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PATENTED FEB 14 1871

Fig. 1.

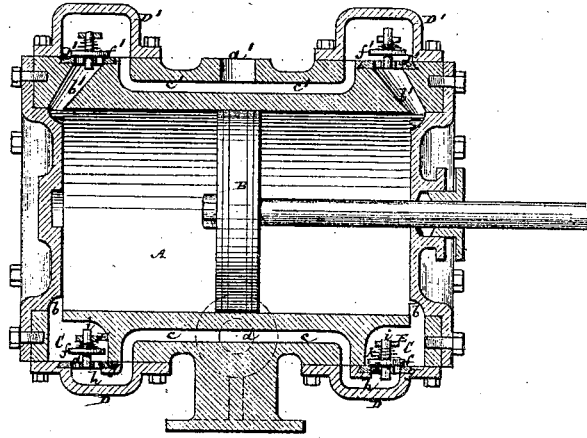


Fig. 2.

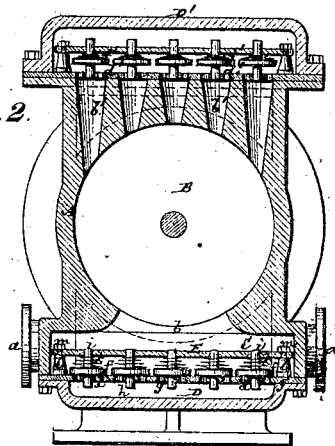


Fig. 3.

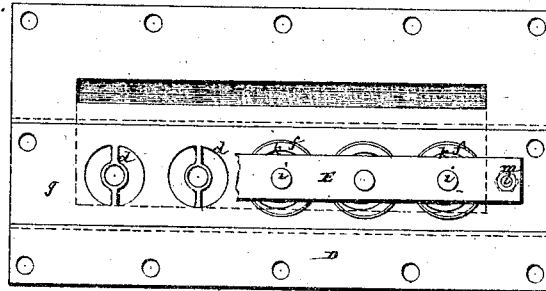
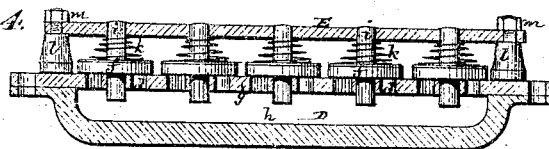


Fig. 4.



Witnesses.
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CHARLES B. HARDICK, OF BROOKLYN, NEW YORK.

Letters Patent No. 111,742, dated February 14, 1871.

IMPROVEMENT IN AIR-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, CHARLES B. HARDICK, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Vacuum and other Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a longitudinal section of a pump having my improvement applied to it.

Figure 2, a transverse section of the same.

Figure 3, an interior face view, on a larger scale, of one of the valve-box lids or covers removed; and

Figure 4, a longitudinal section thereof.

Similar letters of reference indicate corresponding parts.

My invention is mainly designed to be applied to pumps which are fitted with a multiplicity of valves arranged to act in concert at opposite ends of the pump's cylinder alternately, in contradistinction to single receiving and delivery-valves having an area equal to that of the combined area of the many-valve arrangement, which latter is more sensitive or quick in its action and better adapted to the obtainment of a perfect result, as in the case of pumps for working vacuum-pans in the manufacture of sugar, for which purpose a high range of vacuum is required or desirable. One great difficulty in such vacuum-pumps has been the inaccessibility of the valves and valve-seats, or impossibility of their removal without disturbance of the pump, which is inconvenient, laborious, and expensive, occasioning much waste of time, and being otherwise objectionable. A ready accessibility and removal of the valves, together with their seats, without disturbing the pump-cylinder and its other working parts, and this, too, so that the several valves and their seats in a series may be taken out collectively to discover any defect in the action of one or more of them arising from clogging or otherwise, is, accordingly, very desirable. This my invention accomplishes in a very simple and efficient manner by so constructing the bonnets or covers of the valve-boxes as that they carry the valves, and have the valve-seats arranged in connection with them, whereby, on simply detaching from the cylinder of the pump a bonnet or cover to one of the valve-boxes, a series of valves, with their seats, is simultaneously removed; and

Furthermore, the invention includes a combination, with such an arrangement, of a single valve-guiding and spring-holding or base-bar to the several valves in a series, so that, on merely releasing said bar at its opposite ends from connection with the bonnet or cover, the whole of the valves may be separately removed from their seats.

Referring to the accompanying drawing—

A represents the cylinder of a vacuum-pump, arranged to occupy a horizontal position, and having double inlet-connections *a a*, for working vacuum-pans, on both or opposite sides of it; but a single inlet-connection only may be used where the pump is merely required to connect with a vacuum-pan or pans on one side of it.

B is the reciprocating piston, arranged within said cylinder, and operated by any suitable means.

C C are the receiving-valve boxes or chambers arranged on the lower side of the cylinder, and communicating, by openings *b b*, with the cylinder A at its opposite ends, also connecting, through the valve-box lids or covers D D, with passages *c c*, that are in free communication with the inlets *a a*.

Each of these valve-box covers D has the seats *d d* of a series of puppet-valves *f f* formed in them or in a plate, *g*, fitted thereto, the openings in or through said seats establishing communication, by or through a passage, *h*, made in the cover, between the receiving-valve box or chamber C and passages *c*, in connection with which such set or series of valves is arranged to operate.

These valves *f f* are steadied and guided by arranging their stems *i i* to play through guide-holes in the valve-seats and apertures in a guiding-bar, E, which latter is common to the several valves in the series, and serves as the base-bar for the valve-closing springs *k k* to bear against, said bar resting at its opposite ends on stanchions or projections *l l* from or attached to the valve-covers, and being secured thereto by nuts *m m*.

The delivery-valves *f' f'* on the upper side of the cylinder, and which control the outlet-passages *b' b'*, may be similarly carried by their bonnets or covers D' D', that communicate with passages *c' c'*, which open into a general outlet, *a'*; but the seats *d' d'* are here shown as connected with the cylinder of the pump, and the construction or arrangement of parts otherwise different from that of the receiving-valves, as it is only necessary for the purpose of illustrating the improvement to show my invention as applied to certain of the valves.

From this description it will be seen that every facility is afforded, without disturbing the pump, by merely taking off either valve-bonnet or cover D from the cylinder, for lifting out and removing, collectively, the several valves *f f* and their seats *d d* in a series, as examination, repair, or removal of an obstacle may require, and that, by unscrewing the nuts *m m*, the valve-guiding and spring-holding bar E may be disconnected for the purpose of separately removing any one or more of the valves or getting at their seats.

In working the pump it is desirable to introduce a little water into the inlet-passage or passages to fill

the space left between the head of the piston and end of the cylinder at each termination of the stroke, and to seal the valves, also, to prevent heating. Should such water be admitted in quantity greater than necessary for these purposes, such surplus will be discharged through the delivery-valves.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The valve-box lid or cover D, formed with the valve-seats *d d* in it, and with a suitably-arranged passage, *h*, through it, in combination with a series of valves, *f f*, carried by said lid or cover, and for operation in relation to the seats *d d* substantially as specified.

2. The combination, with a valve-box lid or cover, D, its valve-seats *d d*, and valves *f f*, of a general valve-guiding and spring-holding bar E, secured to said lid or cover, so as to be readily detachable for separate removal of the valves or inspection and repair of them and their seats after the same have been collectively detached from the cylinder of the pump, essentially as described.

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Witnesses:

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HENRY PALMER.