

Dec. 1, 1970

H. HVAM

3,544,122

CUP TOE BINDINGS

Filed March 21, 1968

5 Sheets-Sheet 1

FIG. 1

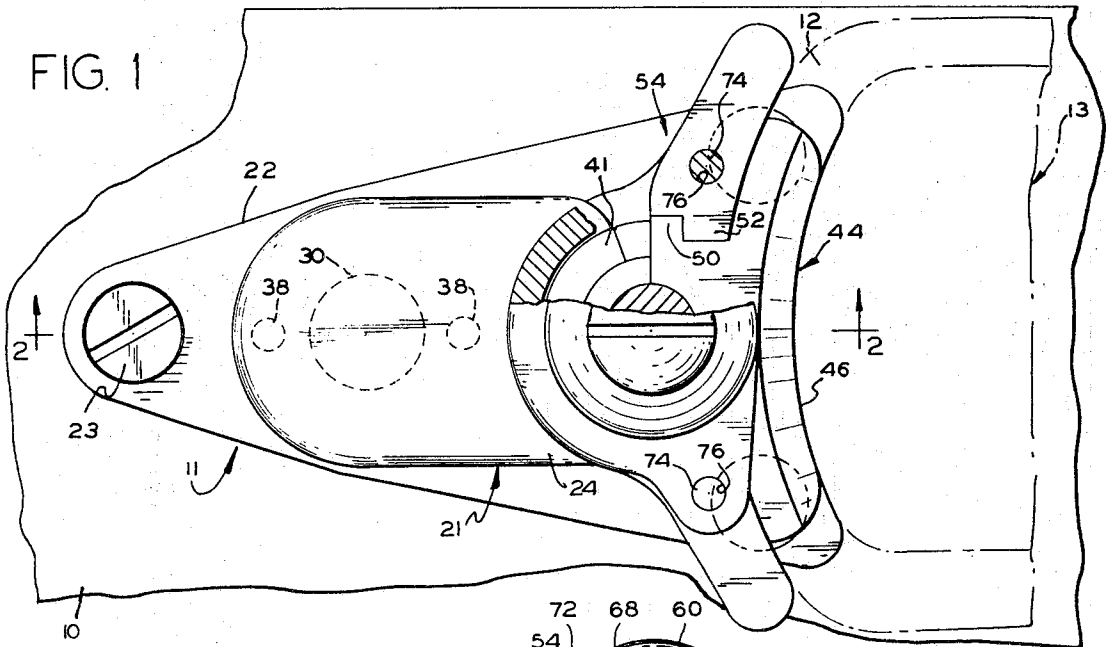


FIG. 2

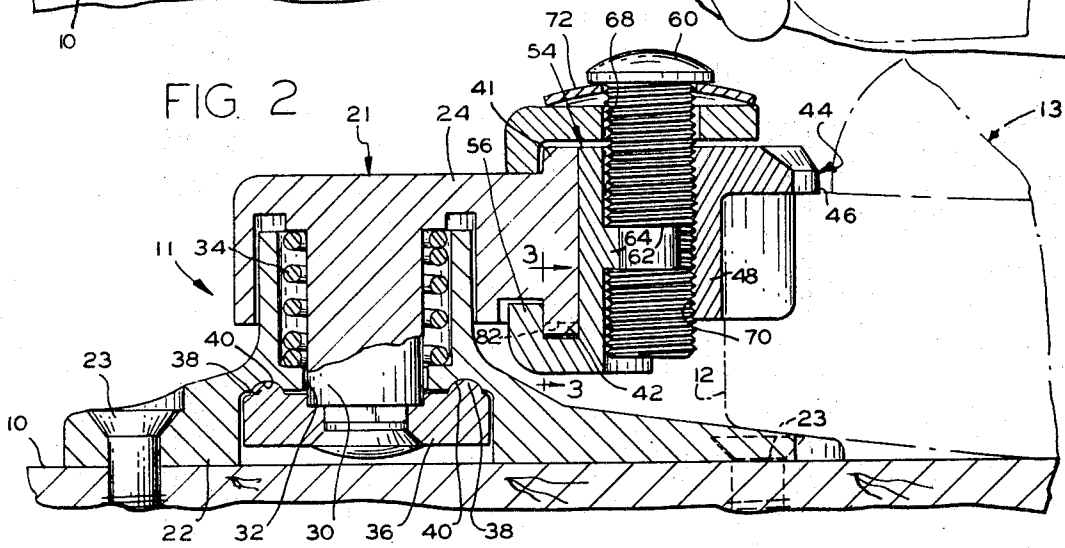
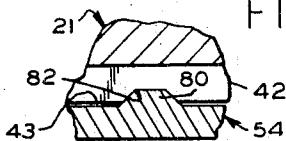


FIG. 3



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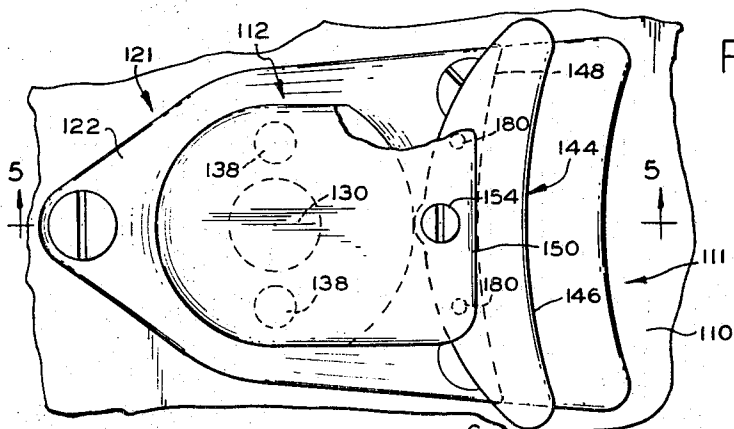


FIG. 4

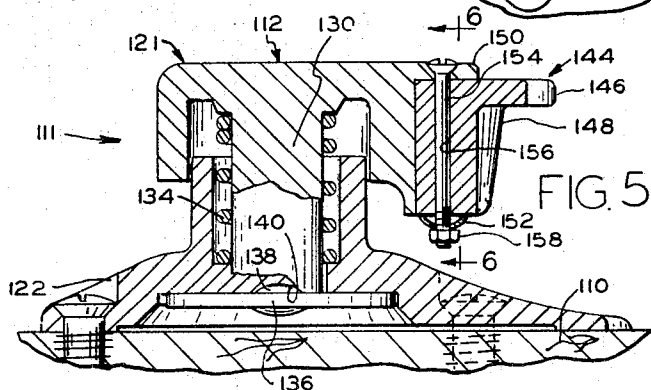


FIG. 5

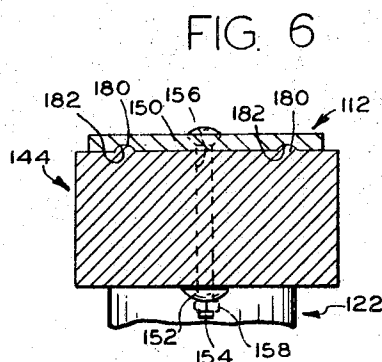


FIG. 6

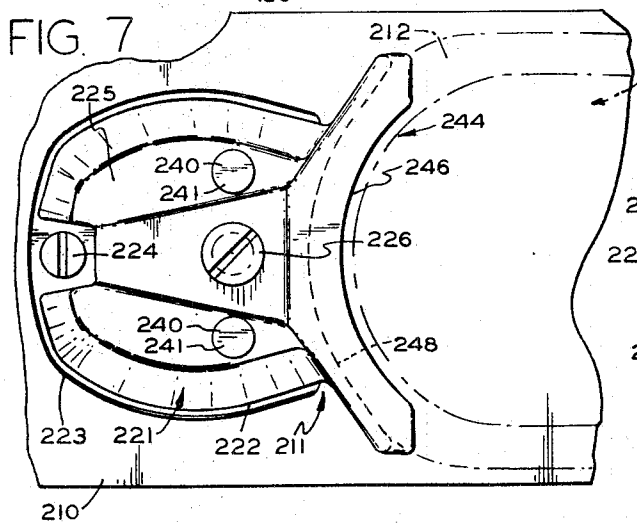


FIG. 7

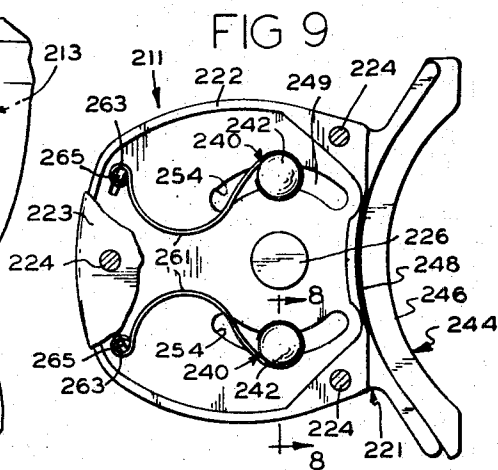


FIG. 9

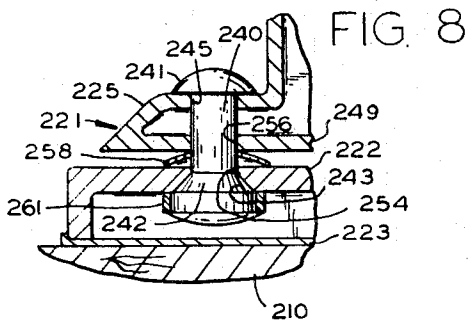


FIG. 8

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FIG. 16

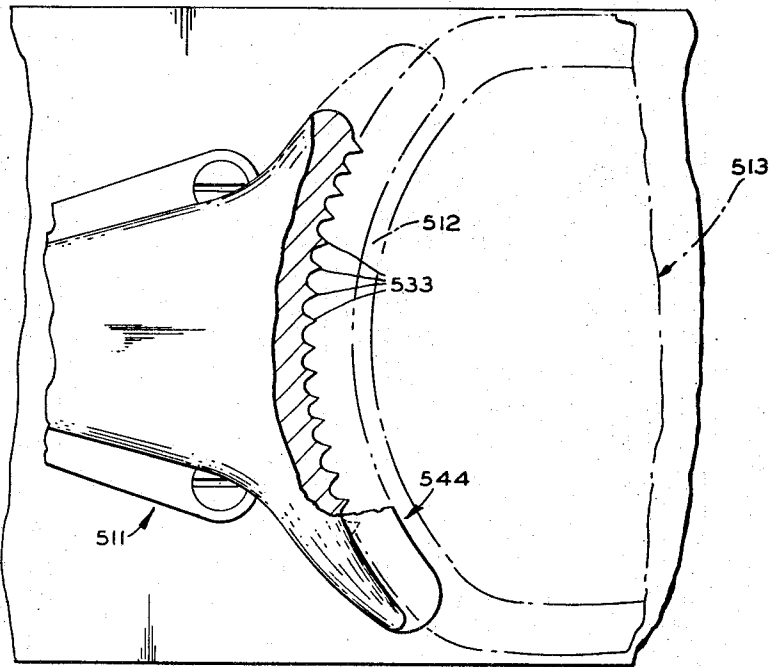


FIG. 17

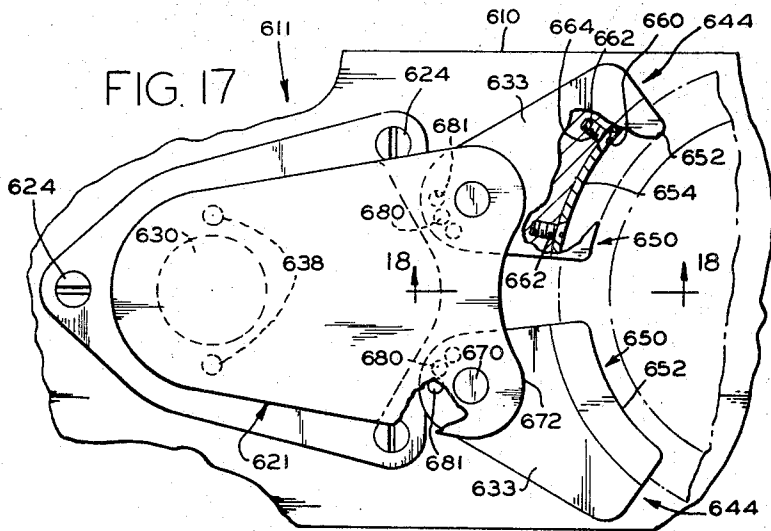
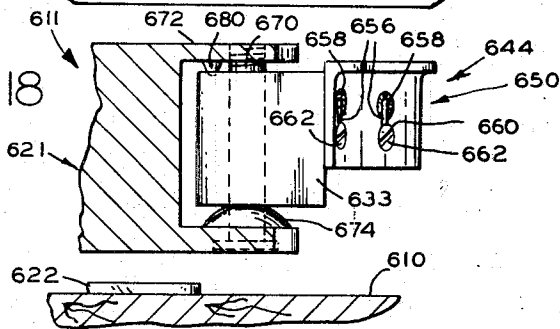


FIG. 18



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CUP TOE BINDINGS

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Int. Cl. A63c 9/081

U.S. Cl. 280—11.35

8 Claims

ABSTRACT OF THE DISCLOSURE

Cup toe bindings 11 and 111 have sole engaging cups pivotal on swivels and downwardly detented to the swivels more strongly than the swivels are downwardly detented to bases so that when maximum safe forces are approached the swivels pivot on the bases first and then, if the forces are sustained, the cups pivot on the swivels. In binding 211, a hollow swivel 221 having an integral cup portion 244 is swiveled on a base. Downwardly acting detenting pins 240 are movable in arcuate slots 154, and a leaf spring 261 urges the swivel toward its operative position. In binding 311, a downwardly detented swivel 321 carries downwardly detented wings 344, cup means as an abutment being preferable to teeth larger contact and eliminating destructive scoring of the toes of the ski boots, and ease of fitting. A binding 411 includes a toe engaging member 444 pivoted on swivel 421 and having an arm 478 and normally held by a detent 482 holding the arm and detents 480 acting on the swivel. A binding 511 is like the binding 411 but has a tooth cup 544. In binding 611, cup halves 644 are angularly adjustable on swivel 621.

DESCRIPTION

This invention relates to cup toe bindings, and more particularly to safety cup toe bindings having improved detenting means.

Ski toe bindings of the triangle type having swivel means, downward detenting means and two sole end engaging teeth on the swivel means positioned on opposite sides of the center line and requiring overcenter and downward movement of the tooth and swivel means serve to hold the ski boot until the overcenter movement occurs. Such bindings excellently hold the ski boot but have short overhanging lips which chew up the boot unless sole protectors are put on the soles. Such sole protectors are difficult to maintain on the soles. Cup bindings which have sole engaging members having long overhanging lips which substantially span the width of the sole of the ski boot also have been known and do not chew up the boot. However, such bindings either release too easily on jars or, if tightened, do not release when dangerous forces are applied to them. It would be desirable to provide a cup binding so that the ski boot is not chewed up and also serving to hold up when there is applied a force just less than a maximum safe force and release when the maximum force is reached.

An object of the invention is to provide improved cup toe bindings.

Another object of the invention is to provide safety cup toe bindings having improved detenting means.

A further object of the invention is to provide an automatic and feasible, safe cup toe binding.

Another object of the invention is to provide a cup toe binding for a ski in which the holding power of the binding is increased while a skier is executing a turn, thus providing an automatic holding power as needed for any weight skier at any speed and to any additional stress as a result of the centrifugal power of a high speed skier while executing a turn.

A further object of the invention is to provide cup toe bindings having toe engaging members of substantially the

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width of the ski boot and also having downwardly acting detenting structures which resist release when strong holding forces are required as during turns while releasing readily when forces approaching the maximum safe force are applied.

The invention provides cup ski bindings each including a base fixed to the ski and swivel means provided with a cup portion at one end for engaging a ski boot. The swivel means is mounted on the base for horizontal pivotal movement relative to the base and is movable vertically relative to the base against the force of a spring. Detent means located under the base holds the arm in a holding position and applies an increased holding force to the arm when the arm is pressed upwardly relative to the base. In a binding forming one specific embodiment of the invention, the cup portion is vertically adjustable relative to the base, and is pivoted on and downwardly detented to a swivel pivotal on and downwardly detented to the base, the cup portion being detented to the swivel more strongly than the detenting of the swivel to the base so that, in a release, the swivel pivots on the base before the cup portion pivots. A binding forming an alternate specific embodiment of the invention includes a cup integral with a swivel and detented to a base by pins having frustoconical heads normally seated in socket portions in the base, the pins being movable along arcuate slots in the base when a release occurs. Leaf springs urge the swivel toward its normal position. A binding forming another specific embodiment of the invention includes wings forming two cup halves which are pivotal on arms which are adjustable for height and are downwardly detented to a swivel which is pivoted on and downwardly detented to a base. A binding forming another specific embodiment of the invention includes a pair of wings detented to a swivel in adjustable angular positions.

A complete understanding of the invention may be obtained from the following detailed description of cup toe bindings forming specific embodiments thereof, when read in conjunction with the appended drawings, in which:

FIG. 1 is a fragmentary, top plan view of a ski having thereon a cup toe binding forming one embodiment of the invention;

FIGS. 2 and 3 are enlarged, fragmentary, vertical sectional views taken along lines 2—2 and 3—3 of FIGS. 1 and 2;

FIG. 4 is a top plan view of a ski having thereon a cup toe binding forming an alternate embodiment of the invention;

FIG. 5 is a horizontal sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is a vertical sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is a bottom plan view of a cup toe binding forming an alternate embodiment of the invention;

FIG. 8 is a vertical sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a fragmentary bottom plan view of the binding of FIG. 7;

FIG. 10 is a fragmentary, top plan view of a ski having thereon a cup toe binding forming an alternate embodiment of the invention;

FIGS. 11 and 12 are vertical sectional views taken along lines 11—11 and 12—12, respectively, of FIG. 10;

FIG. 13 is a fragmentary, top plan view of a toe having thereon a toe binding forming an alternate embodiment of the invention;

FIGS. 14 and 15 are views taken respectively along lines 14—14 and 15—15 of FIG. 13;

FIG. 16 is a fragmentary, partially sectional top plan view of a cup toe binding forming an alternate embodiment of the invention;

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FIG. 17 is a top plan view of a cup toe binding forming an alternate embodiment of the invention; and

FIG. 18 is a fragmentary, vertical sectional view of the binding of FIG. 17.

Referring now in detail to the drawings, there is shown in FIGS. 1 to 3 a ski 10 having thereon a cup ski binding 11 against which the forward edge of a sole 12 of a ski boot 13 is urged forwardly by a heel binding (not shown). The toe binding 11 includes an arm or swivel 21 which normally occupies a directly rearwardly extending position, as illustrated in full lines in FIG. 1, and when maximum safe lateral thrust is applied to the free end of the arm 21, will swing to one of the broken line positions of the arm 21 to release the ski boot. The arm 21 is pivoted on a base 22 fastened to the ski by screws 23, and is downwardly detented relative to the base in its normal or full line position as shown in FIG. 1 as is described in detail hereinbelow. The detenting power holding the arm 21 in its normal, rearwardly extending position is increased when the arm is in a slightly raised position relative to the base 22.

The arm 21 has a central shaft 30 journaled and slidable in bore 32. A spring 34 urges upwardly the shaft and a detent washer 36 having upwardly projecting, rounded detents 38 to seat the detents in sockets 40 when the arm is in its normal, rearwardly extending position. To move to its release position, the arm must move downwardly as cammed by the detents 38.

The arm 21 has at its rear end upper and lower arcuate flanges 41 and 42 and a semi-cylindrical bore or groove 43. A sole-engaging toe cup 44 has an overhanging lip 46 and an arcuate sole end engaging portion 48 substantially at least as long as the width of the sole for receiving therein the toe end of the sole. The cup has a T-shaped portion 50 fitting in an undercut guideway 52 in a mount 54 having an arcuate groove 56 receiving arcuate flange 42 and slidable in and rotatable in the groove 43. An adjustment screw 60 having a groove 62 receiving an arcuate rib 64 of the mount and the cup respectively is rotatable in a smooth semi-cylindrical groove 68 in the mount and meshes with threads in a semi-cylindrical groove 70 in the cup to adjust the cup vertically relative to the mount. The head of the screw bears against a cupped spring washer 72 pressing against a washer-like plate splined to the mount 54 by pins 74 passing through bores 76 in the washer. The washer has an arcuate flange hooking over the upper flange 40 of the arm. An upwardly extending wedge-like detent 80 normally extends into complementary, slightly shallower, detenting notch 82 in the lower flange. Upward force on the lip 48 tends to hold the detent 80 in the notch 82. However, maximum safe lateral force on the ski boot swings the cup 44, the mount 54 and the washer on the arm 21 to release the boot from the binding. Similarly, the maximum safe lateral force swings the arm 21 about the base 22. The detent 80 gives a stronger detenting force than the detents 38 so that, during a release, the arm 21 first turns and then the cup turns on the arm if the maximum safe lateral force is sustained.

In executing a turn, the skier tends to twist his ski boot 13 about a generally horizontal axis generally parallel to the longitudinal axis of the ski. This applies a strong lifting force to the lip 46 of the arm 21 and holds the arm strongly detented. Thus, the arm 21 is detented against releasing movement with one force when there is no appreciable upward force on the lip 46, which is the condition during falling, and is held against such releasing movement with a much stronger force when there is a substantial upward force on the lip 46 as is needed during execution of a turn. Stated in other words, during execution of a turn, there is a high force urging the ski boot laterally of the ski and the toe binding, and also there is a high force from the ski boot sole pressing the arm 21 upwardly. This upward force results from the tendency of the ski boot to twist generally about its longitudinal axis during execution of the turn. These forces are not danger-

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ous to the skier, and it is desirable that the ski boot be held strongly by the toe binding at this time, and the cup binding does this by making the strong detenting power effective during turning. However, whenever the skier is falling, it is essential that the ski boot be released before the highest non-dangerous or maximum safe force is exceeded. During falling there is no great upward thrust on the arm 21 and the arm and the cup release before a dangerously high force is reached.

EMBODIMENT OF FIGS. 4 TO 6

A cup toe ski binding 111 forming an alternate embodiment of the invention mounted on ski 110 includes an arm or swivel 112, a base 122, a rigid locking and detenting washer 136 like the washer 36 and a compression spring 134. The arm includes a shaft 130 to which is keyed the detenting washer 136 having downward acting detents 138 identical in structure to the detents 38, and fitting in detenting sockets 140.

A sole-engaging toe cup 144 having an overhanging lip 146 and an arcuate sole end-engaging portion 148 is pressed up against arcuate flange 150 by a cupped spring washer 152 on a screw 154 extending through a bore 156 in the cup 144 and mounting the cup pivotally on the arm 122 with a retaining nut 158. The spring washer 152 normally holds detents 180 on the cup in detenting sockets 182 in the flange 150 to hold the cup normally in a rearwardly facing position. The cup 144 is detented more strongly to the swivel than the swivel is detented to the base so that, in a release, the swivel turns on the base before the cup turns on the swivel.

EMBODIMENT OF FIGS. 7 TO 9

A cup toe binding 211 forming an alternate embodiment of the invention has a cupped base 222 and a cupped bottom cover 223 secured to a ski 210 by screws 224. A swivel or arm 221 has a hollow body portion 225 mounted pivotally and slidably on a headed post 226 fixed to the base 222. The arm 221 has an integral cup portion 244 including an arcuate lip or flange 246 adapted to overhang a sole 212 of a ski boot 213 when the toe end of the sole abuts an arcuate or cupped sole end-engaging portion 248. The cup portion 244 is at least substantially as long as the width of the boot sole on the toe.

When a maximum safe lateral force is applied by the boot 232 to the cup portion 244 of the arm 221, the arm is cammed downwardly relative to the ski by detent rivets or pins 240 having heads 241 and frustoconical detenting portions 242 fitting in frustoconical detenting socket or countersunk portions 243 of arcuate slots 254 in the base 222. The slots 254 are centered on the post 226. The pins 240 extend through bores 245 and 256 (FIG. 8) in the hollow body portion 225, and cupped spring washers 258 positioned between the base and bottom plate 249 of the hollow body portion 225 of the arm 221 urge the arm 221 upwardly to seat the detenting portions 242 in the socket portions 243 when the pins 240 are aligned with the socket portions 243. Thus, the cup toe binding 211 has a downward detented action so that it securely holds the ski boot when the boot presses hard upwardly on the lip 231 as during fast turns, and releases the ski boot when abnormally high lateral forces are applied to the cup 244 by the ski boot. Bowed leaf springs 261 (FIGS. 8 and 9) are secured to the pins 240 and secured to tabs 265 of the base 222 by loop portions 263. The leaf springs normally urge the swivel to its holding position, and return the swivel to this position after a release is effected. The springs 261 are not strong enough to have any appreciable effect in resisting a release.

EMBODIMENT OF FIGS. 10 TO 12

A cup toe binding 311 forming an alternate embodiment of the invention includes a base 322 secured by screws 324 to a ski 310. An arm or swivel 321 has a shaft portion 330 like the shaft portion 30 and journaled

to the base and slidable vertically to a limited extent relative to the base 322. Downward detents 338 like the detents 38 give a downward detenting action to the arm as release is effected, that is, as the arm is swung from its normal, directly rearwardly extending position the detents 338 must cam the arm downwardly before any appreciable releasing movement can occur.

Shoes 344 form a cup to engage and trap a sole 312 of a ski boot 313. Each shoe has an arcuate overhanging lip 331 and a toothed sole end engaging portion 334. Each shoe is secured pivotally to a vertical adjusting screw 333 mounted by arms of a fork 335 of an arm 350. The arms 350 are mounted between upper and lower clevis portions 354 and 356 of the arm 321. Each arm 350 is slidable and pivotal on a rivet 360 and is urged upwardly by a cupped washer 362 to seat a detent 364 in a detent socket 366 in the portion 354 when the wing is in its normal or holding position. The detenting strength of each detent 364 and socket 366 is stronger than the detenting strength of the detents 338 so that when an abnormally high lateral force, approaching the maximum safe force, is applied to the binding by the ski boot, the detents 330 first release and then, if the force is sustained, the detent 364 releases. When both sets of detents are broken, the release of the ski boot toe from the abutment is instantaneous because the whole swivel abutment moves in a forward arc.

EMBODIMENT OF FIGS. 13 TO 15

A toe binding 411 forming an alternate embodiment includes a base 422 secured by screws 424 to a ski 410. An arm or swivel 421 is threaded onto and freely pivotal on a vertical, threaded post or arbor 430 fixed rigidly to the base 422. A sole engaging member 444 has an overhanging lip 431 and vertical ridges or teeth 433 spaced at equal distances from the centerline of the member 444 for engaging the toe end of the sole of the ski boot. The member 444 has a fork 445 loosely receiving an end portion 447 of the swivel and pivotally secured to the end portion 447 by a screw 456 screwed into a vertical tapped bore 457 in the upper arm of the fork 445 and rotatable and slightly pivotal in a bore 459 in the swivel 421. A cupped washer 452 positioned between the upper arm of the fork and the end portion 447 presses the member 444 upwardly to bring downwardly camming detents 480 on the bottom arm of the fork 445 into shallower sockets 481 in the swivel 421 to normally hold the member 444 in a boot holding position. A detent 482 on the swivel normally projects into socket 483 in a long arm portion 478 of the member 444. To release, the detent 482 cams the forward end of the arm portion 478 upwardly, as permitted by the loose fit of the screw 456 in the bore 459. This and the downward detenting action of the detents 480, move the lip 431 downwardly before a release occurs.

The cup member 444 and the swivel 421 are, in effect, a single rigid arm until the maximum safe lateral force is applied to the ski boot. Then the member 444 is pivoted on the swivel 421 to release the boot, the detents 480 camming the member 444 downwardly and the detent 482 pivots the member 444 clockwise, as viewed in FIG. 14, before there is any appreciable releasing movement, this being the natural result of the leverage because the detents 480 are located slightly forward of the centerline of the screw 456 in the bore 459.

EMBODIMENT OF FIG. 16

A cup toe binding 611 forming an alternate embodiment of the invention is identical to the binding 411 except that a cup 544 of the binding 511 is wider than the member 444 and is cup shaped with a large number of vertical sole end engaging ribs 533. The ribs 533 securely engage sole 512 of ski boot 513 to prevent side-wise slipping.

EMBODIMENT OF FIGS. 17 AND 18

A cup toe binding 11 forming an alternate embodiment of the invention includes a base 622 fixed to a ski 610 by screws 624 and a swivel or arm 621 mounted pivotally on the base by a post 630. Downward detents 638 cam the swivel and toe engaging cup halves 644 downwardly relative to the base when a high lateral force is reached. Then, when a slightly higher, maximum safe lateral force is approached, one of detents 680 in one of detent sockets 681 in one of arms 633 of the cup halves 644 cams that arm downwardly as that arm breaks away from its detented position relative to the swivel 621. Each cup half 644 includes a cupped toe engaging member 650 including a lip 652 and an arcuate, vertical sole end engaging portion 654 having adjustment slots 656 with upper and lower countersunk portions 658 and 660 for receiving heads of flatheaded screws 662 screwed into tapped holes 664 in the arms 633. By loosening the screws, the members 650 can be adjusted from an upper position to a lower position, or vice versa, and the screws retightened. The arms 633 are pivotal on screws 670 fixed to forked or clevis portions 672, and cupped spring washers 674 urge the arms 633 upwardly to detented positions.

There is only one detent 680 on each clevis portion 672 while there are a plurality of detent sockets 682. This construction permits the arms 633 to be adjusted to inner positions for narrow ski boots and to outer positions for wide ski boots, the cup halves 144 preferably being adjusted to positions substantially spanning the ski boot. If desired, the detents 680 and the sockets 681 may be located 180° around the screws 670 from the positions disclosed in FIG. 17. Or, as an alternative, detents and sockets like the detents 680 and sockets 681 may be placed to the rear of the pins 670 in addition to the detents 680 and sockets 681 to double detenting effect.

The above described cup toe bindings provide one holding force for skiing and provide a much increased holding force while normal turning occurs. They also inherently increase the detenting force while any lifting force is applied to the lips. The bindings are very rugged and durable, and have minimum numbers of parts.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a cup toe binding, a base adapted to be secured to a ski, swivel means including a swivel and a cup means pivotal on the swivel about a first vertical axis for encircling the toe end of a sole of a ski boot to prevent lateral movement of the sole relative to the cup and having an overhanging lip means, means mounting the swivel pivotally on the base about a second vertical axis spaced laterally from the first vertical axis, and detent means between the cup means and the swivel means for moving the lip means downwardly relative to the base during releasing movement of the swivel means.
2. The binding of claim 1 including means for adjusting the lip toward and away from the base.
3. In a cup toe binding, a base adapted to be secured to a ski, swivel means including a swivel and a cup means for encircling the toe end of a sole of a ski boot to prevent lateral movement of the sole relative to the cup and having an overhanging lip means, means mounting the swivel pivotally on the base, detent means between the cup means and the swivel for moving the lip means downwardly relative to the

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base during releasing movement of the swivel means, the swivel comprising an arm and including post means on the base mounting the arm pivotally thereon, and means mounting the cup means pivotally on the arm.

4. The cup toe binding of claim 3 wherein the post means comprises a threaded post and the arm includes a tapped bore screwed onto the post to provide vertical adjustment of the arm.

5. The cup toe binding of claim 3 wherein the detent means is between the arm and the cup means.

6. The cup toe binding of claim 5 wherein the cup means is one piece and includes an arm portion normally held by the detent means in a position overlying the arm.

7. The cup toe binding of claim 6 wherein the detent means is positioned at the ends of the arm and the arm portion.

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8. The cup toe binding of claim 5 wherein the cup means is one piece and includes a fork portion receiving an end portion of the arm and mounted pivotally thereon, the detent means being positioned between a lower arm portion of the fork portion and the end portion of the arm and adapted to cam the cup means downwardly.

References Cited

UNITED STATES PATENTS

2,858,137	10/1958	Marker	-----	280-11.35
3,265,400	8/1966	Hvam	-----	280-11.35
3,282,599	11/1966	Hvam	-----	280-11.35

BENJAMIN HERSH, Primary Examiner

J. A. PEKAR, Assistant Examiner

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,544,122 Dated December 1, 1970

Inventor(s) Hjalmar Hvam

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

In the specification:

Column 1, line 18, "154" should be -- 254 --;

Column 5, line 69, "611" should be -- 511 --;

Column 6, line 2, "11" should be -- 611 --; and

In the claims:

Column 6, line 68, "cki" should be -- ski --.

SIGNED AND
SEALED
MAR 2 1971

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents