

June 25, 1963

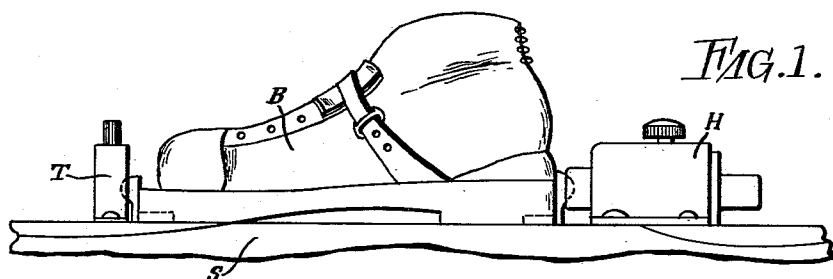
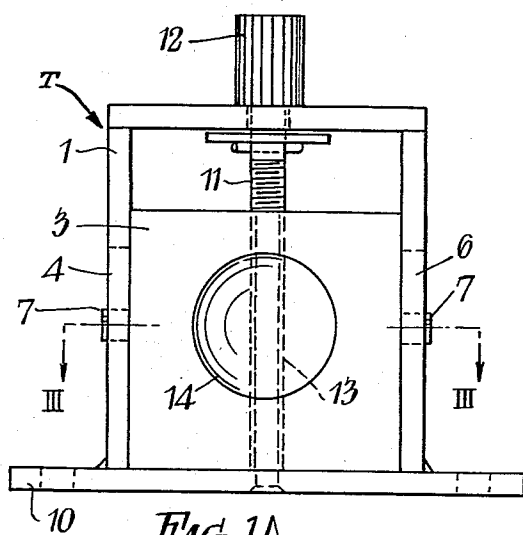
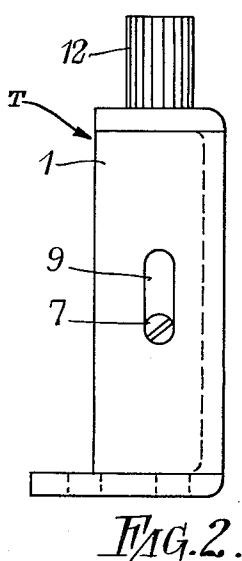
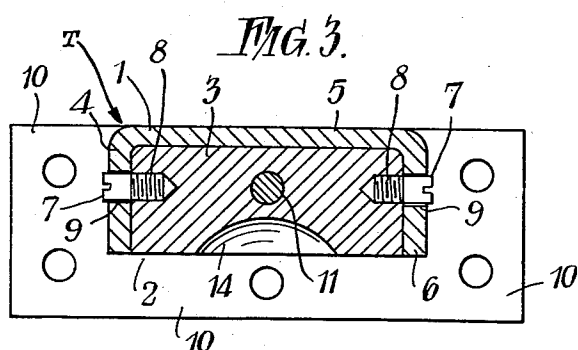
H. A. HALLAM

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SKI BINDINGS

Filed Oct. 31, 1961

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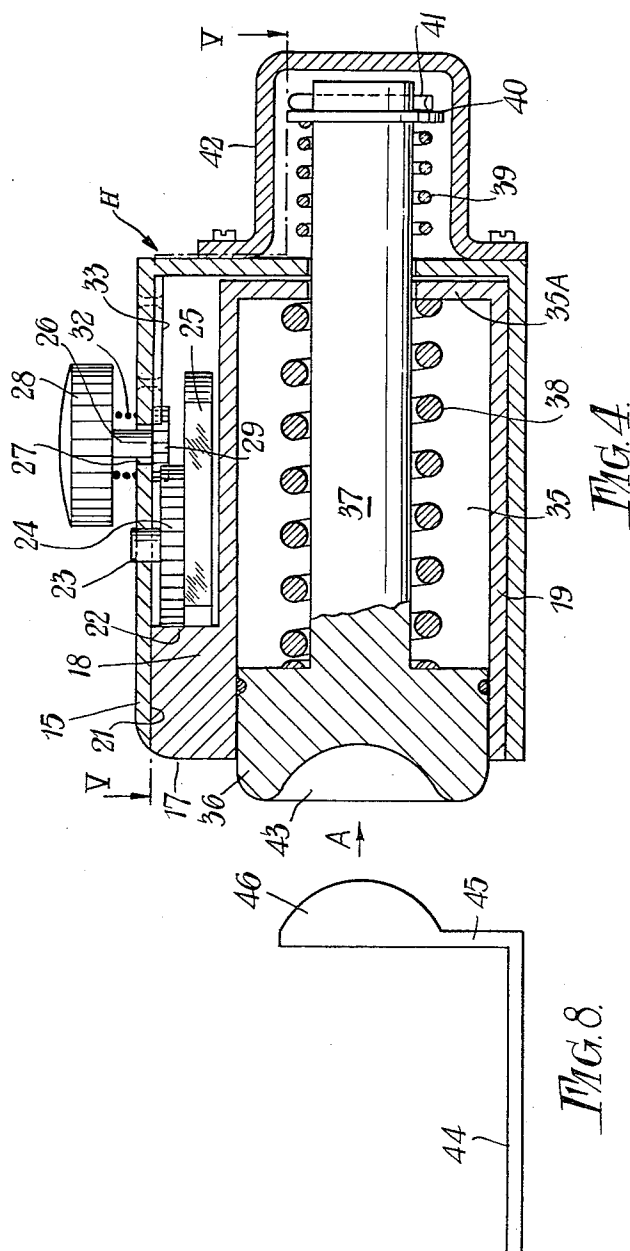
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SKI BINDINGS

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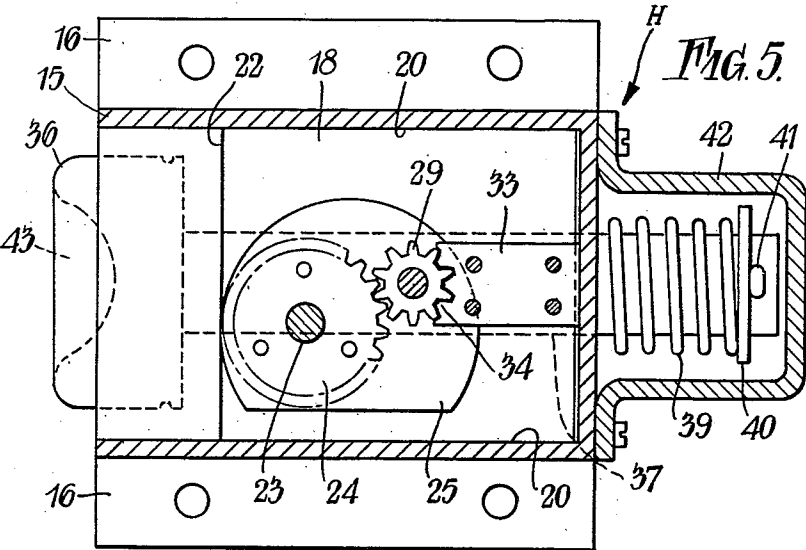
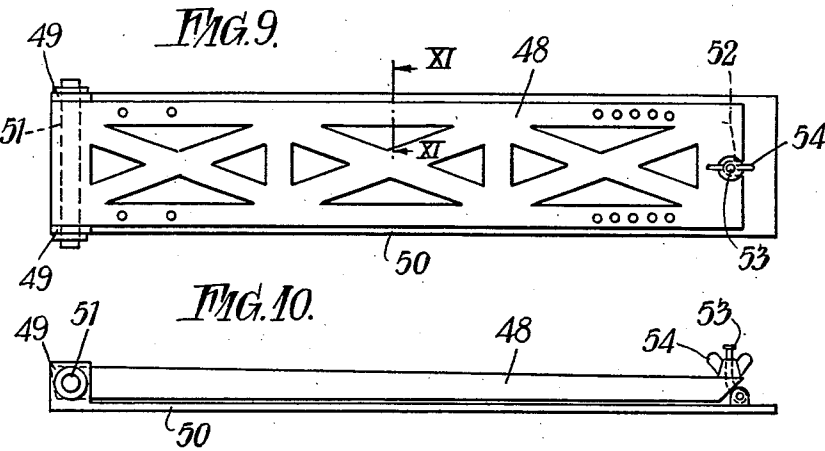


FIG. 11

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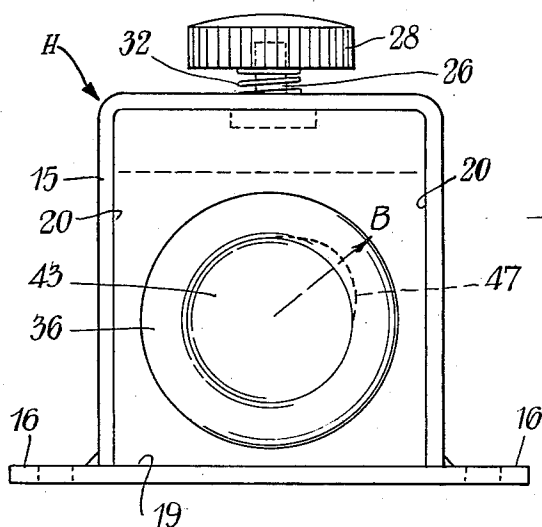
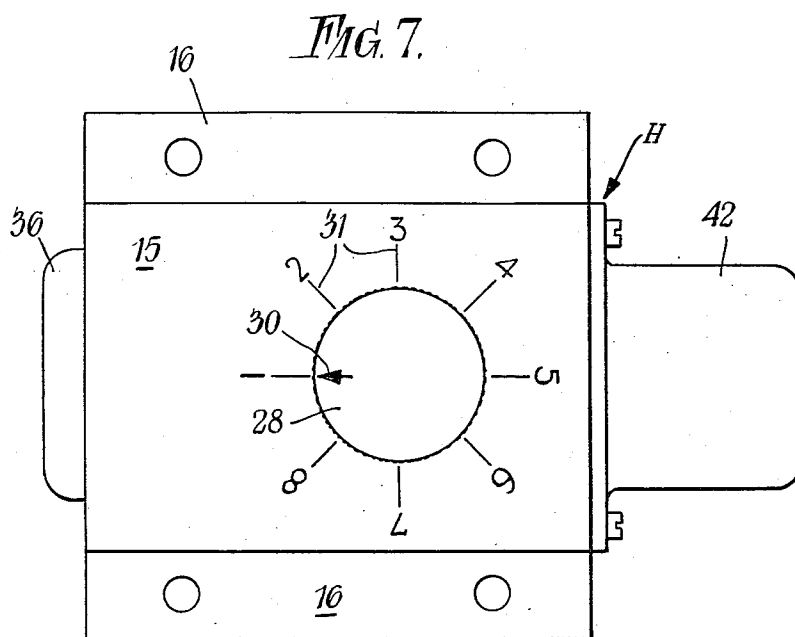
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SKI BINDINGS

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SKI BINDINGS

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3 Claims. (Cl. 280—11.35)

This invention relates to ski bindings of the kind that are adapted to release the skier's boot from the ski in the event that he suffers a fall that would injure the skier's leg in the event that the boot remained secured to the ski.

Such ski bindings are known in which a toe-retaining device is provided for releasably securing the toe of a boot to the ski, and a heel-retaining device is provided for securing the heel of the boot to the ski. In such known bindings the toe-retaining device is arranged to release upon displacement of the toe of the boot laterally of the ski in the horizontal direction whilst the heel-retaining device is arranged to release in the event of more than a predetermined amount of vertical movement of the heel of the boot from the ski. These known bindings only operate to release the boot from the ski for particular directions of lateral displacement of the heel and toe of the boot relative to the ski.

It is an object of the invention to provide a ski binding in which the toe- and heel-retaining devices release the boot from the ski irrespective of the direction of lateral movement of the toe or heel of the boot with respect to the ski.

According to the present invention there is provided a ski binding for co-operation with a ski boot, the binding comprising a toe-retaining device for attachment to the upper surface of the ski, a toe-piece for attachment to the toe of a ski boot, a first member on the toe-retaining device, a second member on the toe-piece, a first recess in one of said members, a first convex projection on the other of said members for releasable engagement with the recess, a heel-retaining device for attachment to the upper surface of the ski, a heel-piece for attachment to the heel of the boot, a third member on the heel-piece, a fourth member on the heel-retaining device, one of the third and fourth members having a second recess and the other of them having a second convex projection for releasable engagement with the second recess, a spring associated with one of said first and fourth members for urging it towards the other of said first and fourth members, a slider member carrying the spring and said member associated therewith, an operating member for displacing the slider member from a rearward position where the projections and recesses are disengaged to a forward position where the projections and recesses are engageable to secure the boot to the ski, said operating member also serving for displacing said slider member rearwardly from the forward position, and means for locking the slider member when displaced forwardly from the rearward position.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIGURE 1 is a side elevation illustrating a ski boot attached to the central part of a ski by a ski binding,

FIGURE 1A is a front elevation of a toe-retaining device of the ski binding,

FIGURE 2 is a side elevation of the device of FIGURE 1A,

FIGURE 3 is a section on III—III of FIGURE 1A,

FIGURE 4 is a longitudinal sectional view of a heel-retaining device of the ski binding,

FIGURE 5 is a view on V—V of FIGURE 4,

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FIGURE 6 is a view in the direction of the arrow A, of the device of FIGURE 4,

FIGURE 7 is a plan view of the device of FIGURE 4,

FIGURE 8 is a side elevation of an element for attachment to a ski boot,

FIGURE 9 is a plan view of a hinged platform that can be used in conjunction with the ski binding of FIGURES 1 to 8,

FIGURE 10 is a side view of the platform of FIGURE 9, and

FIGURE 11 is a part-section on XI—XI of FIGURE 9.

The ski binding has a toe-retaining device T (FIGURES 1—3) for mounting on the ski S adjacent the toe of a ski boot B appropriately positioned on the ski. The binding also has a heel-retaining device H (FIGURES 1 and 4—7) incorporating a release mechanism and adapted to be mounted on the ski S adjacent the heel of the boot. The toe-retaining device T has a box-like housing 1 which is open at the rear 2 and contains a block 3 which fits in the channel formed by the three upright sides 4, 5, 6 of the housing. The block 3 is capable of limited vertical movement in the housing 1. The heads 7 of two screws 8 fitted in opposite sides of the block 3 project from the block 3 and engage in vertical slots 9 in opposite upright sides 4 and 6 of the housing 1. The bottom of the housing 1 is extended horizontally to form flanges 10 which are adapted to be bolted to the ski to secure the toe-retaining device thereon. The upper and lower ends of an adjusting screw 11 are rotatably mounted in the top and bottom of the housing 1. A knob 12 on the outside of the housing 1 is connected to the upper end of the adjusting screw 11 for enabling the screw to be turned. The adjusting screw 11 is passed through a threaded hole 13 in the block 3 and engages with the block 3 so that when the screw 11 is turned the block 3 is moved vertically in the housing 1. The central part of the rear face of the block 3 has therein a recess 14 of part-spherical form.

The heel-retaining device H (FIGURES 4—7) has an elongated rectangular shaped housing 15, the longitudinal axis of the housing being aligned with the axis of the ski when mounted thereon. The housing 15 has at the bottom thereof webs 16 which extend laterally from this housing. These webs 16 are adapted to be bolted to the ski to secure the heel-retaining device thereon. The front end 17 of the housing 15 is open and the rear is closed. A rectangularly sectioned slider member 18 is contained in the housing 15. The bottom 19, the lateral side walls 20 and the front portion 21 of the top of the slider member 18 are in sliding contact with the inside surfaces of the housing 15. A shoulder 22 is formed at the rear of the front portion 21 of the top of the slider member 18, the remaining part of the top of the slider member 18 being spaced from the top of the housing 15. The upper end of a pin 23 is rotatably mounted in the top of the housing 15, the pin 23 having a gearwheel 24 secured thereon adjacent the inside surface of the top of the housing 15. Beneath the gearwheel 24 a cam 25 is also secured on the pin 23, the cam 25 co-operating with the shoulder 22. A pin 26 is passed freely through a hole 27 in the top of the housing 15, the upper end of the pin 26 having an operating knob 28 secured thereon and the lower end of the pin 26 carrying a gearwheel 29 which meshes with the gearwheel 24. The operating knob 28 has on the top thereof an arrow 30 which co-operates with graduations 31 inscribed on the top of the housing 15 around the axis of the pin 26. These graduations 31 are numbered, for example, from 1 to 8 and are spaced at equiangular intervals around the axis of the pin 26. A coil spring 32 coaxial with the pin 27 abuts at one end against the underside of the knob 28 and at

the other end against the top of the housing 15. A small plate 33 having gear teeth 34 thereon is secured to the underside of the top of the housing 15, the teeth 34 on the plate 33 meshing with the teeth of the gearwheel 29 when this gearwheel is pressed into contact with the underside of the top of the housing 15 by the coil spring 32.

The slider member 18 has therein an axially directed cylindrical recess 35 extending from the front face thereof to near the rear face so that an upright rear wall 35A of the slider member 18 exists between the right-hand end (FIGURE 4) of the recess 35 and the rear face of the slider member 18. A piston 36 is entered in the recess 35, the piston 36 being on one end of a rod 37 which extends through the rear wall 35A of the slider member 18 and through the rear of the housing 15. A coil spring 38 is disposed within the recess 35, coaxial with the rod 37, one end of the spring 38 bearing on the piston 36 and the other end bearing on said rear wall 35A. A coil spring 39 is mounted on the part of the rod 37 that projects from the rear of the housing 15, one end of this spring 39 bearing on the rear of the housing 15 and the other end abutting against a washer 40 which is maintained on the rod 37 by a split pin 41 passed through the rod 37. The strength of the spring 38 is greater than that of the spring 39. A waterproof cap 42 secured to the rear of the housing 15 encloses the projecting part of the rod 37, the spring 39, the washer 40 and the split pin 41.

The spring 38 causes the head of the piston 36 to project from the front of the slider member 18. The head of the piston 36 has therein a recess 43 of part-spherical form.

The heel-retaining device is packed with grease to exclude therefrom water which might otherwise enter the release mechanism and form ice that would interfere with the operation of this mechanism.

The ski boot B that co-operates with the binding has heel and toe pieces (FIGURE 8) fixed thereto. Each piece consists of a plate 44 which is screwed to the underside of the boot and a vertical lug 45 integral with the plate which lies closely adjacent the central part of the toe of the boot or heel of the boot as the case may be. The upper end of each lug 45 carries a convex projection 46 in the form of a spherical segment. The projection 46 at the toe of the boot serves to co-operate with the recess 14 in the block 3 of the toe-retaining device. The projection 46 at the heel of the boot serves to co-operate with the recess 43 in the piston 36 of the heel-retaining device.

The binding is adjusted for use with a particular ski boot B by securing the toe-retaining device T (FIGURES 1A, 2 and 3) to the ski S and then placing the boot fitted with the toe and heel pieces (FIGURE 8) on the ski S with the projection 46 on the toe-piece entered in the recess 14 of the block 3 of the toe-retaining device, the block 3 having been previously appropriately adjusted vertically so that the recess 14 in the block 3 is at the same level as the projection 46 on the toe-piece when the boot is on the ski. The heel-retaining device H (FIGURES 4-7), not yet secured to the ski S, is then placed on the ski S with the arrow 30 on the operating knob 28 aligned with the graduation labelled with the figure "1." The recess 43 in the piston 36 of the release mechanism is placed in axial alignment with the projection 46 on the heel-piece, any difference in height being eliminated by placing shims between the base of the heel-retaining device and the upper surface of the ski. The heel-retaining device H is positioned on the ski S with the projection 46 of the heel-piece just clear of the recess 43 in the piston 36 of the release mechanism. The heel-retaining device H is then secured to the upper surface of the ski S.

To secure the boot B releasably to the binding the operating knob 28 is depressed against the action of the

coil spring 32 whereby the gearwheel 29 disengages from the teeth 34 of the small plate 33. Such displacement, however, does not disengage the gearwheel 29 from the gearwheel 24 and in fact such displacement brings the two gearwheels 29, 24 more closely into alignment. The operating knob 28 is then turned. Such turning of the knob turns the gearwheel 29 whereby the gearwheel 24 and the cam 25 are also rotated. The cam 25 which is in contact with the shoulder 22 of the slider member 18 pushes the slider member 18 forward, the rod 37, the piston 36 and the spring 38 also being carried forward whilst the spring 39 is compressed between the washer 40 and the rear of the housing 15. The piston 36 eventually encounters the projection 46 on the heel-piece so that movement of the piston 36 and rod 37 is arrested and the spring 39 is not further compressed. However, with continued turning of the operating knob 28 the slider member 18 is pushed further forward, the spring 38 being compressed whereby the force with which the heel and toe-pieces are gripped between the toe-retaining device and the heel-retaining device is progressively increased. When this force has been increased to the desired value the operating knob 28 is turned no further and is allowed to move upwardly under the action of the coil spring 32 so that the gearwheel 29 engages with the teeth 34 of the small plate 33 whereby further rotation of this gearwheel 29 is prevented. When so displaced upwardly by the coil spring 32 the gearwheel 29 remains in mesh with the gearwheel 24 so that the release mechanism is locked.

When a skier equipped with boots and bindings as described above suffers a forward fall the heel of each boot tends to lift from the ski, the toe of the boot serving as a fulcrum. If the lifting force is sufficient the piston 36 of the release mechanism is displaced rearwardly against the action of the spring 38 in the slider member 18 and the projection 46 on the heel-piece disengages from the recess 43 in the piston 36, the boot becoming free from the ski. If when in difficulties the skier's leg suffers a sufficiently severe twist about a vertical axis either the heel will slide laterally of the ski and force the projection 46 of the heel-piece out of the recess 43 in the piston 36 or the boot will slide rearwardly on the ski pushing the piston 36 of the release mechanism rearwardly until the projection 46 on the toe-piece disengages from the recess 14 in the block 3 of the toe-retaining device. In both cases the boot is freed from the ski. In the event that the leg is subjected to a couple tending to bend it about a horizontal front-to-rear axis, the boot will tend to tip either about the inside or the outside longitudinal upper edge of the ski and if the couple is of sufficient magnitude the piston 36 of the release mechanism will once again become disengaged from the projection 46 of the heel-piece, whereby the boot is freed from the ski.

Since each projection 46 is convex, displacement thereof laterally of the longitudinal axis of the ski in any direction disengages the projection 46 from the recess 14 or 43 as the case may be. Should it be desired to make release easier in any particular direction, say the direction B (FIGURE 6) this can be done by relieving the lips of the recesses 43 and 14 as illustrated by the dotted line 47 in FIGURE 6.

It will be understood that the ski binding described above is based on the heel being held firmly to the ski. When a skier is touring it is necessary for the heel to be able to lift from the ski. To permit this, in a modified form of the embodiment described above, the toe- and heel-retaining devices instead of being mounted directly on the ski are secured to an elongated platform 48 which has the front end thereof pivotally connected, by a pin 51, to two upstanding lugs 49 on a plate 50 fixed to the ski, the axis of the pin 51 being horizontal and transverse to the ski. A short slot 52 extends forwardly from the rear end of the platform 48 and a swivel bolt 53

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mounted on the plate 50 and carrying a wing nut 54 co-operates with the slot 52. The arrangement is such that in the normal running position the bolt 53 extends vertically upwards from the ski through the slot 52 and the wing nut 54 is tightened up to bear on the parts of the platform 48 on either side of the slot 52 thereby to hold the rear end of the platform 48 against the plate 50. For touring purposes the wing nuts 54 at the rear ends of the platforms 48 are loosened and the swivel bolts 53 swung rearwardly to disengage from the slots 52. The rear end of each platform 48 can then swing upwardly about the axis of the pin 51 whenever the heel of the boot has to be lifted from the ski. The platform 48 is of open latticework construction, the members of the latticework each being of V-section (FIGURE 11) with the apex of the V downwards and slightly radiused.

Should it be desired to permit a limited amount of lift of the heel from the ski, or the platform 48, in the running position of the binding, the piston 36 can, instead of having a recess 43 of spherical form, have a short vertical slot of semi-circular section and with curved end walls.

It will be understood that although in the embodiment described above the heel- and toe-pieces have projections 46 which co-operate with recesses 14 and 43 in the toe- and heel-retaining devices, it is possible to provide the binding with projections which co-operate with recesses in the heel- and toe-pieces.

If preferred the knob 28 may be replaced by a two-armed horizontally disposed operating lever (not shown), the central part of which is secured to the pin 26. Such a lever may be found easier for the skier to grip than a circular sectioned knob.

I claim:

1. A ski binding for co-operation with a ski boot, the binding comprising a toe-retaining device for attachment to the upper surface of the ski, a toe-piece for attachment to the toe of a ski boot, a first member on the toe-retaining device, a second member on the toe-piece, a first recess in one of said members, a first convex projection on the other of said members for releasable engagement with the recess, a heel-retaining device for attachment to the upper surface of the ski, a heel-piece for attachment to the heel of the boot, a third member on the heel-piece, a fourth member on the heel-retaining device, one of the third and fourth members having a second recess and the other of them having a second convex projection for

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releasable engagement with the second recess, a spring associated with one of said first and fourth members for urging it towards the other of said first and fourth members, a slider member carrying the spring and said member associated therewith, a housing in which the slider member is mounted, a shoulder on the slider member, a cam rotatably mounted on the housing and co-operating with the shoulder, an operating member for rotating the cam to displace the slider member from a rearward position where the projections and recesses are disengaged to a forward position where the projections and recesses are engageable to secure the boot to the ski, said operating member also serving for controlling displacement of said slider member rearwardly from the forward position, and means for locking the slider member when displaced forwardly from the rearward position.

2. A binding as claimed in claim 1, wherein the operating member is rotatable, and wherein there is a driving connection between the cam and the operating member, which connection includes a first gearwheel fixed to the cam to rotate therewith and a second gearwheel meshing with the first gearwheel and fixed to rotate with the operating member.

3. A binding as claimed in claim 2, wherein the second gearwheel and operating member are together movable axially from a first position to a second position and vice versa, there being a spring for urging the second gearwheel and operating member to the second position, the locking means comprising gear teeth fixed to the housing and meshing with the second gearwheel when the latter is in its second position, the second gearwheel being in mesh with the first gearwheel in both the first and second positions of the second gearwheel and the second gearwheel being disengaged from the teeth of the locking means when in its first position.

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