July 31, 1934. W. B. KERRICK 1,968,525

THERMOSTATIC CONTROL

Filed Nov. 14, 1930 2 Sheets-Sheet 1

Fig. 1.

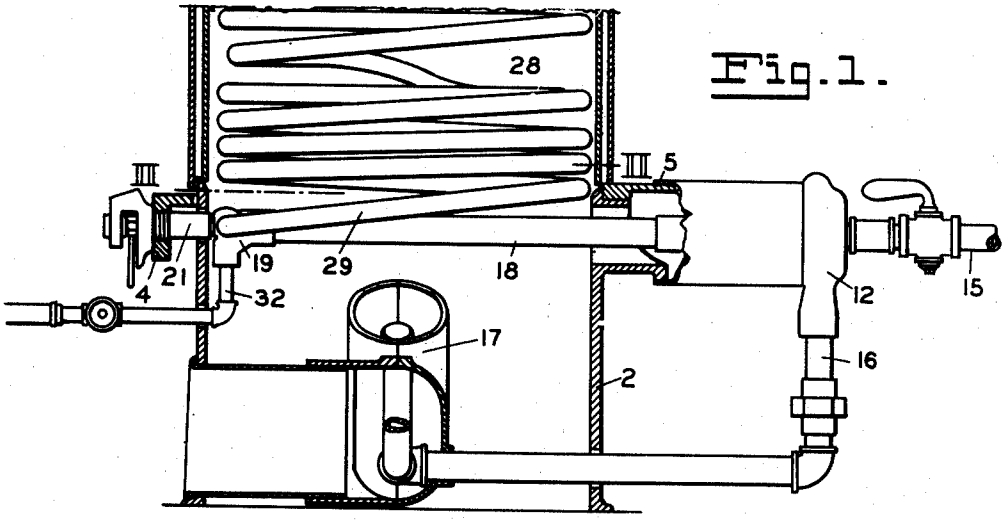
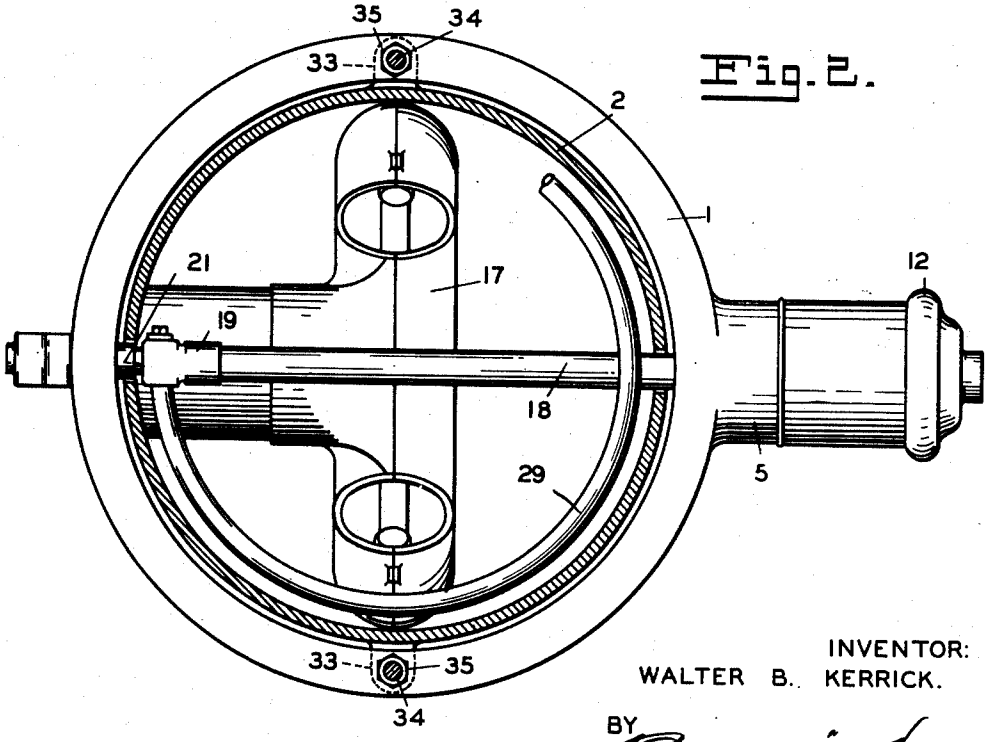


Fig. 2.



INVENTOR:
WALTER B. KERRICK.

BY Roderick Dale

ATTORNEY.

July 31, 1934. W. B. KERRICK 1,968,525

THERMOSTATIC CONTROL

Filed Nov. 14, 1930 2 Sheets-Sheet 2

Fig. 3.

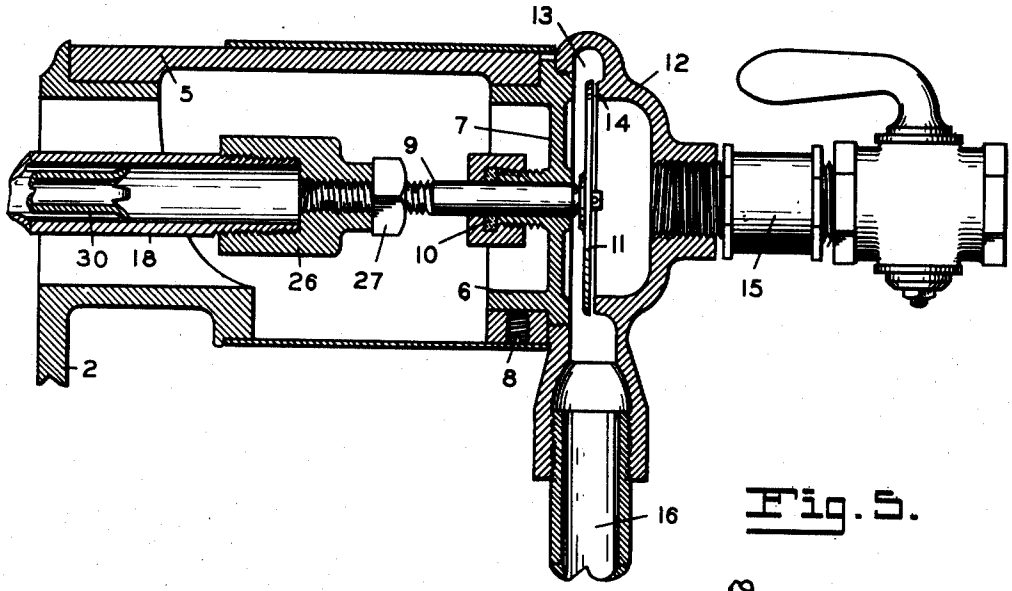


Fig. 5.

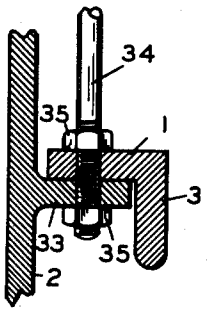
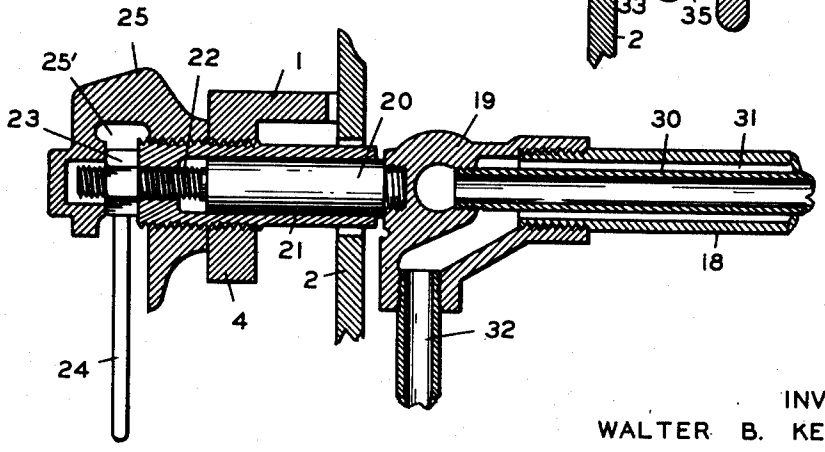


Fig. 4.



INVENTOR:
WALTER B. KERRICK.

BY Baldwin & Wes

ATTORNEY.

Patented July 31, 1934 1,968,525

UNITED STATES PATENT OFFICE

1,968,525

THERMOSTATIC CONTROL

Walter Barnes Kerrick, Los Angeles, Calif., assignor, by mesne assignments, to Chemical Processes Company, Los Angeles, Calif., a corporation of California

Application November 14, 1930, Serial No. 495,635

11 Claims. (Cl. 236—20)

This invention relates to improvements in thermostatic controls and more particularly to fuel valve controls for liquid heaters.

The principal object of the invention is to synchronize the variations in the volume of heat generated, with the variations in the temperature of the contents of a fluid heater.

Another object is to accomplish maximum precision and sensitiveness in the maintenance of predetermined temperatures in the output from fluid heaters.

Another object is to counteract the effect of heat absorbed by the base of the thermostatic unit.

A further object is to minimize the effect of extraneous influences on the thermostatic element.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawings the invention is disclosed in its preferred form. But it is to be understood that it is not limited to this form because it may be embodied in other forms without departing from the spirit of the invention as defined in the claims following the description.

In the two sheets of drawings:

Fig. 1 is a side elevation of a portion of a fluid heater having this invention combined therewith.

Fig. 2 is a plan view from above of the same, the fluid container being shown in horizontal section on the line II—II, Fig. 1.

Fig. 3 is an enlarged detail in vertical section of the thermostatic element connected with the fuel control valve.

Fig. 4 is a similar view of the opposite end of the thermostatic element showing the manual adjustment.

Fig. 5 is a fragmentary detail of the supporting and attaching means for the thermostat base.

In detail the construction illustrated in the drawings comprises the encircling rigid base 1, in this instance an annulus adapted to exteriorly surround the wall 2 of the combustion chamber. This annulus 1 is preferably angular in cross section with the depending flange 3.

The boss 4 is formed on the base flange to anchor one end of the thermostatic element. The neck 5 is formed on the opposite side of the annulus in diametrical alinement with the boss 4.

The base 6 of the plate 7 is fixed in the end of the neck 5, and secured by the set screw 8. The valve stem 9 extends through the packing gland 10, and has the valve disc 11 freely mounted thereon. The valve housing 12 is threaded onto the plate 7 and together they form the valve chamber 13. The annular valve seat 14 is formed on the interior wall of the housing 12 and is faced off to form a gas tight fit with the disc 11.

The gas service pipe 15 is connected to the housing 12 and the outlet 16 leads therefrom to the gas burner 17. The valve 11—14 and burner may be substituted or modified in form to handle any type of fuel. For instance, if an oil burner were used, a needle valve should be substituted for the disc type shown. Such substitutions are available to those skilled in the art without departing from the purview of this invention.

The thermostatic element comprises the external tube 18, of any suitable material capable of withstanding the corrosive action of the products of combustion from the burner 17. This tube 18 should also have a relatively high coefficient of expansion. Therefore, copper and brass are suitable for the purpose. One end of the tube is fixed in the head 19, into which the trunnion 20 is fixed coaxially with the tube 18. This trunnion is slidably guided in the sleeve 21 screwed into the boss 4. This trunnion is turned down to form the stem 22 upon which the adjusting nut 23 is threaded. This nut has the handle 24, by which the nut may be turned to longitudinally adjust the position of the tube 18. This nut is confined within the slot 25' in the yoke 25, also screwed onto the sleeve 21 and jammed against the boss 4 to hold the stem 22 in adjusted position.

The opposite end of the tube 18 is fixed in the cap 26 which closes the end thereof and into which the valve stem 9 is threaded and locked by the nut 27. The tube 18 is thus slidably guided and supported upon the valve stem 9 and the trunnion 20. The position of the trunnion is selectively fixed by the nut 23. The longitudinal expansion and contraction of the tube 18 moves the valve stem 9 and varies the capacity of the valve 11—14. This increases or reduces the flow of the fuel, through the valve, in proportion to the expansion and contraction of the tube 18. At full expansion the valve is closed, contrawise the valve opens when the tube cools and contracts.

To proportion the consumption of fuel and generation of heat by the burner 17, to the temperature of the fluid discharged from the heater 28, the discharge tube 29 is screwed into the head 19. The continuation 30 of this tube extends coaxially throughout the length of the external tube 18, terminating adjacent the cap 26. This forms an annular return passage 31 between the tubes 18—30, which discharges from the head 19 into the pipe 32, leading from the apparatus.

The heat absorbed by the tube 18 causes it to expand and reduce the flow of fuel to the burner. The heat absorbed from the tube 18 by the liquid in the passage 31, causes the tube 18 to contract and increase the flow of fuel.

In a static condition of no discharge from the pipe 32, a thermal unbalance would result between the natural thermal losses by radiation and the production of heat by the burner 17. If this condition continued the valve 11—14 would close.

By adjusting the nut 23 or 27 or both, the capacity of the valve 11—14 can be precisely adjusted to maintain the discharge temperature of any given quantity of liquid or fluid through the pipe 32. That is to say, if the valve 11—14 is adjusted to produce the quantity of heat necessary to maintain a desired temperature in the maximum discharge from the pipe 32, the thermostat tube 18 will maintain that temperature in the discharged liquid at 32, regardless of the quantity discharged below the maximum quantity predetermined, as stated. Practical operation has demonstrated that the desired temperature can be maintained within two degrees F.

The ring 1 should entirely surround the external wall 2 of the fire box and be as free as possible from the heat therein, since abnormal expansion or contraction of the ring 1 would interfere with the precision of the thermostatic unit 18.

The ring 1 may be supported upon the brackets 33—33 on the wall 2, see Fig. 5. In this manner the thrust of the tube 18 is applied directly, without lost motion, there being no compounding leverages, or extraneous temperatures imposing distorting influences upon the thermal unit.

The ring 1, naturally absorbs a certain amount of heat from the wall 2. When the ring 1 is expanded by this absorbed heat, it enlarges diametrically and tends to open the valve 11—14. In practice I have found that by fixing the ring to the brackets 33—33 by passing the tie rods 34—34 therethrough and holding them between the nuts 35—35, the expansion of the wall 2 distorts the ring 1 transversely to the line of the thermostatic tube 18 and exactly counteracts the effect of the expansion of the ring 1. This restores the precision in the operation of valve 11—14 by the tube 18.

Further accuracy is obtained by extending the tube 18 across the entire heat zone. The extra length increases the elongation movement.

The larger area exposed to the heat from the burner 17, establishes a more consistent average temperature in the tube 18. These results cannot be obtained in more compact thermal units with multiplied leverages and exposed to a relatively small area of a combustion chamber, and their bases subjected to heat conduction therefrom.

It is preferable to entirely encircle the combustion chamber with a base ring, such as 1. However, a semi-circular base, if sufficiently rigid, extending partially around or beneath the combustion chamber would serve the same purpose.

It is obvious that an electric switch or other control mechanism could be substituted for the fuel valve shown, to regulate the volume of heat produced by any form of fuel or power.

Having thus described this invention what I claim and desire to secure by Letters Patent is:

1. A thermostatic control comprising an open base; a thermostatic unit extending across said base having a trunnion on one end, and a valve on the other end; a guide fixed on said base and slidably engaging said trunnion; a yoke fixed to said base; a nut threaded on said trunnion and confined in said yoke.

2. A thermostatic control comprising a combustion chamber; a base encircling and spaced from the outer wall of said chamber; contacts between said ring and chamber wall on diametrically opposite sides; a thermostatic unit extending across and guided on said ring transversely to the said contacts and a valve operated by said unit.

3. A thermostatic control comprising a combustion chamber having lugs on its opposite sides; a base encircling and spaced from the outer wall of said chamber and fixed to said lugs; a thermostatic tube extending across said base and slidably guided thereon; intermediate said lugs; a valve on said tube and a valve seat on said base.

4. A thermostatic control comprising a combustion chamber having external lugs on the opposite walls thereof; a base encircling and spaced from said wall and engaging said lugs; a valve seat and a guide on said base; a thermostatic tube extending across said base intermediate said lugs and having a valve on one end cooperating with said valve seat, and having at its other end a trunnion slidable in said guide; manual means for adjusting said trunnion with respect to said guide; a fluid heater above said chamber and means for passing a body of liquid through said heater and thermostatic tube.

5. A thermostatic control comprising a combustion chamber; an open base externally surrounding said chamber; a thermostatic tube extending diametrically across said base and closed at one end and open at the other end and suitably mounted on said base; an inner tube entering said thermostatic tube at its open end and discharging thereinto near the closed end thereof; a fluid heater above said chamber and connected with said inner tube; and means for passing a body of liquid through said heater and telescoped tubes so that it flows through said inner tube and returns between said tubes and discharges from the open end of said thermostatic tube.

6. In an apparatus for heating fluids, the combination of: a combustion chamber; walls adapted to confine the fluid to be heated; a fuel burner so placed as to supply hot combustion products to said walls; means for supplying a fluid fuel to said burner; a valve body, said fuel passing through an opening in said body; a valve adapted to close said opening by being forced into contact with a valve seat surrounding said opening; a thermostatic member having a free end and a fixed end, said member being formed of a material which expands when heated; means for causing said fluid, after it has been so heated, to supply heat to said thermostatic member; means for so connecting the free end of said thermostatic member to said valve that any expansion of said thermostatic member tends to cause said valve to close said opening and thus reduce the amount of fuel passing therethrough; and means operable from the exterior of said combustion chamber for regulating the position of the free end of said thermostatic member with relation to said valve seat so that the position of said valve with relation to said valve seat can be regulated independently of the expansion of said thermostatic member, said valve body and valve being mounted exteriorly of the combustion chamber.

7. In an apparatus for heating fluids, the combination of: a combustion chamber; walls adapt-

ed to confine the fluid to be heated; a fuel burner so placed as to supply hot combustion products to said walls; means for supplying a fluid fuel to said burner; a valve body, said fuel passing through an opening in said body; a valve adapted to close said opening by being forced into contact with a valve seat surrounding said opening; an outer pipe; an inner pipe projecting into said outer pipe and having an open communication therewith, one of said pipes acting as a thermostatic member having a free end and a fixed end, said member being formed of a material which expands when heated; means for causing said fluid, after it has been so heated, to supply heat to said thermostatic member; means for so connecting the free end of said thermostatic member to said valve that any expansion of said thermostatic member tends to cause said valve to close said opening and thus reduce the amount of fuel passing therethrough; and means operable exteriorly of the combustion chamber for regulating the position of the free end of said thermostatic member with relation to said valve seat so that the position of said valve with relation to said valve seat can be regulated independently of the expansion of said thermostatic member, said valve body and valve being mounted exteriorly of the combustion chamber.

8. A thermostatic control for a device adapted to heat fluids to a predetermined temperature by controlling the amount of fluid supplied to the burner of said device, said device including an outer wall comprising: a valve body placed outside said wall; an anchorage for a thermostatic element, said element being adapted to operate a valve in said valve body; and a member connecting said valve body with said anchorage, said member being situated entirely outside said wall so that it is not materially affected by temperatures prevailing inside said wall.

9. A thermostatic control for a device adapted to heat fluids to a predetermined temperature by controlling the amount of fluid supplied to the burner of said device, said device including an outer wall comprising: a valve body placed outside said wall; an anchorage for a thermostatic element, said element being adapted to operate a valve in said valve body; and a ring member encircling said device outside said wall and serving to connect said anchorage and said valve body.

10. A thermostatic control for a device adapted to heat fluids to a predetermined temperature by controlling the amount of fluid supplied to the burner of said device, said device including an outer wall comprising: a valve body placed outside said wall; an anchorage for a thermostatic element, said element being adapted to operate a valve in said valve body; and a ring member encircling said device outside said wall and serving to connect said anchorage and said valve body, said ring being so supported that it is not affected by changes in said wall.

11. In an apparatus for heating fluids, the combination of: a combustion chamber; walls adapted to confine the fluid to be heated; a fuel burner so placed as to supply hot combustion products to said walls; means for supplying a fluid fuel to said burner; a valve body, said fuel passing through an opening in said body; a valve adapted to close said opening by being forced into contact with a valve seat surrounding said opening; a thermostatic member having a free end and a fixed end, said member being formed of a material which expands when heated; means for causing said fluid, after it has been so heated, to supply heat to said thermostatic member; a member passing in gas-tight relationship through the walls of said valve body and connecting the free end of said thermostatic member with said valve; and means operable exteriorly of the combustion chamber for regulating the position of the free end of said thermostatic member with relation to said valve seat so that the position of said valve with relation to said valve seat can be regulated independently of the expansion of said thermostatic member, said valve and valve body being mounted exteriorly of the combustion chamber.

WALTER BARNES KERRICK.