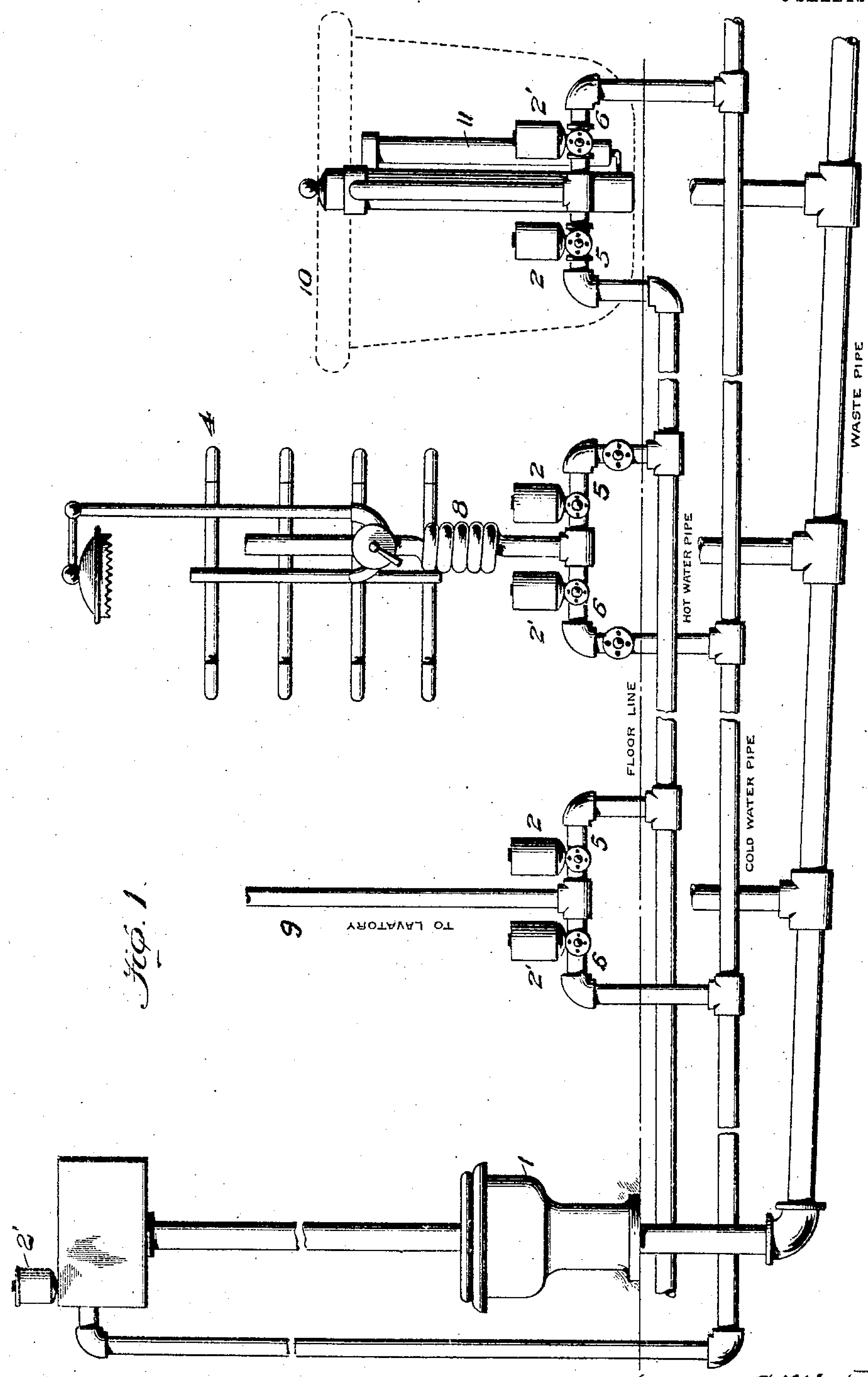
No. 775,021. PATENTED NOV. 15, 1904.

I. G. WATERMAN.

ELECTRICAL VALVE CONTROLLING MECHANISM.

APPLICATION FILED JUNE 24, 1902. RENEWED NOV. 27, 1903.

NO MODEL. 3 SHEETS—SHEET 1.



Witnesses

[signatures]

Isaac G. Waterman
Inventor

By his Attorney
Henry N. Copp

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

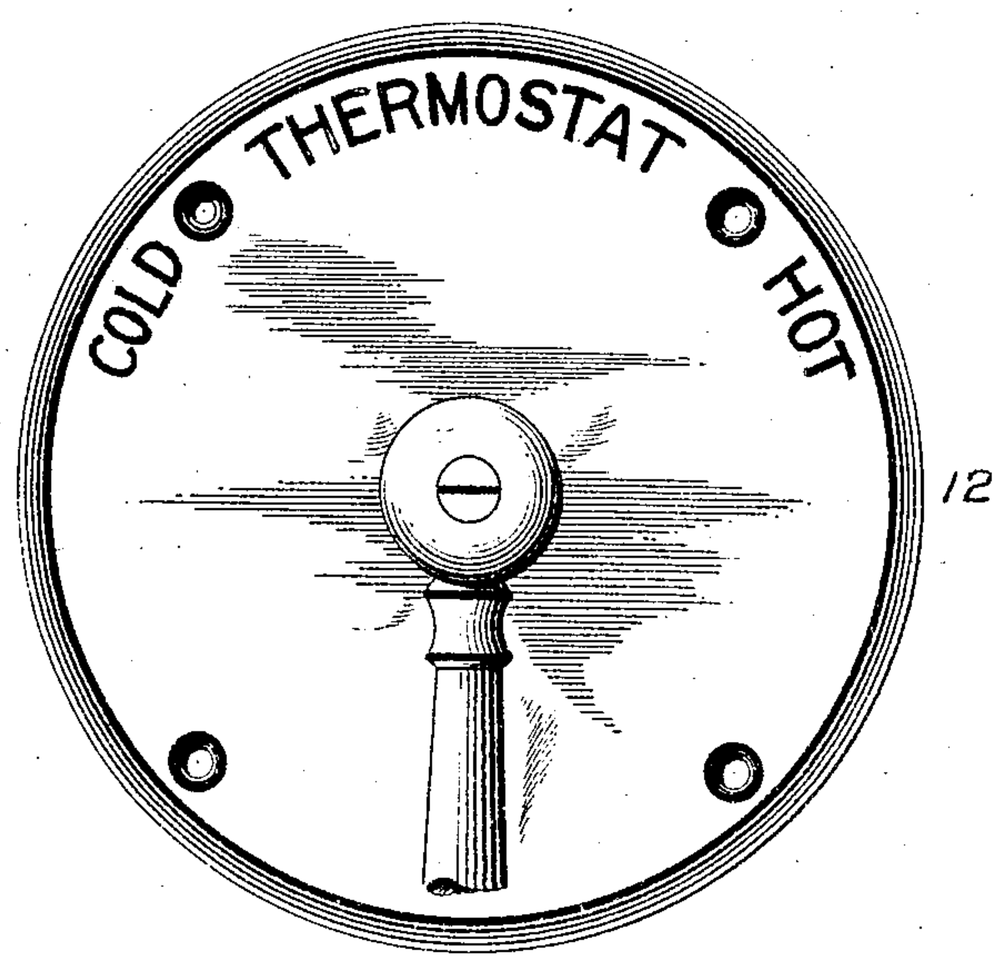
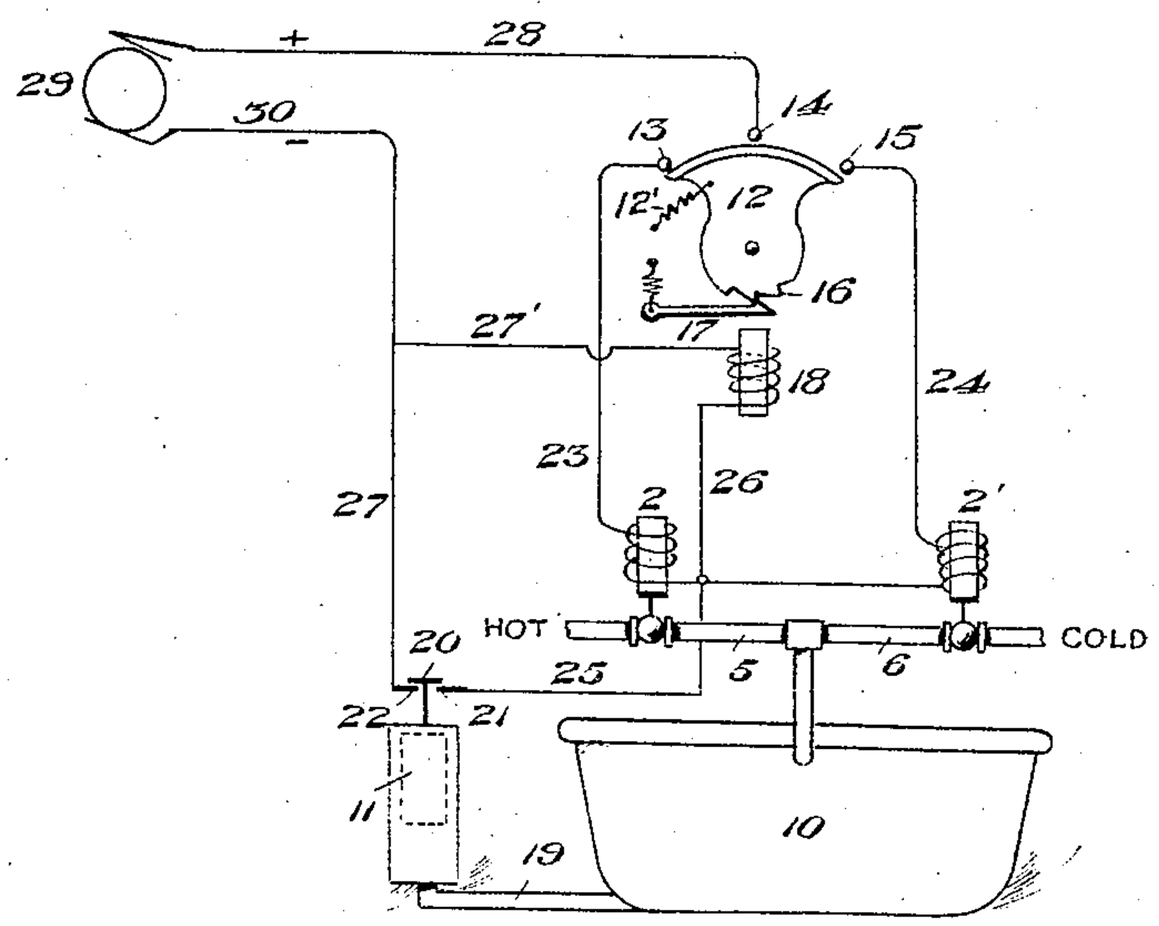


Fig. 3.



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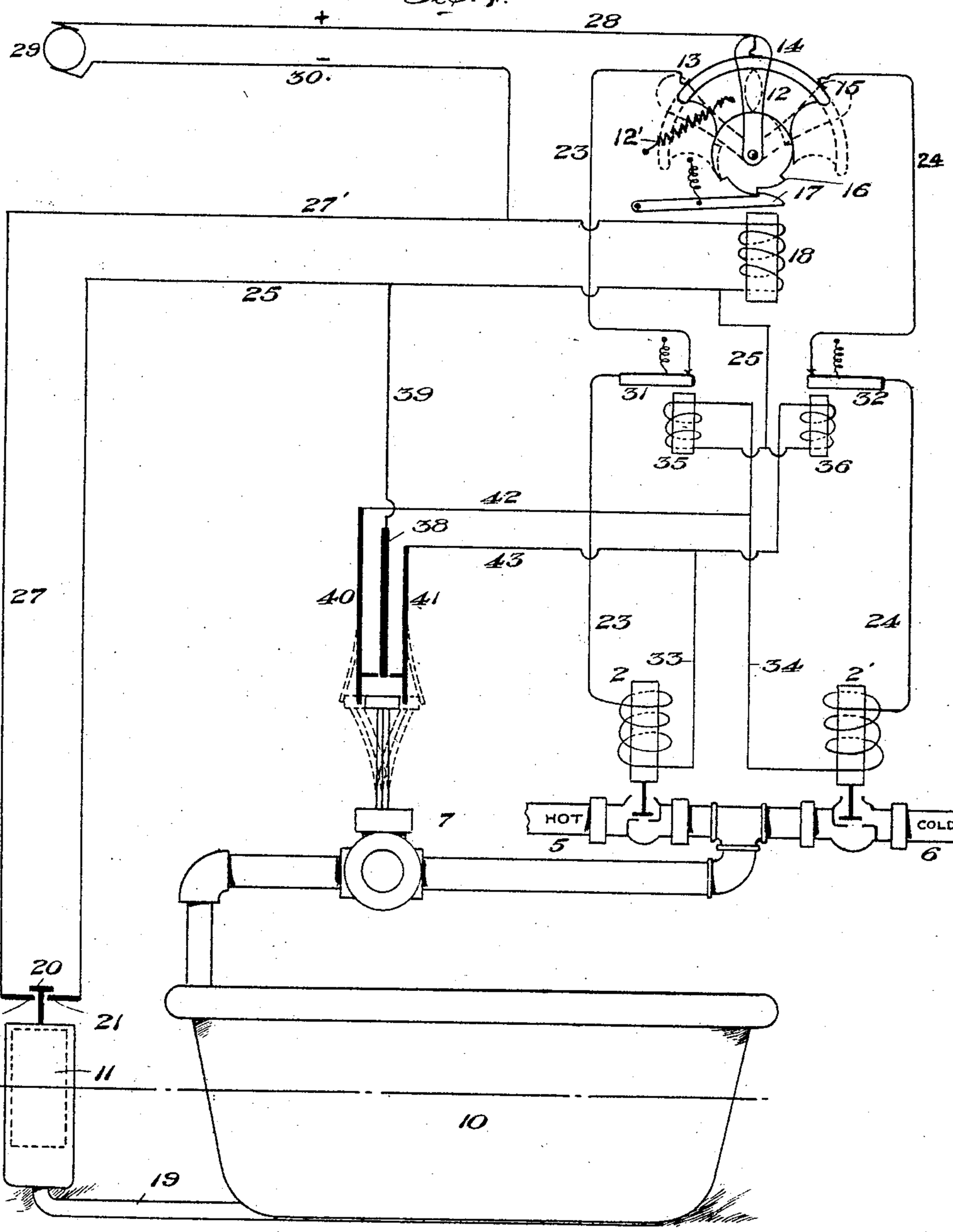
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.



Witnesses

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No. 775,021. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

ISAAC G. WATERMAN, OF SANTA BARBARA, CALIFORNIA.

ELECTRICAL-VALVE-CONTROLLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 775,021, dated November 15, 1904.

Application filed June 24, 1902. Renewed November 27, 1903. Serial No. 182,908. (No model.)

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 certain new and useful Improvements in Electrical-Valve-Controlling Mechanism, of which the following is a specification.

This invention relates to electrical-valve-controlling mechanism.

The object of the invention is the provision of certain improvements in the inventions set forth in my United States Patents No. 682,006, dated September 3, 1901, and No. 724,527, dated April 7, 1903.

In the present invention my object is to provide an improved and novel electromagnetic system whereby either hot or cold water, or both, can be supplied to a lavatory, bath-tub, shower-bath, or bowl in such quantities and at such a temperature as may be desired by the use of a switch or electric button, which may be located near the place of supply or in any other preferred position. In the use of the invention for supplying water to a bath-tub the switch can be positioned not only in the bath-room, but an additional switch may be employed adjacent to the bedside, so that the bath can be made ready by operating the switch without necessitating rising.

In the use of the present invention, especially in connection with the bath and lavatory, I provide a thermostatic device which is adapted to automatically control the circuits and electromagnetic-valve mechanism to insure a temperature of the water satisfactory to the user.

Another object is to provide novel means for automatically cutting off the water-supply when the water has reached a predetermined level in the lavatory or bath-tub.

The present invention is adapted especially for the utilization of certain improved electromagnets, electromagnetically-controlled valves, and automatic electric switch constituting the subject-matter of copending applications filed of even date herewith.

The invention is set forth in detail hereinafter and the novel features are recited in the appended claims.

In the accompanying drawings, Figure 1 is a view illustrating the system of piping and my apparatus; Fig. 2, a detail of the face-plate of the switch; Fig. 3, a diagram of the electric circuits when the thermostat is not used, and Fig. 4 a diagram of the electric circuits when the thermostat is employed.

Referring more particularly to Fig. 1, the bowl 1 will have its flow controlled by an electromagnetically-opened self-closing valve 2′ in a simple battery-circuit opened and closed by a push-button conveniently positioned. The shower-bath 4 is provided with electromagnetically-opened and self-closing valves 2 and 2′, controlling the hot-water supply through a pipe 5, and the cold-water supply through the pipe 6, for controlling both the hot and cold water valves 2 and 2′ to insure supply of the water at the desired temperature without attention, and I find it desirable to employ a mixer 8—in the present instance a coil of pipe—to insure proper mixing of the hot and cold water. The pipe 9, leading to the lavatory and bath-tub 10, each have hot and cold water electromagnetically-opened self-closing valves 2 and 2′ and may be provided with a thermostat 7, as shown in Fig. 4, for controlling both the hot and cold water valves to insure supply of the water at the desired temperature without attention. In connection with the lavatory and bath-tub I also employ a float 11, as shown in Figs. 3 and 4, which is adapted to open the electric circuits when the water has reached a predetermined level in the lavatory or bath-tub, and thereby allow the valves 2 and 2′ to close and cut off the supply. To open the electromagnetic valves 2 and 2′, a self-opening switch 12, as shown in Figs. 3 and 4, is used, whereby either the hot or cold water valve can be opened or both opened simultaneously. The float 11 is designed to release the switch when the water has reached the predetermined level in the bath-tub or lavatory, and thus allow the valves 2 and 2′ to close and shut off the water-supply. The switches 12 are located conveniently in the bath-room, and an additional switch may be positioned adjacent the bedside, if desired, so that the bath can be made ready without necessitating rising.

In Figs. 3 and 4 the electrical circuits and different apparatus are shown diagrammatically. Referring first to Fig. 3, the switch 12 has three contacts 13, 14, and 15, and the switch is adapted to bridge either 13 and 14, 14 and 15, or 13, 14, and 15, and to hold it where adjusted it is provided with teeth 16, adapted to be engaged by a spring-actuated armature 17. The numeral 18 designates a releasing-electromagnet, which when energized attracts the armature 17. The float 11, which is connected by pipe 19 to the bath-tub or lavatory, has a contact-head 20, adapted to make electrical contact with the points 21 and 22 at all times except when the water has risen to the predetermined level, whereupon the rise of the float will disengage the head from the points 21 and 22. The electromagnets 2 and 2′, one of which controls the supply of hot water through the pipe 5 and the other the supply of cold water through pipe 6, are respectively included in the branches 23 and 24, leading to the contacts 13 and 15, and have a common branch 25 leading to contact-point 21, to which the branch 26 of electromagnet 18 also connects. The branches 27′ and 27 of electromagnet 18 lead direct to the contact-point 22. The feeder 28 runs to the middle contact 14 from a suitable electric generator 29 and the return-feeder 30 from branch 27 to the generator. If the switch 12 be made to bridge contacts 13 and 14, it will be locked by armature 17, and a current will flow from generator 29 through feeder 28 and the switch 12 and the electromagnet 2, thence by branch 25 through the normally bridged contacts 21 and 22 and branch 27 and return 30 to the generator, whereupon the valve of magnet 2 will be opened, allowing hot water to flow to the bath-tub, (or lavatory.) The magnet 18 will receive no appreciable portion of the current on account of the relatively high resistance of its circuit as compared to branches 25 and 27. The hot water will continue flowing until the switch is opened by hand or the rise of the water to the predetermined height causes the contact 20 on float 11 to break contact with the contacts 21 and 22, whereupon the current will have to find its outlet via branch 26 and magnet-coil 18 to branch 27′ and return-feeder 30 and will thereupon energize magnet 18, causing the attraction of armature 17 and the release of switch 12, whose retracting-spring 12′ will then return it to normal open position, thus breaking the current and allowing the valve 2 to reseat itself. Similarly, when the switch is turned to bridge the contacts 14 and 15 it will be locked by the armature 17, and the current will then enter at 14, pass to 15, and then to cold-water magnet 2′ via branch 24, causing opening of the cold-water valve, and via the branch 25 and contacts 21, 20, and 22 through branch 27 to return 30, and the valve 2′ will remain open until the switch is opened by hand or the rise of water causes a break at the contacts 20, 21, and 22, whereupon the current will return via the magnet 18, as before, and cause a release of the switch, which will then automatically open. When the switch is made to bridge contacts 13, 14, and 15 simultaneously, it will be held by the armature 17, as before, and the current entering at 14 will divide, passing through both magnets 2 and 2′ and opening both hot and cold water valves. The water will flow until the switch is turned back by hand or the break of the contacts 20, 21, and 22, by the rise of the float and consequent energization of magnet 18, release and return of the switch, and closing of both valves.

Referring now to Fig. 4, in the branches 23 and 24 I include the armatures 31 and 32, which keep the branches normally closed. In the return circuits or branches 33 and 34, which lead to the common return 25, are included the electromagnets 35 and 36 for the armatures 31 and 32, respectively. The numeral 7 designates a thermostat whose action is governed by the temperature of the water flowing through the feed-pipe to the bath-tub. This thermostat may consist of a bar of metals of different coefficients of expansion. The center contact 38 connects by a branch 39 to the branch 25, and the spring-contacts 40 and 41 are adapted to normally make contact with contact 38. The contact 40 is connected via branch 42 to return branch 34, and the contact 41 is connected via branch 43 to return branch 33. If hot water is desired, the switch 12 will be turned so that it will bridge the contacts 13 and 14, whereupon the current will flow through branch 23, the normally closed armature-contacts of armature 31, through said armature and through the hot-water magnet 2, opening the hot-water valve, thence returning via branches 33 and 43, contacts 41 and 38, branches 39 and 25, contacts 21, 20, and 22, and back to the generator. The switch 12 will be held on 13 and 14 by the armature 17. The switch can be opened by hand to cause closing of the valve, or when the water has reached the predetermined height the opening of the contacts 20, 21, and 22 will necessitate return of the current through the magnets 36 and 18, and magnet 18 will attract armature 17 and release the switch, which will thereupon automatically return to open position. When the switch is made to bridge contacts 14 and 15, the current passes through the armature 32, branch 24, cold-water magnet 2′, opening the cold-water valve, thence through branches 34 and 42, contacts 40 and 38, and through the float-contacts 20, 21, and 22 back to the generator. The valve of magnet 2′ will be released to close itself whenever the switch is opened by hand or the contact broken by the rise of the float, and the return will then be through magnets 35 and 18, which latter will cause the release of the switch. When the

switch is made to bridge contacts 13, 14, and 15 at the same time, both valves 2 and 2′ will be opened; but if the temperature of the water becomes too high the thermostat will bend and push contact 40 away from contact 38, whereupon the current from the cold-water magnet 2′ will have to find its return through magnet 35, which thereupon becomes energized, attracting armature 31 and breaking the supply-circuit 23 of the hot-water magnet 2, and the valve of the latter will then close automatically, thus cutting off the supply of hot water until the drop in temperature causes the thermostat to return to normal position and restore the shorter circuit through contacts 40 and 38. The magnet 35 being then deënergized, the armature 31 restores the circuit 23 and the magnet 2 again becomes energized and its valve is opened. When the temperature of the water becomes too low, the thermostat will break the contact between 41 and 38, whereupon the return-circuit 33 will be made through magnet 36, which then becomes energized, attracting armature 32 and breaking the supply-circuit 24. The cold-water magnet 2′ becoming deënergized its valve will close, cutting off the cold-water supply until the temperature of the water has risen to the proper point and the thermostat again allowed the contacts 41 and 38 to touch, whereupon the return is made through the shorter circuit and the magnet 36 deënergized, thus restoring the supply-circuit 24 and opening the cold-water valve of magnet 2′. When the water has reached the predetermined height, the breaking of the contacts 20, 21, and 22 will cause the return-circuit to be made through magnet 18 and the switch released and opened and valves 2 and 2′ closed in consequence.

I am aware that the present invention could be varied in several ways without essentially changing the mode of operation of the thermostat, magnets, float, switch, and other features, and I do therefore lay claim to all modifications falling within the spirit and scope of the invention.

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

1. The combination with an electric circuit, of a switch controlling said circuit, means for automatically breaking the circuit, and electromagnetically-released means for locking the switch which is included in a branch or shunt circuit and normally deënergized and energized on the breaking of the main circuit by the automatic means aforesaid.

2. The combination with a main or feeder circuit and a main return-circuit, of a float controlling the main return-circuit, electromagnetically-operated valves each in a branch circuit and in circuit with the return-circuit aforesaid, a switch controlling the current supplied to the branch circuits of the electromagnets of the valves, means for locking the switch, and an electromagnet for releasing said locking means which is in a shunt or branch circuit and normally deënergized and energized on the breaking of the main return-circuit by the float.

3. The combination with a main or feeder circuit and a main return-circuit, of a float normally closing the main return-circuit, branch circuits leading from the return-circuit to separate contacts of the switch, electromagnetically-operated valves in the respective branch circuits, an automatically-opening switch adapted for connecting either or both branch circuits to the feeder-circuit, means for locking the switch when contacting with any of its contacts aforesaid, and an electromagnet for releasing said locking means which is included in a shunt or branch circuit and normally deënergized and energized on the breaking of the main return-circuit by the float.

4. The combination with a main or feeder circuit, of branch circuits, a return-circuit, armatures normally closing the branch circuits, branch circuits including electromagnets for opening the armature-contacts, and a thermostat controlling the branch circuits last named.

5. The combination with a main or feeder circuit, of branch circuits, a return-circuit, armatures normally closing the branch circuits, contacts for connecting the respective branch circuits to the return-circuit, additional circuits forming shunts on the return-circuit, electromagnets in said shunt-circuits adapted for opening the respective armature-contacts, and a thermostat for separating the contacts from the return-circuit.

6. The combination with an electrical supply-circuit of an electromagnetically-operated valve in circuit with said supply-circuit, a receptacle whose fluid-supply is controlled by the electromagnetically-operated valve, an electromagnetically-operated device in another circuit, said device controlling the circuit of the electromagnetically-operated valve, and means operated when the fluid is at a predetermined position which controls the circuit of the electromagnetically-operated device, whereby said device in turn controls the circuit of the electromagnetically-operated valve.

7. The combination with an electrical supply-circuit of an electromagnetically-operated valve in circuit with said supply-circuit, a receptacle whose fluid-supply is controlled by the electromagnetically-operated valve, a switch controlling the circuit of the electromagnetically-operated valve, an electromagnetically-operated device in another circuit, said device being adapted for causing the operation of the switch, and means operated by the fluid in the receptacle adapted to control the circuit of the electromagnetically-operated device, whereby the electromagnetically-operated device is operated at a predetermined time

to cause the operation of the switch controlling the electromagnetically-operated valve.

8. The combination with an electrical supply-circuit, of an electromagnetically-operated valve in circuit with said supply-circuit, a receptacle whose fluid-supply is controlled by the electromagnetically-operated valve, an electromagnetically-operated device in a shunt-circuit, said device controlling the circuit of the electromagnetically-operated valve, and means operated when the fluid is at a predetermined position which controls the circuit of the electromagnetically-operated device, whereby said device in turn controls the circuit of the electromagnetically-operated valve.

9. The combination with an electrical supply-circuit, of a switch controlling said circuit, an electromagnetically-operated valve in said supply-circuit and controlled by said switch, a receptacle whose fluid-supply is controlled by the electromagnetically-operated valve, an electromagnetically-operated device for causing the operation of the switch, a shunt-circuit embracing said electromagnetically-operated device, and means for causing the operation of said electromagnetically-operated device when the fluid in the receptacle reaches a predetermined position.

10. The combination with an electrical supply-circuit, of an electromagnetically-operated valve controlled by said supply-circuit, a receptacle whose fluid-supply is controlled by the electromagnetically-operated valve, an electromagnetically-operated device controlling the circuit of the electromagnetically-operated valve, a shunt-circuit embracing said electromagnetically-operated device, and means controlled by the position of the fluid in the receptacle which keeps said shunt-circuit normally closed and opens said shunt-circuit when the fluid assumes a predetermined position, whereby the said shunt-circuit thereupon becomes energized to cause the operation of the electromagnetically-operated device.

11. The combination with an electrical supply-circuit, of a switch controlling said supply-circuit, an electromagnetically-operated valve in the supply-circuit controlled by the switch, an electromagnetically-operated device for causing the operation of the switch, a circuit in shunt on the supply-circuit embracing said electromagnetically-operated device, and means for opening and closing the shunt-circuit aforesaid.

12. The combination with a feeder or supply circuit, of branch circuits, independent electromagnetically-operated valves in said branch circuits, a return-circuit for the circuits of said valves, switch mechanism controlling the supply of current from the supply-circuit to the branch circuits, an electromagnetically-operated device for causing the operation of the switch, a circuit in shunt on the supply-circuit embracing said electromagnetically-operated device, and means for opening and closing the return-circuit aforesaid.

13. The combination with a main or feeder circuit, of branch circuits therefrom, a return-circuit for the branch circuits, electromagnetically-operated valves embraced in the branch circuits aforesaid, armatures controlling the branch circuits aforesaid, other branch circuits including electromagnets for operating the respective armatures, and a thermostat controlling the branch circuits last named.

14. The combination with a main or feeder circuit, of branch circuits therefrom, armatures for opening and closing said branch circuits, electromagnetically-operated valves embraced in said branch circuits, a return-circuit for said branch circuits, additional circuits forming shunts on the return-circuit, electromagnets in said shunt-circuits adapted for operating the respective armatures aforesaid, and a thermostat for controlling the connection of the respective branch valve-circuits to the return-circuit.

15. The combination with an electrical supply-circuit, branch circuits fed from the supply-circuit, switch mechanism controlling the supply of current from the supply-circuit to the said branch circuits, armatures controlling the said branch circuits, additional circuits constituting shunts on the return-circuit, electromagnets in said additional circuits and controlling the armatures aforesaid, a thermostat controlling the connection of the branch circuits to the return-circuit, electromagnetically-operated means for causing the operation of the switch, a circuit embracing said electromagnetically-operated means, contacts which govern the circuit of the electromagnetically-operated means last named, and means for opening and closing said contacts.

16. The combination with a fluid-receptacle, of an electrically-operated valve controlling the supply of fluid to the receptacle, a switch controlling the supply of current to the electrically-operated valve, an electrically-operated device adapted to coact with the switch to operate the same, and means operated by the fluid when at a predetermined position in the receptacle adapted to control the supply of current to the electrical switch-operating device.

17. The combination with a fluid-receptacle, of an electrically-operated valve controlling the supply of fluid to the receptacle, a switch controlling the supply of current to the electrically-operated valve, an electrically-operated device adapted to coact with the switch to operate the same, normally closed contacts preventing energization of the electrical switch-operating device, and means operated by the fluid when at a predetermined position in the receptacle adapted to cause the opening or separation of the contacts and consequent energization of the electrical switch-operating

device and closing of the supply-valve aforesaid.

18. The combination with a fluid-receptacle, of electrically-operated valves controlling the supply of independent fluids to the receptacle, switch mechanism for causing a current to pass to either or both of the electrically-operated valves, an electrically-operated device adapted to coact with the switch to operate the same, and means operated by the fluid when at a predetermined position in the receptacle adapted to cause a current to pass to the electrical switch-operating device.

19. The combination with a fluid-receptacle, of an electrically-opened valve controlling the supply of fluid to the receptacle, switch mechanism for causing a current to pass to the electrically-opened valve, an electrically-operated device adapted to cause the switch to be thrown to off position, and means operated by the fluid when at a predetermined position in the receptacle adapted to cause a current to pass to the electrical switch-operating device.

20. The combination with a fluid-receptacle, of an electrically-operated valve controlling the supply of fluid to the receptacle, an automatically-opening switch adapted for sending a current through the electrically-operated valve, a latch for holding the switch on its contacts, an electromagnet for releasing the latch, and means operated by the fluid when at a predetermined position in the receptacle adapted to cause a current to pass to the electromagnet.

21. The combination with electrically-operated valves for regulating the independent supply of hot and cold fluids, of a thermostat, and electrically-operated mechanisms independent of the electrically-operated valves for opening and closing the circuits of the electrically-operated valves, said electrically-operated mechanisms being controlled by the thermostat, whereby the flow of fluid at the desired temperature is obtained.

22. The combination with electrically-operated valves for regulating the independent supply of hot and cold fluids, of armatures controlling the circuits of the valves, electromagnets for attracting said armatures, and a thermostat controlling the supply of current to the electromagnets aforesaid, whereby the electrically-operated valves are made to open or close and the flow of fluid at the desired temperature is obtained.

23. The combination with a receptacle, of electrically-operated valves for regulating the independent supply of hot and cold fluids thereto, a thermostat controlling the supply of current to both electrically-operated valves, whereby the flow of fluid at the desired temperature is obtained, switch mechanism for controlling the circuits of the valves, electrically-operated means controlling the switch, and mechanism acting when the fluid is at a predetermined position in the receptacle to cause a current to pass to the electrical switch-controlling means, whereby said valves are made to close.

24. The combination with an electrically-operated valve, of a switch controlling the supply of current to the electrically-operated valve, an electrically-operated device adapted to coact with the switch to operate the same, and means adapted to control the current-supply of the electrical switch-operating device.

25. The combination with electrically-operated valves controlling the supply of independent fluids, of switch mechanism for causing a current to pass to either or both of the electrically-operated valves, an electrically-operated device adapted to coact with the switch to operate the same, and means adapted to control the current-supply of the electrical switch-operating device.

26. The combination with an electrically-operated valve, of an automatically-operating switch adapted for sending a current through the electrically-operated valve, a latch for locking the switch, and an electromagnet for releasing the latch.

27. The combination with a fluid-receptacle, of an electrically-operated valve controlling the supply of fluid to the receptacle, an automatically-operating switch adapted for sending a current through the electrically-operated valve, a latch for locking the switch, an electromagnet for releasing the latch, and means operated by the fluid when at a predetermined position in the receptacle adapted to control the supply of current to the electromagnet.

28. The combination with a receptacle, of electrically-operated valves for regulating the independent supply of hot and cold fluids thereto, a thermostat controlling the supply of current to both electrically-operated valves, whereby the flow of fluid at the desired temperature is obtained, switch mechanism for controlling the circuits of the valves, means for causing operation of the switch, and means for causing operation of the switch-operating means acting when the fluid is at a predetermined position in the receptacle, whereby said valves are made to close.

29. The combination with a receptacle, of independent electrically-operated valves for regulating the independent supply of hot and cold fluids thereto, switch mechanism for operating either or both of the valves at will, and a thermostat controlling the supply of current to both electrically-operated valves independently of the control of the valves by the switch mechanism, whereby the flow of fluid at the desired temperature is obtained.

30. The combination with an electrically-operated valve, of a switch having means for operating said switch by hand at will, said switch controlling the supply of current to the electrically-operated valve, an electrically-operated device adapted to coact with the switch to operate the same, and means adapt-

ed to control the current-supply of the electrical switch-operating device.

31. The combination with electrically-operated valves controlling the supply of independent fluids, of switch mechanism having means for operating said switch mechanism by hand at will, said switch mechanism controlling the flow of current to either or both of the electrically-operated valves, an electrically-operated device adapted to coact with the switch to operate the same, and means adapted to control the current-supply of the electrical switch-operating device.

32. The combination with an electrically-operated valve, of a switch having means for the hand operation thereof, and also having means for the automatic operation thereof, said switch being adapted for sending a current through the electrically-operated valve, a latch for locking the switch, and an electromagnet for releasing the latch.

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

ISAAC G. WATERMAN.

Witnesses:
WM. C. DASHIELL,
THOS. M. APPLEGARTH.