

(No Model.)

A. H. DODD.
VACUUM PUMP.

No. 470,847.

Patented Mar. 15, 1892.

Fig. 1.

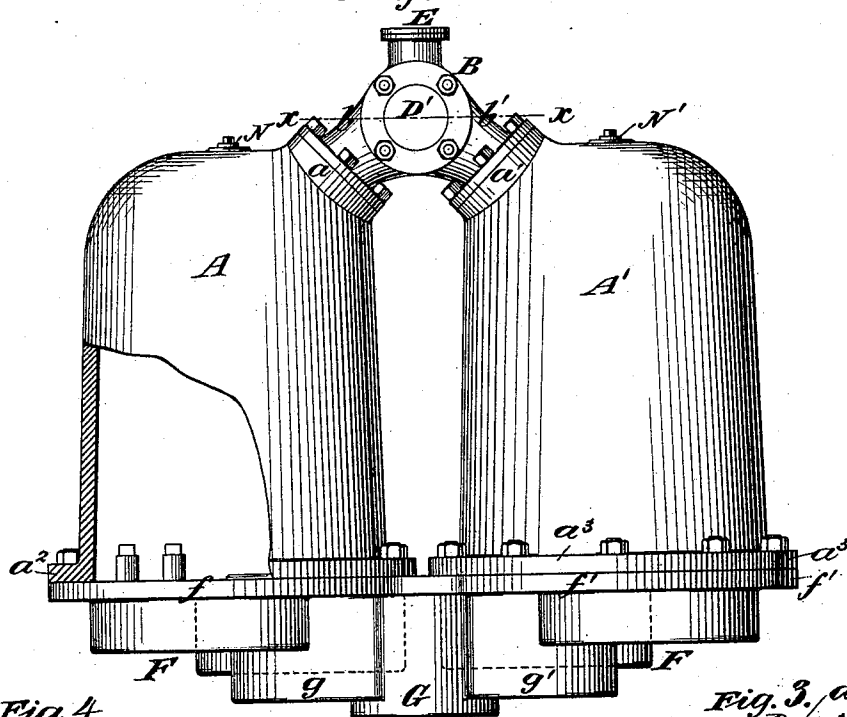


Fig. 4.

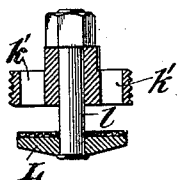
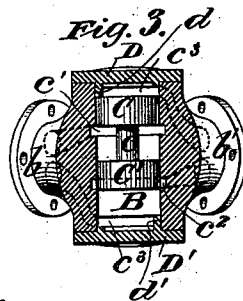
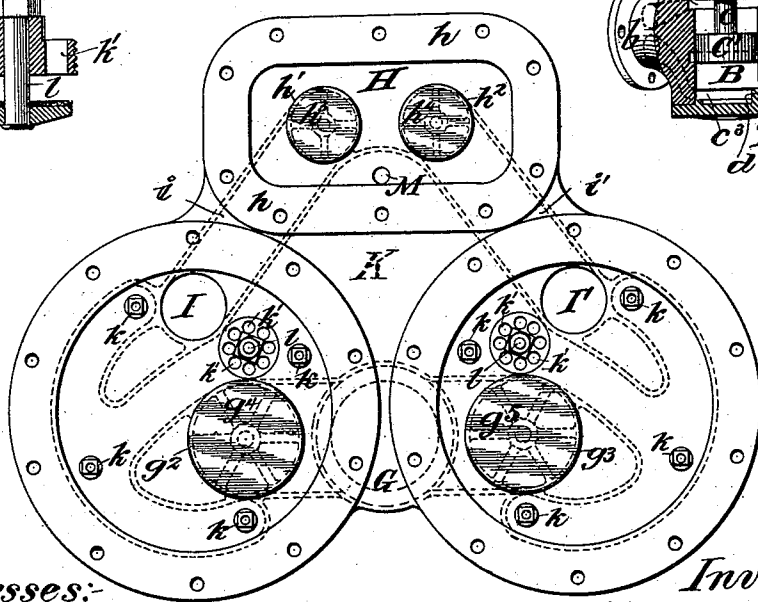


Fig. 2.



Witnesses:-

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ALVIN H. DODD, OF DENVER, COLORADO.

VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 470,847, dated March 15, 1892.

Application filed April 27, 1891. Serial No. 390,624. (No model.)

To all whom it may concern:

Be it known that I, ALVIN H. DODD, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Vacuum-Pumps, of which the following is a specification.

My invention relates to an improvement in vacuum-pumps in which the pressure of the live steam upon the liquid in one of two cylinders to discharge the same sprays a portion of the liquid into the steam-filled cylinder from which the liquid has been discharged, and thereby produces a vacuum and causes the refilling of the other cylinder.

The object of my present invention is to provide a simple and economical structure and arrangement of the cylinders and the chamber which connects their bases and to provide means whereby the liquid in the discharge-chamber will serve to form a partial vacuum in the cylinder from which the liquid has just been discharged and thereby effect the throw of the valve to admit live steam to the liquid-filled cylinder.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view in side elevation, partly in section. Fig. 2 is a top plan view of the base-plate, showing in dotted lines the positions of the sub-chambers and discharge-conduits, the cylinders themselves being removed. Fig. 3 is a view in horizontal section through line $x x$ of Fig. 1, and Fig. 4 is a sectional view in detail of one of the feeding-valves leading from the cylinder to the sprayer-chamber.

A and A' represent the two cylinders, which are preferably formed, as shown, tapering and with rounded tops and short necks a and a' on the upper adjacent edges, to which the branches b and b' of the valve-chamber B are bolted, so as to establish communication between the valve-chamber and each of the cylinders.

The valve-chamber B is provided with a bore extending therethrough from end to end, in which is seated the valve, comprising a pair of pistons C and C', connected by a stem c . Steam-ports c' and c'' lead from points intermediate of the ends of the chamber B to the cylinders A and A', respectively, and an-

other set of ports c^3 and c^4 lead from the cylinders A and A', respectively, to the ends of the valve-chamber B. The caps D and D', which close the opposite ends of the valve-chamber B, are provided with lugs d and d' , which enter a short distance within the ends of the valve-chamber and serve to stop the movement of the valve before it reaches the end of the valve-chamber, so that there is always open communication between the ends of the valve-chamber and the interiors of the respective cylinders. Steam is admitted to the central portion of the valve-chamber, so as to enter the ports c' and c'' when either one is uncovered by the pistons C, by a steam-inlet pipe E.

The cylinders A and A' are provided at their bases with outwardly-turned flanges a^2 , by means of which they are bolted to seats f and f' on the upper face of the base F. The base F is made hollow and separated into chambers and conduits, as follows: The common inlet-pipe for the liquid is represented at G and communicates through passages g and g' with openings g^2 and g^3 through into the bases of the cylinders. The openings g^2 and g^3 are provided with valves g^4 and g^5 , which open upwardly into the cylinder to admit water from the inlet-pipe G when the pressure is removed from their upper sides and to prevent its return when pressure is exerted upon their upper sides.

A seat h for the discharge-chamber H is provided in proximity to the seats for the cylinders A and A' and preferably upon the same base therewith, and communication is established between the bases of the cylinders and the discharge-chamber by means of openings I and I' through the bottoms of the cylinders into passages i and i' , which lead thence to the base of the discharge-chamber H and open upwardly into it through openings h' and h'' , provided with upwardly-opening valves h^3 and h^4 . There is also provided in connection with the discharge-chamber and the cylinders a sub-chamber K, of anchor form, which communicates with the interiors of the two cylinders around the outer portions of their bases through series of upwardly-projected spray-nozzles k , in the present instance four being represented in the bottom of each cylinder. There are also provided what I am

pleased to term "spray-feeders" or "spray-supply valves," comprising a series of openings k' , here shown as grouped in circular form and adapted to be opened and closed by a vertically-movable valve L, fixed to a stem l . The valve L closes upward, so that when there is pressure within the cylinders A and A' the said valve will remain open and allow the liquid to flow down through it into the sub-chamber K; but when the pressure is removed from within the cylinder the said valve L will close and prevent the return of liquid from the sub-chamber K up into the cylinder.

The spray-nozzles k are at all times open, so that when there is pressure exerted upon the liquid in the sub-chamber K and the pressure is removed from within the cylinder the liquid within the sub-chamber will be forced upwardly through the spray-nozzles k in the form of jets within the cylinder. There is also a permanent opening M through the bottom of the discharge-chamber H into the sub-chamber K, so that the pressure of the liquid within the discharge-chamber will tend to exert a back-pressure into the sub-chamber K, and hence will tend to throw the liquid upwardly into the jet-nozzles k when the pressure is removed within the cylinder.

The cylinders A and A' are provided at their upper ends with doors N and N' for gaining access to the cylinders when desired.

In operation suppose the cylinder A to have been filled with liquid and the liquid to have been discharged from the cylinder A'. As soon as the liquid being discharged in A' has reached a point below the spray-nozzles k , exposing the iron surface of the base, the steam will be thereby sufficiently condensed to reduce the pressure in that cylinder and start the valve to admit steam into the other cylinder, or the steam may be momentarily cut off by well-known or suitable cut-off devices, (not shown herein,) and the back-pressure from the discharge-chamber H upon the liquid in the sub-chamber K will force jets of the liquid up through the spray-nozzles k in the cylinder A', and thereby form a partial vacuum, sufficient to complete the throw of the valve in the chamber B over into the position shown in Fig. 3, thereby closing the entrance of live steam to the cylinder A' and

admitting it to the cylinder A through the ports c' . The pressure of the live steam upon the liquid in the filled cylinder A will discharge the same through the opening I and channel i into the discharge-chamber and will at the same time exert a pressure upon the liquid in the sub-chamber K, forcing jets through the spray-nozzles k in the cylinder A' and completing the condensation of steam therein, and thereby forming a vacuum and allowing the same to fill through the valve-opening g^3 . The same operation will take place in reverse order when the liquid in the cylinder A has been lowered to a point below the spray-nozzles k in that cylinder.

What I claim as my invention is—

1. The combination of the cylinders, a discharge-chamber in direct communication with the cylinders, a sub-chamber having a valved communication with the cylinders and an open communication with the discharge-chamber, and spraying-nozzles uprising from the sub-chamber into the bottoms of the cylinders, substantially as set forth.

2. The combination of cylinders having a tapered form, rounded tops, and outwardly-turned flanges at their bases, a discharge-chamber, a hollow base-section forming a seat for the cylinders and discharge-chamber, and a sub-chamber in said hollow base-section, the cylinders having direct communication with the discharge-chamber and sub-chamber and said sub-chamber having a direct communication with the discharge-chamber, substantially as set forth.

3. The combination of cylinders, a discharge-chamber, a sub-chamber extending along under the periphery of the bases of the cylinders, and spraying-nozzles arranged around the said periphery and extending from the sub-chamber up into the bottoms of the cylinders, the cylinders communicating directly with the discharge-chamber and the sub-chamber and the sub-chamber having a direct communication with the discharge-chamber, substantially as set forth.

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

ALVIN H. DODD.

Witnesses:

WM. R. HOWLAND,
WM. G. RUSSELL.