Oct. 6, 1970 R. LUSSER 3,532,352

SKI SAFETY HEEL BINDING

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FIG. 1

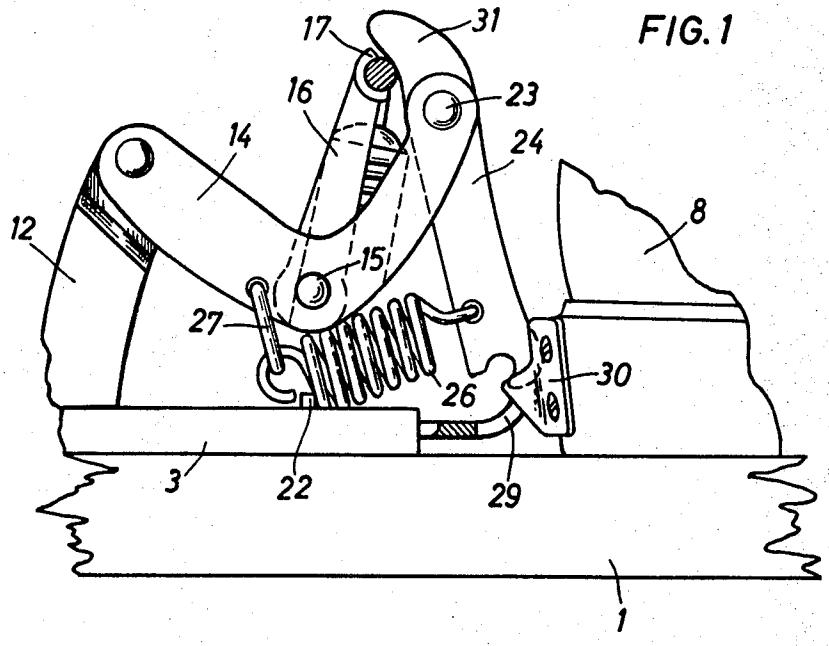

FIG. 2

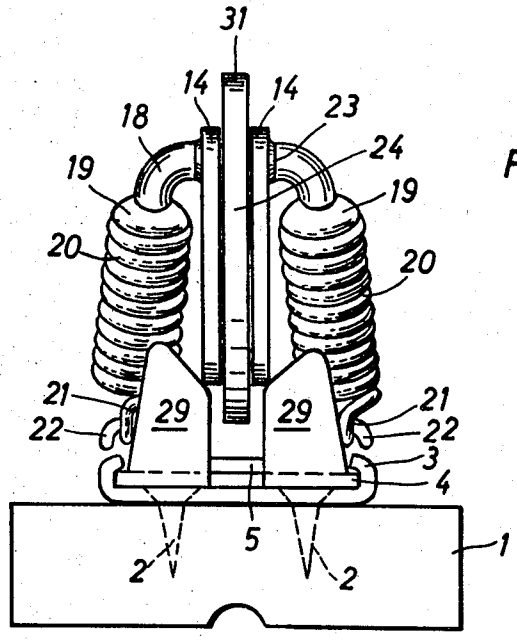

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FIG. 3

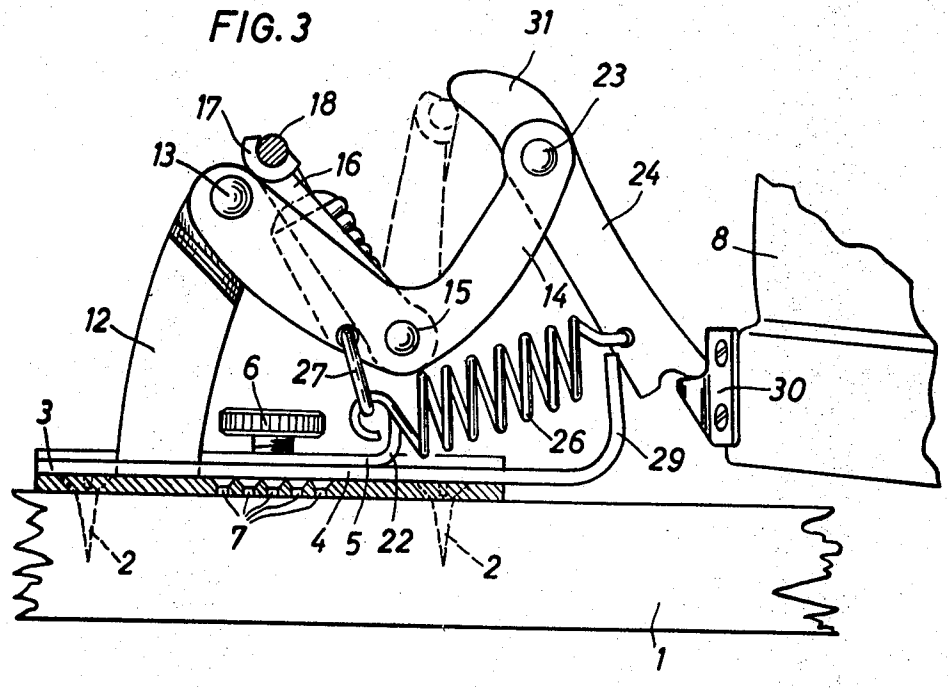
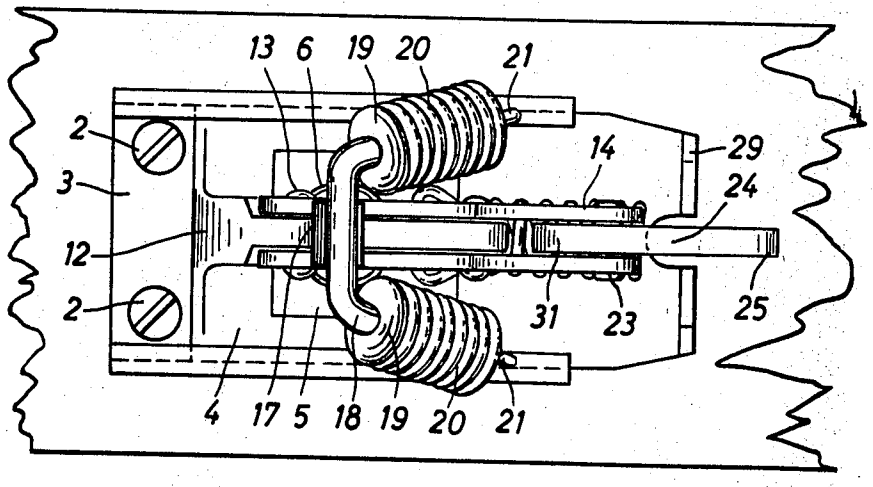


FIG. 4



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3,532,352

SKI SAFETY HEEL BINDING

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Int. Cl. A63c 9/84
U.S. Cl. 280—11.35 2 Claims

ABSTRACT OF THE DISCLOSURE

A ski safety heel binding has a guide lever swingably mounted on the ski in a perpendicular horizontal plane and a pressure element connected to the free end of the lever for movement in the same plane presses obliquely from the rear and above to the front and below on the ski boot's heel. A selection lever is pivotably attached to the guide lever in the above plane between two stops and spring means is secured to the section lever and the ski. The pivotal point of the selection lever lies between the connecting lines of the securing point of the spring and two end positions of its free end. The pressure element has a projection which extends beyond the free end of the guide lever and serves as a front stop for the selection lever.

The invention relates to a ski safety heel binding provided with a guide lever assemblage mounted for swinging or pivoting movement on the ski in a prependicular longitudinal plane, a pressure element on the free end of the assemblage which presses from the rear top portion to the front bottom portion on the heel of the ski boot, with such element being swingable or pivotable in the same plane, and receiving its pressure force from a spring anchored on the ski, which engages at the free end of a selection lever mounted swingably between two stops on the guide lever assemblage in the above-mentioned plane, and whose pivotal point lies between the connecting lines of the anchoring point of the spring with the two end positions of its free end.

A ski safety binding of this design is shown in German Pat. No. 1,182,993 of the applicant. In the case of such a heel binding, the heel of a ski boot which is supported forward by a support, for example, a safety jaw of a known design, is pressed by the pressure element of the heel binding firmly downward against the ski as long as the selection lever asumes its front end position provided for starting of the run. If, in the case of a forward fall of the skier, the force which is directed upwardly from the heel and transferred to the pressure element, exceeds a certain limit which corresponds to a still permissible load on the leg of the skier, the guide lever assemblage is swung upwardly counter to the effect of the spring anchored on the ski. At the same time, it carries along the selection lever and brings it into a position where its free end, engaged by the spring, lies on the connecting line between the anchoring point of the spring and the pivotal point of the selection lever. From this position, the selection lever will automatically jump into its rear end position under action of the above-mentioned spring, in which the force of the spring has only a very much lesser momentum in relation to the pivotal axis of the guide lever assemblage and, correspondingly, is able merely to produce a relatively small force of the pressure element, directed obliquely forwardly and downwardly, which is no longer dangerous for the leg of the skier. In the rear position of the selection lever, the heel of the ski boot therefore can be swung upwardly against

a relatively small resistance up to a point, until the pressure element assumes an essentially horizontal position in which it is easily released from the heel in the case of a fall and thus completely frees the ski boot. The rear position of the selection lever is also selected for ascent with climbing furs or skins and for the long distance run. The pressure element at the same time can be swung within a wide range upwardly against the effect of an additional spring, through which, according to applicant's German Pat. No. 1,204,984, it has been connected with the guide lever assemblage at a distance from its articulation point and vis-a-vis the arm, so that the heel of the ski boot can be sufficiently lifted from the ski.

In the case of the known binding of the described design, the front position of the selection lever is determined by a stop which has been developed on the guide lever assemblage per se. Hence, swings of the pressure element have no influence on the front end position of the selection lever. The additional spring in the normal downhill skiing position of the binding is without tension and will not be under stress even if the heel of the boot presses the pressure element together with the guide lever assemblage so far upwardly in the case of a normal forward fall, until the selection lever jumps from the front to the rear end position. It may be different when the forward fall is connected with a turning fall and the front binding releases the point of the boot prematurely. In the situation, the ski boot can escape in a forward direction so that the heel in is upwardly directed movement no longer describes an arc around the point of the boot, as in the case of a normal forward fall, but moves obliquely forwardly and upwardly. In such situation, it can happen that only the angular position of the pressure element in relation to the guide lever assemblage increases, while the latter is either not present at all or not pressed sufficiently upwardly to move the selection lever into its dead center position, from which it automatically jumps into its rear end position. Consequently, it is possible that the additional spring will be overstretched, and which spring per se is expected to act as a return spring for the pressure element only in the ascent position of the binding in which the selection lever assumes its rear end position.

In the case of the known binding of the design described, it is not yet completely out of the question that the jumping of the selection lever from the front to the rear end position will be impeded through icing.

It is the object of the invention to develop the described safety heel binding in such a manner that it will guarantee a timely release even under unfavorable circumstances of the type mentioned.

According to the invention, the side of a projection of a pressure element projecting beyond the free end of the guide lever assemblage serves as a front stop for the selection lever. In the case of an enlargement of the angle between the guide lever assemblage and the pressure element, the projection forces the selection lever from its front end position toward the rear in the direction of its dead center position. Whenever a swing of the guide lever assemblage directed upwardly is connected with an enlargement of the angle between the selection lever and the pressure element for the above-mentioned reason, the selection lever therefore reaches its dead center position even sooner than is the case with the above-described known heel binding. Hence, the danger of an overstretching of the spring connecting the pressure element with the guide lever assemblage is avoided. Such an overstretching can only occur if the selection lever does not jump into its rear end position. In the rear end position of the selection lever, the guide lever assemblage can swing so

far upwardly that the danger of an overstretching of the additional spring is impossible.

The projection according to the invention has the further advantage that even slight swings of the pressure element in relation to the guide lever assemblage as occur constantly in a downhill skiing due to the varying degree of the force transferred from the heel to the pressure element, are transferred to the selection lever in such a manner that the latter likewise executes slight angular movements in relation to the guide lever assemblage which, it is true, are hardly discernable, but which suffice to prevent the selection lever from freezing to the guide lever assemblage or if any freezing may have developed, to loosen the same.

In the case of a preferred embodiment of the invention, the projection in the case of the pressure element pointing forwardly, essentially in parallel to the ski, projects so far rearwardly that it will force the selection lever backwardly beyond the dead center position, in which its free end lies on the connecting line between the anchoring point of the spring and the pivotal point of the selection lever.

Further objects and advantages of the invention will become more readily apparent to persons skilled in the art from the following detailed description and annexed drawings of an exemplary embodiment, and in which drawings:

FIG. 1 is a side elevational view of a ski safety heel binding according to the invention in downhill skiing;

FIG. 2 is a front elevational view of the binding shown in FIG. 1;

FIG. 3 is a side elevational view of the same binding in the case of a fall under unfavorable conditions; and

FIG. 4 is a plan view of the binding illustrated in FIG. 3.

In the case of the embodiment, shown by way of example, of a ski safety binding with the characteristics of the invention, a guide plate **3** is attached to a ski **1** by screws or the like **2**. In the guide plate **3**, a base plate **4** is supported for sliding movement in the longitudinal direction of the ski **1**. A reinforcing plate **5** is soldered onto the upper side of the plate **4** and a perpendicular tap hole extends through the plates **5** and **4**. An adjusting screw **6** is positioned in the tap hole and the point thereof meshes with one of a plurality of conical indentations or recesses **7** in the guide plate **3** (FIG. 3) in order to hold the plate **4** firmly in a position which corresponds to the size of a ski boot **8** that is to be held fastly by the safety binding.

A bracket **12** is attached to the rear end of the base plate **4** and projects upwardly therefrom. A guide lever assemblage **14** is swingably or pivotally connected to the upper end of the bracket **12** by means of a hinge bolt or the like **13** in the perpendicular longitudinal plane of the ski **1**. The guide lever assemblage **14** is defined by two identically stamped metal parts of strong sheet metal, which extend at a distance in parallelism to one another essentially in a forward direction and which embrace the flattened upper end of the bracket **12** on both sides (FIG. 4). The assemblage arm **14** has a curvature directed downwardly and a selection lever **16**, which engages between the two parts of the assemblage **14**, is mounted swingably by a hinge bolt **15** at the lowest point of such curvature.

The selection lever **16** is provided with a jaw **17** at its upper end and the jaw extends in a transverse direction. The middle portion of a substantially U-shaped stirrup **18** is seated in the jaw **17**. A threaded plug **19** is screwed onto each end of the stirrup **18** and carries a spiral tension spring **20**. More specifically, a thread is provided on the outside periphery of each threaded plug adapted to the pitch of the spring **20**, and on to which the upper windings of the spring are threaded with a radial pre-stress. An eye **21** is located at the lower end of each spring **20** and engages a hook **22** which is bent upwardly and is a part of the reinforcing plate **5**.

The selection lever **16** together with the stirrup **18** and the springs **20** can be swung from the front end position shown in FIG. 1 into the rear end position illustrated in FIGS. 3 and 4. In the rear end position, the plane which contains the longitudinal axes of the springs **20**, and thus also the effective lines of the drawing forces of such springs, is at a distance behind the bolt **15**. In the front end position, the above-mentioned plane, on the other hand, lies in front of this hinge bolt **15**.

A pressure element **24** is swingingly connected at the front end of the guide lever assemblage **14** in the perpendicular longitudinal plane of the ski **1** by means of a hinge or pivot bolt **23**. In downhill skiing (FIG. 1), the pressure element **24** extends from the bolt **23** forwardly and downwardly and a hook **25** (FIG. 4) is provided at its lower end. An additional tension spring **26** at one end thereof engages the pressure element **24** between the hinge bolt **23** and the hook **25**. The other end of the spring **26** engages an eye **27**, consisting of a strong wire, and the eye is articulated to the assemblage **14** in the vicinity of the hinge bolt **15**.

The front end of the base plate **4** is bent or displaced upwardly and is developed as a fork provided with two prongs **29** open in an upward direction. In the case of the angular position of the assemblage **14**, as shown in FIG. 1, the pressure element **24** projects from the rear and above to the front and below into the interstice or gap between the two prongs **29**, and its hook **25** extends into a fitting **30** attached to the rear of the heel of the ski boot **8**. The fitting **30** is approximately the shape of a scoop.

The pressure element **24** has a projection **31** at the end remote from the hook **25**, and the projection points in a direction opposite to that of the hook and which, (FIG. 1) in downhill skiing, serves as a stop for the selection lever **16**. The projection **31** is efficacious for the following:

The changing stresses affecting the skier's leg during a downhill skiing result in the heel of the ski boot **8** frequently being ever so slightly raised from the ski **1** by a few millimeters, so that the heel fitting **30** presses the pressure element **24** and consequently the guide lever assemblage **14** slightly upwardly. In the case of this movement of the fitting **30** being directed substantially precisely upwardly, the acute angle between the pressure element **24** and the forward part of the assemblage **14** decreases, whereby the projection **31** yields slightly forwardly and thereby enables the selection lever **16** to also swing slightly forwardly under the effect of the springs **20**. In the case of a decreasing stress, the sole of the ski boot **8** is again pressed firmly against the ski **1** and at the same time the angle between the pressure element **24** and the guide lever assemblage **14** is again increased to the original degree, so that the projection **31** together with the selection lever **16** return to the original position shown in FIG. 1. Such movements which are constantly repeated during downhill skiing make it impossible in the case of a forward fall for the binding to be blocked because the selection lever **16** had been frozen solidly to the assemblage **14**.

When the ski boot **8**, in the case of a combined forward and pivoting fall, yields forwardly because of a premature opening of the front binding as shown in FIG. 3 without the guide lever assemblage **14** being pressed upwardly, then the projection **31** will assume that the selection lever **16** is forced backwardly and per force via its dead center position, shown in broken lines in FIG. 3, and jump into its end position, shown in solid lines. In this position in which the spring **20** exerts only a small torque directed downwardly on the assemblage **14**, the assemblage **14** upon the pressure element **24** being pulled forwardly can yield in an upward direction, so that the pressure element **24** is released from the heel fitting **30** before the additional spring **26** can be overstretched.

What is claimed is:

1. A safety heel binding for skies comprising a guide lever assemblage mounted for pivotal movement in a

perpendicular longitudinal plane on a ski, a pressure element connected to the free end of the guide lever assemblage for pivotal movement in the same plane, said pressure element pressing obliquely from the rear and above to the front and below on the heel of a ski boot, a selection lever pivotally mounted on the guide lever assemblage in the perpendicular longitudinal plane between two stops, spring means secured to the selection lever and anchored to the ski serving as a pressure force for the pressure element, the pivotal point of the selection lever lying between the connecting lines of the anchoring point of the spring means with two end positions of the free end of the selection lever, and a projection on the pressure element, said projection serving as a front stop for the extension lever and extending beyond the free end of the guide lever assemblage in such a manner that, in the event of an enlargement of the angle between the guide lever assemblage and the pressure element, the projection forces the selection lever from its front end position towards the rear in the direction of its dead center position in which the free end thereof lies on the connecting line between the anchoring point of the spring means and the pivotal point of the selection lever.

2. A safety heel binding for skis comprising a guide lever assemblage mounted for pivotal movement in a perpendicular longitudinal plane on a ski, a pressure element connected to the free end of the guide lever assemblage for pivotal movement in the same plane, said pressure element pressing obliquely from the rear and above to the front and below on the heel of a ski boot, a selection lever pivotally mounted on the guide lever assemblage in the perpendicular longitudinal plane between two stops, spring

means secured to the selection lever and anchored to the ski serving as a pressure force for the pressure element, the pivotal point of the selection lever lying between the connecting lines of the anchoring point of the spring means with two end positions of the free end of the selection lever, a projection on the pressure element, said projection serving as a front stop for the selection lever and extending beyond the free end of the guide lever assemblage in such a manner that, in the event of an enlargement of the angle between the guide lever assemblage and the pressure element, the projection forces the selection lever from its front end position towards the rear in the direction of its dead center position in which the free end thereof lies on the connecting line between the anchoring point of the spring means and the pivotal point of the selection lever, and said pressure element, when swung upwardly into a position in which it points forward substantially further than in its normal downhill skiing position, said projection extends sufficiently rearwardly to force the selection lever rearwardly beyond the dead center position.

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