

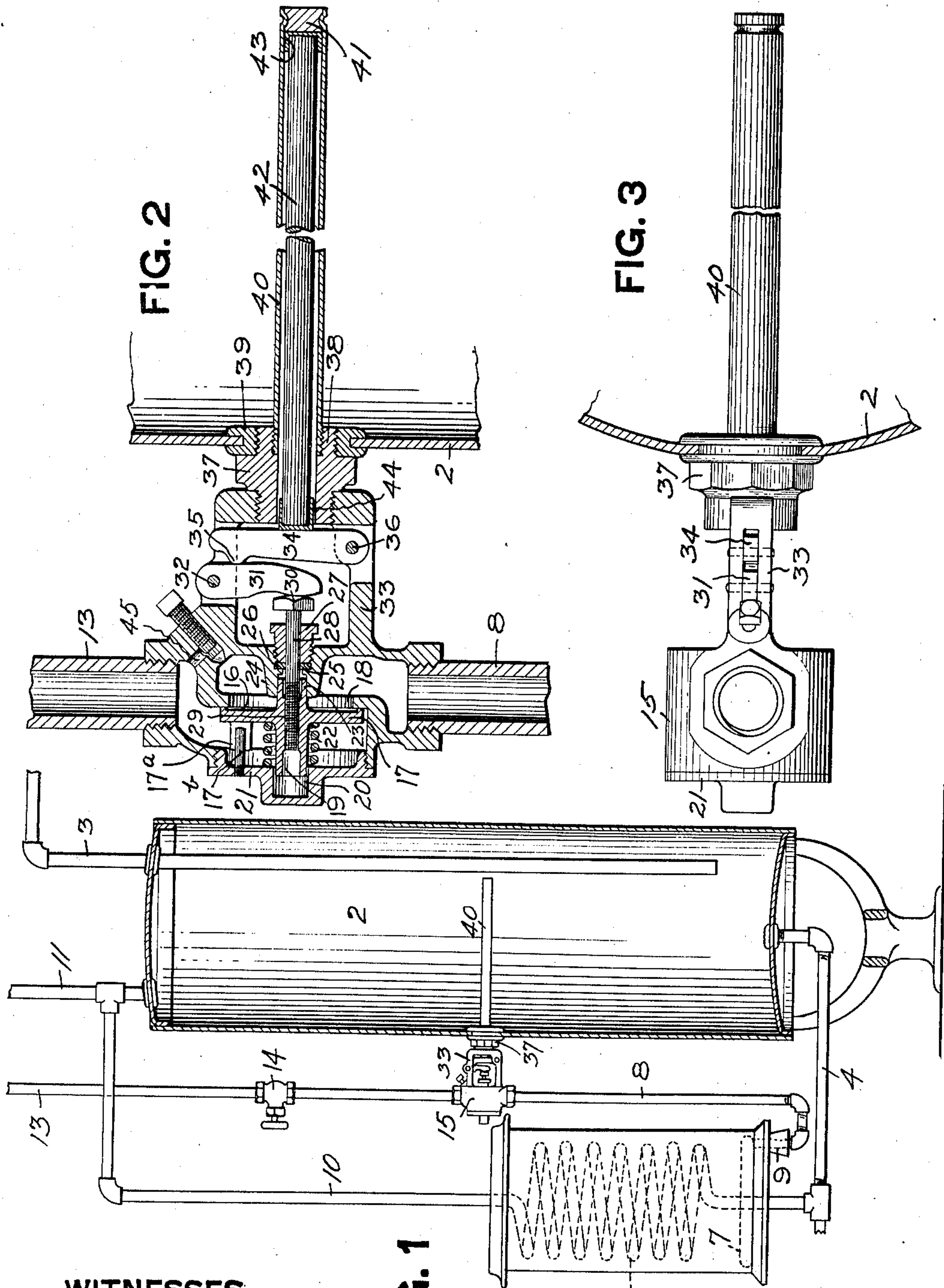
No. 864,263.

PATENTED AUG. 27, 1907.

F. W. ROBERTSHAW.

THERMOSTAT.

APPLICATION FILED OCT. 25, 1906.



WITNESSES.

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FIG. 1

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FREDERICK W. ROBERTSHAW, OF PITTSBURG, PENNSYLVANIA.

THERMOSTAT.

No. 864,263.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed October 25, 1906. Serial No. 340,581.

To all whom it may concern:

Be it known that I, FREDERICK W. ROBERTSHAW, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful
5 Improvement in Thermostats; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to thermostats and gas valves for controlling the flow of gas to the burners in water or
10 like heaters, the varying temperature of the water acting indirectly to operate the valve to increase or diminish the supply of gas as may be required to maintain the water at the proper temperature.

The main object of my invention is to provide a thermostat in which the coefficient of linear expansion of
15 one member which acts to operate the valve is so low that practically no account need be taken of it, whereby the exact movement of the valve may be calculated to a nicety.

A further object of my invention is to provide for the adjustment of the movement of the valve so that when
20 once the desired temperature has been acquired, the valve may be adjusted so as to maintain the water at such temperature.

To these ends my invention comprises, generally stated, a thermostat comprising a valve casing having
25 inlet and outlet ports, a valve and seat therefor, a section of tubing connected to said casing, a rod of compressed carbonaceous material incased by said tube, the coefficient of linear expansion of the tubing being
30 greater than that of the rod, whereby the rod acts to operate the valve by the expansion of the tubing.

My invention further comprises certain other novel features, all of which will be fully set forth and
35 claimed.

In the accompanying drawing Figure 1 is a side elevation of a water heater showing my improved thermostat applied thereto, the water reservoir being shown in sections; Fig. 2 is an enlarged sectional view of my improved thermostat showing the connections leading
40 thereto; and Fig. 3 is an enlarged plan view.

My invention may be applied to an ordinary hot water heater such as is employed in dwelling houses, or employed in connection with a hot water heating system or to a steam line. I have illustrated my invention as connected with a hot water heater, in which the numeral 2 designates a suitable tank or receptacle having the inlet pipe 3 extending down into the tank. From the bottom of the tank 2 leads the pipe 4 which is
45 connected up to the heater or coil 5 provided with the burner 7 connected up to pipe 8, a suitable mixer 9 being employed. The pipe 10 leads from the upper end of the coil 5, and said pipe is connected with the service pipe 11.
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The main gas pipe 13 is provided with the valve 14

and is connected up to the valve casing 15. The pipe 8 is connected up to the opposite side of the valve casing 15. Within the valve casing 15 is the valve seat 16, with which the valve 17 is adapted to engage to open and close the port 18. The valve 18 has the stud or
60 projection 19 which is adapted to enter the recess 20 in the cap 21, which is secured to the casing 15. A spring 22 encircles the stud 19 and bears at one end against the valve, and at the other end against its seat. The flange 17 has the projection 23 which extends within
65 the hub 24 of the casing. This hub 24 has the internal flange or shoulder 25, against which the washer 26 rests. A threaded nut 27 engages the threaded seat in the hub 24 and is adapted to press the washer 26 against the shoulder 25 to form a packing joint. A stem 28 passes
70 through the nut 27, the said stem being threaded at its end as at 29 to engage with the threads formed within the valve 17. This stem 28 is provided with the head 30. The valve 17 is provided with the lugs or ears 17^a and between said lugs the inner end of pin 17^b enters.
75 This pin enters a threaded opening in the valve cap. The object of said pin is to prevent the rotation of the valve by the turning of the adjustable stem 28, in case said stem should be difficult to turn.

Bearing against the head 30 of the stem 28 is the short
80 arm or lever 31, pivoted at 32 to the yoke 33 of the casing. Bearing against the short lever 31 is the long lever 34, which brings the lug 35 in engagement with said lever adjacent to its pivotal point. The long lever 34 is pivoted at 36 to the yoke 33.
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The nut 37 is threaded into the yoke 33 and said nut has the threaded neck tapped into the tank 2, which is provided with the nipple 39 so as to connect said nut securely to the tank and provide a tight joint at this point to prevent leakage.
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A tube 40 formed of copper or other suitable metal is threaded into the neck 38 of nut 37, said tubing projecting into the tank 2 for a suitable distance and being closed at its inner end by the plug 41. Contained within the tube 40 is the rod 42 formed of carbonaceous material, such as graphite, coke or lampblack. For this purpose I may employ the ordinary carbons used in electric arc lighting. At the outer end of the rod 42 is secured the ferrule 43 which may be formed of brass or other suitable metal. A like ferrule 44 is provided at
100 the inner end of the rod 42 which bears against the long lever 34. I prefer to have the axial line of the rod 42 in line with the axial line of the valve stem 28, so that the pressure is on a direct line, while at the same time I provide a compound lever formed of the levers 31 and
105 34, whereby the movement of the rod 42 is compounded.

When my improved thermostat is in use in connection with the form of apparatus described and illustrated, the gas is lighted at the burner 7 and the water passing from the tank 2 up to the coil 5 is heated and
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passed from the pipe 10 back by the pipe 11 to the tank 2, creating a circuit in this manner. The action of the spring 22 is to normally hold the valve 17 closed. However, when the water is below a certain temperature, the rod 42 is arranged to exert a pressure on the lever 34, which through the lever 31 acts to move the valve stem 28 sufficiently to unseat the valve and gas passes through the pipe 13 into the pipe 8 to the burner. When the water in the tank 2 becomes heated above a certain temperature the tubing 40 will be elongated, and as it elongates the pressure of the spring 22 will act to close the valve and force the rod 42 to the outer end of the tube 40. In this manner the gas supply is shut off except what enters the valve casing by the by-pass 45, which is sufficient to keep the burner 7 lighted.

As the water is drawn from the tank 2 by the service pipe 11, the temperature is reduced by the incoming supply of cold water from pipe 3, and as the temperature of the tube 40 is reduced said tubing contracts and by its contraction the rod 42 is forced against the lever 34 and this movement is compounded by the lever 31, so as to move the valve stem 28 sufficiently to open the valve to permit the gas to pass from the pipe 13 into the pipe 8 and thence to the burner. This gives a greater supply of gas, and as a consequence the water in the coil 5 is highly heated and the circuit is maintained in the manner before described. As the water continues to be drawn through the service pipe 11 the valve will remain open so as to supply the necessary hot water, but after the service pipe is closed, the water will then flow back into the tank 2 and when the temperature of the water in the tank 2 has been raised to a certain temperature, the tube 40 will elongate and the

spring will close the valve and force the rod 42 to the outer end of the tube 40.

After it has been once determined just what movement of the valve is required to get the desired results, the valve stem 28 may be turned so as to provide for this movement, and the valve is thus adjusted to operate very accurately to maintain the water at the desired temperature. By compounding the levers in the manner illustrated, the movement of the rod 42 is compounded so as to get a greatly increased movement on the valve stem 28.

By the employment of a rod composed of a material having a very low coefficient of linear expansion, the amount of the expansion and contraction of the rod 42 is so inappreciable that it does not have to be taken into account, and as a consequence the expansion and contraction of the tubing when once determined is the only factor to be taken into consideration.

It is apparent that my improved device is also applicable to steam traps for the trapping and discharging of condensed steam from any steam line employing the variation of temperature to operate the thermostat.

What I claim is:

In a thermostat, the combination of a valve casing having inlet and outlet ports, a valve and seat, a section of tubing connected to said casing, a rod of compressed carbonaceous material incased by said tubing, and means for operating said valve by said rod.

In testimony whereof, I the said FREDERICK W. ROBERTSHAW have hereunto set my hand.

FREDERICK W. ROBERTSHAW.

Witnesses:

ROBERT C. TOTTEN,
ROBT. D. TOTTEN.