(No Model.) 2 Sheets—Sheet 1.

C. G. E. NEVEUX.

VACUUM PUMP.

No. 297,433. Patented Apr. 22, 1884.

Fig. 1

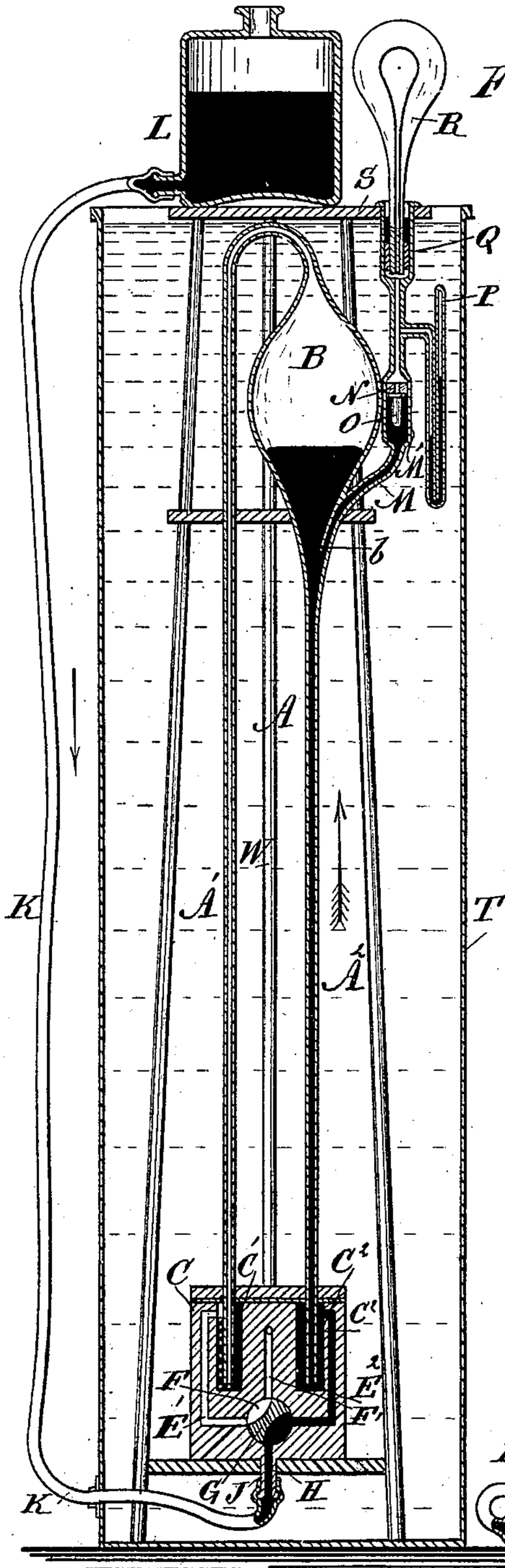
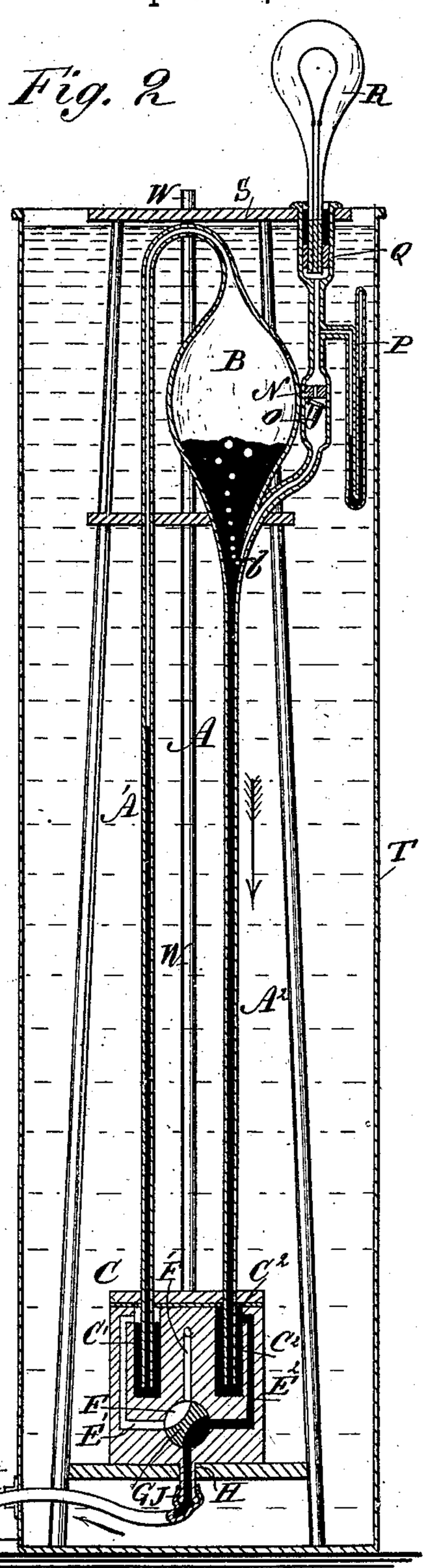


Fig. 2



WITNESSES:

Donn Twitchell.

C. Sedgwick

INVENTOR:

Charles G. E. Neveux

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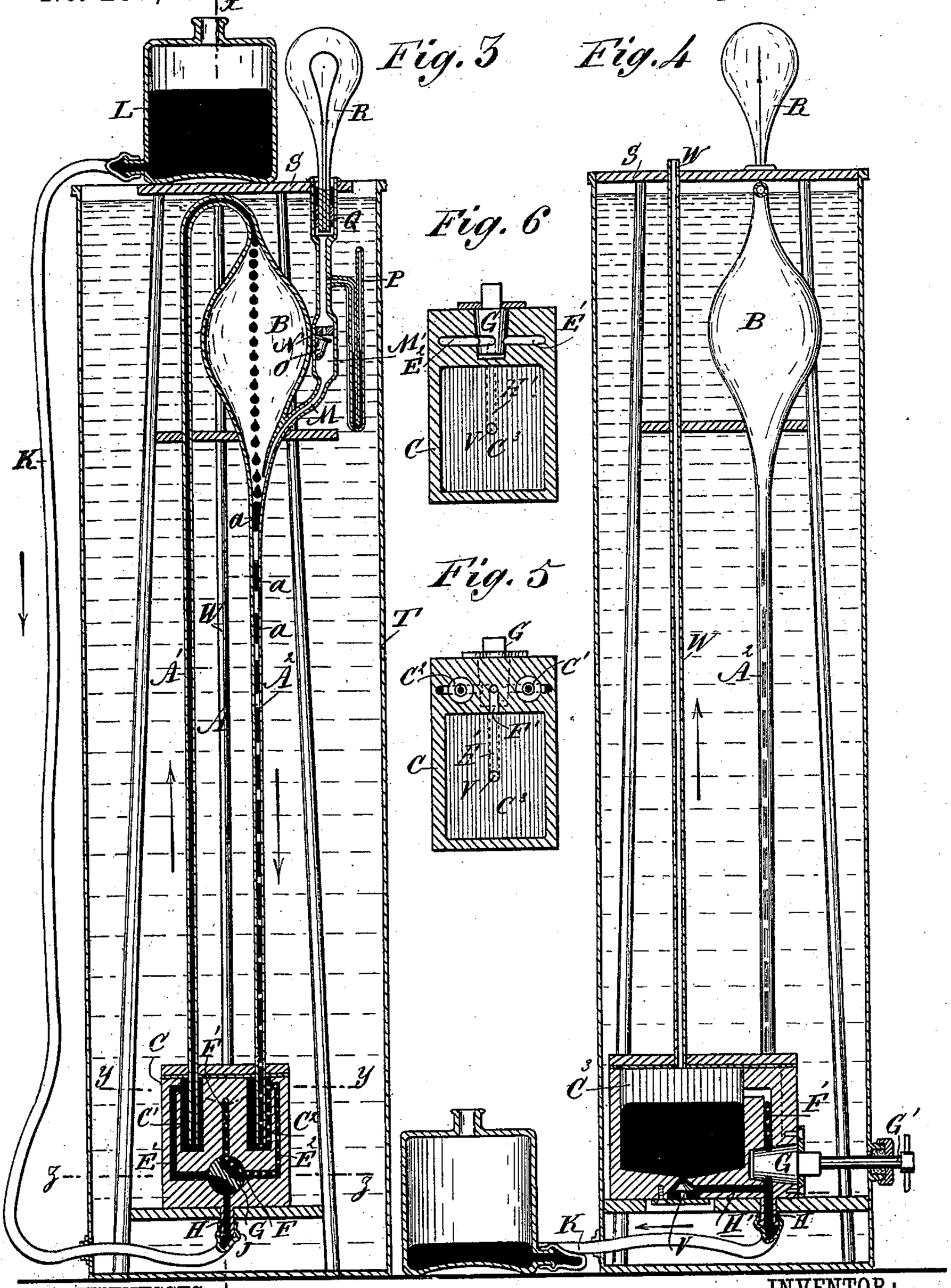

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INVENTOR:

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UNITED STATES PATENT OFFICE.

CHARLES G. E. NEVEUX, OF NEW YORK, N. Y.

VACUUM-PUMP.

SPECIFICATION forming part of Letters Patent No. 297,433, dated April 22, 1884.

Application filed October 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. E. NEVEUX, of the city, county, and State of New York, have invented a new and Improved Vacuum-Pump, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved pump for exhausting the air from vessels and producing a vacuum in the same in the most perfect manner, which pump is of very simple construction, operates very rapidly, and is devoid of the dangers and inconveniences accompanying other mercury vacuum-pumps.

The invention consists in a vacuum-pump constructed with two vertical pipes united at their upper ends, a bulb being formed in one of the pipes and a tube projecting from the pipe provided with a bulb, with which tube the receptacle from which the air is to be exhausted is connected, and which tube is so located that it will be closed by the mercury before the mercury rises in the bulb.

The invention further consists in the combination, with the said united vertical pipes, of which one is provided with a bulb, of a cock, by means of which the inlets and outlets of the pipes can be so arranged that the mercury can be admitted into the bulb from either the top or the bottom and the flow of the mercury regulated.

The invention also consists in various parts and details and combinations of the same, as will be fully described and claimed hereinafter.

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 my improved vacuum-pump, showing it adjusted to operate in the manner of a Geissler pump, the mercury passing into the bulb. Fig. 2 is a like view with the mercury passing out of the bulb. Fig. 3 is a like sectional view of the pump, showing it adjusted to operate as a Sprengel pump. Fig. 4 is a cross-sectional elevation of the same on the line *x x*, Fig. 3. Fig. 5 is a sectional plan view of the same on the line *y y*, Fig. 3. Fig. 6 is a sectional plan view of the same on the line *z z*, Fig. 3.

A U-shaped pipe or tube, A, having two shanks, A′ and A^2, has a bulb, B, formed at the upper end of the shank A^2—that is, formed at that end of the shank at which the curve or bend is formed. The free ends of the shanks A′ and A^2 pass into pockets C′ and C^2 in a block, C, provided with a reservoir-opening C^3. The upper ends of the pockets C′ and C^2 are connected by channels E′ E^2 with a valve-opening, F, containing a four-way-cock plug, G. From the said opening F a channel, F′, extends to the upper part of the reservoir-opening C^3, and from the said opening F a channel, H, extends down through a neck, J, to which a flexible tube or hose, K, is coupled, the other end of which flexible tube or hose K is coupled to the bottom of a mercury-bottle, L. A channel, H′, extends from the bottom of the reservoir-opening C^3 to the channel H. By means of the four-way-cock plug G the channel E^2 can be brought in communication with the channel H, and the channel F′ can be brought in communication with the channel E′, as shown in Figs. 1 and 2; or by reversing the said cock-plug the channel E′ can be brought in communication with the channel H, and the channel E^2 can be brought in communication with the channel F′, as shown in Fig. 3. The cock-plug G is provided with a suitable handle, G′, for turning it. From the lower part of the bulb B a curved tube, M, projects upward, which is provided with an enlargement, M′, near the upper part of which a transverse apertured disk, N, is held, against the bottom of which a floating valve-plug, O, is adapted to be pressed by the mercury for the purpose of closing the aperture in the said disk N. Above the enlargement M′ a gage, P, is secured to the tube M, and in the upper part of the tube M an enlargement, Q, is formed for receiving bulb or other vessel R, from which the air is to be exhausted. The tube A and reservoir-block C are held in a suitable frame, on the top of which a table or platform, S, is formed, on which the mercury-bottle L can be placed. If desired, the entire pump can be contained in a tank, T, which is filled with water or other refrigerating material to prevent the heat from evaporating the mercury, the valve-stem and the tube K being suitably

packed in the walls of the said tank. A pipe, W, is provided, which extends upward and projects from the top of the table S, and is used to carry off the air that accumulates in the reservoir-aperture C^3. The bottom of the reservoir-opening C^3 is provided with an upwardly-closing check-valve, V, which closes the channel H′ and prevents the mercury from flowing into the said reservoir-opening C^3 from the bottom when the bottle L is raised.

The operation is as follows: The bulb or vessel R, from which the air is to be exhausted, is placed in the enlargement Q on the upper end of the tube M, and the four-way cock G is turned, as shown in Fig. 1, so as to connect the shank A^2, extending from the bottom of the bulb B, with the flexible tube or hose K. The bottle L is then placed on the table S, and the mercury flows from the bottle into the tube K, the channel H, the channel E^2, and into the pocket C^2, which is closed at its top and forms a mercury seal. The mercury then rises in the shank A^2 in the tube M, and presses the valve O against the bottom of the apertured disk N, thereby closing the aperture in the said disk. The mercury then rises in the bulb B until it flows out of the top of the same, and thus forces all the air out of the said bulb. When the mercury rises up to the lower end of the tube M—that is, to *b*—it automatically closes the lower end of the said tube M, and prevents the mercury from forcing the air in the bulb B up through the tube M, back into the vessel R. As soon as the mercury begins to flow through the bent tube at the upper end of the bulb B, the mercury-bottle L is placed on the floor, as shown in Fig. 2. The mercury then flows down through the shank A^2 into the pocket C^2, the channel E^2, the channel H, the tube K, into the bottle L, whereby a vacuum will be formed in the bulb B, and the air will pass from the vessel R into the said vacuum, the same pressure being in the bulb B as in the vessel R. Then the mercury-bottle L is placed on the table S again, thereby causing the mercury to rise and force the air out of the bulb B. The bottle is then lowered, and so on continually, whereby the air will be almost entirely exhausted from the vessel R. The gage P shows the pressure in the vessel R. If more air is to be exhausted from the vessel R, the four-way-cock plug G is turned, as shown in Fig. 3, so that the shank A′ will be in communication with the channel E′, the channel H, and the tube K. The bottle L is then placed on the table S, and the mercury flows from the said bottle through the tube K, the channels H and E′, the pocket C′, and the shank A′, into the top of the bulb B, and then drops down through the same, and in dropping through the bulb the flow of mercury is so regulated by the cock G as to form a series of pistons, *a*, Fig. 3, between which pistons a small quantity of air is locked. The mercury-pistons descend and carry the air down into the pocket C^2, through the channel E^2, the channel F′, into the reservoir-opening C^3, in which the mercury collects, the air escaping through the pipe W. Then the bottle is placed on the floor, and the mercury flows from the reservoir-opening C^3 through the tube K and back into the bottle. If all the air has not been exhausted from the vessel R, the bottle L is again placed on the table S, and the operation just described is repeated.

In the above-described pump the mercury never leaves the apparatus or pump, and there is no loss of mercury by handling the same. The pump is very compact, is simple in construction, and can be adjusted almost instantaneously to operate either as a Geissler pump or as a Sprengel pump, as circumstances may require. As a rule, a greater quantity of air is exhausted by using the pump as a Geissler pump, and when it is found that no more air can be exhausted by using the pump as a Geissler pump the cock is turned and the pump is operated as a Sprengel pump. The point *b* must always be a few inches above the barometer-line from the level of the mercury in the reservoir.

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

1. A vacuum-pump constructed substantially as herein shown and described, and consisting of two vertical tubes united at their upper ends, one of the tubes being provided at the upper end with a bulb and at the base of the bulb with a pipe leading to the receptacle from which the air is to be exhausted, as set forth.

2. A vacuum-pump constructed of two vertical tubes united at their upper ends, one of the tubes being provided at the upper end with a bulb communicating with both tubes, from the bottom of which bulb a tube projects upward, which is connected with a receptacle from which the air is to be exhausted, the lower ends of the said tubes being contained in cups forming mercury seals, to and from which cups channels lead for conducting mercury into and from the tubes, substantially as herein shown and described, and for the purpose set forth.

3. In a vacuum-pump, the combination, with two vertical tubes, united at their upper ends, of channels leading to the lower ends of the tubes, and of a cock for bringing the lower end of either tube in communication with a channel through which the mercury can be conducted, substantially as herein shown and described, and for the purpose set forth.

4. In a vacuum-pump, the combination, with two vertical tubes united at their upper ends, in one of which tubes a bulb is formed, of a tube projecting upward from the base of the bulb, an apertured disk in the said tube, and a valve for closing the aperture in the said disk, substantially as herein shown and described, and for the purpose set forth.

5. In a vacuum-pump, the combination,

with two vertical tubes united at their upper ends, one of the tubes being provided with a bulb from the lower end of which a tube projects upward, which is connected with a vessel from which the air is to be exhausted, of two pockets, into which the lower ends of the tubes pass, and in which they are sealed by mercury seals, channels connecting the said pockets with an opening containing a cock-plug, which cock-plug opening is connected by suitable tubing with a mercury-receptacle, substantially as herein shown and described, and for the purpose set forth.

6. In a vacuum-pump, the combination, with two vertical tubes united at their upper ends, a bulb being formed in one of the tubes, and a tube projecting from the base of the bulb, with which tube the receptacle from which the air is to be exhausted is connected, of a block provided with pockets, into which the lower ends of the tubes pass, a reservoir-opening formed in the said block, an opening containing a cock-plug, channels connecting the said openings with the upper ends of the pockets, a channel connecting the said opening with the reservoir recess or aperture, and a tube connecting the said opening with a mercury-receptacle, substantially as herein shown and described, and for the purpose set forth.

7. In a vacuum-pump, the combination, with a U-shaped tube, A, having a bulb, B, of the tube M, with which the vessel to be exhausted is connected, the blocks C, provided with pockets C′ C², for receiving the ends of the shanks, and with an opening, C³, forming a mercury-reservoir, which block is provided with chambers E′ E², extending from the pockets to an opening, F, containing a cock-plug, G, and with a channel, F′, extending from the aperture C³ to the opening F, the neck J, the tube K, the mercury-bottle L, the valve V in the bottom of the reservoir, and the air-pipe W, substantially as herein shown and described, and for the purpose set forth.

8. A vacuum-pump constructed with two pipes united at the upper ends, one of the pipes being provided with a bulb and with a branch pipe, to which the receptacle from which the air is to be exhausted is connected, which branch pipe is so located that when the mercury rises to enter the bulb from the bottom the mercury will seal the lower end of the said branch pipe before it rises in the bulb, substantially as herein shown and described, and for the purpose set forth.

9. In a vacuum-pump, the combination, with two vertical pipes united at their upper ends, one of which pipes is provided with a bulb, of a cock by means of which the inlets at the lower ends of the pipes can be regulated in such a manner that mercury can be admitted in the bulb, either from the top or from the bottom, and also whereby the flow of mercury into the top of the bulb can be regulated as may be desired, substantially as herein shown and described, and for the purpose set forth.

CHARLES G. E. NEVEUX.

Witnesses:

C. SEDGWICK,

E. M. CLARK.