Feb. 17, 1931. H. ROTH 1,793,252

PLUMBING FIXTURE

Filed Feb. 27, 1926

Fig. 1.

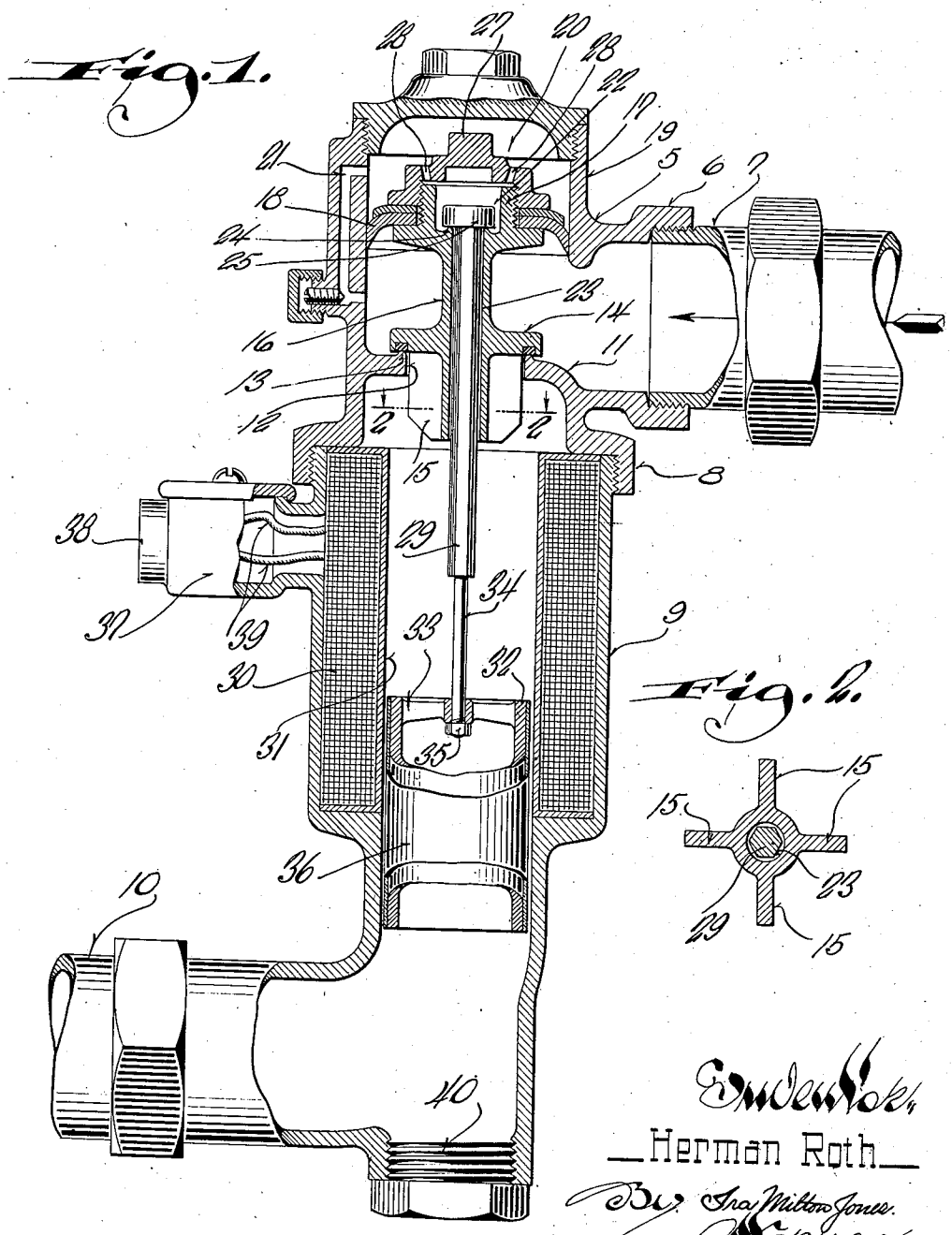


Fig. 2.

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PLUMBING FIXTURE

Application filed February 27, 1926. Serial No. 91,174.

This invention relates to certain new and useful improvements in plumbing fixtures and refers more particularly to an electrically operated flush valve having as one of its objects the provision of a compact valve arranged with safe-guards against overheating in the event the electrical circuit is inadvertently maintained longer than the ordinarily safe period.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawing I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view of a flush valve embodying my invention, parts thereof being in section and parts in elevation;

Figure 2 is an enlarged, detail view taken through Figure 1 on the plane of the line 2—2.

Referring now more particularly to the accompanying drawing in which like numerals designate like parts throughout the several views, the numeral 5 designates a valve casing having an inlet 6 with which a water supply pipe 7 is connected and an outlet 8 with which a jacket or casing 9 is connected and from which an outlet 10 leads to the usual bowl, not shown. The valve casing 5 has a partition 11 interposed between its inlet and outlet provided with a port 12 having a seat 13 with which a valve 14 is engageable. The valve 14 has vertical fins 15 extended therefrom which are guided within the port 12 and extended below and above the valve is a tubular extension or shank 16, on the upper end of which a head 17 is formed carrying a leather cup or washer 18 which slides within a cylinder 19 in the upper portion of the valve casing in axial alignment with the valve port 12.

The chamber 20 above the head 17 is normally closed from the valve inlet except through a by-pass 21 so that the water pressure from the inlet 7 being equal at both sides of the head 17 and impinging on the valve 14 causes the valve to be normally held closed, and means are provided for releasing the pressure at the top of head 17 so that the same raises into chamber 20, carrying with it the valve 14 to permit the water to flow from the supply pipe 7 through the valve port, through the housing 9 and out through the outlet 10 to the bowl. The upper end of head 17 is counter-bored, as at 22, concentric with the bore 23 of the shank 16 and has a valve seat 24 with which a valve 25, mounted within the counter-bore 22, normally engages; the valve being held in closed position by the weight of an armature 32 to be later described. A cap member 27 closes the upper end of the counter-bore and a plurality of passages 28 formed in the cap 27 permit the water within the chamber 20 to enter the counter-bore 22.

A square or hexagonal stem 29 carrying on its upper end the valve 25 extends through the bore 23 of the tubular extension 16 and projects below the valve 14 and its fins 15, the irregular cross-sectional shape of the stem defining a plurality of passages in the bore 23 through which water may flow from chamber 20 when the valve member 25 is raised from its seat 24. As stated before, the valve 14 is normally urged to its closed position but upon unseating of the valve 25, the pressure within chamber 20 is instantly released, the water passing through the bore 23 and as a result the larger area of the head 17 with respect to the valve 14 raises the valve from its seat permitting the water to flow from the inlet through the port 12 and outlet 10 into the bowl. The water continues to flow until the valve 25 again reseats and the pressure within the chamber 20 builds up sufficiently to force the head 17 downwardly and reseat the valve 14. Heretofore, it has been customary to actuate the auxiliary valve 25 by means of a lever or other mechanical device and this invention contemplates the

actuation of the valve by means of an electrical device as hereinafter described.

The housing 9 has a solenoid or coil 30 built therein about a tubular core 31 of brass or other nonmagnetic material and in which an armature 32 is slidable, the armature being of tubular construction having a spider member 33 in its upper end to slidably receive a guide rod 34 extending from the stem 29 and having a nut or stop 35 on its lower end for engagement with the web 33 to limit the downward movement of the armature, the armature being freely slidable upwardly on the guide rod when the solenoid is energized. The armature normally hangs from the stop 35 closing valve 25, as illustrated, with its mass below the magnetic center of the solenoid, the end of the guide stem 29 being so arranged that with the web 33 of the armature abutting the same, the mass of the armature remains below the magnetic center of the solenoid so that upon energization of the solenoid the armature rapidly travels upwardly, striking the end of the stem 29 with a hammer blow unseating the valve 25 to permit the opening of the valve 14 in the manner before described. Upon deenergization of the solenoid, the armature slides down the guide rod 34 to rest on the stop 35 returning to its position illustrated in Figure 1, thereby closing the valve 25 to effect the closing of the valve 14. The armature is shielded with brass or other non-corrosive metal 36, as illustrated in my co-pending application, filed April 16, 1925, Serial No. 23,560 and the water flowing through the coil and armature overcomes any tendency of the solenoid to overheat irrespective of the period of time the same remains energized.

In the drawing one type of circuit closure for the solenoid is illustrated in which a box 37 leads from the housing 9 and has a circuit closure button or the like 38 to connect and disconnect a supply line 39. The housing 9 is enlarged at its upper end to fit the solenoid and as illustrated, the outlet branches therefrom at an angle. A clean-out or drain plug 40, in axial alignment with the housing, is provided to facilitate removal of all foreign matter that may accumulate therein.

From the foregoing description taken in connection with the accompanying drawing it will be readily obvious to those skilled in the art to which an invention of this character appertains that I have provided a simplified and improved type of flush valve which may be readily applied to bowls now in use or else to bowls at the time of their installation which has all possible safe-guards against over-heating and one which is very reliable and efficient in operation.

What I claim as my invention is:

1. A device of the character described, comprising a valve casing having an inlet and an outlet, a valve normally disconnecting the inlet and outlet, an auxiliary valve, a stem extended from the auxiliary valve, a tubular armature slidably mounted on the stem and holding the auxiliary valve in closed position by gravity, a solenoid having a hollow core adapted to receive the armature and, upon energization, attract the same to open the auxiliary valve with a hammer blow, and means whereby the first-mentioned valve is opened upon opening of the auxiliary valve to permit the fluid to pass from the inlet to the outlet through the tubular armature and the hollow solenoid.

2. A plumbing fixture comprising a casing having a fluid inlet and outlet, a valve normally disconnecting the inlet and outlet and having an aperture therethrough, an auxiliary valve closing said aperture, a stem extended downwardly from said auxiliary valve, a tubular armature slidably mounted on the stem and holding the auxiliary valve in closed position by gravity, and a tubular solenoid, which when energized attracts the armature and opens the auxiliary valve to release the first mentioned valve to allow fluid to pass from the inlet to the outlet, the fluid passing through the solenoid and the armature after leaving the outlet and before leaving the fixture.

3. In a device of the character described, including a valve casing having an inlet and an outlet, a main valve normally disconnecting the inlet from the outlet, an auxiliary valve adapted to—upon opening—cause the main valve to open, means for opening the auxiliary valve comprising a solenoid having a hollow core forming part of the outlet, a tubular armature slidably received in the hollow core, and means connecting the armature with the auxiliary valve whereby the weight of the armature normally holds the auxiliary valve closed and movement of the armature upon energization of the solenoid, opens the same.

In testimony whereof I affix my signature.

HERMAN ROTH.