



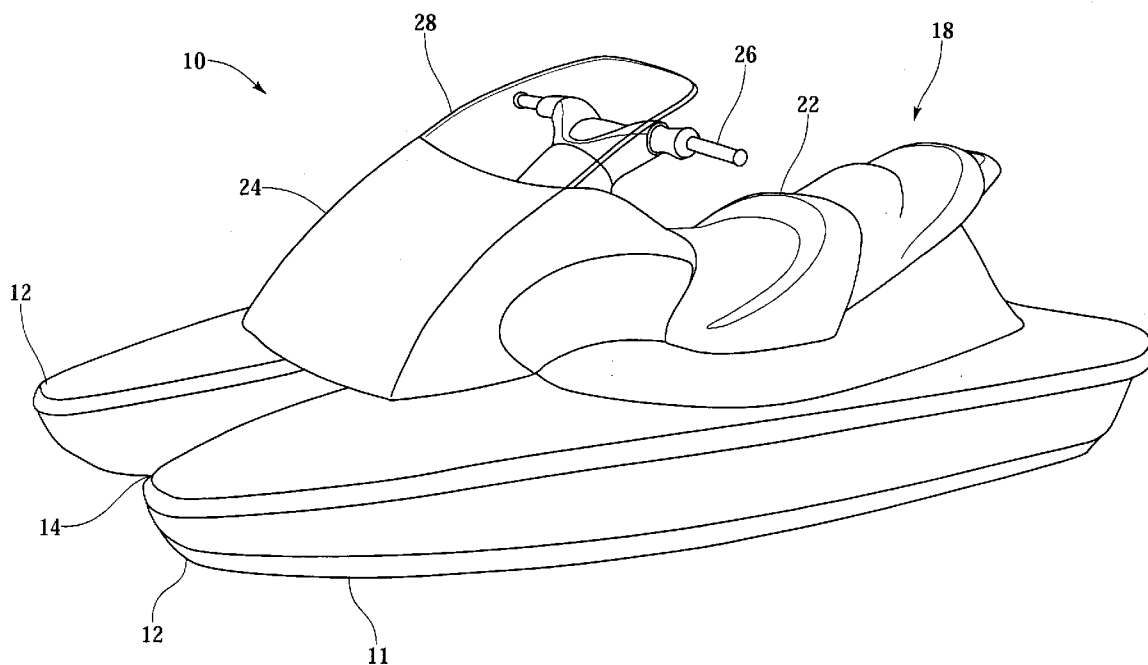
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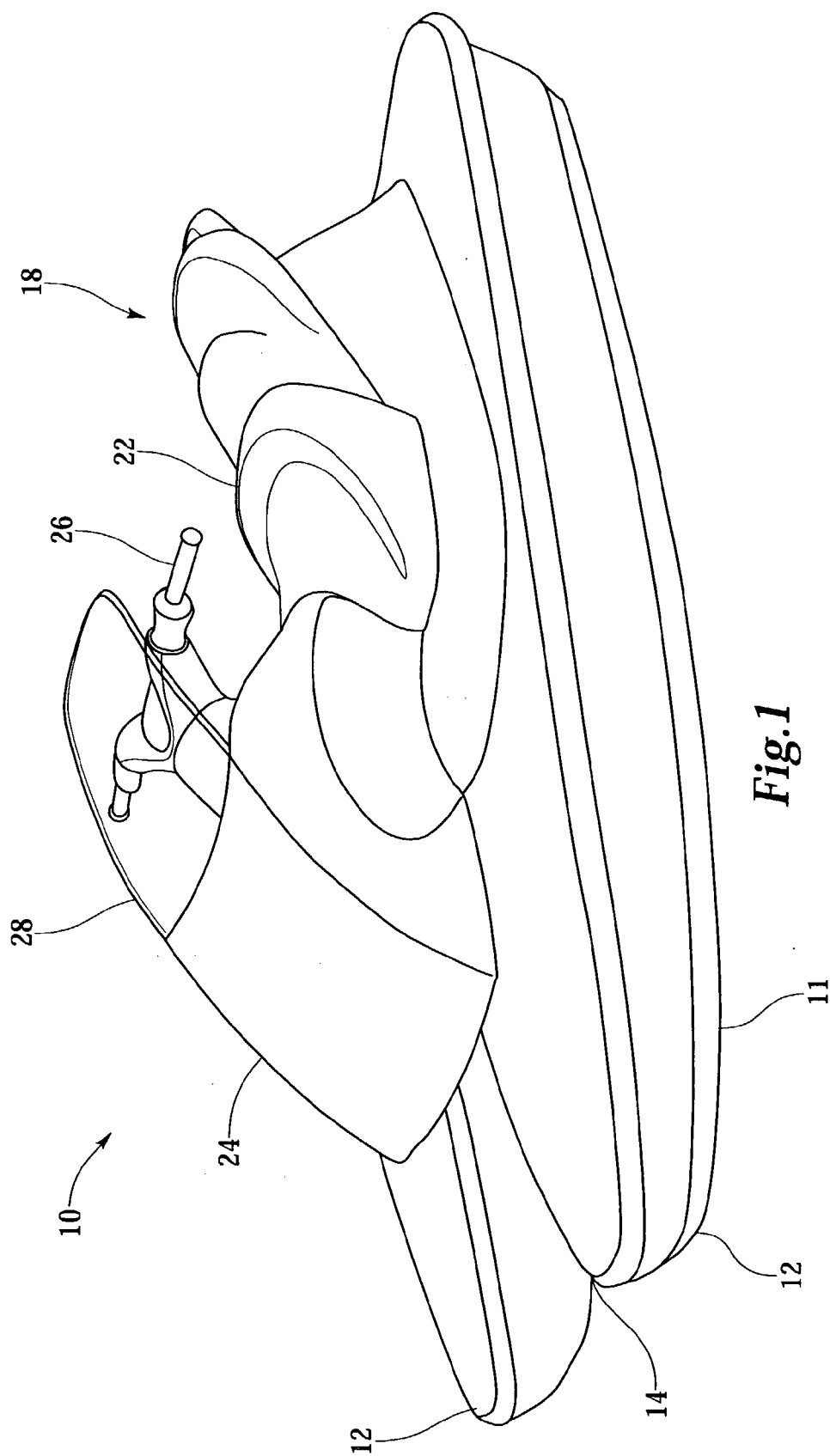
(19) **United States**(12) **Patent Application Publication**
Kirk(10) **Pub. No.: US 2004/0168623 A1**(43) **Pub. Date: Sep. 2, 2004**(54) **MULTI-HULL PERSONAL WATERCRAFT**(57) **ABSTRACT**(76) **Inventor: Clint F. Kirk, Poteau, OK (US)**

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CONLEY ROSE, P.C.**5700 GRANITE PARKWAY, SUITE 330****PLANO, TX 75024 (US)**(21) **Appl. No.: 10/377,245**(22) **Filed: Feb. 27, 2003****Publication Classification**(51) **Int. Cl.⁷ B63B 1/00**(52) **U.S. Cl. 114/55.57**

A personal watercraft having a multi-hull is disclosed herein. In an embodiment the multi-hull is a catamaran hull, for example two pontoons connected by a cross structure which form an air passage between the hull and the surface of the water upon launching. In alternative embodiments, the multi-hull is a SWATH hull or a trimaran hull. Also, disclosed herein is a personal watercraft having two water outlets from the propulsion system. In an embodiment, the two or more water outlets are disposed between the pontoons. In another embodiment, each pontoon has a water outlet mounted thereto or integral therewith. In another embodiment, each water outlet is positioned within the cross-sectional area of the pontoon. Also, disclosed herein is a method for increasing the speed at which a personal watercraft is propelled comprising using a multi-hull design to decrease the hydrodynamic resistance on the watercraft.





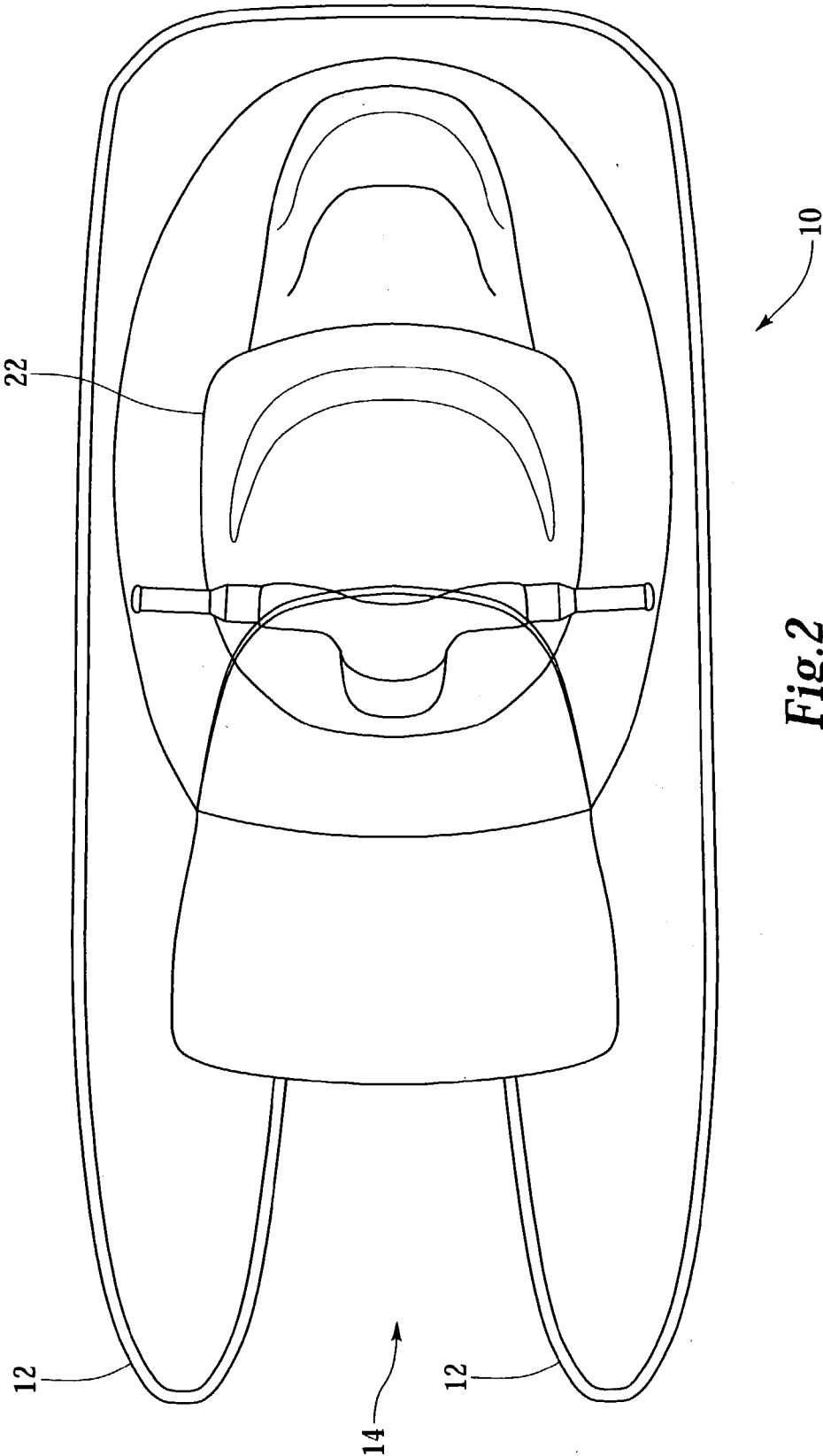
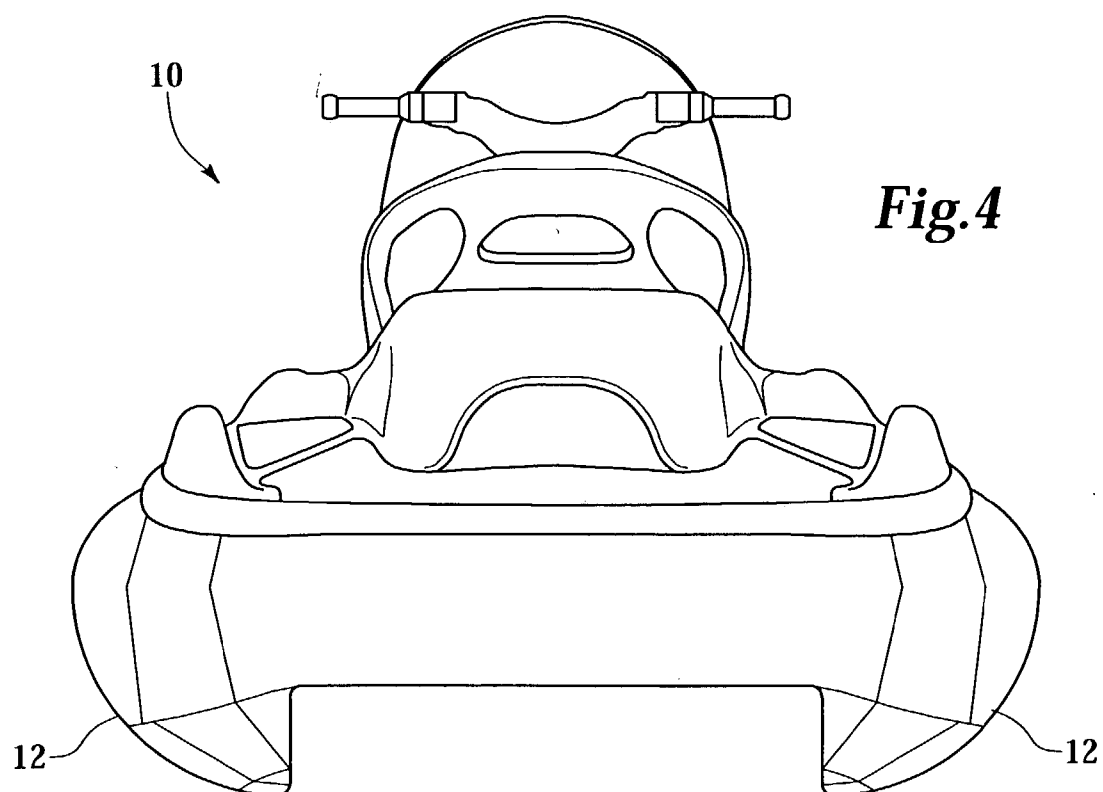
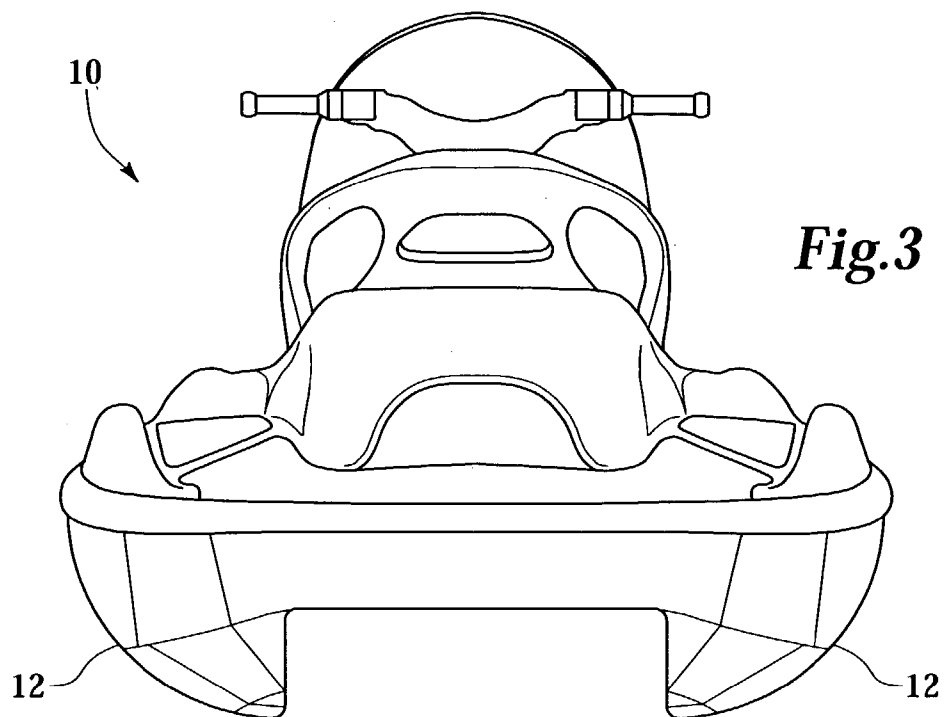


Fig.2



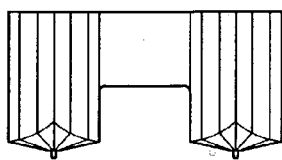


Fig. 5A

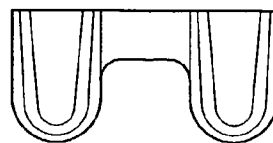


Fig. 5B

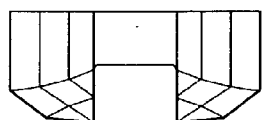


Fig. 5C

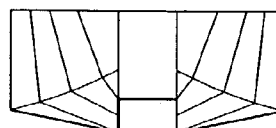


Fig. 5D

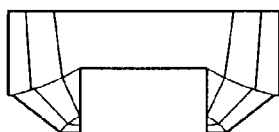


Fig. 5E

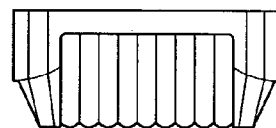


Fig. 5F

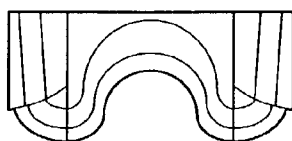


Fig. 5G

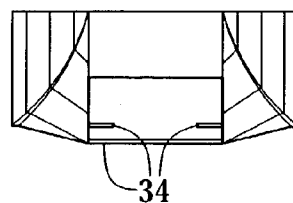


Fig. 5H

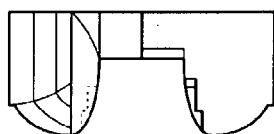


Fig. 5I

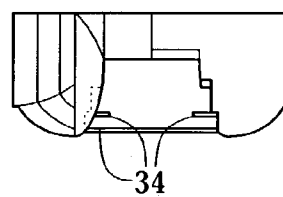


Fig. 5J



Fig. 5K



Fig. 5L

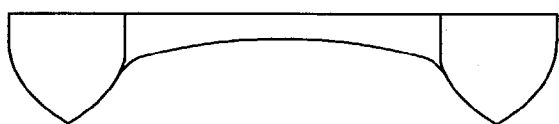


Fig. 5M

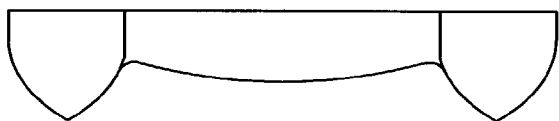


Fig. 5N

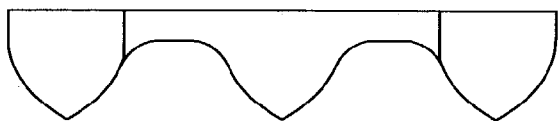


Fig. 5O

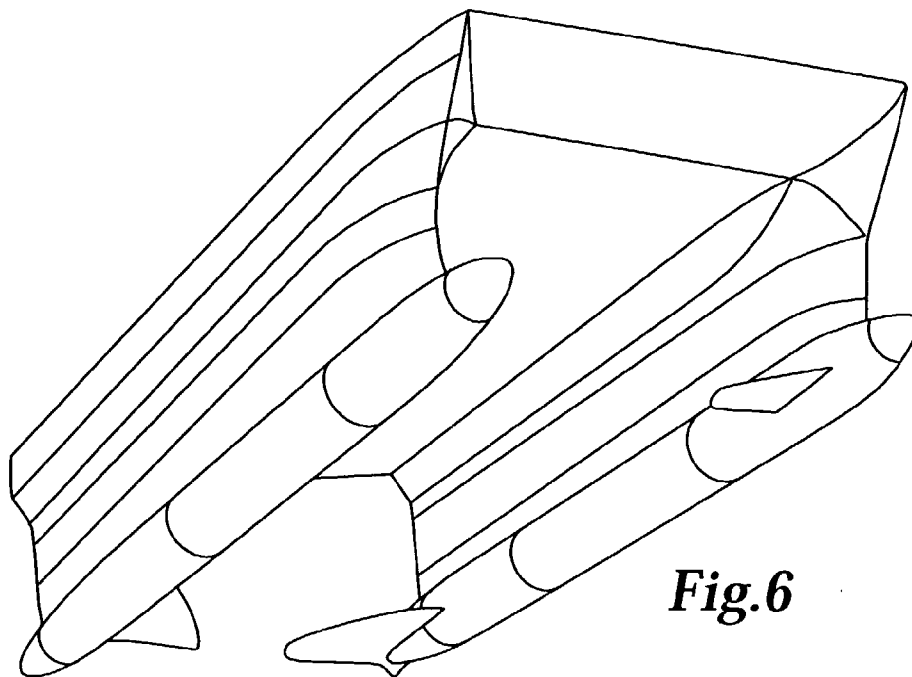
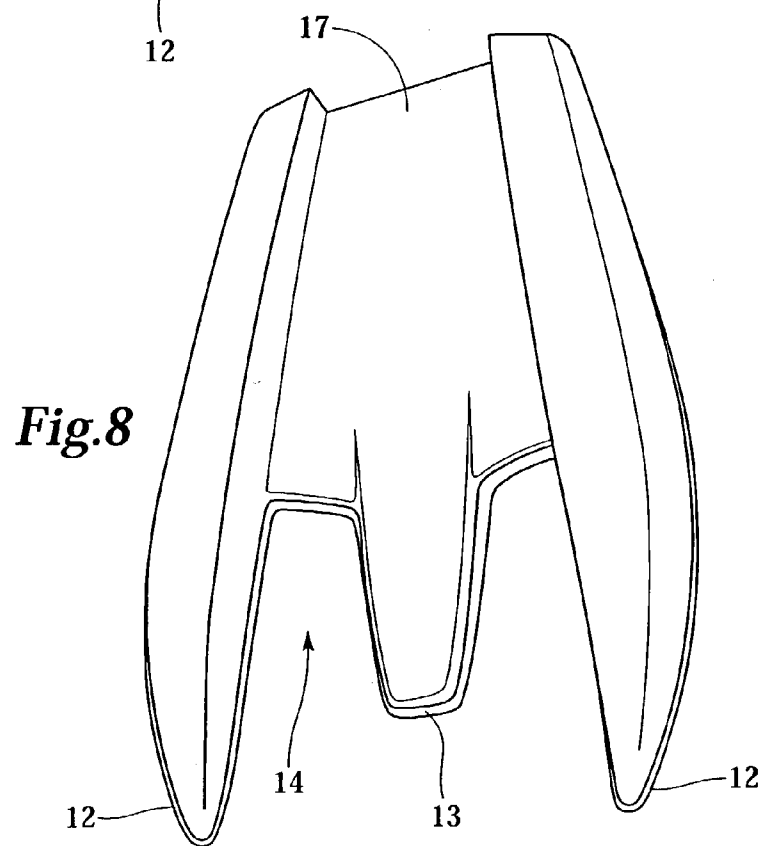
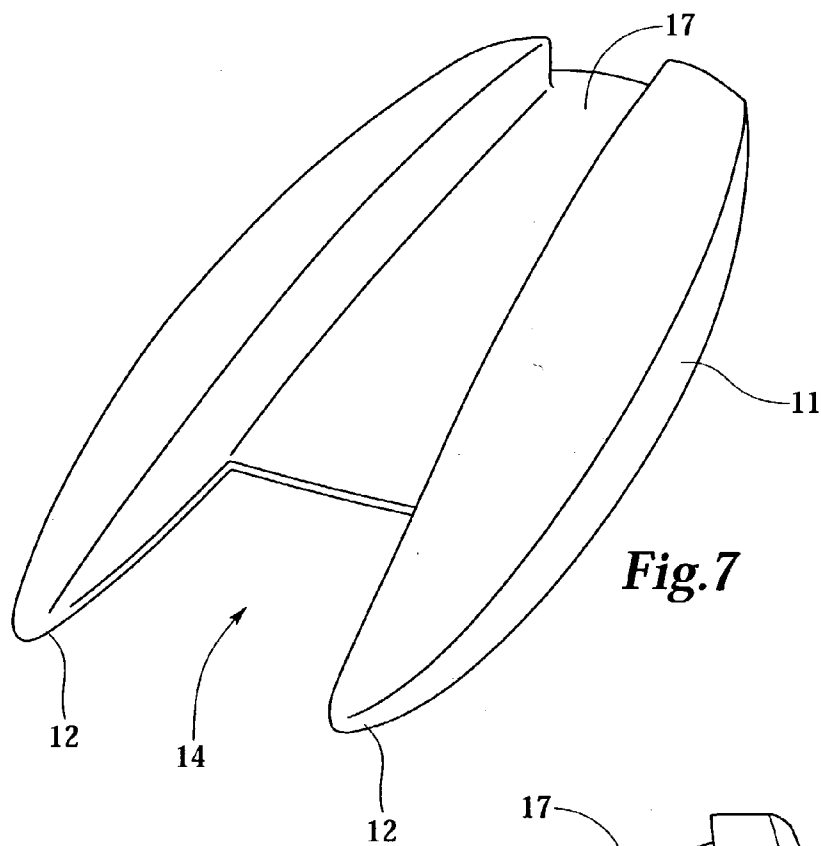
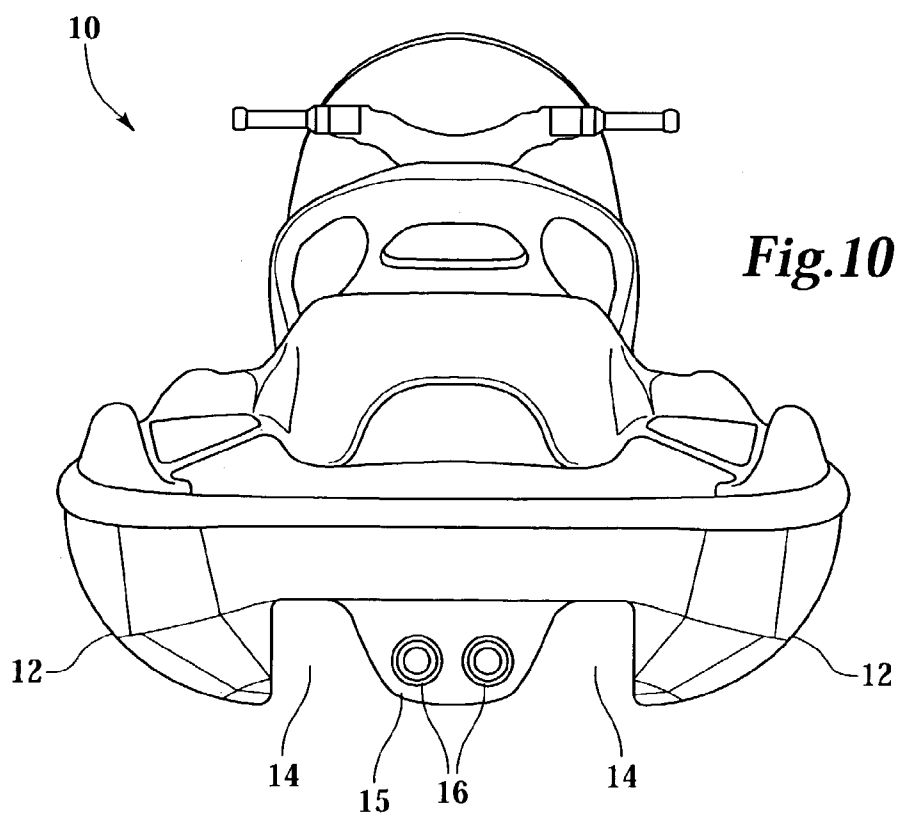
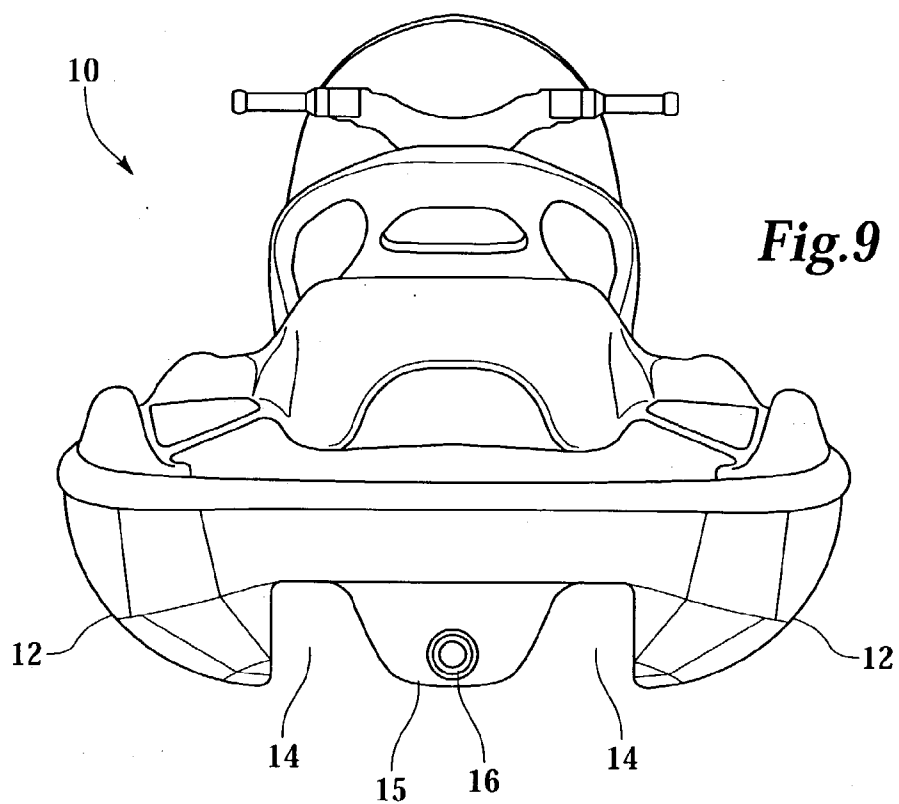
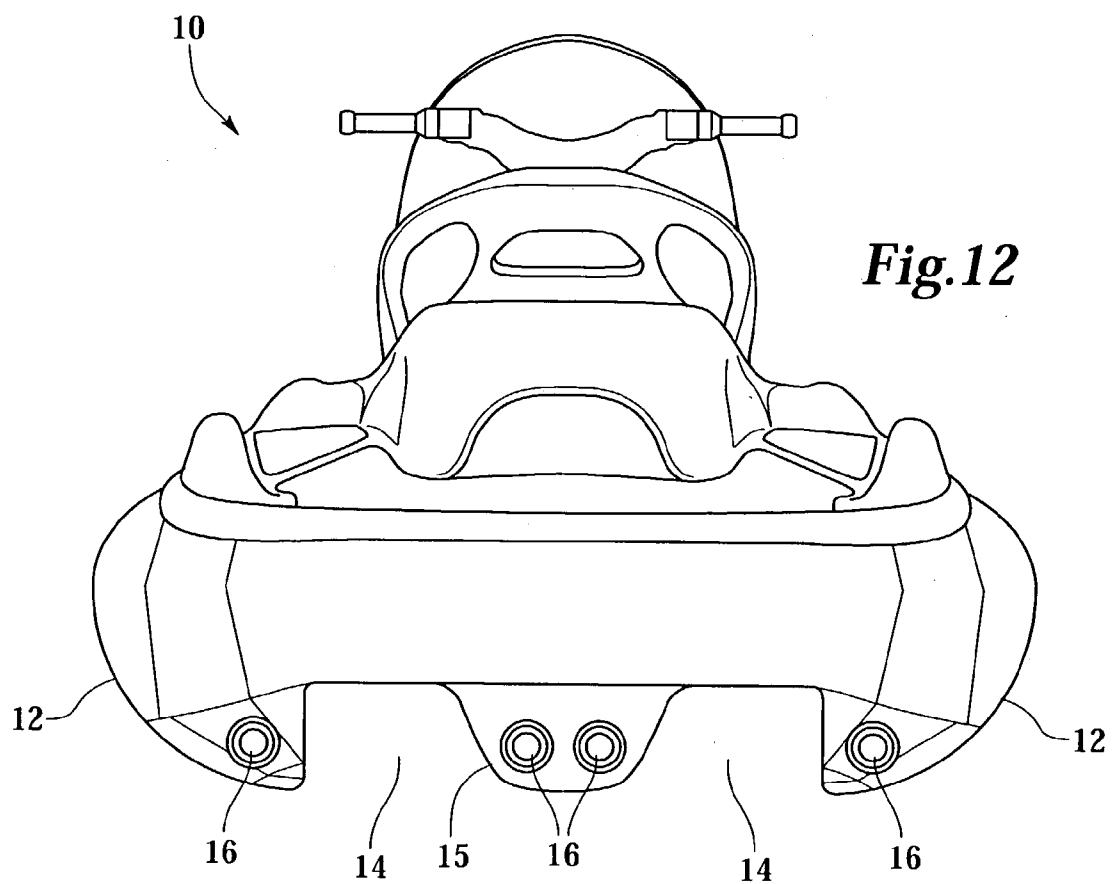
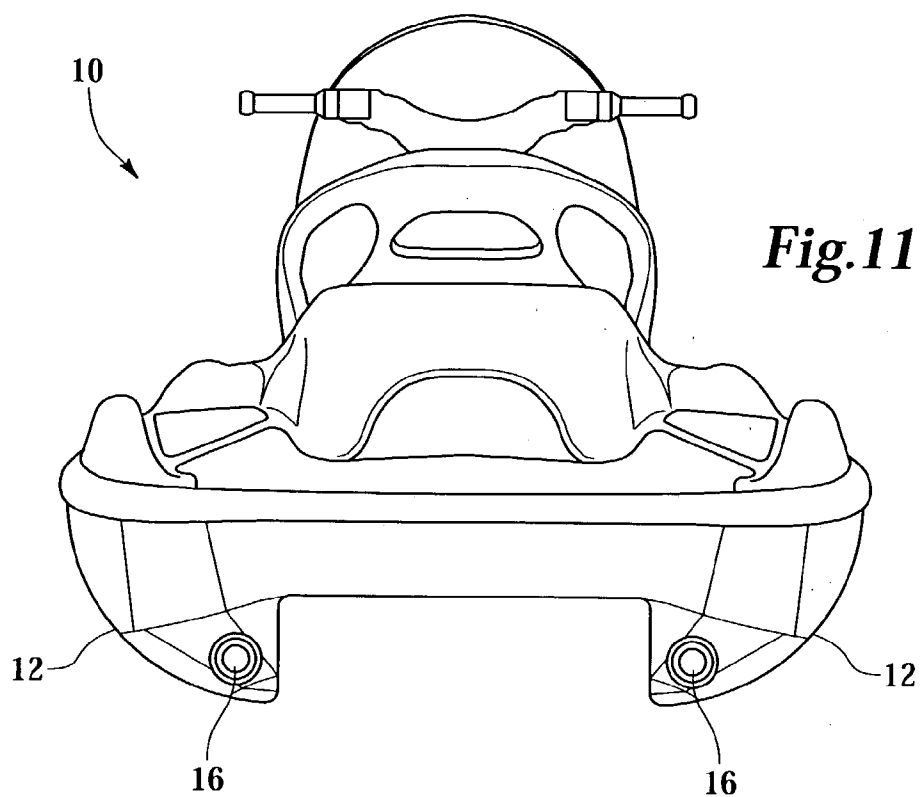


Fig. 6







MULTI-HULL PERSONAL WATERCRAFT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not applicable.

FIELD OF THE INVENTION

[0004] The present invention relates to personal watercraft and more specifically to an improved hull for such watercraft.

BACKGROUND OF THE INVENTION

[0005] Personal watercraft are widely used in leisure, sport, rescue, and similar activities. A personal watercraft may be defined as a vessel that uses an inboard motor powering a jet pump as its primary source of propulsion and is designed to be operated by a person sitting, standing, or kneeling on the vessel rather than the conventional manner of sitting, standing, or kneeling inside the vessel. Personal watercraft are typically less than about sixteen feet long and typically can carry one to four passengers. In one type of personal watercraft, an operator sits astride a longitudinally disposed seating area under which are located the means for propulsion of the watercraft. Examples of such watercraft include those given trademarked names such as Sea-Doo, Jet Ski, Waverunner, and the like. Major systems that typically comprise personal watercraft include a water jet propulsion system, a steering system, an electrical system, and structural members within which the other systems may be located and upon which the operator may sit. The water jet propulsion system may comprise an engine (including a fuel system and a means for controlling the speed of the engine), a water pump, a water inlet, and a water outlet. Examples of suitable engines include two-cycle and four-cycle internal combustion engines. As will be recognized by those of skill in the art, other types of engines may be used in the water jet propulsion system. The engine drives an impeller within the water pump, which pulls water through the inlet and forces it rearward through the outlet at high speed. The personal watercraft is thereby propelled forward.

[0006] The steering system typically comprises a guidance mechanism, such as a steering wheel or handlebars, and a directionally adjustable nozzle attached to or integrated with the water outlet. By turning the guidance mechanism, the operator adjusts the direction of the nozzle and changes the direction at which a jet of water is forced from the outlet, thus changing the direction of the watercraft. The electrical system typically comprises a battery and suitable wiring to aid in starting the watercraft and to provide power to devices that control and monitor the status of the watercraft. The structural members of a personal watercraft typically comprise a lower part and an upper part referred to as a hull and a deck, respectively. The hull is typically V-shaped to improve the hydrodynamic properties of the watercraft. The deck typically includes a seat, the guidance mechanism, and

a control panel that might include gauges, an on/off switch, and other control and monitoring devices. Storage compartments may be located within available spaces of the deck and/or hull.

[0007] Further details of the function and operation of a personal watercraft and its components are well known to those of skill in the art and may be found in numerous patent specifications such as U.S. Pat. No. 6,425,789, Small Watercraft, and U.S. Pat. No. 6,422,168, Sporting Water Vehicle, both of which are incorporated herein by reference.

[0008] The speed of propulsion is typically one of the major attractions of personal watercraft. Therefore, an improvement in the hull of a personal watercraft that provides an improvement in hydrodynamic properties such as an increase in speed and/or stability would generally be desirable for users of such watercraft.

SUMMARY OF THE INVENTION

[0009] Disclosed herein is a personal watercraft having a multi-hull. In an embodiment the multi-hull is a catamaran hull, for example two pontoons connected by a cross structure which form an air passage between the hull and the surface of the water upon launching. In alternative embodiments, the multi-hull is a SWATH hull or a trimaran hull.

[0010] Disclosed herein is a personal watercraft having two water outlets from the propulsion system. In an embodiment, the two or more water outlets are disposed between the pontoons. In another embodiment, each pontoon has a water outlet mounted thereto or integral therewith. In another embodiment, each water outlet is positioned within the cross-sectional area of the pontoon.

[0011] Disclosed herein is a method for increasing the speed at which a personal watercraft is propelled comprising using a multi-hull design to decrease the hydrodynamic resistance on the watercraft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective view of a personal watercraft configured in accordance with an embodiment of the invention;

[0013] FIG. 2 is a top view of a personal watercraft configured in accordance with an embodiment of the invention;

[0014] FIG. 3 is a rear view of a personal watercraft configured in accordance with an embodiment of the invention;

[0015] FIG. 4 is a rear view of a personal watercraft configured in accordance with an alternative embodiment of the invention;

[0016] FIGS. 5A-5O each present a rear view of alternative catamaran hull designs;

[0017] FIG. 6 is a perspective view of a SWATH hull;

[0018] FIG. 7 is a bottom view of a catamaran hull;

[0019] FIG. 8 is a bottom view of an alternative catamaran hull;

[0020] FIG. 9 is a rear view of a personal watercraft configured in accordance with an embodiment of the invention;

[0021] FIG. 10 is a rear view of a personal watercraft configured in accordance with an alternative embodiment of the invention;

[0022] FIG. 11 is a rear view of a personal watercraft configured in accordance with another alternative embodiment of the invention; and

[0023] FIG. 12 is a rear view of a personal watercraft configured in accordance with another alternative embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] A personal watercraft having a multi-hull configuration such as a catamaran hull, a trimaran hull, and the like is disclosed. In the embodiment of FIG. 1, a perspective view of a personal watercraft 10 having a catamaran hull 11 is shown. The term “catamaran” refers to a hull configuration in which the hull comprises two sections in contact with the water and having an air passage or tunnel disposed therebetween. The two sections, referred to as pontoons or sponsons, are typically long in the bow to stern direction compared to their width in the port to starboard direction and are shaped and/or filled to provide buoyancy to the personal watercraft. The bottoms of the pontoons may be narrower than the tops to improve their hydrodynamic characteristics. The pontoons are typically arranged parallel to each other and to the direction of travel (i.e., bow to stern direction of the watercraft) with a cross structure between them and connecting them (preferably at or near the upper or top portions of the pontoons relative to the surface of the water) such that a gap or tunnel for air passage exists between the pontoons. During operation, the air passing through the tunnel between the surface of the water and the lower surface of the hull creates a lifting force that reduces the amount of drag between the hull and the surface of the water.

[0025] In FIG. 1, the catamaran hull 11 comprises a pontoon 12 located on each side of the watercraft 10 and a tunnel 14 between the pontoons 12. The upper portion 18 of the watercraft 10 typically comprises a seat 22 and a control console 24 typically comprising a steering mechanism 26, a windshield 28, and other control features. The upper portion 18 of the personal watercraft 10 is not shown in detail in FIG. 1 since it is not anticipated to differ significantly in appearance or function from the upper portions found on previously existing personal watercraft, details of which are provided in U.S. Pat. Nos. 6,425,789 and 6,422,168 referenced previously. Similarly, the operation of a personal watercraft is well known and is not addressed in this specification. Any operational, functional, structural, mechanical, or other aspects of a personal watercraft not otherwise addressed in this specification typically are anticipated to be similar to those for existing watercraft as would be known to those of skill in the art.

[0026] A top view of a personal watercraft 10 configured in accordance with an embodiment of the present invention is shown in FIG. 2. The tunnel 14 between the two pontoons 12 is more clearly visible in this view. While the seat 22 shown in FIG. 2 has a design that accommodates two passengers, other configurations are possible. For example, seats designed for one, three, four, or more passengers could also be used. In particular, a three-person seat may be

preferable to accommodate regulations requiring that personal watercraft marketed to pull skiers have three seats.

[0027] FIG. 3 is a rear view of a personal watercraft 10 configured in accordance with an embodiment of the present invention and FIG. 4 is a rear view of an alternative embodiment with wider pontoons 12 than those shown in FIG. 3. Wider pontoons such as these may be used to enhance performance, for example by increasing the stability of the personal watercraft.

[0028] Several embodiments of suitable designs for the shapes and sizes of catamaran hulls are illustrated in FIGS. 5A-5N. The hulls of FIGS. 5A-5O and 6-8 correspond to hull 11 in FIG. 1, and thus can be mated to an appropriate upper portion 18 as shown in FIG. 1. Additional description of these designs is disclosed in an article entitled “A Comparison of Power Catamaran Hull Types” by Jacob van Renen van Niekirk published in the Spring 2000 issue of Power Multihulls Magazine, which is incorporated herein by reference. Each design offers various advantages in speed, stability, and ability to handle different water conditions and may be selected in view of such for use with the present invention. The pontoons may further comprise one or more foils or canards 34 as illustrated in FIGS. 5H and 5J to provide additional speed and stability by creating additional lift on a personal watercraft. Such foils may vary in number, length (e.g., extending partially or across the entire width between the pontoons), width, cross-section, composition, shape, angle, and the like to promote a desired performance. Likewise as shown in the Figures, the shapes and sizes of the pontoons and resulting tunnel between them may vary in width, cross-section, composition, shape, angle, and the like to promote a desired performance. For example, in addition to the designs illustrated in FIG. 5, the SWATH (Small Waterplane Area Twin Hull) hull technology as shown in FIG. 6 may be used wherein the pontoons are submerged below the waterline and are connected to the above-water portions of the watercraft by struts. Foils or canards may be used in the SWATH technology to improve speed and stability. In any of the pontoon designs, the pontoons may be made of suitable lightweight, water-resistant materials such as molded fiberglass-reinforced resin or similar materials. The pontoons may be hollow, filled or partially filled with buoyant material such as foam, and/or may be used in whole or in part as service, utility, and/or storage areas for other portions of the watercraft.

[0029] For additional clarity, bottom views of alternative catamaran hull embodiments are shown in FIGS. 7 and 8. Referring to FIG. 7, catamaran hull 11 comprises two pontoons 12 connected by a cross structure 17 to form a tunnel 17 between the bottom surface of the hull and the surface of the water. Referring to FIG. 8, catamaran hull 11 likewise comprises two pontoons 12 connected by a cross structure 17 to form a tunnel 17, and further comprises a “nose” member 13 extending forward from cross structure 17 and disposed between the front portions of pontoons 12. The shape of nose member 13 may be modified to achieve desired aesthetic and/or functional results such as adjusting the flow of air through tunnel 14. In addition to the traditional double-pontoon catamaran design, an embodiment could include a multi-hull configuration having three or more pontoons and two or more resulting gaps or tunnels for air passage. For example, the hull may comprise a “trimaran” design as shown in FIG. 50, in which three pontoons

are present. Alternatively, the hull may comprise four or more pontoons with a resulting number of tunnels for air passage.

[0030] Referring to the top view of the embodiment shown in FIG. 2, a permanent or removable panel (not shown) may be inserted between the pontoons 12 so that a continuous deck surface is formed from the outer edge of one pontoon 12 to the outer edge of the other pontoon 12. Such panels may be adjusted in size and shape, for example to provide a “nose” appearance as shown in FIG. 8. The panel may be removable or the panel, the pontoons 12, and other structural parts of the watercraft 10 may form a single, integrated structure. When a removable panel is in place or when a panel is integrated with the other structural parts of the watercraft 10, the deck of the watercraft 10 may have a top view appearance similar to that of the decks of previously existing personal watercraft. The panel may be shaped as desired, for example convex or concave.

[0031] Several configurations are possible for the locations of the water outlets of the propulsion system and for the mechanical configuration of the propulsion system. In various embodiments, the propulsion system may comprise one or more engines, one or more pumps, one or more water inlets, and one or more water outlets. In FIG. 9, only one water outlet 16 is present, disposed in the tunnel 14 between the pontoons 12 and held in place by a support member 15. When two water outlets 16 are present, both may be disposed within tunnel 14 between the pontoons 12 and held in place by support member 15 as shown in FIG. 10. Alternatively, as shown in FIG. 11, one water outlet 16 may be located in or near one of the pontoons 12 and the other water outlet 16 may be located in or near the other pontoon 12. In the embodiment of FIG. 12, two water outlets 16 are disposed within tunnel 14 between the pontoons 12 and are held in place by support member 15 and two additional water outlets 16 are present, one located in or near one of the pontoons 12 and the other located in or near the other pontoon 12.

[0032] In configurations having multiple water outlets, the amount of water exiting each outlet may be independently or dependently varied by control means to achieve a desired performance, such as decreased turning radius or increased navigational control. In an embodiment, two engines, two pumps, and two water outlets may be present. Each engine may power one of the pumps, which in turn forces water through one of the water outlets. In this configuration, the speed of each engine could be controlled separately so that the speed of each pump, and thus the speed of water ejection through each water outlet, could be varied independently. Alternatively, the speed and/or flow volume of the pump may be varied independently or dependently from the engine speed. This may aid in steering the watercraft. For example, if water is ejected at high speed from the right water outlet and at low speed from the left water outlet, the watercraft would turn to the left at a smaller turning radius than could be achieved using traditional steering methods alone.

[0033] Alternatively, a single engine could supply power to two separate pumps, each of which could force water through one of two water outlets. A tighter turning radius could also be achieved with this configuration but the transfer of power from the engine to the pumps would occur in a slightly different manner than that described above. For

example, two power regulation devices could be present, each placed between the engine and one of the pumps. While the engine might operate at a constant power, the power regulation devices could be adjusted independently by the operator of the watercraft to vary the amount of power delivered to each of the pumps. In this manner, the ejection speed of the water from each of the water outlets could be varied independently or dependently and the steering capabilities of the watercraft could be improved. Alternatively, a single engine and single pump could be plumbed to multiple water outlets, with flow from the pump being diverted in equal or unequal amounts to achieve desired control as discussed herein.

[0034] Other possible configurations for the components of the propulsion system could include any other combination of one or more engines, one or more pumps, one or more water inlets, and one or more water outlets. In such embodiments, for example as shown in FIG. 12, the pontoons may be sized such that each may accommodate all or a portion of the propulsion system. Furthermore, additional means may be used to control the flow and direction of water exiting the outlets, such as flow restrictors and/or means for vectoring the water jet thrust exiting the outlets. Other control features such as propulsion system trim, tilt, directional control and the like may be incorporated as known to those of skill in the art.

[0035] Personal watercraft hulls as described herein may comprise known, conventional manufacturing materials and methods as known to those of skill in the art, for example composite materials such as fiberglass composites using lay-up or spray molding techniques. Personal watercraft having hulls as described herein provide improved speed and stability characteristics as compared to existing watercraft having single-hull designs. For example, speed is increased in a personal watercraft having a catamaran hull because air may pass through the tunnel between the two pontoons and create aerodynamic lift on the personal watercraft, thus reducing frictional forces between the pontoons and the water. Furthermore, stability, and in particular lateral or port-to-starboard stability of the type where an operator tips or overbalances the watercraft and is thrown therefrom during operation and/or attempts to re-mount the watercraft, is typically improved by the opposing pontoons and may be further controlled by adjusting the length, width, and distance between pontoons.

[0036] Although only a few embodiments of the present invention have been described, it should be understood that the present invention may be embodied in many other specific forms without departing from the spirit or the scope of the present invention. The present examples are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims along with their full scope of equivalents.

What is claimed is:

1. A personal watercraft having a multi-hull.
2. The personal watercraft of claim 1 wherein the multi-hull is a catamaran hull.
3. The personal watercraft of claim 2 wherein the catamaran hull further comprises two pontoons connected by a cross structure.

4. The personal watercraft of claim 3 wherein upon launching into a body of water and operation of the watercraft, the two pontoons connected by a cross structure form one or more air passageways between the hull and the surface of the water.

5. The personal watercraft of claim 3 further comprising two or more water outlets disposed between the pontoons.

6. The personal watercraft of claim 3 wherein each pontoon has a water outlet mounted thereto or integral therewith.

7. The personal watercraft of claim 6 wherein each water outlet is positioned within the cross-sectional area of the pontoon.

8. The personal watercraft of claim 6 further comprising one or more additional water outlets disposed between the pontoons.

9. The personal watercraft of claim 5 further comprising a propulsion system coupled to the water outlets, the propulsion system comprising one or more engines driving one or more pumps transferring water from one or more water inlets to the water outlets.

10. The personal watercraft of claim 6 further comprising a propulsion system coupled to the water outlets, the propulsion system comprising one or more engines driving one or more pumps transferring water from one or more water inlets to the water outlets.

11. The personal watercraft of claim 1 further comprising a seat that can accommodate at least three passengers.

12. The personal watercraft of claim 2 wherein the catamaran hull is a SWATH hull.

13. The personal watercraft of claim 1 wherein the multi-hull is a trimaran hull.

14. The personal watercraft of claim 3 further comprising one or more panels located between the pontoons.

15. The personal watercraft of claim 14 wherein at least one panel is removable.

16. The personal watercraft of claim 14 wherein at least one panel is integrated with the cross structure to form a deck.

17. A personal watercraft having two water outlets.

18. A personal watercraft hull having two or more pontoons.

19. The personal watercraft hull of claim 18 wherein the hull is a catamaran.

20. A method for increasing the speed at which a personal watercraft is propelled comprising using a multi-hull design to decrease the hydrodynamic resistance on the watercraft.

21. The method of claim 21 wherein the multi-hull is a catamaran hull.

* * * * *