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[54] **HEEL-HOLDING DEVICE FOR SAFETY SKI BINDINGS**  
**3 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**  
**HA**

**ABSTRACT:** A pivoted carrier is biased by a spring element and carries a sole holder and a closing pedal and in response to the insertion of the skiing boot into the binding automatically assumes a locked position. From this position it can be swung to a heel-releasing position arbitrarily, e.g., by a slight pressure applied with the ski stick to a release member, or automatically in response to an excessive force which is approximately vertically upwardly directed. Two separate pivotal axes are provided for the opening of the device, one of which is for the arbitrary opening of the device. The other pivotal axis is for the automatic opening of the device carrier which is held in operative position by a releasable locking member.

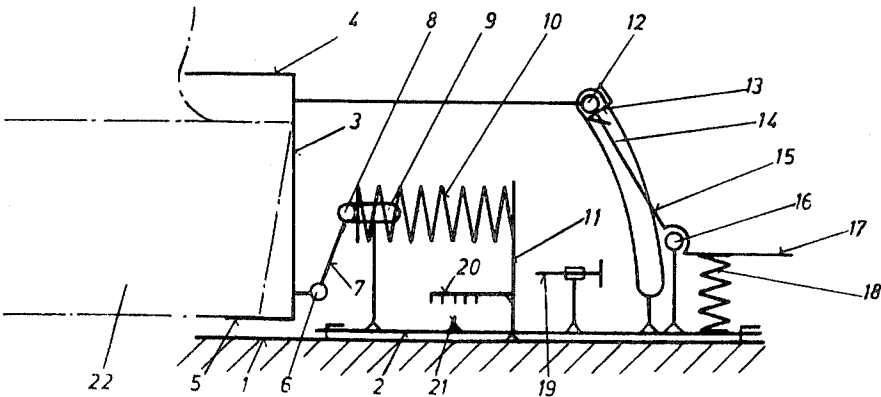


FIG. 1

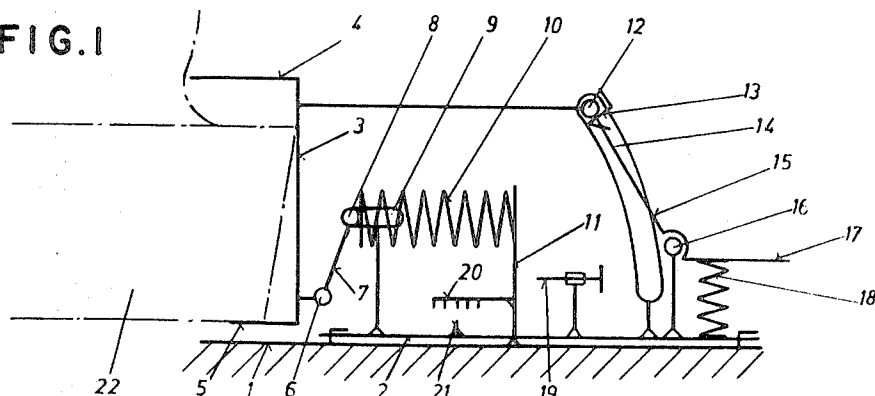


FIG. 2

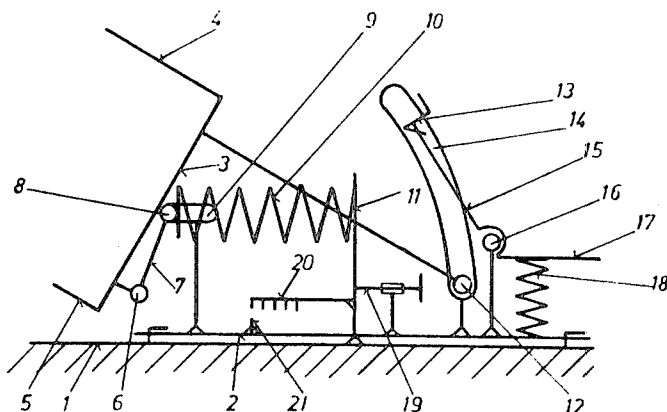
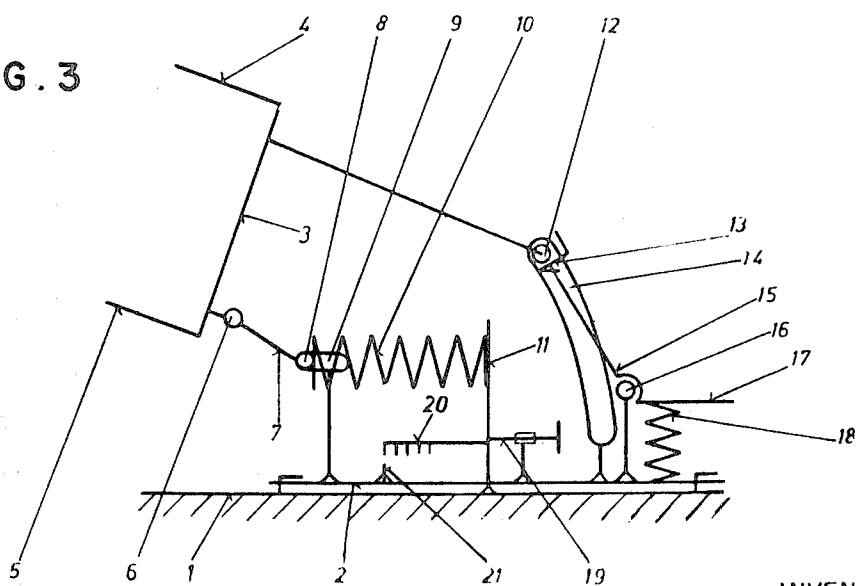


FIG. 3



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**HEEL-HOLDING DEVICE FOR SAFETY SKI BINDINGS**

The present invention relates to a heel-holding device for safety ski bindings, comprising a pivoted carrier, which is biased by a spring element. The carrier carries a sole holder and a closing pedal which in response to the insertion of the skiing boot into the binding automatically assumes a locked position and can be swung to a heel-releasing position arbitrarily, e.g., by a slight pressure applied with the ski stick to a release member, or automatically in response to an excessive force which is approximately vertically upwardly directed.

A large number of types of such heel-holding devices are known but only some of said types have been used in practice. For an arbitrary opening, these devices usually comprise a release member, which consists of a lever and when operated stresses the spring element by means of the lever in such a manner that there is almost no resistance to the pivotal movement of the carrier for the sole holder and the closing pedal.

Because the heel-holding devices must take up considerable forces, the force which is required to operate the release member is relatively large, even where leverages are provided, so that it is often difficult for skiers, particularly female skiers, to open the device to release the heel. On the other hand, a torque which is as large as the releasing torque must be exerted in these heel-holding devices when the skiing boot is to be inserted into the binding.

In a known heel-holding device, a large force is not required for the operation of the release member because the normally fixed spring abutment can be unlocked by the operation of the release member so that the spring need not be stressed further but can be moved away from the carrier during the pivotal movement of the latter. Just as in the other known devices, a large force is required when it is desired to insert the skiing boot into the binding unless the release member is operated simultaneously. Such simultaneous operation cannot always be easily effected.

It is a main object of the present invention to design a heel-holding device so that no force other than that required to overcome friction and the holding force for the release member is to be applied for an arbitrary opening of the device and for a subsequent closing thereof.

The present invention pertains to a heel-holding device for safety ski bindings, which comprises a pivoted carrier, which is biased by a spring element and carries a sole holder and a closing pedal which in response to the insertion of the skiing boot into the binding automatically assumes a locked position. The pivoted carrier can be swung to a heel-releasing position arbitrarily, e.g., by a slight pressure applied with the ski stick to a release member, or automatically in response to an excessive force which is approximately vertically upwardly directed. The object of the invention is accomplished in that two separate pivotal axes are provided for the arbitrary and automatic pivotal movements of the carrier to open the device. The point where the spring force acts on the carrier defines one pivotal axis for the carrier during the arbitrary opening of the device, and the other pivotal axis for the automatic opening movement of the carrier is held in operative position by a releasable locking member. This arrangement enables a simple and rugged design of the release mechanism and thus reduces the costs of manufacturing the device and the likelihood of trouble in the use thereof.

For design reasons, it has proved desirable to provide the releasable locking member on a lever, which is biased to its locking position by a spring. The lever is suitably two-armed and with its second arm forms the release member.

Further details of the invention will become apparent from the following detailed description of a heel-holding device with reference to the accompanying drawing, in which

FIG. 1 is a diagrammatic view showing the heel-holding device in a closed condition,

FIG. 2 is a view similar to FIG. 1 and shows the heel-holding device when it has been opened arbitrarily, and

FIG. 3 is a view similar to FIG. 1 and shows the heel-holding device when it has been opened automatically.

The heel-holding device as shown in the drawings has a baseplate 1, which can be fixed to a ski. This baseplate is adjustable on the ski in the longitudinal direction of the latter in known manner for adaptation to skiing boots having different sizes and to vary the pressure applied by the skiing boot to a toe iron, not shown. The baseplate carries a carriage 2 and forms for the latter a track in which the carriage can perform a limited movement in the longitudinal direction of the ski. A sole holder 4 and a closing pedal 5 are provided on a carrier 3. The sole holder is adjustable in height in known manner for adaptation to soles differing in thickness.

An overcenter rocker arm 7 is pivoted at 6 to the carrier 3 and has a pivot 8, which is received by a slot 9, which extends in the longitudinal direction of the ski in sidewalls of the carriage 2. The pivot 8 is engaged by a helical compression spring 10, which bears at one end on a spring abutment 11, which is firmly connected to the baseplate 1.

The carrier 3 has a pivot 12, which is normally held by a locking member 13 in its upper limiting position in a guide slot 14 formed in the sidewalls of the carriage 2. The locking member 13 is carried by the free end portion of a lever arm 15 of a two-armed lever, which is pivotally movable about a pivot 16, which is mounted in the carriage 2. The second arm 17 of the lever is biased by a retaining spring 18 bearing on the carriage and serves as an actuating grip for the pivotal movement of the levers to release the pivot 12 of the carrier 3. The carriage 2 has a stop 19, which in the open position of the heel-holding device bears on the part 11 which is connected to the baseplate 1. As a result, the helical compression spring which in this case applies the forward contact force and the holding-down force, cannot relax completely so that even in the open position, the device is held under a desired initial stress. A scale 20 which is calibrated for certain forward contact forces and holding-down forces is provided on the baseplate 1 or on a part that is fixed thereto. The carriage 2 has a pointer 21, which indicates the set forces at the scale when the skiing boot 22 has been inserted into the binding, as is shown in FIG. 1. The scale may suitably be provided with the numbers from 1 to 4 so that four different settings can be indicated, just as in the safety toe iron which is sold under the trademark "Simplex" by the assignee of the inventor. Intermediate settings are possible if an infinite adjustment is provided for.

FIG. 1 shows the heel-holding device according to the invention with the skiing boot 22 inserted in the binding. If the pointer 21 does not indicate at the scale, the setting which has been proposed by the manufacturer of the binding for the skier in view of his personal data, the skier must first adjust the device on the ski. Before the skier can step out of the binding, he must press the release member 17. As a result, he unlocks the pivot 12 so that virtually no force is required for a pivotal movement of the carrier 3 about the point 6. For this reason, the guide slot 14 has a corresponding curvature, the center of which coincides with the point 6. FIG. 2 shows the heel-holding device when it has been opened arbitrarily. As the skiing boot is inserted into the binding, the heel contacts the closing pedal 5 so that the carrier 3 is pivotally moved to its locked position and virtually no force is required for this movement.

FIG. 3 shows the heel-holding device according to the invention when it has been opened automatically arbitrarily, i.e., during a forward fall. This condition will be assumed in response to the action of an excessive tensile force, which is approximately vertically upwardly directed, to the sole holder 4. The carrier 3 is thus swung about the pivot 12 against the force of the helical compression spring 10 because the point 6 is moved upwardly and the pivot 8 is displaced rearwardly in the slot 9 against the action of the spring during the pivotal movement of the rocker arm 7. When the rocker arm 7 has moved through the plane of action of the spring 10, the latter expands and acts in an opening sense on the carrier 3. The skiing boot is subsequently inserted into the binding against the force of the spring 10. This case seldom happens because forward falls occur much less often than twisting falls. To reduce the force which must be overcome to insert the boot into the

binding, the skier can quickly close the heel-holding device when the same has been opened automatically. This closing requires a smaller force. The skier can then open the device arbitrarily to obtain the condition shown in FIG. 2.

The invention can also be applied to heel-holding devices having designs other than that shown. For instance, the single spring 10 may be replaced by two springs for applying the forward contact force and the holding-down force, respectively. The invention may also be applied to a design in which there is no rocker arm 7 but the carriage and carrier 3 are connected by a cam and a cam follower roller. In any case, it is essential for the invention that separate pivotal axes are provided for the arbitrary and automatic pivotal movements of the carrier to open the device and the point where the spring force acts on the carrier defines the pivotal axis for the carrier during an arbitrary opening of the device.

What is claimed is:

1. A ski boot heel-holding device for safety ski bindings comprising a carriage, releasable locking means connected to said carriage, a carrier pivotally connected to said carriage and a sole holder and closing pedal carried by said carrier, said pivotable carrier being biased by a spring and adapted to respond to the insertion of a ski boot into the binding to auto-

matically assume a locked position, said pivotable carrier also being able to be arbitrarily swung to a heel-releasing position when a slight predetermined pressure is applied to said releasable locking means and automatically swung to a heel-releasing position in response to a predetermined force which is substantially vertically upwardly directed, said carrier being provided with two separate pivot axes for said arbitrary and automatic pivotal movements, the pivotal axis for the carrier during the arbitrary opening of the device being defined at the point where the spring force acts on the carrier and the other pivotal axis for the automatic opening movement of the carrier being held in a defined operative position by said releasable locking means.

2. A heel-holding device according to claim 1, wherein the releasable locking means comprises a releasable locking member on a lever, said lever being connected to and under the influence of a second spring to hold said lever in a locking position.

3. A heel-holding device according to claim 1, wherein said releasable locking means is a lever having two arms with one of said arms forming the release member.

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