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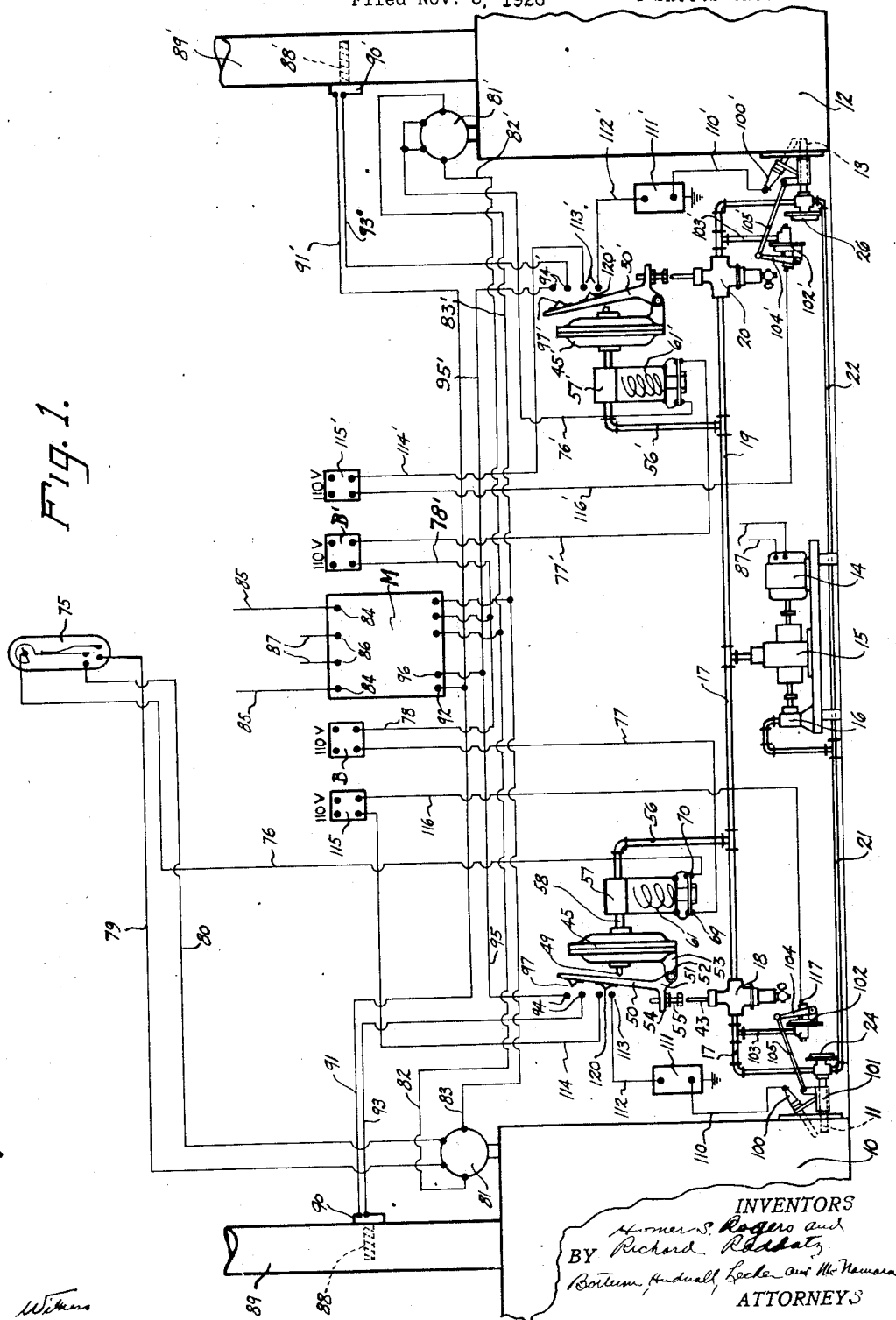
H. S. ROGERS ET AL

1,884,256

CONTROL FOR OIL BURNING APPARATUS

Filed Nov. 3, 1926

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

Fig. 2.

Fig. 3.

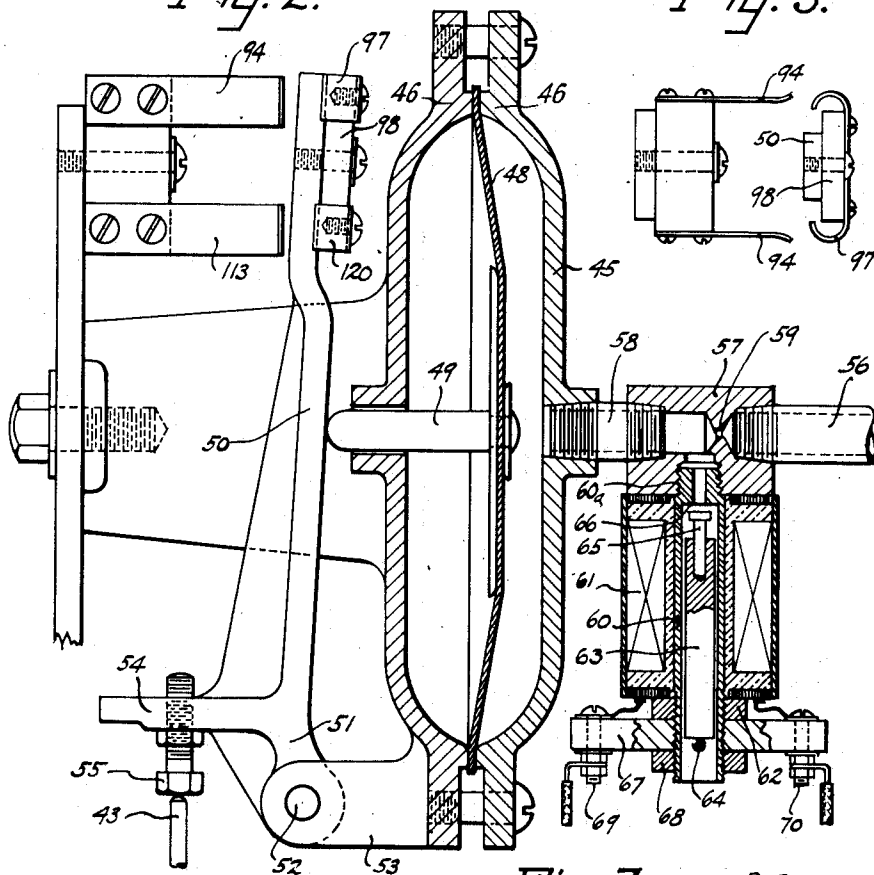
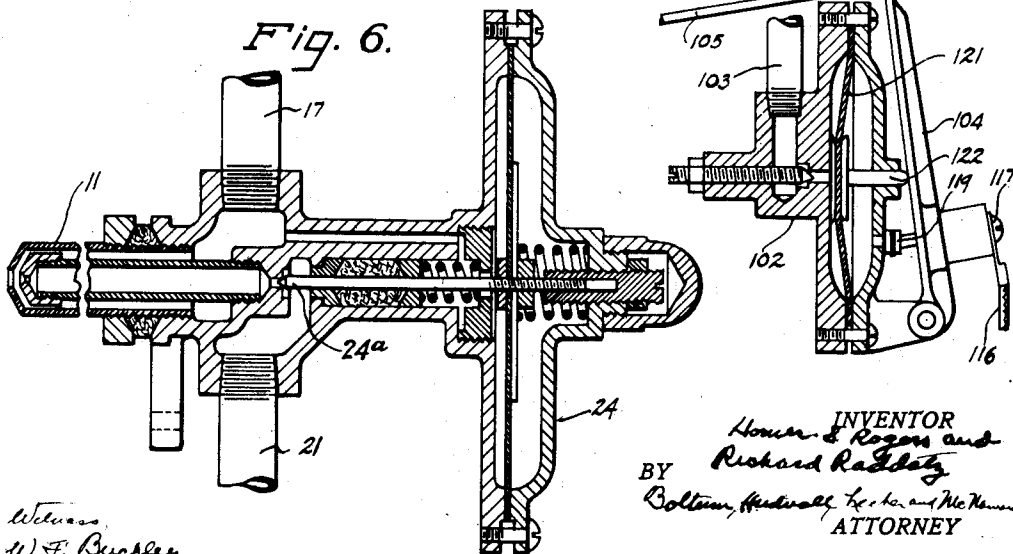


Fig. 7.



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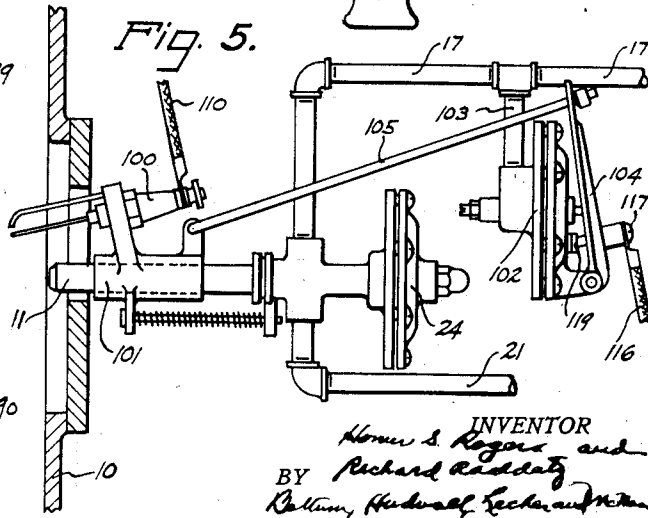
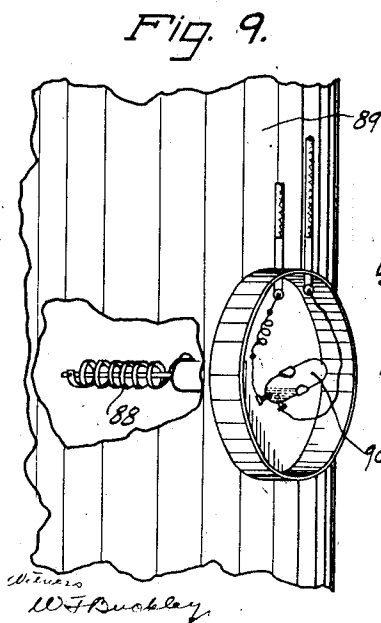
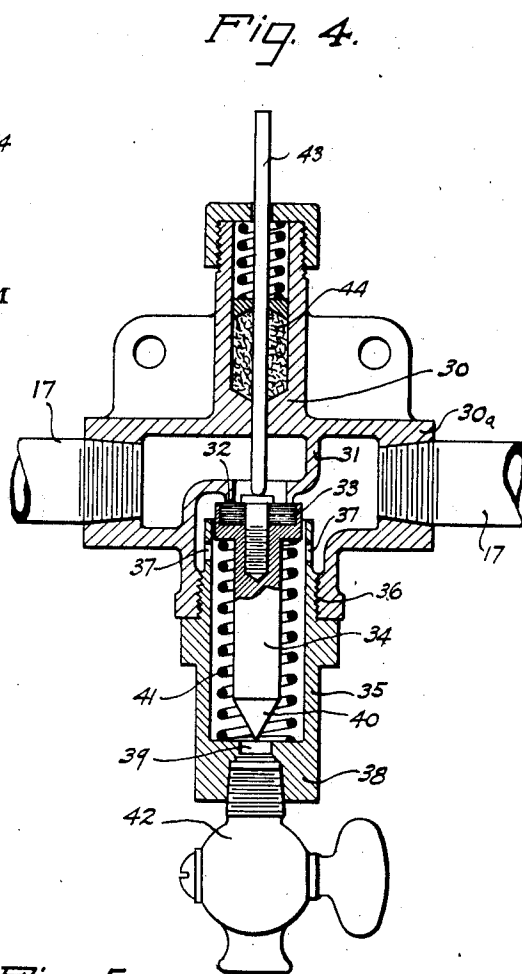
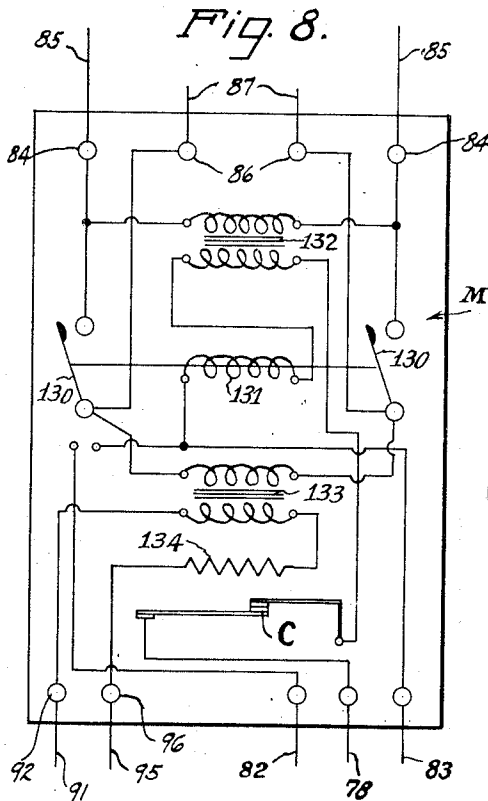
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CONTROL FOR OIL BURNING APPARATUS

Filed Nov. 3, 1926

4 Sheets-Sheet 3



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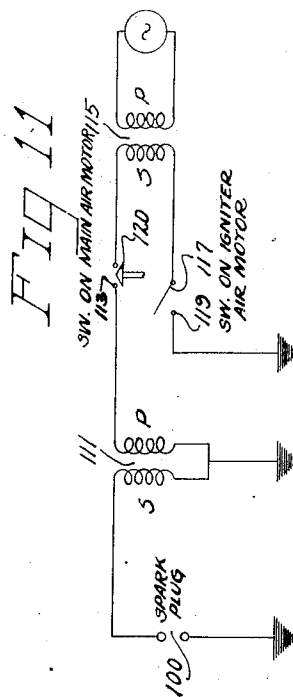
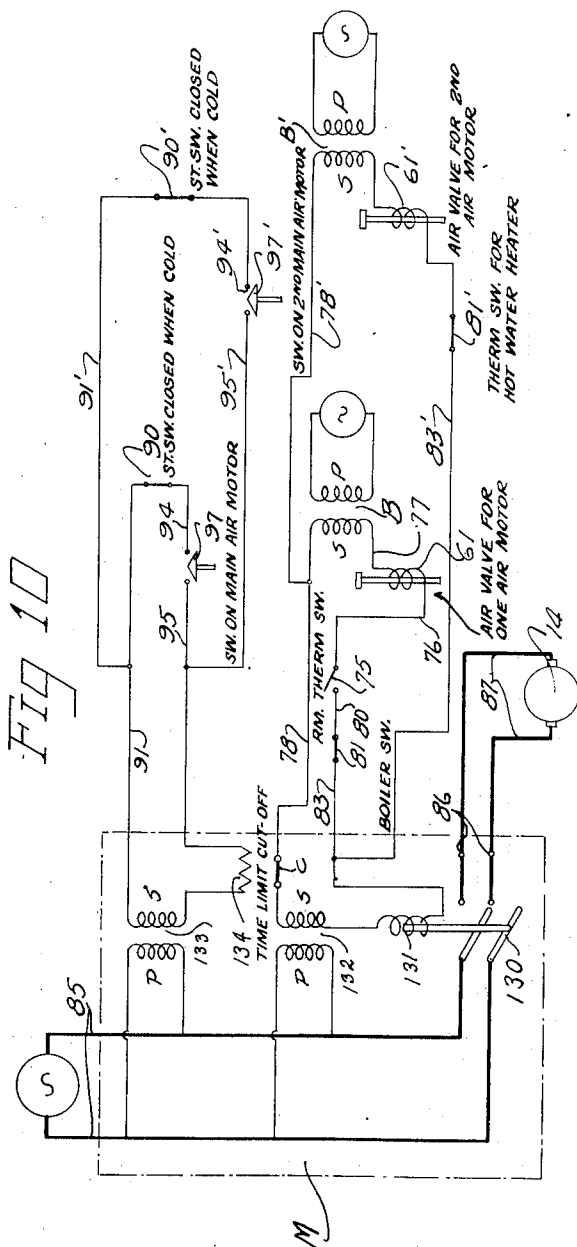
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CONTROL FOR OIL BURNING APPARATUS

Filed Nov. 3, 1926

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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CONTROL FOR OIL BURNING APPARATUS

Application filed November 3, 1926. Serial No. 145,934.

This invention relates in general to oil burning apparatus or installations, and more particularly, to controls for oil burning apparatus or installations embodying a plurality of separate burners which are separately and independently regulated and controlled though supplied with fuel from a common source.

One of the objects of the present invention is to provide, in oil burning apparatus having a plurality of burners, a single means common to all of the oil burners for supplying the same with fuel, and control means for the respective burners for controlling the fuel supply thereto from the common source in accordance with the requirements of any one burner and independently of the requirements of the other of the burners.

Another object is to provide, in oil burning apparatus having a burner nozzle, means disposed at the nozzle for igniting the combustible mixture issuing therefrom, and valve means for controlling the flow of oil-atomizing air to the nozzle; means common to the igniting means and said valve means for controlling the same.

Another object is to provide, in oil burning apparatus, a fluid-pressure motor operable upon admission of fluid under pressure thereto to control the fuel supply to the burner, and electro-responsive means for controlling the flow of fluid under pressure to the motor.

Another object is to provide, in oil burning apparatus such as is now in extensive use and having a plurality of burners, improved controlling means which may be readily incorporated therein and which provides for and controls the supply of fuel to the separate burners from a common source, and which may be installed without necessitating any material change in the construction and arrangement of the various parts of such apparatus.

In carrying out the present invention, a single compressor, motor and pump unit is

provided for a plurality of burners and is operable to supply each burner according to its individual requirements and independently of the requirements of the other burners. In the present embodiment of the invention this desirable action is effected by employing burners in which oil is supplied under pressure to all the burner nozzles whenever the oil pump is operated, the oil, however, not being admitted to the atomizing space of any burner until air in sufficient quantity to ensure proper atomization is supplied to the burner or burners. The outlet or discharge of the compressor is connected by suitable air lines to the several burners so that whenever the compressor is operating it supplies air under pressure to the several lines sufficient to operate all of the burners. A valve unit is incorporated in each air line and is opened to bleed or vent the air of its line to the atmosphere when its burner is not operating. Operating means is provided for each valve and preferably comprises a fluid-pressure motor supplied with air from the associated air line, but also vented to the atmosphere when the burner which it controls is not in operation. A solenoid controlled valve regulates the venting of each fluid pressure motor to the atmosphere and each solenoid controlled valve has the windings of its solenoid connected in series with the circuit of the thermostat which primarily controls the operation of the burner so that when such thermostatic circuit is closed and the motor, pump, compressor unit is operated the solenoid operated valve will also be closed, whereby the fluid-pressure motor will be operated to close the vent in the associated air line and start up the associated burner and this irrespective and independently of whether the other burner is operating or not. The operation of the fluid pressure motor is also utilized to regulate and control the action of the sparking device employed with each burner to ignite the combustible mixture and also to regulate the safe-

ty stack control employed in conjunction with the burners or heating appliances with which the burners are associated. By placing the several safety stack controls or safety devices under the control of the fluid pressure motors, but a single relay is required in conjunction with all the circuits employed.

For the purpose of illustrating the invention, one embodiment thereof is shown in the drawings, in which

Fig. 1 is a diagrammatic view of a complete oil burning installation having two burner nozzles which are supplied with oil and atomizing air from a common source;

Fig. 2 is a detail, partly in side elevation and partly in vertical central section, showing one of the main fluid-pressure motors of the dual control and the parts associated therewith.

Fig. 3 is a partial plan view of Fig. 2 showing the switches controlled by the associated fluid-pressure motor.

Fig. 4 is a view, partly in section and partly in elevation, showing one of the control valves governed by the fluid-pressure motors.

Fig. 5 is a fragmentary view in elevation showing one type of nozzle and ignition means that may be employed.

Fig. 6 is a sectional view of the nozzle and its motor control.

Fig. 7 is a sectional view of the ignition motor control.

Fig. 8 is a diagrammatic view illustrating the relay employed with the control.

Figure 9 is a fragmentary perspective view showing one type of stack or flame safety device employed with each burner.

Figure 10 is an elementary circuit diagram showing the electrical connections used in controlling the supply of air and oil to the burners; and

Figure 11 is a circuit diagram showing the electrical connections for an electrical ignition system used with one of the burners.

In Fig. 1 a boiler or furnace 10 is shown as being provided with an oil burning nozzle 11, and a hot water heater 12 is shown as being provided with a similar oil burning nozzle 13, the nozzles being supplied with oil and atomizing air by a single compressor, motor and pump unit, including an electric motor 14, an air compressor 15 and an oil pump 16, the compressor and pump being connected to the motor for operation thereby. An air line 17 provides communication between the compressor 15 and the nozzle 11 and is provided with a controlling valve unit designated generally at 18 and hereinafter more fully described. In like manner, an air line 19 provides communication between the compressor and the nozzle 13 and is provided with a controlling valve unit designated generally at 20 and which is similar in construction and manner of operation to the valve unit 18. Oil is supplied to the nozzle 11 through an oil

line 21 leading from the pump 16, while an oil line 22 supplies nozzle 13 with oil from the pump. Associated with the nozzle 11 is a fluid-pressure motor 24 which operates upon the flow of compressed air to the nozzle to open a needle valve 24* in the latter, the needle valve normally preventing flow of oil into the nozzle, but when open permitting ready flow of oil to the atomizing space of the nozzle. The motor 24 thereby provides against any flow of oil into the nozzle until the same is supplied with compressed air in sufficient quantity to properly atomize the oil. This type of nozzle 11 and its fluid pressure motor 24 are fully shown and described in a copending application filed October 10th, 1925, Serial No. 61,733 and to which reference is made for a detailed disclosure of these parts. It is to be understood, however, that the particular construction of these parts may be varied. A fluid-pressure motor 26 similar in construction and manner of operation to the motor 24 is associated with the nozzle 13 and serves a similar purpose as the latter, namely, to permit flow of oil from the pipe line 22 into nozzle 13 only when the nozzle is supplied with air under sufficient pressure and in sufficient amount to properly atomize the oil.

The valve units 18 and 20 are of identical construction so that the description of the valve unit 18 will apply also to the valve unit 20. As shown in Figure 4, the valve unit 18 comprises a casing 30 having internally threaded nipples 30* connected with sections of the supply line 17. Internally, this casing 30 has a ported partition 31 around the port of which a valve seat 32 is provided. A valve 33 coacts with the valve seat 32 and controls the flow of air through the port of the partition 31. This valve 33 is carried at the upper end of a valve stem 34 which operates in the casing 30 and in a tubular extension 35 thereof, the extension 35 being threadedly connected as at 36 with the casing 30. The inner portion of this extension 35 is provided with ports 37 which afford communication between the interior of the extension 35 and the inlet side of the valve casing 30. The lower end of the extension is provided with a head or end wall 38 having an opening 39, the inner portion of the wall of which is formed to constitute a valve seat with which a valve 40 formed on the lower end of the stem 34 coacts. A spring 41 encircles the valve stem 34 and has its upper end abutting the under side of the valve 33 and its lower end abutting the end wall 38 of the extension 35, this spring 41 being compressed to close the valve 33 and open the valve 40, that is, the spring holds the valve 33 against its valve seat 32 and maintains the valve 40 spaced from its valve seat.

With this construction the air supplied to the air line 17 when the compressor 15 is

operating flows into the inlet side of the valve casing 30 through the ports 37 and through the extension 35 to the outlet opening 39. The escape of this air through the outlet opening is regulated by means of a

cock 42 threadedly connected with the wall of the opening 39 below the valve seat thereof.

A plunger 43 is slidably mounted in a combined guide and stuffing box 44 provided therefor in the casing 30, the lower end of this plunger 43 engaging the valve 33 and the upper end thereof projecting above the combined guide and stuffing box 44. When the plunger 43 is depressed it pushes the valve 33 away from its seat 32 and moves the valve 40 into engagement with its seat, thereby preventing escape of the air to the atmosphere and permitting the air to flow through the air line 17 to the burner nozzle 11.

The valve 18 is under the control of a fluid-pressure motor designated generally at 45 and comprises a hollow casing 46 in which flexible diaphragm 48 is mounted for operative movement. The diaphragm 48 carries a pin 49 which extends loosely through an opening provided therefor in one wall of the casing and projects outwardly beyond the casing to engage an arm 50 of a lever designated generally at 51, the lever being fulcrumed as at 52 on a bracket 53 carried by the motor casing and having a second lever arm 54 carrying adjustable abutment member 55 which is engageable with the plunger 43 of the valve 18.

Fluid pressure is supplied to the motor 45 from the air line 17 through a branch pipe 56, one end of the branch pipe communicating with that portion of the air line located between the compressor 15 and the valve 18. The opposite end of the air line is coupled to a union 57 which is in turn connected to the casing 46 by means of a nipple 58, there being a restricted opening or aperture 59 in the union 57 between the branch pipe 56 and the nipple 58. As shown, the nipple 58 communicates with the interior of the casing 46 on the opposite side of the diaphragm 48 from that on which pin 49 is located. A combined vent pipe and solenoid support 60 is provided and has its upper end threadedly connected as at 60^a with the union 57, the connection being such that the upper open end of the vent pipe communicates with the passage through the union at a point between the restricted aperture 59 and the nipple 58. The lower end of the vent pipe 60 is open to the atmosphere. A solenoid 61 is mounted on the combined vent pipe and solenoid support and is held in position thereon by means of a nut 62 threaded on the combined bent pipe and solenoid support and engaging the lower end of the solenoid. Solenoid 61 has a slidable core 63 associated therewith, the core 63 being

loosely fitted within the combined vent pipe and solenoid support 60 and being limited in its downward movement by means of a cross pin 64 carried by the combined vent pipe and solenoid support 60. At its upper end the core 63 carries a valve 65 which coacts with a valve seat 66 provided adjacent the upper end of the combined vent pipe and solenoid support, the valve 65 when engaged with its seat 66 serving to prevent escape of the air from the union 57 to the atmosphere but permitting such escape of the air when it is disengaged from its seat. A support 67 is clamped on the combined vent pipe and solenoid support between the nut 62 and a nut 68 and this support carries binding posts 69 and 70, these binding posts being electrically connected with the terminals of the windings of the solenoid.

With this arrangement, whenever the compressor is operating, air under pressure is supplied to the air line 17 and to the branch pipe 56 and this air flows into the union 57 and through the restricted aperture 59 thereof. The air after passing through the restricted aperture may pass on into the casing of the motor 45 but it also may and does escape to the atmosphere through the vent pipe 60 as long as the valve 65 remains open. The core 63 does not materially interfere with this escape of the air since it has a loose fit in the vent pipe 60. As a consequence of this venting or bleeding of the branch pipe 56 and motor casing 45, air pressure will not build up in the motor casing to flex the diaphragm 48 until the valve 65 is closed. When the valve 65 is closed, the escape of air to the atmosphere is prevented and the pressure builds up in the casing of the motor and flexes diaphragm 48 to project the pin 49 into engagement with the lever 51, thereby to swing the lever 51 about its fulcrum to cause the abutment member 55 to press downwardly on the plunger 43. Downward movement of the plunger 43 opens the valve 33 of the valve unit 18 and closes the valve 40 thereof, as previously described.

The cock 42 is so adjusted that when the valve 40 is open it will permit escape of air to the atmosphere in an amount equal to the amount of air necessary to be supplied to nozzle 11 for its proper operation, and since this amount varies with different nozzles and according to their location with respect to the compressor 15, it will be seen that the cock 42 provides simple means for adjusting the apparatus to meet varying conditions. Assuming that motor 14 is operating and valve 65 remains open, a relatively small amount of compressed air will flow through the branch pipe 56 and the aperture 59 and escape to the atmosphere by way of the vent pipe 60, and an amount of air equal substantially to that required for normal operation of nozzle 11 minus the small amount flowing

through aperture 59 will escape to the atmosphere by way of the cock 42. However, when the valve 65 is closed, the motor 45 is actuated to close the valve 40 and open the valve 33, air in amount sufficient to operate properly the nozzle 11 is at once available and is supplied thereto.

Simultaneously with the supply of atomizing air and oil to the burner nozzle 11, ignition means is brought into operation to ignite the combustible mixture and this ignition means preferably comprises a spark plug 100 mounted on a sleeve 101 slidable longitudinally along the nozzle and urged at all times to the left by any suitable means, such as a spring. Upon the ignition of the oil spray by the spark plug, the same is automatically withdrawn to the right and out of the zone of combustion by means of a fluid-pressure motor 102 connected to the air line 17 through the branch pipe 103 and provided with an operating arm 104 connected by a rod 105 to sleeve 101. The construction of a motor of the type of motor 102 has been more fully shown and described in co-pending application Serial No. 60,936, filed October 7, 1925, the general operation being to withdraw the spark plug 100 gradually to the right out of the zone of combustion upon admission of compressed air into branch pipe 103 and after ignition of the oil spray by the spark plug 100, the motor operating when the burner is shut down to permit of relatively rapid return movement of the spark plug 100 to the left under the action of the spring provided where it will be in position ready to ignite the oil spray when the burner is operated again.

As shown in Figures 1 and 11, the spark plug 100 is connected to a wire 110 which leads to one end of the secondary coil of a conventional coil box 111, the other end of the secondary coil being grounded as shown. A wire 112 leads from one of the contacts of a switch 113 to the primary coil the other end of which is connected to the ground terminal of the secondary. The other contact of the switch 113 is connected by wire 114 with a secondary transformer 115, the other terminal of which is in turn connected with the wire 116 which leads back to a contact 117 mounted on a swinging arm 104 pivotally supported on the fluid-pressure motor 102. The contact 117 is insulated from the arm 104 but in certain phases of the operation is engageable with a contact 119 grounded on the motor casing 102. The contacts of switch 113 are adapted to be electrically connected by contact 120 carried by and insulated from the lever arm 50 in the same manner as the contact 97. The coil arrangement in the box 111 is preferably of the type which has a vibrator and condenser therein for causing a high secondary voltage. It will now be understood that when the com-

combustible mixture is supplied to the nozzle 11, the contact 120 will be engaged with the contacts 113 and the circuit for the primary of the coil in box 111 will be completed to cause a spark to jump across the electrodes of the spark plug in the usual manner to ignite the combustible mixture. After ignition of the combustible mixture and while the burner is operating, the circuit for the primary coil in box 111 is broken by virtue of action of the diaphragm 121 of the motor 102, this diaphragm being flexed at such time to project its pin 122 rearwardly of the motor casing, whereby to swing the arm 104 to disengage the contacts 117 and 119 and break the high tension circuit. This swinging movement of the arm 104 serves not only this purpose but also the retraction of the spark plug 100, as hereinbefore described. It is to be understood that the primary coil of the transformer 115 is connected to a suitable supply as indicated.

For the purpose of controlling the operation of nozzle 11 to maintain the temperature of a room, for example, at a predetermined fixed point, a thermostat of the usual and well known construction, designated generally at 75, is disposed in the room at some convenient place and is connected through the wire 76 with solenoid 61, the latter in turn being connected through line 77 to one end of the secondary of what might conveniently be termed a booster transformer B, the other end of this secondary being connected through the line 78 with the conventional relay M. The room thermostat 75 is also connected through the lines 79 and 80 to a safety thermostat 81 of any well known construction and which is associated with the boiler or furnace 10, as shown, and is responsive to the temperature thereof, the thermostat 81 being in turn connected as shown through lines 82 and 83 to relay M. The primary coil of the transformer B is connected to a suitable supply, as indicated. The posts 84 of relay M are connected to the supply lines 85, while the posts 86 are connected through the lines 87 to motor 14. As shown in Figures 8 and 10, the relay unit M provides a main circuit connection for the motor 14 from the supply lines 85, through main switch 130. The switch 130 is normally open but is closed by an electromagnet 131 when it is energized. As shown in Figure 10, the electromagnet is in series with the secondary of a transformer 132, the thermostatic switch C, secondary or transformer B solenoid 61, room thermostat 75, and a boiler control switch 81. This series circuit thus provides one of the control circuits for main switch 130 which controls the motor 13 and also provides a control circuit for solenoid 61, which controls the supply of air to the fluid pressure motor 45.

A second safety device in the form of the usual stack control is provided and comprises

a coiled thermostatic element 88 extending into the stack 89 of the furnace 10 and a mercury switch unit 90 mechanically connected to element 88 for tilting movement thereby, the mercury switch being connected by the line 91 to post 92 of relay M and by the line 93 to one of a pair of contacts 94, the other contact 94 being connected through line 95 to a post 96 of the relay. As shown in Figures 8 and 10, these connections place the stack control switch 90 in series with the switch 94, the secondary of a transformer 133, and a heating resistance 134. The heating resistance is placed near the thermostatic switch C and controls the operation thereof.

The contacts 94 are adapted to be electrically connected by means of a contact 97 carried by and insulated from the lever arm 50 by being fastened to a block 98 of insulating material, said block being fastened to the lever arm 50. Thus the contacts 94 are electrically connected only when the fluid-pressure motor 45 has operated to control valve 18 so as to start up the burner nozzle 11. The parts and connections just described, except for the contacts 94 and 97, are well known to those skilled in the art, and are standard equipment in oil burning apparatus now in extensive use. In order to clearly disclose the circuits and the operation of the various electrical parts of the present invention, a circuit diagram is shown in Figure 10. For the sake of convenience in illustration, this figure shows only one circuit (76—80) to the room thermostat and shows only one switch in the room thermostat, a single circuit being sufficient to successfully operate the controls, although it is preferable to employ two circuits as shown by the wires 76, 79 and 80 of Figure 1, and two circuit breakers in the room thermostat. Referring to Figure 10, and assuming that the switches C and 81 are closed and that the room temperature falls sufficiently to cause room thermostat 75 to close, the control circuit for the solenoid 61 and electromagnet 131 will be closed and these devices will be energized, this closed control circuit being traced as follows: from secondary of transformer 132, switch C, wire 78, secondary of transformer B, wire 77, solenoid 61, wire 76, room thermostat 75, boiler control switch 81, wire 83, and electromagnet 131, back to the secondary of transformer 132. Upon completion of this circuit, the electromagnet 131 operates in the usual manner to connect motor 14 directly to the supply lines 85 through the connecting lines 87. At the same time solenoid 61 will be excited, atomizing air and oil supplied to the nozzle and the igniting means or spark plug 100 simultaneously operated in the manner and for the purpose set forth. Upon rise in the room temperature to a point above that for which the thermostat 75 has been set, the control circuit just described, will be broken by the thermostat 75

and motor 14 will be disconnected from line 85 and solenoid 61 simultaneously deenergized. At this time the spring 41 causes the valve 33 to close and the valve 40 to open and imparts upward movement to plunger 43, whereby the lever 51 is moved in a clockwise direction to initial position, as shown in Figs. 1 and 2.

The safety thermostat 81 operates to open the control circuit between room thermostat 75 and solenoid 61 and electromagnet 131, in the event the temperature of the boiler or furnace 10 should rise above the maximum point allowed for safe operation, this thermostat operating in the reverse way upon decrease in the temperature of the boiler or furnace below the danger point to again establish the operating circuit between room thermostat 75 and relay M. While the safety thermostat 81 has been explained as being of the type responsive to the temperature of the boiler or furnace 10, it will be understood that when this heating unit or generator is a steam boiler, the safety device 81 is of the well known type responsive to the pressure conditions in the steam boiler and operates to open the relay circuit should the pressure rise to a point above that allowed for safe operation.

Upon operation of room thermostat 75 to start motor 14 and excite solenoid 61 in the manner and for the purpose explained, the switch 94—97 will be closed. Since the thermostatic element 88 in stack 89 will be relatively cold and the mercury switch 90 closed at this time, there will be a complete circuit from the secondary of transformer 133 through the switch 90, switch 94—97, conductor 95, and resistance 134, back to the secondary of transformer 133. The action is such that if the ignition means or spark plug 100 fails to ignite the combustible mixture issuing from nozzle 11, the thermostatic element 88 will remain cold, and if this condition exist for a relatively short period of time the cut-out device C will become heated by resistance 134 and operate to open the relay circuit and shut down the system. On the other hand, if combustion takes place at the burner in the normal way the products of combustion will escape through stack 89 and heat up element 88 which thereupon operates to tilt the mercury switch unit 90 to open position to open the circuit to the resistance 134 before it is able to function. It will therefore be seen that operation of room thermostat 75 causes simultaneous operation of motor 14 and excitation of solenoid 61, and that the thermostat or safety device 81 and the stack safety control 88—90 operate to open the relay circuit to simultaneously stop motor 14 and deenergize solenoid 61 in the event the temperature or pressure, as the case may be, of the heating unit 10 should rise to a point above that al-

lowed for safe operation, or in the event of failure of combustion at nozzle 11.

The oil burning apparatus and control therefor associated with the water heater 12 is identical in construction and manner of operation of and is connected to relay M in substantially the same manner, as shown, and for the same purpose as the apparatus just described for the boiler or furnace 10. For the purpose of simplifying matters, the various parts comprising the apparatus associated with the water heater 12 have been designated by primed numerals corresponding to the respective reference numerals designating like parts of the apparatus associated with the boiler or furnace 10. Since the heating unit 12 has been shown as a water heater it will be understood that there is no room thermostat associated therewith, and for this reason the connections between the safety thermostat 81' and the relay M are slightly different, as indicated, from the connections between thermostat 81 and relay M. The thermostat 81' is responsive to the temperature of water heater 12 and is set to close the circuit in which relay M and solenoid 61' are connected when the temperature of the water heater drops below a point for which thermostat 81' has been set, thereby causing simultaneous starting of motor 14 and excitation of solenoid 61', whereby the fluid-pressure motor 45' operates to impart controlling movement to valve unit 20 and to simultaneously complete the high tension circuit for the ignition means or spark plug 100'. Assuming that combustion takes place at nozzle 13, the thermostatic element 88' in stack 89' operates to tilt the mercury switch unit 90' to open position to prevent operation of the safety cut-out forming part of the relay unit and connected across posts 92 and 96. If combustion at nozzle 13 fails to take place the thermostatic element 88' will fail to heat up whereby the mercury switch unit 90' will remain closed to maintain the safety cut-out circuit so that within a relatively short time after starting of the system the relay will operate to shut down motor 14 and simultaneously deenergize solenoid 61'. It will therefore be seen that an improved oil burning system has been provided having two nozzles which are supplied with oil and atomizing air from a single compressor unit and which are controlled by the same relay M, and that except for the controlling unit shown in Fig. 2, the parts of the apparatus may be of the standard type such as are now in extensive use, and that the controlling units comprising the fluid-pressure motors 45 and 45' and their respective actuating solenoids 61 and 61' are of relatively simple construction and may be readily installed in operating relation with the other parts of the apparatus.

Assuming that both heating units 10 and

12 are shut down, it is to be noted that upon operation of room thermostat 75 motor 14 will start and solenoid 61 will become excited, and that upon ignition of the combustible mixture issuing from nozzle 11 the stack safety or control 88—90 will operate to open the cut-out device of relay 78 and prevent operation thereof. In this connection it is to be noted further that the contact member 97' is out of engaging relation at this time with contacts 94' so that the safety cut-out circuit from heater 12 is open. Such an arrangement is necessary since the two stack safety devices are connected in parallel across the posts 92 and 96 to which the cut-out device of relay M is connected. In like manner, should heater 12 be operating and the boiler or furnace 10 shut down, the contact member 97 associated with the latter will be in the position shown out of engagement with contacts 94 so as not to open the safety cut-out circuit leading from the boiler or furnace 10.

Upon drop in temperature of heater 12 below the point for which thermostat 81' has been set, the latter will complete the relay circuit in the usual manner and excite solenoid 61' and simultaneously cause motor 14 to start, if the latter is not already running to operate the apparatus associated with the boiler or furnace 10. Operation of either of the thermostats 75 and 81', therefore, is effective to simultaneously start motor 14 and to excite the respective solenoids 61 and 61', it being understood that thermostat 75 operates only to cause excitation of solenoid 61 while thermostat 81' operates only to cause excitation of solenoid 61'. While the heating unit 12 has been represented and described as being a hot water heater, it will be understood that the same may be a steam or hot water boiler or furnace similar to the unit 10, in which case a second room thermostat may be provided and connected like the room thermostat 75. It will therefore be appreciated that both of the units 10 and 12 may be in the form of a steam or hot water boiler or furnace of the type commonly used in homes, and that burners or nozzles 11 and 13 therefor are supplied from a common source with oil and atomizing air and are controlled by the single relay M. In this connection it will be appreciated that the improved apparatus provides for the installation in homes such as duplexes and apartments calling for a plurality of burners, of oil burning apparatus at a substantially lower initial cost than has been possible heretofore, since only one compressor unit and relay are required, the latter representing the more expensive parts of oil burning apparatus of the type shown.

The apparatus shown and described is provided with two burners 11 and 13 and the dual control therefor, but of course a

greater number of burners may be employed to operate as many different heating units or accessories, in which case the additional burners will be connected in like manner and will each be controlled by a fluid-pressure motor, solenoid and valve unit similar to motors 45 and 45', solenoids 61 and 61' and valve units 18 and 20.

While but one embodiment of the invention has been shown and described, various changes, such as in the size, shape and arrangement of the parts may be adopted without departing from the spirit of the invention or the scope of the claims.

The invention claimed is:

1. In oil burning apparatus of the character described, a burner nozzle, valve means for controlling the flow of air to said nozzle and for controlling means which controls the oil supply to the nozzle, means disposed at said nozzle for igniting the mixture issuing therefrom, a fluid-pressure motor common to said valve means and said igniting means for controlling the same, and valve means for controlling said motor.

2. In apparatus of the character described, a burner nozzle, valve means in a compressed air supply line for controlling the flow of oil-atomizing air to said nozzle, a spark gap disposed at the nozzle for igniting the mixture issuing therefrom, a switch for controlling said gap, a fluid-pressure motor common to said valve means and said switch for imparting operating movements thereto, and valve means for controlling the operation of said motor.

3. In apparatus of the character described, a plurality of oil-burning installations and means common thereto for supplying the same with oil and atomizing air, each of said installations including a heating unit, a burner nozzle therefor, valve means for controlling the supply of oil to said nozzle, a fluid-pressure motor connected to the air supply and operable upon admission of compressed air thereto to impart controlling movement to said valve means, a second valve means interposed between the air supply and said motor for permitting the flow of air under pressure thereto or for allowing the air to escape to the atmosphere, and temperature responsive means for actuating said last-named valve means.

4. In apparatus of the character described, a plurality of oil-burning installations and means common thereto for supplying the same with fuel, each of said installations including a burner, a fluid-pressure motor having an operating element and being operable upon admission of fluid under pressure to one side of the latter to control the supply of fuel to said burner, a fluid-pressure supply, a connection between said supply and said side of the motor element and provided with an outlet to atmosphere, valve means for open-

ing and closing said outlet, and actuating means for said valve means.

5. In apparatus of the character described, a plurality of oil-burning installations and means common thereto for supplying the same with fuel, each of said installations including a burner, a fluid-pressure motor having an operating element and being operable upon admission of fluid under pressure to one side of the latter to control the supply of fuel to said burner, a fluid-pressure supply, a connection between said supply and said side of the motor element and provided with an outlet to atmosphere, valve means for opening and closing said outlet, electro-responsive means for actuating said valve means, a current source, and means operable to provide an operating connection between said electro-responsive means and the current source, said last-named means being responsive to the heat generated by the heating unit and operating at a predetermined temperature condition.

6. In apparatus of the character described, a plurality of oil-burning installations and means common thereto for supplying the same with oil and atomizing air, each of said installations including a burner nozzle, a connection having an opening providing communication between said nozzle and the air supply and provided with an outlet to atmosphere, valve means operable to substantially simultaneously open said outlet and close said opening and vice versa, a fluid-pressure motor having an operating element and being operable upon admission of air under pressure to one side of the latter to impart controlling movement to said valve means, a valve operable upon movement to closed position to provide an operating connection between the air supply and said side of the motor element, and actuating means for said last-named valve.

7. The combination with an oil burning apparatus having a plurality of separate burners, a single motor, pump and compressor unit, an air line leading from the compressor to each burner, an oil line leading from the pump to each burner, each burner having an atomizing space, and means for admitting oil to the atomizing space when air in sufficient quantity to produce combustion is supplied to the burner, a valve unit in each air line, each valve unit having a vent, a valve co-operable with the vent to close the same, an operating element for each valve, a fluid-pressure motor associated with each valve and having a member co-operable with the operating element thereof, and means for controlling the action of the fluid-pressure motors.

8. The combination with an oil burning apparatus having a plurality of separate burners, a single motor, pump and compressor unit, an air line leading from the compressor

to each burner, an oil line leading from the pump to each burner, each burner having an atomizing space, and means for admitting oil to the atomizing space when air in sufficient
5 quantity to produce combustion is supplied to the burner, a valve unit in each air line, each valve unit having a vent, a valve co-operable with the vent to close the same, an operating element for each valve, a fluid-
10 pressure motor associated with each valve and having a member co-operable with the operating element thereof, electro-magnetically controlled means associated with each fluid-pressure motor for governing the supply
15 of fluid pressure thereto, and temperature-responsive means for controlling the action of said electro-magnetic means.

In witness whereof, we hereto affix our signatures.

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HOMER S. ROGERS.
RICHARD RADDATZ.

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