

Aug. 13, 1935.

A. E. PAIGE

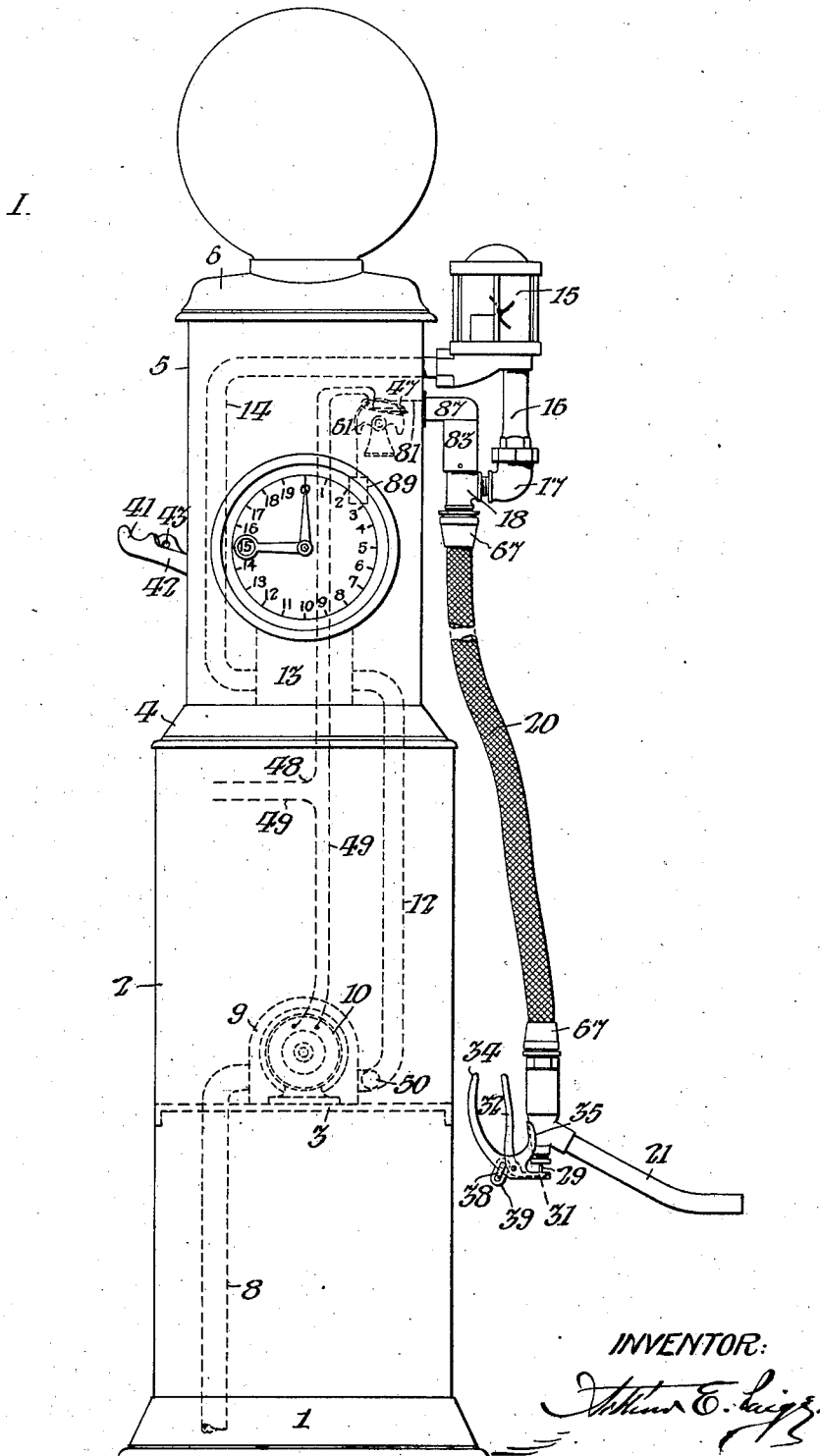
2,011,009

LIQUID DISPENSING APPARATUS

Filed Feb. 5, 1931

2 Sheets-Sheet 1

FIG. 1.



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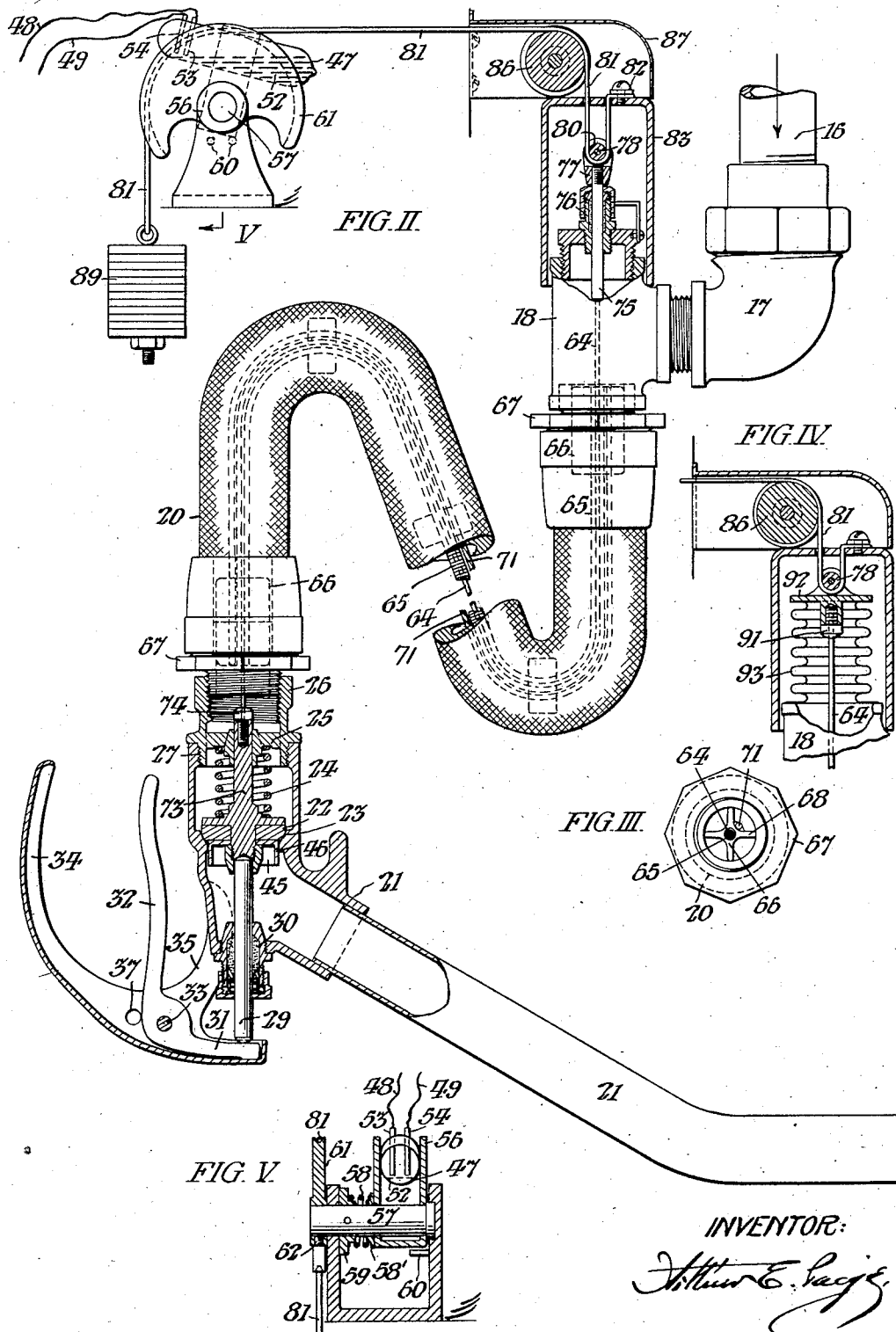
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INVENTOR:

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UNITED STATES PATENT OFFICE

2,011,009

LIQUID DISPENSING APPARATUS

Arthur E. Paige, Philadelphia, Pa.

Application February 5, 1931, Serial No. 513,567

12 Claims. (Cl. 221—95)

My invention may be advantageously employed in apparatus for dispensing gasoline from curb stands, and particularly such apparatus wherein the discharge of liquid is effected by an electrically driven pump, in the stand, controlled by a switch, in the stand, operable by means of a flexible mechanical connector, such as a push or pull wire or pull cable extending along a flexible liquid dispensing hose to manually operative means for moving said wire or cable at a dispensing nozzle at the discharge end of said base.

Ordinarily, such a flexible connector is carried by the hose in eccentric relation to the latter; however, I have shown my invention embodied in a form including a hose provided with means for supporting the flexible connector in coaxial position in the hose, as disclosed in my copending application Serial No. 535,751 filed December 31, 1930, and as described and claimed in my copending application Serial No. 512,318 filed January 30, 1931.

An object and effect of my invention is to provide means to automatically effect adjustment of the motion-transmitting device above contemplated, connecting the spaced switch and valve so as to not only maintain the same in proper cooperative relation while permitting the hose to be flexed to the maximum degree necessary or desirable for dispensation of liquid there-thru, but to also automatically compensate for wear and stretch of the parts.

My invention also includes such construction and arrangement of the nozzle valve in connection with said motion-transmitting device that a lever adapted to operate said valve may be utilized to contemporaneously operate the switch but with such correlation of the parts that the switch may be closed before said valve is opened and the effective area of the valve opening be varied at the will of the operator without breaking the circuit at the switch.

My invention includes the various novel features of construction and arrangement hereinafter more definitely specified.

In said drawings; Fig. I is an elevation of liquid dispensing apparatus of the character aforesaid including a convenient embodiment of my invention.

Fig. II is a fragmentary partly sectional elevation of the dispensing hose and its appurtenances indicated in Fig. I. The hose is shown distorted intermediate of its length in Fig. II in that it is impossible to bend it upon such short radii as there indicated. In practice, the shortest

radius of any bend in the hose is at least five inches.

Fig. III is an elevation of the lower end of the lower hose coupling shown in Fig. II, but detached from the nozzle.

Fig. IV is a fragmentary vertical sectional view showing a modified form of the motion-transmitting means wherein a corrugated metal bellows is substituted for the plunger mounted to reciprocate in the stuffing box shown in Fig. II.

Fig. V is a vertical sectional view of the switch cradle and its support, taken on the line V in Fig. II in the direction of the arrow marked on said line.

Referring to Fig. I; the pump stand includes the base 1, casing 2, platform 3, center frame 4, casing 5, and dome 6.

The liquid to be pumped is withdrawn from a subjacent tank thru the pipe 8 by and thru the rotary pump 9 which is supported by said platform 3. Said pump is operatively connected with the electric motor 10 and adapted to discharge the liquid thru the pipe 12, the meter 13, and the pipe 14, into the sight gage 15 from which it gravitates thru the pipe 16 and the elbow 17 and T fitting 18 into the flexible dispensing hose 20. Said hose has, at its free end, the nozzle 21 containing the valve 22 which is normally closed upon its seat 23 by the pressure of the spring 24 which abuts at its free end against the cross bar 25 in the adapter 26 which is detachably connected with the nozzle by the screw thread 27. Said valve has the stem 29 extending thru the stuffing box 30 in the nozzle 21 adapted to be operated by the arm 31 of the lever 32 which is fulcrumed at 33 in the handle frame 34 which is rigidly connected with said nozzle 21, conveniently by spot welding its opposite bracket members 35 thereon.

Said handle frame 34 is U-shaped in cross section and has aligned openings 37 in its opposite walls to receive the staple 38 of the lock 39 indicated in Fig. I to prevent unauthorized manipulation of said lever 32 to operate said valve and the parts connected therewith, as hereinafter described. Said nozzle may be thus locked in inoperative position when hung in the hook 41 of the support 42 projecting from said casing 5; in which position the staple 38 is extended thru the opening 43 in said support.

Said valve 22 is provided with the follower 45 which, as shown in Fig. II, includes a circular cylindrical skirt flange slip fitted in the port 46 in said seat 23, controlled by said valve; so that altho said valve may be moved from its seat by an

operator gripping said lever 32 and handle 34 together; the motion of said valve is idle, as far as dispensation of liquid thru said port 46 is concerned until the skirt flange on said follower 45 is thrust thru said port 46 far enough to permit passage of liquid thru the latter. Such motion is utilized to operate an electric switch 47 controlling said motor 10 thru the circuit conductors 48 and 49; but with such correlation of the parts that said switch may be closed to start the operation of said pump 9, before said valve 22 is opened, and the effective area of the valve controlled port 46 be varied at the will of the operator without breaking the pump motor circuit at said switch; so that the operator may control the rate of discharge of liquid thru said hose, to vary the same without variation in the operation of the pump. In order to limit the pressure imposed upon the liquid in the conduit 12 by the operation of said pump; I find it convenient to provide the bypass valve 50 which opens to permit the escape of liquid from the discharge to the intake side of said pump at a predetermined pressure for which said valve 50 may be variably set.

Said switch 47 conveniently includes an evacuated glass tube containing the body of mercury 52 which, in the open position shown, is separated from the terminals 53 and 54 of said electric circuit 48 and 49, but electrically connects them when said switch 47 is tilted counterclockwise with reference to Figs. I and II which show said switch in open position and said valve closed.

As shown in Fig. V, said switch 47 is detachably mounted in the cradle 56 which is carried by the rock shaft 57 and frictionally engaged therewith by the spring 58, which latter is compressed between the washer 58', which bears against said cradle, and the collar 59 fixed on said shaft; so that said shaft may be turned in either direction, idly, in excess of the motion required to tilt said cradle 56 to the slight extent necessary to open and close said switch. Such tilting movement may be limited by the stop pins 60 indicated in Figs. II and V. Such rocking movement of the shaft 57 is conveniently effected by the sector 61 which is rigidly connected therewith, conveniently by the set screw 62 shown in Fig. V.

The operation of said switch 47 both to open and close it, is effected by motion transmitting means including the flexible connector 64 which may be a single wire but is preferably a cable including a plurality of fine wires twisted together. For instance, forty-two fine phosphor bronze wires may be grouped in six strands of seven each and twisted around a cotton cord center to provide a cable one-sixteenth of an inch in diameter having the maximum degree of flexibility with the maximum degree of resistance to elongation under tensile stress. Said connector 64 is mounted to reciprocate in the liquid passageway of said dispensing hose 20, in coaxial relation with the latter by extension through the flexible tubular sheath 65 which may be conveniently formed of a single helically wound wire with its convolutions in close relation and having its ends fixed in spacing members 66 rigidly connected with the opposite end couplings 67 of said hose 20 as indicated in Fig. III; each of said spacing members comprising an axial tube maintained in coaxial relation with the hose by a plurality of radially extending flanges 68. The intermediate portions of said sheath 65 are conveniently slipfitted thru spacing members 70 which are similar to the members 66 but shorter and held in proper spaced

relation longitudinally with respect to the hose by the constant length cable 71 which is conveniently formed of a plurality of small wires twisted together and soldered or brazed at its opposite ends upon said spacing elements 66, as indicated in Fig. III.

A liquid dispensing hose structure having means for supporting in coaxial relation therewith reciprocatory motion transmitting means such as above described is claimed in my copending application Serial No. 505,751 filed December 31, 1930, for Letters Patent of the United States.

Said motion transmitting flexible connector 64 is preferably connected with the stem 73 of said valve 22 by the screw 74 which is fixed upon the end of said connector 64 and axially adjustable in said stem which is mounted to reciprocate as a plunger thru said bearing 25.

The opposite end of said flexible connector 64 is fixed in the plunger 75 which is mounted to reciprocate in the stuffing box 76 carried by said T fitting 18. As shown in Fig. II, said plunger 75 has its upper end screw threaded in axially adjustable relation with the yoke 77 which carries the pulley 78 engaged in the bight 80 of the flexible connector 81 which is detachably rigidly secured at one end, conveniently by the clamp screw 82 upon the normally stationary but removable cover 83 which incloses said stuffing box 76; so that every longitudinal movement of said connector 81 effected by the lever 32 and the spring 24 is double that imparted from the flexible connector 64 to said pulley yoke 77. Said connector 81 extends over the idle pulley 96 in the casing 87 to said sector 61 and, in order to maintain a proper tension of said connector 81, through said plunger 75, upon said connector 64, I find it convenient to provide the weight 89, pendent from said connector 81 over said sector 61 which is, in effect, a bell crank lever.

It may be observed that in the arrangement above described, said weight not only maintains tensile stress on the flexible connector 64 of the motion transmitting device between said switch and valve, but also partially counterbalances the pressure of the liquid in the hose, which tends to close said valve, and thus facilitates the opening movement of the latter. Of course, the inclusion of motion multiplying means in the motion transmitting device above described permits the use of a smaller weight to accomplish a given result than if such motion multiplying means were omitted from said device. Moreover, I prefer to make said weight in sections, as indicated, or otherwise adapted for variation, so that the apparatus may be calibrated to effect the coordinate operation of the valve and switch with the minimum exertion by the operator.

Motion transmitting and multiplying means cooperatively connecting said flexible connectors 64 and 81 may be formed without the plunger 75 and stuffing box 76. For instance, as shown in Fig. IV, the screw 91 at the upper end of the cable 64 may be fitted in axially adjustable position in the head 92 of the corrugated metal bellows 93, which is attached at its lower end to the T fitting 18. Said head 92 is adapted to carry the pulley 78 with the same effect as above described with reference to Fig. II.

In the form of my invention shown in this case, said bellows 93 is normally partly collapsed so that when the tension on the cable 64 is relaxed, the bellows is distended by the weight 89. 75

However, a spring may be substituted for said weight.

However, such motion transmitting and multiplying means as shown in Fig. IV are described and claimed in my copending application Serial No. 505,751 filed December 31, 1930, for Letters Patent of the United States for Liquid dispensing apparatus wherein the bellows is normally distended but adapted to be collapsed by pulling a cable equivalent to 64 to close an electric switch. In other words; such motion transmitting means as above described may be stressed and moved axially either away from or toward the nozzle end of the hose to effect the switch closing operation.

Therefore, I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. In liquid dispensing apparatus, the combination with a flexible hose; of a flexible connector extending along said hose and axially movable relatively thereto; means at the discharge end of said hose whereby said flexible connector may be axially moved; a plunger at the initial end of said hose, operatively connected with said axially movable connector; a pump whereby said liquid is dispensed; an electric motor operatively connected with said pump; an electric switch in the motor circuit, adapted to control the operation of said pump; and a motion multiplying device, and frictional switch engaging means, connecting said plunger with said switch; whereby said switch may be operated by means at the discharge end of said hose, regardless of position of flexure of the latter, and the relative position of said switch and plunger may be adjustably varied at said frictional means, to variably determine the position of said plunger at which said switch is operated by said connector.

2. In liquid dispensing apparatus, the combination with a flexible hose; of a flexible connector extending along said hose and axially movable relatively thereto; means at the discharge end of said hose whereby said flexible connector may be axially moved; a plunger at the initial end of said hose, operatively connected with said axially movable connector; a pump whereby said liquid is dispensed; an electric motor operatively connected with said pump; an electric switch in the motor circuit, adapted to control the operation of said pump; and a motion multiplying device connecting said plunger with said switch; whereby said switch may be operated by means at the discharge end of said hose, regardless of position of flexure of the latter wherein the motion multiplying device includes a flexible connector operatively connected at one end to said switch and fixed at its opposite end and depending in a bight, and a pulley carried by said plunger and engaged in said bight; whereby the motion imparted to said switch is more than that imparted to said plunger by the operating means at the discharge end of said hose.

3. In liquid dispensing apparatus, the combination with a flexible hose; of a flexible connector extending along said hose and axially movable relatively thereto; means at the discharge end of said hose whereby said flexible connector may be axially moved; a plunger at the initial end of said hose, operatively connected with said axially movable connector; a

pump whereby said liquid is dispensed; an electric motor operatively connected with said pump; an electric switch in the motor circuit, adapted to control the operation of said pump; and a motion multiplying device connecting said plunger with said switch; whereby said switch may be operated by means at the discharge end of said hose, regardless of position of flexure of the latter; wherein the motion multiplying device includes a flexible connector operatively connected at one end to said switch and fixed at its opposite end and depending in a bight, and a pulley carried by said plunger and engaged in said bight; whereby the motion imparted to said switch is more than that imparted to said plunger by the operating means at the discharge end of said hose; and adjustably variable means adapted to automatically stress said switch to a predetermined position, when released.

4. In liquid dispensing apparatus, the combination with a flexible hose; of a flexible connector extending along said hose and axially movable relatively thereto; means at the discharge end of said hose whereby said flexible connector may be axially moved; a plunger at the initial end of said hose, operatively connected with said axially movable connector; a pump whereby said liquid is dispensed; an electric motor operatively connected with said pump; an electric switch in the motor circuit, adapted to control the operation of said pump; and a motion multiplying device connecting said plunger with said switch; whereby said switch may be operated by means at the discharge end of said hose, regardless of position of flexure of the latter; wherein the motion multiplying device includes a flexible connector operatively connected at one end to said switch and fixed at its opposite end and depending in a bight, and a pulley carried by said plunger and engaged in said bight; whereby the motion imparted to said switch is more than that imparted to said plunger by the operating means at the discharge end of said hose, and adjustably variable means adapted to automatically stress said switch to a predetermined position, when released, including an oscillatory body carrying a movable member of said switch; and a weight pendent from said oscillatory body.

5. In a liquid dispensing apparatus, the combination with a flexible hose of stretchable material; of means adapted and arranged to render the axial length of said hose substantially constant; an electric switch at the initial end of said hose; means controlled by said switch for forcing liquid through said hose; switch operating means at the discharge end of said hose; and a flexible connector extending along the hose from said switch to said switch operating means; whereby said switch may be controlled by an operator at the discharge end of the hose, regardless of flexure of the latter.

6. Liquid dispensing apparatus as in claim 5; wherein the flexible switch connector is provided with a metal body mounted to reciprocate axially with respect to the hose at the switch end thereof, and provided with another such body at the discharge end of the hose.

7. In a liquid dispensing system, a conduit including a flexible hose, and a port through which the liquid is dispensed; means for supplying liquid through said conduit; an electric switch for controlling said supplying means; a valve for controlling said port, including means maintaining said port closed during the initial movement of

tinually cooperatively connecting said valve and switch; whereby movement of said switch is consequent upon any movement of said valve; means for continually stressing said valve toward its closed position and said switch toward its open position; said valve being normally closed and said switch normally open; and means for moving said valve toward its open position; whereby closing movement of said switch may be effected as a consequence of opening movement of said valve, before said valve is opened.

8. In a liquid dispensing system, a conduit including a flexible hose, and a port through which the liquid is dispensed; means for supplying liquid through said conduit; an electric switch for controlling said supplying means; a valve for controlling said port, including means maintaining said port closed during the initial movement of said valve toward its open position; means continually operatively connecting said valve and switch; whereby movement of said switch is consequent upon any movement of said valve; means for continually stressing said valve toward its closed position and said switch toward its open position; said valve being normally closed and said switch normally open; and means for moving said valve toward its open position; whereby opening movement of said switch may be effected as a consequence of closing movement of said valve, before said valve is closed.

9. In a liquid dispensing system, a conduit including a flexible hose, and a port through which the liquid is dispensed; means for supplying liquid through said conduit; an electric switch for controlling said supplying means; a valve for controlling said port, including means maintaining said port closed during the initial movement of said valve toward its open position; means continually operatively connecting said valve and said valve toward its open position; means con-

switch; whereby movement of said switch is consequent upon any movement of said valve; means for continually stressing said valve toward its closed position and said switch toward its open position; said valve being normally closed and said switch normally open; and means for moving said valve toward its open position; whereby closing movement of said switch may be effected as a consequence of opening movement of said valve, before said valve is opened, and opening movement of said switch may be effected as a consequence of closing movement of said valve, before said valve is closed.

10. A liquid dispensing system as in claim 7, wherein the means continually cooperatively connecting said valve and switch include frictional engaging means for the switch permitting relative adjustment of the position of said switch with reference to the position of said valve, whereby the relation of the closing movement of said switch and the opening movement of said valve may be adjustably varied.

11. A liquid dispensing system as in claim 8, wherein the means continually cooperatively connecting said valve and switch include frictional engaging means for the switch permitting relative adjustment of the position of said switch with reference to the position of said valve, whereby the time relation of the operation of said valve and switch may be adjustably varied.

12. A liquid dispensing system as in claim 9, wherein the means continually cooperatively connecting said valve and switch include frictional engaging means for the switch permitting relative adjustment of the position of said switch with reference to the position of said valve, whereby the time relation of the operation of said valve and switch may be adjustably varied.

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CERTIFICATE OF CORRECTION.

Patent No. 2,011,009.

August 13, 1935.

ARTHUR E. PAIGE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 11, for "base" read hose; second column, line 26, strike out the comma and insert a period; page 2, second column, line 33, for "82" read 32; and page 4, line 40, claim 9, strike out the words "said valve toward its open position; means con-"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of October, A. D. 1935.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.