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Salomon

[11] **3,734,522**

[45] **May 22, 1973**

[54] **APPARATUS AND METHOD FOR COMPENSATING FOR THE LONGITUDINAL MOVEMENT OF A SAFETY SKI BINDING**

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Jan. 19, 1970 France....................................7001826

[52] **U.S. Cl.** ....**280/11.35 T**
[51] **Int. Cl.**..**A63c 9/00**
[58] **Field of Search** ....280/11.35 T

[56] **References Cited**

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Assistant Examiner—Robert R. Song
Attorney—Roger Goudreau

[57] **ABSTRACT**

The disclosure herein describes an apparatus and method for compensating for the longitudinal movement of a safety ski binding and thereby protecting the skier when falling. To achieve this aim, the moving part of the ski binding is subjected to the action of a resilient force which resists the displacement of the moving part in one direction; this resilient force varies as a function of the moving part and, at the same time it varies, the component of this force which acts on the moving part of the binding parallel with the direction of movement thereof, is maintained at an appreciably constant value.

15 Claims, 13 Drawing Figures

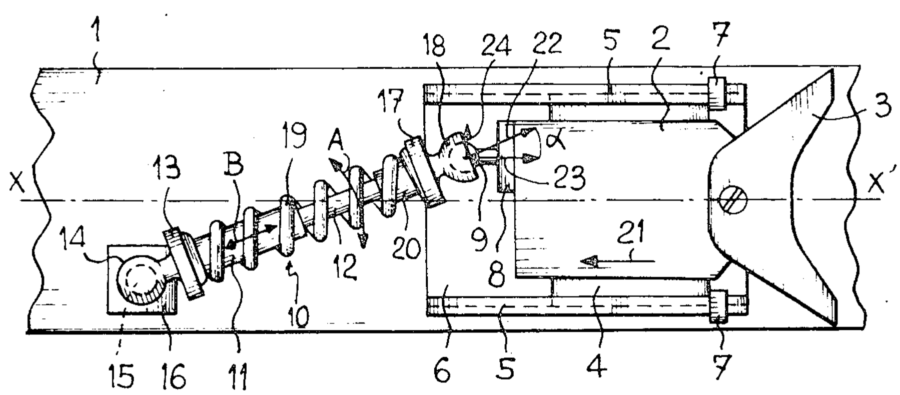


Fig.1

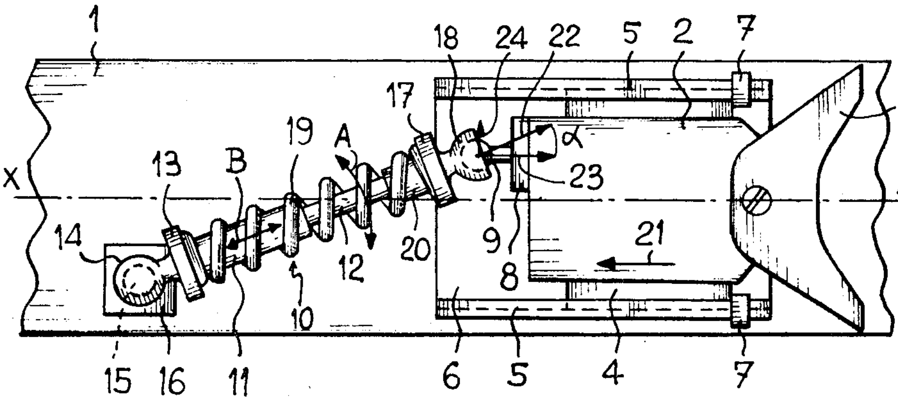


Fig.2

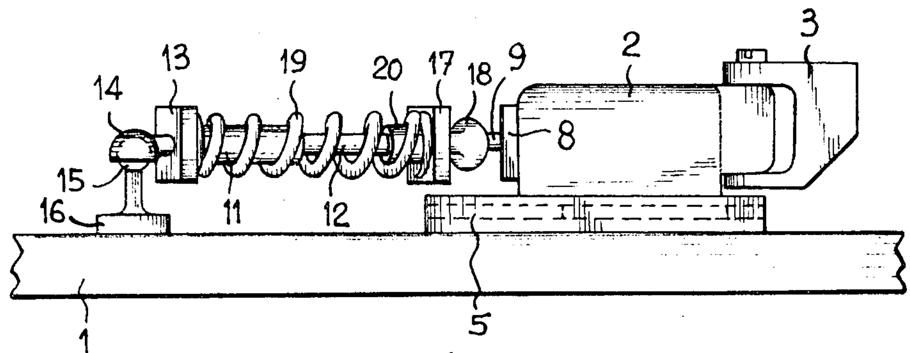


Fig.3

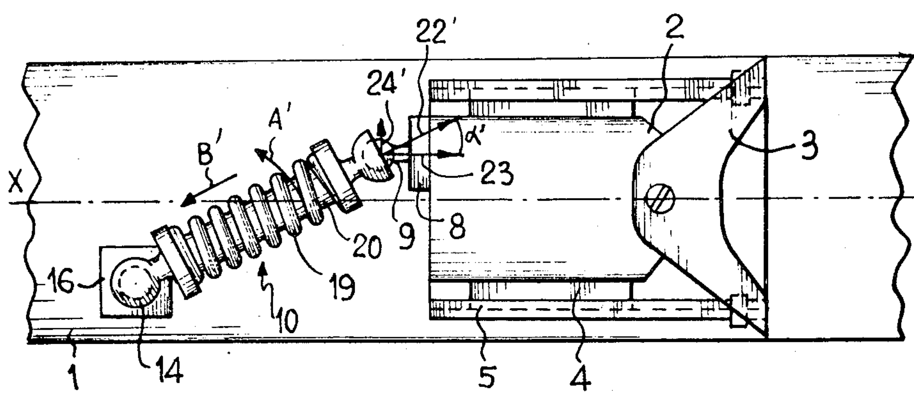
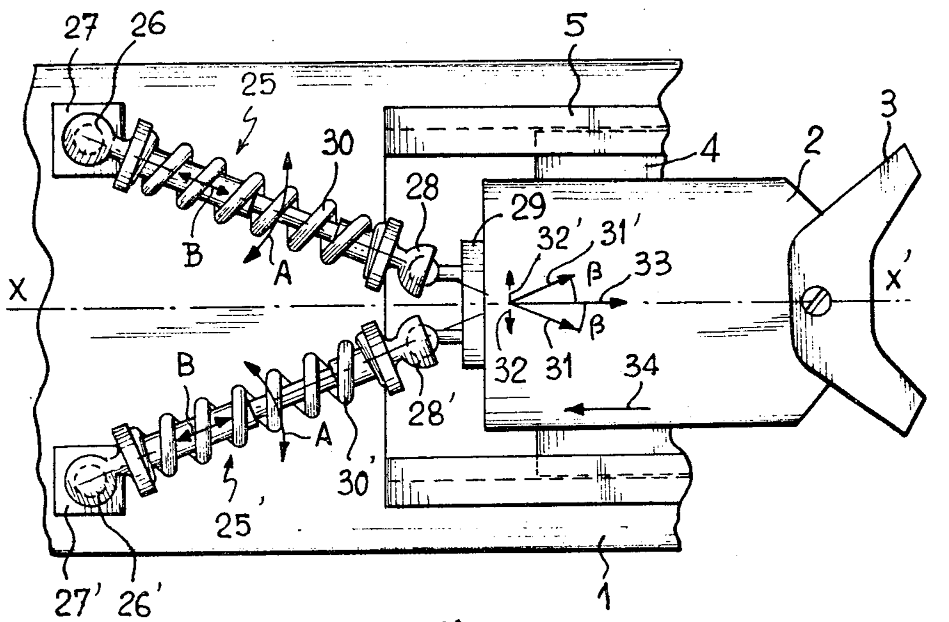


Fig.4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26
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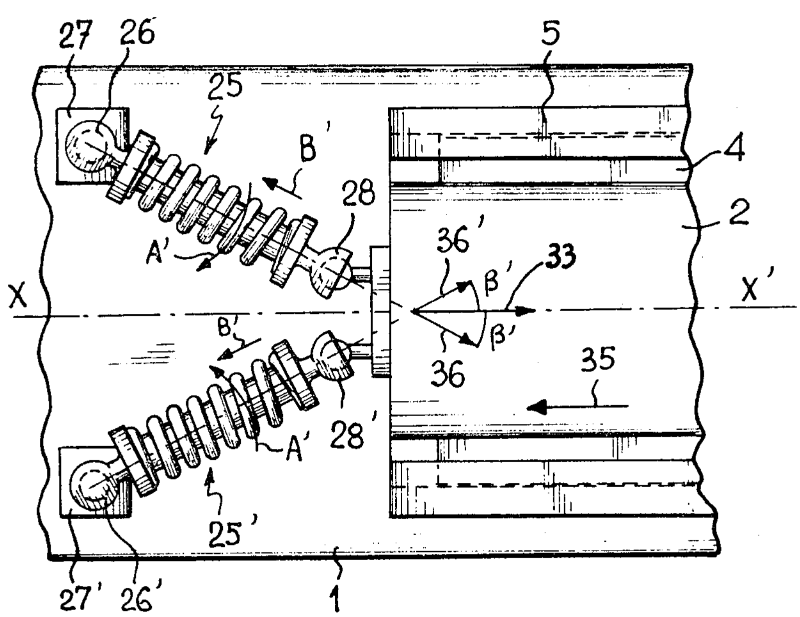
30
5
4
2
3
28
29
32'
31'
33
X
X'
β
B
A
32
31
34
28'
30'
25'
27'
26'
1

Fig.5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36
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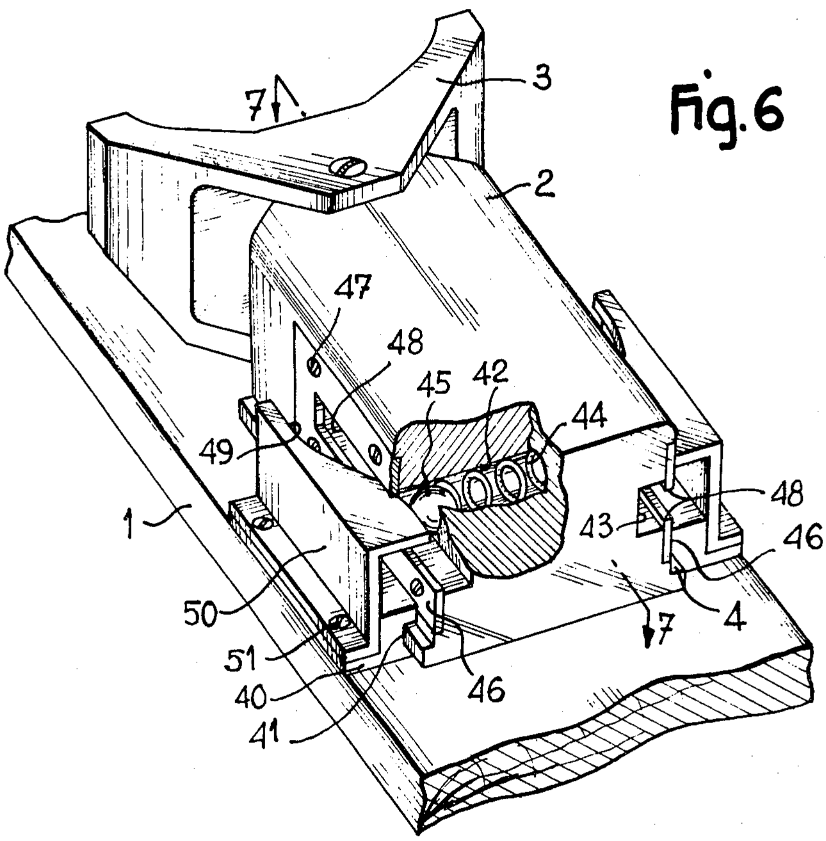
25'
27'
26'
1


7
3
2
47
48
45
42
44
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43
46
1
50
4
7
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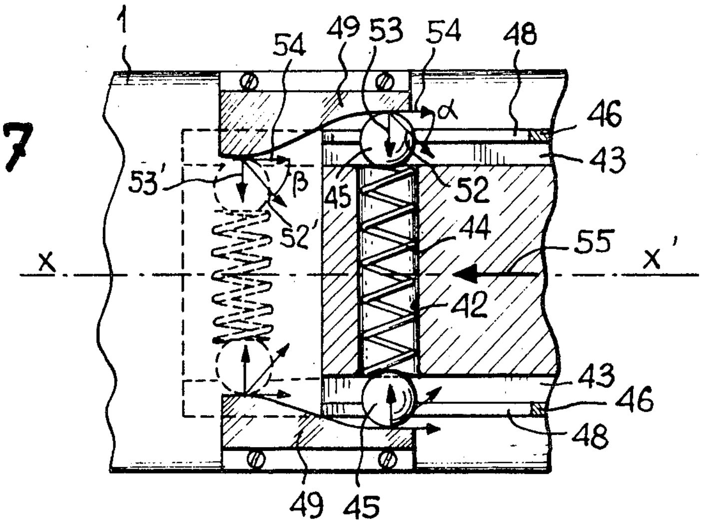
46
41

Fig.6

Fig.7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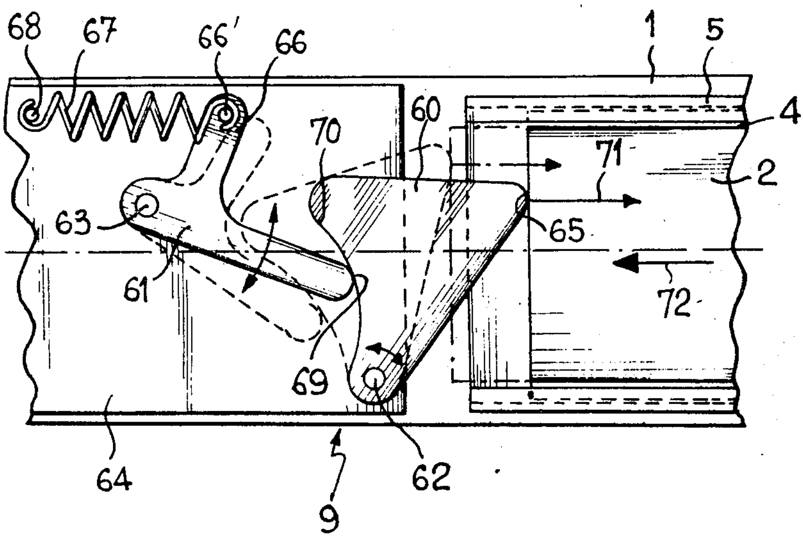
54
49
53
54
48
α
46
43
53'
β
45
52
52'
44
55
x
x'
42
43
46
48
49
45

Fig. 8


68
67
66'
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5
60
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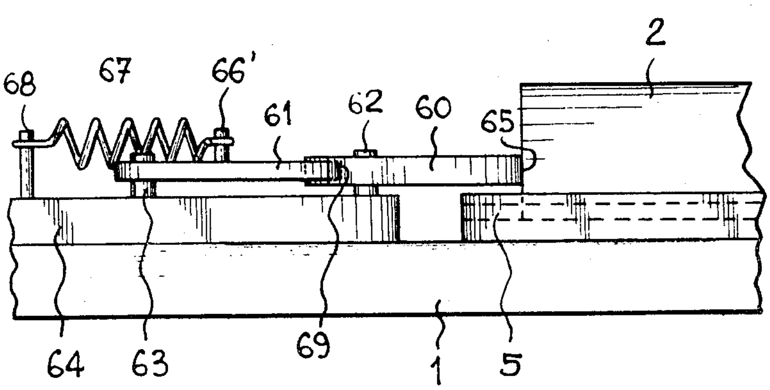
4
71
2
63
65
61
72
69
64
9
62

Fig. 9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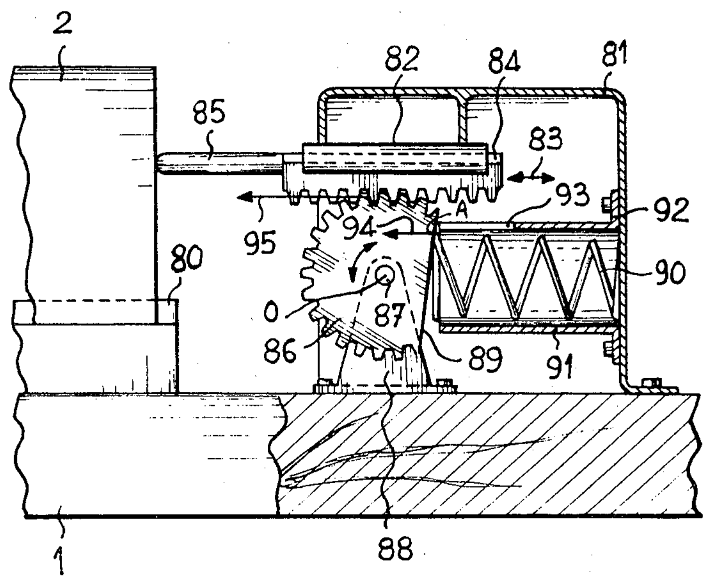
5

Fig.10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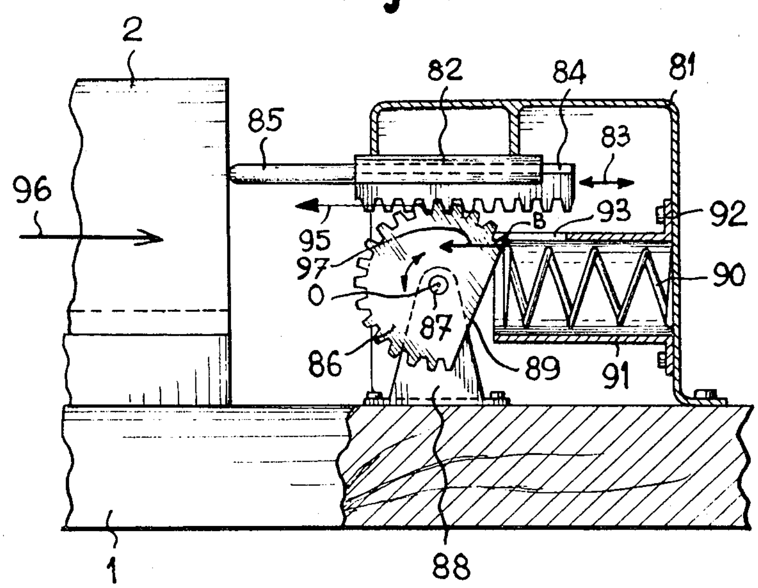
88

Fig.11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B
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92
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86
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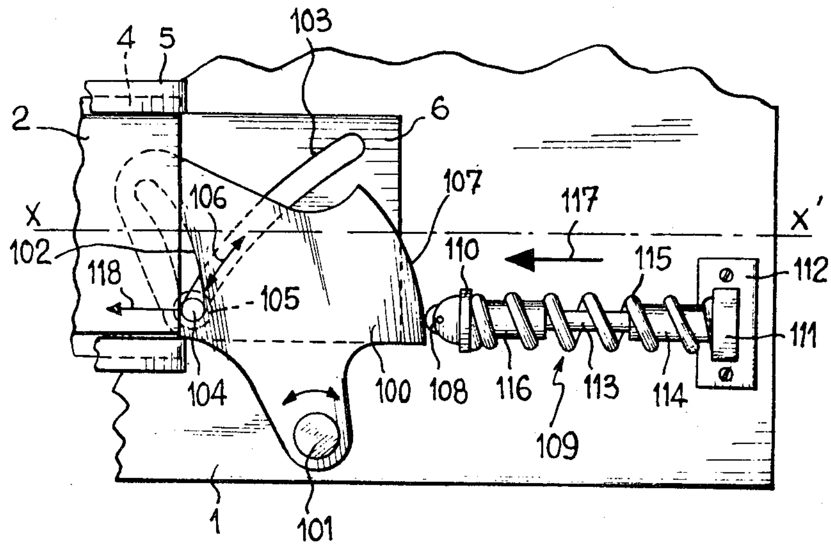
1
88

Fig.12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4
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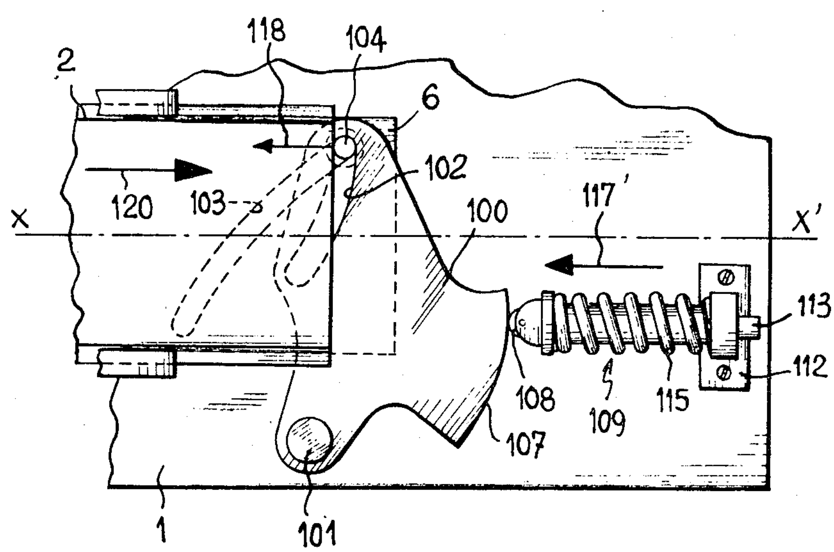
2
6
107
117
106
X
X'
102
110
115
112
118
105
111
104
100
108
116
113
114
109
1
101

Fig.13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6
102
120
103
100
117'
X
X'
113
108
109
115
112
107
1
101

APPARATUS AND METHOD FOR COMPENSATING FOR THE LONGITUDINAL MOVEMENT OF A SAFETY SKI BINDING

The present invention relates to safety ski bindings, and more particularly to bindings, a portion of which at least is susceptible to movement along the longitudinal axis of the ski.

Known types of safety bindings for skis, intended to protect the skier when falling forwards, backwards, or sideways, are usually mounted on the ski so that they may slide longitudinally, for example in grooves, and may thus be adjusted to different sizes of boot. Furthermore, these known bindings are frequently equipped with an arrangement which applies a constant longitudinal thrust to the moving part of the bindings, so that they may bear against the boots. The purpose of this longitudinal thrust is to keep the bindings pressed against the boots, in spite of any movement the bindings may make. The movements for which this known arrangement is intended to compensate may be caused, for instance, by temporary bending of the ski, a type of boot unsuitable for the adjustment at the binding location, incorrect longitudinal adjustment of the binding location on the ski, or the presence of foreign matter, such as snow, between the binding and the boot.

This type of known arrangement is resilient and, in order to assure its resiliency, it makes use either of a part of the energy of the resilient system ensuring the safety of the binding in the event of a fall, or of the energy of a resilient system independent of the binding mechanism.

However, although with this type of arrangement it is possible to obtain constant bearing of the binding against the boot while the said binding is being displaced, the value of the compensating force exerted by the arrangement on the binding, in response to the displacement thereof cannot be constant.

Thus, when the binding moves longitudinally, especially under the circumstances mentioned above, the bearing force of the boot against the binding varies, and the resilient arrangement reacts with an opposing action which also varies.

Moreover, the mechanism ensuring the safe functioning of the binding is known to be adjusted to release in response to a specific stress applied by the boot to the binding, and it is therefore essential that no external stress shall temporarily modify the calibration of the safety mechanism.

Now the variable reaction of this known type of arrangement on the moving part of the binding does in fact modify this calibration, which leads to irregular and unexpected functioning of the safety binding, with the result that skis fitted with these bindings are dangerous.

Applicant has therefore endeavoured to eliminate the disadvantages of ski bindings which move longitudinally and have compensating arrangements.

In order to achieve this aim, applicant proposes, according to the invention, to subject the moving part of the binding to the action of a resilient force resisting displacement of the moving part in one direction, this resilient force varying as a function of the said moving part of the binding and, at the same time that this resilient force varies, to maintain, at an appreciably constant value, the component of this force which acts on the moving part of the binding parallel with the direction of movement thereof.

Thus, however far the moving part of the binding moves, it is subjected to a longitudinal force of a predetermined constant value, this force at no time having any effect upon the safety function of the binding.

As regards the device which makes it possible to apply the method mentioned above, its achievement is subject to a variety of demands inherent in the technology of ski bindings.

A device of this kind must be simple, reliable in operation, of small size, inexpensive, rugged, and it must require a minimum of moving parts.

In a general way, a movement-compensating device according to the present invention comprises a resilient unit arranged between a fixed element integral with the ski and the longitudinally mobile part of the binding, the said resilient unit exerting upon this mobile part a force which opposes the force which causes the binding to move longitudinally, the said force having an appreciably constant value regardless of the extent of longitudinal movement of the moving part of the binding.

It should nevertheless be noted that, in the case of safety bindings for skis, the longitudinal movement of the moving part of the binding is limited by its nature, and does not exceed a few centimeters.

The compensating device according to the invention is therefore particularly well suited to exert an almost constant opposing force on the moving part of the binding which is capable of moving longitudinally over a relatively short distance. It is therefore sufficient if the design and arrangement of the device produce the desired result while functioning within relatively narrow limits. This consideration therefore permits the use of a simple and inexpensive device.

It will be observed that when the moving part of the binding is in what is known as the "forward" position, in which position the ski is not put on, the said binding is preferably stopped, in such a manner that the resilient unit exerts upon the moving part a force opposing the movement of the binding towards what is known as the "rearward" position, one component of this force acting parallel with the longitudinal movement of the binding and having a value equal to that of the constant opposing force acting on the binding while it is moving.

In the "rearward" position, it is also of advantage for the binding to be up against a stop.

According to one aspect of the invention, the resilient unit comprises means which, when the resilient force thereof varies while the moving part of the binding is moving, modify the orientation of this resilient force in relation to the longitudinal direction in which the force displacing the moving part acts, with the result that the angle formed between the said resultant and the direction of displacement varies in proportion to the variation in the resilient force, which means that the component of the said resilient force acting upon the moving part of the binding parallel with the direction of displacement has an almost constant value.

Furthermore, the resilient unit comprises at least one guided spring, the axis of which is kept in a straight line, the ends of the said spring being connected to elements co-operating on the one hand with the fixed structure of the ski and, on the other hand, with the moving part of the safety binding.

The compensating device according to the invention may vary in design, depending upon whether it is desired to obtain a device exhibiting high functional accuracy or, on the contrary, relative accuracy, i.e., one which allows minor tolerances in the constant value of the opposing force.

If this relative functional accuracy is acceptable, the design of the device may be extremely simple and economical, whereas if high functional accuracy is required, the design of the device will be somewhat more complex and slightly more costly.

In the first case, one form of execution of the device comprises a single spring mounted around a telescopic support having a rectilinear axis and exhibiting end flanges against which the ends of the springs rest, one end of the said support being hinged to a fixed pivot-point on the ski located to one side of the longitudinal axis thereof, whereas the other end is hinged to a pivot integral with the moving part of the binding and located in the vicinity of the longitudinal axis of the ski.

In this arrangement, the axis of the spring support is at an angle to the longitudinal axis of the ski, and the action of the device upon the moving part of the binding comprises a longitudinal component and a component transverse to the direction of movement of the moving part of the binding.

In order to eliminate any transverse component, use will be made of another form of execution of this type of simple device, consisting of two telescopic spring supports similar to those defined above, these supports being arranged in relation to the longitudinal axis of the ski in such a manner that their transverse components on the moving part counterbalance each other. The characteristics of these springs, and their respective locations on the ski, may differ, and in this case their transverse components will not be equal; it will be understood, however, that one particularly interesting arrangement will be that in which the two telescopic spring supports are identical and are arranged symmetrically with the longitudinal axis of the ski, in which case the two springs will have the same characteristics. This arrangement makes it possible to eliminate almost any reaction of the device transversely of the longitudinal axis of the ski.

If it is desired to make use of a system of higher functional accuracy, use may be made of a second type of device comprising guide ramps, the shape of which may be calculated and adjusted with accuracy, thus making it possible to obtain an opposing force acting upon the moving part of the binding, which will have a constant value with very good approximation.

One form of execution of this type of device consists of a compression spring arranged perpendicularly to the longitudinal axis of the ski and inside the moving part of the binding, the said spring acting upon at least one retractable element also located within the said moving part, which it urges laterally outwards, causing it to co-operate with a cam profile integral with the ski and extending longitudinally. The distance between the said cam and the longitudinal axis of the ski decreases progressively from front to rear; the device preferably comprises two opposing retractable elements, such as balls or rollers which compress between them a single spring and which co-operate respectively with a cam profile, the two cam profiles being symmetrical with the longitudinal axis of the ski.

According to still another form of execution, the devices comprise two parts pivoting respectively about vertical axes integral with the ski, one of the said parts being subjected to the action of a spring attached to a fixed point of the ski and pushing the second part into contact with the moving part of the binding, the said parts exhibiting cam profiles which co-operate and slide upon each other in almost spot contact, which makes frictional forces almost negligible.

According to another form of execution, a return spring kept in a straight line is stopped at one end by a fixed part integral with the ski, the other end of the said spring resting on a toothed wheel to which it applies a torque, the said toothed wheel engaging with a rack mounted to slide along the longitudinal axis of the ski in a sliding support, the front end of the said rack abutting against the moving part of the binding. The said spring is in almost spot contact with the toothed wheel, preferably along a chord-like section thereof, the distance between the axis of the said wheel and the point of contact with the spring varying in proportion to the restoring force of the spring.

According to still another form of execution, a spring is mounted on a telescopic support intended to keep it substantially parallel with the longitudinal axis of the ski, one end of the said support being integral with the ski while the other end pushes into contact with the moving part of the binding an intermediate part mounted on a pivot remote from the longitudinal axis of the ski and from the axis of the spring, the said intermediate part having a profile which co-operates with a conjugate profile pertaining to the mobile part of the binding. As a variant, the profile of the said intermediate part may co-operate with a conjugate profile pertaining to a fixed part of the binding, via an element integral with the moving part of the binding and moving within the two profiles.

The invention will now be described in detail, and by way of non-restrictive example, with reference to the attached drawings, wherein:

FIG. **1** shows a plan view of a safety binding comprising a compensating device, in a first form of execution;

FIG. **2** is a side elevation of the binding and device in FIG. **1**;

FIG. **3** shows the device in FIGS. **1** and **2** in a different position, the binding having been moved towards its rearward position;

FIGS. **4** and **5** show a second form of execution of the device according to the invention, shown in the conditions corresponding respectively to the "forward" position of the binding in FIG. **4** and the "rearward" position in FIG. **5**;

FIG. **6** is a perspective of a third form of execution of the device;

FIG. **7** is a schematic part section of the device along the line **7—7** in FIG. **6**;

FIG. **8** is a plan view of the device according to a fourth form of execution shown in two different conditions, one in full lines and one in broken lines;

FIG. **9** is a side elevation of the device, as seen in the direction of arrow **9** in FIG. **8**;

FIGS. **10** and **11** show a partial longitudinal section of the device according to a fifth form of execution and in two different conditions;

FIGS. **12** and **13** show a plan view in two extreme conditions of a device according to a sixth form of execution.

In the following description, similar elements have the same reference numbers.

In FIGS. 1 to 3, 1 is a central section of the ski and 2 is the moving part of a safety binding, for example, a heel-piece carrying a holding jaw 3 for a boot (not shown). Hereinafter, the moving part of the binding will be considered as a heel-piece but it is to be understood that it might also be some other binding element. The said heel-piece may move longitudinally along axis XX′ of the ski, sliding on lateral tongues 4, with which it is equipped, in corresponding slides 5 integral with a bracket 6 attached to the ski in any appropriate manner. Slides 5 have longitudinal stops 7, at least at their front ends, which limit the forward travel of the heel-piece. These stops, which may be of any known type, are preferably simultaneously adjustable on slides 5. Rear stops might also be provided to limit the rearward travel of the heel-piece, but this is not mandatory. Attached to the rear face of heel-piece 2, and in area close to longitudinal axis XX′ of the ski, is the seat 8 of the male part 9 of a ball joint, the female portion of which is part of a compensating device generally marked 10. The said compensating device consists of a telescopic element comprising a cylinder 11 in which a rod 12 slides. The free end of cylinder 11 is fixed to flange 13 of a female part 14 of the ball joint, male part 15 of which carries a seat 16 permanently attached to ski 1, in an area laterally remote from longitudinal axis XX′ and preferably in that half of the ski opposite to the location of seat 8 of the ball joint attached to the binding. It will also be observed in the drawing that seat 16 is located to the rear of bracket 6 in which the binding slides.

Furthermore, rod 12 also carries at its free end a female part 18 of flanged ball joint 17 which co-operates with male part 9 of the ball joint carried by the heel-piece. A compression spring 19 is mounted around telescopic element 11—12, the ends of the said spring resting against flanges 13 and 17.

In the vicinity of flange 17, rod 12 has an expanded section 20, the shoulder of which is intended to come into contact with the free end of cylinder 11 in order to limit the compression travel of spring 19 (as shown in FIG. 3). When the expanded section comes into contact with the cylinder, it is impossible to compress device 10 any further, and the said device therefore becomes a stop, limiting the rearward travel of binding 2. The device is therefore free to contract or expand as indicated by the double arrow B in FIG. 1, and to pivot about ball joint 15 as indicated by double arrow A.

It will be noted that the angle between the axis of device 10 and longitudinal axis XX′ of the ski is preferably between 30° and 60°, and this applies over the entire travel of the binding. Moreover, according to the design, when the binding is in the forward position shown in FIG. 1, spring 19 is already in the compressed condition, exerting upon the moving part of the binding a force, the resultant of which, following the axis of the spring, is shown at 22; the said force has a longitudinal component 23 and a transverse component 24.

In actual operation, if binding 2 moves towards the rear in the direction of arrow 21, under the action of a force superior to longitudinal component 23 of the device, spring 19 (FIG. 3) is compressed in the direction of arrow B′ and, at the same time, device 10 as a whole pivots about ball joint 15 in the direction of arrow A′, ball joint 9 making this movement possible. Therefore, as the compression of the spring, and thus its resilient reaction represented by resultant 22, increases, angle α between the axis of device 10 and longitudinal axis XX′ increaseas proportionally, as does transverse component 24.

Thus, in the vectorial system of FIGS. 1 and 3, longitudinal component 23 is invariable, and the opposing longitudinal force which it represents has a constant value, regardless of the movement of the heel-piece. In FIG. 3, binding 2 is shown in its maximal rearward position, and it may be seen that resultant 22′ and transverse component 24′ are greater than resultant 22 and component 24 in FIG. 1, just as angle α' is larger than angle α; only longitudinal component 23 remains the same in both figures.

The simplicity of this device is interesting, but the presence of a transverse component 24 acting upon the binding may increase the friction between the binding and one of its slides (the top slide in FIG. 1) as the binding moves; above all it may produce increased wear in the said slide.

The device in FIGS. 4 and 5 makes it possible to balance the friction between the binding and the two slides 5, since this device cancels out any transverse component.

In this variant, use is made of two telescopic spring supports 25 and 25′. These are identical with support 10 in FIGS. 1 to 3 and are arranged symmetrically in relation to longitudinal axis XX′ of the ski.

The feet of ball joints 26, 26′ of the said symmetrical supports are mounted on seats 27, 27′ respectively, while sockets 28, 28′ are mounted on a common seat 29 attached to the rear of heel-piece 2. Ball joints 28, 28′ are in the vicinity of axis XX′ whereas rear joints 26, 26′ are spaced symmetrically from axis XX′, in order that supports 25, 25′ may be at an angle to axis XX′.

Springs 30, 30′ of the supports may, with advantages, have identical characteristics, and resultants 31, 31′ of the reaction of these springs on binding 2 are equal.

A vectorial breakdown of the force exerted by the device on the binding, when it is in the "forward" position shown in FIG. 4 (i.e. up against the forward stop), shows that transverse components 32 and 32′ (shown in broken lines) equal and acting in opposite directions, cancel each other out, and may therefore be disregarded. On the other hand, the longitudinal components add together, as shown by vector 33. This component acts exactly along the line of axis XX′ of the ski.

When the binding is in the "forward" position (FIG. 4), it is up against the stop as already indicated, and the reaction of the binding to the device, symbolized by arrow 34, is therefore equal and opposite to component 33. In this starting position, the angle between each of the resultants 31, 31′ and component 33 is in the angle β, which is also the angle between each of the supports 25, 25′ and axis XX′.

When, during operation, the binding moves towards its "rearward" position under the action of a force 35 (FIG. 5) superior to component 33, the devices are compressed in the direction of arrow B′ and pivot about the joints 26, 26′ in the direction of arrows A′.

Thus resultants 36, 36′ of the vectorial system in FIG. 5 are higher in value than resultants 31, 31′ in FIG. 4, while angle β increases in proportion to these resultants. Longitudinal component 33 is therefore substantially the same as in FIG. 4.

It will be understood that in the case of the devices 1 to 3 and 4, 5, the ball joints could be replaced by axes perpendicular to the plane of the ski, in fact joint **28**, **28'** could even be replaced by a single axis, on to which the ends of supports **25**, **25'** would be slipped. The use of ball joints is recommended especially when the axis of the supports does not lie in a plane parallel with the plane of the ski.

In the form of execution in FIGS. **6** and **7**, heel-piece **2** may slide longitudinally along ski **1** on lateral tongues **4** in slides **41** on a bracket **40** attached to the ski, as in the previous forms of execution. Towards its rear end, heel-piece **2** has a hole **42** perpendicular to longitudinal axis XX' of the ski, the said hole opening into longitudinal grooves **43** on each side, the height of which is practically equal to the diameter of hole **42**. Located in hole **42** is a compression spring **44**, the ends of which rest against two retractable elements such as balls **45**, which are thus urged towards the outside. Attached to each of the lateral faces of heel-piece **2**, by screws **47** for example, are retaining plates **46** for balls **45**. Each stop plate **46** partially obstructs corresponding groove **43**, but provides a longitudinal gap **48** wider than the groove which allows relevant ball **45** to project outwardly as shown in FIG. **7**, but without being able to leave the heel-piece. Each ball **45** is kept in alignment with spring **44** by any appropriate means, such as, for example, a spherical ball-receiving seat provided in the edges facing the retaining plate. Each ball **45** is in constant rolling contact with a ramp **49** on the outside of the heel-piece; the said ramp extends longitudinally at the level of gap **48** formed by retaining plate **46**, and are produced in the edge of two brackets **50** symmetrical with longitudinal axis XX' of the ski and are attached to member **40** by means of screws **51**.

The shape of the ramps resembles that of a very elongated recumbent S. In other words, the distance between the ramp and longitudinal axis XX' decreases progressively from front to rear.

When the binding is in the "forward" position shown in full lines in FIG. **7**, the binding is up against the forward stops as already indicated, for instance the stops on slides **41**. In this position, spring **44**, under tension, forces balls **45** against the forward part of ramps **49**. It will be observed that in this device it is the reaction of the ramps on the balls which imparts to the heel-piece a thrust in the forward direction. The vector diagram shown in the drawing therefore illustrates the breakdown of the ramp reaction and is symmetrical at the point of contact between the balls and the ramps, to the diagram which would be represented for the force applied by the balls.

In FIG. **7**, for the forward position, the reaction of ramp **49** exhibits a resultant **52** which breaks down into a transverse component **53** and a longitudinal component **54**. The angle between component **54** and the resultant is shown at α. When the heel-piece retreats by reason of a force **55** superior to longitudinal component **54**, ramps cause the balls to come towards each other and compress spring **44**.

Due to the shape of the ramp, therefore, and with the heel-piece in the rearward position shown in FIG. **7** in broken lines, resultant **52'** and transverse component **53'** are greater than resultant **52** and component **53**, and angle β between the resultant and the transverse component is also larger than angle α. It follows that longitudinal component **54** has a constant value.

In FIGS. **8** and **9**, the compensating device consists of two parts **60** and **61** mounted to pivot about fixed vertical axes **62** and **63** respectively, the latter being integral with a common support plate **64** mounted on the ski behind heel-piece **2**. Part **60** is generally triangular in shape, and one of its rounded tips **55** is kept in permanent contact with the rear face of the heel-piece. Part **61** is L-shaped, one end of an arm **66** thereof carrying an axis **66'** to which is hooked one end of a tension spring **67**, the other end being hooked to a stationary axis integral with the ski. Free end **69** of the other arm of the L-shaped part is rounded and is in contact with a concave side **70** of part **60** facing tip **65**.

When the heel-piece is in the "forward" position shown in full lines in FIG. **8**, spring **67** urges part **61** upwards (as seen in the drawing) and end **69** of part **61** tends to rock part **60** downwards, applying tip **65** to the heel-piece with a specific force, the longitudinal component of which is indicated at **71**. Thus the heel-piece, stopped in the forward direction, has imparted to it a longitudinal thrust **71**. When the binding returns to its rearward position, shown in broken lines, under the action of a force **72** greater than the said thrust **71**, it pushes back part **60**, the concave side of which causes part **61** to pivot downwards — in FIG. **7** — thus stretching spring **67**. Concave ramp **70** on part **60** is calculated in such a manner that for any given position of heel-piece **2**, longitudinal component **71** of the force acting upon the said heel-piece has a constant value.

In FIGS. **10** and **11**, heel-piece **2** may slide on a bracket **80** fixed to ski **1**, by means of a system of slides of any appropriate type, for instance, a dove-tail system.

The compensating device is located behind the heel-piece in a housing **81** attached to the ski and equipped at the top with a longitudinal guiding slide **82** in which a rack **84** may slide in the direction of double arrow **83**, the said rack carrying, at the end emerging from the housing, a rod **85** in constant contact with the rear face of the heel-piece.

The said rack engages with a toothed sector **86** turning freely on a horizontal axis **87** running perpendicularly to the longitudinal axis of the ski, and mounted in a bracket **88** attached to the ski. A compression spring **90** presses against the chord or flat part **89** of the toothed sector, the axis of the said spring being parallel with the longitudinal axis of the ski, and the said spring being located in a tubular sleeve **91** attached by its rear end **92** to the rear wall of housing **81**, the rear end of the said spring thus resting against housing **81**. Towards its forward end, the said sleeve exhibits a slot **43** extending in the form of a generatrix and providing a free passage for the rotary motion of the toothed sector.

When the heel-piece is in its "forward" position, i.e. up against the forward stops as shown in FIG. **10**, the toothed sector is arranged in such a manner that chord **89** is not perpendicular, as shown in FIG. **10**, in relation to the axis of spring **90**. As a result of this, the said spring, which may be in spot contact with the chord, imparts at all times a torque to the toothed sector, the latter transmitting to the rack and to heel-piece **2** a forward thrust.

It is to be understood that the arrangement illustrated is a schematic example only, and that some other system of contact between the toothed sector and the spring is conceivable.

When the heel-piece is stopped in its "forward" position, as shown in FIG. **10**, spring **90** rests at A against the chord and imparts to the toothed sector a thrust **94** which produces an opposing force **95** acting on rack **84** and therefore on heel-piece **2**.

In the "rearward" position illustrated in FIG. **11**, resulting from a force **96** acting upon the heel-piece, superior in value to force **95**, the heel-piece pushes rack **84** back, causing toothed sector **85** to pivot in a clockwise direction, and thus compressing spring **90**. Thus, point of contact B between the latter and chord **89** is spaced from pivot axis O of the toothed sector **86**; in other words, distance OB is greater than distance OA. Thrust **97** exerted by the spring on the sector is superior to force **94**, but since sector **86** has pivoted, and since the distance between the point of application of this thrust and axis O has altered simultaneously, opposing force **95** transmitted by the toothed sector to the rack remains at a practically constant value, the said force being transmitted directly to heel-piece **2**.

In FIGS. **12** and **13**, the heel-piece **2** may slide on its lateral tongues **4** in slides **5** integral with a bracket **6** attached to ski **1**. Bracket **6** extends to the rear of slides **5**, forming a plate on which a part **100**, pivoting about a vertical axis **101** integral with the ski, may slide. In the front, a curved slot **102** is cut into part **100**, the said slot co-operating, when part **100** pivots, with another curved slot **103** cut into the rear part of bracket **6**, these two slots co-operating via a vertical axis **104** provided in a head **105** located between the ski and the bottom surface of bracket **6** and free to move in slot **103** in the direction of double arrow **106**.

The rear portion of pivoting part **100** has a convex ramp **107** co-operating with a roller **108** mounted on the head **110** of a telescopic support **109** extending approximately parallel with longitudinal axis XX' of the ski, base **111** of which is integral with a seat **112** attached to the ski. The head of the said telescopic support is extended by a rod **113** sliding in a cylinder **114** drilled from end to end and pertaining to base **111**. A compression spring **115** abuts against a flange on the head and base **111**. As in the case of the telescopic supports in FIGS. **1** to **5**, the compression travel of the support may be limited by contact between an expanded part **116** on the head and cylinder **114**.

When the heel-piece **2** is in the "forward" position, shown in FIG. **12**, the spring exerts a thrust **117** on part **100** which is pivoted forward and presses axis **104** against the rear of heel-piece **2**, thus providing an opposing force, component **118** of which is parallel with axis XX' of the ski.

Under the action of a force **120** causing the heel-piece to move towards the rear, the said heel-piece pushes axis **104** backwards, which causes part **100** to rock in a clockwise direction. Ramp **107** thereof compresses telescopic support **109**, whereupon the spring exerts a reaction **117'** greater than thrust **117** on part **100.** But since axis **104** has simultaneously moved away from axis **101** of part **100**, component **118** of the opposing force exerted by axis **104** on the heel-piece is almost equal in value to component **118** in FIG. **12.**

Slots **102** and **103** and ramp **107** keep opposing force **118** constant by reason of their shape and arrangement. Variations in compression of spring **115** and/or variations in the position of the heel-piece thus subjecting the latter at all times to the same opposing force.

It is to be understood that this present description is not restrictive, and that additions and modifications could be applied without thereby departing from the scope of the invention.

Thus, in one form of execution not shown, the resilient device might consist of a lever pivoting about an axis integral with the ski, the said lever being subjected, at one end, to the action of a spring, while the other end constantly abuts against the longitudinally moving part of the binding.

The said resilient device might also comprise a lever pivoting about an axis integral with the ski, the said lever being subjected to the action of a spring acting upon the longitudinally mobile part of the binding via two conjugate profiles, one pertaining to the said lever and the other to the moving part of the binding, a part having a good coefficient of friction being interposed between the two conjugate profiles.

What I claim is:

1. A safety ski binding mounted on a ski and comprising: slides rigid with the ski and parallel to the longitudinal axis of said ski; a movable member slidably mounted in said slides for guided motion in the longitudinal axis of said ski, said member carrying a boot-retaining jaw; a fixed structure integral with said ski and arranged apart from said movable member; and a resilient unit, including at least a spring, said unit being arranged between said fixed structure and said movable member, and forming an angle relative to said longitudinal axis of said ski, said unit exerting on said movable member a thrust oriented at an angle relative to said longitudinal axis, said angle increasing as the force of the spring increases so that said unit exerts on said movable member an opposite action of substantially constant value, regardless of the longitudinal travel of the said movable member.

2. A safety ski binding as claimed in claim **1**, wherein said movable member is displaceable along the slides between a forward and a rearward position, said slides including stops for the movable member at least in the forward position.

3. A safety ski binding as claimed in claim **1**, wherein said resilient unit includes a compression spring which is subjected to be compressed during the motion of the movable member from said forward position to said rearward position.

4. A safety ski binding as claimed in claim **1**, wherein the axis of said resilient unit is kept in a straight line and is concurrent with the longitudinal axis of the ski.

5. A safety ski binding as claimed in claim **1**, wherein the resilient unit comprises rotatable means arranged between said fixed structure and said movable member, said spring applying its force on said rotatable means.

6. A safety ski binding as claimed in claim **5** wherein said rotatable means are connected on the one hand to the fixed structure and on the other hand to the movable member.

7. A safety ski binding as claimed in claim **6**, wherein said spring extends between said rotatable means.

8. A safety ski binding as claimed in claim **6**, wherein said rotatable means are connected together by a telescopic support having a rectilinear axis, said telescopic support being surrounded by a compression spring, said support having end flanges against which the ends of the said spring abut.

9. A safety ski binding as claimed in claim **8**, wherein one rotatable means is articulated in a pivoting manner to a pivot fixed to the ski and spaced laterally from the longitudinal axis thereof, whereas the other rotatable means is articulated about a pivot integral with the movable member and located in the vicinity of the longitudinal axis of the ski.

10. A safety ski binding as claimed in claim **8**, wherein the telescopic support comprises a cylinder and a rod sliding therein, the rearward travel of the movable member being limited by the stop formed by the head of the rod against the cylinder.

11. A safety ski binding as claimed in claim **8**, wherein two telescopic supports having rectilinear axes are arranged on each side of the longitudinal axis of the ski, each being surrounded by a spring, the rear ends of the said supports pivoting on fixed pivots laterally spaced from the longitudinal axis of the ski, whereas the front ends of the said supports pivot on pivots integral with the movable member and located in the vicinity of the longitudinal axis of the ski.

12. A safety ski binding as claimed in claim **11**, wherein the telescopic supports are identical and are arranged symmetrically with the longitudinal axis of the ski, the two springs having the same characteristics.

13. A device according to claim **6**, characterized in that the compression spring is arranged approximately perpendicularly to the longitudinal axis of the ski and within the movable member, the said spring acting upon at least one retractable element located within the said movable member; and in that the said spring urges the said element laterally outwards, causing it to co-operate with a cam profile integral with the ski and extending longitudinally.

14. A device according to claim **13**, characterized in that the distance between the cam and the longitudinal axis of the ski decreases progressively from front to rear.

15. A device according to claim **14**, characterized in that the spring is compressed between two opposing retractable elements respectively co-operating with a cam profile, the two cam profiles being symmetrical with the longitudinal axis of the ski.

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