

E. JOSSE.
DOUBLE ACTING WET AIR PUMP.
APPLICATION FILED JULY 23, 1907.

898,746.

Patented Sept. 15, 1908.

Fig.1.

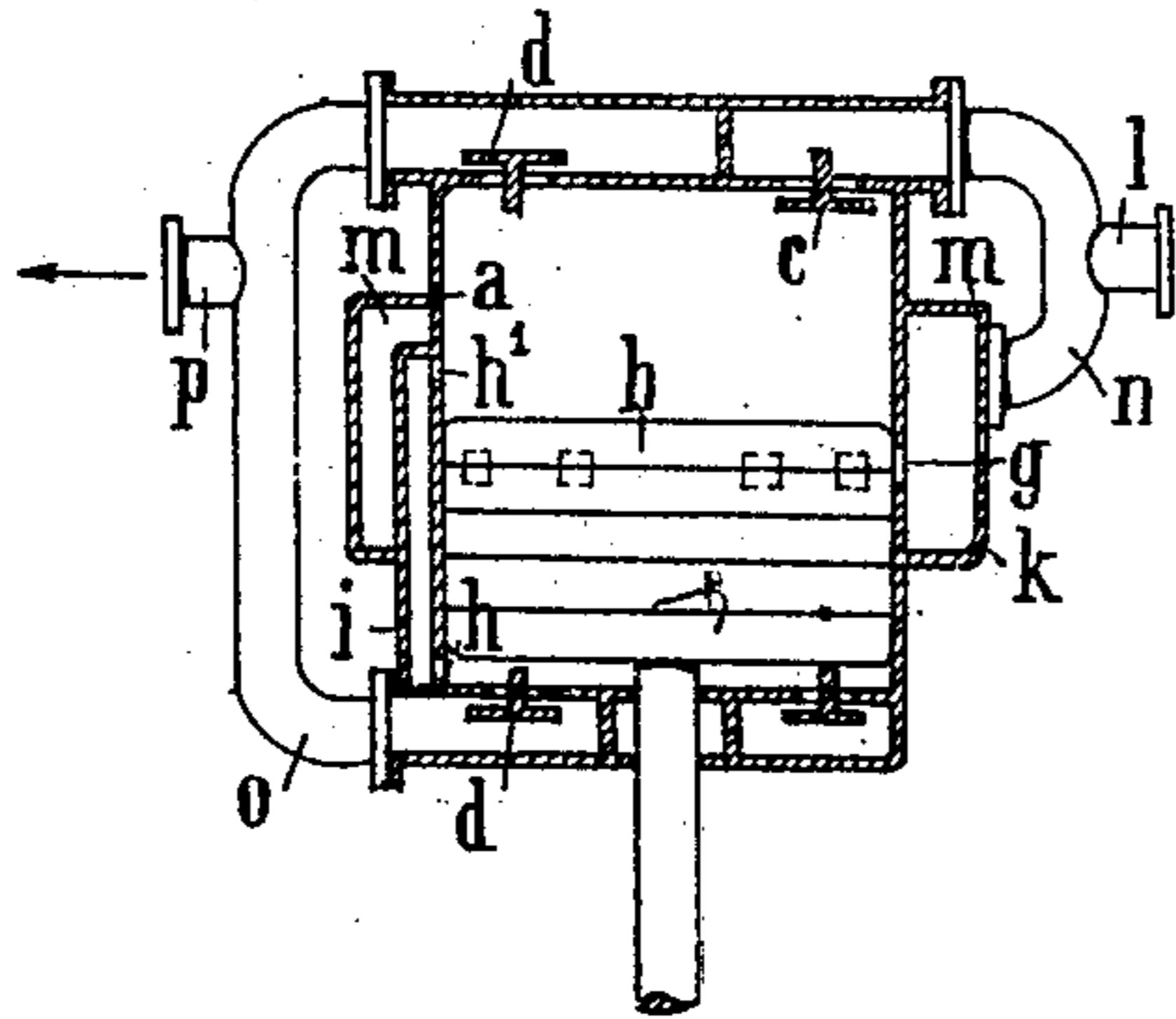


Fig.2.

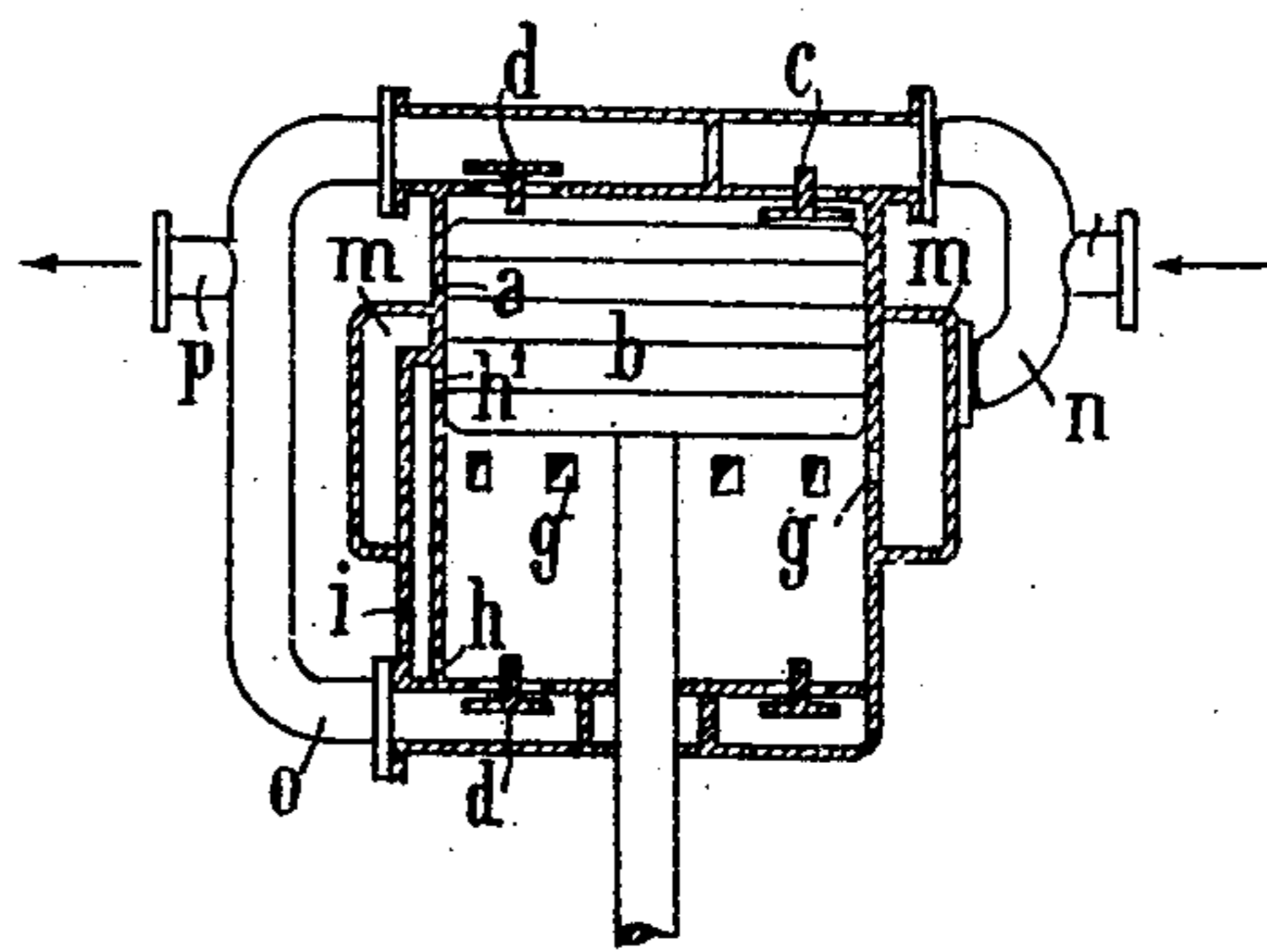


Fig.3.

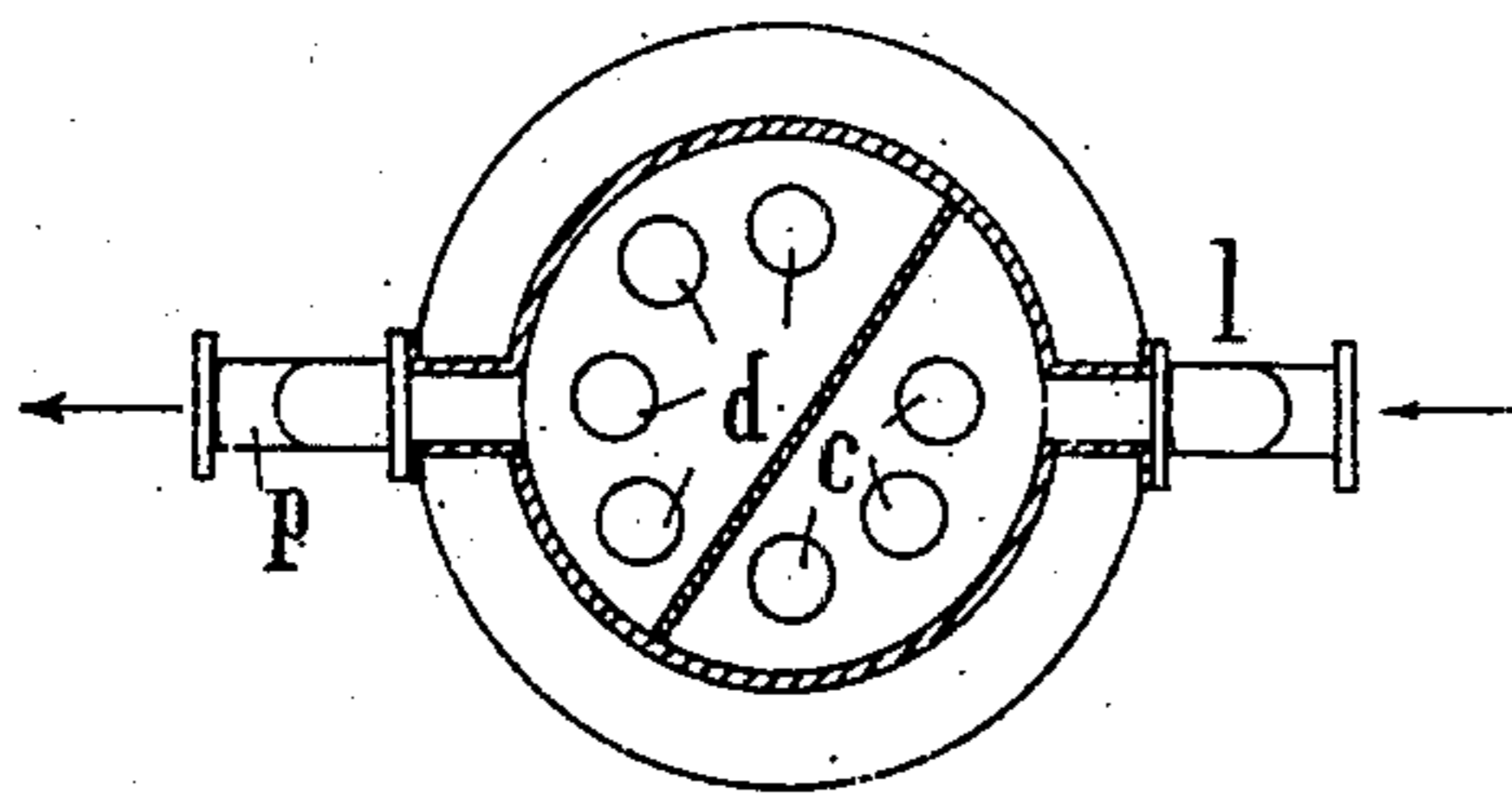
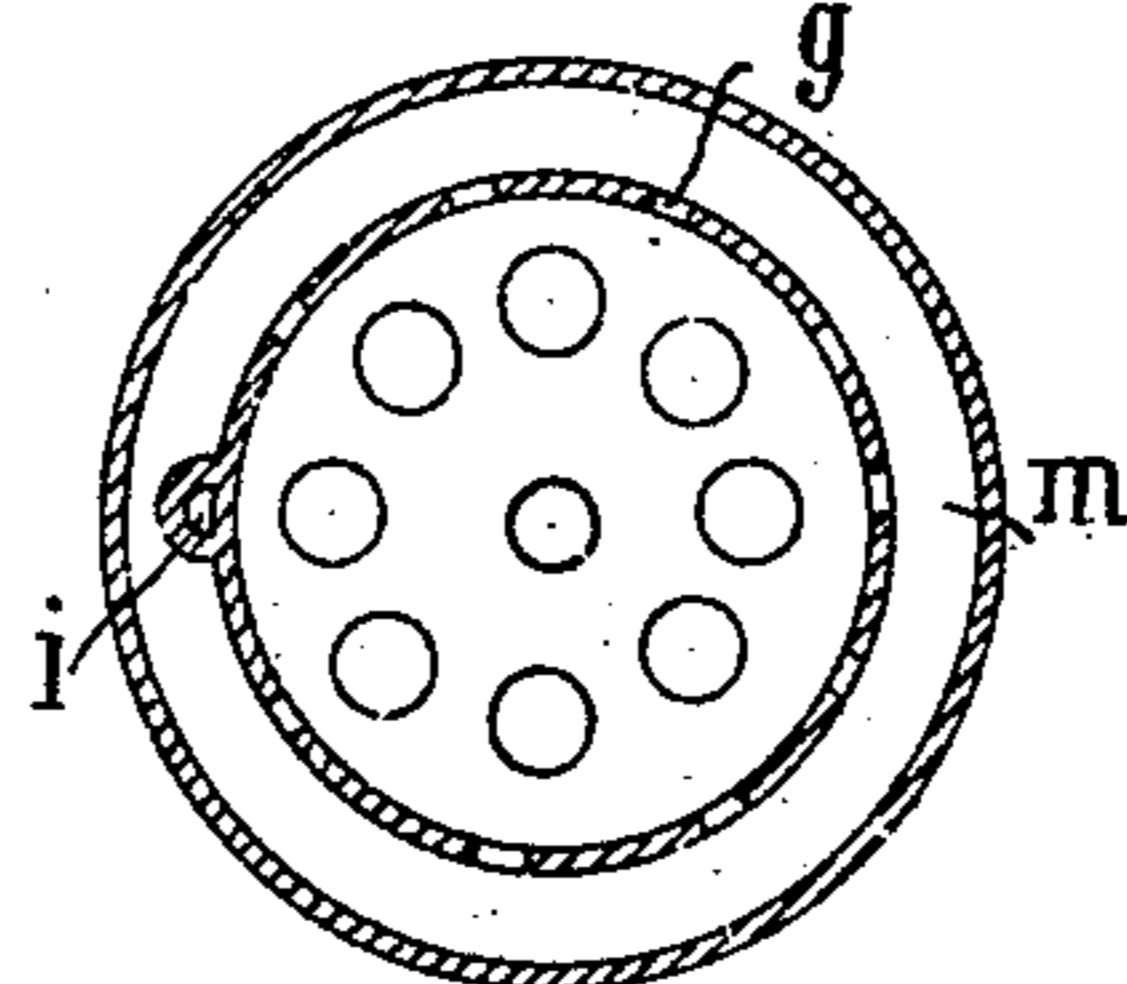


Fig.4.



Witnesses:

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UNITED STATES PATENT OFFICE.

EMIL JOSSE, OF BERLIN, GERMANY.

DOUBLE-ACTING WET-AIR PUMP.

No. 898,745.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed July 23, 1907. Serial No. 335,170.

To all whom it may concern:

Be it known that I, EMIL JOSSE, a subject of the Emperor of Germany, and resident of Berlin, Germany, have invented a certain new and useful Improvement in Double-Acting Wet-Air Pumps, of which the following is a specification.

The present invention relates to a double acting wet air pump which works with a high number of revolutions and a high vacuum.

In order to obtain a high number of revolutions it is necessary to introduce some air into the side of the cylinder at which the delivery of water takes place. The air present forms an elastic medium between the piston and the water. In order on the other hand to obtain a high vacuum it is necessary that water should be present at the side of the cylinder at which the air delivery takes place. This water fills up the space and keeps the piston rings wet. Since some water is also delivered through the air valves these valves can be arranged to be always covered by water which insures their tightness. Pumps already in use have been able to obtain a high vacuum and a fairly high number of revolutions only with two-stage compression so that as a rule only single acting pumps could be employed.

Pumps according to the present invention have a high vacuum and a high number of revolutions and are double-acting, while the pumps are considerably smaller and cheaper than those heretofore used.

The essence of the present invention consists in this that in the upright pump cylinder in the upper half air is delivered for the greater part and water for the smaller part, while in the lower half water is delivered for the greater part and air for the smaller part.

In the upper half the air is admitted in the known manner through suction valves. The water required for the upper half passes when the piston is at the lowest dead center through a passage controlled by the piston from the lower side of the piston to the upper side in order to keep the upper side of the piston wet, to fill up the space on the upper side of the piston with water which would otherwise prevent the vacuum from being formed and to keep the pressure valves of the upper side of the piston under water for the purpose of obtaining perfect closure. This filling of the lower side of the piston with water and with some air takes place at the upper dead position of the piston through slots formed in

the shell of the cylinder, the condensate falling first owing to its weight into the cylinder and then some air being sucked with it through the slots. In the lower side of the cylinder therefore only pressure valves are provided while the upper side of the cylinder is provided with pressure valves and suction valves.

The pump is illustrated in Figs. 1 to 4 in the accompanying drawing.

a represents the upright pump cylinder, *b* the piston. The pump is connected with a surface condenser by the connection *l* through which air and condensed water enter from the condenser. The connection *l* is so arranged that water flows to it from the condenser. Through the connecting pipe *n* the condensate and a part of the air pass into the annular chamber *m* and thence into the lower part of the cylinder. The passage into the cylinder takes place through slots *g* which are so arranged in the wall of the cylinder that the piston opens the same fully in its highest dead position (see Fig. 2). On its descent the piston closes the slots and the water and air introduced are compressed in known manner and forced outwardly through the pressure valve *d*, the pipe *o* and the connection *p*.

By the delivery of a mixture of a large quantity of water and a small quantity of air the operation on the lower side takes place silently even at a large number of revolutions.

For the upper side of the cylinder practically only air is required, this air being sucked through the connection *l* and suction valves *c* into the cylinder and forced out of the cylinder through the pressure valves *d* and connection *p*. For the purpose of better packing and lubricating the same before the piston reaches its lowest dead point the slots *h*¹ in the wall of the cylinder are uncovered. The slot *h*¹ is connected by a passage *i* of suitable dimensions and slot *h* with the lower side of the cylinder so that a quantity of water corresponding to the cross-section of the passage passes from the lower side of the piston which is in compression through *h*, *i* and *h*¹ to the upper side of the cylinder. In this way high temperatures which sometimes attend dry compression are avoided and besides the space which would prevent a vacuum from being formed is filled with water and the upper pressure valves are kept under water.

In Fig. 1 the piston is shown in its lowest dead position and in Fig. 2 in the upper dead position. Fig. 3 is a section through the valve chest on the upper side of the piston, Fig. 4 shows the pressure valves on the lower side of the cylinder together with the overflow passage *i*.

Having described my invention what I claim and desire to secure by Letters Patent of the United States is:—

The improved high speed upright double acting wet air pump comprising in combination with the cylinder *a* and the piston *b*, a passage *l* by which air and water are led from the condenser to said cylinder, a casing *m* surrounding said cylinder and adapted to communicate with the cylinder through slots *g* in the walls of said cylinders, said slots being located at a distance from the top end of the cylinder just greater than the distance of the lower end of the piston from said top end, a connection *n* between said passage *l* and said casing *m*, a connection be-

tween said passage and the upper part of said cylinder, said connection being partitioned into two branches, inlet and outlet valves *c* and *d* disposed in the respective branches, an external passage *i* communicating with the interior of the cylinder through openings in the walls of the cylinder, said openings being a distance apart slightly greater than the length of the piston, the lower opening located near the lower end of the cylinder, an outlet pipe *p*, branch connections *o*, from said outlet pipe to the upper and lower ends of the cylinder, and pressure valves *d* disposed in the branch connection *o*, as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMIL JOSSE.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.