

No. 703,181.

Patented June 24, 1902.

CARLOS CONSTANTINO DA ROCHA CARVALHO.

MARINE PROPELLER.

(Application filed Feb. 6, 1902.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

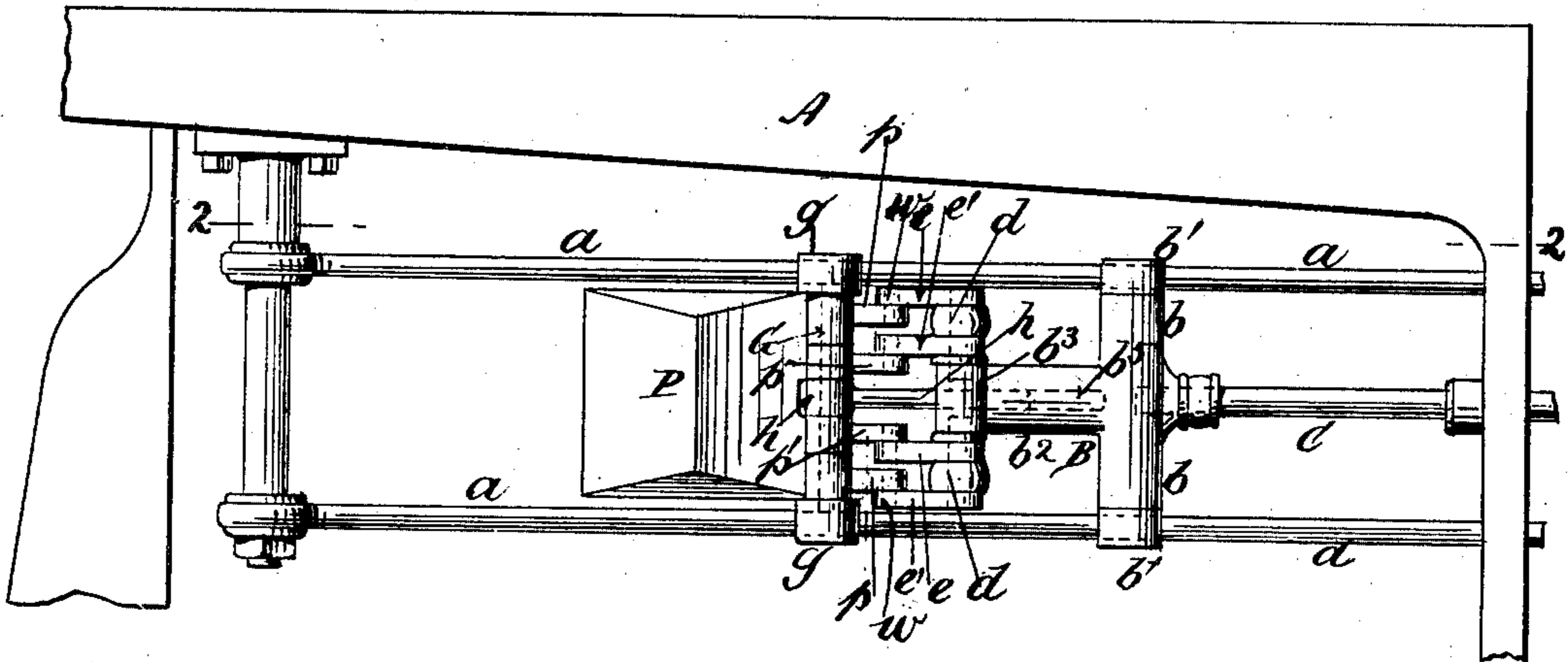


Fig. 2.

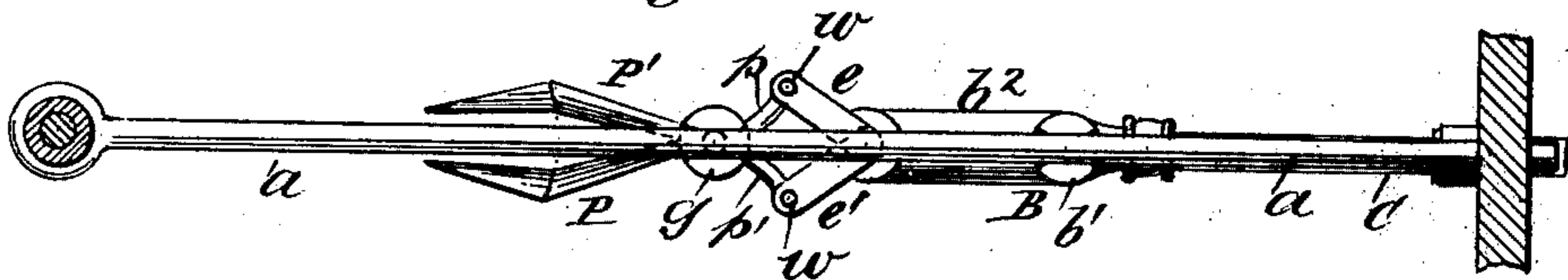


Fig. 3.

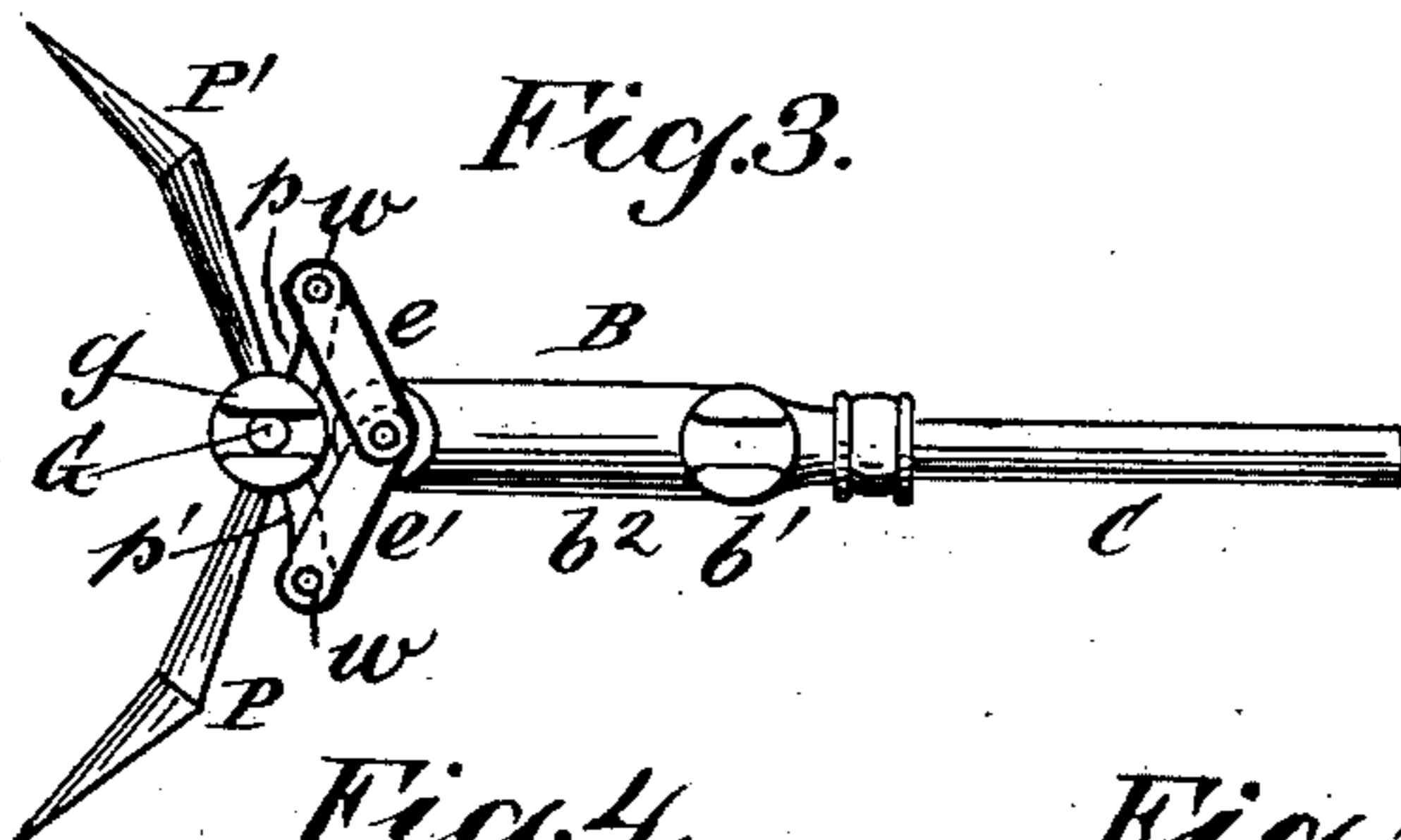


Fig. 4.

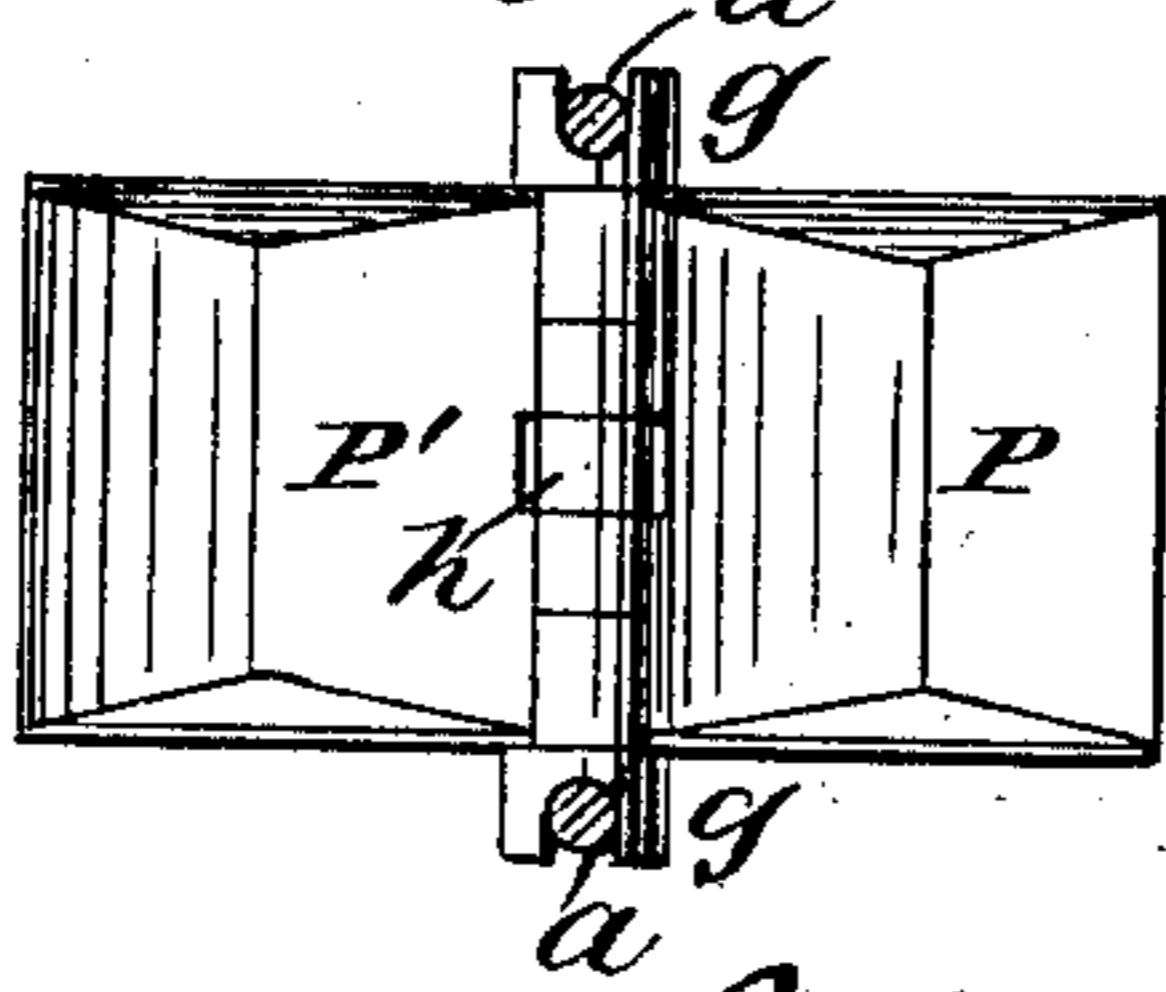
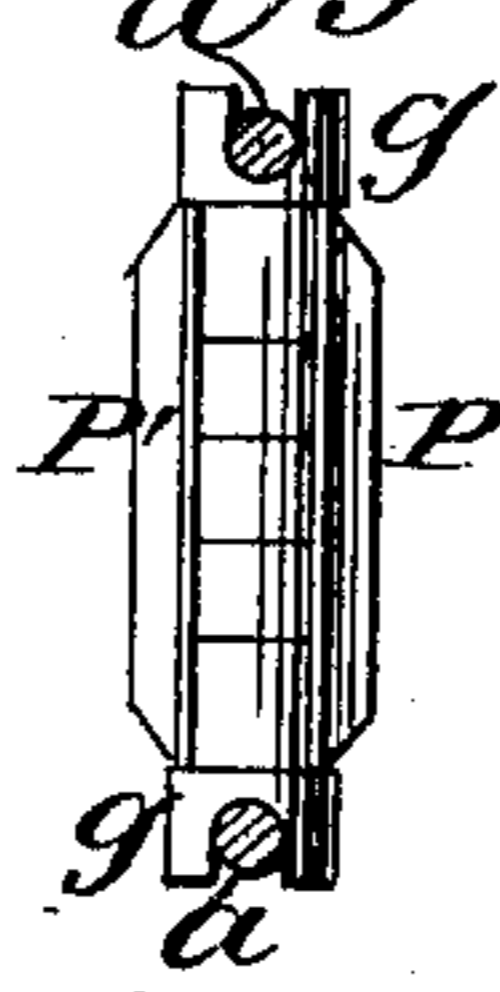


Fig. 5.



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No. 703,181.

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CARLOS CONSTANTINO DA ROCHA CARVALHO.

MARINE PROPELLER.

(Application filed Feb. 8, 1902.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 6.

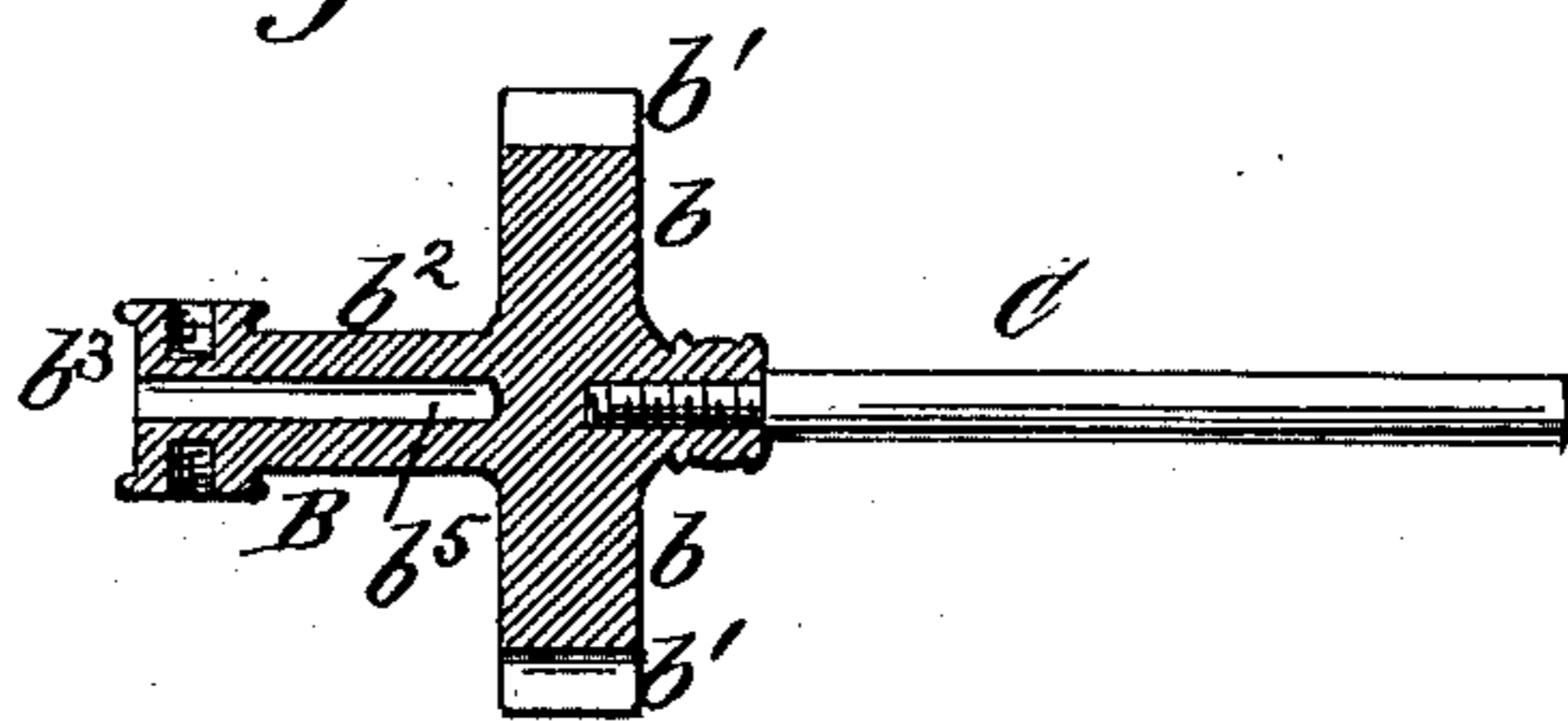


Fig. 7.

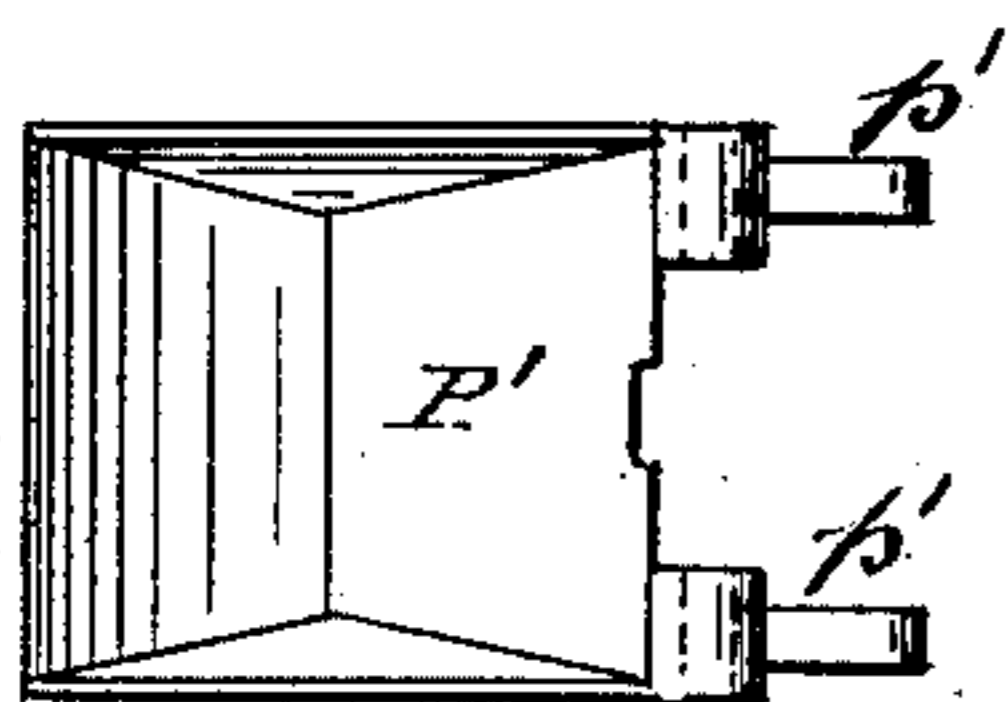


Fig. 8.

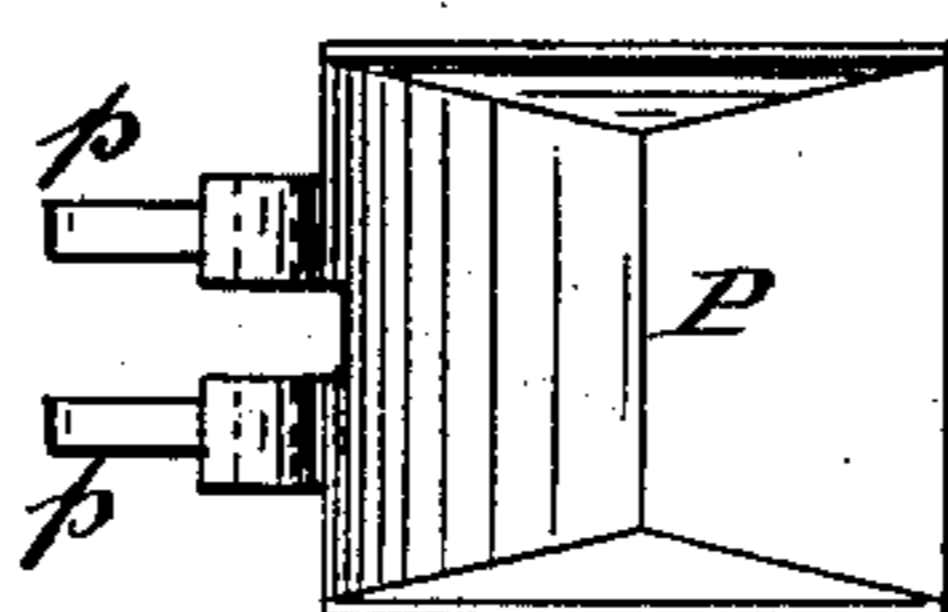


Fig. 9.

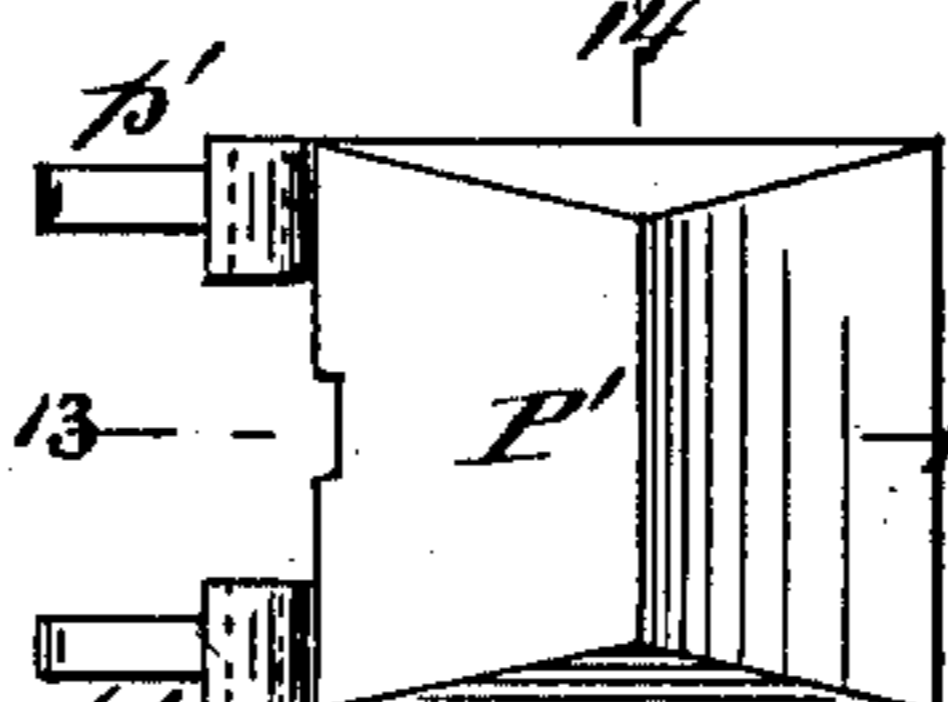


Fig. 10.

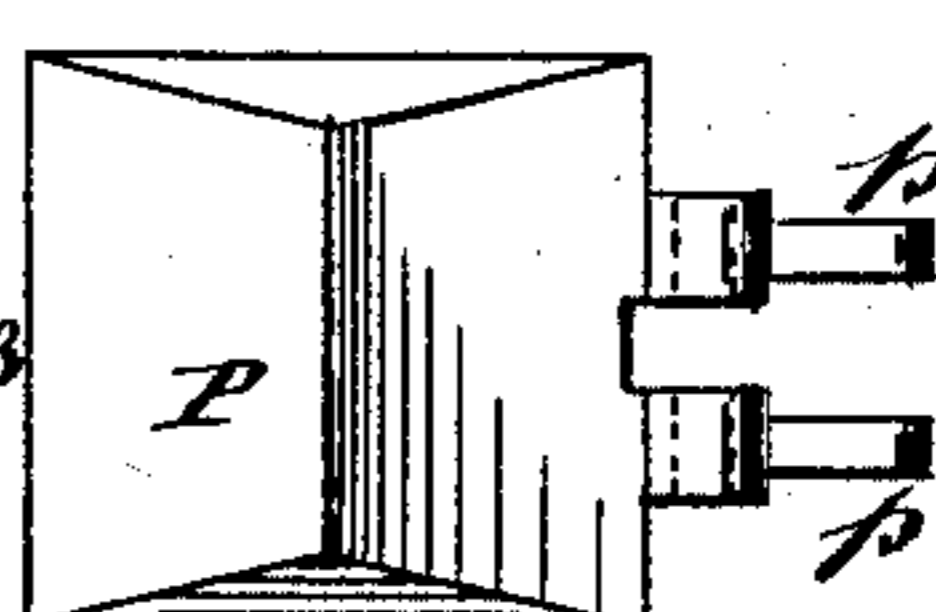


Fig. 11.

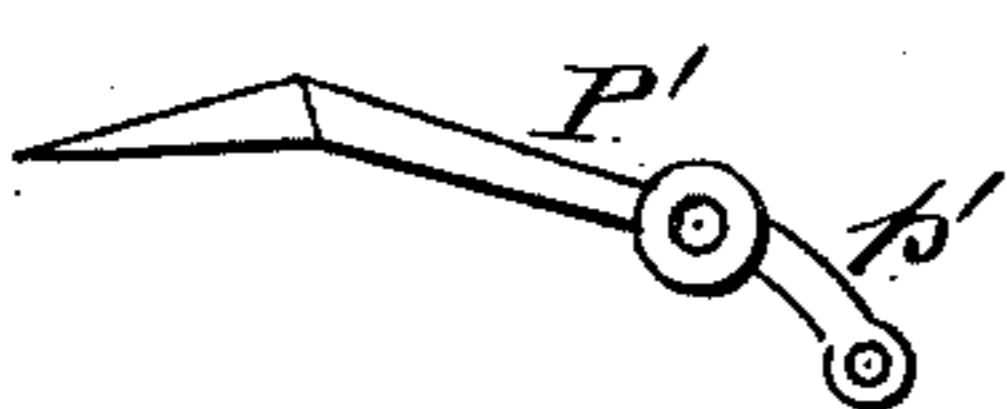


Fig. 12.

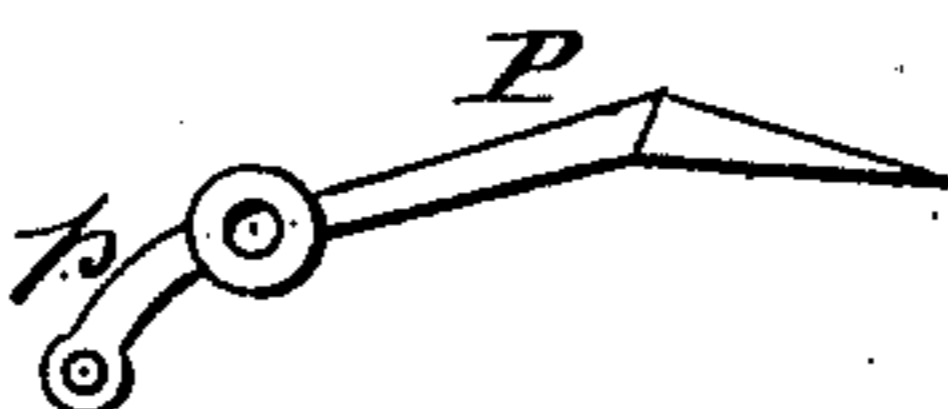


Fig. 13.

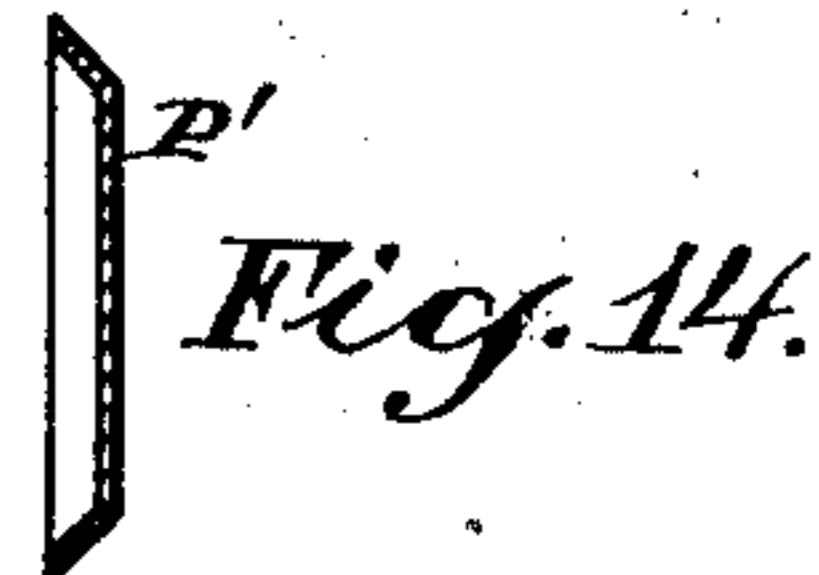
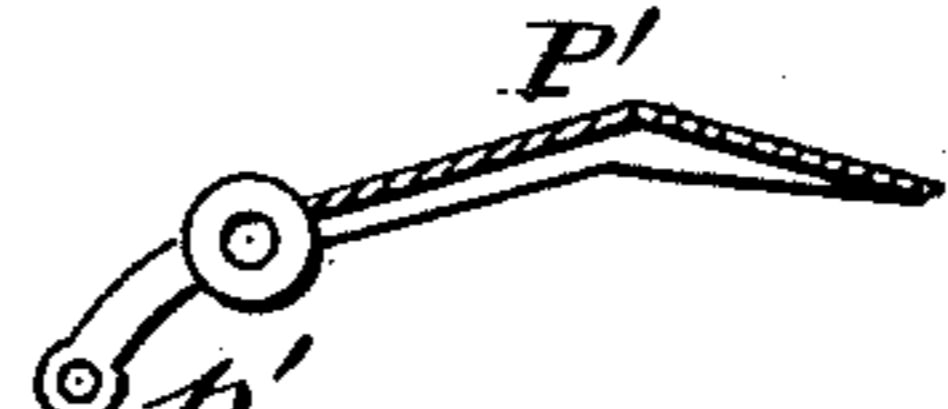


Fig. 15.



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UNITED STATES PATENT OFFICE.

CARLOS CONSTANTINO DA ROCHA CARVALHO, OF LISBON, PORTUGAL.

MARINE PROPELLER.

SPECIFICATION forming part of Letters Patent No. 703,181, dated June 24, 1902.

Application filed February 6, 1902. Serial No. 92,845. (No model.)

To all whom it may concern:

Be it known that I, CARLOS CONSTANTINO DA ROCHA CARVALHO, a subject of the King of Portugal, residing at Lisbon, Portugal, have
5 invented certain new and useful Improvements in Marine Propellers, of which the following is a specification sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

10 My improvements relate to marine propellers, and are designed to obviate objections inherent in what is known as the "screw-propeller," as well as to utilize by means which
15 are positive the full power of the motor employed for the propulsion of the vessel, as will be understood by reference to the body of this specification.

The invention consists primarily in a pair
20 of articulated blades carried by a reciprocating cross-head mounted between ways and arranged to expand during the rearward stroke, so as to exert their full efficiency against the resistance of the water, and to collapse during the forward stroke, so as to afford the least
25 possible resistance to the water, as hereinafter set forth, and, secondarily, in certain features in the construction and arrangement of parts hereinafter described and claimed specifically.

30 In the accompanying drawings, Figure 1 is a sectional elevation illustrating the application of my improved propelling device to the stern of a vessel. Fig. 2 is a horizontal section upon plane of line 2 2, Fig. 1. Fig. 3 is
35 a detail view showing the propeller-wings expanded; Fig. 4, a rear view of the propeller-wings expanded; Fig. 5, a similar view showing the wings collapsed; Fig. 6, a sectional view of the cross-head; Figs. 7, 8, 9, and 10,
40 respectively, detail views of the two blades; Figs. 11 and 12, top views of Figs. 7 and 8; Fig. 13, a section upon plane of line 13 13, Fig. 9; Fig. 14, a section upon plane of line 14 14, Fig. 9; Fig. 15, a detail view of one of
45 the links.

I herein illustrate and describe mechanical parts essential in the practical application of my invention to the propulsion of a marine vessel, although I do not confine myself strictly to
50 the identical form and construction of parts shown, since it is obvious that various mechanical expedients may be resorted to with-

out departing from the spirit and intent of my invention and with like result. Thus in the drawings, A represents the hull of a vessel, at the stern of which are securely mounted two parallel guide rods or ways *a a*, upon and between which rides a T-shaped cross-head B, rigidly secured to a reciprocating shaft C, actuated by any suitable motive
55 power within or upon the vessel A, it being understood that the longitudinal axis of the shaft C is parallel to the guide-rods *a a*.

The ends of the vertical member *b* of the cross-head B are formed with flanges *b' b'*,
60 which straddle the guide-rods *a a*, while its horizontal member *b²* is formed with a boss *b³*, carrying vertical wrist-pins *d d*, consisting, preferably, though not necessarily, of screw-bolts. Pivotally connected with the
70 wrist-pins *d d* are toggle-links *e e'*, which are also connected pivotally with wrist-pins *w w* on the lever-arms *p p'*, attached rigidly to or forming part of the propeller-blades P P', the toggle-links *e* coupling the blade P with the
75 cross-head B, and the toggle-links *e'* performing a like office for the blade P'.

The propeller-blades are mounted upon a secondary cross head or bar G, carried by and between flanged runners *g g*, which straddle
80 the ways *a a*.

In order to steady and strengthen the parts and assist in preserving their alinement, I prefer to employ an axial rod *h*, attached rigidly to the cross-bar G at its rear end and engaging with and entering an axial recess *b⁵*
85 in the horizontal member *b²* of the cross-head B. The length of the axial rod *h* is such that under all conditions it remains in contact with the horizontal member *b²* of the cross-head B, the recess *b⁵* of which is made of sufficient length to admit of the requisite degree
90 of motion or play between the parts. The opposed inner surfaces of the propeller-blades are made slightly concave, and the parts are
95 so timed and arranged that these surfaces when the blades are closed or come together to their fullest extent are still a sufficient distance apart to afford an instant purchase upon the water when the rear stroke of the
100 reciprocating shaft C begins, as will be seen by reference to Fig. 2.

The operation is as follows: The parts being in the position shown in said figure last

mentioned, the rearward stroke of the reciprocating shaft C, acting through the toggle-links $e e'$, opens the propeller-blades P P' gradually but positively to their fullest degree of extension, as shown in Figs. 3 and 4, by reason of the resistance exerted by the water against said blades. As a result the full power of the thrust is distributed and exerted equally upon both sides of the axial line of the shaft C, all danger of lateral twist or slip is avoided, and the vessel is advanced in perfect alinement and with greater economy of power. At the beginning of the retractile or forward stroke of the reciprocating shaft C the propeller-blades naturally collapse, their arms $p p'$ being drawn toward each other by the links $e e'$, the action being assisted by the resistance of the water, the toggle-links $e e'$ allowing them to do this freely without resistance, all the operative parts of the device assuming positions along the line of least resistance. It will thus be seen that the propeller-blades to all intents and purposes expand and contract automatically, the toggle-links $e e'$, rod h , &c., acting only as guides to limit and restrict the motion and render it uniform on either side of the propelling-shaft.

By my improved construction of marine propeller I not only positively utilize the full power transmitted by the motor, but I exert it equally on both sides at right angles to the shaft, and there can be no lateral tendency or twist, as in the case of the screw-propeller. I furthermore avoid the slip between blades of the screw-propeller and reduce skin friction to the minimum.

An objection to the screw-propeller is that it acts as a drag, should it become disabled, to retard the vessel if forcing passage under sail—a contingency that could not arise in my case, since the blades collapsed afford little or no resistance to the advance of the ship. Should it, however, be desired to use my propeller as a drag to retard the speed of the vessel, as for the purpose of avoiding collision, it is obvious that its blades expanded and held so would afford a maximum amount of resistance, since in such position it presents practically a solid unbroken surface substantially at right angles to the line of motion.

It is obvious that my improved propelling apparatus may be duplicated upon a vessel or situated and arranged at some other point or points than the stern, and I do not limit myself in this respect.

With a marine propeller of my pattern properly proportioned with relation to the

size of vessel and supplied with the requisite power a very great rate of speed can be attained and maintained, or, in other terms, a prescribed distance can be accomplished in much less time than at present required with an expenditure of less fuel.

It will be obvious that by reversing the cross-head and connections the device may be made and arranged to propel the vessel backward, and for this reason a duplicate of my propeller may be used with the arrangement herein described for service in conjunction therewith in stopping or backing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a marine propeller, a reciprocatory part, guideways for the same, links connected with said part, a cross-head mounted to travel on said ways, propeller-blades pivoted on the cross-head, articulated connections between the blades and reciprocatory part, and an axial rod carried by the cross-head and movably connected with said part, as and for the purpose specified.

2. The combination of the guideways a, a , the reciprocating shaft C, the cross-head B attached to said shaft and formed with the flanges b, b' , engaging the ways a, a , and with the horizontal extension b^2 , the cross-bar G, formed with the runners g, g , the propeller-blades P, P', pivotally supported on the cross-bar G, and the toggle-links e, e' , the whole arranged and operating substantially in the manner and for the purpose described.

3. The combination of the guideways a, a , the cross-head B, supported upon and between, the said ways a, a , the reciprocating shaft C, attached to the cross-head, the axial recess b^5 , formed in the horizontal member b^2 , of the cross-head B, the cross-bar G, formed with the axial rod h , engaging the recess b^5 , in the cross-head B, the propeller-blades P, P', pivotally supported on the cross-bar G, and the toggle-links e, e' , the whole arranged and operating substantially as set forth.

4. In a marine propeller, the combination of fixed guideways, a cross-head guided thereon, a cross-head also mounted on said ways, propeller-blades pivoted on the last-mentioned cross-head, a horizontal member on the other cross-head, axial means on the one movably engaged with the other, a boss, wrist-pins thereon and toggle connections, as set forth.

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Witnesses:

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