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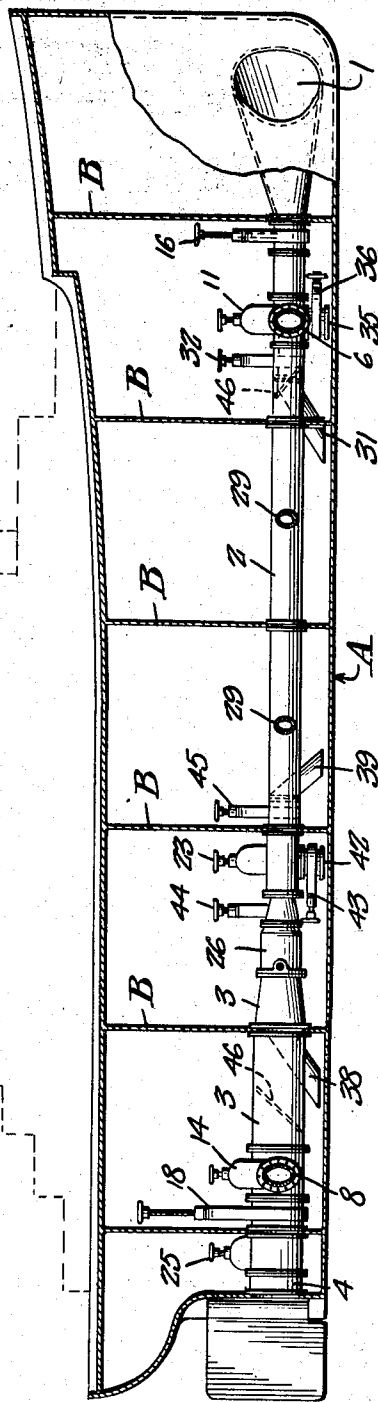
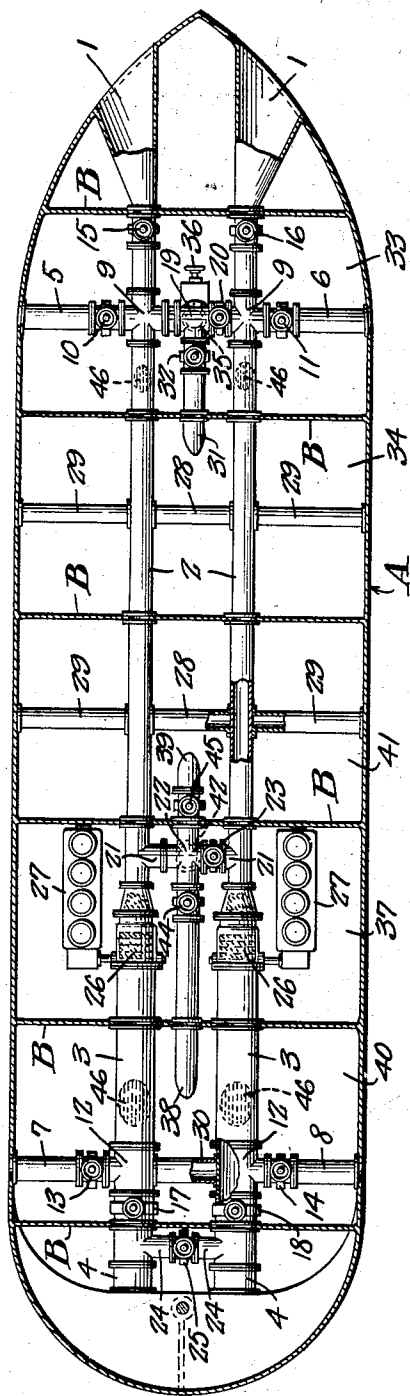
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2,270,690

HYDRAULIC PROPELLING APPARATUS FOR BOATS

Filed April 4, 1941

2 Sheets-Sheet 1



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WITNESS

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2 Sheets-Sheet 2

Fig. 3.

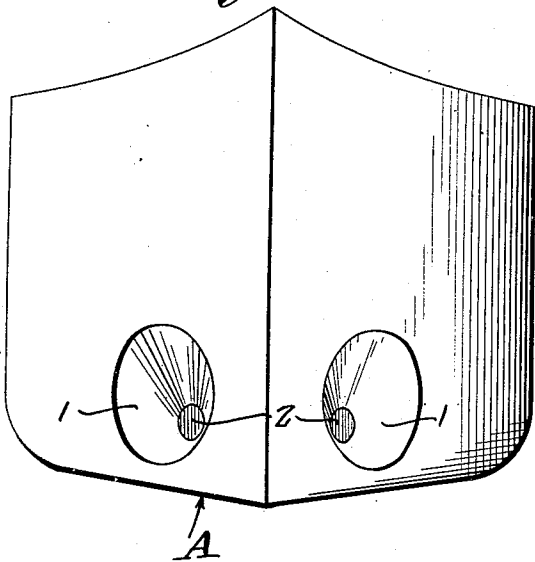


Fig. 4.

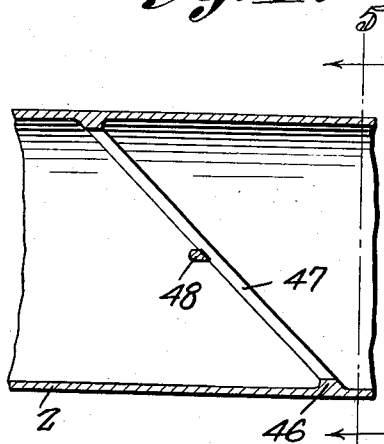


Fig. 5.

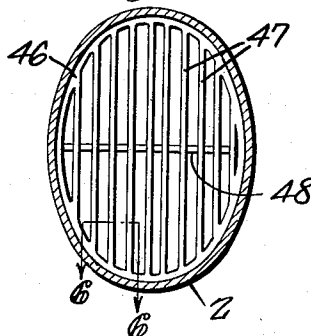
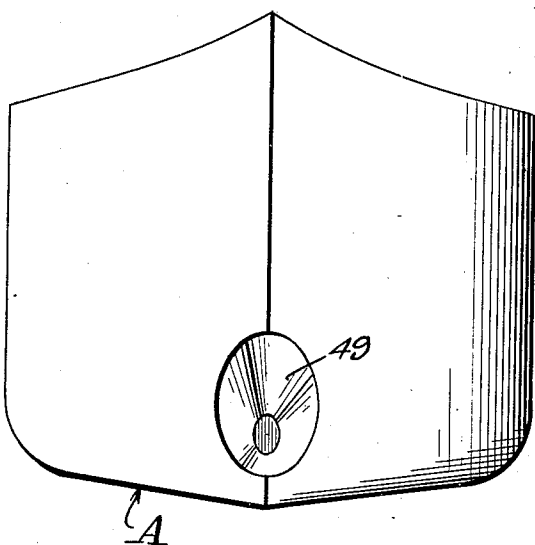


Fig. 6.



Fig. 7.



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HYDRAULIC PROPELLING APPARATUS FOR BOATS

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6 Claims. (Cl. 115—14)

This invention relates to hydraulic propelling apparatus for boats, and its general object is to provide apparatus that includes main water conveying means extending longitudinally of and within the hull of a vessel and opening through the bow and stern, and lateral conveying means communicating with the main conveying means and opening through the port and starboard sides of the hull adjacent the bow and stern, the water being forced through the conveying means or conduits, by suitable pumping means, and the direction of flow and passage of water through any of the conveying means is controlled by the pumping means and valves, thus it will be seen that my apparatus is capable of propelling a vessel forwardly, rearwardly or laterally, as well as will bring about turning of the vessel in an area slightly greater than the length thereof.

A further object is to provide hydraulic propelling apparatus that not only makes it possible to maneuver a vessel, regardless of the size thereof, with more accuracy and less effort than with the screw propelling means and rudder of vessels now in general use, but the apparatus also brings about greater speed, with safety, economy and less vibration.

Another object is to provide hydraulic propelling apparatus that includes dual sets of elements, which can be operated simultaneously or individually, therefore if any part or parts of one set should become damaged or inoperative for any reason, the other set can be used without interference from the damaged set and without effecting the steering of the vessel.

A still further object is to provide an apparatus of the character set forth, that can be used for pumping water from the hold of the vessel or from any compartment provided by the bulkheads, thereby eliminating the usual bilge or emergency pumps and preventing flooding of the hold in the event of leakage brought about by damage to the hull.

Another object is to provide hydraulic propelling apparatus in which the conveying means or conduits are protected or screened against becoming clogged with debris, thus assuring free passage of water therethrough at all times, when the apparatus is in operation.

A further object is to provide hydraulic propelling apparatus in which the conduits are fixed to the hull and bulkheads for cooperation with the latter and suitable reinforcing means to strengthen and reinforce the hull throughout the length and width thereof.

A still further object is to provide hydraulic

propelling apparatus that is simple in construction, inexpensive to manufacture, easy to install on vessels of various types and designs and is extremely efficient in operation, use and service.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts, to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:

Figure 1 is a horizontal longitudinal sectional view taken through the hull of a vessel having my apparatus installed therein and illustrates the apparatus in top plan, with parts broken away and in section.

Figure 2 is a vertical longitudinal sectional view with parts broken away and in side elevation.

Figure 3 is a view looking toward the bow of the vessel with the form of Figures 1 and 2 installed therein.

Figure 4 is a fragmentary longitudinal sectional view taken through one of the main conduits and illustrates one of the debris screens or grating therein.

Figure 5 is a sectional view taken approximately on line 5—5 of Figure 4, looking in the direction of the arrows.

Figure 6 is a sectional view taken approximately on line 6—6 of Figure 5, looking in the direction of the arrows.

Figure 7 is a view looking toward the bow of the vessel and illustrates the inlet section of a modified form that includes only a single longitudinal conduit.

Referring to the drawings in detail, the letter A indicates the hull of a vessel, and B the bulkheads that divide the hull into separate compartments. While I have illustrated my apparatus as being installed on a vessel of the type shown, it will be understood that it can be used on any type and design.

The preferred form of apparatus as shown in Figures 1 and 2, includes a pair of main conduits, that extend longitudinally of the hull throughout its length, an equal distance upon opposite sides of the longitudinal center thereof, and each conduit is made up of a funnel shaped inlet section 1, intermediate sections 2, pump discharge sections 3, and outlet sections 4. The sections of each conduit are aligned with each other so as to allow for the free passage of water therethrough, and

the inlet sections are outwardly flared toward the bow and open therethrough, while the outermost outlet sections open through the stern, as clearly shown in Figure 2.

Communicating with the main conduits are four lateral conduits, there being two forward lateral conduits 5 and 6 and two rear lateral conduits 7 and 8. The conduits 5 and 7 open through the port side of the vessel, while the conduits 6 and 8 open through the starboard side, and the lateral conduits 5 and 6 are connected to the intermediate sections by four-way couplings 9 that likewise connect the outermost intermediate sections with the adjacent intermediate sections, as clearly shown in Figure 1. Valves 10 and 11 are connected to the four-way couplings for controlling the passage of water through the conduits 5 and 6. The rear lateral conduits 7 and 8 are connected to the discharge sections 3 by three-way couplings 12 and valves 13 and 14 control the passage of water through the conduits 7 and 8.

Valves 15 and 16 are provided between the inlet sections 1 and the outermost intermediate sections 2 for controlling the main conduits at the bow of the vessel, while valves 17 and 18 are provided between the three-way couplings 12 and the innermost outlet sections 4 for controlling the main conduits at the stern of the vessel.

The main conduits communicate with each other both fore-and-aft and intermediate their ends. For that purpose the four-way couplings 9 have connected thereto for disposal between the same, a four-way coupling 19 that has a valve 20 connected thereto and to one of the four-way couplings 9. Inwardly directed coupling elements 21 are formed on the innermost sections 2 and have connected thereto, a five-way pipe or coupling element 22, and a valve 23 is disposed between one of the coupling elements 21 and the adjacent section 2. Inwardly directed coupling elements 24 are formed on the innermost outlet sections 4 which as shown are in the form of four-way couplings, and a valve 25 is connected to the inner ends of the coupling elements 24. By that construction, it will be obvious that water can be passed from one main conduit to the other, and the passage thereof is controlled by the valves 20, 23 and 25.

The innermost intermediate sections 2 and the discharge sections 3 are connected to pumping units 26 of any suitable reversible rotary type and are driven by motors 27, therefore it will be seen that a pumping unit is provided for each longitudinal or main conduit and a motor is provided for each pumping unit. It will be further noted that the discharge sections 3 and outlet sections 4 are of a greater diameter than that of the intermediate sections 2, and that all the sections are shown as being of oval shape in cross section.

Suitable bracing means are provided for the conduits, and I have illustrated tubular members 28 secured to and extending between certain of the intermediate sections 2 of each of the main conduits, as well as tubular members 29 between the last mentioned sections and the side walls of the hull. A tubular member 30 is likewise mounted between and secured to the three-way couplings 12. The tubular members are also preferably of oval shape in cross section, as best shown in Figure 2, and the same is true with respect to the passageways of the coupling elements and the bodies of the valves. The ends of the sections, coupling elements and bodies of the valves, as well as other joined elements are each pro-

vided with outwardly directed annular flanges, as clearly shown in Figure 1, and the companion flanges of adjacent couplings, valves and pipe members are bolted or otherwise detachably joined together, but the flanges of the conduit sections are preferably welded or otherwise permanently fixed to the bulkheads which have openings therein registering with the bores of the sections, and the bulkheads about the openings are faced to match the flanges. By fixing the flanges of the conduit sections to the bulkheads, it will be obvious that the sections and bulkheads act to reinforce each other to provide a strong and sturdy structure which in turn materially reinforces the hull throughout the length and width thereof, as will be apparent upon inspection of Figure 1.

In order to pump water from the hold, it will be noted, as best shown in Figure 1 that the four-way coupling 19 has connected thereto a pipe 31 that is controlled by a valve 32, and while the coupling 19 is in the compartment 33 the pipe 31 extends into the compartment 34, for removing water therefrom. However, the coupling 19 has an inlet 35 depending therefrom for removing water from the compartment 33, and the inlet 35 is controlled by a valve 36. The five-way coupling 22 is mounted within the compartment 37 and has pipes 38 and 39 connected thereto and extending respectively into compartments 40 and 41 to remove water therefrom, and in order to remove water from the compartment 37 an inlet 42 is disposed on the underside of the coupling element 22 and controlled by a valve 43. The pipes 38 and 39 are controlled by valves 44 and 45. The pipes 31, 38 and 39 have their outer end portions downturned and disposed in close proximity to the bottom of the hull, and the inlets 35 and 42 are disposed accordingly, as clearly shown in Figure 2, with the result it will be seen that in the event water should accumulate in the hull, from any source, or from a leakage therein, it can be pumped therefrom in a manner which will be later described.

The apparatus also includes debris traps in the form of grating members 46 that are preferably arranged in the pump discharge sections 3 and the intermediate sections 2 inwardly of the four-way couplings 9, as best shown in Figure 1. The grating members are arranged at an inclination and include parallel rods 47 that are preferably of triangular shape in cross section with the edges of the beveled walls thereof directed laterally, as best shown in Figure 6. It has been found that such arrangement tends to prevent the water from setting up a whirling or churning action when passing through the conduits, and secured to and bridging the parallel rods is a central connecting rod 48.

From the above description and disclosure in the drawings, it is believed that the operation will be obvious, but it might be mentioned that when it is desired to propel the vessel forwardly, the valves 15 to 18 inclusive are open, and the remaining valves are closed, and of course the pumps are being driven in a direction to draw the water within the inlet sections 1 for passage rearwardly through the main conduits. When it is desired to reverse the direction of travel of the vessel, it is only necessary to reverse the pumping units, as will be apparent, and in that event the water is drawn in the outlet sections 4 for passage forwardly through the main conduits. When it is desired to turn the vessel in

a circle in the direction of the port side thereof, the pumping unit is driven forwardly or ahead, the valves 15 and 17 are closed, and the valves 10 and 13 are open. The same action can be accomplished when the valves 16 and 18 are closed, the valves 11 and 14 are open, and when the pumping element is driven in reverse. When it is desired to turn the vessel in a circle in the direction of the starboard side thereof, the valves 16 and 18 are closed, the valves 11 and 14 are open, and the pumping unit is driven ahead. That action can likewise be accomplished by reversing the direction of the pumping unit, with the valves 15 and 17 closed and the valves 10 and 13 open. It will of course be understood that the valves 32, 36, 43, 44 and 45 are closed at all times unless it is desired to pump water from the hold, and in that event any one or all of the latter valves will be opened and the valves 15 and 16 will be closed, as well as the valves 10, 11, 13 and 14, and the valves 20, 23 and 25 may be either open or closed, but the valves 17 and 18 will of course be open to allow the water from the hold to pass through the outlet sections.

Due to the high pumping capacity of my apparatus, it will be seen that a vessel equipped therewith can suffer considerable damage or leakage below the water line and yet remain afloat, much longer than vessels now in general use, as the leakage can be equalized, by pumping the water from the hold as fast as it runs therein.

By the use of the dual system or double set of elements above described, it will be obvious that in the event one set or any part or unit thereof should become damaged or inoperative, for example the pump or engine, or if a leak should occur in a conduit, that may render the same unsafe to use, the damaged set can be completely cut off from the operative set by the use of the valves 20, 23 and 25 and the operative set will furnish sufficient power to propel the vessel.

It will be noted that the valves shown are of the gate type, but any other suitable type may be used in practice, and any suitable remote control means may be provided for operating the valves, from the engine room or other centralized place.

In the modified form of Figure 7, only a single longitudinal or main conduit is used, and the inlet section 49 is disposed centrally of the bow. A pair of outlet sections may be provided for the single conduit for communication therewith at its rear end and to open through the stern upon opposite sides of the rudder, so as not to interfere with the steering of the vessel. This form likewise includes lateral conduits both fore-and-aft and opening through the port and starboard sides of the vessel, and of course it will be understood that suitable valves are provided for controlling the conduits of the form of Figure 7, so that a vessel equipped with this form can be maneuvered in substantially the same manner as the preferred form. The form of Figure 7 will of course include only one pumping unit and one engine, and means may be provided in this form for pumping water from the hold of the vessel.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts, provided that such changes fall within the scope of the appended claims.

What I claim is:

1. In a hydraulic propelling apparatus for a water vessel including bulkheads, water conveying means extending longitudinally of and within the hull of the vessel and opening through the bow and stern, conveying means including a funnel shaped inlet section and outlet sections, intermediate sections connected to the inlet section, discharge sections connected to the outlet sections, lateral conduits connected to the intermediate and discharge sections respectively and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means between certain of the intermediate and discharge sections for forcing water through the conveying means and said conduits, valve means for controlling the passage of water through the conveying means and said conduits, said bulkheads having openings therein, outwardly directed annular flanges formed on the ends of each of said sections and fixed to the bulkheads about the openings, and bracing means secured to and bridging said water conveying means and hull for reinforcing the same.

2. In a hydraulic propelling apparatus for a water vessel including bulkheads, water conveying means extending longitudinally of and within the hull of the vessel and opening through the bow and stern, conveying means including a funnel shaped inlet section and outlet sections, intermediate sections connected to the inlet section, discharge sections connected to the outlet sections, lateral conduits connected to the intermediate and discharge sections respectively and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means between certain of the intermediate and discharge sections for forcing water through the conveying means and said conduits, valve means for controlling the passage of water through the conveying means and said conduits, said bulkheads having openings therein, outwardly directed annular flanges formed on the ends of each of said sections and fixed to the bulkheads about the openings, bracing means secured to and bridging said water conveying means and hull for reinforcing the same, and screening means in certain of the intermediate and discharge sections to prevent the passage of debris through said water conveying means.

3. In a hydraulic propelling apparatus for a water vessel, a pair of main conduits extending longitudinally of and within the hull of the vessel upon opposite sides of the longitudinal center thereof, said conduits opening through the bow and stern and each including a funnel shaped inlet section and outlet sections, intermediate sections connected to the inlet section, discharge sections connected to the outlet sections, lateral conduits connected to the intermediate and discharge sections of each main conduit and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means for each main conduit and arranged between certain of the intermediate and discharge sections thereof for forcing water through the main conduits and said lateral conduits, valve means between the outermost intermediate sections and the outlet sections, valve means between the outermost discharge sections and the outlet sections, valve means in the lateral conduits and together with the other valve means being adapted for controlling the passage of water through all the conduits, means between the main conduits for disposing the same in com-

munication with each other, and valve means for controlling the communicating means.

4. In a hydraulic propelling apparatus for a water vessel, a pair of main conduits extending longitudinally of and within the hull of the vessel upon opposite sides of the longitudinal center thereof, said conduits opening through the bow and stern, lateral conduits extending from each main conduit and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means for each of the main conduits and being disposed therein for forcing water therethrough and through said lateral conduits, valve means for controlling the passage of water through each of the conduits, means of communication between the main conduits and being arranged at intervals along the length thereof, and valve means for each communicating means.

5. In a hydraulic propelling apparatus for a water vessel, a pair of main conduits extending longitudinally of and within the hull of the vessel upon opposite sides of the longitudinal center thereof, said conduits opening through the bow and stern, lateral conduits extending from each main conduit and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means for each of the main conduits and being disposed therein for forcing water therethrough and through said lateral conduits, valve means for controlling the passage of water through each of the conduits, means of communication between the main conduits and being arranged at intervals along the length

thereof, valve means for each communicating means, means connected to certain of the communicating means and cooperating with the pumping means for removing water from the hull through any of the conduits, and valves for controlling the water removal means.

6. In a hydraulic propelling apparatus for a water vessel, a pair of main conduits extending longitudinally of and within the hull of the vessel upon opposite sides of the longitudinal center thereof, said conduits opening through the bow and stern, lateral conduits extending from each main conduit and opening through the port and starboard sides of the hull adjacent the bow and stern, reversible pumping means for each of the main conduits and being disposed therein for forcing water through any of the conduits, valve means for controlling the passage of water through each of the conduits and certain of the valve means being arranged adjacent to the inlet and outlet ends of the main conduits, means of communication between the main conduits and being arranged at intervals along the length thereof, valve means for each communicating means for controlling the passage of water from one main conduit to the other, suction pipes connected to certain of the communicating means and paralleling the main conduits, said pipes having their inlet ends terminating in close proximity to the bottom of the hull and cooperating with the pumping means for removing water from the hull through the conduits, and valves at the outlet ends of each pipe.

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