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Martin et al.

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[54] **MANUALLY PROPELLED WATER CRAFT**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 170,481, Aug. 10, 1971, Pat. No. 3,779,202.

[52] **U.S. Cl.** **115/23**

[51] **Int. Cl.** **B63h 16/00**

[58] **Field of Search** ..... 115/21, 23, 25, 28 R, 70; 9/1 R, 6, 310; 114/56, 66.5; D71/1 Q, 1 CC, 1 FF; 308/238, DIG. 7; 46/201; 416/212, 197

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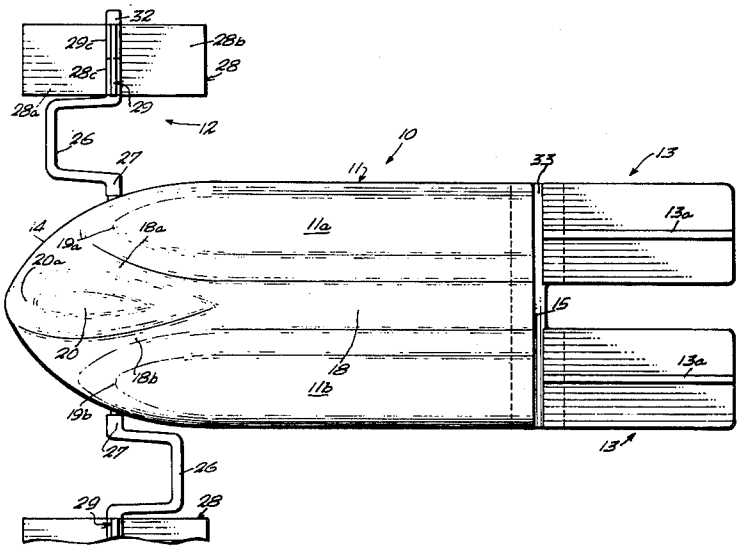
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[57] **ABSTRACT**

A surfboard-like buoyant support member is provided at one end with a manually operable crank mechanism comprising a transverse axle rod having, at each end, a crank handle and a paddle wheel for hand actuation by an operator lying prone upon the support member. The underside of the support member is formed with a central, longitudinal channel, bifurcated at the front, which substantially improves lateral stability and directional control at high speeds. Vertically swingable flap members extend rearwardly of the rear end of the support member for actuation by the legs of the operator in propelling and steering the craft.

6 Claims, 6 Drawing Figures



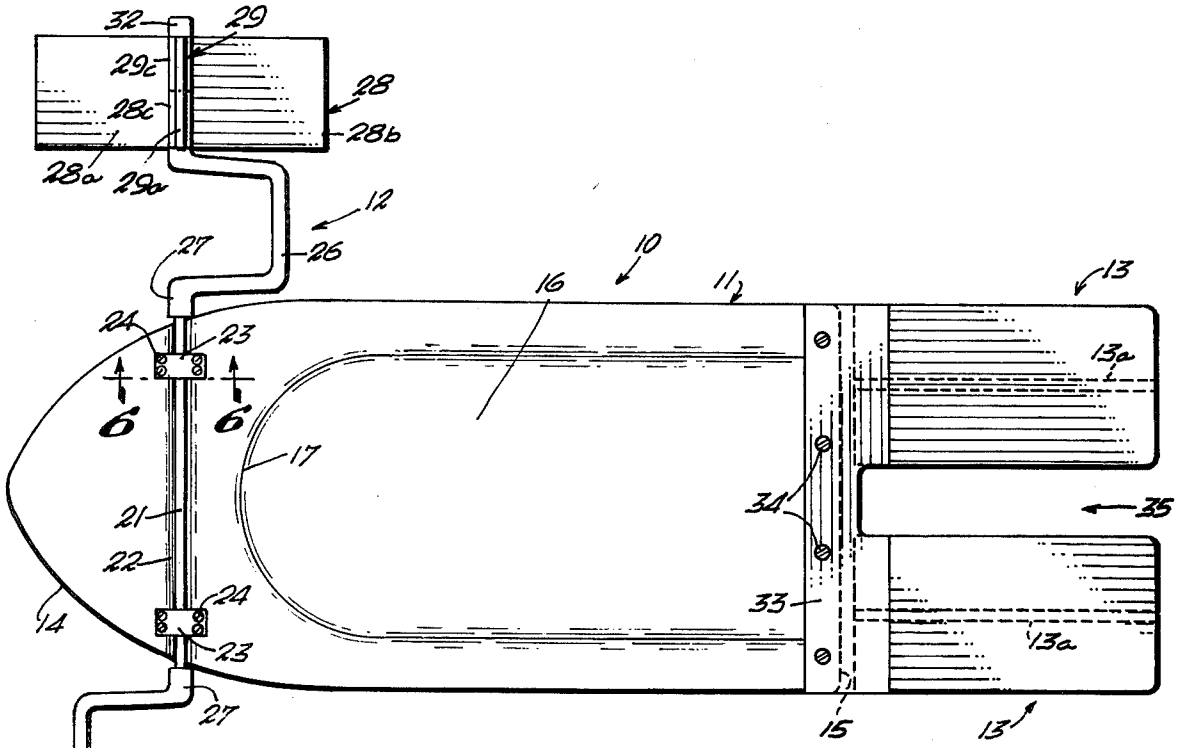

32
29
29c
28
28c
28b
28a
29a
12
27
26
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13a
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28c
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29c
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29c
28b
28c
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28a
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12
26
27
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33
13
13a
14
19a
18a
11a
20a
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18b
11b
19b
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13a
13

Fig. 1

Fig. 2

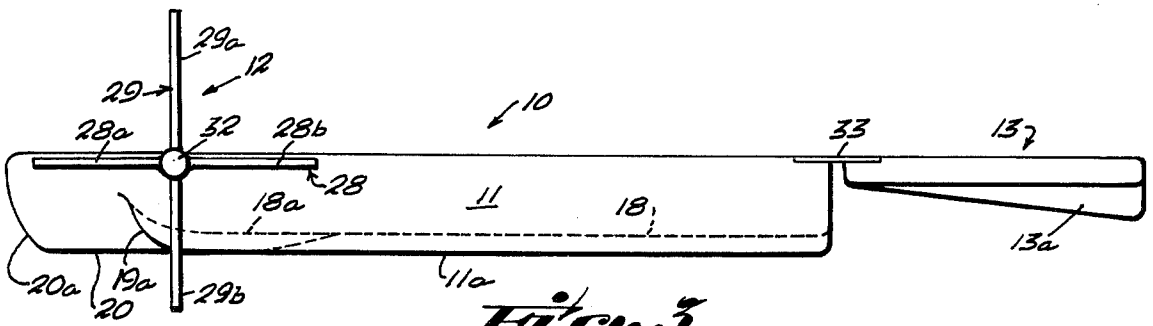


Fig. 3

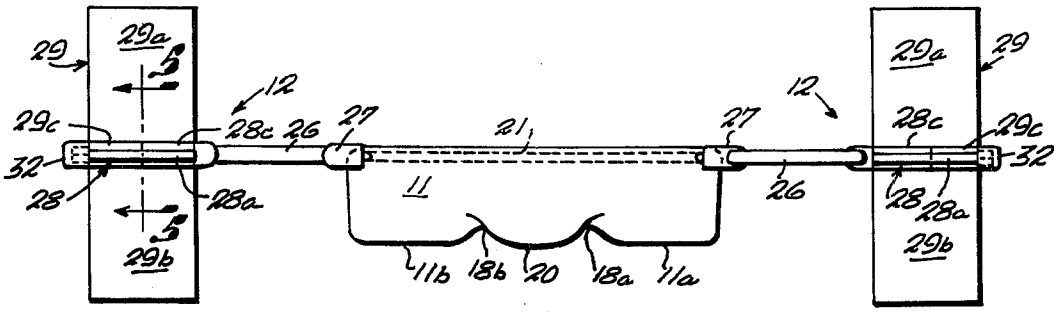


Fig. 4

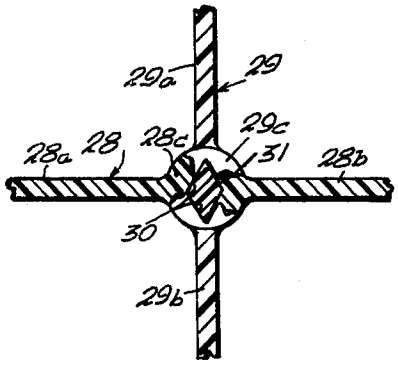


Fig. 5

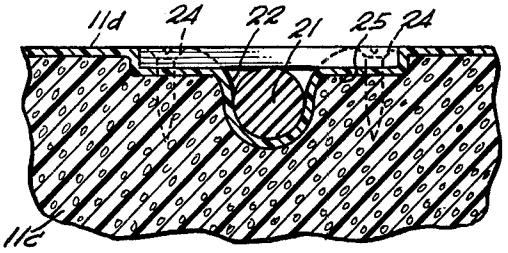


Fig. 6

MANUALLY PROPELLED WATER CRAFT

This invention is a continuation-in-part of application Ser. No. 170,481, filed Aug. 10, 1971 and issued as U.S. Pat. No. 3,779,202 on Dec. 18, 1973 and is directed particularly to an improved manually-propelled water craft comprising a surfboard-like, buoyant support member having crank actuated paddle wheel propulsion mechanism at the front end, and swingable flap members at the rear end operated by the arms and legs, respectfully, of a person lying prone on the support member.

It is the principal object of this invention to provide a personal water craft of the character described which, because of the novel design of the buoyant support member, is greatly improved with respect to lateral stability and therefore especially well suited for water sports use, while at the same time lending itself well to use in swimming instruction, as an exercisor, and as a water rescue craft.

A more particular object of the invention is to provide a manually-propelled water craft having a buoyant, surfboard-like support member the underside or hull portion of which is provided with a central, longitudinally-extending groove simulating twin hull construction and affording substantially improved lateral stability as compared with water craft of a similar nature heretofore devised, the support member being adapted to support the operator in prone position thereon and including a crank operated paddle wheel mechanism at the front for hand operation, and swingable flap members at the rear or stern end for operation by the legs of the operator in propelling and steering the craft.

Another object of the invention is to provide a water craft of the above nature which is well suited for manufacture as a kit for economical storage and transport, while at the same time being very easy to assemble for use and disassemble for storage.

Yet another object of the invention is to provide a manually propelled water craft of the above nature which can readily be molded of inexpensive synthetic plastic materials for economy and ease of manufacture, while at the same time being sturdy enough to withstand the stresses and abuse which can be expected in the use of water sports devices.

Other objects, features and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. **1** is a plan view of a manually propelled water craft embodying the invention;

FIG. **2** is a bottom view thereof;

FIG. **3** is a side elevational view thereof;

FIG. **4** is a front elevational view thereof;

FIG. **5** is a vertical cross-sectional view taken along the line **5—5** of FIG. **4** in the direction of the arrows; and

FIG. **6** is a partial longitudinal cross-sectional view taken along the line **6—6** of FIG. **1** in the direction of the arrows.

Referring now in detail to the drawing, reference numeral **10** in FIGS. **1** through **5** designates a preferred form of manually-propelled water craft embodying the invention, the same being comprised, generally, of a

buoyant support member **11** having crank operated paddle wheel mechanism **12** at one end for actuation by the hands of the operator, and a pair of vertically-swingable flap members **13, 13** at the other end for operation by the legs of the operator.

The support member **11** is surfboard-like in peripheral shape, having a rounded front end **14,** and a substantially square rear or stern end **15.** Preferably, the support member **11** will be formed by urethane foam **11***c* having a dense outer skin **11***d* (see FIG. **6**).

As so fabricated, the support member **11** will be very buoyant in water, while at the same time possessing great strength and rigidity. As illustrated in FIG. **1** the upper surface of the support member **11** is formed along its length with a shallow recess **16,** the front of which is substantially semi-circular in shape, as indicated at **17,** and terminates somewhat short of the front of said support member.

As illustrated in FIG. **2,** the underside or "hull" portion of the support member **11** is formed along its length, beginning at the stern or rear end, with a fairly deep, central channel **18,** which, near the front, is bifurcated to provide relatively outwardly divided, symmetrically-arranged front channel portions **18***a* and **18***b*, being arcuate in shape and having substantially the same depth as that of the main or central channel **18.** The foreward ends of the twin hull portions **11***a* and **11***b* defined by the channels **18, 18***a* and **18***b* are rounded as indicated at **19***a* and **19***b*, and the front central portion **20** is rounded at the front end at the underside of the buoyant support member **11,** or hull, as indicated at **20***a*, for streamlining purposes.

The crank operated paddle wheel mechanism **12** comprises an axle rod **21** seated within a recess **22** extending transversely in the front end of the support member **11,** said axle rod being of such length as to project somewhat outwardly of each side of said support member. As best illustrated in FIG. **6,** the axle rod **21** has substantially the same diameter as that of the arcuate recess **22,** to permit rotation thereof in said recess with a minimum of play. As illustrated in FIGS. **1** and **6,** a pair of rectangular metal cleats **23, 23,** one near each side of the support member **11,** straddle transverse recess **22** to retain the axle rod **21** in place, said cleats being removably secured as by screws **24.** Preferably, as illustrated in FIG. **6,** the cleats **23, 23** are received in recesses **25** formed in the support member **11** so that they fit substantially flush with respect to the upper surface of said support member. As further illustrated in FIG. **6,** the axle rod recess **22** is of such depth as to permit free rotation of the axle rod **21** in the manner hereinbelow more particularly described, while at the same time minimizing lateral play or wobble.

Secured at each end of the axle rod **21** are U-shaped crank handle members **26, 26,** one end of each of which terminates in an outwardly-extending socket portion **27** having a coaxial, blind core (not illustrated). The blind bores are of such size as to receive, press fitted therein, outer end portions of the axle rod **21.** In its manufacture, the water craft will preferably be supplied in kit form with the crank handle members **26, 26,** disassembled with respect to the axle rod **21.** The axle rod **21** moreover, will preferably be of a synthetic plastic material identical with or similar with that of the crank handle members **26, 26** so as to enable effecting a strong bond therebetween by the use of a suitable cement.

The paddle wheel mechanism **12** further comprises, at each side of the support member **11**, a pair of half paddle wheel members **28, 29**, each of which further comprises a pair of opposed paddle wheel vanes **28***a*, *28b* and **29***a*, **29***b*, respectively. Each half paddle wheel member **28, 29** also comprises a cylindrical hub portion **28***c*, **29***c*, respectively, extending from one side to approximately one-half the full width of the paddle wheel vanes, said hub portions being integrally molded with their associated paddle vanes. With such construction, the half paddle wheel members **28, 29** can readily be assembled by moving the inner ends of their hub portions **28***c*, **29***c* into coaxially aligned abutting engagement, with the paddle wheel vanes angularly spaced by 90 circular degrees. When so positioned, diamond shaped axial openings **30** in the hub portions **28***c*, **29***c* will be in register, as illustrated in FIG. **5**. As further illustrated in FIG. **5**, outwardly-extending hub shaft portions **31** of the crank handle members **26, 26** are also diamond shaped in cross-section, so as to be snugly received in the axial openings **30** in the hub portions of the assembled paddle wheels to secure them in relatively interlocked position thereon. After thus assembling the paddle wheel assemblies in place, they are retained by cinch caps **32** or the like fitted over outwardly projecting end portions of the crank handle hub shaft portions **31**.

The vertically swingable flap members **13, 13** are of rectangular shape, and are preferably about one third the length of the support member **11**. The flap members **13, 13** are also about one half the vertical thickness of the support member **11**, and constructed of the same or a similar buoyant material. The underside of the flap members **13** are integrally formed, centrally along their length, with downwardly extending fins **13***a*, merging with the underside of said flap members at the foreward end thereof and divergently increasing in depth to their outer ends, whereat their thickness is about doubled. The foreward ends of the flap member **13** are hingedly joined with the rear end of the support member **11** as by a transversely extending band **33** of a flexible synthetic plastic material such as polyethylene. As illustrated in FIG. **2**, transverse marginal portions of the support member **11** and the flap members **13, 13** will be mortised or recessed to receive the resilient band **33**. Preferably, the resilient band **33** will be cemented within the recesses of the flap members **13**, 13 and secured as by screws **34** within the recess in the support member **11** to permit ready disassembly and assembly of the flap members with respect to said support member. As illustrated in FIGS. **1** and **2**, the flap members **13, 13** are of such transverse width as to define a gap **35** therebetween when their outer edges are in alignment with the opposed outer edges of the support member **11**. At the inner end of the gap **35**, the resilient band **33** is cut away at the juncture zone between the support member **11** and the flap members **13, 13** to permit independent vertical swinging movement of said flap members. In use, the operator will ordinarily lie prone upon the support member **11** so that he can conveniently grasp the opposed crank handle members **26**, 26 of the paddle wheel mechanism **12** for turning the paddle blades or vanes **28***a*, **28***b*, **29***a*, **29***b* at each side of the craft in unison. For foreward propulsion, the paddle wheel mechanism **12** will be turned anticlockwisely, as seen in FIG. **3**, thereby simulating the crawl stroke commonly used in swimming. At the same time the legs of the operator, while lying upon the swingable flap members **13, 13**, will actuate said flap member by kicking them downward alternatively, thereby simulating the kicking movement of the legs as in swimming. Because arm and leg movements in the use of the water craft are similar to their movement in swimming, the water craft device is particularly well suited to use in swimming instruction. Moreover, because substantial coordinated movement of both the arms and legs of the operator is required in the propulsion of the water craft, and since the propulsion rate can vary over a wide range from very slow movement to a speed limited only by the physical activity of the operator, the watercraft is also well suited for use in exercising and body building.

The operator or user of the water craft, instead of lying prone on the support member **11** as described above, can alternatively sit upon the support member and use his feet to operate the paddle mechanism. Using his feet in this manner, the cract can be propelled forwardly or backwardly at various speeds, and turning can readily be accomplished with a little practice by leaning in one direction or the other while paddling. The increased stability afforded by the double hull construction as described above, moreover, minimizes the possibility of capsizing, even when so operated by adults at high turning speeds.

The support member **11** can also be used separately as either surfboard or a skiboard. For such use, the flap members **13, 13**, as well as the paddle wheel mechanism **12** will not be used. However, when using the support member **11** as a skiboard, the cleats **23, 23** will be secured in place by their screws **24** to provide for the looping through a tow rope for towing by a motor boat or the like. It will be understood that the buoyancy of the support member **11** when being used as a skiboard will keep the skier afloat at all times, even when the towing boat is motionless. For this reason, it is well suited to use by children and novice water skiers. The water skiing, moreover, can be accomplished either while in the usual standing position or even while sitting or lying prone.

While we have illustrated and described herein only one form in which the invention can conveniently be embodied in practice, it is to be understood that this form is presented by way of example only and not in a limiting sense. The invention, in brief, comprises all the embodiments and modifications coming within the scope and spirit of the following claims.

What we claim as new and desire to secure by Letters Patent is:

1. A manually propelled water craft, comprising, in combination, an elongated, buoyant support member, manually rotatable paddle wheel mechanism at the front of said support member, a pair of buoyant, laterally-spaced flap members extending rearwardly of the rear end of said support member, and hinge means interjoining the foreward ends of said flap members with said support member and providing for swinging movement thereof with respect to said support member independently about a transverse axis, the underside of said buoyant support member being formed along its length with a deep, central channel opening into said rear end of said support member, said channel, short of said front end of said support member being bifurcated to provide relatively divergent, symmetrically-arranged front channel portions in the underside of said support

member, said symmetrically-arranged front channel portions being arcuate in shape and having substantially the same depth as that of said central channel, said front end of said support member being symmetrically rounded and the foreward ends of said front channel portions being arcuately widened at their zones of opening into said front end of said support member to define, with said central channel, a streamlined central support member portion, said manually rotatable paddle wheel mechanism comprising, at each side of said support member, a pair of half paddle wheel members, each half paddle wheel member further comprising a pair of opposed paddle wheel vanes integrally formed with an axially extending hub portion having a length of approximately one-half the width of said paddle wheel vanes, whereby each pair of half paddle wheel members can be assembled by moving the inner ends of their hub portions into coaxially-aligned, abutting engagement with the associated paddle wheel vanes angularly mutually spaced by 90 circular degrees, means journalling said paddle wheel mechanism half pairs for rotation in unison about a common axis extending transversely of said support member, said paddle wheel mechanism further comprising, at each side of said support member, a crank handle portion eccentrically offset with respect to said common axis, said crank handle portions being eccectrically offset in diametrically opposite directions, said paddle wheel members journalling means comprising a transversely-extending recess formed in the upper surface of said buoyant support member, an axle rod seated within said recess and extending outwardly of each side of said support member, said paddle wheel half members comprising means for their attachment to the outwardly projecting ends, respectively, of said crank handle portion, and means for removably constraining said axle to rotational movement in said recess, said attachment means for said paddle wheel half members comprising aligned, axially extending through openings in the hub portions of each of said pairs of paddle wheel half members, said through openings being rhombic in cross-sectional shape, said crank handle portion being formed with outer end portions coaxial with said axle rod and of complementary rhombic cross-sectional shape to fit snuggly within the through openings of one of said pairs of half paddle wheel members to rotatively interlock said half paddle wheel member pairs with their respective crank handle portions.

2. A manually-propelled water craft as defined in claim **1,** wherein said axle constraining means comprises a pair of cleats straddling said recess near each end thereof and being removably secured to said support member.

3. A manually propelled water craft as defined in claim **2,** wherein said cleats are substantially flat and rectangular in shape, said cleats being received within conforming recesses in the upper surface of said support member so that upper surface portions of said cleats will seat substantially flush with the upper surface of said support member.

4. A manually-propelled water craft as defined in claim **1,** wherein said hinge means comprises a transversely-extending band of resilient synthetic plastic material interjoining marginal end portions of said flap members with said support members.

5. A manually-propelled water craft as defined in claim **4,** wherein the interjoining of said transversely-extending band with respect to said support member comprises releasable means providing for removal of said flap member with respect to said support member.

6. A manually-propelled water craft as defined in claim **5,** wherein said releasable means comprises a plurality of screws.

* * * * *