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Salomon

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[54] **SAFETY FIXING DEVICE FOR SKI BOOTS**

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[51] **Int. Cl.²** **A63C 9/08**

[58] **Field of Search** .....280/11.35 E, 11.35 Y, 280/11.35 K, 11.35 R, 11.35 D, 280/11.35 A

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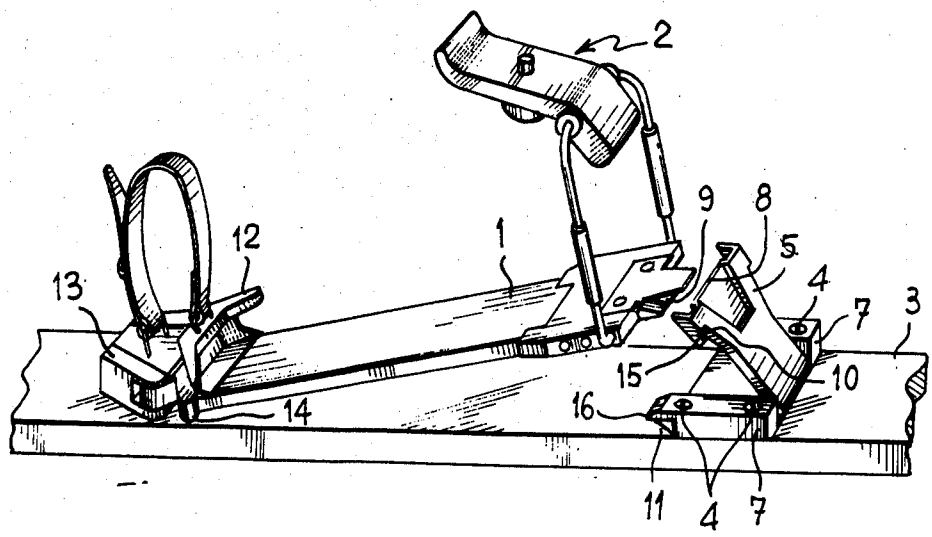
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Assistant Examiner—Sherman D. Basinger

[57] **ABSTRACT**

The device comprises a bridge member formed in two portions, a first portion fixed with respect to the ski and a second mobile portion articulated with respect to the first portion; the second mobile portion co-operates with a member fixed to one extremity of the boot by a first system of ramps, one of which is fixed to the second portion while the other is fixed to the boot, and with the first portion fixed to the ski by at least one second system of ramps, one of which is fixed to the second portion and the other to the first portion. A first spring system of a holding device is located at the other extremity of the boot and urges the second portion downwards towards the ski by the effect of the ramps; at least one of each system of ramps is inclined so as to form an acute angle with the ski, the acute angle being open towards the holding member of the other extremity of said boot. The invention solves the problem of putting on skis when the skier's boot soles have collected considerable quantities of packed snow and permits the safety release action to operate under these conditions.

10 Claims, 6 Drawing Figures



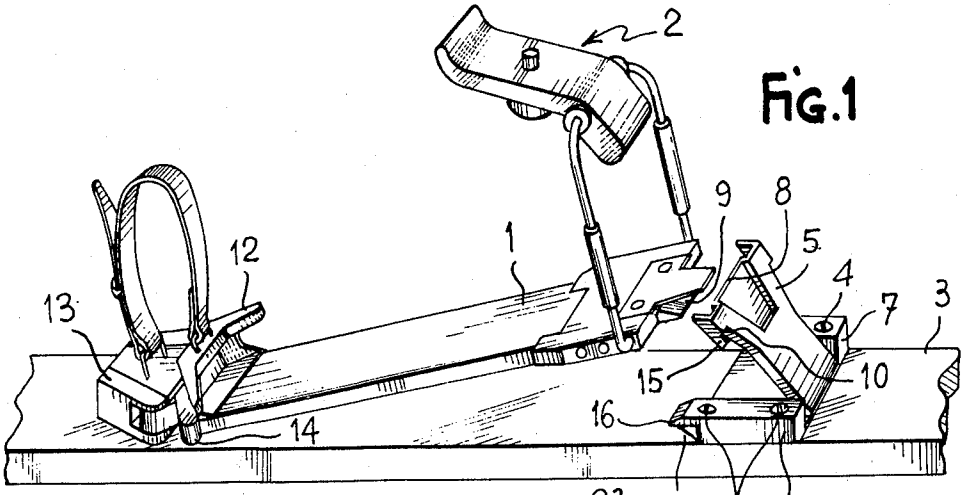


Fig.1

Fig.2

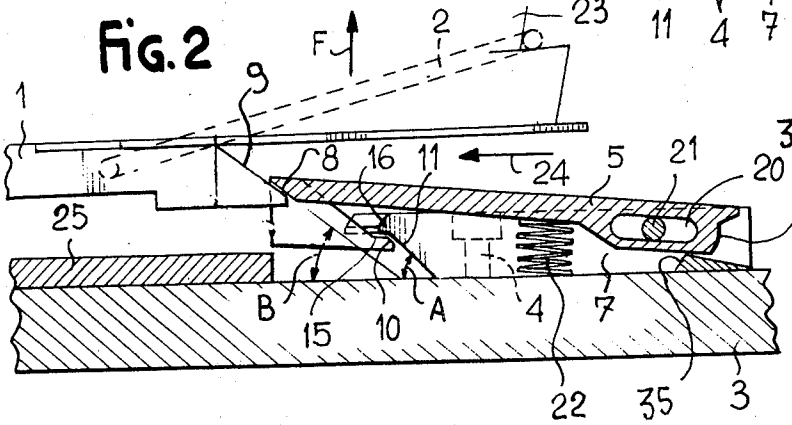


Fig.2a

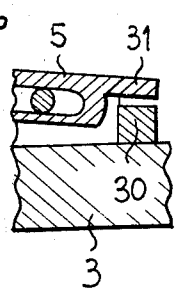


Fig.3

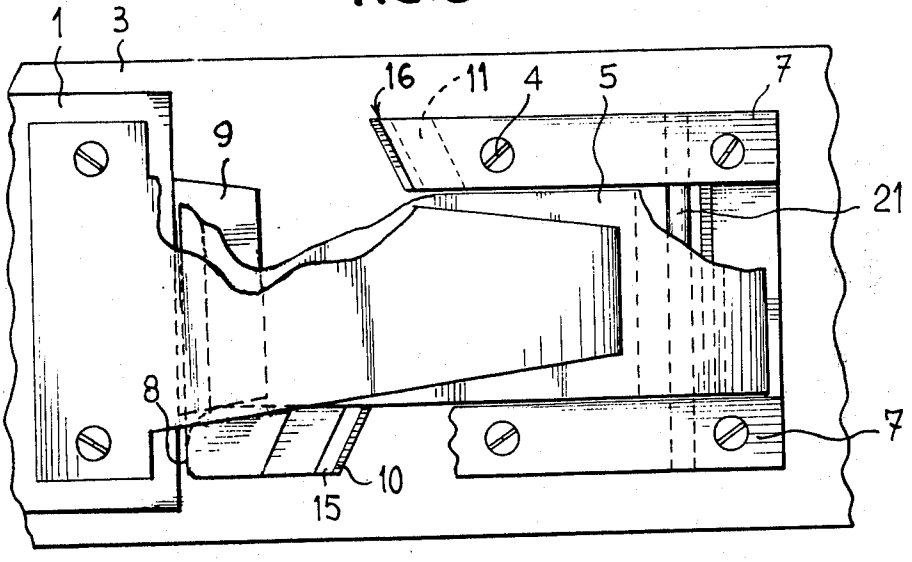
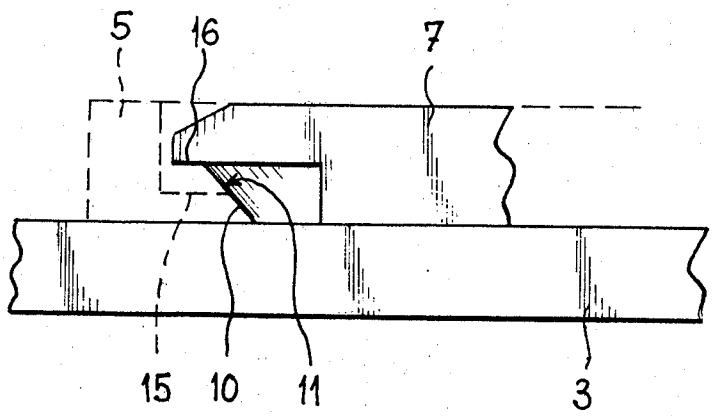


FIG.1a



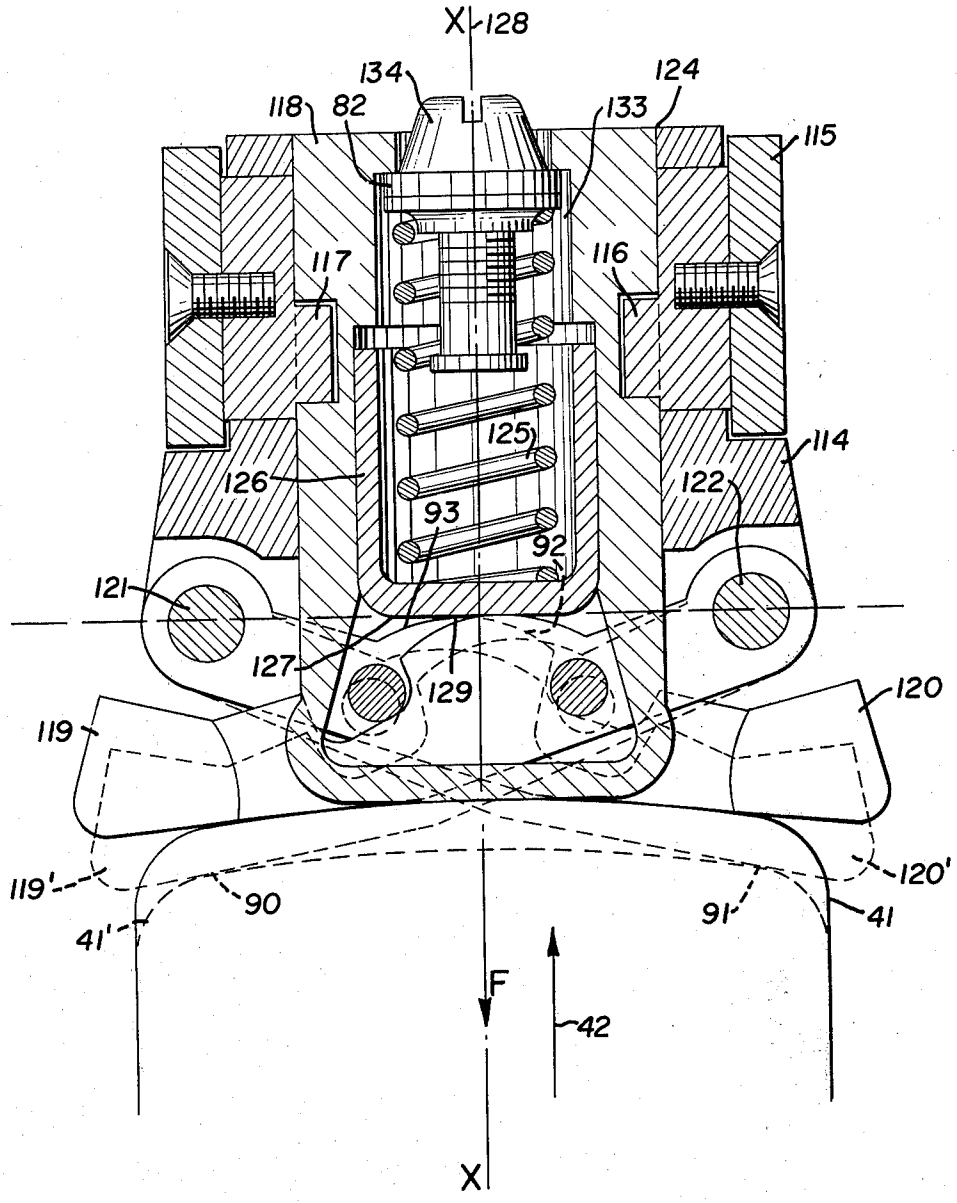

X
128
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41'
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42
X

FIG. 1b

SAFETY FIXING DEVICE FOR SKI BOOTS

The present invention relates to a ski fixing device comprising a bridge member under which the skier engages a member rigidly fixed to his boot, in particular the rear extremity of the plate of a plate fixing device.

The invention is more particularly concerned with fixing devices in which the bridge member is composed of two parts, one fixed with respect to the ski and the other movable and articulated with respect to the first. The Applicant has described a fixing device of this type in his U.S. Pat. application No. 374,623 filed on June 28, 1973, which is made part of the disclosure herein. These fixing devices have been specially designed so as to permit plate fixing devices to be automatically fixed on the feet when the skier is in a standing position.

It is well known that when a skier walks in the snow without his skis, either deliberately or as a result of a fall, he collects under the soles of his boots more or less considerable quantities of snow, depending on the physical state of the snow. In addition, at the moment of putting on the skis and especially when putting them on again, since the ski is in the snow, the latter may be introduced into the fixing devices or may simply remain on the ski between the fixing devices. This extra thickness of snow compressed between the sole of the boot and the ski is particularly troublesome when putting skis on again. In fact, in the case of thicknesses which are too large, the holding device of the boot cannot be locked, so that the skier must remove the snow by hand from the sole of the boot, which is not always very easy, especially since the snow is packed hard.

Certain fixing devices comprise holding members, the forward release travel of which is large. For this reason, the skier can put on his skis again, even if thickness of snow are sticking to the soles of his boots. However, the presence of this snow modifies the safety release characteristics, so that it would be necessary again to change the height adjustment of the holding member with respect to the boot in order to compensate for the variations of the forward release travel.

The present invention has for its object to remedy these difficulties by providing a fixing device capable of accepting considerable over-thicknesses of snow, without the safety release characteristics being thereby substantially modified.

According to an essential feature of the invention, the second mobile portion of the bridge member cooperates on the one hand with the ramp of an element fixed on the extremity of the boot, in particular the extremity of a plate temporarily fixed to the boot, and on the other hand with the first portion of the bridge member by means of sloping ramps orientated in such manner that the acute angles which they form with the ski are open towards the holding member of the other extremity of the boot. The displacement of the moving elements can then be carried out during the removal of the safety device, against the action of a spring system, constituted in particular by that holding member which maintains the opposite extremity of the boot or of the plate of the boot.

According to a second characteristic feature of the invention, an abutment, of which one of the bearing surfaces is fixed to the second portion, limits the upward travel of this latter.

According to a characteristic form of embodiment of the invention, the acute angles formed by each of the ramps with the ski have different values. Very precisely, the acute angle of the second system of ramps (that permitting the co-operation of the first and second portions) is greater than the acute angle formed by the first system of ramps (that which permits the co-operation of the second portion with the element fixed on the boot).

By virtue of these arrangements according to the invention, taken in combination, a force of vertical component applied on the boot has the effect:

- of lifting in an elastic and reversible manner, the second portion as long as the travel of this latter is not limited by the abutment;
- of liberating the extremity of the element fixed to the boot from the extremity of the second portion of the bridge member, as soon as this latter is in abutment;
- the safety device is then released in the known manner.

Thus the device according to the invention provides an additional elastic travel of the skier's boot without modifying the characteristics of the safety release system. This elastic travel can be used with advantage to compensate for over-thicknesses of snow under the sole of the boot, in accordance with the object to which the invention is directed. Even in the absence of snow under his boots, the skier will find appreciable advantages in these new methods of fixing. In fact, during a forward fall, the releasing force is not always applied to its members; this force is gradually applied during the elastic travel of the second portion, and this results in considerable comfort for the skier.

When the systems of ramps are underneath the boot and are therefore limited in thickness, the elastic travel (to within the thicknesses of the abutments) can be doubled, tripled or quadrupled by providing two, three or four successive systems of ramps. On the other hand, when the ramp systems are not underneath the boot, the multiplication coefficient may have any desired value.

In an alternative form, the angle of the second ramp system may be less than that of the first; in this way, the function of the second ramp system would be limited to giving the fixing device the possibility of putting on the skis with snow. In fact, in the case where the moving portion of the bridge member is continuously urged towards its opening position by a spring, in the absence of a boot or plate, it is therefore lifted until it comes into abutment and when putting on the ski, it would be lowered by the necessary amount, determined by the height of snow.

Non-limitative examples of constructions in accordance with the invention will now be described, reference being made to the accompanying drawings, in which:

FIG. 1 shows a perspective view of a fixing device according to the invention;

FIG. 1*a* is a partial view to a large scale of the second system of ramps;

FIG. 1*b* is a partial cross-sectional plan view of one of the holding members of the fixing device;

FIG. 2 is a view in partial section taken along the plane of vertical and longitudinal symmetry of the ski during the release phase;

FIG. 2*a* is a detail view of an alternative form of construction of the abutment;

FIG. 3 is a plan view of the fixing device shown in

FIG. 2, the second portion not being locked on the first.

FIG. 1 shows a perspective view of a first form of construction of a fixing device in the removed position. The device is of the plate fixing type, the plate 1 being temporarily fixed in known manner to the boot by means of the elements 2 and 12. The first portion 7 of the bridge member is fixed to the ski 3 by screws 4. The second portion 5 of the bridge member can be folded back and is movable in translation with respect to the first portion 7 of the bridge member.

The second portion 5 co-operates with the extremity of the plate 1 by means of a first system of two ramps, of which one ramp 9 is fixed to the plate 1 while the other ramp 8 is fixed on the second portion.

The second portion 5 co-operates with the first portion 7 by means of a second system of two ramps of which one ramp 10 is rigidly fixed to this second portion, while the other ramp 11 is fixed to the first.

FIG. 1*b* shows a view from above, in section, of the locking system facing towards the front of the ski; the two levers 120, 119 are hinged about two vertical axes integral with the body 114 of the locking system. In this particular example of embodiment, levers 119, 120 rest with their ends against the vertical edge of the skier's boot 41.

The two levers 119, 120 are pressed against the boot by a piston 126 actuated by a spring 125. The contact areas 129, between piston 126 and cylindrical profiles 92, 93 of levers 119, 120 are located between hinge axes 121, 122 and areas 90, 91 of support on the boot. In other words, the supporting area of a lever and the axis of rotation thereof are located on each side of the longitudinal axis of the binding.

It will be noted that, by reason of this crossed arrangement of the levers, a considerable forward movement of the boot produces only a small movement of contact areas 129 between the piston and the levers, so that the plane containing the contact areas passes, substantially permanently, through axes 121, 122. Moreover, this arrangement makes it possible to obtain a suitable angular variation to compensate for the increase in spring restraint arising from the forward movement of the boot. Manipulating element 115 rotates about a horizontal axis integral with element 114 of the locking system. This manipulating element consists of two eccentrics 116 arranged on each side of the locking system. Each eccentric 116 is engaged in a vertical groove 117 of a slide 118. The slide moves horizontally in a cylindrical channel 124 drilled in body 114 of the locking system along the longitudinal axis 128 of the ski.

Manipulating element 115 moves between two positions; in one of the positions, the position of rest, slide 118 is locked to body 114 of the locking system by eccentric 116.

A second cylindrical channel 133 is arranged along the longitudinal axis 128 of the slide. A piston 126 moves horizontally in this second cylindrical channel 133. A compression spring 125 is housed, along the axis of this channel, within the piston, one end of the spring resting on the piston and the other against the slide through a system of threads 134 which makes it possible to adjust the rate of compression of the spring. This system of threads consists of a nut 82 prevented from rotating in relation to the slide, but adapted to move axially. The piston rests on levers 119, 120 in areas located substantially along axis 128 of the locking system. The outer surface of the piston, which bears against the levers is flat and perpendicular to the longitudinal axis of the ski, so that this surface 127 is perpendicular to the direction of the force F applied by spring 125 to the levers.

A description will now be given of the operation of this locking system in the event of a forward fall. In this case, boot 41 moves in the direction of arrow 42 and pushes the two levers 119, 120 against the action of spring 125. Slide 118, let it be recalled, is locked to body 114 of the locking system, and the end of the spring, butted up against the spring-tension adjusting system 134, does not move. The positions occupied by levers 119', 120' and boot 41' prior to the fall are shown in dotted lines. As soon as the toe of the boot has moved sufficiently, the rear end thereof is disengaged from the rear locking system with which it is associated.

In this first form of embodiment, the two ramp systems extend transversely with respect to the ski. On the other hand, in the example which follows, the second ramp system converges towards the rear portion 7 of the bridge member, this arrangement providing a take-up of play by virtue of the thrust of the fixing device 13.

FIG. 1a is a partial view to a large scale of the second ramp system. There can again be seen the greater part of the element described with reference to FIG. 1, in particular the second portion 5 co-operating by means of the ramp system 10 and 11 with the first portion 7. The abutment system 15 and 16 limits the elastic travel of the second portion 5, as previously described.

FIG. 2 shows a view in section taken through the plane of vertical and longitudinal symmetry of the ski during the release phase. The elements described with reference to FIG. 1 have been given the same reference numbers. The first portion 7 is fixed to the ski by screws 4. The second portion 5 comprises an elongated slot 20 in which is engaged a shaft 21 fixed on the first portion 7, so that the second portion 5 can pivot about this shaft and can move in a substantially horizontal plane when it is in the bottom position. This arrangement already existed in FIG. 1 but was not apparent.

The spring 22, supported on the one hand on the ski 3 and on the other hand on the second portion 5 urges this latter into the raised position.

The second portion is shown in the raised position and locked on the first portion of the bridge member by means of the abutments 15 and 16. The ramps 10 and 11 act in co-operation as do also the ramps 8 and 9.

The operation of the fixing device according to the invention will now be described.

Under the action of a vertical force acting in the direction of the arrow F and applied on the boot, the plate rigidly fixed to the boot is lifted and carried with it in its movement the second portion 5 which pivots about the shaft 21 while moving forward.

The second portion 5 is guided in its movement by the system of ramps 10 and 11 inclined with respect to the ski and orientated in such manner that they compel the first portion 5 and the plate 1 to move towards the front of the ski in the direction of the arrow 24.

This movement is effected against the elastic restoring force developed by the spring system of the fixing device, against which the front extremity of the plate 1 is in abutment, so that if the vertical force ceases to be applied, the plate 1 and the second portion 5 return to their initial lowest position. On the other hand, if the

intensity of the vertical force increases, the plate **1** and the second portion **5** continue to rise. The travel of the second portion **5** is limited by the nose **16** against which the bent-back portion **15** fixed on the second portion **5** comes into abutment. If the intensity of the vertical force is sufficient, the spring system of the front fixing device continues to be compressed and the ramp **9**, formed on the plate **1**, becomes progressively free from the ramp **8** which is formed on the second portion **5** of the bridge member, in known manner. It is very precisely in this position that the various moving parts of the fixing device have been shown.

The ramp **35** has the purpose of guiding the second portion during the automatic re-fixing of the skis on the feet. When the second portion **5** pivots about the shaft **21**, the rear extremity **36** of the second portion slides along the ramp **35**, but it is not essential to the invention that the fixing device comprises this system of ramps which is necessary in the case of a fixing device of the type for automatic replacement on the feet.

The angle A formed by the ramp **11** with the ski is greater than the angle B formed by the ramp **8** with the ski. By virtue of this arrangement, the second portion **5** is the first to lift before the ramp **9** is disengaged from the ramp **8**.

The operation of the fixing device according to the invention is identical with that which has been described above in the case where an over-thickness of compact snow adheres to the sole of the skier's boots or to the plate, and raising this latter or the element fixed to the boot. The shaded area **25** represents the additional quantity of snow permitted by the fixing device according to the invention.

The elastic travel before release is defined by the length of the ramp **9** fixed to the boot, and this is strictly accurate when the angle A is greater than the angle B. It can immediately be seen that, even with a wedge of snow having a height such as shown at **25**, the elastic travel of the fixing device remains determined by the length of the ramp **9**, that is to say it remains constant, and it is thus not necessary to mofify the initial adjustment of the fixing device.

There has been shown in FIG. **2***a*, an alternative form of construction of the abutment. The travel of the second portion **5** is limited by an abutment **30** fixed on the ski against which the rear extremity **31** of the second portion **5** of the bridge system comes into contact when the portion **5** is in the locked position.

FIG. **3** shows a plan view of the fixing device. There will again be seen the greater part of the elements described with reference to the previous figures. Each system of ramps comprises two portions symmetrically disposed with respect to the longitudinal axis of the ski.

The invention is not limited to the examples of construction shown and described in detail, since various modifications may be made thereto without departing from its scope. In particular, it is not necessary for the boot to be fixed to a plate, and the element fixed to the boot may especially be constituted simply by a roll formed on the sole.

I claim:

1. A fixing device for a ski comprising a first holding member and second holding member, said members binding the ends of a boot element to the ski,

said first holding member comprising a bridge member formed in two parts including

- a first portion fixed with respect to the ski,
- a second portion pivoting and moving substantially longitudinally with respect to said first portion;

said second portion being adapted to cooperate,

- on one hand, with one end of the boot element by means of a first system of two ramps, one of said two ramps being rigidly fixed to said second portion and the other being fixed to the boot element,
- on the other hand, with said first portion by means of at least one second system of two ramps, one of said two ramps of said second system being rigidly fixed to said first portion,

at least one of said two ramps of each of said first and second system of two ramps forming an acute angle with respect to the ski,

said acute angles being both open towards said second holding member; said fixing device further comprising,

- a first spring system compressed by the boot and located on at least one of said first and second holding members;

said spring system urging through the boot element said second portion downwards towards the ski by the effect of said second system of two ramps; and

- locking means intercalated between said first and second portions, limiting the amplitude of displacement of said second portion.

2. A fixing device for a ski as claimed in claim **1**, in which said locking means is composed of an element integral with said second portion engaging a nose fixed on said first portion.

3. A fixing device for a ski as claimed in claim **1**, and further comprising a second spring system adapted, in the absence of the boot, to urge said second portion into a raised position with respect to said ski.

4. A fixing device for a ski as claimed in claim **1**, further permitting the skier to put on his ski automatically, in which the locking means intercalated between said first and second portions in releasable and urged by the skier when he puts on his skis;

said second portion being movable downward with respect to said first portion and being actuated by the foot of the skier between two series of positions, namely:

- a first series of positions for which said second portion is raised,
- a second series of positions, for which said second portion is locked on ssaid first portion by said locking means, whereby the amplitude of displacement of said second portion is limited by said locking means, and for which said second portion cooperates with the first portion by means of said second system of ramps.

5. A fixing device for a ski as claimed in claim **1**, further permitting the skier to put his ski on automatically, in which said locking means is releasable and urged by the skier when he puts on his ski; said locking means being composed of an element integral with said second portion engaging, after a longitudinal translation, a nose fixed on said first portion,

said second portion, actuated by the foot of the skier, being adapted to tilt with respect to said first portion between two series of positions,

- a first series of positions for which said second portion is raised,
- a second series of positions, for which said second portion is locked on said first portion by said

locking means whereby the amplitude of displacement of said second portion is limited by said locking means. and for which said second portion cooperates with said first portion by means of said second system of ramps.

6. A fixing device for a ski as claimed in claim **5** in which,

- said second portion comprises a slot engaging a shaft mounted on said first portion around which said second portion is movable in rotation and longitudinal translation,
- said nose is located substantially at the same distance from said shaft as said first system of two ramps.

7. A fixing device for a ski as claimed in claim **1**, in which the acute angle formed with the ski by at least one of the two ramps of said second system of two ramps is greater than the acute angle formed with said ski by one of the two ramps of said first system of two ramps.

8. A fixing device for a ski as claimed in claim **1**, in which said locking means is composed of an abutment fixed on the ski against which the rear extremity of said second portion comes into contact.

9. A fixing device for a ski as claimed in claim **1**, in which each of said first and second systems of two ramps is constituted by two sliding surfaces, disposed symmetrically with respect to the longitudinal axis of the ski.

10. A fixing device for a ski as claimed in claim **9** in which the two ramps of said second system of two ramps converge towards said bridge member.

* * * * *