United States Patent

[11] **3,560,011**

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[21] Appl. No. **769,628**
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[45] Patented **Feb. 2, 1971**

[54] **SAFETY BINDING MECHANISM**
6 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **280/11.35**
[51] **Int. Cl.** **A63c 9/08**
[50] **Field of Search** 280/11.35

[56] **References Cited**

UNITED STATES PATENTS

2,026,084	12/1935	Elster	280/11.35(TA)
2,338,249	1/1944	Jansen	280/11.35(H)
3,140,877	7/1964	Spademan	280/11.35(HA)
3,170,702	2/1965	Beier	280/11.35(AA)
3,271,040	9/1966	Spademan	280/11.35(HA)

FOREIGN PATENTS

1,015,728	12/1957	Germany	280/11.35(LB)

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ABSTRACT: An improved stability safety binding of the type in which all degrees of movement of a ski boot relative to a ski are releasably resisted without requiring the use of a toe fastening device. A unitary safety release mechanism spring-biases upwardly and inwardly directed clamping arms into engagement with flanges at the sides and rear of the ski boot. The rear clamp resists rearward longitudinal movement of the boot, and the side clamps are inclined in an outwardly and rearwardly direction to resist forward longitudinal movement of the boot.

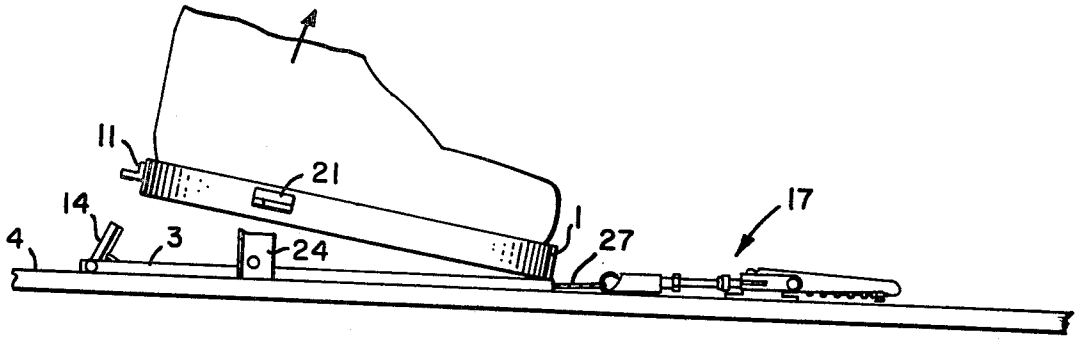


FIG. 1

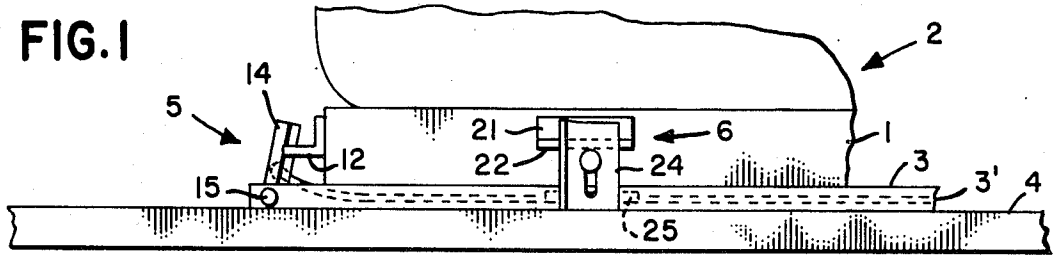


FIG. 2

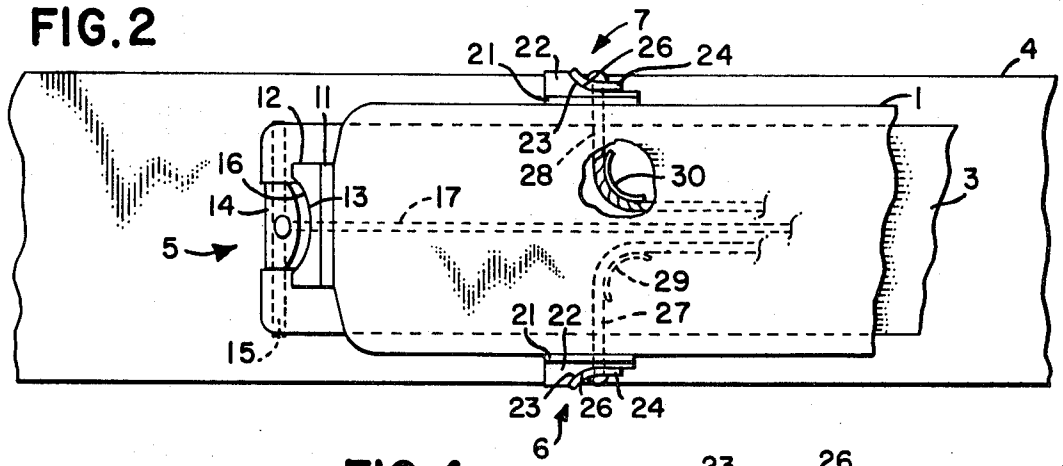


FIG. 4

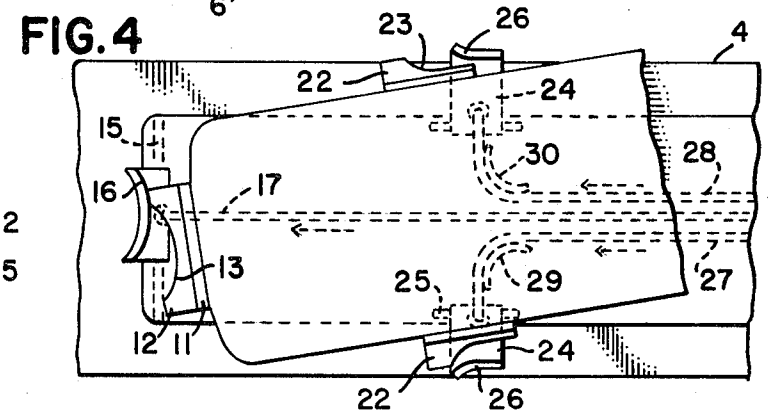


FIG. 3

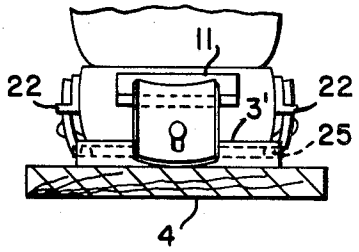
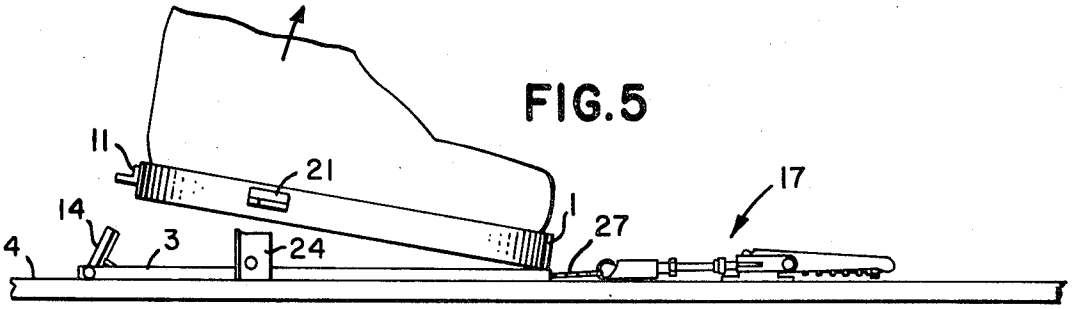


FIG. 5



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SAFETY BINDING MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to safety bindings of the type disclosed in my U.S. Pat. Nos. 3,140,877 and 3,271,040 in which all degrees of movement of a ski boot relative to a ski, namely longitudinal, lateral, twisting, and heel-lifting movement, are releasably resisted without requiring the use of a toe-fastening device. Such a construction not only reduces the costs in view of the resulting simplification and reduction in the number of parts, but also reduces the risk of ankle injury resulting from acute dorsiflection of the ankle when the toe of the boot encounters an impediment to forward movement during an impending downhill fall condition.

In the specific structures disclosed in the above patents, the safety binder mechanism engages the ski boot either at the rear of the boot only or at the side of the boot. It has been found that such constructions can require a rather high degree of precision in tolerances and alignment of parts in order to achieve good mechanical stability in view of the close spacing of the various contacting surfaces used to resist the different degrees of movement of the ski boot.

SUMMARY OF THE INVENTION

In accordance with the present invention, a ski binding of the foregoing type is provided in which the safety release mechanism engages the ski boot at both the sides and rear for improved stability.

DESCRIPTION OF THE DRAWINGS

The various objects, features, and advantages of the present invention will become more apparent upon a consideration of the following description, taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevational view of the rear portion of a ski boot affixed to a ski by a safety binding in accordance with the present invention;

FIG. 2 is a top plan view of the ski boot sole, ski and safety binding of FIG. 1, the remainder of the ski boot having been removed for clarity of illustration;

FIG. 3 is a rear elevational view of the rear of the ski boot, ski and safety binding of FIG. 1;

FIG. 4 is a top plan view of the ski boot sole, ski, and safety binding of FIG. 1, shown as disengaging due to the twisting force of the ski boot; and,

FIG. 5 is a side elevational view of the ski boot, ski and safety binding of FIG. 1 shown as disengaging due to the heel-lifting force of the ski boot.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, the sole 1 of a ski boot 2 rests on a plate 3 secured to the top of a ski 4. Longitudinal, lateral, twisting and heel-lifting movement of the boot 2 relative to the ski 4 are releasably resisted by a safety binding including a mechanism 5 engaging the rear end of the sole 1 and mechanisms 6 and 7 engaging the sides of the sole 1. The side mechanisms 6 and 7 are, in general, located to the rear of the point of application of heel-lifting force on the boot which point is to the rear of the boot toe by an amount which varies with the flexibility of the sole. Typically, with usual boot construction, this point is adjacent the ball of the skier's foot.

In the rear mechanism 5, a plate 11 is secured to the heel end of the sole 1 by screws or other suitable means. A protuberance, or outwardly directed flange 12 of the plate 11 is provided with a concave female surface 13 which is generally symmetrical with respect to the longitudinal axis of the boot 2. An upstanding clamping member or arm 14 is pivotedly secured for rotation about a transverse pin 15 attached to the plate 3. The arm 14 is provided with a convex inwardly directed male surface 16 which is generally symmetrical with respect to the longitudinal axis of the ski 4. Pivoting of the arm 14 about the pin 15 is controlled by a cable 17 fixed at one end

of the arm 14 and at the other end to a conventional spring-loaded safety release mechanism 17 mounted on the ski 4 (see FIG. 5). In the engaged position, the mechanism 17 biases the arm 14 via the cable 17, into an upwardly and inwardly directed position with the convex surface 16 of the arm 14 bearing against the concave surface 13 of the boot flange 12 in the male-female relationship.

In each of the side mechanisms 6 and 7, a plate 21 is secured to the side of sole 1 by screws or other suitable means. A protuberance, or outwardly directed flange 22 of the plate 21 is provided with a female surface 23 which is concave on the rear half thereof only, whereby the flange 22 is tapered in a rearwardly and outwardly direction as seen in FIG. 2. An upstanding clamping member or arm 14 is pivotedly secured for rotation about a longitudinal pin 25 attached to each side of the plate 3. Each arm 24 is provided with a male surface 26 which is convex on the rear half thereof only, whereby the arm 24 is curved in a rearwardly and outwardly direction also as seen in FIG. 2. Pivoting of the respective arms 24 about their respective pins 25 is controlled by cables 27 and 28 which are fixed at one end to the arms 24 and are guided for a 90° change in direction about respective arcuate members 29 and 30, and are fixed at the other end to the unitary spring-loaded safety release mechanism 17 (see FIG. 5). In the engaged position, the mechanism 17 biases the arms 24 via the respective cables 27 and 28, into a position with the top portions of the arms 24 upwardly and inwardly direction directed and the partially convex surface 26 of the arms 24 bearing against the partially concave surface 23 of the boot 1 flange 22 in male-female relationship.

The upper surface of the plate 3 is spaced from the ski 4 by the arcuate members 29 and 30, and by the downwardly depending edge 3' of said plate, in an amount sufficient to protect the cables 17, 27, and 28 from being inoperative due to the weight of the skier. In addition, this raised plate 3 serves to raise the boot 2 in order to minimize the impediment presented to the forward movement of the boot 2 under safety release conditions. If further removal of such impediment to forward movement is desired, the release mechanism 17 may be mounted on the ski 4 rearwardly of the plate 3.

In operation, when the skier desires to mount the ski 4, the release mechanism 17 is unclamped whereby the tension on the cables 17, 27 and 28 is released and the ski boot sole 1 is placed with the sole flanges 12 and 22 adjacent the clamping arms 14 and 24 which are now pivoted outwardly due to the lack of tension in the cables. Next the release mechanism 17 is activated so that the respective clamping arms and adjacent boot flanges become engaged as shown in FIGS. 1, 2, and 3. The ski boot 2 then remains fixed to the ski 4 either until a premeditated release is accomplished by manual unclamping of the release mechanism 17, or until an impeding fall condition causes sufficient force to be transmitted to the safety binding for effecting safety release in a manner which will now be described in detail.

Under the engaged condition shown in FIGS. 1, 2 and 2 3, forward longitudinal movement of the boot 2 is resisted by the contacting of the outwardly and rearwardly curved portions of the engaging surfaces 23 and 26 of the slide mechanisms 6 and 7; rearward longitudinal movement of the boot is resisted by the contacting of the inwardly arcuate surfaces 13 and 16 of the rear mechanism 5; and lateral movement of the boot is resisted both by the contacting of the side mechanism surfaces 23 and 26 and by the contacting of the rear mechanism surfaces 13 and 16. When excessive force is transmittted by the boot to the binding, the clamping arms 14 and/or 24 transmit sufficient force through respective cables 17, 27 and 28 to overcome the spring bias of release mechanism 17.

Twisting movement of the boot is resisted both by the contacting of the surfaces 23 and 26 of the side mechanisms 6 and 7 and by the contacting of the surfaces 13 and 16 of the rear mechanism 5. When excessive twisting force is transmitted by the boot to the binding, the inwardly arcuate surfaces 23 of the side boot flanges 22 and the inwardly arcuate surface 13 of

the rear boot flange **12** cam over the conforming inwardly arcuate surfaces **26** and **16** of the respective pivotably mounted clamping arms **24** and **14** against the spring bias thereof, whereby the boot becomes free of the binding as seen in FIG. **4**.

Finally, heel-lifting movement of the boot is resisted by the upper and inward disposition both of the the contacting surfaces **13** and **16** of the rear mechanism **5** and of the contacting surfaces **23** and **26** of the side mechanisms **6** and **7**, the friction between these contacting surfaces being increased as the heel tends to lift. When excessive heel-lifting force is transmitted by the boot to the binding, the boot flange surfaces **23** and **13** cam upwardly over the conforming surfaces **26** and **16** of the respective pivotably mounted clamping arms **24** and **14** against the spring bias thereof, whereby the boot becomes free of the binding as seen in FIG. **5**.

It is apparent that various modifications of safety releasable clamping arms engageable with the ski boot may be used which have these required operational characteristics, including various such mechanisms described in the above-mentioned U.S. Pat. No. 3,271,040. Particularly it should be noted that the clamps may either pivot or slide into engagement with the boot, and that the boot may either have an attached engagement structure or the engagement structure may be built into the boot.

I claim:

1. A safety binding adapted to releasably resist longitudinal, lateral, twisting and heel-lifting movement of a ski boot relative to a ski without requiring the use of a toe-fastening device, comprising: means adapted to secure said ski boot to said ski at a point of engagement located forwardly of the rearward end of said ski boot and rearwardly of the point of application of heel-lifting force; means adapted to secure said ski boot to said ski at the rear of said ski boot; and safety release means coupled to said last two named means for releasing the engagement of said last two named means for releasing the engagement of said last two named means upon the transmission of excessive force by said ski boot.

2. A safety binding according to claim **1**, wherein: said first named engagement means resists the forward direction of longitudinal movement of said ski boot; and said second named engagement means resists the rearward direction of longitudinal movement of said ski boot.

3. A safety binding according to claim **2** wherein: said first named engagement means includes means on each side of said ski boot having an engagement surface which is inclined in an outwardly and rearwardly direction, and clamping member on each side of a said ski having a surface which conforms to said engagement surface and which is releasably mounted in and out of engagement with said engagement surface.

4. A safety binding mechanism according to claim **1**, wherein said second named engagement means includes: means providing an engagement surface on the rear of said ski boot; and a clamping member on said ski having an upwardly and inwardly directed surface which conforms to said engagement surface and which is releasably moveable in and out of engagement with said engagement surface.

5. A safety binding mechanism according to claim **4** wherein the said first named engagement means in claim **1** includes: means providing an engagement surface on each side of said ski boot; and a clamping member on each side of said ski having an upwardly and inwardly directed surface which conforms to said engagement surface and which is releasably moveable in and out of engagement with said engagement surface.

6. A safety binding mechanism according to claim **5**, including unitary means for releasably biasing each of said rear and side clamping members into engagement.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,560,011 Dated February 2, 1971

Inventor(s) Richard G. Spademan

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 17, "binder" should read -- binding --; line 18, after "at the side of the boot" insert -- only --. Column 2, line 1, "of" should read -- to --; line 14, "14" should read -- 24 --; line 27, cancel "direction"; line 29, cancel "1"; same line 29, "flange" should read -- flanges --; line 57, cancel "2", second occurrence; line 60, "slide" should read -- side --. Column 4, lines 1 and 2, cancel "for releasing the engagement of said last two named means"; line 13, before "said" cancel "a"; line 14, "mounted" should read -- moveable --.

Signed and sealed this 15th day of June 1971.

(SEAL)
Attest:

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Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents