(No Model.)

A. B. WORTH.

ELECTRIC AIR PUMP.

No. 337,803. Patented Mar. 9, 1886.

Fig. 1.

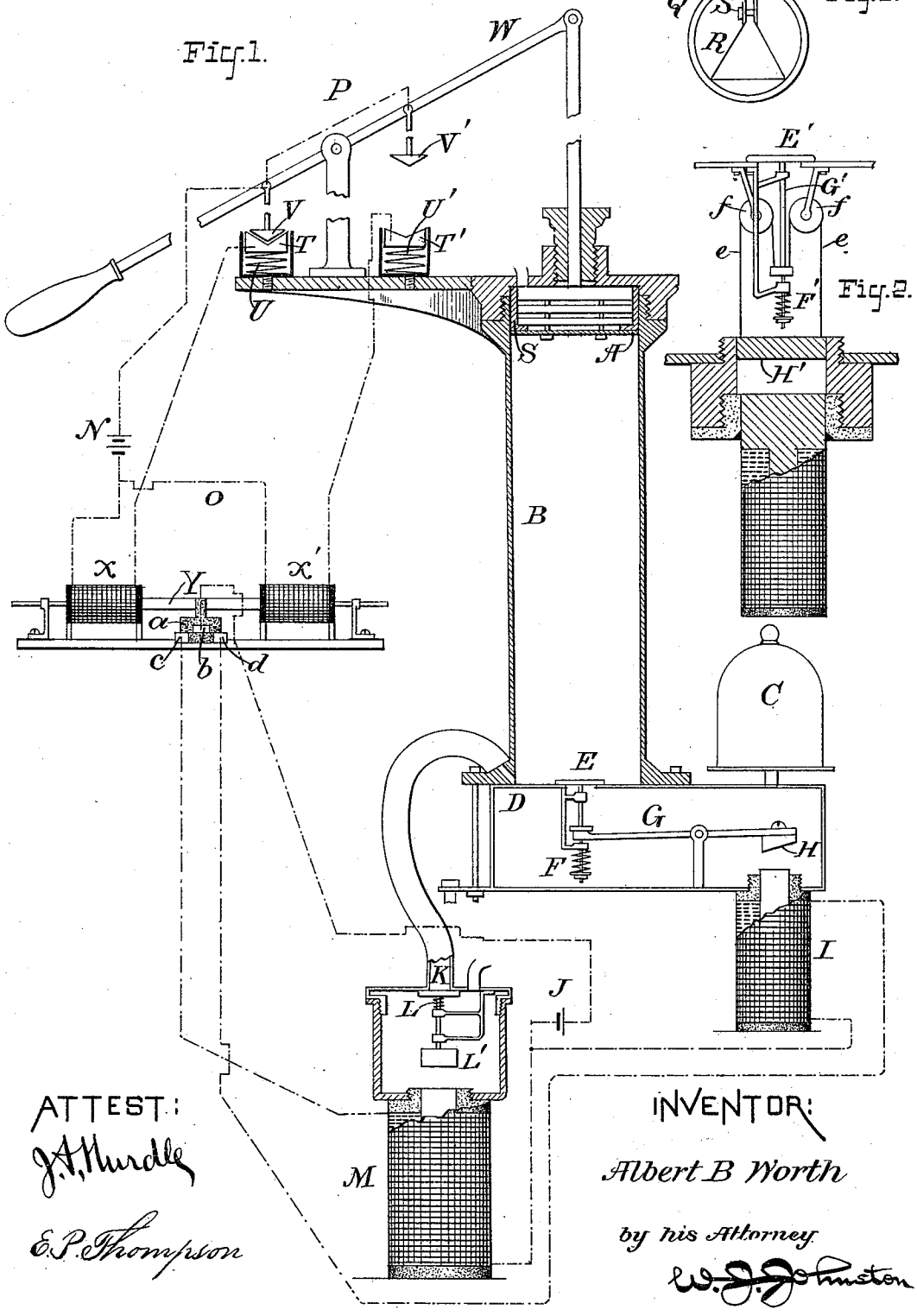


Fig. 3.

Fig. 2.

ATTEST:

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UNITED STATES PATENT OFFICE.

ALBERT B. WORTH, OF GREENPORT, NEW YORK.

ELECTRIC AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 337,803, dated March 9, 1886.

Application filed November 18, 1885. Serial No. 183,182. (No model.)

To all whom it may concern:

Be it known that I, ALBERT B. WORTH, a citizen of the United States, and a resident of Greenport, in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Electric Air-Pumps, of which the following is a specification.

The invention includes valuable and patentable features having reference to certain important improvements in the form, combination, and disposition of the several elements composing the invention and necessary to its operation.

The invention includes also all the uses and applications to which it may be applied; but all such uses are not enumerated, as it is evident that the party controlling the patent may devote the invention to any purpose now or hereafter proposed.

It is very well known that in vacuum air-pumps the pressure in the receiver or in that space which is being exhausted of air becomes less and less until finally it is not sufficient to operate the valve, although practically there is some air left in the receiver.

My invention relates, therefore, in particular, to means for operating said valve, said means being independent of the pressure in the receiver and adapted to be operated by electricity.

The object of my invention is to provide the valves of an air-pump with devices adapted to operate in a superior manner automatically.

The invention consists, generally, of certain elements organized, essentially as described, in conformity to the accompanying drawings, adapted to operate as hereinafter explained, and for the purpose of accomplishing the above-named object, including all modifications as to their form, combination, and disposition covered by the claims hereinafter annexed, and applicable to any purpose mentioned or not mentioned but intended to be devoted to the uses herein alluded to.

In order to illustrate the practical manner of carrying out the invention and to enable others skilled in the art to which the invention appertains to make and use the same, drawings are hereunto annexed and described, in which similar letters represent corresponding elements, and in which each part referred to is designated by a single character. Those parts not mentioned are not claimed in this the present application. The materials of construction employed, the exact forms of design, and the proportional dimensions are not alluded to in every instance, as they are best determined upon by engineers in the art.

Figure 1 is a general view, partly in section and with some portions broken away. Fig. 2 is a modification, and Fig. 3 shows a detail of construction of the piston.

The device embodying my invention consists, essentially, of the combination of the piston A, the cylinder B, receiver C, a chamber, D, communicating with said receiver, a first valve, E, leading to said receiver from said cylinder, a spring-support, F, for said valve, an operating-lever, G, geared at one end to said valve and fixed at the other end to an armature, H, an electro-magnet, I, under said armature and in circuit with a first electric generator, J, a second valve, K, and a spring-support, L, therefor, and armature L′, attached to said valve, an electro-magnet, M, under said armature and in a circuit having a second electric generator, N, and a commutator, O, having electrical connection with said circuits and with a pole-changer, P, which is geared to said piston.

Some of the details of construction are as follows: Fig. 3 shows a ring, Q, similar to those composing the piston A. A triangular piece of wire, R, and nut S serve as means of making the ring larger or smaller, so as to vary the pressure of the leather or rubber packing S against the inner surface of the cylinder. The pole-changer P, geared to the piston, consists of the cylinder T, containing the conical pieces T and T′, supported by spiral springs U and U′. These conical pieces are adapted to contain other conical pieces, V and V′, suspended from the handle W of the piston. The commutator consists of two solenoids, X and X′, having a common core, Y, to which is fixed a piece of insulating substance, *a*, supporting a contact-piece, *b*, which is adapted to slide from the contact-piece *c* to the contact-piece *d*. In both electric valves the magnets I and M are located without the

respective valve-chambers, except one end of each, which screws, as shown, into the said valve-chambers.

The operation of the air-pump is substantially the same as in ordinary air-pumps, except as regards the valves. When the contact-points V and T come together, the current passes through the magnet X, drawing the core Y to the left, so that the current can pass through the contacts *b* and *c* into magnet M, which operates the valve K and keeps it open until the contacts V′ and U′ switch the current through magnet X′, drawing the core Y to the right, thereby allowing the current to energize the magnet I, which keeps the valve open until the contacts V and T come together again.

The invention is not limited to the precise construction hereinbefore described, as it is evident that many modifications may be made therein without departing from the spirit of the invention.

In Fig. 2 is shown the valve E′, partially supported by a spring, F′, and by a weight or core, H′, which is connected to the valve-stem G′ by cords *e* passing over pulleys *f*.

Having now stated the title, object, and relation of the said invention, having described its practical realization by reference to the accompanying drawings, having particularly ascertained the manner in which the same operates to accomplish the said objects, and further stating that it is not necessary to state all the uses to which the invention may be applied, what applicant considers to be novel and original, and therefore claims as his invention secured to him by the hereinbefore in part recited Letters Patent of the United States, is—

1. In combination with the usual valves and piston of an ordinary mechanical air-pump, operating electrical devices geared to said valves and current-controlling devices geared to said piston and in circuit with said operating electrical devices, substantially as and for the purpose mentioned.

2. In combination with an electric air-pump, two solenoids having a common core, a piece of insulating substance rigidly fixed thereto, and a piece of conducting substance secured to the said insulating substance and resting upon one of two conducting-pieces, the said three pieces having electrical connections, as described.

3. In an air-pump, the combination, with the handle or operating-lever of the pump, of a fulcrum for said lever, loosely-suspended conically-shaped contact pieces or terminals to said handles, one being on each side of the fulcrum, corresponding terminals supported on springs and located below the first-named terminals, electric valves to said pumps, and suitable electrical connections, substantially as described.

4. In an air-pump, the combination of the usual piston, cylinder, and receiver, a chamber communicating with said cylinder and with said receiver, a first valve leading to said receiver from said cylinder, a spring support or balance for said valve, an operating-lever geared at one end to said valve and fixed at the other end to an armature, an electro-magnet under said armature and in circuit with a first electric generator, a second valve and a spring support or balance therefor, an armature attached to said valve, an electro-magnet under said armature and in a circuit having a second electric generator, and a commutator having electrical connection with said circuits and with a pole-changer, which is geared to said piston, substantially as described.

November 12, 1885.

ALBERT B. WORTH.

Witnesses:
CHRISTOPHER B. MOORE,
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