(No Model.)

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M. BOOM.

AIR PUMP.

No. 295,341.

Patented Mar. 18, 1884.

Fig. 3

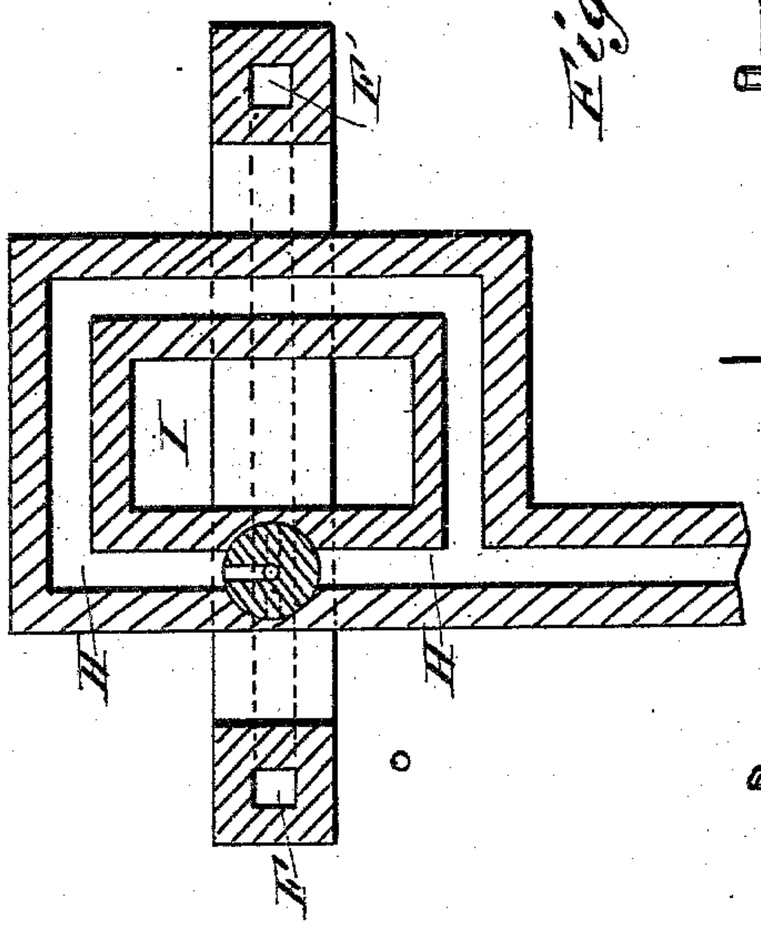


Fig. 2

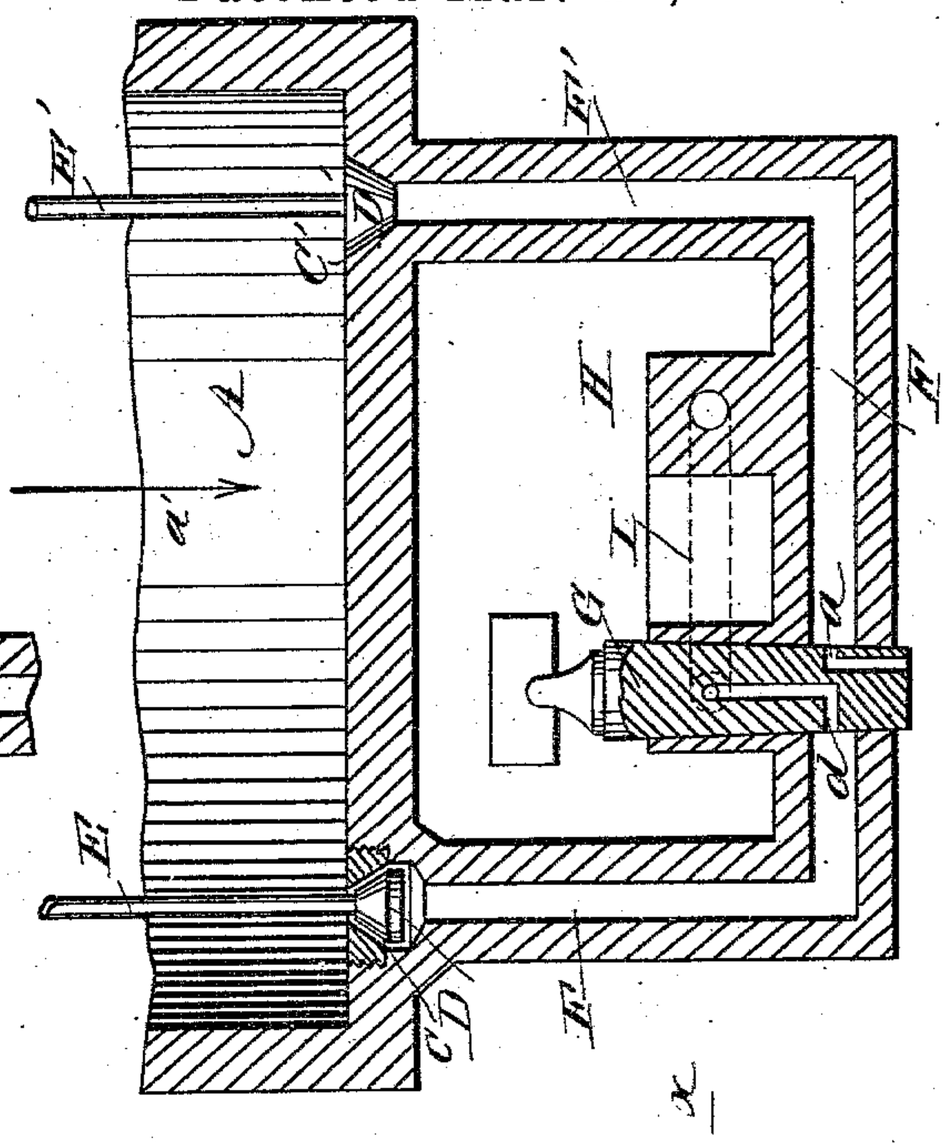
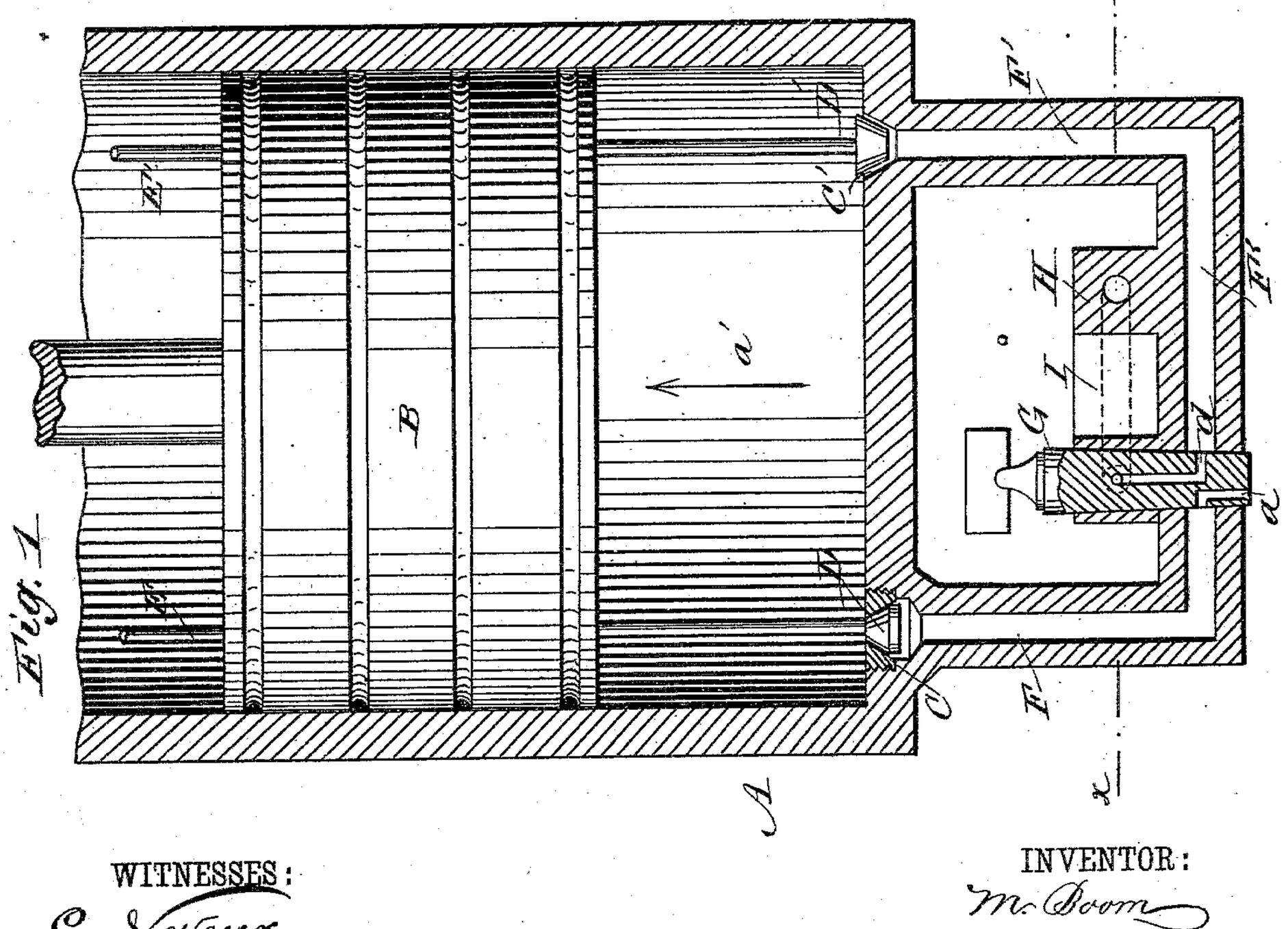


Fig. 1



WITNESSES:

C. Neveux

C. Sedgwick

INVENTOR:

M. Boom

BY Munn & Co

ATTORNEYS.

(No Model.)

3 Sheets—Sheet 2.

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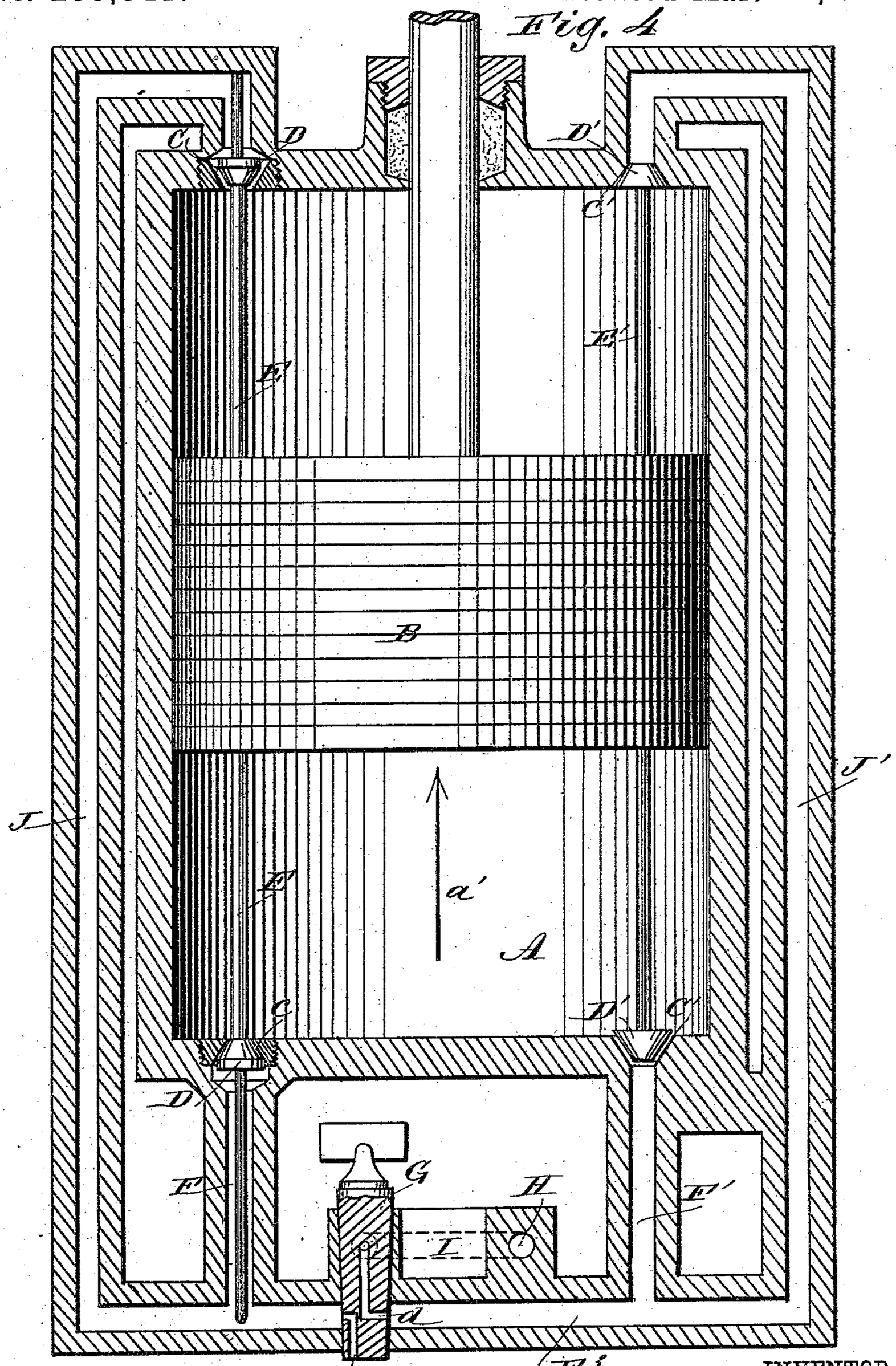
Fig. 4



WITNESSES:

C. Neveux

L. Bedgwick

INVENTOR:

M. Boom

BY Munn & Co

ATTORNEYS.

(No Model.)

3 Sheets—Sheet 3.

M. BOOM.

AIR PUMP.

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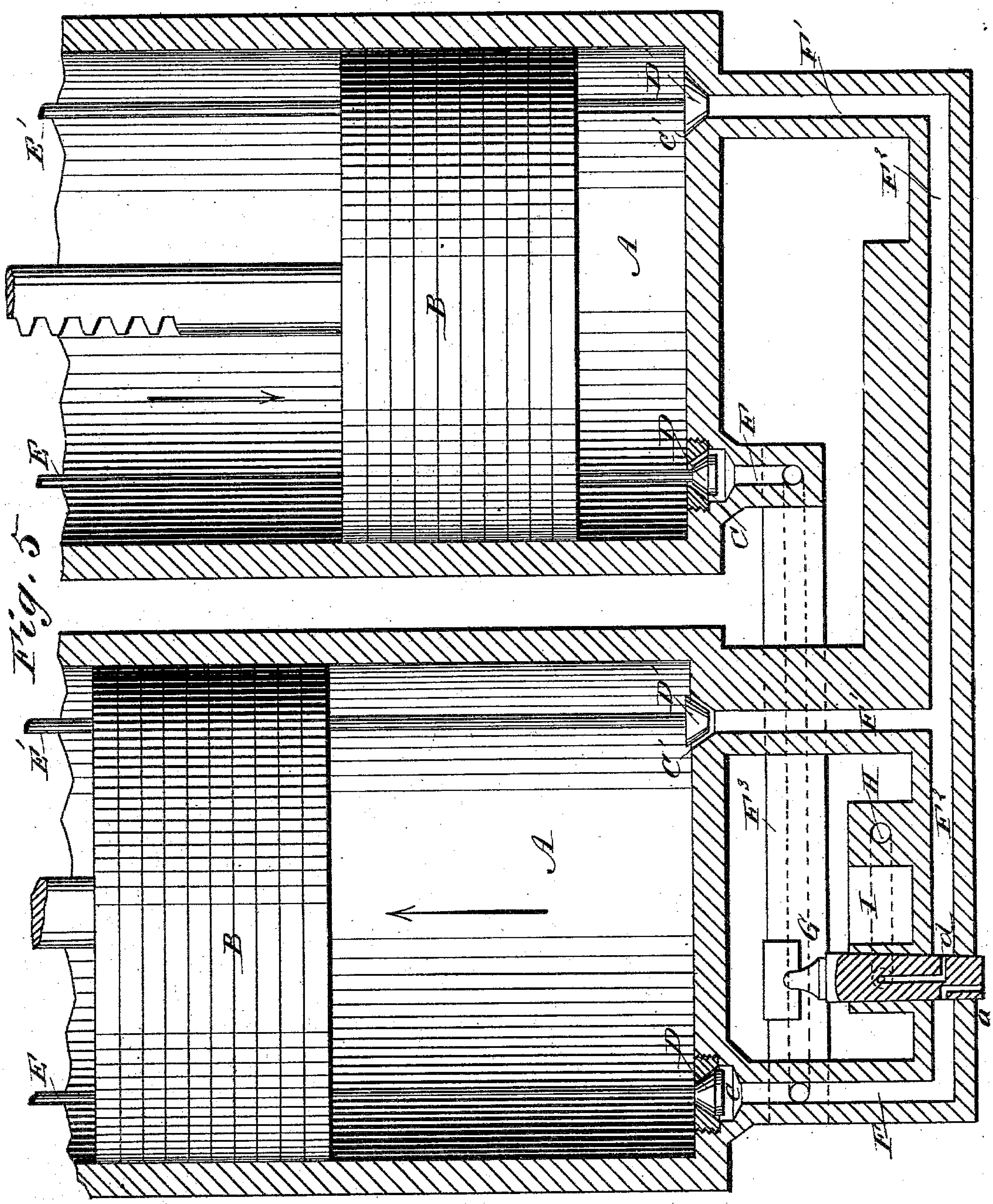

Fig. 5

WITNESSES:

C. Neveux

C. Sedgwick

INVENTOR:

M. Boom

BY Munn & Co

ATTORNEYS.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

MIGUEL BOOM, OF PORT AU PRINCE, HAYTI.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 295,341, dated March 18, 1884.

Application filed April 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, MIGUEL BOOM, of Port au Prince, Hayti, have invented a new and Improved Air-Pump, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved air-pump which can be adjusted for use for creating a vacuum, and also for compressing air.

The invention consists in an air-pump which is adapted to be used for compressing air or for creating a vacuum by turning a cock-plug in a tube uniting the inlet and outlet tubes at the end of the cylinder, which cock-plug is provided with channels for establishing communication between the outer air and the inlet or outlet pipes of the cylinder, and with a channel for establishing communication between the inlet or outlet pipes of the cylinder, and a tube united with the vessel for receiving compressed air, or in which a vacuum is to be produced, which latter tube also forms a suitable by-pass.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of the lower part of the cylinder of my improved air-pump, showing the same adjusted for creating a vacuum. Fig. 2 is a like sectional elevation, showing it adjusted for compressing air. Fig. 3 is a sectional plan view of the valve-channel on the line *x x*, Fig. 1. Fig. 4 is a longitudinal sectional elevation of my improved double-acting air-pump, showing the same adjusted for creating a vacuum. Fig. 5 is a longitudinal sectional elevation of the lower part of the cylinders of a compound air-pump of my improved construction, showing the same adjusted for creating a vacuum.

A cylinder, A, in which the pump-piston B moves longitudinally, is provided in its bottom with two ports, C and C′, which are closed by suitable valves, D and D′, which are operated from the piston, the valves being preferably attached to rods E and E′, passing through the piston, and so arranged that the valve D closes when the piston rises, and the valve D′ closes when the piston descends. I have shown cone-shaped valves; but it is evident that any other suitable kind of valves may be used. Two tubes, F and F′, extend downward from the bottom of the cylinder, and are connected by a transverse tube, F^2, through which a cock-plug, G, passes, which has two channels, *a* and *d*, of which the channel *a* extends from the lower end of the plug up to the bore of the tube F^2, and the channel *d* extends from the bore of the tube F^2 to the upper part of the plug, which upper part of the plug passes through a tube, H, forming a square, oblong, or circular by-pass, I, above the tube F^2, one end of which tube H is connected with a vessel in which a vacuum is to be created, or with a reservoir for containing the compressed air.

In the compound pump shown in Fig. 4 the tubes are constructed and arranged as described; but the ends of the tube F^2 are connected, by means of tubes J and J′, with the opposite end of the cylinder A, and a valve, D, and a valve, D′, are mounted on each end of the rods E and E′, which valves D D′, at the upper end of the cylinder, close the ends of the channels or tubes J J′.

In the compound pump shown in Fig. 5 the tube F′ of both cylinders leads to the tube F^2, and the tube F of one of the cylinders also leads into the tube F^2. The tube F of the other cylinder is connected by means of a tube, F^3, with the tube F of the first-mentioned cylinder. The tube F^2 is provided with a cock-plug, G, below one cylinder only, as no more are required.

The operation is as follows:

I will first describe the action of the single-action pump shown in Figs. 1 to 3, inclusive.

If the pump is to be used for creating a vacuum, the plug G is so adjusted that the channel *a* will establish communication between the tube F and the outer air, and the channel *d* will establish communication, by means of the tube H, between the tube F′ and the vessel in which the vacuum is to be produced. If the piston rises in the direction of the arrow *a′*, the friction between the same and the rods E draws the valve D upward, thereby closing the port C, and in a like manner the rod E′ is drawn upward, and thereby the valve D′ will be opened. The rise of the pis-

ton produces a vacuum in the lower part of the cylinder, and the air passes through the tube H and the channel *d* into the tube F², the tube F′, and into the lower part of the cylinder, whereby the air in the vessel connected with the tube H is rarefied. When the piston has completed its upward stroke and begins to descend in the reverse direction of the arrow *a′*, the rods E E′ are moved downward, and thereby the valve D is opened and the valve D′ is closed. The air in the lower part of the cylinder is then forced out through the tube F and the channel *a*, and so on until the desired vacuum is created. If the same pump is to be used for compressing air, the plug G is so adjusted that communication is established by means of the channel *d* between the tube H and the tube F, and communication is established by means of the channel *a* between the outer air and the tube F′. If the piston descends, the valve D will be opened and the valve D′ closed, and the air in the cylinder will be forced through the tube F, the channel *d*, and the tube H into the receptacle for receiving compressed air. When the piston rises, the valve D′ will be opened, and the air for filling the cylinder can pass through the channel *a* and the tube F′ into the cylinder, and so on. By turning the cock-plug G the pump can thus easily be adjusted for two entirely different purposes. In the double-action pump shown in Fig. 4 the adjustment is made in the same manner—by turning the cock-plug G.

If the pump is to be used for creating a vacuum, it is adjusted as shown in Fig. 4, the piston rises in the direction of the arrow *a′*, the bottom valve D and the upper valve D′ will be closed, and the bottom valve D′ and upper valve D will be opened. The rising piston creates a vacuum in the lower part of the cylinder, and the air from the receptacle in which a vacuum is to be produced passes through the tube H, the channel *d*, the tube F², and the tube F′ into the cylinder. The air above the piston is forced through the port C at the upper end of the cylinder, through the channel J, the tube F², and the channel *a* in the cock-plug. When the piston descends, the lower valve D and the upper valve D′ are opened, and the lower valve D′ and the upper valve D are closed, a vacuum is produced above the piston, and the air passes from the receptacle in which a vacuum is to be produced through the tube H, the channel *d*, the tube F², and the channel J′ into the upper part of the cylinder. The air below the piston is forced out through the tube F, the tube F², and the channel *a*.

In the compound pump shown in Fig. 5 the pistons B descend alternately, and while a vacuum is being created in one cylinder the air is being forced out of the other. When the left-hand piston rises, the air is drawn through the tubes F′ and F², the channel *d*, and the tube H from the vessel in which the vacuum is to be produced, and the compressed air in the right-hand cylinder is forced through the tube F of the said cylinder, the tube F³, and tube F of the other cylinder to the channel *a* and escapes. When the piston of the right-hand cylinder rises, the air is drawn into the cylinder through the tube F′, the tube F², the channel *d*, and the tube H, the piston of the left-hand cylinder descends, and the air is forced out of the said cylinder through the tube F and the channel *a*.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an air-pump, the combination, with a cylinder having inlet and outlet tubes alternately opened and closed by valves operated by a piston, of a tube communicating with said inlet and outlet tubes, and provided with a pipe for connecting it with a reservoir, and a two-way cock, substantially as herein shown and described, whereby communication may be established between the outer air and the inlet and outlet tubes, and between either of the said inlet and outlet tubes and the pipe leading to the reservoir, as set forth.

2. In an air-pump, the combination, with the cylinder A, of the tubes F F′, having their inner ends alternately closed by valves, and having their opposite ends united by a tube, F², a cock-plug, G, having channels *a d*, and the tube H, adapted to be connected with a suitable vessel for receiving the compressed air, or in which the vacuum is to be produced, which tube H forms a by-pass, substantially as herein shown and described, and for the purpose set forth.

3. In an air-pump, the combination, with a cylinder, A, provided with ports C C′ in its top and bottom, and a piston, B, carrying valves D D′, of the tubes F F′, united by a tube, F², the cock-plug G, having channels *a d*, the tube H, forming a by-pass, and the channels J J′, connecting the ends of the tube F² with the opposite ends of the cylinder A, substantially as herein shown and described, and for the purpose set forth.

MIGUEL BOOM.

Witnesses:
E. LELAND, Jeune,
E. V. KRUMAN.