

July 26, 1966

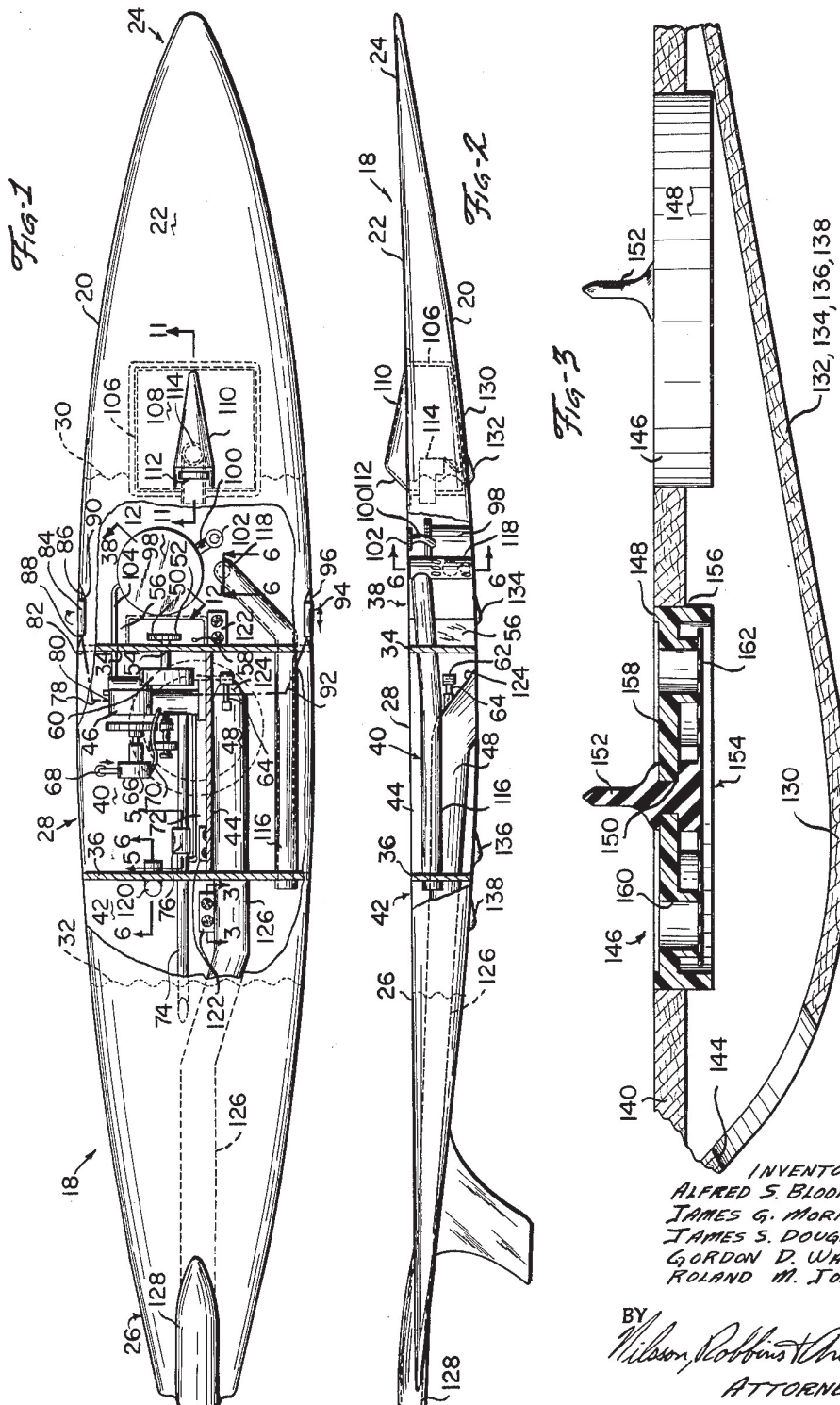
J. S. DOUGLAS ET AL

3,262,413

MOTORIZED SURFBOARD

Filed Sept. 22, 1964

3 Sheets-Sheet 1



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MOTORIZED SURFBOARD

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3 Sheets-Sheet 2

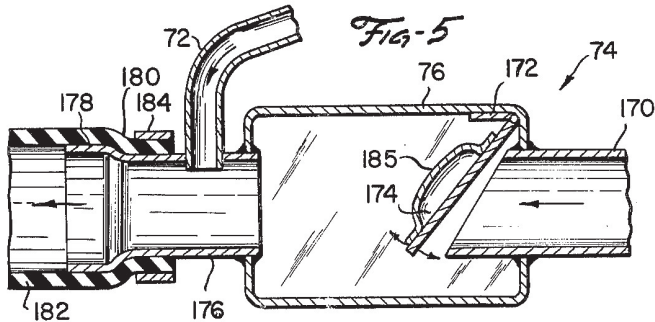


Fig-4

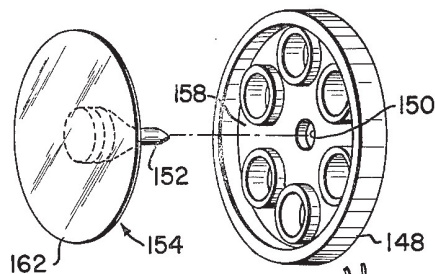


Fig-6

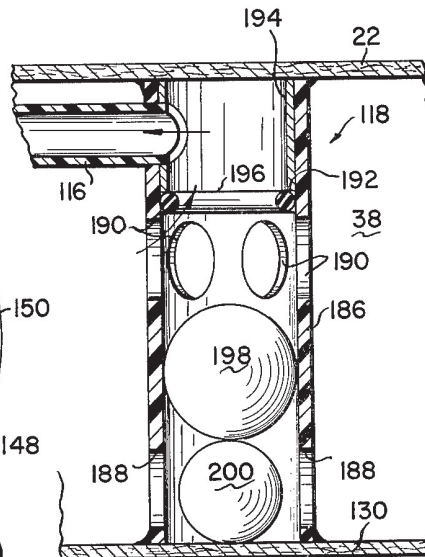


Fig-7

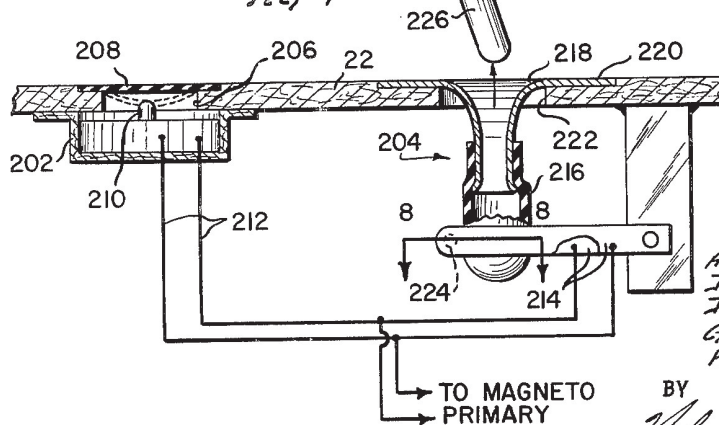


Fig-8



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3 Sheets-Sheet 3

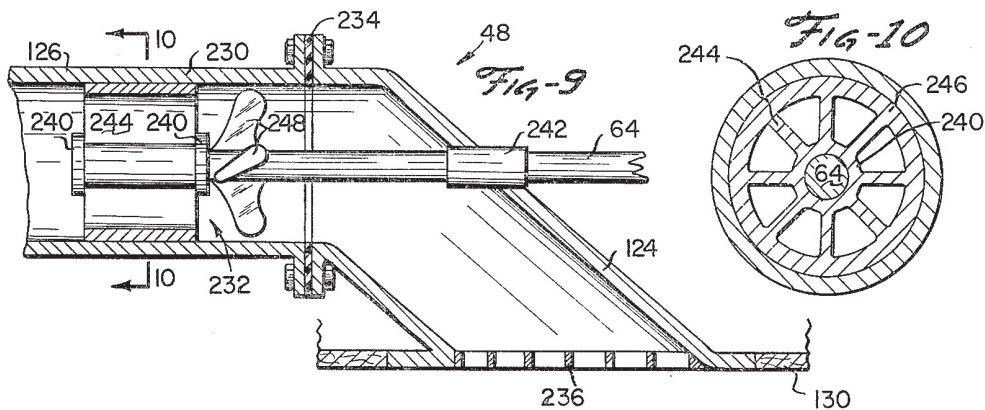
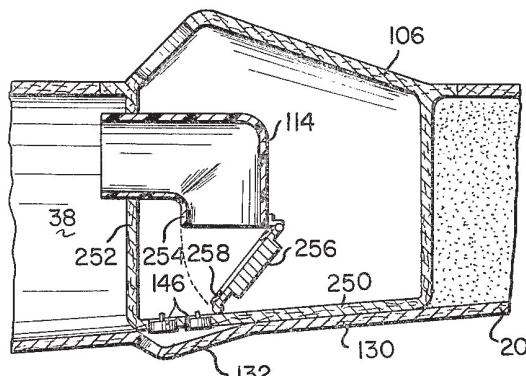
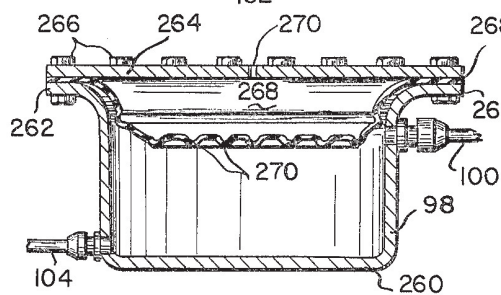
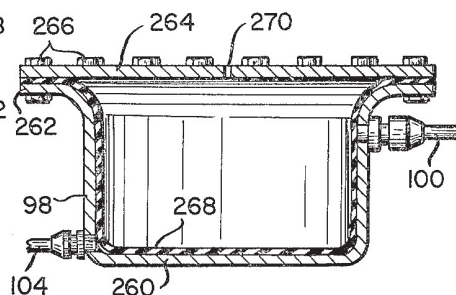


FIG-12

FIG-13

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3,262,413

MOTORIZED SURFBOARD

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10 Claims. (Cl. 115—70)

This invention relates generally to the sport of surfing and more particularly to surfboards which while being motorized for propelling the board out to the breakers, maintains the appearance and functional characteristics of the classical surfboard.

In the sport of surfing the exertion and time required for the participant to paddle his board repeatedly out through the surf typically constitutes a serious limitation upon the practice and full enjoyment of the sport. Similarly the effort and time required to transport the board laterally along the beach is often undesirable particularly when the beach itself is rocky or otherwise difficult to negotiate, and the board must either be hand-carried thereover, or hand paddled therealong outside of the breakers.

Accordingly, it is a fundamental object of the present invention to provide a surfboard which is self-propelled and thus capable of transporting the surfer quickly and effortlessly out through the surf or otherwise along and over the surface of the water.

Many others have assaulted this objective in the past; however, all known efforts have not resulted in a surfboard which, while being self-propellable retains in function and appearance the characteristics of the classical surfboard. Typically, for example, such efforts have resulted in apparatus which is constructed more along the lines of a motorboat than a surfboard. Such craft not only fail to appear and function as a classical surfboard, but many sink or at least suffer engine failure and serious engine damage when the craft is capsized or otherwise temporarily inundated.

Other deficiencies of such prior art devices are that an exposed propeller is used which is a serious and often lethal hazard to the participant and other swimmers in the water. The exposed propeller is of course also vulnerable to damage to itself from rocks and sand as it approaches and impacts the beach. In this general connection of safety and durability associated with surfboards, it should be noted that the environment contemplated for surfing is inherently rough and the probability of at least momentary lack of complete control, at which time a capsize could occur, is quite high.

Outside of such considerations of damage from and damage to the exposed bladed propeller, it must be realized that unless the propeller is removed or retracted in some manner, it remains as a significant drag in the water hence detracting even further from the craft's resemblance, particularly in handling characteristics, to a traditional surfboard.

Closely associated with the disadvantages of the propeller just discussed is that prior attempts to develop motorized surfboards typically have resulted in crafts having an undesirably large effective draft in the water and overall profile height, often due primarily to the propeller projecting below the boat bottom while other engine parts or their housing project upwardly above the water line.

Other disadvantages of the prior art approaches stem from the result that the weight distribution along the length of the board typically is significantly different from that of a regular surfboard, which further detracts from its surfing characteristics.

2

In summary, prior art approaches have not resulted in a motorized surfboard which retains the aesthetic and functional attributes and characteristics of the traditional islander surfboard.

It is therefore an object of the present invention as noted above, to provide such a self-powered surfboard which does not suffer these and other disadvantages of the prior art.

It is another object to provide such a surfboard which is exceedingly safe with regard to danger to its user and other persons in the immediate area.

It is another object to provide such a surfboard which does not embody an exposed propeller of any sort.

It is another object to provide such a motorized surfboard which has an exceedingly low profile and draft.

It is another object to provide such a surfboard which is rugged and reliable over long periods of use in a salt water environment.

It is another object to provide such a motorized surfboard which can be placed in any orientation, capsized, or inundated for short periods of time, without causing the engine to stop and without permitting the entry of water into the engine, or engine compartment.

It is another object of the present invention to provide such a surfboard which does not permit the accumulation of fuel or exhaust vapors in any enclosure within the board.

It is another object to provide such a surfboard which does not eject engine exhaust materials directly into the atmosphere.

It is another object to provide such a motorized surfboard the engine of which is fully controllable from the external deck of the board.

It is another object to provide such a surfboard the propulsion slip-stream of which is unusually attractive and pleasing to the eye and the propulsion motor of which is relatively quiet and non-disturbing to others.

It is another object to provide such a surfboard which is directionally stable while under power and exceedingly easily guided by the surfer.

It is another object to provide such a motorized surfboard which is relatively low in cost regarding manufacturing and operating and maintaining.

Briefly these and other objects and advantages are achieved in one example of the invention which includes a moulded fiberglass surfboard hull, the internal midportion of which is divided by transverse bulkheads into three compartments, viz forward, engine, and aft. The forward compartment includes a snorkel air inlet chamber which communicates between the external atmosphere and the remainder of the forward compartment. A second snorkel arrangement is included in an air tube system connecting the forward with the rear compartments and bypassing the engine compartment. Through still a third snorkel arrangement the rear compartment is then coupled to the engine compartment which is disposed longitudinally between the fore and aft compartments. Each of the chambers and compartments is provided with automatic self-bailing apparatus. Thusly the carburetor of the internal combustion engine draws its required air supply through a plurality of chambers and compartments which are interconnected by water rejecting snorkels, and which are each continually bailed of any water which does pass through the cascaded snorkel system.

The internal combustion engine is mounted in the engine compartment and is coupled to a sprocket driven jet assembly. The jet assembly is mounted in a tubular housing which is coupled forwardly to a propulsion inlet duct which ports through the bottom, planing surface of the board near its midportion. The jet is coupled rearwardly to a propulsion outlet jet which ports at or above the water line at the extreme stern of the board.

The jet assembly comprises a rotor portion having a set of water driving blades mounted on a rotary shaft which is turned by the sprocket coupled to the engine. The rotor portion draws water through the inlet duct, forces it aft through a stator section consisting of fixed, longitudinally extending blades which resolves into trans-

lational motion the rotary component of the water driven by the rotor. The water is then forced rearwardly at relatively high velocity to the jet output propulsion port at the stern.

The jet output readily propels the board, which otherwise appears to be a conventional surfboard, at a relatively high velocity of several knots; and the jet output, manifest as a solid tubular shaft of water centered somewhat above the water line is visually an exceptionally appealing phenomenon. Also particularly appealing is the relatively low noise output of the engine due to its enclosure within the board isolated from the atmosphere by the plurality of snorkel arrangements.

Further details of these and other novel features and their operation as well as additional objects and advantages of the invention will become apparent and be best understood from a consideration of the following description taken in connection with the following drawings which are all presented by way of an illustrative example only, and in which:

FIG. 1 is an overall plan view of one example of a motorized surfboard constructed in accordance with the principles of the present invention and in which, for purposes of illustration, portions of the top decking are shown broken away;

FIG. 2 is a right side elevational view of the structure of FIG. 1, also illustrated with portions of the structural skin of the apparatus broken away;

FIG. 3 is a longitudinal sectional view of a portion of the structure of FIG. 1 taken along the lines 3—3 thereof;

FIG. 4 is a perspective view of certain of the components of the apparatus illustrated in FIG. 3;

FIG. 5 is a longitudinal sectional view of a portion of the structure of FIG. 1 taken along the lines 5—5 thereof;

FIG. 6 is a sectional view of a portion of the snorkel structure of FIG. 1 taken along the lines 6—6 thereof;

FIG. 7 and FIG. 8 are sectional views of an example of an electrical stopping system for the internal combustion engine utilized in this example of the invention.

FIG. 9 and FIG. 10 are sectional views of an example of a portion of the jet propulsion system utilized in the example of the invention illustrated in FIG. 1;

FIG. 11 is a longitudinal sectional view of a portion of the structure of FIG. 1 taken along the lines 11—11 thereof;

FIG. 12 and FIG. 13 are sectional views of an example of the gas tank structure illustrated in FIG. 1 and taken along the lines 12—12 thereof at different periods of time; and

With specific reference now to the figures in more detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and structural concepts of the invention. In this regard no attempt is made to show structural details of the apparatus in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the surfboard combination may be embodied in practice. Specifically, the detailed showing is not to be taken as a limitation upon the scope of the invention which is defined by the appended claims forming, along with the drawings, a part of this specification.

In FIG. 1 an example of a motorized surfboard is illustrated having a hull body 20 with an upper deck surface 22 and bow and stern portions indicated generally at 24 and 26 respectively. In the figure the upper deck

surface 22 is shown broken away over a major proportion of the midportion 28 of the hull body 20 and reveals certain of the internal construction and mechanical aspects of the motorized surfboard 18. The internal volume of the bow and stern portions 24, 26 are in this example, filled with a low density foamed-in-place cellular plastic such as styrofoam. The extent of this foam filler toward the midportion 28 of the hull body 20 is indicated by the foam boundary lines 30, 32 respectively.

The midportion 28 of the hull body is internally divided athwart-ships by a forward and an aft transverse bulkhead 34, 36 respectively. These bulkheads not only provide substantial structural rigidity but also isolate the midportion 28 of the hull body 20 into forward, engine, and aft compartments 38, 40, 42 respectively, which are hydraulically isolated from each other by means described more fully below. Extending longitudinally between the bulkheads 34, 36 is a mounting bulkhead 44 which in part supports an internal combustion engine assembly 46 and a water jet propulsion unit 48.

The engine assembly 46 is also supported by mounting means, not shown, in cooperation with the forward bulkhead 34 as well as with the keel of the midportion of the hull body 20. The engine in this example is a compact assembly having low horsepower rating and includes a starter shaft 50 which extends through the forward bulkhead 34 and is terminated by a conventional recoil starter reel 52. The starter shaft 50 in passing through the bulkhead 34 is provided with a watertight rotational packing bearing 54. The recoil starter reel 52 is housed within a sub-compartment 56 which extends from the keel upward along the forward surface of the bulkhead 34 to the top surface 22 through which the sub-compartment forms an opening for ready access to the rope actuated starter reel 52. The sub-compartment 56 may be self-drained by an opening 58 therein through the bottom surface of the keel of the hull body 20.

The engine assembly 46 also includes a power output shaft coupled to a centrifugal clutch assembly 60. The clutch assembly is in turn coupled to a sprocket and chain system 62 which drives rotationally the shaft 64 of the water jet propulsion unit 48.

A rotary water pump 66 is also coupled to the power output shaft of the engine assembly and is hydraulically coupled to draw water from below the keel through a port indicated at 68, deliver it to the engine block through a coolant line 70, and force it along a coolant output line 72 which empties into the exhaust pipe system 74 of the engine just aft of an exhaust check valve 76.

The carburetor 78 of the engine assembly 46 includes a throttle and choke, not shown, the former being connected by a throttle control linkage 80 to a watertight seal at 82 to a motorcycle handlegrip type hand throttle 84. The rotary hand throttle 84 is supported on rotary spindles 86, 88 which are carried by the top deck surface 22 of the hull body 20 in a contoured recess 90 formed therein at its boundary with the side surface of the hull body 20. Similarly a choke control linkage 92 is coupled to a hand choke member 94 which is slidably mounted on a rod 96, which is carried by the hull body 20, so that by translational motion of the hand choke member 94 along the rod 96 the operator of the surfboard may control at all times the choking of the engine.

It may be noted that both the hand throttle 84 and the hand choke member 94 are mounted symmetrically amidships of the hull body 20 in a manner which does not disturb the lines of the hull body either functionally or aesthetically and which at the same time provide convenient and effective handholds for the operator of the board. It may also be noted that under normal operating conditions the motorcycle type hand throttle 84 in combination with the centrifugal clutch assembly 60 forms a highly desirable deadman type switch in that when the hand throttle 84 is released, as for example when the surf rider is thrown from the board, the hand

throttle returns to its idle position, the centrifugal clutch disengages the sprocket system 62 from the power output shaft, and the propulsion effects of the water jet unit 48 are stopped. Thus in such event the board becomes neither lost nor a hazard to other swimmers.

The fuel system for the motorized surfboard 18 comprises in this example a collapsible tank 98, the details of which are better shown in subsequent views, having a filler tube 100 which communicates with a filler cap 102 mounted flush on the top deck surface 22 and further includes a fuel line 104 which communicates between the bottom of the tank 98 and the carburetor assembly 78 of the engine.

A second sub-compartment 106, similarly to the starter reel sub-compartment 56, is mounted as illustrated in the forward portion 24 of the hull body 28. The sub-compartment 106 constitutes in this example an inlet air chamber 108 which communicates with the external atmosphere through a streamlined vent 110, the opening 112 of which is directed rearwardly thusly to minimize the splash intake of sea water. Air passing into the air chamber 108 is directed rearwardly into the forward compartment 38 through an air tube 114 which, along with other structural details of the sub-compartment 106, are shown more clearly in the subsequent figures.

The air, which is required for breathing by the internal combustion engine assembly 46 is carried from the forward compartment 38 through the rear or aft compartment 42 by means of an air supply duct 116 which is pneumatically coupled to the compartment 38 by a snorkel assembly 118 and passes through the bulkheads 34, 36 in a manner bypassing the engine compartment 40. The air thusly supplied to the rear or aft compartment 42 is then coupled through a snorkel assembly 120 through the bulkhead 36 to the engine compartment 40, from whence the carburetor assembly 78 may directly supply its oxygen to the cylinder of the engine. Each of the sub-compartment 106 and the compartments 38, 40, 42 are continually and automatically self-bailed by bailing assemblies 122; see FIG. 3 below.

The water jet propulsion unit 48 is coupled through a forward duct member 124 downwardly through the keel and the bottom surface of the hull body 20. The after-end of the propulsion unit 48 is coupled to a rear propulsion tube 126 which terminates in a water jet output nozzle 128, which in a smooth contour fashion, is faired upwardly out of the rear portion of the upper deck surface 22 at the extreme stern end of the hull body 20.

Referring to FIG. 2 a right side elevational view of the structure of FIG. 1 is illustrated, again with a portion of the fiberglass skin structure shown graphically broken away. For comparative reference with respect to FIG. 1, it is noted that the motorized surfboard 18 comprises a hull body 20 having an upper deck surface 22 and bow, stern, and midportion 24, 26, 28 respectively, which are formed by the transverse bulkheads 34, 36. The mounting bulkhead 44 is again shown extending fore and aft between the transverse bulkheads 34, 36. The water jet propulsion unit 48 is seen disposed to starboard of the mounting panel 44 with its shaft 64 extending forwardly through the duct member 124 which communicates, as indicated above, through the bottom surface of the keel of the hull body 20. The forward end of the shaft 64 is seen to be terminated by a portion of the sprocket and chain assembly 62.

The propulsion duct system is seen to include, in addition to the forward duct member 124 and the water jet propulsion unit 48 itself, the rear propulsion tube 126 and the water jet output nozzle 128. The sub-compartment 156 formed just forwardly of the forward bulkhead 34 and extending throughout the height of the hull body 20 and the inlet air chamber sub-compartment 106 with its streamlined vent 110, its opening 112 and its air tube 114, are shown emplaced in the forward compartment 38 in a manner contributing to the structural integrity of

the surfboard in regions near its midportions. In this regard note that both of the sub-compartments 56, 106 extend from keel to deck. The fuel tank 98 is also mounted on the keel of the hull body so that gravitational forces and other accelerations will have a minimal deleterious effect on the structural integrity of the overall combination. The filler tube 100 and the filler cap 102 mounted flush with the upper deck surface 22 are clearly indicated in this view. In the same manner and for the same purposes of rigidity, the snorkel assembly 118 is mounted between the keel surface and the upper deck surface 22 of the hull body 20. The output of the snorkel assembly 118 is connected through the air supply duct 116 to the aft compartment 42.

The undersurface 130 of the hull body 20 is formed in this example having a number of small, externally protruding, thin walled blister surfaces 132, 134, 136, 138 which are placed in the lowest portions of, respectively, the sub-compartment 106, the forward compartment 38, the engine compartment 40, and the aft compartment 42. These blister surfaces, as may be seen more clearly in the enlarged presentation of FIG. 3, form a cooperating component of the self-bailing assemblies 122. With continued reference to FIG. 3, it may be noted that a mounting plate 140 is cemented as shown across the top of the blister surface internally of the hull body. As also seen in the figure, the mounting plate 140 may be secured to the undersurface 130 of the hull body at a level slightly below the surrounding keel surface, thusly providing a collecting pool for any water which finds its way into the respective compartment being automatically bailed. The blister surface is ported to the rear by an opening 144.

One or more bailing valve assemblies 146 are mounted in openings provided through the mounting plate 140. Each of the bailing valve assemblies 146 (see also FIG. 4) consist of, in this example, a moulded plastic body 148 having a central opening 150 therein, for retainably engaging the central column supporting member 152 of a neoprene valve closure member 154. The moulded plastic body 148 comprises an outer cylindrical retaining collar 156 and a web portion 158 extending thereacross. Formed through this web portion radially outwardly from the central opening 150 are a plurality of valve seat forming cylinders 160 which extend below the surface of the web portion 158 and engage, in valve closure relationship, the upper surface of a highly flexible flat disc portion 162 of the valve closure member 154.

In operation the bailing valve assemblies 146 open to permit the passage of water downwardly through the cylinders 160 whenever a droplet of water is placed therein against the upper surface of the flexible flat disc portion 162. The water is then deposited into the interior surface of the blister 130 from whence it is drawn into the slip stream of the hull body through the opening 144 due primarily to the dynamically produced low pressure region in that portion of the slip stream behind the blister surface. When, however, there is a positive water pressure within the interior surface of the blister, the flat disc portion 162 of the valve assembly is held thereby tightly upwardly against the valve seat forming cylinders 160.

The flat disc portion 162 of the bailing valve assemblies is readily replaceable by forcefully pulling it downwardly through the central opening 150. A new unit may then be installed by drawing the central column member 152 of the new unit upwardly from the blister surface through the central opening 150 until it is retained as shown by the central opening 150, in the web portion of the molded plastic body 148 of the valve assembly. In practice it has been observed that a suitable choice of material out of which the valve closure member 154 is fabricated is neoprene due to its salt water resisting characteristics.

Referring to FIG. 5, the exhaust system 74 is shown in more detail to include a forward exhaust pipe portion 170 which extends from the exhaust check valve 76 for-

wardly to the exhaust manifold of the engine assembly. The exhaust pipe portion 170, as well as the exhaust check valve housing 172 and the hinged valve closure member 174, are, in this example formed of a heat resistant metallic alloy. The output of the check valve apparatus is coupled to a short connecting pipe 176 which is also formed of metal and into which is coupled the engine coolant output line 72. The connecting pipe 176 is, in this example, formed with an enlarged end portion 178 which, in cooperation with the forward smaller diameter portion, forms a flexible tube retaining shoulder 180. A flexible rubber or neoprene exhaust tube 182 is pressed over the enlarged diameter end portion 178, extended part way along the forward portion of the connector pipe 176, and there retained by a circumferential binding clamp 184.

In operation of the engine, exhaust materials are directed under pressure through the forward exhaust portion 170 against the hinged valve closure member 174 thusly causing it to hinge to an open position with respect to the left-hand end of the pipe portion 170 for so long as the exhaust pressure exists, that is whenever the engine is operating. When the engine is not operating the hinged valve closure member 174 is retained by gravity in a closed position. In the event the craft capsizes, the hinged valve closure member 174 is held upwardly in a closure relationship with the exhaust pipe portion 170, because of its large volume displacement due to a sealed metallic cap 185 bonded as by welding in a water-tight relationship to the back side of the closure member 174. Thus if the board capsizes and the housing 172 becomes filled with water, the valve closure member 174 tends to float and thereby close the output end of the exhaust pipe portion 170 thereby keeping the water out of the cylinder and manifold assemblies of the engine.

Referring to FIG. 6, the snorkel assembly 118 in the forward compartment 38 is illustrated in sectional view. It is noted that the snorkel 20 mounted in the rear or aft compartment 42 and communicating through the bulkhead 36 into the engine compartment 40 is constructed similarly to and may for all practical purposes be considered identical to the snorkel assembly 120. The snorkel assembly in this example, comprises a cylindrical housing member 186 which extends between and is bonded to the upper deck surface 22 and the lower keel surface 130. The housing member is apertured near its bottom end by a plurality of openings 188 and just above its mid-portion by a series of apertures 190. Just above the apertures 190, a retaining shoulder 192 is formed by the emplacement within the housing member 186 of a short cylindrical member 194 whose outer diameter is approximately equal to the inner diameter of the cylindrical housing member 186. A sealing O-ring 196 is disposed against the retaining shoulder 192. The air supply duct 116 is connected through the wall of the housing member 186 and communicates pneumatically between the region of the snorkel assembly above the O-ring 196 and the aft compartment 42 as shown in the previous figures.

A floating valve ball 198 is disposed within the housing member 186 on the opposite side of the O-ring 196; and placed below the floating valve ball 198 is a heavy non-floating, valve holding ball 200.

In operation of the snorkel assembly 118 air normally passes into the housing member 186 through the apertures 190, past the O-ring 196 and through the air supply duct 116. If, however, water accumulates in the forward compartment 38 the water enters the housing member through the openings 188 and causes the valve ball 198 to float upwardly in snorkel closing contact with the sealing O-ring 196. If, on the other hand, the craft should capsize, the weighted valve holding ball 200 acts to hold the valve ball 198 in sealing contact with the O-ring 196 by virtue of its weight. It may be noted that when the board is upright, any undesired water which is disposed within the housing member 186 is drained out into the

interior portions of the forward compartment 38 through the openings 188.

Referring to FIG. 7, an example of an engine stopping system constructed in accordance with the present invention is illustrated. The functional concept utilized is that when the magneto ignition supply is deenergized by shorting its contact points, the engine will stop due to loss of ignition. The system illustrated in FIG. 7 includes a pair of different types of switches: one being a normally open momentary contact switch 202 and the other being a normally open automatically actuated dead man switch 204. External finger pressure communication may be had with the momentary contact switch 202 by virtue of an opening 206 in the upper deck surface 22 of the hull body over which is emplaced, in a relationship flush with the top deck surface 22, a neoprene diaphragm 208. The diaphragm is flexible and may be inwardly deformed by pressure exerted through the thumb or finger of the operator until the actuator 210 is depressed thereby shorting together the electrical leads 212 which are connected to the breaker points of the magneto primary thereby shorting them and causing the ignition supply for the engine assembly to be deenergized. Also connected to the leads 212 and in parallel with the switch 202 are a pair of cantilevered contacts 214 (see also FIG. 8). Disposed between the cantilevered contacts 214 is a flexible nipple 216 which is retained over the end of the flared sleeve member 218 which terminates in a flush mounting flange 220 in the exterior surface of the deck top surface 22 through an opening 222 therein. In operation, the cantilevered contacts are normally biased toward each other and maintain electrical contact with each other thusly shorting out the magneto primary circuit unless an external body is inserted through the sleeve 218 and within the flexible nipple 216 in a manner to hold apart the contact points 224 which are mounted on the ends of the cantilevered contacts 214. A key member 226 having a suitable length and diameter may be inserted through the sleeve member 218 and into the flexible nipple member 216 when it is desired to operate the engine of the motorized surfboard. The key member may be affixed, as by a fabric line 228, to the body of the surfer so that if he is thrown overboard the key member 226 will automatically be removed from its position of separating the contact points 224 and the engine will be stopped. This apparatus is particularly useful when the motorcycle-type hand throttle 84 is locked in a cruise position as is sometimes desirable. Furthermore, when desired, the key member 226 may be designed to serve as a personal ignition key and may be uniquely shaped matingly with the sleeve member 218 so that the board can be operated only by the person having possession of the particular key designed for the particular motorized surfboard.

Referring to FIG. 9, additional details of the water jet propulsion unit 48 are illustrated. The rear propulsion tube 126, the forward portion of which forms a housing body 230 for the jet assembly 232, is connected to a flange and gasket coupling 234 to the forward water duct member 124 which communicates through a flush strainer grill 236 with the under side of the hull body 20 flush with its lower skin surface 130. The propeller shaft 64 is supported between a set of journals and thrust bearings 240 and a packing bearing 242 in the forward wall of the duct member 124. The bearings and journals 240 are supported concentrically within a stator blade assembly 244 (see FIG. 10). The assembly 244 includes a set of, in this example, eight stator blades extending radially outwardly from the bearings and journals 240 toward an outer peripheral cylindrical structural member 246. A set of propeller blades 248 are mounted on the shaft 64 just forwardly of the stator blade assembly 244.

In operation, the rotation of the shaft 64 causes the rotation of the propeller blades 248, forces the upward flow of a stream of water from below the craft through the grill 236 into the forward duct member 124 and

through the stator blade assembly 244 into the rear propulsion tube 126. The stator blades function to resolve the rotary component of the water stream into translational, or longitudinal, motion so that the stream of water traversing the length of the rear propulsion tube 126 and being ejected from the water jet output nozzle 128 at the stern is a straight column of water.

In FIG. 11 the inlet air chamber sub-compartment 106 is illustrated in a longitudinal-vertical cross section view with somewhat more detail than in FIG. 1 and FIG. 2. Again, the structure of the sub-compartment is seen to add rigidity to the hull body by virtue of its bonding along its bottom surface 250 to the lower skin surface 130 of the hull body 20. The cooperation of the blister surface 132 with the bailing valve assembly 146 is shown here with more clarity. Note that the forward portion of the bottom surface 250 of the sub-compartment 106 itself forms the mounting plate for the valve assemblies 146. The air tube 114 which communicates pneumatically between the interior of the sub-compartment 106 and the remainder of a forward compartment 38 is supported at its juncture with the rear bulkhead 252 of the sub-compartment. The air tube 114 is formed as an L-shaped length of cylindrical pipe which is terminated in the downward direction within the sub-compartment 106 by a circular lip valve seat portion 254. A valve closure member 256 which is weighted as indicated is hingedly affixed to the forward edge of the lip portion 254. A water gasket sealing ring 258 may be affixed to the upper surface of the valve closure member 256 so that if the surfboard were to capsize, the valve closure member 256 and the gasket 258 in a closure relationship with the lip portion 254 of the air tube 114 will preclude the entrance into the forward chamber of any significant quantity of sea water.

Referring to FIG. 12 an example of the gas tank 98 indicated in the previous figures is illustrated in enlarged detail. The fuel tank 98 having a volume of approximately one gallon may be formed of spun aluminum in a bowl shaped form 260 having an upwardly terminating coupling flange 262 affixed integrally thereto and compressively sealingly cooperating with a circular lid member 264 by a series of tension supporting members such as screws 266 distributed as indicated about the periphery of the coupling flange 262 and the lid member 264. A circular neoprene, or other petro-resistant substance, concentrically corrugated diaphragm 268 is compressively interposed between the periphery of the lid member 264 and the coupling flange 262. The concentric corrugations, indicated at 270 permit the flexing of the diaphragm 268 from its position shown in FIG. 12 when the fuel tank is substantially full to that indicated in FIG. 13 wherein the fuel tank 98 is substantially empty of the fuel. In this manner, fuel may be placed into the fuel tank 98 through the filler tube 100 and drawn out through the fuel line 104 in a non-breathing fashion. That is, as the flexible diaphragm 268 is forced downwardly or upwardly by the removal or filling of fuel, the displacement air passing through the vent opening 270 in the central portion of the lid member 264 does not contain any gasoline fumes, thusly insuring an environment within the hull body which is safe with regard to fire or explosion. In addition, the fuel tank 98 while being effectively totally flexible, does not cause a varying pressure in the fuel line 104 and is totally enclosed by rigid structure thusly further insuring minimal fire or explosion danger due to resistance against rupture of the tank.

There have thus been disclosed and described a number of examples of a motorized surfboard combination constructed in accordance with the principles and concepts of the present invention and achieving the objects and exhibiting the advantages set forth hereinabove.

What is claimed is:

1. Self-propellable surfboard comprising:

rigid hull body having overall traditional surfboard

configuration forming internally thereof a plurality of enclosures within said hull body;

internal combustion engine means mounted within one of said enclosures and having power output and starter shafts;

water jet propulsion means comprising,

cylindrical tubular housing for carrying a propulsion water jet stream axially thereof and mounted within one of said enclosures,

stator blades carried by said housing,

rotary propeller and propeller shaft means rotatably supported in said housing with said propeller means disposed upstream from said stator blades for generating the water movement associated with said propulsion jet stream,

water jet inlet port formed in the bottom surface of said hull body,

water jet inlet duct means hydraulically interconnecting said inlet port and said tubular housing,

jet outlet port formed at the stern portion of said hull body, and

water jet outlet duct means hydraulically interconnecting said tubular housing and said outlet port for directing said propulsion jet stream in the aft direction and through said jet outlet port in a forward thrust producing relation with respect to said hull body;

mechanical coupling means for connecting said propeller shaft means to said power output shaft;

air inlet means disposed in the top surface of said hull body;

air supply means extending through and including said plurality of enclosures from said air inlet means to said engine means for providing oxygen thereto;

water rejecting snorkel means pneumatically intercoupled in said air supply means for hydraulically isolating individual ones from another of said enclosures;

starter means mechanically communicating through the external surface of said hull body and connected to said starter shaft;

carburetor and ignition control means communicating through the external surface of said hull body and connected with said engine means; and

self-bailing means disposed in each of said enclosures.

2. The invention according to claim 1 which further includes collapsible, non-breathing fuel tank means mounted in one of said enclosures and having an input filler line communicating through said hull body top surface for filling and having an output fueling line connected to the carburetor of said engine means.

3. The invention according to claim 2 in which said tank means comprises a flexible diaphragm member and a rigid container including first and second tank forming members having mated flange perimeters between which the periphery of said diaphragm member is compressively and sealingly retained, said inlet filling line and said output fueling line being connected in fuel communication relationship with said first tank forming member, said second tank forming member being apertured to permit the passage bi-directionally of fuel displacement air therethrough.

4. The invention according to claim 1 in which said plurality of enclosures includes a forward compartment, an engine compartment, and an aft compartment and in which said water-rejecting snorkel means includes a first snorkel for removing substantially only air from the upper reaches of said forward compartment, an air supply duct connected between said first snorkel and said aft compartment for delivering the air removed from said forward compartment directly to said aft compartment, and a second snorkel for removing substantially only air from the upper reaches of said aft compartment and delivering it to said engine compartment.

11

5. The invention according to claim 1 which further includes engine exhaust means comprising first exhaust tube means connected to said engine means, second exhaust tube means ported through the aft under surface of said hull body, and unidirectional flow, exhaust pressure actuated valve means intercoupled between said first and second exhaust tube means.

6. The invention according to claim 1 which further includes engine coolant water pump means connected to said power output shaft and having coolant water inlet line means ported through the bottom surface of said hull body, and coolant water outlet line means hydraulically connected through said engine means in a cooling relationship therewith and thence into said second exhaust tube means at a point contiguous to said valve means for cooling said second exhaust tube means, and the exhaust materials transported therethrough.

7. The invention according to claim 1 in which said carburetor and ignition control means include at least one motorcycle handle grip type throttle control mounted externally on the surface of said hull body, control connecting means intercoupled between said carburetor and said throttle control, and sealing means disposed through said hull body contiguously to said throttle control for providing water tight mechanical communication between said control and said carburetor.

8. The invention according to claim 1 which further includes deadman type switching means comprising a pair of contact points connected electrically to the ignition system of said engine means and mounted internally of said hull body contiguously to the upper surface thereof and being supported in a manner whereby said points are normally biased toward and in contact with each other, flexible nipple means the internal surface of which is secured in open communication with the external upper surface of said hull body with a portion of said flexible nipple means being disposed between said contact points, key means removably retainable in said flexible nipple means in said portion thereof between said

12

contact points and that portion of said key means having a lateral dimension such as to stretch said nipple means and hold said points electrically separate until said key means is removed.

9. The invention according to claim 1 in which said self-bailing means comprises a small externally protruding thin walled blister surface formed in the bottom skin structure of said hull body, a bailer mounting plate secured internally of said hull body over said small blister surface forming thereby a blister enclosure, said blister surface being apertured rearwardly to provide water flow communication through said bottom skin structure into said blister enclosure, valve seat means carried by said bailer mounting plate comprising a downwardly protruding tubular extension communicating through said mounting plate and having a valve flapper engaging, peripheral, terminating lip portion, valve flapper means disposed in said blister enclosure and supported upwardly against said terminating portion in unidirectional, automatic flow control relationship therewith whereby water above said mounting plate may open said bailer means by moving said valve flapper means downwardly away from said terminating lip portion of said downwardly protruding extension.

10. The invention according to claim 1 in which said jet outlet port is formed at least partially above the normal water line of said stern portion.

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