May 12, 1970 T. G. SMOLKA ET AL 3,511,516

SKI-BINDING

Filed April 12, 1968 2 Sheets-Sheet 1

FIG. 1

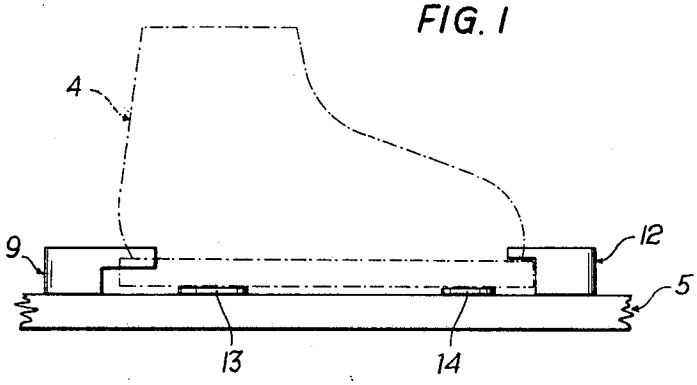

FIG. 2

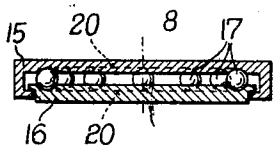

FIG. 4

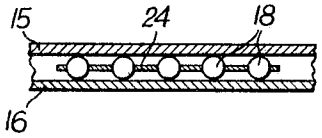

FIG. 3

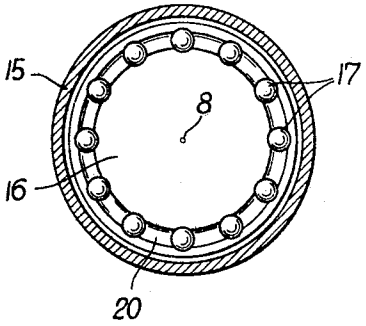

FIG. 5

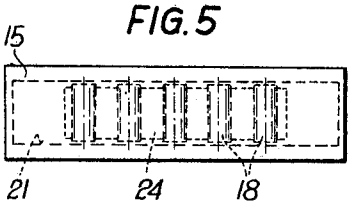

FIG. 6

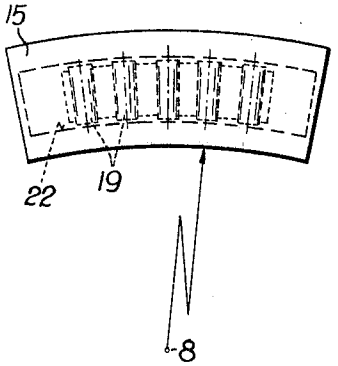

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FIG. 9

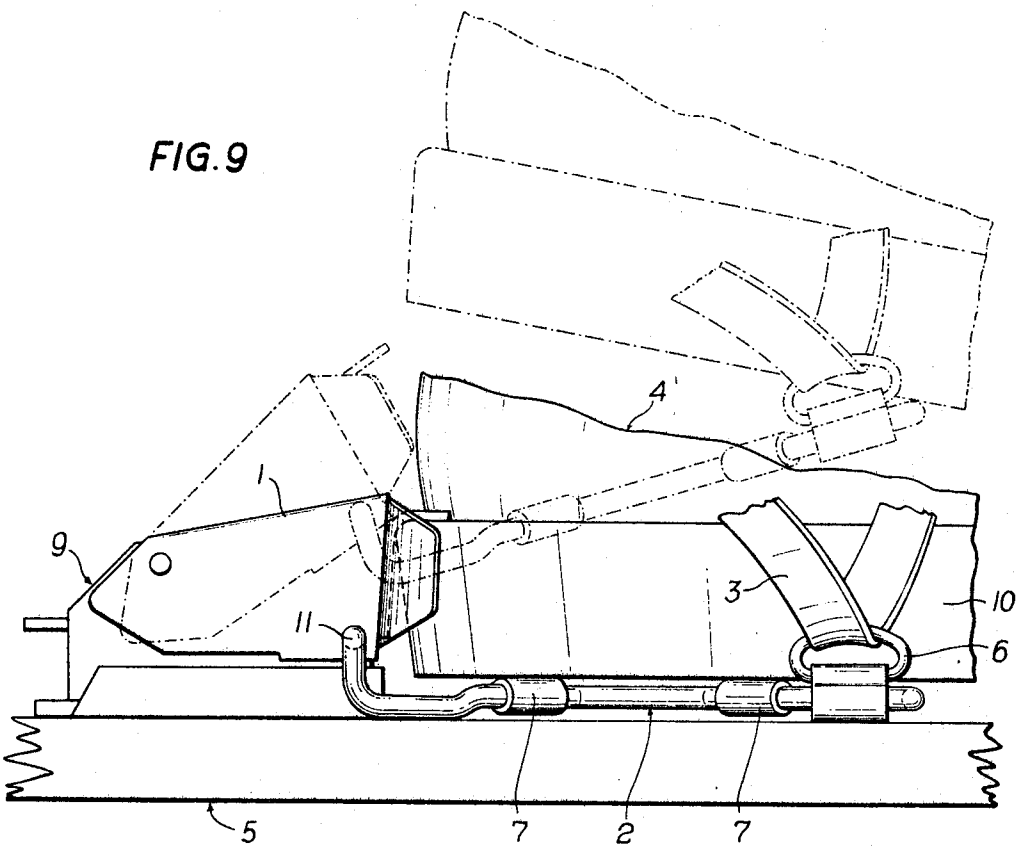


FIG. 7

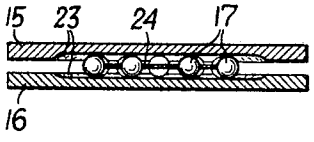


FIG. 8

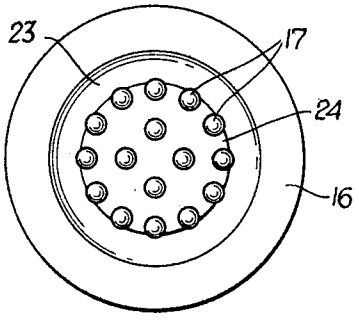
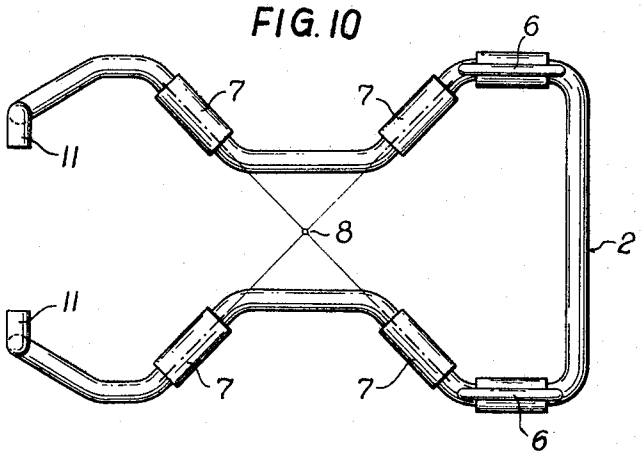


FIG. 10



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3,511,516

SKI-BINDING

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Claims priority, application Austria, Apr. 20, 1967, A 3,748/67
Int. Cl. A63c 9/081
U.S. Cl. 280—11.35 11 Claims

ABSTRACT OF THE DISCLOSURE

A safety ski binding in which the ski is released from the ski boot in response to development of predetermined pressures and initially turns in a plane substantially parallel to the plane of the boot sole and about an axis normal to these planes. Anti-friction means is interposed between the facing surfaces of the ski and the boot sole and facilitates turning movement of the ski about the aforementioned axis to reduce delays in the separation of the ski from the boot.

The invention refers to a ski binding (toe jaw, rear clamping means or the like) which assures a freedom of the ski boot in case of an over load. Said invention is characterized in that for releasing the ski boot there are provided movable parts which reduce the friction or maintain the friction constant, respectively, and which interact with the sole of the boot. The parts reducing the friction or maintaining same constant, respectively, can be provided on the ski or an a part of the binding.

In a special embodiment the parts reducing the friction or maintaining same constant, respectively, are sleeves which are movably mounted on a bent piece of material pivoted on the ski binding. Preferably the axes of the sleeves are arranged to lie radially with respect to one point.

Further the parts reducing the friction or maintaining same constant, respectively, can be provided in the form of thrust bearings which substantially comprise two plates which are movable relatively to each other; in use one of these plates lies against the sole of the boot. Between said plates there are provided balls, cylindrical rolls, conical rolls or the like.

In the drawing the object of the invention by way of example is shown in several embodiments, in which:

FIG. 1 is the holding of a ski boot on the ski;

FIGS. 2 and 3 are in corresponding projections cross sections of the part reducing the friction or maintaining same constant, respectively, according to the invention;

FIGS. 4 and 5 are a further embodiment in corresponding projections;

FIG. 6 is an embodiment similar to the FIGS. 4 and 5;

FIGS. 7 and 8 again are an embodiment in corresponding projections;

FIG. 9 is a side view of parts reducing the friction or maintaining same constant, respectively, arranged on a part of a ski binding; and

FIG. 10 is a plan view of the part reducing the friction or maintaining same constant, respectively, arranged on a part of the ski binding.

By FIG. 1 it is ascertained that the ski boot **4** with its sole **10** is secured to the ski **5** between parts of the binding, for instance a rear clamping means **9** and a toe jaw **12**. In case of a sudden twisting fall the boot **4**, with regard to the ski **5**, is turned out of the parts **9** and **12** of the ski binding. Depending on the manner in which the parts **9** and **12** of the binding are designed

the boot will be turned either around the top of the sole or around an axis in the area of the heel. In order to secure that the boot is freed safely, in accordance with the invention there are provided one or several parts **13**, **14** reducing the friction or maintaining same constant, respectively, between the ski boot and the ski or a part of the ski binding (as will be explained later on).

According to the construction of FIGS. 2 and 3 such a part reducing the friction or maintaining same constant, respectively, consists of two plates **15**, **16**, wherebetween balls **17** are arranged. The plate **16** is rigidly connected with the ski or a part of the ski binding; the plate **15** can be turned around the axis **8** with regard to the plate **16**; for a good sealing the plate **15** clasps the plate **16** from below. Both the plates have concentric ways **20** wherein the balls are rolling in case of said turning. The turning centre **8** is provided on the ski or on the binding, respectively, about in that area in which the boot is turned in case of safety freeing. Of course the balls can be surrounded by a cage, as is known per se.

In the embodiment according to the FIGS. 4 and 5 rolls **18** are provided which are arranged between the plates **15** and **16** in straight ways **21**. These rolls are separated from each other by a cage **24**. This embodiment will be arranged beneath the sole of the boot as far as possible distant from the turning axis of the boot in case of safety freeing.

In the embodiment according to FIG. 6 the ways **22** are segmentally shaped and concentric to a point **8**. This point is identical with the turning axis of the boot in case of safety freeing. Of course, in this embodiment the rolls must be conical as must be the ways **22** for the rolls **19**.

In the embodiments described it had to be considered where the turning axis of the boot was situated in case of safety freeing. In the constructions according to the FIGS. 7 and 8 the plates **15** and **16** each have a clearance **23**; in said clearance balls **17** are arranged separated by a cage **24**. The plate **15** can be displaced and turned with regard to the plate **16** in any direction in one plane.

Of course the constructions according to the FIGS. 4 to 8 are designed in such a manner that the inner sides of the plates **15** and **16** and thus also the balls **17** and the rolls **18**, **19** carried therein are protected from outside. Advantageously the plates **15** will clasp the plates **16** from beneath as shown in the FIGS. 2 and 3.

Said part reducing the friction or maintaining same constant do not need unconditionally to be fixed on the ski; they can be provided also on a part of the binding. A construction of this kind is shown in the FIGS. 9 and 10. According to FIG. 9 a rear clamping means **9** is arranged on the ski **5**; said means carries a clamping part **1** which interacts with the sole **10** of the boot. In FIG. 9 the position of normal use is shown in full lines. The heel and the back part of the sole, respectively, is secured to the ski **5** by the clamping part **1**. Between the sole **10** and the ski **5** is provided an extension **2** in the form of a bent piece of material which has a ring **6** on its front end. A holding or catching strap **3** is drawn through the ring **6** and is strung around the ski boot in a known manner. The bent piece **2** is pivoted to the clamping part **1** at **11**.

The rear clamping means **9** with its clamping part **1** is constructed in the manner of a safety binding. In case of an over load, for instance at a sudden fall in a forward direction the ski boot is lifted as shown by the dotted lines. Thus the ski boot **4** is freed from the binding; however, there is still the required connection through the bent piece **2** and the catching strap **3**. Elastic retracting forces are provided neither in the bent piece **2** nor in the catching strap **3**. Therefore it must not be

apprehended that the ski is thrown after by the effect of a spring after the fall. Anyway the ski is connected with the ski boot in such a manner that it cannot get away. Of course the bent piece is long enough as to allow the sole **10** to be freed of the clamping part **1** in case of safety freeing. Freeing is facilitated by the bent piece **2** being pivoted at **11**.

On the bent piece **2** four sleeves **7** are provided, rotatably. The axes of the sleeves **7** are arranged to cross in the point **11**. In case of safety freeing by the toe jaw (which is not shown) the boot is turned around the point **8**; said turning is facilitated by the parts **7** reducing the friction or maintaining same constant, respectively. If said part **7** reducing the friction or maintain same constant, respectively, are missing it can occur that the boot is not released in the right time and injuries can be caused.

The present invention is not limited to the illustrated embodiments. Of course, one of the constructions according to the FIGS. 2 to 8 could be arranged also on the bent piece **2** of FIG. 10 instead of the sleeves **10**. It is possible also to provide the sleeves **7** rotatably on the ski directly. In general it can be said that within the scope of the invention a plurality of constructive possibilities is available. For instance a pin bearing can be provided instead of the ball-bearing or the roller bearing. Two plates sliding one on the other and made of a friction-free material (for instance of Teflon) can be used, too. For the embodiments according to the FIGS. 4 to 8 advantageously elastic means will be provided, for instance springs, rubber bands or the like, which always will tend to maintain the individual parts in an intermediate position or to reset same after any movement, respectively. It is sufficient if the force of said elastic means will be low; said force must be as strong only as to safely reset the means or to retain same, respectively.

We claim:

1. In a safety ski binding of the type which releases the ski from the ski boot in response to development of predetermined pressures resulting from a fall or analogous occurrence, so that the ski may initially turn in a plane substantially parallel to the plane of the boot sole and about an axis normal to said planes, the improvement comprising a first plate member mounted on an upper face of said ski; a second plate member adapted to be contacted by the lower face of said boot sole and overlying said first plate member and being connected only to the same for turning movement relative thereto about an axis of rotation; and a plurality of anti-friction elements confined between and contacting only said plate members for rolling movement therebetween.

2. In a safety ski binding as defined in claim **1**, said anti-friction elements comprising a plurality of anti-friction bearing balls.

3. In a safety ski binding as defined in claim **1**, said anti-friction bearing elements comprising a plurality of anti-friction rolling elements.

4. In a safety ski binding as defined in claim **1**, said plate members having respective juxtaposed surfaces defining between each other ways in which said anti-friction elements are received and confined for rolling movement in response to relative turning of said plate members about said axis of rotation.

5. In a safety ski binding as defined in claim **4**, said ways being circular and concentric with said axis, and said anti-friction elements being bearing balls.

6. In a safety ski binding as defined in claim **4**, said ways being linear and said anti-friction elements being rolling elements of cylindrical configuration.

7. In a safety ski binding as defined in claim **4**, said ways comprising a plurality of arcuately curved segments concentric with said axis, and said anti-friction elements being rolling elements of conical configuration which taper in cross-section in direction towards said axis.

8. In a safety ski binding as defined in claim **1**, said plate members having respective juxtaposed surfaces defining between each other a substantially circular clearance, said anti-friction elements being bearing balls received in said clearance; and further comprising cage means also received in said clearance and separating said bearing balls from one another with freedom of individual turning movement in all directions in the general plane of said clearance.

9. In a safety ski binding of the type which includes a plurality of boot holding components and releases the ski boot in response to development of predetermined pressures resulting from a fall or analogous occurrence, so that the ski may initially turn in a plane substantially normal to the plane of the boot sole and about an axis normal to said planes, the improvement comprising a shaped rod element pivotally connected to one of said boot holding components and normally located between the lower face of the boot sole and the upper face of the ski, and means secured to and carried by said rod element for facilitating turning movement of the ski about said axis so as to reduce delays in the separation of the ski from the boot.

10. In a safety ski binding as defined in claim **9**, said means comprising a plurality of sleeve members mounted for free rotation on said rod element surrounding portions thereof and being located between and in contact with said faces.

11. In a safety ski binding as defined in claim **10**, said rod element comprising a plurality of mutually inclined sections having respective axes all of which converge in and extend radially of common point, and said sleeve members comprising at least a corresponding plurality of sleeve members each provided on and surrounding a portion of one of said sections and rotatable about an axis of rotation coincident with the axis of the respective section, so that the axes of rotation of the respective sleeve members also converge in said common point.

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