

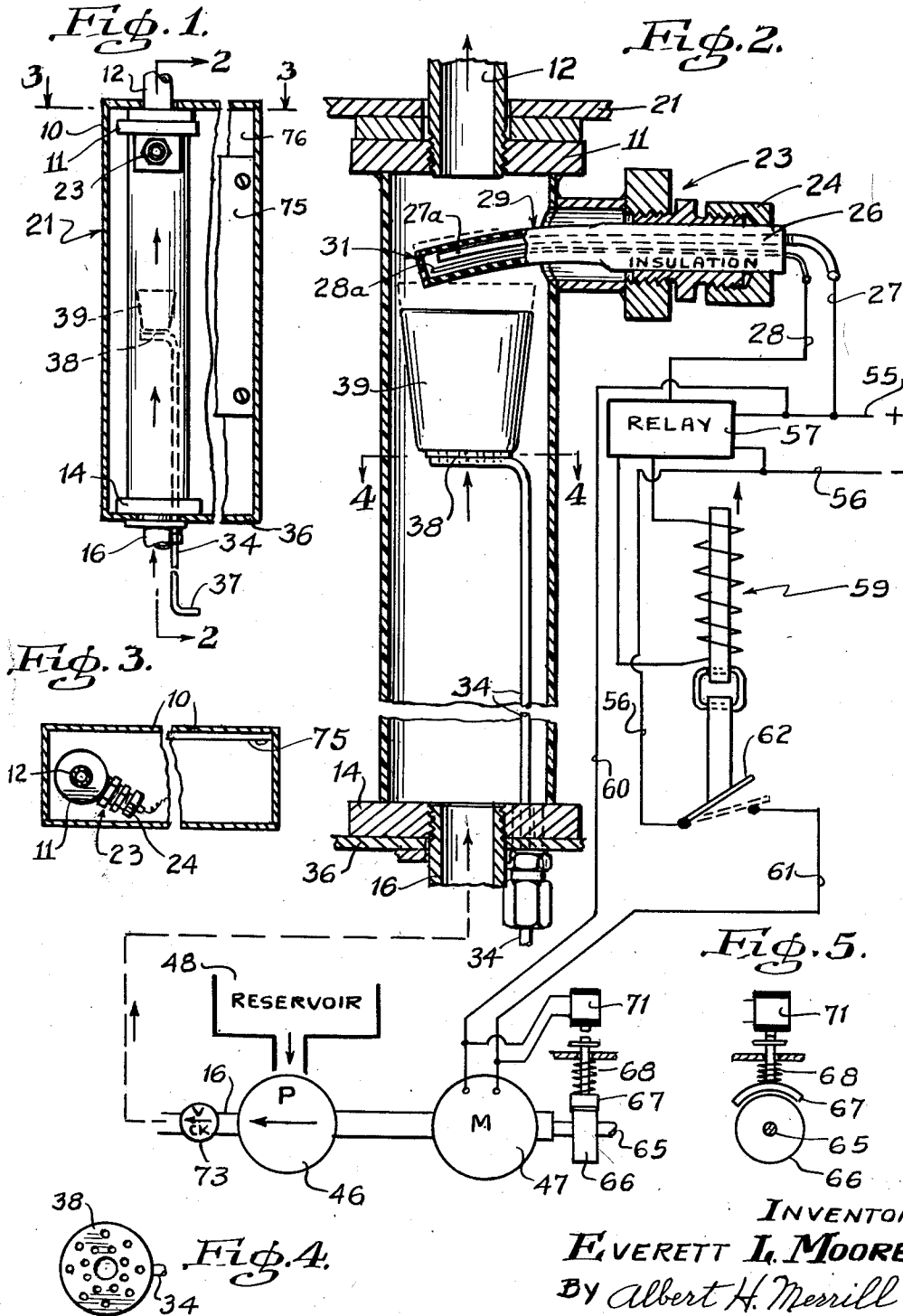
April 20, 1954

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2,675,757

ELECTRICALLY CONTROLLED LIQUID MEASURER AND DISPENSER

Filed June 13, 1952



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UNITED STATES PATENT OFFICE

2,675,757

ELECTRICALLY CONTROLLED LIQUID
MEASURER AND DISPENSER

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Application June 13, 1952, Serial No. 293,328

8 Claims. (Cl. 103—25)

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This invention relates to an electrically controlled device which, each time it is manually or otherwise put into operation, will dispense a predetermined quantity of liquid.

One important use of the invention is in connection with supplying liquid reagents to concrete during the mixing thereof.

In the operation of mixing concrete preparatory to pouring it into builder's forms, it has been found advantageous (and therefore is a common practice), to inject from time to time into the batch of concrete being mixed, a liquid air entraining agent.

Hitherto this has either been done by hand or by an intermittently operating automatic mechanical means. In such automatic mechanical devices as have hitherto been used for this purpose no provision has been made for accommodating them to different pressure heads, and, consequently, undesirably varied quantities of the liquid being dispensed have been delivered.

Another defect in present liquid dispensing devices resides in the fact that no adequate provision has been made in them for dispensing liquids containing clogging materials, such as sand and other earthen substances.

Still another defect in these machines has been due to the fact that, in such of them as use time interval switches, the return movement of the switches has not been sufficiently uniform to cause the pump operating motor to make the same number of revolutions each time operated.

It is an object of the present invention to overcome the above mentioned defects by providing an electrically controlled liquid dispensing device which will deliver, in a very precise and uniform manner at each dispensing operation, the same pre-set quantity of liquid admixture, and which will do this irrespective of the amount of clogging materials, such as sand and dirt, which may be contained in the liquid being dispensed.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates a preferred embodiment of the invention,

Fig. 1 is an elevational view of the liquid dispensing tube and parts associated therewith, a portion of the housing, shown in section, being included in the view.

Fig. 2 is a partly diagrammatic and partly sectional view of the complete apparatus, the plane of the sectioned portion of the view being indicated by line 2—2 on Fig. 1, the scale being enlarged.

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Fig. 3 is a horizontal section on line 3—3 of Fig. 1, but differs from the latter view in that the dispensing tube is shown turned in relation to the housing through an angle of about forty-five degrees to illustrate an optional, space economizing way of mounting it, together with the fitting carried by its upper end portion.

Fig. 4 is a horizontal section on line 4—4 of Fig. 2.

Fig. 5 is an end elevation of the braking means shown in the adjacent portion of Fig. 2, the brake being shown released.

Referring in detail to the drawing, the embodiment of the invention therein shown comprises an elongated main tube 10, which may be made of a transparent plastic, said tube being mounted in an upstanding position and closed at its top by a head 11 through which extends, in a liquid tight manner, an outlet pipe 12. The lower end of said tube is closed by a head 14 through which likewise extends the liquid supply pipe 16. Said tube 10 is supported by and within a casing or housing 21 which also contains presently to be described other parts of the apparatus. Except for the inlet tube 16 and outlet tube 12, said tube 10 is sealed in a liquid tight manner.

A tubular fitting 23 projects radially from the upper part of said main tube 10, said fitting carrying a packing gland structure 24. Axially through said fitting and gland extends a sealed, cylindrical body 26 of insulation within which is embedded and through which passes a pair of conductors 27 and 28.

Axially from the inner end of said body 26 projects into the tube 10 a resilient, closed in tube 29, considerably less in diameter than said tube 10. The inner end of said smaller tube 29 is closed by a wall 31, thus sealing off the liquid from a stiff upper wire 27a, which forms the terminal part of the conductor 27, and from an easily deflected resilient wire 28a, which forms the terminal part of the conductor 28.

In a suitably packed manner a vertically adjustable rod 34 extends through the lower head 14 of the tube 10, said rod extending loosely through the lower wall 36 of the casing or housing 21. Below said casing said rod is shown provided with a horizontally directed operating handle or fingerhold 37.

The upper end of said rod 34 is curled in a horizontal plane and carries a foraminated plate 38 which normally supports a detached body 39, this body occupying less than the internal cross section of the tube 10 and having a specific grav-

ity somewhat greater than that of the liquid being dispensed, so that said body normally rests upon said support 38. When, however, a sufficient upflow of liquid through the tube occurs, said body 39, being freely movable in the liquid flow, will be lifted from its said support and will be moved up against the resilient tube 29 with sufficient force to spring the movable part of this tube upwardly, and also to deflect the lower wire 28a upwardly into a contacting, circuit closing relation to the stiffer upper wire 27a.

A pump 45 is operatively connected with a motor 47, from time to time to be driven thereby, thus to entrain liquid from a reservoir 48 and deliver it through the aforesaid conduit 13 to and through the main tube 10.

The circuit forming means shown in the drawing includes main supply wires 55 and 56 and the aforesaid conductor 27 branching off from said wire 55. Said wires 27 and 28 form a part of an auxiliary circuit which is normally open, but is closed when the resilient wire 28a is caused, as aforesaid, to engage the stiff wire 27a. A relay 57 is included in said auxiliary circuit to decrease the amperage through the aforesaid small, circuit completing wire 28a. Said relay is shown in circuit with said wire 28a and with the wire 27a which cooperates therewith. Whenever said relay 57 is actuated, by reason of the engagement of the wire 28a with the wire 27a closing said auxiliary circuit through said relay, said relay, in turn, by means of wires 59 and 61 completes the main circuit through a solenoid 59, causing the latter to open the main switch 62, assuming that the latter switch has been manually closed to put the apparatus into action to perform a dispensing operation. Said switch 62 is of the ordinary household light switch type.

The motor 47 has directly connected to it a shaft extension 65 to which is secured a brake drum 66 with which co-operates a conventional brake 67 of the automobile external brake drum type, said brake being normally held applied by a spring 68. This braking equipment includes a solenoid 71 which is operated whenever the motor is operated, by current from the same circuit, so that the brake is released whenever current is supplied to the motor. When the pump stops, check valve 73 prevents backflow, if that is necessary.

The lower head 14 of the tube 10 will preferably rest upon the lower wall 36 of the casing 21, and the pipes 16 and 12 will keep said tube in place.

The relay 57, solenoid 59 and their associated conductors may be carried by a panel 75 attached to the rear wall 76 of the casing 21, said panel being fragmentarily shown in Fig. 1.

In operating the apparatus, assuming the parts thereof are in the positions shown in full lines in the drawing wherein the switch 62 is open and there is a gap between the wire portions 27a and 28a, and therefore the pump and motor are not running, and that the adjustable rod 34 is positioned to dispense the desired amount of liquid each time the device is operated; whenever he desires to dispense that quantity of liquid the operator will close the switch 62, thus directing the current through the motor 47 from the main supply line comprising wires 55 and 56, starting the pump 45. This will cause the liquid to flow upwardly through the main tube 10, which, in turn, will move the detached body 39 upwardly from its foraminated support till said body engages the flexible tube 29 and, by flexing the lat-

ter upwardly, causes the switch structure therein to close. This will occur after the desired amount of liquid has been dispensed through the outlet conduit 12. When the switch formed by the wire portions 27a and 28a is closed the circuit is completed through and activates the relay 57 which, in turn, closes the circuit through the solenoid 59, causing the latter to reopen the switch 62, it being understood that this switch maintains itself in the adjusted position, whether open or closed.

When the liquid outflow through said tube 10 ceases the body 39, having a specific gravity only a little greater than that of the liquid being dispensed, gravitates through the motionless liquid down to the support 38. The shape of said body may be varied without exceeding the scope of the claimed invention. A piece of solid material of considerable size may move upwardly past said body, and said body, under pressure, will shift away from such a piece, thus providing a wider space for its passage.

It will be observed that by this invention a liquid dispensing device is provided which is manually pre-settable to dispense, under pressure, various mounts of liquid, so that the liquid delivered at each operation of the device may be used at a higher level, gravity not being depended upon to deliver the liquid from the measuring chamber to the place of use.

I claim:

1. In an electrically controlled liquid dispensing device, an elongated tube which is sealed in except for being provided with an inlet and an outlet spaced apart from each other lengthwise of the tube, mounting means supporting said tube in an upstanding position wherein said inlet is below said outlet, a pump operatively connected with said inlet to from time to time deliver a predetermined quantity of liquid therethrough into and through said tube under pressure to a place of use, an electric motor operatively connected with said pump, conductors forming a main electric circuit to supply current to said motor to operate it together with said pump, a manually operable switch in said circuit, conductors forming an auxiliary electric circuit, means located in said tube between said inlet and outlet to open and close said auxiliary circuit, the latter means normally maintaining said auxiliary circuit open, a freely movable body loose within said tube below said circuit opening and closing means of said auxiliary circuit, said body occupying somewhat less than the internal cross section of the tube and having a greater specific gravity than the liquid to be dispensed, an upwardly and downwardly adjustable support for said body detachably related thereto, whereby said body is normally supported at a predetermined distance below said circuit opening and closing means within said tube, so that upward flow of liquid through the tube will move said body upwardly into engagement with and operate the latter means, thus closing said auxiliary circuit, and means operatively connecting said auxiliary circuit and manually operable switch to open the latter whenever said auxiliary circuit is closed, thus stopping the operation of said motor and pump after the predetermined amount of liquid has been dispensed through said outlet.

2. The subject matter of claim 1, and said support for said body occupying less than the internal cross section of said tube and including a

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manually operable stem, projecting with a slidable fit through the lower end of said tube.

3. In a liquid dispensing apparatus of the kind described, the combination, with conductors forming an electric circuit operatively connected with means to supply under pressure liquid to be dispensed; of an upstanding main tube which is sealed in except for being provided with an outlet and with an inlet widely spaced below said inlet lengthwise of said tube, said inlet being in communication with said liquid supply means, a resilient tube of smaller diameter than said main tube, said resilient tube projecting with a liquid tight fit through the side wall of said main tube and having a vertically movable closed in portion within said main tube subjacent to the aforesaid outlet, the aforesaid circuit including conductors comprising a normally open circuit, circuit closing means within said movable portion of said resilient tube, which is closed by upward movement of said movable tube portion, a body loose within said main tube in freely movable detached relation thereto, said body being at all times located below said resilient tube and occupying less than the internal cross section of said main tube and having a specific gravity greater than that of the liquid dispensed by the apparatus, and vertically adjustable means normally to support said body within said main tube a predetermined distance below said resilient tube, each upflow through said main tube of the liquid being dispensed raising said body from said supporting means and causing said body to engage and move upwardly said movable tube portion, thus closing said electric circuit to thereby stop delivery, said body gravitating back to its said support upon the cessation of each aforesaid liquid upflow.

4. The subject matter of claim 3, and said normally open circuit, closing means comprising an upper terminal wire and a lower terminal wire, the latter wire being deflected upwardly into contact with the former whenever said vertically movable portion of said resilient tube is moved upwardly as aforesaid by the engagement of said body therewith.

5. In a liquid dispensing apparatus of the kind described, the combination, with conductors forming an electric circuit operatively connected with a means to supply under pressure liquid to be dispensed; of an upstanding tube which is sealed except for being provided with an inlet and with an outlet above said inlet, said inlet and outlet being widely spaced apart lengthwise of tube, said inlet being in communication with said liquid supply means, the conductors which form said electric circuit comprising a normally open circuit completing means within said tube subjacent to said outlet, a detached freely movable body within said tube occupying considerably less than the internal cross section thereof, means normally supporting said body at a predetermined distance below said circuit completing means, said body having a greater specific gravity than the liquid dispensed by the device, each upflow through said tube of the liquid dispensed therefrom lifting said body from said support and causing said body to engage and close said normally open circuit completing means, and means put into operation by the closing of said circuit to arrest upflow of the liquid through said tube, whereupon said body gravitates back to said support.

6. An apparatus of the kind described comprising a pump, a motor operatively connected

therewith, conductors providing a main electric circuit which supplies operating current to said motor, an electric switch in said main circuit which maintains itself in either open or closed position, said switch when open being manually movable to closed position, an elongated tube which is sealed in except for being provided with an inlet and an outlet spaced widely apart from each other lengthwise of the tube, mounting means supporting said tube in an upstanding position wherein said inlet is below said outlet and is in communication with said pump, conductors forming an auxiliary electric circuit, means located in said tube between said inlet and outlet to open and close said auxiliary circuit, the latter means normally maintaining said auxiliary circuit open, a freely movable body loose within said tube between said inlet and said circuit opening and closing means of said auxiliary circuit, said body occupying considerably less than the internal cross section of the tube and having a greater specific gravity than the liquid being dispensed, an upwardly and downwardly adjustable support for said body, detachably related thereto, whereby said body is normally supported at a selected distance below said circuit opening and closing means within said tube, so that upward flow of liquid through the tube will move said body up into engagement with and operate the latter means, thus closing said auxiliary circuit, and a solenoid operatively connecting said auxiliary circuit and manually operable switch to open the latter whenever said auxiliary circuit is closed, at such times stopping the operation of said motor and pump after a liquid dispensing operation.

7. An apparatus of the kind described comprising a pump, a motor operatively connected therewith, conductors providing a main electric circuit which supplies operating current to said motor, an electric switch in said main circuit which maintains itself in either open or closed position, said switch when open being manually movable to closed position, an elongated tube provided with an inlet and an outlet spaced widely apart from each other lengthwise of the tube, mounting means supporting said tube in an upstanding position wherein said inlet is below said outlet and is in communication with said pump, conductors forming an auxiliary electric circuit, means located in said tube between said inlet and outlet to open and close said auxiliary circuit, the latter means normally maintaining said auxiliary circuit open, a body loose within said tube between said inlet and said circuit opening and closing means of said auxiliary circuit, said body occupying somewhat less than the internal cross section of the tube and having a greater specific gravity than the liquid being dispensed, an upwardly and downwardly adjustable support for said body, detachably related thereto, whereby said body is normally supported at a selected distance below said circuit opening and closing means within said tube, so that upward flow of liquid through the tube will move said body up into engagement with and operate the latter means, thus closing said auxiliary circuit, a spring loaded brake positioned normally to brake the operation of said motor, a brake releasing solenoid in said main circuit positioned, when energized, to retract said brake against the opposition of its spring, and a solenoid operatively connecting said auxiliary circuit and manually operable switch to open the latter whenever said auxiliary circuit is closed, at such times stopping

the operation of said motor and pump after a liquid dispensing operation.

8. In an electrically controlled liquid dispensing apparatus of the kind described, the combination, with an upstanding main tube through which the liquid flows longitudinally and is from time to time dispensed in pre-determined quantities; of vertically movable electric circuit opening and closing means connected with the upper portion of said tube, and contained at least partly therewithin, an at all times completely submerged, detached body within said tube occupying considerably less than the internal cross section thereof, said body having a greater specific gravity than the liquid dispensed by the device, 15

and a vertically adjustable support for said body, each upflow of the liquid through said tube lifting said body from said support and causing said body to engage said circuit opening and closing means thus closing the circuit.

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