Feb. 16, 1932. G. E. HULSE 1,844,959

MULTIPLE BURNER CONTROL

Filed Jan. 25, 1929

FIG. 1.

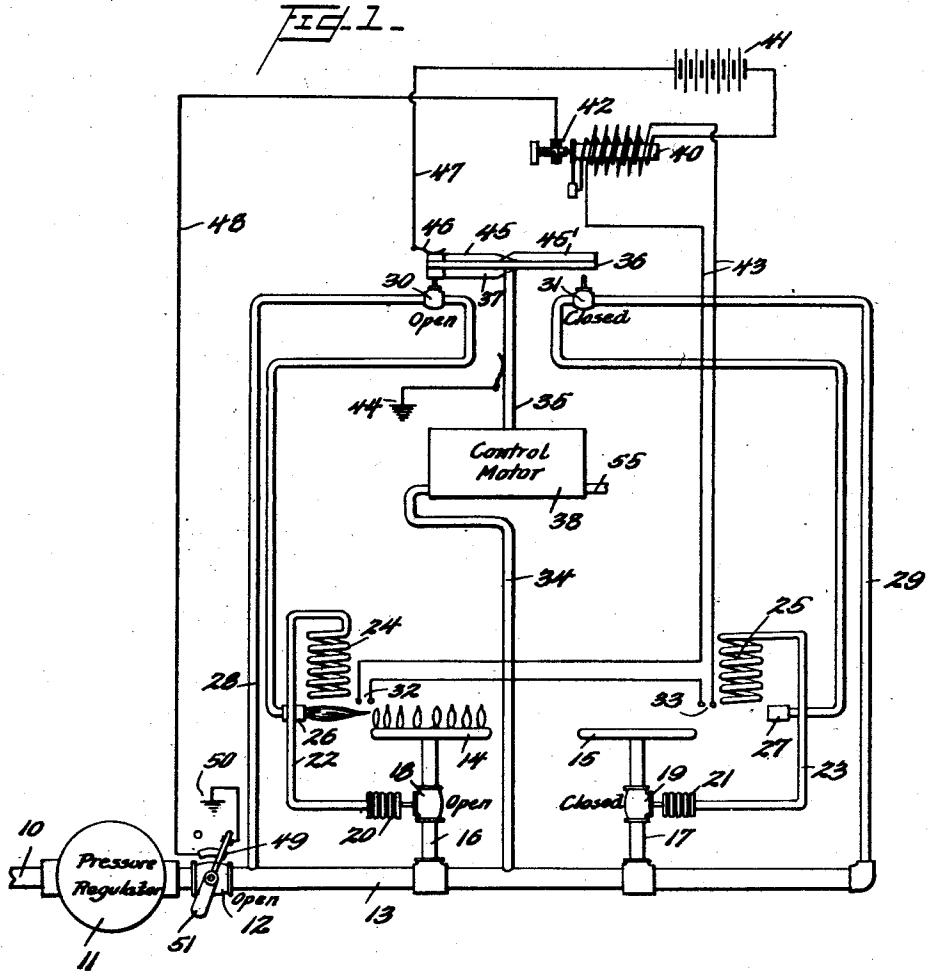
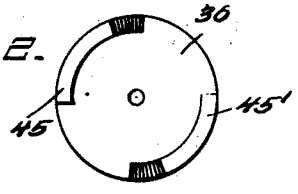


FIG. 2.



Inventor

George E. Hulse

By Watson, Cole, Morse & Grindle

Attorney

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GEORGE E. HULSE, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE SILICA GEL CORPORATION, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND

MULTIPLE BURNER CONTROL

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This invention relates to a burner control system and more particularly to a method of and apparatus for controlling fluid fuel burners.

It is a general object of the present invention to provide novel and improved apparatus for and a method of controlling fluid fuel burners.

One of the features of the invention comprises an arrangement of burners, a fuel supply, and ignition means so that one or a plurality of burners can be made to function intermittently or successively and intermittently.

Another feature of the invention comprises the arrangement of a main burner, a pilot burner, and an ignition device so that upon the start of a supply of fuel to the pilot burner, the ignition device will operate to ignite the fuel at the pilot burner, together with means responsive to the burning of the fuel at the pilot burner for supplying fuel to the main burner to be ignited by the pilot light.

A further feature of the invention comprises a system for automatically and successively lighting a plurality of main burners, each to burn for a predetermined period, together with means for shutting off the burners, their pilots, and all ignition means so that they can be turned on simultaneously to re-establish any portion of an incomplete burning period of any burner which was extinguished by turning off the various agencies recited above.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawings and following specification wherein is disclosed a single exemplary embodiment of the invention with the understanding, however, that such variations and changes may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawings:

Figure 1 is a schematic and diagrammatic representation of the system and parts for carrying out the above mentioned invention; and

Figure 2 is a plan view of the cam disk.

In various commercial installations, both stationary and portable, it is often desirable to supply heat over certain fixed periods of time and to have these periods repeat themselves at definite intervals or controlled intervals. Sometimes it is desirable to heat several units or devices and to heat them intermittently and successively. The present invention provides apparatus for carrying out these features together with means whereby the heating interval may be stopped when it is desired to do so for purposes of safety (for instance, in the presence of inflammable gases) by the operation of a single lever and to again start and finish the interval by the movement of this lever in the reverse direction.

Referring now to the drawings, which disclose a two-burner installation for convenience in description, it will be seen that a pipe 10 leads from a source of fluid fuel (not shown) preferably under pressure. Any conventional form of pressure regulator 11 serves to reduce the pressure to that suitable for the burners. The fuel flows from the pressure regulator through a valve 12 and into a manifold 13. The main burners are shown at 14 and 15 respectively connected by means of the pipes 16 and 17 with the manifold 13.

Each pipe 16, 17, is provided with a valve 18, 19, normally held closed by any suitable means and adapted to be opened by a pressure responsive device 20, 21, which may be in the form of a corrugated metal bellows. Each such device is connected by a pipe 22, 23, to a coil 24, 25, which contains a thermally responsive liquid. While it is intended that the burner valves 18, 19, may be operated in any manner, for convenience they have been shown here as subject to temperature control. Under normal temperature conditions the fluid in the coils 24, 25, is sufficiently contracted to allow the valves to remain closed, but upon any major rise in temperature of the coils 24, 25, the fluid expands and the valves are opened thereby.

Each main burner is provided with a pilot burner 26, 27, respectively, and these burners are so positioned in respect to the coils 24, 25, that each heats its own coil when burn-

ing. These coils, however, are so mounted as to be out of the range of heating of the main burner.

Each pilot burner is supplied with fuel by means of a pipe 28, 29, respectively, leading from the manifold 13 and passing through the valves 30, 31, respectively. When either of the valves 30, 31, is opened, its corresponding pilot burner can be lighted. Each pilot burner has located adjacent it the spark gap 32, 33, respectively, connected to suitable ignition means so that a spark can pass across the gap to ignite the fuel issuing from the burner.

For purposes of convenience, two burners have been shown in the present system, and they are arbitrarily shown as adapted to burn alternately each one-quarter of the time leaving half of the time with neither burner ignited. The control of the time regulation is effected by means of a suitable motor 38, here shown as driven by the expansion of the fuel which is supplied to the motor through the pipe 34 from the manifold 13. This motor may well be of the gas meter type or some similar type adapted to rotate the shaft 35 very slowly through suitable gearing or otherwise as desired. This shaft carries a cam disk 36 at its upper end which is provided on its undersurface with a circumferential cam 37 of substantially 90° arcuate extent (this 90° is an arbitrary figure fixed for the purpose of this explanation) This cam 37 is adapted to engage the operating member of the valve 30 and of the valve 31 alternately so as to hold each valve open throughout 90° of rotation of the shaft and to leave two intervals of 90° of rotation of the shaft when both valves are closed.

It will thus be seen that this motor effects the control and operation of the burners for when the cam 37 engages and opens the valve 30, the fuel from the pilot burner 26 will be ignited, and the heat responsive coil 24 will function to open the valve 18 so that the fuel from the main burner 14 will be ignited from its pilot light and will continue to burn until the cam 27 allows the valve 30 to close. Shortly after this, the contraction of the fluid in the coil 24, due to the absence of the pilot light, will allow the bellows 20 to close the valve 18 and shut off the main burner 14.

After a period of substantially 90° of rotation of the cam disk 36, a similar succession of events will take place at the other main burner and its appurtenances.

The ignition system is of the electric type and includes the induction coil 40, the primary winding of which is supplied with current from the battery 41 through the interrupter 42 in the customary manner. The secondary winding of the induction coil is connected by means of wires 43 to the spark gaps 32 and 33 which, it will be seen, are connected in a series for simultaneous operation. The circuit of the primary winding of the induction coil is from the ground at 44 at a suitable place on the control motor through the cam disk 36, one of the cams 45 on its upper surface, the contact spring 46, wire 47, battery 41, primary winding, vibrator 42, wire 48, switch 49 to ground again at 50.

In Figure 2 is shown a plan view of the cam disk 36 which carries the cams 45 and 45′ on its upper surface, each of substantially 90° extent and 90° apart. These cams are so positioned that their phase relation to the cam 37; the valves 30, 31; and the spring 46 is such that contact is made at the spring 46 simultaneously with the opening of either valve 30 or 31 and is maintained throughout the full extent of the time that either of these valves is opened. Thus, when either pilot burner is burning or should be burning, its ignition means is in operation. This ensures against a pilot becoming extinguished and any fuel being wasted or escaping to cause damage.

The valve 12 previously referred to, when closed, cuts off the supply of fuel to the manifold 13, and thus will extinguish either burner and its pilot light which happens to be burning at the time it is turned off and will stop the operation of the control motor at whatever position of the cycle it has reached. Whenever the valve is again turned on, the cycle will be resumed at exactly the place where it stopped so that whichever burner was burning will be relighted for the remainder of its period.

The circuit to the induction coil is closed by the switch 49 mounted for operation by the same handle 51 which controls the valve 12 so that when the valve is closed, the circuit is opened and vice versa. This ensures that when the valve is closed, all flames are extinguished, and the ignition means is put out of operation so that there is no danger of igniting any inflammable gases which may be present. Immediately upon movement of the handle 51 in the opposite direction, however, the fuel is turned on to the motor and to any burner which may have been burning when the motor was stopped and the ignition immediately starts, so that after the pilot burner has been ignited, it will open its main burner valve and ignite the main burner.

By using pilot burner control as above described, a very small control motor 38 can be used and one that will use but a small quantity of fuel, which can be exhausted from the pipe 55 into the atmosphere is desired without any great waste. The valves and pipes for the pilot burners can be very small because of the small quantity of fuel which they must handle, and the valves 30 and 31 can thus be readily operated by a control motor of small size, light weight and low cost. However, the burners may be as large

as desired, and very large valves 18 and 19 can be controlled by the temperature responsive means. This reduces the cost of the whole equipment and makes it more compact. At the same time it ensures more certain ignition of the main burners, for the pilot burners being small can have their fuel ignited more readily by an electric ignition means than could the main burners, and the pilot flames will ensure ignition of the main burners.

The burner control disclosed in this application was designed particularly for use in a motor vehicle or truck carrying an adsorption type refrigeration apparatus. The two burners shown are arranged to alternately heat the adsorbers to drive off the adsorbed vapor and again place them in condition for adsorption. The electric ignition is readily connected to the storage battery of the vehicle, and the combination shut-off valve and switch is provided within the easy reach of the operator so that all flame and sparks can be cut off, for instance, when the vehicle is in a garage or taking on a supply of fuel, so that there will be no danger of fire. No part of the refrigeration apparatus has been shown since it is to be understood that the invention is not limited in this respect but is applicable to the control of any type of burner or burners.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a multiple burner control system, in combination, a source of fuel supply, a plurality of main burners connected to said fuel source, a pilot burner for each main burner, a valve for each main burner, each valve being normally closed, means responsive to the condition of its pilot burner to actuate each main burner valve and means to selectively light said pilot burners.

2. In a multiple burner control system, in combination, a source of fuel supply, a plurality of main burners connected to said fuel source, a pilot burner for each main burner, a valve for each main burner, each valve being normally closed, means responsive to the condition of its pilot burner to actuate each main burner valve, a valve for each pilot burner, means to successively open said pilot burner valves and means to ignite the fuel at the pilot burner whose valve is opened.

3. In a multiple burner control system, in combination, a source of fuel supply, a plurality of main burners connected to said fuel source, a pilot burner for each main burner, a valve for each main burner, each valve being normally closed, means responsive to the condition of its pilot burner to actuate each main burner valve, a valve for each pilot burner, means to successively open said pilot burner valves and means to ignite the fuel at the pilot burner whose valve is opened, said last mentioned means being controlled by the pilot valve actuating means.

4. In a multiple burner control system, in combination, a source of fuel supply, a plurality of main burners connected to said fuel source, a pilot burner for each main burner, a valve for each main burner, each valve being normally closed, means responsive to the condition of its pilot burner to actuate each main burner valve, a valve for each pilot burner, means to successively open said pilot burner valves, an ignition system for said pilot burners and means whereby said ignition system is put in operation upon the opening of any pilot burner valve.

5. In a multiple burner control system, in combination, a source of fluid fuel, a fuel conduit, a plurality of main burners connected to said conduit, a pilot burner for each main burner and connected to said conduit, a motor connected to said conduit and adapted to be driven by said fuel at a substantially constant speed, a valve for each pilot burner, a valve for each main burner, all of said burner valves being normally closed, means driven by said motor to open said pilot burner valves successively, means to ignite the fuel at the pilot burner whose valve is open, means associating each main burner valve and pilot burner to open the main burner valve when the pilot burner is burning.

6. In a multiple burner control system, in combination, a source of fluid fuel, a fuel conduit, a shut-off valve between said source and conduit, a plurality of main burners connected to said conduit, a pilot burner for each main burner and connected to said conduit, a motor connected to said conduit and adapted to be driven by said fuel at a substantially constant speed, a valve for each pilot burner, a valve for each main burner, all of said burner valves being normally closed, means driven by said motor to open said pilot burner valves successively, means associating each main burner valve and pilot burner to open the main burner valve when the pilot burner is burning, an electric ignition system for said pilot burners, means driven by said motor to start said ignition system when any pilot burner valve is opened, and means on said shut-off valve to open said ignition circuit when the valve is closed and close the same when the valve is opened.

7. In a multiple burner control system, in combination, a source of fluid fuel, a plurality of main burners, a pilot burner for each main burner, ignition means for said pilot burners, means responsive to the burning of each pilot burner to turn on the fuel to the corresponding main burner, a substantially constant speed motor adapted to successively turn on the fuel to said pilot burners and means to simultaneously stop said motor, shut off all fuel and stop said ignition means.

8. In a burner control system, in combina-

tion, a source of fuel, a burner, a valve controlling the flow of fuel to said burner, a pilot burner, a pipe connecting said source of fuel supply to said pilot burner, a valve in said pipe, electric ignition means for said pilot burner, a motor actuated by the flow of said fuel to move at a substantially constant speed, said motor being in control of said second mentioned valve and said ignition means, said first mentioned valve being under the control of said pilot burner.

9. In a burner control system, in combination, a source of fuel, a burner, a valve controlling the flow of fuel to said burner, a pilot burner, a pipe connecting said source of fuel supply to said pilot burner, a valve in said pipe, electric ignition means for said pilot burner, a motor actuated by the flow of said fuel to move at a substantially constant speed, said motor being in control of said second mentioned valve and said ignition means, said first mentioned valve being under the control of said pilot burner, and means to simultaneously stop the operation of all parts of said system.

In testimony whereof I hereunto affix my signature.

GEORGE E. HULSE.