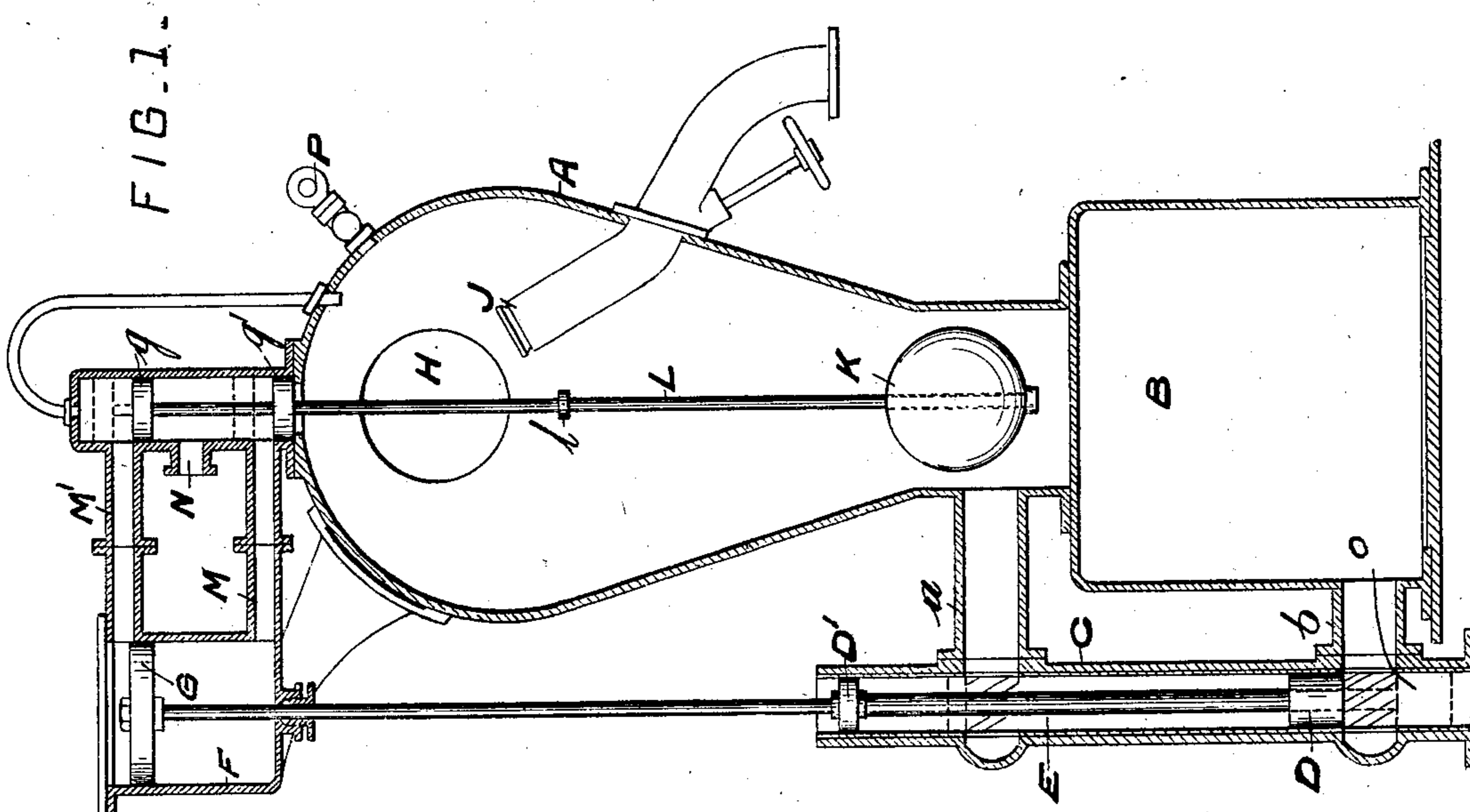
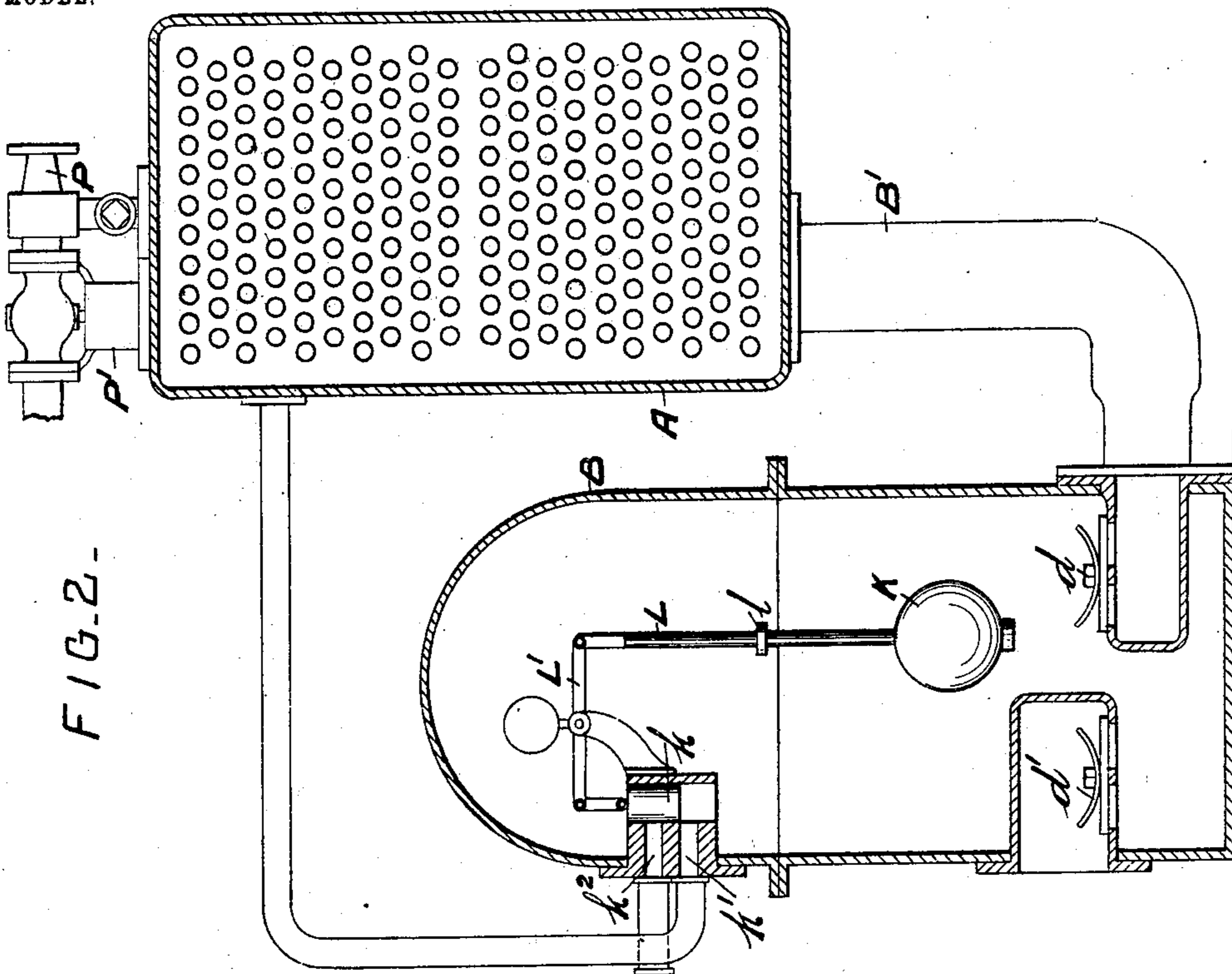


No. 734,525.

PATENTED JULY

C. V. A. ELEY.
STEAM CONDENSING APPARATUS.
APPLICATION FILED MAR. 22, 1902.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES VICTOR ALBERT ELEY, OF BIRMINGHAM, ENGLAND.

STEAM-CONDENSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 734,525, dated July 28, 1903.

Application filed March 22, 1902. Serial No. 99,537. (No model.)

To all whom it may concern:

Be it known that I, CHARLES VICTOR ALBERT ELEY, a subject of the King of Great Britain and Ireland, and a resident of 10 County Chambers, Corporation street, Birmingham, England, have invented certain new and useful Improvements Relating to Steam-Condensing Apparatus, (for which I have filed an application in Great Britain, No. 8,399, bearing date April 24, 1901,) of which the following is a specification.

This invention relates to the condensation of exhaust-steam by means of condensers of the well-known jet, surface, and evaporative types, my object being to provide effective, but less costly, means than are now employed for the withdrawal of the water, air, and vapor from such apparatus when in service.

My invention comprises the withdrawal of the said water and the air and vapor by separate means working independently instead of effecting their discharge together by one and the same means, as with the present ordinary practice. For the withdrawal of the water I arrange beneath the condenser a chamber or separate vessel for the reception of the condensed steam and also for the condensing water in the case of a jet-condenser. Such chamber communicates both with the condenser proper and with the atmosphere; but the respective communications are controlled, preferably, by a double valve in such a manner that only one communication can be open at a time. Thus when the communication between the chamber and the condenser is open to permit water to flow from the latter to the former the outlet or atmosphere communication or connection is closed. Similarly when the last-named communication is open to permit of outflow from the chamber the condenser connection or communication is closed. The chamber thus serves as a water-lock, whereby the discharge of the water from the condenser can be effected without materially impairing the vacuum. I effect the withdrawal of the air and vapor from the interior of the condenser for the maintenance of a good vacuum by means of a pump or ejector; but as such pump or ejector has no water to discharge it is of a much smaller and simpler character than the ordinary so-called

"air-pumps," which must be capable of removing not only the air and vapor from the condenser, but the condensed steam or water of condensation and also in the case of a jet-condenser the much larger quantity of condensing water.

Referring to the accompanying sheet of explanatory drawings, Figure 1 is a sectional elevation of a jet-condensing apparatus constructed in accordance with my invention, having the valve controlling the water-lock communications arranged on the exterior of the lock or lock-chamber and the air vessel. Fig. 2 is a sectional elevation representing the application of my invention to a surface condenser.

The condensing vessel or condenser proper, A, at Fig. 1 is arranged directly over the water-lock chamber B. Both A and B are connected by lateral branch pipes or connections *a* and *b*, respectively, with the valve-casing C. The said casing C is open at each end to the atmosphere and is fitted with a sleeve or liner, within which is placed the piston-valves D D', fixed on the rod E. The upper end of the rod E passes into the valve-operating cylinder F and is fitted with a piston G. The movement of such piston is effected by the atmospheric or other pressure in the manner hereinafter described. The exhaust-steam entering the condenser at H is met by water from the injection connection J. The combined condensing water and water of condensation accumulating in the lower part of the vessel A will gradually raise the float K (mounted loosely on the stem L) until it abuts against the fixed collar *l*. Further ascent of the ball or float K will then move the rod L, and so raise the valves *g g'*, fixed at its upper end, from the full-line to the dotted-line positions shown at Fig. 1. The under side of the piston G will thus be put into communication (by way of the port M) with the vacuum interior of the condenser A, while its upper side, through the air, steam, or other connection N and the port M', will be subjected to atmospheric or other pressure. The piston G will be accordingly depressed and the valves D D' moved from the full to the dotted line positions indicated, with the result that A and B will be put into communication, so that the water may flow by way of the

branch *a*, valve-casing C, and branch *b* from the condenser to the water-lock chamber. When the accumulated water has been thus automatically withdrawn from A to B, the positions of the valves *g g'*, controlling the movement of the piston G, will have returned through the descent of the float to the full-line positions, thus bringing about a corresponding return to the valve D D', with the closing of the communication between A and B and the opening of B to the outlet O.

The piston-valve or valve-like part D', hereinbefore referred to, serves only to balance the valve proper, D.

With this apparatus as the water accumulates in the bottom of the condenser its automatic discharge is intermittently effected, as required, without materially affecting the vacuum.

The ejector at P for the removal of the air and vapor from the condenser is directly operated by steam in the ordinary manner. Instead of the ejector a small belt or power-driven or a steam or electric pump can be connected with the condenser for this purpose.

Isometimes arrange the float device in a separate chamber having a permanent communication with the condenser A instead of within the condenser, as aforesaid.

In the application of my invention to a surface condenser, as shown at Fig. 2, the water lock or chamber B is connected with the interior of the condenser A by means of the pipe B', the inlet of the chamber being controlled by the inwardly-opening valve *d*. The outlet to atmosphere is controlled by the outwardly-opening valve *d'*. With the loose float K in the position indicated in the figure the piston-valve *k* (with which the float is connected through the rod or stem L and the balance-lever L') uncovers the port *k'*, and thus puts the upper part of the chamber B into communication with the upper part or vacuum-space of the condenser A. The removal of the air and vapor from the condenser and the water-lock is effected, preferably, by means of the ejector P. The admission of steam to the ejector for the working of the same is controlled automatically by the equilibrium-valve P', of any ordinary construction, which is connected with the interior of the condenser. The condensed steam in A flows through the pipe B' and valve *d* into the chamber or water-lock B, and as it accumulates within the latter it causes the loose float K to rise on its stem L until it comes into contact with the fixed collar *l*. The further ascent of the float will then impart motion to the rod L and lever L', and so cause the piston-valve *k* to descend, and thereby to close the aforesaid port *k'* and open the port *k*²,

which communicates with the atmosphere. The accumulated water within the lock will then drain out through the valve *d'* until the float has descended sufficiently to act upon the lever L', and so reverse the valve *k* for again closing the water-lock to the atmosphere and reconnecting it with the condenser.

The aforesaid operations are automatically and continuously repeated while the condenser is in operation.

The water-lock and water-discharging apparatus, as illustrated at Fig. 1 in combination with a jet-condenser, may be also applied in combination with a surface or evaporative condenser. Similarly the water-lock and water-discharging apparatus, as illustrated at Fig. 2 in combination with a surface condenser, may be also applied in combination with a jet-condenser.

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

1. In exhaust-steam-condensing apparatus, the combination with a condensing-chamber fitted with means for removing the air and vapor independently of the water, of a water-lock chamber having communications with the condensing-chamber and the atmosphere and valves controlling the opening and closing of the said communications substantially as set forth.

2. In exhaust-steam-condensing apparatus, the combination consisting of a condensing-chamber fitted with means for removing the air and vapor independently of the water, a water-lock chamber having communications with the condensing-chamber and the atmosphere, valves controlling the opening and closing of the said communications, valve-actuating mechanism, and a float automatically controlling the said mechanism, substantially as set forth.

3. In exhaust-steam-condensing apparatus, the combination consisting of a condensing-chamber fitted with means for removing the air and vapor independently of the water, a water-lock chamber having communications with the condensing-chamber and the atmosphere, valves controlling the opening and closing of the said communications, a piston in direct connection with the said valves, a cylinder inclosing the said piston, and a float controlling the admission and discharge of the actuating fluid respectively to and from the said cylinder, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES VICTOR ALBERT ELEY.

Witnesses:

HERBERT BOWKETT,
HARRY DAVIS.