

[54] **SOLE SUPPORT DEVICE**

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[51] Int. Cl. **A63c 9/00**

[58] Field of Search...280/11.35 C, 11.35 K, 11.35 Y

[56] **References Cited**

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[57] **ABSTRACT**

The invention is applicable to a low friction device for mounting on a ski and permitting low friction sideward movement of a boot supported thereon. Such a device is provided with a base plate that is mounted on the ski and a stepping plate which supports the boot. The device has friction devices, such as a ball and cage structure interposed between said plates to permit low friction sideward movement of the stepping plate with respect to the base plate. A lever is pivotally mounted on the cage at a point intermediate its ends and has one end thereof pivotally engaging the base plate and the other end thereof pivotally engaging the stepping plate. Thus, as the stepping plate is caused to move sidewardly with respect to the base plate the presence of the lever insures that the ball carrying cage will also move sidewardly a predetermined portion of the distance so moved by the stepping plate. Normally such movement of the cage is one-half the movement of the stepping plate with respect to the base plate.

10 Claims, 12 Drawing Figures

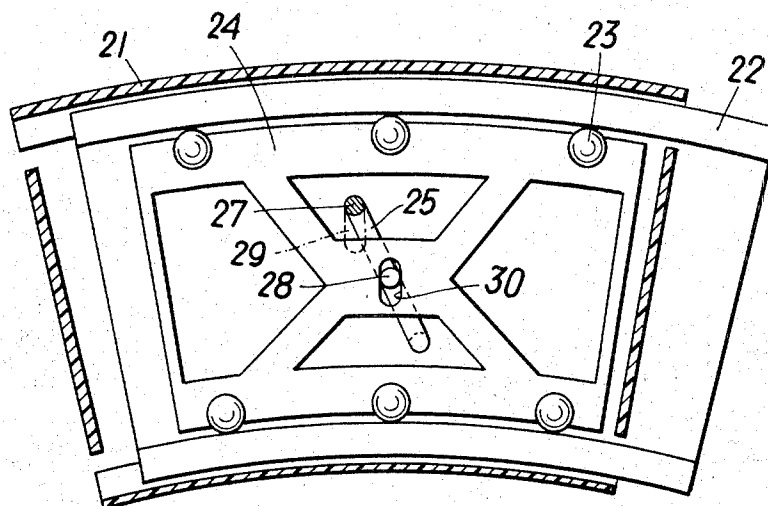


FIG. 2

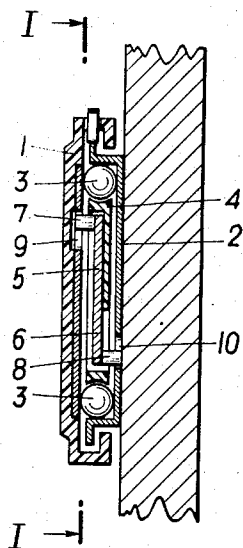


FIG. 1

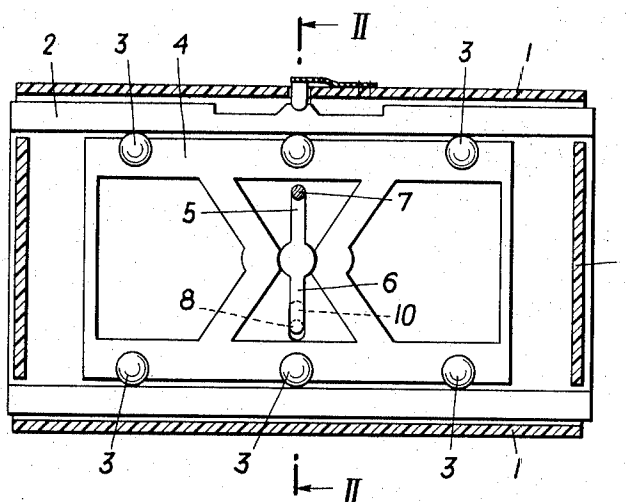


FIG. 3

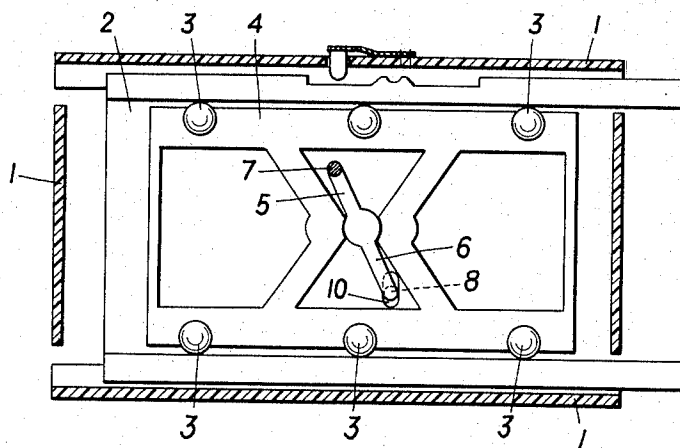


FIG. 4

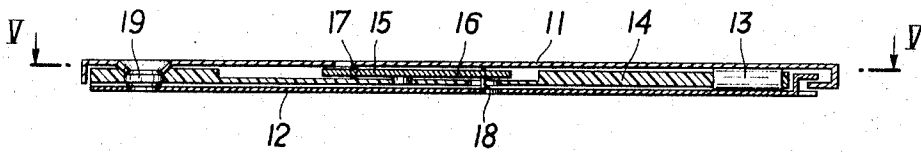


FIG. 5

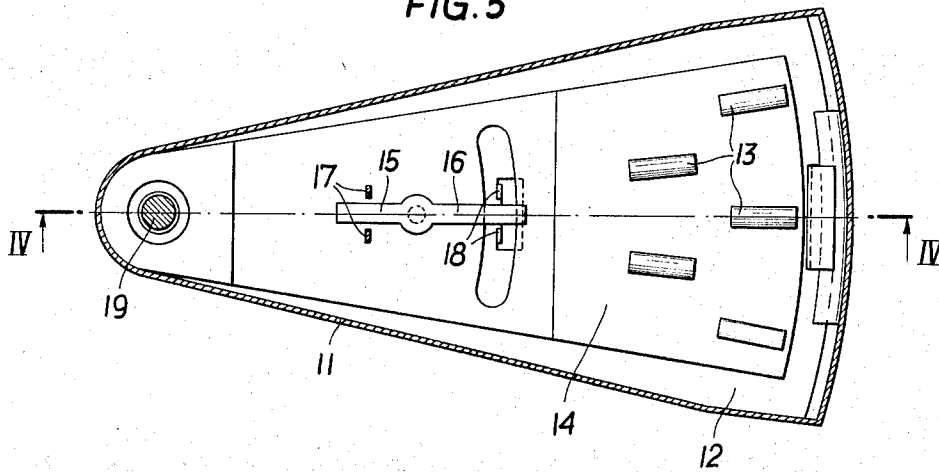


FIG. 6

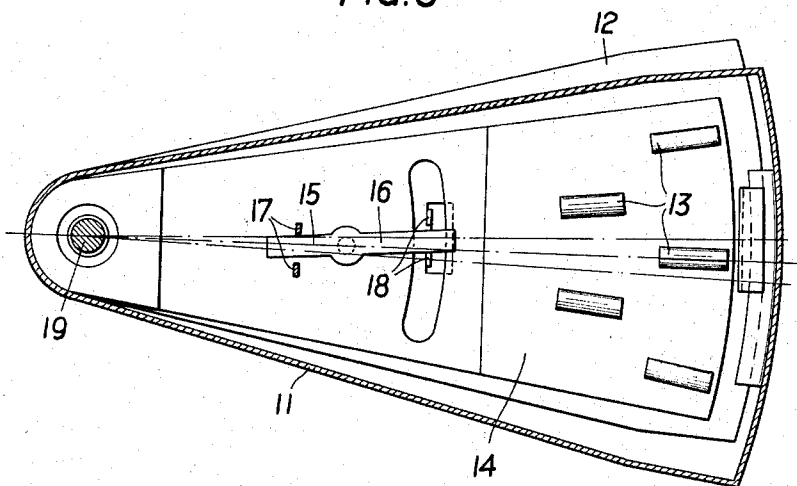


FIG. 7

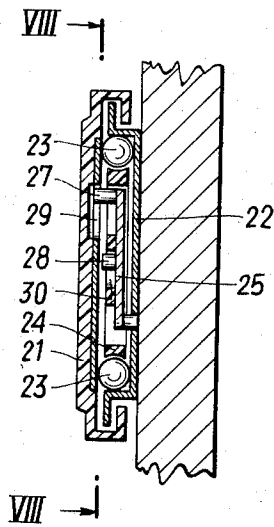


FIG. 8

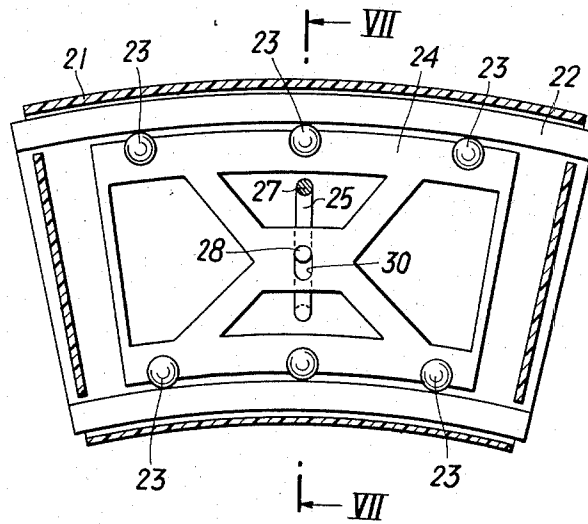


FIG. 9

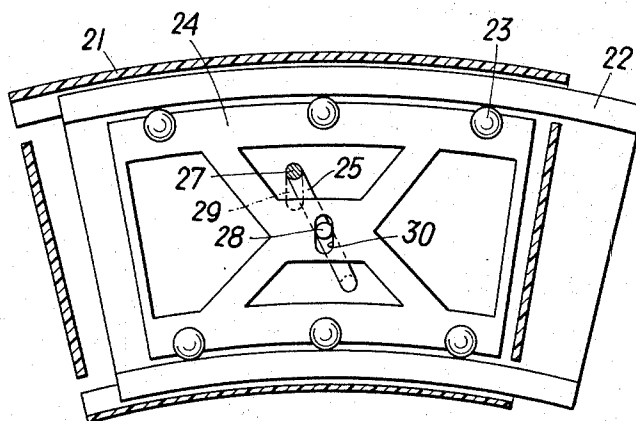


FIG. 11

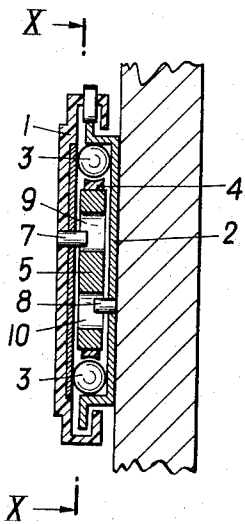


FIG. 10

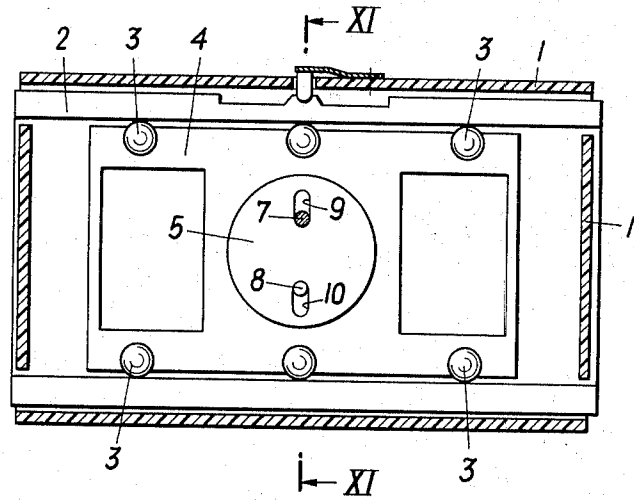
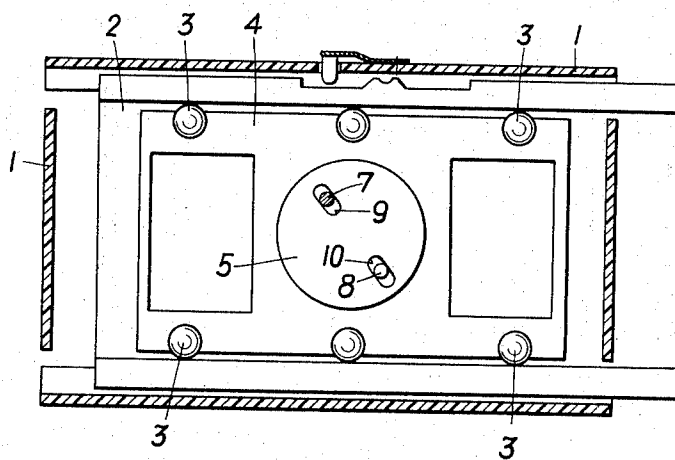


FIG. 12



SOLE SUPPORT DEVICE

The invention relates to a support device for a ski boot, which device has at least one stepping plate which is movable on the ski, whereby friction-reducing parts, like balls, rollers or the like are arranged in a cage between the stepping plate and either the ski or a base plate arranged on the ski.

A support device for a ski boot is known in which the cage extends into a recess in the stepping plate and is held in the center of this recess by springs. The springs are in such a unit supported on the ends of the recess on one side and on the cage on the other side. In this manner, the cage is normally held in the central position with respect to the stepping plate. However, there is no assurance that the cage will always assume the correct position with respect to the ski or with respect to the base plate which is mounted on the ski. Basically in order to assume a perfect operation, the cage would always have to cover half of the path which is covered by the stepping plate. However, in the known device there exists the possibility that the cage during a movement of the stepping plate may not move as desired relative to the base plate. Instead, it is possible, especially in the case of a shifted stepping plate, for the cage to be urged by the force of the springs into the central position relative to the stepping plate so that the cage covers practically the same path as the stepping plate.

The present invention is intended to overcome this disadvantage and the invention is characterized in that a lever is provided which is connected intermediate its ends movably to the cage, at or near its one end to the base plate and at or near its other end to the stepping plate. The lever assures that the cage moves with the stepping plate at all times in the required relationship.

The subject matter of the invention is illustrated in several exemplary embodiments in the drawings, in which:

FIGS. 1 and 2 are associated views of a support device embodying the invention, wherein FIG. 1 is a cross-sectional view along the line I—I of FIG. 2 and FIG. 2 is a cross-sectional view along the line II—II of FIG. 1,

FIG. 3 is a same cross-sectional view as FIG. 1, but showing the stepped plate and the cage in a shifted position,

FIGS. 4 and 5 are associated views of a modified embodiment, wherein FIG. 4 is a cross-sectional view along the line IV—IV of FIG. 5 and FIG. 5 is a cross-sectional view along the line V—V of FIG. 4,

FIG. 6 is the same cross-sectional view as FIG. 5, wherein, however, the stepping plate and the cage are shown in a shifted position,

FIGS. 7 to 9 illustrate a further embodiment, wherein FIGS. 7 and 8 again are associated views and FIG. 9 illustrates the stepping plate in a shifted position,

FIGS. 10 and 11 are associated views of a still further embodiment, wherein FIG. 10 is a cross-sectional view along the line X—X of FIG. 11 and FIG. 11 is a cross-sectional view along the line XI—XI of FIG. 10,

FIG. 12 is an identical cross-sectional view as FIG. 10, however, with a shifted stepping plate and cage.

According to FIGS. 1 to 3, the stepping plate 1 is supported movably on the base plate 2 with the interpositioning of balls 3 which are arranged in a cage 4. A lever 5, 6 is mounted in its central portion for pivotal

relationship to the cage 4. Tongues 7, 8 are provided respectively on the ends of the lever arms, 5, 6, one tongue 7 extending thereby into a slotted hole 9 of the stepping plate 1 and the other tongue 8 extending into a slotted hole 10 of the base plate 2. If the stepping plate is moved, as shown in FIG. 3, the lever 5, 6 pivots and the cage of the illustrated arrangement covers automatically only half of the path which has been covered by the stepping plate 1.

According to FIGS. 4 to 6 both the stepping plate 11 and the cage 14 are provided pivotably about an axis 19 of the base plate 12. Rollers 13 are arranged in the cage 14, on which rollers the stepping plate 11 rolls during movement. The cage 14 carries a lever of which the lever arms 15, 16 are positioned respectively between two downward projections 17 from stepping plate 11 and two upward projections 18 from base plate 12. Therefore during a swinging of the stepping plate, as seen in FIG. 6, the cage 14 is always swung out only half as far as the stepping plate 11. This assures a perfect operation and the only friction occurring is the rolling friction of the friction-reducing parts, as the rollers 13.

The embodiment shown in FIGS. 7 to 9 is very similar to the first exemplary embodiment shown in FIGS. 1 to 3. The base plate, however, 22 here forms an arcuate guide so that the also accurate shaped stepping plate 21 and the cage 24 which holds the balls 23 provides for a movement along this thus formed arc. The lever 25 is supported pivotably in the base plate 22 and has two extensions 27, 28 of which the extension 27 engages a slotted hole 29 in the stepping plate 21 and the extension 28 engages a slotted hole 30 in the central portion of the cage 24. The relationship of the movement of the stepping plate to the cage is again precisely controlled by the lever guide so as to prevent an unintentional shifting of the cage.

As seen in FIGS. 10 to 12, the stepping plate 1 is again supported movably on the base plate 2 with the interpositioning of balls 3 which are arranged in a cage 4. A rotatable disk 5 is also supported in the cage 4, which disk, with its slotted holes 9, 10, effectively forms a lever. A pin-shaped projection 7 of the stepping plate 1 engages the slotted hole 9 and a pin-shaped projection 8 of the base plate 2 engages the slotted hole 10.

If the stepping plate is moved, as can be seen in FIG. 12, the disk 5 is rotated and the cage covers automatically, through the illustrated arrangement, only half of the path which the stepping plate 1 covers.

The invention is not limited to the illustrated exemplary embodiments. A number of further embodiments are possible which lie within the scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a sole support device positioned between an upper surface of a ski and a lower surface of the sole of a ski boot, said sole support device having a base plate secured to said ski and a sole engaging plate movable transversely relative thereto and means defining a bearing cage therebetween to reduce the friction between said relatively movable sole engaging plate and said base plate, the improvement comprising:

rigid lever means supported for movement in a horizontal plane and including pivotal coaction means

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for interconnecting said base plate, said bearing cage means and said sole engaging plate to effect a positive movement and correct alignment of said bearing cage means in response to a movement of said sole engaging plate, said bearing cage being movable in the same direction as said sole engaging plate and at one half the distance of said sole engaging plate when a relative movement occurs between said sole engaging plate, said bearing cage means and said base plate.

2. The improvement according to claim 1, wherein said rigid lever means is an elongated rigid lever; and

wherein said pivotal coaction means comprises first, second and third extensions on said rigid lever extending perpendicular to said horizontal plane;

wherein said base plate has means defining a first opening therein adapted to pivotably receive said first extension;

wherein said sole engaging plate has means defining a second opening therein adapted to pivotably receive said second extension;

wherein said bearing cage means has means defining a third opening therein adapted to pivotably receive said third extension, said third opening being positioned in the central portion of said bearing cage means.

3. The improvement according to claim 2, wherein said second and third openings are elongated slots adapted to slidably receive said second and third extensions therein to facilitate said relative movement between said sole engaging plate and said bearing cage means, said elongated slots being longitudinally aligned with the longitudinal axis of said ski when said sole engaging plate and said bearing cage are centered;

wherein said first opening is adapted to only pivotally engage said first extension; and

wherein said third extension is positioned intermediate said first and second extensions.

4. The improvement according to claim 3, wherein said rigid lever is pivotable relative to said bearing cage means about an axis corresponding to the axis of said third extension.

5. The improvement according to claim 2, wherein

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said first and second openings are elongated slots adapted to slidably receive said first and second extensions therein to facilitate said relative movement between said sole engaging plate and said bearing cage means;

wherein said third opening is adapted to only pivotally engage said third extension; and

wherein said third extension is positioned intermediate said first and second extensions.

6. The improvement according to claim 5, wherein said lever is pivotable relative to said bearing cage means about an axis corresponding to the axis of said third extension.

7. The improvement according to claim 1, wherein said base plate includes means defining a track; and wherein said sole engaging means includes guide means guided by said track means during said relative movement.

8. The improvement according to claim 7, wherein said track means is arcuate.

9. The improvement according to claim 1, wherein said rigid lever means comprises a circular shaped disk rotatably mounted on said bearing cage means and having a pair of slotted openings therein;

wherein said base plate and said sole engaging plate both include means defining an extension secured thereon, each being received in a respective one of said slotted openings, said disk being rotated to facilitate said relative movement.

10. The improvement according to claim 1, wherein said sole engaging plate is pivotally connected to said base plate for movement about a pivot axis and includes means defining a first pair of laterally spaced stops;

wherein said base plate includes means defining a second pair of laterally spaced stops spaced from said first pair of stops; and

wherein said lever means comprises an elongated lever pivotally secured to said bearing cage means and having opposite ends thereof being received between said first and second laterally spaced stops.

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