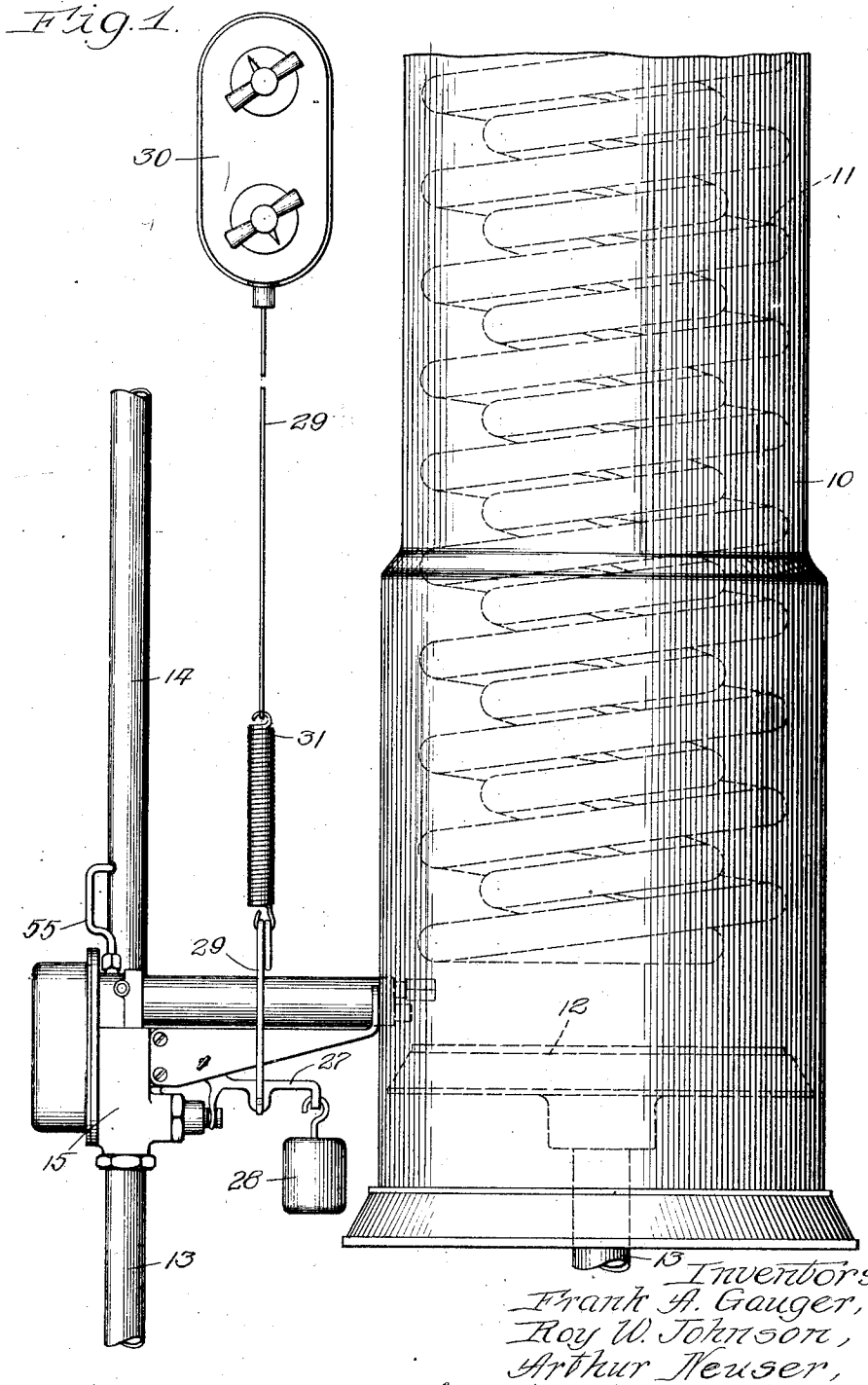
Aug. 7, 1928. 1,680,263

F. A. GAUGER ET AL

PILOT AND BURNER CONTROL APPARATUS

Filed May 29, 1925 2 Sheets-Sheet 1

Fig. 1.



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Fig. 3.

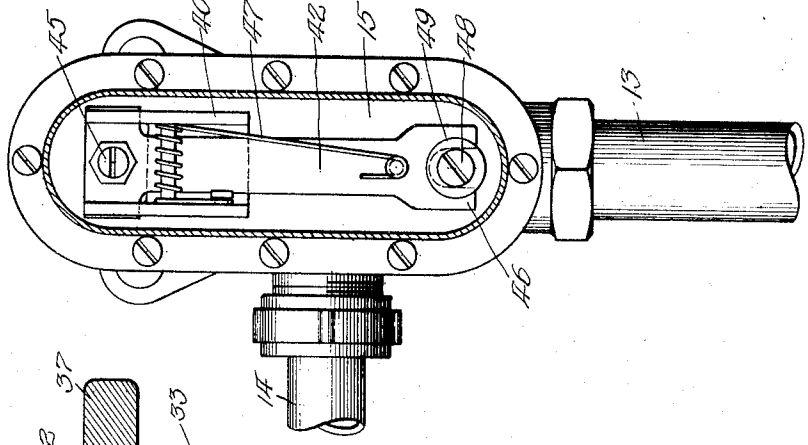
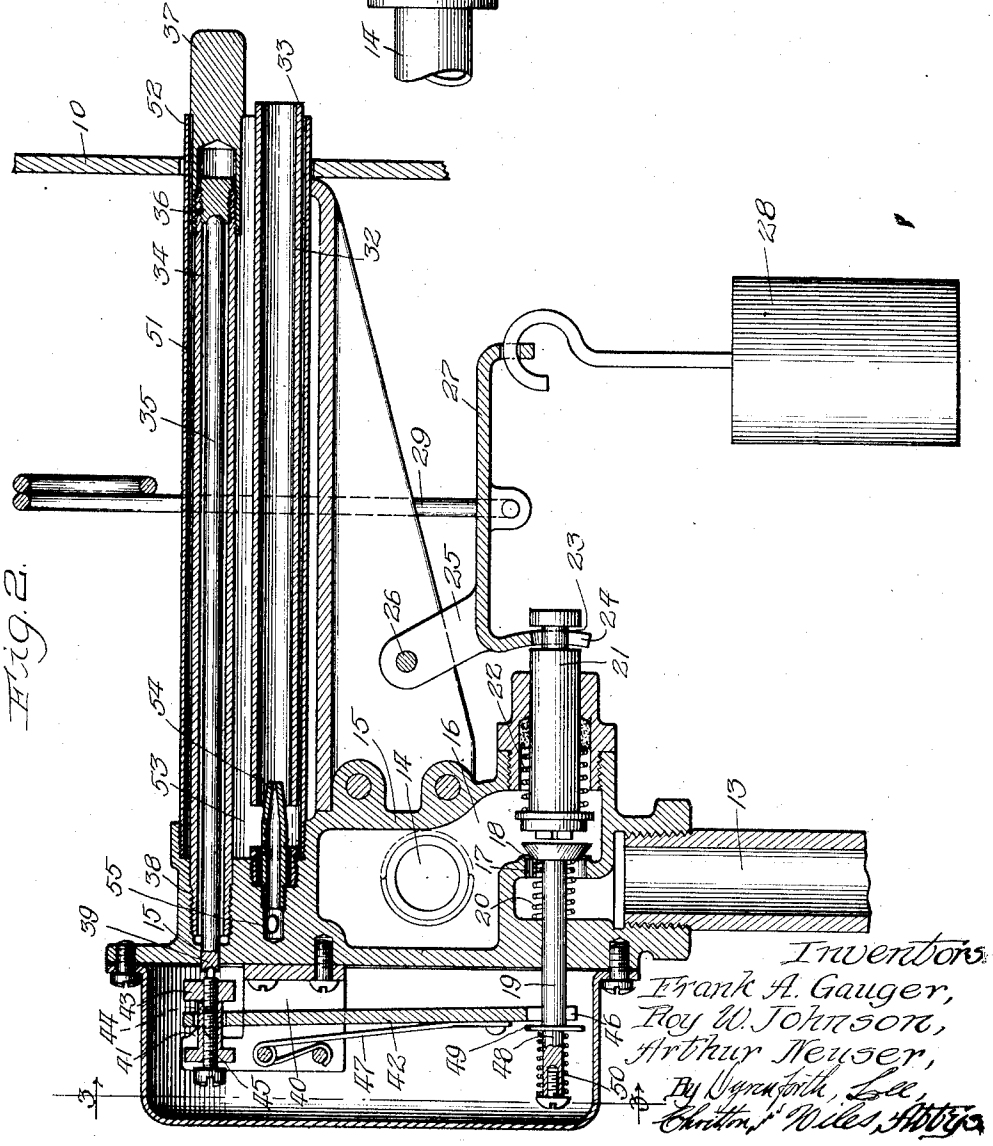


Fig. 2.



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Patented Aug. 7, 1928. 1,680,263

UNITED STATES PATENT OFFICE.

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PILOT AND BURNER CONTROL APPARATUS.

Application filed May 29, 1925. Serial No. 33,698.

This invention relates to improvements in pilot and burner control apparatus, and more especially to such apparatus adapted for use in connection with gas appliances having gas burners therein. The present application and the co-pending application of Frank A. Gauger, Roy W. Johnson and Arthur J. Neuser, filed July 18, 1927, Serial No. 206,725, both relate to the same general subject matter and the features of the pilot and burner control apparatus not herein claimed are claimed in the said co-pending application.

For the purpose of illustrating our invention, we have here shown a gas appliance which is a water heater. It is to be understood, however, that our invention may be used with other forms of gas appliances or heaters.

The apparatus is especially adapted for use in connection with gas appliances in which the main burner is somewhat enclosed by a casing, housing or otherwise. In practically all gas appliances there is provided such a casing or housing for the purpose of confining the heat.

By the use of our invention, we are enabled to use a Bunsen pilot light and thus provide a blue smokeless flame. The apparatus is so constructed also that the concussion occurring upon the ignition of the main burner does not extinguish the pilot light.

Another feature of our invention is the provision of a single valve which acts both as a safety valve and also regulates the gas or fuel supply to the main burner.

Our apparatus is also so constructed that the thermostat forming a part of the apparatus is protected from cold drafts of air such as frequently may be found in basements where gas appliances are installed.

Other features and advantages of our invention will appear more fully as we proceed with our specification.

In that form of device embodying the features of our invention shown in the accompanying drawings, Figure 1 is a view in side elevation of a gas appliance such as, for example, a gas water heater, showing the same equipped with our improved pilot and burner control apparatus, Fig. 2 is a vertical sectional view showing the thermostat, pilot, gas valve, and related parts, and Fig. 3 is a view taken as indicated by the line 3 of Fig. 2.

As shown in the drawings, 10 indicates the housing or casing of a gas appliance such as, for example, a water heater having therein the usual water coil 11. Below the water coil is arranged, in the usual manner, the main gas burner 12 to which gas or other suitable fuel is admitted through the pipe 13. 14 indicates the main gas supply pipe which supplies fuel both to the pilot and the main burner.

15 indicates, in general, a member here shown as a box-like casting adapted to house the gas valve and also serving as a support at its upper end for the pilot tube and thermostat. As shown in Fig. 2, the fuel pipe 14 enters the casting 15 at one side permitting gas to enter the chamber 16. From the chamber 16 a port 17 leads to the end of the pipe 13 which goes to the burner 12. It will be seen that gas coming from the fuel pipe 14 must pass through the port 17 to reach the burner 12. The port 17 is controlled by a valve 18 provided with a valve stem 19 as shown. A spiral spring 20 operates normally to hold the valve 18 open.

We will now describe the apparatus used for controlling the valve 18 during the ordinary operation of the gas appliance, assuming that there has been no failure of the pilot light. Opposite to the valve 18 is arranged a slidable plunger 21 which is urged inwardy, that is, toward the valve 18, by means of the spiral spring 22. The outer end of the plunger 21 is provided with an annular groove 23 in which is fitted the forked end 24 of the bell crank lever 25 which is pivoted at 26. The arm 27 of the bell crank lever has attached at its outer end a weight 28 tending to pull the arm 27 downwardly because of the force of gravity. Also attached to the arm 27 is a wire or cable 29 leading upwardly to a time control mechanism 30. Interposed in the wire or cable 29 is a spiral spring 31 for the purpose of absorbing jars. The time control mechanism 30 is not shown or described in detail as the same comprises no part of the present invention. For the purpose of understanding the construction and operation of the rest of the apparatus, however, we may state that this time control apparatus may comprise clockwork mechanism adapted to be set to

release the wire 29 at a predetermined time. It will be seen that, upon the release of the wire 29, the weight 28 will rock the bell crank lever to force in the plunger 21 and close the valve 18. When the gas appliance is burning, the valve 18 is open. The apparatus 30 is set so that, at the desired time, the wire 29 will be released, permitting the weight 28 to drop, thereby closing the valve 18 and shutting off the gas from the main burner.

Means are also provided whereby the valve 18 will be closed in the event the pilot light goes out. In general, such means include a thermostat kept hot while the pilot light is burning. Upon failure of the pilot light, the thermostat cools and thereby closes the valve 18. 32 indicates the Bunsen pilot tube having the flame end 33 inside of the gas supply casing 10 and over the main burner 12. Arranged above the Bunsen pilot tube is a thermostat comprising the tube 34 having inside of it the rod 35. In the end of the tube is a plug 36 against which the end of the rod 35 rests. The tube and rod are made of different metals, having different coefficients of expansion. For example, tube 34 may be copper and the rod 35 some other metal that does not expand so rapidly. Attached to the end 36 of the tube 34 is a cap 37 which lies inside of the gas appliance casing 10 just above the pilot flame at the end 33 of pilot 32 so that the burning of the pilot will keep the cap 37 hot. The outer end of the tube 34 as indicated at 38 is joined to the casting 15. The rod 35 however, is somewhat longer and has its end 39 projecting out through a suitable hole in the casting 15 and provided at its end with a slight depression. Attached to the outer side of the casting 15 is a fulcrum bracket 40 carrying the fulcrum 41 against which is balanced the lever 42. 43 indicates a nut having a pair of knife edges 44 engaging the inner side of the lever 42. The knife edges 44 are slightly below the fulcrum 41. The nut 43 carries an adjusting screw 45 having its inner end resting in the depression at the end 39 of the rod 35. The lower end of the lever 42 is forked as indicated by 46 and embraces the valve stem 19. A spring 47 urges the lower end of the lever 42 inwardly. It will be seen that the offsetting of the fulcrum 41 and 44 causes movement of the lever 42 outwardly (as viewed in Fig. 2) when the end 39 of the rod 35 moves outwardly. Such movement of the rod is caused by contraction of the tube 34 upon cooling, and vice versa. The outer end of the valve stem 19 is somewhat reduced in diameter as indicated by 48 and a washer 49 is held against the shoulder thus formed by means of a spiral spring 50.

In normal operation with the pilot light burning the valve 18 remains open unless it is closed by means of the plunger 21. The parts are so proportioned and adjusted that the heat from the pilot flame against the cap 37 keeps the tube 34 sufficiently hot and consequently lengthened so that the end 39 of the rod 35 is held in sufficiently so that the forked end 46 of the lever 42 is held in far enough, as shown in Fig. 2, so that the valve 18 remains open. If the pilot light goes out, the cap 37 and tube 34 cool, and the latter contracts. This forces the end 39 of the rod 35 outwardly, to the left, (as viewed in Fig. 2) thus swinging the fork 46 of the lever 42 outwardly against the washer 49 to move the valve 18 to the left and thus close the same thereby shutting off all gas to the main burner. The spring 50 is stiff enough to overcome resistance of the spring 20 so that as lever 42 moves to the left the valve 18 will be closed.

Means are also provided so that a Bunsen pilot light can be used without danger of the same being extinguished from the concussion caused by the lighting or extinguishing of the main burner. A Bunsen flame is preferable to the ordinary carbon flame as it is practically smokeless and considerably hotter. Heretofore, however, difficulty has been experienced in using a small Bunsen pilot due to the fact that the gas coming through the pilot orifice is of such a small amount that it has practically no velocity. In the Bunsen type of burner there is an air inlet adjacent to the gas orifice. Heretofore, when it was attempted to use the Bunsen pilot it was found that when the concussion accompanying the lighting or extinguishing of the main burner took place, such a draft of air was carried through the Bunsen tube as to put out the pilot light. In our device, we have surrounded the entire Bunsen tube and also the thermostat by the air tube 51 which has its inner end 52 lying inside of the gas appliance housing or casing 10. It will be seen that the inner end of the Bunsen tube and the cap 37 of the thermostat project slightly beyond the end of the tube 52. 53 indicates the air inlet in the Bunsen tube 32 and 54 the gas orifice or jet. It will be seen that by means of this construction air entering the inlet 53 comes from the inside of the tube 51 which has its open end lying inside of the casing 10. Thus when there is a concussion in the heater the pressure at the end of the tube 52 is the same as that in the pilot tube 33. Consequently when such concussion occurs, there is no rush of air through the pilot tube 32 and consequently no disturbance of the gas supply coming out of the orifice 54. In other words the air pressure is balanced in both directions so that a concussion does not interfere with the flow of the pilot gas supply.

The tube 51 also serves to protect the thermostat from cold drafts which fre-

quently occur in basements and similar places where gas appliances are often installed.

It is to be noted that by the use of our invention only one valve 18 is provided which acts as a safety valve for the pilot and also serves to regulate the gas supply.

It will be seen also that dropping of the weight 28 permits the spring 22 to move the plunger 21 to close the valve 18 and that the forked end 24 of the bell crank lever also operates to move the plunger 21. 55 indicates a gas supply pipe connected to the pipe 14 and adapted to supply gas to the Bunsen pilot light.

While we have shown and described certain embodiments of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is our intention to claim all novelty inherent in our invention as broadly as possible in view of the prior art.

What we claim as new, and desire to secure by Letters Patent, is:

1. In combination with a gas appliance having a casing and main burner therein; a Bunsen burner pilot tube disposed exteriorly of said casing and having its flame end protruding therethrough adjacent the main burner of the gas appliance; and an air connection between the air inlet of the Bunsen burner tube in rear of the flame and the interior of the casing.

2. In combination with a gas appliance having a main burner therein; a Bunsen burner tube having its flame end lying inside of the gas appliance and adjacent the main burner; and a larger tube surrounding the Bunsen burner tube having the end adjacent the flame end of the Bunsen tube open and lying inside of the gas appliance and the other end closed so as to cause variation of the pressure in the Bunsen tube in rear of the flame in accordance with pressure fluctuations in the gas appliance.

3. In combination with a gas appliance having a main burner therein; a tube having one end opening into the interior of the gas appliance adjacent the main burner and the other end closed and lying outside the gas appliance; a second smaller Bunsen burner pilot tube lying inside of said first mentioned tube with its flame end adjacent the open end thereof and near the main burner of the gas appliance and its air inlet end lying inside of first mentioned tube near the closed end thereof whereby the pressure in said Bunsen tube in rear of the flame will fluctuate with changes in pressure in the gas appliance.

4. In combination with a gas appliance having a casing and a main burner therein, a burner pilot tube having its flame end disposed within the casing and in igniting relation to the burner, the outer end of the pilot tube having an air inlet leading into the interior thereof, a gas supply member projecting into the tube at the air inlet end of the same whereby a combustible mixture of gas and air is formed in the tube and burns at the flame end thereof, and means coacting with the casing and with the pilot tube whereby the pressure of the combustible mixture within the tube in rear of the flame is maintained substantially equal to the pressure in the casing to prevent the flame from being extinguished.

5. In combination with a gas appliance having a casing and a main burner therein, a burner pilot tube having its flame end disposed within the casing and in igniting relation to the burner, the outer end of the pilot tube having an air inlet leading into the interior thereof, a gas supply member projecting into the tube at the air inlet end of the same whereby a combustible mixture of gas and air is formed in the tube and burns at the flame end thereof, a large tube surrounding the burner pilot tube and the air inlet thereof and having its end adjacent the flame end of the pilot tube open and in free communication with the interior of the casing, the outer end of the large tube being closed whereby the pressure of the combustible mixture within the pilot tube in rear of the flame is maintained substantially equal to the pressure within the casing to prevent the flame from being extinguished.

6. In combination with a gas appliance having a casing and a main burner therein, a burner pilot tube having a flame burning at an end thereof disposed within the casing and in igniting relation to the burner, and means coacting with the casing and with the pilot tube in rear of the flame whereby the pressure in the tube is maintained substantially equal to the pressure in the casing.

Witness our hands this 20th day of May, A. D. 1925.

FRANK A. GAUGER.
ROY W. JOHNSON.
ARTHUR J. NEUSER.