Oct. 7, 1947. C. F. PRANGLEY ET AL 2,428,383

LIQUID DISPENSING APPARATUS

Filed Jan. 21, 1944 2 Sheets-Sheet 1

Fig. 1.

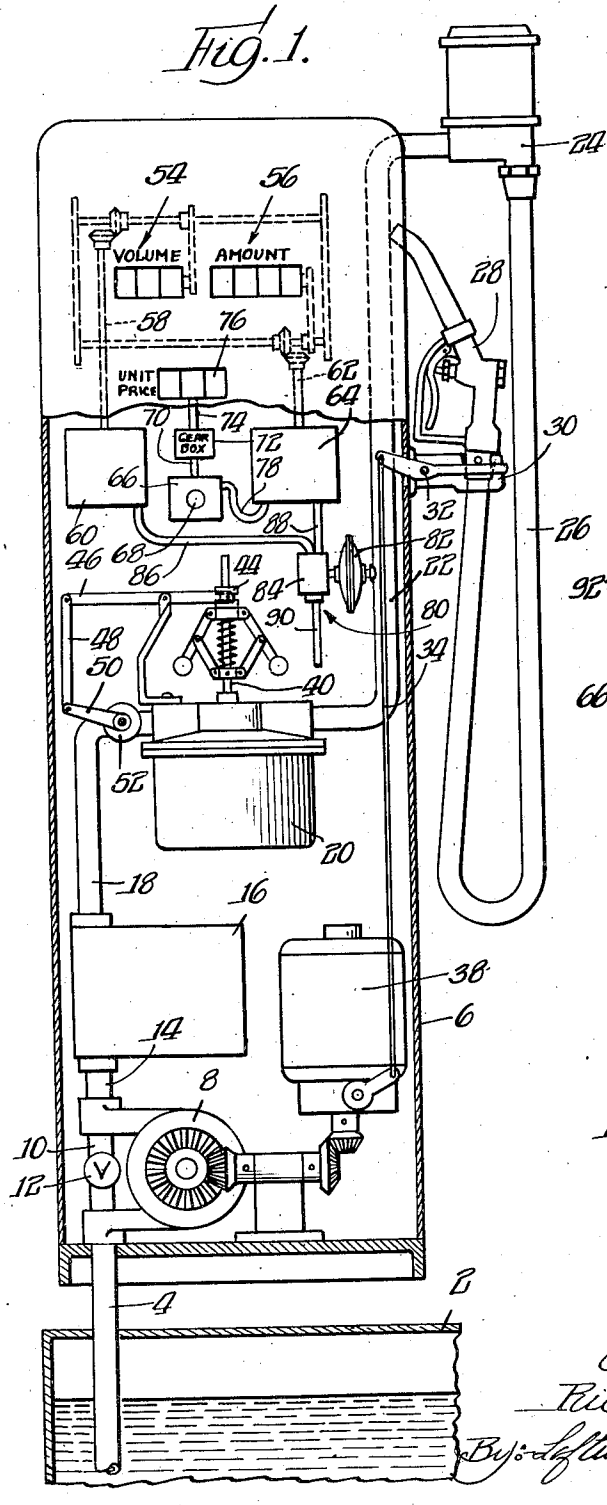


Fig. 2.

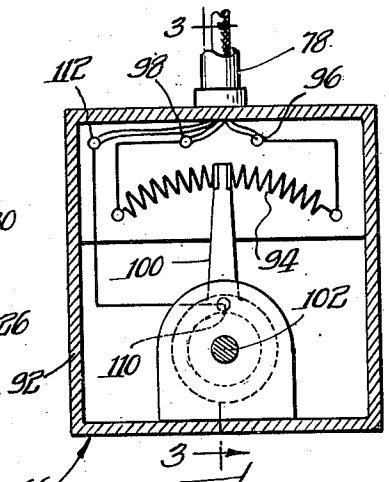
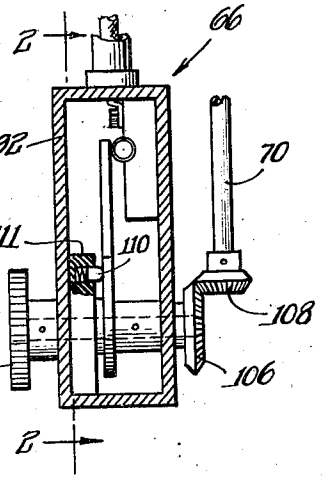


Fig. 3.



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Fig. 4.

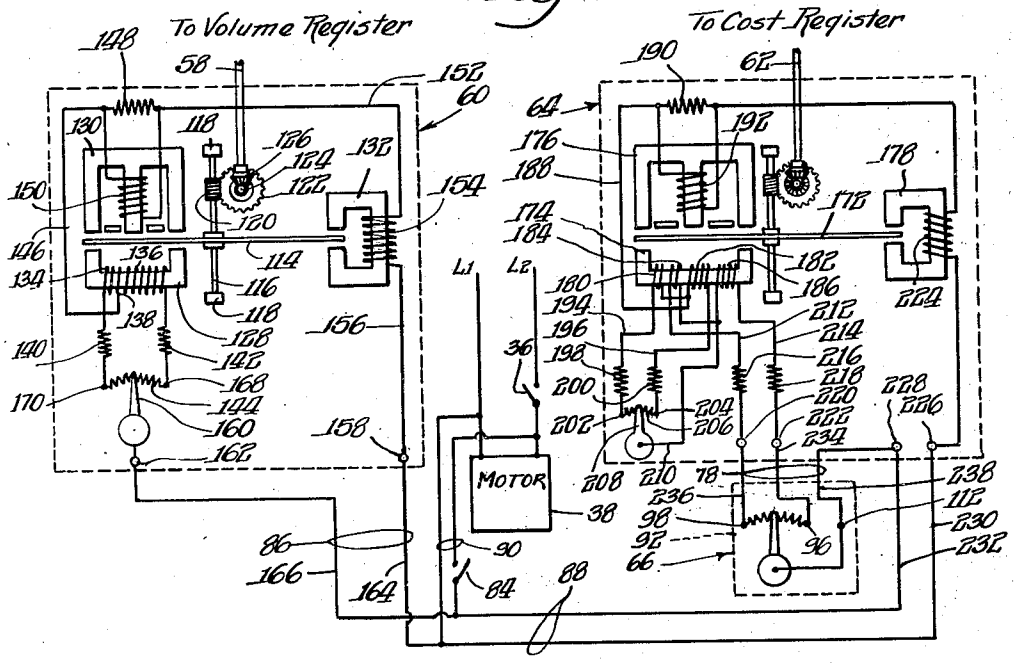


Fig. 5.

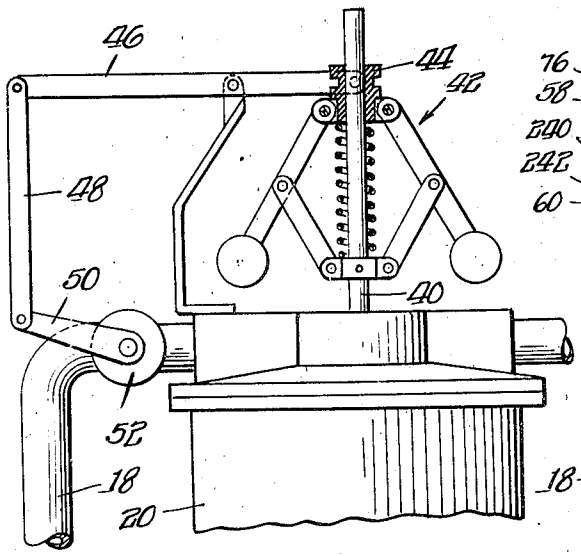
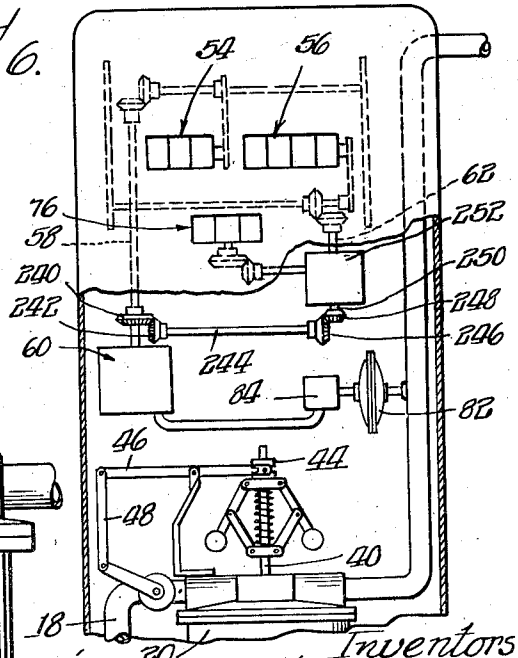


Fig. 6.



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LIQUID DISPENSING APPARATUS

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7 Claims. (Cl. 222—26)

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This invention relates to liquid dispensing apparatus, and concerns more particularly means for operating the register mechanisms provided in such apparatus for registering functions such as the volume and cost of the liquid dispensed.

It is an object of the invention to provide improved means for operating a registering mechanism or mechanisms in apparatus of the type defined.

More specifically, it is an object of the present invention to provide improved electrical means for operating the registers of a dispensing apparatus, which registers may be located at a remote point with respect to the dispensing line of the dispensing apparatus.

Various other objects, advantages and features of the invention will be apparent from the following specification when taken in connection with the accompanying drawings, wherein certain preferred embodiments are set forth for purposes of illustration.

In the drawings, wherein like reference numerals refer to like parts throughout:

Figure 1 is a view in elevation, and part in section, of a liquid dispensing apparatus embodying the present invention.

Figure 2 is a view in vertical section taken substantially along the line 2—2 of Figure 3.

Figure 3 is a view in vertical section taken substantially along the line 3—3 of Figure 2.

Figure 4 is a schematic diagram of the electric circuit forming a part of the present invention.

Figure 5 is a diagrammatic view of a rate of flow control mechanism forming part of the present invention.

Figure 6 is a fragmentary view in elevation, and partly in section, illustrating a modified form of the present invention.

Referring now to the drawings in detail, there is shown in Figure 1 the usual type of gasoline reservoir, preferably an underground tank 2, and a pipe 4 having the usual foot valve (not shown) at its lower portion and extending at its upper end into a housing 6 which may be of any desired type containing the pumping mechanism. The pipe 4 is connected within the housing to the suction side of any usual pump 8 having between its exhaust and intake sides a bypass line 10 controlled by a pressure responsive bypass valve 12. The pump 8 supplies the liquid to a dispensing line which comprises a pipe 14 which discharges the liquid into an air eliminator 16 of the usual construction; a pipe 18 which leads from the air eliminator 16 to a conventional meter 20, a pipe 22 into which the liquid measured by the meter is

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discharged, a sight glass and hose fitting 24 to which the pipe 22 is connected; a flexible dispensing house 26 and a nozzle valve assembly 28 with the usual lever controlled dispensing valve. The nozzle valve assembly is supported when not in use on the conventional supporting bracket 30 secured to an outer wall of the housing and, when in such position, prevents operation of a manually actuated switch operating lever 32 which, through a rod 34, actuates a switch 36 (Figure 4) to energize and deenergize the system.

An electric motor 38, preferably a single phase, alternating current synchronous motor, is connected to the supply lines L—1 and L—2 through the nozzle control switch 36 and is mechanically connected through suitable gears and shafts to the pump 8 to drive the latter, as indicated in Figure 1.

The meter 20 may be of any usual construction in which elements displaced by the flow of liquid through the meter actuate a meter shaft 40. The meter shaft 40 carries a speed regulating governor 42 of any suitable known structure having a speed responsive displaceable member, such as the yoke 44, connected as by lever 46, link 48 and crank 50 to a speed regulating valve 52 of any suitable known construction interposed in the pipe 18 between the air eliminator 16 and the meter 20. The speed regulator or governor 42 is so calibrated that by operation of the speed regulating valve 52, it maintains the flow of fluid through the dispensing line at a constant rate so long as the dispensing valve is fully open. The dispensing valve which is in the nozzle assembly 28 is of the type which is either fully on or fully off, so that when its operating handle is depressed, the valve moves immediately to fully open position and remains in that position as long as the lever is held in a depressed position by the operator, and moves to fully closed position when the lever is released. Thus, so long as the nozzle valve actuating lever is depressed, the fluid is dispensed at a rate determined by the setting and calibration of the governor 42. Dispensing of small amounts, as accomplished by the previously known types of dispensing apparatus, can be accomplished with this invention by the manual regulation of the time during which the valve is open, or the periodicity of successive opening and closing movements, manually controlled.

In the housing 6, or remotely therefrom, as may be desired, a resettable volume register 54 and a resettable cost register 56, which may be of any conventional structure and which, as shown in Figure 1, may be mounted adjacent

the top of the housing, in the customary manner. The actuating shaft 58 for the volume register 54 is driven by an induction meter motor mechanism 60 mounted in any convenient manner in the housing and below the registers, while the actuating shaft 62 for the cost register 56 is driven by an induction meter motor mechanism 64 similarly mounted in the housing below the registers. An electrical price variator or device 66 is also mounted in the housing in any convenient position, and is provided with an adjustment knob 68 for setting the price variator, which knob is connected to a shaft 70 interconnected through a gear box 72 to the adjusting shaft 74 of a unit price indicator 76 of the usual structure. The electrical price variator 68 is connected to the induction meter motor 64, through a cable 78, to control the operation of this induction meter in accordance with the setting of the price variator 66.

A pressure control switch device 80 has a pressure responsive actuating element 82 connected to the pipe 22, while its actuating switch mechanism 84 is connected by a cable 86 to the induction meter motor 60, by a cable 88 to the induction meter motor 64, and by cable 90 to a suitable source of supply, indicated in Figure 4 as supply lines L—1 and L—2.

The pressure control switch device 80, therefore, controls the energization and deenergization of the induction meters 60 and 64 in response to the pressure in the dispensing line so that when the valve is opened and liquid flows freely through the dispensing line at a relatively low pressure, these induction meters are energized and when, on closing of the nozzle valve, the pressure in the dispensing line rises to the value set by the bypass valve 12, the induction meters are deenergized.

The price variator 66, as shown in Figures 2 and 3, comprises an explosion-proof housing 92 in which is mounted a resistor, rheostat or potentiometer 94 having its opposite ends connected to terminals 96 and 98, and a wiper arm 100 mounted on a manually adjustable shaft 102 projecting through the forward wall of the housing and provided with an operating knob 104. The shaft 102 also extends through the opposite wall of the housing and carries a gear 106 meshing with a gear 108 carried by the vertical shaft 70 which extends into the gear box 72 that drives the unit price indicator 76. The wiper arm 100 is secured to, but insulated from, the shaft 102 and its annular hub portion engages a spring pressed contact pin 110 mounted in a terminal block 111, the contact pin 110 being connected to a terminal 112. The terminals 96, 98 and 112 are mounted in an appropriate manner in the housing 92 and are connected to the ends of the three-wire cable 78 which extends to the induction meter motor 64.

As shown in Figure 4, the induction meter motor 60 for driving the volume register comprises a conductive disk 114, preferably of aluminum, secured to a spindle 116 journaled in suitable end bearings 118 and provided with a worm or other gear 120 meshing with a worm wheel or other gear 122 on a suitably mounted shaft 124, carrying a second gear meshing with a gear 126 on the bottom of the register actuating shaft 58. The disk 114 is driven by magnets 128 and 130 and braked by a magnet 132. The magnet 128 is provided with differentially acting coils 134 and 136 connected at their inner ends, as at 138, and connected at their free ends through balancing, calibrated resistors 140 and 142, to the opposite ends of a resistor, rheostat or potentiometer 144. The common terminal 138 of the differentially acting coils is connected by a wire 146 to a resistor 148, across which the coil 150 of the electromagnet 130 is connected. The coil 150 constitutes the potential or voltage coil for the induction meter motor while the differentially acting coils 134 and 136, acting together, constitute the series or current coils for the induction meter motor. The wire 152 extends from the resistor 148 to the coil 154 of the braking electromagnet 132; the other side of this coil being connected by a wire 156 to a terminal 158. The wiper arm 160 of the potentiometer or rheostat 44 is connected to the terminal 162. The cable 86 is connected to the terminals 158 and 162, wire 164 of the cable being connected to terminal 158 and wire 166 being connected to terminal 162.

It will be evident, of course, that where necessary, a transformer may be connected between the cables 86 and 90 as between the cable 90 and the supply lines L—1 and L—2 to provide proper operating voltage for the induction meter motors. The several coils of the induction meter motors being properly proportioned and calibrated by the balancing resistances, the speed of the disk 114 is dependent solely upon the ratio of the resistance between the terminal 168 of the resistor, rheostat or potentiometer 144 and the arm 160 to the resistance between the opposite terminal 170 and the arm 160. Hence, by the adjustment of the wiper arm 160, the speed of the disk is made at every instant proportionate to the rate of flow of fluid through the dispensing line as set by the governor speed regulating device 42.

The braking coil 154 being properly proportioned to the series and potential coils, the speed of the disk is made independent of changes in the voltages, or frequency changes of the supply line. As the voltage or frequency changes, the driving torque applied to the disk by the magnets 128 and 130 varies, but at the same time the braking force or torque exerted by the magnet 132 varies in an opposite or compensating sense, so that for all practical purposes the speed of the disk is independent of the voltage and frequency and is determined solely by the position of adjustment of the wiper arm 160. The adjustment of the speed of the induction meter motor being thus so readily accomplished by the simple adjustment of the wiper arm 160, it may be maintained in perfect accuracy by periodic adjustment by the inspection official so that there is no need to put a pump out of commission by condemnation if the accuracy is not perfect, as such official may effect the simple adjustment at the time of inspection and reseal the explosion-proof housing in which the induction meter motor is mounted.

The induction meter motor 64 is generally similar to the induction meter motor 60, but the speed thereof is also governed by the price variator 66 in accordance with the price per unit volume of liquid dispensed. This induction meter motor, therefore, comprises a conductive disk 172 similar to the disk 114 and similarly connected to its register operating shaft 62 by which the cost register is driven. The disk 172 is driven by electromagnets 174 and 176 and braked by an electromagnet 178. The electromagnet 174 is, in this instance, provided with two sets of differentially acting coils, one set comprising a coil 180 and a coil 182, and the other set comprising a coil

184 and a coil 186. The coils 180 and 182 are interconnected at their adjacent ends and by wire 188 to one end of a resistor 190, across which the coil 192 of the magnet 176 is connected. At their other ends the coils 180 and 182 are connected through wires 194 and 196 and calibrated and balancing resistors 198 and 200 to the end terminals 202 and 204 of a resistor, rheostat or potentiometer 206. The cooperating wiper arm 208 is connected by a wire 210 to one end of the coil 186 and the adjacent end of the coil 184. The other ends of the coils 184 and 186 are connected through wires 212 and 214 and calibrating and balancing resistors 216 and 218 to terminals 220 and 222. The coil 224 of the braking electromagnet 178 is connected to the resistor 190 and to the terminal 226.

The terminal 226 and a companion terminal 228 are connected by wires 230 and 232, respectively, of the cable 88 to the cable 90. The terminals 96 and 98 of the price variator 66 are connected by the wires 234 and 236, respectively, of the cable 78 to the terminals 220 and 222 of the induction meter motor 64, while the third wire 238 of the cable 78 is connected from the terminal 112 to the terminal 228 of the induction meter motor. The induction meter motor 64 operates similarly to the induction meter motor 60, but integrates, in effect, the constant rate of flow of the liquid with the adjusted price per unit volume of the liquid dispensed. The rheostat or potentiometer 206 provides means for adjusting the induction meter motor 64 as to accuracy, while the rheostat or potentiometer of the price variator provides means for adjusting the speed of the induction meter motor in accordance with the unit price of the liquid dispensed.

The pressure actuated switch 84 maintains the two induction meter motors deenergized until the nozzle valve is opened and the pressure in the dispensing line has dropped to the normal dispensing pressure, at which time the switch 84 is automatically closed and the induction meter motors thereby energized.

It is to be noted that the nozzle switch controls the starting and stopping of the motor 38, while the pressure switch does not, and, further, that regardless of whether the pressure switch is open or closed, the induction meter motors cannot be started until the nozzle valve assembly is removed from its support and the switch 36 manually closed.

As shown in Figure 6, the single induction meter motor 60 drives both the volume register 54 and the cost register 56. For this purpose, the register actuating shaft 58 for the volume register is connected by gears 240 and 242 to a shaft 244, in turn connected by gears 246 and 248 to a shaft 250 which, through any suitable mechanical variator 252 that is adjustable in accordance with the unit price per volume of liquid dispensed, drives the actuating shaft 62 of the cost register. Through suitable shafts and gearings, the mechanical variator 252 is connected in the usual manner to the price indicator 76.

In both forms of the invention, the registers are driven independently of the meter 20 without any mechanical or governing connection therebetween, and yet register accurately the volume and cost of the liquid dispensed and are under the control of the operator so that they are energized and deenergized with the initiation and termination of each dispensing transaction.

It will be evident from the foregoing that applicants have provided a liquid dispensing apparatus, including improved electrical means for operating the volume and cost registers, which registers may be located at a remote point with respect to the dispensing line of the apparatus.

Obviously the invention is not limited to the specific details of construction disclosed herein but is capable of other modifications and changes without departing from the spirit and scope of the appended claims.

We claim:

1. In a liquid dispensing device, a dispensing line, means for supplying liquid under pressure to said line, a dispensing valve controlling the flow of liquid through said line, flow regulating means for maintaining a constant rate of flow through said line when said valve is open, a cost register, electrically operable motor means driving said cost register and operating at a speed proportionate to the maintained constant rate of flow of liquid through said line, and price adjustable means for adjustably varying the speed of the motor means operating the cost register in accordance with the price per unit of liquid dispensed.

2. In a liquid dispensing device, a dispensing line, a dispensing valve in said line for opening and closing said line to the flow of liquid therethrough, means in said line for forcing liquid therethrough, when the valve is open, at a constant rate of flow, a cost register, voltage and frequency compensated electrical motor means for operating said register, control means for presetting the speed of the motor and adjustable speed control, price variator means for adjustably presetting the speed of operation of the motor means driving the cost registered in proportion to both the price per unit volume of liquid dispensed and the constant rate of flow of the liquid through the dispensing line.

3. In a liquid dispensing apparatus, the combination of a source of liquid supply, a pump, the suction side of which is connected to said source, a dispensing line connected to the outlet side of said pump and through which liquid is forced by said pump, a dispensing valve in said line having an open position and a closed position, flow regulating means in said line, means responsive to the flow of liquid through said line and connected to said flow regulating means to maintain a constant rate of flow of liquid through said line when said valve is open, registering means having a volume registering portion and a cost registering portion, electrically operable motor means independent of said flow responsive means for driving the volume registering portion of the registering means, said motor means including electrical speed presetting means preset to cause the speed of driving the volume registering portion to be in fixed ratio to the constant rate of flow of liquid through said line, electrically operable motor means for driving the cost registering portion of the registering means, said last mentioned motor means including electrical speed control means for adjustably presetting the speed of driving the cost register in proportion to the constant rate of flow of liquid through said line and the price per unit volume of liquid dispensed, and means for initiating and terminating operation of both said motor means simultaneously on opening and closing of said dispensing valve.

4. In a liquid dispensing apparatus, the combination of a source of liquid supply, a pump, the suction side of which is connected to said source, a dispensing line connected to the outlet side of

said pump, a dispensing valve in said line and having an open position and a closed position, flow responsive and regulating means for maintaining a constant rate of flow of liquid through said line when said valve is open, mechanical registering means for registering the cost of the liquid dispensed, electric motor means independent of said flow responsive and regulating means for driving the said registering means, electrically operable speed control means adjustably presettable to proportion the speed of driving of the registering means by the motor means to the constant rate of flow of liquid through said line, and auxiliary electrically operable speed control means for adjustably varying the speed of driving the registering means by said motor means in accordance with the price per unit of volume of liquid dispensed.

5. In a liquid dispensing apparatus, the combination of a source of liquid supply, a pump, the suction side of which is connected to said source, a dispensing line connected to the outlet side of said pump, a dispensing valve in said line and having an open position and a closed position, flow responsive and regulating means for maintaining a constant rate of flow of liquid through said line when the valve is open, means for registering the volume of liquid dispensed through said line, electrically operable motor means independent of said flow responsive and regulating means for driving the said volume register in proportion to the constant rate of flow of liquid through said line, and means responsive to the opening and closing of said valve for initiating and terminating the operation of said motor means.

6. In a liquid dispensing device, a source of liquid under pressure connected to a dispensing line, a valve for controlling the flow of liquid through said line, flow regulating means for maintaining a constant rate of flow of liquid

through said line when said valve is opened, an indicating register, an electric motor connected to drive said register at a speed proportional to the flow of liquid through said dispensing line, and means for adjusting the speed of said motor to operate said register in accordance with the ratio between a unit of liquid dispensed and a unit factor to be indicated.

7. In a liquid dispensing device, a source of liquid under pressure connected to a dispensing line, a valve for controlling the flow of liquid through said line, flow regulating means for maintaining a constant rate of flow of liquid through said line when said valve is opened, an indicating register, an electric motor connected to drive said register at a speed proportional to the flow of liquid through said dispensing line, means for adjusting the speed of said motor so as to be proportionate at each instant to the constant rate of flow of liquid through said dispensing line, and means for adjusting the speed of said motor to operate said register in accordance with a selected ratio between a unit of liquid dispensed and a unit factor to be indicated by said register.

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