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FUEL IGNITING DEVICE FOR BURNERS

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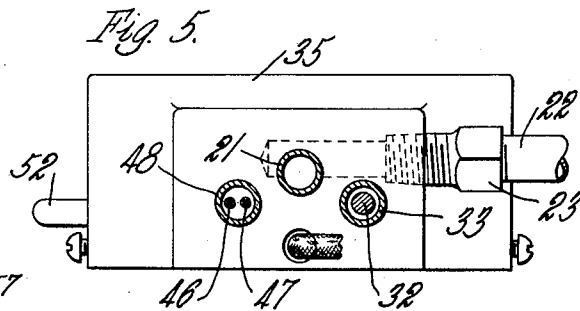
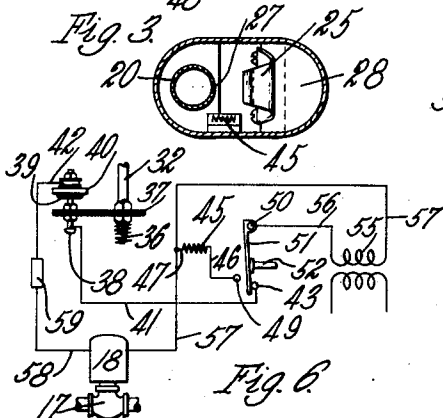
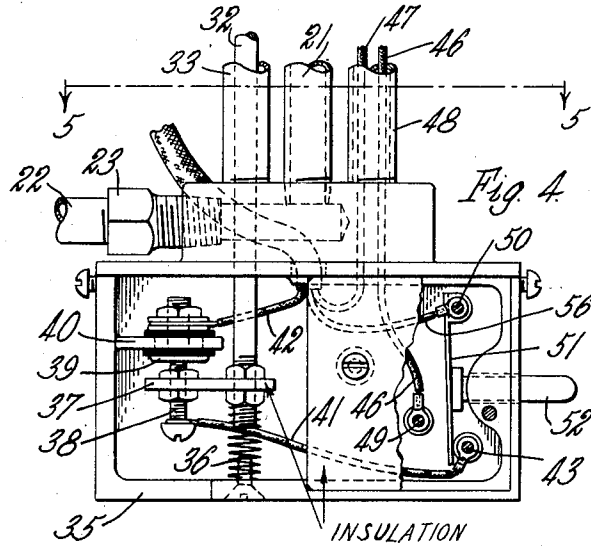
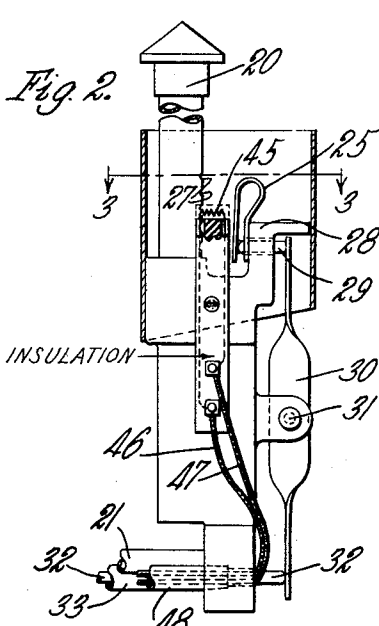
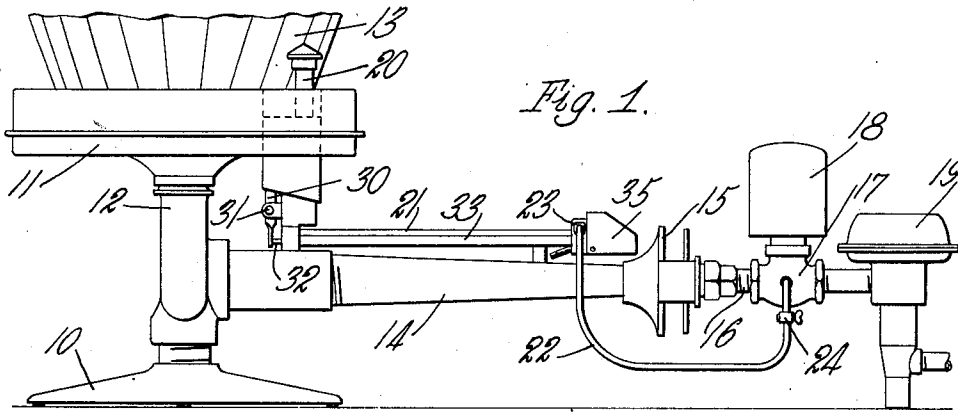


Fig. 6

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FUEL IGNITING DEVICE FOR BURNERS

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4 Claims. (Cl. 155—115)

This invention relates to devices for igniting gaseous fuel discharged to a burner, and more particularly to igniting devices of the kind which light a pilot or starting flame or jet.

5 The objects of this invention are to provide an arrangement by means of which a pilot or starting jet may be ignited, and in which means are provided for insuring the turning off of the fuel supply for the main flame when the pilot or
10 starting jet is being ignited; also to provide an igniting device for a starting jet which cooperates with an electrically operated main fuel supply valve, in such a manner that the supply of current to the electrically operated fuel valve
15 will be interrupted prior to the igniting of the starting jet; also to improve the construction of flame igniting devices in other respects herein-after specified.

In the accompanying drawing:

20 Fig. 1 is a side elevation of a fluid fuel burner provided with a flame igniting device embodying this invention.

Fig. 2 is a sectional elevation on an enlarged scale of a portion of the pilot controlled mechanism of the burner.

25 Fig. 3 is a sectional plan view thereof on line 3—3, Fig. 2.

Fig. 4 is a top plan view of a control box with its cover removed.

30 Fig. 5 is a sectional elevation thereof on line 5—5, Fig. 4.

Fig. 6 is a diagram of the wiring connections employed in our improved ignition system.

35 Our improvements may be applied to any suitable or desired fluid fuel burner, and in the accompanying drawing by way of example, our improvements are shown as applied to a gas burner having a base 10, a burner head 11 and a hollow standard or conduit 12 leading to the gas discharge apertures in the burner head 11. 13 represents a series of baffles preferably of ceramic material. Gas is conducted to this burner through
40 a conduit 14 which also forms a mixing tube for gas and primary air admitted through the bell-shaped mouth or opening 15 of the mixing tube, and gas is conducted to the mixing tube 14 through a conduit 16 controlled by means of a valve 17, which may, for example, be operated by an electric motor 18. If desired, a pressure control device or regulator 19 may be provided in the fuel pipe or duct leading to the valve 17. The burner shown is also provided with a pilot burner
50 20 arranged adjacent to the fuel discharge apertures of the main burner and receiving gas through a conduit 21 which in turn connects with

a conduit 22 through a suitable coupling device 23, Figs. 4 and 5, the conduit 22, in the construction illustrated receiving fuel from the inlet side of the valve 17, so that fuel will be supplied
5 to the pilot burner, at all times, regardless of whether or not fuel is supplied to the main burner, subject, however, to the control of the flow of fuel in the passage 22 by means of a valve 24 arranged in this passage. All of the parts
10 thus far described are old in connection with gas burners and do not of themselves constitute a part of our invention. It will also be understood that the invention may be applied to fluid fuel burners of materially different construction and the construction and operation of the pilot
15 burner may also be different from that described, or may be eliminated in the case of burners of the kind in which the fuel to the main burner is not entirely turned off by the fuel supply valve 17, thus leaving a small starting flame burning on the
20 main burner.

In burners of the kind shown in the drawing, it is also customary to provide a safety arrangement, whereby the supply of fuel to the main burner will be interrupted, in the event that the
25 starting or pilot flame becomes extinguished. This safety feature may also be of any suitable or desired construction, and of itself does not constitute a part of our invention. The safety feature, as illustrated in the accompanying
30 drawing, includes a thermostatic element 25 arranged adjacent to the pilot burner 20, and the pilot burner is also provided in its side with a series of apertures 27 through which fuel may be discharged toward the thermostatic element 25.
35 The thermostatic element shown is of a bi-metallic type, one end of which is secured to a stationary or fixed bracket 28 supporting the pilot burner and the other or movable end of which acts on a pin 29 slidably arranged in the bracket
40 28 and engaging one arm of a lever 30 pivoted at 31 on the bracket 28. The other arm of the lever engages a rod 32 slidably arranged in a tube or duct 33 and the other end of this rod extends into a control box 35. In the particular
45 construction illustrated, this end of the rod is yieldingly urged by means of a spring 36 against the lever 30 and this end of the rod also has secured thereto an arm or extension 37, preferably made of insulating material and carrying
50 a terminal or contact of an electric circuit, which in the construction shown, is in the form of a set screw 38. The thermostatic element and its connections are so arranged that when the element 25 is heated by the small flames issuing
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from the side of the pilot burner 20, the free end of the thermostatic element moves toward the pilot burner and thus permits the spring 36 to move the rod 32 and lever 30 into a position, such as shown in Figs. 2 and 4, in which the movable contact 38 engages with a stationary terminal or contact 39 supported in the box 35 on a bracket or partition 40. If the pilot flame becomes extinguished, the thermostatic element will cool so that the free end thereof will move the pin 29 to the right in Fig. 2, and thus swing the lever 30 to move the rod 32 against the action of the spring 36, and thus move the contact 38 out of engagement with the fixed contact 39. The fixed and movable contacts 38 and 39 are included in a circuit leading to the motor 18 actuating the valve 17, and this motor operates in such a manner that the valve 17 is held open only when current is supplied to the motor. The circuit to the valve motor 18 includes a conductor 41 connected with the movable contact 38 and a conductor 42 connected with the fixed contact 39, and the conductor 41 in the construction shown leads to a post or terminal 43, which, in the construction illustrated, is also arranged within the box 35 and secured to an insulating plate 44.

In accordance with our invention, we provide suitable means for igniting the fuel discharged from the pilot burner 20. Preferably, an electrical igniting device is employed, such as a sparking device or an electric heating device which becomes heated to such an extent as to ignite fluid fuel contacting therewith. An electric heating element 45 is illustrated by way of example in the construction shown, and is arranged adjacent to the discharge openings 27 of the pilot or starting flame, as may be seen by reference to Figs. 2 and 3 where it is shown as being supported upon the inner side or wall of a chimney or flue member 45a surrounding a part of the pilot burner 20 and the thermostatic element 25. This chimney is open at its top and bottom. Preferably, the heating element is located at a side of the jets of fuel or flame issuing from the apertures 27 in the burner, so that the flow of cold gas discharged from the apertures 27 will not tend to chill the heating element 45, and thus interfere with the igniting of the fuel, and by arranging the heating element at a side of the flame jets, there will be less tendency of corrosion or other damage to the heating element by the flame jets. We have also found that some of the gas discharged from these jets when impinging upon the thermostatic device 25 will be deflected so as to come into contact with the heating element 45, so that ignition of the fuel will result. The heating element 45 may be connected to a pair of conductors 46 and 47, which extend through a tube or conduit 48 into the control box 35 and the conductor 46 leads to a contact or post 49 mounted on the insulating plate 44. This plate 44, which is suitably secured to the box 35 also has another terminal or post 50 mounted thereon, to which a spring plate or movable current carrying switch member 51 is secured in such a manner as to be yieldingly urged against the contact post or terminal 43. The contact post or terminal 49 is so arranged that the spring or switch member 51 may contact therewith after the same is moved against its spring tension out of contact with the post 43. 52 represents a pin or rod, preferably made of insulating material and connected with the spring 51. This rod extends out through the wall of the box 35 where it may be actuated by

hand. When this rod or pin 52 is pushed inwardly, the spring member 51 will move out of engagement with the terminal or pin 43 and into engagement with the pin 49.

The wiring connections are such that when the spring 51 is moved out of engagement with the terminal or post 43, the circuit leading to the valve motor 18 is broken, and when the spring 51 contacts with the terminal or post 49, a circuit is closed, which includes the heating element 45. Consequently, if by any chance the motor controlled valve 17 should be in open position when it is attempted to light the pilot valve, the inward movement of the fuel button 52 will first break the circuit leading to the valve motor 18 so that the valve 17 will be closed and no further fuel will be discharged to the main burner, and upon further movement of the spring 51, the circuit to the heating element 45 will be completed. By means of this arrangement, danger of explosion within a furnace, in which the burner may be located, is greatly reduced and the starting of the burner by lighting a starting jet of fuel is greatly facilitated.

In Fig. 6 is shown diagrammatically an arrangement of the wiring that may be employed in connection with our improved pilot igniting system. Current for operating the system may be derived from a transformer winding 55, one terminal of the winding being connected by means of a conductor 56 to the post 50 to which the spring or movable switch member 51 is secured. The other terminal of the transformer winding is connected by means of a conductor 57 leading to the motor 18 controlling the valve 17 and the conductor 47 from the heating element 45 also is connected to the conductor 57. Another conductor 58 leads from the other terminal of the motor 18 to a thermostat 59 which may, for example, be located in one of the rooms or in the space to be heated, and the conductor 42 extends from the fixed contact 39 within the control box 35 to the thermostat 59. Consequently, when the pilot burner is in operation, and the set screw 38 contacts with the stationary terminal 39, as indicated in Fig. 6, then if the temperature in the space to be heated falls below that for which the thermostat 59 is set, this thermostat will close a circuit leading to the motor 18, thus causing the motor to open the main gas valve 17. If, however, the starting flame is extinguished, the movable contact 38 will be out of engagement with the fixed contact 39, thus opening the circuit leading from the transformer coil 55 to the motor 18, so that even if the thermostat 59 is in circuit closing position, the motor 18 will not open the valve 17. Consequently, if it is then desired to light the starting flame, it is merely necessary to push the pin 52 inwardly, in which case the spring or movable contact member 51 will make another break in the motor circuit by moving out of contact with the pin or contact 43 and then into contact with the terminal or post 49, thus closing the circuit of the heating element 45 and causing this element to become heated sufficiently to ignite fuel discharged through the orifices 27 of the pilot burner or other fuel jet to produce a starting flame. In the construction shown, gas discharged from these orifices 27 will in turn ignite the gas discharged from the upper end of the pilot burner 20. Consequently, upon removing pressure from the insulating pin 52 and after the thermostatic element 25 has become heated, the circuit through

the motor 18 will be completed, thus permitting the main fuel valve 17 to be opened.

In the event that all of the parts of the pilot control operate correctly, the circuit to the valve motor 18 will, of course, be broken whenever the pilot flame becomes extinguished, and under such circumstances, the additional precaution of opening the circuit by moving the spring 51 out of engagement with the post or terminal 43 is not necessary. This last mentioned safety feature, however, is desirable, in the event that anything goes wrong with the pilot controlled circuit opening means, such, for example, as a breaking of the thermostat 25 or any of the parts actuated thereby. Since a slight time interval elapses from the breaking of the valve motor circuit by movement of the spring 51 and the heating of the element 45 to a sufficient extent to enable it to ignite the pilot flame, this time interval is sufficient to permit any gas that may have been discharged through the main burner prior to the pressing inward of the insulating pin 52, to escape through a chimney, so that dangerous explosions are avoided.

In the use of the device, it will be obvious that when it is desired to start the burner, the pilot fuel supply valve 24 is first opened and the insulating pin 52 is then pressed to close the circuit through the heating element 45. The construction described, therefore, greatly facilitates the starting of the burner and avoids the necessity of reaching into the furnace with a lighted match or taper to ignite the starting flame, and also eliminates the danger of explosions in the furnace. The device described can also be easily added to burner control systems now in use and adds comparatively little to the cost of the same.

We claim as our invention:

1. A fuel ignition device for a burner comprising a burner conduit having a main gaseous fuel discharge zone and an igniting zone discharging a second stream of gaseous fuel at a level below but in igniting relation to said main zone when said second stream is burning, a deflector disposed across the path of the unignited gaseous fuel of said second stream for deflecting and spreading laterally of its direction of discharge the portion of said second stream which impinges thereon when said second stream is unignited, and an ignition element disposed outside of the portion of said second stream which passes to said deflector, but within that portion of the marginal zone of the unignited, spread portion of the second gaseous stream which is normally out of the path of the burning gases of said second stream, whereby some of the unignited gaseous fuel that is deflected by the deflector will normally impinge on said element to be ignited thereby, and said second stream when so ignited will ignite the gaseous fuel at said main zone, the burning of said fuel creating air currents passing said element tending to draw said burning gases in the second stream largely away from said element.

2. A fuel ignition device for a burner comprising a burner conduit having a main gaseous fuel discharge zone and an igniting zone discharging a second stream of gaseous fuel at a level below but in igniting relation to said main zone when said second stream is burning, a deflector disposed across the path of the unignited gaseous fuel of said second stream for deflecting and spreading laterally of its direction of discharge the portion of said second stream which impinges thereon when said second stream is unignited,

and an ignition element disposed outside of the portion of said second stream which passes to said deflector, but within that portion of the marginal zone of the unignited, spread portion of the second gaseous stream which is normally out of the path of the burning gases of said second stream, whereby some of the unignited gaseous fuel that is deflected by the deflector will normally impinge on said element to be ignited thereby, and said second stream when so ignited will ignite the gaseous fuel at said main zone, the burning of said fuel creating air currents passing said element tending to draw said burning gases in the second stream largely away from said element, the space adjacent and immediately above and below said second stream being substantially unobstructed and open near the top and bottom thereof to provide for free flow of said currents of air created by the heat of the ignited gases which tend to draw said burning gases largely away from said ignition element.

3. A fuel ignition device for a burner comprising a substantially upright burner conduit formed to discharge the main portion of a gaseous fuel therefrom in one zone adjacent the top thereof, and also having an opening in its side for at least a portion of its length for also discharging from said conduit a small stream of gaseous fuel in a direction generally horizontally and at a level below the said zone of discharge, but in igniting relation to the fuel released at said zone, a deflector disposed directly across the path of the unignited fuel of said small stream, and upon which said small stream impinges and is spread and deflected laterally of its direction of discharge thereby, an ignition element disposed outside of the portion of said small stream which passes from said conduit toward said deflector but within that portion of marginal zone of the unignited, spread gaseous stream from said deflector and which is normally outside of the path of the burning gases of said small stream, whereby some of the unignited gaseous fuel that is deflected and spread by the deflector will normally impinge on said element and be ignited thereby, and said small stream when so ignited will ignite said fuel leaving said one zone, and an enclosure surrounding said conduit, deflector and ignition element for a portion of their height and forming around said elements a chimney which is open adjacent its top and bottom, whereby the heat created by the ignited gases from said burner will create convection air currents through said enclosure and tend to draw largely away from said ignition element the burning gases of said small stream that when unignited were deflected by said deflector against said element.

4. A fuel ignition device comprising a main burner, a pilot burner conduit discharging a main body of gaseous fuel in one zone which is in igniting relation to said main burner, and also a minor lateral stream of gaseous fuel at a level below said zone but in a direction to cause, when ignited, the ignition of said main body of fuel discharged from adjacent the upper end of said conduit, a thermostatic element disposed in the path of unignited gaseous fuel of said minor stream for spreading laterally the portion of the minor stream of unignited gaseous fuel impinging thereon, an ignition element disposed outside of the portion of said minor stream passing directly from said conduit towards said thermostatic element but disposed within approximately that portion of the marginal zone of the unignited gases deflected by said thermostatic element

which is normally outside of the flame of the burning gases of said minor stream, whereby some of the unignited fuel that is deflected by said thermostatic element will pass to said ignition element and be ignited thereby, and, when ignited, will ignite the lateral minor stream and through it the remainder of the gas leaving said conduit, and the air currents created by the heat of the burning gases will tend to draw largely

away from said ignition element the gases of said minor stream that, when unignited, were diverted by said thermostatic element against said ignited element, and means controlled by said thermostatic element for cutting off fuel to said main burner when fuel from said pilot burner is unignited.

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