H. B. HARTMAN.

CONTROL VALVE MECHANISM FOR ELECTROLYTIC WATER PURIFYING APPARATUS.

APPLICATION FILED MAY 22, 1909.

951,312. Patented Mar. 8, 1910.

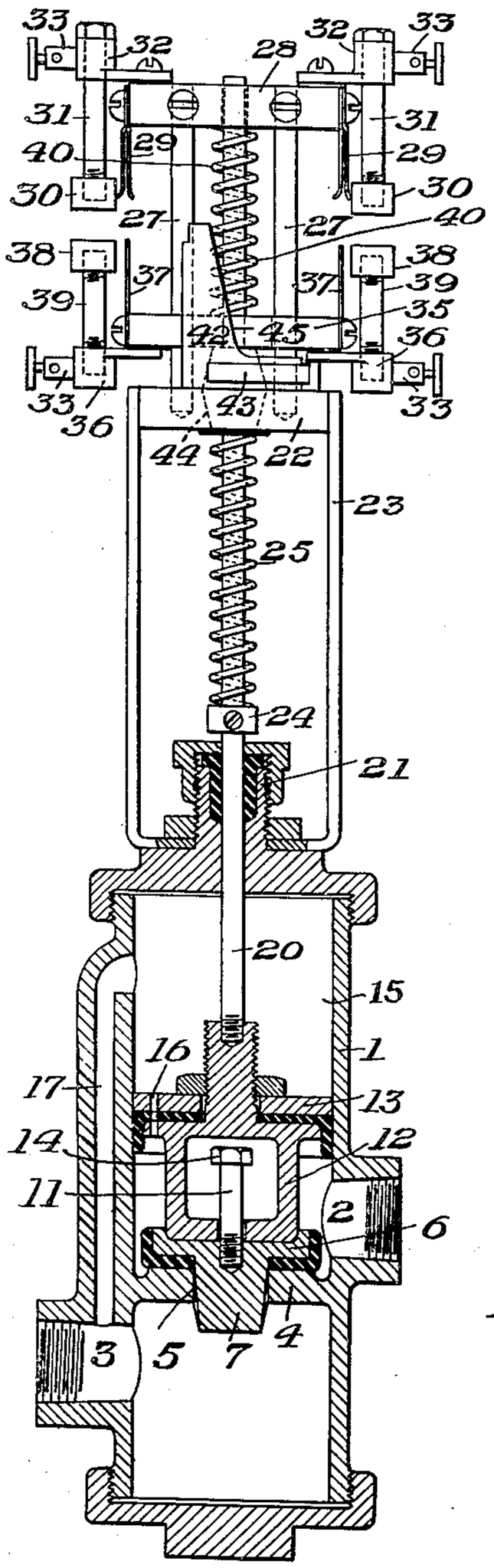


Fig. 1.

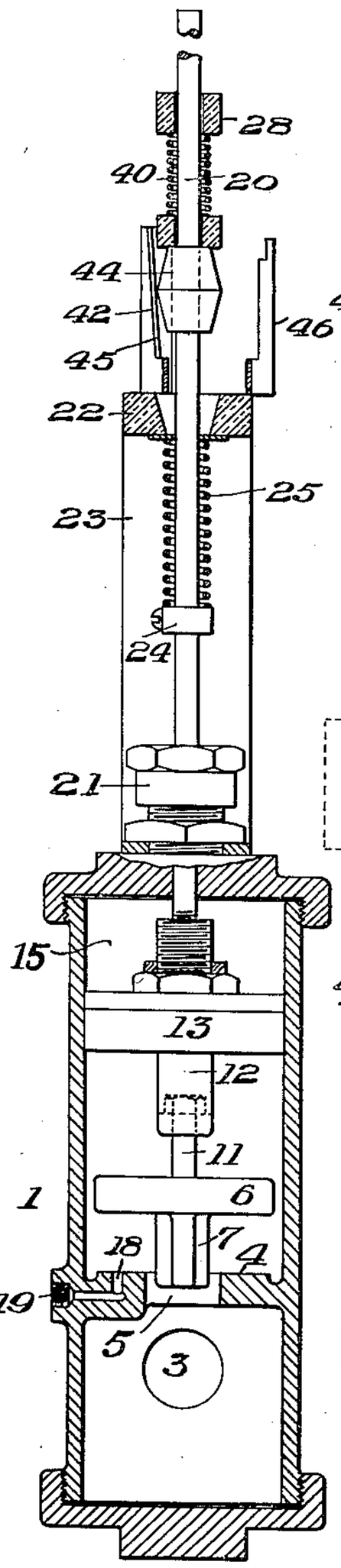


Fig. 2.

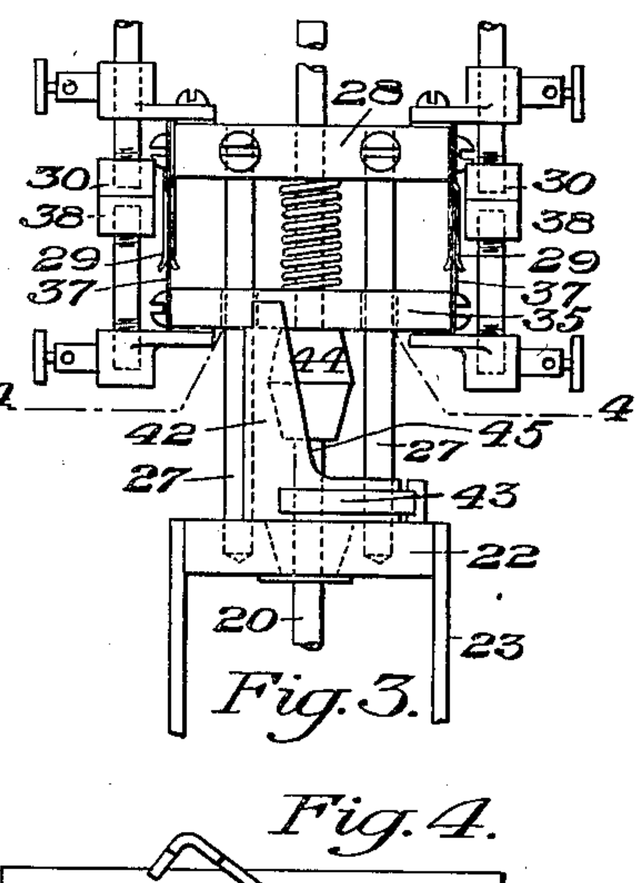
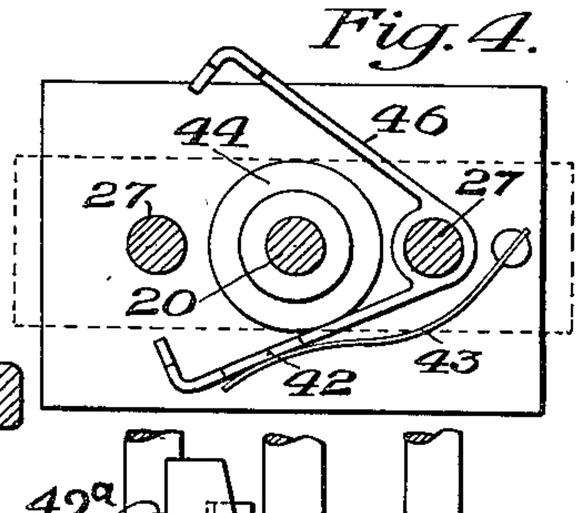


Fig. 3.

Fig. 4.



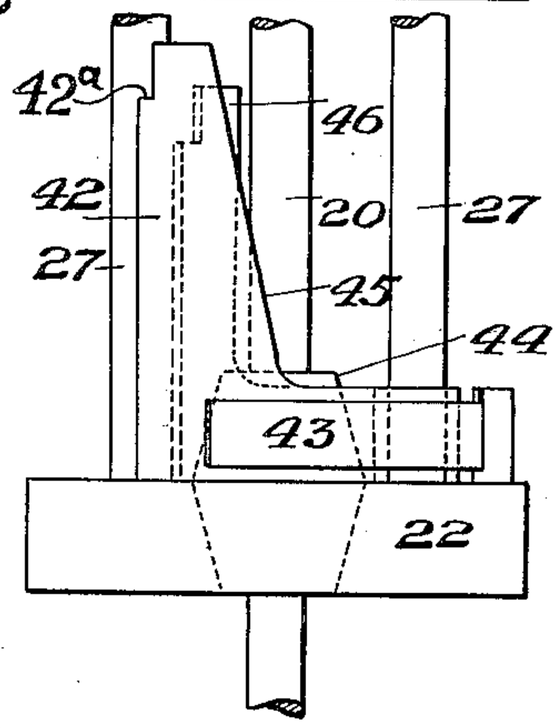


Fig. 5.

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UNITED STATES PATENT OFFICE.

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CONTROL VALVE MECHANISM FOR ELECTROLYTIC WATER-PURIFYING APPARATUS.

951,312. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed May 22, 1909. Serial No. 497,730.

To all whom it may concern:

Be it known that I, HARRY B. HARTMAN, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Control Valve Mechanism for Electrolytic Water-Purifying Apparatus, of which the following is a specification.

This invention relates to electrolytic liquid purifying apparatus and more particularly to mechanism for automatically making and breaking the circuit to the electrodes when the liquid is turned on or off.

The object of the invention is to provide a simple device whereby the electric current is automatically established as soon as the service faucet is opened and slightly before the liquid begins to flow through the purifying apparatus, and whereby when the liquid is shut off the current is automatically broken, but not until slightly after the liquid ceases to flow through the purifying apparatus, whereby a saving of electric current is effected but nevertheless the electric current flows for an appreciably greater length of time than the flow of liquid through the purifying apparatus, thereby insuring the proper electrical treatment of all the liquid flowing through the purifying apparatus.

The invention comprises control valve mechanism constructed and arranged as hereinafter described and claimed.

In the accompanying drawing Figure 1 is in part a side view and in part a vertical section through the control mechanism; Fig. 2 is a vertical section taken on a plane at right angles to that on which Fig. 1 is taken; Fig. 2 is a side view of the upper part of the device showing the parts in position to hold the circuit closed; Fig. 4 is a horizontal section on the line 4—4, Fig. 3; and Fig. 5 is a side view of the locking means for the circuit controller on an enlarged scale.

The control mechanism includes a suitable casing 1 arranged to be placed preferably in the conduit leading from the liquid purifying apparatus, but may be placed in the conduit leading to said apparatus. This casing is provided on one side with an inlet 2 coming from the liquid purifying apparatus and on the opposite side and somewhat lower with an outlet 3 leading to the service or house pipe, and which outlet, or the pipe connected thereto, will be controlled by a suitable faucet or cock. In the casing between the ports 2 and 3 is a valve seat 4 around an opening 5 which establishes communication through said casing. Coöperating with the valve seat 4 is a suitable valve 6 which is provided with a downwardly projecting guide 7 extending through the opening 5. Projecting upwardly from the valve 6 is a stem or rod 11 passing loosely through an opening in a yoke 12 on the under side of a piston or disk 13, and provided at its upper end with a nut or head 14. The piston or disk 13 is vertically movable in the cylindrical upper portion 15 of the casing, and is provided with an equalizing port or passage 16 therethrough. The upper end of the cylinder 15 is connected by a release passage 17 with the outlet port 3. A port 18 opens through the valve seat and is covered by the valve 6 when the latter is seated. This port 18 connects to a side port 19 to which will be connected a pipe leading to circuit reversing mechanism as described in my application filed concurrently herewith Serial No. 497,733.

Connected to the piston 13 is a rod 20 which projects up through stuffing box 21 in the upper head of the casing and also through an opening in the cross member 22 of a bracket 23 projecting upwardly from the casing. Surrounding said rod 20 and interposed between the cross member 22 of the bracket and a collar 24 adjustably secured on the rod is a helical compression spring 25 which acts normally to keep the rod depressed and the piston 13 in its lowermost position. Rising from the cross member 22 are a pair of guide rods 27 having secured to their upper ends the cross member 28 through which the upper end of rod 20 projects. Mounted on the cross member 28 are a pair of metallic contacts 29 and a pair of carbon contacts 30, the latter being carried on the lower ends of rods 31 which are freely slidable in openings in metallic members 32 mounted on the cross member 28, and to which the metallic contacts 29 are also connected, and which metallic members 32 are provided with binding posts 33 to which are connected the positive and negative leads respectively coming from any suit-

able source of electric current. Slidably mounted on the guide rods 27 is a cross head 35 upon the ends of which are mounted metallic members 36 carrying metallic contacts 37 coöperating with the metallic contacts 29 on the upper cross members 28, and with carbon contacts 38 mounted on rods 39 and coöperating with the upper carbon contacts 30. The metallic members 36 are also provided with binding posts 39 to which are connected conductors leading to the liquid purifying apparatus. A helical compression spring 40 around rod 20 is interposed between the upper cross member 28 and the sliding cross head 35 and serves normally to hold said cross head 35 in its depressed position, or with the circuit broken, as shown in Fig. 1.

The circuit is closed by elevating the cross head 35. This position is shown in Figs. 2 and 3. When in such position the cross head 35 is locked to hold the circuit closed by means of a trigger or latch 42 pivotally mounted on any suitable parts, such as upon one of the guide rods 27 and normally held by spring 43 in locking engagement with the cross head 35. Secured to the rod 20 above the bracket cross member 22 is a suitable cam member 44, shown as of double cone shape, which upon its extreme downward movement engages the projecting portion 45 of the trigger and releases said trigger from locking engagement with the cross head so as to allow the spring 40 to suddenly move the cross head downwardly. Connected to trigger 42 is a second trigger 46 arranged to engage the cross head 35 on its opposite side but unprovided with a portion 45 so that when it engages the cross head it cannot be released by the cone 44. The spring 43 normally holds the trigger 42 against the cross head and the trigger 46 away therefrom.

The operation of the mechanism described is as follows: We will suppose that the service outlet 3 is closed and no liquid flowing through the purifying apparatus. In this condition the parts will be in the position shown in Fig. 1 with the valve 6 seated on seat 4, so closing the passage through the casing, the piston 13 being in its lowermost position and the cross head 35 also in its lowermost position with the circuit open. As soon as the service spigot is opened the pressure in the cylinder 15 above piston 13 is suddenly relieved through relief passage 17 thus permitting the supply pressure underneath the piston 13 to raise said piston 13. The effect of this is to compress spring 25 and cause cam 44 to engage cross head 35 and lift the same until the circuit is closed. In closing the circuit the carbon contacts 30 and 38 first touch so establishing the circuit through a path of high resistance, or through non-arcing terminals. The further upward movement of the cross head causes the contact carrying rods 31 to slide upwardly and then the metallic contacts 29 and 37 come into contact to establish the circuit through said metallic contacts. The spring 43 holds the trigger 42 against the cross-head 35, and when the latter is fully elevated it is above the shoulder 42^a on the trigger and the spring presses the trigger inwardly to bring the shoulder 42^a underneath the cross-head and lock the latter in elevated position. The piston 13 can lift about $\frac{3}{4}$ of an inch, or until the circuit is fully closed, before its yoke 12 contacts with the head 14 on the stem 11 of a valve 6, and it is not until this takes place that valve 6 is lifted from its seat. Consequently the electric circuit is fully established to the purifying apparatus before any liquid can begin to flow through the latter, for the reason that no liquid can flow through the purifying apparatus until valve 6 is raised from its seat. The parts remain in this position, that is, the position shown in Figs. 2 and 3, as long as the service pipe is open. As soon as the latter is closed the pressure above the piston 13 immediately equalizes through the relief port 17 with the pressure at the supply side 2. This permits spring 25 to move the piston 13 downwardly, and as soon as said piston has moved downwardly slightly the valve 6 is seated by the action of gravity. This seating of valve 6 however takes place considerably before the piston 13 has moved down to its full extent. Until the valve 6 seats, the equalization of pressure above and below piston 13 takes place very rapidly through port 17 so that the first part of the downward movement of the piston is quite rapid and gives a quick seating to valve 6. As soon as valve 6, however, is seated, so cutting off communication between supply 2 and relief port 17, the further downward movement of the piston is more slow, since the equalizing port 16 through the piston is so small that only a gradual equalization takes place. During such slow downward movement of the piston the circuit is still closed, being held closed by the trigger 42. Just as the piston 13 approaches the limit of its downward movement the cam 44 contacts with the projecting portion 45 on the trigger 42 and moves said trigger out of locking engagement with the cross head 35, whereupon the spring 40, which was placed in compression when the circuit was closed, moves the cross head 35 downwardly with a snap, so getting a quick break of the circuit, said circuit being first broken between the spring or metallic contacts 29 and 37, and finally broken by the separation of the carbon contacts 30 and 38. When the purifying apparatus is being flushed and no liquid flowing through to the valve 1, the cross head 35 is raised by hand

and the trigger 46 moved into position to lock the same, the cam 44 remaining depressed, so that current is flowing through the purifying apparatus while flushing and notwithstanding that valve 6 is closed. It will be thus seen that the control device described makes and breaks the circuit to the electrolytic purifying apparatus with the starting and stoppage of flow of liquid through the purifying apparatus, but in a manner to establish the circuit before the liquid actually begins to flow between the purifying apparatus, and holds said circuit closed until the elapse of an appreciable time after the liquid ceases to flow through the purifying apparatus. The operation of the device, however, is entirely automatic. The consequence is that the circuit is not unnecessarily held closed to waste current when the purifying apparatus is not in use, but nevertheless all of the liquid flowing through the water purifying apparatus is efficiently and sufficiently subjected to the action of the electric current.

What I claim is:

1. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing and arranged to be opened by the flow of liquid when the service pipe is opened, a circuit controller operated by the liquid flow, and connections whereby under all conditions of opening of the service pipe said valve is not opened until after the circuit is closed at the controller.

2. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member operated by liquid flow, a circuit controller actuated by said movable member, and connections between said movable member and said valve and arranged to open the valve after the circuit is closed at the circuit controller.

3. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by the flow of liquid through the casing, a circuit controller actuated by said movable member, and a lost-motion connection between said movable member and valve and arranged to open said valve after the circuit is closed at the circuit closer.

4. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member subject on one side to the supply pressure, connections between said movable member and said valve, a relief passage from the opposite side of said movable member, whereby when the service pipe is opened said movable member is actuated, and a circuit controller actuated by said movable member.

5. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member subject on one side to supply pressure, a relief passage from the opposite side of said member, whereby when the service pipe is opened said movable member is actuated, a circuit closer actuated by said movable member, and a lost-motion connection between said movable member and valve.

6. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member subject on one side to supply pressure, a relief port from the opposite side of said movable member, an equalizing port connecting the two sides of the movable member, connections between said movable member and said valve a circuit closer actuated by said movable member, and a spring arranged to return said movable member to normal position.

7. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member subject on one side to supply pressure in the casing, a relief passage for releasing the pressure from the opposite side of said movable member, a spring arranged to return said movable member to normal position, a lost-motion connection between said movable member and valve, and a circuit controller actuated by said movable member.

8. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member subject on one side to supply pressure, a relief passage for relieving pressure on the opposite side of said movable member, an equalizing port connecting the two sides of said movable member, a spring arranged to return said movable member to normal position, a lost-motion connection between said movable member and valve, and a circuit closer actuated by said movable member.

9. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by supply pressure, a circuit controller actuated by said movable member, connections between the movable member and valve arranged to open the valve after the circuit is closed, and means arranged to retard the breaking of the circuit until after the valve is closed.

10. Circuit control mechanism for liquid

purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by supply pressure in the casing, connections between said movable member and valve, a circuit controller actuated by said movable member, a lock for holding said circuit controller closed, a spring for returning the movable member to normal position, and means arranged when the movable member approaches the limit of its return movement to release said lock.

11. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by supply pressure, a spring arranged to return said movable member to normal position, a circuit controller actuated by said movable member, a spring arranged to open said circuit closer, a lock arranged to hold said circuit controller closed against the tension of the spring, and means arranged when the movable member approaches the limit of its movement to normal position to release said lock.

12. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by supply pressure, a lost-motion connection between said movable member and the valve, an equalizing passage between the two sides of the movable member, a spring arranged to move the movable member to normal position, a circuit controller actuated by the movable member, a lock for holding the circuit controller in closed position, and means arranged to release said lock when the movable member approaches its normal position.

13. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a movable member therein actuated by supply pressure, a circuit controller actuated by said movable member and comprising a pair of carbon contacts, a pair of metallic contacts, said pairs of contacts being so arranged that the carbon contacts close before and separate after the metallic contacts, a spring tending to separate said contacts, a lock arranged to hold said contacts in closed position, and means operative upon the return of the movable member to normal position for releasing said lock.

14. Circuit control mechanism for liquid purifying apparatus, comprising a casing, a movable member in the casing actuated by supply pressure, a circuit controller actuated by said movable member, a lock for said circuit controller arranged to hold the circuit closed, said lock comprising a pair of connected triggers, one provided with a projection, a spring arranged to normally hold the latter trigger in position to lock the circuit controller, and means operative on return of said movable member to normal position and arranged to contact the projection on the one trigger for releasing the same from the circuit controller.

15. Circuit control mechanism for liquid purifying apparatus comprising a casing, a valve arranged to normally close the passage through said casing and arranged to be opened by the flow of liquid when the service pipe is opened, a circuit controller operated by the liquid flow, and connections whereby said circuit controller maintains the circuit closed until after the valve is closed.

16. Circuit control mechanism for liquid purifying apparatus comprising a casing, a valve arranged to normally close the passage through said casing, a movable member actuated by liquid flow, connections between said movable member and said valve and arranged to open the valve, a circuit controller actuated by said movable member, and means arranged to hold the circuit closed until after the valve is closed.

17. Circuit control mechanism for liquid purifying apparatus comprising a casing, a valve arranged to normally close the passage through said casing and arranged to be opened by the flow of liquid when the service pipe is opened, a circuit controller operated by the liquid flow, connections whereby under all conditions of the opening of the service pipe said valve is not opened until after the circuit is closed, and means arranged to hold the circuit closed until after the valve is seated.

18. Circuit control mechanism for liquid purifying apparatus comprising a casing, a valve arranged to normally close the passage through said casing, a movable member operated by liquid flow, a circuit controller actuated by said movable member, connections between said movable member and said valve arranged to open the valve after the circuit is closed, and means arranged to hold the circuit closed until after the valve is closed.

In testimony whereof, I have hereunto set my hand.

HARRY B. HARTMAN.

Witnesses:
HOWARD NEELY,
F. W. WINTER.