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VALVE CONSTRUCTION FOR AUTOMATIC HOT WATER HEATERS

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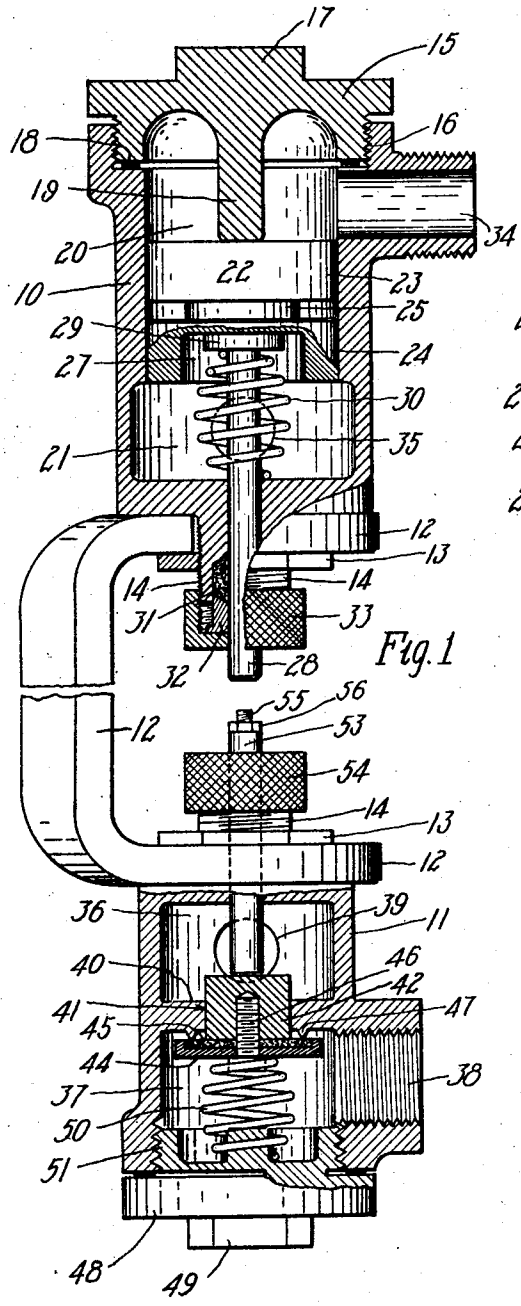


Fig. 1

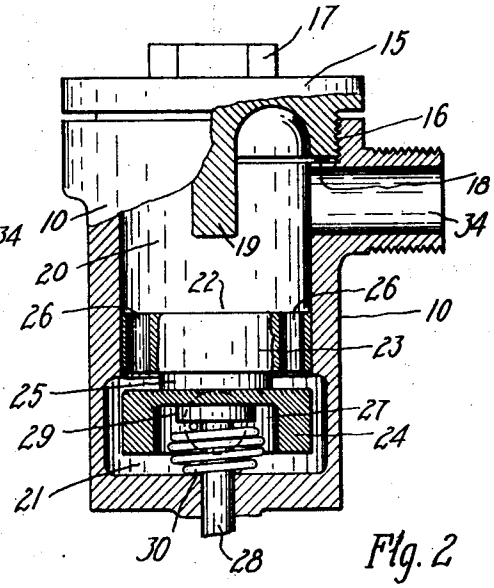


Fig. 2

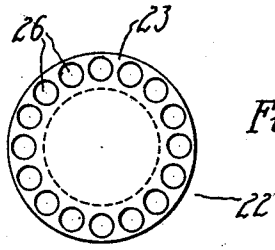


Fig. 3

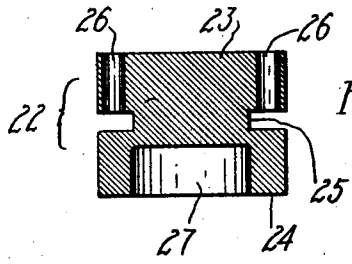


Fig. 4

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VALVE CONSTRUCTION FOR AUTOMATIC HOT-WATER HEATERS.

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This invention relates to improvements in valves for use on automatic hot-water heaters. In one standard form of hot-water heater a gas valve operating to admit gas to the heater is controlled by the movement of a plunger which is influenced by the flow of water through the house-supply system under the action of the usual faucets. When a faucet is opened the equilibrium of the plunger is disturbed and the gas valve operated. It is the object of this invention to improve valves of this general character in several respects. Among other specific objects is the production of a valve of this character which will be very simple in operation and cheap in construction. A further object is to produce a valve in which moving packings will be eliminated. A further object is to construct a valve in which danger of plugging of the valve due to particles of grit being caught in the moving part is substantially eliminated. A further object is to produce a valve which will be substantially self-flushing.

Referring to the drawings,

Fig. 1 is a view, largely in median section, showing both the improved operating mechanism and a conventional gas valve;

Fig. 2 is a sectional detail substantially the same as the upper portion of Fig. 1, but showing the parts in a different operative position;

Fig. 3 is a top-plan view of a piston; and

Fig. 4 is a central vertical section through the piston shown in Fig. 3.

The valve in the present case is mounted in two casings 10 and 11, the former containing those operating parts controlled by the flow of water, and the latter containing the gas valve. The two casings are connected by a yoke 12, being secured in place by lock nuts 13 threaded onto an extension 14 of the casing. Into the upper casing 10 is threaded as at 16 a cap 15 having a hexagonal boss for the application of a wrench. The cap is provided with a packing 18 which insures a water tight joint between it and the body of the casing. The cap is likewise fitted with an abutment 19 for a purpose to be described. The casing 10 has a cylindrical bore 20 merging into an enlarged portion 21 near the bottom of the casing.

Within the cylindrical bore 20 a piston 22 slides, this piston being composed of upper and lower portions 23 and 24 respectively, connected by a neck of reduced circumference 25. By this construction a central annular recess is formed in the piston. Holes 26 extend through the upper portion 23 into this annular recess. The piston 22 is made sufficiently smaller than the bore 20 so that a very slight leakage will result when the water is not flowing. By this means the pressure is equalized upon the two sides of the piston and a condition of equilibrium in the various parts results. The bottom of the piston is formed with a recess 27 into which projects the end of a rod 28 extending through the bottom of the casing 10. At the top of this rod is a collar 29 against which a spring 30 rests. The spring likewise abuts against the bottom of the enlargement 21 and normally holds the piston in the upper position of Fig. 1, in which its upper surface rests against the abutment 19. A packing 31 surrounds the rod 28 being held in position by a collar 32 and a screw cap 33, thereby forming a stuffing-box which prevents any leakage of water past the rod. The casing 10 is provided with an inlet 34 and an outlet 35.

The lower casing 11 is formed with upper and lower chambers 36 and 37 respectively separated by a web 40. The chambers are joined by a hole 41 through the web in which slides a plunger 42. A disk 44 carrying a packing 45 is secured to the bottom of the plunger 42 by a screw 46, the packing pressing against ribs 47 on the web 40 to form a gas tight seal. The lower chamber is closed by a cap 49 carrying a hexagonal boss 48 and provided with an abutment 49′ which supports the lower end of a spring 50. The upper end of this spring encircles the head of the screw 46. Sliding in the upper end of the casing 11 and pressing at its lower against the plunger 42 is a rod 53. A stuffing-box 54 constructed like the one previously described and therefore not more fully detailed here serves to prevent leakage of gas around the rod 53. An adjusting rod 55 is threaded into the upper end of the rod 53 and is held in place by a lock-nut 56.

Assuming the faucets in the water supply to be closed the parts of the valve will remain in equilibrium in the position shown in Fig. 1. As stated above the fit of the piston 22 within the cylindrical bore 20 is sufficiently loose to permit a slight flow of water between them in order to equalize the condition of pressure. In this position also the spring 50 will hold the packing 45

against the rib 47, thus preventing gas from the inlet 38 reaching the outlet 39. If now a faucet in the water supply system be opened the pressure in the enlargement 21 is reduced and the plunger 20 will descend. As it descends the rod 28 is forced into contact with the adjusting rod 55 and the gas valve is opened by the downward descent of rods 53 and packing 45. As the faucet is left open a constant flow of water takes place between the inlet 34 and the outlet 35. This flow occurs during the continued operation of the device with the parts in the position of Fig. 2. By reference to that figure it appears that a passage of considerable area is opened between the bore 20 and the enlargement 21 by means of the holes 26 and the recess 27. The downward force of the flowing water, however, is sufficient to keep the piston in its lower position. Even if the force of the flowing water is insufficient for this a similar result would be secured immediately the piston started to ascend as the flow of water would be shut off by the lower portion 24 of the piston coming into the cylindrical bore 20. The lower portion 24 not being provided with holes, this would completely shut off the flow of water, but the faucet in the outlet pipe being open, the pressure of the water from above would at once reopen the valve. The constant flow of water through the holes 26 and into the annular recess between the paths of the piston completely flushes out any particles of dirt or grit which might otherwise tend to accumulate, and insures that there will be no sticking of the piston when the faucet is closed and the piston again tends to rise under the action of the spring 30.

Having thus described my invention, I claim:

1. A water valve for instantaneous water heaters comprising a chamber having a main portion and an enlarged end portion, an inlet opening into the main portion and an outlet opening out of the enlarged portion, a piston sliding in the main portion, connections operable to open a gas valve when the piston is projected into the enlarged portion of the chamber, said piston having an annular recess intermediate of its length and vents leading into said recess from the end of the piston remote from the enlarged portion of the chamber, whereby the water flow will be through the vents and the recess into the enlarged portion of the chamber.

2. A water valve for instantaneous water heaters comprising a chamber having a main portion and an enlarged end portion, an inlet opening into the main portion and an outlet opening out of the enlarged portion, an operatively integral piston having an intermediate annular recess and vents opening from the inlet end into said recess without interfering with the guiding action of the inlet end of the piston, and gas valve actuating devices controlled by the position of the piston.

3. An automatic water operated gas controlled valve consisting of a casing having a chamber therein and an inlet opening into one end of the chamber and an outlet opening from the other end of the chamber, a piston having a sliding fit with a portion of the chamber between said inlet and outlet, the end of the chamber near the outlet being enlarged to provide a water clearance between the piston and the wall of the chamber, said piston having a circular recess between its upper and lower ends and a series of openings through its upper end maintaining a normally open connection between said recess and the upper portion of the chamber, a spring in the lower end of the chamber for holding the piston toward the inlet, means for limiting the movement of the piston toward the inlet, and a rod having engagement at its upper end with the piston and extending through the lower end of the casing for operating the gas valve.

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