April 20, 1965 D. MINISINI 3,179,434

SAFETY SKI DEVICE

Filed Oct. 2, 1962

Fig. 1

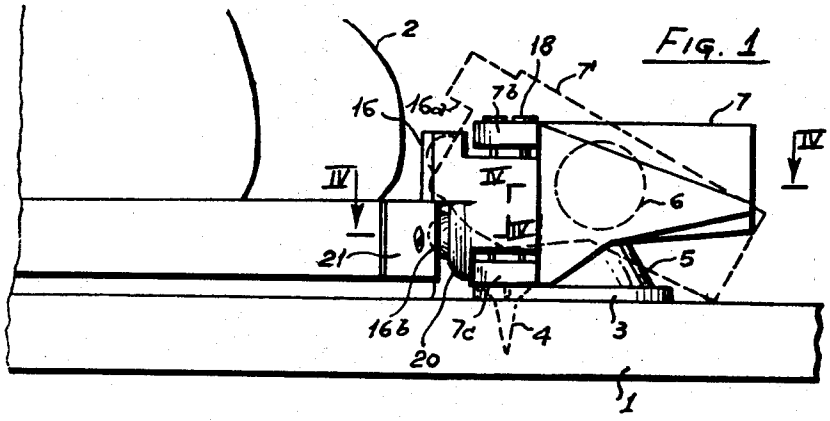


Fig. 2

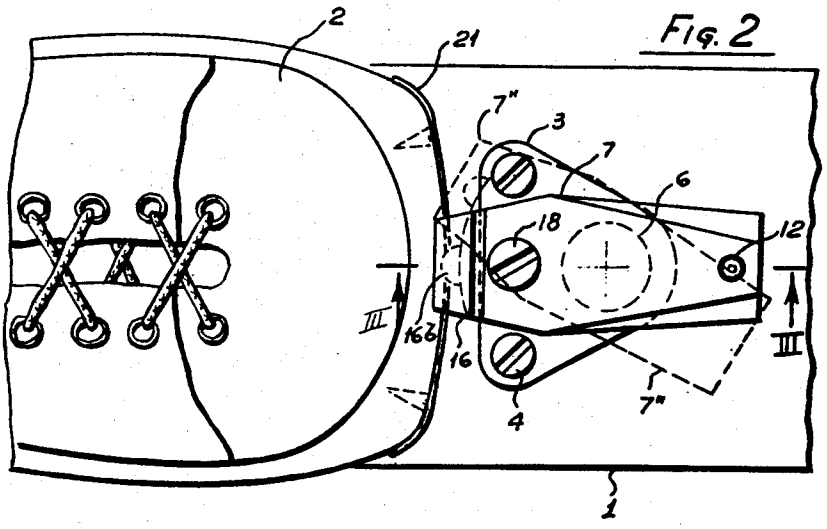
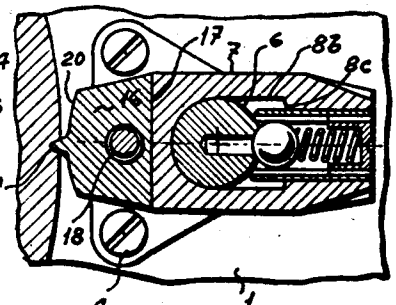


Fig. 4



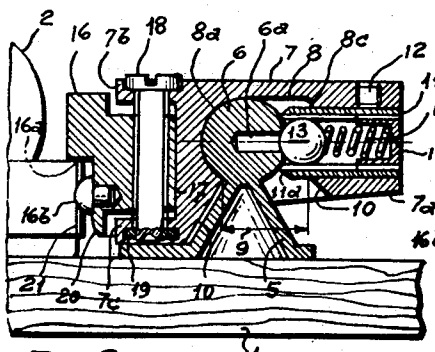


Fig. 3

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SAFETY SKI DEVICE

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This invention relates to safety ski bindings, and more particularly to a front attachment for the type of ski binding in which the heel of a boot is urged forward by a resilient cable arrangement separately fastened to the ski or by a resilient lever arrangement known per se.

Known front attachments intended for cooperation with resilient means urging a ski boot forward toward the front attachment provide an abutment for the front portion of the boot. The abutment is movable in a plane parallel to the top face of the ski while in engagement with the boot under transverse stresses exerted by the boot and exceeding a set maximum value. The boot may thereby escape from the binding to avoid injury to the skier under excessive lateral stresses.

I have found that the protection against injury provided by known safety bindings is inadequate if the stresses transmitted from the boot to the front attachment have a predominant component perpendicular to the top face of the ski. If the skis slip forward under a skier so that he falls backward, the known front attachments do not necessarily release the binding from the boot. Serious injuries to the foot or leg of the skier have resulted from such accidents.

An object of this invention is the provision of a front attachment for a safety ski binding of the type described, which permits disengagement of the boot from the ski under excessive stresses in any direction other than the direction of elongation of the ski.

Another object is the provision of a front attachment which releases the engaged boot when the undesired stresses exceed an adjustably predetermined value.

A further object is the prevention of boot release by stresses smaller than the predetermined value, regardless of the direction of the stress.

Other objects and many of the attendant advantages of this invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing in which like reference numerals designate like parts throughout the several figures, and wherein:

FIG. 1 shows a preferred embodiment of the front attachment of the invention assembled with relevant portions of a ski and a ski boot, the view being in side elevation;

FIG. 2 shows the assembly of FIG. 1 in plan view;

FIG. 3 shows a portion of the assembly of FIG. 2 in side-elevational section on the line III—III; and

FIG. 4 illustrates a modified embodiment of the invention in a sectional plan view corresponding to a section taken on the line IV—IV in FIG. 1.

Referring now to the drawing in detail, there is seen the central portion of an elongated ski **1** on the top face of which a boot **2** is attached. The resilient cable device which urges the illustrated front or toe portion of the boot **2** toward the right, as viewed in the drawing, has been omitted since it is well known in itself and not part of the invention. The two ends of the cable device are fastened to the ski forwardly of the front attachment and the center portion of the cable device is trained over the non-illustrated heel of the boot.

The front attachment, with which this invention is more particularly concerned, has a stationary portion and a

movable portion which are connected by a universal pivot of the ball-and-socket type. The stationary portion of the front attachment consists of a flange **3** attached to the top face of the ski **1** by screws **4**, of a conical standard **5**, and of a ball **6** integrally connected with the flange **3** by the standard **5**.

The movable portion of the front attachment includes a socket member **7** formed with a cavity **8** and with an outwardly flaring passage **10** which communicates with the cavity **8**. The ball **6** is received in the cavity **8** and a portion of the standard **5**, which has a cross section substantially smaller than that of the ball **6**, passes outward through the passage **10**.

The wall **8***a* of the socket member **7** in the cavity **8** is spherically curved to conform to the ball **6**. The remainder **8***b* of the cavity is approximately cylindrical about an axis parallel to the normal direction of forward movement of the ski **1** and has a radial end wall **8***c* about this axis. The passage **10** has an axial length **9** somewhat greater than the diameter of the ball **6** and a maximum width slightly greater than this diameter. The socket member **7** is thus universally rotatable on the ball **6** within the limits set by abutment of the standard **5** against the walls of the passage **10**, and may pivot in a vertical plane parallel to the direction of elongation of the ski into the position **7'** shown in broken lines in FIG. 1. Rotary movement in a normally horizontal plane is not restrained by the conical standard **5** and the socket member may move into the position **7''** shown in broken outline in FIG. 2.

A coaxial bore in the forward portion **7***a* of the socket member **7** communicates with the cavity **8**. An internally threaded cylindrical sleeve **11** is axially movable in the portion **7***a* and is axially fixed by a set screw **12** in such a manner that the annular rear edge of the sleeve **11** is slosely adjacent the front surface of the ball **6**.

A radial recess **6***a* in the ball **6** is normally axially aligned with the sleeve **11**. Its orifice is spherically flared for conforming engagement with a ball **13** which is axially slidable in the sleeve **11**. A plug **15** is threadedly received in the front end of the sleeve **11**. A recess in the radial rear face of the plug **15** abuttingly receives one end of the helical compression spring **14** the other end of which axially urges the ball **13** into engagement with the recess **6***a* of the ball **6**. The force of the spring may be adjusted by inserting a conforming key or a screw driver into a recess in the radial front face of the plug **15**, and by rotating the plug.

The rear part of the socket member **7** has two integral lugs **7***b*, **7***c* respectively arranged at a vertical distance from the flange **3** and near the flange. The lugs carry therebetween a threaded spindle **18** which is rotatable about its axis and secured against axial movement by a washer **19**. A boot engaging member **16** is threadedly mounted on the spindle **18**. The boot engaging member conformingly and slidably abuts against a flat rear face **17** of the socket member **7** which is perpendicular to the direction of elongation of the ski. The spindle **18** has a slotted head which may be rotated by means of a screw driver or suitable key to adjust the spacing of the engaging member **16** from the top face of the ski **1**. Rotation of the boot engaging member about the axis of the spindle **18** is prevented by the rear face **17**.

The boot engaging member **16** has a flat abutment face **16***a* spacedly parallel to the top face of the ski **1** for engagement with the projecting top of the boot sole. The lower portion **20** of the rear face of the boot engaging member **16** is approximately spherical about the center of the ball **6**. A round-headed pin **16***b* inserted in the center of the rear face portion **20** presents a face to the front edge of the boot sole for abutment in the direction of elongation of the ski **1**. The boot sole is reinforced

with a metal band 21 conformingly enveloping the front edge of the sole and having a central recess for receiving the head of the pin 16*b*.

The embodiment of the invention illustrated in FIG. 4 is identical with that illustrated in FIGS. 1 to 3, except for replacement of the round headed pin 16*b* by a rearwardly tapering integral projection 16*b'* which engages a shallow recess in the front edge of the boot sole under the pressure of the non-illustrated heel retaining cable.

The illustrated front attachment is assembled by slipping the socket member 7 over the ball 6 and then inserting the sleeve 11 of the resilient stop assembly until it partially obstructs the passage 10. The ball 13, spring 14 and plug 15 are then placed in the sleeve 15 and the socket member 7 is rotated on its ball pivot until the ball 13 registers with the recess 6*a* and further rotation of the socket member by forces insufficient to overcome the force of the spring 14 is arrested. The spring force may be selected at will over a wide range by choice of a suitable spring and by threaded movement of the plug 15 in the sleeve 11. The assembled front attachment is then mounted on the ski 1 by means of the screws 4 in fixed spatial relationship.

The front attachment is engaged with the boot as follows:

The boot is placed on the top face of the ski 1 so that the recess in the metal band 21 or in the front edge of the boot sole receives the pin 16*b* or the projection 16*b'*. The heel retaining cable is then tightened. The boot engaging member 16 is moved toward the top face of the ski by rotation of the spindle 18 until the flat abutment face 16*a* engages the boot sole from above.

During normal skiing, the boot 2 transmits to the front attachment forces which are substantially parallel to the direction of elongation of the ski, and the spherical front wall 8*a* of the socket member 7 is pressed against the corresponding surface portion of the ball 6. Under the influence of forces parallel to the top face of the ski, but inclined to the direction of elongation, the socket member 7 tends to rotate in a plane parallel to the top face of the ski. If these forces can overcome the force of the spring 14, the ball 13 is displaced from the recess 6*a* and the socket member rotates into the position 7'' (FIG. 2) whereby the boot 2 is released from the binding.

Forces acting in a plane parallel to the direction of elongation of the ski, but upwardly transverse to the top surface of the ski, are transmitted to the socket member 7 by the abutment face 16*a* but also partly by the head of the pin 16*b* or by the projection 16*b'*. When the last named forces can overcome the spring 14, the socket member 7 is pivoted upward into the position 7' (FIG. 1) and the boot is also released. The convexly spherical shape of the rear face portion 20 prevents abutting engagement of the boot and the rear face portion which might interfere with proper release of the boot from the binding.

The friction which exists between the front wall 8*a* in the socket member 7 and the cooperating surface portion of the ball 6 prevents displacement of the ball-and-socket pivot from its normal position under minor torsional stresses. It has been found that this engagement alone under the pressure of the forward component of stresses transmitted by the boot will normally prevent undesired release of the boot from the binding. Yet, lack of the forward component, as in an accident, reduces the contact pressure and the friction between the ball 6 and the socket member 7, and favors release of the boot 2. The adjustment of the spring tension thus is not usually critical and the front attachment usually performs adequately with only coarse adjustment of pressure in the resilient stop assembly. Critical adjustment, however, is available for racing and under similar exacting conditions. The sleeve 11 retains the ball 6 in the cavity 8 even in the event of mechanical failure of the spring 14.

The ball-and-socket connection of the invention provides equal resistance to relative movement of the boot engaging member 16 and of the ski 1 in all directions other than the direction of elongation of the ski. It maintains the boot engaging member in its normal operative position against minor stresses and avoids accidental release of the boot from the binding. The response of the front attachment to forces inclined relative to the direction of elongation can be adjusted where such adjustment is necessary. The boot engaging member 16 is adjustable in a direction toward and away from the top face of the ski but cannot rotate relative to the socket member 7, thereby making the front attachment insensitive to forces which may otherwise induce relative movement of the socket member and the engaging member.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What I claim is:

1. In a safety ski binding, a front attachment for cooperation with resilient means urging a ski boot forward toward said front attachment, the attachment comprising, in combination:

(*a*) a spherical pivot member formed with a recess therein;

(*b*) means for attaching said pivot member to the top face of a ski in fixed spatial relationship to the normal direction of forward movement of the ski;

(*c*) a unitary socket member formed with a cavity therein, and with an outwardly open passage communicating with said cavity,

(1) the cross section of said pivot member being smaller than the free cross section of said passage,

(2) said pivot member being received in said cavity, and said attaching means passing through said passage,

(3) said socket member having a spherical wall portion in said cavity rearwardly spaced from said passage and conformingly engaging said pivot member and

(4) another wall portion opposite said spherical wall portion and forwardly spaced from said passage, said other wall portion being spaced from said pivot member and formed with an opening therethrough extending in said normal direction;

(*d*) a tubular sleeve member mounted in the opening of said other wall portion and movable therein toward and away from a position in which said sleeve member restricts the free cross section of said passage and prevents outward movement of said pivot member through said passage;

(*e*) fixing means for fixing said sleeve in said position thereof;

(*f*) a stop member axially slidable in said sleeve member;

(*g*) resilient means in said sleeve member permanently urging said stop member to move axially in said sleeve member into engagement with said recess in said pivot member; and

(*h*) engaging means mounted on a portion of said socket member spaced from said spherical wall portion in a rearward direction for engagement with a front portion of said ski boot.

2. In a safety binding as set forth in claim 1, said sleeve member having an annular edge in said cavity, each portion of said edge being approximately equidistant from said pivot member when said sleeve member is in said position thereof.

3. In a binding as set forth in claim 1, said engaging means having a first abutment portion facing in a direc-

tion opposite to said normal direction of movement, and a second abutment portion spaced from the top face of a ski attached in said spatial relationship, and facing said top face.

4. In a binding as set forth in claim 3, means on said socket member for adjusting the spacing of said second abutment portion from said top face.

5. In a binding as set forth in claim 3, said engaging means having a rear face portion substantially spherical about the center of said ball pivot member, said first abutment portion being on said rear face portion.

6. In a binding as set forth in claim 5, said first abutment portion projecting from said rear face portion in said opposite direction.

References Cited by the Examiner

UNITED STATES PATENTS

3,027,173 3/62 Beyl ---------- 280—11.35

FOREIGN PATENTS

1,217,631 12/59 France.

A. HARRY LEVY, *Primary Examiner.*