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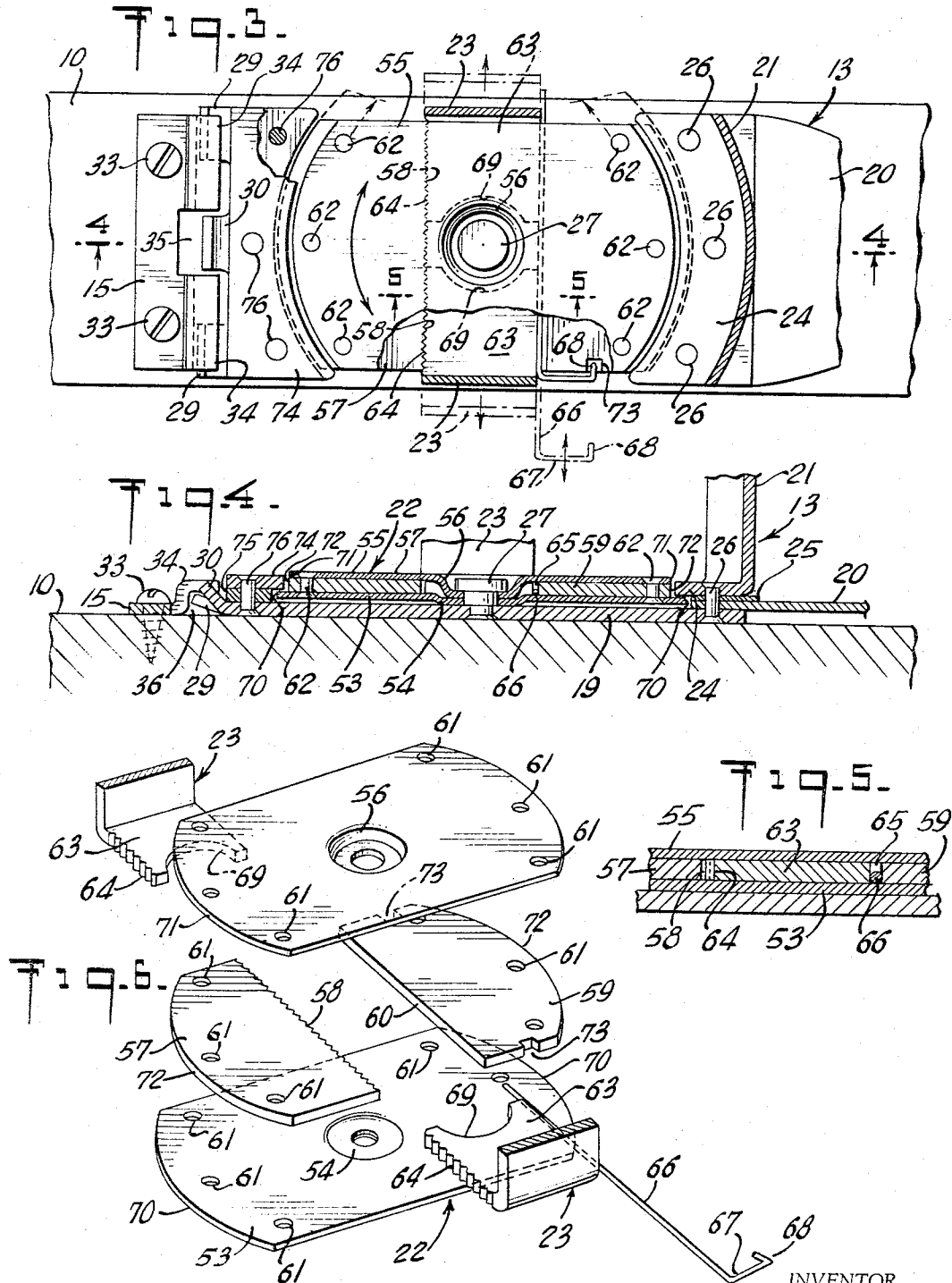
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LONG THONG SAFETY SKI BINDING HAVING IMPROVED TURNTABLE MEANS

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**LONG THONG SAFETY SKI BINDING HAVING
IMPROVED TURNABLE MEANS**

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This invention relates to a binding for attaching the heel of a skier's boot to a ski, and more particularly, to a binding of this type including an improved turntable adapted to permit pivotal movement of the skier's boot and leg relative to the ski under certain circumstances.

Many skiers have long shown a preference for ski bindings in which a strap or long thong attached directly to the ski is wrapped around the skier's boot and ankle to hold down the heel of the boot firmly against the top of the ski. Direct attachment of the skier's boot in this manner provides excellent control of the skis but is almost certain to cause serious injury to the skier in the event of a heavy fall since in such a circumstance, the skis almost invariably act as levers applying strong torsional stresses to the skier's legs. Consequently, use of such a binding is hazardous although common among expert skiers who are willing to forego safety to obtain the advantages of a secure heel attachment. It has long been recognized that novice and other less-than-expert skiers would use the long thong binding if it could be made safe. The use of a turntable under the heel of a skier's boot to permit the ski to pivot with respect to the skier's leg has been suggested to eliminate the dangerous torsional stresses. As an additional safety factor, it has been suggested that means be provided which automatically release the ski from the boot in the event of a serious fall or other mishap. An automatically releasable, long thong heel binding including turntable means is described and claimed in my related copending United States Patent No. 3,272,524, issued Sept. 23, 1966.

Although the concept of using a turntable under the heel of a skier's boot has made is practicable for larger numbers of the skiers to employ the desired long thong bindings, the turntables of available bindings leave room for improvement. Those in which the long thong harness attachment means are permanently affixed to the turntable have the disadvantage that they are not adjustable to fit ski boots of varying width. Therefore, when the width of the skier's boot is less than the distance between the long thong harness attachment means on opposite sides of the turntable, the boot is free to move laterally and control of the ski is affected adversely. Even the available heel bindings in which the long thongs are attached to laterally adjustable attachment means are unsatisfactory in certain respects. For example, heel bindings have been provided in which the long thongs are attached to the upstanding legs of laterally adjustable L-shaped tongues or cheeks having their horizontal legs inserted between the turntable and the ski body or a stationary base plate. In the event of a fall the strong upward forces normally applied to the vertical legs of the tongues tend to cause the horizontal legs to bind against the ski or base plate thus inhibiting pivotal movement of the turntable at the very moment when it is required to prevent injury.

It is, therefore, an object of the present invention to provide an adjustable long thong heel binding having an improved turntable structure adapted to pivot easily and dependably without binding under the most stringent conditions of use to provide a secure but safe long thong attachment for the heel of a skier's boot.

The above and other objects of the invention are achieved by providing a long thong heel binding including

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a novel turntable structure which will now be described in conjunction with the accompanying drawings in which:

FIG. 1 is a fragmentary side elevational view of a ski equipped with a novel turntable structure of this invention associated with an automatically releasable ski boot heel binding structure and an independent boot toe retaining device;

FIG. 2 is a plan view of the ski and ski bindings of FIG. 1, the heel and toe portions of the engaged ski boot being shown in broken lines;

FIG. 3 is a top plan view showing on an enlarged scale the heel binding of FIG. 2, including the improved turntable structure;

FIG. 4 is a horizontal cross sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a vertical cross sectional view further enlarged and taken on the line 5—5 of FIG. 3; and

FIG. 6 is an exploded, perspective view showing some of the parts of FIGS. 3 and 4.

Corresponding parts of the drawings are indicated by the same reference numerals.

Referring to the drawings, a ski body 10 has a skier's boot 11 releasably attached thereto, according to the invention of my related United States patent application referred to above, by means of boot toe binding structure 12, a separable boot heel binding structure 13, a boot engaging harness 14, an anchoring block 15 and a latching assembly 16. The boot harness 14 includes a strap or long thong 17 and a ring 18. The separable heel binding structure 13, which is releasable from the ski as a unit, includes a base plate 19, a leaf spring 20, a heel abutment member 21, and the novel turntable structure 22 of this invention which carries a pair of harness engaging tongues 23.

The novel turntable structure 22, which is pivotally mounted on the base plate 19 by suitable pivot means 27, includes a bottom plate 53, having an annular, downwardly projecting boss 54, and a top plate 55, also having a downwardly projecting, annular boss 56. The boss 56 of top plate 55, which nests in the upper concave portion of boss 54 of bottom plate 53, provides an annular concave area in its upper surface to accommodate the cap of the pivot means 27 so that the cap is flush with or below the upper surface of the top plate 55. Disposed between the bottom plate 53 and the top plate 55 are intermediate plates 57 and 59 having outer curved edges 72. Intermediate plate 57 has a toothed inner edge 58 whereas intermediate plate 59 has a smooth inner edge 60. The bottom plate 53, top plate 55 and intermediate plates 57 and 59 are fastened together in a unified structure by suitable means such as rivets 62 extending through the soles 61 in the plates.

L-shaped harness engaging tongues 23, having upstanding legs provided with openings 28 to receive the long thong 17, and horizontal legs 63, are adjustably and removably mounted on the turntable structure 22 by inserting the horizontal legs 63 into the space between the top plate 55, bottom plate 53 and the intermediate plates 57 and 59. The horizontal legs 63 of the tongues 23 are each provided on one side with a toothed edge 64 which is adapted to engage the toothed edge 58 of the intermediate plate 57. The edges of the horizontal legs 63 opposite the toothed edges 64 are smooth. It should be noted that the two long thong harness engaging tongues 23 constitute a pair; one being "right-handed" and the other "left-handed" with respect to its toothed edge 64. Consequently, one of the tongues is adapted to be inserted on one side of the turntable and one on the other side, with both tongues having a toothed edge 64 engaging the toothed edge 58 of the plate 57. The inner ends of the horizontal legs 63 of the tongues 23 are provided with

an arcuate cut-out portion 69 adapted to prevent contact of the tongues 23 with the boss 56 of plate 55.

The width of the horizontal legs 63 of the tongues 23 is somewhat less than the width of the open space between the intermediate plates 57 and 59 when the toothed edges 58 and 64 are interlocked, thus providing a channel 65 between the smooth edge of leg 63 and the smooth inner edge 60 of the intermediate plate 59. A locking pin 66 is inserted in the channel 65 to fill the channel and hold the toothed edge 64 of the leg 63 in interlocked engagement with the toothed edge 58 of the plate 57 thus preventing withdrawal of the leg 63 from the turntable structure. The locking pin 66 is provided with means to prevent accidental withdrawal such as the bends 67 and 68, the latter being adapted to be inserted in, and releasably held by, notch 73 in the plate 59. The plate 59 is preferably provided with a notch 73 on each side as shown in FIG. 6. This permits insertion of the locking pin 66 into channel 65 from either side of the turntable structure and engagement of the bend 68 in the notch 73 on the opposite side of the plate 59. It will be apparent that the distance between the upstanding legs of the tongues 23 on opposite sides of the turntable may be varied at will to accommodate ski boots of different widths by removing the pin 66 to permit disengagement of the toothed edges 58 and 64, adjustment of the position of the legs 63 as desired, and locking of the legs in the new position by reinsertion of the locking pin 66 into the channel 65. Any suitable means other than the toothed edges 58 and 64 and the locking pin 66 may be employed to adjustably and removably engage the legs 63 of the tongues 23 and lock them in the desired operable position with respect to the turntable structure 22.

It will be understood that the harness 14, being anchored to turntable structure 22 by engagement with tongues 23, will, when exerting twisting pull upon the turntable, cause it to yield rotatably to sidewise movement of the boot toe. Rotation of the turntable structure 22 about the vertical axis of pivot 27 may be facilitated by providing guide means at the periphery of the turntable, e.g. at the forward end of structure 13, by guide plate 74 which overhangs an edge 70 of bottom plate 53, and at the rearward end of the structure, by the edge of base 24 of heel abutment member 21 which similarly overhangs the opposite edge 70 of the bottom plate. It will be seen, therefore, that when the turntable structure 22 is in operable skiing position, the curved edges 70 of the bottom plate 53 are closely confined below by the base plate 19 and above by the lips of guide plate 74 and base 24 of the heel abutment member 21. The edges of guide plate 74 and base 24 which overhang the bottom plate 53 have a concave arcuate configuration complementary to the convex arcuate configuration of the edges 71 and 72 of plates 55 and 57 and thus act as guide means for these plates as well as the bottom plate 53 upon rotation of the turntable. Friction between the bottom plate 53 and the base plate 19 upon rotation of the turntable 22 may be reduced by any suitable means. In the embodiment shown in the drawings, this is accomplished by providing the bottom plate 53 with optional downwardly projecting boss 54 which bears against the base plate 53 as best shown in FIG. 4.

It will be seen that when strong forces are exerted upwardly on the upstanding legs of tongues 23 by the engaged long thong harness 14 as would be the case in a heavy fall, the horizontal legs 63 of the tongues 23 may be biased downward at their inner ends. However, downward bias of the inner ends of the legs 63 cannot cause binding or in any way inhibit pivotal movement of the turntable, as would be the case with certain previously available ski bindings, since the inner ends of the legs 63 bear on the bottom plate 53, which is part of the turntable structure, rather than against the stationary base plate 19. Therefore, objectionable binding is eliminated and a turntable structure is provided which is easily and de-

pendably pivotable under the most stringent conditions of use. It is apparent, therefore, that the novel turntable structure 22 makes practicable a heel binding combining the advantages of a secure long thong attachment with the additional advantage of safety due to the elimination of torsional stresses on a skier's leg in the event of a heavy fall.

The novel turntable structure described above may be mounted on a ski either permanently or releasably in any suitable manner, it being preferred, however, to incorporate it in an automatically releasable and separable boot heel attachment means such as that illustrated in the drawings and described and claimed in my copending United States patent application referred to above. Briefly, such an automatically releasable, long thong heel binding includes a separable boot heel binding structure 13, a long thong boot engaging harness 14, an anchoring block 15 and a latching assembly 16. The separable heel binding structure 13 includes the novel turntable structure 22 of this invention, a base plate 19, tongues 23, harness 14, heel abutment member 21 and an upstanding, transversely arcuate abutment portion at the rear which is adapted to receive the heel of the skier's boot and prevent rearward displacement of the boot relative to the base plate 19. The base 24 of heel abutment member 21 is positioned above an optional spacing plate 25, the forward end of the leaf spring 20 and the rear end of the base plate 19. The sandwich formed in this way is permanently united by suitable fastening means such as screws or rivets 26.

The forward edge of the base plate 19 is provided with a pair of upwardly extending lugs 29 disposed at the sides of the base plate and an upwardly extending intermediate lug 30. The leaf spring 20 is provided with a small hole 31 to accommodate the spike of a ski pole and terminates at its rear end in an upwardly extending flange 32.

The anchoring block 15 is permanently mounted transversely on the ski body 10 by means of screws 33 or other suitable fastening means and is provided at its rear edge with a pair of raised shoulders 34 and an intermediate notch 35; recesses 36 being formed in this way between the shoulders 34 and the ski body 10.

The spring retaining latch assembly 16 includes a latch base 37 provided with a pivot pin 39 which projects vertically upward. The latch base 37, which is permanently fastened to the ski body 10 by means of screws 43 or other suitable means, has an opening 44 in its forward edge. A spring latch lever 46 is pivotally mounted on the latch base by means of pivot pin 39. A cap 48 is fastened to the upper end of the pivot pin 39 by screw threads or other suitable means to retain the latch lever 46 which is free to pivot under manual pressure through an arc of somewhat less than 180° as shown in FIG. 2. The latch lever 46 is preferably provided with a detent or catch, not shown, which yieldably resists pivotal movement of latch lever 46 away from the central position shown in full lines in FIG. 2. The latch lever 46 may optionally be provided with an upwardly extending flange 50 to facilitate manual operation. The forward end 51 of latch lever 46 is offset upwardly as shown to provide a recess 52 to accommodate flange 32 of leaf spring 20. The separable heel binding structure 13 is operably and releasably connected to the ski body 10 by first sliding the forward end of the base plate 19 into withdrawable engagement with anchoring block 15 whereby the lugs 29 engage shoulders 34 and the lug 30 projects upwardly through the notch 35 between the shoulders 34 thus preventing sidewise movement of the forward end of the base plate 19 and structure 13. The leaf spring 20, which when untensioned has an upwardly curved configuration, is then tensioned by applying a downward force on its upwardly curved free end, e.g. by means of a ski pole spike inserted in the hole 31 provided for that purpose. As the leaf spring 20 is forced downwardly, the latch lever 46 is pivoted manually to one side, as shown in broken lines

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in FIG. 2, to uncover the opening 44 in the forward edge of the latch base 37 into which opening the free end of the leaf spring 20 is forced. The latch lever 46 is then manually pivoted back to the central position, shown in full lines in FIG. 2, and the leaf spring 20 is released from the downward force, whereby the tension in the leaf spring 20 forces the flange 32 at its free end into contact with the under side of the end 51 of latch lever 46. The tension in, and extended length of, the leaf spring 20 also forces the forward edge of the base plate 19 against the anchoring block 15 thus holding the separable heel binding structure 13 in tight but resilient and releasable contact with the ski body 10.

For cooperation with the above described boot heel releasable attachment means, or with the novel turntable structure of this invention alone if the latter is mounted on the ski in some other suitable manner, the ski body 10 should preferably be provided with means to engage and hold the toe of boot 11 against the ski body subject to release and withdrawal when the heel portion of the boot is pivoted or released. Such boot toe engaging means may be of any suitable form and construction which is adapted to function in the manner specified.

A desirable releasable boot toe attachment means is disclosed in detail in my prior United States Letters Patent No. 2,616,714, granted Nov. 4, 1952. Again referring to the drawings, such a boot toe attachment means generally comprises a toe plate 77 which is affixed to the boot sole at the toe, said toe plate having a forwardly projecting portion which is indented by a seating notch 78, and a holding means which is cooperative with said toe plate. Said holding means comprises a latching stud 79 and a spring actuated thrust means 80, with a pivotal joint 81 connecting said latching stud and thrust means in end to end relation. Said parts are supported by upstanding end plates 82 and 83 of base 84, the latter being secured to the ski body 10 by the screws 85 or other suitable fastening means. The rear free end of the latching stud 79 engages in the seating notch 78 of the toe plate 77. The latching stud 79 is provided with a radially extending fulcrum flange 86 adapted to normally bear flatly against a face of the end plate 83 of the fixed base 84 under the pressure of the spring actuated thrust means 80. Peripheral portions of the fulcrum flange 86 provide fulcrum points about which the latching stud 79 can pivot relative to said end plate 83, which said latching stud is subjected to transversely applied or uplifting force sufficient to overpower the counterforce of the thrust means 80, thereby to disengage the latching stud 79 from the seating notch 78 of the boot toe plate 77, with boot toe releasing effect, all as more particularly set forth in my aforesaid prior Patent No. 2,616,714.

It will be understood that the latch assembly 16, which normally holds down the end flange 32 of leaf spring 20, inhibits sidewise movement of the spring and attached heel binding structure by confining the end of the leaf spring in the opening 44 in latch base 37. The tension in the leaf spring 20 and the restraint of the latch lever 46 also resist any displacement of the separable heel binding structure 13 from its boot attaching relation to the ski body 10 due to normal upward pulling stresses or strains to which the ski is subjected in use. In the event of a fall or other occurrence which induces an abnormal upward pulling stress or strain, tending to separate the structure 13 and boot 11 from attached relation to the ski body, said leaf spring 20 will yield so as to disengage the flange 32, releasing the spring and separate heel binding structure 13 from attachment to the ski body. Lesser shocks or strains, however, may merely cause the leaf spring to bow and permit the skier's boot heel to lift from the ski body without releasing the separable heel binding structure 13, thus providing a resilient binding between the ski boot and ski.

When the separable heel binding structure 13 and boot 11 are released from the holding effect of the latching

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means 16, the structure 13 tends to move rearwardly, withdrawing its forward edge and lugs 29 and 30 from the recesses 36 of the anchoring block 15, thereby fully detaching the separable heel binding structure 13 and boot 11 from the ski body 10.

As the separable heel binding structure 13, and consequently boot 11 which is tied thereto by the long thong harness 14, is separated from the ski body as described above, it will be obvious that the toe of the boot 11 will free itself from the forward boot toe binding means 12, and consequently the skier's boot will be entirely detached and separated from the ski.

It will be apparent from the above discussion that coupling of the ski to the user's boot by means of the described device in conjunction with the novel turntable structure of the invention, permits use of a strap or long thong harness in connection with the boot and leg of the skier, which use is so frequently desired by skiers, while nevertheless providing the additional safety factor of quick and automatic separation and detachment of the skier's boot from the ski in the event of a fall or other mishap.

The specific embodiments of the invention described above are given by way of illustration and are not to be construed as limiting the scope of the invention defined by the appended claims.

I claim:

1. In a long thong ski binding for attaching the heel of a skier's boot to a ski, a turntable structure comprising a bottom plate, a top plate and a pair of intermediate plates, all of said plates being fastened together in a unified structure, a channel between said bottom plate and said top plate having an opening on each of two opposite sides of said turntable structure and being further defined by the inner edges of said intermediate plates, means for pivotally mounting said turntable structure above a ski, a pair of tongues, each having an upstanding leg adapted to engage a long thong for tying a skier's boot thereto and a horizontal leg, said tongues being mounted on opposite sides of said turntable structure by insertion of the horizontal leg thereof in one of the openings of said channel, the position of said tongues relative to each other being adjustable by moving the horizontal legs thereof back and forth in said channel whereby the distance between the upstanding legs of said tongues on opposite sides of said turntable structure can be varied to accommodate therebetween ski boots of varying widths, and means for removably locking the horizontal legs of said tongues in said channel in a desired position, said turntable structure being characterized by being easily and dependably pivotable without binding when strong lifting forces are applied to said upstanding legs thereby causing the horizontal legs of said tongues to be biased downward against the bottom plate of said turntable structure.

2. In a long thong ski binding for attaching the heel of a skier's boot to a ski, a turntable structure comprising a bottom plate, a top plate and a pair of intermediate plates, all of said plates being fastened together in a unified structure, a channel between said bottom plate and said top plate having an opening on each of two opposite sides of said turntable structure and being further defined by the inner edges of said intermediate plates, means for pivotally mounting said turntable structure above a ski, a pair of tongues each having an upstanding leg adapted to engage a long thong for tying a skier's boot thereto and a horizontal leg, said tongues being mounted on opposite sides of said turntable structure by insertion of the horizontal leg thereof in one of the openings of said channel, the position of said tongues relative to each other being adjustable by moving the horizontal legs thereof back and forth in said channel whereby the distance between the upstanding legs of said tongues on opposite sides of said turntable structure can be varied to accommodate therebetween ski boots of varying widths,

means for removably locking the horizontal legs of said tongues in said channel in a desired position, and means adapted to be mounted above a ski forwardly and rearwardly of said turntable structure adjacent to the periphery thereof to guide said turntable structure during pivotal movement, said turntable structure being characterized by being easily and dependably pivotable without binding when strong lifting forces are applied to said upstanding legs thereby causing the horizontal legs of said tongues to be biased downward against the bottom plate of said turntable structure.

3. In a long thong ski binding for attaching the heel of a skier's boot to a ski, a turntable structure comprising a bottom plate, a top plate and a pair of intermediate plates, all of said plates being fastened together in a unified structure, a channel between said bottom plate and said top plate having an opening on each of two opposite sides of said turntable structure and being further defined by the smooth inner edge of one of said intermediate plates and the inner edge, provided with a plurality of teeth of the other intermediate plate, means for pivotally mounting said turntable structure above a ski, a pair of tongues, each having an upstanding leg adapted to engage a long thong for tying a skier's boot thereto and a horizontal leg, one edge of said horizontal leg being smooth and the opposite edge being provided with a plurality of teeth, said tongues being mounted on opposite sides of said turntable structure by insertion of the horizontal leg thereof in one of the openings of said channel, the position of said tongues relative to each other being adjustable by moving the horizontal legs thereof back and forth in said channel whereby the distance between the upstanding legs of said tongues on opposite sides of said turntable structure can be varied to accommodate therebetween ski boots of varying widths, and a locking pin adapted to be inserted in said channel between the smooth edges of said horizontal legs and the smooth edge of said intermediate plate, said locking pin acting to force the teeth of the horizontal legs of said tongues into engagement with the teeth of the inner edge of said intermediate plate thereby removably locking the horizontal legs of said tongues in said channel in a desired position, said turntable structure being characterized by being easily and dependably pivotable without binding when strong lifting forces are applied to said upstanding legs thereby causing the horizontal legs of said tongues to be biased downward against the bottom plate of said turntable structure.

4. In a long thong ski binding for attaching the heel of a skier's boot to a ski, a turntable structure comprising a bottom plate, a top plate and a pair of intermediate plates, all of said plates having two opposite arcuate ends and being fastened together in superimposed relation in a unified structure with the arcuate ends of said top plate and said intermediate plates in register and the arcuate ends of said bottom plate extending beyond the said regis-

tered arcuate ends to provide a lip at each of two opposite ends of said turntable structure, a channel between said bottom plate and said top plate having an opening on each of two opposite sides of said turntable structure and being further defined by the inner edges of said intermediate plates, one of said intermediate plates having a smooth inner edge and the other intermediate plate having an inner edge provided with a plurality of teeth, means for pivotally mounting said turntable structure above a ski, a pair of tongues, each having an upstanding leg adapted to engage a long thong for tying a skier's boot thereto and a horizontal leg, one edge of said horizontal leg being smooth and the opposite edge being provided with a plurality of teeth, said tongues being mounted on opposite sides of said turntable structure by insertion of the horizontal leg thereof in one of the openings of said channel, the position of said tongues relative to each other being adjustable by moving the horizontal legs thereof back and forth in said channel whereby the distance between the upstanding legs of said tongues on opposite sides of said turntable structure can be varied to accommodate therebetween ski boots of varying widths, a locking pin adapted to be removably inserted in said channel between the smooth edges of said horizontal legs and the smooth edge of said intermediate plate, said locking pin acting to force the teeth of the horizontal legs of said tongues into engagement with the teeth of the inner edge of said intermediate plate thereby removably locking the horizontal legs of said tongues in said channel in a desired position, and arcuate means adapted to be mounted above a ski forwardly and rearwardly of said turntable structure adjacent to the periphery thereof to guide the arcuate edges of said top plate and intermediate plates and to overhang the lip portion of said bottom plate at each end of said turntable structure, whereby pivotal movement of said turntable structure is facilitated, said turntable structure being characterized by being easily and dependably pivotable without binding when strong lifting forces are applied to said upstanding legs thereby causing the horizontal legs of said tongues to be biased downward against the bottom plate of said turntable structure.

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