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SAFETY SKI BINDER

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Fig.1

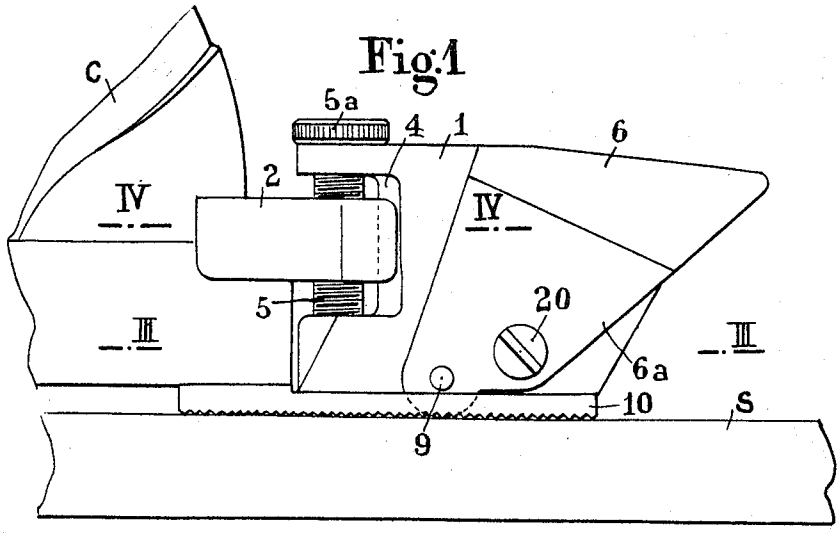

Fig. 2

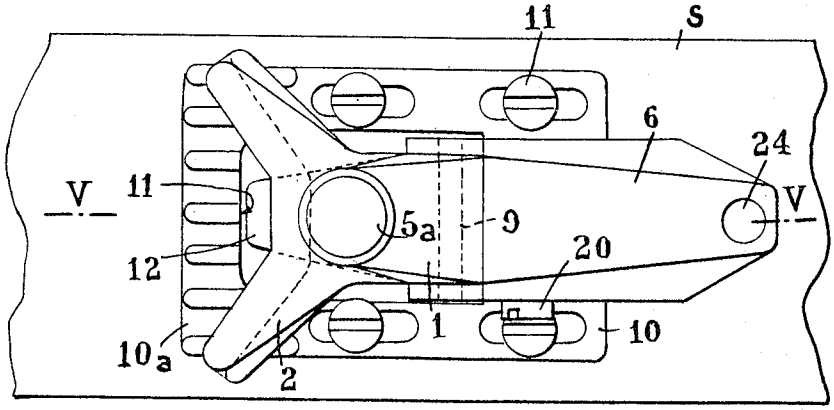

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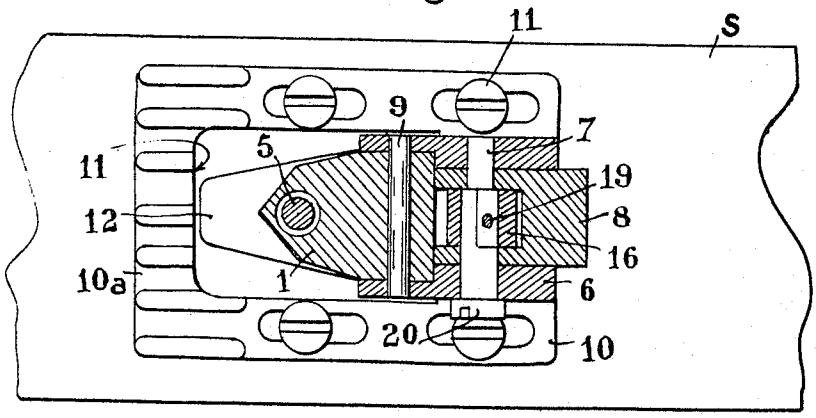
Fig. 3



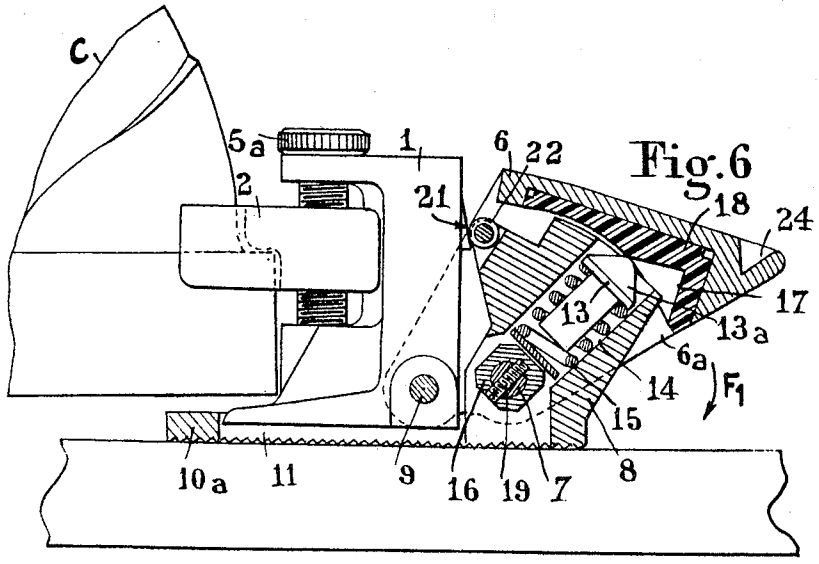


Fig. 6

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Fig.4

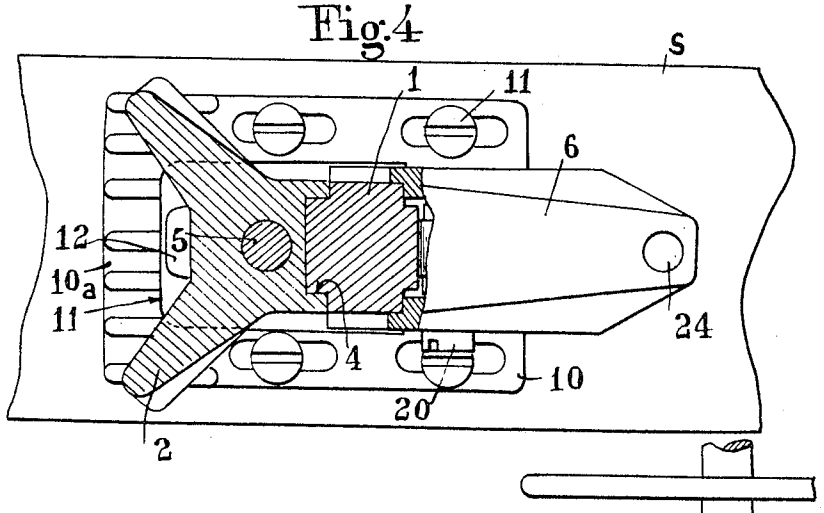

Fig.5

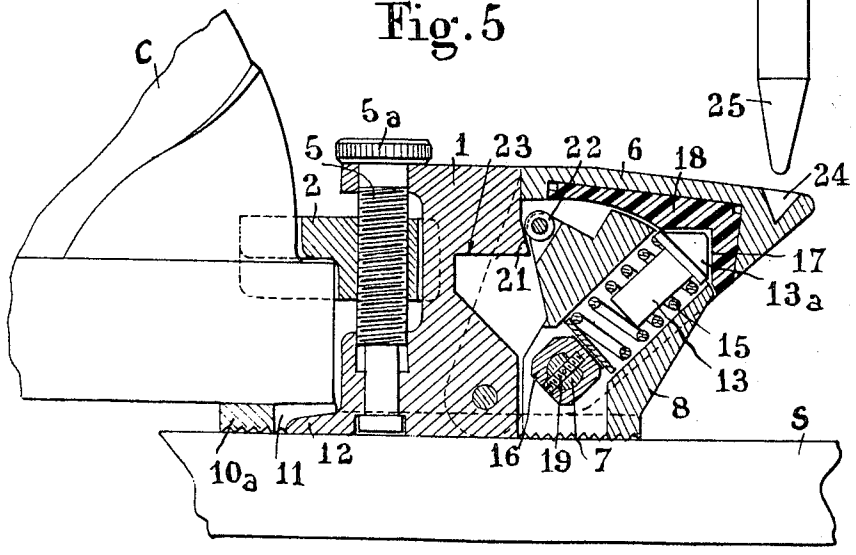

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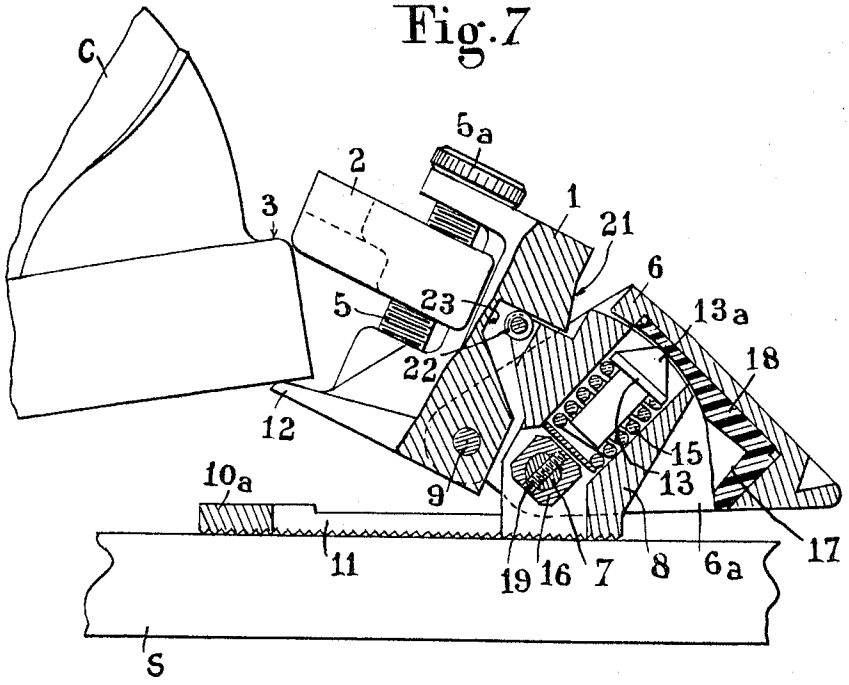
Fig.7



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3,436,089

SAFETY SKI BINDER

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Int. Cl. A63c 9/082
U.S. Cl. 280—11.35
6 Claims

ABSTRACT OF THE DISCLOSURE

A ski boot heel binding for a ski includes a base fastened to the ski. The base carries a first pivot pin upon which is pivoted a support member carrying a second pivot pin. A heel gripping member is pivoted on the second pivot pin. A spring-loaded piston normally urges the support member against the rear face of the heel gripping member to lock the ski boot heel.

This invention relates to the fastening devices provided on skis for holding the heel portion of the ski boot against motion by urging same against a toe retaining member or any other suitable hold-down means.

More particularly, this invention is concerned with a fastening device of the type set forth which is adapted automatically to release the heel portion of the ski boot in case of forward fall of the skier, thus safely protecting the skier's leg and foot from detrimental tension stress.

Many safety binding devices of this character have already been proposed. Among these, the most advantageous ones are those avoiding the use of a fastening cable surrounding the ski boot.

Thus, in a prior patent, 3,173,701, the applicant disclosed a ski binding comprising a heel hold-down device comprising a retaining member swingable about a horizontal axis in the form of a pivot pin carried by a base member disposed behind the boot heel, suitable resilient means constantly urging said retaining member against the top edge of the heel.

It is the object of the present invention to provide a device of this general type but comprising a number of improvements and specific features aiming more particularly at reducing the manufacturing cost of the device as well as its overall dimensions.

To this end, this invention provides a safety device for fastening the heel portion of a ski boot, which comprises a boot gripping member swingable on a support pivotally mounted in turn on a fixed base member, this safety device comprising a resilient mechanism for locking or detent-positioning said support in a position causing said gripping member to hold the boot against motion, this safety device being characterised in that said pivotally mounted support is of substantially strap configuration and straddles the fixed base member, and that the support locking mechanism comprises a piston or other-movable member slidably mounted in said base member and biased by a spring, said piston abutting or fitting into a seat provided therefor in said strap-shaped pivotally mounted support.

According to another feature characterising this device the piston or other movable locking member projects from an aperture formed in the top of said fixed base, and the seat provided for said piston or other member is located on the inner face of the upper wall of said strap-shaped pivoted support.

According to a further feature of the safety device the heel gripping member bears with its upper end against the front face of said fixed base and the two registering portions of these two members are formed with complementary cam faces or the like adapted to produce

a slight forward tilting movement of said gripping member at the beginning of any upward movement thereof, so as to cause said gripping member to follow somewhat the path of the heel portion of the ski boot.

Besides, the rear face of the heel gripping member comprises a central cavity engageable by the upper end of said base member when said gripping member has accomplished an upward movement of a predetermined amplitude, whereafter said gripping member can be tilted backwards.

These and other features and advantages of the safety ski binding device of this invention will appear as the following description proceeds with reference to the accompanying drawings illustrating diagrammatically by way of example a typical form of embodiment of this device.

In the drawings:

FIGURE 1 is a side elevational view of the safety device of this invention;

FIGURE 2 is a plan view from above thereof;

FIGURE 3 is a horizontal section taken upon the line III—III of FIGURE 1;

FIGURE 4 is a view partly from above and partly in section, the latter being taken upon the line IV—IV of FIGURE 1;

FIGURE 5 is a vertical section taken upon the line V—V of FIGURE 2;

FIGURES 6 and 7 are part-sectional and part-elevational views respectively, showing the component elements of the safety device during a partial lifting of the heel portion of the ski boot and after the complete release of the heel portion.

The device illustrated in the drawings comprises a member **1** adapted to hold the heel portion of a ski boot C against motion. To this end, this member carries at its front end a jaw **2** adapted to engage the heel of the ski boot by fitting on the top edge **3** thereof, as shown.

The rear end of this jaw **2** is slidably mounted on a vertical slideway **4** formed in the bottom of a strap consisting of the front face of member **1**. However, this jaw **2** is held against vertical motion by a screw **5** engaging a tapped hole formed in said jaw. The two ends of this screw are mounted for free rotation in the horizontal arms on the strap constituting the front portion of member **1**. The top end of screw **5** emerges above the member **1** and carries a knurled control knob or head **5***a* whereby the vertical position of jaw **2** can be adjusted with the desired accuracy.

The member **1** is pivotally connected to another member **6** constituting its support and this other member **6** is pivoted in turn about a horizontal pin **7** carried by a fixed base member **8**. The support **6** is substantially strap-shaped and covers the base member **8**, its lateral flanges **6***a* extending on either side thereof. The pivot pin **9** of the heel hold-down member **1** is carried by the lower portion of the front end of said lateral flanges **6***a*, ahead of the fixed base member **8**.

The fixed base member **8** is rigid with a fastening plate **10** secured to the top of the ski S by means of screws **11**. On the other hand, this fastening plate **10** comprises ahead of said base member **8** a relatively wide aperture **11** engaged by the lower portion of the heel-retaining member **1** when the device is in its normal position (see FIGURE 5). In this respect it will be noted that the front end of member **1** comprises at its lower portion a horizontal lug **12** extending beneath the rear end of the boot heel when the latter is held down by the device in its normal operative position. The function of this lug is to constitute a kind of pedal for controlling the device when fitting initially the boot, as will be explained more in detail presently.

The device according to this invention comprises a resilient mechanism for detent-positioning the support **6** of the heel retaining member **1** in its normal position.

This mechanism comprises a piston **13** slidably mounted in a bore **14** formed in the base member **8**. This bore opens at the top of this base member and its lower end communicates with an inner cavity of the base member through which the pivot pin **7** of support **6** is engaged.

The piston **13** is responsive to the action of a coil compression spring **15** reacting against a cam **16** carried by said pivot pin **7**. Thus, the spring **15** constantly urges the piston upwards so that its opposite end emerges above the base member **8**. This piston end **13***a* is advantageously of tapered or pointed configuration and when the support **6** is in its normal operative position said piston end engages a corespondingly shaped seat-forming cavity **17**. This cavity **17** is formed in a plastic or elastomer insert **18** fitting against, and secured to, the inner face of the top of support **6**. Thus, the piston **13** will safely hold the member **6** in the corresponding position shown in FIGURE 5.

The cam member **16** consists of a tubular socket or core of parallelipipedic shape and formed with an eccentric bore engaged by the pivot pin **7**. Thus, the flat outer faces of this socket have different relative spacings with respect to the axis of pivot pin **7**. Under these conditions, by properly selecting the socket face to be brought into engagement with the spring **15** a suitable value may be given to the initial compression thereof, for adjusting the resilient resistance of the detent mechanism holding the support **6** in its operative position.

To this end, the cam member **16** is made rotatably solid with pivot pin **7** for example by means of a cross-pin or screw **19**. On the other hand, one end of this pivot pin **7** may project externally from the support **6** and be formed with a control head **20** for rotating same and thus altering the adjustment position of cam **16**. In this respect, it will be noted that when this adjustment has thus been altered the cam as well as the pivot pin **7** are resiliently held in their selected position since the spring **15** bears against the corresponding cam face.

In its normal or operative position the heel hold-down member **1** bears with its upper end against the corresponding end of the front face of the fixed base member **8**. Under these conditions this heel hold-down member **1**, having its lower end pivoted to pivot pin **9**, is prevented from tilting backwards.

More particularly, the upper end of the rear face of member **1** consists of an inclined or cam face **21** engaging a rotary roller **22** carried by the upper end of the front face of base member **8**. The contour of this face **21** is such that during the initial portion of the lifting movement of member **1** the latter is slightly tilted forwards by rotating about the pivot pin **9** so that the path followed by the jaw **2** will correspond substantially to the path followed by the heel portion of the ski boot during its upward movement.

However, the rear face of member **1** comprises beneath the position of the inclined or cam face **21** a cavity **23** adapted to receive the upper end of the front face of base member **8** after the latter has accomplished a predetermined upward movement, to permit the subsequent backward tilting movement of said member **1**.

The device described hereinabove operates as follows: When the heel **3** of a ski boot C is normally held down the various component elements of the device are positioned as shown in FIGURES 1 to 5.

The heel retaining member **1** is resiliently held in the corresponding position due to the fact that its upper end bears against the roller **22** carried by the front face of base member **8** and that on the other hand this member **1** is prevented from moving upwards by the detent positioning of its support **6** by the corresponding mechanism. In fact, the tip **13***a* of piston **13** of this mechanism is then engaged in the seat-forming cavity **17**, thus preventing

the support **6** from rotating about its pivot pin **7** and notably its backward tilting in the direction of the arrow F_1.

However, if a relatively pronounced upward torque is applied to the heel portion of the ski boot, for example in case of forward fall of the skier, this torque will tend to lift the retaining member **1** and therefore to tilt its support **6** backwards. If this torque is sufficient the support **6** will tilt in the direction of the arrow F_1 about its pivot pin **7** against the action of the detent-positioning mechanism. In fact, in this case the inclined faces of the seat-forming cavity **17** will slide on the corresponding walls of the end **13***a* of piston **13** to force the latter back into the bore **14** of base member **8** (see FIGURE 6).

It should be noted more particularly that during the backward tilting of support **6** the heel retaining member **1** is caused to perform two successive and different movements:

In a first phase, this member **1** is raised but cannot tilt backwards for the cam face **21** formed on its rear end still engages the roller **22** of the fixed base member **8**. However, due to the inclination of this face **21** the member **1** will pivot slightly forward about the pivot pin **9** during its upward movement (see FIGURE 6). This causes the jaw **2** to move along a curved path corresponding substantially to that followed by the rear end of the boot heel. In fact, the rear end of the boot heel accomplishes in this case a substantially curved movement as the boot bends about a transverse axis located in the front portion of the boot, at a point underlying substantially the metatarsus of the foot.

Under these conditions, during this first movement the jaw **2** remains in engagement against the top edge **3** of the boot heel and follows the movement of this heel, thus preventing the jaw from exerting on this heel a pressure tending to tear it away from the sole and upper of the boot as observed in some of the hitherto known devices intended for holding down the heel portion of ski boots.

Then, during a second phase, when the member **1** has been lifted sufficiently to separate the cam face **21** from the roller **22**, this member **1** bears no more against the base member **8** at the rear end thereof, whereby it is caused to tilt backwards about the pivot pin **9**. On the other hand, this movement is made possible by the presence of the cavity **23** provided at the rear of member **1** which can then receive the upper end of base member **6**.

Due to the backward tilting of retaining member **1** the boot is released completely at its heel end and can be released from the ski, thus avoiding accidents likely to be caused by the holding down of the boot on the ski while the skier's leg and foot are subjected to considerable tension stress, for example in case of forward fall of the skier.

It may also be noted that when the actual release of the boot heel takes place the detent-positioning mechanism does not exert any resilient holding action upon the support **6** and the retaining member **1**. Under these conditions the retaining member **1** can tilt freely backward when the cam face **21***a* leaves the roller **22**. During the heel release movement this retaining member **1** will not exert on the heel any stress likely to tear or simply damage it.

Besides, the release takes place gradually, so that the skier is protected against being suddenly thrown forwards by a too premature release of his heel.

Finally, the member **1** moves to the position shown in FIGURE 7, its support **6** being tilted completely backwards. The end **13***a* of piston **13** will then simply abute the member **18**, beyond the location of the seat-forming recess **17**. The various component elements of the device of this invention may thus safely remain in this position until the skier wishes to restore the heel holding conditions by means of this device.

In this case, the skier simply places the toe end of the boot against the front or toe device of like means of the

ski binding, whereafter he exerts a pressure with the heel of the boot against the lug **12** of member **1** of the device of this invention, as illustrated in FIGURE 7. In this case the lug **12** will act somewhat as a control pedal for resetting the device. In fact, the pressure thus exerted on this lug will tend to restore the member **1** to its lower or operative position and during this movement the member **1** carries along its support **6**, whereby the later will pivot about the pivot pin **7** in the direction opposite to that shown by the arrow F_1, and eventually the various component elements of the device are restored to the positions illustrated in FIGURE 5.

When it is desired to voluntarily free the heel of the ski boot the only movement required consists in tilting the support **6** backwards, in the direction of the arrow F_1. Of course, this movement may be effected manually by the skier, but as it requires an awkawrd backward torsion and leaning deflection of the skier's body, a cavity **24** is provided in the top surface of support **6**, and thus the skier may engage the pointed tip **25** of one of his sticks into this cavity **24** and exert a downward pressure on the support **6** to tilt same backwards.

Due to its basic design, the resilient detent-positioning mechanism incorporated in this device affords slight lifting movements of the ski-boot heel during normal skiing, without any risk or releasing the boot therefrom. Under the same conditions, it permits upward heel movements of limited amplitude in case of sudden stoppages or even in case of minor forward falls.

In fact, in this case the tapered end **13***a* of piston **13** is slightly unseated from the relevant cavity **17**, thus permitting a slight backward tilting movement of the support **6** and, therefore, a limited upward movement of the retaining member **1**. However, this tapered end **13***a* of piston **13** remainst still engaged in said cavity **17**, the wall of this end **13***a* simply sliding along the wall of the cavity. When the torque tending to lift the boot heel is discontinued, the detent-positioning mechanism will automatically restore the support **6** and therefore the member **1** in their initial positions. In fact, the convex wall of the tapered end **13***a* of piston **13** and the corresponding concave wall of cavity **17** will then act somewhat like coacting return cam faces. It will be seen that during this heel lifting movement of limited amplitude the jaw **2** remains in contact with the top edge **3** of the boot heel (see FIGURE 6) according to the above-described first movement of the boot-retaining member **1**, so that the boot C cannot be released undesiredly in the occurrence of this limited upward movement of the heel.

As already explained in the foregoing, the initial compression of spring **15** may be adjusted by modifying the angular setting of cam **16**, by simply rotating the head **20** of pivot pin **7**. Thus, the skier is in a position to preset the elastic resistance of the mechanism to a partial or complete lifting of the boot retaining member **1**, notably as a function of the skier's weight and also of his technical skiing ability.

It will be readily apparent that the heel hold-down device of this invention is attended by many advantageous features in comparison with the various devices now being used for the same purpose.

It may also be noted that this device is particularly compact and of extremely reduced transverse dimensions, and that its manufacturing cost is particularly low due to its specific design and structure.

Of course, the device of this invention is not restricted to the single form of embodiment described hereinabove by way of example. Thus, the resilient detent-positioning mechanism may be designed differently, and the tapered-point piston **13** replaced by another movable member slidably mounted in the base member **8** and co-acting with seat-forming means provided on a tilting support **6**, without inasmuch departing from the spirit and scope of the invention.

Besides, the jaw **2** may be mounted in a different manner on the heel retaining member **1**. Alternately, this jaw may constitute an integral part of this heel retaining member.

What is claimed is:

1. A safety fastening device for releasably holding the heel portion of a boot on the top of a ski, this device comprising, in combination, a base member adapted to be secured to top surface of the ski, a pivot pin carried by said base member parallel to said top surface and across said ski, a strap-shaped member straddling said base member and pivoted to said pivot pin, means for gripping the heel portion of a ski boot which are carried by said strap-shaped member, means for resiliently locking said strap-shaped member on said base member in a position causing said heel gripping means to hold said heel portion down on the ski, said locking means comprising resilient means housed in said base member, a locking member slidably mounted in said base member and urged by said resilient means, said locking member projecting from said base member through an aperture formed on the upper position thereof, and a seat provided on said strap-shaped member and adapted to receive said locking member, said seat being formed in the inner face of the upper wall of said strap-shaped member.

2. A safety fastening device for releasably holding the heel portion of a boot on the top of a ski, this device comprising, in combination, a base member adapted to be secured to top surface of the ski, a pivot pin carried by said base member parallel to said top surface and across said ski, a gripping member for gripping the heel portion of a ski boot, and means for resiliently locking said gripping member on said base member in a position causing said gripping member to hold said heel portion down on the ski, said locking means comprising a locking support member slidably mounted on the upper face of said base member and pivoted to the pivot pin carried by said base member, a second pivot pin carried by said locking support member, resilient means housed in said base member, a locking piston slidably mounted in said base member and urged by said resilient means, said locking piston projectable from said base member through an aperture formed on the upper face thereof, and a seat provided in said locking support member adapted to receive said locking piston, wherein said heel gripping member is pivoted on said second pivot pin and wherein said locking piston in locking said gripping member is seated and positions said locking support member against the rear face of said gripping member.

3. A safety fastening device for releasably holding the heel portion of a boot on the top of a ski, this device comprising, in combination, a base member adapted to be secured to top surface of the ski, a pivot pin carried by said base member parallel to said top surface and across said ski, a strap-shaped member straddling said base member and pivoted to said pivot pin, means for gripping the heel portion of a ski boot which are carried by said strap-shaped member, means for resiliently locking said strap-shaped member on said base member in a position causing said heel gripping means to hold said heel portion down on the ski, said locking means comprising resilient means housed in said base member and urged by said resilient means, whereby said locking member normally emerges from said base member, and a seat provided on said strap-shaped member and adapted to receive said locking member, wherein said resilient means urging said movable locking member consist of a coil compression spring reacting against a cam member secured to the pivot pin carried by said fixed base member and on which said strap-shaped member is pivotally mounted.

4. A safety fastening device for releasably holding

the heel portion of a boot on the top of a ski, this device comprising, in combination, a base member adapted to be secured to top surface of the ski, a pivot pin carried by said base member parallel to said top surface and across said ski, a strap-shaped member straddling said base member and pivoted to said pivot pin, means for gripping the heel portion of a ski boot which are carried by said strap-shaped member, means for resiliently locking said strap-shaped member on said base member in a position causing said heel gripping means to hold said heel portion down on the ski, said locking means comprising resilient means housed in said base member, a locking member slidably mounted in said base member and urged by said resilient means, whereby said locking member normally emerges from said base member, and a seat provided on said strap-shaped member and adapted to receive said locking member, wherein said strap-shaped member comprises a pair of lateral flanges extending on either side of said base member, and another pivot pin parallel to said pivot pin of said member, said other pivot pin being carried by the lower end of the front portion of said lateral flanges, ahead of said fixed base member, said means for gripping the heel portion of a ski boot being mounted on said strap-shaped member by means of a member constituting a support for said

gripping means, said support member being pivotally mounted on said other pivot pin carried by said lateral flanges of said strap-shaped member.

5. A safety device as set forth in claim 4, wherein said member supporting said means for gripping the heel portion of a boot bears with its upper end against the front face of said base member, and one of the mutually engaging portions of said support member and base member comprises a cam face adapted to cause a slight forward tilting movement of said support during the initial portion of the heel lifting movement.

6. A safety device as set forth in claim 4, wherein the rear face of said member supporting said means for gripping the heel portion of a boot comprises a cavity adapted to receive the upper end portion of said base member after an upward movement of a predetermined amplitude of said member, whereby said member can tilt backwards.

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