May 19, 1925. 1,538,216

H. ROTH

PLUMBING FIXTURE

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Fig. 1.

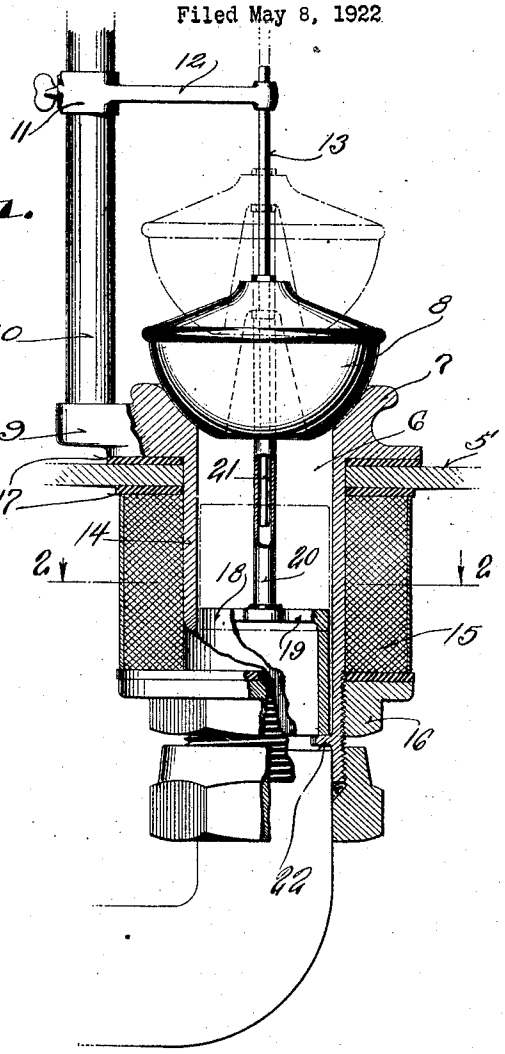
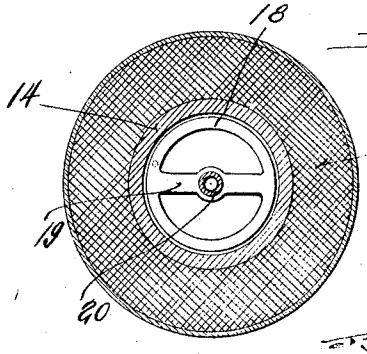


Fig. 2.



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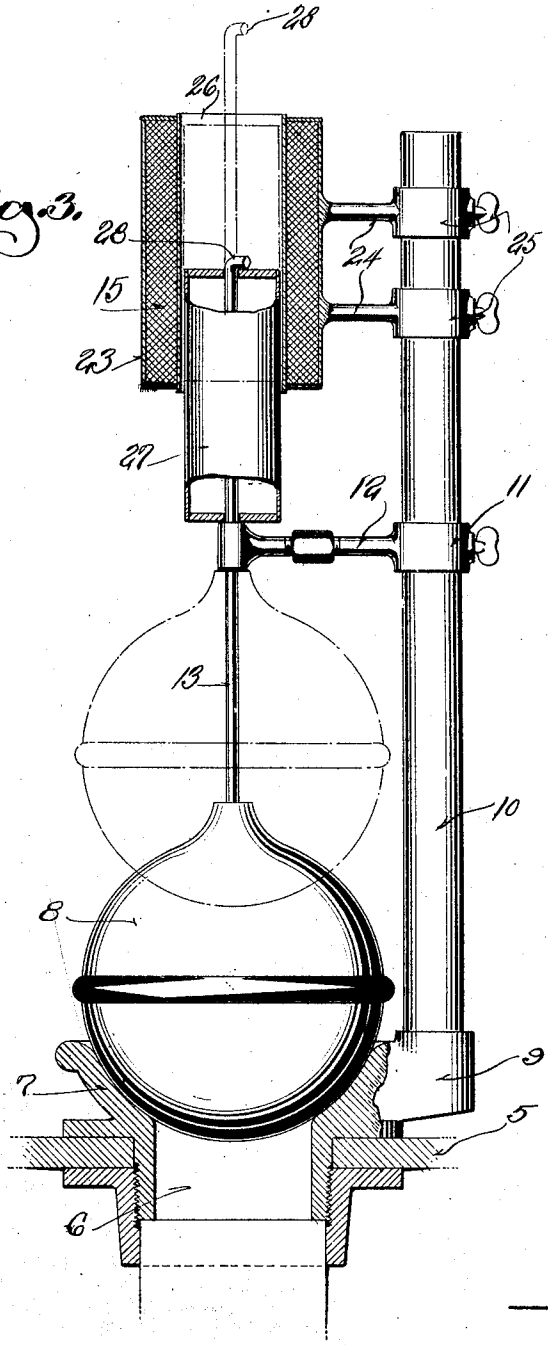
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Fig. 3.



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UNITED STATES PATENT OFFICE.

HERMAN ROTH, OF MILWAUKEE, WISCONSIN.

PLUMBING FIXTURE.

Application filed May 8, 1922. Serial No. 559,303.

To all whom it may concern:

Be it known that I, HERMAN ROTH, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Plumbing Fixtures, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to certain new and useful improvements in plumbing fixtures and refers more particularly to what is generally termed a flush valve.

The present conventional type of flush valve consists of a hollow ball valve member closing the outlet of the supply tank and which, when raised by a suitable lever, floats in the water free of its seat until the tank supply is exhausted, the valve member then closing the outlet and being held in such position by suction until it is again manually actuated.

It is, therefore, one of the objects of my invention to provide a device of the character described which is electrically actuated to permit its operation either at the tank or from a remote point.

Another object of this invention resides in the provision of a solenoid cooperating with an armature connected with the valve member in such a manner that energization of the solenoid unseats the valve member and at the same time permits return of the armature to normal position independent of the valve member.

A further object of this invention resides in the provision of a device of the character described having electrical means for moving the valve member to open position which means include a solenoid and an armature coperating therewith, the movement of the armature in either direction being restricted and the armature being returned to its position permitting closing movement of the valve by gravity.

It is a further object of this invention to provide a device of the character described whereby the upward limit of movement of the armature is adjustably limited and whereby the solenoid may be adjusted with respect to the normal inactive position of the armature.

This invention has for a still further object to provide a device of the character described in which the outlet pipe of the tank forms the core of the operating solenoid, the armature being preferably tubular to permit free flowage of fluid through the outlet.

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 drawings, 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 fragmentary perspective view taken through the bottom wall of a flush tank embodying my invention, the valve member and its electrical operating mechanism being illustrated partly in section and partly in elevation;

Figure 2 is a transverse sectional view through Figure 1 on the line 2—2, and

Figure 3 is a view similar to Figure 1 of a slightly modified form of my invention.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, the numeral 5 designates the bottom wall of a flush tank provided with a bottom opening through which leads an outlet 6 surrounded by a valve seat 7 adapted to be normally closed by a valve member 8. The casting forming seat 7 has a lug 9 from which extends a post or standard 10 having adjustably secured thereto, as at 11, a guide arm 12 for a stem 13 carried by the valve member. The outer end of arm 12 is bored to receive stem 13 and acts as a limit to the upward movement of the valve member and its operating means, now about to be described.

In that form of my invention illustrated in Figures 1 and 2, outlet 6 is constructed of brass, or any other non-magnetic material, and extends some distance beneath the tank bottom to form a core 14 for a solenoid or magnet coil 15, the outlet and coil being preferably secured in place by a lock nut 16. As illustrated, suitable washers 17 are pro-

vided on each side of wall 5, surrounding the outlet opening, to prevent leakage of the fluid in the tank about the outlet.

Mounted within core 14 is an armature 18 of soft iron, or other magnetic material, the armature being tubular and open at each end to permit unrestricted flowing of fluid through the outlet. The upper end of the armature is provided with a cross head 19 carrying an upwardly extended tubular rod 20 into which the lower end 21 of valve stem 13 projects, tube 20 serving both as means for unseating ball valve 8 when the armature is attracted upwardly by energization of coil 15, as hereinafter described, and as a guide for the valve.

The armature is normally positioned with its upper end disposed slightly beneath the center of the magnetic force of the solenoid, being held in this position by gravity with its lower end engaging a stop or limit 22. Momentary energization of coil 15 will instantly attract the armature upwardly to center its metal with respect to the center of the magnetic force of the solenoid unseating valve 8. By reason of the valve member being hollow, it floats free of seat 7 when the armature falls to its normal position engaging stop 22 upon deenergization of the solenoid and does not engage its seat until the water within the tank is exhausted. The stop arm 12 not only limits the upward movement of valve 8 but provides a check, on the upward movement of the armature should it be too strong, as will be readily obvious.

In that form of my invention illustrated in Figure 3, the solenoid 15 is positioned within the interior of the tank and is carried by a casing 23 provided with attaching arms 24 that are secured to post 10 by adjustable means 25. The core 26 of the solenoid is tubular and formed of brass or other nonmagnetic material and is axially aligned with outlet 6 and has slidable therein an armature 27 formed of soft iron, or other magnetic material, through which freely slidably passes the valve stem. The upper end of the stem is bent over or provided with a projection 28 to prevent its disengagement from the armature.

The armature is normally inactive with its lower end engaging arm 12 and when the solenoid is energized, the valve member is raised to its dotted line position, the armature immediately falling, by gravity, to its position engaging arm 12 upon deenergization of the solenoid.

As in the case of that form of my invention illustrated in Figures 1 and 2, armature 27 is normally positioned with its upper end slightly beneath the center of the solenoid 15, this position being regulated by the adjustable arm 12 which also adjusts the upward movement of the armature and the ball 8, to prevent the throwing outwardly of the armature when the solenoid is energized, as would be the case were no stop provided. Stop 12, as well as arms 24, are adjustable to regulate the position of the solenoid with respect to its armature in order that the amount of pull exerted may be varied.

What I claim as my invention is:

1. In a device of the character described, an outlet pipe, a magnet coil wound thereabout, the outlet pipe forming a tubular core for the coil, a valve member controlling the flow of fluid through the pipe, an armature slidable in the pipe, a guide carried by the armature, and a guide carried by the valve member and engaged with the armature carried guide, said guides forming a connection between the armature and valve member whereby energization of the magnet coil will cause the armature to actuate the valve member.

2. In a device of the character described, an outlet pipe, a magnet coil wound thereabout, the outlet pipe forming a tubular core for the coil, a valve member controlling the flow of fluid through the pipe, an armature slidable in the pipe, a guide carried by the armature, and a guide carried by the valve member and engaged with the armature carried guide, said guides forming a connection between the armature and valve member whereby energization of the magnet coil will cause the armature to actuate the valve member, the guides permitting return of the armature to its normal inactive position independent of the valve member.

3. In a device of the character described, an outlet pipe of non-magnetic material, a valve seat at the receiving end of the outlet pipe, a magnet coil wound around the outlet pipe using the outlet pipe as a core, an armature longitudinally movable in the pipe and normally disposed beneath the center of force of said magnet coil and adapted to be moved upwardly upon energization of the coil, a valve member engageable with the valve seat to control the flow of fluid through the pipe, and a slidable connection between the armature and valve member whereby the armature disengages the valve from its seat upon energization of the coil and the armature is returned to its normal position beneath the center of force of said magnet coil upon deenergization of the coil by force of gravity and the discharge of water through the outlet pipe.

4. In a device of the character described, an outlet pipe of non-magnetic material, a valve seat at the receiving end of the outlet pipe, a magnet coil wound around the outlet pipe and employing the same as a core, an armature longitudinally movable in the pipe and normally disposed beneath the center of force of said magnet coil and adapted

to be moved upwardly upon energization of the coil, a valve member engageable with the valve seat to control the flow of fluid through the pipe, a slidable connection between the armature and valve member whereby the armature disengages the valve from its seat upon energization of the coil and free movement apart of the armature in the valve is permitted upon deenergization of the coil, and means limiting the opening movement of the valve member and armature.

5. In a device of the character described, an outlet, a valve member normally closing the outlet, a magnet coil, an armature adapted to be attracted by the coil upon energization, and a connection between the valve member and the armature whereby the latter moves the valve member to open position upon energization of the magnet coil, and means permitting the ready return of the armature to normal position independent of the valve member upon the deenergization of the magnet coil.

6. In a device of the character described, a tank, an outlet leading therefrom and provided with a valve seat, a buoyant valve member normally held in engagement with the seat to close the outlet by the pressure exerted by the fluid in the tank, a magnet coil, an armature, said armature normally resting in an inactive position and being moved therefrom by energization of the magnet coil, means operable to move the valve member with the armature upon energization of the magnet coil to disengage the valve member from its seat, said valve member being sustained in a position disengaging the seat after actuation of the armature by its own buoyancy until the tank is substantially emptied of its contents, and means permitting the ready return of the armature to normal position independent of the valve member, whereby the magnet coil may be substantially instantly deenergized upon actuation of the armature.

7. A device of the class described including an outlet pipe, a valve normally closing said pipe, a magnet coil positioned in axial alignment with said pipe, an armature for said coil, said armature adapted to move within said coil upon the energization of the same to move the valve from its seat, and said armature adapted to return to its normal position upon the completion of such movement of the valve.

In testimony whereof I affix my signature

HERMAN ROTH.