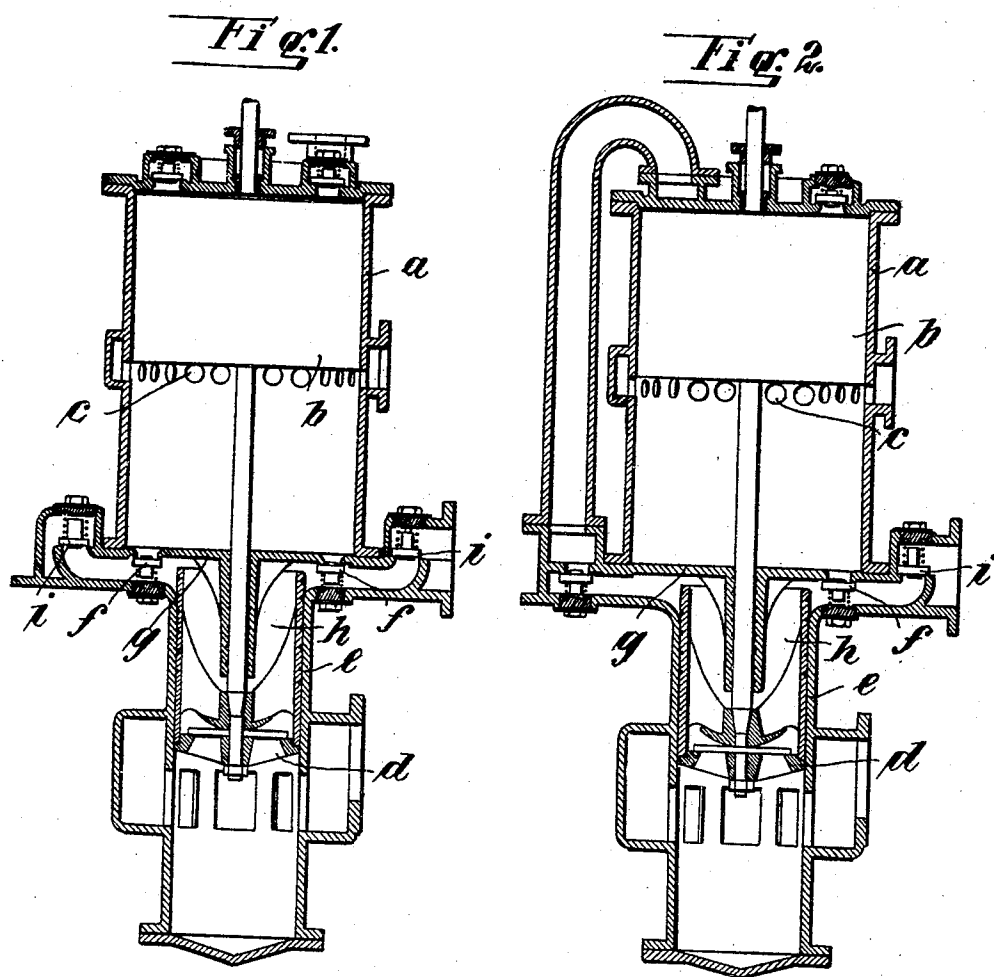


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CONDENSER PUMP.
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945,587.

Patented Jan. 4, 1910.



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UNITED STATES PATENT OFFICE.

PIETER JOHANNES PENNINGS, OF KIEL, GERMANY.

CONDENSER-PUMP.

945,587.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed March 12, 1909. Serial No. 483,023.

To all whom it may concern:

Be it known that I, PIETER JOHANNES PENNINGS, a subject of the Queen of the Netherlands, residing at Kiel, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in Condenser-Pumps, of which the following is a specification.

Although the noxious space in the cylinder of an air pump can be filled out with cold water, specially supplied, the absence of sufficient water produces such excessive disturbances in the output or efficiency of the air pump that such pumps cannot be regarded as reliable. In order to avoid this drawback it is of advantage not to compress the air up to atmospheric pressure in the cylinder, which, during the suction period, is in communication with the condenser, but to force said air at a lower pressure into another pump chamber, which does not come into communication with the condenser and then to further compress said air in said chamber and force it out into the atmosphere. For this purpose, it is usual to provide two air pumps, one behind the other, the first pump primarily compressing the air and the second one compressing the primarily compressed air up to the pressure of the atmosphere.

According to the present invention, the pressure chamber of the pump for the water of condensation is adapted to take up the air primarily compressed in the air pump and to raise the pressure of said air to that of the atmosphere.

The pump used for the water of condensation is of the single acting type, having a valve piston, no suction valves, and a receiver for the water of condensation, which, on the piston descending, is cut off from the feed pipe and passes through the piston valves. The chamber provided over or behind the valve piston, in regard to the direction of flow of the water, is the pressure chamber.

The air, in as cold a condition as possible, and free from vapor, is sucked in through a cooling apparatus and forced, at a low pressure, direct into the compressor chamber of the pump for the water of condensation.

From said chamber the air is forced out, together with the water of condensation, into the atmosphere.

In the accompanying drawing two ways of carrying out my invention are shown as examples.

Figure 1 shows a double acting air cylinder *a* of larger diameter, having a plunger piston *b*, which sucks alternately into the top and bottom end of the cylinder *a* cold air out of the condenser through the openings *c*, in the middle of the cylinder, and is so connected with the pump chamber *e*, of smaller diameter, in which the valve piston *d* works, that over said valve piston *d* and immediately underneath the bottom end *g* of the cylinder *a* between the two pumps a pressure chamber *h* is formed, which is fitted with special outlet valves *i* toward the atmosphere. The inlet valves *f* are provided in the bottom *g* of the cylinder *a*. Into the chamber *h* air is forced at a low pressure out of the lower end of the dry air pump *a*. When the piston descends, the pressure is determined by the proportional sections of the piston of the air pump and that of the water pump and by the quantity of the water of condensation. When the stroke is reversed, the valve piston *d* of the pump *e* forces out into the atmosphere not only the water of condensation, but also the low pressure air contained in the chamber *h*.

Fig. 2 shows a similar arrangement, where the bottom end of the cylinder *a* operates in the same manner as that of the pump shown in Fig. 1, while the top end of said cylinder is connected with the pressure chamber *h* of the condenser pump through an intermediate receiver.

It will be evident that the device comprises aligned wet and dry cylinders of which the wet cylinder is of smaller diameter, a pressure chamber between the cylinders communicating freely with the wet cylinder and having a valve controlled communication with the atmosphere, a piston in each cylinder, and a rigid connection between the pistons.

What I claim and desire to secure by Letters Patent of the United States is:—

A device of the class described, compris-

ing alined wet and dry cylinders, the wet cylinder being of smaller diameter than the dry cylinder, a pressure chamber between the cylinders, and with which the wet cylinder freely communicates, a valve controlled communication between the chamber and the the dry cylinder, a valve controlled communication between the chamber and the atmosphere, a piston in each cylin-

der, and a rigid connection between the 10 pistons.

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

PIETER JOHANNES PENNINGS

Witnesses:

JULIUS RÖPKE,
HUGO LIEBELT.