United States Patent [19]

Weg

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[45] **June 19, 1973**

[54] **SKI BINDING**

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[22] Filed: **May 6, 1971**

[21] Appl. No.: **140,730**

[52] **U.S. Cl.** ..... **280/11.35 T**

[51] **Int. Cl.** **A63c 9/08**

[58] **Field of Search** ..... 280/11.35 D, 11.35 R, 280/11.35 T, 11.35 Z, 11.35 H, 11.35 B, 11.35 C, 11.35 K

[56] **References Cited**

UNITED STATES PATENTS

3,271,040	9/1966	Spademan	280/11.35 T

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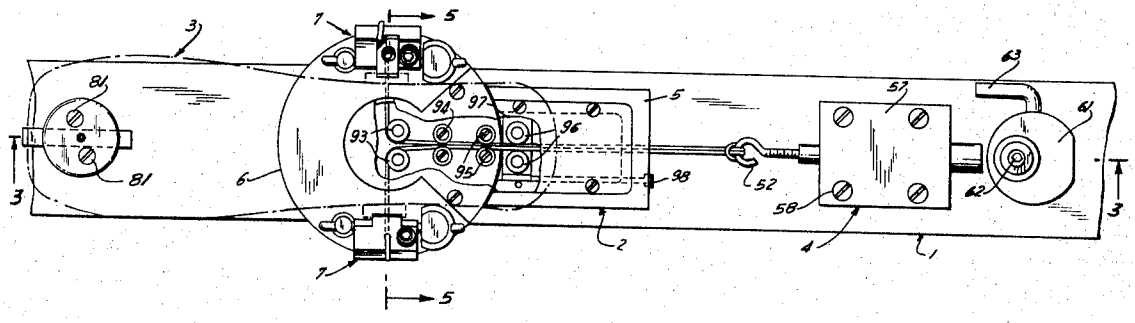
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Assistant Examiner—Milton L. Smith
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[57] **ABSTRACT**

A safety ski binding where opposing forces of at least two springs provide not only for release of the ski boot upon application of excess force, but ejection of the boot from the binding.

7 Claims, 6 Drawing Figures



PATENTED JUN 19 1973

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SHEET 1 OF 3

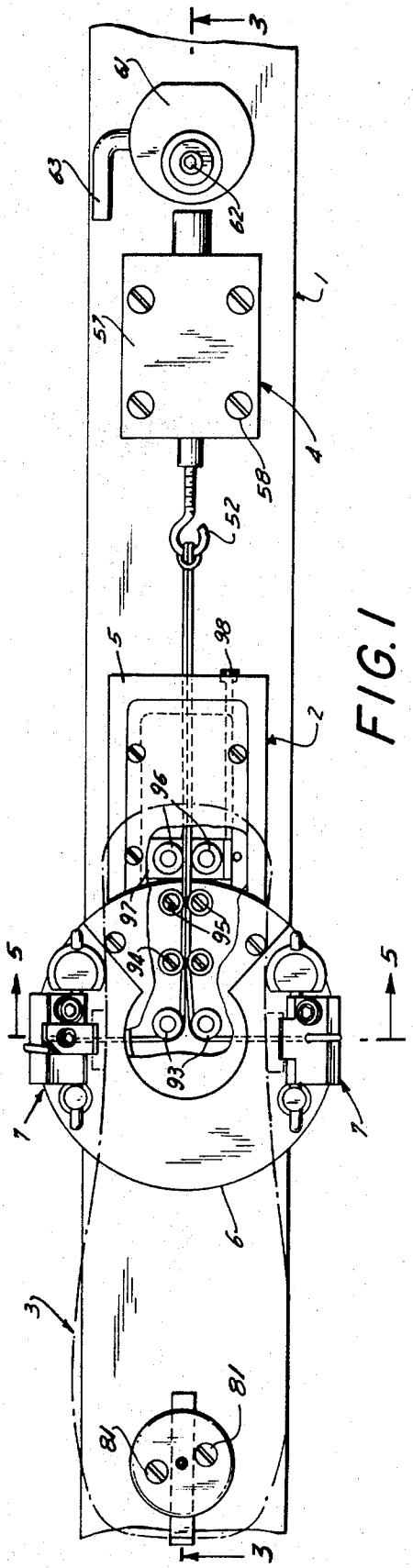


FIG. 1

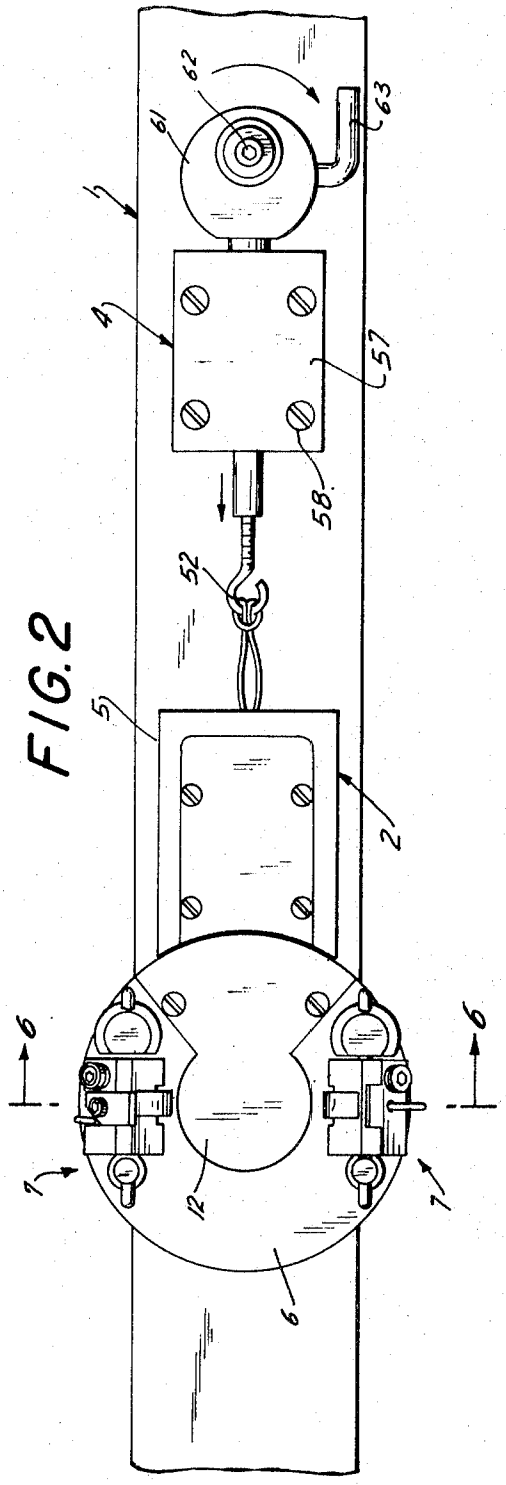


FIG. 2

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FIG. 4

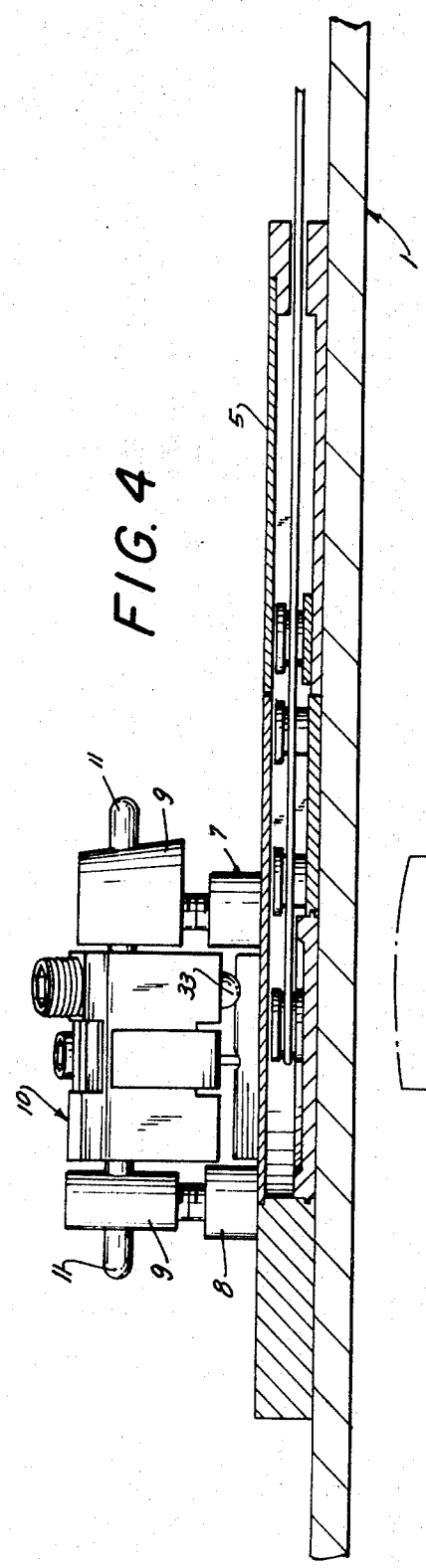
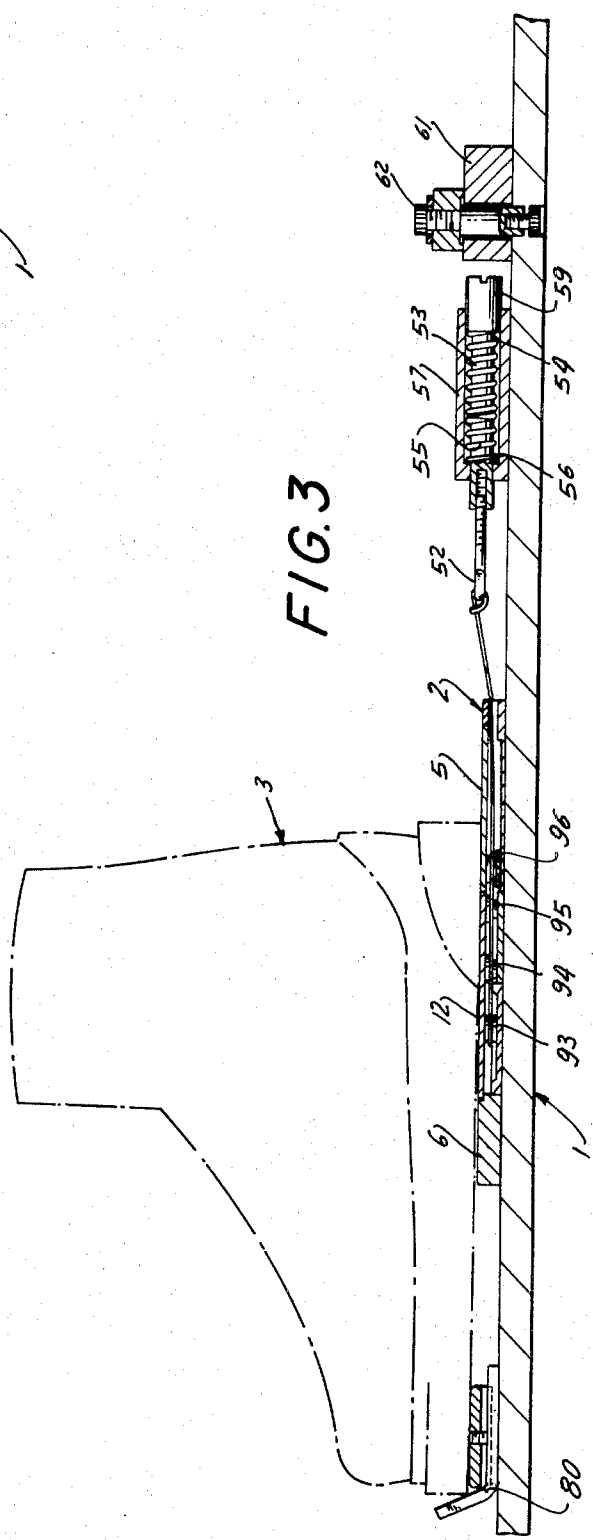


FIG. 3



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FIG. 5

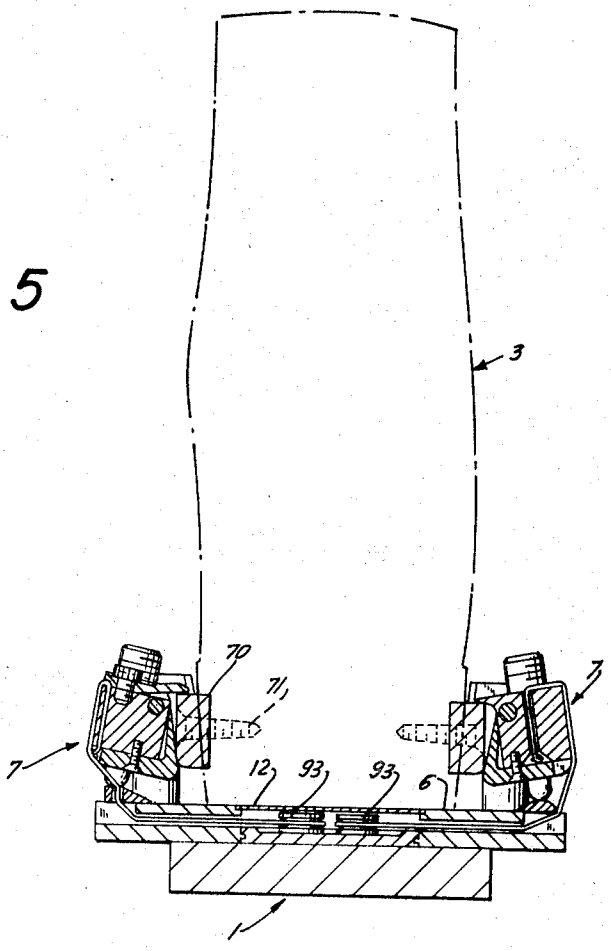
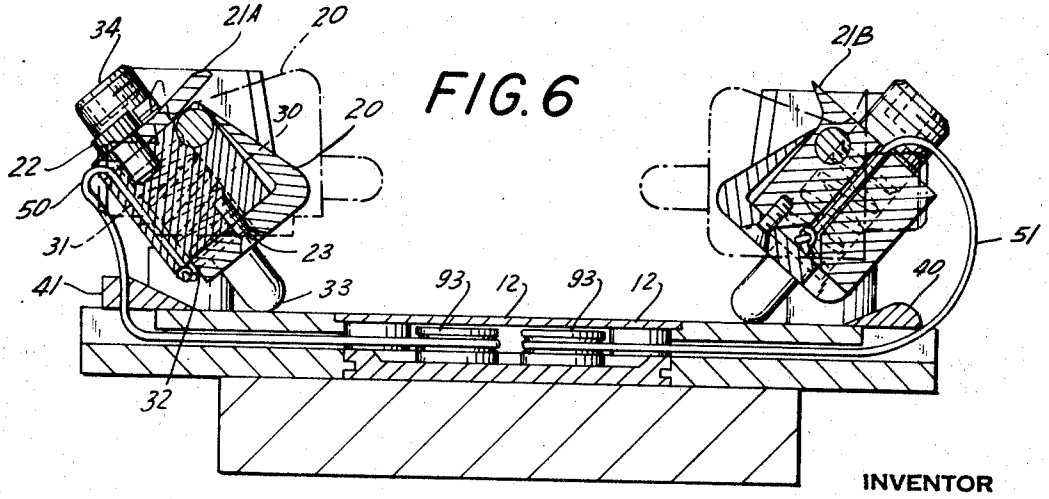


FIG. 6



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SKI BINDING

BACKGROUND OF THE INVENTION

With the increasing popularity of skiing, a proliferation of safety bindings for skis have been developed. In a large number of these bindings, the toe and heel of the boot are, in some manner, releasably held to the ski. An application of excess forced by either twisting or upward movement of the boot, causes unlocking at the toe, or at the heel, of the boot.

However, because of the manner of holding the ski to the boot, and the proximity of the boot to the ski, frequently mere unlocking of the boot does not free the boot from the ski and the danger which these safety bindings are meant to ameliorate, namely, damage to the skier's limb, is not ameliorated because the boot remains in contact with the ski and the skier's limb is affected by the force which caused the boot to twist or move upward in the first instance.

More recently safety bindings for skis have been developed where the boot is clamped along the instep, rather than near the heel. However, these bindings react in the same manner as those which bound the heel, in that the boot is merely released through application of excess force. An example of a binding of this type is shown in U.S. Pat. No. 3,271,040 — Spademan where wings clamp along the instep of the boot, the wings being connected to a cable which is further connected to compression springs. The compression springs and linkages hold the wings in clamping position, while an excess force exerted on the clamping wings overcomes the springs and releases the boot.

SUMMARY OF THE INVENTION

In accordance with the present invention, a safety binding for skis has been developed where the boots are not only releasably secured to the ski, but, additionally, are actually ejected at the time of release so as to positively separate the boot from the ski. In this manner, when there is sufficient twisting motion of the boot relative to the ski, a sufficient upward movement of the boot relative to the ski, or sufficient force exerted by any combination of these two motions, the clamps not only unlock the boot, but act to separate the boot and the ski. Thus, the dangers which initiated the movement are overcome and injuries to the skier's limbs are significantly reduced.

Briefly, this new effect is accomplished by spring loading the clamps against the boot in the locking position, while the clamps are simultaneously acted upon by a second spring action which acts in a direction to overcome the force of the first spring action. The forces of the springs are so adjusted that a predetermined level of force is required to overcome the action of the first spring and allow the second spring action to control the clamps. When the second spring action is allowed to so act, the clamps are forcibly returned to an unlocked position and act to move the boot away from the ski, thus providing a forcible ejection.

DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a plan view of a ski equipped with a safety binding of the present invention, in locked position, with the boot shown in phantom;

FIG. 2 is a plan view, as in FIG. 1, with the binding in an unlocked position;

FIG. 3 is a sectional view along the line 3—3 of FIG. 1;

FIG. 4 is an enlarged view of the clamp shown in FIG. 3;

FIG. 5 is a view along the line 5—5 of FIG. 1; and

FIG. 6 is a view along the line 6—6 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and particularly FIGS. 1 and 2, a ski 1 is shown with a safety binding 2 holding a boot 3. The binding is formed in, essentially, two pieces, the actual clamping mechanism 3 and a spring loading mechanism 4.

The clamping mechanism 3 includes a base 5 to which is attached a rotatable member 6, pivoted at 12 to the mechanism 3. On the rotatable member 6 two clamps 7 are securely fastened.

The clamps 7 are best seen in FIGS. 4, 5 and 6. The clamps include mounting pedestals 8 to each of which is threadably secured a journal 9. A boot locking member 10 is held within journals 9 by means of shafts 11.

Each boot locking member 10 includes a shoulder 20 and a locking lip 21*a*, 21*b*. Locking lip 21a may be adjusted for varying boot sizes, as illustrated in FIG. 6, by slidably attaching it to the body of the boot locking member and threadably attaching the locking lip by screw member 22. Such a construction may also be employed for the opposite locking lip 21b, but this is not required. If desired, the shoulder 20 may be formed as a piece separate from the main body of the boot locking member and attached to this member by threaded means 23.

Within a hollow portion 30 of the boot locking member 10 a compression spring 31 is placed. This spring bears against the head 32 of a lug 33 which extends through the bottom of the boot locking member 10. Adjustment of the compression exerted by the lug 33 is obtained through threaded member 34 which bears against the opposite end of the compression spring 31.

Also formed on the rotatable member 6 are cam surfaces 40 and 41, generally adjacent the boot locking members 10. These cam surfaces are so located that when the boot locking members are rotated into an upright, locking position as shown in FIG. 5, the lugs 33 are adjacent an upper flattened portion, or slightly beyond the peak of the cam member.

Cables 50 and 51 are secured to the two boot locking members. As illustrated in FIG. 1, these two cables may be, merely, opposite ends of a single cable. The ends of the cables 50 and 51 are secured to a threadably adjustable member 52, or other means for holding the cable securely. In order to prevent binding of the cables, and to assure smooth bending and movement of the cables, guides 93, 94, 95 and 96 are provided within base 5 secured to the ski.

The threadably adjustable member is threadably secured to shaft 53. A shoulder 54 is formed on shaft 53, the shoulder bearing against compression spring 55. The opposite end of spring 55 bears against the inner surface 56 of compartment 57 which is formed, merely, to cover the spring and prevent its inactivation, as by packed snow, etc. Compartment 57 may be held to the ski as by screw members 58.

An end 59 of shaft 53 extends to and beyond the rear of compartment 57. This end 59 may be acted upon by the straight surface 60 of cam member 61. Cam mem-

ber **61** is rotatably secured to the ski as by means **62** and is actuated by means of handle **63.**

As best seen in FIG. **5,** boot **3,** which is secured in the binding, is provided with bearing plates **70** preferably firmly secured to the boot, as by screw members **71.** In addition to the ski binding described, if desired, a toe plate **80** may be secured to the ski as by screw members **81.**

In operation, the binding is placed into an unlocked position as illustrated in FIG. **2,** through rotation of cam member **61** so as to move shaft **53** against the action of compression spring **55.** It will be appreciated that through a slight rearrangement of parts, a tension spring might be substituted for this compression spring, which would then be deactivated. Deactivation of the spring causes relaxation of cable **50,51,** and allows for easier insertion of boot **3.**

The skier, wearing the boot, aligns the bearing plates **70** with the boot locking members **10** and then steps down on the boot. If a toe plate **80** is provided, the toe of the boot is first placed against this toe plate and the skier then steps down.

The action of the skier stepping down causes the bearing plates **70** to ride on the shoulders **20,** which causes rotation of the boot locking members **10** within journal **9.** As this rotation continues, lugs **33** ride up cam surfaces **40** and **41** to the top, or slightly beyond the crest, of these cam surfaces. Upon reaching that position, locking lips **21a** and **21b** lock over bearing plates **70,** as best seen in FIG. **5,** while springs **31** urge lugs **33** against the cam surface to prevent movement of boot locking members **10.**

With the boot **3** held firmly in place by lips **21a** and **21b** of boot locking members **10,** cam member **61** is rotated to the locked position, as illustrated in FIG. **1,** allowing the shaft **53** to move to the right, as illustrated in the figures, under the urging of spring **55.** This movement places cable **50,51** under tension and provides a spring force, the tendency of which is to return boot locking members **10** to the unlocked position. However, sizing and adjustment of springs **31** and **55,** and sizing of cams **40** and **41,** are such as to provide a stronger locking, than unlocking force.

If an unusual force is applied through the leg of the skier to the boot, an upward movement on the boot can be created. Such a movement tends to rotate boot locking members **10** into an unlocked position, against the force of springs **31** and lugs **33** on cams **40** and **41,** that force being transmitted by bearing plates **70** against locking lips **21***a* and **21***b.* If the force transmitted by this boot movement, added to the force of spring **55** on cable **50,51** is more than the force exerted by springs **31** against lugs **33** and thereby on cams **40** and **41,** the boot locking members will start rotation to the unlocked position. When the lugs no longer exert a force on the cams **40** and **41,** the only force operative on the boot locking members **10** is that of spring **55,** through cables **50,51.** As this force is suddenly allowed to actuate when the lugs no longer exert substantial force against the cams, it causes a sudden movement of the boot locking members **10** to the unlocked position, thus causing a force to be transmitted by shoulders **20** to bearing plates **70** and an ejection of the boot from the ski binding.

The sequence just described for an upward movement of the boot also occurs if there is a sufficient twisting of the boot relative to the ski. Such a twisting causes rotation of member **6** and, in effect, causes a shortening of at least one of cables **50,51,** depending upon the direction of rotation. This effective shortening causes movement of threadably adjustable member **52** to draw shaft **53** to the left, as viewed in the drawings, thus increasing the force exerted by spring **55.** When this force becomes sufficient, it will overcome the force exerted by lugs **33** on cams **40** and **41** and will eject the boot in the same manner as just described for an upward movement of the boot.

The amount of twisting motion which will cause ejection of the boot in the manner just described can be controlled by certain adjustments to the binding of the present invention. For example, guides **96** are mounted on plate **97.** This plate can be moved horizontally within the binding, to the left and right as viewed in FIG. **1,** by means of adjusting screw **98.** Bringing plate **97** closer to rotatable member **6** provides for unlocking and ejection of the boot at a lesser angle of twist. As the plate **97** is moved further from the rotatable member **6,** increasingly greater angles of twist are required to unlock and eject the boot. Additionally, guides **93, 94** and **95** may be moved closer to or further from the rotatable member, by providing suitable openings to accommodate these guides, with similar results. However, this last method of adjustment does not provide for the same fine control as use of adjusting screw **98.**

Should the skier have completed a run, or otherwise wish to remove the boot from the ski, this may be easily accomplished. With the skier in a normal, upright position, either of the locking members **7** may be pried to an unlocked position employing the end of the ski pole. The locking members then pivot to the full line position of FIG. **6,** so that the boot may be easily removed from the ski.

The unlocked position of the locking member **7** is best seen in FIG. **6,** in full line. When the locking members **7** reach this position, they are no longer held in place by the cams **40** and **41.** However, the force of spring **55** is such as to continue motion of these locking members **7** to the dotted line position of FIG. **6,** where there is actual ejection. Of course, the cams **40** and **41** can be made replaceable and cams of different configurations and slopes can be substituted to provide more or less locking action.

The bearing plates **70** shown attached to the instep of the boot are shown as individual plates. If desired, a single U-shaped plate may be substituted for the two plates. The U-shaped plate would be fastened to the sole of the shoe, though fastening to the side of the instep may still be used.

Thus, an improved ski binding has been illustrated where the binding not only releases the boot from the ski upon application of sufficient force, but forcibly ejects the boot from the ski, thus providing for more protection of the skier's limbs. While the present invention has been described for purposes of illustration, the invention should not be considered as so limited.

I claim:

1. In a safety ski binding for a boot having bearing plates along the instep, the improvement which comprises:

a. a boot locking means provided with means to bear against the boot bearing plates upon release of the boot from the ski binding so as to eject the boot from the binding, and means to lock said boot bear-

ing plates so as to hold the boot against the ski prior to release;

b. first spring means within said boot locking means securing said boot locking means into a locked position;

c. second spring means having a force less than that of said first spring means and directed opposite the force of said first spring means, connected to said boot locking means.

2. The ski binding of claim **1** wherein said first spring means acts through lugs extending from said boot locking means, said lugs acting upon cam surfaces formed adjacent said boot locking means.

3. The ski binding of claim **2** wherein the force of said springs is adjustable.

4. The ski binding of claim **1** wherein said boot locking means are formed on a rotatable member, rotatably secured to said ski.

5. The ski binding of claim **1** wherein said second spring means is secured to said boot locking means by a cable.

6. The ski binding of claim **1** wherein means are provided to disable said second spring means.

7. The ski binding of claim **5** wherein means are provided to vary the effect of the cable.

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