United States Patent

[11] 3,584,891

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[54] **SKI BINDING RELEASABLE TOE CLAMP**
10 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **280/11.35T**
[51] **Int. Cl.** **A63c 9/00**
[50] **Field of Search** 280/11.35

[56] **References Cited**

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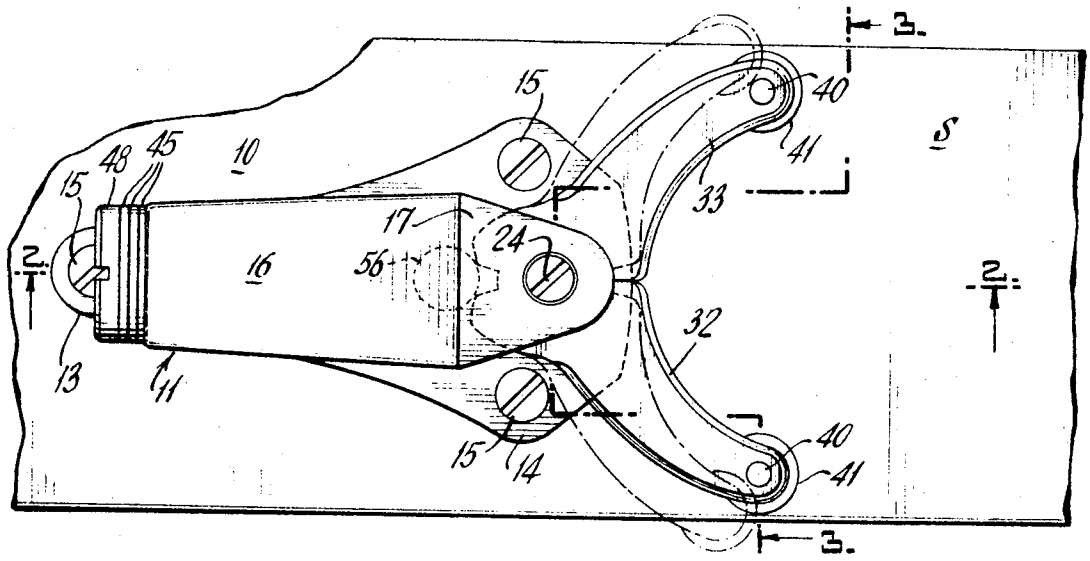
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ABSTRACT: A ski binding releasable toe clamp includes a pair of roller-supporting rearwardly outwardly projecting clamp arms swingable about and vertically adjustable on a common pivot pin and are provided at their inner ends with symmetrical rear cam surfaces having raised portions between their inner and outer end sections. A cam follower roller is adjustably spring urged toward the cam surfaces so that movement of one of the arms disengages the roller from the other cam surface and each cam is urged inwardly or outwardly when the roller engages the cam surface on the inner or outer side of the rise surface respectively.



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Fig. 1.

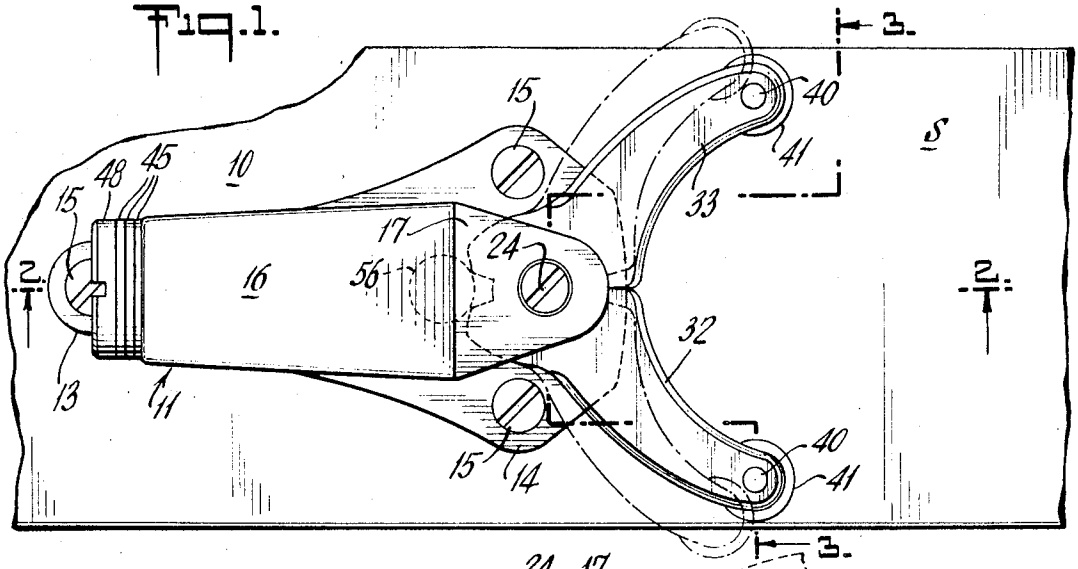


Fig. 2.

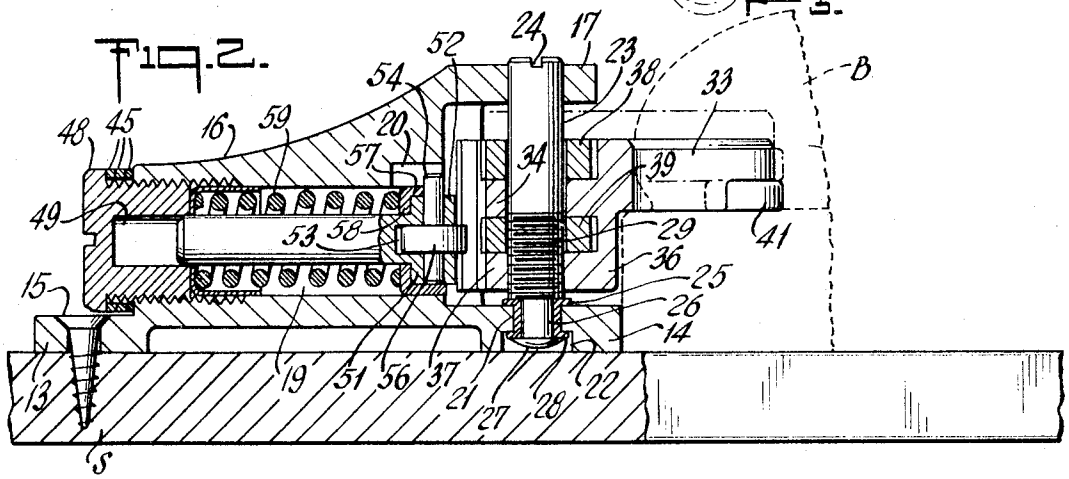


Fig. 4.

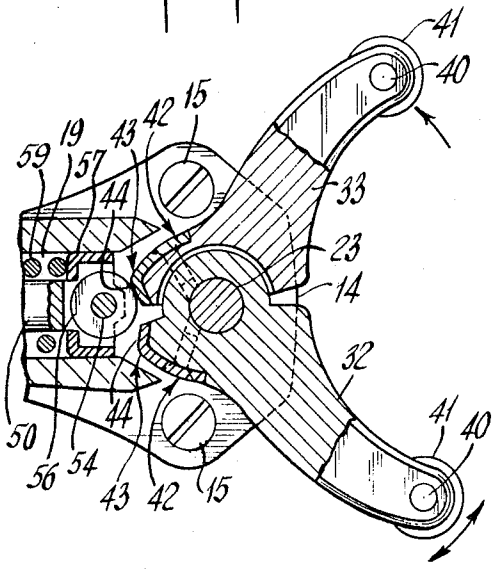
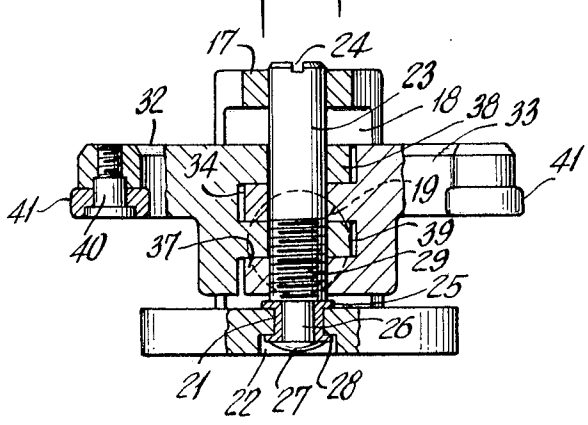


Fig. 3.



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SKI BINDING RELEASABLE TOE CLAMP

BACKGROUND OF THE INVENTION

The present invention relates generally to improvements in safety ski bindings and it relates particularly to an improved releasable toe clamp in a ski binding.

In safety ski bindings it is desirable so to clamp the toe portion of the ski boot to the ski as to permit high maneuverability of the ski even under greatly adverse conditions where considerable stress is transmitted from the ski to the boot while automatically releasing the boot from the ski when this stress exceeds a value beyond which injury to the skier may occur. Where the boot release pressure is too low, release of the boot may undesirably occur under many maneuvers thereby greatly reducing the usefulness of the binding. On the other hand, where the required boot release pressure is excessive, injury which may otherwise have been avoided may occur. Not only does the optimum release pressure vary with different individuals but the sequential response of the toe binding to various pressures, the manner of coupling the binding to the boot, and the configuration of the toe clamps and the pressure thereon under different situations are conditions which greatly effect the operation of the toe binding. Many different forms and types of toe binding mechanisms have been employed and proposed but these are deficient in one or more of the desired requirements and usually represent a compromise in the operation thereof.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide an improved safety ski binding.

Another object of the present invention is to provide an improved ski boot toe clamp.

Still another object of the present invention is to provide a releasable toe clamp which may be employed with conventional ski boots without modification thereof or damage thereto.

A further object of the present invention is to provide a ski safety toe clamp which permits a limited movement of the boot toe under adjustable predetermined stress before the release thereof.

Still a further object of the present invention is to provide an improved ski binding of the above nature characterized by its ruggedness, reliability, versatility and adaptability.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing.

In a sense, the present invention contemplates the provision of a safety ski binding comprising a base member, a pair of independently swingable boot clamp arms mounted on said base member, and spring loaded positioning means resiliently urging said clamp arms to predetermined closed positions and responsive to the movement of one of said arms from said closed position to release the other of said arms. In its preferred form, the body member supports a vertical pivot pin which swingably supports the clamp arms which extend rearwardly and outwardly from the pivot pin. The clamp arms are provided at their front ends with symmetrical cam surfaces having rise portions relative to the pivot pin between the inner and outer opposite sections of the cam surfaces. A cam following roller is longitudinally movable along a path intermediate the cam surfaces and is urged under adjustable spring pressure toward engagement with the cam surfaces. The clamp arms are vertically adjustable along the pivot pin and terminate at their free ends in toe engaging rollers.

The improved releasable toe clamp possesses numerous characteristics which contribute to a superior device. It permits a limited movement of the toe before release under adjustable pressure conditions and by reason of the limited freeing of one of the clamps attendant the movement of the other clamp greater safe maneuverability is available and damage to the ski boot minimized, the latter property being enhanced by the provision of the clamp rollers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a safety toe clamp embodying the present invention illustrated in a closed condition and mounted on a ski;

FIG. 2 is a sectional view taken along line 2–2 in Figure 1;

FIG. 3 is a sectional view taken along line 3–3 in Figure 1; and

FIG. 4 is a fragmentary top plan view thereof, partially in section, the clamp jaws being shown in a partially open condition.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing which illustrates a preferred embodiment of the present invention, reference numeral **10** generally designates the improved safety toe clamp which comprises a body member **11** formed as an integral unit of metal by casting or the like. Body member **11** includes a base member **12** having a narrow forward end section **13** and a relatively wide rear end section **14**, base **12** having a countersunk hole formed in front section **13** and a pair of laterally spaced countersunk holes formed in rear section to facilitate the securement of toe clamp **10** to a ski as by means of screws **15**.

Positioned on the top of and integrally formed with base **12** is a spring housing **16** which extends medially longitudinally between points short of front and rear sections **13** and **14** to leave the countersunk holes screws **15** therein freely accessible, the top wall of housing **16** being rearwardly upwardly curved. Projecting rearwardly from the upper part of housing **16** and integrally formed therewith is a horizontal ear **17** parallel to and in vertical registry with base section **14**. A pair of medially disposed vertically aligned bores are formed in base rear section **14** and ear **17** and a vertical cylindrical recess or well **18** is formed in the rear face of housing **16** and extends between base rear section **14** and ear **17**. A housing-defining large bore **19** extends longitudinally for the full length of housing section **16** and is tapped at its front end and provided at the top of its rear end with a longitudinal channel or groove **20** of rectangular transverse cross section and communicating with recess **18**.

A bushing **21** registers with the medial bore in base front section **14**, the bore being enlarged at the bottom thereof as at **22**, and bushing **21** being provided with a top peripheral flange **25** abutting the top face of base front section **14**. A pivot pin **23** provided at its top with a screw driver-receiving notch **24** has its upper end journaled in the bore in ear **17** and is provided with a depending stub shaft **26** engaging bushing **21**. The shoulder-delineating stub shaft **26** of pivot pin **23** abuts the top face of bushing flange **25**, and the bottom end of stub shaft **26** is upset to form an enlarged head **27** nesting in enlarged bore **22**. An annular member **28** is sandwiched between the top peripheral shoulder of counterbore **22** and head **27** whereby pivot pin **23** is freely rotatable and locked against axial movement. The lower section **29** of pivot pin **23** is threaded.

Swingably supported by pivot pin **23** are a pair of outwardly rearwardly projecting toe clamp arms **32** and **33**, which are relatively symmetrically shaped and adapted to engage the toe section of a ski boot B at the level of the sole thereof. Clamp arm **33** is provided at its front end with a first integrally formed flat faced hinge knuckle **34** of a height half that of clamp arm **33** with its bottom face coplanar with the bottom face of clamp arm **33**, a curved depending rear skirt wall **36**, and a second hinge knuckle **37** of similar shape to and in vertical alignment with knuckle **34** and spaced therefrom a distance about equal to the knuckle thickness. Clamp arm **32** is likewise provided with a depending curved skirt wall and a pair of upper and lower vertically space-designed hinge knuckles **38** and **39** respectively, knuckles **38** and **39** being of the same size and configuration as and interdigitating with knuckles **34** and **37**, knuckles **38** and **39** being above knuckles **37** and **34** respectively. Hinge knuckles **34**, **37**, **38** and **39** are provided with aligned bores engaged by pivot pin **23**, the bore in lowermost knuckle **37** being tapped and engaging pivot pin

threaded section 29. Thus, clamp arms 32 and 33 are independently swingable on pivot pin 23 and the level thereof is adjustable by turning pivot pin 23 by means of a screw driver.

The rear free ends of clamp arms 32 and 33 are undercut and support vertical pins 40. Mounted on each pin 40 and registering with the undercut portions of clamp arms 32 and 33 are freely rotatable rollers 41, the peripheries of which project rearwardly and laterally beyond the clamp arm free ends.

Suitably secured, such as by screws or the like, to the correspondingly shaped rear faces of clamp arms 32 and 33 are a pair of symmetrically shaped cam plates 42 which are of uniform transverse cross section along the full heights thereof. Each cam plate 42 includes a rise portion 43 relative to the axis of pivot pin 23 that is whose radial distance from the pivot pin axis is maximum, an inner section 44 extending circumferentially and radially inwardly from rise portion 43 and an outer section 46 extending circumferentially outwardly and radially inwardly from rise portion 43.

A screw closure member 47 engages the tapped front end of bore 13 and includes an enlarged outer head 48 separated from the confronting front face of housing 16 by a plurality of washers 45 and having a bore 49 formed in its inner face coaxial with bore 16. A longitudinal rod 50 extends coaxially of bore 19 with its forward end slideably engaging bore 49 and provided at its rear end with an enlarged cylindrical head 51. Vertical and horizontal diametrical slots or channels, 52 and 53 respectively are formed in the rear face of rod head 51. A vertical axle 54 engages vertical slot 53, crossing slot 52, and its upper end projects into and is slideably engaged by longitudinal slot 20. A freely rotatable cam follower-defining roller 56 engages axle 54 and registers with horizontal slot 53 with the rear peripheral face projecting beyond the rear face of head 51. A collar 57 engages the rear peripheral face of head 51 and underlies the bottom of axle 54 and is provided in its upper rear part with a longitudinal slot engaging the upper part of axle 54. Collar 57 is provided at its front end with an inwardly directed peripheral flange 58 which abuts the front face of head 51. A helical compression spring 59 surrounds slide rod 50 and is entrapped between the rear face of screw closure 47 and collar flange 58 to urge the rod and cam follower assembly rearwardly with roller 56 bearing on cams 42 under the influence of spring 59.

In employing the improved safety toe clamp, clamp arms 32 and 33 are adjusted to an optimum level by turning pivot pin 23 and the release pressure is adjusted by varying the compression of spring 29 by appropriate turning of threaded plug 47 and adjustment of the number of washers 45. The ski boot is centered in the toe clamp in a firm condition with rollers 41 resting atop the toe section of the sole and engaging the boot toe section with the peripheral surfaces thereof. Roller 56 bears on cam inner surfaces 44 under the influence of spring 59 and releasably maintains the toe clamp arms in a contracted closed condition to maintain boot B centered. Maneuvers which require turning of the boot relative to the ski are permitted without hazard or damage, since the pressure of the turning boot on one of the clamp arms effects the swinging thereof and the retraction of follow roller 56 as a consequence of the turning of the corresponding cam plate 42, the retraction of follower roller 56 permitting the free unstressed swinging of the other clamp arm thereby to greatly facilitate greater maneuverability without any accompanying disadvantages and release of the boot. On the other hand, if the pressure on the clamp arm is excessive due to an accident or a possibly injurious stress, the clamp arm is swung to move the cam rise portion 43 past follower roller 56. As a result, follower roller 56 bears on the outer cam section 46 and thereby urges the clamp arm to swing outwardly to a position releasing the boot.

While there has been described and illustrated a preferred embodiment of the present invention it is apparent that numerous alterations, omissions and additions may be made without departure from the spirit thereof.

I claim:

1. A safety ski binding comprising a base member, a pair of independently swingable boot clamp arms pivotally mounted about a common vertical axis on said base member, and spring loaded positioning means engaging and resiliently urging said clamp arms to predetermined closed positions and responsive to the movement of one of said arms from said closed position to release and disengage the other of said arms to permit the free swinging thereof.

2. The safety ski binding of claim 1 wherein the force of said positioning means urging a respective arm to its closed position is diminished when said arm is swung a predetermined angle from said closed position.

3. The safety ski binding of claim 1 wherein said positioning means urges a respective arm to swing in a direction from said closed position when said arm is in a position exceeding a predetermined angle from said closed position.

4. A safety ski binding comprising a base member, a vertical pivot pin mounted on the rear section of said base member, a pair of independently swingable boot clamp arms engaging said pivot pin for swinging about the vertical axis thereof and extending forwardly and outwardly from said pivot pin, and spring loaded positioning means resiliently urging said clamp arms to predetermined closed positions and responsive to the movement of one of said arms from said closed position to release and disengage the other of said arms to permit the free swinging thereof and including cams positioned on the forward sections of said clamp arms and having forwardly directed cam surfaces, a common longitudinally moving cam follower registering with said cam surfaces, and spring means urging said cam follower toward engagement with said cam surfaces.

5. The safety ski binding of claim 4 wherein each of said cam surfaces has a raised portion relative to said pivot pin between the inner and outer ends of said cam surface, said cam surface extending circumferentially radially inwardly on opposite sides of said raised position.

6. The safety ski binding of claim 5, wherein said cam follower comprises a roller rotatable about a vertical axis and movable along a medial longitudinal axis relative to said cam surfaces.

7. The safety ski binding of claim 4 including a roller mounted at the rear free end of each of said clamp arms and rotatable about a vertical axis.

8. The safety ski binding of claim 7 wherein each of said rollers is supported on the underface of a respective clamp arm with its peripheral face projecting beyond the end of said clamp arm.

9. The safety ski binding of claim 4 including means for vertically adjusting said clamp arms along said pivot pin.

10. The safety ski binding of claim 4 wherein said clamp arms are provided at their inner forward ends with integrally formed interdigitating knuckles engaging said pivot pin.