March 17, 1925. 1,530,079

J. A. H. HOOD

LIQUID FUEL BURNING APPARATUS

Filed Nov. 23, 1923

Fig. 1.

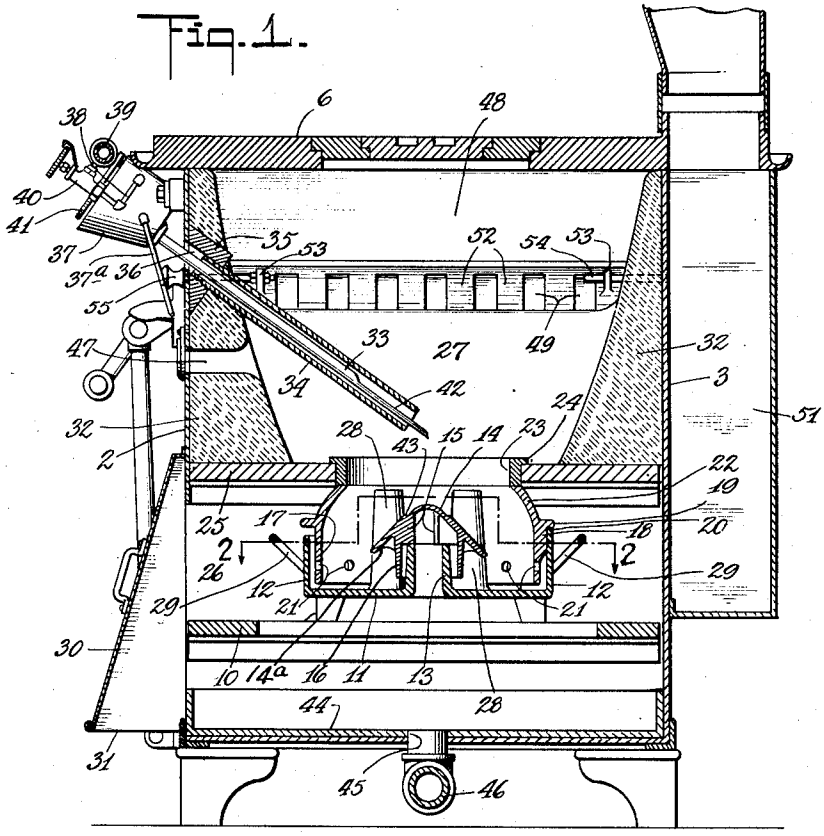
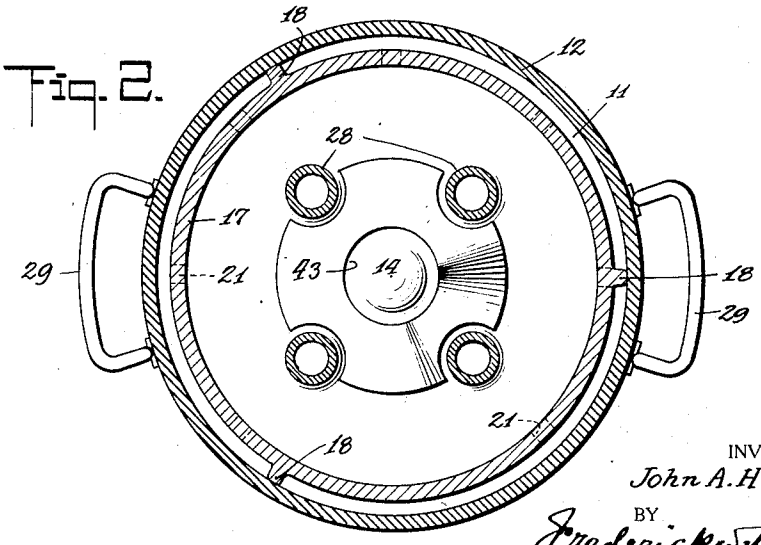


Fig. 2.



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LIQUID-FUEL-BURNING APPARATUS.

Application filed November 23, 1923. Serial No. 676,498.

To all whom it may concern:

Be it known that I, JOHN A. H. HOOD, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented a new and useful Improvement in Liquid-Fuel-Burning Apparatus, of which the following is a specification.

This invention relates to oil burning heaters, and my improvements are directed to a heater capable of utilizing the heavier grades of hydrocarbon oil, such as fuel oil, and of operating with maximum efficiency without resorting to manual control means for regulating the air supply.

Further my invention includes novel means for delivering oil to the burner by causing a stream thereof to fall upon the apex of a heated conoidal surface so that it may spread evenly thereover to facilitate vaporization. In addition the burner structure is of such character and so provided with air admission means that the volume of inflowing air is automatically regulated according to the degree of temperature attained, the air supply at all times being proportioned to the combustion needs.

In the application of my improved burner to a range having ovens disposed at opposite sides thereof, heat from a centrally disposed burner chamber is directed through a passage that extends over an oven top, thence downwardly past the outer side of the oven, thence under the oven, and upwardly toward a flue which is disposed behind the back wall of the heater, so that the hot gases produced by combustion are caused to completely envelope the oven in their passage to the flue.

Other features and advantages of my invention will hereinafter appear.

In the drawings:

Figure 1 is a sectional view of a stove or range including my improved burner apparatus, and

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1.

In the representation of my invention here given, I have illustrated a range or cook stove in which the front wall 2, back wall 3, and top 6 appear.

Mounted upon a suitable support within the heater, such support being here indicated as a horizontal, skeleton frame 10, is a circular vessel having the bottom 11 and surrounding wall 12, said vessel serving as the container or foundation element for the burner.

A central air supply tube 13, which is open through the bottom 11, extends upwardly therefrom, and supports a hollow cone 14 that is provided with interior lugs 15 to rest upon the upper edge of tube 13. A circular flange or tubular extension 16, pendent from cone 14, is adapted to lie, in spaced relation, concentric with tube 13, the end of said flange 16 being in spaced relation with bottom 11, so that air entering the cone through tube 13, must return downwardly between tube 13 and flange 16 before it can reach the exterior of the cone.

It will be noted that the cone 14 extends beyond the tubular extension 16, as an overhang 14^a, to pocket the rising air and aid it in hugging the upper surface of the cone as such rising air rounds the cone edge.

A skirt or annulus having a cylindrical wall 17, of less diameter than wall 12, is disposed in spaced relation within said wall 12, having spacing lugs 18 for that purpose, said skirt being provided with an external flange 19 that engages with vertical lugs 20 extended from wall 12, thereby supporting the wall 17 clear above bottom 11. The purpose of this arrangement is that a suitable clearance may be provided between walls 12 and 17 for the passage of air to the interior of the skirt. The wall 17 is also provided with air admission holes 21. The body 22 of the skirt, above flange 19, is contracted toward its upper perimeter, where it is adapted to butt against the lower edge of a ring or tube 23, that, by means of a flange 24, is supported within an opening in a plate 25, which divides the burner containing compartment 26 from the fire chamber 27. Also contained within walls 12 and 17 are a number of air admission tubes 28, which extend up to a point near the top of the skirt, and are open through the bottom 11. Four of these tubes 28 are here shown as arranged concentrically about tube 13, and portions of the cone 14 are cut away to permit these tubes 28 to be disposed in a relatively small circle without thereby limiting the size and consequently the area of the cone.

The elements of the burner structure are

co-ordinated in the manner described to achieve certain results in combustion which will be referred to hereinafter.

Handles 29 attached to the wall 12 permit the convenient placement and removal of the burner as a whole. The burner compartment 26 is guarded at its front by a removable shutter or cover 30, which is provided with a base opening 31 for the restricted, upward admission of air to said compartment.

The fire chamber 27 is surrounded by a suitable wall 32 of refractory material, such as fire clay or brick, which is shown as carried by the plate 25, that divides the burner compartment from the fire chamber.

Entered at a downward angle through the front of the range is an oil delivery tube 33, whose lower end lies above the cone 14 exactly in position to cause oil dropping therefrom to fall by gravity upon the apex of the cone. This tube 33 lies in spaced relation within a tubular sheath 34, that is fitted at one end within a boss 35, secured to the inner surface of front wall 2, the tube 33 being extended outwardly and clearingly through an enlarged orifice 36, and having at its outer end a supply cup 37. Said cup 37 is connected by means of a branch pipe 38 with a main feed pipe 39, which latter is here shown as extended along the front of the range in the form of a rail, and which is adapted to receive oil from any suitable source.

The feed to cup 37 may be regulated by suitable control means, such for example as that indicated at 40. Overflow from cup 37 may be carried off by a pipe 37a.

The cover 41 of the supply cup 37 is perpendicular to the tubes 33 and 34, and may be provided with a transparent insertion, so that the passage through tube 33 may serve to afford visual indication of the fire. The space between tube 33 and sheath 34 permits the passage of air to prevent overheating of tube 33, which might otherwise become clogged by carbonization of oil therein. To further assist the free delivery of oil from tube 33, said tube is provided with an open trough-like terminal portion 42, that begins within sheath 34 and extends out beyond the confines of the sheath, this trough-like portion being disposed in the zone of maximum heat from the burner.

The cone 14 is provided with annular lodgement means located in a horizontal plane at a point intermediate its height, to retard the flow of oil over the lower portion of said cone, thus assuring the combustion of a large proportion of the fuel about the apical portion of the cone, and having the further advantage of causing oil not so consumed to well up over said lodgement means and thereby become better distributed in its continued flow over the whole of the remaining lower cone surface.

This annular lodgement means may be in the form of a groove and such groove is here provided by increasing the thickness of the cone material at the lower part of the cone, which results in the formation of a shoulder 43, that surrounds the cone near its upper part.

In practice, the film of oil that is able to form upon the cone surface below the lodgement means is of such attenuated character as to be capable of flashing into vapor in contacting with the heated cone surface.

In the preliminary stage of starting up the fire, before sufficient heat has been generated in the burner to vaporize the oil, it may happen that through a too copious supply of oil the vessel 11, 12 may overflow, and therefore I provide a base catch pan 44 having a waste orifice 45 and communicating pipe 46 to suitably convey such overflow. Air to support combustion enters the burner chamber through lower opening 31 and a stream thereof flows into the flame area by passing downwardly between walls 12 and 17 and thence through holes 21 and around the bottom of skirt 17; air also passing upwardly through tube 13 and around between said tube and cone flange 16. As the temperature of the flame area increases, the indraught of air accelerates, so that when through the raised temperature the fuel falling upon the cone becomes vaporized and burns as a gas, the induced flow of air through tubes 28, becoming heated in said tubes and issuing above the cone in the vicinity of the gaseous flame, will satisfy these combustion requirements.

Hence it will be apparent that with my improved burner structure the variable air supply is controlled by the different stages of combustion, accordingly to the needs thereof.

In addition to the sight through tube 33, the progress of the fire may be observed through a peep hole 47.

The hot gases from the fire chamber pass through openings (not shown) in the walls 32 at each side, and through a grating 49 to a passage (not shown) which leads rearwardly to the flue 51.

The grating 49 is guarded by ported slide 52 which is mounted by lugs 53 on rods 54, being slidable between the open and closed positions.

Variations within the spirit and scope of my invention are equally comprehended by the foregoing disclosure:

I claim:

1. In a liquid fuel burner, in combination, a casing, a central air supply tube extending upwardly within said casing, a hollow cone, means within said cone to engage the upper end of the air supply tube, to support the cone thereon, a tubular extension pendant from the cone and surrounding the

air supply tube in spaced relation therewith, to provide a downward path for air that has ascended through said supply tube prior to the rising of such air over the cone, said cone being extended in the form of an over-hang beyond the tubular extension to pocket the rising air, and means for delivering liquid fuel upon the apex of said cone.

2. In a liquid fuel burner apparatus, in combination, a fire chamber, a burner therein, a liquid fuel delivery tube entered angularly within said fire chamber from the exterior thereof, said tube having a terminal trough-like portion, and an open-ended tubular sheath encasing said delivery tube, in spaced relation therewith, the free end of the trough-like portion being extended beyond said sheath.

3. A liquid fuel burner comprising a casing element having a base and a surrounding wall, a central vertical air tube opening through the base, a skirt supported within said casing element in spaced relation with said wall and base, for the passage of air downwardly to the casing interior, a hollow cone supported upon said central tube, in spaced relation therewith, and vertical tubes, opening through said base, ranged about the cone, the upper ends of said tubes lying in a plane above the upper surface of the cone.

4. A liquid fuel burner comprising a casing element having a base and a surrounding wall, a central vertical air tube opening through the base, a skirt supported within said casing element in spaced relation with said wall and base, for the passage of air downwardly to the casing interior, said skirt having a contracted upward opening, a hollow cone supported upon said central tube, in spaced relation therewith, and vertical tubes, opening through said base, ranged about the cone, the upper ends of said tubes lying in a plane above the upper surface of the cone.

5. A liquid fuel burner comprising a casing element having a base and a surrounding wall, a central vertical air tube opening through the base, a skirt supported within said casing element in spaced relation with said wall and base, for the passage of air downwardly to the casing interior, said skirt also provided with a series of air ports therethrough, a hollow cone supported upon said central tube, in spaced relation therewith, and vertical tubes, opening through said base, ranged about the cone, the upper ends of said tubes lying in a plane above the upper surface of the cone.

6. A liquid fuel burning apparatus comprising, in combination, a lower chamber having air inlet means, a burner supported in said chamber, said burner including a conoidal element, an upper fire chamber in communication with the burner, a liquid fuel delivery tube entered angularly within the upper chamber from the exterior thereof, a tubular sheath encasing said delivery tube, in spaced relation therewith, the tip of said tube being extended beyond said sheath and disposed above the conoidal element, in the vertical axis thereof, to permit fuel to fall upon the apex of the conoidal element.

7. A liquid fuel burning apparatus comprising, in combination, a fire chamber, a burner including a conoidal element, a liquid fuel delivery tube entered angularly within said fire chamber from the exterior thereof, and a tubular sheath encasing said delivery tube in spaced relation therewith, said tube being extended at its lower end, beyond the sheath in open trough-like form, whose tip is disposed above the coniodal element, in the vertical axis thereof, to permit fuel to fall upon the apex of said conoidal element.

8. A liquid fuel burning apparatus comprising, in combination, a fire chamber, a burner including a conoidal element, a liquid fuel delivery tube entered angularly within said fire chamber from the exterior thereof, and a tubular sheath encasing said delivery tube in spaced relation therewith, said tube being extended at its lower end, beyond the sheath in open trough-like form, whose tip is disposed above the conoidal element, in the vertical axis thereof, to permit fuel to fall upon the apex of said conoidal element.

Executed this 13th day of November, 1923.

JOHN A. H. HOOD.