Feb. 28, 1928. 1,660,776

J. G. WRAGG

THERMOSTATIC CONTROL DEVICE FOR WATER HEATERS

Filed Nov. 8, 1926 2 Sheets-Sheet 1

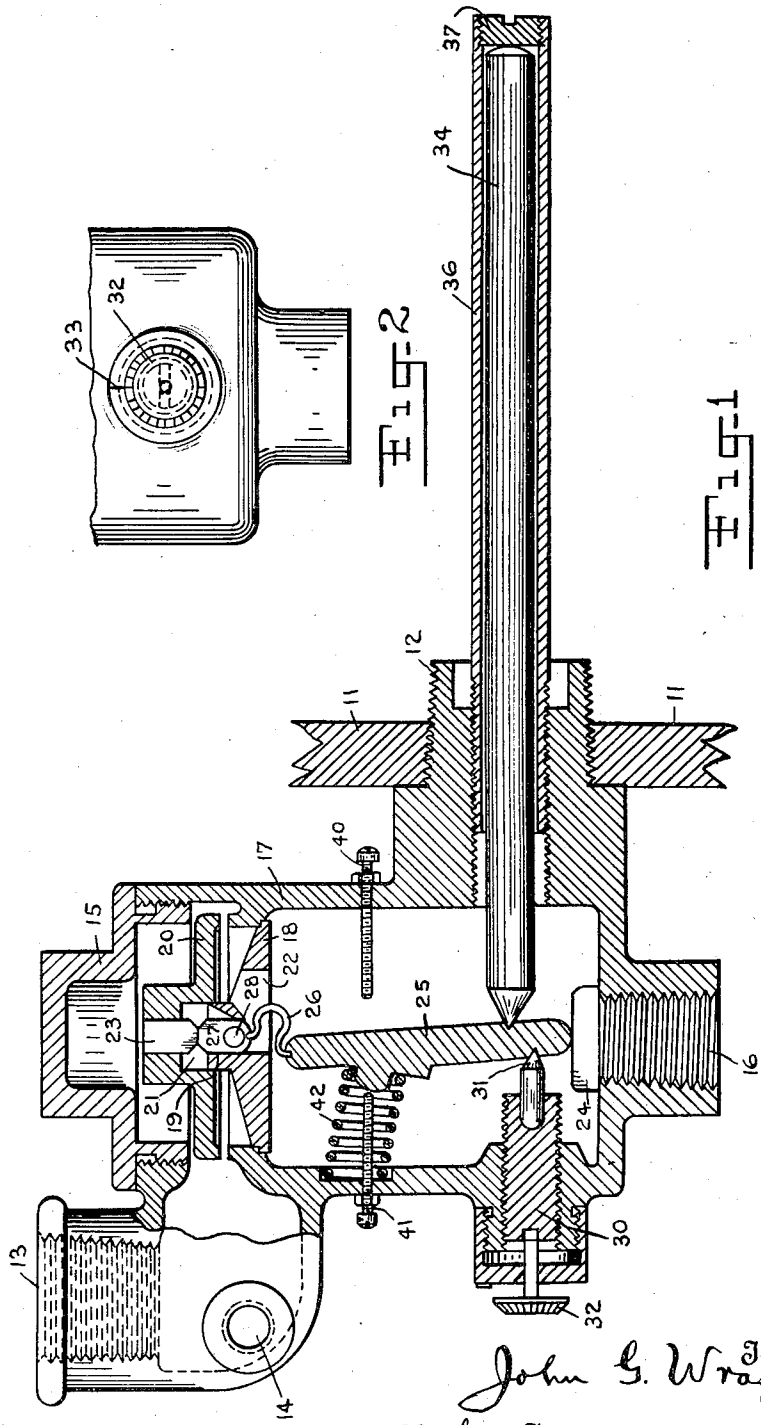


Fig. 2

Fig. 1

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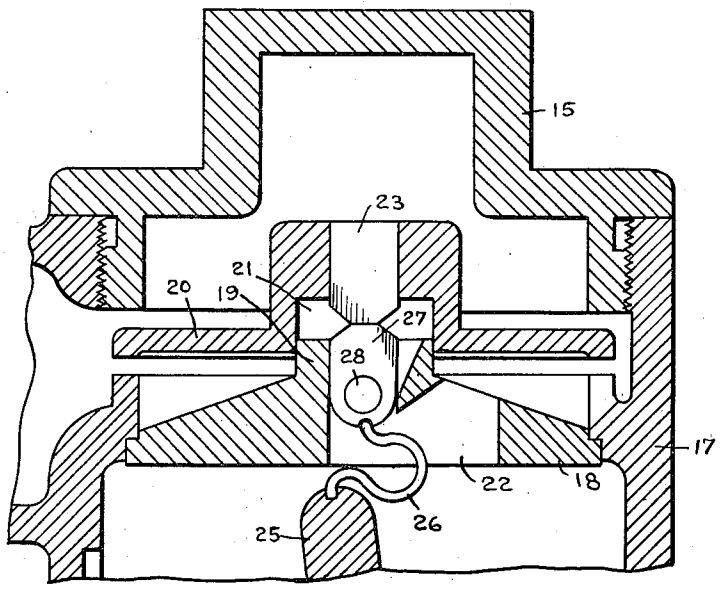


Fig. 3

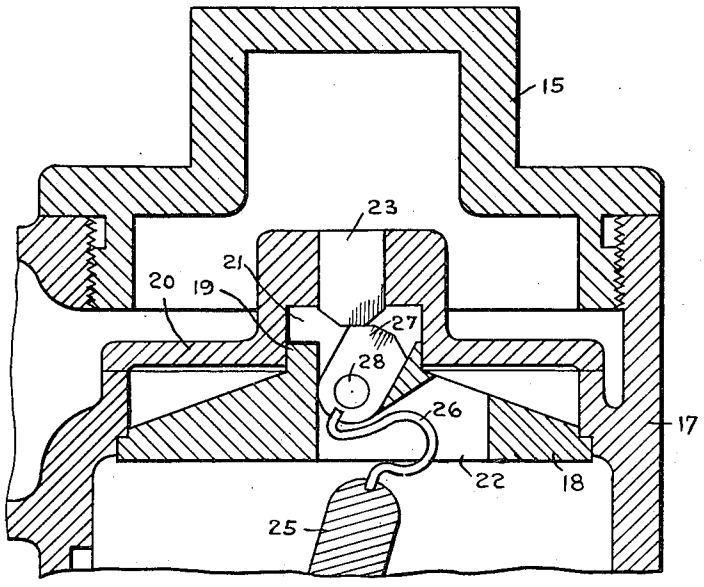


Fig. 4

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UNITED STATES PATENT OFFICE.

JOHN G. WRAGG, OF NEW LONDON, CONNECTICUT.

THERMOSTATIC CONTROL DEVICE FOR WATER HEATERS.

Application filed November 8, 1926. Serial No. 146,996.

The invention relates to water heating systems, and particularly to that class of such apparatus in which the heating means for the water are automatically controlled and caused to function by the falling of the temperature of the water in the neighborhood of such heating means or by the flow of cold water thereto, and in which the functioning of the heating means automatically ceases upon the temperature of the water in the neighborhood of the same becoming raised to a predetermined degree.

One of the principal objects of the invention is to provide an apparatus or system of the kind mentioned which shall be simple, efficient, reliable and prompt in operation and which shall overcome the disadvantages which have been found to exist in apparatus of this kind previously known in the art. Other objects of the invention will appear from the following specification.

The invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as set forth in the claims hereof, one embodiment of the same being illustrated in the accompanying drawings and described in this specification.

In the accompanying drawings,

Fig. 1 is a vertical sectional view of an embodiment of my invention;

Fig. 2 is a detail view showing an indicator device which may be used in connection with the invention or as a part of the same; and

Figs. 3 and 4 are vertical sectional views showing on an enlarged scale a detail of the invention, as hereinafter more fully described.

My invention is intended to be carried into effect in connection with a hot water tank, or, as it is usually called, boiler, which may be of any size, shape or construction suitable for the purpose. As water receptacles of this description are well understood in the art, I have shown the same in the drawings only in a fragmentary way, the reference numeral 11 in Fig. 1 being intended to designate a portion of the wall of such a water receptacle, the same being provided with an aperture in the part shown in Fig. 1, which is internally screw-threaded so as to be adapted to receive the screw-threaded nipple 12 which projects from the valve chamber forming a part of my invention, as shown in this particular embodiment thereof. The boiler is supported in any suitable manner, and is provided with an inlet pipe for filling the same with water and an outlet pipe, as will be well understood.

The means for heating the water in the boiler form no part of my invention, and I have therefore neither shown nor described the same. My present invention relates more particularly to the control of such water-heating means, and in the here described and illustrated embodiment of the invention, I have shown a method of controlling the flow of gas to such heating means.

Referring more particularly to Fig. 1, 13 shows the gas inlet pipe, and 14 indicates the beginning of a by-pass to a pilot light of the usual or any suitable construction. This gas inlet pipe is shown of an elbow form, and opens into the main valve chamber to the right, hereinafter specifically described. This valve chamber is closed at the top by a screw-threaded cap 15, and has an opening 16 in the bottom, leading to the burner. The valve chamber is designated 17.

In the upper part of the valve chamber is positioned a disk member 18 having a gas passage 22. The upper surface of this member 18 is of sloping form as shown in the drawings and is provided with an upward extending annular flange 19. Over the member 18 is positioned the valve 20, which is provided with a central recess 21 adapted to engage with the annular flange 19. Positioned in the valve 20 and extending downwards into the recess 21 is a plug 23, which is adapted to engage with the valve-operating devices now to be described, so that the valve may be raised or lowered as the thermostatic control is affected by the temperature of the water in the boiler.

In the lower part of the valve chamber, and bridging though not closing, the gas outlet 16, is a supporting bar 24. Upon this bar is supported the lower end of a lever 25, which is provided with a notch at its upper end adapted to receive one end of a U-spring 26, the other end of which is seated in a similar notch in the lower end of a short lever 27 pivotally secured to the member 18 as shown at 28. The member 27 extends upwardly through on opening in the member 18, so as to come into contact with the member 23 in the valve.

In the side wall of the valve chamber, near the bottom, is inserted a screw plug 30, having a pointed end 31 which enters a suitable

socket in the lower part of the lever 25. The plug 30 is provided with a disk 32 for rotating the same and thereby adjusting the lateral position of the point 31, and this disk may if desired be graduated so as to be read in connection with a pointer 33, for convenience in adjusting the plug in any desired lateral position, this construction being shown in detail in Fig. 2.

Acting upon the other side of the lever 25 is a rod 34, one end of which projects into the valve chamber and is pointed so as to engage with a suitable socket in the member 25, and the other end of which is contained in a sleeve 36 which extends laterally into the boiler, the inner end being closed by a screw plug 37. The sleeve 36 should be of a material having a substantially different coefficient of expansion under the action of heat from that of the rod 34.

Extending into the upper part of the valve chamber are adjusting screws 40 and 41, which are adapted to prevent undue lateral swing of the member 25. A spiral spring 42 is interposed between the upper part of the lever 25 and the wall of the valve chamber, adapted by extension to swing the member 25 to the right when the sleeve 36 expands sufficiently to permit such swing.

The operation of my invention is as follows: Gas is admitted through the inlet 13, passes into the valve chamber, if the valve be open to admit same, and through the outlet 16 to the main burner (not shown). A portion of the gas is carried by the by-pass 14 to the pilot light (not shown) adjacent the main burner. Assuming the parts to be in the position shown in Figs. 1 and 3, the valve being open and the burner in operation under the boiler just to the right of the apparatus shown in Fig. 1 and into which the thermostat extends, the water in said boiler becomes heated, causing the sleeve 36 to expand. As the rod 34 contained in the said sleeve is to some extent protected from the heat of the water, and also because its coefficient of expansion is substantially less than that of the sleeve 36, the rod is permitted to pass to the right, the spring 42 acting upon the lever 25, and swinging the upper end of same over to the right. In the position of the parts shown in Figs. 1 and 3, the U-spring 26, acting between the upper end of the lever 25 and the lower end of the lever 27, tends to keep the lever 27 in the position shown, so that the valve 20 is held up, that is, open. When, however, the right-handed swing of the lever 25 passes beyond a certain critical point, the action of the U-spring is reversed, that is to say, it impels the lower end of the lever 27 to the left and consequently its upper end to the right, thus bringing a slanting portion or cut off corner of the upper end of the said lever into contact with the plug 23 and permitting the valve 20 to fall, thus bringing the parts into the position shown in Fig. 4. The flow of gas being thus cut off, and the frame in the main burner extinguished, the temperature of the water in the boiler accordingly decreases, thereby allowing the sleeve 36 to contract, drawing the rod 34 to the left and impelling the lever 25 and the parts connected therewith again into the position shown in Figs. 1 and 3, whereupon the flame of the main burner is lighted by the pilot light and the water is again heated, and so on intermittently as may be required.

The advantages of my invention will be obvious from what has been above said with regard to its construction and operation. One of the novel features of the invention is the employment of a quick-acting valve control device, which in the here described and illustrated embodiment of the invention is represented by the lever 27, in combination with the other operating parts which control same, and which provides a positive and quick snap action of the valve. When employing the combination of parts comprising my invention, it is not possible for the valve to remain poised in a partly open and partly closed position, but it must be either open or tightly closed, in other words, there is a critical position of the parts which if varied even very slightly in one direction causes the valve to close or if in the other direction causes the valve to open. I am aware that in devices previously known in the art, mechanism adapted to open and close valves automatically by thermostatic action are well known, and I am also aware that certain of such devices employ elements similar to some of the elements which are comprised in my invention, but so far as I am aware no apparatus has been known in the art which operates as does my invention and which provides the positive snap action for opening and closing the gas valve, which I have invented.

I do not therefore claim broadly the control of the gas valve by thermostatic means, but what I claim as new and desire to secure by Letters Patent is as follows:

1. A thermostatic gas-control device for water heaters and the like, comprising in combination the following elements: a suitable supporting frame or casing; a gas-control valve; a heat-expansible member adapted to be placed in proximity to the water to be heated; a swinging lever adapted to be swung by the expansion of said heat-expansible member; a second swinging lever one end of which is adjacent said gas valve and the other end of which is in substantial proximity to the outer end of said first-named lever, said second-named lever being adapted when in one position to close said valve and when in another position to open same; and a thrust snap-spring located be-

tween the proximate ends of said swinging levers and having its ends operatively connected to the same respectively and being adapted, when said first-named swinging lever is swung, to swing said second-named swinging lever and to hold the same either in the position whereby said gas valve is opened or in the position whereby said gas valve is closed but to prevent said second swinging lever from remaining in an intermediate position.

2. A thermostatic gas-control device for water heaters and the like, comprising in combination the following elements: a suitable supporting frame or casing; a gas-control valve; a heat-expansible member adapted to be placed in proximity to the water to be heated; a swinging lever adapted to be swung by the expansion of said heat-expansible member; a second swinging lever one end of which is adjacent said gas valve and the other end of which is in substantial proximity to the outer end of said first-named lever, said second-named lever being adapted when in one position to close said valve and when in another position to open same; a thrust snap-spring located between the proximate ends of said swinging levers and having its ends operatively connected to the same respectively and being adapted, when said first-named swinging lever is swung, to swing said second-named swinging lever and to hold the same either in the position whereby said gas valve is opened or in the position whereby said gas valve is closed but to prevent said second swinging lever from remaining in an intermediate position; and a spring interposed between the said first-named swinging lever and said casing, adapted to keep said first-named swinging lever in contact with said heat-expansible member.

3. A thermostatic gas-control device for water heaters and the like, comprising in combination the following elements: a suitable supporting frame or casing; a gas-control valve; a heat-expansible member adapted to be placed in proximity to the water to be heated; a swinging lever adapted to be swung by the expansion of said heat-expansible member; a second swinging lever one end of which is adjacent said gas valve and the other end of which is in substantial proximity to the outer end of said first-named lever, said second-named lever being adapted when in one position to close said valve and when in another position to open same; a thrust snap-spring located between the proximate ends of said swinging levers and having its ends operatively connected to the same respectively and being adapted, when said first-named swinging lever is swung, to swing said second-named swinging lever and to hold the same either in the position whereby said gas valve is opened or in the position whereby said gas valve is closed but to prevent said second swinging lever from remaining in an intermediate position; a spring interposed between the said first-named swinging lever and said casing adapted to keep said first-named swinging lever in contact with said heat-expansible member; and an adjustable stop adapted to operate against the lower portion of said first-named swinging lever and hold the same in position.

4. A thermostatic gas-control device for water heaters and the like, comprising in combination the following elements: a suitable supporting frame or casing; a gas-control valve; a heat-expansible member adapted to be placed in proximity to the water to be heated; a swinging lever adapted to be swung by the expansion of said heat-expansible member; a second swinging lever one end of which is adjacent said gas valve and the other end of which is in substantial proximity to the outer end of said first-named lever, said second-named lever being adapted when in one position to close said valve and when in another position to open same; a thrust snap-spring located between the proximate ends of said swinging levers and having its ends operatively connected to the same respectively and being adapted, when said first-named swinging lever is swung, to swing said second-named swinging lever and to hold the same either in the position whereby said gas valve is opened or in the position whereby said gas valve is closed but to prevent said second swinging lever from remaining in an intermediate position; a spring interposed between the said first-named swinging lever and said casing, adapted to keep said first-named swinging lever in contact with said heat-expansible member; an adjustable stop adapted to operate against the lower portion of said first-named swinging lever and hold the same in position, and an adjustable stop adapted to limit the extent of the swing of said first-named swinging lever.

In witness whereof I have hereunto signed my name this 21st day of October, 1926.

JOHN G. WRAGG.