

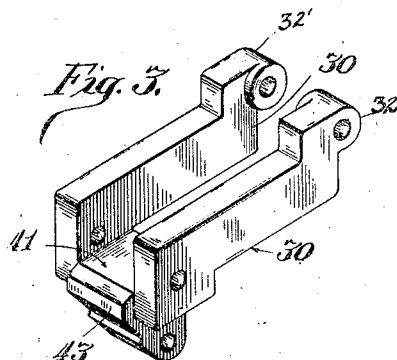
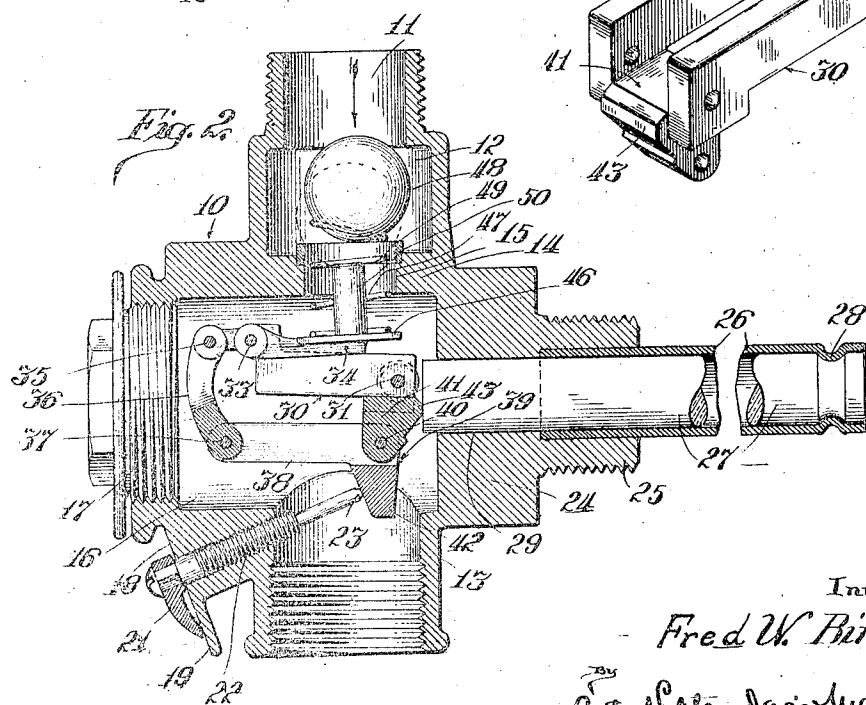
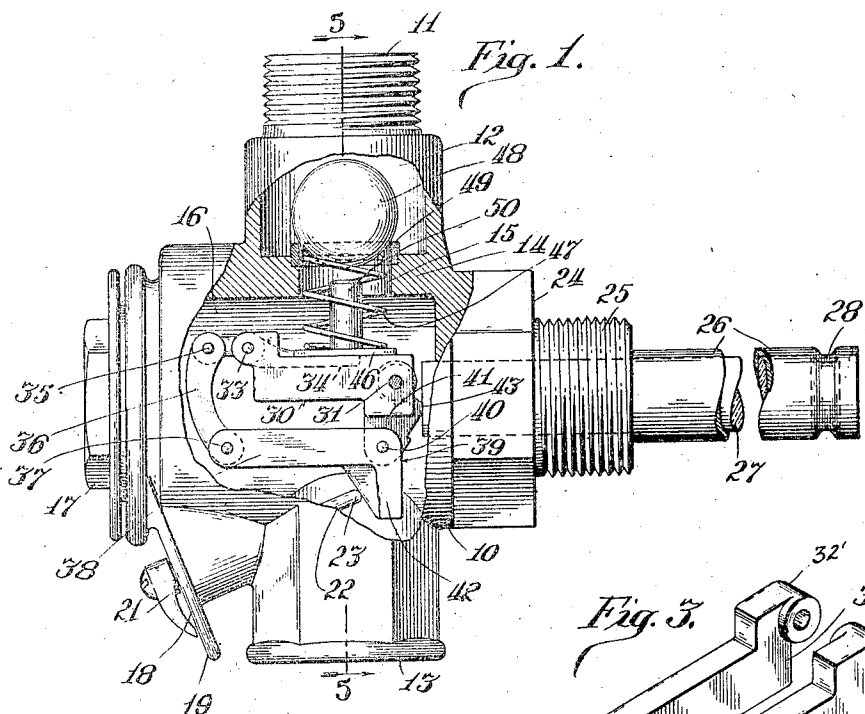
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F. W. BIRTCH
THERMOSTATIC VALVE

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UNITED STATES PATENT OFFICE.

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THERMOSTATIC VALVE.

Application filed November 28, 1921. Serial No. 512,182.

To all whom it may concern:

Be it known that I, FRED WILBUR BIRTCH, a citizen of the United States, residing at Laporte, in the county of Laporte and State of Indiana, have invented certain new and useful Improvements in Thermostatic Valves, of which the following is a specification.

My invention relates to thermostatic valves for governing the flow of fluid under pressure. In supplying gas to the burner of an automatic water-heater, the cut-off valve in the gas-supply line is thermostatically controlled, the thermostat element entering the warm-water chamber, and the control being effected to open the gas supply valve when the temperature of the water drops below a given point and to close the valve again when the temperature has risen to a predetermined point under the heat supplied from the burner.

The general object of my invention is to provide an improved valve of this character that will be simple and economical in construction, durable, efficient and not liable to get out of order.

With a view to attaining these and other objects my invention consists in the features of construction and arrangement of parts hereinafter more fully set forth and claimed, reference being had to the accompanying drawings wherein I have shown a single operative embodiment of my invention for purposes of full disclosure.

In the drawings Fig. 1 is a side elevation with parts broken away showing my valve structure; Fig. 2 is a section showing the parts in their different relations; Fig. 3 is a perspective detail of a lever element; Fig. 4 is a front elevation of the valve casing; Fig. 5 is a vertical section on line 5—5 of Fig. 1; Fig. 6 is a plan view of the operating levers; Fig. 7 is a perspective detail of one lever, and Fig. 8 is a perspective detail of a connecting link.

The valve casing 10 has the gas inlet duct 11 leading to inlet chamber 12 vertically aligning with and above the gas outlet passage 13, the inlet and outlet being separated by a partition wall 14 having a gas-flow port 15 made therethrough, there being below this wall a horizontally extending mechanism-chamber 16 to receive the multiplying levers of the thermostatic mechanism. The front end of the chamber is closed by a re-

movable screw stud 17, and the front wall 18 therebelow, preferably arranged at an oblique angle to the vertical, preferably has a dial formation as indicated at 19 provided with graduations 20 over which swings a pointer handle 21 secured to an adjustable fulcrum-pin 22, the screw-stem of which is threaded through the front wall of the casing so that by adjustment of handle 21 the position of its fulcrum point 23 may be changed.

In rear of the chamber 16 the casting affords a base-wall 24 with suitable provision, as the screw-threaded boss 25, for attachment to a hot water heater, and in this boss is anchored the expansion tube 26 of a thermostatic element the center rod 27 of which, suitably secured as at 28 to the outer end of the tube, extends through and is guided by an opening 29 in said rear wall 24.

Within chamber 16 the lever mechanism for multiplying motion is mounted, the specific construction shown (but which may be widely varied in detail) providing a main bell-crank lever 30 pivoted on an arbor 31 that finds fixed bearing in studs 32 projecting inwardly from the sides of the chamber 16, and this being the only fixed pivot. At or above its pivotal axis main lever 30 has forwardly projecting arms that at their forward extremities carry, preferably on raised ears 32', the pivot pin 33 for terminal lever 34, the forwardly projecting tail of which is pivoted as at 35 to the forked top of a link 36 the solid bottom of which is pivoted as at 37 to the forked forwardly extending arm 38 of a bell-crank lever 39, this lever being pivoted at its angle on pin 40 carried by the downwardly extending arm 41 of the bell-crank lever 30. The downwardly extending arm 42 of bell crank lever 39 is arranged to abut, below its axis, against the adjustable fulcrum pin 22, and the downwardly extending arm 41 of bell crank lever 30 has a rearwardly projecting nose 43, between the fixed pivot 31 and the movable pivot 40, which nose abuts against and receives motion from the inner extremity of thermostat rod 27. Resultantly, inwardly directed pressure of rod 27 not only elevates pivot pin 33 by reason of its pressure on the lever nose 43, but swings pivot pin 40 to the left (Fig. 2) causing lever 39 to tilt on fulcrum point 23 and, through link 36, to pull downwardly on pivotal connection 35, so

imparting a compounded motion to terminal lever 34.

Lever 34 has a plate 46 at its free end, normally to overlie and rest upon the arms of lever 30 as shown in Fig. 1, and on this plate is mounted a coil spring 47 that, at its upper end, cooperates with a valve ball 48 that accurately fits the hardened valve seat 49 bordering the orifice 15. A center pin 50 is preferably provided protruding from plate 46 but normally (Fig. 1) non-contacting with the ball 48.

In operation, since the water affecting the thermostat is normally hot enough to maintain the tube 26 expanded, the parts stand as indicated in Fig. 1, the gas pressure upon the ball 48, which is preferably of steel, coacting with gravity to maintain the ball firmly seated on the hard, sharp-edged seat 49. Under such conditions the spring 47 is under no tension or very weak tension, insufficient to raise the ball. When water temperature drops and thermostat tube 26 shrinks, moving the end of the stem 27 inwardly the vastly multiplied motion resulting at the active end of the terminal lever 34 raises the plate 46 and spring 47, building up spring pressure sufficiently to overcome the resistance of the ball and forcing it slightly from its seat. As soon as the slight opening of the valve relieves the pressure thereon the valve is spring-impelled to fully open position, although should the spring be broken or fail to work as described, center pin 50 will, at a little later period positively raise the valve from its seat. In closing, as the tube 26 expands again, the ball rides down on the weakly-tensioned, expanded spring until it is so close to the valve seat 49 that pressure builds up on the ball, whereupon it snaps closed against minimum spring-resistance. This snap action insures that the valve will work from fully open to fully closed position with a rapid action, so giving the gas

burner a full head of gas or none at all, as is desirable for best and most economical operation of gas-fuel water heaters. It will be observed that the spherical valve not only cooperates accurately with the hardened seat in any position of rotation, but at all times rides easily on the top of the spring and, in closing, tends to clear the seat-edge of any foreign matter that may lodge thereon, and this without sticking. Furthermore, it will be noted that the stated arrangement admits of most economical and advantageous manufacture and the provision of the simplest form of removable or replaceable seat as a mere narrow ring that can be perfectly trued at minimum expense and with simple machinery.

I claim:

A thermostatic valve of the character described, comprising a casing having an upper inlet chamber with an orifice in its bottom, a sharp-edged seat-ring bordering the top of said orifice, a mechanism chamber below said orifice and having an outlet, a thermostatic device entering said mechanism chamber, multiplying lever-means within said mechanism chamber including a terminal lever arranged below the orifice to the inlet chamber, a spherical valve adapted to co-act with the sharp edge of said seat-ring to close said orifice, said valve being arranged within the inlet chamber above said seat, a stem carried by said terminal lever and extending into said orifice to lift said valve as said terminal lever is considerably raised, and a coiled spring surrounding said stem and interposed between said terminal lever and said valve and extending through said orifice, said spring when expanded, being longer than said stem, and normally tensioned to lift said valve before said stem strikes said valve.

FRED WILBUR BIRTCH.