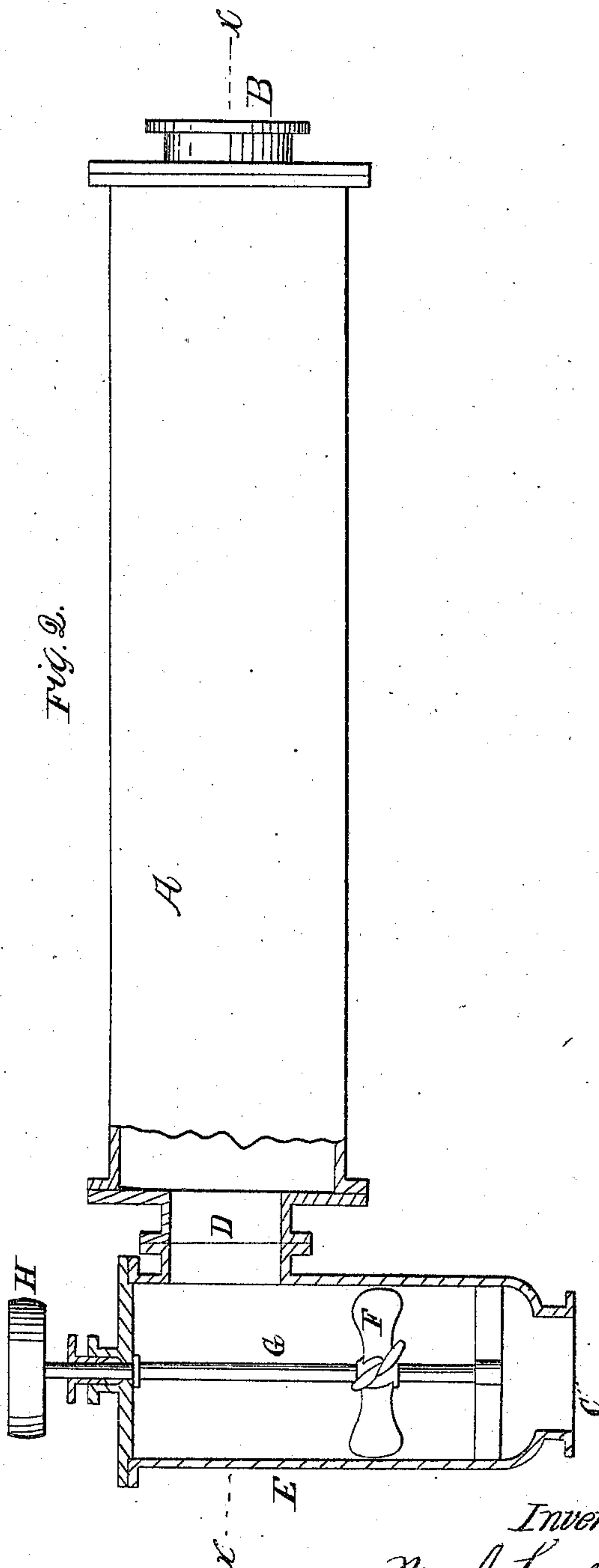
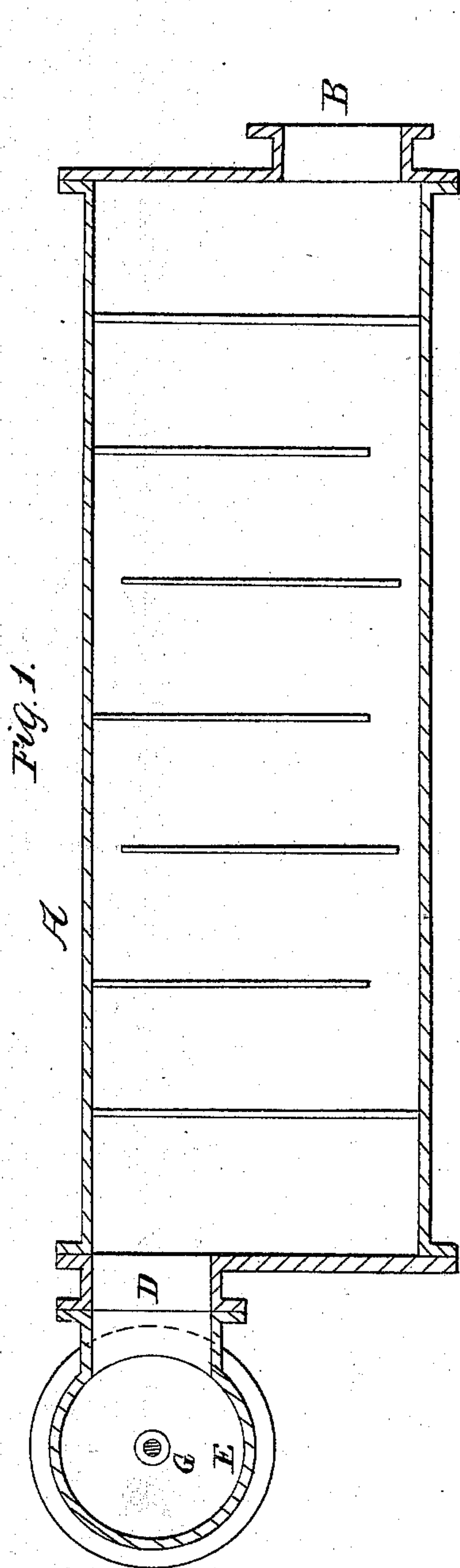


W. A. Lighthall,
Steam-Boiler Condenser.

N^o 35,615.

Patented June 17, 1862.



Witnesses:
Francis S. Loui.
Joseph Bishop.

Inventor:
Wm A Lighthall.

UNITED STATES PATENT OFFICE.

WILLIAM A. LIGTHALL, OF NEW YORK; N. Y.

IMPROVED CIRCULATOR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 35,615, dated June 17, 1862.

To all whom it may concern:

Be it known that I, WILLIAM A. LIGHT-HALL, of the city, county, and State of New York, have invented a certain new and improved arrangement for increasing the circulation of cooling-water through refrigerators or condensers of marine steam-engines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, in which—

Figure 1 is a vertical and longitudinal section taken through the line *x x*, Fig. 2; and Fig. 2 is a plan view with the rear end broken away horizontally on the line *a*, Fig. 1.

My invention is designed to be applied to refrigerators for cooling the injection-water of condensing-engines to be reused in the condenser, and to condensers for condensing the steam exhausted from non-condensing engines where the supply of cooling-water (to cool the injection-water in the first case and to condense the steam in the latter case) is supplied to the apparatus by the movement of the vessel to (which it is applied) through the water by means of the "chutes" or "hoods" patented to me by Letters Patent of the United States bearing date March 5, 1861, and its purpose is to accelerate the flow of cooling-water through the tubes of the refrigerator or condenser when the vessel is propelled at too low a rate of speed to supply the proper amount of cooling-water to the tubes to produce their required effect. It consists in attaching to and connecting with the "outboard-pipe" of the apparatus a "vane" or "propeller" wheel driven by the shaft of the engine, or by other desired means, at a proper rate of speed, which shall force out through the outboard-pipe, and necessarily introduce through the "inboard" or receiving pipe, a larger supply of the external (or cooling) water than would be forced out or introduced into those pipes (and through the refrigerator or condenser) by the motion of the vessel through the water.

My invention is designed to remedy a defect found to exist in practice with the apparatus above named when supplied with cooling-water by the use of the chute or hood

above named when the vessel to which they are applied is propelled at too low a rate of speed to furnish to them a proper supply of cooling-water, which state of things only exists when the vessel is "tied" to a dock, attached to a heavy tow, or laboring in a heavy sea, when she has no movement or where her movement is less than the proper proportion due to the revolutions and movement of the engine of the vessel.

A is the case or shell of a condenser or refrigerator (to condense the steam exhausted from a non-condensing engine or to cool the injection-water of a condensing-engine to be reused) to which the external or cooling water is supplied from the outside of the vessel by and through the pipe B, and is taken off through the pipe C by means of openings in the side of the vessel covered by the chutes or hoods before named.

Between the delivery-pipe C on the side of the vessel and the delivery-pipe D of the case A is placed the shell or case E, which contains the vane or propeller wheel F, attached to the shaft G and worked by the pulley H, (either by a pulley placed and secured on the main shaft of the engine or by a separate moving power, as may be desired,) which is revolved and rotated at such a rate of speed in relation to the pitch of the propeller as to move in the water in the shell or case E at a greater rate of speed than that of the vessel—in other words, that the pitch of the propeller F multiplied by the revolutions of the propeller shall move through or show a greater distance than the distance traveled by the vessel through the water—and also to move the water through the apparatus (*i. e.*, the refrigerator or condenser) in exact proportion to the revolutions of the engine, so that at whatever speed the vessel may be moving by the motion of its engine the cooling-water in the case E will be projected through the pipe C at a greater rate of speed, and consequently that it will enter and pass through the apparatus at greater speed and in greater quantity, and therefore will produce a greater effect than if it were passed through it by the movement of the vessel alone.

I prefer that the propeller F should be operated from the main shaft of the engine, for

the reason that its movement would then correspond exactly with the movement of the engine. If the engine went "ahead," the propeller would receive the cooling-water through the pipe B and project it outboard through the pipe C, and if the engine went "back" the propeller would receive the water through the pipe C to pass through the pipe B outboard, so that the movement of the water by the propeller should be increased by the movement of the vessel when the latter follows the former.

I do not confine myself to operating the propeller by the main shaft of the engine, as it will be apparent that the same effect can be

produced by the application of some other power to its movement that is controlled by the movement of the engine.

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

The combination of the propeller or vane wheel F with the refrigerator or condenser A, supply-pipe B, and delivery-pipe C, arranged and operated as and for the purpose herein set forth.

WM. A. LIGHTHALL.

Witnesses:

FRANCIS S. LOW,
JOSEPH BISHOP.