P. SCHOU.

VACUUM AIR PUMP.

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Fig. 1.

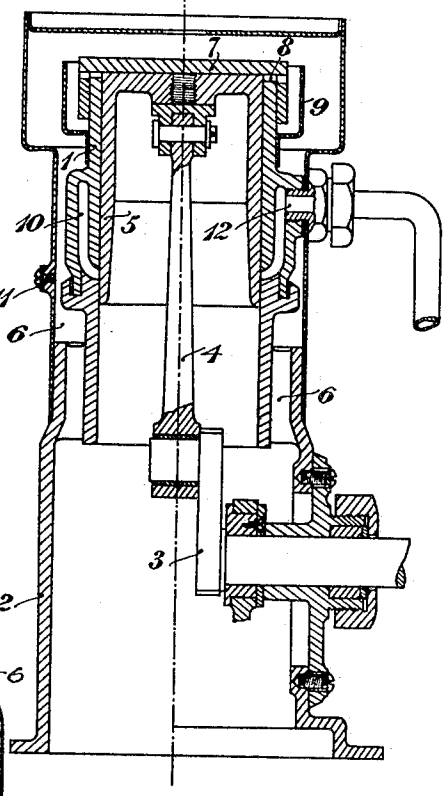
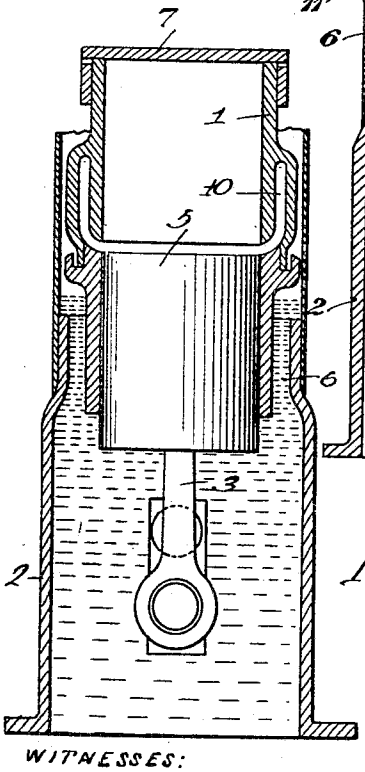


Fig. 2.



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VACUUM AIR-PUMP.

1,117,708. Specification of Letters Patent. Patented Nov. 17, 1914.

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To all whom it may concern:

Be it known that I, PAUL SCHOU, of 11 Puggaardsgade, Copenhagen, in the Kingdom of Denmark, have invented certain new and useful Improvements in Vacuum Air-Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to vacuum pumps of the type in which, to insure complete discharge of air and vapor at each stroke, a small quantity of oil from an oil reservoir in which the pump crank and connecting rod works is allowed to pass under the influence of the pressure of the atmosphere upon the oil in the reservoir, into the cylinder above the piston, the discharge valve, which is oil sealed, being at the top of the cylinder.

According to this invention the cylinder is formed with an annular suction passage into the lower part of which, upon the downward stroke of the piston, oil passes from the oil reservoir and through the clearance space between the lower part of the piston and the cylinder, and from which oil flows onto the top of the piston when at the lowest point of its stroke, the upper part of the said suction passage being in free communication with the suction pipe and the upper end of the cylinder being provided with an annular oil bath that forms a fluid seal to the discharge valve and into which the oil from the cylinder is caused to pass as the piston reaches the highest point in its stroke, oil overflowing from the said annular bath passing down into the said oil reservoir.

A vacuum pump embodying the invention is shown in the accompanying drawing.

Figure 1 shows a vertical section with the piston at the upper end of the stroke, and Fig. 2 shows a vertical section with the piston at the lower end of the stroke.

The cylinder 1 depends downwardly into the oil contained in an oil reservoir 2 in which the crank pin 3 and the connecting rod 4 work, the level of the lubricating oil in the reservoir being such that the lower end of the piston 5 dips into the oil even when the piston is at the top of its stroke. When the piston descends the oil displaced thereby is forced up into the annular space 6 around the cylinder. The space 6 and oil reservoir 2 are in communication with the atmosphere and as the pressure in the cylinder 1 is considerably below atmospheric pressure, a small portion of the oil will be forced by atmospheric pressure into the cylinder and into the annular passage 10 which forms the suction chamber of the pump, as the piston makes its downward strokes. At its lower portion, the piston is so ground that it fits somewhat loosely in the cylinder, the space being so minute as to be imperceptible on the drawings, whereby the atmospheric pressure enables the oil to pass to the said chamber 10, any method of relatively grinding the cylinder and piston so that the oil can pass between them would serve. Each time the piston reaches the lowest point of its stroke oil from the passage 10 flows into the cylinder above the piston and is expelled at the top of the cylinder together with the air immediately the piston lifts the cover or valve 7 the flange of which is formed with holes 8. The oil so expelled passes into an annular oil bath 9 embracing the cover. The upper edge of this oil bath is situated at such a height that the level of the oil is always above the holes 8 in the cover. If when the piston is in its lowest position oil is charged into the reservoir 2 and space 6 up to the level of the filling plug 11 this will be the correct charge of oil. Oil flowing over the upper edge of the pocket 9 falls back into the reservoir 2 and space 6.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed I declare that what I claim is:

1. In a pump, the combination of a cylinder connected with an oil reservoir, a piston reciprocating in said cylinder, and fitting loosely in the cylinder at the portion adjacent to said reservoir, and pressure means connected with said reservoir, whereby the oil can be driven through the space between the said piston and the said adjacent end of said cylinder, above the piston, when the piston is in said adjacent end of said cylinder, to form a seal.

2. In a vacuum pump, the combination of a cylinder connected with an oil reservoir, a piston reciprocating therein, and fitting loosely in the cylinder at the portion adjacent to said oil reservoir, said oil reservoir communicating with the atmosphere, said piston being at the end of its rarefying stroke when in the said adjacent end of said cylinder, whereby the pressure of the atmosphere then drives the oil through the space

between the said piston and the said adjacent end of said cylinder, above the piston, to form a seal.

3. In a vacuum pump, the combination of an exhaust cylinder, an induction pipe connected therewith, and means for placing a liquid seal in said induction pipe, when said induction pipe is disconnected from said exhaust cylinder, and means for removing said liquid seal when said induction is connected with said exhaust cylinder.

4. In a vacuum pump, the combination of an exhaust cylinder, a piston, a reservoir of liquid, an induction pipe, a channel intermediate said induction pipe and said cylinder, means for placing and maintaining a liquid seal in said intermediate channel, when the piston is removing a charge of gas received through said induction pipe and the induction pipe is disconnected from the cylinder, and means for removing said liquid seal when said cylinder is receiving a charge of gas from said induction pipe and is connected therewith.

5. In a vacuum pump, the combination of a cylinder, an induction pipe, a channel intermediate said induction pipe and said cylinder, a discharge-valve in said cylinder, a piston having side walls of greater length than the distance between said discharge-valve and said channel, a reservoir of liquid connected to said cylinder, the end of the piston fitting loosely in the cylinder adjacent the said reservoir, the piston head being below said channels at the end of the exhaust stroke, said reservoir having communication with the atmosphere, whereby the atmospheric pressure drives the liquid into said channels, when the piston is above said channels.

6. In a vacuum-pump, the combination of a cylinder, an induction pipe, a channel intermediate said induction pipe and said cylinder, a discharge-valve in said cylinder, a piston having side-walls of greater length than the distance between said discharge-valve and said channel, a reservoir of liquid connected with said cylinder, the piston, at the end of its stroke, having its head below said channels and dipping into the said reservoir, said piston fitting loosely in that part of the cylinder adjacent said reservoir, said reservoir having communication with the atmosphere, whereby the pressure of the atmosphere drives the liquid from the reservoir into said channel, to be then driven by the gas exhausted upon the piston-head.

7. In a pump, the combination of a cylinder, side-channels intermediate said cylinder and an induction pipe a piston, a reservoir of liquid connected to said cylinder, said piston fitting loosely in that end of the cylinder adjacent said reservoir, means for driving liquid from said reservoir through the space between the piston and the cylinder, when the piston is in the loosely fitting part into said side channels said liquid being driven upon the piston-head when it is below said channels by the gas entering through said induction pipe, a discharge-valve in the tightly fitting part of the cylinder, a cap around said discharge-valve adapted to receive and hold the liquid driven therethrough, and means for returning overflow liquid from said cap to said reservoir.

8. In a vacuum pump, the combination of a cylinder, having a discharge-valve, a cap around said discharge-valve a piston, an induction pipe, a reservoir of liquid connected to said cylinder, means for placing and maintaining a liquid seal from said reservoir in said induction pipe when said piston is expelling a charge of gas drawn through said induction pipe, means for withdrawing said liquid seal when said piston has exhausted said cylinder and is below said channel, means for carrying said liquid seal when withdrawn, through said discharge-valve and into said cap around said discharge-valve, and means for carrying the overflow from said cap into said reservoir.

9. In a vacuum pump, the combination of a cylinder, an induction pipe, a channel intermediate said induction pipe and said cylinder, a discharge valve in said cylinder, a piston having side walls of greater length than the distance between said discharge-valve and said channel, a reservoir of liquid connected to said cylinder, the end of the piston fitting loosely in the cylinder adjacent said reservoir, the piston-head being below the channels at the end of the stroke, said reservoir having communication with the atmosphere, whereby the atmospheric pressure drives the liquid into said channels while the induction pipe is disconnected from the cylinder, the liquid being driven by the gas exhausted upon the piston-head and carried by said head of the piston and forced through said discharge-valve, a cap around the discharge-valve to receive and hold said liquid, and means for returning the overflow from said cap into said reservoir.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

PAUL SCHOU.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."