(No Model.)

W. H. WORTHEN, Dec'd.

A. V. WORTHEN, Administratrix.

VACUUM PUMP.

No. 491,912. Patented Feb. 14, 1893.

Fig. 2.

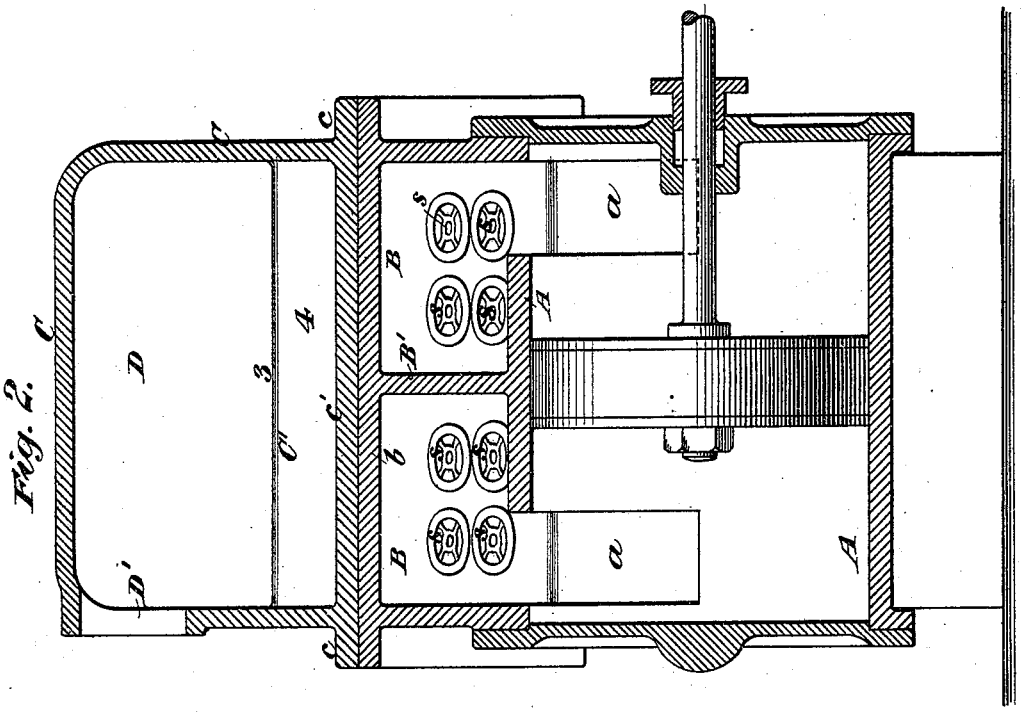
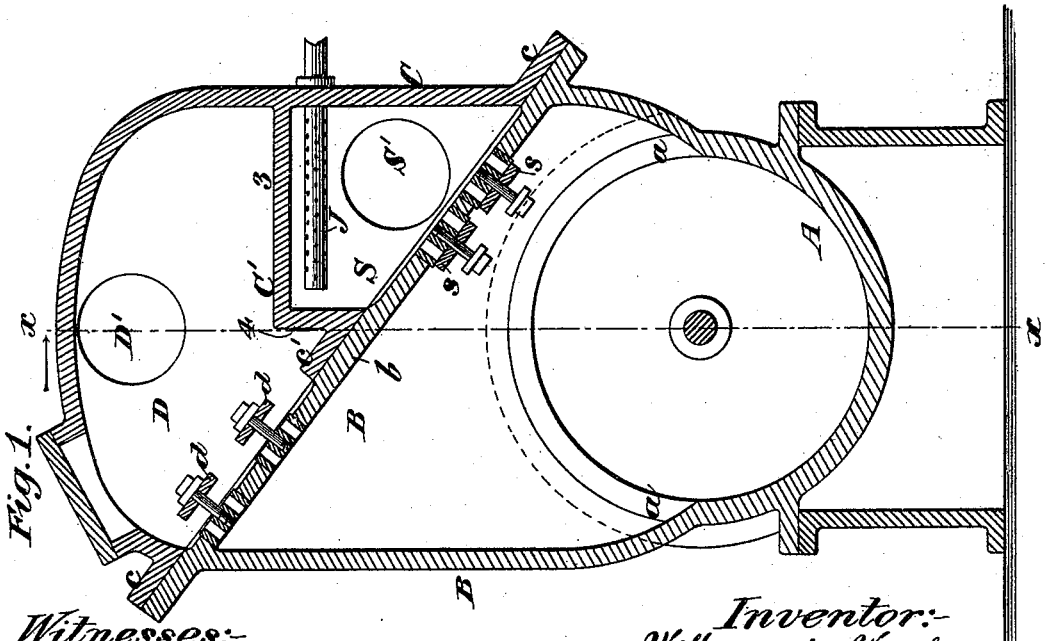


Fig. 1.



Witnesses:-
D. H. Haywood
C. Sundgren

Inventor:-
William H. Worthen
by attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

WILLIAM H. WORTHEN, OF BROOKLYN, NEW YORK; A. VIRGINIA WORTHEN, ADMINISTRATRIX OF SAID WILLIAM H. WORTHEN, DECEASED, ASSIGNOR TO GUILD & GARRISON, OF SAME PLACE.

VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 491,912, dated February 14, 1893.

Application filed November 19, 1890. Serial No. 371,896. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WORTHEN, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Vacuum-Pumps, of which the following is a specification.

This invention relates to that class of vacuum pumps of which the one described in the patent of William F. Garrison, No. 280,600, dated July 3, 1883, is an example.

The objects of my improvement are first to obtain a larger valve area without increasing the width of the pump; second to bring the suction inlet lower down and nearer to the center of the pump cylinder; third to obtain greater facility for fitting up the pump; fourth to make the suction valve chamber serve to a considerable extent as a condenser of any vapors on their way to the pump; and fifth to obtain to a greater extent the advantage derived from the water striking an inclined surface as compared with its striking a horizontal surface.

In the accompanying drawings, Figure 1 represents a transverse sectional view of a vacuum pump embodying my invention. Fig. 2 represents a longitudinal section of the same on the dotted line *x x*, Fig. 1, looking in the direction of the arrow.

Similar letters of reference designate corresponding parts in both the figures.

A designates the pump cylinder having cast with it a water and air chest B which is divided by a transverse partition B′ into two compartments which communicate with the ends of the cylinder by ports or passages *a*. The upper part of this chest B has a continuous inclination from one side of the chest to the other and constitutes an inclined straight valve-plate *b*, the lower part of which comes over the bore of the cylinder. In the lower part of this inclined valve-plate are situated the seats for the downwardly opening suction valves *s*, and in the upper part thereof are situated the seats for the upwardly opening discharge valves *d*.

C is a cover applied over the valve-plate. This cover contains a longitudinal diaphragm C′ by which it is divided into two chambers S and D, the lower one S which is over the suction valves *s* being the suction chamber and having an opening S′ in its lower part for the connection of the suction pipe and the upper one D which includes the valves *d* constituting the discharge chamber and having an opening D′ in its upper part for the connection of the discharge pipe. The said cover C is represented as having a marginal flange *c* all around it and the diaphragm C′ is also provided with a flange *c′*, extending the whole length of the cover. The faces of these flanges are all flush with each other so that they may fit to the flush upper face of the valve-plate and consequently great facility is afforded for making the joint between the cover and the valve-plate as the said faces can be easily planed.

The diaphragm C′ is represented as having the greater portion 3, of its surface horizontal, the remaining portion 4, being upright; and below the horizontal portion of the diaphragm is a jet pipe J to provide for the injection into the suction chamber S of jets of cold water for the purpose of condensing or partially condensing any vapor contained in the air on its way to the pump cylinder. When, in the operation of the pump, water is introduced in such quantity as to produce a constant outflow thereof, this outflowing water will flow over the horizontal portion 3, of the diaphragm and overflow down the upright portion 4, and in so flowing over the diaphragm will not only have the effect of cooling it and thereby in some degree effecting condensation of the vapors in the suction chamber, but will by its direct cooling effect on the air in the discharge chamber tend to condense any vapors remaining in said air.

It will readily be understood by reference to Fig. 1, that by the inclination of the lower portion of the valve-plate which constitutes the bottom of the suction chamber a larger valve area is obtained in a pump of the same width than when the said portion of the plate is horizontal. It may also be understood that the inclination of the said lower portion of the plate allows the suction pipe to be brought nearer to the center of the cylinder. It will also be understood that by placing the whole of the valve-plate at an inclination, the full

advantage of the water striking an inclined surface as compared with its striking a horizontal surface is obtained.

What I claim as my invention and desire to secure by Letters Patent is:

The combination of the air cylinder A, the divided water and air chest B, the inclined straight valve-plate *b*, containing the seats for both suction and discharge valves, all of said parts being in one integral structure, and the removable cover C, containing a diaphragm by which it is divided into suction and discharge chambers S D, the said diaphragm and the margin of the said cover being faced to fit the straight inclined valve-plate, substantially as and for the purpose herein set forth.

WM. H. WORTHEN.

Witnesses:
W. R. LYNCH,
S. H. KAHN.