United States Patent

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[54] **ADJUSTABLE WATER SKI BINDING**
19 Claims, 9 Drawing Figs.

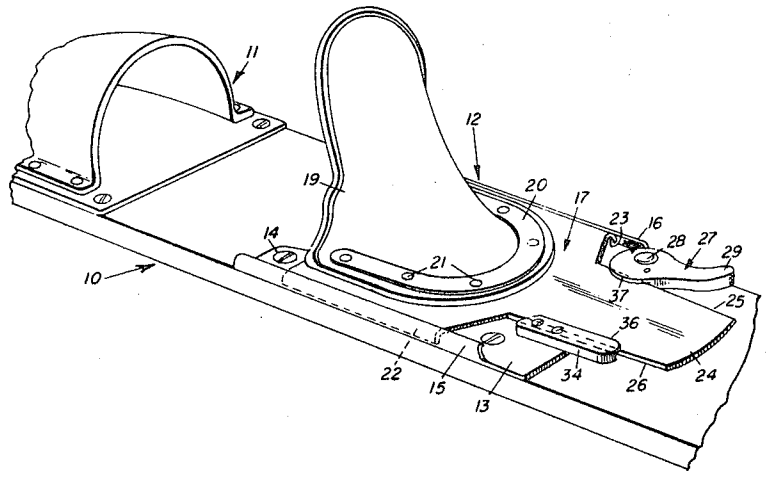
[52] **U.S. Cl.** ..... **9/310 AA**
[51] **Int. Cl.** **A63c 15/06**
[50] **Field of Search** ..... 9/310, 310 AA; 280/11.13, 11.15

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ABSTRACT: A water ski binding including two assemblies for engaging the foot of the user, one of the assemblies being slidable toward and away from the other assembly for adjustment to the size of the foot, the movable assembly including means which permits unrestrained movement toward the other assembly, but locks the assembly in its adjusted position.



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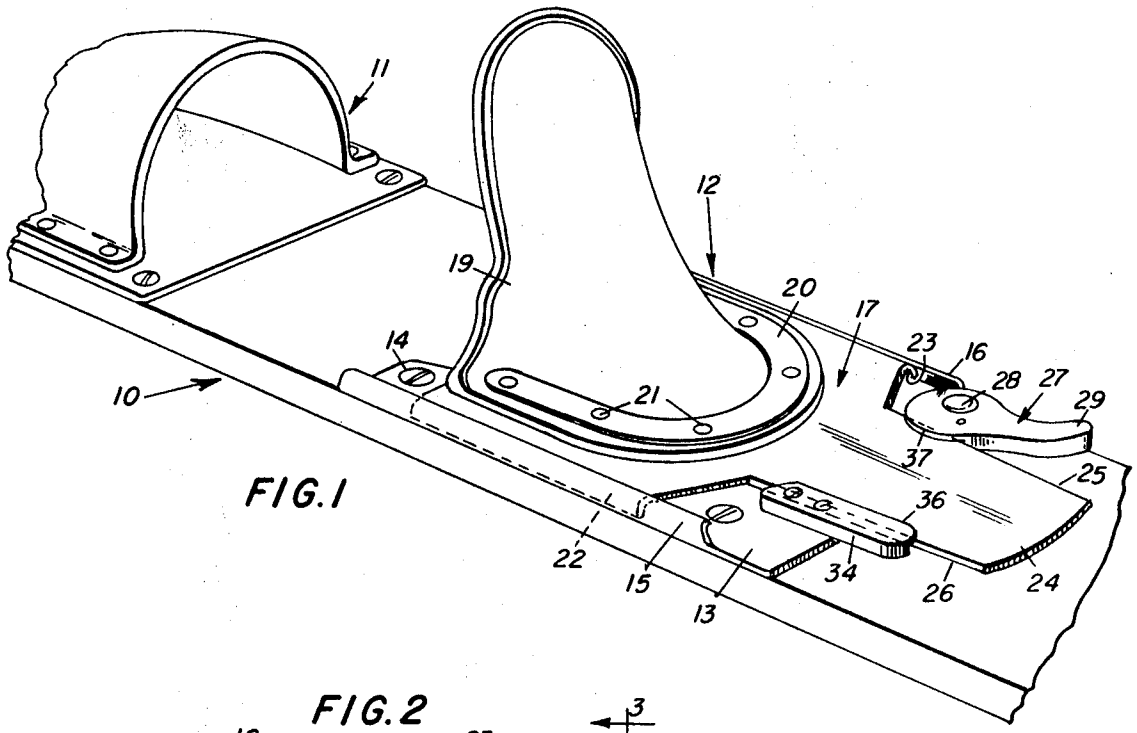
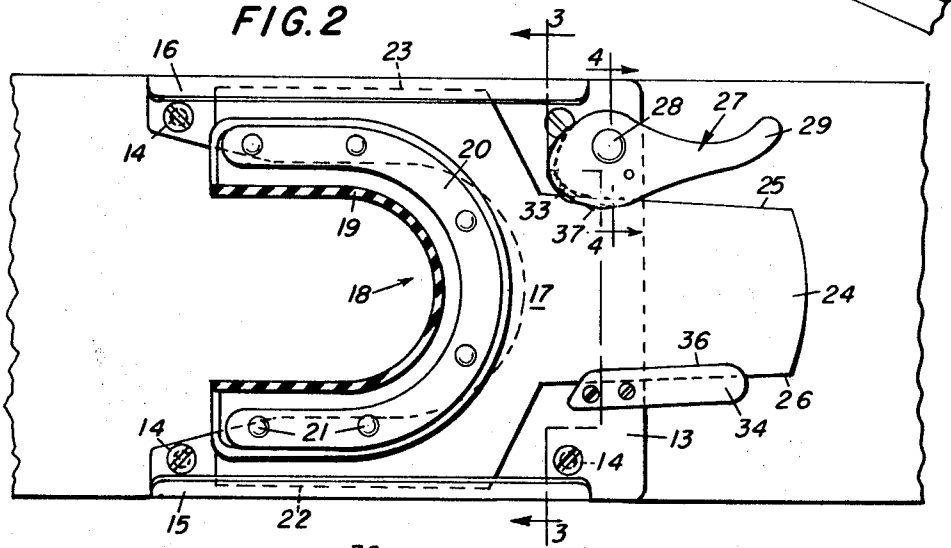


FIG. 1

FIG. 2



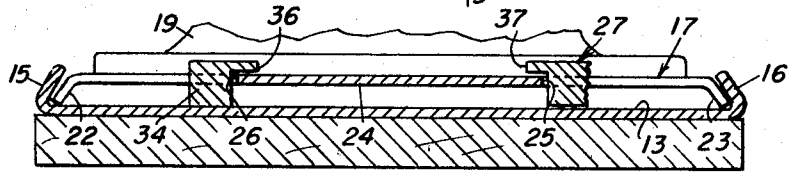


FIG. 3

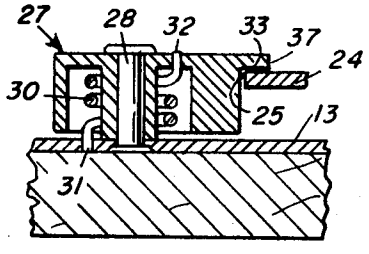


FIG. 4

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FIG. 5

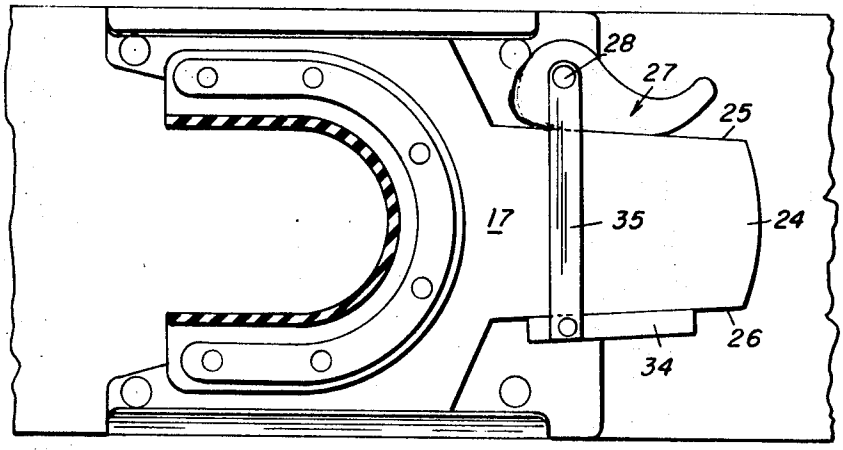


FIG. 6

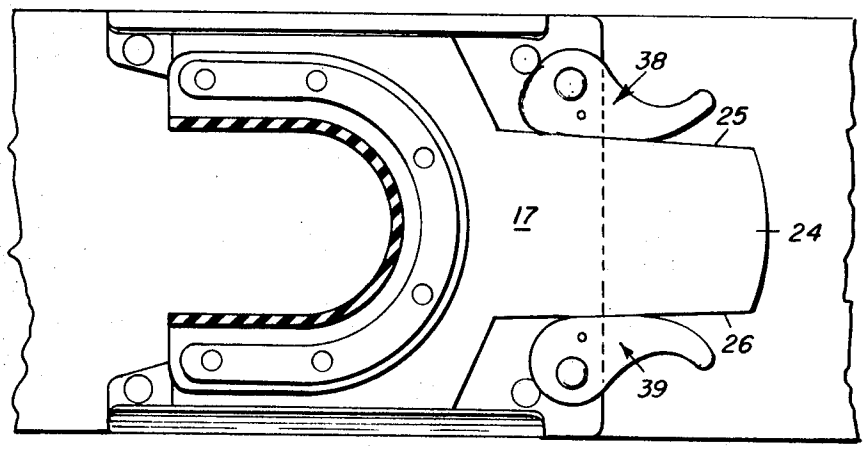


FIG. 7

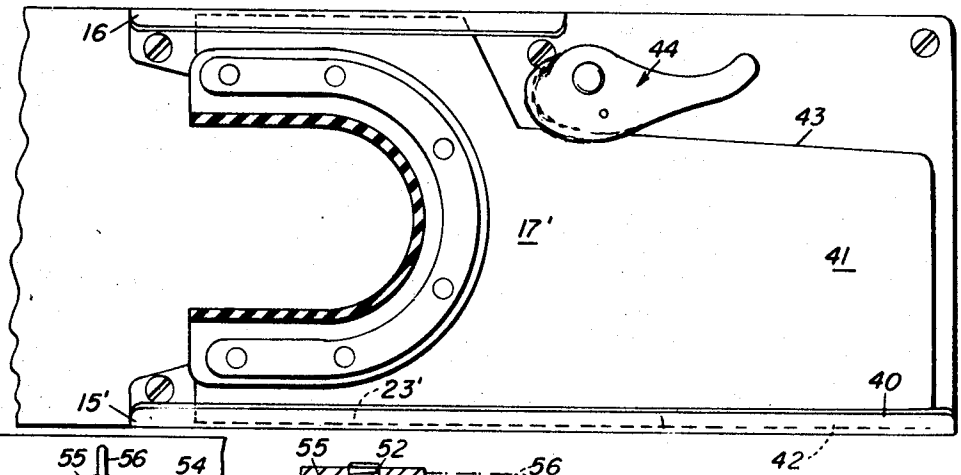
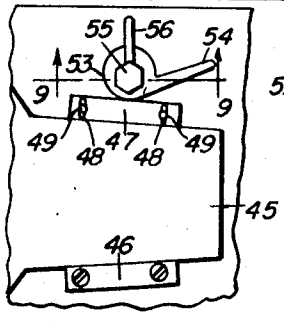


FIG. 8



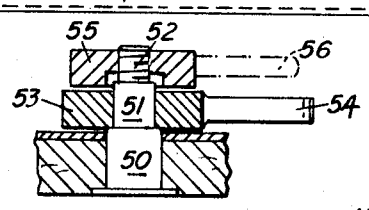


FIG. 9

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ADJUSTABLE WATER SKI BINDING

This invention relates to water sports equipment, and more particular to a novel arrangement for water ski bindings of the general type wherein the foot of the skier is received within a two-part arrangement of flexible rubber assemblies.

Customarily, a sheet of rubberlike material is attached to the ski to cover the fore part of the foot including the toes and instep, while another sheet of rubber is attached to the ski behind the foot to surround the heel of the foot and these can conveniently be identified as forming respectively, the vamp and counter assemblies of a typical binding.

In view of the fact that any given ski may be used by people having different sized feet, there have been developed bindings in which one of the assemblies, usually the vamp is fixedly secured to the ski while the other assembly, namely the counter, may be moved longitudinally towards and away from the vamp to accommodate persons whose feet differ in size.

In some cases, the binding when once adjusted is clamped, or secured permanently in place, but this arrangement makes it difficult to engage, or disengage the foot from the binding or if the binding is arranged to permit easy engagement and disengagement, then the fit of the binding may be too loose to provide firm control of the ski when in use.

It is therefore an object of the present invention to provide an adjustable water ski binding wherein one of the customary foot-engaging assemblies is mounted for longitudinally slidable movement toward and away from the other assemblies with an automatically operative one-way clutch means provided which permits immediate adjustment of the slidable assembly without difficulty or without special tools, or any inconvenience.

In order to accomplish this, one of the assemblies, such as the vamp, is fixedly mounted on the ski while the counter assembly is mounted to be movable toward the vamp so that it may be moved up behind the heel of the foot as soon as the foot has been inserted into the vamp portion. Additionally, one-way clutch means is also provided for the movable assembly which will permit such unrestrained movement of the counter portion but which, when once the correct position has been reached will lock the counter assembly in that position to prevent any retrograde movement of the counter, and regardless of the position which has then been established.

Other objects and advantages will be apparent to those skilled in the art after reading the following specification in connection with the annexed drawings, in which:

FIG. 1 is a perspective view of a preferred form of water ski binding in accordance with the invention;

FIG. 2 is a plan view of the same;

FIG. 3 is a cross section taken on the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary cross section through the camming means for locking the movable assembly, and;

FIGS. 5–9 are plan views of other modified forms of the invention.

In the drawings, the numeral 10 indicates generally a typical water ski having a binding comprising two assemblies, indicated by numerals 11 and 12 for closely encircling the foot of the user, the first of these being known as the vamp portion while the latter may be identified as the counter. While either, or both, of these two assemblies may be mounted on the ski for longitudinal sliding movement in order to adjust the size of binding, it is preferable to arrange the counter assembly 12 for movement toward and away from the vamp assembly 11.

For this purpose the counter assembly may include a flat metal plate 13, provided with suitable openings 14 for attachment to a ski by means of screws. The opposite side margins of this plate are provided with upwardly and reentrantly formed flanges 15 and 16 which are arranged in parallel to serve as guides for slidingly holding another plate 17. The front portion of this plate is cut away, as indicated by number 18, so as to encircle but not directly contact the heel portion of the users foot, and an upwardly extending sheet of rubber-

like material 19 is secured to the plate 17 at its lower edge by a U-shaped clamping member 20 attached to the plate by bolts, or rivets 21. In order to minimize contact between the upper plate 17 and the mounting plate 13, the side margins 22 and 23 of plate 17 may be turned downwardly to be loosely received within the reentrant flanges 15 and 16.

Locking means which permits unrestrained movement of the upper plate assembly towards the vamp assembly 11 but which locks the counter portion in any chosen position against retrograde movement includes the provision of a tail portion 24 of plate 17, both side margins 25 and 26 of which, in the form shown in FIGS. 1 and 2, taper inwardly and rearwardly at a slight angle with respect to the direction of movement of the plate. Adjacent one of these margins there is attached a camming means which may comprise a generally semicylindrical member 27 which is eccentrically mounted for rotating on a vertical pivot 28 secured to the bottom plate 17. The member 27 may also include an integrally formed actuating finger 29 and, as shown in FIG. 4, may have an internally disposed coil spring 30, one end of which 31 engages an aperture in the plate 17 with the other end 32 positioned in an aperture in the member 27 for urging rotation of the member to maintain abutting engagement between the peripheral surface 33 of the cam and the tapered side edge 25 of the tail portion. The arrangement of the camming means is such that when the counter assembly is disposed furthest away from the vamp assembly, as shown in FIG. 2, the rotary member 27 will be angularly positioned with the area of the periphery having minimum radius in contact with the margin 25. When the plate 17 is moved toward the other assembly (toward the left in FIG. 2) the cam member 27 is arranged to rotate in counterclockwise direction to maintain locking engagement. Thus, it will be apparent that any effort to move the plate 17 toward the right is automatically resisted, not only by the camming action of rotary element 27, but also by the wedging action of the inclined, or tapered, margin 25 of the tail portion. On the other hand, by grasping the finger piece 29 and rotating the element 27 in a clockwise direction, the counter assembly may be moved to its extreme position away from the vamp assembly (toward the right, as in FIG. 2) for easy removal of the foot from the binding.

Adjacent the opposite margin 26 of the tail portion there may be located a bar 34 which serves to counteract the force exerted against the tail portion by the camming element 27 and to assist in holding the tail portion in place a metal strap 35 can be connected between the top of the bar and the pivot 28. On the other hand, the strap may be eliminated, and the tail portion may still be retained in place by providing a longitudinal flange 36 along the upper edge of the bar 34 and an annular flange 37 along the upper edge of cam surface 33.

In another form of the invention, it is also possible to use a pair of camming means positioned on opposite sides of the tail portion as shown in FIG. 6, in which the camming means 38 corresponds to that identified by numeral 27 in FIGS. 1—4, and the other camming means is indicated by numeral 39. This latter camming is similar to those previously described but obviously it would be of opposite hand; that is to say, it is designed as a mirror image of camming means 38 and will tend to lock into engagement with the margin 26 when rotated in a clockwise direction, but will be released when manually turned in a counterclockwise direction.

FIG. 7 illustrates still another form of the invention wherein one of the reentrant flanges 15' is extended rearwardly as at 40, and the tail portion 41 includes one side margin 42 which extends rearwardly in a straight line as an extension of the downwardly turned margin 23' at the forward end of the plate 17'. In this case, the margin 43 of the tail portion is inclined in an inward and rearward direction, as in the previously described forms. The camming means, indicated generally by numeral 44 may be similar to the camming means 27 described in connection with the first form of the invention.

An advantage of this form of the invention is the fact that one side of the sliding plate holding the movable portion of the

binding is retained along its entire length by the side flange 15' and, like the form shown in FIG. 6, the sliding portion moves in a straight line and does not shift from side to side, as with the forms shown in FIGS. 1–5, where both sides of the tail portion are tapered, with one side engaged by a fixed surface.

In all forms of the invention described, the engagement between a tapered surface and an angularly movable arcuate surface, the latter having a varying radius, results in a particularly effective wedging action when the two surfaces are being urged in one direction which is more effective than if the tail portion were provided with a surface aligned with the direction of movement. In the latter case, the effectiveness of the camming device is not assisted by the additional wedging action of the angularly disposed edge of the tail portion.

In FIGS. 8 and 9 a further modified form of ski binding is shown wherein the tail portion 45 is provided with angularly directed side edges which are slidable engaged by a fixed bar 46 adjacent one margin, and another bar 47 with adjacent the other margin. One of these bars, 47, is provided transverse slots 48, which receive a pair of pins 49 attached to the mounting plate of the binding whereby the distance between the bars 47 and 46 may be adjusted, as by means of a rotary cam surface 53, having an actuator portion 54, mounted on the stud 50 attached to the ski with a reduced bearing portion 51 and an upper thread portion 52 which holds a locking element 55, itself having an actuator member 56.

In this form of the invention, the movable part of the binding on plate 45 is pushed into engagement with the foot, and the movable bar 47 is pushed inwardly by the cam member 53, after which the cam is locked by element 55. This effectively prevents movement of the plate 45 away from the fixed element of the ski binding until the cam is released by actuation of the locking element 55.

We claim:

1. In a water ski binding of the type which comprises a vamp assembly and a counter assembly and support means for mounting one of said assemblies on a ski for longitudinal slidable adjustment, said support means including one-way clutch means for permitting unrestrained movement of the assembly in one direction but for automatically locking the assembly against movement in the reverse direction in any position of the assembly, said one-way clutch means comprising a longitudinally extending element having a tapered camming surface connected with the slidable assembly and a cam lock mounted for rotary movement about an axis fixed with respect to the support means and having an eccentric surface for continuous engagement with said tapered camming surface.

2. The invention as defined in claim 1, wherein said eccentric surface is yieldably urged into engagement with said camming surface.

3. In a water ski binding having a movable harness, said harness including a first plate for attachment to a ski, said plate having upwardly and reentrantly directed side flanges, a second plate having side margins slidably received in said flanges, said second plate including a tail portion of reduced width, an eccentric rotary cam surface means mounted on said first plate for engagement with one margin of said tail portion, means for urging said engagement of the cam surface to lock said second plate against movement in one direction, and permit unrestrained movement in the other direction.

4. The invention defined in claim 3, wherein said one margin of the tail portion is angularly disposed with respect to the direction of movement of the second plate to increase gripping engagement with the camming means.

5. The invention defined in claim 3, wherein said second plate is provided with downwardly and outwardly directed margins engageable in the reentrant flanges of the first plate to support the main body of the second plate out of direct sliding contact with the first plate.

6. The invention defined in claim 4, wherein said rotary camming means includes a generally semicylindrical member mounted on said first plate for rotation about an eccentrically disposed vertical axis, the peripheral surface of said member being positioned for abutment against the side edge of the second plate.

7. The invention defined in claim 6, wherein means is also provided for engagement with the side margin transversely opposite said rotary camming means for counteracting side thrust resulting from camming action.

8. The invention defined in claim 7, wherein said means for counteracting side thrust includes a rearward extension of one of the reentrant flanges of the first plate.

9. The invention defined in claim 6, wherein said tail portion of said second plate is of reduced width.

10. The invention defined in claim 9, wherein both side margins of the tail portion are inwardly and rearwardly tapered.

11. The invention defined in claim 10, wherein said second plate is loosely received in the margins of the first plate and a member is positioned on said first plate adjacent one margin of the tail piece for counteracting thrust exerted transversely by said rotary camming means.

12. The invention defined in claim 11, wherein said member and said rotary camming means extend upwardly above said tail piece and are provided with flanged portions overlying the tail piece.

13. The invention defined in claim 11, wherein a transverse strap is connected between said member and said rotary camming means overlying said tail piece.

14. The invention defined in claim 9, wherein a second rotary camming means is mounted for one-way locking engagement with the margin of the tail portion opposite said first mentioned rotary camming means.

15. In a two-part ski binding wherein one foot-engaging portion is fixedly attached to a ski and the other foot-engaging portion is mounted for slidable movement toward and away from the fixed portion, said other portion including a horizontal flat plate having at least one tapered margin extending in a direction away from the fixed foot-engaging portion and decreasing in width in the direction of the extremity thereof, and locking means for limiting said movement, said locking means including a pair of elements attached to the ski adjacent the sides of said flat plate having respective surfaces positioned for continuous engagement with the opposite margins of said tapered plate, and means for adjusting the distance between said last mentioned pair of surfaces in response to movement of the tapered plate.

16. The invention as defined in claim 15, wherein one of said pair of elements includes a rotary camming surface in engagement with one margin of the tapered plate.

17. The invention defined in claim 15, wherein one of said last pair of elements includes a bar and means for mounting the bar for movement transverse to the direction of movement of said other foot-engaging portion.

18. The invention defined in claim 17, which also includes a rotary cam means for positioning said bar.

19. The invention defined in claim 18, wherein said cam means includes locking means for adjusting the cam means.