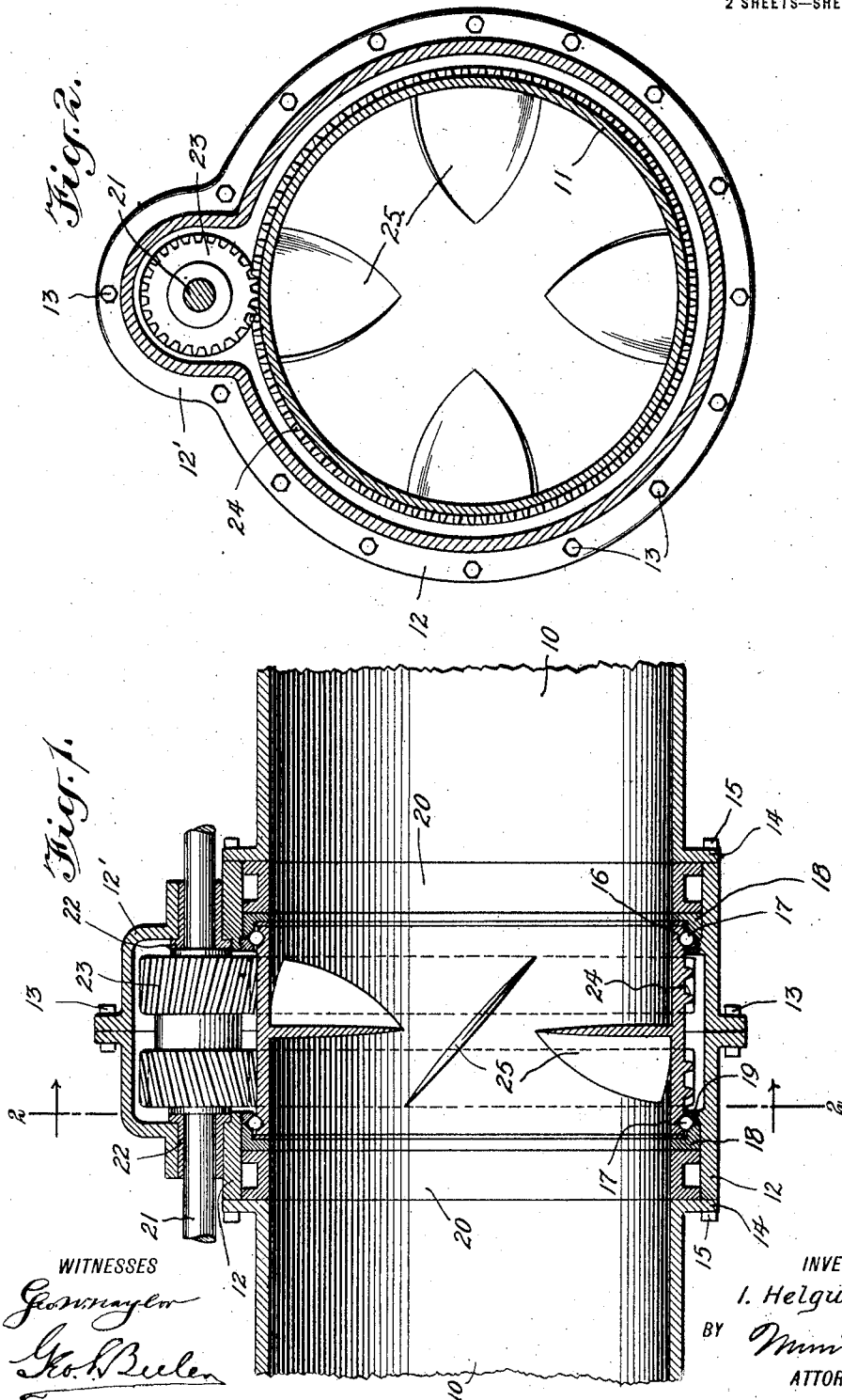


I. HELGUERA.
SHAFTLESS PROPELLER.
APPLICATION FILED AUG. 27, 1918.

1,326,730.

Patented Dec. 30, 1919.
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

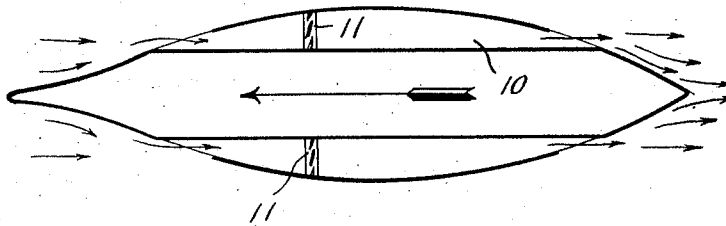


Fig. 4.

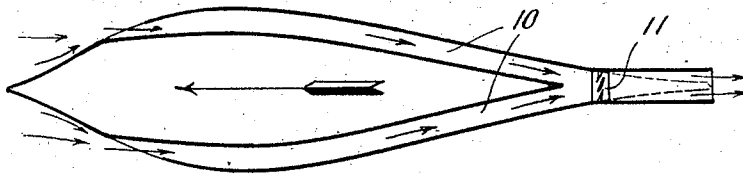


Fig. 5.

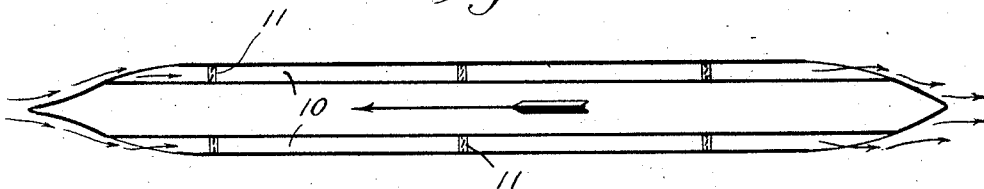


Fig. 6.

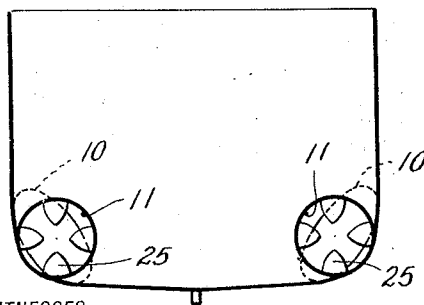
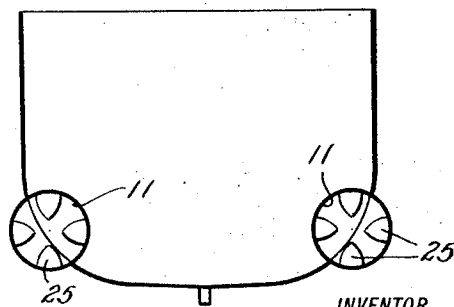


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

IGNACIO HELGUERA, OF TRENTON, NEW JERSEY.

SHAFTLESS PROPELLER.

1,326,730.

Specification of Letters Patent.

Patented Dec. 30, 1919.

Application filed August 27, 1918. Serial No. 251,660.

To all whom it may concern:

Be it known that I, IGNACIO HELGUERA, a citizen of the Republic of Mexico, and a resident of Trenton, in the county of Mercer and State of New Jersey, have invented a new and Improved Shaftless Propeller, of which the following is a full, clear, and exact description.

This invention relates to marine propulsion, and has particular reference to improved propelling devices in connection with boats or ships.

Among the objects of the invention is to provide a propeller or propulsion means so located and designed as to attain the highest possible speed.

Another object of the invention is to so construct a hull and its propelling means as to secure the greatest efficiency and economy in operation, because of the reduction of the tendency to create waves and eddies.

Another object is to provide a propelling means that will tend to increase the stability of the ship.

A still further object is to provide propelling means that is calculated to increase the safety of the ship against mines, torpedoes, or other sub-surface disturbances.

In carrying out the foregoing objects I provide in connection with a ship's hull a plurality of passageways, preferably two in number, and symmetrically spaced on opposite sides of the vertical plane of the keel and located either within the hull if incorporated when the hull is built, or outside of the skin of the hull if the improvement is to be added to hulls already constructed. In each of these passageways are located one or more propellers each preferably in the nature of a relatively short hollow cylinder to the inner surface of which are secured a number of sharp edged blades of suitable inclination to the axis of the propeller and all projecting toward the open center of the device. Each propeller is suitably mounted or supported with its axis coincident with the longitudinal axis of the passageway and rotated at high speed by any suitable power devices applied to the outer surface of the propeller cylinder. In the propulsion of every boat there exists two points or portions of the hull adjacent to the bow thereof that may be termed "pressure points" they being located at those points where the highest wave formation takes place due to the forward movement of the vessel. Since it is

well known that a ship at high speed causes a perceptible high wave on either side, it follows that excessive power is required to thus produce wave formation or disturbance of the stream lines from the normal, and consequently resistance must be encountered as a result of this demand for power. Likewise there are at or near the stern of the ship corresponding points which may be termed "points of release" where the pressure incident to the forward movement of the ship is least. In other words the movement of the ship tends to compress the water ahead of it and to cause rarefaction of the water at the stern. Both circumstances tend to resist the forward movement of the ship or demand extensive power for propulsion. In view of the foregoing I so locate the passageways above mentioned as to lead from the pressure points to the corresponding points of release. Thus the water that is compressed or tends to be compressed at the bow is delivered through the passageways and out into the region where the rarefaction or cavitation tends to occur. Through the use of the specific type of propellers herein shown and described the stream or column of water may be projected rearward through each passageway at a speed varying from five to ten times that of the forward movement of the ship; consequently a considerable amount of the resisting water is conveyed from the bow, thus tending to rarefy instead of compressing the water in front of the ship to the stern where the tendency of the stream of water is to compress instead of rarefying and causing eddies where under the ordinary practice the streams or lines of water flow inward toward each other over the stern of the hull.

Whereas in the practice of an ordinary screw propeller there exists a great loss in efficiency and power due to such factors as the presence of a central hub and shaft interfering with the direct central movement or flow of water through the propeller or through the blades thereof, and also the tendency to cause a conical form of delivery of the water from the propeller thereby increasing the eddy and wave formation, the divergence of the cone being increased with the speed, in my construction I provide for free movement of the water along the axis of the apparatus and positive prevention of the cone formation at the delivery. Consequently the speed of rotation of the propeller

ler need not be limited. Furthermore even though the propeller may be rotated at high speed there is no serious tendency for the water to be caused to rotate around the axis of the propeller and no tendency whatever for the cone formation above referred to since the water is confined in the tubular passageway at all points adjacent to the propeller. The water enters or approaches the propeller with comparative freedom, moving relatively along the passageway, and since the center of the propeller is unobstructed the central portion or core of the stream of water thus passing tends to reduce to a minimum the centrifugal motion of the water and prevents cavitation or the formation of cavities adjacent to the front faces of the blades.

With respect to economy in marine propulsion the admission of water as above explained into and through the passageways from the pressure points on opposite sides of the hull, the resistance is reduced to a minimum with a corresponding increase of efficiency both as to power and speed. The propeller may be said in this respect to absorb the surplus pressure at the bow. If it could be possible to absorb all of this pressure no wave formation at the bow would result and the resistance accordingly would be nullified. Since the rotation of the column of water acted upon is very slight and the water is caused to be propelled relatively in straight lines there will be little effective stern wave. The action in short of the propeller may be regarded as similar to the action of a nut rotated at high speed horizontally along a stationary bolt, assuming that the propeller and ship are moving forward together and the column of water acted upon or caused to pass through the passageway represents the bolt.

I propose to always employ two passageways preferably symmetrically arranged on opposite sides of the vertical plane of the keel and while they may be variously arranged with respect to said vertical plane they should always be horizontal or have their axes in the same horizontal plane. The two passageways may emerge from the hull independent of each other or may merge into a single delivery passageway, but in any event there must be at least one propeller acting to cause movement of the water through each passageway. From what has just been stated it follows that the stability of the vessel is increased by reason of the formation and position of the passageways. The currents of water passing through these passageways on opposite sides of the hull will stabilize the ship because such streams will cause the hull to assume the position presenting the least resistance, that is the horizontal position. Pitching and rolling of the ship will, therefore, be materially re-

duced. Again, the safety of the ship against mines or other sub-surface obstacles or disturbances is increased by the provision of the surplus water chambers or passageways above referred to on opposite sides or along the most vulnerable portions of the hull.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a vertical central longitudinal section of one of the propellers showing the manner of mounting the same for rotation around the longitudinal axis of a stationary passageway.

Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1;

Figs. 3, 4, and 5 are diagrams indicating as many different specific designs of hulls and the arrangement of the passageways and propellers therein; and

Figs. 6 and 7 are vertical transverse sectional diagrams showing respectively the arrangement of the passageways built within the hull and added to the outside of an already completed hull.

Attention will now be given especially to the structural details of Figs. 1 and 2, in which 10 indicates a tubular structure providing a passageway for water. This tubular structure or conduit may assume different forms in cross section as according to the relation thereof to the hull, but at or adjacent to the propeller it must be cylindrical.

The propeller comprises a relatively short hollow cylindrical member 11 in the nature of a spokeless hubless wheel, the center of which accordingly is entirely free or unobstructed as indicated in Fig. 2. This propeller is detachably secured in the conduit with its inner surface flush with the inner surface of the conduit. Being detachably connected as indicated it may be removed for inspection, repair, or substitution at any time with a minimum amount of effort.

12 indicates a two-part housing surrounding the propeller and driving means therefor, the plane of connection between the two parts being indicated at the transverse center of the propeller. Any suitable detachable means such as bolts 13 may be provided to secure the parts together. The opposing ends of the conduit sections have outwardly projecting flanges 14 through which fasteners 15 project into the edges of the housing.

The outer surface of the propeller wheel is curved or otherwise provided with raceways 16 or antifriction rollers indicated in the form of balls 17. Surrounding the series of balls are bearing races 18 and 19, the former of which constitutes a filler ring projecting inward flush with the inner surfaces of the wheel and conduit and arranged between the edge of the wheel and another filler or spacer 20 in the form of a channel member fitted within the housing 12. The other race ring 19 is threaded within the housing.

At 21 I show a driving shaft journaled in the extension 12' of the housing or bushings 22 fitted therein, and upon said shaft is fitted a driving pinion 23 meshing with the toothed periphery 24 of the wheel. This shaft obviously is always within the hull whether the conduit is built within or on the outside of the hull, hence the relation of the driving shaft to the prime mover or engine may easily be arranged in the most advantageous manner.

The construction of the housing and the relation thereto of the propeller provides two important immediate results or advantages as follows: First, the propeller may be introduced or removed from the stationary conduit as a whole or as a unit; and, secondly, the construction of the housing provides that the cavity therein for the gearing may be maintained with any suitable grease or lubricant.

Within the propeller wheel and secured in any suitable manner to the inner surface thereof are a series of propeller blades 25 having relatively sharp edges and with their points directed toward but spaced from the axis of the wheel. These blades are preferably substantially flat and arranged diagonally or at an angle of about 45 degrees to the aforesaid central transverse plane. The centers or axes of the blades accordingly lie in said plane.

From the construction indicated it will be obvious that the column of water caused to pass through the conduit as a result of the rotation of the propeller at high speed will be subjected to the least possible amount of friction, and by virtue of the arrangement and form of the blades in the propeller the

column of water thus propelled will remain substantially solid or with the least possible amount of cavitation. Furthermore the column of water enters the conduit along substantially straight lines and without being subjected to forces tending to disturb the straight lines or cause the water to swirl, twist, or spread.

I claim:

1. The combination with a ship's hull having a pair of tubular conduits following the lines of the outer shell of the hull on opposite sides of the vertical central plane thereof and arranged symmetrically with respect to said plane, said passageways leading rearward from the pressure points of the bow of the hull, of a propeller wheel journaled between the ends of the conduit in an annular space thereof for rotation around a horizontal fore and aft axis and acting to cause the flow of water freely through the tubular passageways, said wheel having a free unobstructed open center and a series of diagonally arranged blades connected to the periphery thereof and extending toward the open center, a split gear housing surrounding the wheel and arranged so as to allow the removal of the wheel without disturbing the position of the conduit, and gears to rotate the propeller wheel at high speed from within the hull.

2. In a shaftless propeller, the combination of a conduit, a section of said conduit with a length shorter than its diameter, a series of diagonally arranged blades fixed to the interior surface of said section and extending toward the open center, a pair of gears fixed to said section, a pair of pinions meshing with said gears, a power shaft operatively connected with said pinions for the rotation of the section around its axes, a plurality of ball races formed on said section, a split housing surrounding said conduit fixed to the ends thereof and arranged to allow removal of the propeller section without disturbing the position of the conduit, a plurality of ball races formed in said housing adjacent to the ball races on the propeller section, a plurality of ball bearings in said races.

IGNACIO HELGUERA.