

(No Model.)

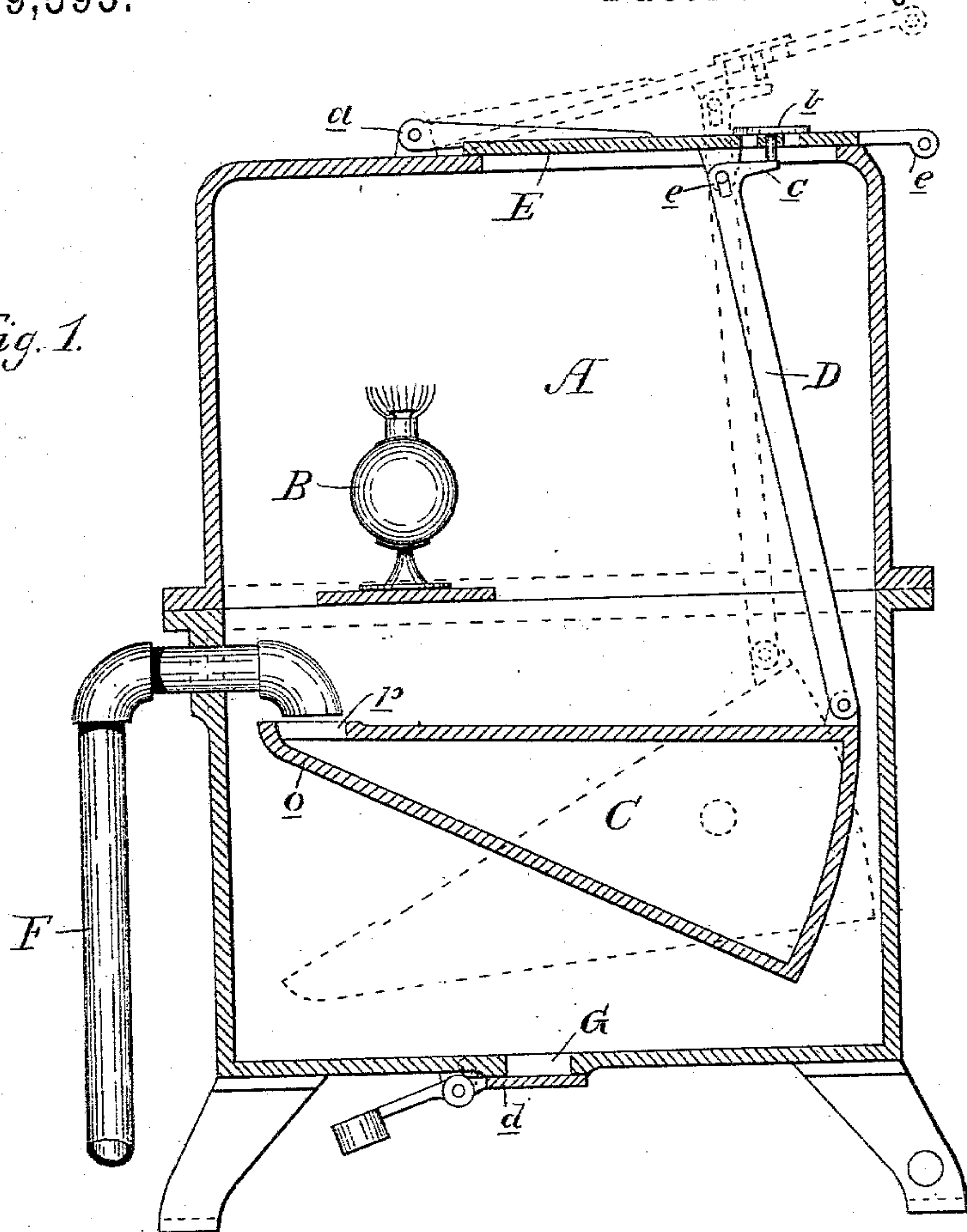
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E. I. NICHOLS.  
APPARATUS FOR RAISING LIQUIDS.

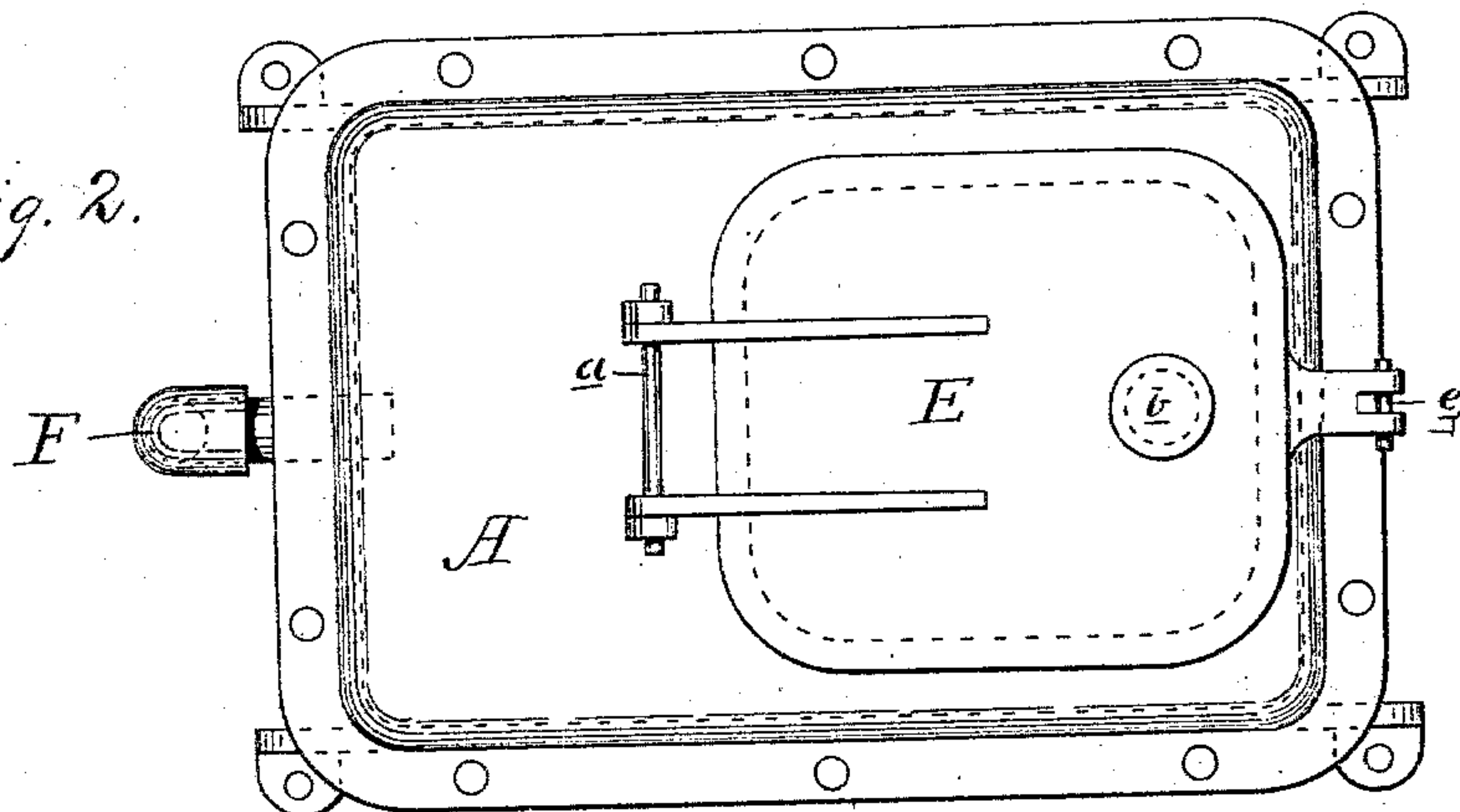
No. 559,595.

Patented May 5, 1896.

*Fig. 1.*



*Fig. 2.*



Witnesses

C. A. Moise  
F. H. Washington

Inventor

Emory I. Nichols.

(No Model.)

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Fig. 3.

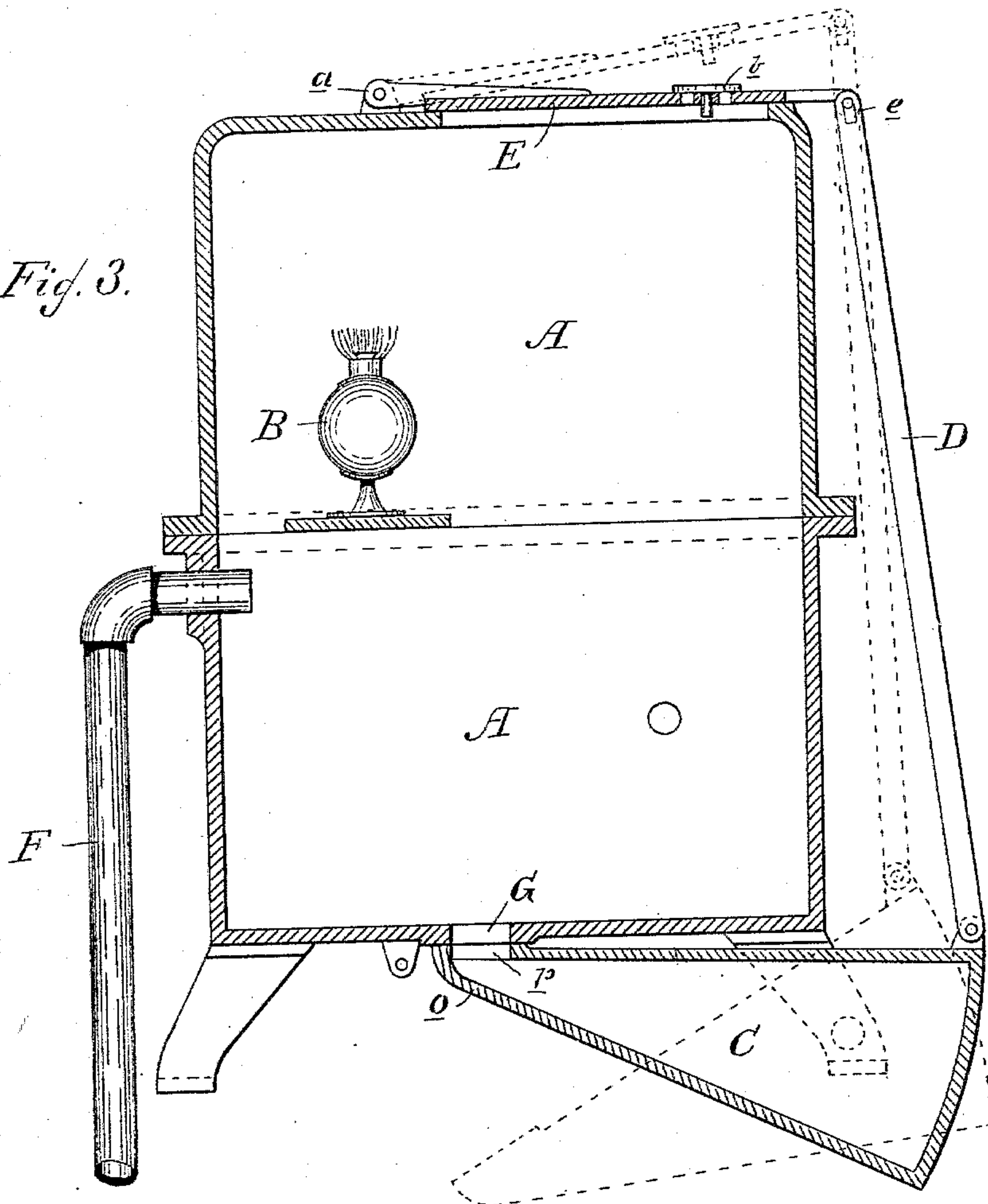
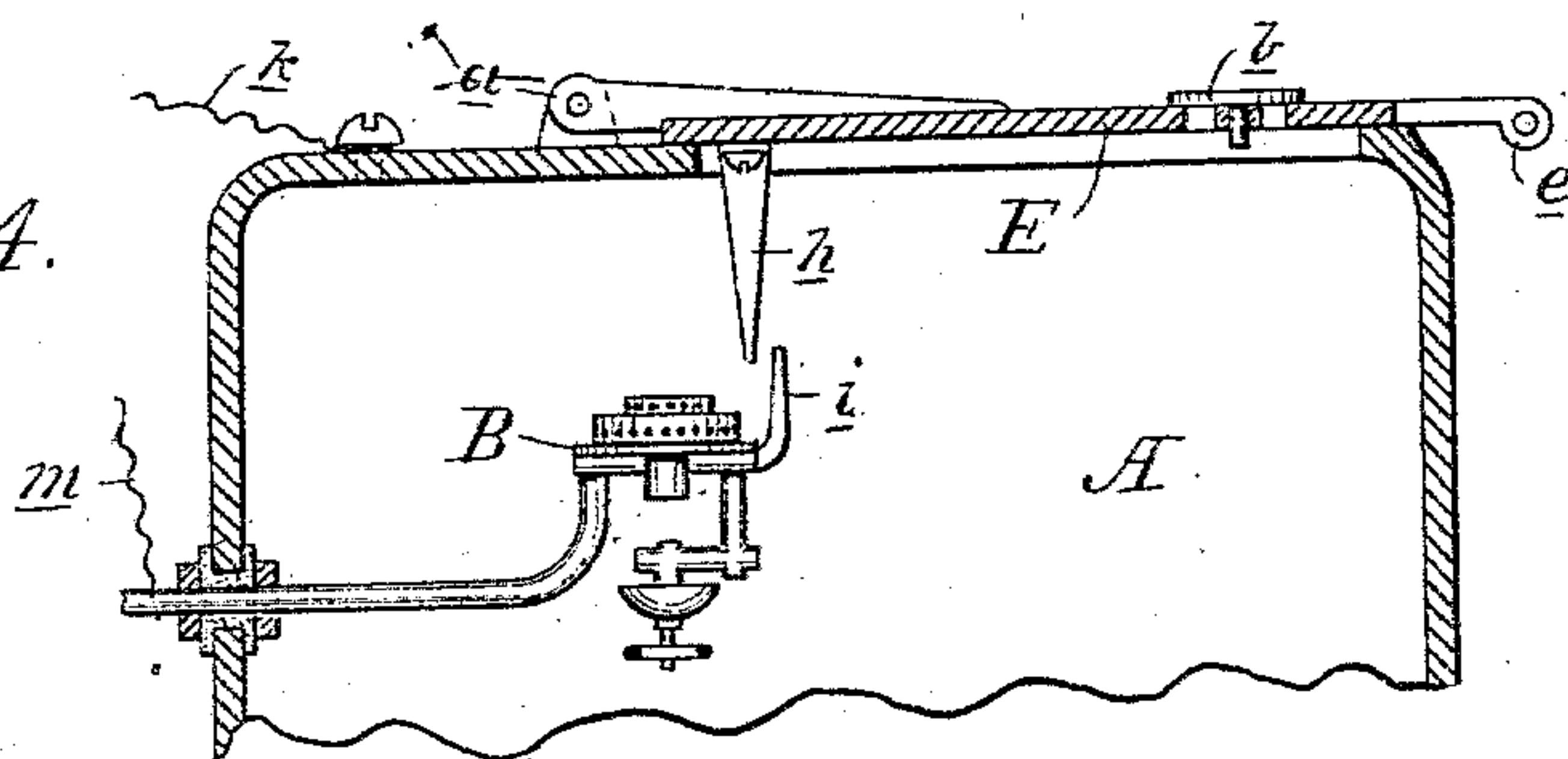


Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

EMORY I. NICHOLS, OF SAN FRANCISCO, CALIFORNIA.

## APPARATUS FOR RAISING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 559,595, dated May 5, 1896.

Application filed January 11, 1896. Serial No. 575,080. (No model.)

*To all whom it may concern:*

Be it known that I, EMORY I. NICHOLS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Apparatus for Raising Liquids; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention is an improved apparatus for raising liquids automatically from a source of supply, for whatever purpose the apparatus may be employed, and is designed and operated so as to change the volume of air by combustion in a closed chamber, for raising liquids without the use of a plunger or pump, and is illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section of the apparatus with the tilting box inclosed therein. Fig. 2 is a plan view of the apparatus. Fig. 3 represents a vertical section of the apparatus with the tilting box operated on the outside of the chamber. Fig. 4 shows a vertical section of the upper part of the chamber with an electrical lighting device operated by the movement of the tilting box.

In the chamber A, as shown in Fig. 1, is arranged the lamp or burner B and the tilting box C, with the connecting-bar D. On the top of the chamber A, as shown, is a large cover or lid E, hinged or pivoted at *a* and provided with a small air-valve *b*. Loosely connected to the lower side of the cover at *e* is the bar D, which has a projecting arm *c* for raising the small air-valve *b* by the upward movement of the said bar. The lower end of this bar is connected to the tilting box C. The box C is so hinged or pivoted within or to the chamber A that when containing a predetermined amount of liquid it will tilt down automatically and discharge its contents and then tilt back to its filling position. This box, as shown in Figs. 1 and 3, is in the form of a triangle; but it may be made in many different forms and shapes and may be hinged or pivoted within the chamber A, as shown

in Fig. 1, or may be hinged or pivoted on the outside of the chamber A, as shown in Fig. 3.

Connected to the chamber is the suction-pipe F, which is provided with a foot-valve the same as ordinary pumps. The chamber is also provided with a discharge-opening G, and, as shown in Fig. 1, has a swinging valve *d*; but any kind of a check-valve may be used, the same as in ordinary pumps. In Fig. 3 I do not use a check-valve, as the tilting box takes the place of this valve.

In Fig. 4 I have shown an electrical lighting device operated by the tilting box, and consists of two electrodes *h* and *i* within the chamber A, which are alternately brought into and released from contact with one another. These electrodes are connected in open circuit with an electrical generator. When the circuit is closed and then opened, a spark is produced which lights the lamp or burner should the same be extinguished during the filling of the box C with liquid. As shown in Fig. 4, the electrode *h* is secured to the cover E, but is operated by the movement of the tilting box C, and I have shown in this figure a vapor-burner; but I am aware that these electrodes may be connected in many different ways, and this lighting device may be used for lighting the lamps, as shown in Figs. 1 and 3, if so desired, and I do not confine myself to this form of lighting the lamp or burner, as shown. The line-wire *k*, as shown, is secured to the chamber A, and the other line-wire, *m*, is secured to the burner-supply pipe and is insulated from the chamber A.

The operation of my liquid-raising apparatus is as follows: The lamp or burner B within the chamber A being lighted burns while the cover E is closed, and as the air becomes heated by the flame a portion of the air in the chamber is expelled through the small air-valve *b*. A reaction soon takes place as the oxygen in air is consumed by the flame. The flame will decrease in size, the gradual rarefaction of the air caused by the diminution of the oxygen creates a vacuum in the chamber A, and the liquid to be raised is drawn through the suction-pipe F by this vacuum into the tilting box C until the box contains the amount it has been adjusted for. Then, the greater weight being at the point *o* in Fig. 1, the box C starts to tilt down,



and consequently forces the bar D up against the cover E and opens the small air-valve b. For the time being the box C remains in this position, or until mutual compensation takes place between the internal and the external pressures through the valve-opening. The box C then tilts down to its discharging position, as shown by dotted lines. As the box C tilts down it forces the cover E open, and both cover E and box C remain in this position until the liquid is discharged from the box C, the time being regulated by the size of the opening p in the box C. While the cover E was open it admitted a fresh supply of air into the chamber A, which resulted in the flame resuming its normal size, so when the box C has discharged its contents it tilts back to its filling position, and with it carries the cover E and closes the chamber A, and the alternate automatic operations of the apparatus are repeated in the manner just described.

In Fig. 3 the operations of the apparatus are similar to those just described, excepting in the manner of equalizing the internal and the external pressures. In this figure the size of the opening G is made to conform to the height the liquid is to be raised, so when the box C contains the amount of liquid it has been adjusted for it starts to tilt down and opens the port G, which admits air to the chamber A, and as soon as the inner and outer pressures are equalized the box C tilts down to its discharging position, and the operations are the same as just described.

The chamber A, as shown in the drawings, is made in two sections and secured together, but this chamber may be in many different forms and of any suitable material. I have only shown one tilting box in the drawings, which may be operated outside the chamber or may be operated within the chamber, but one or more boxes may be operated separately or automatically together, and I do not confine myself to this form of constructing the chamber A, as shown, or the number or the shape of the tilting boxes used.

By the improved devices herein shown and described the cost of constructing a liquid-raising apparatus is very materially reduced and is more durable. The operation of my improved apparatus is thought to be apparent without further description.

I claim—

1. A liquid-raising apparatus, consisting of a chamber having an air-valve receiving and discharge openings, a lamp or burner located within the said chamber, and an automatic tilting box or receptacle adapted to receive a determined quantity of fluid connected to said air-valve for opening and closing the chamber, substantially as and for the purpose described.

2. A liquid-raising apparatus consisting of a chamber having a cover or lid receiving and discharge openings, a lamp or burner located within the said chamber, and an automatic

tilting box or receptacle adapted to receive liquid for operating said cover or lid for opening and closing the chamber, substantially as and for the purpose described.

3. A liquid-raising apparatus, consisting of a chamber having a cover or lid receiving and discharge openings, a lamp or burner located within the said chamber, a cover or lid for closing the chamber, an air-valve, and an automatic tilting box or receptacle adapted to receive liquid for operating the cover or lid and the air-valve, substantially as and for the purpose described.

4. A liquid-raising apparatus, consisting of a chamber having receiving and discharge openings, a cover or lid for closing the chamber, an air-valve located in the cover or lid, a lamp or burner located in the said chamber, and an automatic tilting box or receptacle adapted to receive liquid for operating the air-valve, and the cover or lid, substantially as and for the purpose described.

5. In a liquid-raising apparatus, a chamber or receptacle, having receiving and discharge openings, a lamp or burner located in said chamber or receptacle to produce a burning flame, to partially consume the oxygen of the air confined in the said chamber or receptacle and create a partial vacuum therein, and an automatic electric-lighting device for lighting the lamp or burner, operated by some moving part of the apparatus, substantially for the purpose described.

6. A liquid-raising apparatus, consisting of a chamber having a liquid inlet and outlet, a cover or lid for closing the chamber, an air-valve located in the cover or lid, a lamp or burner located in the chamber, an automatic tilting box or receptacle adapted to receive a determined quantity of fluid, and a bar or rod connected at one end to the tilting box, the other end of rod or bar loosely connected to the cover or lid, and adapted to first open the air-valve, and then open the cover or lid, substantially as and for the purpose described.

7. In a liquid-raising apparatus, the combination of a chamber having a liquid inlet and outlet, a cover or lid for closing the chamber, a lamp or burner located within the said chamber, an automatic electric-lighting device for lighting the said lamp or burner, and means for operating the cover or lid, and the electric-lighting device by some moving part of the device substantially for the purpose described.

8. In a liquid-raising apparatus, the combination with a chamber having a liquid inlet and outlet, a cover or lid for closing the chamber, and a lamp or burner located in the said chamber, of an electric-lighting device for lighting the lamp or burner, and an automatic tilting box or receptacle adapted to receive a determined quantity of fluid for operating the cover or lid and the electric-lighting device, substantially as and for the purpose described.

9. In a liquid-raising apparatus, a chamber



or receptacle, a lamp or burner located therein  
to produce a burning flame to partly consume  
the oxygen of the air confined in the said cham-  
ber and create a vacuum therein, a cover or  
5 lid for closing the chamber, an air-valve, an  
electric-lighting device, and inlet and outlet  
port, and an automatic tilting box or recep-  
tacle adapted to receive liquid to operate the  
cover or lid, the air-valve, and the electric-

lighting device, substantially as and for the  
purpose described.

In testimony whereof I affix my signature  
in presence of two witnesses.

EMORY I. NICHOLS.

Witnesses:

C. A. MORSE,

F. W. WASHINGTON.