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BOAT AND PROPULSION MEANS THEREFOR

Filed Nov. 14, 1960

3 Sheets-Sheet 1

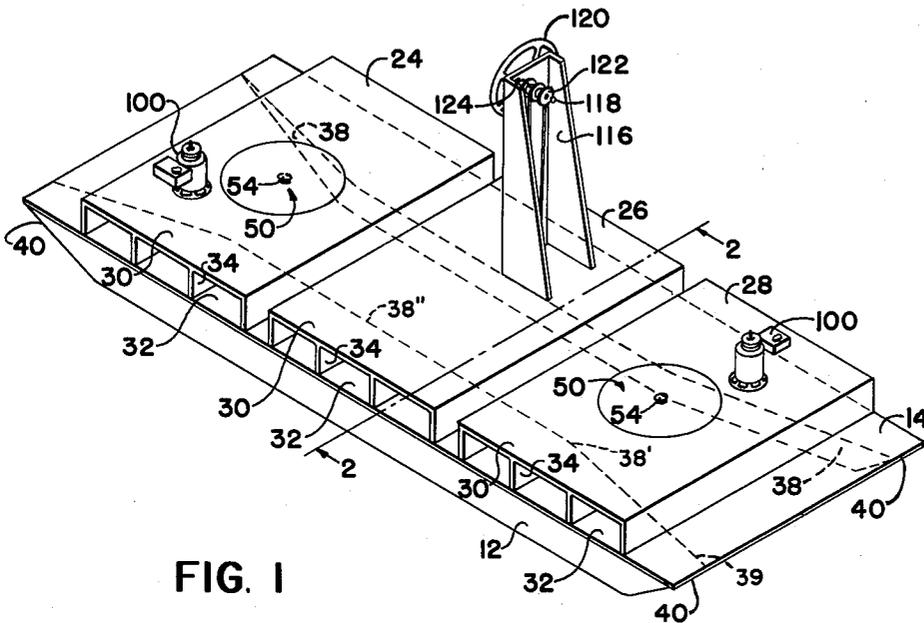


FIG. 1

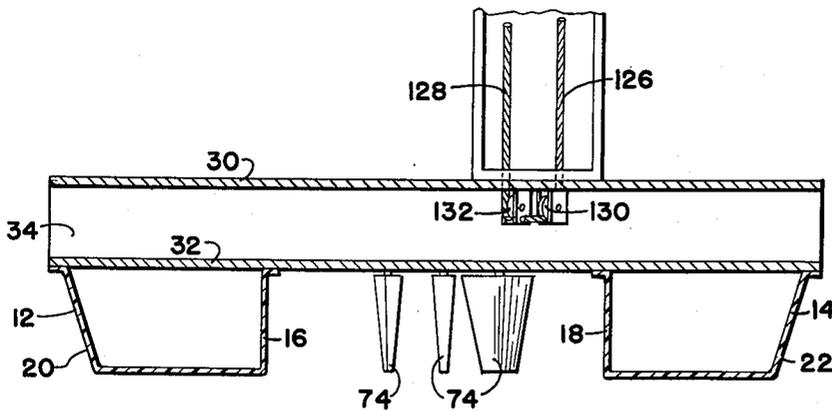


FIG. 2

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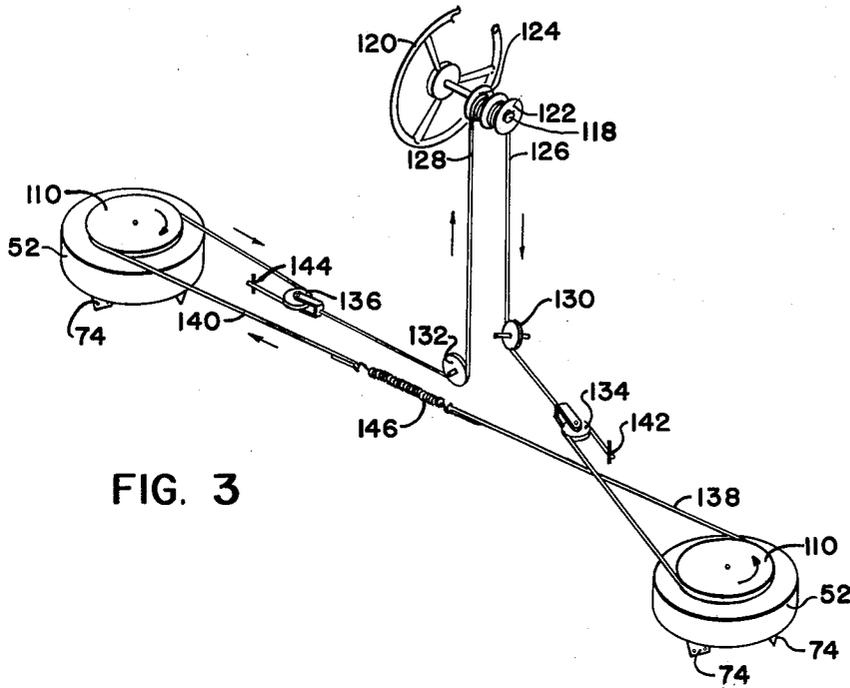


FIG. 3

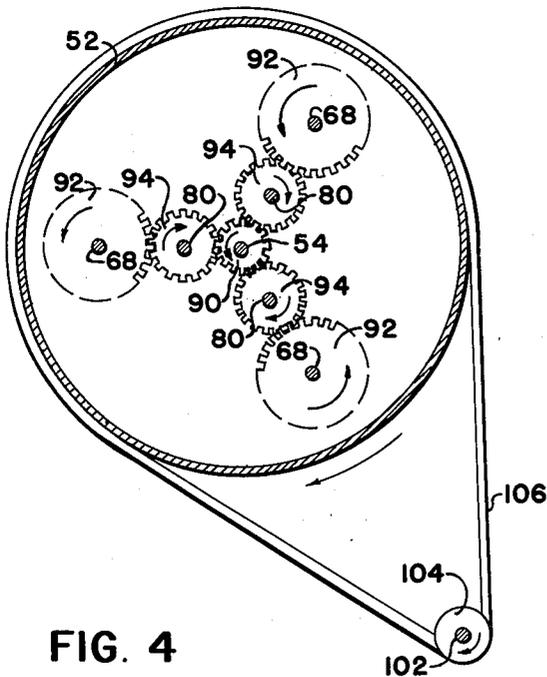


FIG. 4

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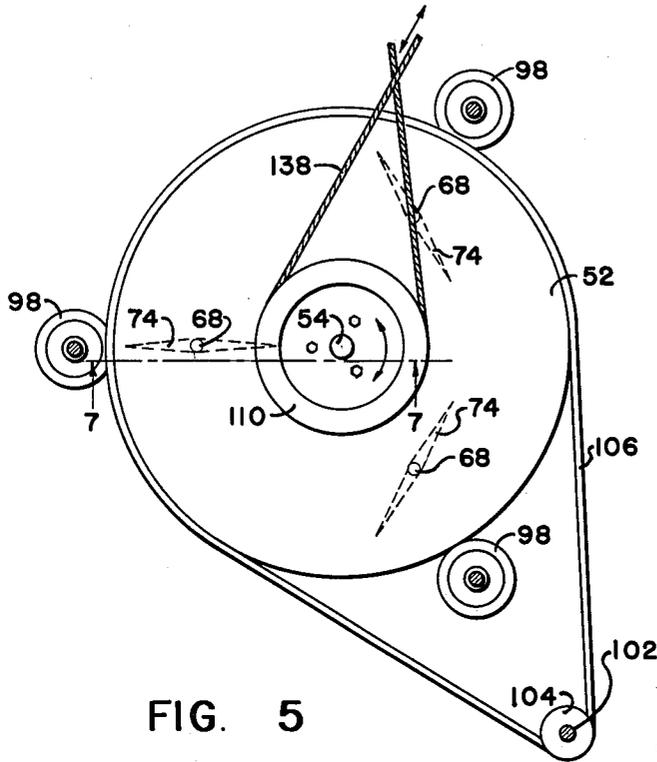


FIG. 5

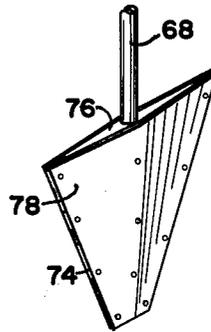


FIG. 6

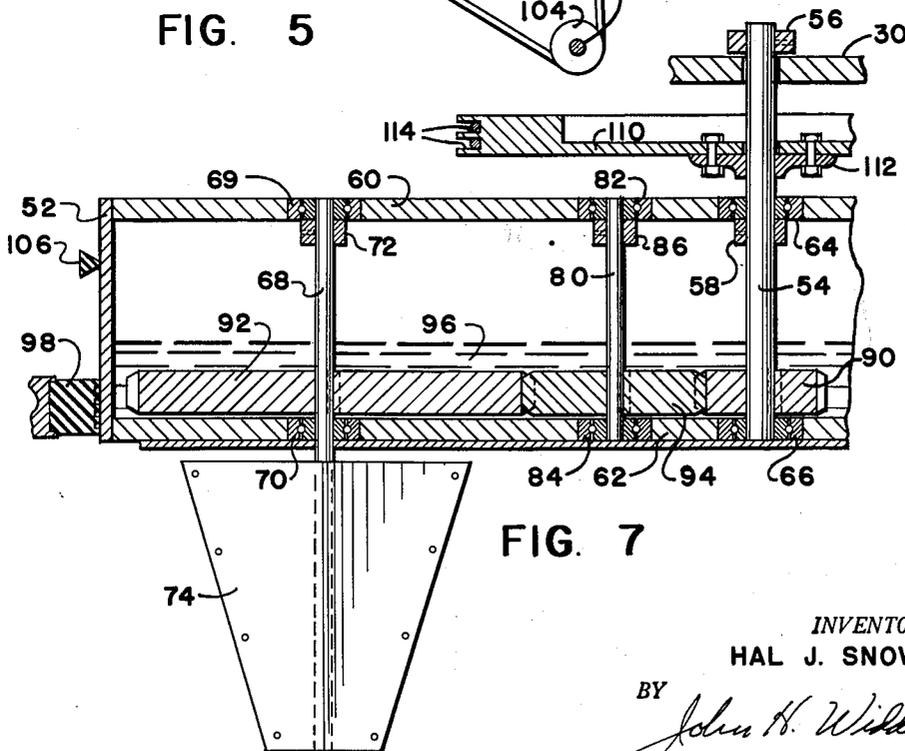


FIG. 7

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BOAT AND PROPULSION MEANS THEREFOR

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4 Claims. (Cl. 114-61)

This invention relates to boats and to drive means for a boat. In a more specific aspect, this invention relates to a twin hulled boat having specific novel and inventive drive means therefor. In another specific aspect, the invention relates to a new boat construction having a venturi configuration. In a still further specific aspect, the invention relates to new sculling drive means. In another specific aspect, the invention relates to a drive means and boat, particularly a twin hulled boat having a venturi throat therebetween. Still more specifically the invention relates to novel drive means in combination with a novel boat construction.

Various types of boat constructions and drive means therefor are known in the prior art. The prior art boat constructions include twin hulled vessels having common drive means therefor. The twin hulled boats of the prior art represent a decided improvement over previous single hulled boats in their stability and ease of operation. The prior art twin hulled vessels have failed to provide the optimum shape or contour to the hulls to provide efficient and streamlined movement of the boat through the water.

The prior art drive means include the so-called sculling or cycloidal drive means. These prior art propulsion drive means have not proved adequate or satisfactory and as a result thereof the potential commercial market for these drive means have not been realized. Furthermore, these prior art drive means have not been utilized with twin hulled boats to provide a highly desirable combination of structures.

The boat of the invention is of a twin hulled construction. In one preferred specific embodiment of the invention, the twin hulls are preferably contoured at one end portion so as to provide a venturi configuration therebetween. The other end portion of each of the hulls is preferably provided with steering rudders which are interconnected so as to move in unison. The drive means for the boat is preferably mounted so as to be in the entry and outlet portions adjacent the throat portion of the venturi passage to provide optimum efficiency in driving the boat. In another preferred specific embodiment of the boat of the invention the twin hulled construction is contoured so as to provide a venturi configuration at each end portion of the boat. A plurality of propulsion means can be provided for this boat construction preferably two are provided with one of the propulsion means mounted in each of the venturi entry and outlet portions formed by the inner hull lines. The propulsion means in each embodiment can be constructed so as to be movable to change the direction of thrust to provide steering for the boat, or suitable rudders can be provided on the boat to steer same. The structure connecting the hulls in both embodiments can conveniently be either a generally flat deck, or it can be formed of a waffle or honeycomb like structure and can have suitable superstructure mounted thereon to close in the deck, as desired.

The sculling or cycloidal type drive means of the invention preferably includes a generally cylindrical housing supported by a center shaft or post carried by the boat. The housing preferably has a plurality of paddles journaled in the housing. Suitable power means, such as a gasoline engine or a powered electric generator and electric motor can be provided to rotate the cylindrical housing while the center shaft remains stationary. Gearing preferably carried by the housing will cause the paddle shafts to rotate the paddles as the housing turns. The

sculling or cycloidal drive means is preferably utilized with the boat construction having a venturi at each end portion thereof, and the sculling propulsion means is desirably mounted in the throat portion of each venturi.

Accordingly, it is an object of this invention to provide a new boat construction.

A further object of the invention is to provide a new, novel and practical means for driving a cycloidal or sculling propeller.

Another object of the invention is to provide a new twin hulled boat construction.

A further object of the invention is to provide a new water craft having increased stability.

Another object is to provide a new water craft capable of operating in relatively shallow water.

A still further object of the invention is to provide a new hulled boat construction wherein the hulls are contoured to form a venturi.

Another object of the invention is to provide a new boat construction having a venturi passage with drive means mounted in the end portions of the venturi passage.

Another object of the invention is to provide a new boat construction having a venturi hull line with sculling drive means mounted in end portions of the venturi passage.

Another object of the invention is to provide a new sculling drive means for a boat.

A further object of the invention is to provide a new sculling drive means particularly suitable for use in a twin hulled boat having a venturi passage formed therebetween with end portions in which the sculling drive means is received.

Another object is to provide a new water craft constructed to eliminate power losses normally encountered in prior art constructions.

A further object of the invention is to provide a water craft having propulsion means operable in the draft of the craft.

Various other objects, advantages and features of the invention will become apparent from the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is an isometric view of one preferred specific embodiment of the boat of the invention having the sculling drive means of the invention mounted therein.

FIG. 2 is an enlarged cross section view taken along the line 2-2 of FIG. 1.

FIG. 3 is a diagrammatic view of the steering apparatus preferably employed with the boat and drive means of FIG. 1.

FIG. 4 is a cross section view through the housing of the sculling drive means of the invention.

FIG. 5 is a top plan view of the housing of the sculling drive means showing the relative position of the various paddles and the connection of the steering apparatus to the drive means.

FIG. 6 is an isometric view showing a preferred construction of the paddles used with the sculling drive means.

FIG. 7 is an enlarged partial cross section view taken along the lines 7-7 of FIG. 5.

The following is a discussion and description of preferred specific embodiments of the boat of the invention and of the new drive means of the invention such being made with reference to the drawings whereon the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and description is not to unduly limit the scope of the invention.

Referring now to the drawings in detail, FIGS. 1 and 2 show a preferred specific embodiment of the boat of the invention. The boat includes two hulls or frames 12

and 14. The hulls 12 and 14 are preferably hollow and are desirably formed of a molded plastic material which can be suitably reinforced to provide the required strength. The hulls 12 and 14 are preferably open at the top side to be secured to the boat deck in any suitable manner. Hulls 12 and 14 can be filled with a foam material or other types of buoyant material to enhance the flotation qualities of the hulls or frames, and they can be divided into a plurality of sections which are water tight so that if one section of the hull is punctured or ruptured in use the boat will remain afloat until repairs can be made. The facing surfaces 16 and 18 of hulls 12 and 14 respectively are preferably disposed in generally vertical planes and the outer surfaces 20 and 22 are preferably tapered slightly from the top to the bottom of each hull to increase the stability and flotation of the boat.

A boat deck of any suitable construction can be provided on which the hulls are mounted. The deck shown in FIG. 1 is composed of three sections 24, 26 and 28. Each of the sections 24, 26 and 28 are preferably constructed of a waffle or honeycomb type construction having upper and lower panels 30 and 32 respectively separated by reinforcing ribs 34. The panels 30 and 32 and ribs 34 can be of any suitable construction, including plastics, wood, light weight metals and the like. The space between panels 30 and 32 can be filled with a foam material, if desired. The deck sections 24 and 28 are duplicates of each other and can be separately constructed as shown in the drawings and have the drive means mounted thereon and then be mounted on the hulls in mirror image relation. In some instances, it will be desirable to form the entire deck structure of a single unitary deck instead of in sections as shown. The deck sections can be spaced as shown and covered with suitable flooring material, or they can be in contact to form a continuous deck.

When hulls 12 and 14 are mounted on or beneath deck sections 24, 26 and 28 they are in generally parallel and spaced relation. The hulls 12 and 14 when mounted on like passageway 38' between the hulls and having a toured as shown at 38 so as to form a venturi or venturi-like passageway 38¹ between the hulls and having a straight throat portion 38'' with diverging end portions 39 extending therefrom at each end of the boat. And, the passageway for water overall from end to end has been found to function in the manner of a venturi relative to the boat and movement through the water. The ends of each hull can also be tapered from top to bottom as shown at 40 to reduce the friction at the leading edge of the boat.

Sculling or cycloidal type propelling means, shown generally at 50, are preferably provided and are preferably mounted in each end portion of the deck in sections 24 and 28 and positioned in relation to the hulls 12 and 14 so as to be approximately in the enlarged or diverging end portions 39 adjacent ends of the throat of the venturi passage formed by the hulls. The combination of the boat construction shown in FIG. 1 and the sculling drive means therefor has been found to be very desirable in use, the hull construction providing streamlined movement in the water. The sculling drive or propelling means of the invention is shown in detail in FIGS. 4-7.

The sculling propelling means includes a housing 52 preferably positioned below one of the panels 30 of the deck. A center shaft 54, which is normally stationary, is suspended from the deck panel 30 or other portion of the craft in any suitable manner, such as by a collar 56 being rigidly secured to the upper end portion of the shaft 54 to engage the panel 30. Shaft 54 is provided with another collar 58, FIG. 7, which limits downward movement of the housing 52. The housing 52 is preferably closed by a top 60 and a bottom 62, and suitable bearings 64 and 66 can be provided to rotatably mount the housing 52 on shaft 54. Housing 52 is preferably cylindrical.

Drive shafts 68 are provided and are preferably jour-

naled in the top 60 and bottom 62 of housing 52 and project downwardly therefrom as best seen in FIG. 7. Preferably, a plurality of the drive shafts 68 are provided, three of such being shown in the drawings, although more or less can be provided if desired. The drive shafts 68 are preferably equally spaced from the center shaft 54 and equally spaced circumferentially within the housing 52.

The drive shafts 68 are preferably journaled in the housing 52 by bearings 69 and 70. A collar 72 can be secured to each drive shaft 68 to prevent upward movement of the shafts 68 within housing 52. A paddle 74 is secured to the lower end portion of each of the drive shafts 68. A preferred construction of paddle 74 is best seen in FIG. 6 wherein two plates 76 and 78 are positioned on opposite sides of the shaft 68 and are secured together and to the shaft along the edges and in the center by welds, mounting bolts or the like. Preferably, the paddle tapers inwardly from top to bottom as shown in the drawings. The plates 76 and 78 can be formed of metal, wood, plastics and the like. As best seen in FIG. 5, the paddles 74 are preferably mounted so that the planes of the paddles will intersect at a common point.

Intermediate shafts 80 are provided and are journaled in the housing 52 by bearings 82 and 84 and positioned therein by a collar 86. One of the intermediate shafts 80 is provided for each of the drive shafts 68, and the shafts 80 are positioned between the center shaft 54 and each of the drive shafts 68.

Center shaft 54 has a sun gear 90 keyed or otherwise secured thereto near the bottom 62 of the housing. The drive shafts 68 have planet gears 92 secured thereto and the intermediate shafts 80 have gears 94 secured thereto. The gear ratio is such that the drive shafts 68, gears 92 and paddles 74 rotate 180 degrees in one direction as the entire housing 52 is rotated 360 degrees in the opposite direction. In order to facilitate lubrication of the gearing system, the housing 52 can be partially or wholly filled with a lubricant, such as grease or oil shown as at 96. If desired, water can be used as a lubricant.

A plurality of wheels or rollers 98, preferably three in number, are provided to engage the side of the housing 52 and support same during rotation of the housing. The wheels or rollers 98 are rotatably mounted within the deck structure in any suitable manner (not shown). In some instances, it will be desirable to taper the side of the housing 52 from top to bottom and mount wheels or rollers 98 at an angle to provide the vertical support for the housing.

Suitable power means, such as the gasoline engines shown at 100, FIG. 1 are provided and are mounted on the deck sections 24 and 28 with the drive shaft thereof projecting into the deck sections. The drive shaft of the engine is shown at 102 in FIG. 5 and has a pulley 104 secured thereto. A V-belt 106 is provided and connects the pulley 104 on the drive shaft 102 of engine 100 with the outer cylindrical surface of the housing 52 as shown in FIGS. 4, 5 and 7. In some instances, it will be desirable to provide a generator on the deck structure to provide current for an electric motor which in turn drives V-belt 106.

In operation, when the gasoline or other type power means 100 is in operation, pulley 104 will be turned driving V-belt 106 and causing the housing 52 to be rotated about the stationary center shaft 54. As housing 52 rotates about shaft 54 the planetary gearing 90, 92 and 94 will cause the paddles 74 to be rotated, driving the boat in the water. As the boat moves in the water, the hulls forming the venturi will permit streamlined movement of the boat relative to the water, thus providing a highly efficient boat having a relatively small amount of energy losses, and the advantage of the venturi structure will be gained to propel the boat.

As will be seen from FIG. 5, as the housing 52 is rotated driving paddles 74, one of the paddles 74 will be

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moved through the position to the left side of FIG. 5, that is, with the plane of the paddle 74 transverse to the direction of movement of the boat. As the paddle is forced through the water by the rotation of the housing 52 it will push backwardly on the water in the venturi throat and move the boat forwardly. As the paddle moves around the center shaft 54, it will rotate 180 degrees in one direction as the housing 52 rotates 360 degrees in the opposite direction due to the ratio of the gearing provided. Thus, as the paddles 74 move to the other positions shown in FIG. 5, the plane of the paddle will be changed so that the component action on the water is always in the same direction. By driving the housing on the periphery, and supporting it on rollers contacting the outside surface, the overhung load is removed from the central shaft, thereby making the cycloidal propeller a practical and improved means of propulsion.

In practice, one power means can be used to drive both cycloidal propelling means, or more than one of the power means can be used with each propelling means. Suitable clutch means (not shown) are provided with the power means in the common manner.

A drum 110 is provided and is secured to center shaft 54 in any suitable manner, such as by providing a collar or plate 112 to which the drum 110 is secured and the collar or plate 112 is in turn mounted on the shaft 54. Drum 110 is positioned between the deck panel 30 and the top 60 of housing 52, although in some instances the drum 110 can be mounted above the deck panel 30. Drum 110 is grooved as shown at 114.

An upright support 116 of suitable construction is mounted on the deck of the boat. The support carries a shaft 118 on which is mounted a steering wheel 120. Two drums 122 and 124 are mounted on the shaft 118 to be turned by the steering wheel 120. Cables 126 and 128 are wound on the drums 122 and 124 respectively. Cables 126 and 128 are wound in opposite directions on drums 122 and 124 so that when shaft 118 is turned by steering wheel 120 one of the cables will be wound on the drums and the other will be unwound.

Intermediate pulleys 130, 132, 134 and 136 are secured to the boat deck construction in any suitable manner. Cables 126 and 128 are received by pulleys 130 and 132 respectively and secured to the mounting means for pulleys 134 and 136 respectively.

Other cables 138 and 140 are provided and are received by the pulleys 134 and 136 respectively. The cables 138 and 140 are secured to a stationary pin or the like shown at 142 and 144. The other ends of cables 138 and 140 are secured to opposite ends of an elongated helical spring 146. The intermediate portion of cables 138 and 140 surround the pulleys 110 on the sculling drive means 50.

As will be seen from FIG. 3, when steering wheel 120 is turned, shaft 118 is rotated causing cables 126 and 128 to be reeled onto drums 122 and 124 or therefrom. This movement of cables 126 and 128 causes drums 134 and 136 to move, which in turn moves cables 140 and 138. As cables 138 and 140 are moved, the drums 110 on the sculling drive means will be rotated, causing the center shafts 54 to be turned. This turning of the center shafts 54 will move the relative position of the paddles 74 in operation, causing a similar change in the direction of the propelling force caused by the movement of paddles 74. By turning steering wheel 120 and rotating the center shafts 54, the direction of the propelling force of each of the sculling drive means 50 mounted on the deck sections 24 and 28 can be changed in unison to provide the steering mechanism for this boat means. By rotating the center shaft 180 degrees the boat can be completely reversed.

It has been found that the sculling drive means as shown and described hereinbefore is particularly suitable for use with a twin hull boat configuration as hereinbefore described. This is particularly so when the sculling drive means 50 is mounted so as to be received in end portions

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of the venturi passage approximately at the ends of the throat thereof formed by the contoured hulls. As the boat is moved through the water, the contour of the hulls will concentrate the water between the hulls at the throat of the venturi formed by the hulls and the location of the drive means adjacent ends thereof results in an efficient and highly economical boat and drive means construction. Pressure differential will propel the boat to the maximum efficiency, a relatively low pressure being formed at the forward end of the craft and a relatively high pressure at the aft end.

The hull lines provided are generally parallel to the direction of travel, providing for streamlined movement of the craft in the water and eliminating power losses occurring as a result of the wake created by conventional boat construction. The sculling propulsion means is operably in the draft of the craft, and in operation increases the desirable pressure differential.

As will be evident to those skilled in the art, various modifications of this invention can be made or followed, in the light of this description and discussion, without departing from the spirit of the disclosure or the scope of the claims.

What is claimed is:

1. A boat comprising, in combination, two hulls, each of said hulls being hollow and formed of a molded, reinforced plastic material, a honeycomb boat deck mounted on said hull and extending therebetween, said deck positioning said hulls in spaced, generally parallel relation, said hulls when mounted being the mirror image of each other and contoured externally so that when mounted on said deck said hulls form a venturi passage therebetween, said venturi passage including a throat portion with straight parallel sides and enlarged end portions having sides diverging from ends of the throat portion toward respective ends of said boat, and sculling propelling means centrally mounted in each end portion of said deck and positioned in said end portions of said venturi passage adjacent ends of the throat thereof, each of said sculling propelling means having a normally stationary center shaft supported from said deck in suspended relation, said center shaft supporting a closed cylindrical housing above the venturi passage, said center shaft journaled in said housing, three drive shafts, said drive shafts being rotatably journaled in said housing and projecting downwardly therefrom, a paddle mounted on the lower end portion of each of said drive shafts and positioned in the venturi passage, the planes of said paddles converging at a single point, said drive shafts being radially and equally spaced from said center shaft and from each other, an intermediate shaft between said center shaft and each of said drive shafts and journaled in said housing, planetary gearing mounted on said center shaft, said intermediate shafts, and said drive shafts connected and operable to turn said paddles, three spaced supporting wheels mounted in said deck and engaging the side of said cylindrical housing to support same for rotation, an engine mounted on said deck adjacent to each of said sculling propelling means with the drive shaft thereof projecting downwardly into said deck, and a V-belt connecting the drive shaft of said engine and the outer surface of said housing to turn said housing when said engine is in operation, a drum rigidly mounted on said center shaft of each of said sculling propelling means between said housing and the top of said deck, an upright support mounted on said deck, a shaft carried by said support, a steering wheel mounted on one end of said shaft, two drums mounted on the other end of said shaft, and cables connecting said drums on said propelling means with said drums on said shaft so that as said steering wheel is turned said center shaft of each of said propelling means is rotated, causing the direction of the propelling force of said paddles to be correspondingly changed, said boat being constructed and adapted so that said engine will rotate said cylindrical housing causing

said drive shafts therein to be rotated to drive said boat in the water with said hulls having streamlined movement relative to the water through said venturi passage, and said steering wheel can rotate said center shafts to change the direction of thrust and turn said boat.

2. A boat comprising, in combination, two elongate hulls, a deck carried by said hulls and extending the length thereof and extending therebetween to space the hulls in mirror image relation, said deck having a bottom surface with said surface between the hulls being planar for the length thereof, said hulls being generally parallel and having opposite outer planar sides parallel to the longitudinal center line of the boat, said hulls having inner adjacent sides contoured to cooperate with said bottom surface of the deck to form an unobstructed venturi passage between said hulls, said inner adjacent hull sides having substantially straight parallel planar portions forming a venturi throat and end portions on the respective hulls in diverging relation extending from the venturi throat to respective ends of the hulls and forming enlarged entry and outlet portions of the venturi passage, and propelling means of cycloidal type having a plurality of depending paddles bodily rotatable about a vertical axis, said propelling means being supported on said deck on the center line of the boat at one of said enlarged portions of said venturi passage adjacent said venturi throat with only the paddles extending below the bottom surface of the deck into said passage for propelling water through said venturi passage and thus propel the boat in operation.

3. A boat comprising, in combination, two elongate hulls, each of said hulls being hollow, a deck carried by said hulls and extending the length thereof and extending therebetween to space the hulls in mirror image relation, said deck having a bottom surface with said surface between the hulls being planar for the length thereof, said hulls being generally parallel and having opposite outer planar sides extending for the length of the hulls and parallel to the longitudinal center line of the boat, said opposite outer sides being inclined downwardly and inwardly, said hulls having inner adjacent sides contoured to cooperate with said bottom surface of the deck to form an unobstructed venturi passage between said hulls, said inner adjacent hull sides having substantially straight parallel planar portions forming a venturi throat and end portions on the respective hulls in diverging relation extending from the venturi throat to respective ends of the hulls and forming enlarged entry and outlet portions of the venturi passage, and propelling means of cycloidal type having a housing rotatably supported on said deck and a plurality of paddles depending therefrom and bodily rotatable with said housing about a vertical axis, said propelling means being arranged at one of said enlarged portions of said venturi passage adjacent said venturi throat with only the paddles extending below the bottom surface of the deck into said passage for propelling water

through said venturi passage and thus propel the boat in operation.

4. A boat comprising, in combination, two elongate hulls, each of said hulls being hollow, a deck carried by said hulls and extending the length thereof and extending therebetween to space the hulls in mirror image relation, said deck having a bottom surface with said surface between the hulls being planar for the length thereof, said hulls being generally parallel and having opposite outer planar sides extending for the length of the hulls parallel to the longitudinal center line of the boat, said opposite outer sides being inclined downwardly and inwardly, said hulls having inner adjacent sides contoured to cooperate with said bottom surface of the deck to form an unobstructed venturi passage between said hulls, said inner adjacent hull sides having substantially straight parallel planar portions forming a venturi throat and end portions on the respective hulls in diverging relation extending from the venturi throat to respective ends of the hulls and forming enlarged entry and outlet portions of the venturi passage, propelling means of cycloidal type having a center shaft supported from the deck in suspended relation and a housing rotatable on said shaft with a plurality of paddles depending therefrom and bodily rotatable with said housing about a vertical axis, said propelling means center shaft being arranged at one of said enlarged portions of said venturi passage adjacent said venturi throat with only the paddles extending below the bottom surface of the deck into said passage for propelling water through said venturi passage and thus propel the boat in operation, gear means operatively connecting said center shaft with said paddles for rotating said paddles relative to said housing in response to rotation of said housing, and means operatively connected to said center shaft for selectively rotating same in changing the relative position of the paddles to the housing and direction of thrust of said paddles.

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