

B. F. BEE.
Improvement in Supplementary Steam-Generator and
Condenser.

No. 131,047.

Patented Sep. 3, 1872.

Fig. 1.

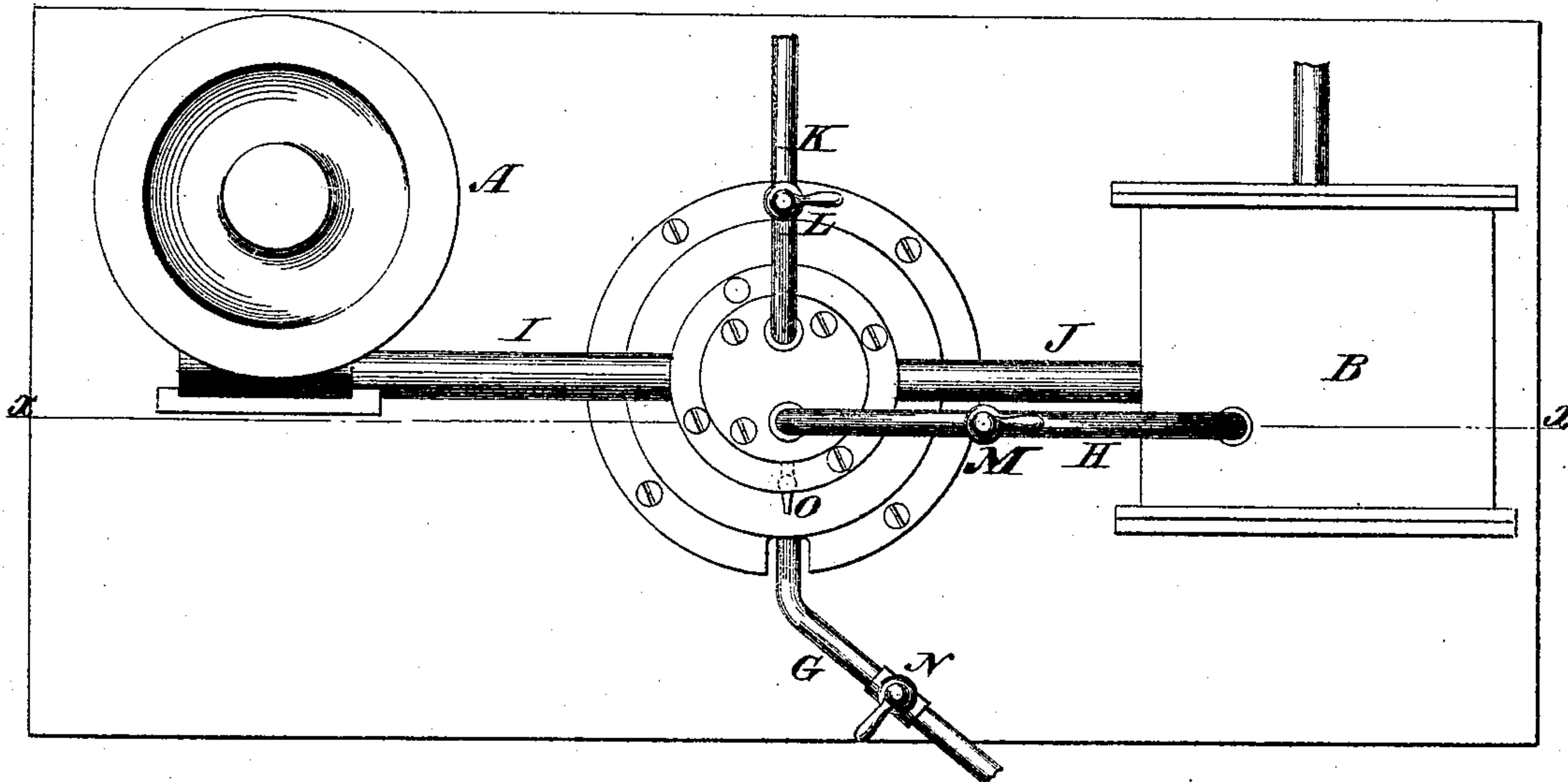
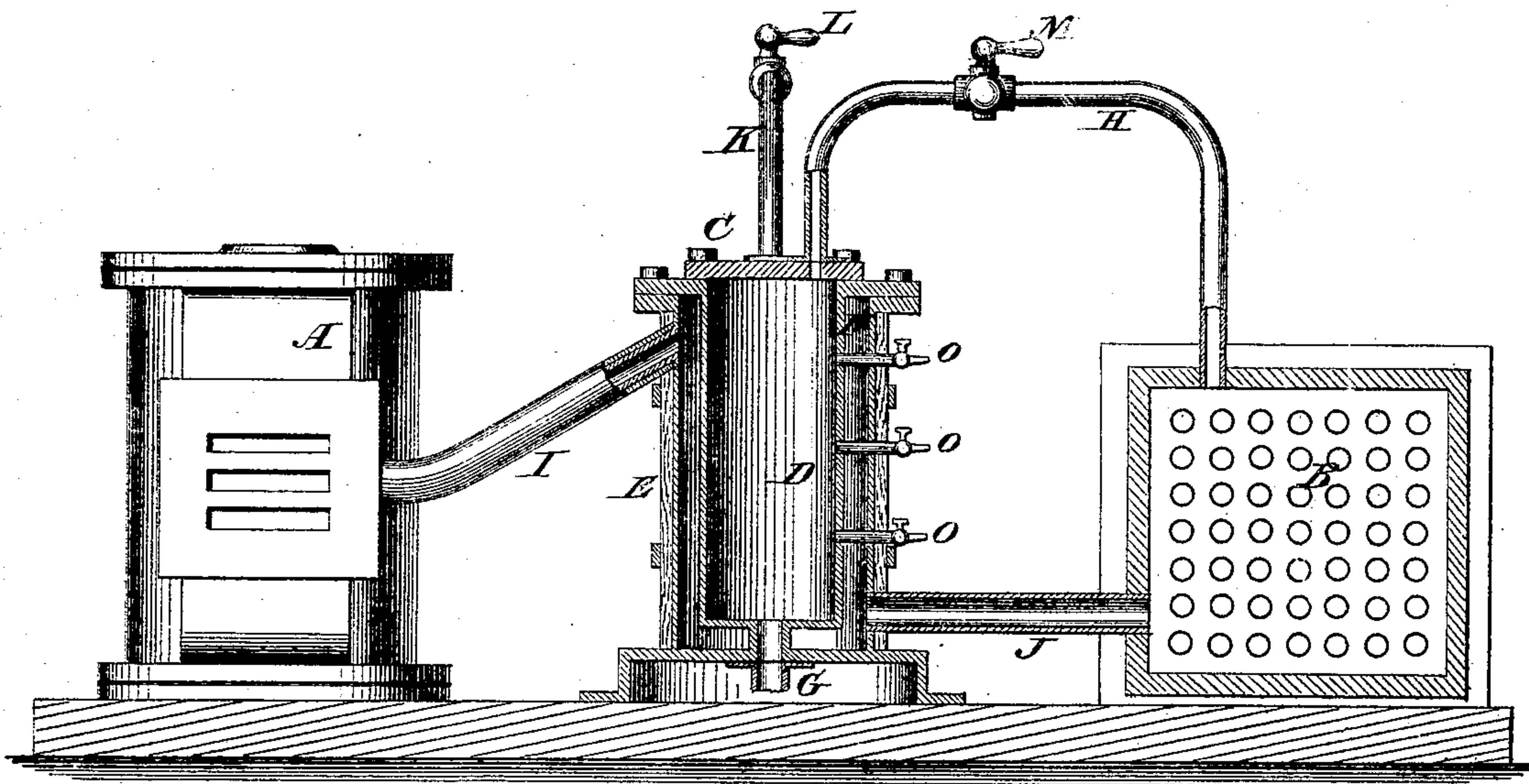


Fig. 2.



Witnesses:

C. Sedgwick
Francis McAuley

Inventor:

B. F. Bee

PER

Mum & Co

Attorneys.

UNITED STATES PATENT OFFICE.

BENJAMIN F. BEE, OF HARWICH, MASSACHUSETTS.

IMPROVEMENT IN SUPPLEMENTARY STEAM GENERATORS AND CONDENSERS.

Specification forming part of Letters Patent No. 131,047, dated September 3, 1872.

Specification describing a new and useful Improvement in Supplementary Steam-Generator, invented by BENJAMIN F. BEE, of Harwich, in the county of Barnstable and State of Massachusetts.

The object of this invention is to enable an ocean steamer to make a voyage of indefinite length without pumping salt water into her boilers; and it consists in a supplementary steam-generator interposed between the engine and the condenser, by means of which the fresh feed-water of the boiler is constantly replenished. The use of fresh water in the boilers of ocean steamers has always been greatly desired, and surface-condensers are employed with this object in view, by which the fresh water taken at the "port" is used over and over; but this is done with a constantly-decreasing quantity, owing to the loss from leakage, blowing off steam, &c. To make up for this loss salt water is pumped into the boiler, which leaves its residuum of salt, which cannot be got rid of except by blowing off and the consequent loss of more or less fresh water. A supply of fresh water may be carried in tanks, but the water-tanks displace so much freight that the plan is not resorted to. Salt water may also be evaporated by any of the converting apparatus used on ship-board for supplying fresh water for culinary purposes, but this also is too expensive. By my plan salt water is evaporated by the exhaust steam in an apparatus interposed between the engine and the condenser, the steam thus generated being conducted into the condenser, mingling with the exhaust steam, and adding to the amount of the water of condensation to be pumped as feed-water into the boiler.

In the accompanying drawing, Figure 1 represents a top view of the engine, the supplementary generator, and the surface-condenser, with the pipes arranged according to my invention. Fig. 2 is a vertical section of the same taken on the line *x x*.

Similar letters of reference indicate corresponding parts.

A is the engine-cylinder. B is a surface-condenser of the ordinary construction. C represents my supplementary generator interposed between the two and connected with each, as seen in the drawing. This generator consists of an interior hollow cylinder, D, surrounded

by an exterior cylinder or casing, E, leaving an annular space, F, outside of the cylinder D. The casing E may be jacketed, if desired, as seen in the drawing. G is a pipe which connects the lower end of the cylinder D with the salt water, passing through the side of the vessel into the ocean. H is a pipe connected with the top of the cylinder D at one end and with the condenser at the other end. I is the exhaust-pipe from the engine, which exhausts the steam into the annular space F around the cylinder D. J is a continuation of the exhaust-pipe which connects the annular space F with the condenser. K is a pipe which connects the top of the cylinder D with the boiler. This pipe, as well as the pipes G and H, are provided with stop-cocks marked, respectively, L, M, and N. The steam from the engine will exhaust into the condenser through the annular space F. There will, of course, be a vacuum in the condenser, and if we open the stop-cock M in the pipe H there will be a vacuum in the cylinder D; and if we now open the stop-cock N in the salt-water pipe G, the steam-pipe K being closed, the salt water will rush in to fill the vacuum and will nearly fill the cylinder. O represents gage-cocks by which to determine the quantity of salt water in the cylinder. Now close the cock N; the water in the cylinder will soon be heated to near the temperature of the exhaust steam by which it is surrounded, and converted into steam, and the salt water being in a vacuum, (or relieved of the pressure of the atmosphere,) the evaporation will consequently be rapid. The steam thus generated escapes to the condenser and adds to the quantity of water of condensation, which is used as feed-water. The salt water in the generator will after awhile become concentrated, and it will be necessary to blow it off. This is done by closing the cock M and opening the steam-cock L and the salt-water cock N. The steam from the boiler will blow out the brine, when the steam-cock is again closed and the cock M is opened, and the cylinder is again filled as before, and the operation is repeated.

I do not confine myself to this particular style of generator. Tubes may be employed instead of the cylinder D, around which the steam may be exhausted; or the generator may be made in any other form. The salt water in

the generator may be renewed automatically by means of a valve actuated by a float within the generator, or by any similar device. The concentrated salt water or brine in the bottom of the generator may be made, by reason of its greater specific gravity, to actuate a valve and discharge itself.

I do not limit myself as to the details. My invention, as before stated, consists in interposing between the engine or engines and surface-condenser of an ocean steamer a supplementary generator, whereby the exhaust steam is utilized and the quantity of fresh water is constantly replenished. In effect my generator very materially assists the engine, as it helps the condenser to produce a greater vacuum than it could form without it. The increased quantity of feed-water is therefore produced with a diminished consumption of fuel.

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

1. The arrangement, between exhaust-port and surface-condenser, of a sea-water vessel in which the exhaust steam creates a vapor that is led to the surface-condenser, as described, whereby an additional supply of fresh water is obtained.

2. The cylinder D, condenser B, annular space F, pipes G, H, and K, stop-cocks L, M, and N, and gage-cocks O, in combination with the exhaust-pipe and condenser of an ocean steam-engine, arranged substantially as and for the purposes described.

BENJAMIN F. BEE.

Witnesses:

GEORGE N. MUNSELL,
RINALDO ELDRIDGE.