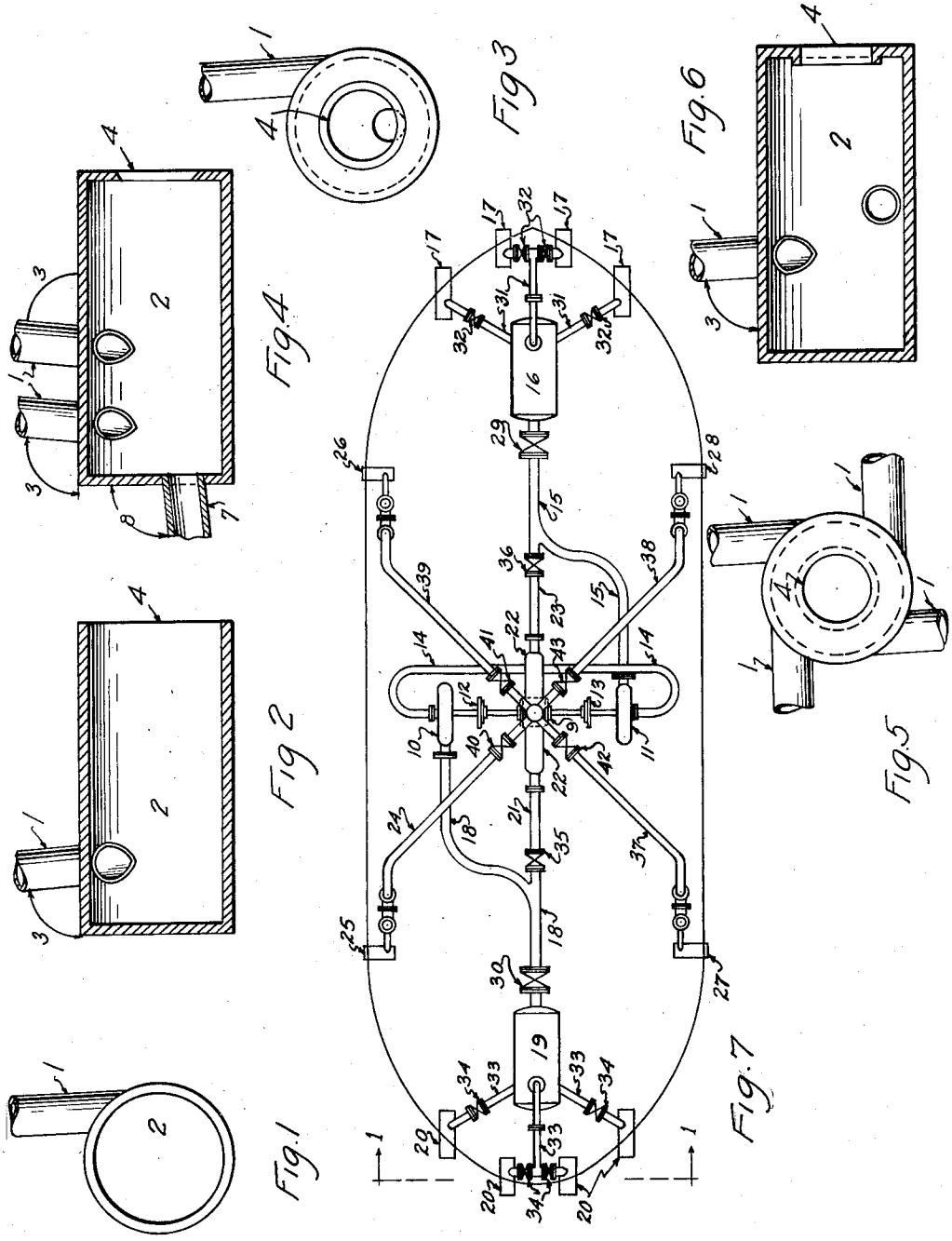
June 13, 1933. A. A. OUSS ET AL 1,914,038

ART AND APPARATUS FOR IMPELLING AND MANEUVERING OF FLOATING VESSELS

Filed Nov. 6, 1931 2 Sheets-Sheet 1



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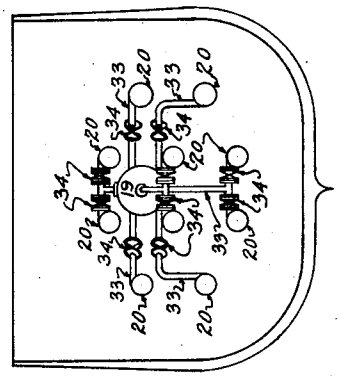


Fig. 9

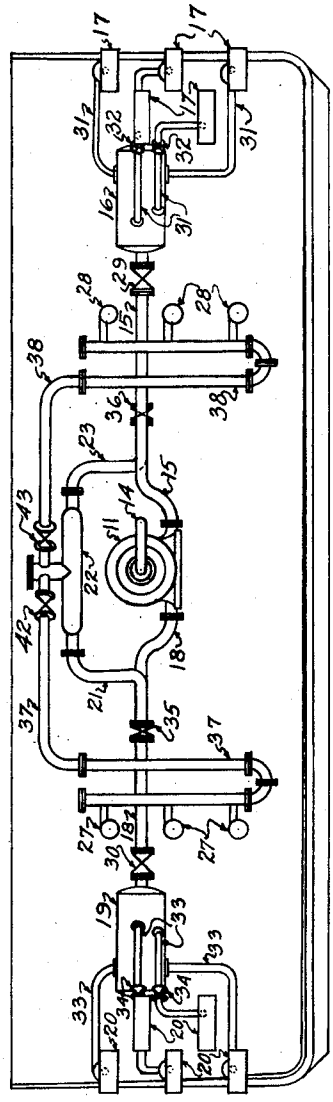


Fig. 8

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UNITED STATES PATENT OFFICE

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ART AND APPARATUS FOR IMPELLING AND MANEUVERING OF FLOATING VESSELS

Application filed November 6, 1931. Serial No. 573,414.

The aim of this invention is to provide a simple and efficient propelling device intended mainly to impel or maneuver such vessels as ocean, lake or river ships or boats and submarine types of vessels. These vessels may be any size or description.

The salient feature of our invention is the device consisting or a whirling chamber in which the fluid or gas is admitted under pressure tangential, or near tangential, to the walls of said chamber. The centrifugal force generated due to the method of entrance causes the influent to whirl along the walls travelling toward the nozzle where the energy is dissipated in causing the fluid or gas to leave the chamber thru the nozzle in a spreading whirling cone extending beyond the nozzle's edge, thereby reacting upon an area greatly in excess of the original entrance pipe or the whirling chamber. This whirling spreading motion produces a thrust on the medium surrounding the vessel, similar to that caused by a revolving propeller universally used by all mechanically driven vessels. The resistance of a medium surrounding the vessel to the thrust, produced by several devices, will cause the vessel to move in the direction opposite to that of the thrust.

This invention in its preferred form of apparatus consists of a plurality of devices opening outside of the walls of the vessel below the surface of the water and having tangential, or about tangential, pipe inlets from a pressure chamber, which is in its turn connected to a pump or pumps, this pump or pumps, in turn, connected directly or indirectly to a prime mover. The inflow into the pressure chamber is maintained equal to the outflow thru the device, or devices, so that the predetermined pressure is always maintained by the pump. In cheaper and simpler installations the pressure chamber can be omitted.

At the present time the thrust on the medium surrounding the vessel is produced by propellers, or paddle wheels, which are revolved by prime movers thru complicated and cumbersome transmission mechanisms, which require the utmost care in design and in supporting it on the framework of the vessel. It induces enormous vibrations in the body of the vessel, thereby limiting its life and greatly increasing its maintenance expenses. Our invention tends to eliminate all the disadvantages of existing methods of propelling vessels, also greatly simplifying the problem. It consists of no moving parts and does not possess the hazard of being disabled due to broken down propellers, caused by running aground or striking other vessels or objects. The device can even be utilized to pull or push the vessel off a bar or other submerged obstruction upon which it might be grounded. There is no revolving shaft, protruding thru the hull, with its resultant tendency toward leakage. There are no gears, shafts, pulleys, chains or belts in transmitting power thru the hull, and the only moving parts are pumps, prime movers and their connections. The vibrations set up by the common type of revolving shaft is eliminated. The installation for providing the necessary fluid or gas under pressure is of the simplest, thereby reducing the maintenance, initial cost and delays contingent on broken down equipment. The space occupied by its driving and transmitting mechanism is reduced to a minimum.

The accompanying drawings illustrate some of the many forms of the device and the general details of a typical installation. The invention will be better understood from the description of the drawings.

Fig. 1 is a plan view of the device in its simplest form, which is substituted for the common screw propeller.

Fig. 2 is a sectional elevation of Fig. 1.

Fig. 3 is a plan of a modification of the device with more than one inlet.

Fig. 4 is a sectional elevation of Fig. 3.

Fig. 5 is a plan of still another modification of the device showing more than one inlet and these inlets entering from different sides.

Fig. 6 is a sectional elevation of Fig. 5.

Fig. 7 represents a plan of a typical installation showing some suggested locations of the device which will enable the vessel to be maneuvered or impelled in all possible directions.

Fig. 8 represents a longitudinal cross-section of the above vessel showing one form

of installation of the new device with its driving apparatus.

Fig. 9 represents a cross-section on line 1—1 of Fig. 7.

In Figs. 1 and 2 the fluid or gas under pressure, this being any pressure from zero to a practical limit, enters thru pipe '1' into chamber '2'. Pipe '1' might be tangent, or near tangent, to the walls of chamber '2' in plan, and angle '3' might vary from 0° to 180°. Pipe '1' is fastened to chamber '2' by screwing, welding, casting or by any other practical method. As the fluid enters chamber '2', it is whirled along its walls by centrifugal force until it reaches nozzle '4' where it leaves chamber '2' in a fanlike fashion. Nozzle '4' might be any shape that will give the maximum efficiency under the pressure used; it might be constricted in area or enlarged, or might even be varied in shape, in order to meet the particular conditions. Chamber '2' might be cylindrical, conical, spherical or any other shape that will prove serviceable. The length of chamber '2' might be any convenient length, and pipe, or pipes, might enter chamber '2' at any distance from the back of the chamber.

Figs. 3 and 4 show another form of the device in which the fluid or gas under pressure enters chamber '2' thru more than one pipe tangent, or near tangent, to the walls of the chamber in plan and entering this chamber at an angle '3' varying from 0° to 180°. Pipe '7' might be another entrance anywhere at the back of the chamber at an angle '8' varying from 0° to 90°. One of the innumerable possible variations of the nozzle '4' is shown, herewith.

Figs. 5 and 6 show still another form of the device in which the fluid or gas enters the chamber '2' by any number of pipes from different sides. The same holds true in this case as in the previous described types as to angles, distances and variations in shape of chamber '2' and nozzle '4'. These are just a few of the many different types that might be employed.

Figs. 7, 8 and 9 are sections and a plan depicting a typical installation in a vessel showing suggested locations of the devices, and in which '9' is the prime mover actuated by any available force, steam, compressed air, electricity, etc. The prime mover, located at some convenient point, drives either pump '10' or '11', this being accomplished by using either clutch '12' or '13', depending upon which direction the vessel is to be moved. The intakes of two pumps are connected by pipe line '14'. The pump '10' or '11' discharges into a pressure chamber '16' or '19' thru pipe '15' with valve '29' and pipe '18' with valve '30' respectively, to which are connected the devices '17' and '20', (various types of which were described in Figs. 1 to 6). by means of leads '31' with valves '32' and leads '33' with valves '34' respectively. These devices are located below the water line of the vessel to insure maximum efficiency, and can be so placed as to equalize the load distribution upon the vessel frame. To illustrate more clearly let us assume that the vessel is to be moved in a forward direction. The devices in the stern are then brought into action. To accomplish this the prime mover '9' is started, clutch '12' is thrown in, thereby actuating pump '10' whose suction side draws water from the bow thru devices '17', leads '31', pressure chamber '16', pipe '15', pump '11', which is idle, clutch '13' being thrown out, and finally thru pipe '14'. Pump '10' then discharges into pressure chamber '19' thru pipe '18'. To this pressure chamber '19' by means of leads '33' with valves '34' is connected one or more of the devices '20', located in the stern of the vessel thru which the water is discharged. Due to the tangential inlet into the device, water will be whirled therein and will spread fanlike upon leaving the nozzle, continuing the whirling motion but on an area several times greater than the area of the nozzle. The discharged water being under pressure will produce corresponding pressure on the water surrounding the vessel, and thus move it in a direction opposite to that of the thrust. The devices with their whirling effect are acting as propellers. The effect of thrust is probably more complicated and more efficient than the thrust produced by the common propeller because besides acting as a propeller, it is cutting into the water and pushing it from the vessel. This thrust is further augmented by the pressure produced by the pump and dissipated upon the surronding water on leaving the device. Furthermore, water is removed from the bow, thereby reducing the frictional resistance of the vessel passing thru the water. These combined effects will give an efficiency surpassing that of the common propeller.

Should it be desirous to move the vessel backward, the order of procedure would be reversed. Then devices '20' would be the influent ends, the water passing thru leads '33', chamber '19', pipe '18', idle pump '10', pipe '14', into pump '11', which is now in action, clutch '12' having been thrown out, and clutch '13' thrown in. The discharge thru pipe '15' enters pressure chamber '16', from whence it is fed thru leads '31' to one or more of the devices '17' in the bow of the vessel thru which the water is discharged producing the same action but opposite in effect to the water emitted thru devices '20', resulting in moving the vessel backward.

Figs. 7 and 8 show a suggested auxiliary pressure chamber '22' connected to both pump discharges by pipe line '21' and '23'. These connections enable us to draw water from whichever pump is in action by merely using

the proper valve. Should pump '10' be in use then pipe line '21' with valve '35' would supply the pressure to the auxiliary chamber '22'; if, on the other hand, pump '11' is in operation, valve '35' would be shut off and line '23' would connect by opening valve '36' with chamber '22'. To this auxiliary pressure chamber '22' are connected additional devices '25', '26', '27' and '28' by means of their respective valves '40', '41', '42' and '43' and respective pipe lines '24', '39', '37' and '38'. In Fig. 7 we show suggested locations of these additional devices, two sets being located in each side of the vessel, two sets fore and two sets aft. The object of this auxiliary installation with the locations of the devices as shown on Fig. 7 is to facilitate the maneuvering of the vessel. It enables the vessel to be moved about in every conceivable manner without the aid of tugs or other means.

The sequence of operation is described as follows:

Should it be desirous to move the vessel broadside to port, the valve '35' in line '21' or valve '36' in line '23' is first opened, depending upon which pump is in operation, admitting water under pressure into chamber '22', the valves '40' and '41' connecting devices '25' and '26' respectively are then shut, and those valves '42' and '43', connecting '27' and '28' respectively, are opened bringing these two '27' and '28' into action, thereby moving the vessel to port. Broadside movement to starboard is obtained by reversing the operation, shutting valves '42' and '43', connecting to '27' and '28' respectively, and opening the valves '40' and '41' connected to '25' and '26' respectively, bringing these two devices into action. It can readily be seen that the vessel can be turned around within its own length by operating devices diagonally opposite to each other as, for instance, a sharp turn to port is obtained by using devices '25' and '28' and shutting off '26' and '27', and conversely a sharp turn to starboard is obtained by opening '26' and '27' and shutting off '25' and '28'. Turning can be facilitated by bringing any of the devices into action that exert a pressure or a component of pressure in the direction desired. The vessel can be maneuvered without a rudder and without the lost forward or backward motion necessary to bring the rudder into play. It can be readily understood that any number of these additional devices can be placed at different and the most effective locations in the vessel.

It is apparent that many forms of the installation or modifications thereof are obtainable or duplicated in the same vessel. In a small boat or in a less expensive installation the pressure chamber may be omitted and the pump be directly connected to the pipe feeding the device or devices. Some installations might avoid the two pumps and use a double suction pump instead, in which case the direction of motion of the prime mover '9' would be reversible. The auxiliary pressure chamber '22' may be omitted entirely, substituting therefor direct pipe connections to the pressure chamber '19' or '16' or direct connections to the pump or pumps, control being obtained by manipulating the proper valves. Altho not absolutely necessary, valves should be placed in all connecting pipe lines. This enables the repairing of parts without the shutdown of the entire plant, and maneuvering is also simplified thereby. Also by using the proper valves, the required pressure can easily be maintained. Valves can be either mechanically or manually controlled depending upon the financial outlay available.

In an installation in which a gas or air is used as the driving medium instead of water, the plant is identical excepting in this respect that the connecting pipe line '14' is omitted and the intakes of the pumps or pump are connected directly to a gas storage tank or to the atmosphere. In this case air pumps or compressors would be substituted for water pumps. Gas or air instead of water is then pumped into the device or devices or into a pressure chamber or chambers first and then into the device or devices.

Our invention may be embodied with diverse details of form and construction while retaining the distinctive characteristics above described. The arrangement as shown on the accompanying drawings, is only one general form of the installation with the new devices, modifications and variations can be made from the foregoing description without departing from the spirit and scope of the invention as set forth in the accompanying claims.

We claim:

1. Apparatus of the class described adapted to be mounted within the hull of a boat, said apparatus including a prime mover, pumps adapted to be selectively operated by said prime mover, a series of propulsion devices projecting through the bow and stern of said hull, conduits connecting said bow and stern devices with respective pumps and in circuit therewith, and means whereby a fluid may be drawn by pumps for discharge in a whirling spreading motion through the selected series of devices to propel said boat.

2. Apparatus of the class described adapted to be mounted within the hull of a boat, said apparatus including a prime mover, pumps adapted to be selectively operated by said prime mover, a series of propulsion devices projecting from the opposite sides of said hull, conduits connecting said devices to said pumps and means whereby a fluid under pressure may be discharged in a whirling

spreading motion through selected devices for maneuvering said boat.

3. The combination with the hull of a boat, of a propulsion device projecting through the skin of the hull, said device comprising a chamber having a nozzle and a pipe communicating with said chamber to discharge a fluid under pressure substantially tangentially to the walls of said chamber thereby setting up a centrifugal force in the fluid for subsequent discharge through said nozzle in a whirling spreading motion to propel said boat.

4. The combination with the hull of a boat, of a propulsion device projecting through the skin of the hull, said device comprising a chamber having a nozzle, a series of pipes communicating with said chamber, the axes thereof being angularly disposed with relation to the axis of said chamber, to discharge a fluid under pressure substantially tangentially to the walls of said chamber thereby setting up a centrifugal force in the fluid for subsequent discharge through said nozzle in a whirling spreading motion to propel said boat, and means for supplying a fluid under pressure to said chamber.

5. A device of the character described comprising a chamber adapted to be attached to the hull of a boat, said chamber having a discharge opening directed exteriorly of said hull and a pipe in communication with the interior of said chamber to discharge a fluid under pressure substantially tangentially to the walls of said chamber thereby setting up a centrifugal force in the fluid for subsequent discharge through the opening in a whirling spreading motion to propel said boat.

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