P. BURKE.

Improvement in Propulsion of Vessels.

No. 114,914. Patented May 16, 1871.

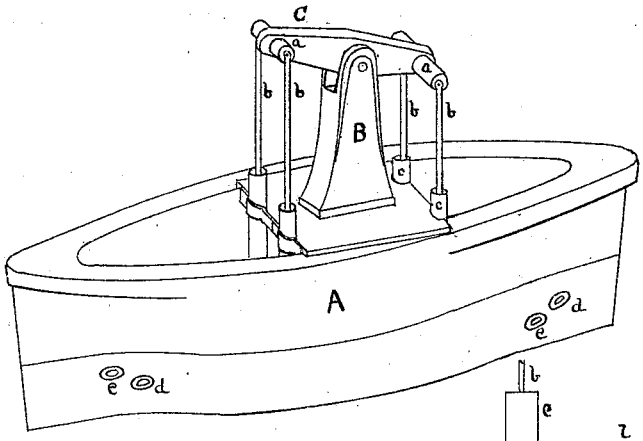

Fig. 1

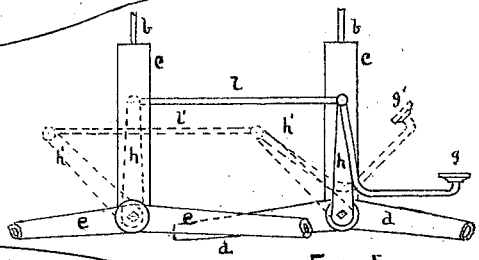

Fig. 5

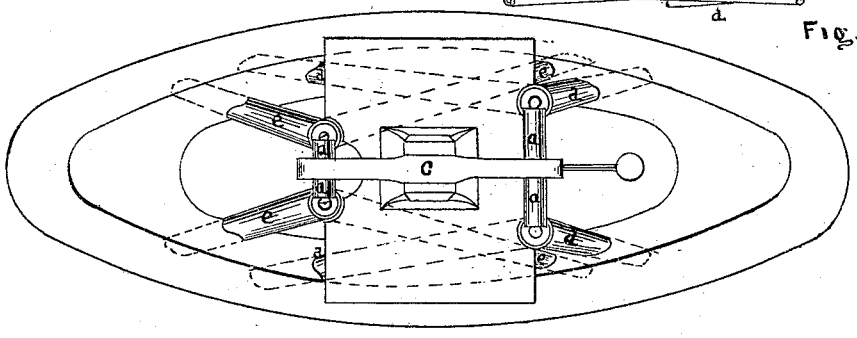

Fig. 2

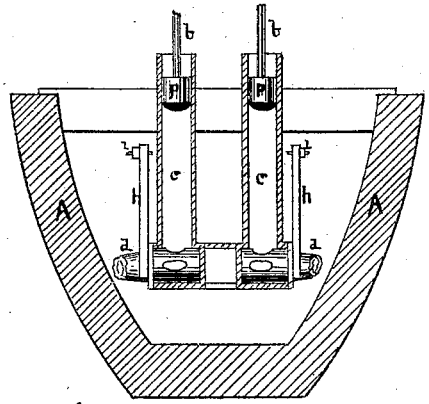

Fig. 3

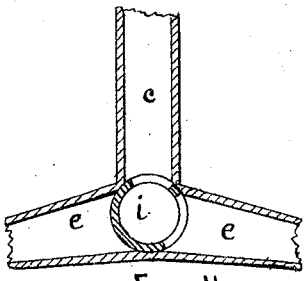

Fig. 4

Witnesses

Frankl. Parker.

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PATRICK BURKE, OF BOSTON, ASSIGNOR TO WILLARD M. HARDING, OF CHELSEA, MASSACHUSETTS.

Letters Patent No. 114,914, dated May 16, 1871.

IMPROVEMENT IN PROPULSION OF VESSELS.

The Schedule referred to in these Letters Patent and making part of the same.

I, PATRICK BURKE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Propelling Vessels, of which the following is a specification.

My invention relates to that class of propellers which operates by the reaction of a jet of water or other fluid impinging against the adjacent mass of water in which the vessel floats; and

It consists—

First, in the form and arrangement of the pipes through which the fluid is ejected.

Second, in the construction and mode of operating the cut-off gates or cocks which control the direction of the propelling-jets.

That others may fully understand my invention I will particularly describe it, having reference to the accompanying drawing, in which—

Figure 1 is a perspective view of a boat provided with my propelling apparatus.

Figure 2 is a plan of the same.

Figure 3 is a vertical transverse section of same.

Figure 4 is a longitudinal section of ejection-pipe and piston-cylinder with cut-off cock.

Figure 5 is a side elevation, showing the method of operating several cut-off cocks at the same time.

My invention may be operated by any proper motor, and therefore no particular description of motor is shown in the drawing or in the specification.

A is the hull of my boat.

The engine or motor is located at any proper point within it, and is connected to the walking-beam C by any proper connection.

In the drawing I represent two pairs of cylinders, *c c*, though the number may be increased or diminished, according to the capacity of the vessel and the power to be exerted.

The cylinders *c c* are placed upright, or nearly so, and at their bottoms connect with the ejection-pipes *e e d d*.

The pistons P are placed within the cylinders *c*, and are moved up and down therein by means of the piston-rods *b* and walking-beam C.

The cross-heads *a a* permit the location of the cylinders *c* at a convenient distance laterally from the walking-beam.

The ejection-pipes *e e d d* extend from the bottoms of the cylinders *c*, forward and backward, and open through the bottom of the vessel A into the surrounding water.

I find it advantageous to incline these ejection-pipes slightly downward and outward from the side of the vessel, as the jet of water is then ejected toward a stratum of water under greater pressure, and therefore less mobile, and exerts some tendency to lift and lighten the vessel in the water.

It is also found to be advantageous to contract the orifice of the pipes *e e d d*, as shown particularly in figs. 4 and 5, because the ejected jet is thereby concentrated, and impinges with more force against the surrounding mass of water, in the same manner as the contracted nozzle of the fire-hose produces greater velocity and force in the jet issuing from it.

The pipes *e e d d* are located near to the lowest part of the bottom of the vessel, so as to be below the water-surface and to act against the greatest water-pressure possible in the case.

The cut-off *i*, as I prefer to make it, is simply a two-way cock placed at the intersection of the cylinder *c* and the ejection-pipe, so that when said cock is turned in one direction the jet will issue from the stern and propel the boat forward, and when turned in the other direction it will issue from the bow and propel the boat backward.

The several cocks *i* are coupled together, as shown in figs. 3 and 5, and operated simultaneously by means of the levers *h* and connecting-rods *l*.

The movement of said levers is shown by dotted lines at *h' l'* in fig. 5.

A hand-lever, *g*, may be employed to operate the levers *h* and the cocks to which they are attached.

Mode of Operation.

The movement of the piston P alternately permits water to flow into and ejects it from the pipe *e* or *d*, and the force exerted by said movements of a jet of water will be proportionate to the depth of submergence and the difference between the water-pressure at that point and the steam or other power exerted upon the moving piston.

When the piston is withdrawn water enters the pipe *e* with a velocity and force equal to the pressure of a column of water having a height equal to the depth of submergence added to the atmospheric pressure; but when it is ejected it moves with a velocity and force equal to the steam or other power applied to the moving piston P, and the propelling power will equal the difference between these two forces. For instance, if at a certain depth of submergence the water-pressure equals thirty (30) pounds per square inch, that amount of force might, theoretically, be utilized to move a vessel; but if the water which flows in under a pressure of thirty pounds per inch be immediately expelled under a force (steam or otherwise) of sixty (60) pounds per square inch, it appears manifest that there will be an excess of force equal to thirty pounds to move the vessel in an opposite direction. It will

also be observed that if water flows into the pipe *e* under a pressure of thirty pounds it will to that extent diminish the force necessary to retract the piston, and the power of the motor will be correspondingly economized. Upon this difference of force the operation of my device depends. To produce effective operation it is, however, necessary to impart a very rapid movement to the pistons and a very short stroke, whereby the ejected streams of water act with the power of impact. The contracted orifice of the ejection-pipes *e* enhances this effect by increasing the velocity at the point of issuance, and by contracting and concentrating the jet, and correspondingly increasing the reaction. The downward inclination of the ejection-pipes *e* also causes the ejected streams to act against a medium under greater pressure and less mobile than at the point where the inflowing stream is received. This also increases the reactive power.

From all these sources the excess of power to propel the boat are material and sufficient, as, by actual experiment, has been demonstrated.

Having now described my invention,

What I claim as new is—

1. The tapering pipes *e d*, arranged so as to incline downward, in connection with the piston-cylinders *c*, substantially as described, and to produce the effect set forth.

2. In connection with the piston-cylinders *c* and ejection-pipes *e d*, the two-way cocks or cut-offs *i*, coupled and moved simultaneously, substantially as described.

his
PATRICK × BURKE.
mark.

Witnesses:

J. L. NEWTON,

WILLARD M. HARDING.