April 12, 1927. 1,624,132

J. W. BROWN

GAS CONTROL APPLIANCE

Original Filed March 26, 1921 2 Sheets-Sheet 1

Fig. 1

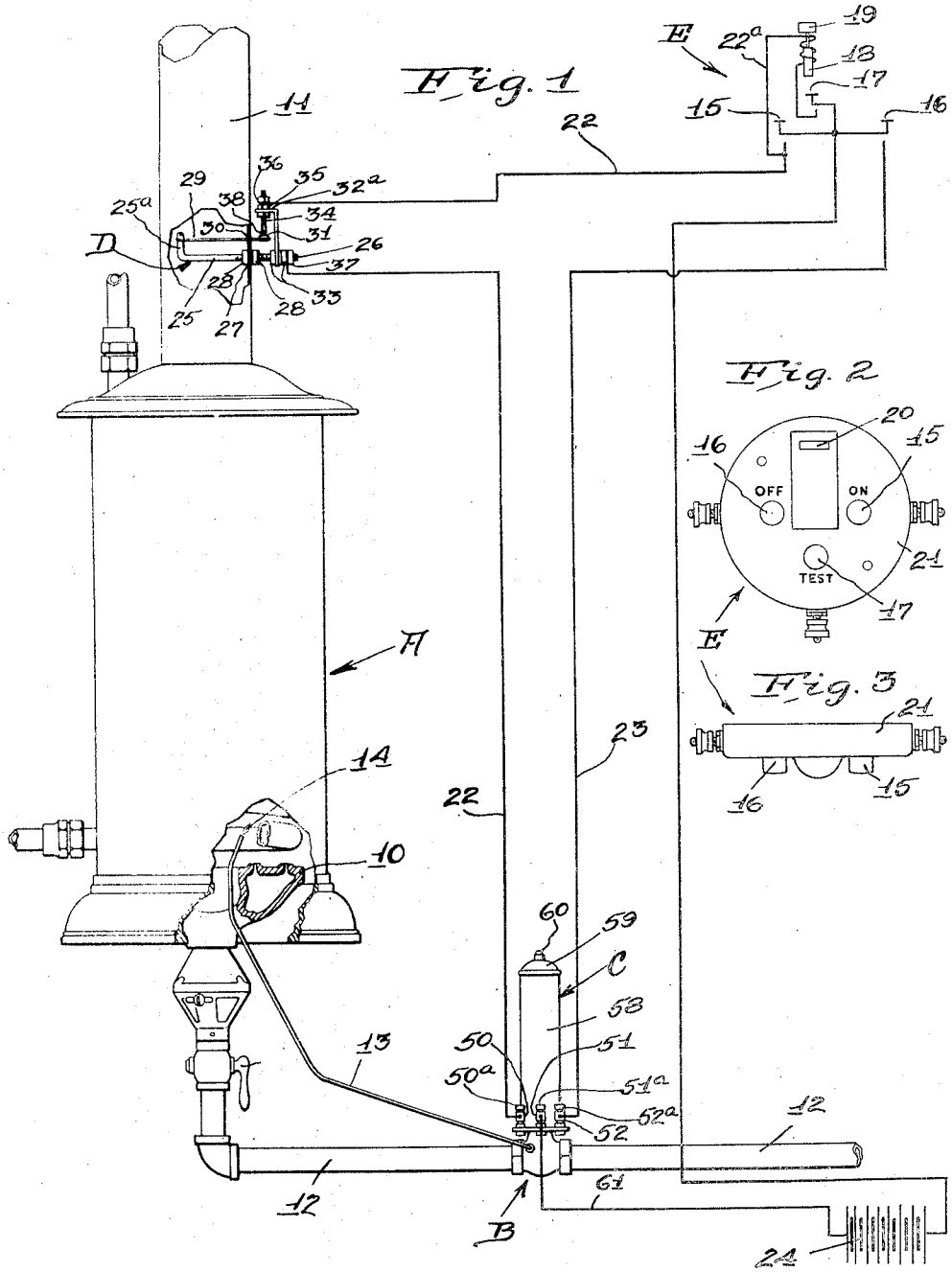


Fig. 2

Fig. 3

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Fig. 5

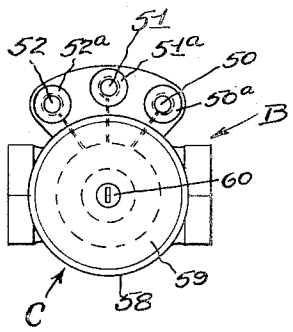


Fig. 7

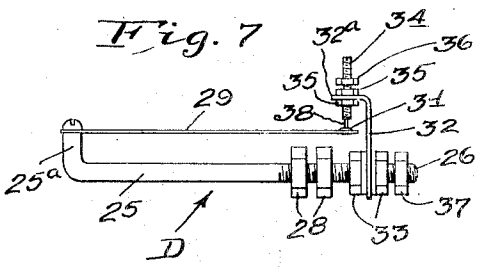


Fig. 4

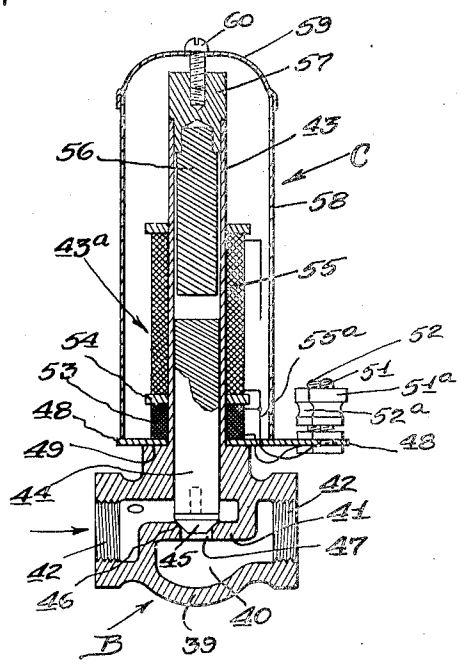
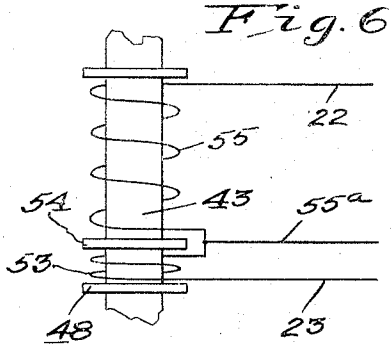


Fig. 6



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UNITED STATES PATENT OFFICE.

JAMES WALTER BROWN, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO BROWN ENGINEERING CORPORATION, OF MINNEAPOLIS, MINNESOTA A CORPORATION OF MINNESOTA.

GAS-CONTROL APPLIANCE.

Application filed March 26, 1921, Serial No. 455,931. Renewed August 27, 1926.

My invention relates to improvements in gas control appliances.

Its object is to provide an inexpensive, safe and reliable appliance for lighting and extinguishing gas in burners from a convenient control station at a distance from said burners, said appliance being especially adapted for use in connection with household water heating apparatus, which is usually located in the basement or other out of the way place, thus necessitating trips back and forth, and often up and down stairs, to turn the heater on and off.

A further object is to provide, in a device of this nature, means for easily determining at the control station whether the gas is or is not burning.

With the foregoing and other objects in view, which will appear in the following description, the invention resides in the novel combination and arrangement of parts and in the details of construction hereinafter described and claimed.

In the drawings, Fig. 1 illustrates, in elevation, a heater of conventional type, parts thereof being broken away, together with a device embodying my invention applied to the heater, said device being illustrated partly in elevation and partly in diagram; Fig. 2 is a view, in elevation, illustrating the switch constituting the control station of my improved appliance; Fig. 3 is a plan view thereof; Fig. 4 is a longitudinal, central, sectional view taken through the gas cut-off valve and actuating mechanism associated therewith; Fig 5 is a plan view of the same; Fig. 6 is a diagrammatic view illustrating in detail the coil windings in said valve actuating mechanism, and Fig. 7 is an enlarged view, in elevation, illustrating in detail the thermostat device, also shown in Fig. 1.

Referring to the drawings, I have indicated a heater by the reference letter A, said heater being of the conventional form having a burner 10 therein and a flue 11 leading therefrom to carry away the heat and gases rising from said burner. Gas is conducted to the burner 10 through a pipe 12, between adjacent sections of which is placed a valve B carrying an actuator C. To the intake side of said valve I connect a small tube 13, which terminates in close proximity to the burner 10 and provides a pilot 14 for said burner. Mounted on and partially within the flue 11 is a thermostat D designed as a circuit making and breaking device. In suitable location, at a point more or less distant from said heater, I employ a control switch E. This switch or station, as it may be termed, includes three circuit completing buttons or devices 15, 16 and 17 of suitable form and arrangement, and includes a solenoid magnet 18 fitted with a sliding target 19 (Fig. 1) visible through an opening 20 (Fig. 2) in the switch housing 21. Said circuit completing devices 15 and 17 are included in a circuit 22 connected with the thermostat D and valve actuator C. This circuit, operating through the actuator, causes the valve B to admit gas to the burner 10. The companion circuit completing device 16 is included in a circuit 23 operating through said actuator to cut off the gas from said burner, both circuits being connected with a source of electrical supply, such as a battery 24.

The thermostat D includes a supporting rod 25 formed with a threaded end 26. This rod is designed to pass through an opening 27 in the flue 11, and nuts 28 on said rod serve to firmly embrace opposite sides of the flue wall to anchor the rod with respect to said flue. A strip 29 of metal, adapted to warp with changes in temperature, is fixed at one end to the upturned extremity 25^a of the rod 25 within the flue 11. The free end of said strip passes freely through a slot 30 in said flue and is equipped at its outer extremity with a platinum or other suitable contacting member 31. A bracket 32, insulated from and secured to the rod 25 by means of clamping nuts 33, slidably carries a threaded stem 34 fitted with nuts 35 upon opposite sides of a horizontal arm 32^a of said bracket for adjustably fixing the lower end of said stem with respect to the free end of the strip 29. A nut 36, above the upper nut 35 on said stem, serves to grip the end of a wire in the circuit 22. A nut 37 on the rod 25, together with the outer nut 33 on said rod, supply a clamp for the end of another wire in said circuit 22. The lower end of the stem 34 is equipped with a platinum or other suitable contacting member 38 for engagement with its companion member 31 on the strip 29.

The valve B and actuator C are composite in form, the former including a casing 39 enclosing a chamber 40 having a horizontal partition 41 therein, the ends of said casing being threaded, as at 42, for connection with the usual pipe fittings. An upright tubular guide or sleeve 43, formed integrally with the casing 39, slidably receives an iron plunger or stem 44, which is fitted at its lower end with a beveled head 45 of brass designed to fit in a beveled seat 46 at the margin of an opening 47 in the partition 41. A perforated fibre plate 48, fitting closely over the sleeve 43 and resting upon a shoulder 49 on the casing 39, is supplied with binding posts 50, 51 and 52 furnished with nuts 50^a, 51^a and 52^a. A coil 53 of fine wire, encircling the base of the sleeve 43, is separated by an insulating washer 54 from a superimposed coil 55 of heavy wire, also encircling said sleeve. A cylindrical, hardened steel magnet 56, suspended from a plug 57, threaded in the upper end of the sleeve 43, occupies the upper portion of said sleeve, the lower end of said magnet terminating near the upper end of the plunger 44 in depressed closing position, as shown in Fig. 4. A cylindrical guard 58, resting upon the plate 48 and enclosing the sleeve 43, is supplied with a cap 59 secured to the plug 57 by means of a screw 60. The coil 55 is included in the circuit 22 and the coil 53 in the circuit 23, both being connected at one end through a wire 55^a with the binding post 51, which in turn is connected through a common lead 61 with the battery 24. The opposite ends of said coils 55 and 53 are respectively connected with the binding posts 50 and 52, which in turn are respectively connected with leads in the circuits 22 and 23. The coil 55, about the sleeve 43, constitutes a solenoid magnet 43^a. The passage of current through the coil 55 causes the plunger 44 to rise in the sleeve 43 to position against the lower end of the magnet 56, thus lifting the head 45 from its seat and permitting the flow of gas to the burner, which is ignited by the pilot flame. The magnet 56 is magnetized sufficiently, by the electrical impulse in the coil 55, to retain the plunger in elevated position after the flow of current in said coil is arrested. The coil 53 is wound in a reverse direction with respect to the coil 55 and passage of current therethrough causes the upper end of the plunger to assume the same magnetic polarity as the lower end of the magnet 56, whereupon the plunger is released and falls by gravity to valve closing position (Fig. 4). The resistance of the coil 53 is so proportioned that the magnetic effect set up is sufficient to neutralize the attractive force between the upper end of the plunger 44 and the lower end of the magnet 56, but is not sufficient to reverse the polarity of the magnet 56, since in this case the plunger might not be released. It will be noted that a momentary impulse of current in the coils 55 and 53 is all that is required to respectively lift the plunger into valve opening position or drop the same into valve closing position. In valve opening position the plunger 44 is held against gravity by the residual magnetism in the hardened steel magnet 56 until that force is counteracted by an electrical impulse in the coil 53.

In use, the button 15, marked "On" is momentarily pressed to complete the circuit 22, whereupon the plunger 44 is elevated, the same being thus retained by the then energized magnet 56. In this elevated position of the plunger 44, the opening 47 in the partition 41 is unobstructed by the head 45 and gas, under pressure in the main 12, passes to the burner 10, where it is ignited by the pilot 14. To extinguish the flame in the burner, the button 16, marked "Off", is pressed to temporarily complete the circuit 23, whereupon the upper end of the plunger 44 is caused to assume the same magnetic polarity as the lower end of the magnet 56. This condition obtaining, the plunger 44 is released and falls from the magnet 56, thus bringing the head 45 in contact with its seat 46 and closing the opening 47 in the partition 41 against the passage of gas therethrough. By thus arresting the supply of gas to the burner 10, the flame therein is extinguished. Should the user desire to ascertain whether or not the burner is lighted, the button 17, marked "Test", is pressed momentarily to complete the circuit 22, including therein a branch 22^a associated with the solenoid magnet 18. If the contacting members 31 and 38 of the thermostat are in engagement with each other, as would be the case at low temperatures within the flue 11, the circuit 22 is completed and the sliding target 19 in the solenoid magnet 18 rises to position visible through the window 20 in the switch housing 21. The user is thereupon apprised that the burner 10 is not lighted. If the contacting members 31 and 38 of the thermostat are separated, as would be the case at high temperatures within the flue, the circuit 22 cannot be completed by pressure upon the button 17, due to the circuit interrupting condition of the thermostat. Thus, it will be seen that the user may readily determine, with reference to the signal 19 at the control station, whether the heater A is or is not operating.

Without further explanation, it might be taken that the actuator mechanism C would be operated to admit gas to the burner, should the thermostat D be closed when the test button 17 is pressed. This, however, is not the case. The resistance in the solenoid magnet 18 is sufficiently great to preclude the lifting of the plunger 44 by the sole-

noid magnet 43ª when the circuit through both magnets is completed by operating the test button 17.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

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

In a device of the class described, the combination with a heater, including a burner, coupled with a gas supply conduit and provided with means for lighting the same, of a gas cut-off mechanism incorporated in said conduit, including a vertically floating valve member adapted, in the absence of resistance, to fall into valve closing position, a solenoid magnet for lifting said valve member, a holding magnet to retain said member in elevated position, a control station at a point removed from the heater, two circuit completing devices at said control station, a circuit for energizing the lifting and holding magnets, including one of said circuit completing devices, and a second circuit for neutralizing the attractive force of said holding magnet, including the other circuit completing device.

In testimony whereof, I have signed my name to this specification.

JAMES WALTER BROWN.