FIG. 5.
FIG. 6.
FIG. 7.
FIG. 8.
This invention relates to water-sports apparatus and is directed particularly to hydrofoils for water skis and the like. It is one object of the invention to increase the skill required and consequently the sporting pleasure derived from water skiing by providing hydrofoils adapted to raise the skis out of the water at a comparatively slow speed. The skis are thus supported entirely upon the comparatively small areas of the hydrofoils.

It is another object of the invention to provide water-ski apparatus of the character described capable of greater speeds, smoother rides and having increased maneuverability.

It is a further object to provide hydrofoil water skis of the above nature having means for adjusting the horizontal position and angle of attack of the hydrofoils to suit the weight, skiing position, desired speed, etc. of the skier.

A further object is to provide a simple, adjustable hydrofoil attachment for ordinary water skis. Still another object is to provide water skis of the character described having automatic means to limit the increased lifting force derived at very high speeds. Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood that this description is given by way of illustration and explanation only, and that various changes therein may be made by those skilled in the art without departing from the scope and spirit of the appended claims.

In the drawings, wherein like reference numerals denote corresponding parts throughout the several views—Fig. 1 illustrates in use one embodiment of the water-ski hydrofoil apparatus according to the invention, Fig. 2 is a vertical cross-sectional view, on an enlarged scale, of one of the hydrofoil skis shown in Fig. 1, Fig. 3 is a side view of the portion of the hydrofoil device shown in Fig. 2 indicated by the arrows 3—3, illustrating the mechanism for adjusting the angle of attack of the hydrofoil, Fig. 4 is an end view of the hydrofoil illustrated in Figs. 1, 2 and 3, Fig. 5 is a modification of the invention wherein V-shaped under-water hydrofoils are used for greater longitudinal stability, Fig. 6 is a horizontal cross-sectional view of the modified hydrofoil attachment shown in Fig. 5, Fig. 7 is a second modification of the invention wherein in vertical, water-piercing hydrofoils are used for automatic lift control at the higher speeds, and Fig. 8 is a top view of the ski hydrofoil shown in Fig. 7.

In the drawings, Fig. 1 illustrates one embodiment of the invention in use. The skier is being towed by the usual auxiliary craft (not illustrated). A moderate speed of about twenty miles per hour has been found sufficient to create enough lifting force in hydrofoils having the general proportions illustrated herein to raise a 150 pound skier and his skis above the water. The hydrofoil equipment illustrated comprises a pair of hydrofoil attachment devices indicated generally by the numeral 10, one for each of the skis 12. Each of the hydrofoil attachment devices comprises a pair of opposed longitudinal channel members 14 adapted to be adjustably secured along the sides of its respective water ski as by means of a pair of through bolts 16 and nuts 18 selectively disposed in corresponding pairs of a plurality of transverse through openings 20 spaced along that portion of the skis under the position of the skier. As clearly illustrated in Fig. 8, the hydrofoil attachment device can be at a central position along the ski, the bolts 16 extending through the central pair of transverse through openings 20. The position of the attachment device can be adjusted forwardly or rearwardly with respect to the position illustrated by use of the pairs of openings 20 forward of or rearward of, respectively, the central pair. Welded or otherwise securely fastened to the undersides of each of the channel members 16 are pairs of downwardly-extending and inwardly-inclined front and rear struts 22 and 24, respectively, secured at their lower ends to the upper edge of oval-shaped side members 24. The side members 24 are thus in spaced alignment for supporting therebetween the hydrofoil unit 26. The hydrofoil unit 26, which may have a general cross-sectional shape as best seen in Fig. 4, is provided at either end with an outwardly-extending threaded stud 30 adapted to fit into aligned central holes 32 in the side members 24. The hydrofoil units are also provided with outwardly-extending pins 34 adapted to be selectively fitted into one each of pairs of aligned openings 36 in the complementary side members 24 to adjust the inclination of the hydrofoil unit with respect to its ski, i.e. to adjust the angle of attack presented when in the water. Nuts 31 threaded upon the hydrofoil studs 30 serve to securely maintain the hydrofoil unit in adjusted position between the side members 24.

Fig. 5 illustrates an alternative embodiment of the invention wherein V-shaped hydrofoils 38 are utilized. The channel members 14, similar in construction and operation to those described in connection with the embodiment illustrated in Fig. 1, are provided with downwardly-extending and transversely-inclined front strut members 40 secured to the upper end of a small, generally rectangular adjustable front support member 42, and right-angularly extending rear struts 44, threaded along their lower ends as indicated by the numerals 46. The hydrofoil 38, which may be of the same general cross-sectional shape as the hydrofoil 26, is provided with a forwardly-extending threaded front stud 48 adapted selectively to fit into one of a plurality of vertically-aligned holes 50 in the front support member 42. The hydrofoil unit 38 is provided with a pair of aligned rear through openings adapted to receive the threaded ends 46 of the rear struts 44. Pair of upper and lower clamp nuts 52, 54 are provided for adjustably securing the rear end of the hydrofoil. The front end is also adjustable by selectively inserting the front stud 48 in one of the vertically-aligned holes 50 and securing it in place by means of a nut 56. It will thus be evident that the front-to-back inclination of the V-shaped hydrofoil 38 with respect to its ski can readily be adjusted.

Figs. 7 and 8 illustrate another embodiment of the invention wherein V-shaped water-piercing hydrofoils 58, especially adapted for skiing at higher speeds, are used. The V-shaped hydrofoil has inwardly-bent portions 60, 62 secured to the upper surface of the adjustable channel member 14. The cross-sectional shape of the hydrofoil 58 can be the same as that of the hydrofoil 26 illustrated in Fig. 4. In connection with the hydrofoil device illustrated in Fig. 7, it will be noted that the greater the amount the hydrofoil is out of the water, the less its lift.
will be because of the lesser amount of surface in the water to be acted upon. The hydrofoil, therefore, will resist any tendency to ride upon the surface of the water at very high speeds, greater stability being thereby assured.

While there have been disclosed in this specification three forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosures but may be modified and embodied in various other forms without departing from its spirit. In short, the invention contains all the modifications and embodiments coming within the scope of the following claims.

I claim:

1. Water sports apparatus comprising a pair of water skis adapted to support a person in standing position upon the upper surfaces thereof, a pair of hydrofoil members, one each for said pair of skis, said hydrofoil members being fixed with respect to and extending below said skis, whereby the skis, upon the person being towed over the surface of a body of water, are lifted upwardly to further raise the person above the surface of the water.

2. Water-sports apparatus comprising a pair of water skis and a pair of hydrofoil members, one each for said pair of skis, said hydrofoils being fixed with respect to and extending below said skis, and means for selectively adjusting said hydrofoils with respect to their respective skis to present various angles of attack in the water, whereby the available lifting force thereof can be varied.

3. The invention as defined in claim 2, including means to vary the respective positions of the hydrofoils with respect to the longitudinal axes of the skis.

4. The invention as defined in claim 3, wherein said positions-varying means comprises a pair of channel members embracingly secured to the side edges of said water skis.

5. The invention as defined in claim 2, wherein said hydrofoils comprise elongated members secured in spaced relation below their respective skis and extending transversely with respect thereto.

6. The invention as defined in claim 2, wherein said hydrofoils comprise substantially planar V-shaped members secured in spaced relation below their respective skis and in planes substantially parallel with the planes of their respective skis.

7. Water-sports apparatus comprising a pair of water skis and a pair of V-shaped water-piercing hydrofoils, one each for said pair of skis, said hydrofoils each being attached to its respective ski so that the apex thereof extends downwardly in a direction substantially perpendicular to the plane of the ski.

8. The invention as defined in claim 2, wherein said selective adjusting means comprises a pair of spaced parallel end plates each having central aligned holes and a plurality of openings arcuately arranged with respect to said central holes, and wherein said hydrofoils each comprise opposed aligned end stud members adapted to be secured in said holes, and opposed aligned pins extending from the ends of said hydrofoils spaced from said studs and adapted to be selectively received within said plurality of arcuately-arranged openings.

9. The invention as defined in claim 2, wherein said selective adjusting means comprises a plurality of strut members extending downwardly from each of said skis and having threaded end portions, said hydrofoil members being provided with openings through which said end portions extend, and nuts in threaded engagement with said end portions for securing said hydrofoils in adjusted position.

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