

July 9, 1968

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3,391,669

CIRCULAR BOAT

Filed Nov. 4, 1966

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FIG. 1

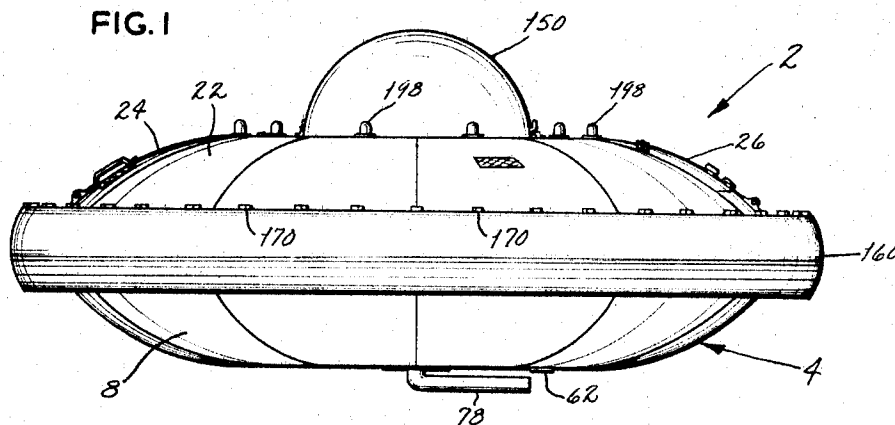
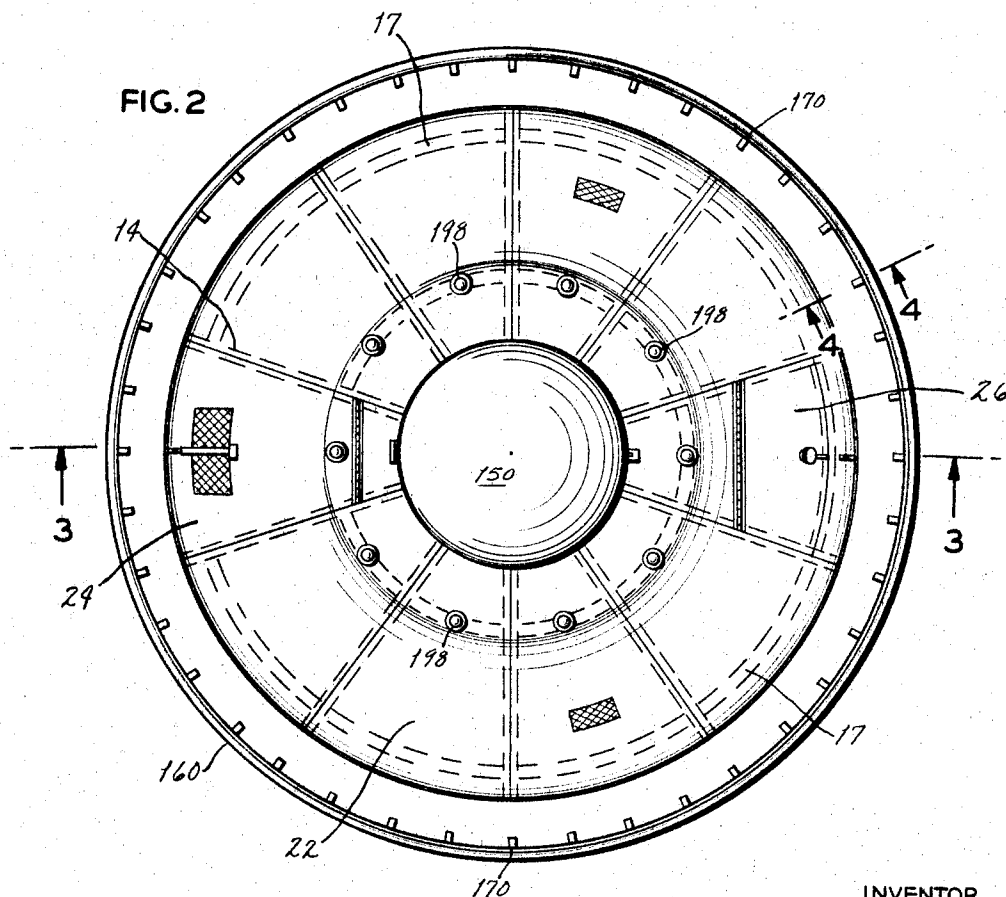


FIG. 2



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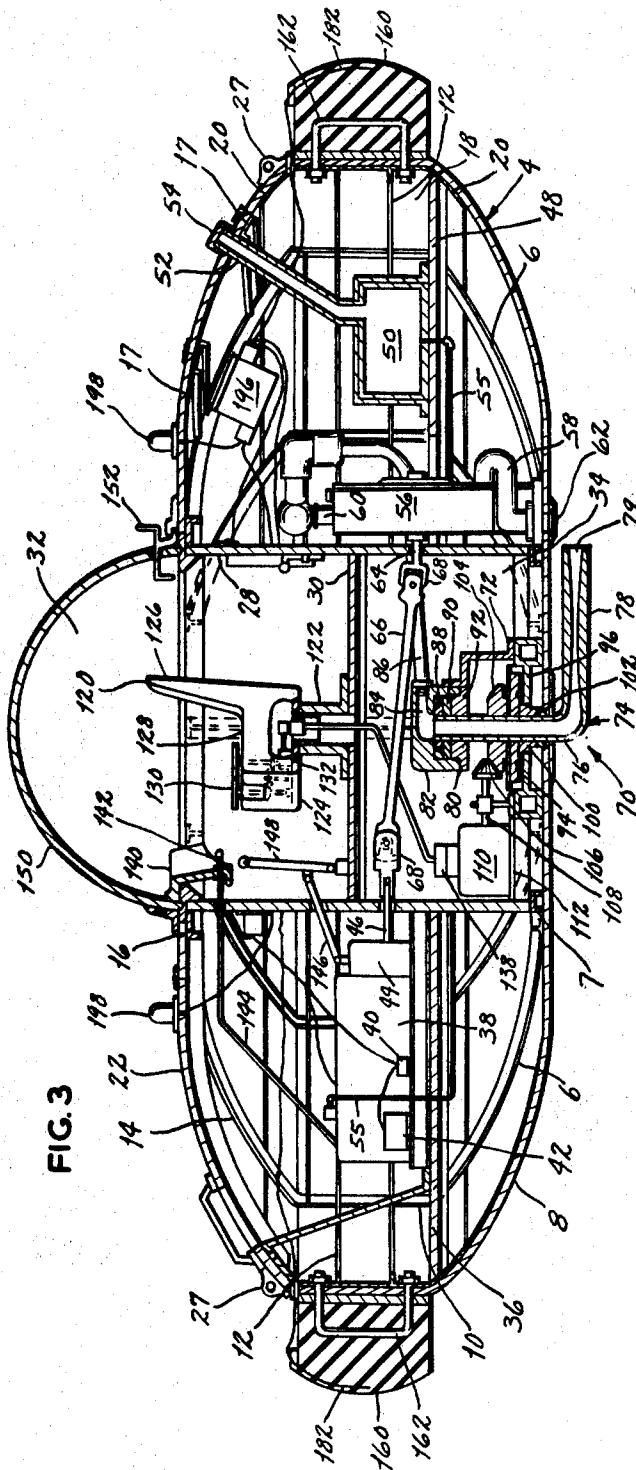


FIG. 3

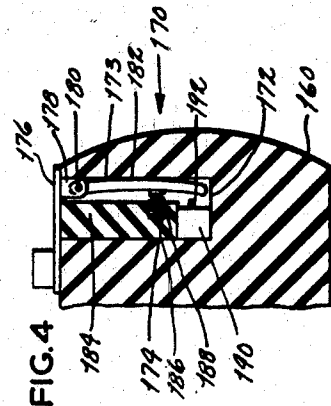


FIG. 4

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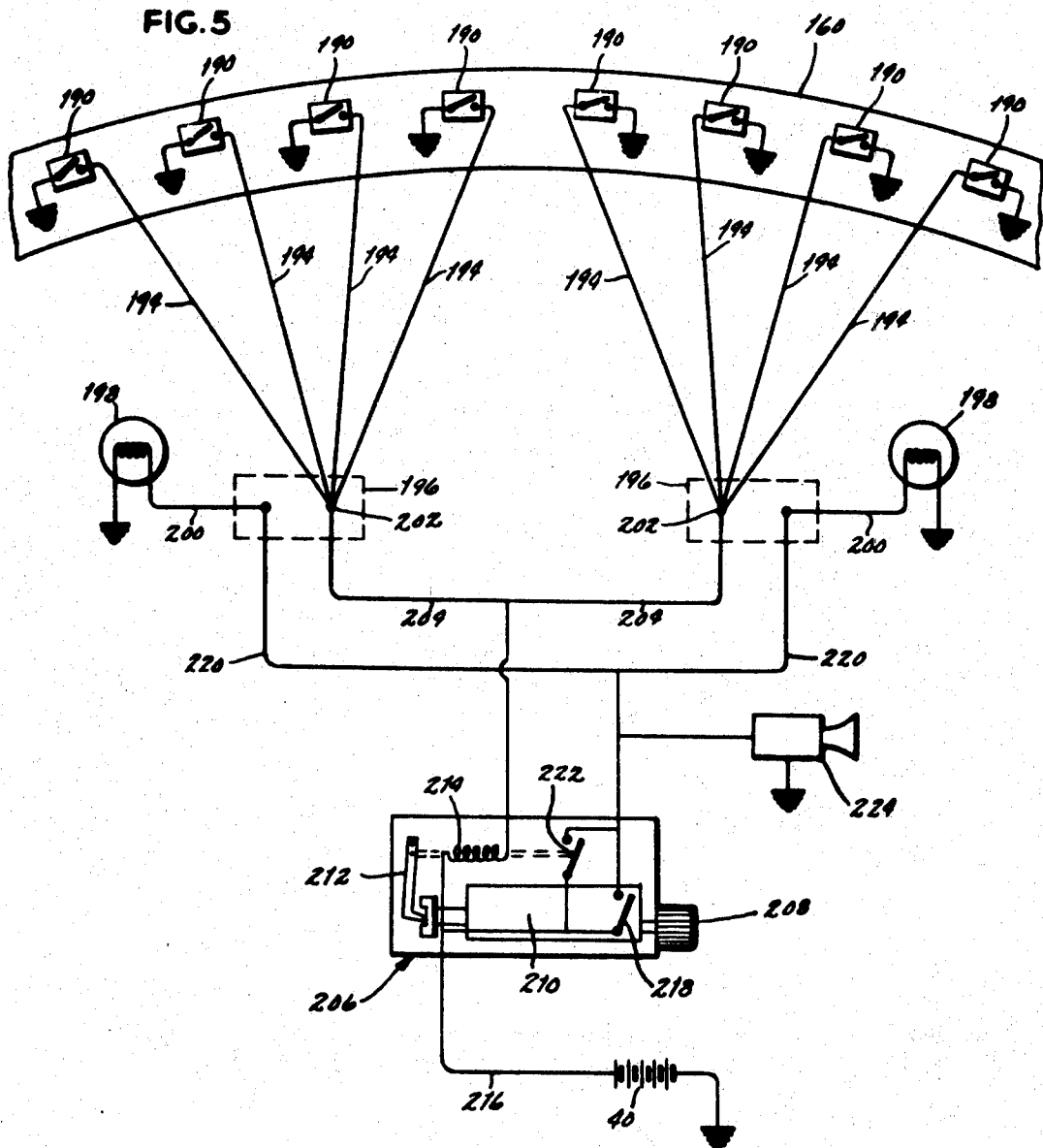
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CIRCULAR BOAT

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3 Sheets-Sheet 3



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3,391,669

## CIRCULAR BOAT

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9 Claims. (Cl. 115-12)

## ABSTRACT OF THE DISCLOSURE

A watercraft having a circular hull surrounded by a rubber bumper into which a plurality of switch-type sensors are embedded for actuating lights on the hull when the bumper is compressed. The hull carries a motor-pump combination which discharges a jet of water through a swivelly-mounted thrust pipe located beneath the hull.

This invention relates in general to watercraft and, more particularly, to watercraft adapted for use in sporting events.

The present invention resides in a one-man watercraft or boat having a substantially circular hull which supports the operator as well as the power source, propulsion unit and other related components. Around its periphery, the hull is provided with a resilient bumper cushion for absorbing much of the impact when the craft strikes a similar craft or other rigid object. Embedded within the cushion are sensors which actuate a timer which, in turn, lights a plurality of lights on the hull to indicate contact has been made with a similar craft.

Among the several objects of the present invention may be noted the provision of a watercraft which is particularly adapted for use in a new water sport somewhat resembling football or hockey; the provision of a watercraft having means for sensing and indicating when contact with another and similar watercraft has been established; the provision of a watercraft which is highly responsive and easy to maneuver; and the provision of a watercraft which is simple and rugged in construction, attractive in appearance, and easy and economical to manufacture. Other objects and features will be in part apparent and in part pointed out hereinafter.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a side elevational view of a watercraft constructed in accordance with and embodying the present invention;

FIG. 2 is a plan view of the watercraft;

FIGS. 3 and 4 are sectional views taken along lines 3-3 and 4-4, respectively, of FIG. 2; and

FIG. 5 is a schematic diagram of the electrical circuit embodied in the sensing and indicator means of the present invention.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now to the drawings, which illustrate a preferred embodiment of the present invention, 2 designates a watercraft having a circular hull 4 including a plurality of radially extending lower ribs 6 which emanate from a lower rib ring 7 and have a fiberglass, aluminum, or other suitable lower skin 8 attached thereto. By reference to FIG. 1, it can be seen that lower skin 8, which is normally submerged, is somewhat convex or dish-shaped. At their upper or outer ends, lower ribs 6 merge into upstanding connecting members 10 which are laterally connected by horizontal peripheral bands 12. At their upper ends, connecting members 10 merge into radially extending upper ribs 14 which terminate at an upper cockpit ring 16. Transversely connecting ribs 14 are rib cross braces 17. Rigidly secured to the upstanding

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members 10 and extending peripherally around hull 4 in slightly outwardly spaced relation to bands 12 is a side rim 18 having two inwardly turned oblique flanges 20 which extend partially over ribs 6, 14. In this connection, it should be noted that lower skin 8 extends upwardly over side rim 18 to the lower margin of upper oblique flange 20. Secured to upper ribs 14 is an upper skin 22 which is cut away intermediate two of ribs 14 and hingedly provided with a front hood 24. Upper skin 22 is similarly cut away between two other ribs 14 on the opposite side of hull 4 where it is hingedly provided with a rear hood 26. Secured to a pair of radially opposed ribs 14 outwardly from front and rear hoods 24, 26, are docking loops or rings 27. Interconnecting lower rib ring 7 and cockpit ring 16 is a vertical cylindrical fire wall 28 which is vertically partitioned by a cockpit floor 30 dividing the interior of fire wall 28 into a cockpit 32 and lower compartment 34.

Secured to lower flange 20 of side rim 18 at their outer ends and extending inwardly to fire wall 28 to which they are secured at their inner ends are a plurality of horizontal support members 36 which support a suitable internal combustion engine 38 and a battery 40. Operatively mounted on engine 38 is a generator 42 and a clutch 44, the latter having a drive shaft 46 extending therefrom through fire wall 28 and into lower compartment 34. On the opposite side of fire wall 28, diametrically opposed to support members 36, hull 4 is similarly provided with another set of horizontal support members 48 on which is mounted a fuel tank 50 having an intake pipe 52 which projects through upper skin 22 and is provided with a cap 54. Interconnecting tank 50 and engine 38 is a fuel line 55.

Also mounted on support members 48 is an impeller-type pump 56 having an intake conduit 58 and discharge port 60, the former of which extends downwardly and terminates slightly below skin 8 where it is covered with an intake screen 62. Pump 56 is further provided with an impeller shaft 64 which is journaled in the housing thereof for carrying and driving the pump impeller. Impeller shaft 64 extends laterally through fire wall 28 and into lower compartment 34 where it is connected to the end of drive shaft 46 by means of a connecting shaft 66. Interposed between the ends of connecting shaft 66 and drive shaft 46 and between the ends of the impeller shaft 64 and connecting shaft 66 are universal joints 68.

Centrally mounted within hull 4 on lower rib ring 7 is a propulsion unit 70 including an upstanding outer housing 72 and a thrust pipe 74, the latter being journaled within the former for rotation about a vertical axis coincident to the central axis of hull 4 and integrally including a vertical portion 76 which extends through skin 8 and therebeyond arcuately merges into a nozzle 78 having a somewhat enlarged elongated discharge mouth 79. At its upper end housing 72 is fitted with a swivel fitting 80 having a body portion 82 provided with an inlet port 84 which communicates with discharge port 60 of pump 56 through a discharge line 86. As will be seen by reference to FIG. 3, vertical portion 76 of thrust pipe 74 extends upwardly through housing 72 into body portion 82 and is journaled therein by means of a bearing 88. Immediately below bearing 88, the cylindrical outer surface of vertical portion 76 is engaged by a suitable packing 90 which is held in place by a gland nut 92 threaded into body portion 82. Thus, water discharged from pump 56 flows freely through discharge line 86 into inlet port 84 and inasmuch as the inner terminus of port 84 is located in juxtaposition to the upper end of vertical portion 76, the water flows directly into thrust pipe 74. At its lower end vertical portion 76 is also journaled within housing 72 by means of a thrust bearing 94, the lower race of which is fastened to a flange 96 formed integral with hous-

ing 72. Threaded into flange 96 and encircling vertical portion 76 of thrust pipe 74 below bearing 94 is a collar 100 having a suitable packing 102 which engages vertical portion 76 where it extends through skin 8 so as to prevent leakage of water into hull 4. Intermediate bearings 83, 94, vertical portion 76 is fitted with a bevel gear 104 which meshes with a diametrically reduced bevel gear 106 carried on a drive shaft 108 of an electric steering motor 110, motor 110 being mounted on a base 112 which is secured to lower rib ring 7 adjacent housing 72.

Mounted centrally upon cockpit floor 30 within cockpit 32 is a pilot's chair 120 including an upstanding pedestal 122 which is rigidly affixed to floor 30. Swivelly mounted on pedestal 122 is a seat 124 having a backrest 126 and upstanding armrests 128. Rotatably mounted within armrest 128 are steering wheels 130 which are connected to one another interiorly of seat 124 by suitable links and gearing for simultaneous rotation. Steering wheels 130 are further connected within seat 124 to an upper selsyn steering control 132 having wires leading therefrom to a slip ring assembly 134 located within seat 124 at its juncture with pedestal 122, the slip ring assembly 134 being in turn connected by means of wires 136, which extend through pedestal 122 and lower compartment 34 to a lower selsyn steering control 138 mounted atop electric steering motor 110. Thus, by turning steering wheels 130, the operator will cause shaft 108 of steering motor 110 to rotate in synchronization therewith, thereby turning bevel gears 106, 104, and rotating thrust pipe 74. Of course, as thrust pipe 74 rotates nozzle 73 alters its angular position. It should be understood, however, that thrust pipe 74 can be rotated by a suitable mechanical linkage extending from cockpit 32 to thrust pipe 74 in lieu of the electrical means described above.

Mounted within cockpit 32 and conveniently located with respect to pilot's chair 120 is an instrument panel 140 having a throttle 142 projecting therefrom which is connected to engine 38 through a suitable throttle linkage 144. Instrument panel 140 further carries a plurality of conventional motor accessories such as an ignition switch, a starter switch, an ammeter, a cockpit light, and the like. Also presented within cockpit 32 and connected to clutch 44 by a suitable clutch linkage 146 is a clutch lever 148 for engaging and disengaging clutch 44. Hingedly secured to cockpit ring 16 is a blister-like transparent cockpit canopy 150 having a canopy latch 152 for releasably holding it to cockpit ring 16 at its opposite side.

Encircling hull 4 is an elastomeric bumper cushion 160 having a plurality of circumferentially spaced U-shaped mounting bolts 162 embedded therein, bolts 162 extending through side rim 18 and being provided with nuts on their opposite ends, so as to hold bumper cushion 160 snugly against side rim 18, whereby bumper cushion 160 forms the outer perimeter of hull 4. Referring now to FIGS. 2 and 4, bumper cushion 160 is provided in close proximity to its outer peripheral face with a plurality of circumferentially spaced sensor assemblies 170, each adapted to detect an impact with a similar watercraft or other solid object. Sensor assemblies 170 are identical and therefore only one will be described herein. As will be seen by reference to FIG. 4, each sensor assembly 170 is contained within a separate upwardly opening cavity 172 located in bumper cushion 160 in close proximity to its outer peripheral face and defined in part by front and rear surfaces 173, 174, respectively. Sensor assembly 170 includes a mounting plate 176 which overlies cavity 172 and is securely fastened to the upper surface of bumper cushion 160 beyond the margins of cavity 172 by any suitable fastening device. Plate 176 is rigidly provided with a downwardly projecting bifurcated bracket 178 which abuts front surface 173 and swingably journaled intermediate the furcations thereof by means of a pin 180 is a depending sensor arm 182. Secured to the downwardly presented face of plate 176 adjacent bracket 178 and also projecting into cavity 172 is a downwardly

extending rubber plug 184, the back face of which abuts against rear surface 174. Extending inwardly from the front face of plug 184 is a socket 186 having a coil spring 188 fitted therein which engages sensor arm 182 and urges it into abutment with front surface 173 of cavity 172. Mounted on the lower end of plug 184 is a normally open microswitch 190 including an actuating element 192 which projects outwardly from the body thereof toward sensor arm 182. Thus, when bumper cushion 160 is compressed by an impact with some solid object, sensor arms 182 of sensor assemblies 170 located in the vicinity of the impact will move inwardly against the bias of their springs 188 to a point where the lower ends of such arms 182 engage actuating elements 192 of their respective microswitches 190, thereby closing the circuits normally interrupted by switches 190. Although severe impacts may on occasion drive a sensor arm 182 into the body of its respective microswitch 190, such impacts will not damage sensor assemblies 170, inasmuch as microswitches 190 both abut against and are suspended from elastomeric members which will yield under such impacts.

Referring to FIG. 5, it can be seen that one of the contacts of each microswitch 190 is grounded while the other contacts thereof are connected by wires 194 to one of several junction boxes 196 which are fastened to ribs 14 interiorly of hull 4. In this connection it should be noted that microswitches 190 are more or less grouped in sets for connection to the nearest junction box 196. Each junction box 196 is associated with indicia means including an indicator light 198 located in circumferentially spaced relation on upper skin 22. One terminal of each light 198 is grounded while the other is connected to a junction box 196 by a wire 200. Within junction box 196 wires 194 are connected to a common terminal 202 which in turn is connected to a line 204 leading to a timer 206 located on instrument panel 140. Timer 206 includes a winding knob 208 which, when turned in the appropriate direction to a pre-selected point, sets a conventional mechanical timing mechanism 210 of the spring-actuated variety. Timing mechanism 210 is triggered by a pawl or other suitable linkage 212 which in turn is connected to and actuated by a spring-loaded solenoid 214 having its one end connected to lines 204 and its other end connected to the hot side of battery 40 by means of a conduit 216 leading from timer 206. When triggered, timing mechanism 210 revolves for a predetermined period and then closes a normally open timer switch 218 which is connected to wires 200 within junction boxes 196 by means of conduits 220 and on its opposite side is connected to conduit 216 leading from battery 40. Shunting timer switch 218 is a normally open bypass switch 222 which is also actuated by solenoid 214. Connected to conduits 220 beyond timer switch 218 is an electric horn 224.

Thus, when another boat or some other rigid object strikes and compresses bumper cushion 160, the microswitches 190 in the vicinity of impact will close and thereby energize solenoid 214 which in turn will move pawl 212 into a disengaged position with respect to timing mechanism 210, thereby triggering the latter. At the same time solenoid 214 will close bypass switch 222 which in turn will energize indicator lights 198, thereby indicating that contact has been established. Lights 198, however, will remain on only momentarily inasmuch as bumper cushion 160 is compressed only momentarily owing to its resiliency. Timing mechanism 210, however, will continue to run and at the end of a predetermined period will close timer switch 218 which in turn will close the circuit to indicator lights 198 and horn 224.

In use, watercraft 2 can be slid into the water off a trailer or can be lowered into the water by means of a derrick, the cables of which are attached to docking loops 27. Once watercraft 2 is in the water, the pilot enters cockpit 32, takes his position on seat 120, and starts engine 38. When he desires to move watercraft 2 he

engages clutch 44 by actuating clutch lever 148. This, in turn, rotates the impeller of pump 56, thereby drawing water into it through screen 62 and intake conduit 58. Pump 56 increases the pressure of the water and discharges the high pressure water into propulsion unit 70 where it enters thrust pipe 74 from which it is discharged as a jet of water beneath hull 4 by means of nozzle 78. Of course, watercraft 2 will be propelled in a direction opposite nozzle 78. By manipulating throttle 142, the pilot can alter the speed of engine 38 and watercraft 2 and similarly by manipulating steering wheels 130 the operator can change the position of nozzle 78 and the course of craft 2. When watercraft 2 strikes a similar craft, or for that matter any other rigid object, bumper cushion 160 will depress and close the microswitches 190 of those sensor assemblies 170 located closest to the point of impact. This will, in turn, trigger timing mechanism 210 of timer 206 and further will cause indicator lights 198 to momentarily flash, thereby indicating that a "strike" has been made. After a predetermined time timing mechanism 210 will close timer switch 218 and thereby energize lights 198 and horn 224 so as to provide both visible and audio notice to referees or other officials of the new water sport that a preselected period of time after contact has elapsed and the driver is no longer eligible to participate in the game. Timer 206 can, of course, be reset when the driver is again eligible to participate, by turning knob 208 located on instrument panel 140.

For maintenance purposes, the pilot or mechanic can gain access to motor 38, pump 56, and other related components through front hood 24 and rear hood 26.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A watercraft comprising a hull of substantially circular shape, a cockpit disposed within the hull and located at substantially the center thereof, a closure-forming transparent cockpit canopy fastened to the upper portion of the hull in encircling relation to and covering the cockpit, power means for propelling the hull through the water, steering means operable from the cockpit for altering the direction of travel, a resilient bumper cushion secured to and extending peripherally around the hull for lessening the impact when the watercraft strikes another watercraft, sensing means for determining when the craft strikes another watercraft, and indicia means connected to and actuated by the sensing means.

2. A watercraft according to claim 1 wherein the bumper cushion projects beyond the outer periphery

of the hull and the hull extends downwardly from the bumper cushion in a substantially convex configuration and upwardly from the bumper cushion in a similar substantially convex configuration, the convexed upper portion of the hull having a centrally disposed opening located above the cockpit.

3. A watercraft according to claim 1 in which the bumper cushion is formed from a resilient elastomeric material and in which the sensing means are embedded within the bumper cushion.

4. A watercraft according to claim 2 in which the sensing means are a plurality of switches embedded within the bumper cushion at spaced intervals around the periphery of the cushion, each switch being adapted to close an electrical circuit when that portion of the bumper cushion in its vicinity is compressed.

5. A watercraft according to claim 2 in which power means comprises a motor carried by the hull, a pump carried by the hull and driven by the motor, and a discharge nozzle swivelly mounted for rotational movement beneath the hull, the nozzle being in communication with the discharge port of the pump, the position of the discharge nozzle being controlled by the steering means.

6. A watercraft according to claim 4 wherein the indicia means comprise a plurality of electric lights mounted on the upper portion of the hull in surrounding relation to the centrally disposed opening.

7. A watercraft according to claim 6 wherein a timer is interposed between the lights and the switches and includes a timing mechanism which is released and thereby set in operation when one of the switches is closed, the timer being adapted to activate the lights after a predetermined period has elapsed from when a switch closes.

8. A watercraft according to claim 7 wherein the timer further comprises a solenoid which is connected in series with the switches across an electrical energy source, the solenoid releasing the timing mechanism when activated by the closing of a switch.

9. A watercraft according to claim 8 wherein the timer further comprises a normally open bypass switch interposed between the electrical energy source and the lights, the bypass switch being connected to and actuated by the solenoid, whereby the lights will be energized momentarily at the moment of impact with another craft.

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