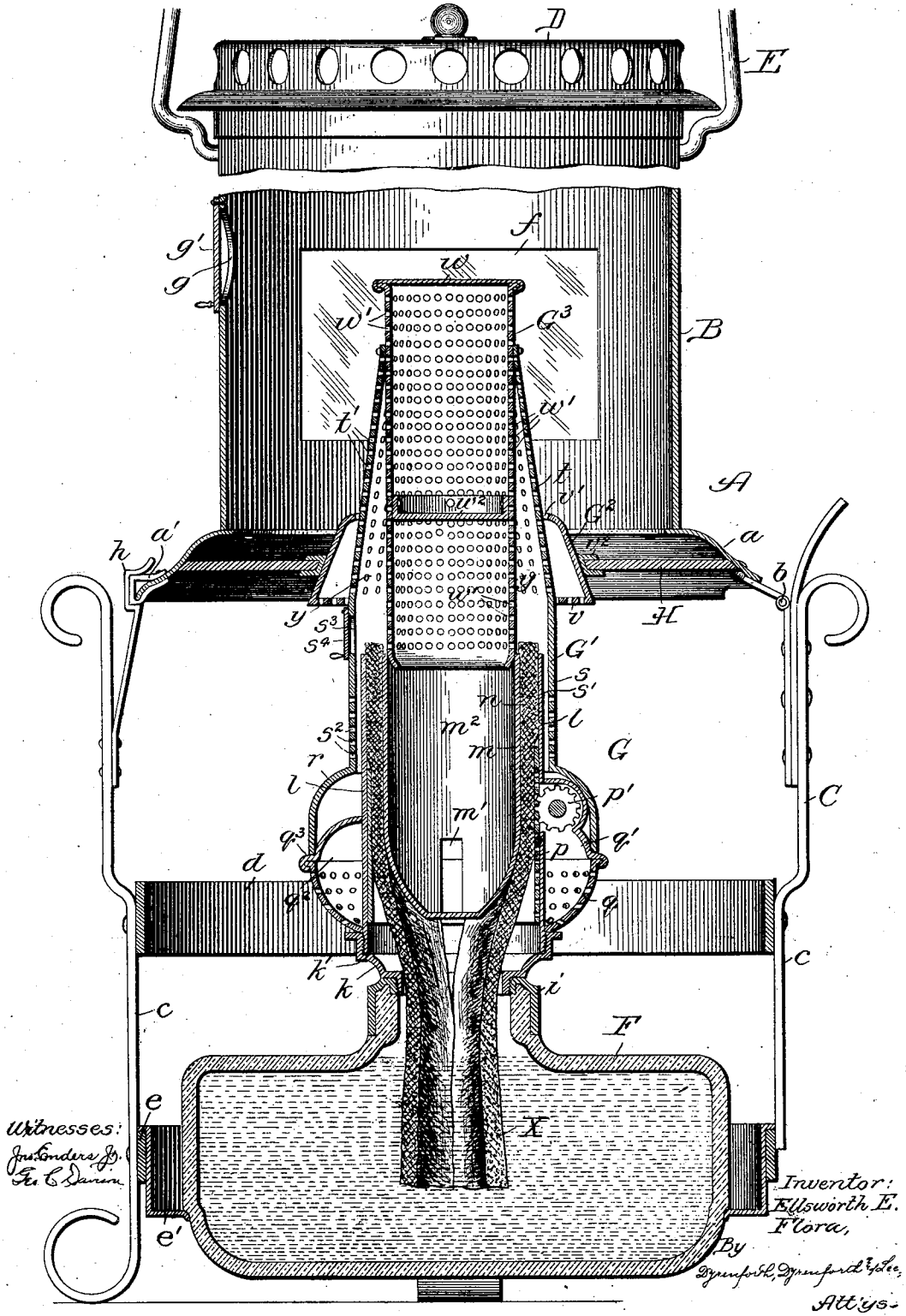
No. 755,864. PATENTED MAR. 29, 1904.

E. E. FLORA.

OIL STOVE.

APPLICATION FILED OCT. 9, 1902.

NO MODEL.



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No. 755,864. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

ELLSWORTH E. FLORA, OF CHICAGO, ILLINOIS, ASSIGNOR TO THOMAS J. LOVETT, OF CHICAGO, ILLINOIS.

OIL-STOVE.

SPECIFICATION forming part of Letters Patent No. 755,864, dated March 29, 1904.

Application filed October 9, 1902. Serial No. 126,468. (No model.)

To all whom it may concern:

Be it known that I, ELLSWORTH E. FLORA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Oil-Stoves, of which the following is a specification.

This invention relates to improvements in stoves adapted for burning hydrocarbon oil.

My object is to provide an oil-stove to be employed more especially as a heater and of a particularly simple, compact, and safe construction for household use and capable of developing and radiating a large amount of heat at a minimum expense of oil.

My invention lies more especially in the general construction of the burner, as well as in details of construction thereof, as hereinafter fully described and claimed.

The drawing is a broken sectional view of a stove constructed with my improvements, the upper end portion of the stove being shown in elevation.

The burner is particularly well adapted for use in small portable stoves; but the burner may be of any desired size, and, if desired, a single stove may be provided with a plurality of the wick-fed burners arranged in a row or in a cluster of any suitable form.

Referring to the construction shown in the drawing, A is a stove having a combustion-chamber formed with the cylindrical casing B. The casing is provided with a base-flange *a*, hinged at *b* to a frame C, formed of vertical legs *c*, braced with upper and lower rings *d e*, respectively. At the top of the cylinder or chamber B is a cover D, provided with vent-holes for the products of combustion, and pivotally connected with opposite sides of the casing beneath the cover D is a bail E, affording a handle by means of which the entire structure may be carried from place to place. In the sides of the cylinder B are one or more openings *f*, closed with mica or other transparent material, and in the position shown is an opening *g*, closed by a sliding or swinging door *g'*. At the side opposite the hinge *b* the base *a* is formed with a catch *a'*, adapted to engage a spring-latch *h* on the frame C to lock the parts together when closed, as shown.

F is a font or oil-reservoir provided with the usual threaded burner-engaging collar *i*.

G is a wick-fed hydrocarbon-oil burner constructed as follows: The base of the burner is a flanged ring *k*, having an internally-threaded upper end portion presenting a shoulder *k'* and a lower threaded end adapted to screw into the collar *i*. An outer wick-tube *l* is threaded at its lower end to screw into the flanged base *k* against the shoulder *k'*. An inner wick-tube *m*, closed at the base, extends concentrically with the other tube *l*, forming with the latter an annular passage or chamber *n* for the wick X. Sliding in the chamber *n* adjacent to the wall *l* is a wick raising and lowering sleeve *p*, actuated from the usual wick raising and lowering pinion *p'* in a common manner. Rigidly secured to the lower end portion of the tube *l* is a perforate cup-shaped base *q*, to which is rigidly secured an imperforate dome-shaped ring *q'*, which extends to the tube *l* and also houses the pinion *p'*, as shown. The parts *l q q'* form a lower draft-chamber q^2, which communicates with the interior of the tube *m* by means of one or more draft-passages *m'*, which are straddled by the wick X in the usual way. The imperforate dome-shaped ring *q'* is shaped to form the annular shoulder q^3. G' is an outer burner-tube consisting of an expanded base portion *r*, a cylindrical portion *s*, and a tapering portion *t*. The expanded base portion *r* fits over the dome-shaped ring portion *q'* and rests tightly but removably against the shoulder q^3. The cylindrical portion *s* is of somewhat greater diameter than the wick-tube *l*, leaving a narrow annular intervening draft-passage *s'*, fed through a series of perforations s^2 in the lower end of the cylindrical portion *s*, beneath the top of the tub *l*. Adjacent to the tops of the tubes *m l* is an igniting-opening s^3 in the cylinder portion *s*, which opening is closed by a door or shutter s^4. The tapering portion *t* is provided throughout its length with numerous perforations *t'*. Rigidly secured to the outer side of the burner-

tube G′ in the position shown is a ring or hood G^2 of frusto-conical form, having a perforate base v and presenting a narrow annular draft-opening v' at its upper end around the perforate tapering portion t. On the outer side of the hood G^2 is an annular socket v^2, holding a ring or diaphragm H, which at its outer edge fits closely against the inner surface of the base-ring a of the casing B. When the upper part of the stove is swung down upon the hinge b to close it, as shown, the diaphragm H closes communication between the combustion-chamber and the under side of the diaphragm except through the burner-passages. Mounted in the tube G′ is an inner burner-tube G^3 of cylindrical form. It is open at its lower end and there adapted to fit closely into the top of the central draft-tube m, and it is closed at the top by an imperforate cap w. The cylindrical wall of the tube G^3 is provided throughout with numerous perforations w'. In the perforate tube G^3 in the position shown is an imperforate disk or diaphragm w^2. The inner burner-tube G^3 fits tightly through the top of the outer burner-tube G′, the tubes being fastened together.

In practice the parts should be so arranged with relation to each other that the disk or diaphragm w^2 is in the horizontal plane of the outer annular draft-opening v'. The burner-tubes G′ G^3 form between them an annular air and gas mixing chamber y. To produce the best results, the font F should be filled with an ordinary good grade of kerosene-oil, such as is usually provided for kerosene-burning lamps. The oil rises in the wick X by capillary attraction in the usual way. To start the stove, the shutter s^4 is opened and a lighted match is passed through the opening s^3 to ignite the top of the wick, the wick being lowered to the position shown for this purpose. Air to supply combustion of the oil at the top of the wick enters through the openings s^2 and passage s' at the outer side and through the openings in the base q the passage or passages m' and central-draft passage m^2, formed by the tube m, the air passing to the wick and mixing-chamber through the openings w' at the lower end of the tube G^3. The products of combustion from the oil, burning at the top of the wick, quickly raises the temperature of the inner burner-tube g^3 and outer burner-tube G′, the heat being conducted by these tubes downward to the upper end portions of the inner and outer wick-tubes $m\,l$. When the parts named have become heated to a sufficiently high temperature, which in practice takes less than a minute's time, the wick may be lowered to extinguish the flame or the flame may be otherwise quenched. The wick is then raised until its top is more or less nearly adjacent to a plane corresponding with the plane of the part v. The heat stored in the inner and outer burner-tubes gasifies the oil rising into the upper part of the wick, and the air entering through the draft-openings s^2 and lower openings w' mixes with the gas in the mixing-chamber. This mixture rising and escaping through the burner-openings t' is then ignited by means of a match inserted through the opening g, the latter being closed again by the door or shutter g'.

Air to mix with the gas and generate the proper burning mixture in the mixing chamber y enters, as before stated, from the outer draft-openings s^2 and inner draft-tube m^2 and escapes for the most part through the burner-openings t'. Additional air to supply combustion enters through the perforate part v, passing through the adjacent perforations t' into the mixing-chamber and a part passing upward through the annular draft-opening v' to direct the flame upward. By reason of the fact that the mixing-chamber y tapers to the top a large portion of the burning mixture passes through the perforations of the inner tube G^3 into the latter and escapes through the upper openings w' near the cap w, being there ignited.

From the foregoing description it will be understood that after the flame at the wick has preliminarily heated the burner-tubes and has then been extinguished, as described, all combustion of the burning mixture takes place at the burner-openings, which burner-openings are the perforations t' above the draft-opening v' and the perforations w' above the upper end of the outer draft-tube G′. As the wick need burn but the fraction of a minute when the stove is first started, a wick once provided may last indefinitely. The construction shown and described is adapted to insure the perfect intermixture of air and gas in desired quantities, the supply of gas of course being regulated by the height to which the wick is raised above the tops of the wick-tubes $l\,m$. Thus an annular flame of a width equaling the distance from the draft-opening v' to the cap w may be produced, the flame being blue in color, indicating substantial perfect combustion. The draft from the opening v' directs the flame upward, preventing its playing directly against the cylindrical wall B, and the products of combustion escape through the outlets in the top D. The stove constructed as described has comparatively great heating capacity.

As before stated, the stove structure may be adapted to hold a plurality of burners, which may be provided with wicks fed from individual fonts F, or all the wicks may be fed from a single font.

By swinging the upper part of the stove backward upon the hinge b access may be had to the burner-tubes when desired, and the burner-tube G′, with the parts G^2, H, and G^3, may be lifted off of the lower part of the

burner (the separation taking place at the shoulder q^3) whenever it is desired to have access to the wick-tubes, &c.

In the construction shown the font F rests in a socket formed by a socket-ring e'. Whenever it is desired to fill the font with oil, it and all the parts carried thereby may be lifted out of the frame, when the stove is opened upon the hinge b, as described.

It has been found in practice that heat of much greater intensity and volume may be obtained from a burner such as I provide than it is possible to obtain from a burner in which the oil is fed by and ignited at a wick. By employing a wick I obtain the advantages of a regular and readily-controllable supply of the oil and render the stove as free from any danger of explosion as any well-constructed kerosene-lamp. When the burner is in operation, the heat-generating portion thereof is altogether at the burner-openings above the draft-opening v', which is far enough above the wick to prevent the heat from charring it, but not so far as to prevent heat from being conducted downward by the burner-tubes to gasify the oil at the wick as fast as desired. As oil is burned at the wick only for a fraction of a minute when the stove is started, the wick is not materially affected thereby, and as there is practically no material charring of the wick at any time it will not become clogged or require trimming except at very long intervals at the worst.

Modifications of details of construction within the spirit of my invention may be made. Hence no undue limitation should be placed upon the invention by reason of the foregoing detailed description.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an oil-burning heater, the combination with a wick and wick-tube, of inner and outer perforated heat-conducting burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into the lower end of which the wick projects above the wick-tube.

2. In an oil-stove, the combination of a wick-tube presenting a central draft-passage, a wick in the wick-tube, inner and outer perforated heat-conducting burner-tubes closed at their upper ends and extending above the wick-tube, forming an air and gas mixing chamber into the lower end of which the wick extends, and a stove-casing inclosing the heat-generating part of the burner, substantially as set forth.

3. In an oil-burner, the combination with a wick and with a wick-tube presenting a central draft-passage, of a perforated outer heat-conducting burner-tube around the wick-tube, a perforated inner heat-conducting burner-tube extending from said central draft-passage beyond the upper end of said outer burner-tube, the inner and outer perforated burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into the lower end of which the wick extends.

4. In an oil-burner, the combination with a wick, and with a wick-tube presenting a central draft-passage, of a perforated outer heat-conducting burner-tube around the wick-tube, a perforated inner heat-conducting burner-tube extending from said central draft-passage beyond the upper end of said outer burner-tube, the inner and outer burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into the lower end of which the wick extends, and a diaphragm in the inner burner-tube between the lower and upper ends of the mixing-chamber.

5. In an oil-burner, the combination with a wick, and with a wick-tube presenting a central draft-passage, of a perforated outer heat-conducting burner-tube forming a draft-passage around the wick-tube, and a hood about the outer burner-tube forming an outer draft-passage, the perforated inner heat-conducting burner-tube extending from said central draft-passage beyond the upper end of said outer burner-tube, and the inner and outer perforated burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into the lower end of which the wick extends.

6. In an oil-burner, the combination with a wick, and with a wick-tube presenting a central draft-passage, of a perforated outer heat-conducting burner-tube around the wick-tube, a perforated inner heat-conducting burner-tube closed at the top and extending from said central draft-passage beyond the upper end of said outer burner-tube, the inner and outer perforated burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber, a hood about the outer burner-tube forming an outer contracted draft-passage between the upper and lower ends of said mixing-chamber and a diaphragm in the inner burner-tube in approximately the plane of the top of said hood, substantially as set forth.

7. In an oil-burner, the combination with a wick, and with a wick-tube presenting a central draft-passage, of a perforated outer heat-conducting burner-tube around the wick-tube, a perforated inner heat-conducting burner-tube extending from said central draft-passage beyond the upper end of said outer burner-tube, the inner and outer perforated burner-tubes forming between them a gradually-contracted air and gas mixing chamber, a hood about the outer burner-tube forming an outer contracted draft-passage between the upper and lower ends of said mixing-chamber, and a diaphragm in the inner burner-tube in ap-

proximately the plane of the top of said hood, substantially as set forth.

8. In an oil-burner, the combination with a wick and wick-tube, of inner and outer perforated heat-conducting burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into which the wick projects above the wick-tube, the wall of the mixing-chamber at one side having an igniting-opening, and a door for said igniting-opening, substantially as described.

9. In an oil-stove, the combination of a frame, an oil-font in the base of the frame, a burner upon the said font having a wick-tube presenting a central draft-passage, inner and outer perforated heat-conducting burner-tubes closed at their upper ends and forming between them an air and gas mixing chamber into which the wick projects above the wick-tube, a stove-casing upon the frame surrounding the heat-generating part of the burner, and a diaphragm at the lower end of said casing presenting a narrow draft-opening around said outer burner-tube between the upper and lower ends of said mixing-chamber, substantially as set forth.

ELLSWORTH E. FLORA.

In presence of—
ALBERT D. BACCI,
J. W. DYRENFORTH.