

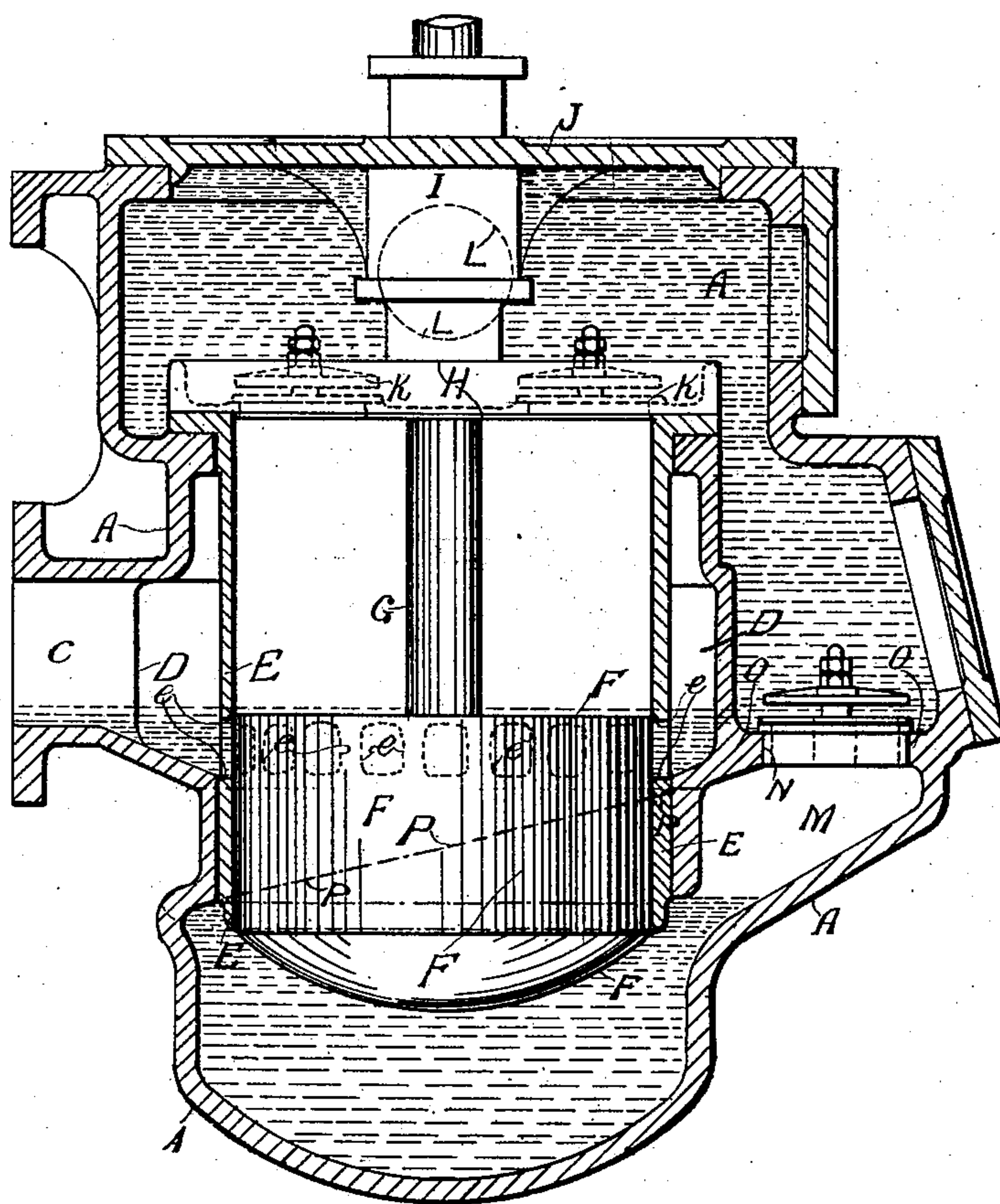
No. 755,938.

PATENTED MAR. 29, 1904.

R. RICHARDSON.
AIR PUMP FOR STEAM ENGINES.

APPLICATION FILED AUG. 11, 1902.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT RICHARDSON, OF GLASGOW, SCOTLAND.

AIR-PUMP FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 755,938, dated March 29, 1904.

Application filed August 11, 1902. Serial No. 119,291. (No model.)

To all whom it may concern:

Be it known that I, ROBERT RICHARDSON, engineer, of 16 Jamieson street, Govanhill, Glasgow, Scotland, have invented certain new and useful Improvements in Air-Pumps for Steam-Engines, (which have been patented in Great Britain, No. 1,726, dated January 22, 1902;) and I do hereby declare that the following is a full, clear, and exact description of the same.

10 This invention relates to air-pumps of the vertical-cylinder type; and it has for its object to provide a double-acting pump from which the air will be forced through the outlet-valve orifices in advance of the water, so that efficient
15 working is insured.

The invention is illustrated, by way of example, in the accompanying drawing, which shows a vertical section of the improved double-acting air-pump.

20 As therein shown, the pump-casing A is adapted to be attached to the side of the condenser of a steam-engine, from which water of condensation flows into the casing A by an inlet C to an annular passage D, from which it
25 passages through perforations *e* in a liner E, fitted in the casing. In the liner reciprocates a combined piston and plunger F, attached to a piston-rod G, passing up through a cover H on the liner E, and a stuffing-box I in the
30 cover J of the casing A. The lower or plunger end of the piston is preferably of convex form, as shown, and the lower end of the casing A is of corresponding shape. When the piston descends under the perforations *e*, the water
35 flows through them into the inside of the liner, and on the ascent of the piston the water, with any air or vapor which rises above it, is forced up through valves K in the cover H into the outer casing A, from which it passes by an
40 outlet L to the hot-well or other receptacle. While the piston rises, water accumulating and passing from the condenser passes through the orifices *e* to the lower end of the casing A, and on the downstroke of the piston its plunger
45 end displaces the accumulated water, so that it rises over the level of the lower end of the liner E and traps the air or vapor in an annular

pocket M, forming an extension of the casing. The air is by the further descent of the plunger driven in advance of the water through valve-
50 orifices N in a partition O into the discharge end of the casing. The pocket M is formed mainly at one side of the casing and is inclined or tapered as shown, by the dotted line P, toward the opposite side when the air-pump is
55 intended for marine use, so as to insure that notwithstanding any list of the ship the air will be trapped and discharged in advance of the water. The relative capacities of the
60 pocket M and the water-space from the bottom of the casing A to the lower edge of the liner E should be such that the water-level will not be raised to the edge of the liner before the descent of the plunger, thus trapping the air
65 within the liner or before the air has been driven into the pocket.

By the arrangement described the piston or plunger is in contact with and is sealed by water in both the up and down strokes, and the possibility of air passing between a loosely-
70 fitting piston and the casing or liner is obviated, so that an efficient double-acting air-pump is produced.

Having now described my invention, what I claim, and desire to secure by Letters Patent, 75 is—

A double-acting vertical air-pump comprising a combined piston and plunger F, a casing A having an opening L, a cylindrical liner E fitted in said casing and having orifices *e* connecting the inside of the liner with an annular
80 passage D without the liner, a cover H on said liner, valves K on said cover connecting the interior of the liner with the casing A, a pocket M forming an extension of said casing and
85 valves N connecting said pocket with the upper end of the casing substantially as and for the purpose set forth.

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

ROBERT RICHARDSON.

Witnesses:

WALLACE CRANSTON FAIRWEATHER,
JNO. ARMSTRONG, Jr.