Oct. 21, 1952 W. M. PIERCE, JR 2,614,858

SKI BINDING

Filed April 17, 1948 2 SHEETS—SHEET 1

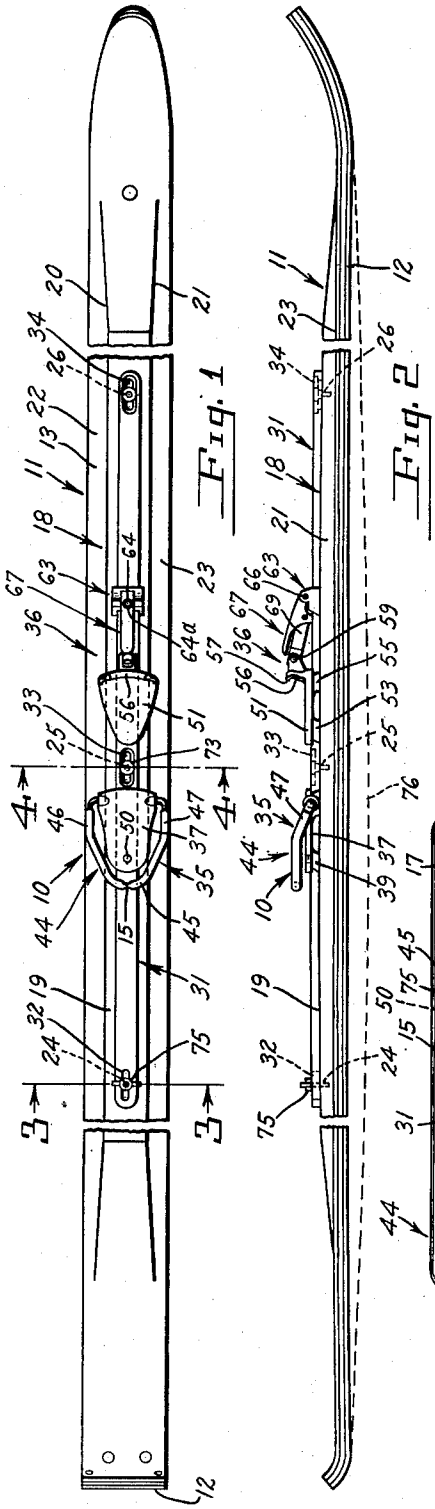


Fig. 1

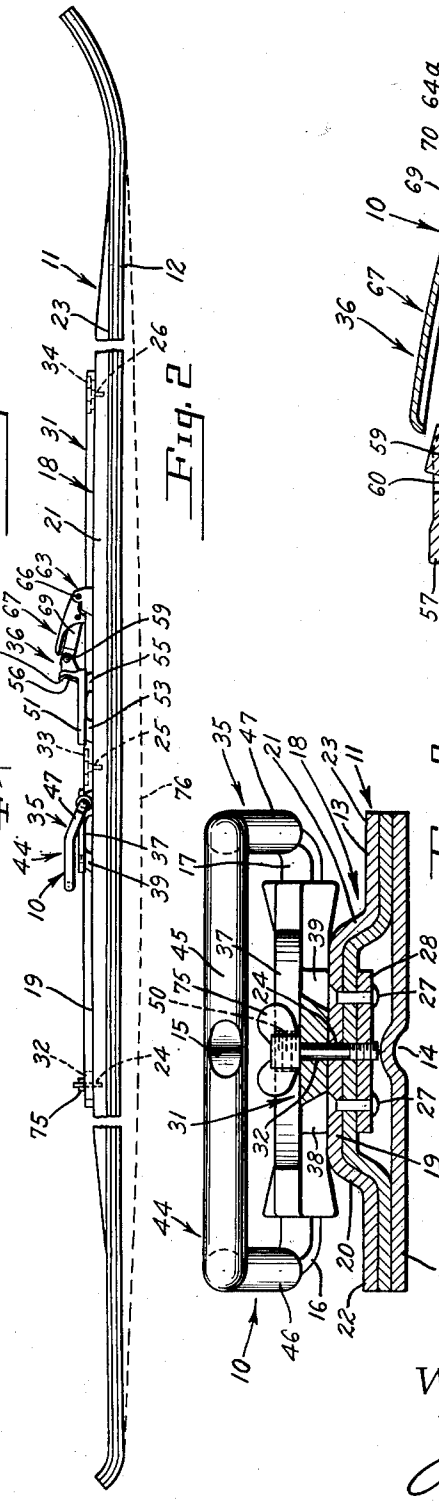


Fig. 2

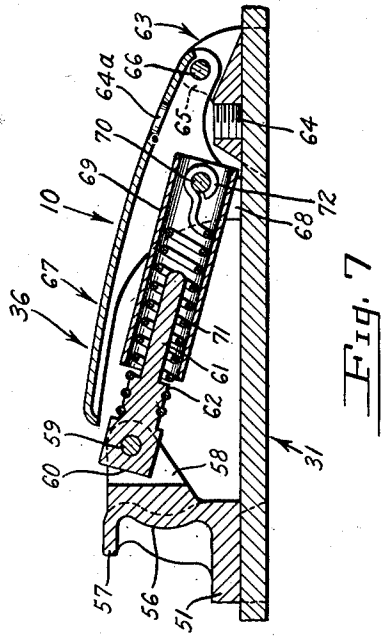


Fig. 7



Fig. 3

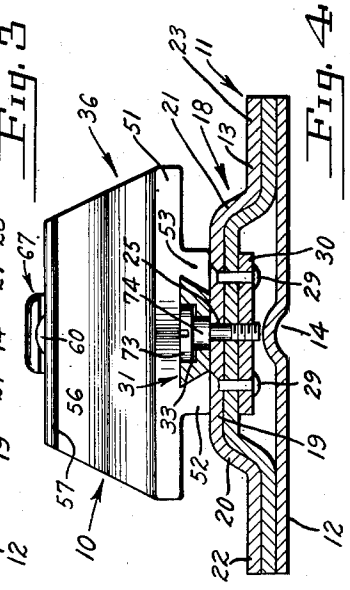


Fig. 4

INVENTOR.
WAYNE M. PIERCE, JR.
BY
John J. Hanrahan
ATTORNEY

Oct. 21, 1952 W. M. PIERCE, JR 2,614,858

SKI BINDING

Filed April 17, 1948 2 SHEETS—SHEET 2

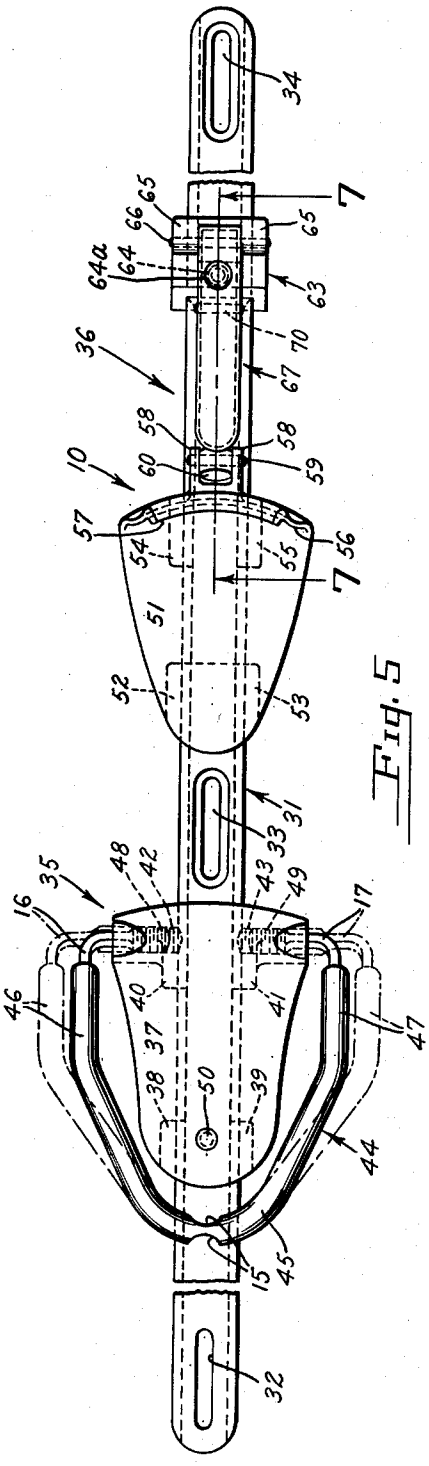


Fig. 5

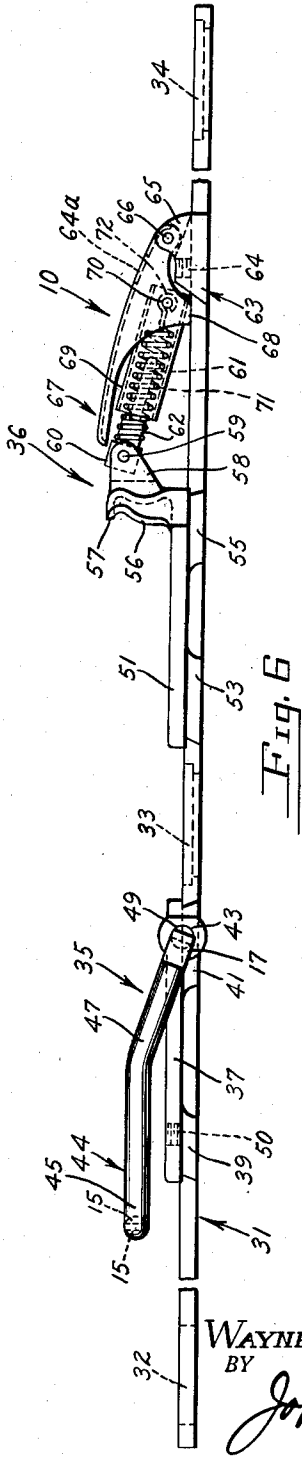


Fig. 6

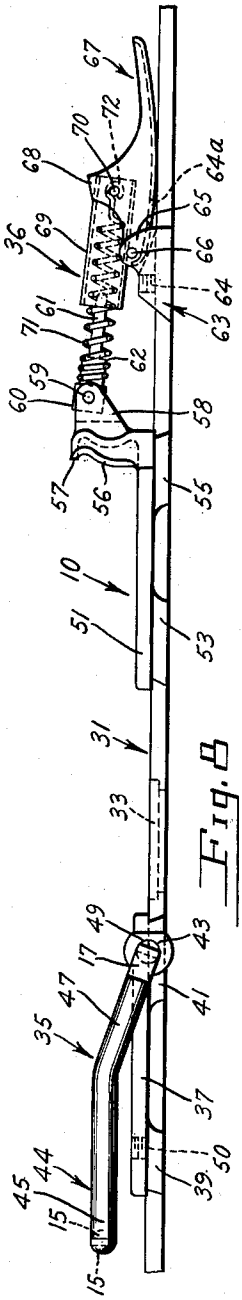


Fig. 8

INVENTOR.
WAYNE M. PIERCE, JR.
BY
John M. Hanrahan
ATTORNEY

Patented Oct. 21, 1952

2,614,858

# UNITED STATES PATENT OFFICE

2,614,858

## SKI BINDING

Wayne M. Pierce, Jr., Milford, Conn., assignor to Tey Manufacturing Corporation, Milford, Conn., a corporation of Connecticut

Application April 17, 1948, Serial No. 21,677

16 Claims. (Cl. 280—11.35)

1

This invention relates to new and useful improvements in skis or similar outdoor sporting foot wear equipment and has particular relation to ski bindings.

An object of the invention is to provide a ski binding comprising a shoe or boot heel clamp and a shoe or boot toe clamp assembled into a unit on a mounting piece constructed for convenient mounting on a ski.

Another object is to provide a ski binding including a shoe or boot heel clamp, a shoe or boot toe clamp, an elongated base on which said clamps are mounted for adjustment toward and from one another whereby the clamps may be positioned relatively for the reception of a shoe or boot of given size, and means for individually securing said clamps in their adjusted positions on said base.

A further object is to provide a ski binding including a unit comprising a base and toe and heel clamps on said base, and means for the mounting of said base on a ski and which means includes adjustable means whereby the said unit may be secured in position on a ski and thereafter quickly and with little difficulty adjusted longitudinally of the ski and secured in its new position.

An additional object is to provide a ski binding comprising a fixed heel clamp, a toe clamp including a portion to engage the toe of a ski boot, and resilient means urging said toe clamp toward said heel clamp to retain a boot heel in the latter and yet permit of yielding of said toe clamp in a manner to have the binding release a boot by lateral movement of the toe of said boot out of the clamp on a strain or twist being imposed such as might result in injury to the user or to the ski.

A further object is to provide a ski binding including a fixed heel clamp, a toe clamp slidable toward said heel clamp to secure a ski boot in said binding, lever means for moving said toe clamp toward said heel clamp to secure a ski boot in said binding and from said heel clamp to release a ski boot from said binding, said lever means including means movable through a dead-center as it is swung to move said toe clamp to and from released position whereby to lock it in such position.

An additional object is to provide a ski binding as set forth in the immediately preceding object and including spring means through which said lever moves said toe clamp whereby to yieldingly force the same into clamping position against the toe of a boot when the binding is in use.

2

Yet another object is to provide a ski binding including a rigid heel clamp incapable of lateral movement relative to a ski to which it is attached whereby the binding serves to prevent any relative movement between a ski and a boot attached to the ski by said binding.

A further object is to provide a ski binding including a clamping structure and means for imparting positive motion to said clamping structure to shift it to released position whereby on actuation of said means said structure is with a positive motion shifted to a released position to free a boot from a ski.

Another object is to provide a heel clamp for a ski binding and which clamp includes a heel plate and a rigid bail pivoted through the forward ends of its arms to said heel plate and adapted to receive a ski boot heel resting on said plate, the pivotal connections between the ends of said arms and said plate comprising threaded connections and said plate and bail of such relative size that the plate may be turned on said threaded connections by passing the plate through the bail to adjust the arms of the bails toward and from the edges of the plate to adjust the effective width of the bail.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a top plan view showing a ski equipped with my improved ski binding;

Fig. 2 is an edge view thereof;

Fig. 3 is an enlarged view taken as along the line 3—3 of Fig. 1;

Fig. 4 is an enlarged view taken as along the line 4—4 of Fig. 1;

Fig. 5 is a top plan view of my improved ski binding with the toe clamp closed, the view being on a larger scale;

Fig. 6 is an edge view of the binding of Fig. 5;

Fig. 7 is an enlarged detail sectional view taken as along the line 7—7 of Fig. 5; and

Fig. 8 is an edge elevational view of the ski binding of Figs. 5 and 6 but with the toe clamp open.

Referring in detail to the drawings, my improved ski binding generally designated 10 is, in Figs. 1–4, illustrated as mounted on a ski gener-

ally designated 11. Ski 11 is preferably made of light weight metal or other material having a high strength to weight ratio.

Ski 11 comprises a runner or lower skin 12 and a laminated top pan or shell 13. The runner or lower skin 12 is of a single length of material and preferably is of a thin resilient metal of high strength to weight ratio. Intermediate its longitudinal edges the skin or runner 12 is formed or provided with a groove or channel 14 as is customary, and further, the said runner or skin is slightly bowed upwardly longitudinally providing it with the desired camber.

The top pan or shell 13 is of the length and breadth of the runner or lower skin 12 and comprises a laminated transversely U-shaped or channel portion 18 extending for a very substantial portion of the intermediate length of the pan or shell. This portion 18 includes a top wall 19, diverging side walls 20 and 21 and flat edge portions or lateral flanges 22 and 23 disposed on the longitudinal edge portions of the lower skin 12. All of the described parts are secured together in the desired manner by the desired means.

Through the top wall 19 of the transversely U-shaped portion 18 of the top pan or shell, three holes are provided in predetermined spaced relation. The rearwardmost of these holes is designated 24 and the intermediate and forward holes are designated 25 and 26. Rivets or other means 27 secure a nut 28 against the inner side of the top pan in aligned relation with the hole 24. Similarly, rivets or the like 29 secure a nut 30 against the inner side of the top pan in aligned relation with the hole 25. In any suitable or similar manner, a nut (not shown) is secured against the inner side of the top pan in alignment with or in registry with the opening or hole 26. Thus, ski 11 has three openings through its top wall in predetermined spaced relation and in alignment with each such opening or in registry with each such opening is a fixed nut located within the ski.

My improved binding as herein disclosed comprises a suitable base or mounting generally designated 31 and herein shown as comprising a single rail or bar. Bar 31 comprises a desired length of stock of the proper width and thickness and inherent characteristics as to rigidity and the like. The longitudinal edges of the base or bar 31 are slightly undercut whereby the bar is transversely a dove-tail shape. This is clearly illustrated in Figs. 3 and 4.

At three spaced points, the bar 31 is provided with slots or elongated openings 32, 33 and 34 each extending longitudinally of the bar and preferable about 2'' in length. The slots 32, 33 and 34 are spaced apart as are the holes or openings 24, 25 and 26 in the upper wall of the ski 11. The construction is so predetermined that if the bar or piece 31 is disposed on the ski and a bolt is passed through each of the slots 32, 33 and 34 and threaded into the fixed nuts registering with the holes or openings 24, 25 and 26 but is not tightened, the bar may be shifted approximately 2'' in the direction of its length and in the direction of the length of the ski.

On the bar or base 31 is a heel clamp generally designated 35 and a toe clamp generally designated 36. The heel clamp 35 comprises a heel plate 37 disposed on the upper side of the base or bar 31 and provided toward its rear edge with a pair of lugs 38 and 39 embracing the opposite undercut edges of the base 31. Somewhat similarly, toward its forward edge, the plate 37 is



thickened providing a pair of lugs 40 and 41 also embracing the opposite undercut edges of the base 31. With this construction, the plate 37 has a way through its underside and may be slid onto the base over one end of the latter with the lugs 38—41 guiding movement of the plate along the base and together with the plate preventing movement of the plate transversely or up and down with respect to the base.

Through diametrically opposite side edges, toward its forward edge, the heel plate 37 is provided with sockets 42 and 43 opening through its opposite edges and internally screw threaded in opposite directions. That is, one socket has left handed screw threads and the other right handed screw threads. Associated with the plate 37 and comprising part of the heel clamp 35 is a bail 44. This bail is for the most part formed of round stock of the desired diameter and other characteristics and the same includes a rear or closed bight portion 45 and side arms 46 and 47, the extreme ends of which are turned into opposing relation and are externally threaded to form threaded studs 48 and 49.

While the bail 44 is formed of transversely round stock it is relieved in its bight portion as at 15 and in the bends at the junctures of its side arms and the studs 48 and 49, as at 16 and 17, respectively. This gives somewhat the effect of a structure pivoted together at three points and provides for flexing of the bail, under adjustment, as will more fully appear.

The studs 48 and 49 are threaded into the sockets 42 and 43, respectively, and the bail 44 is of such size that the entire plate 37 may pass through the bail when the plate is swung on an axis represented by the medial lines of the studs 48 and 49. That is, with the studs threaded into the sockets and the clamp 35 removed from the base 31, if the plate 37 is held stationary the bail 44 may be swung around the plate or the bail may be held stationary and the plate rotated on the studs. As either of these motions take place the studs will be threaded into or out of the sockets 42 and 43.

In the former instance, the side arms 46 and 47 of the bail 44 will be drawn toward one another lessening the width between such arms and in the latter instance such arms will be forced outwardly away from one another (as to the broken line positions of Fig. 5) increasing the distance between the side arms. Thus, by the turning movement described, the side arms may be sprung apart or toward one another to adjust the bail for the proper reception of a ski boot heel of a particular size. Springing of the bail as described is facilitated by the relieving of the stock of the bail at the points 15, 16 and 17.

It will be understood that adjustments are made to have the bail 44 of the desired size and then the clamp 35 is mounted on the base 31 by threading the clamp over one end of the base to locate the latter between the lugs 38 and 39 and 40 and 41. When the clamp 35 is at the desired position longitudinally of the base, a set screw 50 passing through the plate 37 is tightened down to clamp or bite against the upper surface of the base 31 whereby to secure the clamp 35 in the desired position longitudinally of the base.

The toe clamp 36 above referred to comprises a toe plate 51 from the underside of which projects forward and rearward pairs of lugs 52 and 53 and 54 and 55, respectively, which lugs define a way at the underside of the toe plate and together with the latter cooperate with the trans-

versely dove-tail base 31 in the manner described when describing the mounting of the heel plate 37 on such base. Extending upwardly from the forward end of the toe plate 51 is a member or wall-like portion 56 for engagement with the toe of a ski boot and shown as slightly curved in top plan (Fig. 5) and having a slightly rearwardly projecting or overhanging lip 57.

Extending forwardly from the wall 56 is an attaching means comprising a pair of ears 58 through which pass a pivot pin 59 also passing through a head-like portion 60 located between said ears. This head-like portion 60 is integrally or otherwise rigidly secured to a stem 61 which adjacent the head-like portion includes an enlarged diameter shoulder portion 62 externally threaded. With the described construction, it will be clear that the pin 61 is pivoted to the ears 58 which are integral with or otherwise rigid with the wall 56 of the toe plate 51.

Located on the base 31 forwardly of the toe plate 51 is an anchoring means or block 63 having a way through its under portion whereby the block straddles and is slidable longitudinally along the base. A set screw 64 is provided for securing said block in the desired position longitudinally of the base. Block 63 is provided with a pair of upstanding ears 65 through which pass a pivot 66 serving to pivotally mount on the block the inner end portion of a handle or lever 67. Access to the screw 64 is had by inserting a screw driver or other tool through an opening or hole 64a in the handle or lever 67. Lever 67 comprises a manually operable means reacting against the anchoring means 63 and operable to shift the member or wall 56 toward and from said anchoring means.

Such handle or lever 67, intermediate its ends, is substantially U-shaped in transverse section and comprises a pair of side portions 68 between which are located one end portion of a metal tube 69. This end portion of the tube is pivoted to the described portion of the handle 67 as on a pivot 70. A coil spring 71 has one end portion threaded onto the enlarged diameter shoulder portion 62 of the pin 61 and such coil spring then extends forwardly and has its other end 72 hooked onto the pivot pin 70. In this connection it will be clear that the spring extends into the tube 69. As will later clearly appear, this tube functions somewhat in the nature of a guide for the spring.

It will be understood that the toe plate 51 and the anchoring block 63 are permanently, although flexibly, connected. This connection is generally through the pin 61 and the coil spring 71 since the former is pivoted to the toe plate by the pin 59 and the latter is secured to the lever 67 on the anchoring block 63 by having one of its ends hooked over or turned about the pivot pin 70 and the pin and spring are secured together since the latter is threaded onto the shoulder 62 of the former.

Therefore, when assembling or completing the binding 10, the toe plate 51 and the anchoring block 63 are slipped onto the base or bar 31 over one end of the latter and then the heel clamp 35 and the toe clamp 36 are positioned as desired along the base or bar 31 and then secured or anchored to the latter by the screws 50 and 64, respectively. When the toe clamp is open, as in Fig. 8, the toe plate 51 has been drawn forwardly on the bar or base 31 (and along the ski when the binding is on the ski) whereby the wall 56 of the toe plate is spaced an additional distance from the bail 44 of the heel clamp.



Now the user places the heel of his ski boot on the heel plate 37 of clamp 35 with the groove about the heel of his ski boot in alignment with the bail 44. At this time the toe of the ski boot is on the toe plate 51 and the extreme forward end of the ski boot or the extreme toe portion of the ski boot is facing the upstanding wall 56, movable with the toe plate 51. Then the operator takes the lever or hand piece 67 from the position of Fig. 8 and swings such lever or hand piece on the pivot 66 through to the position of Figs. 5 and 6. This movement of the lever carries the pivot 70 about the pivot 66 from a position above and forwardly of such pivot 66 to a position below and rearwardly of such pivot. This action results in a rearward thrust on the toe plate 51, such thrust being transmitted through and resulting in compression of the coil spring 71, it being assumed that the wall 56 of the toe plate has engaged the toe of a ski boot, the heel of which is in the bail 44.

If too great compression is required to shift the lever as described, then either the heel clamp 35 will be adjusted slightly rearwardly on loosening of the screw 50 or the toe clamp 36 will be adjusted slightly forwardly on loosening of the screw 64 or adjustment of both clamps may be made. In any event, with the clamps located in the proper relative positions on the base 31, when a person puts his boot into the binding with the toe clamp as in Fig. 8 and thereafter the lever 67 is swung to the position of Fig. 6, the boot should be properly clamped with considerable pressure being exerted through the spring 71. Thus, all that is required to mount the boot in the binding is manipulation of the hand piece or lever 67.

The described manipulation of said hand piece or lever carries it through a dead center so that in the position of Fig. 6, the thrust through the spring 71 has a tendency to further rock the hand piece 67 about the pivot 66 to keep the toe clamp in its clamping position. Of course, any such movement is prevented since the arm portions 68 of the lever at that time are engaging the upper surface of the mounting member or bar 31. However, there is no danger of the clamp accidentally opening. To open it to release the ski boot, the lever must be shifted about the pivot 66 from the position of Fig. 6 back toward that of Fig. 8.

It is here noted that the toe plate 51 is operated in a positive manner on swinging of the lever 67. Thus, when the lever is swung rearwardly or to clamping or clamp closing position, the toe clamp is positively shifted. Conversely, when the lever is swung to the position of Fig. 8, the toe plate is moved forwardly or to released or open position. Therefore, when the present clamp is manipulated to open or released position, there is a positive motion to release the boot of the skier. With a simple manipulation of lever 67, the boot is positively released and there is no question of any wires or the like binding in guides or the like and preventing release of the boot. Swinging movement of the lever 67 in one direction shifts or slides the toe clamp into clamping or closed relation with the heel clamp and swinging movement of lever 67 in the reverse direction shifts or slides the toe clamp into released or open relation with the heel clamp. Movement of the toe clamp is positive in either direction.

When a ski boot is being held by the present binding, it will be appreciated that the boot is

being resiliently held by the thrust of the spring 71 acting through the toe plate on the forward end of the boot and the consequent rearward thrust of the boot heel into the bail 44. This thrust is yielding or resilient so that in the event of any undue strain, especially in the form of a twist, the leg of the skier will not be injured since the toe plate wall 56 will yield and the binding twist laterally off the toe of the skier's boot or the toe of the boot will twist laterally away from said wall and out over a lateral edge of the plate 51 freeing the boot from the ski.

The ski binding 10 is mounted on the ski 11 by aligning the slots 32, 33 and 34 of the base 31 with the openings 24, 25 and 26 of the ski. Then, similar bolts 73 are passed through the slots 33 and 34 of the base 31 and threaded into the nuts 30 aligned with the openings 25 and 26. These screws may be of a construction best shown in Fig. 4. They are each provided with a shoulder 74 whereby when such shoulder engages the top surface of the portion 19 of the ski, the screws may not be further tightened and the base or bar 31 beneath the heads of said screws is susceptible of slight movement with respect to the ski in directions along the longitudinal center line of the latter and the base.

However, a third screw 75 is threaded through the slot 32 and the hole 24 into the nut 28. This screw is of somewhat different construction and preferably has a head in the form of a wing nut, as shown, although it may have an enlarged and knurled head. The head on bolt or screw 75 provides for manual manipulation of such screw or bolt and such screw or bolt is adapted to be tightened down to secure the rear end portion of the bar or base 31 tight against and rigid with the ski. The purpose of this immediately preceding described arrangement will be set forth.

With the ski binding secured to the ski as described, the entire binding may be adjusted in the direction of the length of the ski within the limits defined by the slots 32, 33 and 34. For racing, or depending on snow conditions as compared with normal skiing, a slightly different position of the binding with respect to the transverse center of the ski is desirable. Heretofore, no provision has been made for conveniently shifting the location of the binding with respect to the transverse center line of the ski. However, with my construction, on loosening of the screw 75 the base or mounting 31 and thus the entire binding may be shifted either forwardly or rearwardly longitudinally of the ski within the limits defined by the slots 32, 33 and 34. This adjustment need be only slight and as suggested above, the slots are approximately 2'' in length.

When an adjustment is made, the screw 75 is again tightened and the ski is ready for use. The purpose of using screws 73 different from the screw 75 is to provide for slight flexing of the ski under the base 31. If this base were absolutely rigid with the ski, the entire center portion of the ski would be rigid and the ski could only flex at the ends of the base, which is somewhat in the nature of the usual foot block of a ski. However, since the screws 73 cannot be tightened to draw the base down against the top surface of the ski, it will be seen that a slight longitudinal movement of the ski with respect to the base, or vice versa, throughout the longitudinal center of the ski is possible.



This will permit of uniform bowing of the ski as suggested by the dotted lines 76 in Fig. 2. The base 31 which is in the nature of a foot block is rigid with the ski only at the point where the screw 75 is tightened down or for a very short distance measured along the length of the ski, and thus these parts may move relatively to the end that substantially uniform bowing of the ski may be experienced.

Another feature of the present ski binding to which particular attention is invited is the rigid bail 44. This heel clamp part is of a single piece of relatively large diameter stock and is rigid against any lateral movement relative to the plate 37 or base 31 and hence relative to any ski to which the binding may be applied. Therefore, the heel of the skier may not shift laterally off the ski as can happen with yielding heel encircling members. With the present structure, the ski is always directly under and in alignment with the boot and the user is safer and may have confidence in the position of his ski relative to his boot and thus to his foot and his entire body.

Having thus set forth the nature of my invention, what I claim is:

1. In a ski binding, an elongated base, a heel clamp fixed on said base, a toe clamp, means mounting said toe clamp on said base for sliding movement toward and from said heel clamp, means for sliding said toe clamp toward said heel clamp to secure a ski boot to said binding and for sliding said toe clamp in the opposite direction to release a ski boot from said binding, said means comprising a pivoted lever and means whereby said lever is moved through a dead-center to each of said clamping and released positions, and spring means between said lever and said toe clamp whereby the latter is only yieldingly secured in said clamping position.

2. In a ski binding, a unit adapted to be mounted on a ski, said unit comprising an elongated base, a heel clamp on said base and slidably adjustable therealong, means to rigidly secure said heel clamp in adjusted position on said base, a toe clamp on and slidably adjustable along said base toward and from said heel clamp, an anchoring block on said base and slidably adjustable therealong, means to rigidly secure said anchoring block in adjusted position on said base, and means including a lever pivoted to said anchoring block and said toe clamp and manually manipulable to slide said toe clamp along said base to and from ski boot clamping relation with said heel clamp.

3. In a ski binding, a heel clamp comprising a heel plate adapted when in use to have the heel of a ski boot disposed thereon, said plate having oppositely threaded sockets opening through its opposite lateral edges adjacent one of its ends, a bail including side arms and a bight portion, said side arms having their free end portions bent into opposing relation and threaded into said sockets, and said plate and bail of such relative size as to permit of turning of the plate on said studs and through said bail to spread and draw toward one another the side arms of said bail.

4. In a ski binding, a toe clamp including an anchoring means to be rigidly attached to a ski, a ski boot toe engaging member, means connecting said member to said anchoring means for movement relative thereto in the direction of the length of a ski to which said anchoring may be attached, and said connecting means

including a lever pivoted to said anchoring means, a spring connecting said lever and said engaging member, said lever operable about its pivot to act through said spring and shift said member from and toward said anchoring means, and said spring permitting of limited movement of said engaging member toward said anchoring means independent of movement of said lever on undue strain being placed on said member.

5. In a ski binding, a toe clamp comprising an anchoring means to be rigidly attached to a ski, a ski boot toe engaging member including a vertical wall portion to engage the toe of a ski boot, a lever pivoted at one end to said anchoring means, a pin pivoted at one end to said vertical wall portion and having an externally threaded portion adjacent said wall portion, a compressible coil spring having one end portion threaded onto the threaded portion of said pin and having its other end anchored to said lever in spaced relation to the pivoted end of the latter whereby on movement of said lever about its pivot said ski boot toe engaging member is moved from and toward said anchoring means depending on the direction of movement of said lever, and the pivots for said pin and lever and the connection of said spring with said lever being in such relation that on movement of the lever in one direction said connection is carried across and to a point below the lever pivot to have the force of the spring secure the lever in such position with said member projected and as the lever is moved in the opposite direction said connection is carried upwardly and across the lever pivot to the opposite side thereof whereby the force of the spring secures the lever in such new position with the member retracted.

6. The device as in claim 5 wherein said ski boot toe engaging member has a way therein for cooperation with a guide rail to guide movement of said member when moved by shifting of said lever.

7. In a ski binding, a rail-like bar, a heel clamp including a heel plate having in its underside a way receiving said bar for guiding movement of the plate along the bar, means for fixing said plate in the desired position along said bar, a bail pivoted to said plate and adapted to receive the heel of a ski boot disposed on said plate, a toe clamp on said bar and including a toe plate having in its underside a way receiving said bar for guiding movements of the toe plate longitudinally along said bar, an anchoring means having a way in its underside receiving said bar for guiding adjustment movements of the anchoring means along the bar, means for securing said anchoring means in the desired position of adjustment along said bar, a connection between said toe plate and said anchoring means, and said connection including manually manipulable means reacting against said anchoring means and operable for shifting said toe plate along said bar toward said heel clamp for securing relation with a ski boot the heel of which is in said bail and from said heel clamp to a released relation with a ski boot the heel of which is in said bail.

8. In a ski binding, a base, a heel clamp on said base and including a bail to receive the heel of a ski boot, a toe clamp on said base and slidable longitudinally thereof toward closed boot clamping relation with said heel clamp and then in the opposite direction into open or boot release relation with said heel clamp, a manually shiftable pivoted lever, a compressible spring connecting said lever and toe clamp for sliding said toe clamp to said closed and open relations with said heel clamp as said lever is swung on its pivot in one and then in the opposite direction, said lever movable through a dead-center position as it is shifted to slide said toe clamp to each of said closed and open positions, and a spring acting on said lever and biasing the same to each side of said dead center position as the lever is manually shifted to said side thereof and providing means whereby said toe clamp is only yieldingly held in said closed position.

9. In a ski binding, a unit comprising an elongated rigid base, a heel clamp on said base and movable as a unit therewith, a toe clamp on said base and movable as a unit therewith and also movable relative thereto and on such latter movement adapted for cooperation with said heel clamp for the securing of said base to a ski boot, and said base having spaced elongated openings therethrough and extending longitudinally thereof for the passage of means for the securing of said unit to the uper side of a ski.

10. In a ski binding, a rail-like bar, a heel clamp including a heel plate having in its underside a way receiving said bar for guiding movement of the plate along the bar, means for fixing said plate in the desired position along said bar, a toe clamp on said bar and including a toe plate having in its underside a way receiving said bar for guiding movements of the toe plate longitudinally along said bar, an anchoring means having a way in its underside receiving said bar for guiding adjustment movements of the anchoring means along the bar, means for securing said anchoring means in the desired position of adjustment along said bar, a connection between said toe plate and said anchoring means, and said connection including manually manipulable means reacting against said anchoring means and operable for shifting said toe plate along said bar toward said heel clamp for securing relation with a ski boot the heel of which is in said heel clamp and from said heel clamp position to a released relation with a ski boot.

11. In a ski binding, a rail-like bar, a heel clamp including a heel plate having in its underside a way receiving said bar for guiding movement of the plate along the bar, means for fixing said plate in the desired position along said bar, a toe clamp on said bar and including a toe plate having in its underside a way receiving said bar for guiding movements of the toe plate longitudinally along said bar, an anchoring means having a way in its underside receiving said bar for guiding adjustment movements of the anchoring means along the bar, means for securing said anchoring means in the desired position of adjustment along said bar, a connection between said toe plate and said anchoring means, said connection including manually manipulable means reacting against said anchoring means and operable for shifting said toe plate along said bar toward said heel clamp for securing relation with a ski boot the heel of which is in said heel clamp and from said heel clamp position to a released relation with a ski boot, and spring means between said lever and said toe clamp whereby the latter is only yieldingly held in securing relation with a ski boot.

12. In a ski binding, a rail-like bar, a heel clamp including a heel plate having in its under-

side a way receiving said bar for guiding movement of the plate along the bar, means for fixing said plate in the desired position along said bar, a toe clamp on said bar and including a toe plate having in its underside a way receiving said bar for guiding movements of the toe plate longitudinally along said bar, an anchoring means having a way in its underside receiving said bar for guiding adjusting movements of the anchoring means along the bar, means for securing said anchoring means in the desired position of adjustment along said bar, a connection between said toe plate and said anchoring means, said connection including manually manipulable means reacting against said anchoring means and operable for shifting said toe plate along said bar toward said heel camp for securing relation with a ski boot the heel of which is in said heel clamp and from said heel clamp position to a released relation with a ski boot, and said rail-like bar having spaced elongated openings therethrough and extending longitudinally thereof for the passage of means for securing said bar and thus said heel clamp, toe clamp and anchoring means to the upper side of a ski.

13. In a ski binding, a toe clamp including an anchoring means to be rigidly attached to a ski, a ski boot toe engaging member having a vertical wall portion to engage the toe of a ski boot, a lever pivoted at one end to said anchoring means, a compressible coil spring having one end attached to said member and having its other end connected to said lever in spaced relation to the pivoted end of the latter whereby on movement of said lever about its pivot said ski boot toe engaging member is moved from and toward said anchoring means depending on the direction of movement of said lever, and the pivot for said lever and the connection of said spring with said lever being in such relation that on movement of the lever in one direction said connection is carried across and to a point below the lever pivot to have the force of the spring secure the lever in such position with said member projected and as the lever is moved in the opposite direction said connection is carried upwardly and across the lever pivot to the opposite side thereof whereby the force of the spring secures the lever in such new position with the member retracted.

14. In a ski binding, an elongated base, a heel clamp fixed on said base, said heel clamp comprising a bail including a closed rear portion and forwardly extending side arms adapted to receive the heel of a ski boot between them, said arms pivotally mounted at their forward ends for swinging movement of said bail upwardly from and downwardly toward a ski while engaged with the heel of a ski boot, a toe clamp, means mounting said toe clamp on said base for sliding movement rearwardly toward and forwardly from said heel clamp, means for sliding said toe clamp rearwardly toward said heel clamp to secure a ski boot in said heel clamp and for sliding said toe clamp in the opposite direction to release a ski boot from said heel clamp, and said means for sliding said toe clamp to clamping position comprising spring means whereby said toe clamp is only yieldingly secured in clamping position.

15. In a ski binding, a heel clamp comprising a bail including a closed rear portion and forwardly extending side arms adapted to receive the heel of a ski boot between them, said arms pivotally mounted at their forward ends for swinging movement of said bail upwardly from and downwardly toward a ski while engaged with the heel of a ski boot, a toe clamp movable rearwardly toward said heel clamp to engage the toe of a ski boot and force the latter rearwardly into said bail toward the closed rear portion thereof and then movable forwardly to release the ski boot for removal from the heel clamp, manually operable means for moving said toe clamp to the first named position and securing it therein, and a yielding connection between said manually operable means and the toe clamp whereby said toe clamp may be forced slightly out of its first named position to release a ski boot from said heel clamp on undue strain.

16. In a ski binding, a unit comprising an elongated rigid base adapted to be mounted on the upper side of a ski, a heel clamp on said base and movable as a unit therewith, said heel clamp including a heel engaging member pivoted for limited swinging movement upwardly and downwardly relative to said base while engaging the heel of a ski boot, a toe engaging means, means mounting said toe engaging means, said mounting means adjustable longitudinally of said base whereby to position said toe engaging means in the desired spaced relation to said heel engaging member, and manually operable means forwardly of said heel engaging member and operable to shift said toe engaging means independent of its mounting means to thrust against the toe of a boot and thereby thrust the heel of the boot against said heel engaging member and to shift said toe engaging means from such a position.

WAYNE M. PIERCE, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,802,116 | Kinsley | Apr. 21, 1931 |
| 2,072,477 | Dodd | Mar. 2, 1937 |
| 2,364,620 | Crocker et al. | Dec. 12, 1944 |
| 2,451,601 | Woolley | Oct. 19, 1948 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 36,085 | Sweden | Dec. 22, 1910 |
| 49,987 | Sweden | Jan. 12, 1920 |
| 177,960 | Switzerland | Sept. 2, 1935 |
| 192,869 | Switzerland | Jan. 17, 1938 |
| 327,523 | Italy | July 13, 1935 |