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G. HEGWEIN

SAFETY IGNITION DEVICES FOR GAS BURNERS

Filed Feb. 27, 1939

Serial No.
258,837

5 Sheets-Sheet 1

*Fig. 1.*

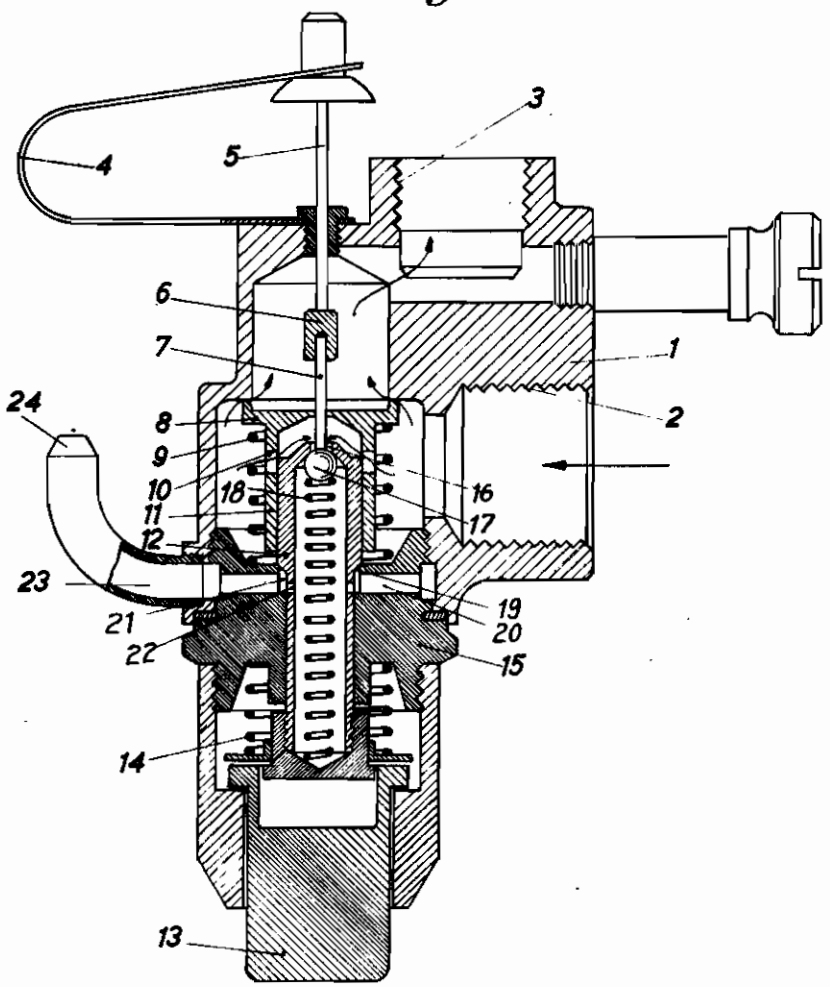


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*Fig. 2.*

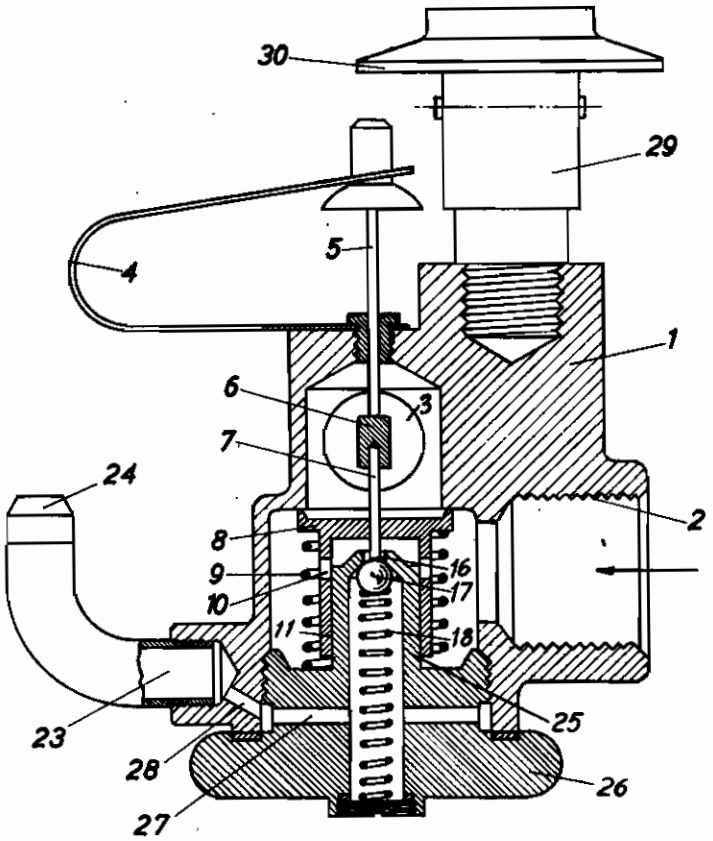


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*Fig. 3.*

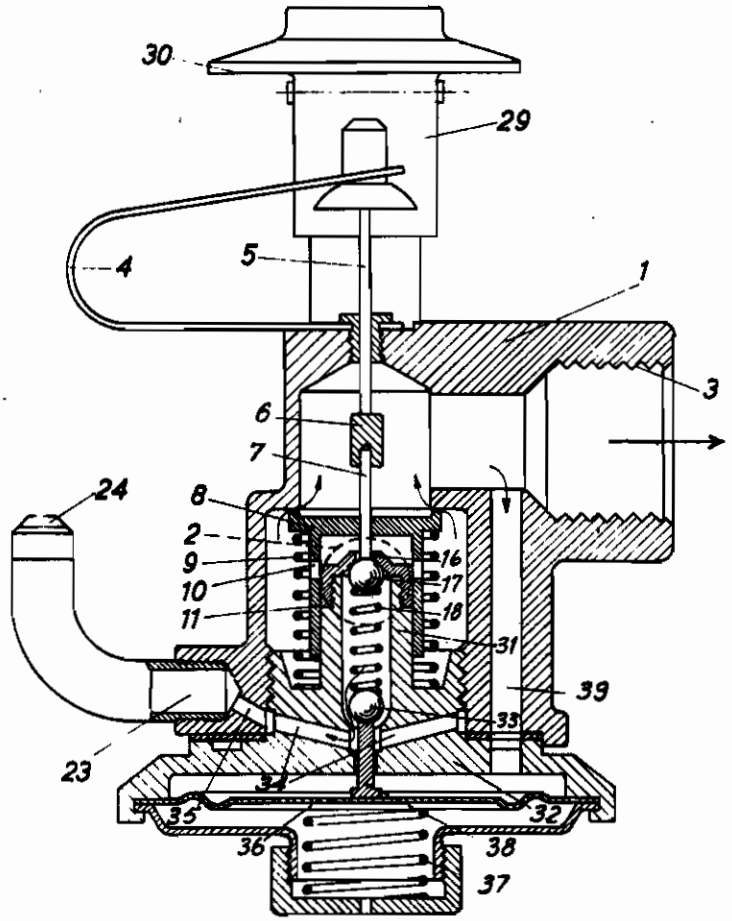


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*Fig. 4.*

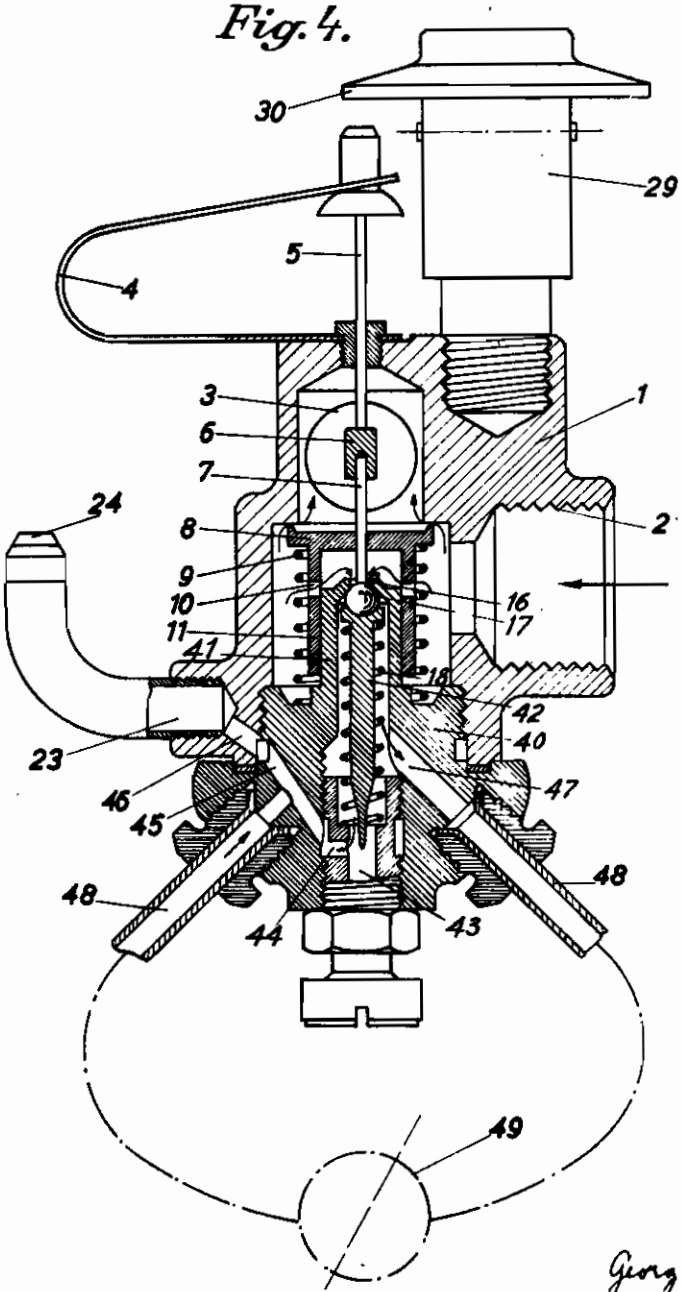


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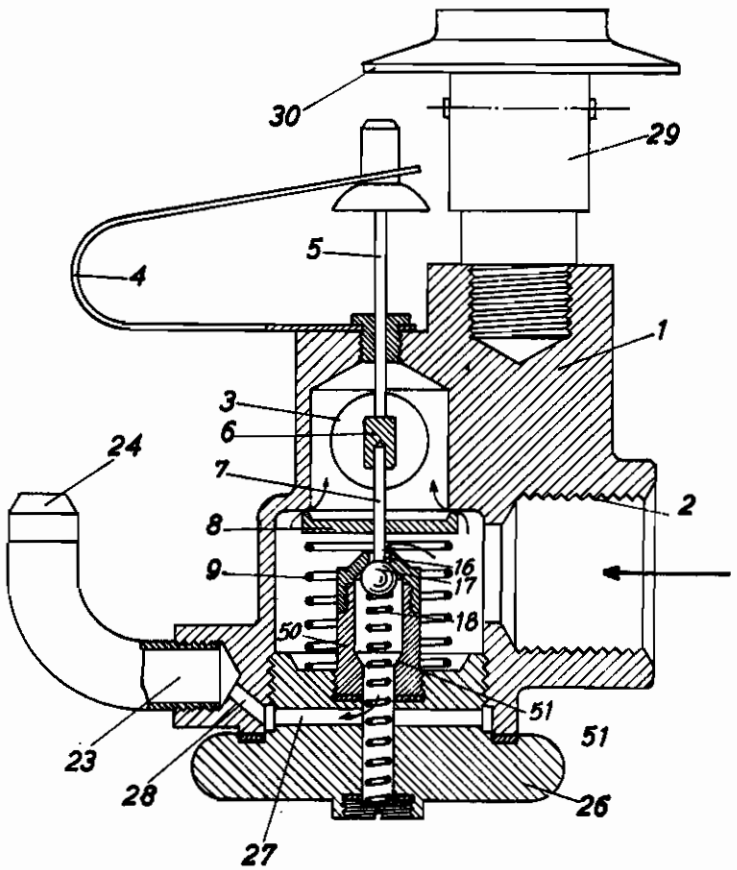
*Fig. 5.*

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# ALIEN PROPERTY CUSTODIAN

## SAFETY IGNITION DEVICES FOR GAS BURNERS

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Application filed February 27, 1939

The invention relates to a safety ignition device for gas burners in which the supply of gas to the pilot flame and main burners is controlled by a thermostat heated by the pilot flame.

In previously proposed arrangements of this kind the main gas valve and pilot flame valve have been connected with a control rod actuated by the thermostat in such a manner that on the thermostat becoming heated the main gas valve is opened and the supply of gas to the pilot flame is throttled whilst on the other hand when the thermostat cools down the main gas valve is closed and the pilot flame valve opened. In such case although the supply of gas to the main burner is shut off when the pilot flame is extinguished gas can still issue without restriction from the pilot flame nozzle. It is therefore necessary to employ a pilot flame nozzle of very small bore which entails the further inconvenience of the nozzle becoming choked by gum or the like which often occurs in the case of small bore gas nozzles. Moreover the control action of such an arrangement is considerably retarded by a pilot flame nozzle having a narrow orifice.

It is an object of the invention to provide a thermostatically controlled safety ignition device for gas burners having means for controlling the supply of gas to the pilot flame and main burner.

Another object of the invention is to provide a safety ignition device wherein the pilot flame valve and the main gas valve are opened in succession after a predetermined interval.

A further object of the invention is to provide an arrangement wherein in the event of the extinction of the pilot flame the gas supply to the main burner and to the pilot flame are cut off.

It is a still further object of the invention to provide an ignition device for a gas burner wherein a single thermally responsive device is adapted to actuate both the pilot flame valve and the main gas valve.

It is a still further object to provide a gas burner ignition device which is adapted to be set in operation by a manually operated press knob and having means whereby the gas supply to the main burner and pilot burner are thereafter automatically regulated.

Other objects of the invention will appear from the following description and appended claims when considered in connection with the accompanying drawings forming part of this specification.

According to the present invention the valves for supplying gas to the pilot flame and main burner are so arranged and combined with the control device actuated by the thermostat that when the thermostat is heated the valve for the pilot flame gas and that for the main supply open in succession after a predetermined lapse of time and are closed in reverse order when the thermostat cools down.

The result of this arrangement is that after the extinction of the pilot flame the supply of gas both to the main burner and the pilot flame is cut off. In this case the pilot flame nozzle may have a comparatively wide bore so that the troublesome choking due to gum is obviated and a rapid uninterrupted flow of gas through the pilot flame pipe accompanied by accelerated opening and therefore rapid control action of the device is obtained.

To enable the invention to be fully understood it will now be described with reference to the accompanying drawings in which five typical embodiments of the invention are illustrated. In all these embodiments substantially corresponding parts are indicated by the same reference numerals.

The safety ignition device according to Fig. 1 comprises a casing 1, with a branch 2 for connection with a gas-supply pipe and a branch 3 for connection with the main burner. Arranged on the casing 1 is a thermostat 4 composed of a bimetallic strip the free end of which is connected with a control rod 5 axially displaceable in the casing 1. Said rod 5 rests on the head 6 of a coaxially arranged thrust rod 7 adapted to slide in a valve plate 8. The plate 8 is held in the closed position by a spring 9 and is provided on its lower end with a tubular extension 11 provided with transverse bores 10 and is slidably guided on a tube 12 adapted to be axially displaced by means of a push knob 13 (against the action of a spring 14) in a guide member 15 which is screwed into the casing 1. At the same time the stroke of the tube 12 is preferably restricted by suitable means. At the end facing the knob 13 the tube 12 is fitted with a gastight packing and is provided at its upper end with an opening 18 below which is located inside the tube 11 a ball valve 17 held in the closing position by a spring 18. The ball valve 17 faces the lower end of the thrust rod 7 through the opening 16 with or without a predetermined amount of lost motion. Below the tubular extension 11 of the valve plate 8 the guide member 15 is provided with a valve seating 19 for the tube 12. The guide member 15 is provided with a horizontal bore 20 extending right through and communicating with the valve seating 19 through a widened bore 21 and with the

interior of the tube 12 through bores 22. A tube 23 leading to the pilot flame nozzle 24 also communicates with the bore 20.

The arrangement according to Fig. 1 functions in the following manner: When the various parts are set in the positions shown in Fig. 1 the arrangement is in the inoperative position. To set it in operation an upward pressure is applied to the knob 13. By this means the tube 12 is correspondingly raised from the value seating 19 so that the gas entering through the branch 2 can flow past the valve seating 18, bores 21 and 20 and the tube 23 of the pilot flame nozzle 24. Raising the tube 12 by means of the knob 13 also causes the ball valve 17 to be opened but since the tube 12 also closes the bores 18 the opening of the valve 17 is inoperative for admitting the gas to the pilot flame nozzle. Consequently the supply of gas to the pilot flame burner 24 takes place at first only by way of the valve seating 19 in the manner already described.

If the gas issuing from the nozzle 24 be now ignited the pilot flame heats the bimetallic strip 4, the free end of which then depresses the control rod 5 and therewith the thrust rod 7 which opens the ball valve 17 more fully against the action of the spring 16. After a short interval the knob 13 may be released whereupon it is returned to its original position by the spring 14. At the same time the tube 12 also is returned into its original position to seat on the valve seating 19. However, since the tube 12 has again uncovered the transverse bores 10 in the tubular extension 11 of the valve plate 8 and the thrust rod 7, correspondingly depressed by the thermostat 4 keeps the ball valve 17 open, gas is now supplied to the pilot burner nozzle 24 through the bores 10, the ball valve 17 and the bores 22 of the tube 12 and the bore 20 communicating with the tube 23 so that the pilot flame is not interrupted.

The continued heating of the thermostat 4 by the pilot flame depresses the control rod 5 still further so that the head 6 of the thrust rod 7 bears against the valve plate 8 and moves it from its seating against the action of the spring 9. In this way gas is also admitted to the main burner connected with the branch 3 and this gas is then ignited by the pilot flame in known manner.

When the valve plate 8 is depressed by the head 6 the bores 10 provided in the tubular extension 11 of the valve plate also occupy a correspondingly lower level and thus become more or less covered by the upper end of the tube 12. The supply of gas to the pilot flame nozzle 24 is thus throttled in such a manner that the pilot flame continues to burn with only just sufficient power to keep the valve plate 8 in the open position. If the gas supply to the nozzle 24 be insufficient to enable this condition to be maintained the valve opening action of the thermostat 4 will diminish and the valve plate 8 will be lifted by the spring 9. The free aperture of the bores 10 will thus increase accordingly so that the supply of gas to the pilot flame nozzle 24 is increased and the more highly heated thermostat will depress the valve plate 8 accordingly against the action of the spring 9. Consequently the supply of gas to the nozzle 24 and the main burner is regulated automatically.

If the knob 13 be held too long in the upward position the pilot flame burner 24 will receive an undiminished supply of gas owing to the tube 12 being maintained above the valve seating 19. The thermostat 4 will therefore be very strongly heated and thus exert a powerful downward pressure on the valve plate 8. The opening stroke of the plate 8, however, is limited by the tubular attachment 11, the lower end of which seats itself on a corresponding flat surface of the guide member 15 and thus interrupts the supply of gas past the valve seating 19 so that the pilot flame goes out. This arrangement prevents, therefore the thermostat 4 from becoming damaged.

If the pilot flame be extinguished and the heating of the thermostat thus ceases the free arm of the thermostat 4 returns to its original position, the valve plate 8 being returned to its original closing position by the spring 9 and the ball valve 17 similarly closed by the spring 16 so that the supply of gas is shut off from the main burner and also the pilot burner nozzle 24.

The arrangement of the transverse bores 10 for supplying gas to the pilot burner nozzle is noteworthy. These bores are comparatively wide and are arranged in such a manner as to be partially covered by the upper part of the tube 12 even when in the inoperative position. The result of this arrangement is that a sufficient aperture for the supply of gas is normally available whilst even a comparatively slight lowering of the valve plate 8 from its seat is enough to throttle the supply of gas to the nozzle 24 considerably. The possibility is also afforded of providing the pilot burner nozzle with a comparatively wide aperture which as already mentioned is of advantage in many respects.

Owing to the relatively slidable telescopic tubular members 11 and 12 for controlling the supply of gas the structural height of the entire arrangement can be kept low and the design as a whole made comparatively simple.

The arrangement according to Fig. 2 differs from that described with reference to Fig. 1 firstly in that the ball valve 17 and its closing spring 10 are located in a fixed (and not slidable) tube 25 which for example is integral with a closure member 28 adapted to be screwed into the casing 1. The free space in which the spring 16 is situated communicates with the tube 23 supplying gas to the pilot burner nozzle 24 by way of a bore 27 in the member 26 and a passage 28 in the casing 1. In this case the gas is supplied to the main burner by a branch 3 attached to the space above the valve plate 8. To make the arrangement ready for lighting up, the casing 1 is provided with a press knob 29 adapted to be depressed against the action of an interiorly housed spring (not shown). Said knob has a widened rim 30 which when the knob is depressed depresses the control rod 5 and therefore the thrust rod 7 accordingly. In this way the ball valve 16 is opened so that in contrast to the arrangement according to Fig. 1 the supply of gas to the pilot burner nozzle 24 now takes place through the bores 10, the opened ball valve 17 and passages 27 and 28. The stroke of the knob 29 is preferably restricted in such a manner that the ball valve cannot be opened to more than a slight extent so that unduly prolonged actuation of the knob will not affect the functioning of the arrangement.

When made ready for lighting up, the arrangement according to Fig. 2 functions in precisely the same manner as that according to Fig. 1.

The arrangement according to Fig. 3 corresponds with that according to Fig. 2 in so far that in this case also a press knob 29 is provided on the casing for preparing the conditions for lighting up.

According to Fig. 3 the gas is supplied through

a branch 2 arranged on the rear side of the example shown. The main burner is connected with the branch 3. The ball valve 17 and its closing spring 18 are housed in a fixed tube 31 which is integral with a diaphragm housing 32 screwed into the lower end of the casing 1. Located in the lower end of the tube 31 is a second ball valve 33 whilst similarly to the case of Fig. 2 the interior space of the tube 31 communicates with the tube 23 supplying gas to the pilot burner nozzle 24 through bores 34 in the diaphragm housing and a passage 35 in the casing 1. The housing 32 is provided with a diaphragm 36 which when in the inoperative position is pressed upwards by a spring 37 and thus keeps the ball valve 33 open by means of a pin 38 adapted to slide axially in the diaphragm housing. Beyond the main valve plate 8 the conduit supplying gas to the main burner is placed in communication with the space above the diaphragm 36 through a passage 39.

The arrangement according to Fig. 3 functions in the following manner: Making ready for lighting up is effected by means of the knob 29 in the manner already described with reference to Fig. 2 whereupon the main burner is brought into operation automatically in the manner also already described. The gas flowing to the main burner also passes through the passage 39 into the chamber above the diaphragm 36 and exerts thereon a pressure counter to that of the spring 37, the diaphragm being thus correspondingly depressed to a smaller or greater extent. The pin 34 shares the movement of the diaphragm thus more or less lifting the ball valve 33 so that under the action of the spring 18 the supply of gas to the pilot burner is correspondingly throttled by the valve 33. The resulting lowering of the pilot flame and the consequently diminished heating of the thermostat 4 adjusts the valve plate 8 in such a manner that the gas pressure in the supply pipe for the main burner is maintained at a predetermined constant level that is to say the supply of gas to the main burner is automatically controlled in accordance with the gas pressure.

Fig. 4 represents an arrangement in which the gas supply is controlled in accordance with a predetermined temperature such as room temperature. By comparison with the arrangement according to Fig. 2 that shown in Fig. 4 differs in respect of the design of the lower portion. In the case of Fig. 4 this portion comprises an attachment 40 which is screwed into the casing 1 and is integral with a tube 41 housing the ball valve 17. In this case the ball valve 17 rests on a volume control pin 42 which, when the arrangement is out of action, is lifted by the spring 18 in such a manner as to hold the ball valve 17 in the closed position. The lower end of the pin 42 is designed in such a manner that on the ball valve 17 being depressed, said pin more or less fully closes a bore 43 at the lower end of the tube 41 and thus controls the supply of gas passing in the first place through the passages 44, 45, 46 and tube 23 to the pilot-burner nozzle 24. Also branching from the tube 41 is a passage 47 to which is attached a tube 48 the other end of which communicates with the passage 45. A known instrument 49 for automatically controlling the supply of gas through the tube 48 in accordance with the room temperature is located at a suitable point in said tube 48.

The arrangement according to Fig. 4 functions in the following manner. After making ready for lighting up by depressing the knob 39 the gas supply to the pilot burner nozzle 24 proceeds by way of the bores 10, the opened ball valve 17, the tube 41 and the passages 43, 44, 45 and 46. After the thermostat 4 has become hot enough to cause the head 6 of the thrust rod 7 to move the valve plate 8 from its seating, the volume control pin is also depressed sufficiently to close the bore 43. The supply of gas to the pilot burner nozzle 24 now takes place by way of the passage 47, tube 48 and passages 45, 46. The control instrument 49 which is set to act at a predetermined temperature now controls the supply of gas to the pilot burner nozzle in known manner, the supply of gas to the main burner being thus controlled by the corresponding adjustment, already described with reference to Fig. 2, of the valve plate 8 by the thermostat 4.

The arrangement according to Fig. 5 differs in the first place from that according to Fig. 2 in that the tubular extension of the valve plate 8 is omitted so that the supply of gas to the pilot burner nozzle 24 is controlled exclusively by the ball valve 17. For this purpose the ball valve 17 and its closing spring 18 are located in a tube 50, the lower end of which is provided with a valve seating 51 and is screwed, for example, into the closure member 26. The interior space of the tube 50 communicates with the nozzle 24 in a similar way to the arrangement according to Fig. 2.

The arrangement according to Fig. 5 functions in the following manner. The arrangement is made ready as in the case of Fig. 2. If now, as the result of the thermostat becoming too strongly heated the valve plate 8 is opened wider than is desired, the ball valve 17 approaches the lower valve seating 51 in such a manner as to throttle the supply of gas to the nozzle accordingly. By this means the supply of gas to the pilot burner nozzle and to the main burner will be automatically controlled in a manner otherwise corresponding with Fig. 2.

In its manner of operating, the device for controlling the supply of gas to the pilot burner in the arrangement according to Fig. 5, corresponds with the volume control pin 42 actuated by the pilot flame valve 17 and coacting with a bore 43, according to Fig. 4. Consequently in the case also of the arrangement according to Fig. 4, the tubular extension 11 employed in connection with the main gas valve 8 for controlling the gas supply to the pilot flame could be omitted altogether.

GEORG HEGWEIN.