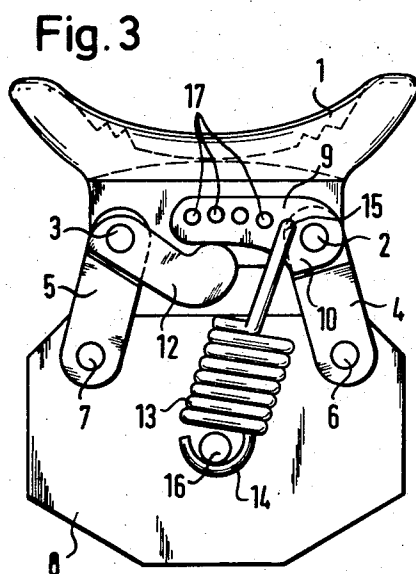


Fig. 3

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TOE IRON FOR SAFETY SKI BINDINGS

This invention relates to a toe iron for safety ski bindings, which toe iron comprises a soleholder member that constitutes a coupling link of a four-bar linkage, which is movable from its normal position against the force of a spring and which comprises levers that are pivoted to a carrying plate which constitutes or is pivoted to a baseplate secured to the ski.

Such toe iron has been proposed in a prior application and due to the use of the four-bar linkage is superior to other known toe irons in that the soleholder member moves along an arc having a center of curvature which at least approximately coincides with the imaginary axis of rotation of the skiing boot. As a result, a pivotal movement of the sole-holder member will not cause the skiing boot to perform a movement having a component directed toward the tip of the ski under the action of the force which acts on the heel and forces the boot against the toe iron.

The toe iron described above has the disadvantage, however, that the force required for a release is variable by a change of the initial stress of the spring. The initial stress of the spring ensures a certain elasticity of the toe iron and a change of this initial stress will result in an undesired change and in virtually all cases in a reduction of that elasticity. On the other hand, a large effort is required to increase the stress of the spring. Such adjustment requires a power screw or the like.

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 toe iron according to the above-mentioned prior application are avoided in a simple manner.

In a toe iron for safety ski bindings, which toe iron comprises a soleholder member that constitutes a coupling link of a four-bar linkage, which is movable from its normal position against the force of a spring and which comprises levers that are pivoted to a carrying plate which constitutes or is pivoted to a baseplate to be secured to the ski, the above object is accomplished according to the invention in that one of the pivot pins which connect the coupling link to the levers and which in the normal position of the toe iron are symmetrically disposed with respect to the longitudinal center line of the toe iron carries an arm which is capable of a limited pivotal movement and which in the normal position of the toe iron assumes an end position in which the free end of said arm overlaps and in one point disposed on the longitudinal center line of the toe iron contacts the free end of another arm, which is connected to the lever that carries the other pivot pin, further, that the spring is held at one end on the carrying plate or on the coupling link and at its other end engages the first-mentioned arm, and this arm is provided with a series of spring-connecting means, which are selectively connectable to the spring and which do not influence the initial stress of the spring.

Another advantage of the ski binding according to the invention resides in that it has no screw for stressing a spring so that the set force required for a release of the binding cannot be inadvertently changed, particularly in transit.

The additional arm is suitably immovably held on the lever of the four-bar linkage. This feature of the invention can easily be realized if the additional arm is integral with the lever of the four-bar linkage.

In a preferred embodiment of the toe iron according to the invention, the arm which is capable of a limited pivotal movement has a locking nose, which in the normal position of the toe iron bears on a stop carried by the lever of the four-bar linkage. If the additional arm is not immovably held on the other lever of the four-bar linkage, that arm may have a suitable locking nose and the lever may carry a suitable stop.

In a development of the toe iron according to the invention, it has proved desirable to provide a spring consisting of a helical tension spring having end hooks extending at an angle of 90° to each other, one hook is hooked on a vertical retaining pin, which is rigid with the carrying plate, and the arm which is capable of a limited pivotal movement is provided with spring-connecting means consisting of a number of holes engageable by the other hook of the spring. The holes are suitably provided on that end face of the arm which is remote from the spring so that the spring can be quickly and simply relocated by means of its hook to change the force required for a release of the toe iron.

Another advantage of the toe iron according to the invention resides in that the spring which has been hooked into one of the holes of the arm capable of a limited pivotal movement can be held in position by a lead seal. For a proof, it may be desirable to use a lead seal to hold the spring in the position which has been selected, e.g., by a dealer for sports articles.

An embodiment of the invention will now be described more fully and by way of example with reference to the drawing, in which

FIG. 1 is a top plan view showing a toe iron in its normal position,

FIG. 2 is a top plan view which is similar to that of FIG. 1 but shows the toe iron with the four-bar linkage swung open and

FIG. 3 is a top plan view which is similar to that of FIG. 1 but shows the toe iron set for another force required for a release.

The toe iron shown in the drawing comprises a soleholder member 1, which constitutes a coupling link of a four-bar linkage. That coupling link is pivoted by two pivot pins 2, 3 to levers 4, 5, which are pivoted at 6 and 7 to a carrying plate 8. By means which are not significant for the invention and for this reason are not shown, the carrying plate 8 is pivoted to a baseplate, which is rigid with the ski. The carrying plate is normally held by a locking device against a pivotal movement. The locking device is operated by the four-bar linkage in a manner which is not shown. Only when the four-bar linkage has performed a predetermined pivotal movement from its normal position is the locking device disengaged so that the carrying plate can move relative to the baseplate and the soleholder member can release the toe portion of the skiing boot.

The pivot pin 2 which connects the soleholder member 1 to the lever 4 carries an arm 9, which is capable of a limited pivotal movement on the pivot pin. When the toe iron is in its normal position, shown in FIGS. 1 and 3, the arm 9 is in its inner end position, in which a nose 10 carried by the arm bears on a stop consisting of a step of the lever 4. Another arm 12 is mounted on the pivot pin 3 and non-rotatable relative to the lever 5. The arrangement of the two arms 9, 12 is such that their free end portions overlap and in the nor-

mal position of the toe iron contact at a point which lies on the longitudinal center line of the toe iron. The two pivot pins 2, 3 are symmetrically spaced by the distance *a* from the longitudinal center line of the toe iron when the same is in its normal position.

The arm 9 is held in its inner limiting position under the influence of a helical tension spring 13. The ends of the helical tension spring consist of hooks 14, 15, which extend at an angle of 90° relative to each other. The spring is hooked by the hook 14 to a vertical retaining pin 16, which is rigid with the carrying plate. The arm 9 is formed with a series of holes 17 for receiving the hook 15. The holes 17 lie on an arc which is centered on the axis of the retaining pin 16. The four-bar linkage is held by the spring in its normal position and can be moved from said position only against the force of the spring, as is shown, e.g., in FIG. 2.

In this toe iron, the force required for a release is not changed by a change of the initial stress of the spring but by a change of the point where the hook 15 of the spring 13 is hooked to the arm 9, whereby the effort arm through which a moment is exerted by the spring force on the four-bar linkage is changed. As has been stated, this will not change the initial stress of the spring because all of the several connection points have the same distance from the retaining pin 16. FIG. 1 shows the arrangement of the spring providing for a maximum force required for a release whereas FIG. 3 shows the arrangement of the spring for a minimum force required for a release.

FIG. 2 shows the toe iron in a position assumed in response to a force acting on the soleholder member 1 in a direction which is transverse to the longitudinal direction of the toe iron and to the right in the drawing and exceeding the initial stress of the helical tension spring 13. The force is transmitted from the soleholder member by means of the lever 4 and the arm 9 to the helical tension spring 13. Upon a decrease of the force, the helical compression spring returns the four-bar linkage to its normal position shown in FIG. 1. If a force which exceeds the preset force required for a release acts on the soleholder member 1 for more than a very short time, the locking device, not shown, which normally holds the carrying plate against a pivotal movement, is disengaged, as described hereinbefore, so that the carrying plate is pivotally moved relative to the baseplate and the toe portion of the skiing boot is released by the soleholder member. When it is then desired to restore the toe iron to a condition ready for skiing, it will be sufficient to swing the carrying plate back by hand. The helical tension spring will then automatically return the four-bar linkage to its normal position.

A design may be adopted in which the carrying plate is automatically restored after a safety release of the toe iron.

A force acting on the soleholder member 1 transversely to the longitudinal direction of the toe iron and to

the left in FIG. 2 will be transmitted from the soleholder member by the lever 5, the arm 12 and the arm 9 to the helical tension spring 13 and will cause the arm 9 to perform a movement relative to the lever 4. In other respects, the toe iron responds just as to the above-described action of a force in the opposite direction.

What is claimed is:

1. A toe iron for safety ski bindings comprising a soleholder member, a four-bar linkage, said soleholder member acting as a coupling link of said four-bar linkage, a helical spring, said linkage being movable from its normal position against the force of the spring, a carrying plate to be secured to the ski, said linkage having a pair of levers each pivoted to said carrying plate in a laterally spaced relation, said toe iron further comprising a first pivot pin (2) pivotally connecting the free end of one of said levers to said coupling link, a second pivot pin pivotally connecting the free end of the other of said levers to said coupling link, a first arm (9) pivotally connected to said first pivot pin (2), another arm (12) pivotally connected to said second pivot pin (3), stop means provided on said levers for limiting pivotal movement of said arms with respect to said levers, the free ends of said arms overlappingly contacting each other at a point disposed on the longitudinal center line of the toe iron in a normal position thereof, a series of spring connecting means provided on one of said arms positioned rearwardly of the other of said arms, said spring being connected at one end thereof to said carrying plate, the other end of said spring being selectively connectible to one of said series of connecting means, whereby effecting variable resisting forces without influencing the initial stress of said spring.

2. A toe iron according to claim 1, wherein said another arm (12) is immovably held on the other said lever (5) of the four-bar linkage.

3. A toe iron according to claim 1, wherein said another arm (12) is integral with the other said lever (5) of the four-bar linkage.

4. A toe iron according to claim 1, wherein said first arm (9) which is capable of a limited pivotal movement has a locking nose (10), which in the normal position of the toe iron engages the stop means carried by said one of said levers (4) of the four-bar linkage.

5. A toe iron according to claim 1, further comprising a retaining pin (16) rigid with the carrying plate, said spring comprising a helical tension spring having end hooks (14,15) extending at an angle of 90° to each other, one hook (14) being hooked on said vertical retaining pin (16), and said spring-connecting means comprising a number of holes (17) engageable by the other hook (15) of the spring (13).

6. A toe iron according to claim 5, wherein the holes lie on an arc centered on said retaining pin (16).

7. A toe iron according to claim 5, wherein that end hook (15) of the spring (13) which extends into one of the holes (17) is provided with a lead seal.

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