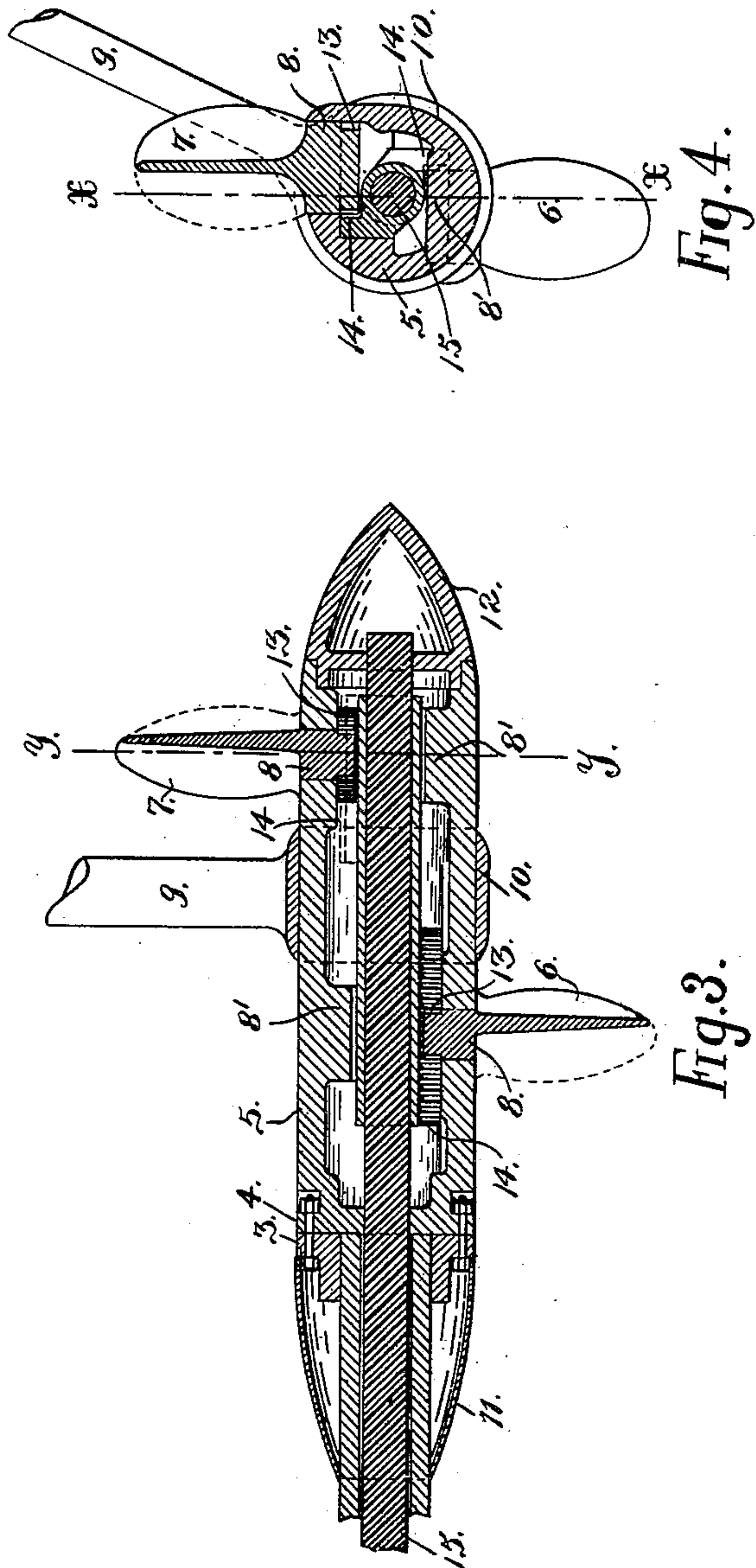
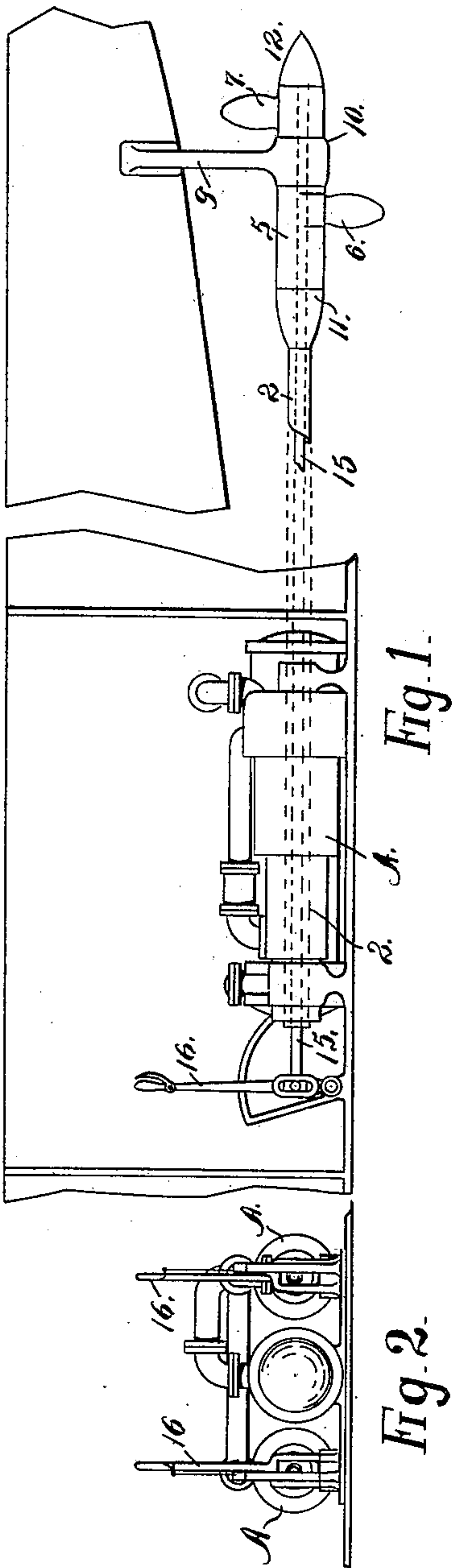


No. 712,677.

Patented Nov. 4, 1902.

R. B. HEWSON.  
MARINE PROPULSION.  
(Application filed Jan. 16, 1902.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

ROBERT B. HEWSON, OF SAN FRANCISCO, CALIFORNIA.

## MARINE PROPULSION.

SPECIFICATION forming part of Letters Patent No. 712,677, dated November 4, 1902.

Application filed January 16, 1902. Serial No. 90,036. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT B. HEWSON, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Marine Propulsion; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in marine propulsion.

It consists in the novel construction of propellers having a variable pitch and mechanism by which the blades may be reversed and in combination therewith of a high-speed engine, such as the steam-turbine, the mechanism being of such a character that the pitch of the propellers may be varied or the position of the blades reversed without reversing the engine or driving mechanism or decreasing its speed of rotation.

Referring to the accompanying drawings, Figure 1 is a side view of steam-turbine and my improved propeller with connections for operating same. Fig. 2 is a front view of same. Fig. 3 is a central vertical section taken on the line  $xx$  of Fig. 4. Fig. 4 is a vertical cross-section taken on the line  $yy$  of Fig. 3.

Difficulty is encountered when it is attempted to drive propellers of the ordinary construction at the high rates of speed necessary when what is known as a "steam-turbine" is used or when it is desirable to drive the boat or vessel at high rates of speed, as in torpedo and like fast-running boats, because the rapid movement churns the water and causes what is known as "cavitation" of the water, preventing the propeller-blades from working in solid water and thus developing their full power.

It is the object of my invention to so construct the propeller and connect it with such an engine that each blade revolves in a plane of solid water of its own and at a distance from the plane of revolution of the other blade or blades, to provide a counterweight for each of said revolving blades, by which they are balanced when running at a high speed, and means by which the pitch of said blades may be changed or reversed altogether without stopping the engine or changing its

direction of motion or decreasing its rate of rotation.

I have here shown my apparatus as consisting of high-pressure steam-turbines A, which may be compounded by admitting the steam into the first turbine at high pressure and exhausting it from this turbine into the second one at a lower pressure. The two may be connected, if desired, to run in unison, or they may be independently connected with two propellers.

As here shown, the propeller-shaft 2 is tubular, and the rear end of the shaft projecting through the stern of the vessel has a flange 3 secured to it. To this flange is bolted the flange 4 of the propeller casing or boss 5. This casing is of sufficient length to carry the two propeller-blades 6 and 7 in different planes. As here shown, these propeller-blades have shanks, as at 8, passing, as shown, into the casing 5, and as but one blade is shown in each position I have shown counterweights 8', so formed with or attached to the casing 5 as to revolve with it, lying upon the opposite side from the blades. Thus when the propeller is running at a high rate of speed these counterweights will steady it and prevent jar.

The whole of the propeller-casing and parts carried thereby is guided and steadied by a strut 9, having a suitable sleeve or bearing, as at 10, through which the propeller-body or boss passes and within which it is turnable. The strut extends upwardly and is secured to the vessel in any suitable or desired manner, forming a sufficient brace and journal to steady the propeller at any rate of revolution. One blade of the propeller is thus located on each side of the journal-bearing. I have here shown a shield 11, made conical and extending from the flange 3 forward upon the propeller-shaft, to which it unites to make an easy entrance and movement through the water, and the rear end of the boss or casing is similarly tapered, as shown at 12. It will be understood that with this construction the propeller-blades may have a permanent pitch and be fixed in place and that the advantage derived from revolving them in different planes will be achieved; but I also desire to change the pitch or reverse the position of the blades when desired to stop or back the boat or



change its rate of speed. I have therefore shown the shanks 8 as having pinions secured to their inner ends, as at 13, and these pinions engage with racks 14, which are carried by an interior rod or shaft 15, passing through the whole propeller-shaft 2 and extending forward within the vessel to a point where it is connected with any suitable device by which it can be reciprocated. As shown in the present case, it is connected with a fulcrumed lever 16, which serves to reciprocate the rod 15 within the propeller-shaft. It will be seen that the reciprocation of this rod and the rack-bars carried by it will turn the propeller-blades 6 and 7 to any desired pitch or angle, depending upon the movement of the lever, and if the movement be sufficiently prolonged the position of the blades can be reversed, so that without changing the direction of movement of the engine the propeller will act to back water and eventually reverse the movement of the boat. By this means and with two propellers, each driven by independent turbines or engines, it will be seen that one propeller can be made to reverse or back while the other is going ahead or driving forward, and the boat can thus be turned or maneuvered with great promptness and rapidity and be under full control. By setting the propeller-blades at zero pitch water resistance will be reduced to a minimum and the speed of the engine so increased that the momentum thus attained will be of great assistance to the rapid maneuvering of the vessel. This combination of the reversible propeller with the steam-turbine avoids the necessity of a separate reversing-turbine and enables the single turbine running continually in one direction to do everything requisite to the proper handling of the vessel.

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

1. A propeller including a boss or casing and means by which it is revoluble about its axis, blades attached to the casing at points along the length thereof and revoluble in unison and in the same direction, and counterweights connected with the blades.

2. A propeller consisting of a boss or body journaled and revoluble about its axis, single propeller-blades projecting in different

planes of rotation, and counterbalance-weights for said blades carried within the boss.

3. A propeller consisting of a boss, a journal and support therefor, blades revoluble in different planes of rotation, means for counterbalancing said blades, and means by which said blades are turnable to reverse or change the pitch.

4. A propeller consisting of a boss or body, a strut and journal-box within which it is supported and revoluble, single blades projecting in opposite directions and in different planes of rotation, means for counterbalancing said blades, a hollow shaft and a steam-turbine from which motion is transmitted to drive the propeller, a rod extending through said shaft into the propeller-boss, and rack-bars carried thereby, pinions fixed upon the journal-shanks of the propeller-blades which extend into the boss, said pinions engaging the racks.

5. The combination in a propeller of a hollow boss, propeller-blades having shanks extending into the boss upon opposite sides of its longitudinal axis, means for counterbalancing said blades, a hollow shaft connecting the boss with the engine by which it is revoluble, a rod extending through said shaft having rack-bars carried by said rod and pinions fixed to the propeller-blade shanks engaging the rack-bars and means by which the rod is reciprocated to revolve the pinions and change the pitch of the propeller-blades.

6. The combination with a high-speed steam turbine or engine, of a propeller having blades revoluble in different planes, means for counterbalancing said blades, a hollow shaft connecting the propeller-boss with the turbine, a rod extending through said shaft into the propeller-hub, toothed racks carried by said rod, pinions on the shanks of the propeller-blades engaging said rack and means for reciprocating the rod whereby the pinions are turned and the pitch of the blades changed or reversed.

In witness whereof I have hereunto set my hand.

ROBERT B. HEWSON.

Witnesses:

S. H. NOURSE,  
JESSIE C. BRODIE.