April 19, 1949. P. WOLLNER 2,467,450

VAPORIZING COIL TYPE OIL BURNER

Filed Aug. 21, 1945 2 Sheets-Sheet 1

Fig. 1

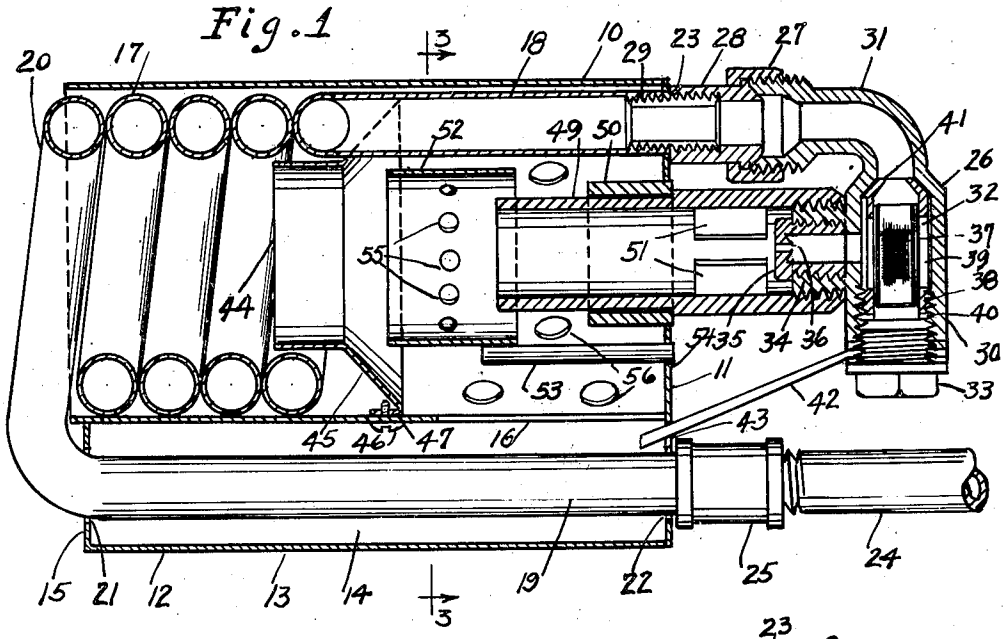

Fig. 2

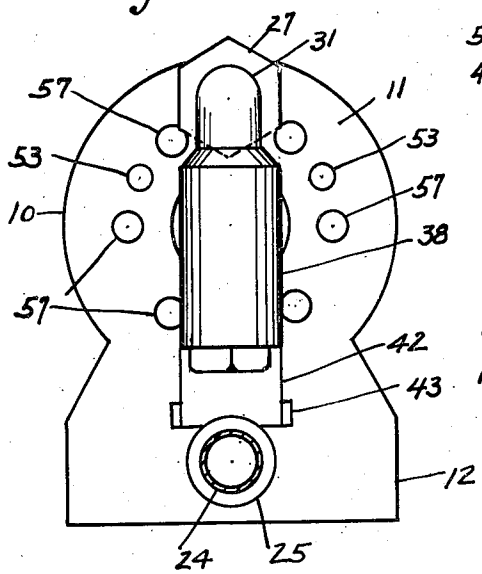

Fig. 3

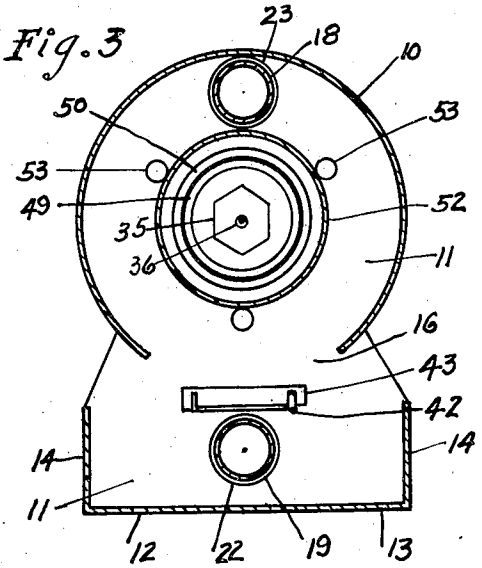

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Fig. 4.

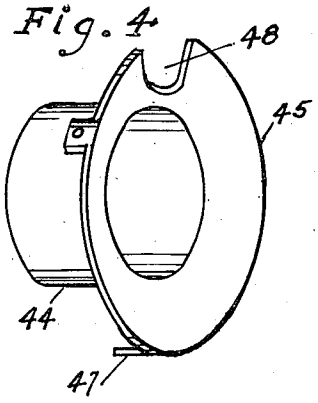


Fig. 5.

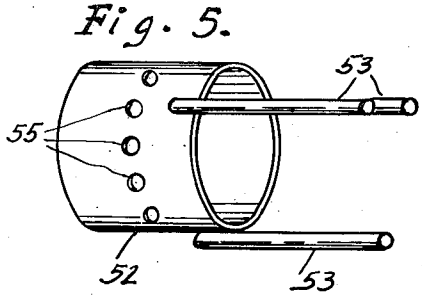


Fig. 6

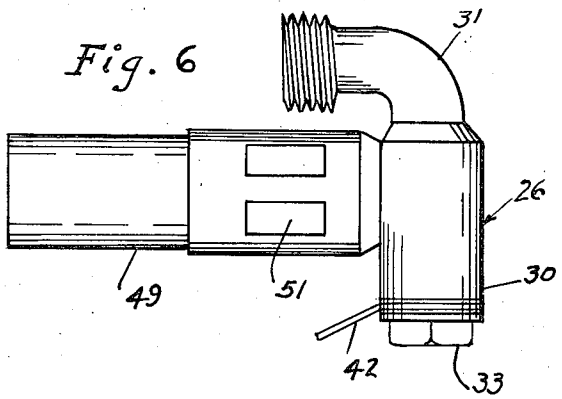
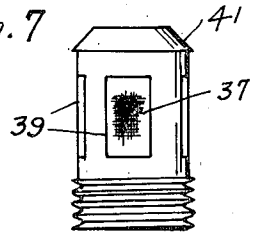


Fig. 7



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VAPORIZING COIL TYPE OIL BURNER

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Application August 21, 1945, Serial No. 611,841

5 Claims. (Cl. 158—79)

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This invention has general reference to liquid fuel burners and refers more particularly to an improved burner for vaporizing and burning the lighter grades of petroleum hydrocarbons such as kerosene, light fuel and the Diesel oils, gasoline and the like.

Due to improper vaporization and an inadequate or improper supply of air for maintaining complete combustion, such fuels form solid carbon or soot which adheres to the walls of the vaporization chamber and accumulates thereon so as to restrict combustion therein and clog up the orifice of the nozzle to thereby prevent operation of the burner. In order to overcome such conditions the present invention provides a burner which is so constructed and arranged as to properly preheat and vaporize the fuel and provide an adequate supply and the proper mixing of air therewith so as to minimize carbonization within the vaporization chamber and the choking of the vapor and flame.

The invention further provides means for preheating an additional or auxiliary supply of air and for mixing the same with the vaporized fuel at the inner end of the flame jet.

The invention also comprehends a burner of the indicated character which may be conveniently disassembled for facilitating cleaning of the parts thereof without distorting the axial alignment of the nozzle.

The invention also provides a burner which is efficient in operation and has a wide range of capacity.

With the foregoing and other objects in view reference is now made to the following specification and accompanying drawings in which the preferred form of the invention is illustrated.

In the drawings:

Fig. 1 is a longitudinal vertical sectional view of a burner constructed in accordance with the invention.

Fig. 2 is a view in elevation of the rear end of the burner.

Fig. 3 is a vertical sectional view taken approximately on line 3—3 of Fig. 1.

Fig. 4 is a perspective view of one of the heat baffles.

Fig. 5 is a perspective view of another heat baffle.

Fig. 6 is a side view of the nozzle and burner tube.

Fig. 7 is an enlarged view in elevation of the strainer and holder.

Referring to the drawings by characters of reference, the burner includes a casing or housing consisting of a cylindrical shell or upper portion 10 having an open forward end and closed at the rear by a rear wall or back plate 11. The casing or housing also includes a rectangular lower portion or pan 12 disposed beneath the cylindrical shell 10 and which includes a flat bottom wall 13 and oppositely disposed side walls 14 extending longitudinally of the cylindrical shell. The side walls 14 are connected with a forward wall 15 which is welded or otherwise secured at its upper edge to the under side of the cylindrical shell 10, the side walls 14 being connected at the rear with the rear wall 11 of the cylindrical shell 10.

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The cylindrical shell 10 is formed with an elongated opening 16 in the lower portion thereof adjacent the rear and above the pan 12 through which air is admitted to the burner for supporting combustion therein and through which the flame extends into the burner for heating the same when fuel is burned in the pan for priming the burner.

Located within the casing or housing is a coil 17 preferably fashioned of seamless steel tubing through which the fuel is fed to the burner, the same entering the coil as a liquid and emerging through the orifice of the burner in the form of a vapor. The coil 17 includes upper and lower straight end portions 18 and 19 and an intermediate portion 20 consisting of a plurality of adjacent convolutions slidably fitted within the free end of the cylindrical shell 10 with the outermost convolution protruding through the open end thereof. The said outermost convolution is directed rearwardly and merges with the straight lower end portion 19 of the coil which extends medially through the pan 12 protruding at its opposite ends through the openings 21 and 22 in the end wall 15 and the rear wall or back plate 11. The inner convolution of the coil 17 is directed rearwardly and merges with the straight upper end portion 18 thereof which has its free end protruding through an opening 23 in the upper portion of the rear wall or back plate 11. The coil 17 is connected with a fuel supply pipe 24 by means of a coupling 25 engaging the threaded outer end of the straight lower end portion 19 while the straight upper end portion 18 of the coil is connected with a fixture 26 by means of a union 27, the male part 28 thereof being threadedly secured to a nipple 29 which engages in the threaded free end of the straight upper end portion 18 of the coil, the coupling 25 and the male part 28 of the union 27 being tightened against the rear wall or back plate 11 of the casing or

housing to thereby secure the coil 17 in position therein which securing means also permits of the convenient removal of the coil for cleaning thereof.

The fixture 26 consists of a hollow cylindrical body 30 having a curved tubular neck 31 connected at its forward end with the straight upper end portion 18 of the coil 17 by the union 27. The body 30 is provided with an enlarged cylindrical chamber 32 which is in communication with the coil 17 through the union 27 and which chamber is closed at its lower end by a plug 33 engaging the interiorly threaded lower end of the body 30. The body 30 is formed with an interiorly and exteriorly threaded boss 34 projecting forwardly thereof in axial alignment with the axis of the cylindrical shell 10 and in which is secured a threaded plug 35 having an opening 36 therethrough defining a nozzle through which the vaporized fuel is fed.

Located within the chamber 32 of the fixture 26 is a strainer 37 mounted in a hollow cylindrical holder 38 arranged in spaced relation to the inner peripheral wall of the chamber and provided with circumferentially spaced rectangular openings 39 in the cylindrical wall thereof through which strainer and openings the vaporized fuel is fed into the annular space between the holder and body 30 and from which space the vaporized fuel is fed through the opening or nozzle 36. The holder 38 is exteriorily threaded at its lower end and is formed with a kerf 40 adapted to be engaged by a tool for facilitating the tightening of the holder in the interiorly threaded lower end of the body 30 of the fixture 26. Disposed in the open upper end of the holder 38 is a bushing 41 having a tapered upper end which snugly fits the correspondingly tapered upper end of the inner wall of the body 30 to thereby prevent leakage of the vaporized fuel between the holder and the inner wall defining the chamber 32.

The strainer 37 is formed of heat resisting material preferably monel metal and the same is of cylindrical formation with an open upper end and closed lower end, the cylindrical wall thereof closely fitting the inner wall of the holder and overlying the openings 39 therein.

Secured between the holder 38 and the plug 33 is the apertured outer end of a gutter or trough 42 which slopes forwardly therefrom with its forward free end protruding through an opening 43 in the rear wall or back plate 11 of the casing or housing and with its lower end disposed above the pan 12 adapted to convey liquid fuel thereto for priming the burner.

A cylindrical baffle 44 formed of heat resisting material such as stainless steel and provided with an outwardly flared frusto-conical rim 45 is arranged within and in spaced relation to the innermost convolutions of the coil 17 and in axial alignment therewith. The flared rim 45 of the baffle 44 extends outwardly at the rear of and in spaced relation to the innermost convolution of the coil so that the baffle and rim provide a shield preventing direct contact of the flame against the innermost convolutions of the coil and the spacing of the same from the coils permits of the circulation of air therebetween. The baffle 44 is secured within the cylindrical shell 10 by means of screws 46 which extend through apertured lugs 47 welded to the outer periphery of the rim 45 and the said rim is formed with a notch 48 through which extends the straight upper end portion 18 of the coil 17.

In order to direct the vaporized fuel axially of the cylindrical shell 10 and the flame through the coil 17, a burner tube 49 is threadedly secured to the boss 34 and extends forwardly therefrom with its reduced forward end protruding through and slidably fitted in a collar 50 secured in an opening in the rear wall or back plate 11 of the casing or housing. Rearwardly of the casing or housing, the tube 49 is formed with circumferentially spaced rectangular openings 51 through which air is drawn by the stream of vaporized fuel passing through the tube and which is mixed with the vapor therein.

A cylindrical baffle 52 is arranged axially of the cylindrical shell 10 with its forward end projecting into the rear end of the baffle 44 in spaced relation to the rim 45 thereof and with its rear end disposed in surrounding spaced relation with the forward end of the tube 49. The baffle 52 is provided with circumferentially spaced rearwardly extending rods 53 welded or otherwise secured to the outer periphery thereof and which extend through and are secured in openings 54 in the rear wall or back plate 11 to thereby support the baffle in position. The said baffle is provided with circumferentially spaced openings 55 through which preheated air is drawn and mixed with the mixture of fuel and air emerging from the tube 49. The cylindrical shell 10 is also provided with circumferentially spaced openings 56 and the rear wall or back plate 11 is provided with similar openings 57 through which air is drawn into the cylindrical shell 10 where it is preheated before mixing with the vaporized fuel and air in the baffles 44 and 52.

In use and operation the pipeline 24 is connected by a valve and hose (not shown) to a tank containing hydrocarbon fuel under pressure which is admitted to the coil 17 when the valve is opened. For priming the burner a small quantity of fuel is allowed to escape through the opening or nozzle 36 which escapes through one of the openings 51 in the tube 49 and is conveyed by the gutter or trough 42 to the pan 12. The liquid fuel is burned in the pan 12 to thereby heat the lower portion of the cylindrical shell 10 and the coil 17 therein so as to vaporize the fuel in the coil which is forced through the opening or nozzle 36 by the pressure generated by the vaporizing of the same. The vapor passing through the tube 49 draws in air through the openings 51 which is mixed therewith and the mixture of vapor and air passing axially through the baffle 52 draws in air through the openings 56 and 57 which has become heated within the cylindrical shell 10 and is then drawn into the baffle 52 through the openings 55 therein and is mixed with the vapor and air traveling therethrough. The mixture of vapor and preheated air is ignited within the baffle 52, the flame extending through the baffle 44 and emerging through the outer convolution of the coil 17. The baffle 44 becoming heated, frequently red hot, functions to preheat the air within the rear portion of the shell 10 surrounding the tube 49 and baffle 52 which mixes with the vapor as hereinbefore described effects complete combustion of the vapor so as to minimize the formation of solid carbon and the deposit thereof within the burner.

It will be understood that the free carbon deposit increases with incorrect heating of the coil due to the burner tube and nozzle opening being out of alignment wtih the axis of the coil. In the embodiment of the invention illustrated the

innermost convolutions of the coil 17 which are most liable to be overheated are protected by the baffle 45. Furthermore the burner tube 49 is maintained in longitudinal alignment with the coil since the same is secured in fixed position in the opening in the rear wall or back plate 11. The present construction also permits of the convenient removal of the coil 17 by disconnecting the coupling 25 and the union 27 without disturbing the axial alignment of the burner tube 49 so that in the event that the convolutions of the coil become warped the same may be removed and a new coil installed which when connected in position by the tightening of the union 27 will be disposed in longitudinal alignment with the burner tube and nozzle opening.

What is claimed is:

1. In a hydrocarbon fuel burner, a casing including a cylindrical shell open at the forward end and provided with a rear wall closing the rear thereof and a receptacle extending longitudinally of and below the shell and secured thereto at its opposite ends, a coil consisting of upper and lower straight end portions and an intermediate portion consisting of a plurality of adjacent convolutions disposed within the shell at the forward end thereof with the outermost convolution being rebent rearwardly and merging with the lower straight end portion extending through said receptacle, the innermost convolution of said coil extending rearwardly and merging with the upper straight end portion extending rearwardly through the rear wall of the shell, a tubular fitting connected with said upper straight end portion of the coil and having a downwardly directed end provided with a forwardly directed boss formed with an opening defining a nozzle orifice arranged in longitudinal alignment with the axis of said shell, a burner tube secured to said boss and extending forwardly therefrom in longitudinal alignment with said shell and having a plurality of circumferentially spaced openings, a cylindrical baffle disposed within the innermost convolution of said coil and having a flared rim located at the rear thereof in spaced relation thereto and a cylindrical baffle located between said first named baffle and said tube extending into the flared rim of said first named baffle and projecting rearwardly beyond the forward end of said tube, said tube functioning to direct vaporized fuel discharged through said nozzle orifice axially of the shell through said baffles, the vaporized fuel drawing air through said openings in the tube and drawing preheated air from said cylindrical shell which is mixed therewith for supporting combustion within the baffles and convolutions of the coil.

2. In a hydrocarbon fuel burner, a casing including a tubular shell open at the forward end an provided with a rear wall closing the rear thereof and a receptacle depending from and secured to the shell at its opposite ends, a coil disposed within the shell having a lower portion extending through said receptacle and an upper portion projecting rearwardly, a tubular fitting connected with said upper portion of the coil and provided with a forwardly directed boss formed with an opening defining a nozzle orifice arranged in longitudinal alignment with the axis of said coil, a burner tube secured to said boss and extending forwardly thereof in longitudinal alignment with said coil and having a plurality of circumferentially spaced openings, a tubular baffle disposed within the innermost convolution of said

coil and having a flared rim located at the rear thereof and a tubular baffle located between said first named baffle and said tube and disposed in spaced relation thereto, said tube functioning to direct vaporized fuel discharged through said nozzle orifice axially of the coil through said baffles, the vaporized fuel drawing outside air through said openings in the tube and drawing preheated air from said shell which is mixed with said fuel for supporting combustion within the baffles and convolutions of the coil.

3. In a hydrocarbon fuel burner, a casing including a tubular shell open at the forward end and provided with a rear wall closing the rear thereof, a coil disposed within the shell with its upper portion projecting rearwardly, a tubular fitting connected with said upper portion of the coil and provided with an opening defining a nozzle orifice arranged in longitudinal alignment with the axis of said coil, a burner tube secured to said fitting and extending forwardly thereof into said shell in longitudinal alignment with the axis of said coil therein and having a plurality of circumferentially spaced openings at the rear of said shell, a tubular baffle disposed within the innermost convolution of said coil and having a flared rim located at the rear thereof and spaced therefrom and a tubular baffle located between said first named baffle and said tube and disposed in spaced relation thereto and having a plurality of circumferentially spaced openings, said tube functioning to direct vaporized fuel discharged through said nozzle orifice axially of the coil through said baffles, the vaporized fuel drawing outside air through said openings in the tube and drawing preheated air from said shell which is mixed with said fuel for supporting combustion within the baffles and convolutions of the coil.

4. In a hydrocarbon fuel burner, a casing including a tubular shell, a coil disposed within the shell with its upper portion projecting rearwardly, a tubular fitting connected with said upper portion of the coil and provided with an opening defining a nozzle orifice arranged in longitudinal alignment with the axis of said coil, a strainer arranged in said fitting in covering relation with said orifice, a burner tube secured to said fitting and extending forwardly thereof into said shell in longitudinal alignment with the axis of said coil therein and having a plurality of circumferentially spaced openings at the rear of said shell, a tubular baffle disposed within the innermost convolution of said coil and spaced therefrom and having a flared rim located at the rear of said innermost convolution and a tubular baffle located between said first named baffle and said tube and disposed in spaced relation thereto and having a plurality of circumferentially spaced openings, said tube functioning to direct the vaporized fuel discharged through said nozzle orifice axially of the coil through said baffles, the vaporized fuel drawing outside air through said openings in the tube and drawing preheated air from said shell through said openings in the baffle which air is mixed with said fuel for supporting combustion within the baffles and convolutions of the coil.

5. In a hydrocarbon fuel burner, a casing including a tubular shell open at the forward end and provided with a rear wall closing the rear thereof, a coil including a plurality of convolutions disposed within the shell, a tubular fitting provided with an opening defining a nozzle orifice, means removably connecting said fitting to said coil for securing the coil in position within

the shell and permitting removal thereof through the open end of the shell, a burner tube secured to said fitting and extending forwardly thereof into said shell in longitudinal alignment with the axis of the coil therein, a tubular baffle disposed within the innermost convolution of said coil and spaced therefrom and having a flared rim located at the rear of said innermost convolution for preventing direct contact of the flame with said innermost convolution and overheating thereof, and a tubular baffle located between said first named baffle and said tube and disposed in spaced relation thereto, said tube functioning to direct the vaporized fuel discharged through said nozzle orifice axially of the coil through said baffles, the vaporized fuel drawing preheated air from said shell for supporting combustion within the baffles and convolutions of the coil.

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