June 30, 1953 W. H. HARGIS, JR 2,643,888

SKI BINDING

Filed March 3, 1951 3 Sheets-Sheet 1

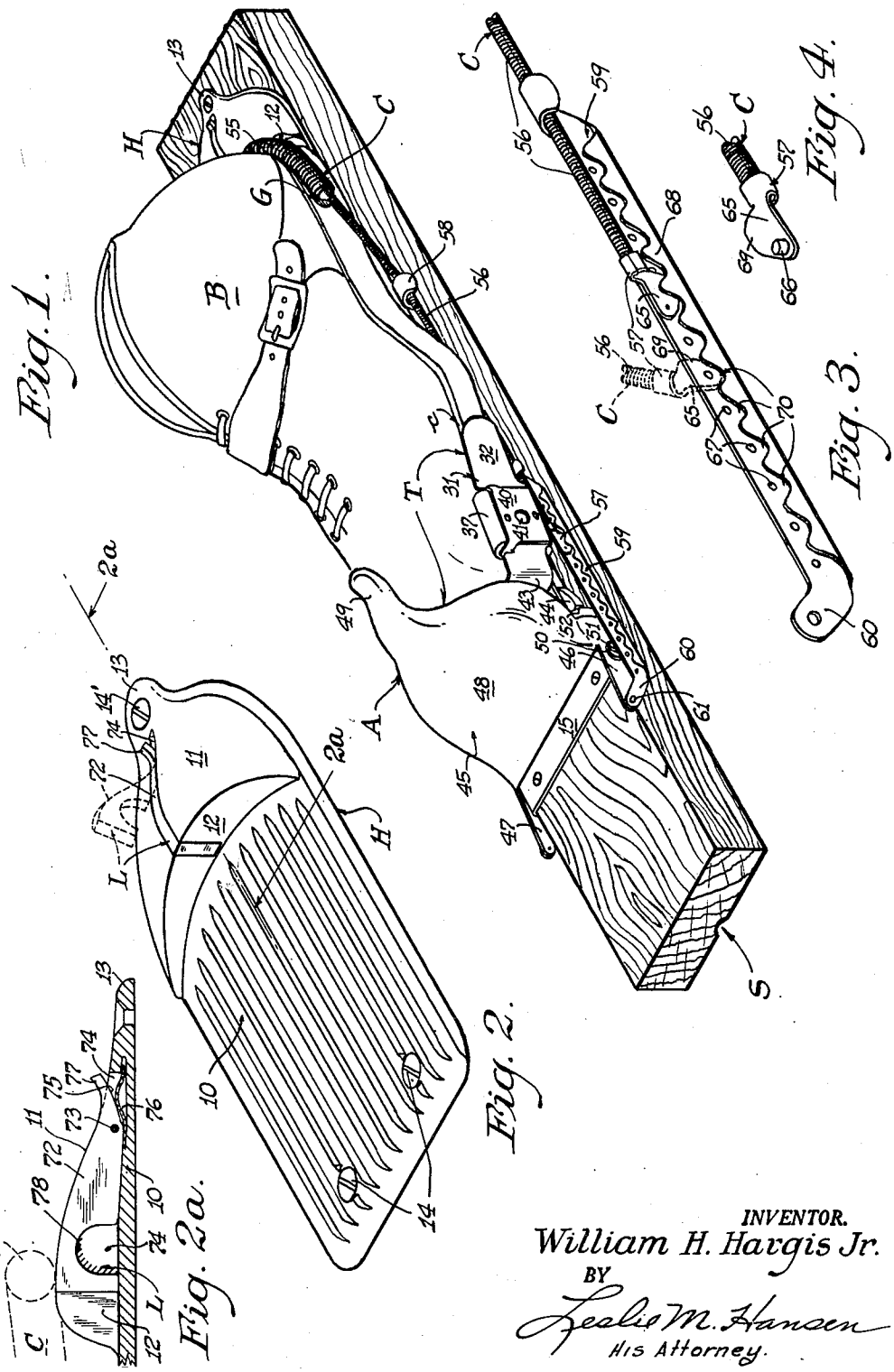


Fig. 1.

Fig. 2.

Fig. 2a.

Fig. 3.

Fig. 4.

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SKI BINDING

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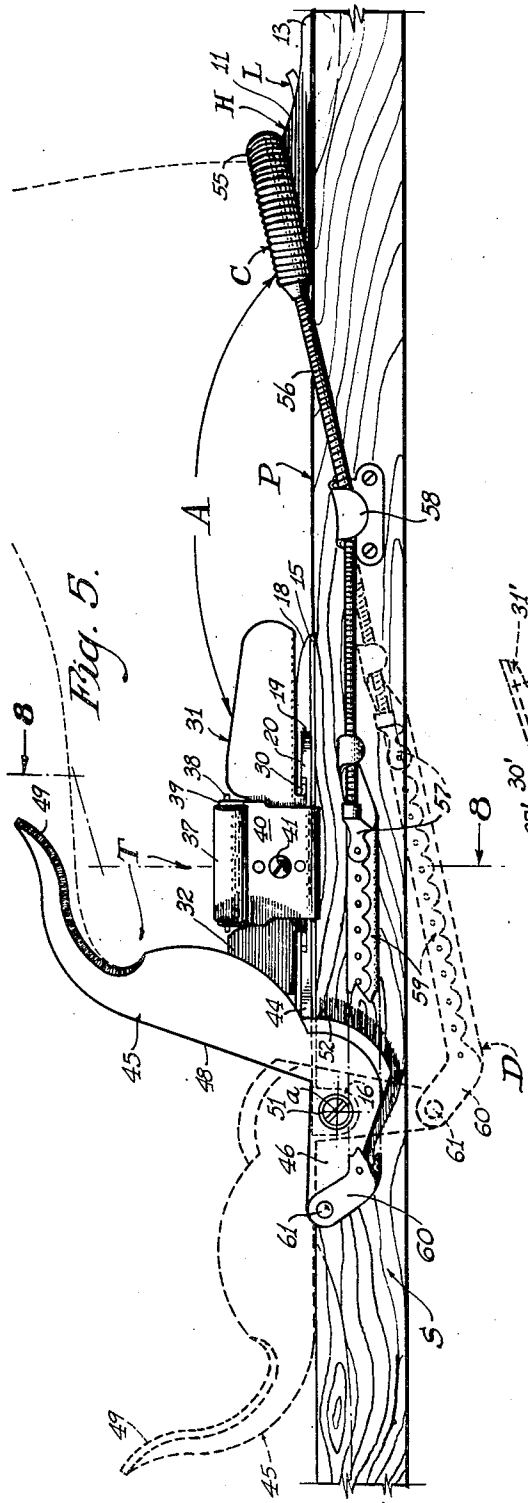


Fig. 5.

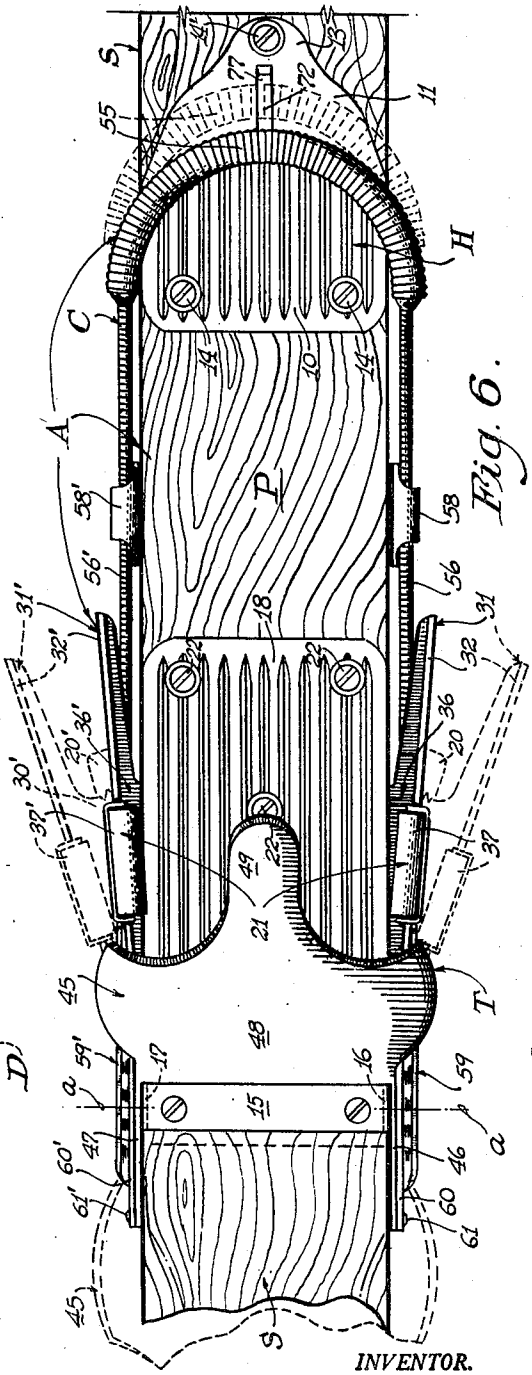


Fig. 6.

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SKI BINDING

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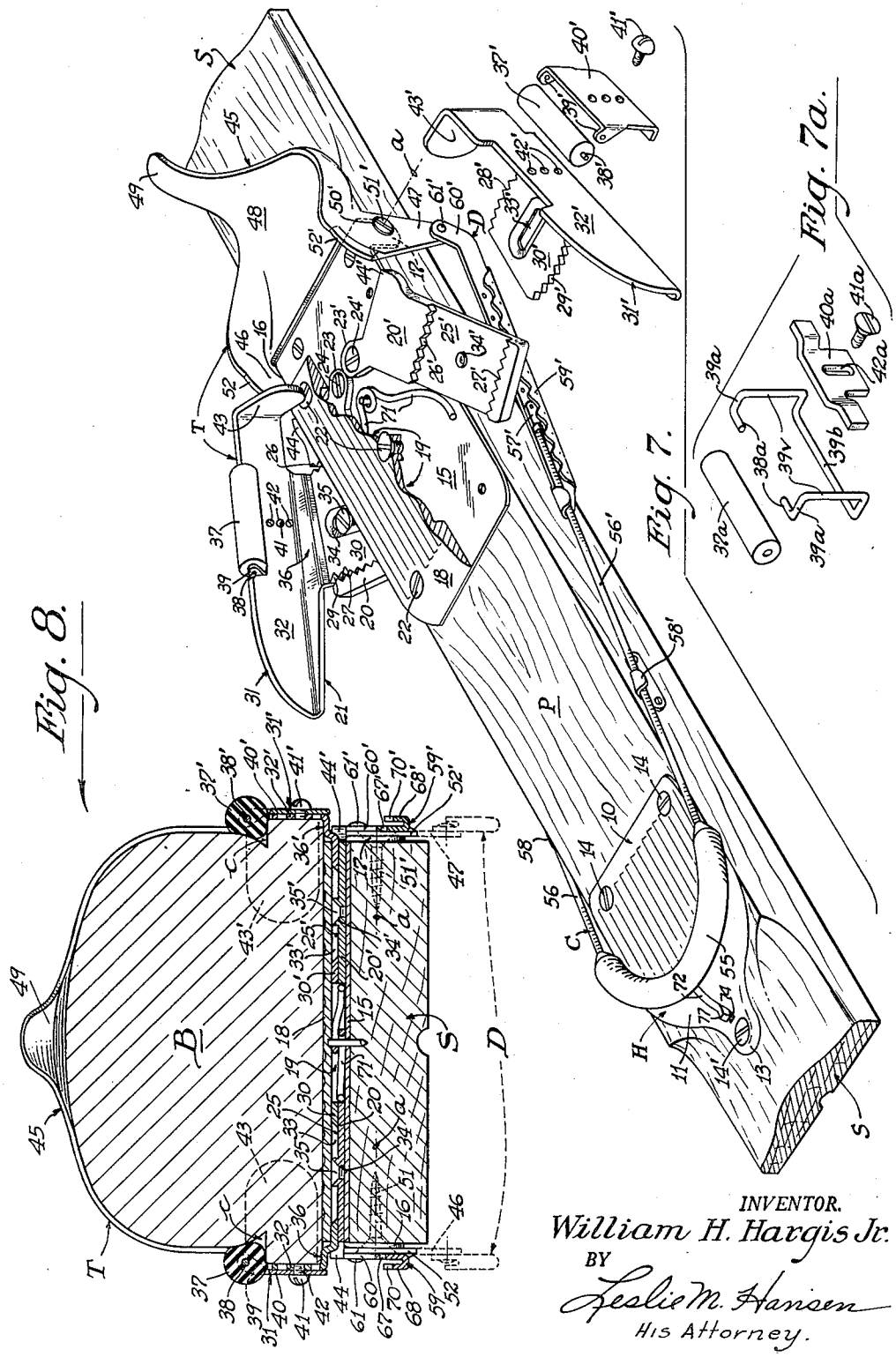


Fig. 8.

Fig. 7.

Fig. 7a.

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Patented June 30, 1953

2,643,888

UNITED STATES PATENT OFFICE

2,643,888

SKI BINDING

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Application March 3, 1951, Serial No. 213,779

20 Claims. (Cl. 280—11.35)

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This invention relates to ski bindings and more particularly to improvements in ski bindings for attaining full control over the skis yet assuring a quick release of a ski boot from the binding when the boot is twisted or turned in a manner other than required in the art of skiing.

Heretofore safety bindings have been devised in which release of a ski boot from the binding is effected when a yawing motion occurs between the ski and the boot. That is to say, when the long axis of the boot deviates from the axis of the ski by pivotal movement of the boot on its sole, the binding is automatically released. The fact that any pivotal movement of the boot can occur when within the binding evidences a loss of control over the ski. In other words, in prior known safety bindings directional control over the skis has been sacrificed upon the supposition that the quick releasing of the binder due to yawing motion is a safety factor. However, taking into consideration that lack of control due to yawing of the boot relative to the ski causes more spills than would normally occur when the boot is firmly secured in alignment with the ski, it will be apparent that a ski binding which holds pivoting of the boot to a minimum is most ideal. Moreover, when it is considered that the breaking of legs due to a ski spill seldom occurs due to failure of the boot to yaw relative to the ski, it follows that loss of control over the ski caused by any yawing motion is not generally advantageous.

Under the present invention control over the ski by a firm binding of the boot thereto is foremost. However, experience has shown that the major number of broken legs and ankles occur when the ski blade meets with an obstruction ahead causing the skier to vault forwardly over the upturned points of the skis; or in cases of obstructions met during sidewise slippage of the ski blades on fast turns causing the skier to fall by momentum to one or the other side of the ski blades. It is accordingly an object of the present invention to effect an immediate release of the boot from the present binding when there is any undue tendency of the ski boot to rock to either side relative to the ski blade or in a forward direction relative thereto.

Another object of this invention is to provide a toe clamping mechanism actuated by a toe lever associated with the ski blade for immediate release upon undue pivoting of the ski boot in a forward direction relative to the ski blade.

Another object is to provide companion winglike toe clamps for engaging the sole of the boot with yieldable cleats engageable over the cleft

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between the sole and last of the boot for effecting immediate release of the boot from between the winglike toe clamps when any undue upward thrust is exerted against one or the other of said yieldable cleats.

It is another object of this invention to operate the heel cable of the binding simultaneously with the actuation of the toe lever upon the toe clamps for effecting release of the heel of the boot simultaneously with the release of the toe clamp upon undue foreward tilting of the boot relative to the ski blade. In conjunction with the foregoing object it is another object to provide an automatic brake for the ski blade for preventing a runaway ski when the ski binding is in ineffective position or during fastening of the ski blade to one's boots.

Yet another object of the present invention is to provide a new and novel form of anchorage for the ends of the heel cable whereby the same can be lengthened or shortened as desired to suit any particular boot size.

Still another object is to so coordinate the yieldable heel cable with an over centering action of the toe lever for maintaining the latter in toe clamp closing position when the cable is sprung around the heel of a ski boot which over centering action is sensitive upon any undue rise of the toe of the boot to effect a release of the toe clamping mechanism under the influence of the yieldable cable.

These and other objects and advantages of the ski binding of the present invention will become apparent in the following description when read in the light of the drawings in which:

Fig. 1 is a perspective view of my new ski binding showing a ski boot secured therein.

Fig. 2 is a perspective view of the heel plate of my new ski binding.

Fig. 2*a* is a fragmentary longitudinal section through the heel plate shown in Fig. 2 and taken along line 2*a*—2*a* thereof.

Fig. 3 is an enlarged perspective view of the heel cable anchorage shown in Fig. 1.

Fig. 4 is a perspective view of the inner side of one end only of the heel cable shown in Fig. 3.

Fig. 5 is a side elevational view of the ski binding shown in Fig. 1.

Fig. 6 is a plan view of the ski binding shown in Figs. 1 and 5.

Fig. 7 is a perspective view of the ski binding shown in Fig. 1 with the boot removed and as seen from the opposite side of the ski, certain parts of the binder being broken away and disassembled for purposes of illustration. Fig. 7*a* is an exploded perspective view of a modified

form of mounting for the yieldable cleat shown in Figs. 1 to 7.

Fig. 8 is a cross section of the ski binding in the region of the toe clamping portion thereof and taken substantially along line 8—8 in Fig. 5.

Referring now to the drawings the entire binding, generally indicated by the letter A, is mounted on the blade of a ski S and consists of a toe section T and a heel section H cooperating with a heel cable C for securing a ski boot B to the ski blade.

The ski blade S may be of any conventional design having a platform P formed midway its fore and aft ends for providing a relatively flat surface on the top side of the ski blade to facilitate securing the toe and heel sections T and H to the ski.

The heel section H (Figs. 2 and 7) comprises a plate 10 having a raised rearward portion 11 providing an arcuate shoulder 12 conforming substantially to the rearward curved wall of a ski boot heel. The raised portion 11 gradually declines from the shoulder 12 toward a receding tail or ear 13 and is perfectly rounded to eliminate any obstructions for reasons later to become apparent. The plate 10 is secured to the platform P by two forward screws 14 and one rearward screw 14', the latter of which extends through the centrally located ear 13 formed on the receding tail of the raised rearward portion 11 of plate 10.

The toe section T, (Figs. 1, 6, 7 and 8) comprises a foundation or base plate 15 substantially the width of the platform P and having downturned ears 16 and 17 at either side of its fore end adapted to straddle the side walls of the ski blade. A treadle plate 18, slightly shorter than the base plate 15 is secured to that portion of the latter to the rear of its fore end on which the downturned ears 16—17 are formed. The under surface of the treadle plate is recessed as best seen in Fig. 7 to provide a chamber 19 between plates 15 and 18 for the reception of winglike arms 20 and 20' forming a part of a clamping mechanism 21. The treadle plate 18 and base plate 15 are secured to the platform P of the ski S by a number of screws 22 suitably arranged to afford adequate clearance for the moving parts of the toe clamping mechanism 21 disposed in the chamber 19.

It should here be noted that the heel plate 10 and the treadle plate 18 are spaced from each other longitudinally of the ski blade S to receive the heel and sole, respectively, of a ski boot regardless of boot size leaving a sufficient portion of the treadle plate 18 in advance of the toe of the boot for reasons later to become apparent.

Concerning the toe clamping mechanism 21, it will be noted that the winglike arms 20 and 20' and parts carried thereby are identical to each other except that they are of reversed construction, one for the right and the other for the left side of the binder. Consequently like reference numbers will be applied to like parts of the toe clamping mechanism 21, the parts on the left side of the ski being indicated by whole numbers and those on the right side of the ski being indicated by the same number with a prime symbol or exponent.

Each winglike arm 20 and 20' consists of a piece of flat rigid metal about half the width of the treadle plate and adapted to fit within the chamber 19 for lateral movement. Each arm 20—20' has a boss 23—23' on its forward inner corner countersunk to receive a screw 24—24' which extends through the base plate 15 and into the body of the ski blade. These bosses 23—23' are arranged symmetrically to either side of the central axis of the ski so that the winglike arms are pivoted to swing in symmetrical arcs.

Each arm 20—20' has its upper surface recessed as at 25—25', the fore and aft shoulders 26—26' and 27—27' of which recesses are serrated in configuration. These serrated shoulders receive similarly serrated edges 28—28' and 29—29' of a mounting flange 30—30' for a toe iron 31—31' provided with upstanding side walls 32—32'. In each case the mounting flange 30—30' has a transverse slot 33—33' adapted to fit over a boss 34—34' formed centrally of the recess 25—25' on the arm 20—20'. The boss 34—34' is tapped to receive a set screw 35—35' which extends through the slot 33—33' for securing the mounting flange 30—30' to the arm 20—20'. It should here be noted that the serrated edges 28—28' and 29—29' on the mounting flange 30—30' are somewhat arcuate so as to attain a differential angular disposition of the upstanding walls of the toe irons to suit various widths and shapes of boot soles.

Each toe iron 31—31', as best seen in cross section in Fig. 8, is provided with an offset shoulder 36—36' between the upturned side wall 32—32' and the mounting flange 30—30' to provide a bearing surface for the sole of the ski boot adjacent its outer side edge and at the same level as the top surface of the treadle plate 18.

Cooperating with this bearing surface 36—36' is a yieldable cleat in the form of a roller 37—37' mounted on a pin 38—38' having its ends supported in trunnion ears 39—39' formed on a resilient carriage 40—40'. This carriage 40—40' is adapted to be secured to the outside of the upstanding side wall 32—32' by a screw 41—41' which is threaded into one or another of the vertically spaced tapped bores 42—42' provided in the side wall 32—32'. In this manner the roller 37—37' can be adjusted to fit snugly into the cleft *c* between the upper surface of the boot sole and the adjacent last of the ski boot as best illustrated in Figs. 1 and 8.

An alternate form of yieldable cleat is shown in Fig. 7*a* as comprising a roller 37*a* pivotally mountable on inwardly bent pintle ends 38*a* of a U-shaped wire 39*a* having its inwardly bent bight 39*b* adapted to fit under the offset shoulder 36 of the toe iron, its vertical legs 39*v* resting against the side wall 32 of the toe iron and secured thereto by a plate 40*a* having a vertical slot 42*a* through which the screw 41*a* passes for threaded connection with the tapped bore 42 in side wall 32 of the toe iron.

The forward end of the upstanding side wall 32—32' of each toe iron is bent at substantially right angles inwardly to provide a forward stop 43—43' against which the toe end of the boot sole abuts when the toe irons 31—31' are urged against the side edges of the boot sole. In this connection each winglike arm 20—20' is provided with a cam lug 44—44' on its forward outer corner so as to project beyond the side margins of the base and treadle plates 15 and 18, respectively.

Each downturned ear 16 and 17 on the base plate 15 forms a bearing surface at the side walls of the ski blade against which the trunnionlike arms 46 and 47 of a toe guard and lever 45 will bear. This toe guard and lever 45 comprises a cup shaped shield 48 having a central tail or trigger arm 49 adapted to fit over the toe portion of a ski boot disposed in the binding. The

sides of the cup shaped shield merge into the shape of the aforementioned trunnionlike arms 46—47 so that the toe guard 45 straddles the ski blade just ahead of the treadle plate 18. When the toe guard 45 is in toe covering position as illustrated in Figs. 1, 5 and 6, the arms 46—47 extend forwardly of the ski blade and are at an obtuse angle relative to the front face of the cup shaped shield 48. Both arms 46—47 are bored and countersunk as at 50—50' on a center slightly in advance of the point of convergence of their upper edges with the front face of the shield 48. The downturned ears 16 and 17 on the base plate 15 are also bored to allow a pivot screw 51—51' to pass from the countersunk bore 50—50' in arm 46—47 and into the side wall of the ski blade for mounting the toe guard and lever 45 thereon for pivotal movement about an axis *a*.

The rear surface of each arm 46—47 is in the form of a cam edge 52—52', respectively, which is eccentric relative to the axis *a*, the distance from said axis being greatest in a plane extended from the upper edge of the arms 46—47. These cam edges 52—52' bear against the cam lugs 44 and 44', respectively, formed on the winglike arms 20—20' as hereinbefore explained. When the high point of the cam edge 52—52' engages the cam lug 44—44', the winglike arm 20—20' is forced into the chamber 19 below the treadle plate 18 to thereby press the upstanding side walls 32—32' firmly against the side edges of the sole of a ski boot disposed on the treadle plate 18. In this sense the toe irons and arms 20 and 20' comprise clamping jaws with which the yieldable cleat rollers 37—37' are firmly set into the cleft *c* between the sole and last of the ski boot to hold the sole of the boot down upon the treadle plate 18. Simultaneous with the foregoing the inturned toe stops 43—43' on the walls 32—32' swing into position ahead of the toe end of the boot sole to prevent forward movement of the boot relative to the treadle plate and toe irons.

Means for urging the entire boot B forward into firm abutment with the toe stops 43—43' of the toe irons comprises a coordinating leverage on the toe guard lever 45 coacting with the heel cable C in a manner now to be explained. The cable C is of conventional construction in that it includes a bight portion 55 of enlarged diameter cross sectionally adapted to seat into a groove G formed in the heel portion of the ski boot. Moreover, the leg strands 56 and 56' of the cable, which are conventionally springlike, are provided with novel anchoring tips 57 and 57', respectively, at their free ends. The leg strands are guided in a side clip 58 or 58' as the case may be, which clip is secured to the side wall of the ski blade in the usual manner. The anchoring tips 57—57' are secured to linkages 59—59', respectively, normally extending directly forward at the sides of the ski blade but each having an end 60—60', respectively, extending angularly upwardly for pivotal connection as at 61 or 61' as the case may be, with the fore extremities of the respective forwardly extending arms 46—47 on the toe guard and lever 45.

The disposition of the cable C in the foregoing description is such that the bight 55 of the cable will be firmly drawn against the grooved heel of the ski boot to force the toe end of the boot sole firmly against the toe stops 43—43' on the toe irons 31—31'.

Should the cable C be too short or too long and therefore fail to function as stated above, the anchoring tips 57 and 57' of the cable need only be shifted rearwardly or forwardly relative to the linkages 59—59' as the case may be. This feature of the present invention is best illustrated in Figs. 3 and 4 wherein it will be noted that each tip 57—57' includes fin 65 having a pin 66 extending laterally therefrom in a plane forwardly of the axis of the leg strand 56—56'. The linkage 59 or 59' has a plurality of spaced apertures 67, any one of which is adapted to receive the pin 66 by a lateral shifting of the fin 65 toward the linkage 59—59'.

The fin 65 is maintained against the linkage by an upturned portion 68 of the linkage which with the latter is of U-shaped formation, the linkage 59—59' and upturned portion 68 being spaced sufficiently to receive the fin 65 between them. Each fin 65 has a downwardly flared portion 69 which fits into the U formation of the linkage to prevent the pin 66 from rocking out of the aperture 67 in the linkage 59—59'. The upper edge of the upturned portion 68 is serrated in configuration, each undulation 70 therein conforming to the round end of the fin 65 and being in axial alignment with a respective one of the apertures 67 formed in the main body of the linkage 59—59'. Consequently, when the fin 65 is rocked upwardly and forwardly about the axis of its pin 66 (see dotted line illustration Fig. 3) the flared portion 69 of the fin is removed from between the linkage and upturned portion thereof. When in this position the fin 65 can be moved laterally away from the linkage 59—59' through the adjacent undulation 70 in the portion 68 to remove the pin 66 from the aperture 67. The cable C can now be adjusted to suit the size of the boot to be held in the binding and the anchoring tip 57—57' again connected to the linkage 59—59' at the particular aperture 67 desired.

When a boot B is about to be placed in the binding A, the binding is open as shown in full lines Fig. 8, dotted lines Figs. 5 and 6. When the binding is in open position the toe guard or lever 45 is disposed all the way forward with its front face resting on the top surface of the ski blade. This accounts for the offset relationship of the axis *a* of the countersunk bore 50 relative to the front face of the lever 45.

When the lever 45 is swung forwardly as just mentioned, the forwardly extending arms 46—47 thereof swing through an arc, downwardly and rearwardly as best seen in Fig. 5. Consequently, the extreme ends of the arms 46—47 extend beyond the lower surface of the ski blade. In addition to the foregoing, the upturned fore ends 60—60' of the linkages 59—59' extend farther beyond the extreme ends of the arms 46—47. In this manner the extreme ends of the arms 46—47 and the fore ends 60—60' of the linkages will dig into the snow and thereby effect a drag or brake D for the ski blade for preventing the latter from sliding downhill. Moreover, when the drag or brake D is thus effected a runaway ski is prevented, accidental injury and damage to persons or property, by runaway skis, being thereby minimized.

The forward swing of the lever 45 from full to dotted line position (Figs. 5 and 6) also causes rearward movement of the entire heel cable C whereby the bight portion 55 of the cable moves out of the groove G formed in the boot heel and onto the gradually declining raised portion 11 of the heel section plate 10. Simultaneously with the foregoing forward swing of the lever 45 the

cam edges 52—52' on the latter decline in a direction toward their lower ends to recede away from the cam lugs 44—44' on the winglike arms 20—20' of the toe clamping mechanism 21. A spring clip 71 arranged within the chamber 19 and between the arms 20—20' then urges the arms 20—20' outwardly about their pivot screws 24—24'. In this manner the toe irons 31—31' are spread outwardly to the position shown in Fig. 8 so that the binder is wide open for the reception of a ski boot.

It should here be noted that the bight portion 55 of the cable C, which would ordinarily dangle during carrying of the ski blades, can be secured to the heel section H through the medium of a latch means L. This latch means L comprises a lever 72 pivotally mounted on a pin 73 supported in the raised portion 11 of the heel plate 10 across a slot or groove 74 formed along the axis thereof. This lever as shown in Fig. 2a has a recessed tail 75 adjacent and rearwardly of the pivot pin 73 adapted to bear against a leaf spring 76 disposed in the floor of the groove 74 for maintaining the fore end of the lever 72 confined within the groove 74. The tail 75 of the lever also has an upturned knob 77 which when pressed down, against the action of spring 76, causes the fore end of the lever to raise out of the groove 74. The fore end of the lever has a hooklike recess 78 open to its lower edge adapted to fit over the bight 55 of the cable C for holding the latter against the raised portion 11 of the heel plate 10.

In summary the operation of the ski binding A and the safety attributes thereof are as follows:

The ski blades S with the binding wide open are placed bottom surface down on the snow, the hook 78 of the latch means L being detached from the cable and the lever 72 being confined within the groove formed in the portion 11 of the heel plate 10. The ski blades S will not slide upon the snow due to the drag or brake D afforded by the extreme ends of the arms 46—47 of lever 45 and the fore ends 60—60' of the linkages 59—59'.

The ski boot B is then placed in the binding A and the toe guard or lever 45 swung back toward the toe of the boot. The forward swing of the arms 46—47 with lever 45 draw the cable C forwardly causing its bight 55 to ride up the inclined portion 11 of heel plate 10 and into the groove G in the boot heel to force the boot well forwardly into the toe clamping mechanism 21. Meantime the cam edges 52—52' act upon the cam lugs 44—44' of the winglike arms 20—20' to force the latter and the upstanding side walls 32—32' of the toe irons 31—31' against the side edges of the boot sole, the stops 43—43' on the toe irons now limiting forward movement of the toe edges of the boot sole.

The cleats or rollers 37—37', being disposed at proper height on the side walls of the toe irons, move into the cleft *c* at the sides of the boot B. When the toe guard or lever 45 is drawn completely into its rearward position, as shown in Fig. 1, the cable C, which is yieldable, stretches and the extreme ends of the arms 46—47 being horizontally above axis *a* effect a toggle or over center action relative to the axis *a*. In this manner the tension of the spring cable C effects an upwardly backward pull against the lever 45 to maintain the latter in closed position with its central tail or trigger arm 49 over the toe portion of the ski boot B.

From the foregoing it will be apparent that the toe clamping mechanism 21 firmly grips the boot sole at either side of the boot, the cleats 37—37' pressing the boot sole firmly down upon the treadle plate 18 while the upstanding side walls 32—32' of the toe irons bear firmly against the side edges of the boot sole. The drag or brake feature D is now ineffective and articulation of the skier's foot by raising of the heel of the boot off of the heel plate 10 is possible along the long axis of the ski blade without disturbing the clamping action of the binder. The boot B being otherwise firmly bound upon the ski blade, yawing motion, i. e. pivotal movement of the boot in a horizontal plane about the ball of its sole relative to the long axis of the ski blade, is reduced to a minimum. It will therefore be seen that the skier has full control and can attain accurate directional control and guidance of the ski blades as they glide over the snow.

Should any undue upward thrust occur against either cleat roller 37 or 37' by reason of an unnatural twist of the skier's leg in a plane transverse to the platform P of the ski blade, the cleat carriage 40—40' is yieldable and the cleats 37—37' are rollable to allow the boot to rock out of engagement with such cleat. Thus the toe of the boot is raised up against the trigger or central tail 49 on the toe guard 45 effecting sufficient forward swing of the latter to rock the pivotal connection 61—61' down below horizontal center of the axis *a* (over center) whereupon the tightened spring cable C snaps the toe guard lever 45 completely forward. Thus the bight of the cable is released from the groove in the boot heel and the cam edges 52—52' release the cam lugs 44—44' of the toe clamping mechanism whereupon the spring clip 71 within chamber 19 urges the winglike arms 20—20' outwardly spreading the toe irons 31—31' apart.

The same result is attained when the boot B is rocked beyond a predetermined angular position in a forward direction relative to the ski blade. In other words, although normal articulation of the skier's ankle and foot is afforded, the moment the sole of the boot begins to rise off of the rear portion of the treadle plate 18, the toe of the boot will engage the trigger 49 on the lever 45 to effect over center release of the latter for immediate opening under the influence of the spring action of the heel cable C.

In either of the foregoing situations it will be apparent that the ski binding of the present invention is immediately opened up wide (as shown in Fig. 8) allowing the boot to come out of the binding. Moreover, should the ski blades thus become detached from the skier's boots and tend to glide downhill on their own, the drag or brake D is now effective to retard or fully stop the ski blades in the snow. Accidents from runaway skis will thereby be minimized.

While I have described in specific detail what I consider to be the best mode of carrying out the principle of my invention it will be apparent that the same may be modified, varied and/or altered in many respects without departing from the spirit of my invention. I therefore desire to avail myself of all modifications, variations and alterations of the above described ski binder as may fairly come within the purview of the following claims.

What I claim as new and desire to protect by Letters Patent is:

1. A device for binding a ski boot to a ski blade comprising a sole treadle plate and a heel plate secured to the upper surface of said ski blade, a

toe clamp including winglike arms having upstanding side walls and pivotally mounted on said treadle plate for movement in a plane wherein said upstanding side walls will engage the side walls of the sole of said ski boot, spring means for normally urging said winglike arms apart, a toe guard lever pivotally mounted on said ski blade for swinging movement about an axis transversely of the latter ahead of said treadle plate, cam means on said toe guard lever engageable with said winglike arms for urging the latter toward each other when the toe guard portion of said lever is swung over the toe of said ski boot, toggle arms on said toe guard lever disposed on either side of said ski blade, said heel plate having a raised rearwardly portion provided with a rearwardly declining surface, a yieldable heel cable having its bight portion normally resting on the rearwardly declining portion of said heel plate and its free ends pivotally secured to the forward extremities of said toggle arms for effecting overcenter action of the latter relative to the pivotal axis when the bight portion of said cable engages the heel of said ski boot to thereby hold said toe guard lever over the toe portion of said ski boot and said cam means on said lever in a position in which said winglike arms are pressed thereby against the side walls of the sole of said ski boot.

2. A device for binding a ski boot to a ski blade comprising a treadle plate and a heel plate secured to the upper surface of said ski blade, a pair of clamping jaws pivotally mounted on said treadle plate for engaging the side walls of the sole of said ski boot, means between said clamping jaws for yieldingly urging the latter apart, a lever pivotally mounted on said ski blade for swinging movement about an axis extending transversely of the latter adjacent the fore end of said clamping jaws, cam means on said lever engageable with said clamping jaws for urging the latter together when said lever is swung toward the toe of said ski boot, said lever having toggle arms disposed on either side of said ski blade, and a tensionable heel cable having its ends pivotally secured to the forward extremities of said toggle arms for effecting overcenter action upon the latter relative to the pivotal axis of said lever when he bight portion of said cable engages the heel of said ski boot to thereby force said lever over the toe portion of said ski boot and simultaneously force said cam means on said lever against said clamping jaws for closing the latter firmly against the side walls of the sole on said ski boot.

3. A device for binding a ski boot to a ski blade comprising a treadle plate and a heel plate secured in spaced relation fore and aft of each other on the upper surface of said ski blade, said heel plate having a raised rearward portion provided with a forward curved shoulder adjacent the heel of the ski boot, a pair of clamping jaws pivotally mounted adjacent the fore end of said treadle plate for swinging movement toward each other for engaging the side walls of the sole of said ski boot, spring means between said clamping jaws for urging them apart, each of said clamping jaws having a yieldable cleat thereon for engaging in the cleft provided between the sole and last of said ski boot, a toe guard lever pivotally mounted on said ski blade for swinging movement about an axis extending transversely of the latter ahead of said clamping jaws, cam means on said lever engageable with said clamping jaws for urging the latter toward each other when said toe guard lever is swung toward the toe of said ski boot, said lever having toggle arms disposed at the sides of said ski blade and extending at an angle relative to the front face of said toe guard, and a tension spring heel cable having its ends pivotally secured to the forward extremities of said toggle arms for drawing the bight portion of said cable up the raised rearward portion of said heel plate into engagement with the heel of said ski boot, said spring cable being tensioned due to forward pull upon its ends by said toggle arms when said lever is positioned over the toe portion of said ski boot to thereby effect an over center action to said toggle arms for maintaining said cam means on said lever in operative engagement with said clamping jaws for urging the latter and the yieldable cleats thereon into clamping engagement with the sole of said ski boot.

4. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot when said lever is disposed in its rearward position, and a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnionlike arms at a point to tauten said cable and effect an over center action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position.

5. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot when said lever is disposed in its rearward position, a yieldable cleat on each of said clamping jaws for engaging said ski boot in the cleft formed between the sole and last thereof, and a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnionlike arms at a point to tauten said cable and effect an over center action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position.

6. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnion-

like arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot when said lever is disposed in its rearward position, a yieldable cleat including a roller on each of said clamping jaws for engaging lengthwise in the cleft formed between the sole and last of said ski boot for effecting quick release of said boot from said clamping jaws when said boot is tilted transversely to one or the other side of said ski blade, and a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnionlike arms at a point to tauten said cable and effect an over center action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position.

7. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot when said lever is disposed in its rearward position, a yieldable bracket on each of said clamping jaws, a roller rollably mounted on said bracket for engaging in the cleft formed between the sole and last of said ski boot for effecting quick release of said boot from said clamping jaws when said boot is tilted transversely to one or the other side of said ski blade, and a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnionlike arms, said trunnionlike arms being disposed at such an angle relative to said lever as to effect an over center action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position, wherein quick release of said clamping jaws relative to said ski boot is effected when the toe portion of the latter is raised either transversely or forwardly into contact with said lever to upset the over center action of said trunnionlike arms for swinging said lever into its forward position under the influence of said tautened cable.

8. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface of the same and toward and away from each other, a lever having toggle arms, means for pivotally mounting said toggle arms to said ski blade so that said lever can swing between a position forwardly against said ski blade and a rearward position overlying the toe portion of said ski boot, each said toggle arm having a cam edge for engaging a respective one of said clamping jaws for urging them into clamping engagement with the sole of said ski boot simultaneously with the swinging of said lever into its rearward position, a U bent yielding heel cable having its bight portion disposed around the heel of said ski boot and its leg strands disposed parallel to the sides of said ski blade, a linkage at each side of said ski blade having its forward end pivotally connected to the extremity of said toggle arm, means for securing the free ends of said leg strands to the respective ones of said linkages, means on at least one of said linkages and the free end of at least one of said leg strands of said cable for selectively securing the latter to said linkage at predetermined points therealong to suit the length of the ski boot disposed in said binding, said toggle arms effecting an over center action relative to the pivotal mounting of said lever when the latter is disposed in its rearward position to thereby draw the bight portion of said cable into engagement with the heel of said ski boot whereby the leg strands of said cable are tautened to maintain said lever in its rearward position with its cam edges forcing said clamping jaws into closed position against the sides of the sole of said ski boot.

9. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface of the same and toward and away from each other, a lever having trunnionlike toggle arms straddling said ski blade, means for pivotally mounting said trunnionlike toggle arms to said ski blade so that said lever can swing either into a rearward position overlying the toe portion of said ski boot or into a forward position against said ski blade with said toggle arms hanging downwardly beyond the bottom surface of said ski blade, each said trunnionlike toggle arm having a cam edge for engaging a respective one of said clamping jaws for urging them into clamping engagement with the sole of the ski boot simultaneously with movement of said lever into its rearward position, a U bent yielding heel cable having its bight portion disposed around the heel of said ski boot and its leg strands disposed parallel to the sides of said ski blade, a linkage at each side of said ski blade having its forward end pivotally connected to the extremity of said toggle arm, means on at least one of said linkagen and the free end of at least one of said leg strands of said cable for selectively securing the latter to said linkage at predetermined points therealong to suit the length of the ski boot disposed in said binding, said toggle arms effecting an over center action relative to the pivotal mounting of said lever when the latter is disposed in its rearward position to thereby draw the bight portion of said cable against the heel of said ski boot whereby the leg strands of said cable are tautened to maintain said lever in its rearward position with its cam edges forcing said clamping jaws into closed position against the sides of the sole of said ski boot, and a trigger formed on said lever for engagement by the toe portion of said ski boot when the latter is unduly raised from said ski blade for upsetting the over center action effected by said toggle arms and the tautened leg strands of said heel cable whereby the latter acts upon said toggle arms to swing said lever into its forward position.

10. In combination with a device for binding a ski boot to a ski blade, a drag or braking means comprising a lever pivotally mounted on said ski blade for swinging movement in a fore and aft direction relative to said blade between an ineffective and an effective position, a pair of

arms disposed to either side of said blade for swinging movement with said lever so as to extend beyond the bottom surface of said blade when said lever is in ineffective position or to extend parallel to the sides of said blade when said lever is in effective position, and a yieldable heel cable having its bight portion disposed around the heel of said ski boot and its leg strands extending parallel to the sides of said ski blade and pivotally connected to said arms eccentrically of the axis about which said arms swing to effect an over centering action when said cable is tautened relative to the heel of said ski boot to thereby maintain said lever in its effective position.

11. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface of the same and toward and away from each other, a lever having trunnionlike toggle arms straddling said ski blade, means for pivotally mounting said trunnionlike toggle arms to said ski blade so that said lever can swing either into a rearward position overlying the toe portion of said ski boot or into a forward position against said ski blade with said toggle arms hanging downwardly beyond the bottom surface of said ski blade for effecting a drag or brake for retarding gliding movement of said ski blade, each said trunnionlike toggle arm having a cam edge for engaging a respective one of said clamping jaws for urging them into clamping engagement with the sole of said ski boot, a yieldable cleat on each of said clamping jaws for engaging said ski boot in the cleft formed between the sole and last of said ski boot for effecting quick release of said boot from said clamping jaws when said boot is tilted transversely to one or the other side of said ski blade, a U bent yielding heel cable having its bight portion disposed around the heel of said ski boot and its leg strands disposed parallel to the sides of said ski blade, a linkage having its forward end pivotally connected to the extremity of each said toggle arm, means for securing the free end of each leg strand to a respective one of said linkages including means on at least one of said linkages and the free end of at least one of said leg strands of said cable for selectively securing the latter to said linkage at predetermined points therealong to suit the length of the ski boot disposed in said binding, said toggle arms effecting an over center action relative to the pivotal mounting of said lever when the latter is disposed in its rearward position to thereby draw the bight portion of said cable against the heel of said ski boot whereby the leg strands of said cable are tautened to maintain said lever in its rearward position with its cam edges forcing said clamping jaws into closed position against the sides of the sole of said ski boot, and a trigger formed on said lever in a position to be engaged by the toe portion of said ski boot should the latter rise unduly from said ski blade to thereby upset the over center action effected by said toggle arms whereby the tautened leg strands of said cable urge said lever into its forward position.

12. In combination with a device for binding a ski boot to a ski blade, a drag or brake means comprising an arm pivotally mounted on said ski blade for normal disposition above the bottom surface of said ski blade and for movement into a position in which said arm extends downwardly beyond the bottom surface of said ski blade to retard gliding movement thereof, a lever mounted coaxially with said arm for concurrent swinging movement therewith, and a yieldable heel cable having a portion surrounding the heel of said ski boot and at least one of its free ends pivotally secured relative to said arm at a point spaced from the pivotal axis thereof for effecting an over center action to said arm whereby said cable is tensioned to grip the heel of said boot to maintain said arm above the bottom surface of said ski blade, said lever having a portion thereof overlying the toe portion of said ski boot for engagement thereby when said ski boot is raised an undue distance above the top surface of said ski blade to thereby rock said arm over center for extension beyond the bottom surface of said ski blade under the influence of said tautened heel cable.

13. In combination with a device for binding a ski boot to a ski blade, a toe clamp comprising a pair of jaws pivotally mounted on said ski blade for swinging movement toward and away from each other in a plane parallel to the top surface of said ski blade, spring means for normally urging said jaws away from each other, a toe guard pivotally mounted on said ski blade for swinging movement in a fore to aft direction thereof, said jaws having cam lugs adjacent their forward ends, said toe guard having cams thereon engageable with said cam lugs for urging said jaws toward each other into gripping engagement with the sides of said ski boot when said toe guard is swung into a position overlying the toe portion of said ski boot, yieldable toggle means connected to said toe guard for maintaining the latter in position overlying the toe portion of said ski boot, and a trigger portion on said toe guard for engagement by the toe portion of said ski boot when the latter is raised beyond a predetermined height relative to the top surface of said ski blade for tripping said yieldable toggle means to thereby release said jaws.

14. In combination with a pair of toe clamping jaws mounted for swinging movement on a ski blade and having unstanding side walls for gripping the sides of a ski boot disposed therebetween for securing the ski boot to said ski blade, a yieldable cleat on each of said jaws comprising a resilient carriage secured on the upstanding side walls of said jaws, and a roller rotatably mounted on the upper edge of said resilient carriage for engaging in the cleft formed between the upper surface of the sole of said ski boot and the last portion of said boot, said carriage being yieldable and said roller being rollable upon occurrence of an excessive upward thrust of said ski boot relative to said ski blade to thereby liberate said ski boot from between said clamping jaws.

15. The combination with a cable for a ski binding or the like in which a connecting portion of said cable is secured to a movable lever for tautening said cable, of means for selectively lengthening or shortening said cable to attain proper tautness thereof when said lever is actuated, comprising a fin tip secured to the connecting portion of said cable in substantial axial alignment therewith, an elongated flat linkage having one end thereof secured to said lever, said linkage having a plurality of spaced apertures formed therethrough along its length, a companion plate on said linkage and spaced therefrom to receive the least thick portion of said fin tip therebetween, said companion plate having its edge opposite the aligned apertures in said linkage serrated to provide a plurality of rounded

recesses axially disposed relative to said apertures, said fin tip having a rounded extremity adapted to fit through one of said recesses when said connecting portion of said cable is disposed with its axis substantially perpendicular to the length of said linkage, a laterally extending pin mounted axially of the rounded extremity of said fin tip and adapted to fit into one of said apertures when said fin tip is shifted toward the latter through an adjacent one of said recesses, and a flared portion on said fin tip between the rounded extremity thereof and said connecting portion of said cable adapted to be disposed behind a raised portion of the serrated edge of said companion plate for maintaining said pin in a particular one of said apertures when said connecting portion of said cable extends parallel to said linkage.

16. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally connecting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, cam means on said trunnion arms for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot, said trunnionlike arms being disposed at such an angle relative to said lever as to extend forwardly relative to said ski blade when said lever is disposed in its rearward position overlying the toe portion of said ski boot, and a yieldable cable having its bight portion engageable with the heel of said ski boot and its ends pivotally connected to said trunnionlike arms for effecting overcenter binding action of said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearmost position and said trunnionlike arms disposed for immediate overcenter unbinding action upon slight forward movement of said lever when the toe portion of said ski boot is raised into contact with said lever to thereby effect quick release of said clamping jaws relative to said ski boot.

17. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally connecting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, cam means on said trunnion arms for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot, said trunnionlike arms being disposed at such an angle relative to said lever as to extend below the bottom surface of said ski blade when said lever is in its forward position for effecting braking action to said ski blade relative to the snow upon which said ski blade rests, a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnionlike arms for tautening said cable when said arms extend forwardly relative to said ski blade, said angular disposition of said trunnionlike arms relative to said lever being such as to effect overcenter binding action of said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearmost position with said trunnionlike arms disposed for immediate overcenter unbinding action upon slight forward movement of said lever when the toe portion of said ski boot is raised into contact with said lever to thereby effect quick release of said clamping jaws relative to said ski boot.

18. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole of said ski boot when said lever is disposed in its rearward position, a yieldable cleat on each of said clamping jaws for engaging said ski boot in the cleft formed between the sole and last thereof, said cleat being yieldable for releasing said boot upon upward thrust due to rocking motion of said ski boot relative to said ski blade, a yieldable heel cable having its bight portion engageable with the heel of said ski boot in its ends pivotally secured to said trunnionlike arms at a point to tauten said cable, said trunnionlike arms being so disposed relative to said lever as to extend forwardly of their pivotal mountings when said lever overlies the toe portion of said ski boot for effecting an over center binding action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position wherein quick release of said clamping jaws relative to said ski boot is effected upon slight movement of said lever when the toe portion of the ski boot is raised into contact with said lever to upset the over center action of said trunnionlike arms for swinging said lever into its forward position under the influence of said tautened cable, and spring means between said clamping jaws for normally urging the latter away from each other for effecting quick release of said clamping jaws relative to said ski boot.

19. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for swinging movement parallel to the top surface thereof and toward and away from each other, a lever having trunnionlike arms straddling the ski blade, means for pivotally mounting said trunnionlike arms to said ski blade so that said lever will swing between a position forwardly against said ski blade and rearwardly overlying the toe portion of said ski boot, said trunnionlike arms being disposed at such an angle relative to said lever as to extend below the bottom surface of said ski blade for retarding gliding movement of said ski blade and effecting a braking action thereto when said lever lies in its forward position against said ski blade, and as to extend forwardly of their pivotal mountings when said lever lies in its rearward position overlying the toe portion of said ski boot, each said trunnionlike arm having a cam edge for engaging said clamping jaws for urging the latter into clamping engagement with the sole

of said ski boot when said lever is disposed in its rearward position, a yieldable cleat on each of said clamping jaws for engaging said ski boot in the cleft formed between the sole and last thereof for effecting quick release of said boot from said clamping jaws when said boot is tilted transversely to one or the other side of said ski blade, and a yieldable heel cable having its bight portion engageable with the heel of said ski boot and its ends pivotally secured to said trunnion-like arms at a point to tauten said cable and effect an over center action to said trunnionlike arms relative to their pivotal mountings under the influence of said tautened cable for maintaining said lever in its rearward position, and for effecting quick release of said clamping jaws relative to said ski boot when the toe portion of the latter is raised into contact with said lever to upset the over center action of said trunnion-like arms for swinging said lever into its forward position under the influence of said tautened cable.

20. A device for binding a ski boot to a ski blade comprising a pair of clamping jaws pivotally mounted on said ski blade for engaging the side walls of the sole of said ski boot, means between said clamping jaws for yieldingly urging the latter apart, a lever pivotally mounted on said ski blade for swinging movement about an axis extending transversely of the latter adjacent the fore end of said clamping jaws, cam means on said lever engageable with said clamping jaws for urging the latter together when said lever is swung toward the toe of said ski boot, said lever having toggle arms disposed on either side of said ski blade, and a tensionable heel cable having its ends pivotally secured to the forward extremities of said toggle arms for effecting overcenter action upon the latter relative to the pivotal axis of said lever when the bight portion of said cable engages the heel of said ski boots to thereby force said lever over the toe portion of said ski boot and simultaneously force said cam means on said lever against said clamping jaws for closing the latter firmly against the side walls of the sole on said ski boot.

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