Nov. 24, 1925. 1,562,910

E. L. NOCK

OIL BURNER

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Fig. 1

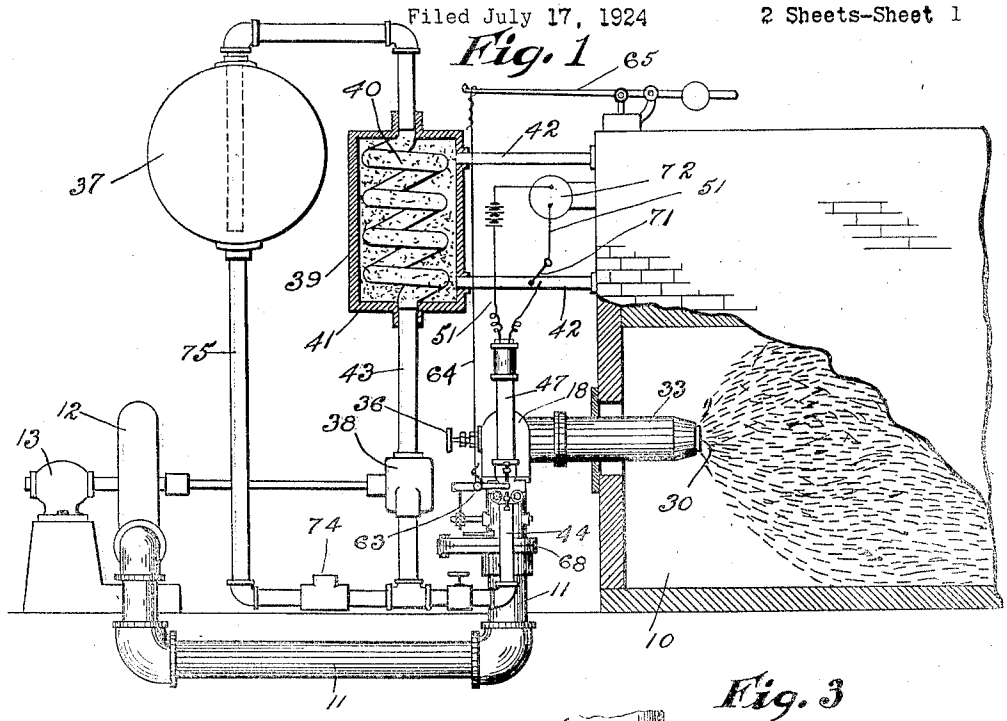


Fig. 3

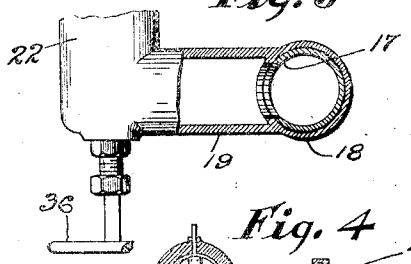


Fig. 2

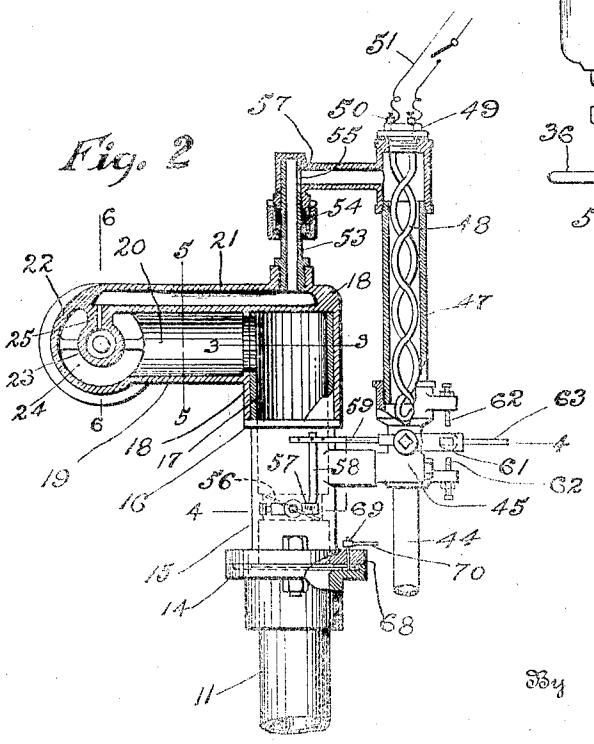


Fig. 4

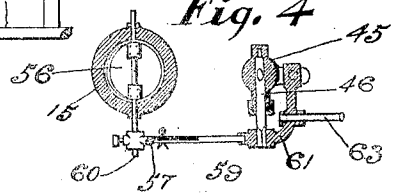
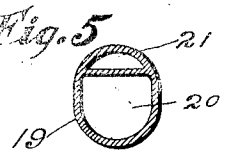


Fig. 5



Inventor

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Fig. 6

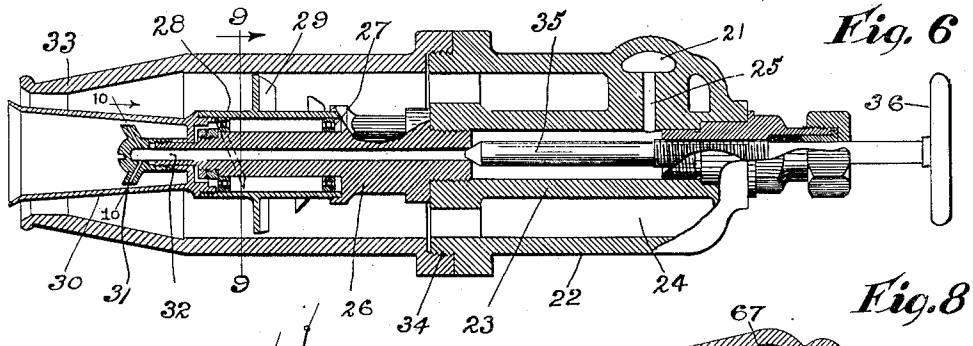


Fig. 8

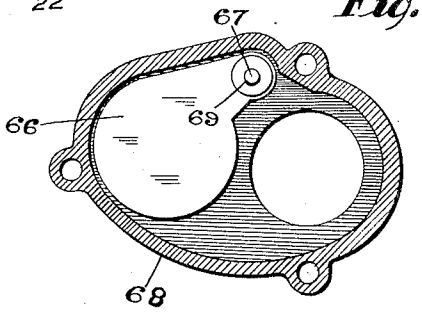


Fig. 10

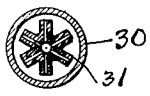


Fig. 7

Fig. 9

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Patented Nov. 24, 1925. 1,562,910

UNITED STATES PATENT OFFICE.

EDGAR L. NOCK, OF EDGEWOOD, RHODE ISLAND.

OIL BURNER.

Application filed July 17, 1924. Serial No. 726,645.

To all whom it may concern:

Be it known that I, EDGAR L. NOCK, a citizen of the United States, residing at Edgewood, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

This invention relates to improvements in the construction of apparatus for burning hydrocarbon as fuel for furnaces and the like; and has for its object to provide a burner for this purpose adapted to employ crude oil or the like in combination with a given percentage of air for this purpose and to provide suitable means for controlling the proportional flow of both the air and the oil to the burner.

A further object of this invention is the provision of means whereby the moving of the burner from working position in the furnace automatically shuts off the supply of either or both the oil and the air.

A still further object of the invention is the provision of means for bypassing the oil back into the system when the flow to the burner is cut off.

The invention further consists in mounting an electric element in the oil supply adjacent the discharge end thereof to heat and so thin the oil to facilitate starting the burner.

The invention still further consists in the provision of a main oil supply heater to work in combination with an auxiliary electric heater and also the provision of means whereby the auxiliary heater may be automatically shut off when the temperature in the furnace is raised sufficiently to raise the temperature in the main heater to a predetermined degree.

A further object of the invention is to heat the air by conducting it along in proximity to the heated oil in the oil passageways just prior to being discharged, to mix with the oil spray at the end of the nozzle.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevation partly in section illustrating one form of my improved apparatus as applied to a furnace.

Figure 2 is a side elevation partly in section showing an electric heating unit as inserted into the oil supply passageway, also showing the means by which the nozzle member is pivotally mounted to be swung back out of operating position and to automatically shut off both the oil and the air by such movement.

Figure 3 is an end elevation partly in section illustrating the openings in the hinge joint in the air supply tube by which the passageway is closed by the swinging back of the nozzle from operating position.

Figure 4 is a sectional plan view on line 4—4 of Figure 2 showing the automatically actuated valves for controlling the flow of both the air and the oil.

Figure 5 is a section on line 5—5 of Figure 2 through the oil and air passageways.

Figure 6 is a sectional elevation on line 6—6 of Figure 2 through the nozzle member of the burner.

Figure 7 is a side elevation of the nozzle and the supply passageways leading thereto and showing the arrangement of the control and shut-off valves for both the oil and the air.

Figure 8 is a section on line 8—8 of Figure 7 showing the gate valve for controlling the air passageway.

Figure 9 is a section on line 9—9 of Figure 6 showing the inclined vanes on the rotating member of the nozzle whereby this member is caused to rotate rapidly by the rapid flow of the air supply past these vanes.

Fig. 10 is an end view of the plurality of spraying oil discharge tubes sectioned on line 10—10 of Figure 6.

It is found in the practical construction and operation of so-called hydrocarbon burners which are adapted to employ crude oil mixed with air as a combustible fluid, of advantage to heat the oil in starting at a point near its discharge into the furnace to thin the oil and facilitate starting the burner into action; also to provide a main heater for raising the temperature of the oil by action of the steam or hot water from the furnace, also to automatically shut off the electrical or auxiliary heater when the temperature of the boiler has been raised a predetermined degree and to automatically control the feed of both the oil and the air to the burner by means responsive to the effect of the heat generated in the furnace, which means may be either a thermal unit or a

unit affected by steam pressure in the furnace, and it is also found of advantage in the practical construction and operation of a device of this character to so mount the nozzle member of the burner that it may be readily withdrawn from its operative position for inspection and repairs and that the withdrawing action of the nozzle automatically closes the supply of either or both the oil and the air to the nozzle; and the following is a detailed description of the present embodiment of my invention showing means by which these advantageous results may be accomplished:—

With reference to the drawing 10 designates one form of furnace to which my improved burning apparatus may be applied. The apparatus comprises essentially an air supply pipe 11 through which air is forced from the blower 12 by a motor 13 or other source of power. Connected to this air supply pipe through a coupling 14 is a casing 15 which is provided with a flange 16 and an upwardly-extending trunnion portion 17 on which is mounted an outer casing portion 18 to swing on the trunnion 17.

This outer casing is provided with a horizontally-disposed short section 19 which is formed with a lower air passageway 20 and an upper oil passageway 21 a cross section of which is shown in Figure 5 and connected to this short horizontal section is another section 22 set at a right angle to the section 19. This latter section being provided with a central oil conducting tube 23 and an air passage 24 communicating with the air passage 20 of the first mentioned section.

The oil from the oil passage 21 communicates with this central tube 23 through the small oil passage 25. Into this central oil-receiving tube, I have threaded a tubular discharge trunnion member 26 on which ball bearings 27 are mounted to support a rotatable member 28 which is provided with a plurality of fins or vanes 29 disposed at an angle to the axis about its periphery whereby passage of the air pressure flowing by this member will cause it to rotate rapidly to spray the oil in a thin film and cause it to mix with the air and form a highly combustible mixture.

On the end of this rotating member, I have mounted a tapering oil discharging funnel-shaped oil spreader 30 on to the inner surface of which the oil is forced through a series of jets 31 from the central passage 32, whereby the oil is better broken up and atomized into a fine spray or mist to more completely mix with the air to form a combustible mixture.

Over this rotatable member including the discharge funnel, I position an outer casing or nozzle member 33 which is threaded at 34 on to the member 22.

The opening through this oil passageway 32 may be manually controlled by a needle valve 35 which may be operated by a handle wheel 36. The oil may be drawn from a tank 37 or any suitable reservoir by means of a pump 38 or other suitable device through the main heater 39 which comprises a coil 40 inclosed in a casing 41 which casing is supplied with hot water or steam through pipes 42 from the furnace 10. From this heated coil the oil passes down through a pipe 43 and is drawn and forced by pump 38 into a supply pipe 44. This supply pipe is connected to the lower end of the valve casing 45 in which is mounted an automatic oil control valve 46, see Figure 4. Thence the oil flows up through tube 47 in which is mounted a thermal heating element 48 which element is of an extended length to quickly raise the temperature of the inflowing oil when passing therethrough. This electrical heating element is mounted on the inner end of a plug 49 which is provided with suitable binding posts 50 and to which is connected circuit wires 51, presently described. This tube 47 has a horizontally-disposed neck portion 52 into which a tube 53 extends upwardly from the casing 18 through a stuffing box 54. This tube is provided with an opening 55 which registers with that in the neck portion 52 when the burner is in operative or firing position, and when the burner is swung back on its trunnion or hub portion this opening is closed, thereby automatically shutting off the supply of oil therethrough.

In some instances, I mount an automatic shut-off or control for both the oil and the air. The air-control being a damper type of valve 56 in the air pipe, as shown in Figure 4, while that in the oil passageway is the valve 46 above described. This valve 46 and air valve 56 are connected through an arm 57 on the arm spindle 60, connection 58 and arm 59 to the valve 46 through arm 61 to the valve 46. This arm 61 is preferably curved around the valve casing 45 and extends into position to be limited in its spreading movement in both its opening and closing motions by stop screws 62. In this arm 61 is set a pin 63 which is arranged to be connected through a wire or cord 64 to a beam 65 which is responsive to the effect of heat generated in the furnace and may be operated either by thermostatic elements or by a pressure of steam in the boiler.

In order to provide means for shutting off the air by hand when desired, I have formed a shutter valve 66, see Figure 8, which is pivoted at 67 in the casing 68 and is connected through a stem 69 to a handle 70 which it is adapted to be opened or closed at the will of the operator.

This apparatus is more particularly adapted for using heavy or crude oil which

when cold flows sluggishly and in order to thin down this oil at a point as near the discharge end of the burner as possible, it is found of advantage to arrange a heating element to raise the temperature of this oil which will facilitate its flow in starting and also facilitate its mixing with the air and its ignition at the firing end of the burner. It is also found of advantage to provide means whereby the circuit to this electrical heating unit may be closed by hand when desired and opened automatically, when the heat in the furnace is raised to a predetermined degree; and to accomplish this in a simple and effective way, I have provided a hand-operated switch 71 and a thermally-controlled switch 72, which latter switch is connected to the furnace so that when the heat in the furnace is raised to a predetermined degree it will operate the mechanism therein to automatically open the circuit through wires 73, in which case the heat from this furnace, either in the form of steam or hot water, will circulate through pipes 42 into the chamber 39 to heat the oil flowing through the coil 40 thereby no longer necessitating the use of an auxiliary electrical heating unit 48.

If it is desired for any reason to withdraw the heating nozzle from its firing or operating position in the furnace it may be swung back on its hub or trunnion 17, at which time it automatically shuts off the flow of the oil to the furnace, the pump 38, however, continues to run, and when the oil cannot be discharged from the working end of the burner the relief valve 74 opens and permits the accumulated oil pressure to flow back into the system through pipe 75.

One advantage of my improved construction of burner is the conducting of both the air and the oil along in parallel adjacent passageways, whereby the high temperature of the heated oil serves to heat the air just before it is discharged from the burner to mix with the oil spray, thereby greatly facilitating the action of combustion to obtain the maximum efficiency of the burner.

My improved hydrocarbon burner apparatus for furnaces and the like, is very simple and practical in construction and effective in its operation and by its use the heavier oils may be readily mixed with the inflowing oil and burned in the furnace and the flow of either or both the oil and the air may be nicely regulated to obtain the proper combustible mixture in the furnace.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In a fuel feeding system having a fuel feeding conduit, a portion of which is helically formed, a casing surrounding said portion, a boiler, communicating means between the boiler and the casing, an auxiliary heating element within the conduit and means for controlling the heating element by the temperature of the boiler.

2. In a fuel feeding system having a fuel feeding conduit a portion of which is helically formed, a casing surrounding said portion, communicating means between the boiler and casing, an electric heating element within the conduit and means for controlling the heating element by the temperature of the boiler.

3. In a fuel feeding system having a fuel feeding conduit, a portion of which is helically formed, a casing surrounding said portion, a boiler, communicating means between the boiler and the casing, an electric heating element within the conduit and means for operating the electric heating element by the temperature of the boiler.

In testimony whereof I affix my signature.

EDGAR L. NOCK.