

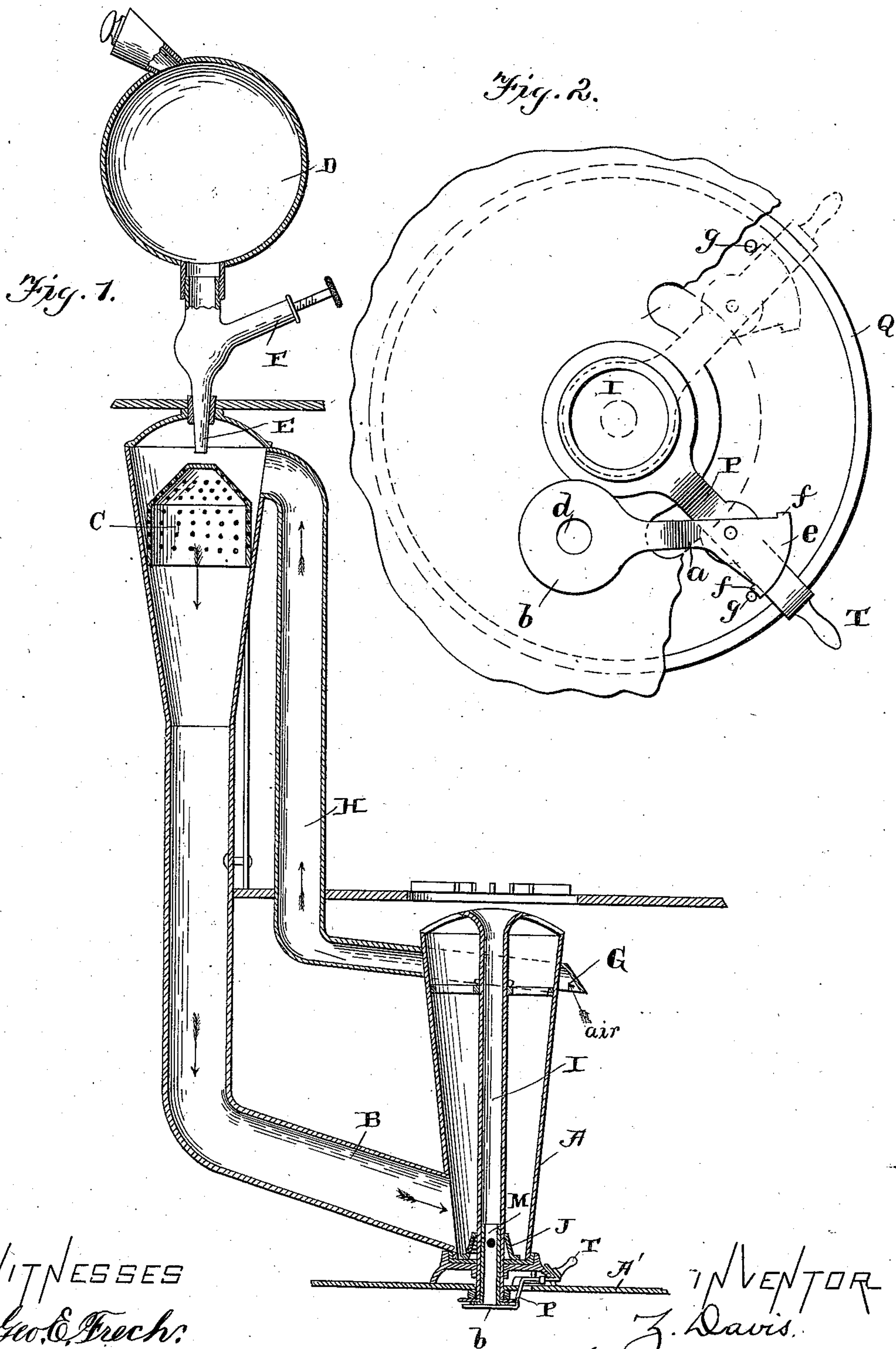
(No Model.)

2 Sheets—Sheet 1.

Z. DAVIS.
EVAPORATOR BURNER OR STOVE.

No. 555,436.

Patented Feb. 25, 1896.



WITNESSES

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Herbert Clayton

INVENTOR

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per Pattison Nesbit
attys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

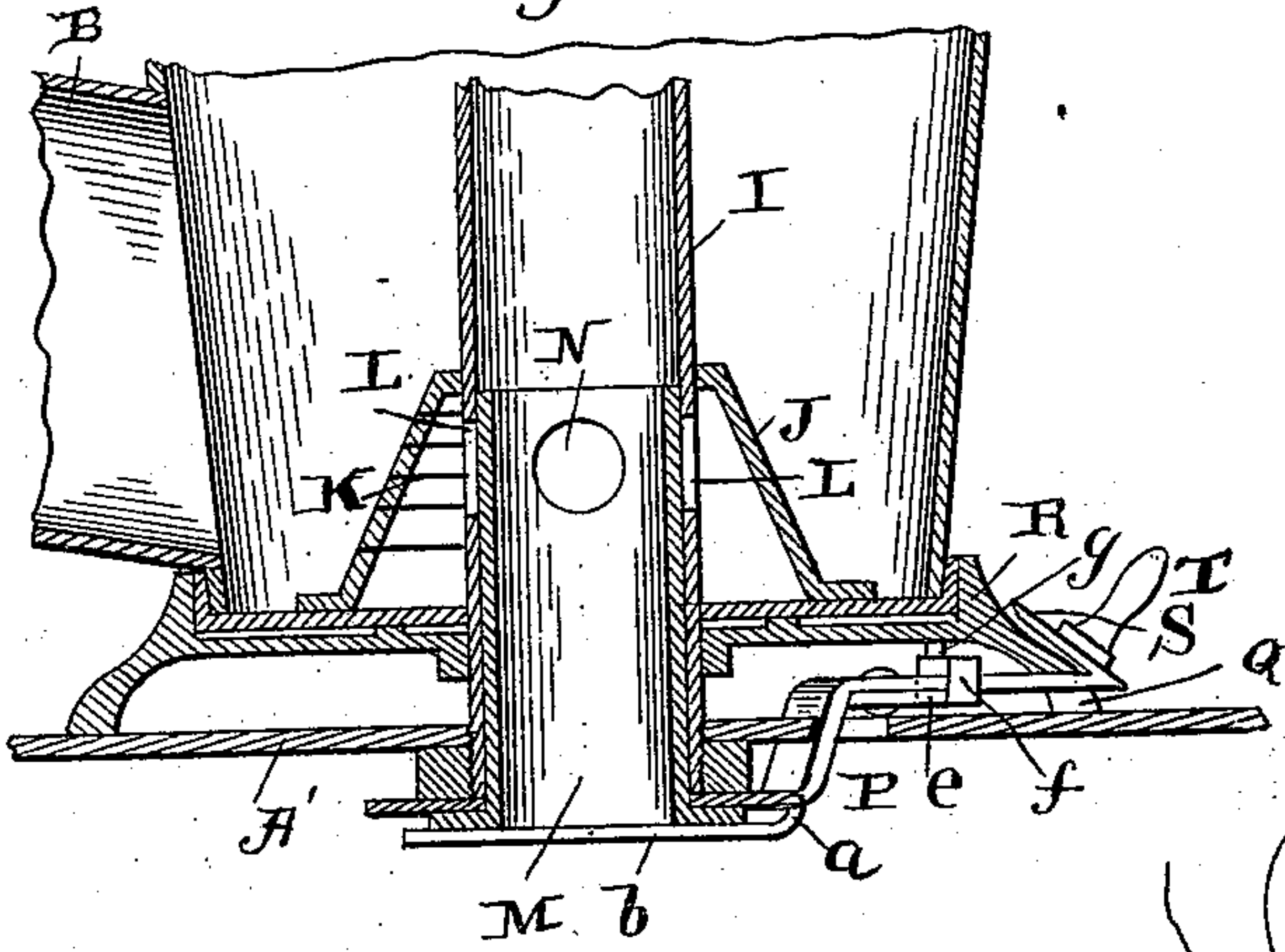


Fig. 4.

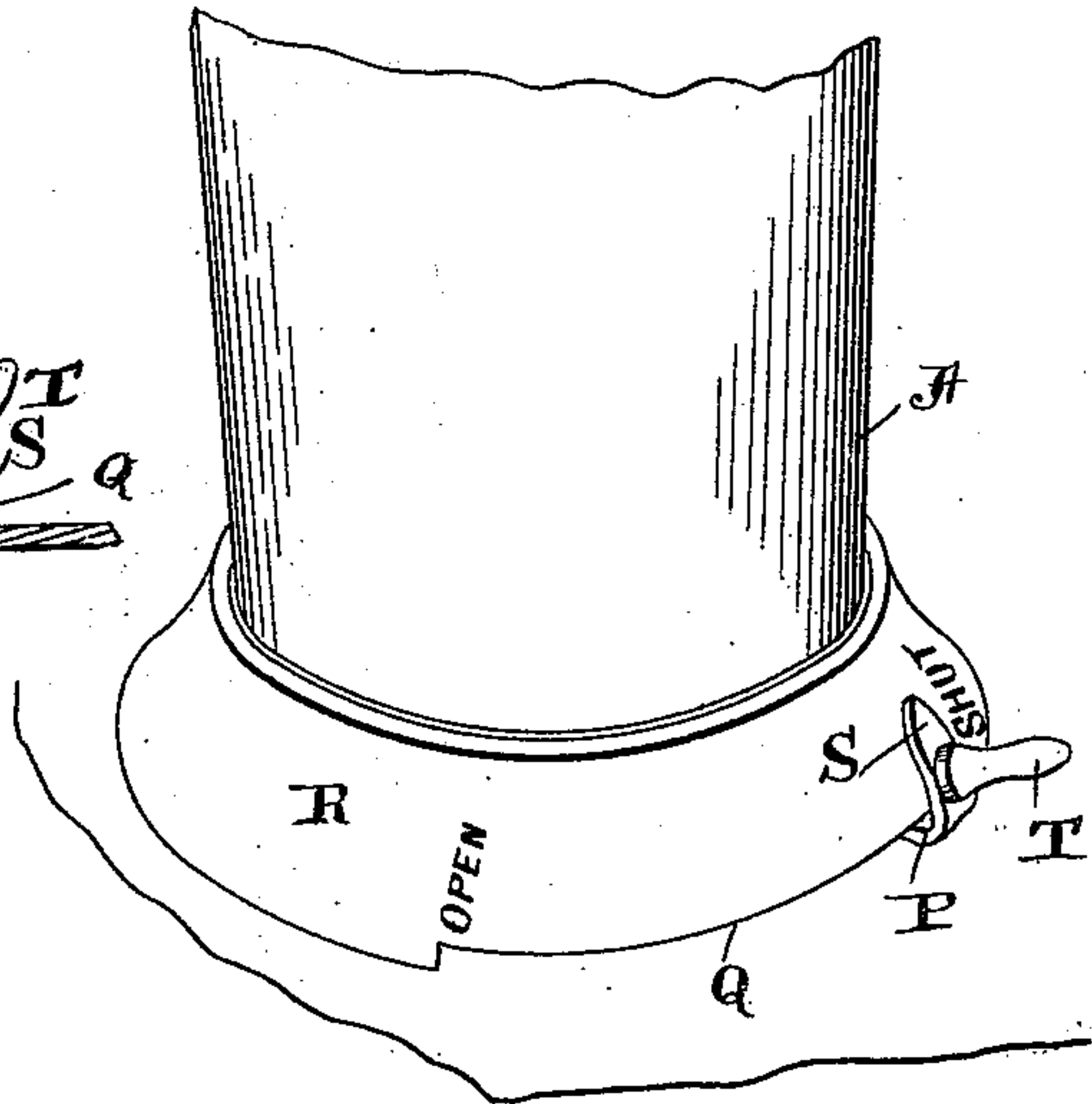


Fig. 5.

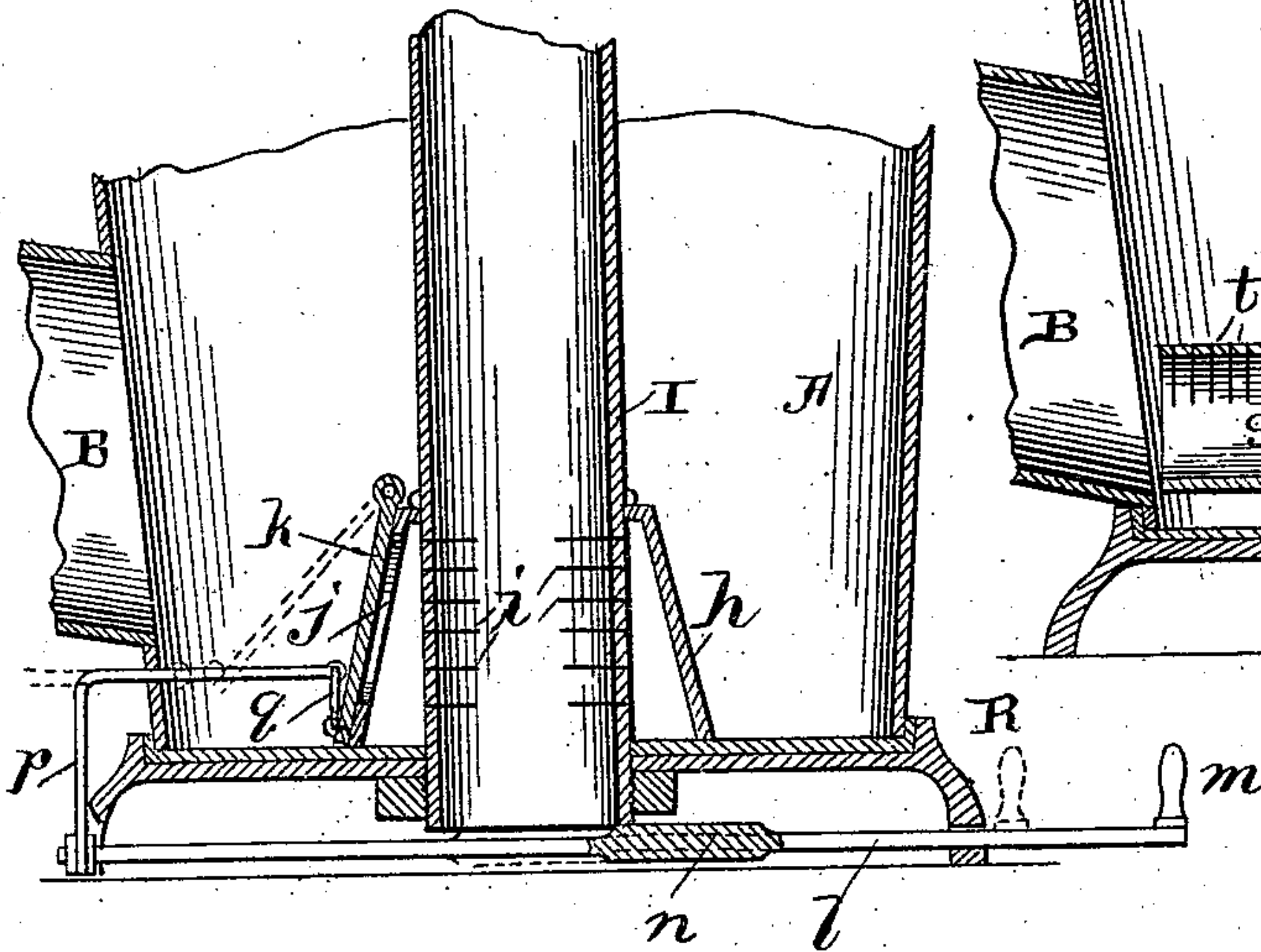
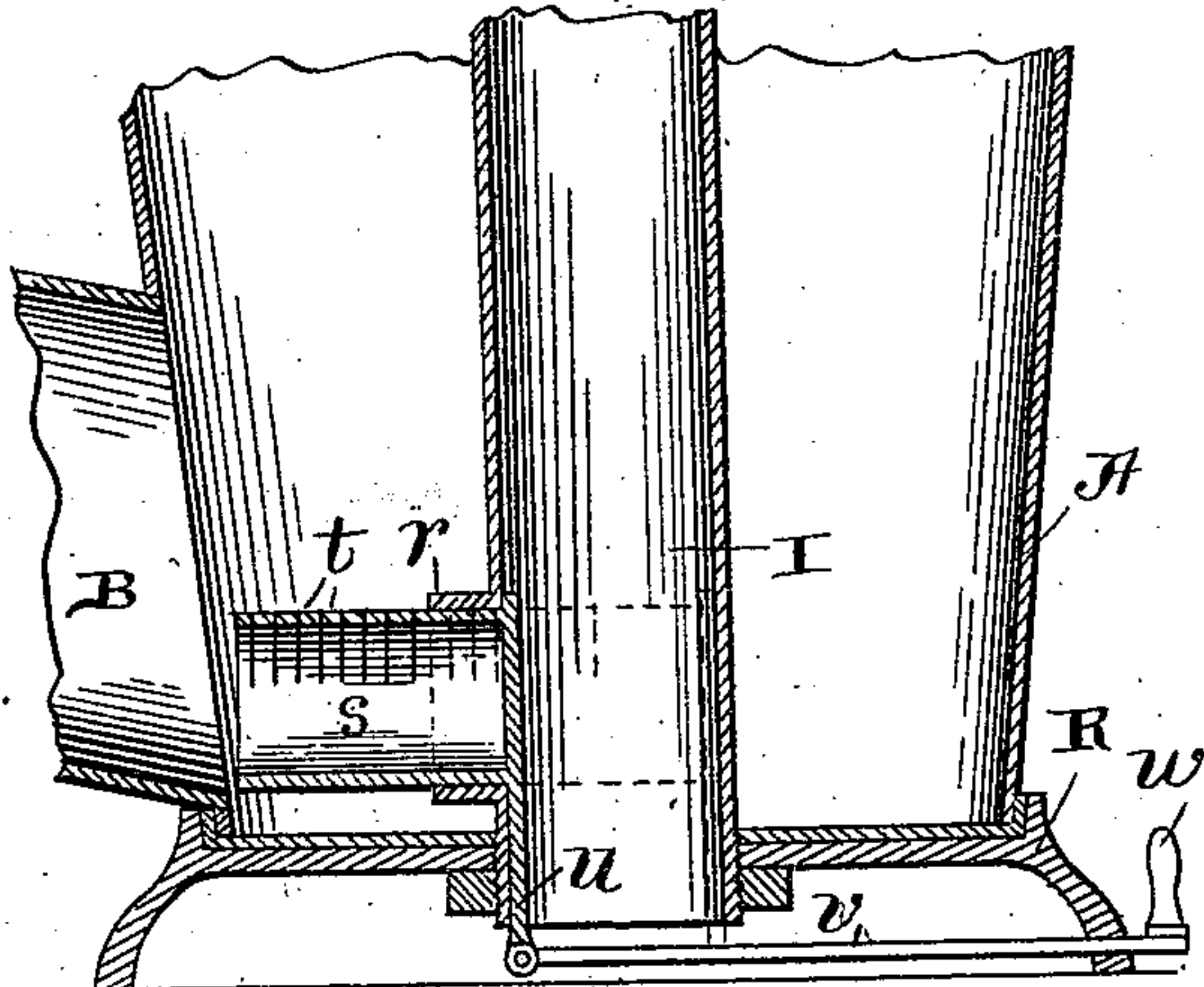


Fig. 6.



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UNITED STATES PATENT OFFICE.

ZEBULON DAVIS, OF CLEVELAND, OHIO.

EVAPORATOR BURNER OR STOVE.

SPECIFICATION forming part of Letters Patent No. 555,436, dated February 25, 1896.

Application filed March 13, 1894. Serial No. 503,436. (No model.)

To all whom it may concern:

Be it known that I, ZEBULON DAVIS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and
5 useful Improvements in Evaporator Burners or Stoves; and I do hereby 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 pertains to make
10 and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in evaporator stoves or burners; and it consists
15 in providing means for a controllable sub fire or flame, which will be fully described hereinafter, and particularly pointed out in the claims.

This invention pertains to that class of vapor-burners wherein hydrocarbon fluid is fed in small particles upon an evaporating-surface exposed to heated air and the resultant vapor fed by gravity to the burner. Burners of this class are constructed and sold with
20 and without means for supplying a sub fire or flame at or near the base thereof. A sub fire is very desirable for the starting or initial operation of the burner, in that it heats the burner quickly and prevents an excess or
30 "flooding" of unevaporated fluid at the base of the burner in cold atmospheres, (as on a winter morning,) which excess will ignite and cause a puff that is harmless, but very undesirable for many reasons. With the sub fire
35 or flame the burner can be started quickly in cold atmospheres with a heavier grade of gasoline than can be satisfactorily done without the subfire, which is an important fact in this connection at this time, when on account of
40 the great demand therefor heavier grades are being supplied to the consumers.

To the subfire as a constancy in a burner there are serious objections, for it is unnecessary and undesirable after the starting or
45 initial operation of the burner, and it consumes a considerable quantity of vapor without producing any beneficial result, thus making the use of a burner provided therewith more expensive, and it causes an unpleasant
50 odor when the burner is extinguished. In warm weather or in a warm room the use of

a sub fire or flame is not needed even in starting the burner and should not be used.

With these points in mind the primary object of my present invention is to provide a
55 stove or burner of the class named with a controllable sub fire or flame, preferably at or near the base thereof, which the operator can open for use when needed in starting the burner and shut off when not needed, whereby the desirable features of a subfire are retained and the undesirable, disadvantageous,
60 and unnecessary features thereof overcome.

A further object of this invention is to provide means for automatically reducing the
65 draft through the burner-flue when the sub fire or flame is in operation, whereby the ignition of the subflame from the top or main burner is made certain, and after ignition is steady, so that it is not intermittently lighted
70 and extinguished, which is found to be the case where the draft through the burner-flue is not reduced, and to automatically allow a full draft when the subfire is shut off.

These objects I obtain by means of the construction illustrated in the accompanying
75 drawings, in which—

Figure 1 is a vertical sectional view of a stove with the preferred form of my invention applied thereto. Fig. 2 is an inverted
80 plan view of the lower end of the burner, the parts being shown in solid lines for shutting off the subfire and in dotted lines for opening or starting it. Fig. 3 is an enlarged vertical sectional view of the lower end of Fig. 1, which is my preferred form. Fig. 4 is an
85 enlarged perspective of the lower end of the burner shown in Fig. 1. Fig. 5 is an enlarged section of the lower end of the burner, showing another construction for accomplishing the same result. Fig. 6 is a similar view
90 of another construction.

Referring now to the drawings, A indicates a burner-chamber carrying a burner-cap at its upper end, a vapor-conducting tube B being connected with the lower end thereof.
95 Placed within the upper end of this vapor-conducting tube is a perforated evaporating-surface C, and supported above the upper end of this tube B is a hydrocarbon reservoir D, having a depending nozzle E for feeding the liquid upon the evaporator, which
100

feed is controlled by a suitable valve F. Surrounding the upper end of the burner-chamber and immediately below the burner-cap is a hot-air conductor G, which is in communication with the upper end of the tube B above the evaporator for feeding heated air to the liquid as it is fed to the evaporator. Passing longitudinally through the burner-chamber A is an air-flue I, through which fresh heated air passes to and above the burner-cap and between the flame and the article being heated.

The above construction is referred to and illustrated for the purpose of enabling my invention to be fully understood and appreciated, but to which I make no claim, my invention residing in a controllable sub fire or flame, which I will now proceed to describe by reference to the accompanying drawings.

The preferred form of my invention is illustrated in Figs. 1, 2, 3, and 4, and to these figures attention is now directed. The lower end of the flue I is provided with one or more openings L near its lower end, and passing upward within this flue is a short rotatable tube M, which is provided with openings N adapted to register with the openings L made in the flue by rotating the same. Attached to the lower end of this short tube M is an operating-lever P, which extends upward and outward through the portion A' and the base R of the burner-chamber. The outer end of this lever is turned upward to form a pointer S, and extending outward from the said lever is a handle T, by means of which the tube M is rotated, as will be more fully described farther on.

Within the lower end of the burner-chamber A, and surrounding the lower end of the flue I, is a chamber J, provided with slits K opposite the lower end of the vapor-conducting tube B, which forms a subfire-burner.

A lever *a* (clearly shown in Fig. 2) is intermediately pivoted to the lower side of the lever P, and the inner end of this lever is provided with an enlarged circular portion *b*, large enough to cover the lower open end of the flue I when turned over it, and this circular portion is provided with a small air-inlet opening *d*. The opposite and outer end of this lever is widened, as shown at *e*, and has at each edge upwardly-extending lips or lugs *f*, which project at either side of the lever P, and are engaged by the pins or projections *g*, which act as stops. A slot Q, Fig. 4, is formed in the lower edge of the base R by cutting the same away, and through this the outer end of the lever P extends and moves, the word "Open" being at one end of the slot and the word "Shut" at the opposite end, so that the operator can tell at a glance whether the subfire is or is not in operation.

The mode of operation of this construction is as follows: When the burner is started the liquid is allowed to drop upon the evaporator, where a portion thereof is instantly evapo-

rated and descends by gravity to the lower end of the burner-chamber and up the same to the burner-cap at the upper end thereof, where it is ignited with a match, the same as a gas-burner. A portion of the descending vapor passes through the slits K in the subfire-burner J into the chamber formed thereby, and when the lever P is turned, with the pointer thereof at the word "Open," the openings N of the tube M register with the openings L in the flue I, which admits air within the subfire-burner for the purpose of supporting combustion, and the same lights from the burner-cap at the top of the burner-chamber through the flue I, which is at this time conveying mixed vapor and air upward, and which forms a "lighting-tube" for the subfire-burner, as is readily understood by those versed in the art. At the same time the circular portion *b* of the lever *a* is thrown across the lower end of the flue I, so that only a small quantity of air is fed thereto, which prevents the subfire from being either extinguished entirely or intermittently extinguished and lighted. This permits just the proper amount of air to keep the subfire burning steadily, which quickly heats the burner, thus feeding heated air through the hot-air tube H to the liquid as it is fed. By reference to Fig. 2 it will be seen that when the subfire is "Open" (dotted lines) the lever *a* is operated by one of the studs or pins *g* engaging the outer end thereof, which throws its inner end over the flue I. When the subfire is no longer needed, the pointer S is carried to "Shut," (solid lines, Fig. 2,) which causes the other pin *g* to engage the opposite side of the outer end of the lever *a*, thus throwing the circular portion from over the flue I, which allows a full flow of air therethrough and a full draft for the burner and closes the subfire, effecting a large saving in fuel. Any excess or "overflow" of the unevaporated fluid which may find its way to the lower end of the burner-chamber is evaporated and fed to the burner at the top thereof before there can be sufficient collection to cause a "puff." When the upper end of the burner and the burner-chamber has become heated and the burner burning its regular force, heated air is fed through the hot-air tube sufficiently to not need the subfire any longer, and it is extinguished in the manner just described.

Another construction for accomplishing this result is illustrated in Fig. 5, to which I will now refer. In this instance the lower end of the flue I is provided with a series of slits *i* to form a subfire-burner, and surrounding these slits is a chamber *h*, having an opening *j* opposite the inlet end of the vapor-conducting tube B. A door or valve *k* is provided for this opening and is hinged at its upper end to the upper end of the chamber *h*. Passing through one side of the base R and under and across the lower end of the flue I is an endwise-moving lever or rod *l*,

carrying a handle *m* at one end and having its opposite end connected with the outer end of a rod *p*. This rod *p* passes through the lower end of the burner-chamber, which forms a supporting-guide therefor, and has its inner end connected with the lower free end of the door or valve *k* through the medium of a link *q*. The rod or lever *l* is provided intermediate its ends with a circular flattened portion *n*, which is slightly smaller in diameter than the diameter of the lower end of the flue I, so that when the rod is moved inward for the purpose of opening the door or valve, and thus permitting the vapor to pass into the chamber *h*, this circular portion *n* is below and partially closes the lower end of the flue, so that only the proper amount of air and draft is admitted thereto to keep the subfire burning steadily, as described in relation to Fig. 1. In this instance, however, the flame is within the flue, but the result is the same. When the rod or lever *l* is out, the subfire is "closed;" but when it is moved inward it is "open."

In Fig. 6 I illustrate another construction which is simple and effective for the same purpose. In this construction the lower end of the flue I is provided with an opening opposite the exit end of the vapor-conducting tube B, which is provided with a flange *r*. Passing through this opening is a short tube *s*, smaller in diameter than the diameter of the flue, and this tube is provided with slits *t* to form a burner, the outer end of said tube being open to receive vapor from the tube B and its opposite end closed, said tube serving the double function of a burner and controller. An arm *u* depends from the inner end of this tube through and below the lower end of the flue I, and to the lower end of this arm an operating rod or lever *v* is attached, the opposite end of said rod passing through and guided by the base R and carrying at its outer end a handle *w*, by means of which it is operated. When the parts are in the position shown in Fig. 6, the subfire is shut off. When, however, the rod *v* is drawn outward, thus moving the tube or burner *s* across and within the flue I, vapor from the burner-chamber passes into the same and through the slits *t*. The tube or burner *s* being smaller in diameter than the flue I, air circulates through the flue at each side of the tube and supplies sufficient air and draft to keep the subfire burning steadily, while it cuts off the draft, as described in the other constructions, for the same purpose. The movement of the rod or lever *v* inward carries the tube *s* to the position shown, the flange *r* serving to extinguish the flame, as will be readily understood, while at the same time the flue I is left clear to supply a full and sufficient draft for the burner when the same is going in full and the starting thereof accomplished by the subfire.

I do not limit myself to either of the above-described constructions, for the same result

may be accomplished in other ways, the object being to show my preferred form and a few of the many ways in which it may be done.

While I have described the invention especially in connection with an "evaporator-burner," I do not limit myself to this use, for it can be applied to other burners where such devices would be desirable.

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

1. In a vapor-burner, an evaporator and a burner-chamber, in combination with an air-flue within the burner-chamber, a subfire-burner below the main burner and in communication with the flue, and a controller for the subfire-burner, an air-diminisher for the said flue below the subfire communication therewith, and an operative connection between the subfire-controller and the said air-diminisher, the parts operating together to have one open when the other is closed for the purpose described.

2. A burner comprising a burner-chamber having a main burner at its upper end and a subfire-burner below the main burner, a vapor-supply, an air-flue with which the subfire-burner communicates, a subfire-burner controller, an air-feed controller intermediately pivoted upon and carried by said subfire-burner controller, the inner end of said air-feed controller adapted to control the air-feed, and a stop engaging the opposite end thereof for the purpose described.

3. A vapor-burner comprising a burner-chamber having a longitudinal flue, a vapor-supply, a main burner at its upper end and a subfire-burner below the main burner, the said flue having an opening forming communication with the subfire-burner, a rotating device controlling the opening, a horizontally-moving air-feed controller for the flue below said opening, an operating-handle for said rotating controller, and a connection between the air-controller and the said operating-handle whereby both controllers are operated together.

4. A burner comprising a burner-chamber having a main burner at its upper end, a vapor-supply, a subfire-burner below said main burner, and a longitudinal flue with open ends, said flue having an opening forming a communication with the subfire-burner, a rotating controller for said opening, an operating-handle for said controller, a lever intermediately pivoted upon said operating handle or lever, the inner end of said lever adapted to partially close the said flue below the said opening therein, and stops for and adapted to engage the opposite end of said intermediately-pivoted lever.

5. A vapor-burner comprising a burner-chamber having a main burner at its upper end, and a subfire-burner below the said main burner, a vapor-supply, a flue extending longitudinally through said burner-chamber and having an opening registering with the said

subfire-burner, a controller for said opening,
a horizontal controller for the lower end of
said flue having itself an opening forming an
air communication with the interior of said
5 flue, and an operative connection between
said controllers opening one and closing the
other.

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

ZEBULON DAVIS.

Witnesses:

E. D. DAKE,
JOE J. DUNN.