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FOOT BINDING FOR WATER SKIS

Filed April 22, 1963

FIG. 1

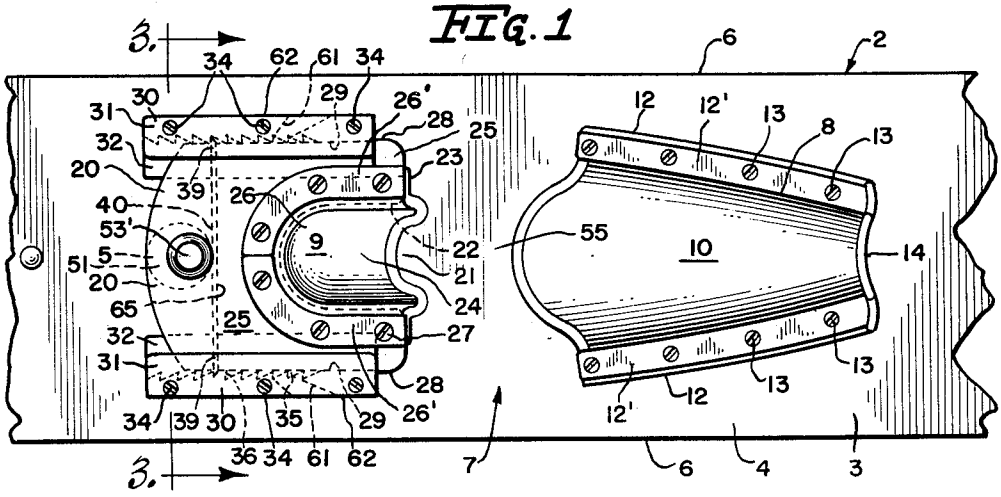


FIG. 2

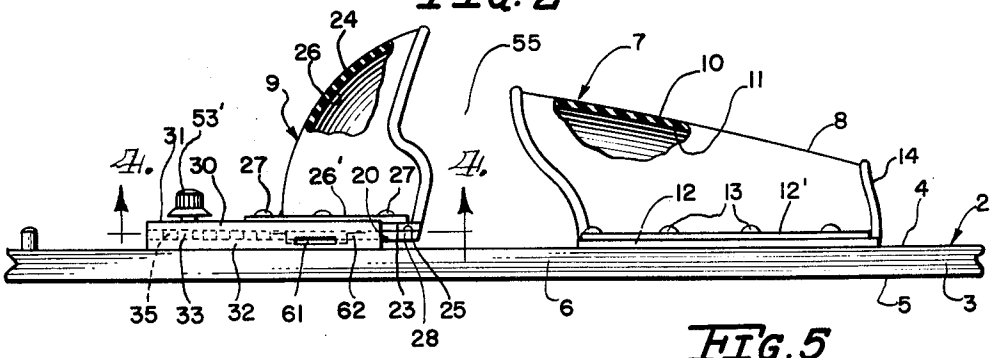


FIG. 5

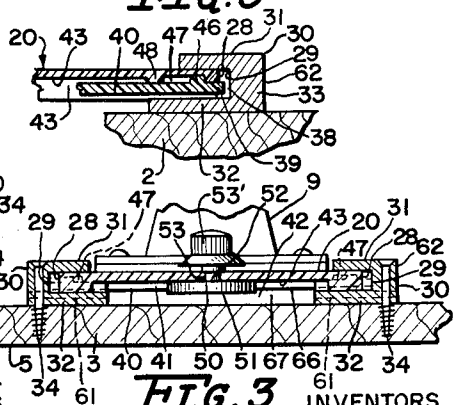


FIG. 4

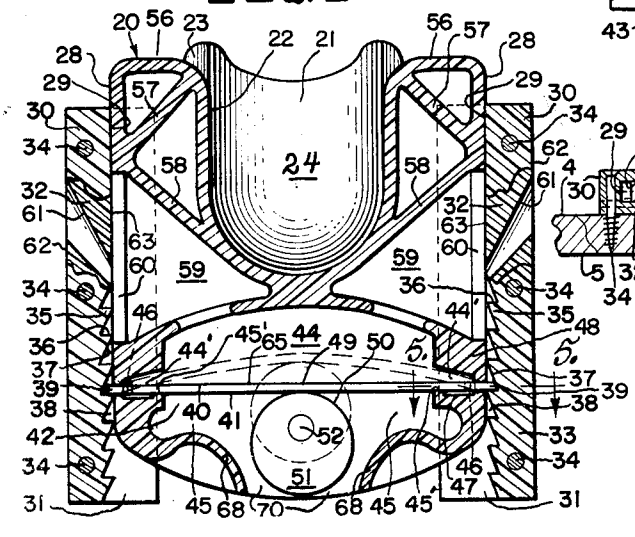


FIG. 3

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FOOT BINDING FOR WATER SKIS

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This invention relates to water skis and more specifically to a novel foot binding therefor.

The present state of the art fails to provide a readily adjustable foot holder for water skis. The user must clamp his feet to the ski runners underwater. The locking devices currently available are either cumbersome or ineffective and in general are difficult for the average user to adjust underwater.

It is a general object of this invention to provide a novel foot binding which obviates all of the foregoing disadvantages.

A further object of the invention is to provide a novel foot clamping device which comprises a vamp portion secured to the ski runner and a heel portion adjustable toward and away with respect to the vamp portion and wherein novel, readily releasable locking means is provided for holding the heel portion in adjusted position.

Malfunctioning is a problem in such devices as heretofore described. Dirt or sand is readily entrapped in the locking parts. The invention contemplates the provision of a novel foot binding in which the locking parts are self-flushing which is induced by the provision of channels for directing forcible flow of water through the mechanism as the skier is propelled over the water.

A different object of the invention is to provide a novel locking mechanism which incorporates a transversely flexible locking bar with end portions which, attendant to flexing of the bar, escape over a series of teeth formed in a pair of opposing tracks which serve to guide the base of the foot holder to and from the vamp to clamping and released positions, the base providing a high pressure chamber at one side of the bar which serves to yieldably hold the bar in secured position when the skier is planing over the water.

A still further object of the invention is to devise a foot clamp which is formed of plastic material having exceptional impact strength and a high yield point to obtain a bolt or locking bar structure which is durable, elastic and can withstand severe abuse and abrasion even when used in sandy or mud entrained water. One such material is sold under the trademark "Delrin" by the Du Pont Company.

A further object of the invention is to provide a novel, quickly releasable locking mechanism for the foot holder, said mechanism comprising a flexible locking bar which extends transversely of a pair of opposed tracks which extend rearwardly from the vamp and mounted therewith on the ski runner, the tracks having inwardly directed teeth which cooperate with the ends of the locking bar, the locking bar being located in a cavity formed in the base of a heel portion which base has its lateral edges guided in grooves formed in the tracks, the bar having a lost-motion connection at each end with the base plate to maintain the bar centered between the tracks.

A different object of the invention is to provide a novel locking mechanism comprising a flexible plastic bolt which is transversely deflected by a cam to withdraw the ends of the bar from opposing locking tracks, the cam being centered with respect to the bar and the bar in locked position being substantially straight.

These and other objects and advantages inherent in and encompassed by the invention will become more readily apparent from the specifications and the drawings, wherein:

FIGURE 1 is a plan view of the novel ski binding shown mounted upon a ski which is broken away at its ends;

FIGURE 2 is a side elevational view of the structure of FIGURE 1 with parts shown in vertical section;

FIGURE 3 is an enlarged cross-sectional view taken substantially on the line 3—3 of FIGURE 1;

FIGURE 4 is an enlarged horizontal sectional view taken substantially on the line 4—4 of FIGURE 2, and

FIGURE 5 is a fragmentary sectional view taken substantially on line 5—5 of FIGURE 4.

Description of the invention

Describing the invention in detail and having particular reference to the drawings, there is shown a water ski generally designated 2 which comprises a wooden runner 3 having top and bottom sides 4 and 5 and lateral edges 6—6.

Centered between the edges 6—6 there is mounted on the top side 4 of the runner, a foot clamp or holder or binding generally designated 7. The clamp 7 comprises a front vamp portion 8 and a rear heel portion 9. The vamp portion comprises a rubber or elastomer top 10 which is bowed upwardly and tapers forwardly to receive a foot of the user within the opneing 11 in wedging relationship thereto. The lateral edges 12, 12 of the vamp are secured by the metal strips 12', 12' by screws 13, 13 to the top 4 of the runner. The forward end 14 of the vamp is preferably open to permit extension therethrough of the toes of the user.

The heel portion 9 comprises a generally flat base 20 which has a forwardly open slot 21 to admit the heel of the user. About the margins 22 of the slot 21 there is mounted a horizontal flange 23 of a heel support 24 made of rubber or other resilient material. The heel support 24 has an upstanding part 26 integral along its lower edge with flange 23 and contoured to fit the heel of the user. The forward side of the heel support, of course, is open and complements the vamp in holding the user's foot.

The flange 23 is secured to the top 25 of the base 20 by means of the horseshoe shaped metal strips 26', 26' and screws 27 which are threaded into the plate 20.

The lateral edges 28, 28 of the base plate 20 fit into inwardly directed opposing grooves 29, 29 in guide and retaining rails 30, 30 which comprises top and bottom flanges 31, 32 and an intervening vertical outer web 33. The rails are secured by screws 34 to the upper surface 4 of the runner along the lateral edges thereof rearwardly of the vamp 8.

The web 33 is provided with a plurality of teeth 35 which have forwardly directed holding edges 36 and rearwardly and outwardly inclined rear ramps 37. In effect the edge 36 of each tooth and the ramp 37 of the tooth thereahead form interdental spaces 38 which admit the locking ends 39 of a flexible locking bar 40 which extends transversely between the side rails 30, 30 and extends at its end portions 39 beyond the lateral edges 28 of the base plate into any one of the spaces 38.

The locking bar or element 40 is a transversely flexible preferably plastic member and has a flat rear edge 41 which in locking position as best shown in FIGURE 4 bears at the end portions 39 against the locking edges 36 of laterally aligned teeth.

The bar or bolt 40 extends through a cavity or recess 42 in the underside 43 of the plate 20 and subdivides the same into high and low pressure chambers 44 and 45.

The end portions 39 of the bar 40 have lost-motion or floating connections generally designed 44' with the plate 20 to prevent excessive endwise displacement of the bar and its accidental withdrawal from the guiding apertures 45'. The connections 44' comprise upstanding lugs 46

on the end portions 39 of the bar which enter into slots 47 thereabove in the underside of the plate 20 in the thickened sections 48 thereof.

The center portion or midpoint 49 of the bar 40 is engaged on its flat rear side 41 with the profile 50 of an eccentric 51 which is mounted on a pin 52. The pin 52 extends through a vertical aperture 53 in the plate 20 and the upper end of the pin 52 is connected to a knob or other suitable handle 52' by which the eccentric is adapted to be turned in order to deflect or bow the locking bar forwardly as seen in phantom lines in FIGURE 4 to withdraw the end portions 39 from the teeth 35. The entire heel assembly is adapted to be moved rearwardly to enlarge the space 55 between the heel portion and the vamp portion to admit or remove the foot. By rotating the cam to locked position as shown in solid lines in FIGURE 4 the locking bar is extended. In this position after the foot is entered into the vamp, the heel assembly is urged forwardly with the locking bar flexing and riding over the ramps 37 until the heel support 24 is brought to bear snugly against the heel of the user.

It will be noted that the plate 20 is skeletonized and that the underside of the plate 20 is provided with peripheral ribbing 56 and diagonal forward and rear ribs 57, 58. The rear ribs 58 at opposite sides of the heel slot 21 converge rearwardly and form the forward margins of channels 59 which at their forward open ends 60 communicate with forwardly directed inlet passages 61 formed in the bottom flanges 32 of the side rails 30. The passages extend from the outer sides 62 of the bottom flange to the inner side 63 thereof and angle rearwardly.

The rear ends of channels 59 communicate with the high pressure chamber 44 and deliver water thereto under pressure developed by the ski rushing through the water.

It will be realized that in working the locking bar it tends to take a forwardly bowed set. The pressure of the water in chamber 45 against the forward side 65 of the bar tends to straighten the bar. The depth, that is the vertical and horizontal thickness, of the bar, which functions as a baffle, is determined by its properties and the pressure required to straighten the bar. It will be noted that the apertures or slots 47 are relieved forwardly of the end portions 39 to permit flexing of the bar and to prevent binding. The underside 66 of the locking bar provides an exit passage 67 with the upper side 4 of the runner from the chamber 44 to the low pressure chamber 45 which is flanked by the lateral marginal ribs 68. The ribs 68 converge rearwardly and develop an exit opening 70.

It will be apparent that any sand or dirt entrapped in the mechanism will be washed away and that the locking bolt is maintained in locking position.

The base 20 and the bar 40 as well as the side rails 30 are preferably made of a plastic material sold under the trademark "Delrin" which is an acetyl resin and more particularly a polyoxymethylene, which means that it is principally made up of recurring CH_2O units. The material is more adequately described in U.S. Patent 2,768,994 issued to R. N. MacDonald on October 30, 1956. The material possesses properties of high impact strength, durability and can be readily molded. It provides flexibility and greatly resists abrasion and wear due to the action of sand and grit washing through the parts.

Having described a preferred form of the invention, it will be understood that various other forms of the invention will be readily apparent to those skilled in the art within the scope of the appended claims.

What is claimed is:

1. In a foot binding for a water ski, the combination of a runner, a vamp and a heel structure mounted thereon, said heel structure including a heel receiving portion and a base therefor, means for locking the base in selected positions relative to the vamp, and water flow directing means on the heel structure for flushing said locking means with water attendant to the ski moving in the water to remove contaminants from said locking means.

2. In a foot holder for a water ski, the combination of a runner, a heel engaging structure mounted thereon including a base portion, guide means on the runner in guiding engagement with the base portion, means interlocking the base portion with the guide means in selected positions, and means having a passage in the guide means in fluid-directing relation to the interlocking means from a side of the guide means for flushing said interlocking means from dirt and the like attendant to the movement of the ski through water.

3. The invention according to claim 2 and said interlocking means comprising a locking element carried by the base portion, toothed means on the guide means selectively engageable with the locking element, said element disposed athwart said passage.

4. The invention according to claim 2 and said interlocking means comprising a locking element, said base portion having a cavity communicating with the passage and receiving the locking element therein, said element subdividing the cavity into high and low pressure chambers.

5. In a ski, a flexibel vamp secured to the upper surface of the ski, a pair of toothed racks mounted on the ski rearwardly of the vamp, a base plate therebetween slidably interlocked therewith, a heel support secured to the base plate, a flexible locking bar floatingly supported from the base plate and having end portions projecting into the racks, said bar elongated transversely of the racks, cam means on the base plate movable to a position bowing said bar to withdraw the end portions from the racks, a lost-motion connection between each end portion of the bar and the base plate accommodating limited longitudinal and transverse movement of the bar.

6. A ski comprising a runner, toe receiving means on the runner, tracks on the runner, each track providing a slot therein, a heel assembly including a support plate slidable forwardly and rearwardly in said slots, a straight locking bar mounted beneath said plate extending substantially perpendicularly of the tracks and having end portions projecting into the slots in respective tracks, teeth on the tracks within the slots, said bar being flexible attendant to movement of the plate for escaping over the teeth in the plate moving forwardly and locking with the teeth to prevent movement of the plate rearwardly, and cam means on the plate in engagement with the bar for bowing the bar whereby withdrawing the end portions from the slots and disengaging the bar from the teeth to permit rearward movement of the plate, said cam means abutingly engaging the bar, and said bar freely movable lengthwise and transversely along, away and toward said cam means.

7. A ski harness for holding a foot in place on a ski having a forward portion under which the toe and instep of the foot may be inserted, a heel engaging flexible covering, a slide plate carrying said covering mounted for movement longitudinally in respect to the foot, a pair of slide gibs embracing the side edges of the plate for holding it against movement except along the longitudinal axis of the harness, and means for restraining movement of the slide plate in a rearward direction longitudinally with respect to the forward portion, said means including an elongated flexible locking member extending transversely of the slide plate, said member having a straight length substantially equal to the distance between the gibs so as to be engageable with each of the gibs, and actuator means pivotally mounted on the slide plate at the center of the member in engagement therewith, said gibs, plate and member being made of plastic said locking member having only touching engagement with the actuator means and floating with respect thereto.

8. The invention according to claim 7 and said slide

gibs having forwardly angled lateral water passages therethrough directed toward said member.

9. The invention according to claim 8 and said plate having a cavity receiving said member therein, and said cavity having a rear outlet.

10. In a ski harness, a slide plate, a heel structure thereon, means for slidably locking the slide plate to a ski comprising an elongated locking bar extending generally parallel to the plate widthwise thereof, a lost motion connection between each end portion of the bar and said plate and comprising slots in the plate elongated lengthwise of the bar and lugs on the end portions loosely fitting into a respective one of said slots.

11. A slide plate for a ski harness comprising a top and bottom, a heel-embracing structure mounted upon the top, said bottom being formed with a pair of laterally open water-inlet channels and a chamber rearwardly of the channels in communication therewith, and having a water discharge outlet rearwardly thereof.

12. The combination according to claim 11 and a flexible locking bar within said chamber subdividing the same into high and low pressure areas, and serving as a baffle for directing water passing through the chambers laterally toward the ends of said member.

13. The invention according to claim 11 and a flexible locking bar in said chamber, a cam structure mounted upon said slide plate rearwardly of the bar in abutment therewith and adapted to bow the bar forwardly attendant to unlocking the bar, and said bar being held against the cam structure by pressure of water impinging thereagainst.

14. The invention according to claim 11 and said slide plate being made of "Delrin."

15. In a water ski harness for a ski comprising a runner, toe holding means on the runner, an adjustable heel-embracing structure on the runner, said structure comprising a base plate and a pair of gibs flanking said plate and having slots receiving lateral edge portions of the plate therein, locking means comprising a combined baffle and locking flexible element mounted to the plate and having end portions extending into said slots, teeth on the gibs cooperating with the locking element for holding the base plate in selected adjusted positions, and means on the structure for directing water against said combined baffle and locking element attendant to passage of the ski over water for flushing grit and the like from the locking means.

16. The invention according to claim 15 wherein said element is disposed crosswise of the direction of movement of the ski and comprising unlocking means on the base plate disposed behind said flexible element and holding said element against deflection in a rearward direction in opposition to fluid pressure developed against the forward side of the bar.

17. The invention according to claim 15 wherein said element is interposed between the base plate and the runner and said means for directing water against said element comprise water passages in the base plate diverging forwardly and having inlets in the gibs for the passages.

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FERGUS S. MIDDLETON, *Primary Examiner.*