

April 26, 1932.

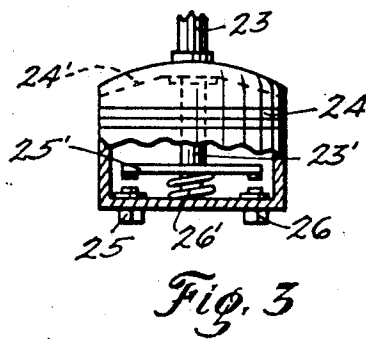
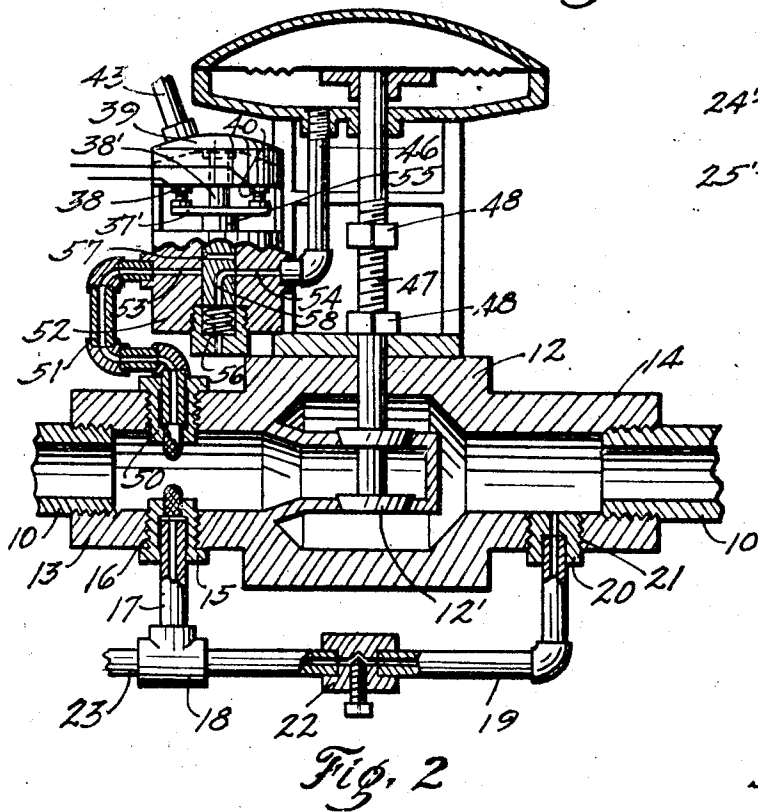
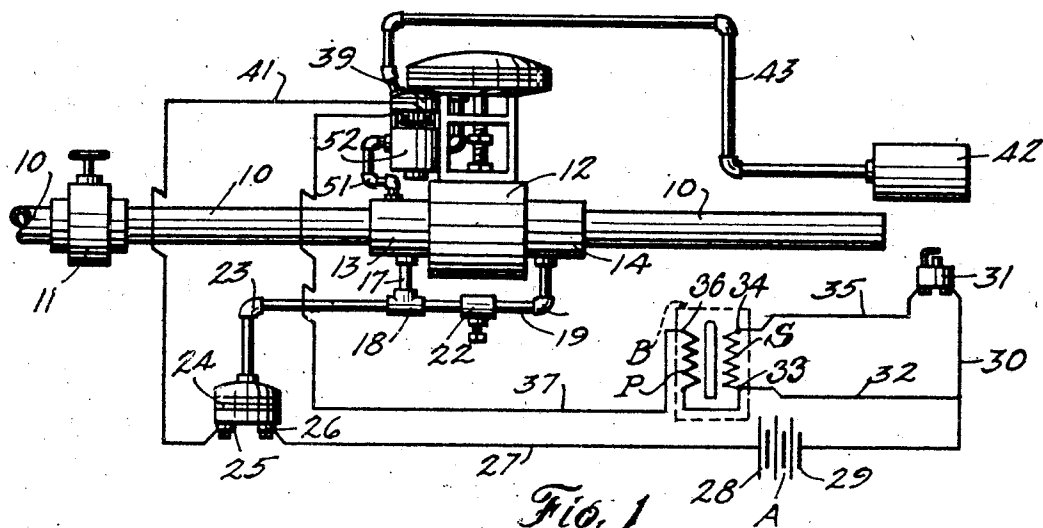
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1,855,551

AUTOMATIC IGNITER

Filed Sept. 21, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

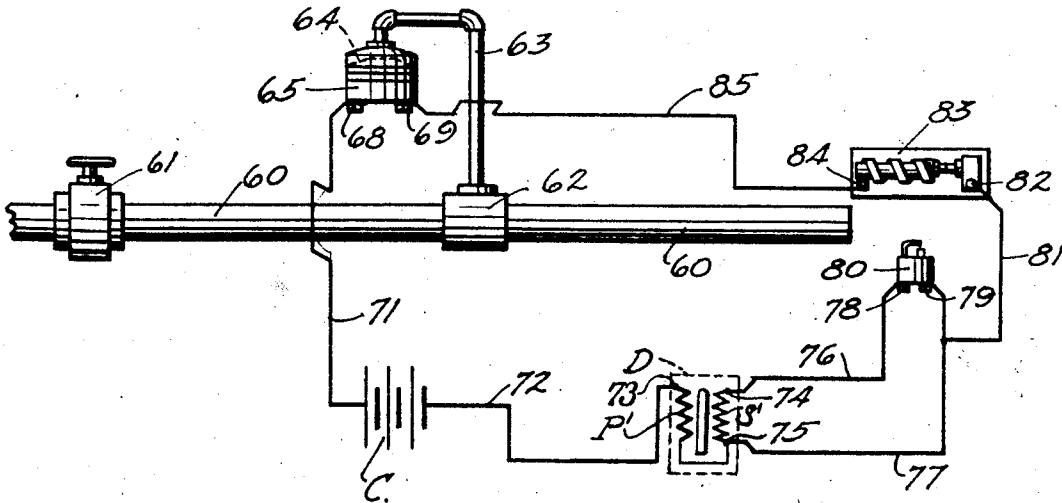


Fig. 4

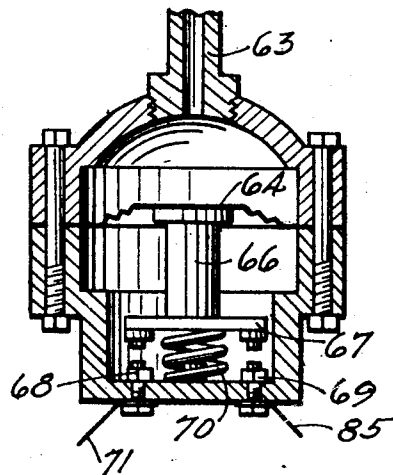


Fig. 5

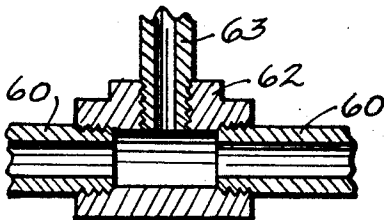


Fig. 6

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UNITED STATES PATENT OFFICE

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AUTOMATIC IGNITER

Application filed September 21, 1929. Serial No. 394,329.

This invention relates to new and useful improvements in automatic igniters.

One object of the invention is to provide an igniter for use on stoves, furnaces, boilers, torches, burners and the like which use gas as fuel for heat or light.

Another object of the invention is to provide improved means for automatically igniting gas escaping either accidentally or intentionally from a burner thereby eliminating the possibility of gas explosions, asphyxiation, monoxide gas and the like resulting from inoperativeness or delayed ignition.

A still further object of the invention is to provide means for regulating the flame of a gas burner whereby the flame will be of a given height regardless of the back pressure on the gas line, thus eliminating all danger and trouble resulting from gas burning at too great a volume and assuring the complete combustion of said gas under all conditions.

And a particular object of the invention is to provide an igniter having automatically operated means for controlling the pressure of the gas until positive ignition thereof, thereby eliminating any danger caused by the back pressure of the gas falling so low as to cause the flame to go out.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a diagrammatical view of an automatic igniter constructed in accordance with the invention.

Figure 2 is an enlarged view partly in section and partly in elevation of the diaphragm gate valve and component parts.

Figure 3 is a detail of the pressure contactor.

Figure 4 is a diametrical view of a modified form.

Figure 5 is a sectional view of the pressure contactor for this form, and

Figure 6 is a sectional view of the connecting T.

In the drawings the numeral 10 designates a gas supply pipe with a regulator valve 11 connected therein for regulating the flow of the gas at a maximum pressure.

Connected in the pipe 10 intermediate its discharge end and the valve 11 is a diaphragm gate valve 12 having reduced collars 13 and 14 at its ends. A bushing 15 is screwed in an opening 16 in the bottom of the collar 13 and has a pipe 17 leading therefrom to a T connection 18. A pipe 19 leads from one side of the T connection to a plug 20 which is screwed in an opening 21 provided in the bottom side of the collar 14.

A screw valve 22 is connected in the pipe 19 intermediate the T 18 and the collar 14 for regulating the flow of the gas there-through. A pipe 23 leads from the other side of the T 18 to the diaphragm 24 of a pressure contactor 24 as is shown on Figure 3. The diaphragm has a stem 23' carrying a contact bar 25' adapted to engage contacts 25 and 26 when the valve is depressed. A coiled spring 26' acts to raise the diaphragm and break the contact when pressure is relieved.

A contact point has a wire connection 27 to one side 28 of a battery A, and the other side 29 of the battery has a wire connection 30 to a spark plug 31. A wire connection 32 leads from the wire 30 to a contact 33 serving the primary winding P and the secondary winding S of a vibrating coil B. A wire 35 leads from the other terminal 34 of the secondary winding of the coil to the spark plug 31. The second terminal 36 of the primary winding of the coil is connected by a wire 37 to a contact point 38 of a diaphragm 39, and the other contact point 40 of said diaphragm has a wire 41 leading to the contact point 25 of the contactor 24.

The valve 39 has a depending stem 38' carrying a contact bar 37' adapted to engage the contacts 38 and 40 and close the circuit to the spark coil. The stem 38' has connection to a vertically reciprocating piston valve 55 mounted in a block 52 provided with transversely alined ports 53 and 54. The

valve 55 rests upon a coiled spring 56 which urges the valve and stem upwardly, thus normally engaging the bar 37' with the contacts 38 and 40. The electrical current to the spark plug 31 is controlled by both the contactor 24 and the valve 39.

As is shown in Figure 2 when the valve members 12' of the valve 12 are seated gas may by-pass the valve by way of the pipes 17 and 19 and may also flow through the pipe 23 to the contactor 24 and operate the diaphragm 24' to depress the bar 25' and close the circuit to the spark coil. By this arrangement gas escaping from the end of the pipe 10 will be ignited.

A pipe 51 leads from a bushing 50 on the collar 13 to the port 53 of the valve block 52, but this port is normally closed by the valve 55, so that the valve 12 cannot be operated.

Thus when the regulator valve 11 is opened and the gate valve 12 being normally closed the gas flows from the pipe 10 through the pipe 17 and is distributed to the diaphragm switch 24 through the pipe 23 and to the discharge end of the pipe 10 through the pipe 19. The screw valve 22 is adjusted to allow only a small quantity of gas to pass there-through and to be discharged from the pipe 10. The gas pressure upon the diaphragm 24' depresses the bar 25' and closes the electrical circuit over the points 25 and 26 to the spark coil B, which emits sparks thereby igniting the small flow of gas that is being discharged from the pipe.

An air box 42 is located adjacent and above the discharge end of the pipe 10 thereby providing for the heating of the air within said box which action expands said air and causes a pressure to be exerted through a connecting pipe 43 to the diaphragm of the valve 39. The pressure upon the diaphragm forces the piston valve 55 downwardly, whereby the bar 37' is moved away from the contacts 38 and 40, thus breaking the electrical circuit to the spark coil.

The piston valve 55 has a snug sliding fit in the block 52 and is provided with a transverse port 57 adapted to register with the ports 53 and 54 when said valve is depressed. This permits gas under pressure from the pipes 10 and 51 to pass to the diaphragm valve 12 by way of a pipe 46 connected to the under side of said diaphragm, thus lifting the valve members 12' by means of the stem 47. The travel of the valve is limited by nuts 48 mounted on the stem. By this means the gas valve is opened automatically.

Should the gas be cut off and the flame at the end of the pipe 10 be extinguished, the air pressure in the pipe 43 will be reduced, thus permitting the compressed spring 56 to lift the valve 55 which will cut off the port 53 and bring a port 58 in the valve into registration with the port 54, whereby pressure under

the diaphragm of the valve 12 will be relieved and cause the valve members to seat.

With the valve 12 closed the bar 37' will be in contact with the points 38 and 40, but the bar 25 will be above the points 25 and 26, thus breaking the ignition circuit. Should gas be accidentally or intentionally admitted to the pipe 10 the spark circuit will be closed and the gas ignited as hereinbefore described.

A modified form of the invention, as shown in Figures 4, 5 and 6, has a gas supply pipe 60 with a regulator valve 61 connected therein for regulating the flow of the gas at a maximum pressure.

Connected in the pipe intermediate its discharge end and the valve 61 is a T connection 62 which has a pipe 63 leading therefrom to a diaphragm 64 of a pressure contactor 65 as is shown in Figure 5. The diaphragm has a stem 66 depending therefrom which carries a contact bar 67 adapted to engage contacts 68 and 69 when the diaphragm is depressed. A coiled spring 70 acts to raise the valve and break the contact when pressure is relieved.

The contact point 68 has a wire connection 71 to one side of a battery C. The other side of the battery has a wire connection 72 to one terminal 73 of the primary winding P' of a vibrating coil D, and the other terminal of the primary winding is connected to one terminal 75 of the secondary winding S'. The second terminal of the secondary winding is indicated at 74. Terminals 74 and 75 are connected by wires 76 and 77 respectively to contacts 78 and 79 of a spark plug 80. A wire connection 81 leads from the wire 77 to a contact 82 of a thermostat control 83, and a contact 84 of said thermostat has a wire connection 85 to the contact point 69 of the pressure contactor. Thus the electrical circuit to the spark plug 80 is controlled by both the thermostat and the contactor 65.

When the regulator valve 61 is opened the gas flows from the pipe 60 through the pipe 63 to the diaphragm switch 64. The gas pressure upon the diaphragm depresses the bar 67 and closes the electrical circuit over the points 68 and 69 to the spark coil D, which emits sparks thereby igniting the flow of gas that is being discharged from the pipe.

As the thermostat 83 is located above and adjacent the discharge end of the pipe 60 the ignited gas will heat the thermostat causing the contact points thereof to open thereby breaking the electrical circuit between the spark coil and the contactor.

Should the gas be cut off and the flame at the end of the pipe be extinguished, the gas pressure upon the diaphragm 64 will be relieved, thus permitting the compressed spring 70 to lift the bar 67 and break contact with the points 68 and 69. Also, should the gas be cut off and the flame be extinguished the thermostat will cool causing the contact points

therein to make contact, completing the electrical circuit between the spark coil and the contactor. Should gas be accidentally or intentionally admitted to the pipe 60 the spark circuit will be closed and the gas ignited as hereinbefore described.

Various changes in the size and shape of the different parts, as well as modifications and alterations, may be made within the scope of the appended claims.

What I claim is:

1. In a gas igniting device, a gas supply pipe, an igniter at the discharge end of the pipe, having an electrical operating circuit, 15 a cut-off valve connected in the pipe, a pressure operator for the cut-off valve connected in the pipe in advance thereof, means for cutting off gas from the pipe to the cut-off valve operator, temperature controlled means at the 20 discharge end of the pipe connected with the cut-off means for actuating the same, and a by-pass connection for by-passing gas around the valve to the discharge end of the pipe.

2. In a gas igniting device, a gas supply pipe having a discharge for ignition at its end, an igniter at the discharge end of the pipe having an electrical operating circuit, a pressure operated contactor connected in said circuit for opening and closing the same, 30 a gas pressure connection between the pipe and the contactor, a cut-off valve connected in the pipe, a by-pass connection for by-passing gas around the cut-off valve to the discharge end of the pipe, a pressure operator for the 35 cut-off valve connected in the pipe in advance thereof, means for cutting off gas from the pipe to the cut-off valve operator, temperature controlled means at the discharge end of the pipe connected with the cut-off means 40 for actuating the same, and a circuit breaking device connected with the temperature controlled means and normally closed and arranged to be operated by said means to break the circuit when the cut-off valve is opened.

3. In a gas igniting device, a gas supply pipe having a discharge end, a cut-off valve in the pipe and means for maintaining said valve normally closed, a by-pass around the cut-off valve for conducting a relatively small volume of gas to the discharge end of the pipe, means for igniting said volume of gas at the discharge end of the pipe responsive to pressure in the pipe, and means actuated 55 by heat at the discharge end for opening the cut-off valve.

4. In a gas igniting device, a gas supply pipe having a discharge end, an igniter adjacent the discharge end, a cut-off valve in the pipe and means for maintaining said valve normally closed, a by-pass around the cut-off valve for conducting a relatively small volume of gas to the discharge end of the pipe, means for operating the igniter responsive 65 to pressure in the pipe, and means actuated

by heat at the discharge end for opening the cut-off valve.

5. A gas igniting device as claimed in claim 4, in which the heat-operated means for opening the cut-off valve operates also to render the igniter inoperative. 70

6. A gas igniting device as claimed in claim 4, which includes an electric spark igniter, a source of electromotive force, a normally open circuit containing said igniter and said source, means responsive to pressure in the pipe for closing said circuit, and means operated by heat at the discharge end of the pipe for opening the cut-off valve and opening said circuit. 75

7. A gas igniting device as claimed in claim 4, including a regulator valve between the inlet end of the gas supply pipe and the cut-off valve. 80

8. A gas igniting device including a gas supply pipe, a cut-off valve therein, means for maintaining said valve normally closed, a by-pass around said valve, an electrical igniter adjacent the discharge end of the pipe, a normally open circuit for said igniter, a contactor operable by pressure in the pipe for closing said circuit, means responsive to heat at the discharge end of the pipe for opening the cut-off valve, and means operated by said heat-responsive means for opening said circuit. 85 90 95

9. A gas igniting device as claimed in claim 8 which includes a diaphragm operatively connected to the cut-off valve, another valve operable by the heat-responsive means, and connections from said other valve to the gas supply pipe and to said diaphragm for communicating pressure in the gas supply pipe to the diaphragm to operate the cut-off valve. 100

10. A gas igniting device as claimed in claim 8 which includes a diaphragm operatively connected to the cut-off valve, a second valve including a plunger operable by the heat-responsive means, said plunger having one port adapted to place the diaphragm in communication with the gas supply pipe to move said diaphragm under the influence of pressure in the gas supply pipe and a second port adapted to exhaust gas pressure from the diaphragm to the atmosphere. 105 110 115

In testimony whereof I affix my signature.

SHERMAN D. JACKSON.

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