March 14, 1939. N. T. BRANCHE 2,150,415

IGNITING MECHANISM FOR GAS BURNERS

Filed Nov. 1, 1934

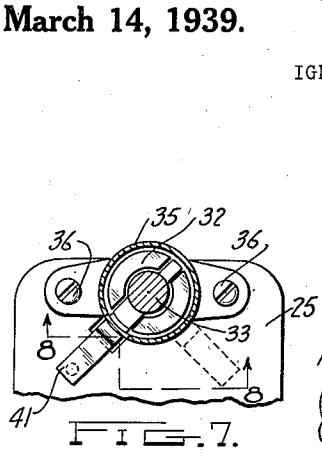


FIG. 7.

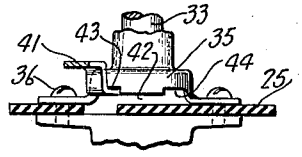


FIG. 8.

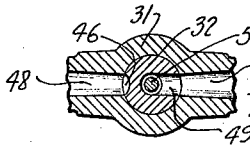


FIG. 9.

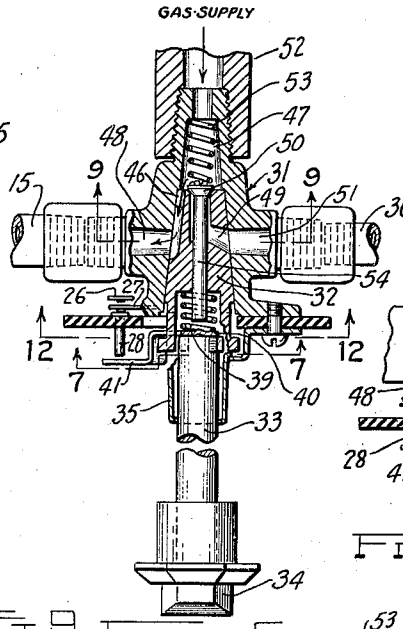


FIG. 5.

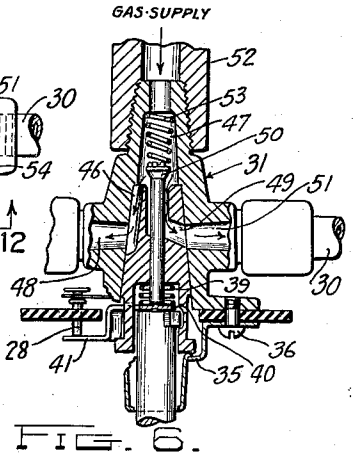


FIG. 6.

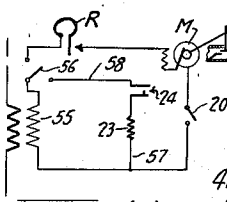


FIG. 11.

FIG. 10.

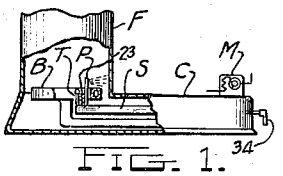


FIG. 1.

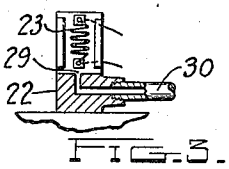


FIG. 3.

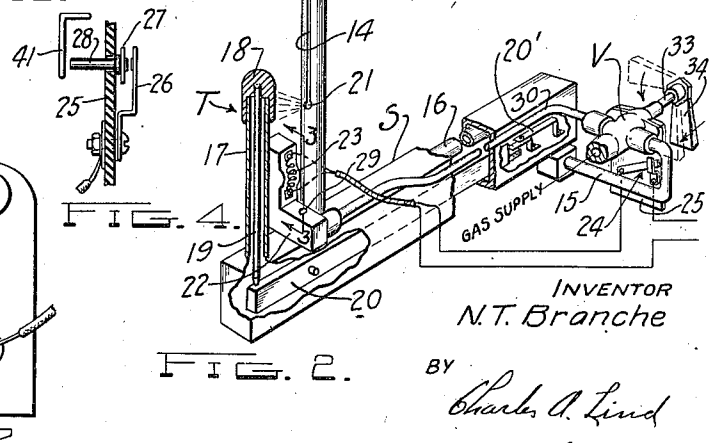


FIG. 2.

FIG. 4.

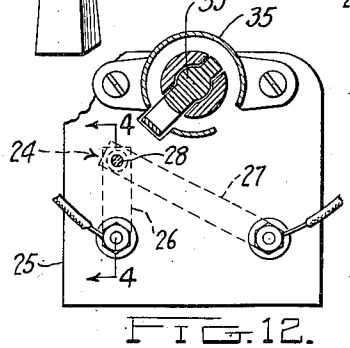


FIG. 12.

INVENTOR
N. T. Branche

BY
Charles A. Lind
ATTORNEY

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IGNITING MECHANISM FOR GAS BURNERS

Nelson T. Branche, Toledo, Ohio, assignor to Surface Combustion Corporation, Toledo, Ohio, a corporation of New York

Application November 1, 1934, Serial No. 751,002

4 Claims. (Cl. 158—115)

This invention relates to igniting mechanism for gas burning apparatus and has for its general object to provide igniting mechanism which shall have special utility for lighting a pilot such as is usually associated with a burner located in a confined space. More particularly, it is an object of the invention to provide a gas igniting mechanism which shall embody; a normally cold electric heating element; means for establishing a flow of gas to a primary burner or pilot; means for temporarily establishing a flow of gas alongside of the electric heating element, and means for temporarily closing the circuit to the electric heating element, whereby the latter may be heated for igniting the stream of gas flowing alongside thereof,—all of said means being under the control of a single operating element. Other objects and special features of the invention will more fully appear from the detailed description taken in connection with the accompanying drawing wherein the preferred mechanism is shown.

Referring to the drawing,—

Fig. 1 illustrates one environment where the invention has special utility, namely, with a gas burner located in a confined space as in a house heating furnace, the view being on a greatly reduced scale as compared with the other views;

Fig. 2 is a perspective view of the igniting mechanism and associated parts;

Fig. 3 is an enlarged section taken on line 3—3 of Fig. 2;

Fig. 4 is a section taken on line 4—4 of Fig. 12;

Fig. 5 is a full size section of the control valve shown in Fig. 2;

Fig. 6 is a view similar to Fig. 5 but with certain parts in a different position;

Fig. 7 is a section taken on line 7—7 of Fig. 5;

Fig. 8 is a section taken on line 8—8 of Fig. 7;

Fig. 9 is a section taken on line 9—9 of Fig. 5;

Fig. 10 is a perspective view showing certain parts of the valve in displaced relation;

Fig. 11 is a diagram of the electrical relation of the various controlling elements, and

Fig. 12 is a section taken on line 12—12 of Fig. 5.

Referring to Fig. 1, F indicates the lower part of any conventional house heating furnace; B a heating burner positioned therein; P a pilot for the burner; C a casing extending laterally from the furnace and forming part of the burner apparatus; M an electric motor for controlling the operation of the burner gas valve Mv (Fig. 11); R a room thermostat for controlling the operation of the motor; S a horizontally disposed member for supporting the pilot, and T a pilot controlled thermostat supported by said member,—the function of the thermostat being to prevent the motor M from being operated unless the pilot is burning. Referring now more particularly to Fig. 2, it will be seen that the pilot P comprises a tube having a lateral outlet 13 adjacent its upper end for discharge over the burner B, and also having a longitudinal slit 14,—the arrangement being such that when the gas issuing from the slit is burning, the gas issuing from the said outlet will be ignited thereby. The flow of gas to the pilot is established by opening the valve V hereinafter more fully described. The gas line from the valve to the pilot includes the pipes 15 and 16, the pipe 16 delivering directly to the lower end of the pilot.

The thermostat T may be of any preferred type insofar as the present invention is concerned. As shown, it comprises a tube 17, closed at its upper end by a cap 18 and secured at its lower end to the support S, and a rod 19 housed by the tube and abutting against the cap 18 thereof, the lower end of the rod resting on a lever 20 which, when the thermostat is properly heated, will close a switch 20' which forms part of the circuit for the motor M. When the pilot is functioning properly, flame from gas issuing from a port 21 in the side of the pilot will play on cap 18 and thereby heat the thermostat.

Supported on the member S is a right-angled body 22 which supports an electric heating element 23, the circuit for which includes a normally open switch 24 secured to a panel board 25 which is secured to the body of the valve V. As shown, the switch comprises two blades 26 and 27 secured at one of their respective ends to said board, the other ends being so disposed as to interengage when blade 27 is deflected by a push pin 28 (see Fig. 4) movably supported by the panel board. It is important to note that the heating element 23 is far enough below the port 21 in the pilot P to prevent flames from the latter from playing on the said element.

The body 22 has a gas passage (see Fig. 3) terminating in an outlet orifice 29 from which gas may be discharged in sufficiently close proximity to the heating element 23 to be ignited thereby and in sufficiently close proximity to the pilot P to ignite the gas issuing from the lower outlet port 21 of the latter. The flow of gas to said orifice 29 is established by the operation of the valve V as hereinafter more fully explained; the gas pipe from the valve to said body 22 being indicated at 30. At this point is suffices to say

that when the valve is operated to admit gas to the pipe 30, the switch 24 will be simultaneously closed whereby to apply electric current to the heating element 23. It may also be noted that before the valve can be operated to admit gas to the pipe 30, it must first have been operated to establish a flow of gas to the pilot P.

The main body of the valve V is indicated at 31. The valve is compound and has complexity of function. The main valve is a tapered plug valve 32, the same being turned by a shaft 33 having a handle 34. The shaft extends into a housing or cap 35 secured as by screws 36 to the valve body, the panel board 25 being interposed between said body and the cap. The shaft has radial lugs 37, inside of the cap and which prevent it from being pulled out of the cap. The valve 32 has a recessed end which is slotted as indicated at 38 to slidably receive the lugs 37 of said shaft. A spring 39 in said recess tends to push the shaft outwardly and therefore also to press the valve 32 to its seat. Interposed between the spring and shaft is a plate 40 having radial extensions that, entering the slots 38, cause the plate to rotate in unison with the valve body. One of said extensions is prolonged and its outer end 41 constitutes a finger for pushing the switch pin 28 when the shaft 33 is pushed inwardly.

Referring to Fig. 8, it will be noted that the rim of the cap 35 is, throughout part of its circumferential extent spaced from the panel board 25 as at 42 and is provided with two spaced notches 43 and 44. When the valve 32 is in the range of its rotation brought to the open position shown in Fig. 5 and the shaft 33 is at its outer limit of movement, the intermediate portion 45 of the prolonged plate extension enters the notch 43 under the pressure exerted by the spring 39 against the plate 40. When the valve is rotated to closed position, the said portion 45 enters the other notch 44, it being understood that to release the latch or portion 45, the shaft is pushed inwardly against the tension of the spring 39 and then the turning of the shaft shifts the latch from a position of alinement with one notch to a position of alinement with the other notch by way of the slot 42 and that the ensuing release of the shaft allows the latch then to enter the second notch. The object of thus locking the valve in either of its two positions at the limits of its range of rotation is to prevent children from tampering with the valve.

In the side of the plug valve 32 is a slot 46 which, when the valve is turned to open position, establishes communication between a gas supply chamber 47 and a lateral passage 48 to the outlet end of which latter the gas pipe 15 is coupled. The valve 32 is also provided with a passage 49 which when the valve is turned to open position registers with a lateral passage 51. To the outlet end of passage 51 the gas pipe 30 is coupled.

A second element of the compound valve is found in a poppet valve 50 that controls the passage 49. When, after the turning of the main valve 32 to open position, the second valve 50 is opened, communication is established from the gas supply chamber 47, through pipe 30, to orifice 29. Gas is delivered to said gas supply chamber 47 by a gas supply pipe 52.

The poppet valve 50 is normally held to its seat by a spring 53 inside of the gas supply chamber and is provided with a stem 54 which extends through the plug valve into the recess wherein the other spring 39 is located. When the shaft 33 is at the outward limit of its movement, as shown in Fig. 5, the plate 40 and the adjacent end of the valve stem are out of engagement but when the shaft is pushed inwardly, as in Fig. 6, the poppet valve will be pushed open, such inward movement of the shaft also causing the finger 41 of the plate 40 to press on the switch operating pin 28 whereby to close the switch 24.

The mode of operation of the apparatus as a whole may be briefly described as follows: Before the gas valve M_V (Fig. 11) for the burner B can be opened by the motor M, the thermostat T must be properly heated by the pilot P whereby to close the switch 20' in the motor circuit. To light the pilot P, the plug valve 32 is first turned to the position shown in Fig. 5 thereby permitting gas to flow to the pilot. The poppet valve 50 is then opened by pushing inwardly on the shaft 33, as shown in Fig. 6, thereby permitting gas to flow to the discharge orifice 29 in front of the heating element 23. When the shaft 33 is pushed inwardly to open the poppet valve, it also closes the neating element switch 24. The time interval that the shaft is held in pushed-in position need be no longer than is required for the heating element 23 to become hot enough to ignite the gas issuing from the orifice 29. Since some of the gas supplied to the pilot issues from the side port 21 and also from the side slit 14, the gas issuing from the orifice 29 serves, when ignited, as a flare for lighting the gas issuing from the pilot as will now be readily understood. After the thermostat T has become sufficiently heated by the ignited gas issuing from the lower port 21 of the pilot the switch 20' will close, and thereafter the motor M may be operated, subject to the action of the room thermostat R, in the usual way.

It will be understood that after the pilot P has been lighted in the manner described, the shaft 33 is permitted to move outwardly by the action of the spring 39 thus permitting the poppet valve 50 to close by the action of its spring 53 and the heating element switch 24 to open.

In accordance with the present invention, the electrical system is such that the motor M must be deenergized before current can be delivered to the heating element 23, it being understood that when the motor M is deenergized, the main gas valve M_V for the burner B will automatically close. Referring to Fig. 11, wherein the electrical system is diagrammatically shown, it will be noted that there is interposed in the circuit leading from the secondary 55 of the power transformer to the room thermostat R a manually operable switch 56. When this circuit is closed by said switch, the motor M is under the control of the thermostat R provided the switch 20' controlled by the pilot thermostat T is also closed. One end of the heating element 23 has a lead 57 in direct connection with one side of the said secondary 55 at a point closer to the latter than the switch 20'. The other end of the heating element has a lead 58 which includes the normally open switch 24, this lead running to the manually operable switch 56. It will now be seen that before the heating element 23 can be energized not only must the switch 24 be closed but the switch 56 must be open as regards the circuit for the motor M and must be closed as regards the circuit for the heating element 23.

It will now be readily apparent that if the gas supply to the burner B and pilot P should suddenly fail while the motor M is energized, or, in other words while the gas valve M_V is open, and then should come back on again before the

pilot-controlled thermostat T had cooled down sufficiently to cause the switch 20' to open the motor circuit, ignition of the gas is not possible. Ignition can only be effected by the heating element 23; but heating element is cold. It can be heated only by a flow of current; and a flow of current is not possible until the motor circuit has been opened and the heating element circuit closed by the said switch 56. This mode of operation therefore reduces explosion hazards to a minimum.

The turning of valve 32 from operative to inoperative position cuts off gas from pilot P. Thermostat T thereupon grows cold; switch 20' opens; the motor M is de-energized; and the main valve Mv closes.

What I claim as new is:

1. Apparatus for igniting a pilot comprising in combination therewith, an electric heating element too remote therefrom to ignite the same, means for discharging a jet of gas in sufficiently close proximity to said element to be ignited thereby for igniting the pilot, a gas supply pipe leading to the pilot, a second gas supply pipe leading to said means, a valve cooperating with both of the two supply pipes and movable from a position of closure to a position of opening with respect to both of said supply pipes, a second valve co-operating with the second supply pipe only and movable from a position of closure to a position of opening with respect to said second supply pipe, an electric circuit for said electric heating element, a make-and-break device in such circuit, the said second valve and the said make-and-break device being operable in unison, the valve to open position and the make-and-break device to closed position.

2. In heating apparatus, the combination of a main burner, a supply pipe leading to said burner, a valve in said supply pipe, an electric motor adapted to shift said valve to and to maintain it in open position, an energizing circuit for said motor, a thermostatically controlled switch in said circuit, a shunt line through which current flowing in said circuit may be diverted from said motor, manually controlled means for causing the current to flow alternately through said motor or through said shunt line, a pilot burner arranged adjacent the main burner, a thermostat responsive to the flame of the pilot burner and controlling said switch, a supply pipe leading to said pilot burner, an igniter for the pilot burner including a third burner and an electric heating element, the electric heating element being included in said shunt line, a third supply pipe leading to said third burner, a valve co-operating with both the second and the third of said supply pipes and movable from a position of closure to a position of opening with respect to both, a second valve co-operating with the third supply pipe only and movable from a position of closure to a position of opening with respect to said third supply pipe, and a make-and-break device in said shunt line, the said second valve and the said make-and-break device being operable in unison, the valve to open position and the make-and-break device to closed position.

3. Apparatus for igniting a pilot comprising in combination therewith, a gas igniting element too remote from the pilot to ignite the same, means for directing a jet of gas within the igniting region of said element, the resulting flame igniting the pilot; a casing in communication with said means and the pilot and a fuel supply; a first valve rotatable in the casing and having passages for simultaneously providing or intercepting communication between the fuel supply and the pilot and the said means, respectively; another valve in one of the passages of the first valve, said other valve being normally closed to intercept communication between the fuel supply and the said means; and a handle splined to the first valve to turn the same and axially movable to open said other valve.

4. Apparatus for igniting a pilot comprising in combination therewith, an electric igniter too remote therefrom to ignite the same; means for directing a jet of gas within the igniting region of the igniter; an energizing circuit for the igniter and including a normally open switch; a casing in communication with the said means and the pilot and a fuel supply; a first valve rotatable in the casing and having passages for simultaneously providing or intercepting communication between the fuel supply and the pilot and the said means, respectively; another valve in one of the passages of the first valve, said other valve being normally closed to intercept communication between the fuel supply and the outlet; and a member slidable in the first valve to open said other valve and to close said switch.

NELSON T. BRANCHE.