

May 27, 1969

H. MARKER

3,446,511

SOLE SUPPORT FOR SAFETY SKI BINDINGS

Filed April 7, 1967

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FIG. 1

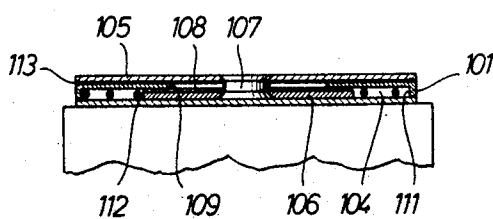


FIG. 2

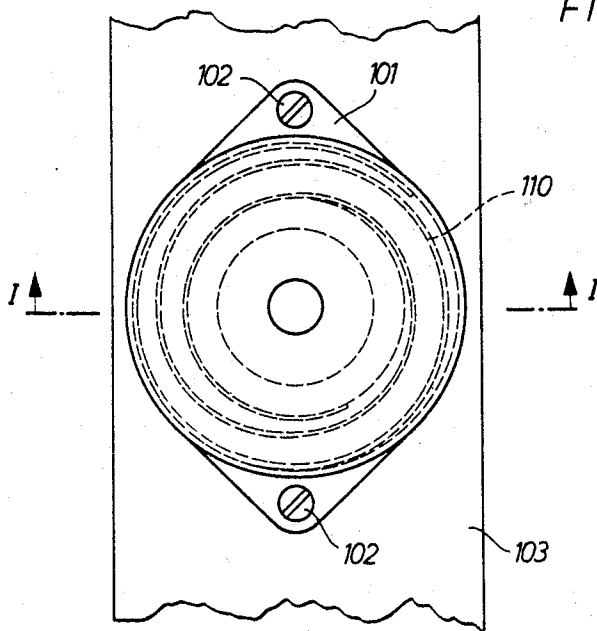
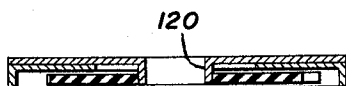


FIG. 9



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FIG. 3

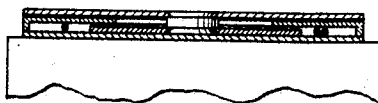


FIG. 4

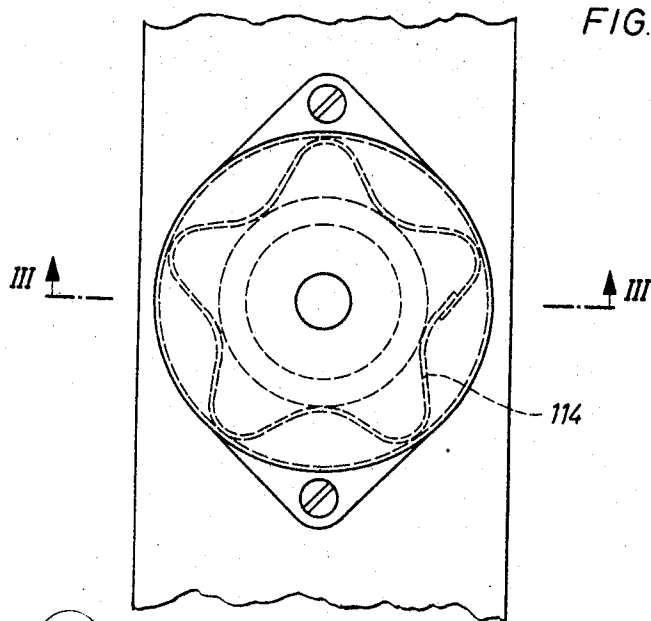
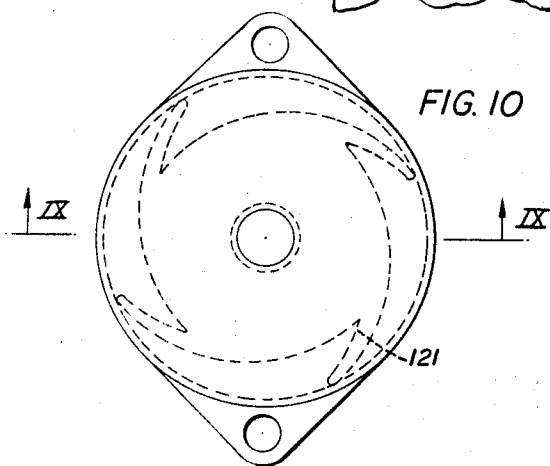


FIG. 10



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FIG. 5



FIG. 6

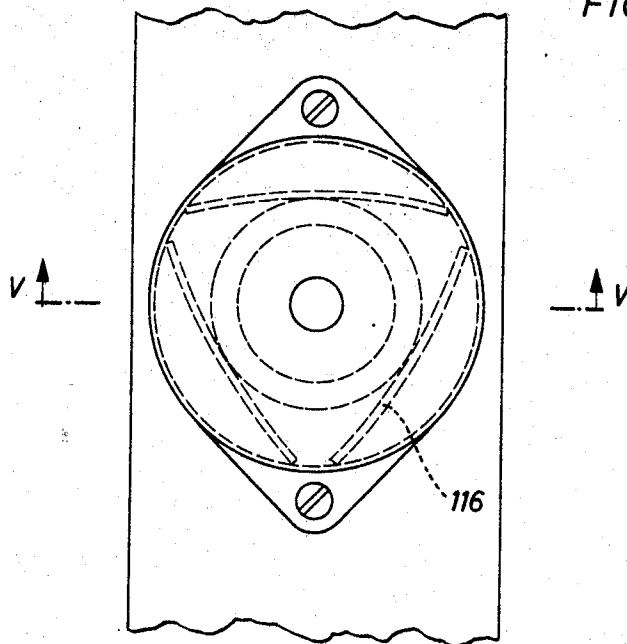
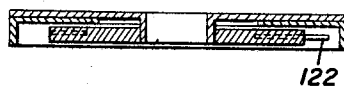


FIG. II



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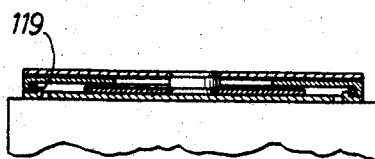


FIG. 7

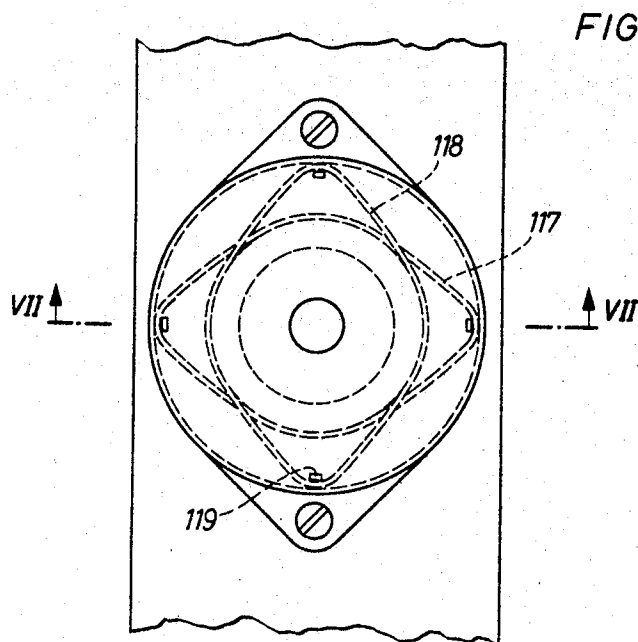


FIG. 8

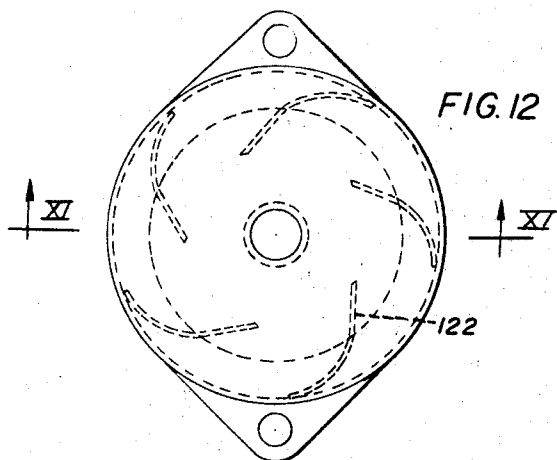


FIG. 12

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SOLE SUPPORT FOR SAFETY SKI BINDINGS
Hannes Marker, Hauptstrasse 51-53, Garmisch-Partenkirchen, Germany

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M 69,324

Int. Cl. A63c 9/086

U.S. Cl. 280-11.35

12 Claims

ABSTRACT OF THE DISCLOSURE

A sole supporting plate for supporting the forward part of the sole of a skiing boot in a safety ski binding having a toe iron is free of side stops and movable parallel to the surface of the ski. Guide means are connected to the sole supporting plate and in lost-motion interengagement with a guide plate that is secured to the ski. The sole supporting plate is connected by a boltlike element to a holding-down plate, which is disposed in a disclike recess, which is parallel to the surface of the ski and formed in the guide plate, which embraces the holding-down plate on all sides. A space is provided on all sides between the bolt element and the rim of the opening in the guide plate and between the holding-down plate and the inwardly facing rim of the recess in the guide plate. An elastic restoring device is disposed on all sides between the holding-down plate and the inwardly facing rim of the recess in the guide plate.

During a forward or forwardly inclined fall, the forward portion of the sole of the boot is strongly forced against the ski. The resulting frictional force may adversely affect the function of the safety toe iron of the ski binding. In order to facilitate the initial slipping of the boot on the surface of the ski so that the release function of the toe iron is highly independent of friction, it is known to provide a pivoted supporting plate or so-called backlash plate, which is pivoted adjacent to the heel on an axis which is at right angles to the ski; this plate extends approximately as far as to the toe iron. The pivotal axis of the backlash plate coincides approximately with the natural axis of the pivotal movement of the foot, i.e., the axis of the shank. This backlash plate has the disadvantage that it contacts the ski on a very large area so that the frictional force between the backlash plate and the surface of the ski is considerable. Besides, ice may form between the backlash plate and the ski so that the backlash plate becomes locked. A further disadvantage resides in that the backlash plate protrudes beyond the sides of the ski when the plate has been pivotally moved outwardly after a fall and in this position may strike obstacles so that it may become damaged or bent and cannot be returned to its centered position. It is also a disadvantage that the backlash plate must be moved to its centered position by hand after each fall and possibly even after a normal application of the binding.

Sole supporting plates have also been disclosed which do not extend beyond the range of the forward part of the foot so that a contact with the surface of the ski in a very large area is avoided. Said known sole supporting plates are used in conjunction with friction-reducing means to facilitate the outward pivotal movement of the plate. Whereas the friction area is reduced where these supporting plates are employed, they have still the disadvantage of protruding beyond the side of the ski to a relatively large extent when the boot has been swung out from the ski. In this position, the plates may become damaged. Besides, they must be returned by hand to their intermediate position. The known embodiments of these

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backlash plates are highly expensive. The sole supports of this kind comprise a sole supporting plate, which is movable parallel to the surface of the ski and is free of side stops. The plate is provided with guide means, which are in lost-motion interengagement with a guide plate so as to enable the outward pivotal movement. The guide plate is secured to the ski.

A further disadvantage of the known backlash plates resides in that they are only displaceable transversely to the longitudinal direction of the ski or pivotally movable about a pivot adjacent to the heel. For this reason they cannot follow a forwardly directed component of motion during a fall so that the release may still be impeded by frictional forces.

In order to avoid the disadvantages of the known embodiments, the invention provides a sole support of the kind described last hereinbefore, in which the sole supporting plate is connected by a boltlike element to a holding-down plate, which is disposed in a disclike recess which is parallel to the surface of the ski and formed in the guide plate, which embraces the holding-down plate on all sides, a space is provided on all sides between the bolt element and the rim of the opening in the guide plate and between the holding-down plate and the inwardly facing rim of the recess in the guide plate, and an elastic restoring device is disposed on all sides between the holding-down plate and the inwardly facing rim of the recess in the guide plate. Large friction areas between the surface of the ski and the sole supporting plate, such as occur with the known backlash plates which are pivoted adjacent to the heel, are avoided in the arrangement according to the invention. Besides, the sole supporting plate will be returned to its centered position immediately after the boot has disengaged the plate during a fall, and in said centered position the sole supporting plate does not protrude on either side over the sides of the ski so that the plate cannot become bent by striking an obstacle. The proposed sole supporting plate also assists the function of the safety toe irons which are now becoming popular and are provided with means for restoring the foot to its centered position after slight lateral shocks, because the arrangement eliminates any friction between the boot and the ski. Such friction might restrain the boot on the ski after a partial pivotal movement of the boot. Furthermore, the sole support according to the invention enables the sole plate to follow any movement of the boot, even a forwardly inclined movement, so that restraining frictional forces are virtually eliminated also during such movement.

In a development of the invention it is desirable if the distance between the bolt element and the rim of the opening of the guide plate and the distance between the holding-down plate and the inwardly facing rim of the recess in the guide plate is at least 0.3 centimeter. If the distance between the holding-down plate and the inwardly rim of the recess in the guide plate exceeds the distance between the bolt element and the rim of the opening in the guide plate, according to another feature of the invention, the movement of the sole supporting plate will be limited in that the bolt element strikes the rim of the opening in the guide plate so that an overstraining of the resilient restoring means is avoided. In a further suitable development of the invention, the sole supporting plate, the guide plate, its opening and its recess as well as the holding-down plate may be circular so that the conditions during an outward pivotal movement are the same on all sides and the mounting on the ski is not critical.

The restoring device may comprise a spiral spring, the innermost turn of which surrounds the holding-down plate and the outermost turn of which engages the in-

wardly facing rim of the recess in the guide plate. Alternatively, the restoring device may comprise a spring wire, which is bent in star shape and alternately to the guide plate, or preferably three flat springs, the ends of which engage the rim of the recess in the guide plate and which are pre-stressed in their intermediate portion by the holding-down plate.

In a further alternative, the restoring device may comprise one or more rubber belts, which are suspended at the inwardly facing rim of the recess in the guide plate and which embrace the holding-down plate in the middle between their points of attachment.

It will be particularly desirable if the guide plate and/or the sole supporting plate consists of plastics material having a low coefficient of friction, or a bearing layer of such plastics material is disposed between said two parts. If the holding-down plate consists also of elastic plastics material, it may be provided with resilient tongues, which extend approximately tangentially in an unstressed state and bear under initial stress on the inwardly facing rim of the recess in the guide plate. The holding-down plate may alternatively be provided with tongues which consist of spring steel and are preferably embedded in the holding-down plate and which are straight and inclined from the periphery of the holding-down plate in an unstressed state and bear under initial stress on the inner rim of the aperture in the guide plate.

The invention will be explained more fully in the subsequent description with reference to the drawing, which shows several embodiments.

FIG. 1 shows a first embodiment in a sectional view taken on line I—I of FIG. 2,

FIG. 2 the corresponding top plan view,

FIG. 3 a second embodiment in a sectional view taken on line III—III of FIG. 4,

FIG. 4 a top plan view of FIG. 3,

FIG. 5 a further embodiment in a sectional view taken on line IV—IV of FIG. 6,

FIG. 6 the corresponding top plan view,

FIG. 7 a fourth embodiment in a sectional view taken on line VII—VII of FIG. 8,

FIG. 8 a top plan view of FIG. 7,

FIG. 9 a fifth embodiment in a sectional view taken on line IX—IX of FIG. 10,

FIG. 10 a top plan view of the embodiment of FIG. 9,

FIG. 11 a last embodiment in a sectional view taken on line XI—XI of FIG. 12, and

FIG. 12 a top plan view of FIG. 11.

In the embodiment shown in FIGS. 1 and 2, the guide plate 101 is secured with the aid of screws 102 to the ski 103. The guide plate 101 is provided with a circular recess 104, in which the holding-down plate 106 is slidably mounted. The holding-down plate 106 is firmly connected to the sole supporting plate 105 by the bolt-like element 107. The upper opening 108 in the guide plate 101 is larger in diameter than the bolt 107 so that the sole supporting plate can be displaced in any desired direction parallel to the surface of the ski until the bolt 107 engages the rim 109 of the opening 108. The spiral spring 110 engages the inwardly facing rim 111 of the recess 104 in the guide plate and the outer rim 112 of the holding-down plate 106 to center the sole supporting plate 105. When the sole supporting plate 105 is displaced from its centered position, the holding-down plate 106, which is firmly connected to the plate 105, will assume in the guide plate 101 an eccentric position so that the spiral spring is stressed. When the boot has been released by the toe iron and rests no longer on the sole supporting plate 105, or if no release has been effected and the toe iron urges the boot back to its centered position on the ski, the spring force acting on the holding-down plate 106 will return said plate and with it the supporting plate 105 to the centered position. A permanent plastic deformation of the spring is prevented because the dis-

placement of the sole supporting plate 105 is limited in that the bolt 107 strikes the rim 109 of the opening 108 and the distance between the bolt 107 in its centered position and the rim 109 is less than the distance between the holding-down plate and the inwardly facing rim of the recess 104. To minimize the friction between the sole supporting plate 105 and the guide plate 101, friction-reducing means 113 may be provided on the guide plate.

The embodiment of FIGS. 3 and 4 is similar to the first embodiment. Those parts which are also provided in the embodiment of FIGS. 1 and 2 are not described and identified again. In this embodiment, the spiral spring 110 is replaced by a spring wire 114, which is bent in star shape and bears alternately on the inwardly facing rim of the recess 104 and the outer rim of the holding-down plate 106. Just as the spiral spring, this spring wire acts as a resilient restoring device.

The embodiment shown in FIGS. 5 and 6 comprises three flat springs 116, which are normally straight, as a resilient restoring device. The ends of said springs engage the inwardly facing rim of the recess 104. The intermediate portions of the springs are somewhat pre-stressed by the rim of the holding-down plate 106, as is distinctly shown in FIG. 6.

In the embodiment shown in FIGS. 7 and 8, the restoring device comprises annular rubber belts 117 and 118, which are suspended from hooks 119, which are struck up from the guide plate. In the embodiment shown by way of example, the hooks are spaced 90° apart so that the center lines of the stretched rubber belts are at right angles to each other. As is shown in FIG. 8, the intermediate portions of the rubber belts embrace the holding-down plate 106 to return the same to its centered position when it has been displaced.

In the embodiment shown in FIGS. 9 and 10, at least the holding-down plate 106 consists of elastic plastics material. The sole supporting plate 105 consists suitably also of plastics material and is provided with a depending, centering sleeve, which serves as a bolt element. The sleeve 120 extends through a bore in the holding-down plate 106 and is riveted thereto. The holding-down plate 106 is provided at its edge with tongues 121, which owing to the nature of the material of the holding-down plate are elastic and extend approximately tangentially in an unstressed state. As is apparent from FIG. 10, these tongues bear under initial stress and with a corresponding deformation on the inwardly facing rim of the recess 104 to act as a restoring device when the holding-down plate is installed.

The embodiment shown in FIGS. 11 and 12 is similar to that of FIGS. 9 and 10. However, the holding-down plate 106 is not provided with spring tongues consisting of the same material as the holding-down plate, but with sheet metal tongues 122, which are straight and inclined from the periphery of the holding-down plate in an unstressed state. The tongues 122 bear on the inwardly facing rim of the recess 104 with deformation. The spring tongues 122 may be secured by being embedded in the holding-down plate 106 of plastics material.

In all embodiments, friction-reducing means, preferably plastics material bearings, may be provided between the sole supporting plate and the guide plate and/or in the recess in the guide plate. Alternatively, the sole supporting plate, holding-down plate and/or guide plate may consist of a material having a low coefficient of friction, preferably of plastics material.

What is claimed is:

1. A sole support which is intended for use with safety ski bindings having a toe iron and said sole support comprising a sole supporting plate which is movable parallel to the surface of the ski and free of side stops, said plate serving to support the forward part of the sole, and comprising guide means which are connected to the sole supporting plate and in lost-motion interengagement with a guide plate that is secured to the ski, and the sole supporting plate (105) is connected by a boltlike element (107, 120) to a

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holding-down plate (106), which is disposed in a disclike recess (104) which is parallel to the surface of the ski and formed in the guide plate (101), which embraces the holding-down plate on all sides, a space is provided on all sides between the bolt element and the rim (109) of the opening (108) in the guide plate and between the holding-down plate and the inwardly facing rim of the recess in the guide plate, and an elastic restoring device (110, 114, 116, 117, 118, 121, 122) is disposed on all sides between the holding-down plate and the inwardly facing rim of the recess in the guide plate.

2. A sole support according to claim 1, wherein the distance between the bolt element (107, 120) and the rim (109) of the opening (108) of the guide plate (101) and the distance between the holding-down plate (106) and the inwardly facing rim of the recess (104) in the guide plate is at least 0.3 centimeter.

3. A sole support according to claim 1, wherein the distance between the holding-down plate (106) and the inwardly facing rim of the recess (104) in the guide plate (101) exceeds the distance between the bolt element (107, 120) and the rim (109) of the opening (108) in the guide plate.

4. A sole support according to claim 1, wherein the sole supporting plate (105), the guide plate (101), its opening (108) and its recess (104) as well as the holding-down plate (106) are circular.

5. A sole support according to claim 1, wherein the restoring device comprises a spiral spring (110), the innermost turn of which surrounds the holding-down plate (106) and the outermost turn of which engages the inwardly facing rim of the recess (104) in the guide plate.

6. A sole support according to claim 1, wherein the restoring device comprises a spring wire (114), which is bent in star shape and alternately engages the holding-down plate (106) and the rim of the recess (104) in the guide plate.

7. A sole support according to claim 1, wherein the restoring device comprises preferably three flat springs (116), the ends of which engage the rim of the recess (104) in the guide plate and which are pre-stressed in their intermediate portion by the holding-down plate (106).

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8. A sole support according to claim 1, wherein the restoring device comprises one or more rubber belts (117, 118), which are suspended at the inwardly facing rim of the recess (104) in the guide plate (101) and which embrace the holding-down plate (106) in the middle between their points of attachment (119).

9. A sole support according to claim 1, wherein one of the guide plate (101) and the sole supporting plate (105) consists of plastics material having a low coefficient of friction.

10. A sole support according to claim 9, wherein the holding-down plate (106) consists of elastic plastics material and is provided with resilient tongues (121), which extend approximately tangentially in an unstressed state and bear under initial stress on the inwardly facing rim of the recess (104) in the guide plate (101).

11. A sole support according to claim 1, wherein the holding-down plate (106) is provided with tongues (122) which consist of spring steel and are preferably embedded in the holding-down plate (106) and which are straight and inclined from the periphery of the holding-down plate in an unstressed state and bear under initial stress on the inwardly facing rim of the recess (104) in the guide plate.

12. A sole support according to claim 1, wherein a bearing layer of plastic material having a low coefficient of friction is disposed between the guide plate (101) and the sole supporting plate (105).

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LEO FRIAGLIA, *Primary Examiner.*

MILTON L. SMITH, *Assistant Examiner.*