United States Patent

[11] 3,596,920

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[54] **ADJUSTABLE SAFETY SKI BINDINGS**
3 Claims, 6 Drawing Figs.

[52] U.S. Cl. ..... 280/11.35 T
[51] Int. Cl. A63c 9/081
[50] Field of Search ..... 280/11.35 T

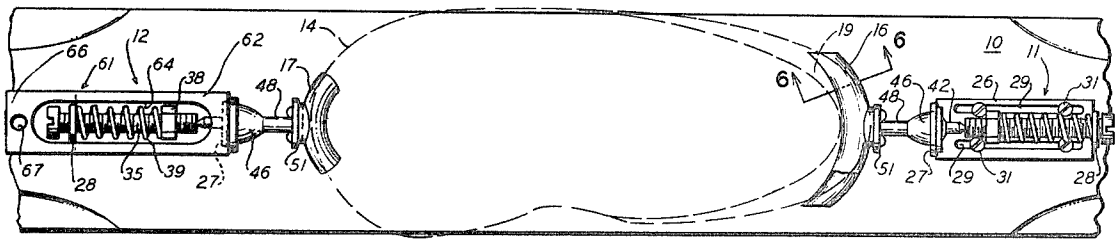
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Assistant Examiner—Robert R. Song
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ABSTRACT: Heel and toe binders are opposed on a ski and bear against the sole portions at heel and toe of a ski boot. The binders are substantially the same, each having a bracket sustaining an adjustable spring-loaded screw and a thrust member articulately joined to the screw. A universal joint on the thrust member is lodged in an arm of the bracket. A boot contact yoke is fastened to the thrust member. The yoke is adjustable perpendicular to the ski with respect to the thrust member. The yoke of the toe binder engages the top of the extending boot sole. The yoke of the heel binder engages the cable groove of the boot heel. Each binder yields to release the boot if pressure in excess of the spring loading on the thrust member impinges in either horizontal or vertical direction above the ski surface. The rear binder may have a horizontally extending lever which may be depressed at its rearward end by hand or by the ski pole to release the binding from the boot heel.



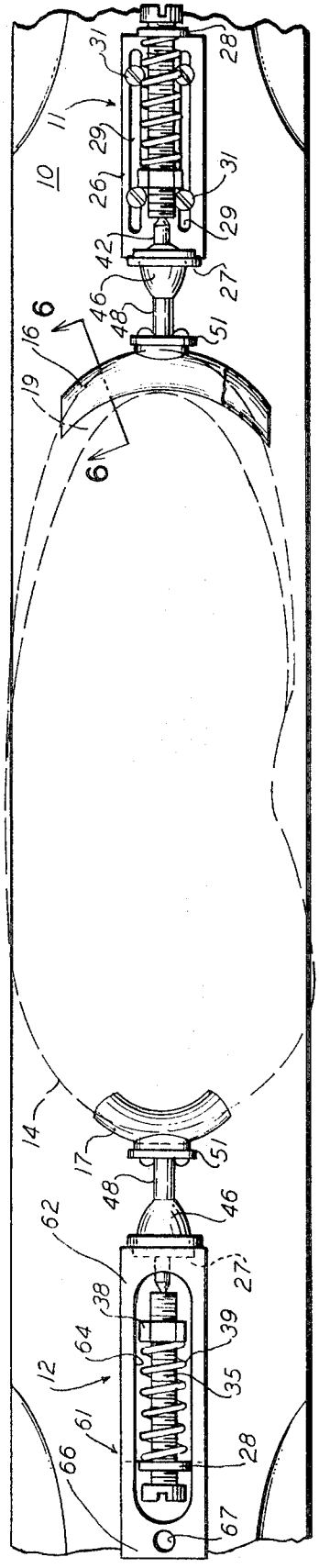


FIG. 1.

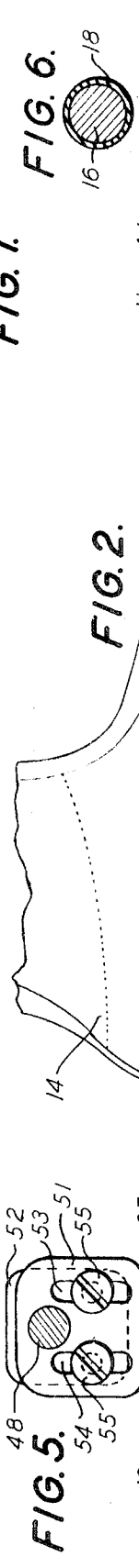


FIG. 6.

FIG. 2.

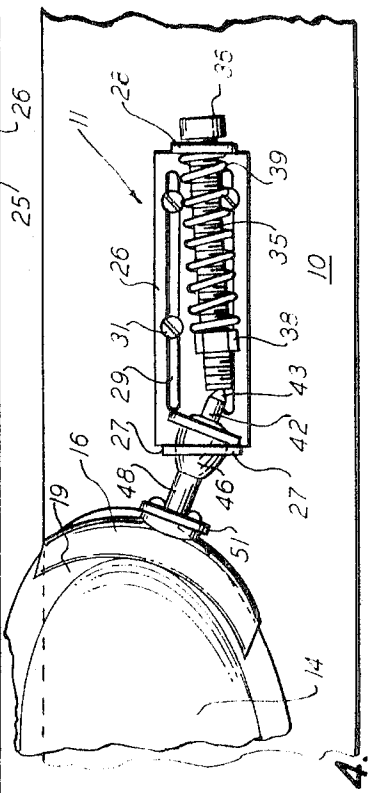


FIG. 4.

FIG. 5.

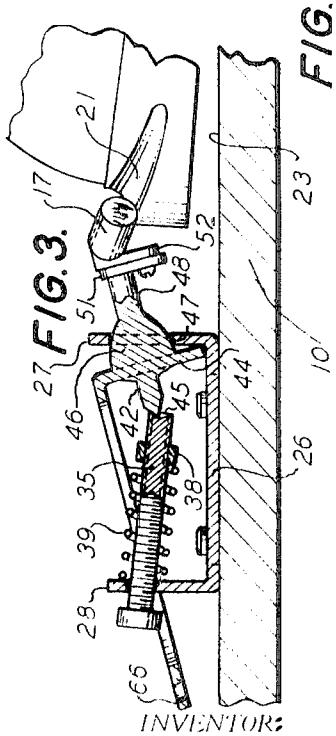


FIG. 3.

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ADJUSTABLE SAFETY SKI BINDINGS

Spring-loaded clamps or binders which directly contact the boot at heel and toe are replacing conventional cable bindings for releasably securing skis to the boot of the wearer. The main advantage of direct-acting spring binders is the degree of freedom, or number of release paths, which the binders afford the ski boot. Previous conventional clamps or spring binders give secure attachment of ski to boot under normal skiing attitudes but are limited at either heel or toe in the release paths afforded, or complicated by translation cams. I have invented a combination of heel and toe clamps unique in the versatility of release while dependable in joining ski and boot under normal operation.

BRIEF DESCRIPTION OF THE INVENTION

The invention contemplates opposed ski clamps mounted to the ski one at the heel and one at the toe of the ski boot. Each clamp comprises a U-shaped bracket longitudinally slotted to receive fasteners to fix the bracket to the ski. That arm of the bracket remote from the position of the boot supports a threaded load member about which a compression spring resides, bearing against an adjustable stop on the threaded member and the inner face of the bracket arm. A thrust member having a central universal ball and a shaped fulcrum plate is mounted in a recess in the second or inboard arm of the bracket. A recess in the end of the threaded member receives a conical pintle on the thrust member. A yoke is adjustably mounted on that end of the thrust member extending beyond the bracket. The yoke is adapted to contact either the upper surface of the sole extending beyond the boot toe or the binding cable groove in the heel portion of the boot sole, depending upon the position with respect to the boot of the clamp. An L-shaped release lever is fixed to the fulcrum plate of the universal joint on the thrust member. The horizontal portion of the release lever extends away from the yoke on the thrust member. Preferably the release lever has a horizontal width in excess of the like width of the bracket such that the release lever may be depressed about the upper portions of the bracket to release the yoke from contact with the boot.

Preferably the thrust member has means for vertical yoke adjustment with respect to the ski surface. Such means may comprise a first vertical plate on the shank extending from the thrust member ball joint, which is adjustably secured to a second vertical plate on the outer edge of the yoke. One of the plates may have a vertical slot or slots and the other plate a threaded recess engaging a screw residing in the slot of the other member. It is thereby possible to adjust yoke spacing with respect to the ski to accommodate boots of varying sole thickness without changing the orientation of the clamp brackets.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary plan view of the clamping apparatus of the invention on a ski;

FIG. 2 is a side elevation of the embodiment of FIG. 1;

FIG. 3 is a sectional elevation showing fragmentarily the heel-clamping apparatus in one releasing position;

FIG. 4 is a fragmentary plan view of the toe-clamping apparatus showing the toe clamp in one releasing position;

FIG. 5 is a fragmentary sectional elevation taken along line 5–5 of FIG. 2; and

FIG. 6 is a sectional detail taken along line 6–6 of FIG. 1.

In FIG. 1 a ski 10 has fixed to it a toe clamp assembly 11 and a heel clamp assembly 12. A ski boot 14 of conventional design is shown in broken lines in FIG. 1 and fragmentarily in solid lines in FIG. 2.

Clamp assembly 11 has a curving yoke 16. Clamp assembly 12 has a curving yoke 17. Preferably each yoke is metallic. Each yoke may have a resilient pad 18 between yoke and boot, which may cover the yoke, as shown in section in FIG. 6 with respect to yoke 16. The pad preferably intervenes along the ski axis line.

Yoke 16 bears upon the upper surface of extending sole toe portion 19. Yoke 17 bears against the sole heel surfaces defining the conventional binder cable grip groove 21.

The configuration of the yokes may vary, depending upon the particular ski boot to which they are adapted, but the configurations illustrative of the invention adapt to most boots presently marketed. In the usage illustrated, yoke 16 is conformed to a larger radius than is yoke 17. In FIGS. 1 and 2 the yokes restrain boot 14 against upper surface 23 of the ski.

Clamp assemblies 11 and 12 are substantially similar. Each has a U-shaped bracket 25 having a base 26 and upturned opposed, spaced arms 27, 28. Slots 29 (see FIG. 1) in the base receive fasteners such as the screws 31 which secure the bracket to the ski. The bracket may thereby be repositioned lengthwise to adjust the interval between clamp assemblies 11 and 12 to receive ski boots of different sizes.

Bracket arm 28 of each bracket journals a threaded load member 35 which may be a machine bolt. The load member has a head 36 exterior of the respective arm 28. A threaded stop 38 on each load member restrains a compression spring 39 between arm 28 and the stop. Relative rotation of the bolt and the stop varies the compression loading of the spring.

Arm 27 of the bracket journals a thrust member 41. In addition to the yoke, the thrust member comprises a pintle 42 with a conical tip 43. The tip and pintle project from a fulcrum plate 44 and engage a load member socket 45 in an articulate joinder. A semispherical ball joint 46 is journaled in a cavity 47 (see FIG. 3) of arm 27 such that the thrust member can take many attitudes with respect to the arm, still under pressure from the load member.

A shank 48 extends from the ball joint. A first vertical plate 51 fixed to the end of the shank abuts a second vertical plate 52 fixed to the outer edge of the yoke. As can be seen from FIG. 5, plate 51 has a pair of vertical slots 53, 54 on either side of shank 48. Screws 55 extend through the first plate into threaded recesses (not shown) in second plate 52. It is apparent that the relative vertical position of the plates may be adjusted by loosening and retightening screws 55.

The fulcrum plate, ball joint, pintle, shank and first vertical plate are preferably unitary. The yoke and second vertical plate are preferably unitary. Together the two units comprise the thrust member. The relative release load point for vertical versus horizontal release paths is determined by the proportions of the fulcrum plate. The proportions are designed to determine the relative lever arms which oppose the spring loading.

The thrust member of the clamp assembly of FIG. 3, the heel assembly, in addition comprises a release lever 61. A horizontal lever arm 62 fixed to the fulcrum plate at the top thereof extends above the load member away from the boot to a point beyond arm 28 of the bracket. A longitudinal clearance opening 64 in the horizontal arm enables the arm to pass the bracket when the lever is depressed, as shown in FIG. 3. The lever may be depressed by hand or by downward pressure of a ski pole upon outward end 66 of the release lever. A hole 67 in the outer end is adapted to receive the pointed end of a conventional ski pole.

In operation the ski is donned in conventional fashion by inserting the boot toe beneath the toe yoke 16. Normally the load on the toe yoke engendered by spring 39 can be overcome by a firm thrust of the boot against the yoke. Since the yoke is round the toe sole projection readily slides beneath the yoke. With the release lever depressed as suggested by FIG. 3, the user may first slip the toe into the front clamp assembly and then lower the heel into place past yoke 17, until the boot heel contacts the ski surface. Once the release lever is free of pressure at its outer end, the clamp assembly returns to the condition of FIG. 2, locking the boot to the ski.

The apparatus of the invention responds readily to aberrations in boot orientation with respect to the ski. If the forces are above those for which the load members 35 are set, that is, the force point above which maintaining boot and ski together endangers the user's safety, the heel or toe, or both, may dis-

engage from the clamp assembly by any of several paths. As FIG. 3 shows, a force sufficient to overcome spring 39 vertically frees the heel to rise away from the ski, independent of the yoke. FIG. 4 illustrates sideward freedom of the toe with respect to the clamp as the boot torques with sufficient power to exceed the restraining resultant of the force of spring 39 transmitted to the yoke through thrust member 41.

Both toe and yoke pivot outwardly, the toe about a pivot near the heel center and the yoke about the ball joint. However, the ball joint is constrained in part in its motion by the fulcrum plate as the plate contacts the bracket.

The toe clamp also affords the toe vertical escape paths similar to that shown with respect to the heel of FIG. 3. The heel, it is apparent, has the same lateral escape path as is illustrated with respect to the toe. Each clamp affords escape paths, or boot articulation with respect to the ski, not previously possible (except with cam devices) with devices not having the combination of elements at both heel and toe restraints that the disclosed inventive apparatus affords.

The yoke tends to move with the boot as the spring force is overcome. Spring force is still imposed upon the yoke, however, through the articulated joinder of thrust member and load member at the pintle, despite displacement of the yoke. The yoke is restrained in motion by the ball joint, which is retained in its socket or cavity by the spring force which impinges the fulcrum plate against the bracket arm.

The apparatus of the invention thus affords to the user boot escape paths at both heel and toe vertically, horizontally in each direction, and combinations of these motions.

The inventive apparatus requires no added attachments on the boot to make secure the clamp assemblies. Therefore, the boot is not perforated, sole leather is not split, and moisture is given no entry to deteriorate the boot, as is often the case with other apparatus used to releasably secure ski and boot. The resilient outer layer of the preferred yoke compensates for boot size changes, either from temperature or style variations.

Since the clamping pressure may be regulated by adjustment of the compression spring on the load member by simple relative rotation of the member and the stop, each user can set the "release" point of heel and toe binder clamps to suit his style, skill and the slope conditions. The ski boot clamp assemblies may be augmented by added slack cords to prevent loss of the ski when separation of boot from binding clamps takes place. Such slack cords are conventionally prescribed by the authorities of the skiing locale. They therefore may vary considerably, and, since they form no part of this invention, are not further shown or described herein.

I claim:

1. Clamping apparatus for binding to a ski a boot having toe and heel bearing areas, the apparatus comprising a clamp bracket adapted to be secured to the ski adjacent the toe bearing area, a clamp bracket adapted to be secured to the ski adjacent the heel bearing area, each bracket comprising a base and opposed spaced vertical arms, a thrust member journaled in one arm of each bracket, each of said thrust members including a semispherical journal joint residing movably in the bracket arm, an extending curving yoke adapted to bear on the adjacent bearing area of the boot, a fulcrum plate and a pintle; an actuation arm extending horizontally from the fulcrum plate above the load member away from the thrust member, a threaded load member journaled in the other arm of each bracket, a threaded stop on each load member, a compression spring about each load member between the stop and the bracket arm, each load member being articulately connected to the pintle of a thrust member such that spring force is transmitted through the thrust member to the bearing area of the boot adjacent the respective bracket, means on the load member for relative rotation of the load member with respect to the stop to alter the spring tension force and change the load of the thrust member against the boot portion; said fulcrum plate bearing against adjacent parts of the bracket to act as a fulcrum for motion of the thrust member with respect to the bracket; the load member and the thrust member of each being so journaled as to be free to move with respect to the bracket in both horizontal and vertical directions when boot motion forces on the thrust member exceed the tension force of the spring.

2. Apparatus in accordance with claim 1 wherein each thrust member further comprises a shank projecting from the journal joint, a first vertical attachment plate on the shank, a second vertical attachment plate on the curving yoke, and means for securing one vertical plate to the other at selected vertical relationships so as to vary the vertical position of the curving yoke with respect to the top surface of the ski.

3. Clamping apparatus for binding to a ski a boot having toe and heel bearing areas, the apparatus comprising a clamp bracket adapted to be secured to the ski adjacent the toe bearing area, a clamp bracket adapted to be secured to the ski adjacent the heel bearing area; each bracket comprising a base and a vertical arm, a thrust member journaled in the arm of each bracket; each of said thrust members including a semispherical journal joint residing movably in the bracket arm, an extending yoke adapted to bear on the adjacent bearing area of the boot, a fulcrum plate attached to the journal joint, a load member biased to bear against the thrust member to load the yoke against the bearing area of the boot adjacent the respective bracket; said fulcrum plate bearing against adjacent parts of the bracket to act as a fulcrum for motion of the thrust member with respect to the bracket, an actuation arm secured to and extending horizontally from the fulcrum plate above the load member away from the thrust member; the load member and the thrust member of each clamp bracket being so journaled as to be free to move with respect to the bracket in both horizontal and vertical directions when boot motion forces on the thrust member exceed the bias force on the load member.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,596,920 Dated August 3, 1971

Inventor(s) ALAN M. HAIRE

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

On the Title Page, first column, change line 2 to read as follows:

1518 West Sixth Street, Ontario, Calif. 91762

Cancel line 3.

Signed and sealed this 26th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

USCOMM-DC 60376-P69
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