No. 802,947. PATENTED OCT. 24, 1905.

I. G. WATERMAN.

ELECTROMAGNETIC VALVE.

APPLICATION FILED JUNE 25, 1903.

2 SHEETS—SHEET 1.

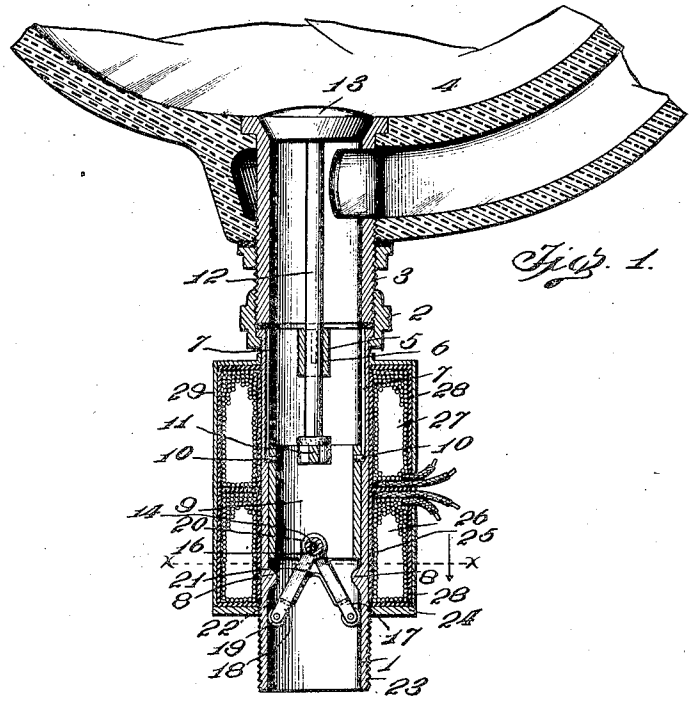
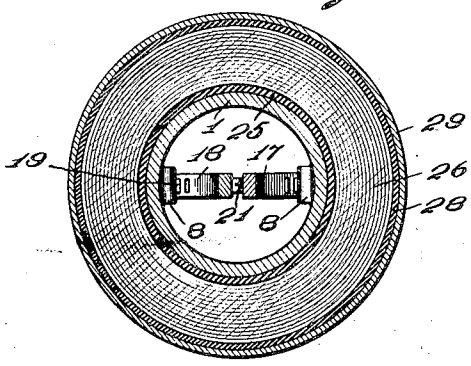


Fig. 1.

Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

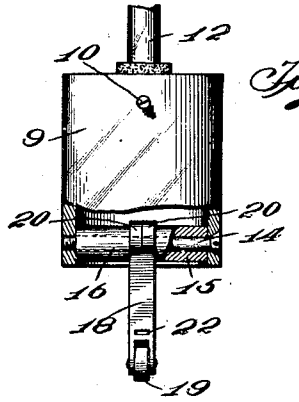


Fig. 4.

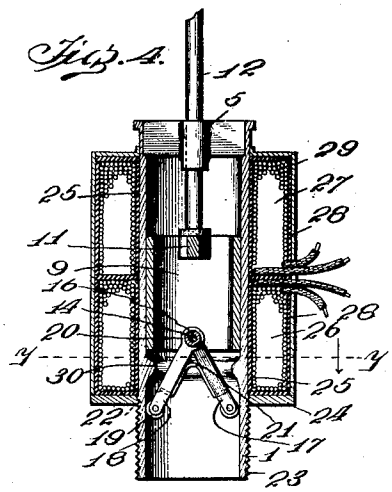


Fig. 5.

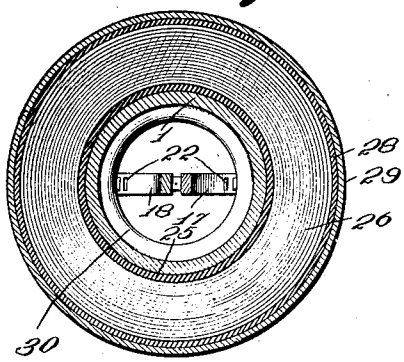
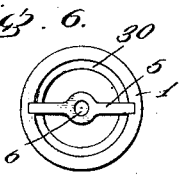


Fig. 6.



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UNITED STATES PATENT OFFICE.

ISAAC G. WATERMAN, OF SANTA BARBARA, CALIFORNIA.

ELECTROMAGNETIC VALVE.

No. 802,947. Specification of Letters Patent. Patented Oct. 24, 1905.

Application filed June 26, 1903. Serial No. 163,129.

To all whom it may concern:

Be it known that I, ISAAC G. WATERMAN, a citizen of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented new and useful Improvements in Electromagnetic Valves, of which the following is a specification.

This invention relates to electromagnetic valves.

In my copending applications, Serial Nos. 146,975 and 146,976, I have shown electromagnetically-opened self-closing valves operating on a temporary current, together with electromagnetically-retracted locking means for holding the valves open until another temporary current is sent through the unlocking-coil.

The object of the present invention is to improve on these constructions by reducing the number, size, and cost of the parts and by providing a more compact arrangement of the magnets and armature, as well as to obtain a reliable and positive action at all times.

The present invention is designed more particularly for use in connection with waste-valves for lavatories and as an improvement on the waste-valve of my application Serial No. 156,676; but I wish it understood that its use is not necessarily thus restricted and that it can be used as an electromagnetic valve in any connection.

The improved features and novel combinations of parts embodied in the invention are set forth in detail hereinafter and recited in the appended claims.

In the accompanying drawings, Figure 1 is a vertical section; Fig. 2, a horizontal section on line X X of Fig. 1; Fig. 3, a detail of the armature; Fig. 4, a vertical section showing a modification; Fig. 5, a section on line *y y* of Fig. 4, and Fig. 6 a top plan view of the water-pipe section.

Referring first to Figs. 1, 2, and 3, the numeral 1 designates a section of water-pipe, usually brass, which can be connected by the coupling 2 to the waste-valve-seat pipe-section 3 of a lavatory bowl or basin 4. The pipe-section 1 has a diametrically-disposed guide 5, having a central guide-opening 6. Located at quadrants' distances from the ends of the guide 5 are keyways or guideways 7, cut into the interior of the pipe-section 1 and extending longitudinally thereof from the upper end downward. Formed or otherwise secured on the interior of the pipe-section 1 and in alinement with the respective guideways 7 are locking-lugs 8. Slidable within and easily fitting the interior of the pipe-section 3 is a tubular or hollow iron armature 9, preferably copper-plated, to prevent rusting by the water. Screwed or secured into the armature at points corresponding to the guideways 7 are screws or pins 10, which are received in said guideways and adapted to move therein when the armature moves, thereby preventing any turning of the armature. Extending across the upper part of the tubular armature is a cross-piece 11, to the center of which is secured the lower end of a valve-stem 12 for the waste-valve 13, said stem being slidable in the opening 6 of the guide 5. Near the lower end of the armature and disposed diametrically thereof is a screw-bolt 14, fastened to the armature, on which are sleeves or bushings 15 and 16. The numerals 17 and 18 designate locking-arms carrying antifriction-rollers 19 in their bifurcated free ends and having eyes 20 of half their thickness through which the screw-bolt 14 loosely passes, said eyes being interposed between the inner ends of the sleeves 15 and 16. A leaf-spring 21, interposed between the arms 17 and 18 and having its ends entering said arms at 22, tends to throw the free ends of the arms apart and keep the rollers 19 bearing against the walls of the pipe-section 1 and allows the arms to move toward each other when drawn against the locking-lugs 8, and then to snap past said lugs and again engage the pipe above or below the locking-lugs, it being understood that the locking-lugs and the locking-arms are in alinement and kept so by the keyways 7 and screws 10. A portion of the pipe-section 1 is screw-threaded at 23, on which is screwed a head or washer 24. Above the washer 24 and on suitable insulating material 25 on the pipe-section 3 are wound two independent coils 26 and 27, separated and covered by insulating material 28. The coils are conveniently supported by the washer 24, and are preferably inclosed in a metallic shell 29. The respective coils 26 and 27 can be included in suitable circuits controlled by suitable switches, such as those set forth in certain applications which I have filed heretofore.

Assuming the valve to be closed and the parts in the position shown in Fig. 1, on sending a current through coil 27 the armature will be drawn upwardly until the cross-piece 11 strikes the guide 5, meanwhile snapping the locking-arms 17 and 18 past the locking-lugs 8, the rollers 19 then engaging the tops

of the locking-lugs, sustaining the armature where drawn and keeping the waste-valve open after cessation of the current. When a current is sent through coil 26, the armature is drawn downwardly until stopped by the engagement of screws 10 with the lower ends of the guideways, the locking-arms and rollers meanwhile snapping past the locking-lugs. The valve is closed by this action.

In the form assumed by the invention, as shown in Figs. 4, 5, and 6, the keyways 7 and screws 10 are dispensed with and an annular locking ridge or lug 30 is substituted for the locking-lugs 8. The annular locking-lug being provided it makes no difference whether the armature and locking-arms turn in the pipe-section, as a positive locking of the armature when in raised position is insured. The annular lug 30 limits the downward movement of the armature.

I wish it distinctly understood that the present invention is not necessarily a waste-valve, but also adapted for use as a valve for any purpose.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with independent electromagnets, of a slidable armature moved independently in opposite directions by said electromagnets, a valve operated by said armature and means for locking the armature.

2. The combination with independent electromagnets, of a gravitating armature operating in a general up-and-down direction under the independent attracting influences of said electromagnets, and means for locking automatically said armature in raised position.

3. The combination with independent electromagnets, of an armature moved independently in opposite directions by said electromagnets, and means for locking the armature comprising a stationary locking lug or projection and a yielding latch carried by the armature for engaging with said locking projection.

4. The combination with independent electromagnets, of an armature moved independently in opposite directions by said electromagnets, and means for locking the armature comprising a locking lug or projection, and a pivoted spring-actuated locking-arm for engaging with said locking projection.

5. The combination with a tube or pipe section having a locking-lug on the interior thereof, of independent solenoids on said tube or pipe section, an armature movable in opposite directions in said tube or pipe section under the influence of the respective solenoids, and a spring-actuated locking-arm on the armature adapted to engage the locking-lug.

6. The combination with a tube or pipe section having locking projecting portions at opposite sides of its interior, of independent solenoids on said tube or pipe section, an armature movable in opposite directions in said tube or pipe section, and pivoted spring-actuated locking-arms carried by the armature and adapted for engaging said locking projecting portions.

7. The combination with a fluid-pipe, of a valve controlling said pipe, independent solenoids around the pipe, an armature connected to the valve and movable in opposite directions in the fluid-pipe under the influence of the respective solenoids, and armature-locking mechanism interposed between the pipe and the armature.

8. The combination with a fluid-pipe, of a valve controlling said pipe, independent solenoids around the pipe, a gravitating armature connected to the valve and movable in opposite directions in the fluid-pipe under the influence of the respective solenoids, and locking mechanism for holding the armature in raised position to keep the valve open.

9. The combination with a valve, of independent electromagnets, a gravitating armature operating in a general up-and-down direction under the independent attracting influences of said electromagnets, and means for locking said armature in raised position to keep the valve open.

10. The combination with a fluid-pipe, of a valve controlling said pipe, independent solenoids around the pipe, an armature connected to the valve and movable in opposite directions in the fluid-pipe under the influence of the respective solenoids, armature-locking mechanism interposed between the pipe and the armature comprising projections on opposite sides of the interior of the pipe, and oppositely-spring-pressed arms carried by the armature and adapted to engage the projections aforesaid.

11. The combination with independent electromagnets, of a slidable armature moved independently in opposite directions by said electromagnets, a valve operated by said armature, and means for automatically locking the armature to hold the valve open when said armature is actuated by the valve-opening electromagnet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ISAAC G. WATERMAN.

Witnesses:
WALLACE R. SEAVEY,
ELMER SEAVEY.