March 24, 1925. 1,530,585

E. T. VINCENT

CONTROLLING MEANS FOR UNIT HEATING DEVICES

Filed Sept. 15, 1921

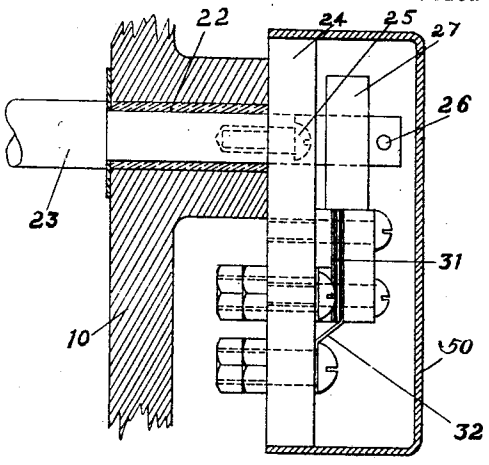


Fig 2

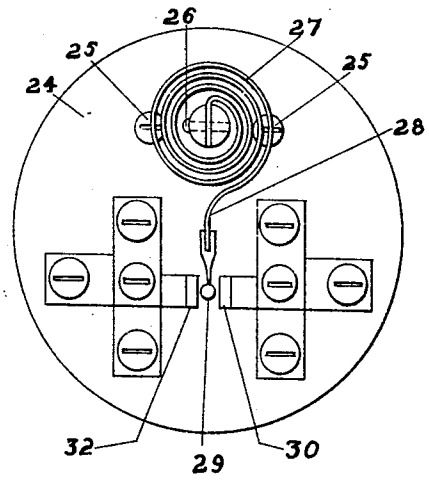


Fig 1

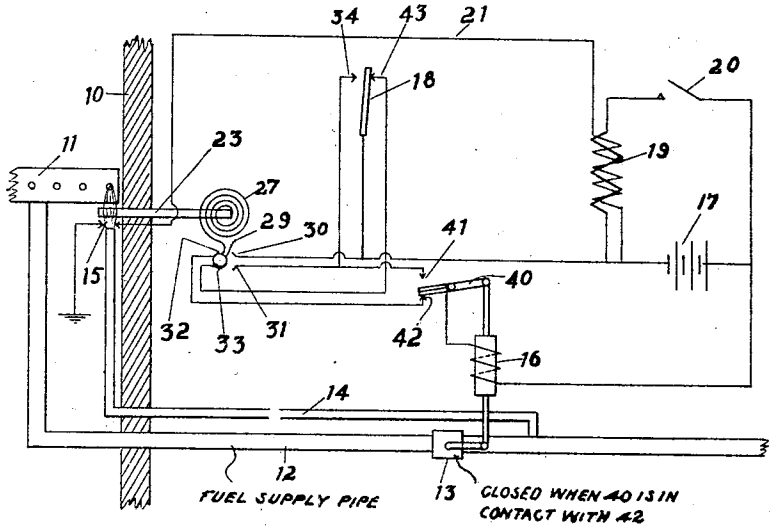


Fig 3

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UNITED STATES PATENT OFFICE.

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CONTROLLING MEANS FOR UNIT-HEATING DEVICES.

Application filed September 15, 1921. Serial No. 500,752.

To all whom it may concern:

Be it known that I, EUGENE T. VINCENT, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Controlling Means for Unit-Heating Devices, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention relates to unit heaters, such as heaters for garages and the like, and more particularly to an improved automatic controlling means for valve operating mechanism for such heaters.

In my copending application, Serial No. 488,379, filed July 29, 1921, I have described and claimed the novel features of the construction and arrangements of parts constituting an improved form of garage heater that is fully automatic in its operation. In such application I have described an improved circuit controlling device, the details of which form the subject matter of the present invention.

In garage heaters as previously constructed, no means of which I am aware have been provided for preventing operation of the fuel supply valve under all conditions of service. In such heaters, it is customary to employ a pilot light for igniting the main heater, with an operating mechanism controlled in its operation by a thermostat for determining the time at which the operating mechanism will open or close the fuel conduit leading to the main heater. Such an operating mechanism is shown and claimed in Patent No. 1,382,412 granted June 21, 1921, to James H. Campbell. A heater intended for service where inflammable gases are likely to be present must be enclosed in such a manner that no flame whatever can ignite such gases More especially is this true when the heater has both intake and flue openings within the room to be heated, with no connection whatever to the outside air. In such a heater the pilot light is not easily accessible, and can only be seen through a suitable screen and mica plate provided for the purpose. It is undesirable in this case to place the pilot light operating device within this inaccessible enclosed space, and it is further undesirable in that electric wires must lead from the pilot light operating device to a battery of dry cells, which are always of necessity outside this enclosed space. An object of the present invention therefore, is to have this pilot light operating device outside the heater while capable of being controlled by means within the heater.

An operating mechanism, such as that disclosed in the patent referred to, is inserted in a circuit controlled by a thermostat, and under ordinary conditions operates to perform its functions. It may happen however, that after the main heater is extinguished by the operating mechanism shutting off the flow of fuel thereto, that the pilot light will be extinguished also. If now the operating mechanism turns on the fuel to the main heater, fuel will flow into the combustion chamber and from thence into the room or garage in which the apparatus is located. There is therefore, danger of an explosion because of the unconsumed fuel coming in contact with an open flame, or because some person, detecting the presence of the unconsumed fuel, attempts to relight the main heater in the usual way. It may happen also, that when the heater is operating to heat up a cold room or garage, the supply of fuel, may be shut off for some reason. Afterwards the supply of fuel may be turned on, and when this happens, prior devices have become sources of danger, because of their inability to shut off the supply of fuel under the existing conditions. The combustion chamber, under such conditions, is filled with inflammable fuel, which finds an exit through the flue of the device into the room or garage, where it may come into contact with an open flame with disastrous results.

To obviate the dangers from these sources is the principal object of my present invention, and I have therefore placed an additional break point in the controlling circuit for the operating mechanism, such break point being under the control of a thermostatic switch operated in turn by the heat from the pilot light. By my improved apparatus, I am enabled to shut off the fuel supply after the pilot light has been extinguished, and also to turn off the fuel supply should the main and pilot lights be extinguished for any reason while the main light is working.

In the accompanying drawings illustrating the preferred embodiment of my invention,

Fig. 1 is a front elevation of my apparatus, with the cover removed;

Fig. 2 is a side elevation, the cover and combustion chamber housing being shown in section, and

Fig. 3 is a circuit diagram showing the manner in which my apparatus works.

Referring to the drawings, 10 designates a wall of the combustion chamber of a unit heating device, having contained therein the main heater 11 connected to a suitable source of fuel supply by a pipe 12, a valve 13 being located in said pipe outside the chamber wall 10. A by-pass tube 14 leads from the pipe 12 to a pilot light 15, the flow of fuel through this tube 14 not being controlled by the valve 13. The valve 13 is controlled by an electromagnetic device 16, preferably of the type shown in the Campbell patent, above referred to, the energizing coil of such device being connected to a suitable source of power, as 17, and is controlled in its operation by any suitable form of thermostat 18, it being possible to regulate the thermostat to operate within any desired limits of temperature. At any convenient point is a spark coil 19 for igniting the fuel at the pilot light and I preferably place the battery 17 and spark coil 19 in a box or other receptacle. The primary winding of the spark coil 19 is connected to the battery 17 through a hand operated switch 20, while the secondary winding is connected to the spark gap at the pilot light 15 by a conductor 21. Associated with and forming part of the electromagnetic device 16, is a switch 40, the function and operation of which will be hereinafter described.

Passing through the wall 10 and separated therefrom by heat insulating material 22, is a rod 23, of copper or other suitable material, the inner end of which is adjacent the pilot light 15, as shown in Fig. 3. On the outer face of the wall 10 is attached, by screws 25, a base plate 24 through which extends the slotted end of the rod 23, and fastened in such slotted end by a pin 26 is the inner end of a volute spring 27, composed of thin layers of brass and vulcanite, or other suitable materials capable of causing a movement of the free end 28 thereof under the influence of heat or cold to the right or left, as the case may be. Attached to the end 28 is a switch blade 29 adapted to engage with the contacts 30, 31 and 32, 33 in its movement to the left or right. The contact 30 is connected to the blade of the thermostat 18, to the primary and secondary windings of the spark coil 19 and to the negative side of the battery 17. The contact 31 is connected to the contact point 34 of the thermostat 18 and to the contact point 41 of the switch 40. The contact 32 is connected to the contact point 42 of the switch 40, and the contact 33 is connected to the contact point 43 of the thermostat 18. A cover 50 encloses the thermostatic and switch elements and is attached to the plate 24 in any suitable manner, this arrangement preventing the outside air from influencing the thermostatic element 27.

Assuming that the heater is installed in a garage, for example, and the thermostat 18 set to operate the electromagnetic device 16 within desired limits, the switch 20 is operated to close the circuit through the primary winding of the spark coil 19 to cause lighting of the pilot light 15. The heat from the pilot light 15 heats the rod 23, which heat is transmitted to the thermostatic element 27, which we will assume, moves the switch blades 29 into engagement with the contacts 32 and 33. At this time it is assumed that the temperature of the room or garage in which the device is located is below the minimum temperature desired, and that the blade of the thermostat 18 is in engagement with the contact 43. It is assumed also, that the switch 40 is at this time, with the valve 13 closed, in engagement with the contact 42. When the thermostatic element 27 therefore, moves into engagement with contacts 32 and 33, a circuit is completed from battery 17, winding of magnetic device 16, switch blade 40, contact 42, contacts 32 and 33, switch blade 29, blade of the thermostat 18, contact 43 and back to battery. Electromagnetic device 16 thereupon operates to open the valve 13 to allow a flow of fuel through the pipe 12 where it is ignited at the main heater 11. Operation of the electromagnetic device 16 moves the switch blade 40 into engagement with contact 41. As the temperature of the room or garage rises, the blade of the thermostat 18 moves gradually over into engagement with the contact 34, and when this occurs, it is assumed that such temperature is too high and that therefore, the supply of fuel should be shut off. As at this time the blade 40 is in engagement with the contact 41 and blade 29 in engagement with contacts 32 and 33, a circuit is completed from battery 17, energizing winding of the electromagnetic device 16, blade 40, contact 41, contact 34, blade of the thermostat 18, and back to battery, energizing the winding of the electromagnetic device and closing the valve 13 to shut off the flow of fuel.

If, while the valve 13 is closed, the pilot light 15 is extinguished for any reason, the blade 29 will gradually move over into engagement with the contacts 30 and 31, due to the cooling of the rod 23 and preventing operation of the electromagnetic device 16 when the blade of the thermostat 18 moves over into engagement with the contact 43.

If, while the valve 13 is open and the de-

vice is operating to heat up a room or garage in which it is located, the supply of fuel is shut off at the source of supply for any reason, such as a break in the fuel supply line, the rod 23 will cool off rapidly, causing the thermostatic element 27 to move the switch blade 29 over into engagement with the contacts 30 and 31. At this time the blade of the room thermostat 18 may be in engagement or out of engagement with the contact 43. Under such conditions a circuit is completed from battery 17, energizing winding of the electromagnetic device 16, blade 40, contact 41, contacts 30 and 31, and back to battery, causing the electromagnetic device 16 to close the valve 13.

It will be seen from the above, that my improved invention takes care of any situation that may possibly arise, and that once started in operation by the hand switch 20, all future operations are automatic, the main supply of fuel being turned on or off under the control of the room thermostat 18, and upon failure of the fuel supply, the valve 13 is closed automatically.

While I have necessarily described the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the details of the construction and arrangement of parts that comprise my invention within wide limits without departing from the spirit of the invention.

Having thus described my invention, what I claim as new, is:

An improved controlling means for unit heating devices comprising, a main heater, a fuel supply conduit leading thereto, a valve in said conduit controlling the flow of fuel to the main heater, electrically operated means controlling said valve, a pilot light, an energizing circuit for said electrically operated means, a pair of break points therein, a pair of thermostats controlling said break points, and operated respectively by the variations of room temperature and by the heat generated by the pilot light to positively and automatically control the operation of the electrically operated valve controlling means.

In testimony whereof, I have signed my name to this specification.

EUGENE T. VINCENT.