Oct. 19, 1926. 1,603,955

J. C. JOHNSON

AUTOMATIC OIL BURNING EQUIPMENT

Filed March 21, 1925 3 Sheets-Sheet 1

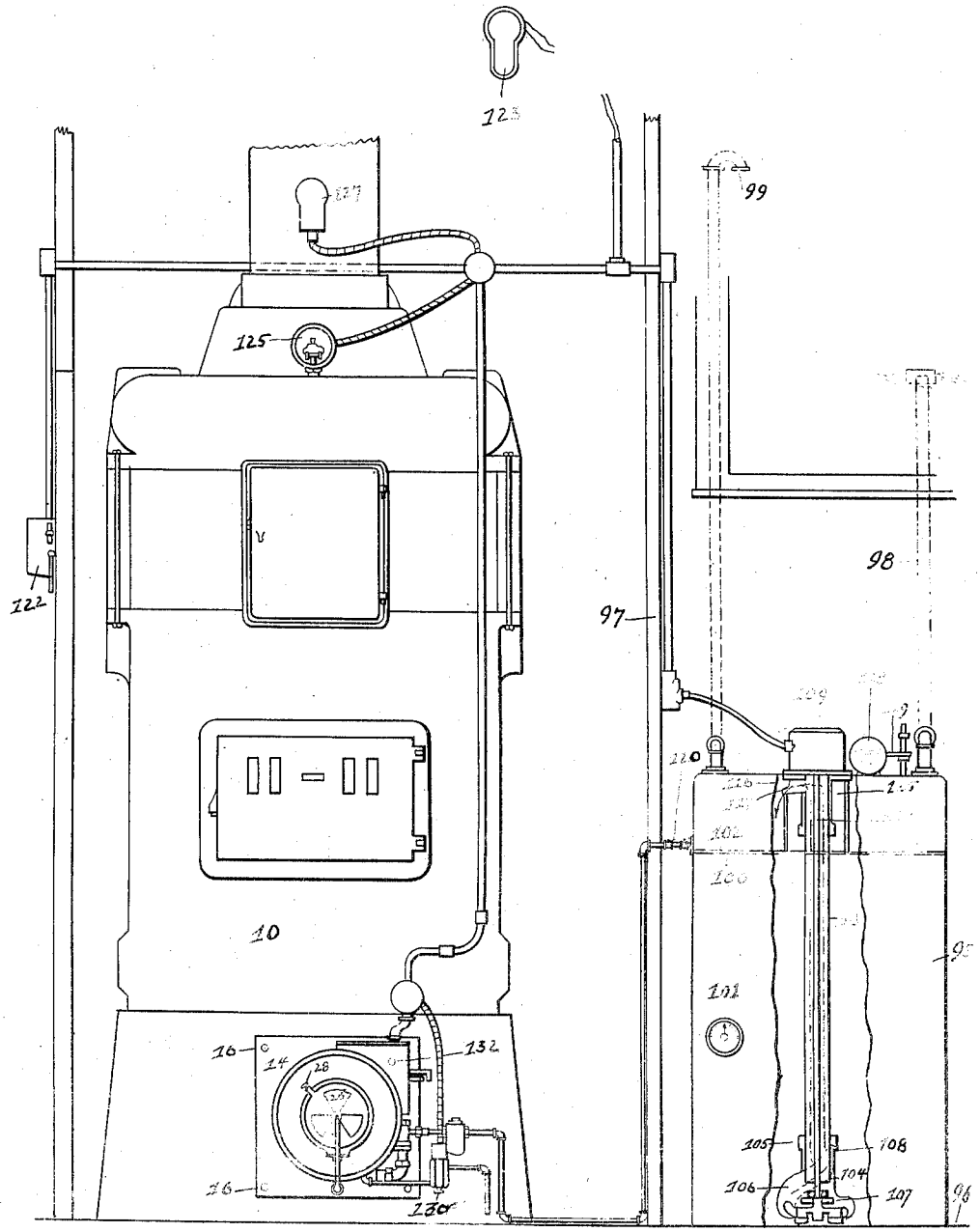


Fig. 1

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Filed March 21, 1925 3 Sheets-Sheet 2

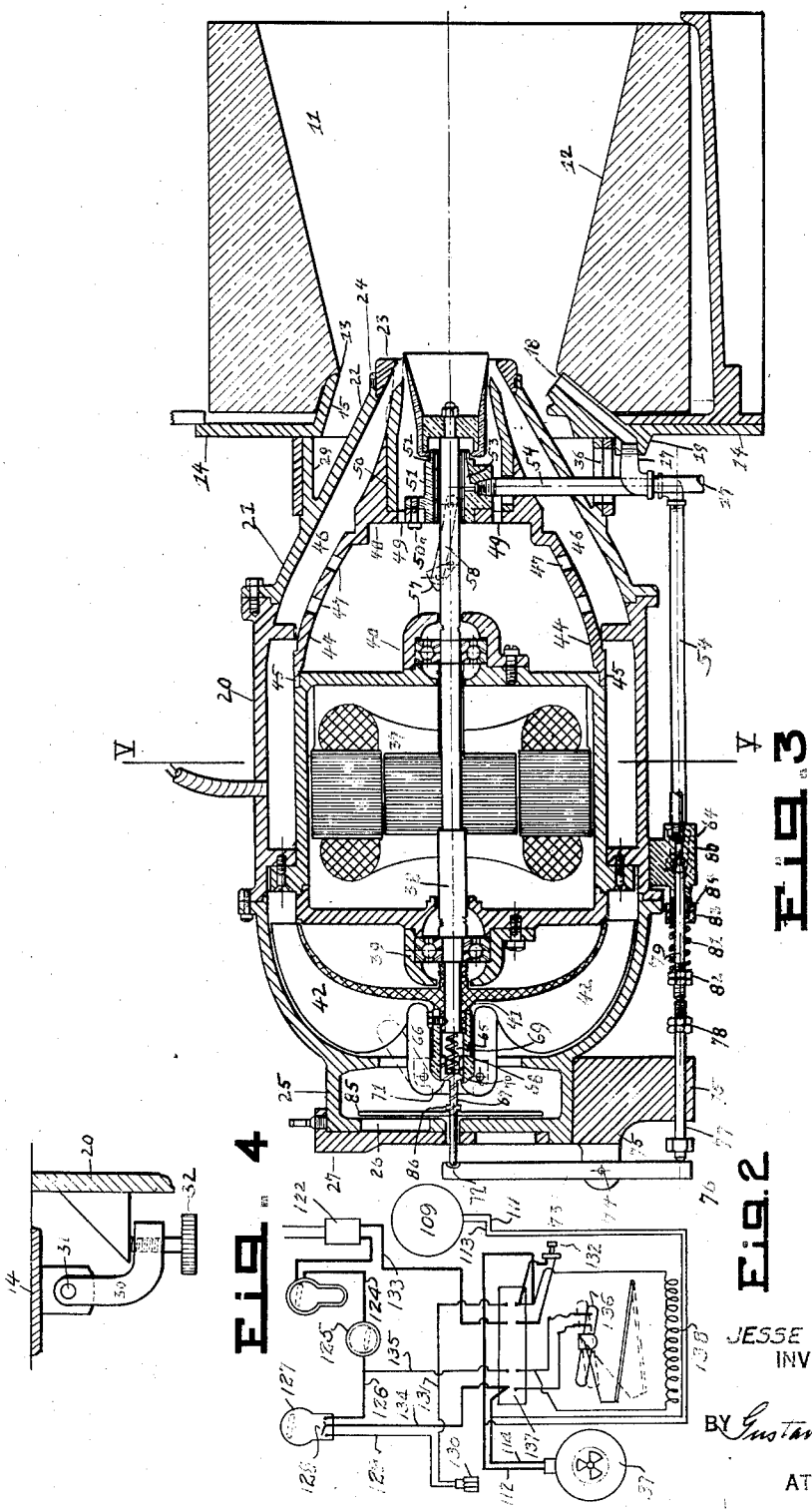


Fig. 2

Fig. 4

Fig. 3

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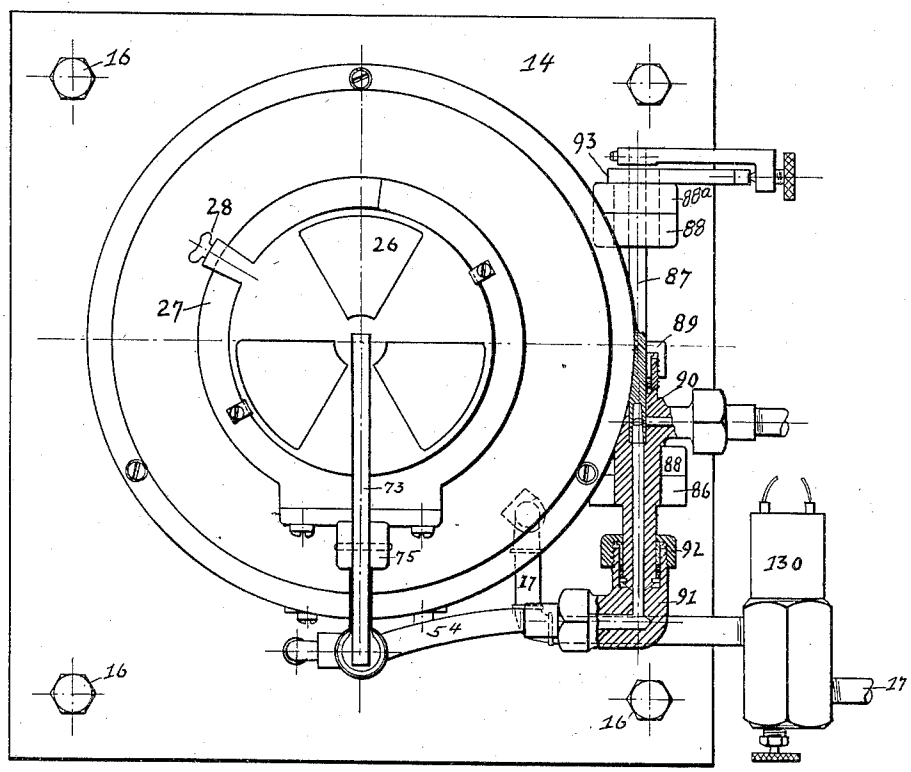


Fig. 7

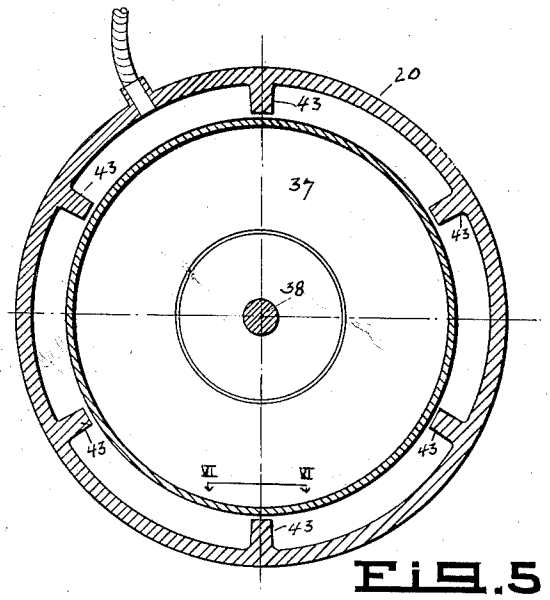


Fig. 5

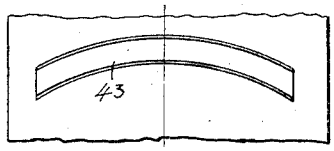


Fig. 6

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UNITED STATES PATENT OFFICE.

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AUTOMATIC OIL-BURNING EQUIPMENT.

Application filed March 21, 1925. Serial No. 17,310.

My invention has its application in connection with the utilization of heavy hydrocarbons, such as fuel oil, kerosene and distillate, as fuel for the rapid generation of heat and relates to an improvement in oil burners, particularly that type employing a horizontal rotary distributing cup and an air pressure means enabling the supplying to a fire box of a finely divided oil spray for intermixture with the required air for combustion.

One of the objects of the present invention is to provide a burner whereby all of the coacting working instrumentalities thereof shall be embodied as a single working unit readily attachable or detachable from the fire-box.

To provide interconnected working instrumentalities whereby the rotation of the propelling shaft is transmitted to the means for operating the oil supply for the delivery of oil through a longitudinally disposed conduit into the rotary atomizing cup.

To provide automatically operating instrumentalities, shown in the present embodiment of the invention, in the form of an oil supply cut-off located exterior of the casing, to prevent a flow of fuel to the burner, when the burner operation is discontinued.

To provide working instrumentalities for the instantaneous ignition of a completely cumbustible mixture at normal temperature for the sustained or continued production of heat by means of a gas pilot light, which result, leaves nothing for the operator to do but to light the pilot burner and start the mixture forming instrumentalities, and which in practice amounts to nothing more than the operation of an electric switch.

To provide a burner simple of construction, efficient in action, economical and durable and one wherein worn parts may be easily and quickly replaced.

And a still further object of the invention is to provide a simple, compact and efficient burner system for domestic and other use.

With the above and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and set forth in the claims hereto appended, it being understood that various changes in the form, proportions, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To more fully comprehend the invention, reference is directed to the accompanying drawings, wherein:—

Figure 1 is a front elevation of an oil burner embodying the invention applied to a furnace;

Fig. 2 a diagrammatical layout of the electrical circuits;

Fig. 3 a vertical sectional view through the burner;

Fig. 4 a plan view of the latch showing its mode of operation in relation to the burner casing;

Fig. 5 a cross sectional view of the motor casing upon the line V—V of Fig. 3;

Fig. 6 a detail of the curved ribs, longitudinally disposed within the motor casing upon the line VI—VI of Fig. 5; and

Fig. 7 an end elevation of the burner shown in Fig. 3.

Referring to the drawings, the numeral 10 (Fig. 1) designates a water tube furnace of the usual construction and therefore unnecessary to describe in detail herein. The oil burner system selected to illustrate the invention, is applied to this furnace and comprises a burner adapted to swing to and from active firing position in the furnace through an aperature, to be hereinafter described.

The present device is herein shown in connection with a fire-box 11 of frusto-conical shape, formed of a refractory material, preferably fire-brick 12; an annular recesss 13 is provided on the outer edge of said fire-box. This fire-box is secured to the inner side of the furnace front. A protecting furnace plate 14, provided with a centrally disposed annular, inwardly directed aperture 15 projecting within the fire-box recess 13, being secured by bolts 16 to the front of the furnace. A gas conduit 17, to supply the pilot burner 18, threaded into a boss 19, formed on the furnace plate 14, extends through the fire-brick 12 and terminates within the fire-box 11.

The burner broadly consists of the burner casing 20, which is substantially circular in cross-section and somewhat reduced in cross-sectional area at its rear or discharge end 21, forming a tapered mouth portion 22, ending into an annular air nozzle 23 projecting

within the fire-box, the air nozzle 23 being secured as at 24, by a short bolt to the tapered mouth portion of the burner casing 20.

The burner casing 20 may be of any suitable construction and in the form here shown, is composed of three sections suitably connected together by bolts passing through flanges at their meeting ends.

The inner end of the casing 20 is inwardly curved, thus somewhat reduced in cross-sectional area and is closed by a casing member 25 provided with centrally disposed sectoral apertures 26, serving as air inlet ports. A circular damper plate 27 is revolubly mounted upon the casing member 25, being shiftable by means of a radially projecting handle 28, it being understood that suitable openings are provided in the damper plate 27, which are adapted to be brought into register with the sectoral apertures of the casing member 25 to control the air supply.

Formed exterior and integral with the tapered mouth portion 22 of the casing 20, is an annular extension member 29, arranged to meet and set against the furnace plate 14. To secure the position of said extension member 29 of the casing to the furnace plate 14, a latch bar 30, pivoted to the furnace plate 14, as at 31, is provided, having a suitable milled set-screw 32 for adjustment.

To rotate this device, an electric motor 37 may be provided comprising the usual field and armature, the latter having a propelling shaft 38 projecting inwardly of the casing 20. The motor 37 is concentrically disposed and journaled within the casing 20 and supported therein by means of ball bearings 39 and 40. The inner end of the motor shaft 38 being extended as shown, has the axle 41 of the fan blades 42 mounted fast thereon. Fan blades being provided in any suitable number, while the blades may be formed of slight curvature if found desirable.

Referring to Fig. 5. The central part of the burner casing 20, enveloping the motor 37, being to some extent larger in cross-sectional area than the circumference of the motor, is suitably spaced therefrom and forming channels around said motor. Air directing means in the form of a series of ribs 43 projecting radially inwardly from the casing 20, are formed integral within said central casing part and in spaced relation to each other, these ribs 43 are formed of a slight curvature as illustrated on Fig. 6. The construction of these ribs is such that when the fan is driven by the motor, air will be forced into the casing part enveloping the motor in a direction parallel to the motor shaft, however, the curvature of the ribs 43 will cause the air current to assume a direction opposite to the rotation of the motor. The air current passes thence the periphery of the motor casing and into the tapered mouth portion 22 of the casing 20.

The outer end portion of the shaft 38 is reduced to receive an atomizing cup. For particular details of this atomizing cup construction, attention is directed to Letters Patent of the United States No. 1,486,383, for rotary oil burners, granted to me March 11, 1924.

An annular direction plate member 44 of frusto-conical form, conforming to the outlet portion of the casing 20, is secured therein by means of lugs 45 being spaced from the outer wall of the casing 20, forming an annular outlet passage 46 for the circulating air set in motion by the fan blades 42. To contribute to the atomizing of the fuel oil, the direction plate member 44 may have a multiplicity of ports 47 therein adjacent the delivery end thereof, preferably extending obliquely to the axis of said member and obliquely circumferentially of said member, the construction being such that the air passing from the annular outlet passage 46 through the ports 47 and 49 is directed inwardly and circumferentially towards the periphery of the atomizing cup to produce a desirable swirling and atomizing effect, which thoroughly breaks up and atomizes the oil to produce an efficient combustible mixture. Provided integral with said annular direction member 44, and approximately near its outer end, is an inwardly extending annular flange 48, provided with a plurality of axial openings 49 serving as air ports. The outer end of the member 44 is inwardly formed to provide a tubular extension 50. Secured to the flange 48, by means of a bolt 50^a is an oil dispenser 51, in the form of a sleeve, and slightly spaced from the rotary shaft 38 driven by the motor at a comparatively high speed. This sleeve is at its outer end reduced to form a boss 52, the inner end of the atomizing cup having a sliding fit with the boss 52. The oil dispenser 51 is provided with an oil passage 53 which is connected to the oil feed conduit 54. The oil feed conduit extends through the casing 20 and direction member 44 and communicates with the oil passage 53 of the dispenser 51. Preferably, the oil supply for the oil passage 53 is supplied by gravity and is discharged therefrom into the atomizer.

For the regulation of the fuel supply to the burner a suitable valve 64 is interposed in the fuel supply conduit 54, leading to the oil passage 53, and this valve is adapted to be controlled by the action of a centrifugal governor element 65 mounted on the shaft 38 including pivotal arms 66. A headed pin 67 is slidably mounted in the collar 68 secured to the governor element 65 and is normally maintained under tension by means of a coil

spring element 69 arranged within said governor element and engaged with a bearing 70 secured to the inner end of the headed pin 67. The pivotal arms 66 are provided with fingers 71, engageable over the head of the slidable pin 67. Thus, when the shaft 38 is rotated, the pivotal arms of the governor element 65, will be thrown outwardly, thereby causing the fingers 71 to move the headed pin 67 inwardly against the tension of the spring 69. The headed pin 67 extends outwardly of the fan casing part and has operative engagement with one arm 72, of a lever 73, fulcrumed as at 74, to a lug 75 secured to the lower fan casing part, the opposite arm 76 of the lever 73, having operative engagement with the valve stem extension 77, slidably mounted within said lug 75, within a bearing therefor provided. The valve stem extension member 77 is provided with adjustable nuts 78, preferably threaded thereon for the purpose of adjusting its lateral movement.

The valve stem 79 of the valve 64, is normally maintained under tension, in a valve closing position by means of a coil spring member 81 arranged about said valve stem and engaged with a bearing, comprising adjustable nuts 82, preferably threaded upon said valve stem 79. Thus, when through the rotation of the shaft 38 the headed pin 67 is forced inwardly, the arm 72, of the lever 73, will be caused to follow the headed pin 67 and move towards the fan casing, thus releasing its pressure at the opposite arm 76, against the valve stem extension 77 and simultaneously against the valve stem 79, also releasing the tension of the coil spring 81, on the valve stem 79 and cause the valve 64 to open for the passage of fuel oil to the burner. To prevent any leakage of oil on the valve stem 79, a stuffing box may be provided therefor, comprising a gland 83 threaded upon the valve casing 80. Said gland is adapted to confine suitable packing material 84 between said gland and the valve stem 79. However, when the shaft 38 is not rotating, the pivotal arms will be permitted to swing downwardly, thereby disengaging the fingers 71 from the head of the pin 67 and allowing the same to return to inactive position by means of the coil spring 69. The headed pin 67 thus will operatively engage the lever 73 and said lever will cause the oil valve to be closed by bearing against the valve stem 79 by means of its extension member 77. Thus a means is provided for automatically discontinuing the supply of fuel oil to the burner upon the stopping of the motor 37.

The gas conduit 17, to supply the gas pilot burner 18, provided for the purpose of igniting the combustible mixture leaving the atomizer, communicates to the main feed line. Interposed in this conduit 17 is an electrically operated gas expanding valve 130 for regulating the flow of gas to the pilot burner 18. This expanding gas valve is interposed for the purpose of admitting a larger quantity of gas to the pilot burner, on commencing the operation of the fuel burner and to maintain the pilot burner lighted against the event of a puff in the furnace, which may otherwise serve to extinguish the pilot burner.

The particular construction of the electrically operated gas expanding valve is immaterial to the present invention and may be of any suitable arrangement.

A circular disk 85 is rotatably mounted upon the headed pin 67, interior of the fan casing part 20 and in close proximity to its outer wall, being secured in this position by means of a small collar 86, secured at the inner side of said disk upon the headed pin 67. Thus, when the pin 67 is forced inwardly, by action of the governor element, the disk 85 will be moved inwardly and permit the air to enter the air inlet ports to the fan blades. However, when the governor element is not rotating, the disk 85 will be positioned against the inner side of the air intake ports and thus efficiently prevent a cold air current to enter and cause a too rapid cooling of the furnace.

Formed on one side of the furnace plate 14 are a pair of supporting lugs 88. The burner casing 20 is hingedly supported on said lugs by means of a pintle formed integral with the dial 93, to be described, and by the casing of the valve 89, as hinge lugs 88^a are formed on said burner casing. An oil supply conduit 87 passes vertically through said pintle members. Interposed in the fuel conduit 87 is a valve 89 associated with a coupling for connecting said valve with an oil reservoir, to be hereinafter described. The valve 89 may have a port 90 for registration with the oil supply conduit 54 to admit oil to the burner when in a firing or closed position, and to prevent the flow of oil to the burner when removed from the fire-box. Secured to the lower end of the oil supply conduit 87, is a hollow pintle member 91, having a packing gland 92 and providing for a rotatable swivel connection for the oil supply conduit 54. By this construction, the burner unit as here shown, is hingedly connected to the furnace plate 14, permitting the burner as a whole, to be swung to, or away from the furnace. The arrangement of the valve 89 is such that the oil supply to the burner is cut off when the burner is removed from firing position. An oil flow adjusting means, in the form of an angle ported construction, being in operative connection within the valve 89, having a dial 93 and an adjustable pointer positioned thereon, is arranged and secured upon the upper end of the oil supply conduit 87.

The oil may be supplied to the burner

from a suitable reservoir 95, (Fig. 1) located within the building on the level of the floor 96 supporting the furnace, said reservoir being preferably separated from the room containing the furnace by a wall 97 of suitable fire-proof material. The reservoir may have a pipe 98 for filling the same and a vent 99 to allow air to pass to and from the reservoir. Formed interior in said reservoir 95 and near its upper portion, is a lateral transverse partition 100, separating the interior of said reservoir 95 into two compartments 101 and 102 respectively. The larger compartment 101, is intended to serve as a storage tank for the fuel oil and the upper compartment 102, being of a smaller capacity, serving as a gravity fuel supply tank for the burner. An indicator gauge is provided, indicating the amount of oil contained therein at any time. Centrally disposed within the reservoir 95 is a vertically disposed tubing 103 extending through the partition 100 and being closed at its lower end as at 104. The tubing 103 supporting on its lower end, approaching in close proximity the bottom of the storage tank, a centrifugal pump 105, comprising a casing 106 having a pump runner 107 journaled therein, a discharge port 108 being in register with a similar port provided in the tubing 103. Operating means for the pump runner 107 comprise an electric motor 109 supported upon the upper surface of the reservoir 95, having a downwardly extending shaft 110, concentrically disposed within said tubing 103, extending through the bottom of said tubing and having bearing therein, and in operative engagement with the pump runner 107.

The motor 109 is connected in parallel with the running circuit of the burner motor 37 by way of the wire 111 to wire 112, and by way of the wire 113 to the wire 114, as illustrated diagrammatically in Fig. 2. The arrangement being such that the motor 109 operating the oil pump 107, cannot operate unless the burner motor 37 is running. Located within the upper compartment 102, and surrounding said tubing 103, is a vertically disposed discharge member 115 having a discharge port 116 in register with the port 117 provided at the upper end of the tubing 103. A float member located within the upper compartment 102 actuates the circuit breaker 118, by means of an outwardly extending member 119 of the float member. The circuit breaker 118 is connected in series with the motor circuits 111 and 113 respectively.

The particular construction of this circuit breaker is immaterial to the present invention and may be of any suitable arrangement.

The arrangement is such, that when the upper compartment 102 is nearly emptied, the float will actuate the circuit breaker to assume a closed position and start the motor to operate the pump runner 107. By the action of the pump runner oil will be forced upwardly into the upper compartment by means of the tubing 103 serving as a conduit and be discharged therefrom through the port 116. The float will rise with the oil supplied into the upper compartment 102, and on attaining a predetermined height will actuate the circuit breaker 118 to an open position and disconnecting the motor circuit to stop the motor.

Ensuing steps in the operation of filling the upper compartment 102 will be a repetition of those just described, as long as the burner motor 37 is operating.

The oil may be fed from the upper compartment by gravity through a conduit 120 projecting from a point adjacent the bottom of said compartment and thence through the wall 97 down to the floor 96 where it communicates with the pintle 87 to the burner. A suitable strainer is interposed in said conduit 120 near the delivery end thereof to prevent solid matter from entering the oil supply valves.

A circuit breaking safety switch 132 in series with the running circuit is conveniently arranged adjacent the burner casing.

Referring now to the circuits illustrated in Fig. 2, the main operating circuit for regulating the operation of the burner motor 37 is indicated in heavy lines. A source of current is connected by one terminal with one pole of a double pole single throw switch 122, the corresponding terminal to that pole leading to a room thermostat 123, adjusted to a predetermined degree of temperature. This thermostat has connection in series by way of the wire 124 with the pressure controlled circuit breaker 125. This pressure controlled circuit breaker has connection with the steam header of the boiler and is arranged to open the circuit when a steam pressure above a predetermined maximum obtains within the boiler.

The particular construction of the circuit breaker 125 is immaterial to the present invention and may be of any suitable arrangement.

Connected in series with the pressure operated circuit breaker 125 by way of the wire 126 is the thermostatic circuit breaker 127. The thermostatic circuit breaker is positioned in, or adjacent, the main burner where the differential expansion member 128 will be subjected to the heat from the burner.

This circuit breaker is controlled thermally, but like the circuit breaker 125, the particular principle of operation of this element is immaterial to the present invention.

Connected in series with the thermostatic circuit breaker 127 by way of wire 129, is the coil of an expanding gas valve 130, connected by way of wire 131 to the safety

switch 132, and by way of wire 133 extending back to switch 122 completing the circuit.

The arrangement is such that when the thermostatic members 123, 125 and 127 are cold, contact will be had between the wires 129 and 134 energizing the expanding gas valve 130, the circuit then being complete from the switch 122 through the room thermostat 123, wire 124, pressure controlled circuit breaker 125, wire 135, timed circuit breaker 136, wire 137 to wire 114 to burner motor 37, and by wire 112 extending back to safety switch 132 and by wire 133 to the other pole of the switch 122.

When the burner has been ignited and has burned for a short interval, the differential expansion occurring to the member 128 will flex the same to one side, thus breaking contact between the wire 129 and the wire 134, interrupting the circuit and de-energizing the coil of the expanding gas valve 130.

The timed circuit breaker 136, is thermally operated by means of the thermal coil 138, connected in series with the wire 135 and the wire 131. This timed circuit breaker comprises a flexing element 136, forming normally, or when the coil 138 is cold, a closed circuit between wires 135 and 137. Bearing against one end of the element 136 is a lever, operatively connected to a thermostatic metal member arranged adjacent to the coil 138. The arrangement is such, that, when the motor has been running for a short interval, the coil 138 of the timed circuit breaker heated by the current, will cause the thermostatic metal member to operate the lever connected with the flexible element 136 sufficiently, to open the circuit between the wire 135 and the wire 137 and would stop the motor 37 except, that during the aforesaid short interval the expansion member 128 of the thermostatic circuit breaker 127, being subjected to the heat of the burner in operation, will flex from wire 129 to wire 126 and close the circuit between the wire 134 and the wire 126, thus completing the operating circuit to the motor 37 by way of wire 126, expansion member 128, wire 134, wire 114 to motor 37 and by way of wire 112 to safety switch 132 and by way of wire 133 extending back to switch 122.

If the expanding gas valve 130 should fail to operate to ignite the fuel oil supply, or for any reason the fuel oil supply to the burner should fail, the thermostatic stack control member would receive no heat from the burner, and consequently would not flex the member 128, to close the circuit between the wires 134 and 126 to operate the motor. The heat generated in the coil 138 under these circumstances would be sufficient in a short time to cause the thermostatic metal member to actuate the lever to flex the element 136 sufficiently to open the circuit to the motor and shut down all of the equipment. In operating the invention, the only act incumbent upon the operator, or attendant in starting the burner, is in lighting the gas pilot burner and in closing the switch 122. This completes the starting regulating circuit to the room thermostat 123, wire 124, the pressure operated circuit breaker 125, wire 135, timed circuit breaker 136, wire 137 to the motor 37, wire 112, safety switch 132, wire 133 extending back to switch 122. The operation of the motor 37 now operates through the centrifugal governor 65, to open the fuel valve 80, thoroughly carburet the liquid fuel issuing from the oil supply conduit 54, and discharge the resulting mixture from the atomizing cup. This mixture is then ignited by the gas pilot burner 18, positioned adjacent and below the atomizer within the furnace. The heat from the burner soon bows the expansive member 128 of the thermostatic circuit breaker 127, to the position shown in the dotted lines, interrupting the circuit to the coil of the expanding gas valve 130. With the burner now running steadily, assume that an excessive steam pressure is generated in the boiler. This will act on the circuit breaker 125, interrupt and open the motor circuit. Upon cessation of the operation of the motor 37, the centrifugal governor 65 operates to close the fuel valve 80, and accordingly the fire is entirely extinguished. Meanwhile, until the undesirable condition within the boiler is corrected, the thermostatic circuit breaker 127 is cooling and contracting to a closed circuit condition. The gradual lowering of the steam pressure in the boiler will eventually complete the regulating circuit through the circuit breaker 125. This completion of the regulating circuit will again start the operation of the motor and soon generate a combustible mixture in the burner to be ignited by the flame from the pilot burner. Ensuing steps in the cycle of operation will be a repetition of those just described, and the cycle will be gone through again and again, as long as the switch 122 is closed. When heat is no longer required for the boiler and it is desired that the burner be entirely shut off, the switch 122 is opened to break all circuits.

I claim:

1. An automatic oil burning equipment having, in combination, an atomizing burner, a motor for rotating said atomizer, an electric running circuit and an electric operating circuit, operatively connected, for said motor, said running circuit comprising fuel oil supply means, an expanding gas valve and a timed circuit breaker connected with the motor, said operating circuit comprising thermostatic responsive means, including a temperature actuated stack control in series

with the motor operating circuit, said temperature actuated stack control arranged when cool, to close the running circuit to said motor, to the said expanding gas valve and to the said timed circuit breaker, and when heated by the burner, arranged to flex its contact member to interrupt the running circuit to the motor and to the expanding gas valve and closing the operating circuit to the motor including to said thermostatic responsive means.

2. An automatic oil burning equipment having, in combination, an atomizing burner, a motor for rotating said atomizer, an electric running circuit and an electric operating circuit for said motor, said running circuit comprising fuel oil supply means, an expanding gas valve and a timed circuit breaker connected with the motor, said running circuit connected with the operating circuit to the motor by means of a thermostatic actuated stack control circuit breaker, said thermostatic stack control arranged when cool, to close the running circuit to said motor, the said expanding gas valve and to the said timed circuit breaker, and when heated by the operating burner, arranged to flex its contact member to interrupt the running circuit to the motor and to the expanding gas valve and to close the operating circuit to the motor.

3. An automatic oil burning equipment having, in combination, an atomizing burner, a motor for rotating said atomizer, an electric circuit for said motor, a fuel oil supply means connected in parallel with the motor circuit, an expanding gas valve, and a room thermostat operated means for opening and closing the circuit between desired limits of temperature and a temperature actuated stack control connected with the said motor circuit, said stack control arranged, when cool to close the circuit to said expanding gas valve and when heated by heat from the burner to flex its contact to close the circuit to said room thermostat operated means and de-energize the expanding gas valve when the burner is ignited.

4. An automatic oil burning equipment having, in combination, an atomizing burner, a motor for rotating said atomizer, an electric circuit for said motor, a fuel oil supply means connected in parallel with the motor circuit, an expanding gas valve and a boiler temperature operated means for opening and closing the circuit under predetermined conditions connected in series with the motor circuit, a temperature actuated stack control connected with the motor circuit and arranged when cool to close the circuit to the expanding gas valve and when heated by heat from the burner to flex its contact to close the circuit to said boiler temperature operated means and de-energize the expanding gas valve when the burner is ignited.

5. An automatic oil burning equipment having, in combination, an atomizing burner, a fuel supply means for said burner, a motor for rotating said burner atomizer, an electric running circuit and an electric operating circuit for said motor, an expanding gas valve and a timed circuit breaker included within said running circuit, means operated by said expanding gas valve for igniting the fuel supplied, a temperature actuated stack control circuit breaker interposed between said two circuits, said temperature actuated stack control circuit breaker arranged when cool, to close the running circuit to the motor, to the expanding gas valve and to the timed circuit breaker, and arranged, when heated by the operating burner to flex its contact member to interrupt the circuit to the expanding gas valve and closing the operating circuit to the motor, thereby preventing the timed circuit breaker from interrupting the motor circuit after the burner is ignited.

6. An automatic oil burning equipment having, in combination, an atomizing burner, a fuel supply means for said burner, a motor for rotating said atomizer, an electric running circuit and an electric operating circuit for said motor, an expanding gas valve and a timed circuit breaker included within said running circuit, means operated by the expanding gas valve for igniting the fuel supply, a temperature actuated stack control circuit breaker interposed between the said two circuits and arranged when cool, to close the running circuit to the motor, to the expanding gas valve and to the timed circuit breaker, said timed circuit breaker arranged, when heated by the electric current to flex and break the motor running circuit upon failure of the expanding gas valve to operate in igniting the burner.

7. An automatic oil burning equipment having, in combination, an atomizing burner, a fuel supply means for said burner, a motor for rotating said atomizer, an electric running circuit and an electric operating circuit for said motor, an expanding gas valve and a timed circuit breaker included within said running circuit, means operated by the expanding gas valve for igniting the fuel supply, a temperature actuated stack control circuit breaker interposed between the said two circuits and arranged when cool, to close the running circuit to the motor, to the expanding gas valve and to the timed circuit breaker, said timed circuit breaker arranged, when heated by the circuit current to flex and break the motor running circuit upon failure of the fuel supply means to operate, resulting in failure of the burner to ignite.

In testimony whereof I have affixed my signature.

JESSE C. JOHNSON.