Sheet 1
2 Sheets

J. Sullivan.

Marine-Engine Governor.

No. 72239

Patented Dec. 17, 1867.

Fig. 1

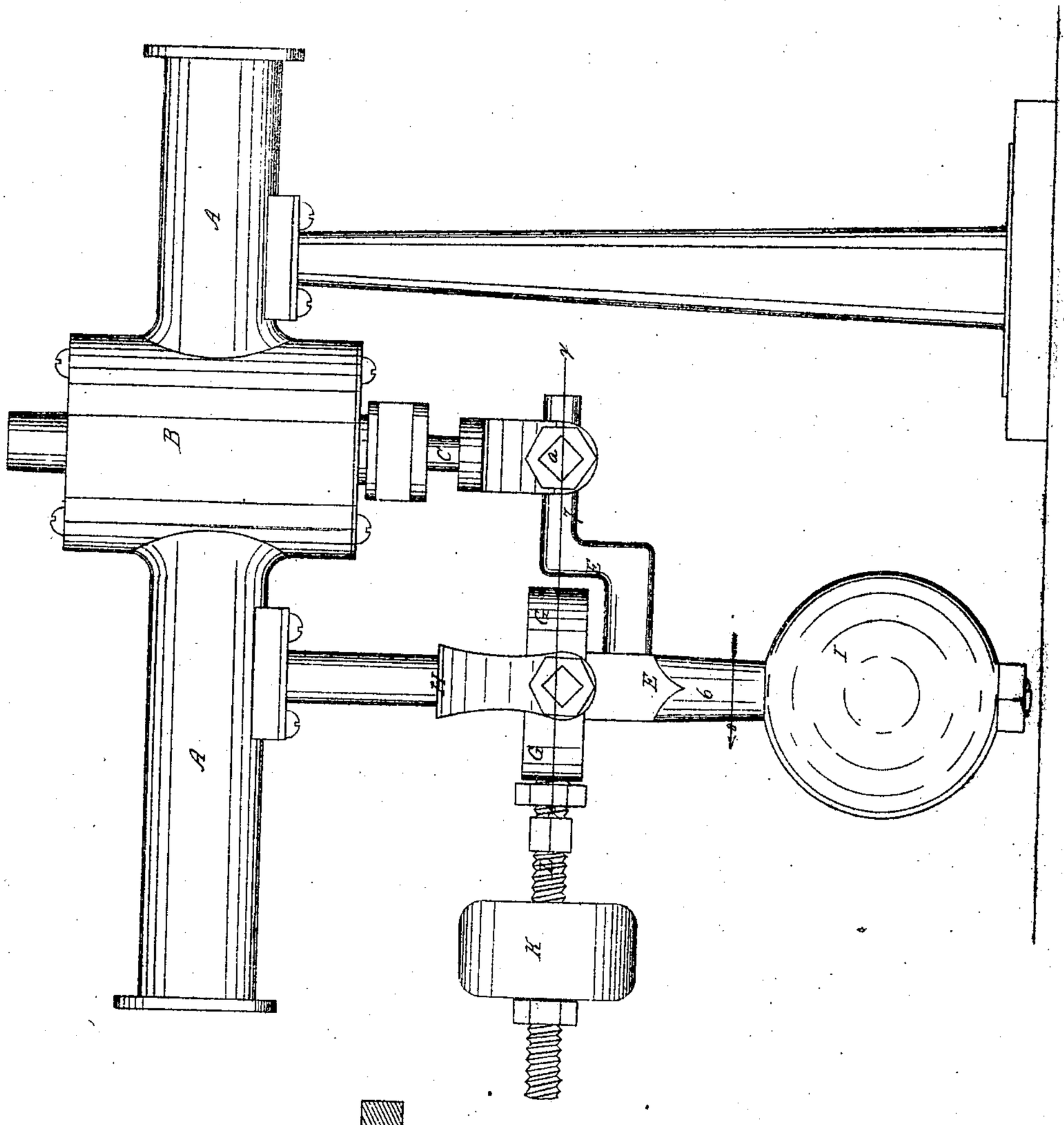
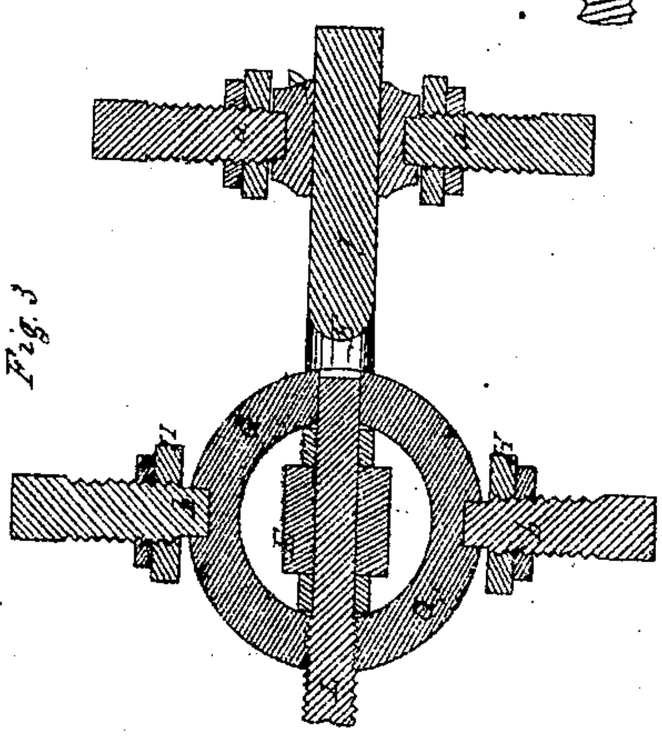


Fig. 3



Witnesses
P. Schoenemacher
N. W. Stearns

Inventor.
James Sullivan

Sheet-2
2 Sheets

J. Sullivan.

Marine-Engine Governor.

No 72239 Patented Dec. 17, 1867.

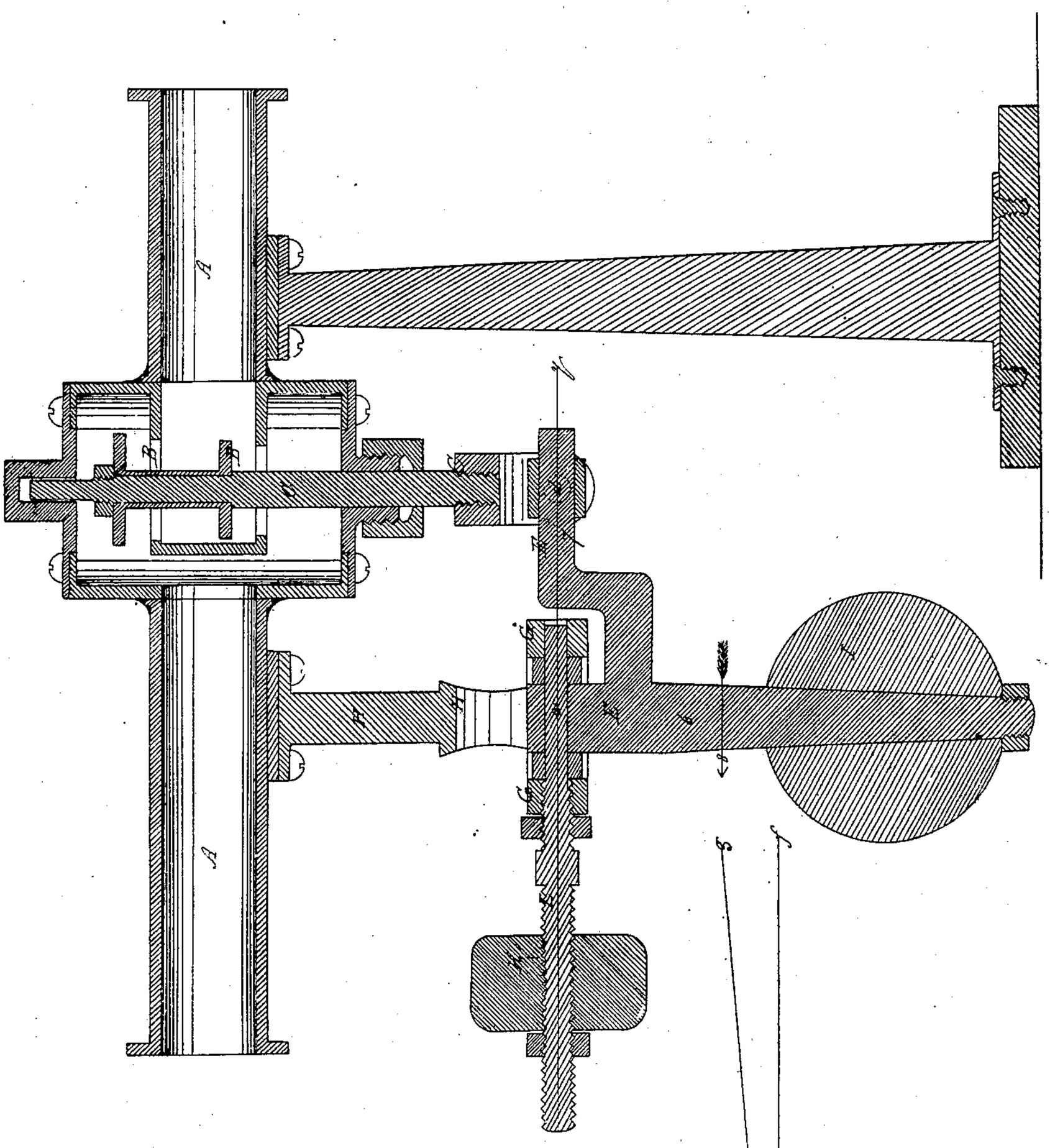


Fig. 2

Fig. 4

Witnesses
P. Ehrhemacher
N. W. Stearns

Inventor.
James Sullivan

United States Patent Office.

JAMES SULLIVAN, OF SOUTH BOSTON, MASSACHUSETTS.

Letters Patent No. 72,239, *dated December* 17, 1867.

IMPROVEMENT IN MARINE-ENGINE GOVERNORS.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JAMES SULLIVAN, of South Boston, in the county of Suffolk, and State of Massachusetts, have invented a Method of Regulating Marine Engines by the motion of the vessel, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of my improved regulator.

Figure 2 is a longitudinal vertical section through the centre of the same.

Figure 3 is a horizontal section on the line *x x* of fig. 1.

Figure 4 is a diagram to be referred to.

The object of my invention is to regulate the supply of steam to a marine engine by the motion of the vessel, so that, as the propeller or wheel is lifted out of the water, the steam will be shut off, and the engine thus prevented from "racing," which often occasions breakage or other serious injury; and my invention consists in connecting a valve in the steam-pipe to a weighted lever, arm, or equivalent, so pivoted that the motion of the vessel will cause the valve to be closed or opened in proportion as the propeller or wheel is raised out of or immersed in the water.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the steam-pipe of a marine engine, through which the steam passes from the boiler to the cylinders. To this pipe A is fitted an ordinary balance-valve B, the stem C of which is bifurcated at its lower end, and has hung within it, on pivots *a*, a block, D, through which slides one end of a bent lever or bell-crank, E, which is pivoted within a ring, G, hung on pivots *b*, fig. 3, within the bifurcated end of a bracket or hanger, H, the upper end of which is secured to the steam-pipe A. The lower end of the bent lever E carries a heavy weight, I, which serves to maintain the arm 6 in a vertical position, notwithstanding the motion of the vessel. K is a counterpoise weight, which is made adjustable on the screw-rod L, and serves to counterbalance the weight of the steam-valve B and its connections, which are attached to the horizontal arm 7 of the bent lever E. The inner end of the rod L passes through the pivoted ring G, and serves to support the bent lever E, which is free to vibrate transversely as well as in a longitudinal direction, and is thus caused to move more easily when the vessel rolls, its horizontal arm, 7, being rounded so as to turn within the block D, when the weight is vibrated to either side of the vessel.

When applied to propellers or stern-wheel vessels, the apparatus is to be placed in any convenient situation, with the arm 7 resting in a horizontal plane, pointing directly to the stern of the vessel, the steam-valve B being wide open, as seen in fig. 2, when the vessel is on an even keel. As the vessel pitches, and the stern is lifted so as to raise the propeller out of the water, the weighted lever E is vibrated in the direction of the arrow 8, causing the arm 7 to draw down the stem C of the valve B, thus shutting off the supply of steam, and preventing the engine from "racing" when the propeller is out of water and encounters but little resistance, an occurrence which often occasions serious injury to the machinery. On the stern of the vessel being again carried down so as to immerse the propeller, the weight I causes the bent lever E to vibrate in a direction contrary to the arrow 8, raising the stem of the valve B, and admitting the steam as required.

The regulator above described is thus operated automatically by the motion of the vessel, the quantity of steam allowed to pass through the valve B being regulated with a great degree of nicety, in proportion as the stern of the vessel and the propeller are raised more or less out of water.

It is evident that my improved regulator may be applied equally as well to side-wheel steamers as to propellers, by placing it in a position at right angles to that above described, with the arm 7 of the lever E pointing transversely across the vessel; but in such case, in order to shut off the steam when either wheel is raised out of water, it will be necessary to have two valves connected with the weighted lever E, (one on each side,) in which case the counterpoise weight K will not be required, the valves balancing each other. If, however, the wheels are disconnected, and each driven by a separate engine, a regulator like that first described will be required for each one.

The length of leverage of the horizontal arm 7 of the bent lever E, or the distance from the point *c* to the point *d*, on the line *y y* of fig. 2, must be such as to close the valve B down upon its seat, and shut off the

steam, when the vessel is inclined at such an angle as to aise the propeller entirely clear of the water. This length of leverage, as it varies in different vessels and under different circumstances, is ascertained in the following manner, reference being had to fig. 4:

First, ascertain the horizontal distance from the propeller to the centre of the vessel's "bearings," as a radius, which is represented by the line *e f*. Then ascertain the angle which the vessel will assume when inclined on its "bearings" so as to raise the propeller entirely clear of the water, the inclination of the vessel being represented by the line *e g*. The length of leverage required will then be equal to the distance from the point *e* to a point, *h*, on the line *e f*, where the vertical distance represented by the line *h i*, between the lines *e f* and *e g*, equals the lift of the valve B.

For side-wheel steamers the length of leverage is ascertained in a similar manner; but in such case the line *e f* will represent the horizontal distance from one of the wheels to a line running longitudinally through the centre of the vessel, and the line *e g* the inclination of the vessel to one side, when either wheel is raised entirely out of the water.

It is evident that the above-described automatic regulator may be used to advantage to regulate the "injection" as well as the supply of steam, and should be applied to the injection-pipe, between the "sea-cocks" and the main stop-cock, so that, as the supply of steam is cut off by the regulator in the steam-pipe, the supply of injection-water to the condenser shall be in proportion to the amount of steam being used.

Claim.

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

The arrangement of valve B, lever E, weight I, and counter-weight K, operating substantially as and for the purpose described.

JAMES SULLIVAN.

Witnesses:

P. E. TESCHEMACHER,

N. W. STEARNS.