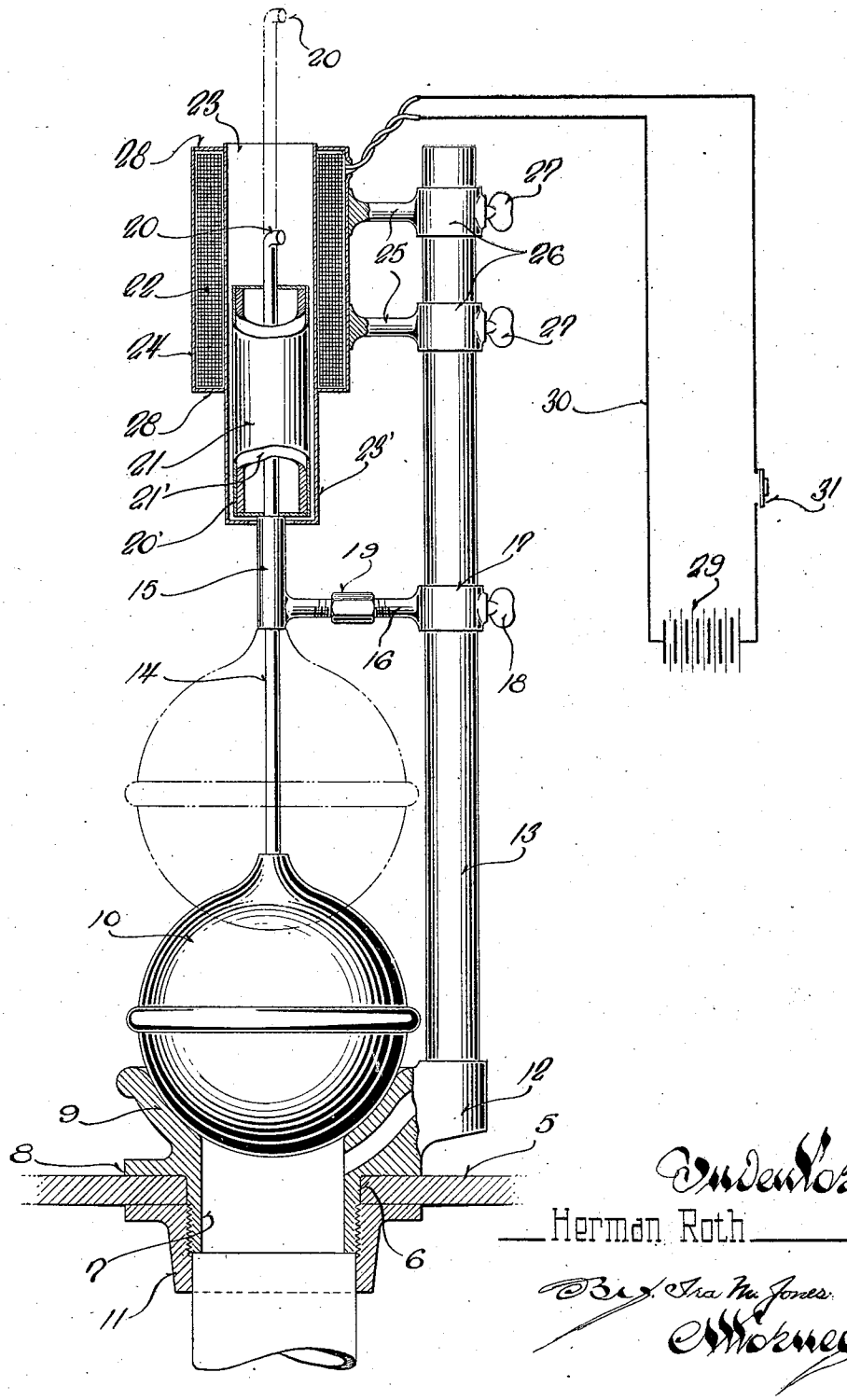
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H. ROTH

PLUMBING FIXTURE

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Inventor

Herman Roth

By Ira M. Jones

Attorney

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HERMAN ROTH, OF WAUWATOSA, WISCONSIN.

PLUMBING FIXTURE.

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It is an object of this invention to generally improve the construction and operation of plumbing fixtures of that type which is termed in the art as a flush valve, although it is to be understood that the principles thereof may be used in connection with other devices.

Another object of this invention resides in the provision of a flush valve operating means which is capable of being readily installed in flush tanks now in use as well at the time of their manufacture.

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 substanially 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:

The single view is a sectional one through the lower or bottom portion of a flush tank illustrating the installation of my improved flush valve operating means, part of the operating means being in section and part thereof being in side elevation.

Referring now more particularly to the accompanying drawing, the numeral 5 represents the bottom wall of a flush tank which is apertured, as at 6, to receive the nippled end 7 of an outlet 8, provided with a valve seat 9 at its inner end. The valve seat is of approximately bowl shape to receive a float valve 10 which is normally held in engagement with the seat to close the outlet by the body of water within the tank, the valve, upon being disengaged from its seat by the means to be later described, floating on the top of the water and reseating as the tank empties.

The outlet is preferably cast and secured in position by a sleeve 11 threaded on its nippled end 7 in the manner illustrated in the drawing. Supported vertically in the tank, preferably from a lug 12 formed on the seat, is a post or standard 13 which mounts means for guiding the valve 10 in its movement to and from a position closing the outlet.

Fixed to the valve and extended upwardly therefrom is a guide rod or stem 14 which is slidable in a sleeve 15 formed on the outer end of a guide arm 16 adjustably supported from the standard 13 by an attaching collar 17 adapted to be releasibly secured thereto by a set screw or other means 18. The guide arm 16 is adjustable by a turnbuckle 19 to align the sleeve 15 with the axis of the outlet.

When in a lower position closing the outlet, the guide rod upper end 20 extends above the sleeve 15 a distance substantially equal to the length of an armature 21, through which the upper end of the rod slidably passes. The armature 21 is soft iron or other magnetic material and may be of hollow construction closed at its ends as illustrated.

Also supported from the standard 13 is a solenoid coil 22 which is wound on a non-magnetic sleeve or hollow core 23 and confined in a casing 24 from which attaching arms 25 extend to sleeves 26 fixed to the standard by set screws or other means 27. The solenoid is axially alined with the outlet and the armature is slidable therein, its limits of movement being defined by the sleeve 15 and the length of the rod 14 disposed therebeneath. The casing 24 is closed over at its ends to the core by the rings 28 to protect the coil from the water within the tank and the sleeves 17 and 26 are so adjusted on the standard that, with the valve closed, the armature rests on the sleeve 15 with its mass positioned below the magnetic center of the solenoid.

The solenoid is connected with a source of energy 29 by conductors 30 in the circuit of which a switch 31 of a suitable type is included, so that the closing of switch 31 connects the solenoid with its source of energy. As the solenoid is energized by connection with its source of current, the armature is quickly attracted into the core 23 to tend to center its mass with respect to the magnetic center of the solenoid. The upper end 20 of the stem 14 being enlarged or bent over the armature, causes the armature to raise the valve as it is attracted into the solenoid, freeing the outlet.

The valve 10 is of the float or buoyant type held in engagement with its seat by the

weight of the water in the tank and as it is freed of the outlet by the attraction of the armature to the solenoid it floats on the top of the water until the tank is emptied when it again engages its seat and is held there by the water entering the tank through the inlet, not shown. The armature 21 being freely slidable on the rod 14 permits the operation of the device by but an instant energization of the solenoid thus reducing the current consumption to a minimum and preventing destructive overheating of the solenoid.

In operation the button 31 is held closed but an instant and as soon as the circuit is broken the armature drops, independently of the valve, to rest on the sleeve 15, the valve dropping as the water lowers in the tank. The pull on the armature is adjustable by varying the relation between the armature and solenoid through the sleeves 17 and 26.

The core 23 preferably extends below the solenoid and is closed at its lower end as at 23′ to form a dash-pot to quiet the return of the armature to normal position, as will be obvious. The armature may also be of the special construction illustrated with its iron body 21′ encased in a brass or other non-corrosive body 20′.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which an invention of this character appertains that I have provided a flush tank valve which is efficient in operation, simple in construction and which may be applied to flush tanks now in use or to tanks at their time of manufacture.

What I claim as my invention is:

1. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid disposed above the outlet, an armature normally resting in an inactive position and adapted to be attracted to the solenoid upon energization thereof, and a connection between the valve member and armature permitting a limited movement of one with respect to the other, whereby, with the valve member in position closing the outlet, a movement of the armature by energization of the solenoid moves the valve member with it free of the outlet.

2. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid disposed above the outlet, an armature normally resting in an inactive position and adapted to be attracted to the solenoid upon energization thereof, and a connection between the valve member and armature permitting a limited movement of one with respect to the other, whereby, with the valve member in position closing the outlet, a movement of the armature by energization of the solenoid moves the valve member with it free of the outlet, the armature moving from the solenoid upon deenergization of the solenoid independent of the return of the valve member to a position closing the outlet.

3. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid disposed above the outlet, an armature normally resting in an inactive position and adapted to be attracted to the solenoid upon energization thereof, a guide rod extended upwardly from the valve member and with which the armature is slidably connected, and means limiting the outward movement of the armature on the guide rod, whereby the attraction of the armature to the solenoid moves the valve member free of the outlet.

4. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid disposed above the outlet, an armature normally resting in an inactive position and adapted to be attracted to the solenoid upon energization thereof, a guide rod extended upwardly from the valve member and with which the armature is slidably connected, means limiting the outward movement of the armature on the guide rod, whereby the attraction of the armature to the solenoid moves the valve member free of the outlet, and means limiting the downward movement of the armature to retain the same within the field of magnetic force of the solenoid when energized.

5. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid having a hollow core, means mounting the solenoid above the outlet, an armature movable into the core of the solenoid when attracted by the energization of the solenoid, a guide stem for the valve member and extended upwardly through an opening in the armature, and means on the end of the guide stem above the armature whereby movement of the armature into the solenoid core carries the guide stem and valve member with it.

6. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid having a hollow core, means mounting the solenoid above the outlet, an armature movable into the core of the solenoid when attracted by the energization of the solenoid, a guide stem for the valve member and extended upwardly through an opening in the armature, means on the end of the guide stem above the armature whereby movement of the armature into the solenoid core carries the guide stem and valve member with it, the armature dropping independently of the guide stem upon deenergization of the solenoid, and means independent of the guide stem limiting the movement of the armature out of the core.

7. In a device of the character described,

an outlet, a valve member normally closing the outlet, a solenoid having a hollow core, means mounting the solenoid above the outlet, an armature movable into the core of the solenoid when attracted by the energization of the solenoid, a guide stem for the valve member and extended upwardly through an opening in the armature, means on the end of the guide stem above the armature whereby movement of the armature into the solenoid core carries the guide stem and valve member with it, and means for adjusting the distance between the solenoid and the outlet.

8. In a device of the character described, an outlet, a valve member normally closing the outlet, a solenoid disposed above the outlet, an armature adapted to be attracted to the solenoid upon energization thereof, a connection between the valve member and armature permitting a limited movement of one with respect to the other, whereby, with the valve member in position closing the outlet, a movement of the armature by energization of the solenoid moves the valve member with it free of the outlet, and means for quieting the return of the solenoid.

9. In a device of the character described, an outlet, a valve member normally resting on the outlet to close the same, an arm, a solenoid adjustably mounted on the arm and having a hollow core in axial alignment with the outlet, an extension carried by the core, an apertured bottom for the extension, an armature normally resting in an inactive position within the extension and adapted to be attracted to the solenoid upon energization thereof, a valve stem carried by the valve and passed through the aperture in the extension bottom, and means connecting the valve stem with the armature whereby energization of the solenoid raises the stem to open the valve.

10. 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 of the fluid in the tank, a support, a solenoid carried by the support and having a hollow core in axial alignment with the outlet, an extension carried by the core, an apertured bottom for the extension, the extension and its bottom forming substantially a dash pot, an armature normally resting in an inactive position within the dash pot and adapted to be attracted to the solenoid upon energization thereof, a valve stem passed through the aperture in the dash pot bottom, means slidably connecting the armature with the valve stem, means whereby movement of the armature upon energization of the solenoid lifts the stem to open the valve, the valve remaining open due to its buoyancy until the tank is substantially emptied, means permitting the ready return of the armature to inactive position, and fluid within the dash pot cushioning the return of the armature.

In testimony whereof I affix my signature.

HERMAN ROTH.