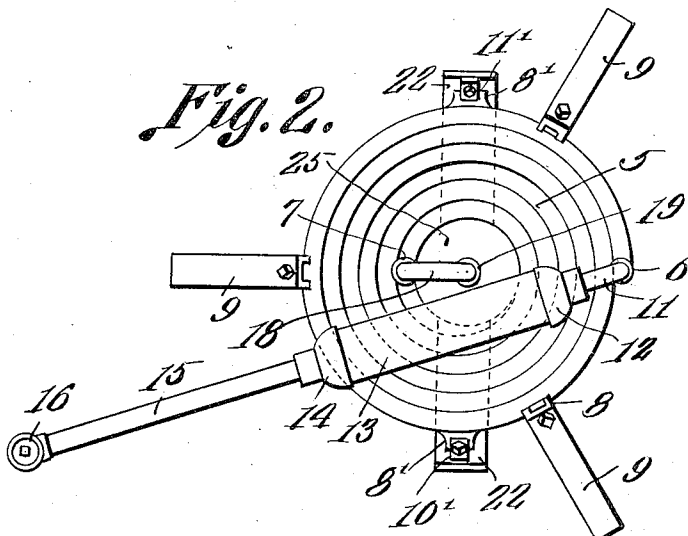
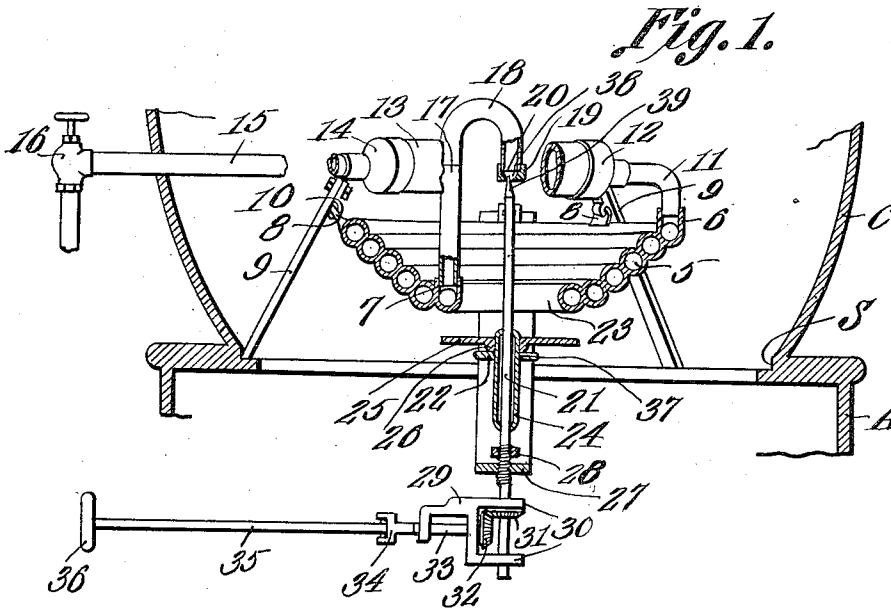


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LIQUID FUEL BURNER.
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LIQUID-FUEL BURNER.

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To all whom it may concern:

Be it known that I, WILLIAM R. McHILL, a citizen of the United States, residing at Moran, in the county of Allen and State of Kansas, have invented a new and useful Liquid-Fuel Burner, of which the following is a specification.

This invention relates to liquid fuel burners and has for its primary object the production of a simple and convenient hydrocarbon burner which shall be efficient in use and which shall provide for a high degree of combustion of the fuel in order to create a maximum heating effect with a minimum fuel supply.

Another object of the present invention is to provide a vapor generator and in connection therewith a super-heater for super-heating the vapor generated by the former, both of which are heated by the flames of the burner.

A further object of the present invention is to provide novel means for controlling the emission of the vapor and for spreading the flames in an effective manner.

With the foregoing and other objects in view, which will be apparent as the invention is better understood, this invention is embodied in the novel construction and combination of parts hereinafter set forth and claimed, it being understood that this device is susceptible of alterations and deviations in its details within the scope of the appended claims without departing from the spirit of the invention.

The invention has been illustrated in its preferred embodiment in the accompanying drawings, wherein similar reference characters have been used to denote corresponding parts, and wherein:—

Figure 1 is a vertical section of the burner, parts being shown in elevation and parts being broken away. Fig. 2 is a plan view of the burner.

Referring specifically to the drawings, the numeral 5 designates a spiral coil forming a super-heater and which is in the form of a basin or funnel with the lower opening 23 therein. The convolutions of the coil 5 are cast integral, thereby closing the spaces between the convolutions, and which also provides a more substantial construction than a similar coil of piping. The inner end of the coil 5 is directed upwardly from one side of the opening 23 as designated by the numeral 7, and the other or outer end of the coil is

directed upwardly as designated by the numeral 6, the ends 6 and 7 being preferably arranged on opposite sides of the center of the opening 23.

The vapor generator comprises the cylindrical casing 13, which is arranged horizontally above the coil 5, and which has the reducing couplings 12 and 14 attached to the ends thereof. One end of the generator 13 is connected to the outer end of the coil 5 by means of an elbow 11 attached at its ends to the coupling 12 and to the outer end 6 of the coil. The other end of the vapor generator is connected to a suitable source of liquid fuel supply by means of piping 15 connected to the coupling 14, which piping is provided with a suitable valve 16 for controlling the passage of fuel therethrough. This piping 15 may be connected to a tank in order to feed the liquid fuel to the burner by gravitation or pressure, as will be understood by those familiar with the art.

A vertical vapor tube 17 is connected at its lower end with the inner end 7 of the coil 5, and has an inverted U-shaped tube 18 connected at one end to the upper end thereof, the other end of the tube 18 being directed downwardly toward the opening 23. The free end of the tube 18 is arranged axially or concentrically relative to the opening 23, and a cap 19 is screw threaded or otherwise engaged on the free end of the tube 18. This cap 19 is provided with an inner concaved recess 20 and with a discharge orifice or outlet 38 leading from the said recess to the exterior of the cap.

A frame 22 is hung from the super-heating coil and passes below the opening 23, the upper convolution of the coil 5 being provided with diametrically opposite loops 8' which are engaged by clamps 11' bolted to the ends of the said frame. This frame 22 has an auxiliary frame 27 hung therefrom or depending therefrom, the said auxiliary frame also being disposed below the opening 23. The frame 22 is provided with an opening 37 therein axially below the opening 23, and a tubular stem 21 passes through the said opening 37, the said stem being of a diameter somewhat smaller than the opening 37. The stem 21 projects through the opening 23 and has the upper end thereof closed and formed into a needle valve 39, this needle valve being adapted to be projected into the orifice or outlet 38 of the cap 19 in order to control the passage of the

vapor emitting through said orifice or outlet from the tube 18. The stem 21 is screw threaded through the frame 27, and has a nut 28 engaged thereon above the lower end of the frame 27 to serve as a stop for limiting the downward movement of the stem.

A short length of tubing 24 passes through the opening 37 in the frame 22 and has the upper and lower ends thereof contracted. A disk or spreader 25 is screw threaded upon the upper end of the tubular member 24 above the lower end of the frame 22 and is provided with a lower boss 26 embracing the said tubular member and which is adapted to seat on the lower end of the frame 22. The tubular member 24 is of a diameter larger than the stem 21 and is slidably arranged in the opening 37 of the frame 22.

A gear frame 29 is mounted on the lower end of the stem 21 below the frame 27, this frame 29 having a pair of ears 30 embracing the stem loosely. A short shaft 33 is journaled in the frame 29 at right angles to the stem 21 and has a bevel gear 32 secured to the inner end thereof which meshes with a bevel gear 31 secured to the stem 21, the upper ear 30 resting or seating upon the bevel gear 31 to support the frame 29. A shaft 35 is flexibly connected to the shaft 33 by means of a universal joint 34, and the outer end of the shaft 35 is provided with a suitable hand wheel 36.

The burner is supported within the casing C of a heating stove by means of a plurality of legs 9, which legs are engaged to the super-heating coil 5 by means of clamps 10 bolted to the upper ends of the legs, and engaging the loops 8 projecting from the upper convolution of the coil. These legs 9 are adapted to rest upon the grate or fit within a suitable seat S within the casing of the stove, the shaft 35 extending through the ash pit A and the piping 15 passing through the casing of the stove with the valve 16 located exteriorly of the stove.

In the operation of the burner, the same is started by admitting a small quantity of oil or other liquid fuel into the vaporizer or generator 13 by opening the valve 16, the said valve then being closed and oil being poured into the ash pit of the stove and being ignited to give an initial heat to the generator which will vaporize the fuel therein. The vapor thus generated will pass into the super-heating coil 5, which also becomes heated and which will super-heat the vapor to a high degree. The vapor will then pass from the super-heating coil 5 into the upright or vertical tube 17 then into the tube 18 to emit or be discharged through the orifice or outlet 38 in the cap 19. The emitted vapor is then lighted and is directed through the opening 23 in the super-heating coil by the pressure of the emitting vapor, and in

passing through the opening 23 will strike the disk or spreader 25 which will direct the flames radially, the flames assuming a circular form to provide a continuous sheet of fire underneath the super-heating coil 5. Then by opening the valve 16 the flow of liquid fuel may be continued in order to supply fuel to the generator and in this manner the vapor is transmitted through the super-heating coil 5 and discharged through the outlet 38. The generator 13 not only serves to vaporize the liquid fuel, but also serves as a trap to prevent the liquid fuel from entering the super-heating coil, thus keeping the super-heating coil free from liquid fuel and therefore materially assisting in the vapor becoming readily raised to a high temperature. The tubes or pipes 17 and 18 are also heated by the flames in order to prevent the vapor from cooling while passing there-through, prior to the discharge of the vapor, the flame being directed below the tubes 17 and 18 as well as the generator and the super-heater. The discharge or emission of the vapor through the outlet 38 is controlled by the needle valve 39 which in being raised and lowered closes and opens the said outlet, the said needle valve also spreading the vapor sufficiently away from the stem 21 in order to prevent the stem from being excessively heated. The upper end of the tubular member 24 which is contracted in the form of a cone also serves to spread the flame in cooperation with the spreader or deflector 25. The stem 21 of the needle valve being hollow also permits the air to enter the lower end thereof in order to cool the stem. This stem 21 is adjusted or reciprocated by rotating the shaft 35 by means of the hand wheel 36, which hand wheel is exposed exterior of the stove, which will cause the bevel gear 32 to be rotated, which in turn will rotate the bevel gear 31 and the stem 21. The stem 21 in being screw threaded through the frame 27 will cause the stem to move longitudinally when the same is rotated, and in this manner the needle valve may readily be adjusted relative to the discharge orifice 38 by rotating the hand wheel 36. The universal joint 34 between the shaft 35 and the shaft 33 provides a flexible connection which permits the frame 29 to be raised and lowered with the stem 21, and it will be noted that the nut or stop 28 on the stem 21 will prevent the stem from being excessively lowered, and will also prevent the stem from falling.

Although the burner is shown as supported within a heating stove by means of the legs 9, it is understood that this burner may be employed in various other stoves and may be supported in any suitable manner and may be altered in its details within the scope of the appended claims without departing from the spirit of the invention to

adapt it for various other purposes, as will be apparent to those skilled in the art. The various parts may also be constructed of any suitable material, preferably of such character as to withstand the heat to which the burner is subjected.

It will also be noted that the flames in being spread in the manner described will strike the side walls of the stove casing in order to effectively heat a room containing the stove. The flames may be readily regulated by means of the valve 16 which controls the passage of the liquid fuel into the vapor generator, and by means of the needle valve 39 which controls the emission of the vapor. The chamber formed by the cylinder 13 also serves to catch any residue of heavy matter in the oil, which will not vaporize, thereby preventing the foreign matter from entering the super-heater and from being emitted with the vapor, this foreign matter being readily emptied from the cylinder 13 by detaching the same, as will be understood. The super-heater not only serves to super-heat the vapor, but also serves as a reservoir for the vapor, the volume of the space within the super-heater being greater than the volume of the space within the generator. This provides for a steady flow of the vapor from the discharge opening 38. The coil 5 in being closed between the convolutions thereof prevents the flame from passing between the convolutions of the coil, which tendency is caused by the upward draft of the air within the stove, and thereby increases the life of the super-heating coil. The vapor in being heated to a high degree when passing through the super-heater produces a very dry gas which will burn with a very clear flame and will provide for a high degree of combustion.

Having thus described the invention, what is claimed as new is:—

1. A liquid fuel burner embodying a spiral coil, a tube connected to the inner end of the coil and having its free end directed toward the opening formed by the coil, and a needle valve cooperating with the free end of the said tube and having its stem passing through the said opening.

2. A liquid fuel burner embodying a spiral coil, a tube connected at one end to the inner end of the coil and having its free end directed toward the opening formed by the coil, a needle valve cooperating with the free end of the tube and having a stem passing through the said opening, a deflector on the stem of the needle valve below the coil, and means below the deflector for adjusting the stem of the needle valve.

3. A liquid fuel burner embodying a vapor generator, a vapor super-heater connected thereto and having an opening there-through, a discharge tube connected to the super-heater and directed downwardly in

alignment with the said opening, a needle valve cooperating with the outlet of the discharge tube to control the passage of vapor therethrough and having its stem passing through the said opening, and means below the super-heater for reciprocating the said stem.

4. A liquid fuel burner embodying a vapor generator, a vapor super-heater connected thereto and having an opening there-through, a discharge tube connected to the super-heater and directed downwardly in alignment with the said opening, a needle valve cooperating with the outlet of the discharge tube to control the passage of vapor and having its stem passing through the said opening, a spreader surrounding the stem and arranged below the said opening, and means below the super-heater for reciprocating the said stem.

5. A liquid fuel burner embodying a spiral super-heating coil having a central opening, a vapor generator connected to the outer end of the coil and arranged above the coil, a tube connected at one end to the inner end of the coil and having the other end thereof projecting toward the said opening, a cap engaged on the latter end of the tube and having a discharge orifice therein, a needle valve coacting with the said orifice to control the passage of vapor therethrough and having its stem projecting through the said opening in the super-heater, a spreader on the stem below the coil, and means for adjusting the stem.

6. A liquid fuel burner embodying a spiral super-heating coil provided with a central opening, a vapor generator connected to the outer end of the coil and arranged above the coil, a tube connected at one end to the inner end of the coil and having the other end directed downwardly toward the said opening, a cap engaged on the latter end of the said tube and having a discharge orifice therein, a frame hung from the coil and passing below the opening therein, a needle valve coacting with the orifice in the said cap to control the passage of vapor therethrough and having its stem in screw threaded engagement with the said frame, a spreader arranged on the stem and seating on the frame below the opening in the super-heating coil, and means for rotating the stem.

7. A liquid fuel burner embodying a spiral superheating coil having a central opening, a vapor generator connected to the outer end of the coil and arranged above the coil, an upright tube connected at its lower end to the inner end of the coil, and an inverted U-shaped tube having one end connected to the upper end of the upright tube and having the other end directed downwardly toward the said opening in the super-heating coil.

8. A liquid fuel burner embodying a spiral super-heating coil having a central opening, a vapor generator connected to the outer end of the coil and arranged above the coil, an upright tube connected at its lower end to the inner end of the coil, an inverted U-shaped tube having one end connected to the upper end of the upright tube and having the other end directed downwardly toward the said opening in the super-heating coil, a cap engaged on the latter end of the U-shaped tube and having a discharge orifice therein, a needle valve coacting with the discharge orifice in the cap to control the passage of vapor therethrough and having its stem projecting through the opening in the said coil, a spreader on the stem below the said opening, and means for adjusting the stem.
9. A liquid fuel burner embodying a spiral super-heating coil, a vapor generator connected to the outer end of the coil, a tube connected at one end to the inner end of the coil and having its other end directed downwardly toward the opening in the coil, a cap engaged on the latter end of the tube and having a discharge orifice therein, a frame hung from the coil and passing below the opening therein, a tubular member slidable through the frame and having its ends contracted, a spreader engaged on the upper end of the tubular member and seatable on

the frame, a needle valve adapted to enter the discharge orifice in the cap and having a stem passing through the said tubular member, and means for adjusting the said stem.

10. A liquid fuel burner embodying a spiral super-heating coil having an opening therein, a vapor generator connected to the outer end of the coil, a tube connected at one end to the inner end of the coil and having its other end directed downwardly toward the said opening, a cap engaged on the latter end of the tube and having a discharge orifice therein, a frame hung from the coil, a needle valve adapted to enter the discharge orifice in the said cap and having its stem in screw threaded engagement with the frame, a bevel gear secured to the said stem below the frame, a gear frame having ears loosely embracing the said stem, a shaft journaled in the gear frame, a bevel gear secured to the said shaft and meshing with the former bevel gear, and an actuating shaft connected to the said shaft by a universal joint.

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

WILLIAM R. McHILL.

Witnesses:

M. L. SHETLAR,
R. J. SHETLAR.