Oct. 4, 1927. 1,644,171

H. K. CALDWELL

REMOTE GAS CONTROL VALVE APPARATUS

Filed Oct. 11, 1923

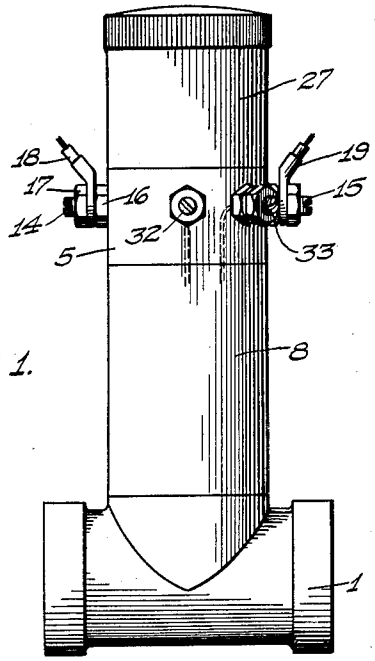


FIG. 1.

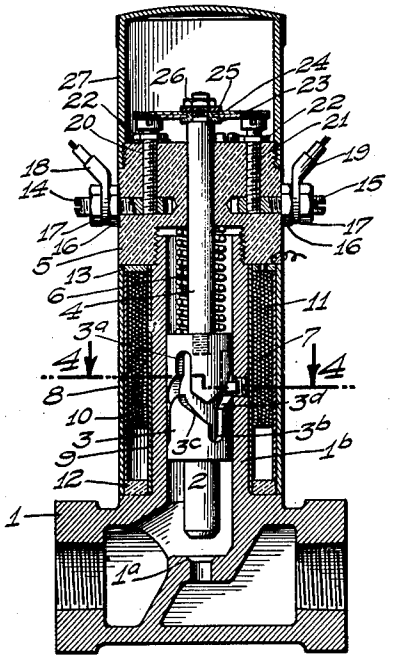


FIG. 2.

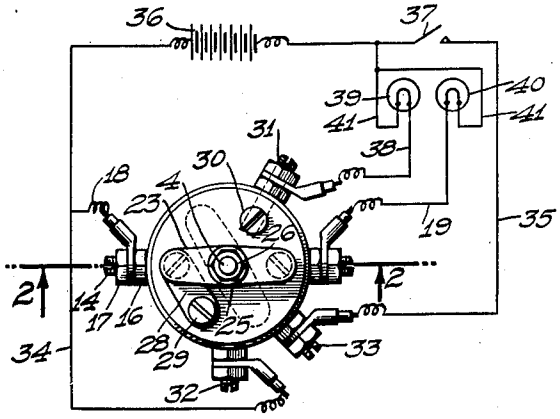


FIG. 3.

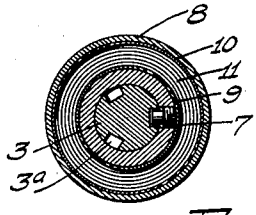


FIG. 4.

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UNITED STATES PATENT OFFICE.

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REMOTE GAS-CONTROL-VALVE APPARATUS.

Application filed October 11, 1923. Serial No. 667,831.

My invention relates to remote gas-control valve apparatus for gas or other heaters and other similar apparatus, and the objects of my invention are: First, to provide a valve apparatus of this class by means of which the fuel to a water or other heater can be controlled from a remote part of the house or building in which the heater is installed; second, to provide such an apparatus which is controlled by an electric switch remotely positioned from the valve, positioned in the gas line connected to the heater; third, to provide an apparatus of this class in which a single electric switch is used for opening and operating the valve, through which the gas is adapted to pass, different degrees for permitting different amounts of gas or other fuel to pass therethrough, as desired, to the heater for controlling the same; fourth, to provide a positively acting, magnetically controlled, valve mechanism for an apparatus of this class; fifth, to provide a novelly constructed cam mechanism for actuating the valve; sixth, to provide luminous indicating means in connection with a valve apparatus of this class for remotely indicating the position of the valve mechanism; seventh, to provide positive switch means in connection with the valve mechanism for illuminating the indicating means when the valve is in certain positions; eighth, to provide a novelly constructed valve mechanism for remotely controlling the gas flowing therethrough and a novelly constructed switch mechanism in connection with the same, and ninth, to provide as a whole a novelly constructed and arranged, remote gas-control valve apparatus, which is very simple and economical of construction proportionate to its functions, durable, efficient, and which will not readily deteriorate or get out of order.

With these and other objects in view, as will appear hereinafter, my invention consists of certain novel features of construction, combination and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

Figure 1 is a side elevational view of the valve mechanism of my remote gas-control valve apparatus; Fig. 2 is a sectional elevational view thereof, taken through 2—2, of Fig. 3, showing certain parts and portions in elevation to facilitate the illustration; Fig. 3 is a plan view thereof, showing diagrammatically the same connected with the remote control switch and the valve condition indicating means and showing by dotted lines a certain shifted position of the switch means for controlling the indicating means, and Fig. 4 is a transverse sectional view of the valve, taken through 4—4 of Fig. 2.

Like characters of reference refer to similar parts and portions throughout the several views of the drawings.

The valve casing 1, valve member 2, cam member 3, rod 4, insulating head member 5, spring 6, screw 7, cylindrical casing 8, insulating members 9 and 10, coil 11, insulating washers 12 and 13, terminal posts 14 and 15, nuts 16 and 17, conductors 18 and 19, contact screws 20 and 21, nuts 22, resilient switch connecting member 23, insulating washers 24 and 25, nut 26, cap 27, contact connecting member 28, screws 29 and 30, terminal posts 31, 32 and 33, conductors 34 and 35, battery 36, spring switch 37, conductor 38, electric bulbs 39 and 40, and the conductors 41, constitute the principal parts and portions of my remote gas-control valve apparatus.

The valve portion of the valve casing 1 is constructed similarly to the conventional globe valve, being provided with an inlet and an outlet and a valve seat portion 1^a, which is engageable by the valve member 2. Extending to one side of the valve portion of the valve casing 1 is the hollow, cylindrical portion 1^b, in which is reciprocally mounted the iron cam member 3, at the lower end of which is secured the valve member 2. The cam member 3 is provided with a plurality, preferably three, upwardly extending slots 3^a, and an equal number of downwardly extending slots 3^b, positioned intermediate the upwardly extending slots. The inner ends of the slots 3^a are connected with the sides of the slots 3^b by means of the angular slots 3^c, and the inner ends of the slots 3^b are connected with the sides of the inner ends of the slots 3^a by means of the angular slots 3^d. In the wall of the hollow, cylindrical portion 1^b of the valve casing 1 and intermediate the ends thereof is provided a screw 7, which is provided with an inwardly extending, reduced portion extending into the slots of the cam mem-

ber 3 for rotating and guiding the same. To the upper end of the cam member 3 is secured a rod 4, which extends upwardly therefrom and is reciprocally mounted in the insulating head member 5, secured to the upper end of the hollow, cylindrical portion 1^b. A compression spring 6 is interposed between the upper end of the cam member 3 and the insulating head member 5, tending to force the valve member 2 against its seat. An electro-magnet, consisting of a coil 11, is wound around an electric insulating drum 9 positioned around the hollow, cylindrical portion 1^b of the member 1. A cylindrical casing 8 is positioned around the coil 11 and extends between the shoulder of the valve casing 1 and the lower portion of the member 5, an electric insulating cylinder 10 being positioned between the coil 11 and the casing 8. Insulating washers 12 and 13 are also provided, respectively at the lower and upper ends of the coil 11. The coil 11 is so positioned relatively to the iron cam member 3 that when a current is passed through the coil 11 or the electro-magnet, the cam member is forced upwardly, disengaging the valve member 2 from its seat, it being here noted that the rod 4 is made of a material not affected by magnetic lines of force. The terminals of the coil 11 extend through the washer 13 into the insulating head member 5, and are connected, respectively, with terminal posts 32 and 33, secured in said head. On opposite sides of the insulating head member 5 are secured other terminal posts 14 and 15, into the inner ends of which are respectively secured the contact screws 20 and 21, thus retaining said terminal posts in position. Said terminal posts are each provided with a lock nut 16 and another nut 17, between which are secured respectively the ends of the conductors 18 and 19. The contact screws 20 and 21 are locked in position in the head member 5 by the lock nuts 22. At the end of the rod 4 extending through the member 5 is provided a resilient connecting switch member 23, which is nonrotatably secured to and insulated from the end of the rod 4 by means of the insulating washers 24 and 25 and secured thereto by means of the nut 26. Angularly spaced from the contact screws 20 and 21, relatively to the center of rotation of the switch member 23, are the contact screws 29 and 30, the former being connected with the contact screw 20 by means of a connecting member 28. The contact screw 30 is connected with the terminal post 31 secured in the head member 5. A cap 27 is secured to the upper end of the member 5 to enclose the switch members and also to prevent gas from escaping between the member 5 and the rod 4. The terminal posts 32 and 33, connected with the coil of the electro-magnet, are connected by means of the conductors 34 and 35 with the battery 36 or other source of electrical energy, a spring switch 37 being positioned in the conductor 35. The conductor 18, connected with the terminal 14, is connected with the conductor 34, while the conductors 19 and 38, the latter being connected with the terminal post 31, are respectively connected with the electric bulbs 40 and 39. Said bulbs may be either differently colored or adapted to give light of different intensity, the bulb 40 connected with the mechanism to indicate the greatest open position of the valve being preferably brighter than the bulb 39. Said bulbs are also connected by means of the conductors 41 with the conductor 35 between the source of electrical energy 36 and the spring switch 37.

It will be noted that if the valve member 2 engages the valve seat portion 1^a of the valve casing 1, the resilient switch member 23 is in the position shown by dotted lines in Fig. 3. If it is desired to permit a small amount of gas or other fuel to pass through the valve the spring switch 37 is operated, which permits electrical energy to flow through the electro-magnet, electrifying the same and forcing the cam member 3 upwardly. The end of the screw 7, being positioned in one of the upwardly extending slots 3^a of the cam member when the valve is closed, will engage the inclined portion of one of the slots 3^c, rotating the cam member and also the switch member through an angle of 60° until the screw engages the opposite wall of one of the downwardly extending slots 3^b. As soon as the spring switch 37 is released the cam member 3, as well as the switch member 23, is forced downwardly by the spring 6 and rotated again through an angle of 60° by reason of the inclined slots 3^d, the screw 7 being permitted to extend into another of said upwardly extending slots 3^a. By rotating the cam member as described through an arc of 120°, the switch member 23 is rotated from the position shown by dotted lines in Fig. 3 of the drawings to the position shown by solid lines, electrically connecting the contact screws 20 and 21, which extend a considerable distance above the top surface of the insulating head member 5, thereby retaining the valve in an open position, as well as closing the circuit with the source of electrical energy and illuminating the bulb 40, thus indicating that the valve is in a wide open position. Similarly by again operating the switch 37 and releasing the same, the cam member, as well as the switch member 23, will be rotated through an arc of 120°, connecting the contact screws 29 and 30, the latter being connected with the bulb 39. The contact screws 29 and 30, being positioned only a short distance above the upper surface of the insulating head member 5, will hold

the valve in a slightly open position. It will be here noted that the arrangement of the contact screws 20 and 21, and 29 and 30, may be reversed, or any reasonable number of such contact screws may be provided to increase the number of opened positions of the valve.

It is obvious from this construction, as illustrated in the drawings and described in the foregoing specification, that there is provided an apparatus as aimed at and set forth in the objects of the invention, and though I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of my invention, the construction, combination and arrangement substantially as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an apparatus of the class described, a valve casing, an electro-magnet controlled valve member mounted therein, an electro-magnet in connection with said valve member, and an electrical contact switch means in connection with said valve member, said electrical contact switch means serving as a multiple stop means for positioning said valve member in various extreme and intermediate positions relatively to and from its seat.

2. An apparatus of the class described, including a valve casing, a valve member mounted therein, a cam means in connection with said valve member, an electro-magnet for reciprocating said valve member, switch means in connection with said valve member for variously positioning the same relatively to its seat, and a plurality of differently, vertically and horizontally spaced, contact members, engageable by said switch means.

3. An apparatus of the class described, including a valve casing, a valve member reciprocally mounted therein, a cam means in connection with said valve member, an electro-magnet for reciprocating said valve member, switch means in connection with said valve member for variously positioning the same relatively to its seat, a plurality of differently, vertically and horizontally spaced, contact members, engageable by said switch means, and valve-position indicating means in connection with said contact members for electrically indicating the position of said valve member.

4. An apparatus of the class described, including a valve casing, a valve member reciprocally mounted therein, a cam means in connection therewith, an electro-magnet surrounding said cam means, an insulating head member secured to said valve casing, said cam member being provided with an extended portion extending through said insulating head member, terminal posts secured to said head member, pairs of contact members connected with said terminal posts, each pair being differently spaced from said insulating head member, and switch means at the extended portion of said cam member adapted to engage and connect one pair of said contact members.

5. An apparatus of the class described, including a valve casing, a valve member reciprocally mounted therein, a cam means in connection therewith, an electro-magnet surrounding said cam means, an insulating head member secured to said valve casing, said cam member being provided with an extended portion extending through said insulating head member, terminal posts secured to said head member, pairs of contact members connected with said terminal posts, each pair being differently spaced from said insulating head member, switch means at the extended portion of said cam member adapted to engage and connect one pair of said contact members, and electric indicating means in connection with each pair of contact members for indicating the position of the valve relatively to its seat.

6. An apparatus of the class described, including a valve casing, a valve member reciprocally mounted therein, a cam means in connection therewith, an electro-magnet surrounding said cam means, an insulating head member secured to said valve casing, said cam member being provided with an extended portion extending through said insulating head member, terminal posts secured to said head member, pairs of contact members connected with said terminal posts, each pair being differently spaced from said insulating head member, switch means at the extended portion of said cam member adapted to engage and connect one pair of said contact members, electric indicating means in connection with each pair of contact members for indicating the position of the valve relatively to its seat, and spring switch means in connection with said electro-magnet for controlling the same.

In testimony whereof, I have hereunto set my hand at San Diego, California, this 5th day of October, 1923.

HENDRIX K. CALDWELL.