A water ski foot binding having a stationary foresection to engage the forefoot of the water skier, and an aft section having a heel engaging portion longitudinally movable on the water ski adapted to accommodate the heel and rear portion of varying sizes of feet. The aft section includes a heel engaging assembly having side flanges movably mounted in channels provided in parallel stationary guide rails. A first portion of a locking mechanism constituted as a linear ratchet assembly is disposed on the guide rails, while the second movable actuating portion is associated with the heel assembly. Pressure caused by the presence of a foot in the binding enhances the locking capability of the locking mechanism.

7 Claims, 9 Drawing Figures
3,798,691 WATER SKI FOOT BINDING

BACKGROUND OF THE INVENTION

Conventionally, the foot binding of a water ski includes a stationary foresection to accept the forward portion of a bare foot, and an adjustable heel section to accommodate the heel and rear portion of the foot and ankle. Guide means are typically provided to allow longitudinal adjustment of the position of the heel section according to the size of the foot of the water skier. For example, a mounting plate carrying a heel engaging pocket may have side edges adapted to slide over the top surface of the water ski, being held in lateral and vertical position by parallel guide rails disposed adjacent either edge of the water ski. Such usual guide means are susceptible to collecting dirt and sand, thus causing sticking and jamming. The movement of the mounting plate over the surface of the ski soon wears away the finish of the ski. When the water ski swells, as by the effects of temperature or moisture, the guide means become loose.

Adjustable heel portions cooperate with various types of locking mechanism to secure them in place. Locking screw nuts which draw the heel assembly into frictional engagement with the ski are common, but require loosening and tightening of the holding nuts with every adjustment. Water ski bindings having more readily adjustable heel portions have been provided, as shown in U.S. Pat. No. 2,970,325 to Moline et al. Such locking mechanisms are nonetheless susceptible to collection of sand and dirt, impeding their function, as well as having exposed parts vulnerable to damage and breakage.

SUMMARY OF THE INVENTION

The present invention relates to a foot binding for a water ski, said foot binding of the type having a stationary pocket to accommodate the forward portion of a foot, and an aft or heel portion having a heel engaging assembly longitudinally adjustable on the water ski, adapted to generally conform to the heel and rear portions of the foot and lower ankle when properly adjusted. The heel engaging assembly is slidable mounted for longitudinal movement in a pair of stationary, parallel, spaced apart guide rails. The heel engaging assembly includes a flexible heel pocket secured to a mounting plate. The mounting plate has vertical lateral side walls terminating in horizontal outwardly extended flanges. The guide rails have inwardly facing channel-shaped grooves which slidably accommodate the flanges of the mounting plate.

The water ski binding is provided with releasable locking means constituted as a manually operable linear ratchet assembly. The rear expanse of the lower interior surface of each of the channels of the guide rails is formed as a stationary portion of the ratchet assembly constituted as a series of ratchet teeth having vertical leading edges and inclined trailing edges. Associated with the mounting plate is a movable portion of the ratchet assembly constituted as a laterally orientated linear flat clamp. The clamp is pivotally connected to the mounting plate and has trailing edges selectively movable through manipulation of an actuator into and out of engagement with the ratchet teeth. Biasing means bias the clamp in engagement with ratchet teeth at a selected location to lock the heel engaging assembly in place. Pressure on the mounting plate caused by the presence of a foot further secures the edges of the clamp in locking engagement with the ratchet teeth.

An object of the invention is to provide a foot binding for a water ski that is readily adjustable to accommodate feet of different sizes. A second object of the invention is to provide such a binding having longitudinal adjusting means not susceptible to the collection of dirt and sand. A further object of the invention is to provide such a binding having a locking mechanism not susceptible to the collection of dirt and sand, and not having exposed parts vulnerable to damage or breakage. A further object of the invention is to provide a binding having a locking mechanism operable to securely lock the binding in the selected position. Further objects of the invention will become apparent upon the following description.

In the drawings:

FIG. 1 is a top plan view of a water ski having a foot binding according to the present invention;
FIG. 2 is an enlarged view of the binding as shown in FIG. 1;
FIG. 3 is an enlarged view of a portion of the foot binding shown in FIG. 2 with sections broken away for purposes of illustration;
FIG. 4 is a sectional view of the foot binding of FIG. 2 taken along the line 4—4 of FIG. 2;
FIG. 5 is a sectional view of the locking mechanism of the foot binding taken along the line 5—5 of FIG. 2;
FIG. 6 is a sectional view of the locking mechanism of the foot binding taken along the line 6—6 of FIG. 3;
FIG. 7 is a sectional view of the locking mechanism of FIG. 6 showing the mechanism in a disengaged position;
FIG. 8 is a bottom plan view of the heel retaining assembly of the foot binding; and
FIG. 9 is a sectional view of a portion of the foot binding taken along the line 9—9 of FIG. 2.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a water ski 10 equipped with the adjustable foot binding of the invention, indicated generally at 11. Binding 11 includes a stationary foresection 13 for accommodating the forward portion of a foot, and an aft or heel section 14, having longitudinally adjustable means to en-compass the heel and rear portion of the foot and lower ankle. Foresection 13 includes a flexible, foot-engaging pocket 15 located on the top surface of water ski 10 held in place on either side by slightly curved clamping plates 17 secured to the ski 10 by a plurality of screws 18. The pocket 15 may be fabricated from a flexible rubber or plastic or like material, and is purposefully shaped to receive and closely accommodate the forward portion of the foot of the water skier. The pocket is symmetrical to accommodate either a right foot or a left foot.

The aft section 14 of binding 11 includes a longitudinally movable heel engaging assembly 20 and a pair of stationary parallel guide rails 21. Guide rails 21 are symmetrically disposed along either edge of the top surface of the ski 10, spaced a short distance behind the foresection 13 and secured in place by suitable means.
3,798,691

3,798,691

3,798,691

3,798,691

3,798,691

as screws 22. Each guide rail, as shown by FIG. 4, has a channel-shaped cross section defining an open, relatively spacious groove or channel 24 disposed inwardly facing such that the channel of each slide rail is open to and faces the channel of the opposing slide rail. The forward expanse of the lower interior surface defined by each channel 24 is flat so as to provide a suitable sliding or bearing surface, as indicated at 23 in FIG. 4, for a portion of the heel engaging assembly. As shown by FIG. 5, the rear expanse of the lower interior surface of each channel 24, beginning approximately midway thereof, is provided with a series of inclined teeth or ratchet teeth 25, each having a vertical forward or leading edge and an inclined trailing edge. The top edge or apex of each of the teeth 25 is coplanar with the forward bearing surface 23. The ratchet teeth 25 form the stationary component of the locking mechanism or linear ratchet assembly for locking the heel assembly in place, as will be more fully described. The ratchet teeth 25 disposed as they are in the channel 24, are shielded and thus protected from damage and breakage, as well as being isolated from sand and dirt. A stop member 26 is located at the rear end of each channel 24 to close the channel.

Heel assembly 20 includes a slide plate or mounting plate 28 and a flexible heel pocket 29. The front of mounting plate 28 is contoured so as to provide a generally U-shaped notch 30, as shown in dashed lines in FIG. 8, providing appropriate space for the placement of a heel. Heel pocket 29 extends upward from the notch 30 of the mounting plate 28, being shaped and molded so as to generally conform to a heel and the rear portion of a foot and lower ankle. The open face of the heel pocket faces the foresection 13 in a conventional manner. As shown by FIG. 9, the lower end of heel pocket 29 terminates in an outwardly turned base flange 32 which peripherally abuts the bottom surface of the mounting plate 28 adjacent the edge of the notch 30. A pair of curved brackets 33 placed against the base flange 32 are held firmly in place relative to the mounting plate by a plurality of rivets 34 to securely fasten the heel pocket 29. The pocket 29, mounted in such a fashion to the bottom of mounting plate 28, is less susceptible to damage as by ripping and provides a more comfortable accommodation for the foot.

The rear and longitudinal side edges of mounting plate 28 are provided with a downwardly curved side wall 36. Horizontal side flanges 37 extend outward from the lower edge of side wall 36 along the longitudinal sides of mounting plate 28, terminating short of the rear edge thereof. In assembled relation to the guide rails 21, flanges 37 are slidably received in the respective channels 24, as shown in FIG. 9, adapted to slide on the bearing surfaces 23. The heel engaging assembly 20 is supported by the flanges 37 in guide rails 21, and is longitudinally adjustable therein for the accommodation of feet of differing sizes between the heel pocket 29 and the front forefoot pocket 15. The side wall 36 adjacent the flanges 37 serves as a bumper or guard. When the heel engaging assembly 20 is pivoted in a horizontal plane, as when a water skier executes a turn or the like, the side wall 36 abuts against the inner vertical edge of the guide rail to absorb the accompanying stress of the maneuver that would otherwise be transferred to the locking mechanism.

Rearwardly disposed on mounting plate 28 is the movable, manually operable detent mechanism of the locking ratchet assembly for cooperation with the ratchet teeth 25. As shown by FIG. 8, a flat, elongated linear clamp 38 extends laterally across the undersurface of mounting plate 28. The respective ends of clamp 38 are in alignment with the outer edge of flanges 37, the adjacent portions of the forward edge 40 of the clamp 38 practically abutting the rear edges of the flanges 37. The rear outer edges 41 of clamp 38 are turned slightly downward, as shown in FIG. 6, so as to engage a pair of symmetrical ratchet teeth 25.

A handle or actuator 43 is located on the upper surface of mounting plate 28 above the center of clamp 38. An extension 44 of actuator 43 extends downward through a hole 45 provided in mounting plate 28 to the clamp 38. The hole 45 is sufficiently enlarged to allow pivotal movement of the extension 44 in a vertical plane. Clamp 38 is fastened to extension 44, as by a screw 47 passing through the center rear portion of clamp 38 and secured to extension 44. A finger engaging member 48 extends rearwardly on actuator 43. It may be seen that pivotal movement of clamp 38 about a lateral axis in proximity to the rear edge 40 is controllable by manipulation of the finger engaging member 48.

Bias means are provided to bias the edges 41 of the clamp 38 in normal locking engagement with ratchet teeth 25. Clamp 38 has a centrally disposed, rearwardly extending tongue 50, as shown in FIGS. 5 and 6. The outer extremity of tongue 50 has provided a raised nut 53 which engages the lower end of a compressed, helical spring 51. The opposite end of spring 51 engages the lower interior surface of an enlarged raised section 54 adjacent the rear edge of mounting plate 28. The spring 51 is held in compression, providing a force biasing the tongue 50 away from the mounting plate 28 whereby the edges 41 of clamp 38 are normally biased in engagement with ratchet teeth 25.

In the use of the foot binding of the invention, finger member 48 of actuator 43 is lifted upwardly against the bias of spring 51. This action moves the rear edges 41 of clamp 38 from the engaged position relative to the ratchet teeth 25, as shown in FIG. 6, to a disengaged position, as shown in FIG. 7. Heel assembly 20 is then freely slidable in guide rails 21 to the position suitable to accommodate the foot of the water skier, between the heel pocket 29 and the front forefoot pocket 15, as may be seen, when in the engaged position, as shown in FIG. 6, the heel assembly 20 is locked from movement in a rearward direction, but is movable in a forward direction by the application of force. Upon the application of force, the rear edges 41 of clamp 38 slide up the inclined edge of the teeth 25 to move forward, but are prevented from rearward movement by the vertical leading edge of the teeth 25. Thus, if desired, the user may open the binding to the maximum extent. Then, after inserting a foot, pressure is applied on the heel assembly 20 to move it snugly to the rear of the foot and automatically obtain the proper adjustment. The pressure of the lower ankle on the heel pocket 29 produces a torque on the clamp 38 causing the rear edges 41 to be more firmly engaged with the ratchet teeth 25. Chances of slippage of the locking mechanism are thereby even further reduced. The required upward movement on actuator 43 to disengage the locking mechanism provides an added measure of safety against accidental disengagement.

As the ratchet teeth are disposed inside the channels 24, they are not susceptible to the collection of sand.
and dirt. While as shown and described the ratchet teeth 25 are located on the lower interior surface of the channel 24, it is understood that they could also be located on the upper interior surface with appropriate modification of the locking mechanism. As the channel 24 is generously spacious, the presence of small amounts of sand and dirt will not be detrimental. Swelling and contracting of the water ski, as from the effects of temperature or moisture, is tolerable. Since the clamp 38 is disposed beneath the mounting plate 28, it likewise is not exposed to sand and dirt. The elements of the locking mechanism are also sheltered from damage and breakage.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A heel portion of a water ski foot binding for cooperation with a forefoot receiving portion to engage the foot of a water skier, comprising: a pair of stationary parallel guide rails symmetrically mountable on the top surface of the water ski adjacent opposite edges thereof; each guide rail having a channel-shaped cross section defining an inwardly facing channel having interior surfaces; a first portion of the interior surfaces being flat to provide a bearing surface; a second portion of the interior surfaces having a series of vertical ratchet teeth; a heel retaining assembly having a mounting plate and a heel retaining pocket mounted on the mounting plate; said mounting plate having laterally disposed flanges extending outward from the lower edge of said parallel guide rails; lateral rigid clamp means movably associated with the mounting plate, said clamp means including an elongated, linear clamp extended across the under surface of the mounting plate, said clamp having downwardly turned outer rear edges movable into engagement with the ratchet teeth to lock the heel retaining assembly in place and movable out of engagement with said ratchet teeth whereby the heel assembly is slidably movable relative to said guide rails; and actuator means adapted to pivot the clamp means relative to the mounting plate about a lateral axis whereby said rear edges are movable into and out of engagement with the ratchet teeth.

2. The binding of claim 1 wherein: said ratchet teeth are located on a portion of the lower interior surface of the channel of each guide rail.

3. The binding of claim 1 including: bias means to bias the clamp in locking engagement with said ratchet teeth.

4. The binding of claim 1 wherein: said ratchet teeth have vertical leading edges and inclined trailing edges.

5. The binding of claim 1 wherein: said mounting plate has downwardly curved side walls, said lateral flanges extending outward from the lower edge of said downwardly curved side walls.

6. The binding of claim 1 wherein: said actuator is disposed on the upper surface of the mounting plate, having a projection extending through a hole in the mounting plate and connected to the clamp whereby through manipulation of the actuator, rear edges of the clamp are movable into and out of engagement with said ratchet teeth.

7. The binding of claim 6 including: bias means biasing the rear edges of the clamp in locking engagement with said ratchet teeth.

* * * * *