Sept. 21, 1965 H. HVAM 3,207,525

TOE BINDING

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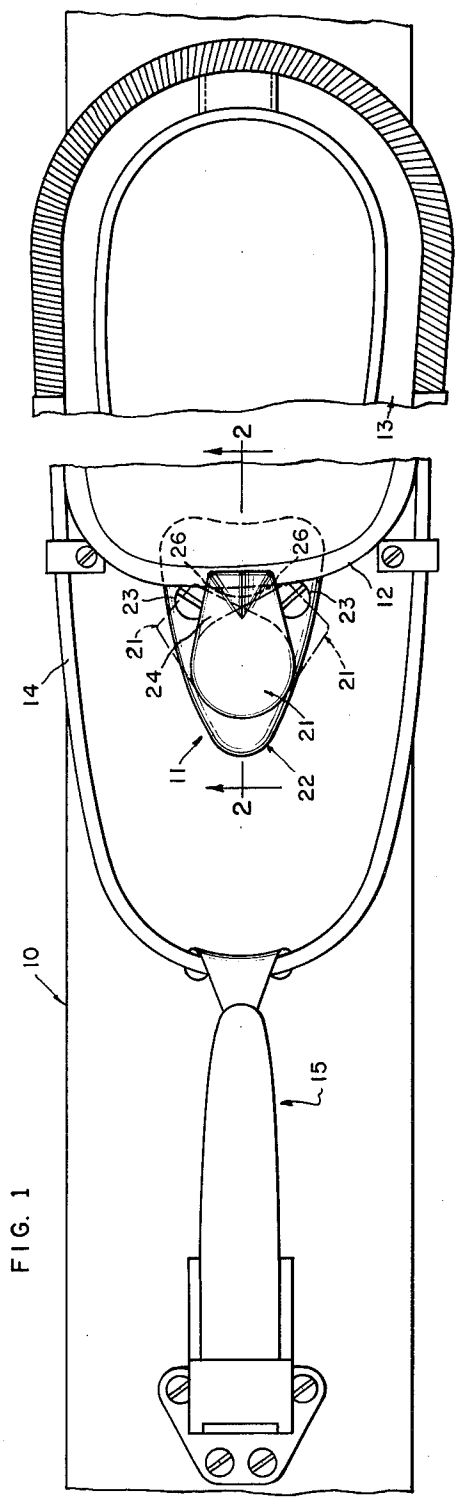


FIG. 1

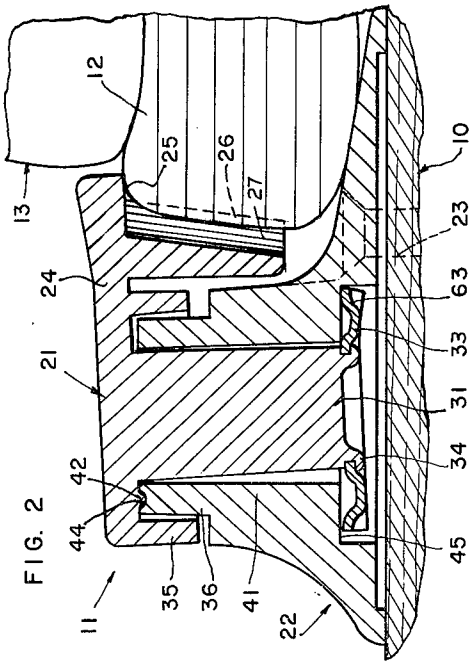


FIG. 2

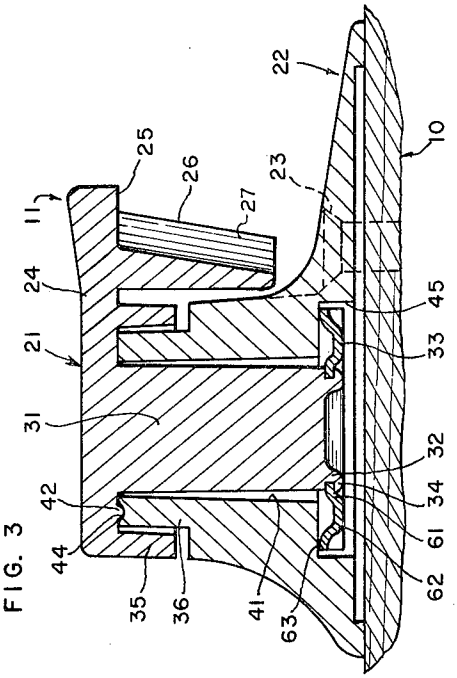


FIG. 3

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FIG. 4

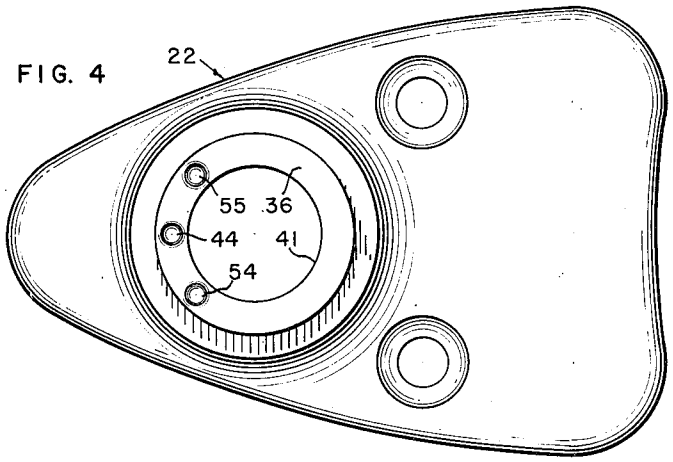


FIG. 5

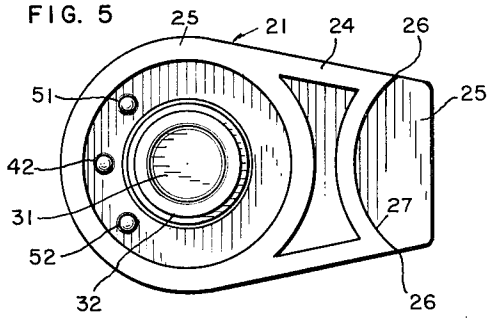


FIG. 6

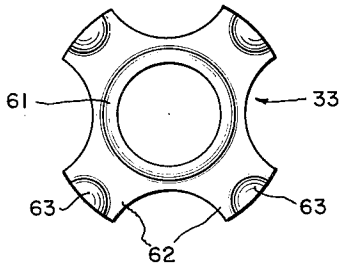


FIG. 7

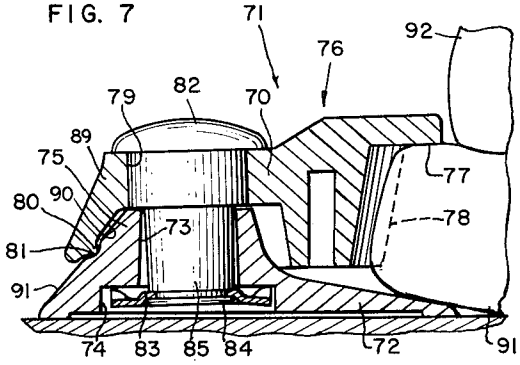
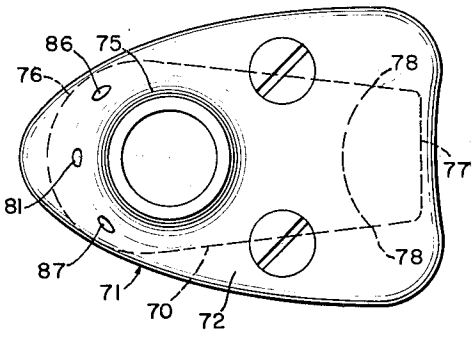


FIG. 8



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United States Patent Office 3,207,525 Patented Sept. 21, 1965

3,207,525

TOE BINDING

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Filed Oct. 7, 1963, Ser. No. 314,105
19 Claims. (Cl. 280—11.35)

This invention relates to ski binding structures, and more particularly to toe ski bindings.

An object of the invention is to provide new and improved ski binding structures.

Another object of the invention is to provide new and improved toe ski bindings.

A further object of the invention is to provide a toe ski binding having detent means variable in accordance with the force of a heel holding binding.

A still further object of the invention is to provide a safety ski binding having a minimum number of parts.

Yet another object of the invention is to provide a safety toe binding for a ski in which the holding power of the binding is dependent on the tension of a heel binding cable.

The invention provides ski binding structures including a heel binding engaging the heel of a ski boot and pressing the ski boot forwardly, together with a releasable, safety toe binding against which the ski boot is urged by the heel binding, and which is provided with detent means variable in holding force in accordance with the forward pressing force of the heel binding. The toe binding includes a base fixed to the ski and an arm provided with a jaw portion at one end thereof having a lip adapted to engage the top of the toe end of the sole of a ski boot and a pair of parallel, vertical ridges positioned below the lip for engaging the toe end of the sole at spaced points thereon. The arm is pivotally mounted on the base for free horizontal pivotal movement relative to the base and is pivotal vertically relative to the base through a limited range. The arm and the base are provided with camming detent portions adapted to interlock when the arm is at an extreme vertical position relative to the base and extends directly rearwardly along the ski. The detent portions cam the arm away from the extreme vertical position thereof to effect release for horizontal pivotal movement of the arm. By adjusting the heel binding, the ski boot is pressed forwardly against the toe binding with adjusted force so that the detent action is adjusted.

In a toe binding forming one specific embodiment of the invention, there is provided a base having a bore therethrough and an arm which has a tapered shaft projecting loosely through the bore and riveted over a spring washer at the lower end of the bore to secure the arm against separation from the base while still permitting pivotal movement of the arm relative to the base. The arm and the base are provided with camming detents adapted to interengage when the arm is pushed upwardly and forwardly relative to the base, and also have two pairs of side detent portions adapted to be selectively interengaged when the arm is turned about the longitudinal axis thereof relative to the base, as occurs during execution of a turn with the ski.

In a toe binding forming an alternate embodiment of the invention a base is provided with a boss portion on which an arm having a bore therethrough is loosely pivoted, and a headed rivet holds the arm on the boss portion for free horizontal pivotal movement of the arm and limited vertical pivotal movement of the arm, the arm and the base being provided with camming detents adapted to interengage when the arm extends directly rearwardly from the rivet and is urged forwardly and upwardly relative to the base.

A complete understanding of the invention may be obtained from the following detailed description of ski 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 heel binding and a toe binding forming one embodiment of the invention;

FIGS. 2 and 3 are enlarged, fragmentary, vertical sections taken along line 2—2 of FIG. 1 and showing the toe binding in two different conditions;

FIG. 4 is an enlarged, top plan view of a base of the toe binding of FIG. 1;

FIG. 5 is an enlarged, bottom plan view of an arm of the toe binding of FIG. 1;

FIG. 6 is an enlarged, plan view of a spring washer of the toe binding of FIG. 1;

FIG. 7 is an enlarged, vertical, sectional view of a toe binding forming an alternate embodiment of the invention; and

FIG. 8 is a top plan view of the toe binding of FIG. 7.

Referring now in detail to the drawings, there is shown in FIGS. 1 to 6 a ski **10** having thereon a toe binding **11** against which a sole **12** of a ski boot **13** is urged by a cable **14** of a heel binding **15**. The heel binding **15** is one of the type in which the tension of the heel binding cable **14** may be manually adjusted, one excellent ski binding for this purpose being that disclosed and claimed in my copending application, Serial No. 198,821, filed May 31, 1962, now Patent 3,147,986, issued September 8,1964, which will release the tension of the cable **14** when there is a maximum safe stress on the cable **14**. The toe binding **11** includes an arm **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 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 adjustable by adjusting the tension of the cable **14**.

The arm **21** (FIGS. 2, 3 and 5) includes an elongated arm body **24** having at one end thereof a lip **25** for engaging the top of the front end of the sole **12** of the ski boot **13**, together with a pair of sharp vertical ribs or ridges **26** which, when the arm **21** is in its normal, rearwardly extending position, are substantially equidistantly spaced from the centerline of the ski **10** on opposite sides of the centerline of the ski. The rear end of the arm has an arcuate recess **27** defining with the sides of the arms the rather sharp ridges **26**. The ridges **26** are adapted to engage the end of the sole **12** of the ski boot **13**. The arm also includes a tapered or frustoconical post or shaft **31** integral with the arm body **24**. The shaft **31** has a reduced portion **32** near the lower end thereof on which is mounted a spring washer **33** which is secured to the shaft by a rivet portion **34** of the shaft.

The arm body **24** has at the forward end thereof a skirt **35** loosely surrounding a boss **36** of the base **22**, and extends laterally beyond the shaft **31** to form, in effect, a head on the shaft. The shaft **31** projects loosely through a slightly tapered bore **41** formed in the boss **36** to mount the arm **21** for unlimited horizontal pivotal movement of the arm **21** relative to the base **22**, and also to permit limited vertical pivotal movement of the arm **21** relative to the base **22**. Directly ahead of the shaft **31**, when the arm is in its normal, rearwardly extending position, the arm body **24** is provided with a rounded detent pin or projection **42**, and the spring washer **33** urges the arm **21** downwardly relative to the base **22** to urge the detent pin

into a camming detent socket or recess **44** formed in the top of the boss **36**. The washer **33** and rivet portion **34** of the shaft **31** are positioned in a counterbore **45** formed in the base **22**. Rounded detent pins or projections **51** and **52** similar to the detent pin **42** are spaced around the shaft **31** about 45° from the detent pin **42**, and are positioned somewhat at the sides of the shaft **31**. The detent pins **51** and **52** are adapted to fully enter camming sockets **54** and **55**, respectively, when the arm **21** is twisted generally about the longitudinal axis thereof, as occurs when the ski boot **13** tends to twist during execution of a turn with the ski, or similar maneuvers, so that the arm **21** is held more strongly against release during such maneuvers, as is desirable.

Normally the spring washer **33** (FIGS. 2, 3 and 6), which has a belled or cup-shaped body portion **61** and spring arms **62** having formed, rounded projections **63**, urges the arm **21** to the position thereof shown in FIG. 3, in which the arm abuts against the top of the boss **36** and the arm body **24** is horizontal. However, when the ski boot **13** is mounted on the ski and is secured thereto by the ski bindings **11** and **15** with the sole **12** engaging the ridges **26** and lip **25**, the forward pressure of the ski boot sole **12** on the arm **21** pivots the arm **21** counterclockwise from the position thereof shown in FIG. 3 to that shown in FIG. 2. The ridges **26** face somewhat downwardly relative to the ski **10** so that, combined with the natural slight upward curl of the toe end of the sole **12** of the ski boot **13**, pressing forward of the boot sole urges the arm counterclockwise as viewed in FIG. 2. This tendency of the boot sole to lift the rear end of the arm **21** is augmented by engagement of the top of the toe end of the boot sole with the lip **25**. The ridges **26** preferably are disposed at an angle of from about 10 to about 20° relative to the longitudinal axis of the post **31**. In the position of the arm body **24** in FIG. 2, the righthand side of the washer **33** abuts against the end of the counterbore **45** to limit the pivotal movement and also the upward movement of the post **31**. The detent pin **42** projects into the detent groove **44**, and the tighter the cable **14** is, the greater is the locking force of the detent pin **42** and socket **44**. If, in executing a turn, the sole **12** of the ski boot tends to twist about its longitudinal axis, the corresponding one of the detent pins **51** and **52** will bottom in the corresponding detent socket **54** or **55**. The arm **21** and base **22** are each integral units formed preferably by die casting out of a suitable known metal, one excellent material being that known as "Zamac." Thus, the toe binding **11** includes only three different parts, the arm **21**, the base **22** and the washer **33**, and, while very effective from the safety and boot-holding standpoints, the binding is extremely simple in the construction and manufacture thereof and is very rugged and durable.

When the maximum safe lateral force is applied to the arm **21**, the detent pin **42**, **51** or **52** (FIG. 5) which is operative at that time is cammed out of the corresponding socket **44**, **54** or **55** (FIG. 4) which forces the lip **25** (FIG. 2) downwardly somewhat against the sole **12** and the arm **21** swings until one of the ridges **26** is overcenter relative to the centerline of the ski. Then the arm **21** swings freely onwardly to release the ski boot.

In FIGS. 7 and 8 there is shown a toe binding **71** forming an alternate embodiment of the invention and which may be used interchangeably with the toe binding **11**. The toe binding **71** includes a base **72** having a generally vertical, tapered bore **73** and a counterbore **74** therein in a boss **75** having a generally frustoconical shape exteriorly. An arm **76** has an arm body **70** having a lip **77** and ridges **78**, which face somewhat downwardly. The arm body also has a bore **79** therein and a frustoconical, forwardly positioned skirt portion **89** fitting loosely over the frustoconical boss **75**, inner frustoconical surface **90** of the skirt portion **89** being larger than but generally complementary to adjacent frustoconical surface **91** of the boss **75**. The arm also has detent pins or projections **80** adapted to enter camming detent sockets or recesses **81**, **86** and **87** formed in the boss **75** of the base **72**. A headed rivet **82** is urged downwardly by a spring washer **83** in the counterbore **74**. The washer **83** is held on the rivet **82** by a riveted end portion **84**, and the rivet **82** has a tapered shank **85** fitting loosely in the bore **73**. The spring washer **83** urges the headed rivet **82** downwardly, and the head of the rivet engages the arm **76** and urges the arm **76** downwardly on the boss **75**. The washer **83** limits upward movement of the rivet **82** relative to the boss.

Normally, with no ski boot engaging the arm **76**, the head of the rivet **82** seats squarely on the upper end of the boss **75** with the detent pins **80** partly entering the sockets **81**, **86** and **87**, the latter being tapered and of a larger diameter than that of the detent pins to facilitate entrance of the pins into the sockets. The rivet **82** may be moved upwardly as permitted by the spring washer **83** sufficiently to permit the arm **76** to pivot freely horizontally relative to the base **72**. When a sole **91** of a ski boot **92** is positioned under the lip **77** and against the ridges **78**, and is urged forwardly along the ski, the arm **76** is pivoted counterclockwise, as viewed in FIG. 7, to move the detent pin **80** into the camming groove or recess **81**. The arm **76** also has rounded detent pins (not shown) spaced 45° on each side of the pin **80** and adapted to almost fully enter detent sockets **86** and **87** in the boss **75** when the arm **76** is in its normal operating position. These detent pins bracketing the pin **80** give added holding power when the arm **76** is twisted about its longitudinal axis. When the maximum safe lateral thrust is applied to the ski boot, the arm **76** pivots horizontally and the pins **80** and sockets **81**, **86** and **87** press the arm **76** clockwise, as viewed in FIG. 7, until the pins clear the sockets, and then the arm swings on horizontally to the releasing position.

Each of the above described toe bindings **11** and **71** is very rugged and durable, is very effective to hold a ski boot with as much or as little holding force as is selected by the setting of the heel binding, and is extremely simple and inexpensive in construction and assembly.

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 toe-holding clamp for a ski,

arm means extending generally horizontally and having an overhanging lip member at one end thereof and also having a pair of horizontally spaced, generally vertically extending ridges at said one end thereof,

pivot means mounting on the ski a portion of the arm means spaced from said one end thereof for generally horizontal pivotal movement of the arm means relative to the ski and also permitting limited vertical movement of the arm means relative to the ski,

and detent means normally holding the arm means against horizontal pivotal movement relative to the ski and releasing the arm means for such horizontal pivotal movement only when said one end of the arm means is moved vertically downwardly a predetermined distance from one extreme vertical position thereof permitted by the pivot means.

2. In a toe-holding clamp for a ski,

arm means extending generally horizontally and having an overhanging lip member at one end thereof and also having a pair of horizontally spaced, generally vertically extending ridges at said one end thereof,

pivot means mounting on the ski a portion of the arm means spaced from said one end thereof for generally horizontal pivotal movement of the arm means relative to the ski and also permitting limited vertical movement of the arm means relative to the ski,

and detent means normally holding the arm means

against horizontal pivotal movement relative to the ski and releasing the arm means for such horizontal pivotal movement only when said one end of the arm means is moved downwardly a predetermined distance from the extreme upward position thereof permitted by the pivot means.

3. In a toe-holding clamp for a ski,

arm means extending generally horizontally and having an overhanging lip member at one end thereof and also having a pair of horizontally spaced, generally vertically extending ridges at said one end thereof,

pivot means mounting the other end of the arm means on the ski for generally horizontal pivotal movement of the arm means relative to the ski and also permitting limited vertical movement of the arm means relative to the ski,

and detent means normally holding the arm means against horizontal pivotal movement relative to the ski and releasing the arm means for such horizontal pivotal movement only when said one end of the arm means is moved downwardly a predetermined distance from the extreme upward position thereof permitted by the pivot means.

4. In a toe-holding clamp for a ski,

arm means having a jaw portion at one end thereof provided with an overhanging lip and a pair of spaced ridges,

the arm means also having a first pivot portion spaced along the arm means from the jaw portion,

and a base having a second pivot portion loosely interfitting with the first pivot portion to permit free horizontal pivotal movement of the arm means relative to the base and to permit limited vertical pivotal movement of the arm means relative to the base,

the arm means and the base being provided with camming detent portions so positioned as to interengage when the arm means is in a position extending directly rearward from the base and is at the extreme of pivotal movement in which the jaw portion is raised to its extreme upper position,

the camming portions serving to pivot the arm means vertically to move the jaw portion downwardly from the extreme upper position thereof when the arm means is pivoted horizontally from the position extending directly rearwardly.

5. In a toe-holding clamp for a ski,

arm means having a jaw portion at one end thereof provided with an overhanging lip and a pair of spaced ridges,

the arm means also having a first pivot portion spaced along the arm means from the jaw portion,

a base having a second pivot portion loosely interfitting with the first pivot portion to permit free horizontal pivotal movement of the arm means relative to the base and to permit limited vertical pivotal movement of the arm means relative to the base,

the arm means and the base being provided with camming detent portions so positioned as to interengage when the arm means is in a position extending directly rearwardly from the base and is at the extreme of pivotal movement in which the jaw portion is raised to its extreme upper position,

the camming portions serving to pivot the arm means vertically to move the jaw portion downwardly from the extreme upper position thereof when the arm means is pivoted horizontally from the position extending directly rearwardly,

and means urging the arm means downwardly relative to the base.

6. In a toe-holding clamp for a ski,

a base adapted to be fixed to a ski and having a generally vertically extending pivot portion,

and arm means having a shaft portion so engaging the first pivot portion as to permit a free end of the arm means to pivot substantially freely horizontally relative to the ski and also slidably engaging the pivot portion to permit limited vertical movement between two extreme positions of the free end of the arm means relative to the ski,

the base and the arm means also being provided with detent portions for holding the arm means against horizontal pivotal movement relative to the ski when the arm is in a normal position extending directly rearwardly along the ski from the first pivot portion and at one of the two extreme positions of vertical movement of the free end of the arm means and releasing the arm for horizontal pivotal movement of the arm relative to the ski when a maximum safe force is applied laterally to the free end of the arm means.

7. In a ski binding structure including a heel binding having a cable for engaging the heel of a ski boot on a ski and urging the ski boot forwardly along the ski boot and means for adjusting the tension of the cable, an improved toe binding comprising

a base fixed to the ski in a position ahead of the ski boot,

an arm having at one end thereof a jaw provided with a lip engaging the top of the toe end of the sole of the ski boot when in a normal position extending directly rearwardly from the base and a pair of laterally vertical ridges extending downwardly from the lip and engaging the toe end of the sole at points thereon positioned on opposite sides of the centerline of the arm,

means mounting the arm pivotally on the base for horizontal pivotal movement on a vertical axis substantially on the centerline of the arm and spaced along the arm from said one end thereof and for limited vertical pivotal movement of the arm relative to the base between two extremes,

and a pair of camming detents on the arm and the base so positioned as to be urged into interlocking engagement by thrust on the arm from the sole of the ski boot forcing the arm to one of said two extremes to hold the arm against horizontal pivotal movement,

the pair of camming detents serving to force the arm from said one of said two extremes to permit horizontal movement of the arm relative to the base.

8. In a toe-holding clamp for a ski,

a base adapted to be fixed to a ski and having a generally vertical extending first pivot portion integral therewith,

and a one-piece arm having a second pivot portion so engaging the first pivot portion as to permit a free end thereof to pivot substantially freely horizontally relative to the ski and also permitting limited vertical movement between two extreme positions of the free end of the arm relative to the ski,

the base and the arm also being provided with detent portions for holding the arm against horizontal pivotal movement relative to the ski when the arm is in a normal position extending directly rearwardly along the ski from the first pivot portion and at one of the two extreme positions of vertical movement of the free end of the arm and releasing the arm for horizontal pivotal movement of the arm relative to the ski when a predetermined force is applied laterally to the free end of the arm.

9. In a toe-holding clamp for a ski,

a base having a vertical bore of a predetermined size extending therethrough,

the base having at the top thereof a detent recess positioned at the front of the bore,

and an arm having a jaw portion at one end provided with a pair of spaced, generally vertical ridges and an overhanging lip,

the arm having a shaft projecting downwardly through the bore and riveted at the lower end thereof at a

point therealong spaced below the lower end of the bore,
the shaft being of such a size relative to that of the bore as to permit limited vertical pivotal movement of the arm relative to the base,
the arm also having a downwardly extending detent pin having a rounded end positioned so as to enter the detent recess at the front of the bore when the arm is in a position extending directly backwardly along the ski and the jaw portion is at the uppermost position thereof relative to the ski.

10. In a toe-holding clamp for a ski,
a base having a vertical bore of a predetermined size therethrough,
the base having at the top thereof a detent recess positioned at the front of the bore,
an arm having a jaw portion at one end provided with a pair of spaced, generally vertical ridges and an overhanging lip,
the arm having a cylindrical shaft projecting downwardly through the bore and riveted at the lower end thereof at a point therealong spaced below the lower end of the bore,
the shaft being of such a size relative to that of the bore as to permit limited vertical pivotal movement of the arm relative to the base,
the arm also having a downwardly extending detent pin having a rounded end positioned so as to enter the detent recess at the front of the bore when the arm is in a position extending directly backwardly along the ski and the jaw portion is at the uppermost position thereof relative to the ski,
and a generally cup-shaped, spring washer on the shaft under the riveted end thereof engaging the base and urging the shaft and arm downwardly relative to the base.

11. In a toe-holding clamp for a ski,
a base having a vertical, tapered bore therethrough larger at the top end than at the bottom end,
the base having at the top thereof a detent recess positioned at the front of the base,
an arm having a jaw portion at one end provided with a pair of spaced, generally vertical ridges and an overhanging lip,
the arm having a tapered shaft projecting downwardly through the bore and riveted at the lower end thereof at a point therealong spaced below the lower end of the bore,
the shaft and bore being of such relative sizes as to permit limited vertical pivotal movement of the arm relative to the base,
the arm also having a downwardly extending detent pin having a rounded end positioned so as to enter the detent recess at the front of the bore when the arm is in a position extending directly backwardly along the ski and the jaw portion is at the uppermost position thereof relative to the ski,
and a generally cup-shaped spring washer on the shaft under the riveted end thereof engaging the base and urging the shaft and arm downwardly relative to the base.

12. In a toe-holding clamp for a ski,
a base,
an arm having a jaw portion provided with an overhanging lip and a pair of spaced, generally vertically extending ridges,
mounting means mounting the arm on the base for free horizontal pivotal movement relative to the base and for limited universal vertical pivotal movement relative to the base,
a first pair of complementary camming detent means positioned to interlock only when the arm is in a first position extending directly rearwardly from the base and the jaw portion is raised to the uppermost position permitted by the mounting means,
a second pair of complementary camming detent means positioned to interlock only when the arm is in a second position extending directly rearwardly from the base and is turned in one direction relative to the first position thereof,
and a third pair of complementary, camming detent means positioned to interlock only when the arm is in a third position extending directly rearwardly from the base and is turned in the other direction relative to the first position thereof.

13. In a toe-holding clamp for a ski,
a base having at the top thereof a plurality of detent recesses positioned at the front and sides thereof,
and an arm having a jaw portion at one end provided with a pair of spaced, generally vertical ridges and an overhanging lip,
the arm and the base having portions permitting free horizontal pivotal movement of the arm relative to the base and limited vertical pivotal movement of the arm relative to the base,
the arm also having a first downwardly extending detent pin having a rounded end positioned so as to enter the detent recess at the front of the base when the arm is in a position extending directly backwardly along the ski and the jaw portion is at the uppermost position thereof relative to the ski,
the arm also having second and third downwardly extending detent pins provided with rounded ends each adapted to enter one of the detent recesses at the side of the bore when the arm is turned about the longitudinal axis thereof.

14. In a toe-holding clamp for a ski,
a base having a plate portion adapted to be fastened to the upper surface of a ski and also provided with a boss portion projecting upwardly from the plate portion,
the boss portion having an axial bore therethrough and having a countersunk portion at the bottom of the bore,
the boss portion also having a camming detent recess positioned on the extreme forward portion of the lower portion thereof,
an arm having a jaw portion at a first end thereof including an overhanging lip and a pair of spaced, generally parallel ridges extending at right angles to the lip,
the arm having at the other end thereof a generally transverse bore of such a size as to fit loosely over the boss portion,
the arm being provided with a detent projection adapted to enter the detent recess when the arm is in a position extending rearwardly from the boss portion,
and a rivet projecting through the bore in the boss portion and having a head retaining the arm on the boss portion permitting limited vertical pivotal movement of the arm relative to the boss portion.

15. In a toe-holding clamp for a ski,
a base having a plate portion adapted to be fastened to the upper surface of a ski and also provided with a generally frustoconical boss portion projecting upwardly from the plate portion,
the boss portion having an axial bore therethrough and having a countersunk portion at the bottom of the bore,
the boss portion also having a camming detent recess positioned on the extreme forward portion of the lower portion thereof,
an arm having a jaw portion at a first end thereof including an overhanging lip and a pair of spaced, generally parallel ridges extending at right angles to the lip,
the arm having at the other end thereof a generally frustoconical, transverse bore of such a size as to fit loosely over the frustoconical boss portion,
the arm being provided with a detent projection adapted to enter the detent recess when the arm is in a position extending rearwardly from the boss portion,

and a rivet projecting through the bore in the boss portion and having a head retaining the arm on the boss portion and permitting limited vertical pivotal movement of the arm relative to the boss portion.

16. In a toe-holding clamp for a ski,

a base having a plate portion adapted to be fastened to the upper surface of a ski and also provided with a generally frustoconical boss portion projecting upwardly from the plate portion,

the boss portion having an axial bore therethrough and having a countersunk portion at the bottom of the bore,

the boss portion also having a first camming detent recess positioned on the extreme forward portion of the lower portion thereof, a second camming detent recess positioned on one side portion of the lower portion of the boss portion about 65° from the first recess and a third camming detent recess positioned on the other side portion of the lower portion of the boss portion about 65° from the first recess,

an arm having a jaw portion at a first end thereof including an overhanging lip and a pair of spaced, generally parallel ridges extending at right angles to the lip,

the arm having at the other end thereof a generally frustoconical transverse bore of such a size as to fit loosely over the frustoconical boss portion,

the arm being provided with a first detent projection adapted to enter the first detent recess when the arm is in a position extending rearwardly from the boss portion, a second detent projection adapted to enter the second detent recess when the arm is in said position and a third detent projection adapted to enter the third detent recess when the arm is in said position,

and a rivet projecting through the bore in the boss portion and having a head retaining the arm on the boss portion for limited vertical pivotal movement of the arm relative to the boss portion.

17. In a toe-holding clamp for a ski,

arm means having a jaw portion at one end thereof provided with an overhanging lip and a pair of spaced ridges,

the arm means also having a first pivot portion spaced along the arm means from the jaw portion,

a base having a second pivot portion loosely interfitting with the first pivot portion to permit free horizontal

pivotal movement of the arm means relative to the base and to permit limited vertical movement of the arm means relative to the base,

and camming detent means connected to the arm means and the base in such positions as to interengage when the arm means is in a position extending directlly rearwardly from the base and is at the extreme of pivotal movement in which the jaw portion is raised to its extreme upper position,

the camming means serving to pivot the arm means vertically to move the jaw portion downwardly from the extreme upper position thereof when the arm means is pivoted horizontally from the position extending directly rearwardly.

18. In a toe binding for a ski,

arm means having an arm portion, a downwardly depending shaft at one end of the arm portion, the arm portion having at the other end thereof a lip and a pair of spaced vertical ridges,

a base having a shaft-receiving vertical bore and a counterbore at the bottom of the bore,

an enlarged retainer member fixed at the bottom end of the shaft positioned in the counterbore to limit upward movement of the shaft relative to the base, and permitting limited upward movement of the shaft and retainer member relative to the base,

and normally interlocking, releasable detent portions connected to the arm means and base and requiring downward movement of the lip of the arm means relative to the base for release.

19. The toe binding of claim **18** wherein the arm portion and the shaft are integral.

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