(No Model.) 2 Sheets—Sheet 1.

# F. A. L. GRUNOW.

## PROPELLING DEVICE FOR SHIPS.

No. 589,946. Patented Sept. 14, 1897.

Fig. 1.

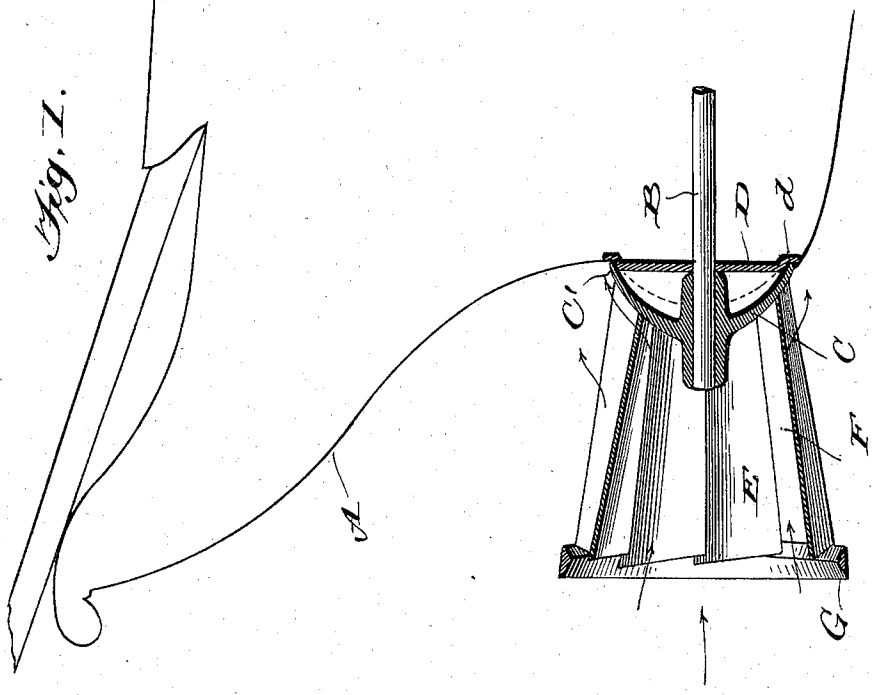



Fig. 3.

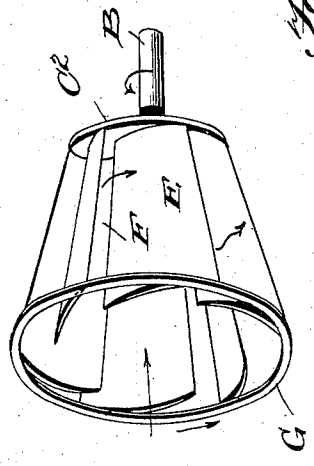
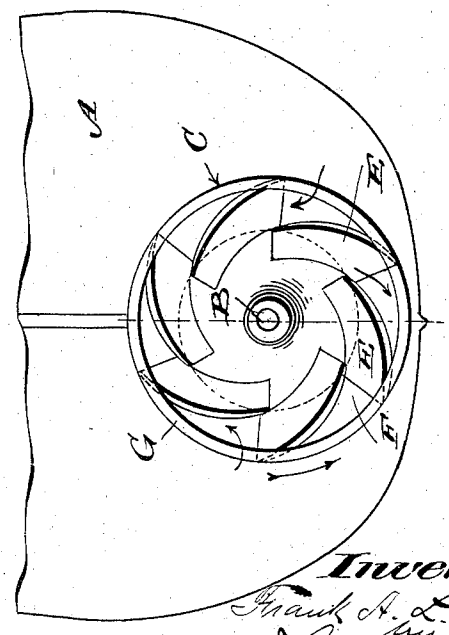



Fig. 2.




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(No Model.) 2 Sheets—Sheet 2.

# F. A. L. GRUNOW.

## PROPELLING DEVICE FOR SHIPS.

No. 589,946. Patented Sept. 14, 1897.

Fig. 5.

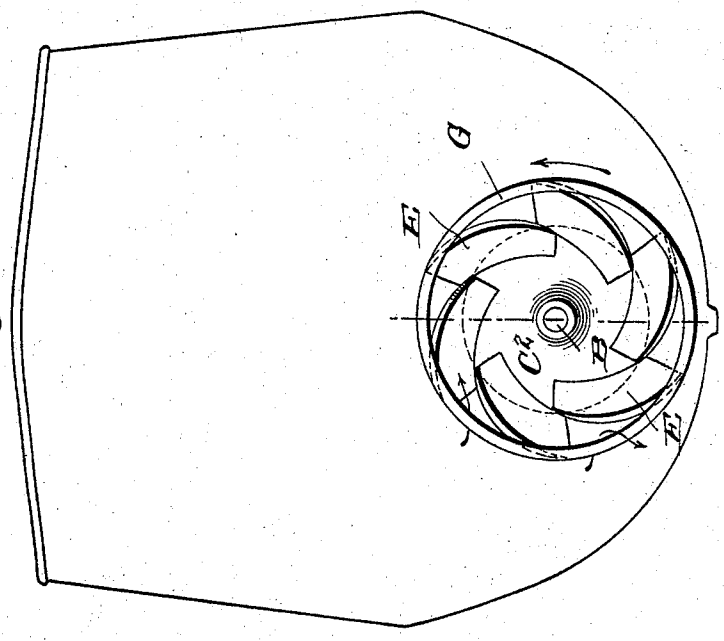
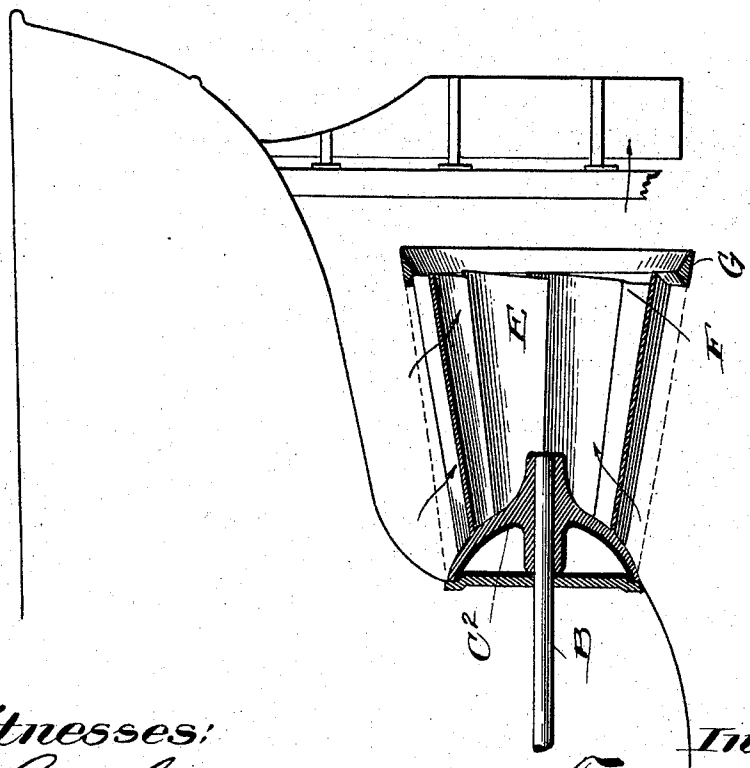



Fig. 4.




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# UNITED STATES PATENT OFFICE.

FRANK A. L. GRUNOW, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF TO COLUMBUS H. ALLEN AND ALPHONSO D. RIFFEL, OF SAME PLACE.

## PROPELLING DEVICE FOR SHIPS.

SPECIFICATION forming part of Letters Patent No. 589,946, dated September 14, 1897.

Application filed November 25, 1896. Serial No. 613,424. (No model.)

*To all whom it may concern.*

Be it known that I, FRANK A. L. GRUNOW, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Propelling Devices for Ships; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in propulsion devices for ships, and especially to a hollow drum open at one end and closed at the other, while in its sides are disposed a plurality of angularly-set cutter-knives or choppers, between each of which is an open space through which water may enter or be dispelled, accordingly as the propelling device may be applied to the bow or stern of the ship.

The invention further relates to a propelling device for ships whereby, for the highest practicability, a drum, which may be of conical, cylindrical, or other shape, is carried at the bow and stern of the ship, each drum being provided with a series of cutter-knives so arranged and operated that the forward drum, or the one at the bow, will exert a pulling force, thus producing a great speed with economic results by a powerful suction which serves to clear the path or course in which the ship is to travel and break the tremendous frictional current against the bow of the vessel, while on the stern of the ship is a similarly-constructed drum, but working in a reverse manner, causing a forward pushing force, suction, and prevention of after current.

To these ends and to such others as the invention may pertain the same consists, further, in the novel construction, combination, and adaptation of the parts, as will be hereinafter more fully described and then specifically defined in the appended claims.

I clearly illustrate my invention in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which drawings similar letters of reference indicate like parts throughout the several views, in which—

Figure 1 is a sectional view in a vertical plane through the propelling-drum, which is carried on a propelling-shaft and at the bow of a ship, the outline of the ship being shown. Fig. 2 is an end view of the same drum, looking into the end thereof. Fig. 3 is a detail in perspective of the propelling-drum, with arrows showing the direction of rotation of the drum and the course that the water takes in entering the drum. Fig. 4 is a vertical longitudinal sectional view through the stern propelling-drum, showing also the stern of the vessel in outline. Fig. 5 is an end elevation of the stern propeller, looking into the drum, showing the angle at which the cutter-knives are set.

Reference now being had to the details of the drawings by letter, A designates the bow of the vessel, through the lower longitudinal portion of which is carried the propelling-shaft B, on the forward end of which is keyed the drum C. While in the drawings this drum is shown tapering and in a conical shape, if preferred it may be cylindrical in shape if found better adapted for the purpose. The forward end of the drum is open and the rear end closed, with a backwardly-extending flange C′, which extends back and rests over a shoulder formed in the plate D, which is circular in outline and provided about its periphery with an annular recess *d*.

Disposed at suitable angles to the driving-shaft is a series of blades, cutters, or choppers E, which are located at uniform intervals, allowing a space F to intervene between each. Each blade or cutter is slightly curved, as best seen in Figs. 2 and 3 of the drawings, and has its longitudinal edges sharpened. The rear ends of each blade are secured to the plate $C^2$ and their forward ends fastened to the ring G. In operation this bow propeller rotates in the direction of the inner edges of the blades E, and in a rapid revolution the said blades E peal or slice the water by centrifugal action, which forces the water through the horizontal channels F between the blades outwardly and entirely out of the course of the vessel. By the action of this displacement a suction is formed with the

propeller and the supply of water rushes through the opening at the end of the drum to fill this powerful suction-creating vacancy. By this operation the ship finds its resistance lessened and the water is quickly forced radially out of the course of the vessel.

At the rear of the ship is mounted on the end of the propelling-shaft B a similarly-constructed drum C, but arranged to operate in a reverse manner. This drum has the blades E, which are secured to the base $C^2$ at their inner ends, their outer ends being fastened to the ring G and disposed at an angle with space F intervening between the edges of each blade. The rotation of the stern propelling-drum is toward the outer sharp edges of the said blades E, which causes them to chop or slice the water by centripetal action, from the outer side inwardly, axially into the drum, and after rapidly filling this space the water rushes backward through the circular opening at the outer end of the drum equal with the velocity at which the water enters the drum at the bow of the vessel. By this concentrated action a forward pressure is produced which acts in coöperation with a pulling force produced at the bow, by which a ship may be propelled through the water at a great velocity.

The outer circumference of the blades E each not only takes care of the flow of water by travel of the ship in connection with any existing stream-current against this reversed taper, but also utilizes the friction gyration and gives assistance in the forward pressure of motive power.

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

1. In a propelling device for ships, the combination with the propelling-shaft B, the plate D through which the shaft passes, the hub C having a convexed flange, of the circular series of blades E secured at their rear ends to the said flange, their forward ends fastened to a ring G, substantially as described.

2. In a propelling device for ships, the combination with the propelling-shaft, of the plate D having an annular shouldered portion *d*, of the hub C, mounted on the shaft, the convexed flange C′, the outer circumference of the edge of which is designed to travel about the shoulder on plate D, of the curved blades E, arranged substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK A. L. GRUNOW.

Witnesses:
A. D. RIFFEL,
W. G. REBENTISCH.