

[54] **METAL BINDING FOR A HEEL OF SKI BOOTS**

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

[58] Field of Search ..... **280/11.35 T**

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[57] **ABSTRACT**

A metal binding for heel of ski boots which is characterized by having a fixed member which is fixed in such manner that its position can be freely adjusted through a screw engaging with screw thread provided on a base plate which is fixed on a ski bench, a crank mechanism holding frame which is connected to said fixed member through a spring in such manner as being freely slidable to the long way of ski bench and has at its both sides guide holes of almost triangle shape being consisted of an upper side, oblique side, and vertical side, a lever metal which is supported in a freely rotatable manner on said holding frame through an activating rotary axle, a connecting swing crank which is axially held in place on the holding frame by a second crank axle and has an arc shaped guide holes groove being matched with the above-mentioned guide holes at its portion, a pull-up arm metal which has its one end axially held in place in the swing crank and the other end being connected to the above-mentioned lever metal, a slide crank pin which is freely inserted into the above-mentioned guide holes and can be slid along said both guide holes further being always pressed to the heel direction of ski boots by the elastic power of the spring, and a lever metal releasing crank which is inserted in a freely slidable manner in a vertical hole provided in the above-mentioned lever metal and has its lower end supported by the above-mentioned slide crank pin.

**5 Claims, 9 Drawing Figures**

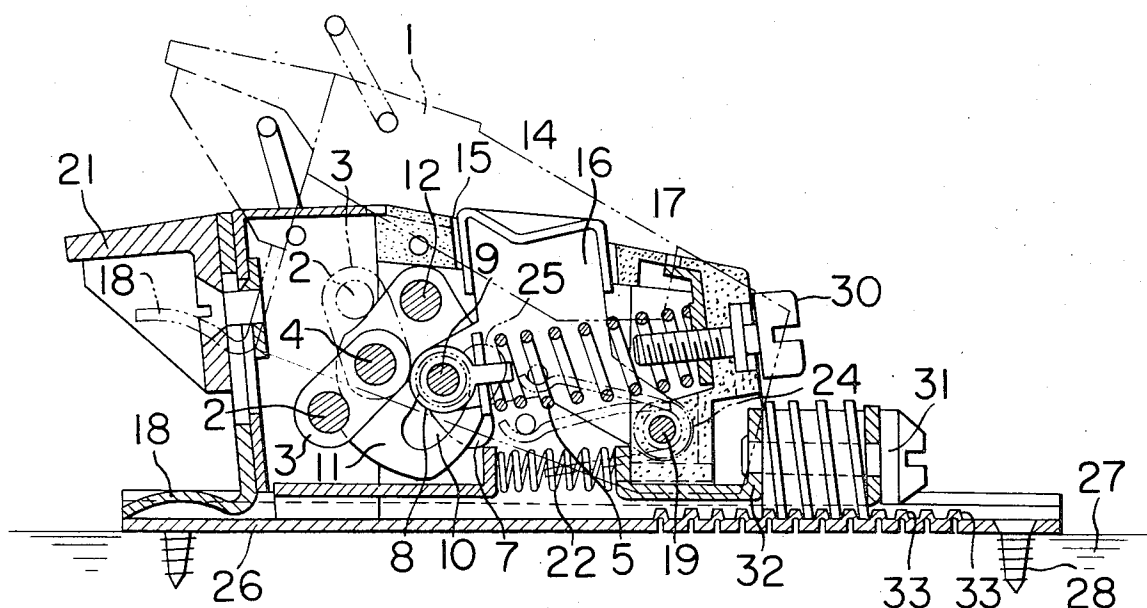


FIG. 1

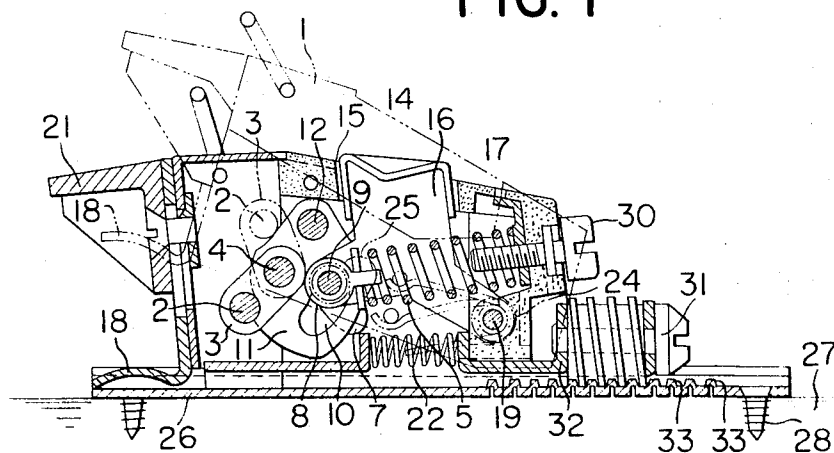
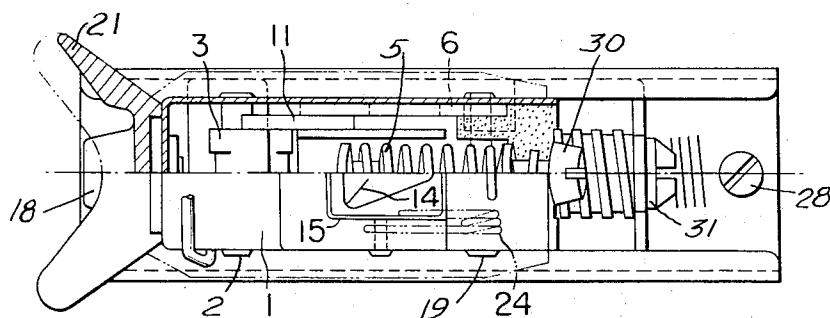


FIG. 2



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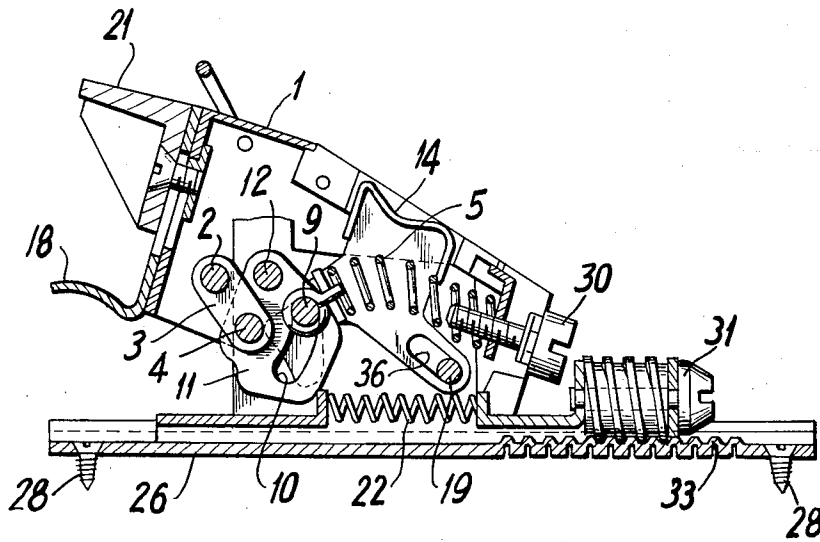


FIG. 1a

FIG. 3

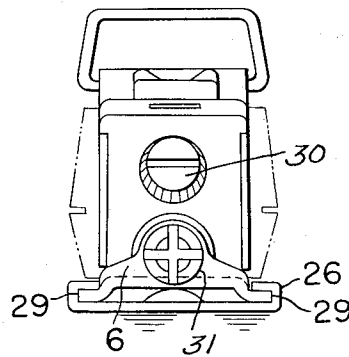


FIG. 4

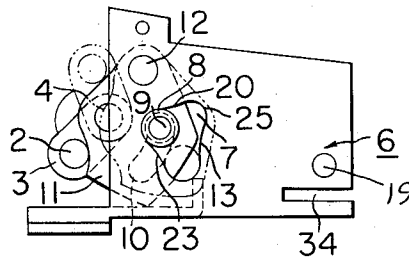
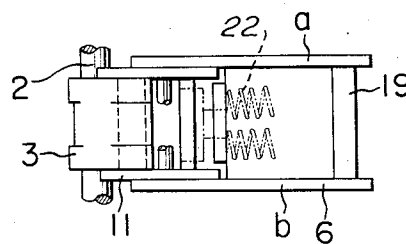


FIG. 5



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FIG. 6

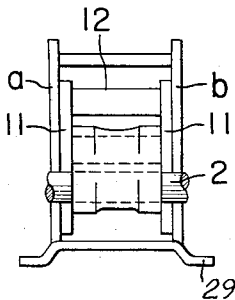


FIG. 7

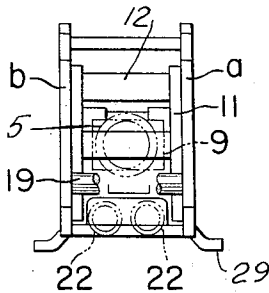
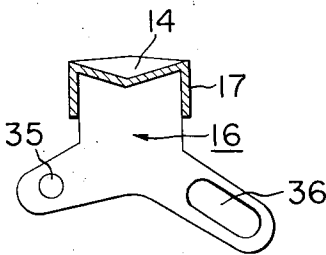


FIG. 8



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## METAL BINDING FOR A HEEL OF SKI BOOTS

The present invention pertains to a metal binding to hold ski boots to the bench of ski, and particularly pertains to an improvement of a metal binding for fixing heel portion of ski boots.

While such metal binding for heel of ski boots is desired that in sliding it secures the holding of ski boots to the bench of ski and at the same time upon finishing of sliding or when an extraordinary external force takes place said fixing power is easily released, the present invention is to provide a such unique metal binding for ski boots as meeting said requirements.

Now detailed explanation shall be made on an example of the present invention shown on the drawings.

Each of drawings shows an example of a metal binding for a heel of ski boots according to the present invention.

FIG. 1 is a side elevation showing an inside mechanism of the metal binding.

FIG. 1A is a side elevation similar to FIG. 1 but showing the parts in a releasing position.

FIG. 2 is a half sectioned plan of the same.

FIG. 3 is a rear elevation.

FIG. 4 is a side elevation of a crank mechanism.

FIG. 5 is a plan for the same.

FIG. 6 is a front elevation for the same.

FIG. 7 is a rear elevation of the same.

FIG. 8 is a side elevation of a release lever.

In the drawings, (26) is a base plate which is fixed to the bench (27) of ski with screws (28), and guide grooves (29) are provided at both sides of this base plate (26). (6) is a crank mechanism holding frame with a cross section of about II like shape having vertical walls (a)(b) at both sides and being held and inserted in said guide grooves (29) in such manner as being slidable along the groove (29). There is a through hole (7) perforated in each of the vertical walls (a)(b) at both sides of the crank mechanism holding frame (6). The hole (7) is of an almost triangle shape and consists of, as shown in FIG. 4, an upper side (20), an oblique side (23) and an almost vertical side (13). And a pair of connecting swing cranks (11) in each one of which an arc shape release guide groove (10) is perforated are axially fixed at both sides between the vertical walls (a) and (b) of the holding frame (6) by a second crank axle (12). Further, one end of a pull-up arm metal (3) is axially fixed between said pair of connecting swing cranks (11) by a first crank axle (4), and the other end of this pull-up arm metal (3) is axially fixed to a lever metal (1) through a crank connecting axle (2).

This lever metal (1) is further axially fixed at outer sides of said holding frame (6) by an activating rotatory axle (19). (9) is a slide crank pin which is inserted through guide holes (7) perforated at both sides of the holding frame (6) and through the guide groove (10) perforated in the connecting swing crank (11), and a spring (5) is provided between said crank pin (9) and the part where the lever metal (1) is installed, wherein the crank pin (9) is always pressed forward by elastic power of this spring (5). (30) is an adjusting screw to adjust the elasticity of the spring (5). (16) is a release crank which has an external wall (17) and a concave groove (14) at its top surface, and is inserted in a freely slidable manner in an almost vertical hole (15) provided in the lever metal (1), and this release crank (16)

has at its lower part a long hole (36) and an axle hole (35) as shown in FIG. 8. The above-mentioned activating rotatory axle (19) is freely supported in said long hole (36), while the axle hole (35) supports both ends of the sliding crank pin (9). (24) is an auxiliary spring for pushing up the lever metal (1). (18) and (21) are a step on tongue plate and a heel holding metal respectively attached to the front part of the lever metal (1).

(31) is a position adjusting screw which is axially attached to a fixed member (32). This position adjusting screw (31) engages with a screw thread (33) provided on the above-mentioned base plate (26), and the fixed member (32) can be shifted and adjusted to the long way of ski bench by rotating said screw (31). And this fixed member is freely inserted in a groove (34) provided in the above-mentioned holding frame (6), and said fixed member (32) and the holding frame (6) are elastically connected together by a spring (22), wherein the ski boots are held in place in a long way of ski by said elasticity.

While the metal binding for heel of ski boots of the present invention has the above-mentioned structure, next its function shall be explained. When the step on tongue plate (18) is activated by being stepped on to fix the ski boots from such released state as shown by chain lines in FIG. 1, the pull-up arm metal (3) which is connected to the lever metal (1) through the crank connecting axle (2) starts rotating downward from the position shown by the chain lines by the rotating movement of the lever metal (1) around the activating rotatory axle (19), and at the same time since the distance between the crank connecting axle (2) and the activating rotatory axle (19) is constant, the connecting swing crank (11) which is connected to the pull-up arm metal (3) by the first crank axle (4) starts rotation to counter-clockwise direction around the second crank axle (12), at the same time the slide crank pin (9), which has been held in place by the release guide groove (10) perforated in the connecting swing crank (11), slides against the compressive force of the spring (5) and along the upper side (20) shown in the drawing of the outside guide holes (7) perforated in the both walls of the crank mechanism holding frame (6) as said compressive force is always directed against the slide crank pin (9). When the rotating movement of the pull-up arm metal (3) passes over the dead point of the same against the compressive force of the spring (5), that is the maximum retreating point of the first crank axle (4), said compressive force is completely changed and becomes a rotating movement to rotate the lever metal (1) to counter-clockwise direction around the activating rotatory axle (19), and this rotating force is transmitted to the heel holding metal (21) to form the force to hold the heel of ski boots, then when the rotating movement of the lever metal (1) is finished taking the completely fixed state as shown by solid lines in FIG. 1, the connecting axle (2) which axially hold the pull-up arm metal (3) is positioned at its lowest point, and the slide crank pin (9) completes the piston movement by the elasticity of the spring (5) and is completely compressed to an end part (8) of the outside guide hole (7), thus the ski boots will be placed in such state as being pressed onto the ski bench with the maximum fixing power by the heel holding metal (21). In addition to this fixing force main parts of the metal binding for heel of ski boots including the all mechanism mentioned above retreat against the compressive force of

the retreating stress spring (22) shown in the drawing at the same time as the step-on action for fixing ski boots, and when fixed this pressure working to front direction by the retreating stress spring (22) works to press the ski boots against any given toe holding metal, thus multiplying said fixing force. In this metal binding for heel of ski boots according to the present invention fixing function of ski boots can be easily achieved by stepping on the step-on tongue plate (18), furthermore as a result of said step-on action, a complete fixing force can be given to the ski boots along with any given toe metal, thus a complete and safe fixing of ski boots can be achieved.

Then next, while sliding down with this ski if unexpected external force works on the heel of ski boots by falling down or any other unexpected accident and the heel holding metal (21) is pulled up by such force as being larger than the fixing force, said pull-up force is transmitted to the pull-up arm metal (3) through the lever metal (1), and then is transmitted to the slide crank pin (9) through the connecting swing crank (11). As a result when said external force working on the heel works with such big power as surpassing the pressure of the spring (5) which presses this slide crank pin (9) and pushing the pin (9) to rear direction, the lever metal (1) springs up to above (clockwise direction) around the axle (19) as a fulcrum, which in turn rotates the connecting swing crank (11) to counter-clockwise direction through the first crank axle (4), furthermore, the slide crank pin (9) held in the release guide groove (10) retreats against the compressive power of the spring (5), thus retreating along the upper side (20) of the outside guide hole (7) of the crank mechanism holding frame (6) until the pull-up arm metal (3) reaches its dead point against the compressive force of the spring (5).

The compressive force by the transposition of the spring (5), which is generated by the shifting of the slide crank pin (9) from its extreme front part (8) to a retreat rest groove (25) provided at the extreme retreat position controls the rotatory movement to upward direction of the pull-up arm metal (3), that is the rotating movement of the lever metal (1) around the activating rotatory fulcrum (19), thus eventually controlling the degree of release safety device of the metal binding for heel of ski boots according to the present invention. Thus the lever metal (1) which has been pulled up by such large external force as mentioned above makes the pull-up arm metal (3) which is connected thereto to function as the force to restrain the heel of ski boots until the arm (3) passes its dead point, then after passing the dead point it completely turns round and automatically releases the lever metal (1) and makes it jump up by the reversal of the working point of the compressive power of the spring (5) and the working direction. As a result the ski boots are released from hazardous external force and a skier is protected from injury on legs and other parts of body by said external force and his safety is secured, thus the function of the metal binding for the heel of ski boots of the present invention as a safety device to protect a skier is proved.

Next, when the metal binding for the heel of ski boots of the present invention needs to be freely removed after ski sliding, as shown in the drawing a releasing concave groove portion (14) provided on the release crank (16) is pressed down, then said release crank (16) is pushed downward as the external wall (17) of

the release concave groove (14) is inserted into a release sliding guide groove (15), furthermore, when said crank (16) is pushed down, its long hole (36) is guided by the activating rotatory axle (19) and the release crank (16) is shifted to the direction of (19), at the same time, the sliding crank pin (9) which is axially attached to the end of the crank (16) moves back to obliquely rear direction. The crank pin (9) at this time moves downward sliding along the release guide groove (10) perforated on the connecting swing crank (11), further, at the same time the crank pin (9) is slid downward along the oblique side (23) of the outside guide hole (7) provided at the crank mechanism holding frame (6), therefore the crank (11) rotates to counter clockwise direction around a fulcrum of the second crank axle (12). That is, as shown in the drawing by the combination of the release guide groove (10) and the oblique side (23) of the outside guide hole (7), as the slide crank pin (9) is shifted downward the connecting swing crank (11) is naturally pulled backward and is rotated around the second crank axle (12), pulling the first crank axle (4) also to rear, thereby the pull-up arm metal (3) which is connected thereto is placed in a horizontal position and is started to rotate to clockwise direction around the first crank axle (4), thus while the lever metal (1) rotates to upward direction around the activating rotatory axle (19) it generates releasing rotatory movement. Further, at the same time when the releasing action of the metal binding for heel of ski boots is continued to the dead point corresponding to the compressive force of the spring (5) it jumps upward by the action of the release spring (24) provided at the actuating rotatory axle (19) by the release action. At this time by the multiplied action of this release spring (24) the descending distance of the release crank (16) should be such distance that the magnitude of the cam efficiency being generated as being transmitted from the spring (5) which works to push the pull-up arm metal (3) downward becomes smaller than the force of the release spring (24), and as the descending distance decreases it helps to reduce the force given to the release crank (16) being required for its release action. Thus the metal binding for heel of ski boots according to the present invention can simply remove or attach the ski boots from/to ski in a completely free manner after sliding with ski or whenever rest is wanted by skier's own will by pressing the release concave groove (14) of the release crank (16), therefore it has excellent simplicity in use and practical advantage.

In addition to above the metal binding for heel of ski boots according to the present invention has, along with the above-mentioned advantage, such advantage as securing complete fixing action for sliding with ski by simple step on action and action of the safety device to protect human body from unexpected external injury which works instantaneously against hazardous external force, thus this metal binding has totally ideal function having great practical value.

Moreover, the fixing mechanism of metal binding according to the present invention can be shifted to the long way of ski bench by rotating the screw (31), thereby the position of said metal binding can be adjusted according to the size of ski boots to be fixed so that ski boots of any size can be surely fixed.

What is claimed is:

1. A ski boot heel binding device comprising a base plate fixedly mounted on a ski, a holding frame, means

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mounting said holding frame on said base plate for movement in the longitudinal direction of the ski, heel-engaging means pivotally mounted on said holding frame, said holding frame having means defining an opening, swing crank means pivotally mounted on said holding frame, a lever having one end portion pivotally mounted on said swing crank means and the other end portion pivotally mounted on said heel engaging means, means defining a groove in said swing crank means, said groove being generally aligned with said opening in said holding frame, a slide crank pin carried in and freely slidable along said aligned groove and opening, spring means biasing said slide crank pin in a direction towards the heel of the ski boot, whereby said spring means is operative to urge said heel engaging means in either one of two pivotal positions wherein in one position, the ski boot heel is engaged and in the other position the ski boot heel is released, and a release means mounted on said slide crank pin and operable to be manually actuated to pivot said heel engaging means from its heel engaging to its heel release position.

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2. A ski boot heel binding device according to claim 1 wherein said release means has two arms one of which is mounted on said slide crank pin and the other of which has an elongated slot, a pivot pin defining a pivot axis for said heel engaging means, said pivot pin being received in said elongated slot.

3. A ski boot heel binding device according to claim 1, wherein said heel engaging means has passage therein, said release means being slidably mounted in said passage.

4. A ski boot heel binding device according to claim 1 wherein said groove in said swing crank is in the form of an arc, said opening in said frame elements having a generally triangular configuration having an upper side, a generally vertically disposed side and an oblique side.

5. A ski boot heel binding device according to claim 1, wherein said means for mounting said holding frame on said base plate comprises a threaded element engaging mating threads provided on said base plate.

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