June 29, 1937. E. E. GREEN 2,085,581

AUTOMATIC SAFETY GAS VALVE

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Fig. 3

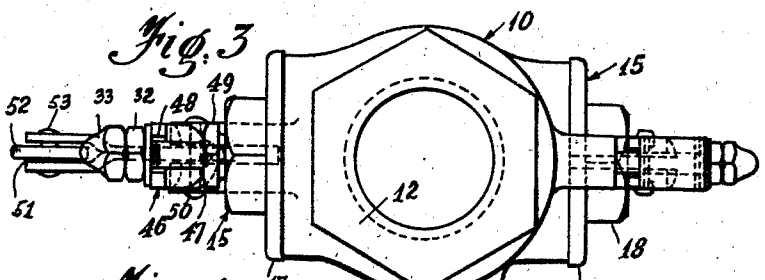


Fig. 4

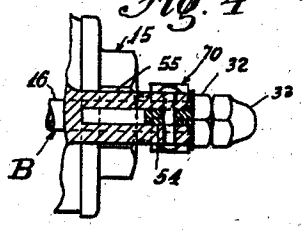
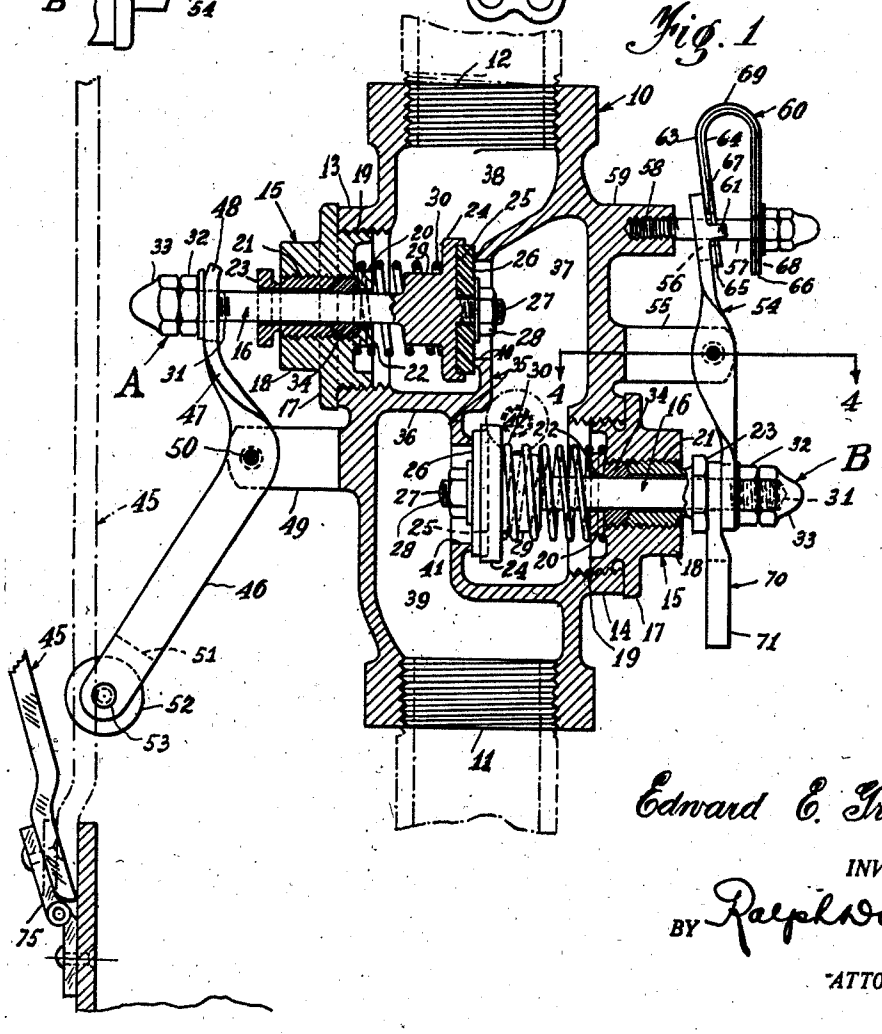


Fig. 1



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AUTOMATIC SAFETY GAS VALVE

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Fig. 2

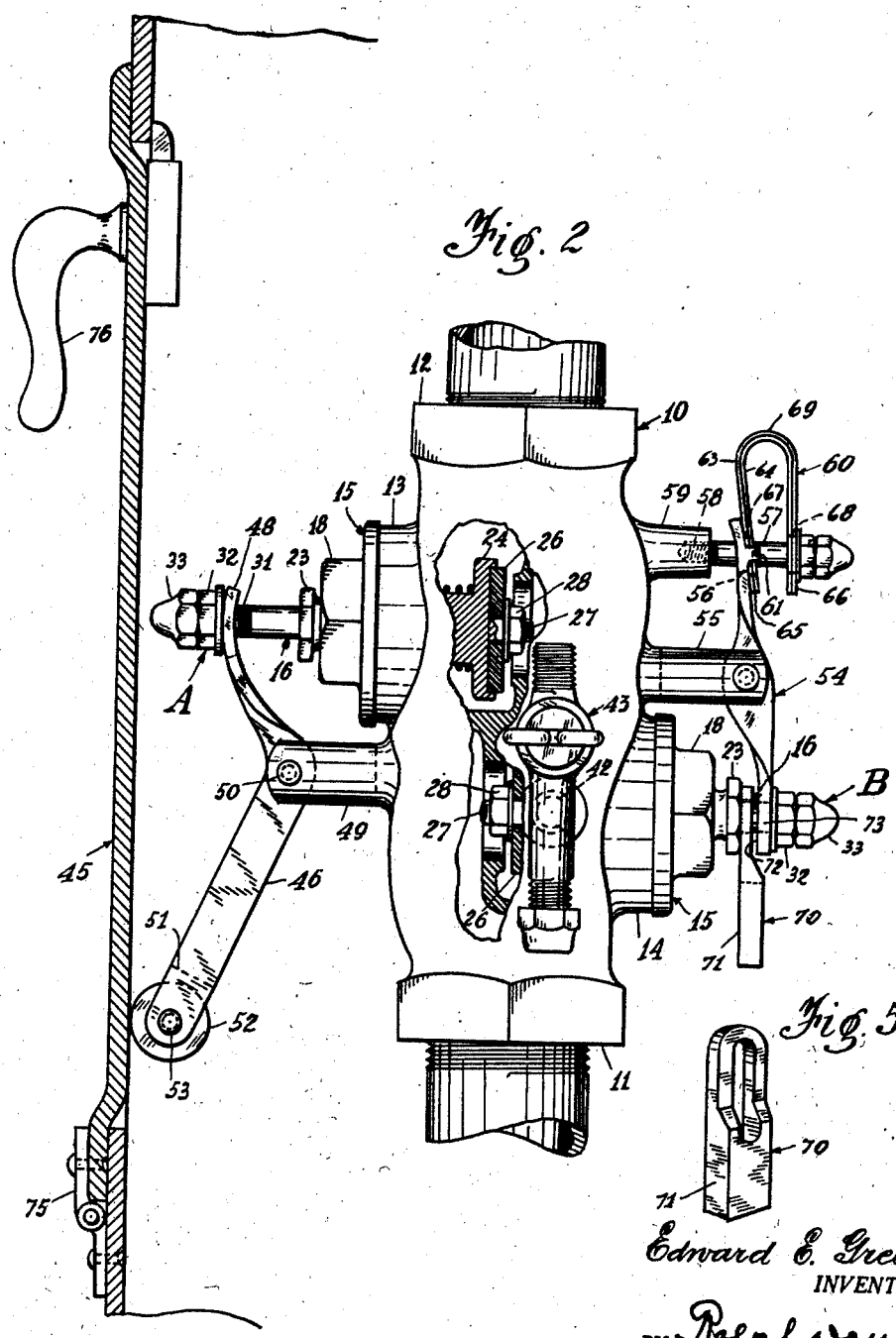

Fig. 5

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AUTOMATIC SAFETY GAS VALVE

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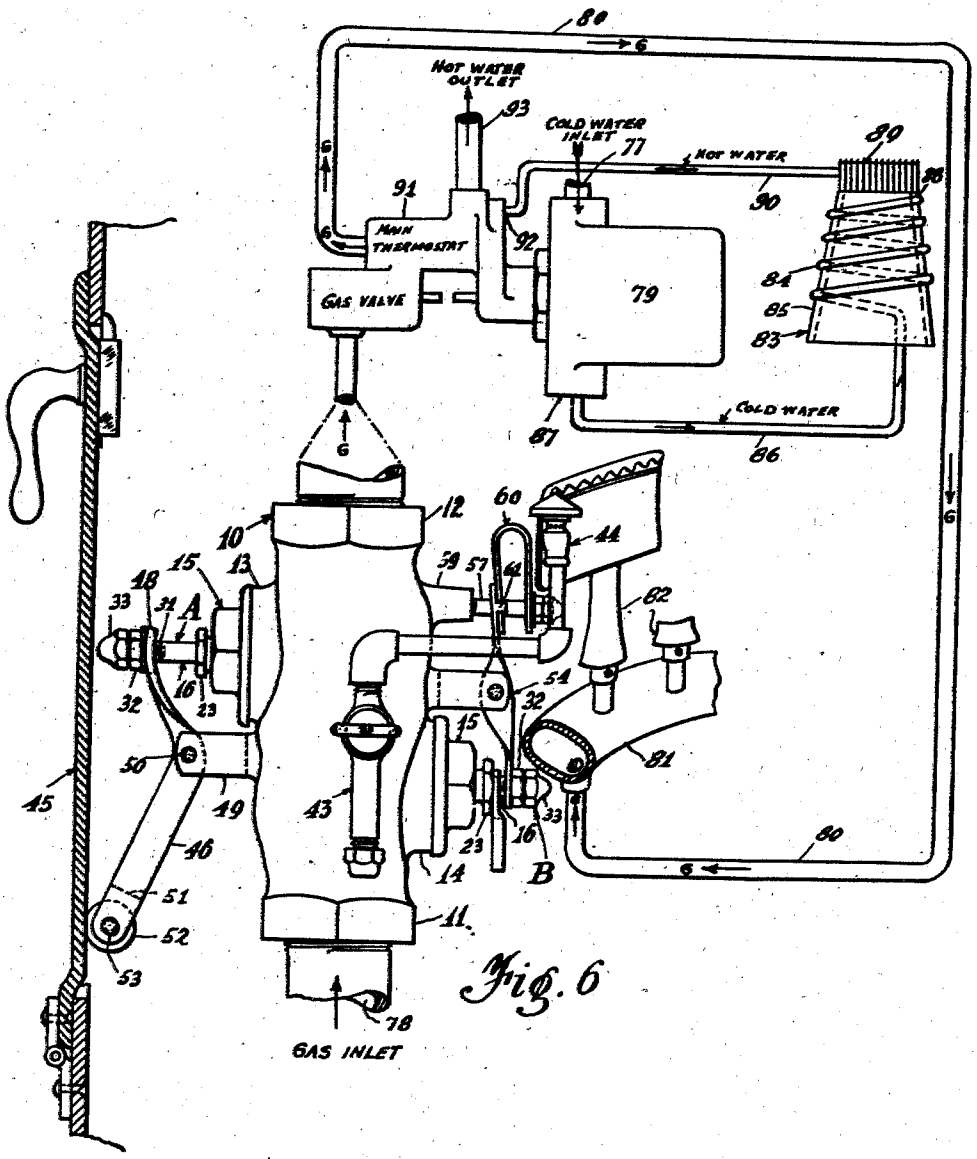

Fig. 6

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2,085,581

AUTOMATIC SAFETY GAS VALVE

Edward E. Green, Pittsburgh, Pa.

Application November 15, 1935, Serial No. 49,914

2 Claims. (Cl. 277—70)

This invention relates to safety valves and more in particular to the type of valves which are used in connection with hot water heaters for boilers, hot water storage heaters or instantaneous automatic hot water heaters which use gas as a fuel.

The above mentioned types of gas heated water heaters are nearly always thermostatically controlled and some of these heaters are equipped with two thermostats, one which controls the supply of gas to the main gas burners and one which controls the usual pilot light.

In instantaneous automatic hot water heaters hot water is provided whenever a tap is opened and it operates by means of an actuating mechanism in a hydrostatic valve which opens the gas valve when the water is turned on and which closes the gas valve when the tap is closed.

Although, in general, these types of water heaters are considered safe from explosions and fires, nevertheless a certain degree of danger exists, for instance, when cleaning or repairing the interior of the heater without turning off the main supply of gas.

Ordinarily, no danger exists when the main supply of gas is turned off while repairing, etc., but often this is neglected and minor repairing is attempted with the main gas supply not turned off. Of course, in order to repair or clean the interior of a heater it is necessary to open the heater door and as long as no one draws water in the building it would not be dangerous to do that.

But supposing a person draws water, not knowing that someone is repairing the heater, that moment the main gas supply is turned on by means of the hydrostatic valve and since the pilot light is still burning the gas escaping from the main burners will ignite and violent flames will surround the heating chamber until the water is again turned off, but, in consequence serious burns may occur to the person manipulating the heater, as will be understood.

One of the objects of this invention is to provide an improved type of automatic control of the main gas supply which prevents accidents as above described.

Another object of this invention is to provide an improved type of gas valve which automatically closes the gas supply line to the main burners when the heater door is opened and which automatically opens the gas supply line to the main burners when the heater door is closed.

Still another object of the invention is to provide a safety valve which will automatically cut off the supply of gas to the main burner when the heater door is opened but will permit a supply of gas for the pilot light.

Yet another object of the invention is the provision of an automatic safety valve which is simple in construction, positive in operation and which can be manufactured at relatively small cost.

Additional features and advantages of the invention will appear from the following description considered in connection with the accompanying drawings in which:

Figure 1 is a sectional view of a valve constructed according to my invention with some parts shown in elevation, all valves are shown in closed position and the door of the water heater is shown open.

Figure 2 is an outline view of Figure 1 with parts of the interior exposed to show all the valves open and the door of the water heater is shown in closed position.

Figure 3 is a top outline view of Figure 1.

Figure 4 is a sectional detail view along line 4—4 in Figure 1.

Figure 5 is a perspective view of the wedge member which retains the pilot light valve open, if so desired, while repairing or testing the heater.

Figure 6 is a diagrammatic detail view of the vital parts and connections of an instantaneous type water heater including my improved valve.

Reference being had to the drawings, the valve built in accord with my invention consists of a body 10 having inlet and outlet connections 11 and 12 respectively and a pair of identical and interiorly threaded necks 13 and 14 into which are screwed valve bonnets 15.

The said bonnet 15 serves as a support and guide for the valve stem 16 and comprises a circular disc 17 which merges at one end into a polygonal hub portion 18 and at the other end into an externally threaded extension 19 which is recessed to form a stub end 20.

The bonnet 15 is also provided with a centrally bored and threaded aperture 21 and a small aperture 22, the first threaded aperture 21 to accommodate the stuffing box gland 23 of usual design and the small aperture 22 to permit free entrance of the valve stem 16. The stuffing box gland 23 presses upon the packing material 34, which in turn is forced against the valve stem 16, thus providing a leakproof joint.

The said valve stem 16 comprises the circular valve retainer 24 which has a centrally disposed recess 25 adapted to receive the annular gasket

26 made of any suitable material. This gasket 26 is placed in the recess 25 and held from movement by the threaded shank 27, which in this example is formed integrally with the valve retainer 24, and the nut 28.

The said valve retainer 24 is also provided with a circular shoulder 29 of approximately the same diameter as the stub end 20, so as to accommodate one end of the coiled compression spring 30, when in assembled position. The outer end 31 of the shank portion of the valve stem 16 is threaded to receive the nut 32 and the lock-nut 33.

Formed integrally with the body 10 are walls 35 and 36 which divide the body into three distinctive compartments 37, 38 and 39. The wall 35 is provided with circular ports 40 and 41 located one above the other as shown and each port faces the respective valve stem mechanism and comes in horizontal alignment with the same so as to cooperate with the gasket 26 and provide a leakproof joint when closed.

The said valve body 10 is also provided with a substantially small internally threaded port hole 42 which communicates with compartment 37 and in which is screwed the pilot light valve 43 of usual design by means of which the gas supply to the pilot light 44 may be manually turned on or off and since there is no novelty in such valve per se a detailed view thereof is therefore not shown.

The valve mechanism "A", facing the door 45, is actuated by means of a bell-crank lever 46 of strip metal, the upper part of which is provided with a twist 47 and a bifurcated extremity 48 which engages therebetween the valve stem 16. The nut 32 and the lock-nut 33 serve as an adjustment- and regulating medium for the valve stem 16.

The said bell-crank lever 46 is mounted for pivotal movement in the slotted boss 49 which is formed integrally with the body 10 by means of the pin connection 50. The lower end of said bell-crank lever is also bifurcated as indicated by the numeral 51 for the reception of the wheel 52 which is rotatably mounted on the pin connection 53.

The valve mechanism "B" which is located opposite the valve mechanism "A" heretofore described is of identical construction as said valve mechanism A and in the construction shown it will be seen that both mechanisms are of the same size so as to eliminate too many different parts, thus permitting considerable economy in manufacturing.

Referring now to the valve mechanism B, in addition to the parts already described, the same comprises a twisted lever 54, mounted for pivotal movement in the slotted boss 55, which is preferably integral with the body 10. The upper end of said lever 54 has a bifurcation 56 to permit free entrance of the stud 57 which engages the threaded hole 58 of the boss 59, as shown.

A thermostat 60, capable to control the valve mechanism B, is attached to the upper portion of the lever 54 by means of a pair of bent-over lugs 61. The said thermostat is primarily used to control the pilot light 44 in such manner that when the pilot light accidentally blows out the valve B automatically closes.

As shown, the thermostat 60 comprises a U-shaped strip of two dissimilar metals 63 and 64, secured together in any desired manner, each having a different coefficient of thermal expansion. The legs 65 and 66 of the U strip are provided with apertures 67 and 68 through which the stud 57 penetrates when in assembled position. The unequal expansion or contraction of the two metals causes a change of the shape of the arch 69 when the thermostat is imparted to heat or returns to its normal shape when cooled off.

In the present case the thermostat provides the force for opening the valve and retains the same open as long as heat is applied thereto, that is, as long as the pilot light 44 is burning.

In Figure 5 of the drawings there is shown a wedge member 70 which serves as a means to retain the valve in open position while adjusting or repairing, with the pilot light not burning. This is accomplished by moving said wedge member upwardly so that the widened part 71 comes between the inner face 72 of the bifurcated lower end 73 of the lever 54 and the top of the stuffing box gland 23. In that position, the valve will be held open indefinitely provided, of course, that the pilot light is not burning.

After the attendant completes adjustments etc., he again lights the pilot light and since the same is in close proximity of the thermostat 60 the heat of the pilot light will cause the legs 65 and 66 to spread apart. This change of configuration of the thermostat provides the force to retain the valve open as long as the pilot light burns. It is not necessary to manually release the wedge member 70 after lighting the pilot light, but owing to the change of configuration of the thermostat the bifurcated lower end 73 of lever 54 pushes against the nut 32 thereby compressing spring 30 and opening valve B, thus creating a gap between the gland 23 and nut 32, which in turn releases the wedge member 70 from its hold and drops down to its normal position.

It will be obvious with such arrangement a positive and effective means is provided for preventing gas from escaping from the pilot light at all times.

Referring again to the valve mechanism A, the same is being actuated by the heater door 45 which is provided with usual hinges 75 and a handle 76 to facilitate opening or closing of the same.

As clearly illustrated in Figure 2 said door 45, when in closed position, is in contact with the wheel 52 of the bell-crank lever 46, which in turn raises the valve from its seat, but when the door is opened the valve is automatically closed by means of coil spring 30.

In general, the diagrammatic arrangement of the various parts of an automatic hot water heater (see Figure 6) as used in connection with my safety valve and its operation is as follows:

It is assumed that the water pipes are filled with cold water supplied by an existing water line. The cold water enters at 77 and the gas enters at 78; the pilot light is burning and therefore the valve B is in open position; the heater door 45 is closed, therefore the valve A is open.

Supposing someone in the building opens a hot water spigot, in that instant the piston (not shown) in the water motor 79 opens a water pressure operated gas valve (not shown) and since the valves A and B of my safety valve are also open, the gas from the main supply is permitted to go through the pipe line 80, to the gas distributing ring 81 and to the series of burners 82. The gas escaping from the burners is ignited by the pilot light 44. The violent flames of the gas burners 82 strike the inner wall of the cone-shaped receptacle 83 which in turn rapidly heats the cold water circulating in the spiral coil 84 secured to the outer wall 85 of receptacle 83 and the

lower end of which is connected by pipes **86** to the outlet end **87** of the water motor **79**.

The upper end **88** of said spiral coil **84** connects to fin-clad pipes **89**, and a pipe line **90** joins the main thermostat housing **91** (not detailed) at one end or inlet **92** and the outlet **93** thereof connects to the various fixtures which are intended to supply hot water.

As will be apparent to those versed in the art, a gas safety valve built and operated along the lines described offers an entirely safe gas heated water heater under all conditions.

While the illustrated example constitutes a practical embodiment of my invention, I do not wish to limit myself strictly to the mechanical details herein illustrated, since manifestly the same can be varied without departing from the scope of the invention, as defined in the appended claims.

I claim:—

1. A valve comprising a casing having open ends adapted for connection with pipe sections, a partition in said casing extending longitudinally therein and provided with a lateral extension intermediate its length, said partition and its extension dividing the casing into end chambers constituting inlet and outlet chambers and an intermediate chamber at one side of the end chambers in overlapping relation thereto, said intermediate chamber having its end portions in communication with the end chambers through ports formed in the partition, valves for closing the ports mounted in the outlet chamber and the intermediate chamber and having stems extending laterally of the casing and slidably engaged through walls thereof at opposite sides of the casing for outward movement to unseat the valves, springs yieldably holding the valves closed, fulcrums carried by the casing externally thereof, levers pivoted to said fulcrums and extending longitudinally of the casing, one lever having one end engaging the stem of the valve in the outlet chamber and its other end free, the other lever having one end engaging the stem of the valve in the intermediate chamber and its other end bifurcated, a stud projecting from said casing through the bifurcated end of the second lever, and a thermostat carried by said stud and engaging the bifurcated end of the second lever for moving the second lever in a direction to open the valve in the intermediate chamber.

2. A valve comprising a casing having an intermediate chamber and end chambers communicating with opposite end portions of the intermediate chamber through ports, a valve yieldably held in closing relation to the port between the intermediate chamber and one end chamber and having a stem projecting laterally from the casing at one side thereof, a valve yieldably held in closing relation to the port between the intermediate chamber and the other end chamber and having a stem projecting laterally from the casing at the other side than the stem of the first valve, fulcrums carried by said casing in spaced relation to the stems longitudinally of the casing, levers pivoted to said fulcrums and extending longitudinally of the casing and each having an end portion connected with the stem of a valve to open the valve when pressure is applied to the other end of the lever, the other end of one lever being free, a pin projecting from said casing adjacent the second end of the other lever, and a thermostat carried by said pin and engaging the second end of the last mentioned lever for imparting movement to the lever and opening the cooperating valve when the thermostat is expanded by heat.

EDWARD E. GREEN.