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SAFETY BINDINGS FOR RELEASABLY LOCKING THE HEELS OF SKI BOOTS

Filed Dec. 3, 1963

3 Sheets-Sheet 1

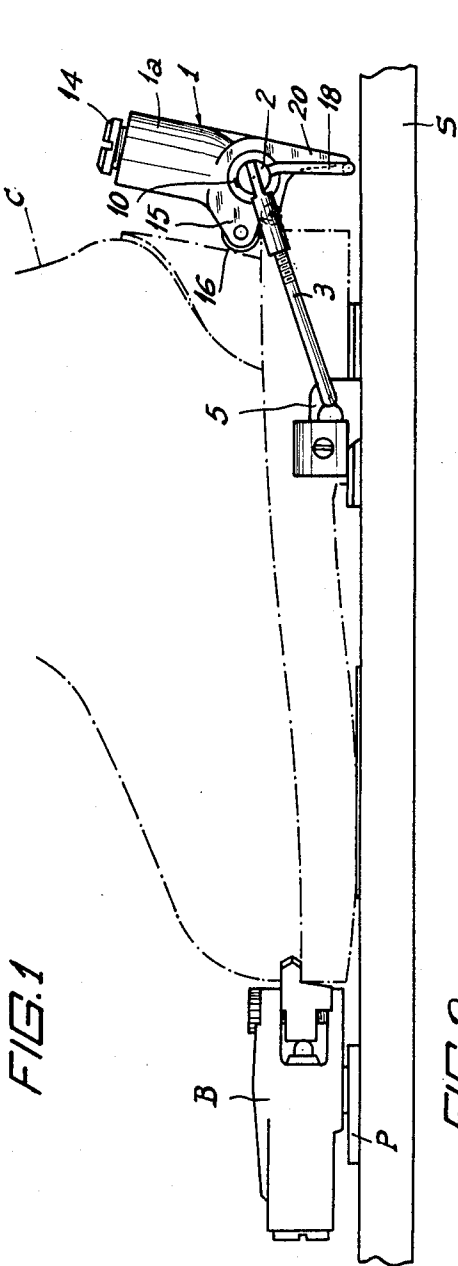


FIG. 1

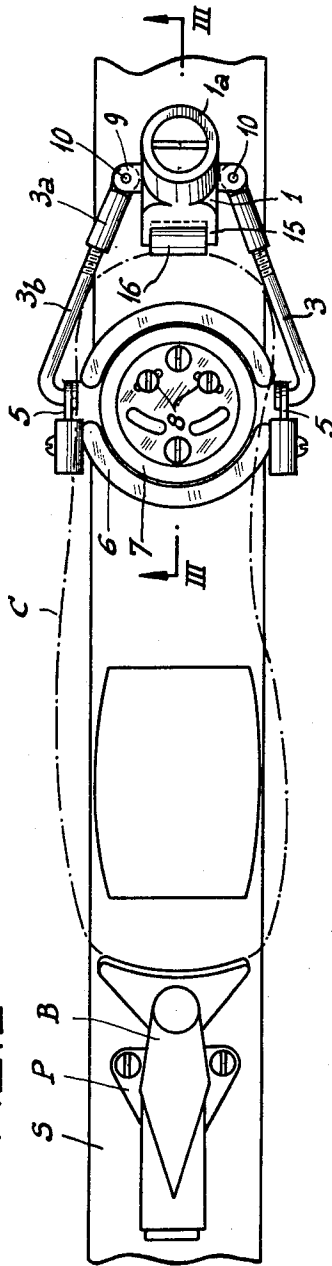


FIG. 2

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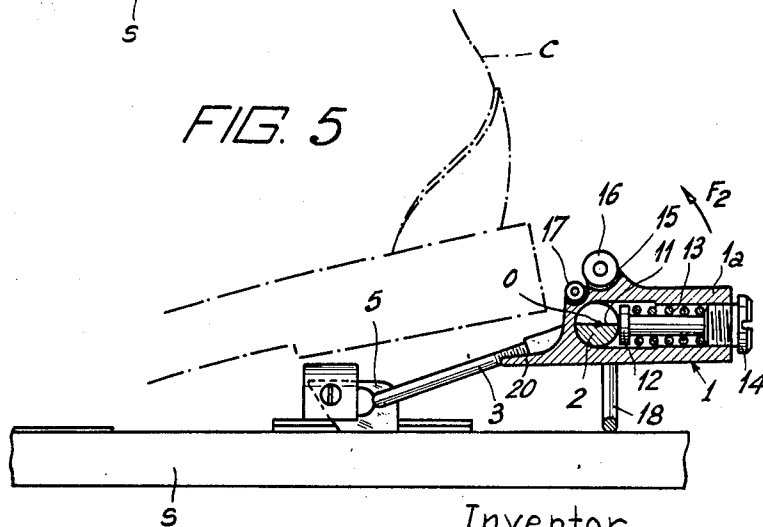
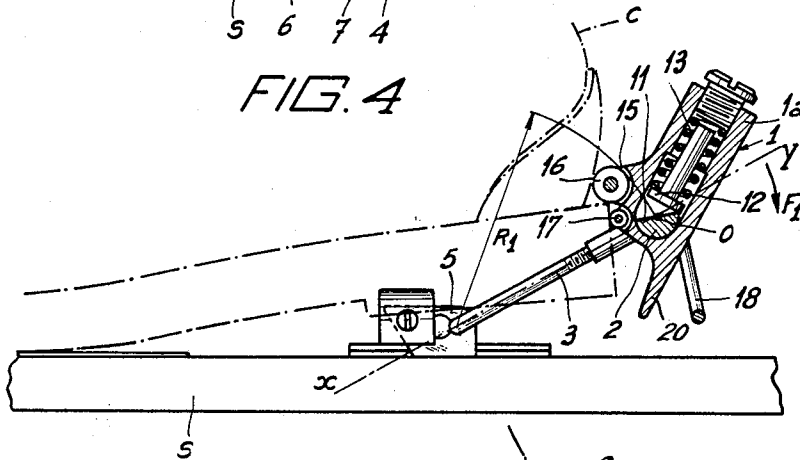
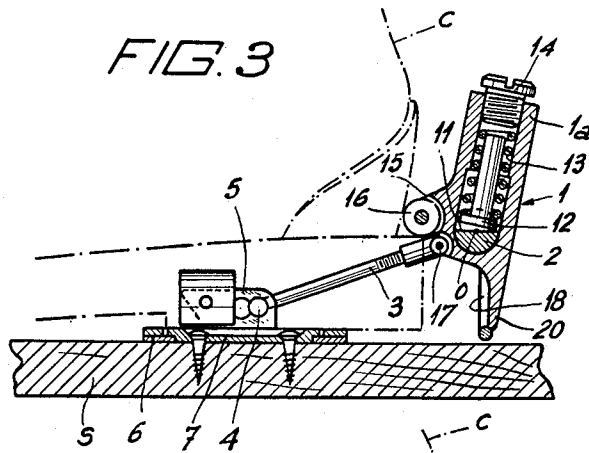
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3 Sheets-Sheet 3

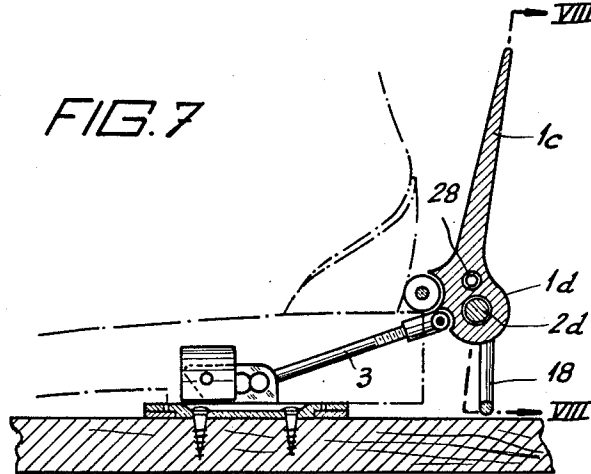
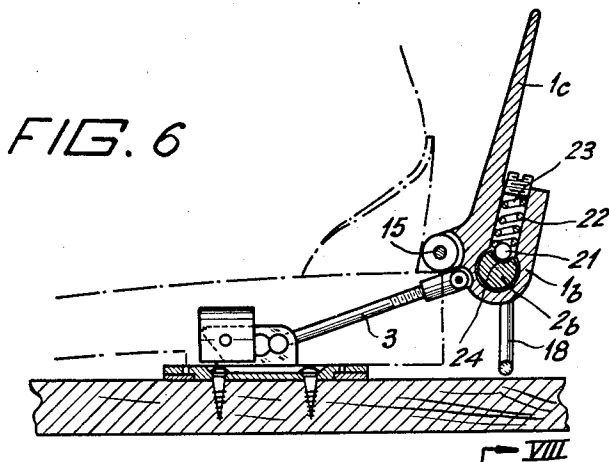


FIG. 8

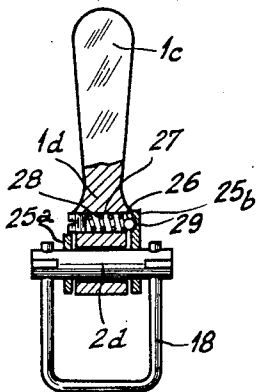


FIG. 9

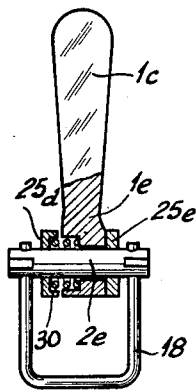
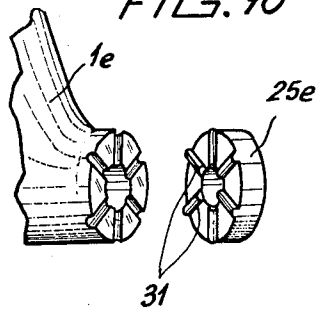


FIG. 10



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**SAFETY BINDINGS FOR RELEASABLY LOCKING THE HEELS OF SKI BOOTS**

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6 Claims. (Cl. 280—11.35)

This invention relates to ski bindings in general, notably of the heel-type to be mounted on a ski for releasably locking the heel of a ski boot while urging the boot forwards against a front binding for holding the toe end of the ski boot. More particularly, this invention relates to a ski binding of the type adapted automatically to release the heel of the ski boot if the skier falls, in order to avoid any abnormal and dangerous stretching of the skier's leg or foot.

The U.S. patent application, Ser. No. 271,143, filed by the same applicant on April 8, 1963, issued as Patent No. 3,173,701 on March 16, 1965, and entitled "Safety Bindings for Releasably Locking the Heels of Ski Boots," describes a ski binding of this character which consists of a pivoting retaining member rotatably mounted on a horizontal pivot pin disposed behind the boot heel and carrying on its front face means for gripping the boot sole, a spring mechanism acting upon this pivoting member to urge the same against the heel end of the boot. However, this spring mechanism is adapted to permit the rotation of said pivoting retaining member when a relatively strong effort is applied to the skier's leg, for example in case of forward fall of the skier, this rotation permitting the free fall and avoiding any risk of accident.

The device described in this preceding patent application comprises a base member constituting the carrier of the pivot pin of said pivoting member which lies behind the boot heel. This base member may be secured either directly on the ski or on a swivel plate or turntable carried by the ski under the heel position. But in either case the presence of this base member is objectionable due to its over-all dimensions. Moreover, when the base member is carried by a swivel plate or turntable a relatively long extension must be provided on this plate for supporting said base plate. Now it is obvious that this extension is liable to flexion or damage when it overhangs one or the other side of the ski as a consequence of the rotation of said swivel plate.

In view of the foregoing it is the primary object of this invention to provide a ski binding of the same character but wherein any fixed base member secured on the ski or any swivel plate is dispensed with. This invention also contemplates a substantial simplification in the construction of this ski binding and an improvement in its operation.

To this end, this invention provides a safety ski binding for releasably securing the heel of a ski boot which comprises a retaining member co-operating with one portion of the boot heel and adapted to pivot about a horizontal pivot pin carried by two lateral arms forming therewith a bow surrounding the boot heel, and having their front ends pivoted on horizontal pivots disposed on either side of the ski, a spring mechanism being interposed between said pivoting retaining member and the pivot pin thereof or a fixed accessory member solid with said pivot pin.

This spring mechanism may be of different types. Thus, it may consist of a spring-urged piston housed in an extension of said pivoting member, said piston reacting against a cam-forming flat face formed on said pivot pin of the retaining member. However, this spring mechanism may also be embodied in any other suitable re-

silient locking device interposed between said pivoting retaining member and the pivot pin thereof, or an accessory member solid with said pin.

A few typical forms of embodiment of the binding device of this invention are described hereinafter by way of example with reference to the accompanying drawing. In the drawing:

FIGURES 1 and 2 are a side elevational view and a plan view from above of a device constructed according to the teachings of this invention;

FIGURE 3 is a vertical section taken upon the line III—III of FIG. 2;

FIGURE 4 is a view similar to FIG. 3 but showing the component elements of the device during its operation, as the boot heel is being lifted off the ski;

FIGURE 5 is another view similar to FIG. 3 but showing the device in its retracted position for positioning a boot on the ski;

FIGURES 6 and 7 are views similar to FIG. 3, illustrating other forms of embodiment of the device;

FIGURE 8 is a section taken upon the line VIII—VIII of FIG. 7;

FIGURE 9 is a view similar to FIG. 8 showing another modified embodiment of the device of this invention, and

FIGURE 10 is a detail view showing the component elements incorporated in this last modified form of embodiment.

The heel-type ski binding according to this invention may be used in combination with a front ski binding adapted automatically to release the toe end of the ski boot when the latter tends to rotate under the influence of an abnormally strong torsional effort. This front ski binding may comprise an abutment B rotatably mounted on a vertical pin carried by a base plate P secured on the ski S. However, this front ski binding is not considered herein as being part of the invention and may be of any other similar or different type.

FIGURES 1 to 5 inclusive of the drawing illustrate a first form of embodiment of the ski binding of this invention. This device comprises a pivoting retaining member having its body 1 rotatably mounted about a horizontal pivot pin 2 extending transversely behind the space occupied by the boot C. According to the essential feature of this invention, this pivot pin 2 is carried by a pair of lateral arms 3 forming therewith a kind of bow surrounding the heel of the ski boot. The front ends of these arms are pivotally mounted about, or formed with, horizontal pins extending ahead of the member 1 and carried by a pair of vertical lugs secured on the ski or carried in turn by a swivel plate mounted on the ski under the position normally occupied by the ski boot.

Thus, in the example illustrated, the front end of each side arm 3 carries a pivot stud 4 engaging an aperture formed in a vertical lug 5 rigid with a swivel plate 6. This plate 6 is retained on the ski by a fixed annulus 7 secured in turn by means of screws 8.

Each arm 3 consists of two portions 3a, 3b screwed together to permit the longitudinal adjustment of these arms. The free end of the rear portion 3a of each arm is pivoted on a pin 10 in a strap 9 provided at either end of the aforesaid horizontal pin 2.

Due to their specific mounting the rear ends of the side arms prevent the horizontal pin 2 from rotating about its axis.

The front face of the pivoting retaining member 1 carries a retaining hook 15 adapted to engage the upper edge of the heel of boot C. This hook comprises preferably a rotary roller 16.

The present device comprises a spring mechanism normally urging the pivoting member 1 to a position such

that the nose or hook 15 thereof bears against the boot heel. This mechanism comprises a piston 12 slidably mounted in a cylindrical extension 1a of the body 1 which constitutes a kind of control lever. Surrounding the rod of piston 12 is a coil compression spring 13 reacting against a screw plug 14 closing the extension 1a and permitting the proper adjustment of the prestress of said spring. This spring 13 constantly urges the piston 12 into engagement with a flat face 11 formed on the pivot pin 2 of pivoting member 1. This flat face constitutes the seat of piston 12 and acts somewhat as a cam member.

The flat face 11 is so inclined that the registering flat end face of piston 12 forms a relatively small angle therewith when the pivoting retaining member 1 is in its normal boot-retaining or operative position, the retaining hook 15 engaging in this position the upper edge of the heel (see FIGS. 1 and 3). Thus, since the flat face of piston 12 does not engage fully the seat 11 the spring 13 continues to exert a thrust urging the hook 15 with a certain pressure against the upper edge of the heel. In this position, the two side arms 3 are inclined. The pressure exerted by the spring 13 produces a resultant force which has the twofold effect of urging the heel of the boot C against the ski surface and urging the boot proper forwards against the rotary stop member B.

It may be noted that in the normal locking position of the retaining member 1 (FIGS. 1 and 3) the hook 15 lies above the inclined plane formed by the lines x-y connecting the pivot pins 4 on the front end of arms 3 and the centre O of the horizontal pin 2. Thus, the boot is perfectly and safely locked on the ski by the retaining hook 15.

However, in case an upward tractive effort is exerted on the leg, the heel will tend to rise and to carry along the bow consisting of the side arms 3 and transverse pin 2. But since the radius of rotation R1 of the retaining member about the pins 4 is smaller than the radius of the pivotal movement accomplished by the boot about its toe end, this upward movement is compulsorily attended by a backward tilting movement of the retaining hook 15 against the pressure exerted by the spring 13 on piston 12. The body 1a of the retaining member is thus caused to pivot according to the arrow F1 about the pin 2 still held against motion in the side arms 3. The heel can thus move to the position shown in FIG. 4. In this position the retaining hook 15 remains in engagement with the upper edge of the heel of boot C.

Under these conditions, if the tractive effort is moderate the heel-retaining device of this invention restores the heel to its initial position when this effort is discontinued.

On the other hand, if the tractive effort exerted on the leg is considerable and persists, the heel continues its upward movement, thus causing the retaining member to continue likewise its backward tilting movement against the resistance of coil spring 13. During this movement, a boss or like projection 17 carried by the lower portion of body 1 engages the rear face of the heel. This boss or projection 17 may advantageously be provided with a rotary roller similar to the roller 16 of retaining hook 15. However, it may be noted that this boss is so disposed that it will engage the heel only when it is brought to a position in which it overlies the inclined plane formed by the lines x-y connecting the pivot pins 4 of side arms 3 and the centre O of the transverse pivot pin 2 (see FIG. 4). From this moment on, the retaining hook 15 is caused to move away from the boot due to the tilting movement of the pivoting member 1. This member 1 will subsequently bear against the rear portion of the boot by means of the aforesaid boss or projection 17 until it tilts backwards completely, so that the retaining hook 15 will be somewhat retracted. Then the heel can escape freely, thus releasing the boot completely.

In the normal position of the pivoting retaining member its cylindrical extension 1a is in a substantially upright

position behind the boot (see FIGS. 1 and 3). Thus the device has reduced over-all dimensions. However, this extension may also be used as a manual control lever for tilting the pivoting member backwards when the skier wishes to release the boot on purpose.

When fitting the boot on the ski, the same operation permits of tilting the retaining pivoting member backwards for somewhat retracting its retaining hook portion 15 to permit the passage of the heel. To facilitate this movement the transverse pin 2 carries a bearing member extending downwardly so that under these conditions it can rest on the ski to retain this pin during the tilting movement of body 1. This bearing member consists preferably of a small inverted bow 18 made of metal wire which may consist of extensions of the pins 10 on which the arms 3 are pivoted on the end of the transverse pin 2. The dimensions of this bow are such that it is somewhat spaced from the ski when the device is in its normal operative position (see FIGS. 1 and 3). However, as already stated, this bow engages the ski to retain the transverse pin 2 as the pivoting member 1 (see FIG. 5) is tilted completely backwards, when fitting the boot.

Preferably, the pivoting member 1 comprises at its lower end a lug 20 so disposed that when said member 1 is pivoted backwards for placing the boot on the ski this lug lies substantially horizontally above the surface normally occupied by the boot heel (see FIG. 5). Thus, when the skier lays his foot on the ski the heel strikes the lug 20 and causes the pivoting member to pivot in the direction of the arrow F2. Then the action of the elastic return mechanism consisting of the piston 12 and coil spring 13 will automatically restore the pivoting member 1 to its normal operative position.

Thus the boot C is bound very simply without resorting to any manual operation since the device is actuated by simply depressing the lug 20.

This device is characterized by many advantageous features in relation to hitherto known safety ski-boot heel bindings comprising a support-forming fixed base member. The essential features of this improved arrangement are listed herebelow:

(1) Due to its mounting on the pivoting bow consisting of the pair of lateral arms 3 and transverse pivot pin 2, the pivoting retaining member and its retaining nose or hook 15 follow a longer portion of the boot-heel upward movement when the heel is being lifted off the ski. In fact, in hitherto known heel bindings of this general character this movement was not quite followed by the device due to the fact that the pivoting retaining member was mounted on a fixed base member. The extension of this retaining action is obviously advantageous in that the heel of the skier's boot is not released too rapidly and may even be restored to its normal sking position if the tractive effort exerted on the skier's leg remains within reasonable limits. This feature is advantageous also in that it avoids the possibility of accidents due to leg stretching as well as any useless or untimely complete release of the ski boot.

(2) Due also to its mounting on the pivoting bow consisting of the side arms 3 and the transverse pin 2, the pivoting retaining member will urge the ski boot both downwards against the ski and forwards against the binding means provided on the other hand at the toe end of the boot, in the fashion of conventional heel binding systems also called "diagonal bindings." As will be readily understood, this arrangement greatly improves the holding of the boot against movement relative to the ski.

(3) Still by virtue of the specific mounting of the pivoting retaining member, the position of this member can be adjusted very easily to suit different heel thicknesses. In fact, this adjustment can be effected very easily by altering the length of the side arms 3. With this adjustment it is also possible to regulate the magnitude of the forward thrust applied to the boot by this device.

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(4) The stationary base member provided in the preceding bindings is dispensed with and this constitutes an advantageous feature for it simplifies greatly the assembly of this device which can be mounted on vertical lugs carried by a swivel plate, as in the form of embodiment illustrated, or if desired on lugs secured directly on the ski.

Of course, this device is not restricted to the specific form of embodiment described and illustrated herein by way of example. Thus, the retaining nose 15 could also be designed with a view to engage a bearing member secured on the boot in order to avoid any direct contact between this nose and the boot. This bearing member could consist if desired of a curved metal plate secured by means of screws or otherwise on the heel portion of the ski boot.

However, many other modifications and variations may also be contemplated in the practical embodiment of the invention.

As already set forth, the mechanism for resiliently locking the pivoting retaining member may differ from the structure illustrated, provided that in all cases this mechanism is interposed between said pivoting member and its pivot pin or an accessory member solid therewith.

Thus, FIG. 6 illustrates another form of embodiment wherein the pivoting retaining member 1b is also rotatably mounted on a horizontal pivot pin 2b carried by a pair of lateral pivoting arms 3 constituting a kind of bow therewith. However, the resilient locking mechanism comprises a ball 21 mounted in a bore 22 formed in the pivoting member 1b, said ball being urged by a spring 23 for engagement in a recess 24 formed in the pivot pin 2b when the pivoting member is in its operative position with the retaining nose 15 engaging the top edge of the boot heel. Thus, the boot is safely and firmly held against motion on the ski. Nevertheless, this arrangement permits the backward movement of the pivoting member 1b when an abnormally high traction effort is exerted on the skier's leg, in order to release the boot. The pivoting member 1b comprises an extension 1c having the only purpose of constituting a convenient handle or lever for manually releasing or operating the device.

FIG. 7 illustrates another form of embodiment of the device. In this case the pivoting retaining member 1d is mounted on a pivot pin 2d between a pair of fixed washers or flanges 25a and 25b solid with this pin. The pivot pin 2d is also carried by a pair of lateral arms 3 forming a kind of bow therewith. The resilient mechanism for locking the pivoting member 1d comprises a ball 26 disposed in a transverse bore 27 in the body of said member 1d and responsive to a compression spring 28. This ball 26 engages a positioning notch or recess 29 formed in the registering fixed washer or flange 25b when the pivoting member 1d is in its operative position with its retaining hook or nose 15 bearing against the top of the heel edge.

However, as in the preceding examples this pivoting mechanism permits the clockwise rotation and therefore the release of the pivoting member 1d (as seen in FIG. 7) in case of abnormal stretching effort applied to the skier's leg, thus releasing the ski boot from the ski.

FIGURES 9 and 10 illustrate a modified form of embodiment of the construction shown in FIG. 7. In this modified device the pivoting retaining member 1e is rotatably mounted on the horizontal pivot pin 2e between a pair of fixed washers or flanges 25d and 25e solid with said pin. This pivot pin 2e is also carried by a pair of pivoting lateral arms 3 constituting a kind of bow therewith. The mechanism for resiliently locking the pivoting member 1e comprises a compression spring 30 interposed between the washer or flange 25d and the body of member 1e, whereby this member 1e is resiliently urged against the opposite washer or flange 25e. This element 25e has formed on its registering face a plurality of radial ribs 31 engaging corresponding radial grooves

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formed in the registering side face of member 1e. This locking of member 1e takes place notably when the latter is in its operative position with its retaining hook or nose 15 engaged on the top of the heel edge.

However, this locking mechanism permits the backward tilting of member 1e to release the ski boot when an abnormally high stretching effort is applied to the skier's leg.

The devices constituting these various modified forms of embodiment of the present invention have the same essential advantageous features as the device shown in FIGS. 1 to 5 inclusive, due to the fact that each device is free of any fixed base plate and that the pivoting retaining member is pivotally mounted on a pivot pin carried by a pair of lateral pivoting arms constituting a kind of bow therewith. In any case, the resilient mechanism for locking or holding the pivoting retaining member may be designed differently.

What I claim is:

1. In a ski binding a safety fastening device for holding the heel end of a ski boot against motion, which comprises in combination two rigid lateral arms extending on either side of the ski-boot heel location; support means mounted on the ski and carrying horizontal pivot pins extending on either side of the boot and having pivoted thereon the front ends of said lateral arms, a pivot pin disposed behind the area occupied by the boot on the ski, parallel to the top face of the ski but extending transversely to the ski axis, said pivot pin being carried by the rear ends of said lateral arms forming therewith a bow surrounding the boot heel; a pivoting retaining member comprising a bore in which said horizontal pivot pin is engaged to constitute a bearing therefor; forwards of said pivoting member, means for gripping the rear end of the boot heel and retaining same on the ski surface when said pivoting retaining member is in its normal operative position, resilient locking means connecting said pivoting retaining member and said pivot pin therefor, said locking means comprising a spring and at least one locking member adapted to keep said pivoting retaining member in its normal operative position with its gripping means bearing on the top of the rear portion of the boot heel, said locking means being on the other hand adapted to permit the tilting of said pivoting retaining member backwards to free the boot heel when an abnormally strong upward tractive effort is exerted thereon.

2. Ski binding as set forth in claim 1, wherein the rear ends of said lateral arms are pivotally mounted in straps formed at the ends of said horizontal pivot pin of said pivoting retaining member, whereby the relative distance between said arms may be modified without causing said arms to interfere with the rotation of said horizontal pivot pin about its axis independently of said arms.

3. Ski binding as set forth in claim 1, wherein the bow consisting of said lateral arms and said pivot pin carried by said pivoting retaining member carries a bearing member extending downwards and adapted to bear on the ski for retaining said pivot pin during the manual backward tilting of said member when the user wishes to retract same for placing the boot on the ski.

4. Ski binding as set forth in claim 3, wherein said pivoting retaining member carries a lug extending downwards but disposed horizontally forwards when the pivoting member is tilted backwards, said lug being adapted to be depressed by the boot heel when the boot is being placed on the ski, thus causing said pivoting member to tilt forwards.

5. Ski binding as set forth in claim 1, wherein said pivoting retaining member comprises an extension constituting a manual control lever, said extension being erected behind the boot heel when said pivoting retaining member is in its normal operative position with its nose bearing on the edge of the boot heel.

6. Ski binding as set forth in claim 1, wherein said resilient means for locking said pivoting retaining member

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comprise a hollow extension provided on said pivoting retaining member, said extension projecting in a position to register with the axis of rotation of said member, a piston mounted in said extension, a spring acting upon said piston, a flat face formed on said pivot pin of said pivoting retaining member, said flat face being normally engaged by said piston and constituting a cam face therefor.

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10 BENJAMIN HERSH, *Primary Examiner*.  
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