No. 802,953. PATENTED OCT. 24, 1905.

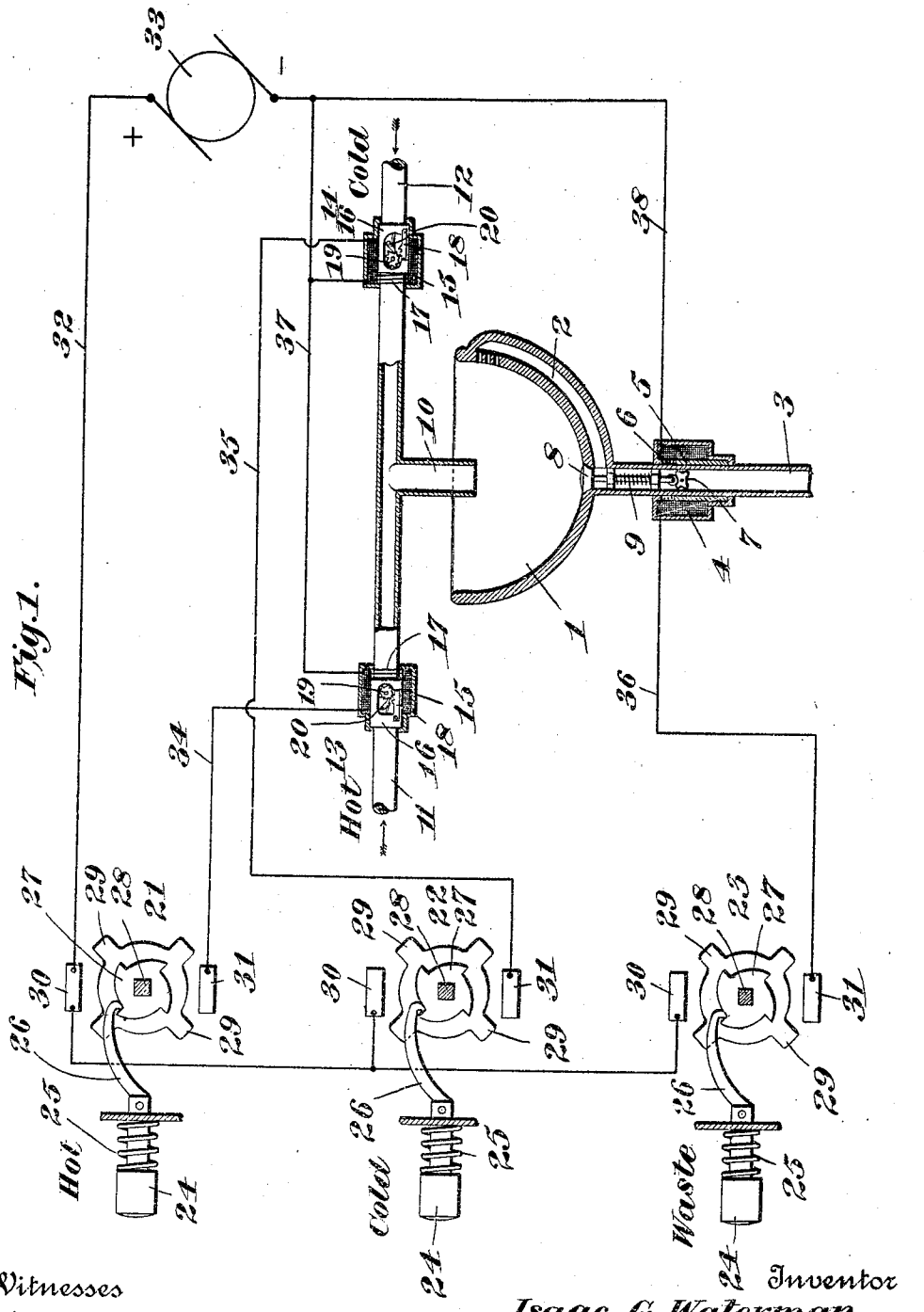
I. G. WATERMAN.

ELECTROMAGNETIC VALVE CONTROLLING SYSTEM.

APPLICATION FILED NOV. 19, 1903.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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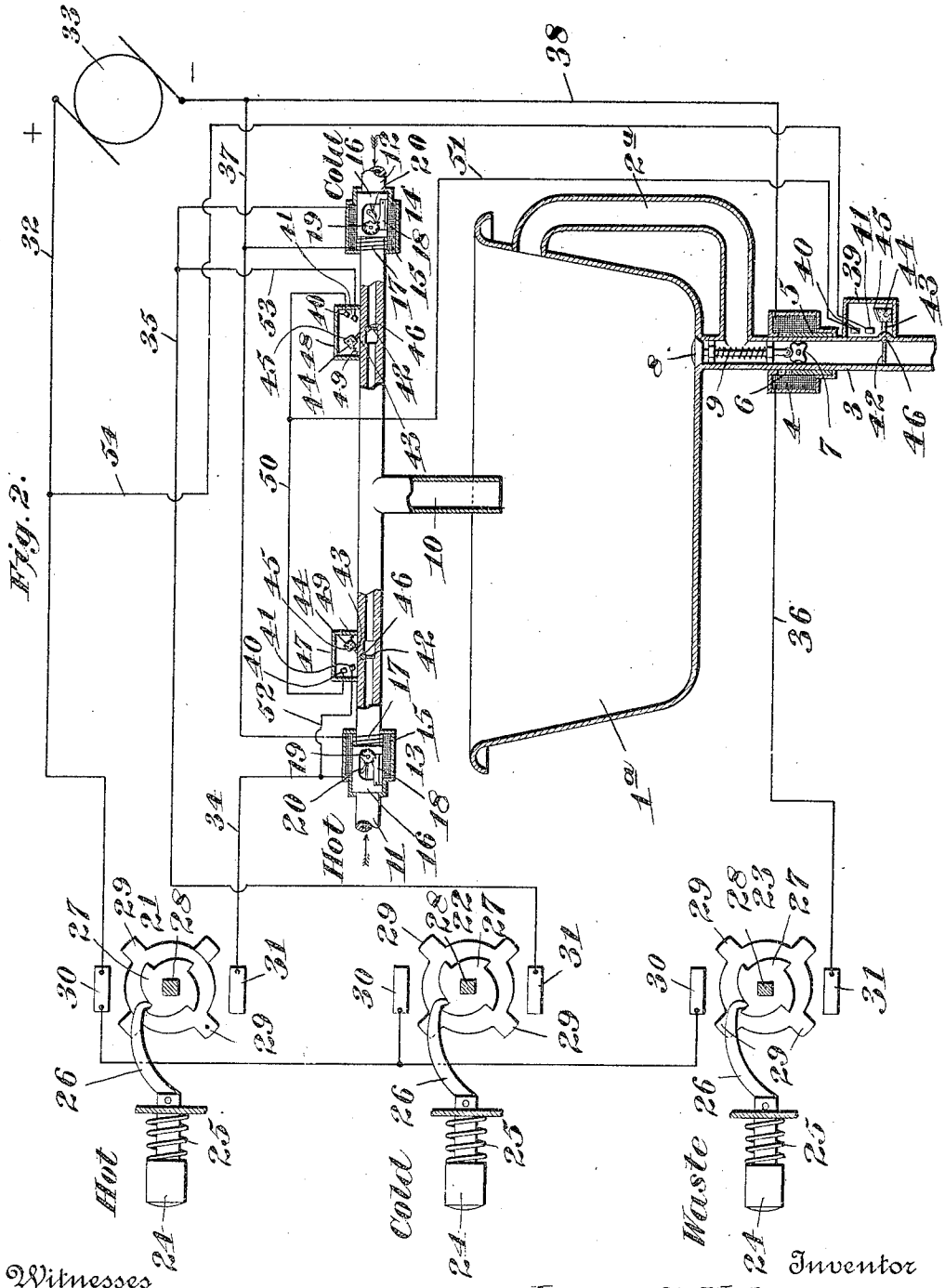
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APPLICATION FILED NOV. 19, 1903.

3 SHEETS—SHEET 2.

Fig. 2.



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ELECTROMAGNETIC VALVE CONTROLLING SYSTEM.

APPLICATION FILED NOV. 19, 1903.

3 SHEETS—SHEET 3.

Fig. 3.

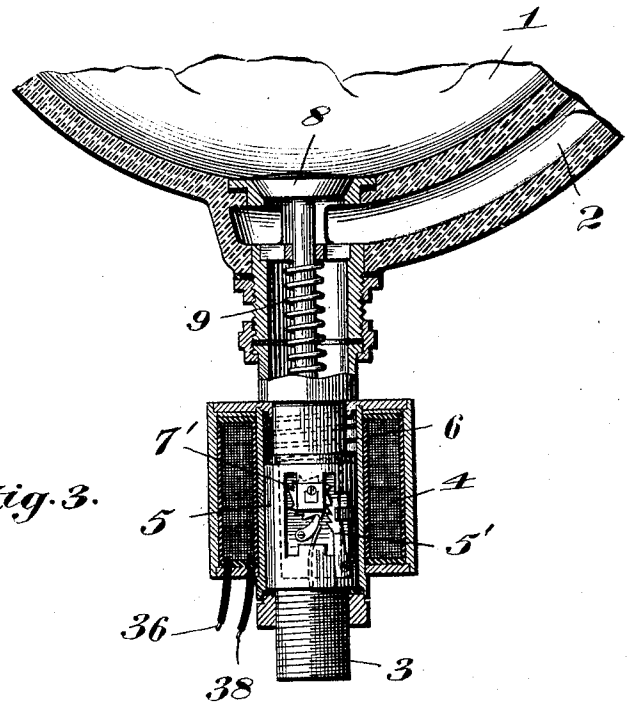
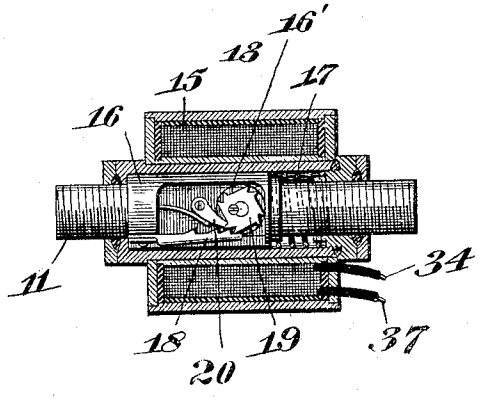


Fig. 4.



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ELECTROMAGNETIC VALVE-CONTROLLING SYSTEM.

No. 802,953. Specification of Letters Patent. Patented Oct. 24, 1905.

Application filed November 19, 1903. Serial No. 181,858.

To all whom it may concern:

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

This invention relates to electromagnetic valve-controlling systems.

In certain applications which I have heretofore filed disclosing electrical systems for the control of the flow of water to and from bath-tubs and lavatory-bowls electromagnetic valves are used employing two electromagnets or coils, one of which is adapted to attract an armature to open a valve and the other coil being used for closing the valve. In these systems temporary contact-switches have been used for controlling the different coils or magnets of the valves and electromagnetic means used to snap the switches to operate the valves on the rise of the fluid in the bath-tub or receptacle to a predetermined height in order to cut off the supply of fluid. Instances of these copending electromagnetic valve-controlling-system applications are Serial No. 156,672, filed May 11, 1903; Serial No. 163,133, filed June 25, 1903, and Serial No. 169,893, filed August 18, 1903.

In certain other applications which I have filed there are disclosed valves comprising a single electromagnet or coil adapted on alternate energizations by their action on an armature to open and close the valve in alternation. An instance of this type of valve is that disclosed in my application, Serial No. 171,215, filed August 29, 1903, while in my application, Serial No. 172,489, filed September 9, 1903, I have disclosed a waste-valve operated by a single magnet or coil and opened and closed on alternate energizations of said magnet or coil.

The object of the present invention is the provision of an electromagnetic valve-controlling system adapted especially for the use of valves which I have previously invented, the general type of which is a single magnet or coil, and an armature coacting with the valve to open or close the valve on alternate energizations of the coil, such as set forth in my application, Serial No. 171,215, above referred to, and also adapted for the operation of a single-magnet waste-valve, such as set forth in my application Serial No. 172,489 or others of that general type.

Another object of the invention is to dispense with electrically-operated means for throwing the switches to close the supply-valves and to provide a simple contact device and circuit connection whereby when the water in the bath-tub or lavatory-bowl reaches a predetermined height a contact will be operated by the overflow to close the supply to the valve or valves which have been opened, and with this end in view my object is to provide a second contact device operated by the flow of the water to so adapt the circuits after either supply-valve has been opened that the contact operated by the overflow will be enabled to perform its function of closing the valves at the proper time.

Having the foregoing objects in view, the invention consists in certain novel features set forth fully hereinafter, and recited in the appended claims.

In the accompanying drawings, Figure 1 is a diagrammatic view of the system as adapted for the opening and closing of the supply and waste valves by the hand manipulation of the switches. Fig. 2 is a similar view illustrating the circuit arrangements and contact devices for automatically closing the supply valve or valves when the water reaches a predetermined position; Fig. 3, a detail of the waste-valve, and Fig. 4 a detail of one of the supply-valves.

Referring first to Fig. 1, a lavatory bowl or basin is shown at 1, having the overflow conduit or pipe 2 and the waste-pipe 3. Surrounding the waste-pipe is a solenoid 4, and slidable on the waste-pipe is a tubular armature 5, normally pressed downwardly by a spring 6. This armature has a pawl 5′ cooperating with a ratchet-wheel 7′, secured to a cam 7, which operates with the stem of a waste-valve 8, which has a spring 9, tending to keep the valve normally closed. Said spring also keeps the valve-stem pressed down on the cam 7. This form of waste-valve is shown and claimed in my copending application, Serial No. 172,489, filed September 9, 1903, and appears in detail in Fig. 3. The supply-pipe for the lavatory-bowl 1 is shown at 10, to which the hot and cold water supply pipes 11 and 12 lead. The hot and cold water valves are shown at 13 and 14 and are duplicates. Each valve consists of a single solenoid 15, surrounding the pipe, an armature 16, slidable on the pipe and urged in one direction by a spring 17, a pawl 18, carried by the armature and coöperating with the

ratchet-wheel 19 on the turning plug-valve 16', which is employed, and a pawl or dog 20 to engage the ratchet-wheel and prevent backward turning thereof. This form of valve is shown and claimed in my copending application, Serial No. 171,215, filed August 29, 1903, and appears in detail in Fig. 4. The valves 13 and 14 and the waste-valve are all adapted to operate on a temporary current and open and close on alternate energizations of the single magnet or coil used in each instance. In other words, assuming that the valve is closed, when the coil is electrically energized the armature is retracted against the action of the spring and the valve is opened. In the valves 13 and 14 the valve remains open, because it has no self-closing means. In the waste-valve the valve remains open on account of the coöperation of the cam with the valve. In each instance after the current has ceased the spring returns the armature to normal position and the pawl carried by the armature acts in an idle manner and does not affect the valve. When the coil is again energized, the valve is closed. With the valves 13 and 14 the closing is accomplished by the turning of the plug-valve a one-quarter revolution. In the waste-valve the spring on the valve-stem snaps the valve closed. In this connection I wish it to be understood that the specific forms of valves shown and described are not the only ones which are adaptable for use in the system shown in Fig. 1 or that shown in Fig. 2 of the present application, as other valves employing a single magnet could be used, if preferred. The switches 21, 22, and 23 are of the general type disclosed in a series of applications filed by me, an instance of which is found in the switch set forth in my application, Serial No. 172,490, filed September 9, 1903. These switches employ a push-button 24, pressed by a spring 25 and carrying a pawl 26, adapted to engage a four-toothed cam 27 on the same rotary shaft 28 with a four-armed metal contact 29. The arrangement and operation are such that when the push-button is pressed in the pawl 26 engages a tooth on the ratchet-wheel 27, and on releasing the push-button the spring 25 snaps the diametrically opposite projections on the contact 29 first on and then off the stationary switch-contacts 30 and 31, turning the contact 29 a one-quarter revolution. On the next operation of the switch the other pair of projections on the contact 29 are snapped first on and then off their contacts. The contact-points 30 are all in the feeder-circuit 32, leading to generator 33. The contact 31 of switch 21 is in circuit via the circuit 34 with the coil of the valve 13. The contact-point 31 of the switch 22 is in circuit via circuit 35 with the coil of the valve 14, and the contact-point of the switch 23 is in circuit via the circuit 36 with the waste-valve magnet-coil 4. The coils of valves 13 and 14 have a return-circuit 37, and the waste-valve coil has a return-circuit 38. On operating the switch 21 the valve 13 is turned on to supply the water and remains turned on until the said switch is again operated, whereupon said valve is turned off. Similar operations of the switch 22 turns valve 14 on or off. Alternate manipulations of the switch 23 open and close the waste-valve.

Referring now to Fig. 2, I have here shown the system of Fig. 1 with the addition of means for automatically closing the hot or cold water supply valves 13 or 14, according as either or both of them are open, when the water in the bath-tub 1^a assumes a predetermined height and begins to overflow. The bath-tub has an overflow 2^a, corresponding to the overflow 2 of the lavatory-bowl 1 of Fig. 1. The valves 13 and 14 and the waste-valve are of the same construction as shown in Fig. 1, and so also are the switches 21, 22, and 23, and the circuit arrangements are the same, with the addition of the automatic devices and circuit connection. On the waste-pipe 3 I provide a box or casing 39, having insulated metal contacts 40 and 41. The numeral 42 designates a gate located in the waste-pipe 3 transversely thereof and provided with a stem 43, carrying an insulated block 44, provided with a contact-strip 45. The gate and stem are pivoted to the waste-pipe at 46. This construction is substantially the same as that shown in my copending application, Serial No. 169,893, filed August 18, 1903. When the water reaches a predetermined height in the bath-tub 1^a and overflows into the pipe 2^a and thence to the waste-pipe 3, it pushes the gate 42 downward and throws the stem 43 upward, causing the contact-strip 45 to bridge the contacts 40 and 41, and this condition continues until the flow of water has ceased, whereupon the weight of the block 44 causes the gate and stem to assume the position shown in Fig. 2. The return of the parts to the normal position (shown in Fig. 2) can be supplemented by the use of a spring. On the pipes 11 and 12 I provide contact devices 47 and 48, which are similar in construction and operation to the contact device on the waste-pipe just described, and in these contact devices 47 and 48 retracting-springs 49 are preferably employed, which are stretched when the gates are pushed aside by the weight of the water on the opening of the respective valves 13 and 14. One contact of each of the devices 47 and 48 is connected with the similar contact by a circuit 50, which is connected by circuit 51 to the contact 40. The other contact of these devices 47 and 48 is in the first instance connected by a circuit 52 to the circuit 34 and in the second instance by a circuit 53 to the circuit 35. The contact 41 is fed from circuit 32 by a circuit 54.

The system shown in Fig. 2 is operated in the same manner as that shown in Fig. 1 to

open or close either of the supply or the waste valves by hand manipulation of the respective switches. When, however, either of the valves 13 or 14 is opened, the water flowing through the pipe pushes aside the gate and causes the contacts in either of the devices 47 or 48, or both, if both valves are open, to be bridged, thus making provision for a branch circuit through the coils of valves 13 or 14, as the case may be, via the circuit 51, and this circuit is maintained ready for use as long as the water is permitted to flow. Consequently when the water in the bath-tub 1^a reaches the level at which it will pass down the overflow-pipe 2^a, or if the waste-valve is open, so that the water drains out through the waste-pipe 3, the outflowing water will press the gate 42 down and cause the contact-strip 45 to bridge the contacts 40 and 41, whereupon the circuit 54 feeds the current into circuit 51, thence through circuit 50 and through either or both the circuits 52 and 53, through either or both of the valve-coils, and back to the generator 33 via the circuit 37, energizing either or both coils of the valves 13 or 14 and closing either or both of said valves according as either or both were previously open. It will be understood that the current has access to the branches 52 or 53 only when the valve is open, and consequently a valve which was previously closed would not be opened. Provision is thus made for maintaining the water in the bath-tub and automatically cutting off the supply and also to cut off the supply if the waste-valve should be open, so that the water could not run and waste.

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

1. The combination with a valve, of a single electromagnet coöperating with the valve to alternately open and close the valve on successive electrical energizations of said electromagnet, circuit connections to said electromagnet, and a snap-switch controlling said circuit connections and comprising a switch-contact and a movable snap-contact adapted, when actuated, to pass on and then off the switch-contact and thereby only temporarily or momentarily energize the circuit connections and send only a temporary or momentary current through the single electromagnet and whereby the valve is alternately opened and closed on alternate operations of the snap-contact of the switch.

2. The combination with a valve, of a single electromagnet coöperating with the valve to alternately open and close the valve on successive electrical energizations of said electromagnet, circuit connections to said electromagnet, and a snap-switch controlling the circuit connections which is adapted, on being operated, to temporarily or momentarily energize the circuit connections aforesaid and send a temporary or momentary current through the single electromagnet to thereby open and close the valve on alternate operation of said switch.

3. In an electromagnetic valve-controlling system, the combination with a receptacle, of a valve controlling the supply of fluid to the receptacle comprising an armature for alternately opening and closing the valve, a single electromagnet adapted on alternate energizations to actuate the armature to alternately open and close the valve, a valve controlling the waste or flow from the receptacle comprising an armature for opening and closing the valve, and a single electromagnet adapted on alternate energizations to actuate the armature and alternately open and close the waste-valve, and means for electrically energizing the respective electromagnets aforesaid.

4. In an electromagnetic valve-controlling system, the combination with a receptacle, of hot and cold water supply-pipes for feeding water to the receptacle, independent valves controlling said hot and cold water pipes, and armatures for the respective valves adapted for opening and closing the valves independently, electromagnets for independently actuating the armatures, each armature being adapted on alternate energizations of its electromagnet to alternately open and close its valve, a waste-valve for controlling the flow from the receptacle comprising an armature for opening and closing said waste-valve, and a single electromagnet adapted on alternate energizations to actuate the armature and alternately open and close the waste-valve, and means for electrically energizing the respective supply-valves and the waste-valve.

5. In an electromagnetic valve-controlling system, the combination with a receptacle, of an electrically-operated supply-valve for said receptacle, means actuated by the fluid when at a predetermined height in the receptacle having circuit connections to the supply-valve to effect closing thereof, and an electrical contact device automatically actuated by the action of the fluid upon the operation of said supply-valve, controlling said circuit connections and opening said circuit connections after closing of the supply-valve.

6. In an electromagnetic valve-controlling system, the combination with a receptacle, of independent electrically-operated supply-valves controlling the flow of separate fluids to the receptacle, an electrical contact device operated when the flow in the receptacle reaches a predetermined position and having circuit connections with the receptacle-supply valves to effect closing thereof, and independent electrical contact devices automatically operated by the action of the fluid upon the opening of the respective supply-valves, con-

trolling said circuit connections and opening said circuit connections if not previously opened.

7. In an electromagnetic valve-controlling system, the combination with a receptacle, of an electrically-operated supply-valve controlling the supply to said receptacle, a fluid-operated electrical contact which is closed when the supply-valve is opened and opened when the supply-valve is closed, and a fluid-operated electrical contact which is actuated to close the contacts thereof when the fluid in the receptacle reaches a predetermined position, said last-named fluid-operated electrical contact having circuit connections with the electrically-operated valve, said circuit connections being controlled by the fluid-operated electrical contact first named, whereby when the supply-valve is opened and the fluid reaches a predetermined height in the receptacle the supply-valve will be automatically closed.

8. The combination with a valve, of a single solenoid, a sliding core or armature controlled by said solenoid and adapted to be drawn thereto for operating the valve, a spring coacting with the armature, circuit connections to said solenoid, and a snap-switch controlling the circuit connections which is adapted, on being operated, to temporarily or momentarily energize the circuit connections and send a momentary or temporary current through the solenoid, said solenoid on alternate energizations thereof, operating the armature to alternately open and close the valve on alternate operations of said switch.

9. In an electromagnetic valve-controlling system, the combination with a receptacle, of a valve controlling the supply of fluid to the receptacle comprising an armature for alternately opening or closing the valve, a single electromagnet adapted on alternate energizations to actuate the armature to alternately open and close the valve, a valve controlling the waste or flow from the receptacle comprising an armature for opening and closing the valve, a single electromagnet adapted on alternate energizations to actuate the armature and alternately open and close the waste-valve, independent circuit connections to the electromagnets of the supply and waste valves, snap-switches independently controlling the independent circuit connections aforesaid which are adapted, on being operated, to temporarily or momentarily energize the respective circuit connections and send a momentary or temporary current through the respective electromagnets, whereby the supply and waste valves may be operated independently.

10. In an electromagnetic valve-controlling system, the combination with a receptacle, of an electrically-operated supply-valve controlling the supply to said receptacle, a fluid-operated electrical contact which is closed when the supply-valve is opened and opened when the supply-valve is closed, a fluid-operated electrical contact which is actuated to close the contacts thereof when the fluid in the receptacle reaches a predetermined position, said last-named fluid-operated electrical contact having circuit connections with the electrically-operated valve, said circuit connections being controlled by the fluid-operated electrical contact first named, whereby when the supply-valve is opened and the fluid reaches a predetermined height in the receptacle, the supply-valve will be automatically closed, independent circuit connections for the supply and waste valves aforesaid, and independent switch mechanisms independently controlling said circuit connections, whereby the supply and waste valves may be operated independently of each other and independently of the automatic closing of the supply-valve.

11. In an electromagnetic valve-controlling system, the combination with a receptacle, of independent electrically-operated supply-valves controlling the flow of separate fluids to the receptacle, independent electrical contact devices automatically operated upon the opening of the respective supply-valves, an electrical contact device operated when the fluid in the receptacle reaches a predetermined position and having circuit connections with the receptacle-supply valves to effect closing thereof, said circuit connections to the respective supply-valves being independently controlled by the independent electrically-automatic contact devices aforesaid, said fluid-operated electrical contact devices being adapted to cause closing of either supply-valve if previously opened, and the independent automatic electrical contact devices opening the circuit connections after such automatic closing of respective valves, said independent electrical automatic contact devices preventing operation of their respective valves automatically except when said valves have been previously opened, circuit connections to the respective valves whereby they are capable of operation independently of each other and independently of the action of the automatic closing devices aforesaid, and independent switch mechanisms controlling said circuit connections.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

ISAAC G. WATERMAN.

Witnesses:
ELMER SEAVEY,
WALLACE R. SEAVEY.