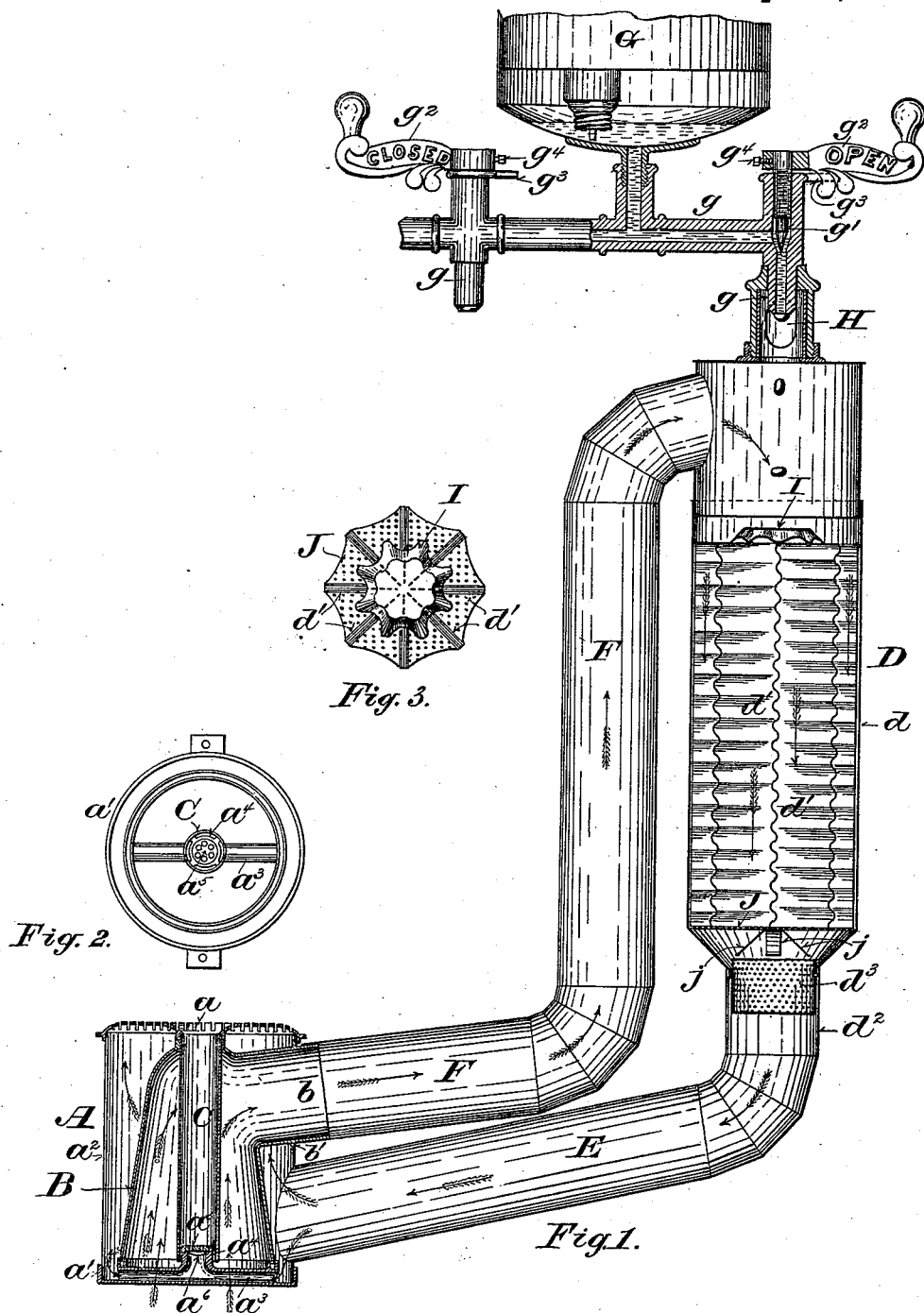


(No Model.)

A. J. LINDEMANN.
VAPOR BURNING APPARATUS.

No. 525,350.

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Witnesses:
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UNITED STATES PATENT OFFICE.

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VAPOR-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 525,350, dated September 4, 1894.

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To all whom it may concern:

Be it known that I, ALBERT J. LINDEMANN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Vapor-Burning Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains 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.

The main objects of my invention are to completely vaporize the oil before it reaches the burner, to dispense with absorbents, to avoid offensive odor, to provide the required current or pressure for maintaining a strong, constant flame, and generally to improve the construction and operation of apparatus of this class.

It consists of certain peculiarities in the construction and arrangement of the component parts of the vaporizer and burner and their connections, hereinafter particularly described and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures, such parts only of apparatus being shown as are necessary to a full and clear understanding of my improvements.

Figure 1 is a medial vertical section of a burner and vaporizer casing with their connections embodying my improvements, the evaporating plates and spreader of the vaporizer being shown in elevation. Fig. 2 is a plan view of the base of the burner, and Fig. 3 a plan view of the spreader and evaporating plates or wings forming a part of the vaporizer.

A designates the burner, comprising a perforated cap *a* which may be of any suitable form ordinarily employed in this class of burners, a base *a'*, preferably made of cast-iron, and a cylindrical casing *a²*, preferably of sheet metal, connecting the cap and base. The base *a'* is of annular shape and formed with a cross-passage *a³*, having an upwardly extending branch *a⁴* at the center, and opening at the ends between upturned concentric flanges on the base.

B is a bell or dome-shaped casting fitted at

its lower edge into a groove in the inner flange on the base, and formed at the top with a central opening which registers with a corresponding opening in the burner cap *a* in line with the branch *a⁴*, which is open at its upper end.

C is a tube, preferably made of brass or some other good conductor of heat, fitted at its upper end into the central opening in the burner cap and top of casting B, and extending at its lower end over the branch *a⁴*, so as to leave an annular space or opening between the outer face of said branch and the inner face of the tube, as shown in Fig. 2, said branch being formed on the outside with lugs by which said tube is held at a uniform distance therefrom on all sides. The casting B is formed at or near the top with a neck *b* projecting laterally therefrom through the casing *a*, and provided with an external flange *b'* to close the joint between it and the casing. *a⁵* is a perforated cap or disk placed in the upper open end of the branch *a⁴*, and *a⁶* is a screen of wire gauze inserted below said cap to prevent the flame from burning below it. The branch *a⁴* with its cap *a⁵*, and the tube C, constitute a supplementary burner of the Bunsen type, being supplied with air through the annular opening around the base of said tube, and with vapor through the passage *a³*. The casting B is open at the base and serves as an air intake and heating chamber.

D designates a vaporizer comprising a vertical cylindrical casing *d* made of sheet metal or other suitable material, inclosing a number of vertically disposed plates *d' d'*, which may be arranged radially as shown, or in any other convenient manner. It is formed at its lower end with a contracted neck *d²* which is connected by a pipe E with the annular space of burner A between its casing *a²* and the casting B. The neck *b* of casting B is connected by a pipe F with the upper part of the vaporizer above the plates *d'*.

G designates the lower portion of the tank or reservoir from which oil is supplied to the vaporizer. It is connected at the bottom with the top of the vaporizer by a pipe *g* which is provided with a needle valve *g'*. The pipe *g* or a branch thereof, controlled by said valve, terminates a short distance above the vaporizer in a lantern H through which the flow of

oil to the vaporizer may be observed. The plates d' are preferably fluted or corrugated horizontally, as shown, and a grooved or fluted spreader I is attached to their upper edges so as to distribute the oil as it falls thereon drop by drop from the end of pipe g directly above it, and deliver it equally to the several evaporating plates d' at or near the middle of their upper edges. At their lower edges said plates rest upon or are attached to a perforated plate or screen J which is provided on the under side with outwardly projecting strips j to prevent the accumulation of oil at the center of said perforated plate and its dropping therefrom into pipe E before it is vaporized.

d^3 is a perforated cylinder open at the ends, placed concentrically in the neck d^2 at the lower end of the vaporizer, and projecting a short distance above said neck so as to intercept any oil which may flow down the inclined sides of the bottom of the casing d , and to prevent its passing to the burner in a liquid state. The needle valve g' is formed with a threaded stem, to the upper end of which is adjustably attached a crank handle g^2 marked "open" on one side, and "closed" on the other, to plainly designate the position of the valve and to avoid uncertainty in its operation, and liability to accident arising from such uncertainty.

While I have for the purpose of illustration, shown but one burner and vaporizer, I have shown in connection therewith two oil feed connections and controlling valves, one valve being open and the other closed.

The projection g^3 formed or provided on the valve case, serves by engagement with the crank handle or a projection therefrom, to limit the opening of the valve at the proper point. The requisite amount of opening is obtained by the permanent adjustment of the handle g^2 on the valve stem, which is effected by means of a set screw g^4 .

My improved apparatus operates as follows: To start the burner the valve g' is opened and oil from the reservoir thus allowed to flow to the vaporizer, falling drop by drop upon the spreader I, by which it is conducted to the upper edges of the evaporating plates d' . As it spreads over the surfaces of these plates in contact with the air, it rapidly evaporates and forms an inflammable vapor, which, being of somewhat greater specific gravity than the air, flows downwardly through pipe E into the outer annular chamber of the burner, from which it is supplied to the main burner cap a , and through the passage a^3 to the auxiliary burner. As soon as vapor sufficient for lighting is formed, the main burner is lighted by passing a match or flame over the perforated cap a , the flame of which passes down the tube C and lights the auxiliary burner next to the perforated disk a^5 . The tube C soon becomes highly heated by the flame of the auxiliary burner, and the base a' and connecting passage a^3 are also

heated by conduction. The air surrounding the tube C is thus heated, and being expanded, tends to rise through pipe F into the upper part of the vaporizer. A strong current of heated air is thus produced downwardly through the vaporizer over the evaporating plates d' , thence through pipe E into the outer portion of the burner, where it affords the requisite pressure to force the vapor through the openings in the burner cap and through the passage a^3 to the perforated disk a^5 , and thereby maintain a strong hot flame. The current of hot air thus produced through the vaporizer greatly accelerates the evaporation of the oil which is exposed thereto over the expanded surfaces of the plates d' . The corrugation of these plates not only affords more surface, but tends to retard the flow of oil over the same, thus promoting evaporation and preventing the oil from passing in a liquid state to the burner. Any oil which finds its way to the lower edge of the plates d' , is spread over the perforated plate or screen J and the deflecting strips j attached to the under side thereof, and any oil which passes by said perforated plate and flows down the inclined bottom of casing d , is caught by and spread over the surface of the perforated cylinder d^3 lining the neck d^2 at the lower end of the vaporizer.

By means of the various evaporating devices above mentioned, all the oil fed to the vaporizer will be converted into a vapor before it passes from its lower end into pipe E. I thus avoid the use of absorbents, which are frequently employed in apparatus of this class to take up such portions of the oil as the vaporizer fails to convert into vapor, and which when the apparatus is not in operation, give off an unpleasant odor.

It has been proposed in apparatus of this kind to vaporize the oil by free access of atmospheric air thereto, and to depend for the requisite pressure of vapor to operate the burner upon the difference in the specific gravity between such vapor and air, but apparatus constructed on this principle has been found impracticable for the reason that the difference in the specific gravity of air at ordinary temperatures, and the vapor of the oil is insufficient to afford the necessary pressure. By my improved construction and arrangement of the burner and its connections with the vaporizer, I am enabled not only to produce the requisite pressure of vapor to maintain a strong steady flame, but I secure more rapid and complete evaporation of the oil. My construction also possesses the additional advantages of neatness, compactness and simplicity.

It is obvious that various changes in minor details of construction may be made without departure from the spirit of my invention; as for instance, the auxiliary burner may be dispensed with and the air sufficiently warmed by the main burner flame, but in that case it is necessary or advisable to increase the evapo-

rating surface of the evaporizer, and the air intake opening of the interior burner chamber may be made otherwise than in or through the base.

5 I claim—

1. In vapor burning apparatus the combination of a vaporizer and a burner comprising an exterior vapor chamber connected with said vaporizer, and an interior air chamber
10 within the vapor chamber, having an air intake opening and an outlet connection leading from the upper part thereof into the upper part of said vaporizer, the upper part of said air chamber being otherwise closed, substantially as and for the purposes set forth.

2. In vapor burning apparatus the combination with a vaporizer of a burner comprising an exterior vapor chamber, a perforated cap, a tube opening at the upper end through said
20 cap and having an air intake opening at or near its lower end, and an air heating chamber surrounding said tube within the exterior vapor chamber, having an air intake opening and connected at or near the top with the upper part of the vaporizer, and a pipe or passage connecting the lower part of the vaporizer with the said vapor chamber, substantially as and for the purposes set forth.

3. In vapor burning apparatus the combination of a main burner chamber provided with a perforated cap and having a vapor connection, a central auxiliary burner tube opening at its upper end through said cap and having a vapor connection and air intake at or near
35 its lower end, and an air chamber surrounding said tube inside of the main burner chamber, and having an intake at or near the bottom, and an outlet at or near the top, substantially as and for the purposes set forth.

4. In vapor burning apparatus, a burner comprising an exterior casing, a perforated cap and a base forming an exterior chamber into which vapor is introduced, an interior chamber inclosed therein and having an air
45 intake opening at the bottom through the base, and a lateral outlet connection at or near the top, and an auxiliary burner tube surrounded by said interior chamber, opening at its upper end through said cap and connected
50 at its lower end with said exterior chamber, substantially as and for the purposes set forth.

5. In vapor burning apparatus, a vaporizer comprising a casing having an oil feed connection at the upper end, and a vapor delivery connection at the lower end, a number

55 of vertically disposed radiating evaporating plates, a spreader arranged to distribute the oil to the upper parts of the several plates, and a transverse perforated plate or screen below said plates, substantially as and for the purposes set forth.

6. In vapor burning apparatus, a vaporizer comprising evaporating plates, an inclosing casing having a contracted neck at the lower end, and a perforated cylinder placed a short
65 distance within the walls of said neck in contact with the contracted wall of the casing, substantially as and for the purposes set forth.

7. In vapor burning apparatus, a vaporizer comprising a casing having an oil feed connection at or near the top, and a vapor delivery connection at or near the bottom, a number of vertically arranged evaporating plates, a spreader in contact with the upper parts of said plates, and a transverse screen in contact with the lower parts of said plates, provided on the under side with a number of depending radiating distributing strips, substantially as and for the purposes set forth.

8. In vapor burning apparatus, a vaporizer comprising a casing, vertically disposed radiating evaporating plates inclosed therein and a spreader arranged to distribute oil to said plates, substantially as and for the purposes set forth.

9. In vapor burning apparatus, a vaporizer comprising a casing, and vertically disposed horizontally corrugated evaporating plates upon which oil is fed, and a spreader arranged to distribute oil to the upper portion of said plates substantially as and for the purposes set forth.

10. In vapor burning apparatus, a vaporizer comprising a casing and a number of horizontally corrugated or fluted evaporating plates arranged radially therein, and a spreader arranged to distribute oil to the upper portion of said plates substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ALBERT J. LINDEMANN.

Witnesses:

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E. P. WORDELL.