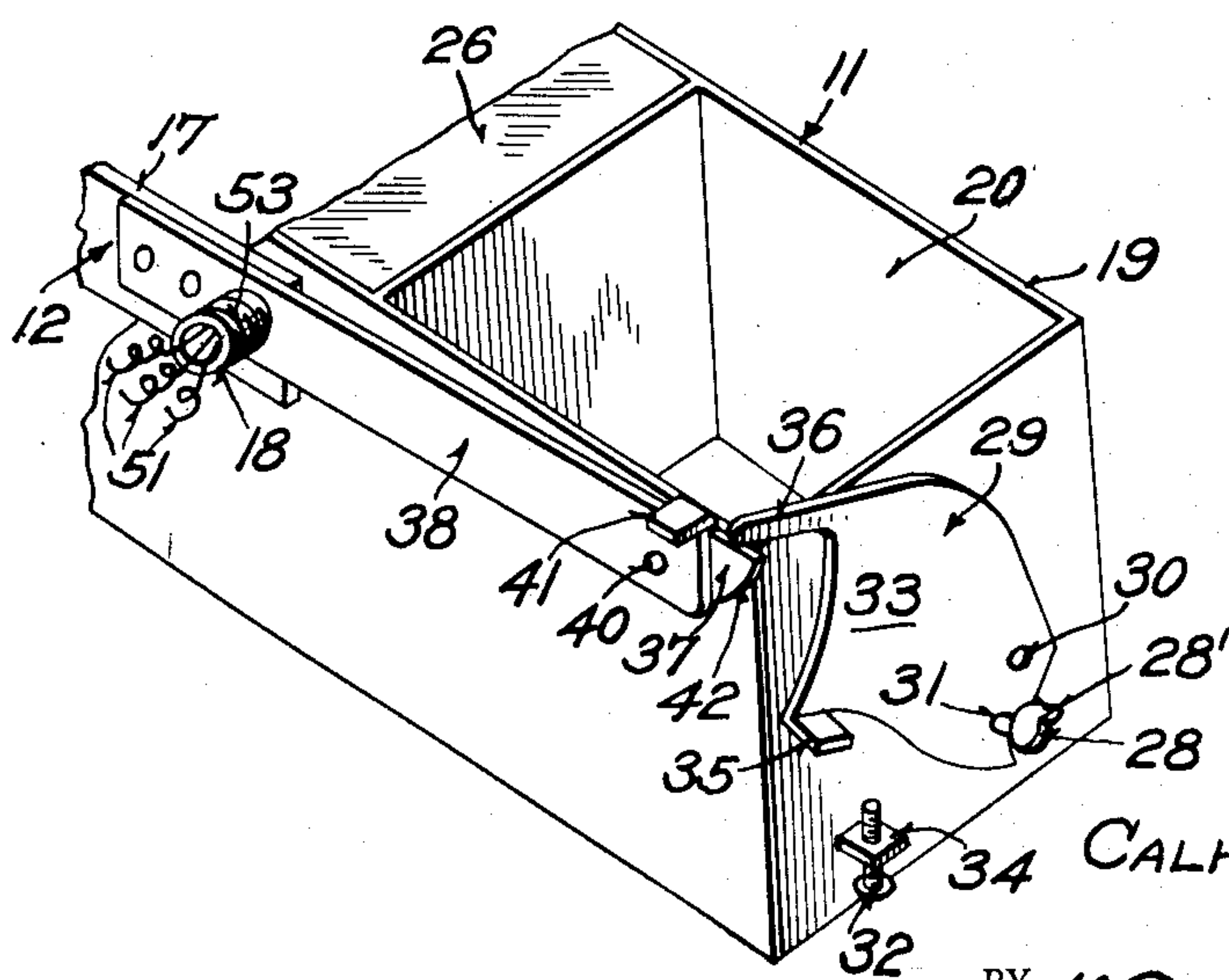
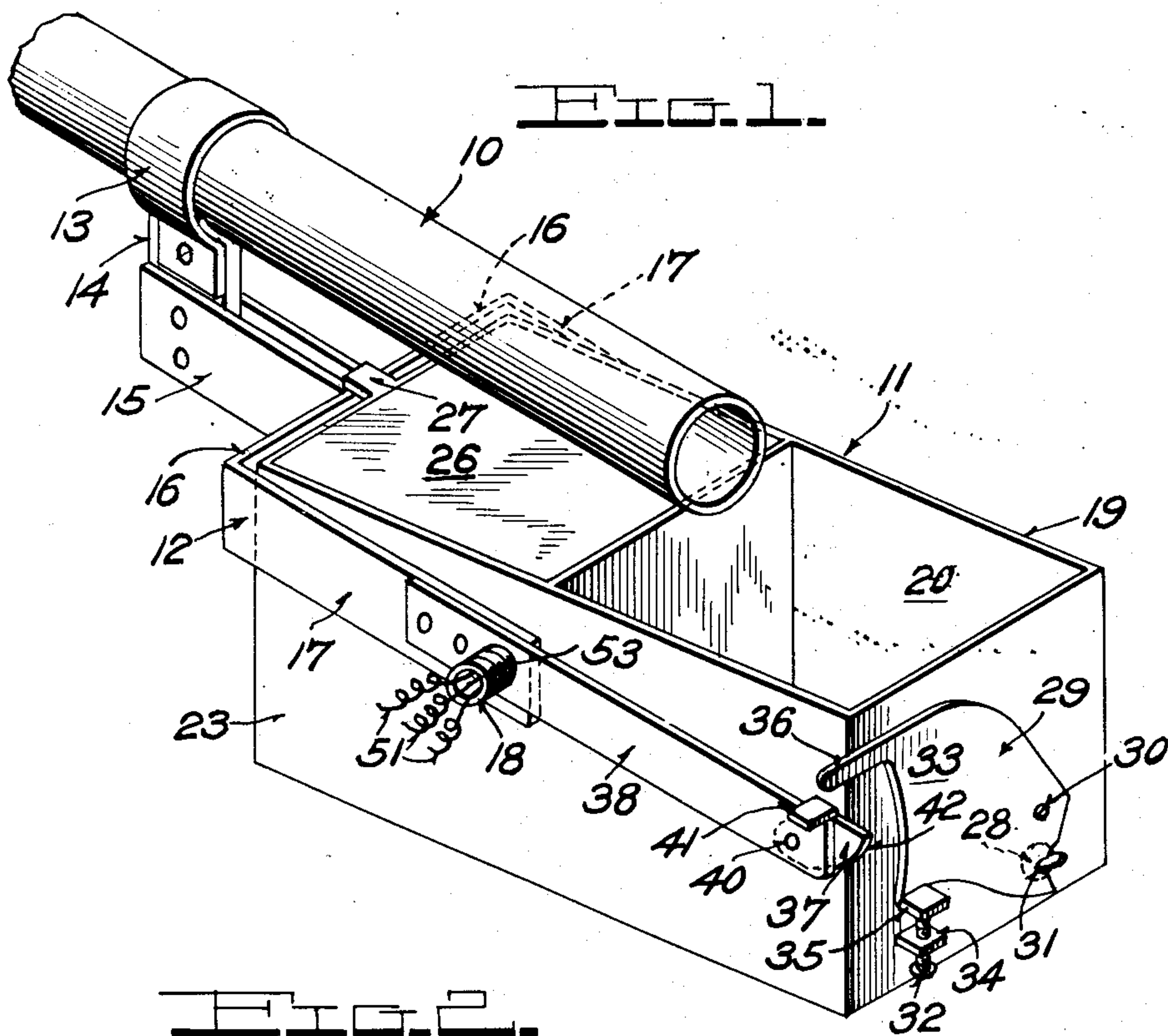


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LIQUID CONTROLLED DEVICE WITH SELF-CLEANING VALVE

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2 SHEETS—SHEET 1



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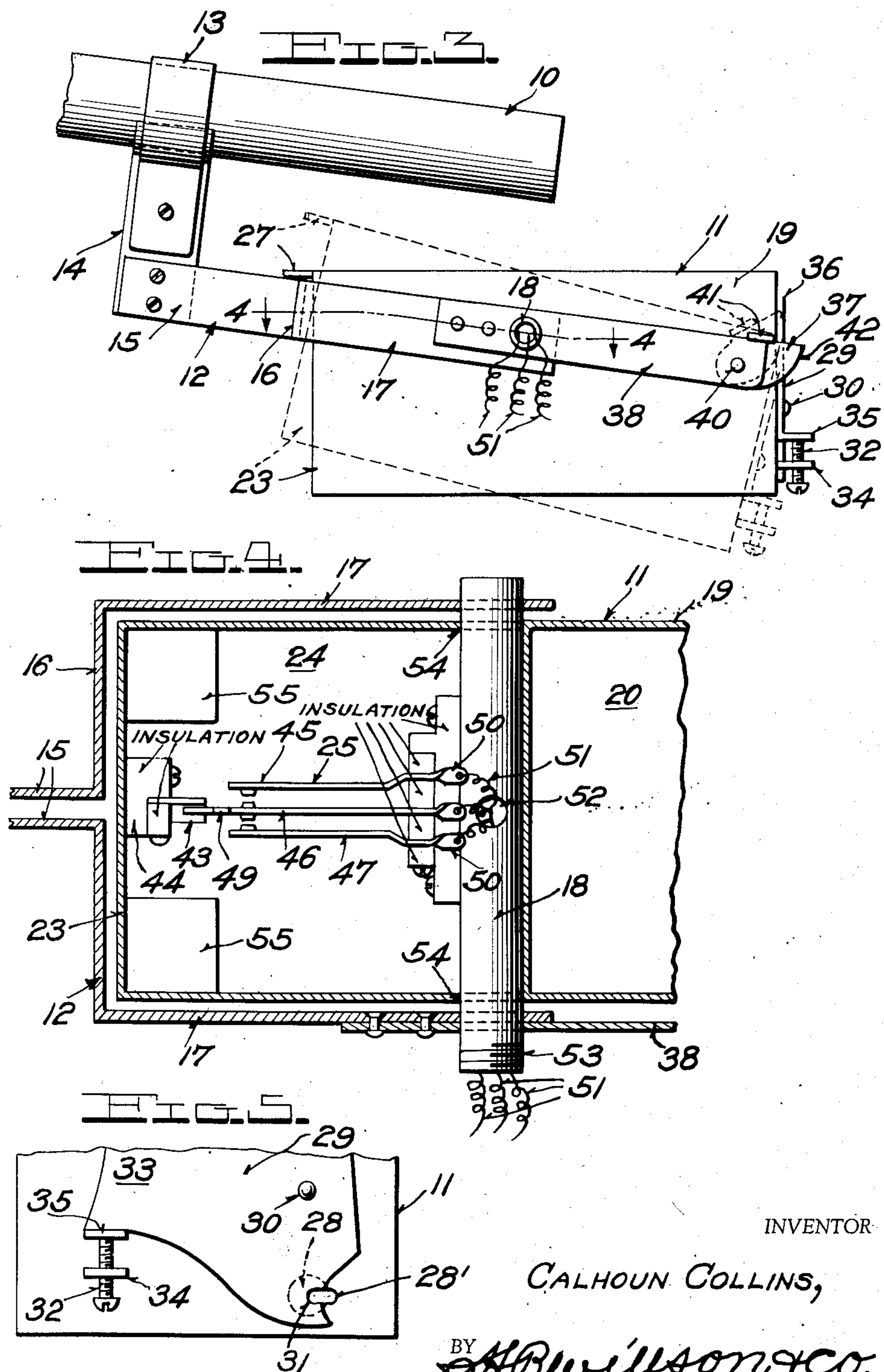
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

2,628,630

LIQUID CONTROLLED DEVICE WITH SELF-CLEANING VALVE

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8 Claims. (Cl. 137—395)

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My invention relates to liquid controlled devices of the type disclosed in Patent 2,205,811, granted June 25, 1940, and more particularly to such devices used in connection with laundry extractors which must be stopped at the proper time to leave the required moisture content in the load in the extractor.

In the device of said patent a cup with a valve controlled drain received a portion of the liquid discharged from the extractor and when the discharge dwindled to a point where the drain through the valve was greater than the amount of liquid entering the cup, the latter was elevated by spring means to operate a switch which controlled the operation of the electric motor driving the extractor. When the water discharged from the extractor contained much lint, the latter collected at the small drain opening in the cup and clogged or partially clogged the same, and thus affected the operation of the device. Further it was found difficult to maintain the desired spring tension in the means for elevating the cup. It is therefore an object of this invention to overcome these drawbacks to my earlier device.

Another object is to provide a more simple and less expensive device of this character which at the same time is more reliable and effective in operation.

A further object is to provide a device of this character in which the drain valve or outlet of the cup is automatically flushed at each operation of the device to remove lint or other foreign matter, thus making the device self-cleaning.

With the above and other objects and advantages in view the invention resides in the novel combinations and arrangements of parts and in the novel features of construction hereinafter described and claimed, and illustrated in the accompanying drawings which show the present preferred embodiment of the invention.

In the drawings:

Fig. 1 is a perspective view of a liquid controlled device showing the parts in normal position as when there is no discharge from the extractor;

Fig. 2 is a detail perspective showing a portion of Fig. 1 but with the cup in a position to cause the valve to uncover the drain outlet so that lint or foreign matter may be flushed out;

Fig. 3 is a side elevation showing the cup in its normal or raised position in full lines and in its tilted or lowered position in dotted lines;

Fig. 4 is a detail horizontal section on an enlarged scale taken on the line 4—4 of Fig. 3; and

Fig. 5 is a detail view showing the valve adjustment to control the drain from the cup.

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Referring more in detail to the drawings the numeral 10 denotes the liquid outlet or discharge pipe from a laundry extractor (not shown). My improved liquid controlled device 11 may be suspended from such pipe by means of a substantially Y-shaped bracket 12 and a two-part clamp 13. The latter is shown as a metal strap bent around the pipe with its ends fastened to the opposite sides of a plate 14 having at its top a curved seat to engage the bottom of the pipe. The lower end of the plate 14 is secured by bolts or the like between the rear ends of two angular metal bars 15 forming the bracket or support 12. The bars 15 have oppositely projecting portions 16 from which extend two opposed and parallel supporting arms 17. The device 11 is pivotally mounted on a horizontal axis between said arms.

The device 11 comprises an elongated body normally disposed in a substantially horizontal position and pivotally mounted between its ends on a stationary tubular shaft 18 fixed in the arms 17 of the support. As shown the body 11 is of rectangular shape and its front or outer end 19 has an open top and forms a rectangular chamber or cup 20 which receives the liquid flowing from the end of the pipe or liquid passage 10. The rear or inner end 23 of the body 11 forms a closed chamber 24 to contain an electric circuit controlling switch generally indicated at 25; and it may have a suitable removable top or cover 26 to afford access to the switch. The weight of the end 23 is greater than that of the end 19 when the cup contains no liquid or very little liquid, and hence the cup is biased upwardly by gravity. At the center of the rear end 23 at its top portion is a rearwardly projecting stop finger 27 to engage the rear portion of the bracket 12 to limit the downward movement of said end so that the body 11 will be normally held in the position shown in full lines in Fig. 3. When water or other liquid flows from the pipe 10, the additional weight of the liquid in the cup overbalances the cup end 19 and the body tilts. The tilting movement of the body operates the switch 25 as hereinafter described.

In the outer or front wall of the cup 20 at or near its bottom I provide a large opening 28 of any suitable shape controlled by a valve 29 which is in the form of a thin, rust-proof metal plate pivoted at 30 on the outer face of the front wall. The pivoted valve disk or plate has a lower edge portion in which is formed an opening or notch 31 to cooperate with the opening 28 in forming a drain, the effective size of which may be controlled by adjusting the plate on its pivot 30.

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Instead of forming the notch in the valve plate it may be formed in an edge of the opening 28, as shown at 28'; or both notches 31 and 28' may be used. Obviously both notches may be omitted and the drain opening formed by the valve plate being adjusted to cover most of the opening 28 which may be of triangular or other shape, but I have found that by the use of at least one notch better results are obtained, and I preferably use the two opposed notches. It will be seen that the opening 28, 28' forms a combined drain and flush-out opening or outlet for the cup. It will be seen on reference to Fig. 5 that the pivotal movement of the valve plate will move the notch 31 relative to a portion of the edge of the opening 28, if notch 28' is not used, so that more or less of the notch will be in registration with said opening to control the amount of liquid that may drain from the cup in a predetermined time. If both notches 31 and 28' are used, as shown, the effective size of the drain is determined by the adjustment of the notch 31 relative to the opposed notch 28' as will be understood upon reference to Fig. 5.

The valve may be set or adjusted for any desired moisture content in the load in the extractor by means of an adjusting screw 32 which also serves as a stop to limit the swinging movement of the valve in one direction. It will be noted that the pivot 30 is closer to one side than the other of the valve plate so that the latter is overbalanced. Its larger and heavier side 33 will therefore cause the plate to swing by gravity to normally close the valve opening or outlet 28, 28' except that portion which is in register with the notch 31 to form the drain. The screw 32 may be threaded through a lug 34 on the front of the cup and it is adapted to be engaged by a stop finger 35 bent outwardly from the lower portion of the overbalanced side or end 33 of the valve. When said end 33 is swung upwardly, as shown in Fig. 2, the valve will completely uncover the opening or outlet so that a large volume of liquid will leave the cup 24 and thus flush out any lint or foreign matter that may have collected at said opening and at the notch 31. This flushing out or cleaning action of the valve takes place on each operation of the device. If desired the top of the cup may be covered by a screen (not shown) to prevent the larger pieces of lint or other foreign matter from entering the cup.

The weight of the overbalanced end 23 of the control member or body 11 holds the cup end elevated when no liquid is flowing from the outlet or discharge pipe 10, but when a large volume enters the cup 24, the end 19 of the control 11 tilts downwardly under the weight of the liquid, and the valve 29 is moved to its open or flushing position. The valve is thus operated by providing at the top of its end 33 a laterally projecting portion or arm 36 which coacts with a pivoted trip 37 mounted on an extension bracket arm 38 projecting forwardly or outwardly from one of the arms 17 of the support 12. The bracket 38 is a flat metal bar riveted or otherwise secured at its rear end and at its outer end carries a pivot 40 on which the trip 37 swings. The trip is a flat metal plate disposed against the inner face of the bracket and projects forwardly from the bracket in a plane at right angles to the plane of the valve plate 29 so as to lie in the path of movement of the arm 36 as the cup end of the control tilts downwardly and upwardly. A stop finger 41 projects laterally from the upper edge of the forward portion

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of the trip to engage the upper edge of the bracket 38 to limit the downward swinging movement of the trip, and the front end of the latter is beveled or rounded as at 42 so that the arm 36 may engage the bevel or cam portion 42 to lift the trip and pass it when the cup moves upwardly from its lowered position. In other words the trip remains stationary when the cup 24 moves downwardly and the arm 36 is raised as it passes the trip, and thus the valve 29 uncovers the opening 28 only long enough to produce the flushing action. After arm 36 passes the trip the valve swings to its closed position against the stop 32 so that the amount of liquid that continues to drain from the lowered cup depends upon the adjustment of the notch 31 with respect to the edge of the opening 28 or the notch 28'. When the desired moisture content is reached the drain from the cup exceeds the amount of liquid that enters the cup from the pipe 10, and when the weight of the remaining water in the cup is insufficient to overbalance the end 23 of the control, the cup swings up to its normal position. The end 23 of the control may be larger and heavier than the cup end 19, or weights 55 may be used to overbalance the cup and a small amount of liquid therein.

The swinging movement of the control 11 operates the switch 25 to control one or more electric circuits. The switch may operate a suitable signal or control directly or indirectly the motor which operates the extractor; but I preferably use the switch to close or cause the closing of the extractor driving motor circuit when the cup swings downwardly and to cause the application of a brake on the extractor when the cup swings upwardly. The switch is preferably of the type shown in Patent 2,323,646, dated July 6, 1943. It comprises a cam blade 43 having one end fixed in a sectional block or support 44 of insulation fastened to the rear wall of the compartment 24 as seen in Fig. 4 so that the cam moves with the tilting control 11. The switch also comprises three resilient contact fingers 45, 46 and 47 which project in the same direction from a sectional support 48 of insulation fixed to the portion of the stationary tubular shaft 18 within the compartment or casing 24. The intermediate finger 46 is provided with a rearwardly extending operating portion or member 49 which is disposed in the path of swinging movement of the flat angularly disposed cam 43. The finger 46 is normally separated from the other fingers 45 and 47, and the parts 43 and 49 are so arranged that when the end 23 of the control 11 swings up and down the operating member 49 will move alternately over the opposite faces of the cam 43 to cause the contact finger to alternately engage the contacts 45 and 47 to complete suitable electric circuits. One circuit may cause the extractor motor to start and stop while the other circuit may cause a brake for the extractor to be applied and released. The contact fingers have terminals 50 for the connection of conductor wires 51 which may pass into the fixed tube or shaft 18 through an opening 52 and then pass out of the end 53. The latter may be externally screw threaded for the attachment of an outlet box on a metal conduit through which the electric wires are run. The fixed tubular shaft extends through bearing openings 54 in the side walls of the control body 11 and its end portions may be fastened in any suitable manner in the arms 17 of the support 12. From the foregoing, taken in connection with

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the accompanying drawing, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. In a device of the class described having a support, a cup adapted to continuously receive some liquid discharging from an outlet, a control member mounting said cup on said support for downward movement under the weight of liquid therein, said cup having in the lower portion thereof a combined drain and flush-out outlet, a valve mounted on said cup to control the flow of liquid through said outlet, said valve being movable in one direction to fully open said outlet for flushing it and being movable in another direction for restricting the flow through said outlet to provide a drain for the cup, means to limit the movement of said valve in the last mentioned direction toward its drain position, the conducting capacity of the outlet when said valve is in its drain position being insufficient to drain said cup until the flow of liquid into the cup dwindles to a predetermined extent, and trip means carried by said support and coacting with said valve to move it to open position for momentarily flushing said outlet each time said cup lowers under the weight of liquid therein.

2. A device of the class described comprising a support, a control member pivotally mounted on said support to swing vertically, a cup carried by one end of said member and adapted to be positioned to continuously receive some liquid discharging from an outlet, said cup swinging downwardly under the weight of liquid therein, said cup having in the lower portion thereof a combined drain and flush-out opening, a pivoted valve on said cup to control the flow of liquid through said opening, said valve being movable in one direction to fully open said opening for flushing it and being movable in the opposite direction for restricting the flow through it to provide a drain for said cup, means to limit the movement of said valve in the last mentioned direction toward its drain position, the conducting capacity of the opening when said valve is in its drain position being insufficient to drain said cup until the flow of liquid into the cup dwindles to a predetermined extent, and trip means carried by said support and coacting with said valve to move it to open position for momentarily flushing said opening each time said cup swings downwardly under the weight of liquid therein.

3. A device of the class described comprising a support, a control member pivotally mounted on said support to swing vertically, a cup carried by one end of said member and adapted to be positioned to continuously receive some liquid discharging from an outlet, said cup swinging downwardly under the weight of liquid therein, said cup having an outer end with a flat portion in which is formed adjacent its bottom a combined drain and flush-out opening, a valve plate pivotally mounted on the outer face of said end to move over said opening, said valve plate being movable to an open position in which it uncovers said opening to permit the latter to be flushed out and being movable to a drain position in which the valve plate does not completely close the opening so that there will be a limited

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flow of liquid between edge portions of the valve plate and the opening to provide a drain for the cup, adjustable means to limit the movement of said valve plate in the direction of its drain position to permit the drain from the cup to be varied, the conducting capacity of the drain being insufficient to drain said cup until the flow of liquid into the cup dwindles to a predetermined extent, and trip means carried by said support and coacting with said valve plate to move it to open position for momentarily flushing said opening each time said cup swings downwardly under the weight of liquid therein.

4. The structure of claim 3 in which said trip means comprises an upwardly swingable trip plate pivoted on a portion of said support for upwardly swinging movement from a normal position, said trip plate being disposed in a plane at right angles to said valve plate and normally lying in the path of movement of a portion of said valve plate when the cup swings downwardly, said trip plate being moved upwardly by the valve plate portion to permit the latter to pass it when the cup swings upwardly.

5. The structure of claim 3 in which at least one of the coacting edges of the valve plate and the opening, which edges form the cup drain, is provided with a notch through which the liquid drains from the cup, and the effective size of which may be varied by said adjustable means.

6. The structure of claim 3 in which the coacting edges of the valve plate and the opening, which edges form the cup drain, are formed with opposed notches through which the liquid drains from the cup, and the effective size of which may be varied by said adjustable means.

7. In a device of the class described, a support, an elongated control body fulcrumed between its ends on said support and having at its outer end a cup to receive liquid, the outer end of said cup having a flat wall portion formed in its lower part with a combined drain and flush-out opening, a valve plate to control said opening and pivoted off-center to said cup and disposed against said flat wall portion, said valve plate being movable to an open position in which it uncovers said opening to permit the latter to be flushed out and being movable to a drain position in which the valve plate does not completely close the opening so that there will be a limited flow of liquid between edge portions of the valve plate and the opening to provide a drain for the cup, adjustable stop means between said cup and the heavier portion of said valve plate to limit the swinging movement of the valve plate in the direction of the drain position, said valve plate having on its heavier portion a laterally projecting arm, and upwardly yieldably trip means carried by said support and arranged in the path of movement of said arm as said cup swings on the fulcrum of said body.

8. A device of the class described comprising a supporting bracket having a cross portion with two horizontally spaced arms projecting outwardly therefrom, a transverse shaft fixed to the outer portions of said arms, a rectangular control body pivotally mounted between its ends on said shaft and having its inner end disposed between said arms, said inner end forming a switch-receiving compartment and being heavier than its out end, a stop on said inner end to engage said cross portion to normally hold said body in a substantially horizontal position, the outer end of said body forming a liquid receiving

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cup having a flat outer end face provided in its lower portion with a combined drain and flush-out opening, a valve plate to control said opening disposed on the exterior of said end face and pivoted thereto, said valve plate being movable to an open position in which it uncovers said opening to permit the latter to be flushed out and being movable to a drain position in which the valve plate does not completely close the opening so that there will be a limited flow of liquid between edge portions of the valve plate and the opening to provide a drain for the cup, said valve plate being overbalanced to normally swing by gravity toward its drain position, coacting stops on said valve plate and said end wall of the cup to limit the swing of the valve toward its drain position, an adjusting screw carried by one of the last-mentioned stops for engagement with the other for varying the size of the drain, said valve plate having on its heavier portion an arm projecting laterally beyond one side of said end wall of the cup, a bracket extension projecting out-

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wardly from one of said arms, and a trip plate pivoted to said extension and disposed in a plane at right angles to the plane of said valve plate, said trip plate having a portion normally disposed in the path of movement of the arm of said latch plate for moving said valve plate momentarily to open position each time said cup swings downwardly, said trip plate being yieldable upwardly to permit said arm to pass it when said cup moves upwardly to its normal position.

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