No. 646,391. Patented Mar. 27, 1900.

F. W. SIMMONS.

HYDRAULIC PROPELLING APPARATUS.

(Application filed July 17, 1899.)

(No Model.)

Fig. I.

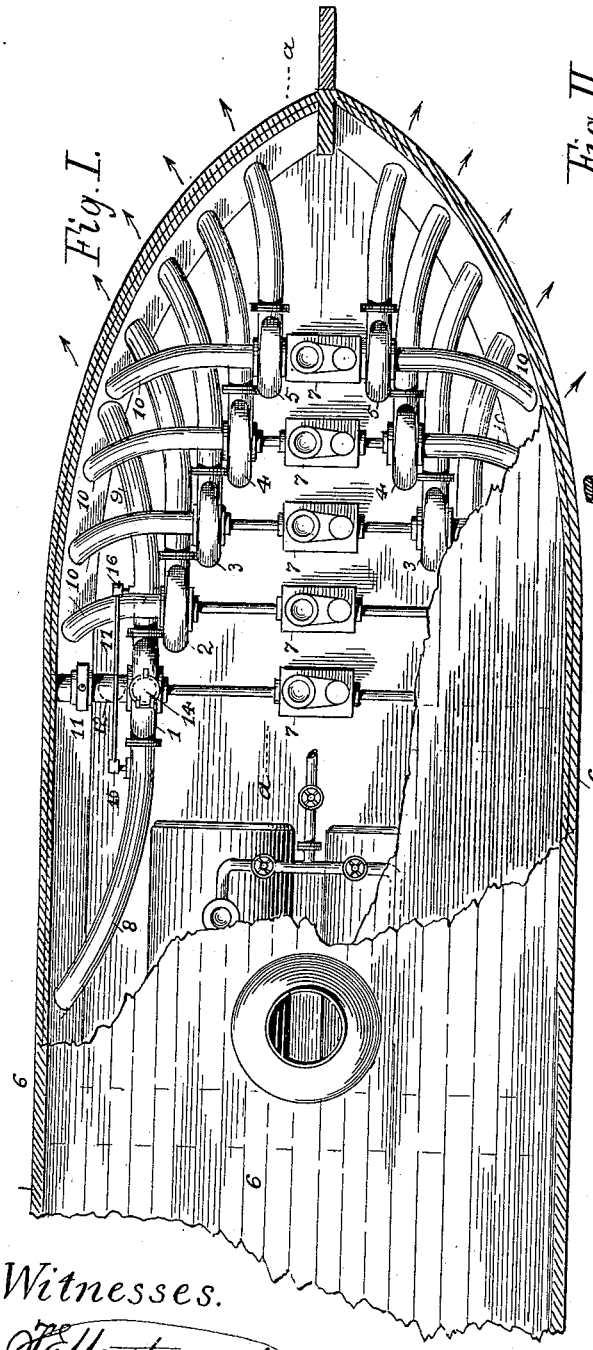
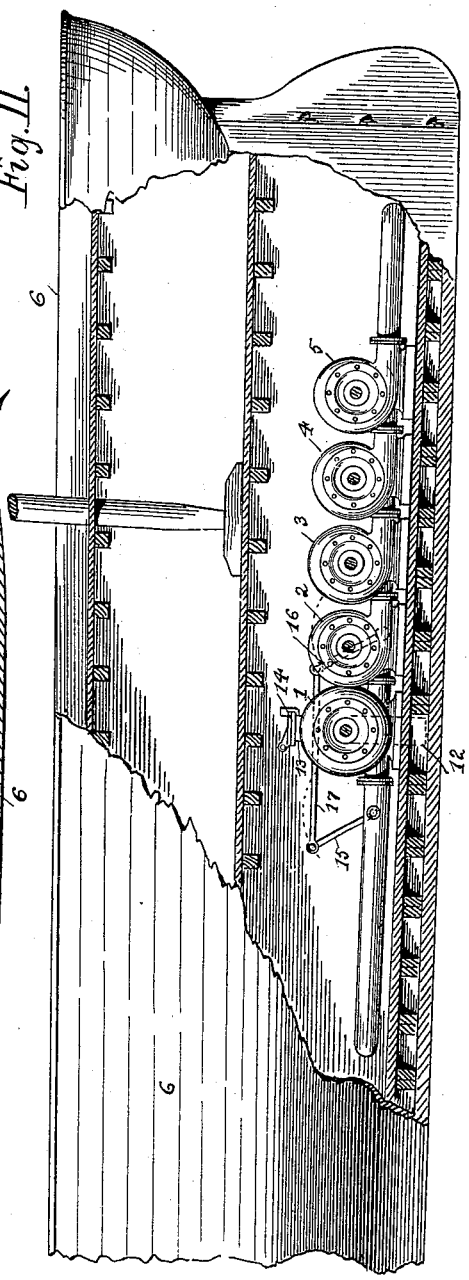


Fig. II.



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HYDRAULIC PROPELLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 646,391, dated March 27, 1900.

Application filed July 17, 1899. Serial No. 724,150. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. SIMMONS, a citizen of the United States, residing at Felton, county of Santa Cruz, and State of California, have invented certain new and useful Improvements in Hydraulic Propelling Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to certain improvements in reactive propulsion for vessels by means of water forcibly discharged astern or as nearly as possible opposite to the vessel's course and to machinery and apparatus for this purpose.

My improvements consist in a series of pumps of the centrifugal type, disposed in pairs athwartships and obliquely in respect to the vessel's axis or keel, driven by a corresponding series of steam-engines or other motors placed on the vessel's keel and connected to the pairs of pumps, two or more of the latter being arranged to reverse and discharge water forward or astern.

The objects of my invention are to set up a reactive propelling force for vessels by discharging a large volume of water astern at a comparatively-low velocity; also, a division of the amount of power or impelling force applied without changing the velocity of the discharged water; also, to reduce the impelling machinery to a simple and compact form, all contained within the vessel's hull, and accessible for removal, renewal, or repairing.

Referring to the drawings herewith and forming a part of this specification, Figure I is a view in plan of the after portion of a vessel provided with my improved propelling apparatus, the decks being in part broken away to expose the machinery. Fig. II is a section through Fig. I in the line *a a*.

In nearly all the forms in which jet propulsion has been attempted and applied the water has been discharged at considerable velocity and in some cases at high velocity, with a corresponding loss of power and effect, and when lower velocities have been employed the machinery has been ponderous in proportion, occupying and obstructing valuable space in the vessels, and the engines or motive power had to be varied in speed to suit the speed of the vessel or the amount of propelling power required. These difficulties I point out as a means of more clearly explaining my improvements and their purpose.

Referring to the drawings, it will be seen that I employ a series of rotative pumps disposed in pairs and designated by numerals 1 to 5, the references being applied on one side only of the vessel 6, the equipment being dual and alike at each side. These pumps 1 to 5 are arranged in a row, set obliquely in respect to the keel, so as to fit into the stern of the vessel, as shown in Fig. I, driven in pairs by motors 7, preferably steam-engines of the marine type, adapted to be operated at high speed and expansively in such degree as to be economical. Two or more of the pumps in the series I construct annular in form, reversible, and arranged to discharge astern or ahead by the pipes 8 and 9, as shown in the pump 1.

In sea-going vessels that are seldom moved astern by their own propelling power, a single pair of reversible pumps, as shown in the drawings, is sufficient, while for inland waters four or more pumps can be thus arranged. As the efficiency of such pumps is to some extent impaired by the annular form shown in 1, I limit this reversible function to as few as possible of the pumps in the set or series, which should consist of eight or more.

Water can be drawn in and applied to the pumps from the bow of the vessel, and thus reduce the area of the immense cross-section and resistance thereto in proportion to the area of the inlet-way; but a conduit of this kind would occupy valuable space and might endanger the safety of a vessel. Hence I have shown the pipes 10 supplying from the stern-quarter, as seen in Fig. I. The inlet-pipes 10, except for the pump 1 or others that are reversible, are inclined forward to facilitate the entry of water when the vessel is under way. In the pump 1 the inlet-pipe is made straight and is provided with a valve 11 and a downward-projecting pipe 12, (indicated by dotted lines in Fig. II,) so that when required the valve 11 can be closed and water drawn from the bilge. The latter is a

provision for accidents, so that a vessel can be quickly cleared of water in case of extensive leaks. On the top of this pump 1 I provide a nozzle 13 and a valve or a hinged covering-plate 14, through which water can be rapidly admitted to flood the vessel in case of fire or for other purpose.

Referring to the pumps 1 or to as many of the series as are made reversible and to discharge either fore or aft by the pipes 8 and 9, these pipes are provided with valves of any suitable kind, preferably oscillating disks operated by the levers 15 and 16, connected by a link 17, so that when one valve is opened the other is closed, and the reverse. In this manner water from the pump 1 can be discharged through either of the pipes 8 or 9 ahead or astern, as may be required. This reversal of the discharged water from the pump 1 can be performed without reversing the revolution of the pump; but a better result is attained by also reversing the motor 7 at the same time to correspond to the course of discharge from the pump.

By this method of constructing and arranging the machinery it will be seen that the amount of power applied in propelling can be regulated by the number of pumps that are acting and that whether this power be more or less the motors and pumps operate at their normal speed of revolution, and consequently at their best efficiency.

Having thus described the nature and objects of my invention, what I claim, and desire to secure by Letters Patent, is—

1. In hydraulic propelling apparatus, centrifugal pumps connected in pairs to a single motive engine placed between the pumps and central over the vessel's keel, the pumps arranged on each side in the stern, overlapping each other so as to form rows oblique to the vessel's keel whereby space is economized and provided with inlet and discharge pipes, substantially as specified.

2. In hydraulic propelling apparatus, a series of centrifugal pumps set in the stern overlapping each other obliquely in rows inclined in respect to the vessel's axis or keel, said pumps connected in pairs to a motive engine set on or over the vessel's keel, substantially as specified.

3. In hydraulic propelling apparatus, a series of centrifugal pumps set at or near the stern of a vessel obliquely overlapping in rows and connected in pairs to motive engines placed on or over the vessel's keel, two or more of said centrifugal pumps arranged with two discharge-nozzles each, one discharging water forward, and the other aft, substantially as specified.

4. In hydraulic propelling apparatus, a series of centrifugal pumps set in rows in the stern, overlapping each other obliquely on each side of the vessel's axis or keel, connected in pairs to motive engines set on or over the vessel's keel, and forwardly-directed suction-pipes extending from one side of each pump to the sides of the vessel and open to the sea, substantially as specified.

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Witnesses:
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