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CONTROL ASSEMBLY FOR A LIQUID DISPENSER

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2 Sheets-Sheet 1

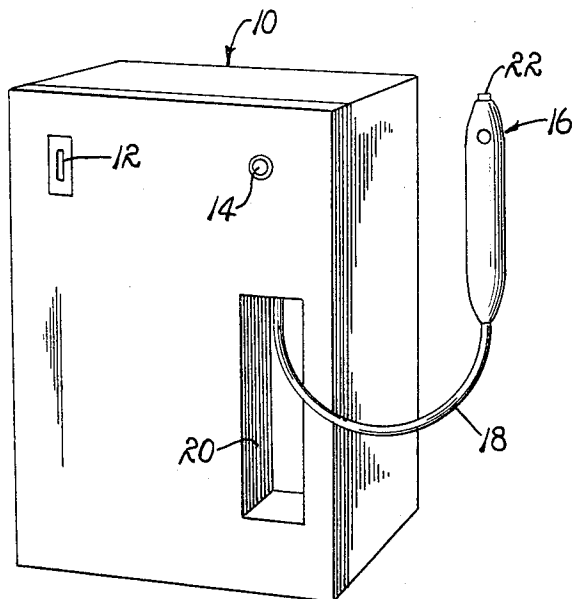


FIG. 1.

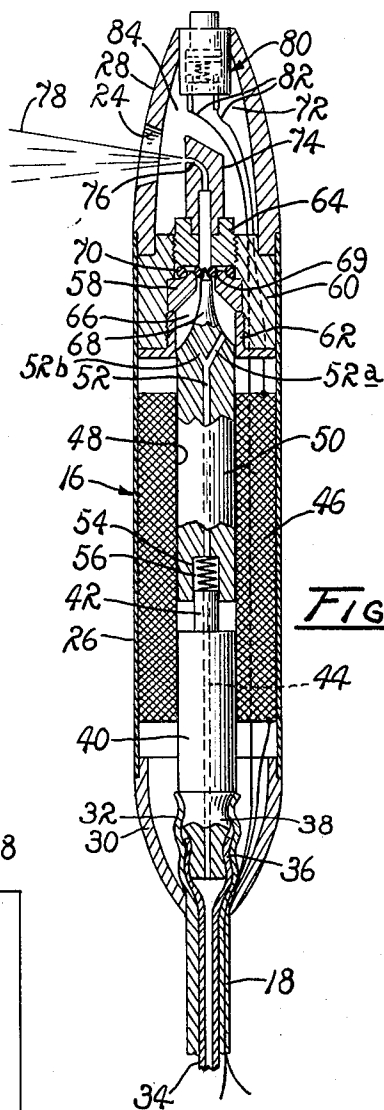


FIG. 2.

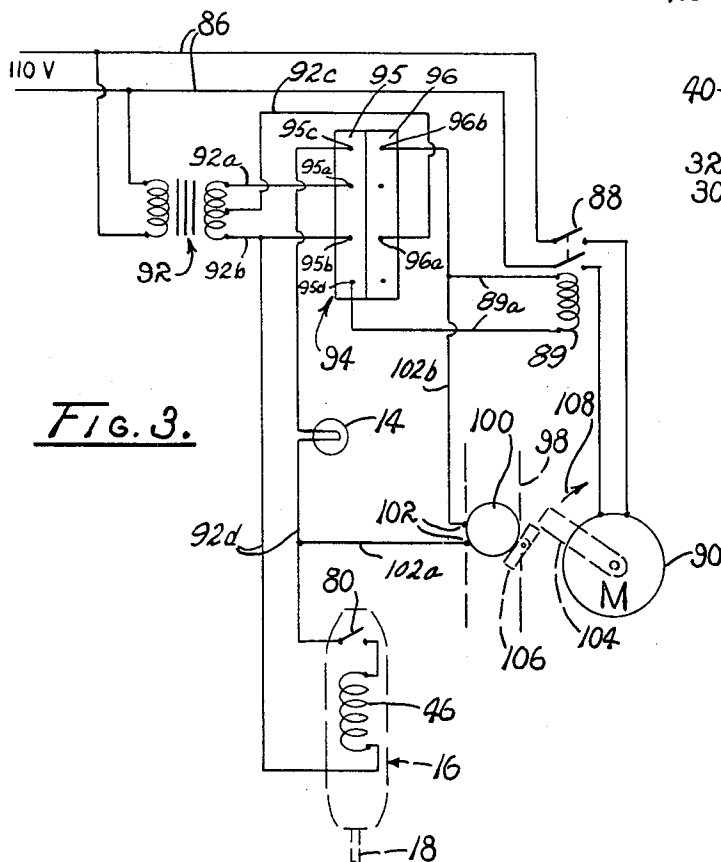


FIG. 3.

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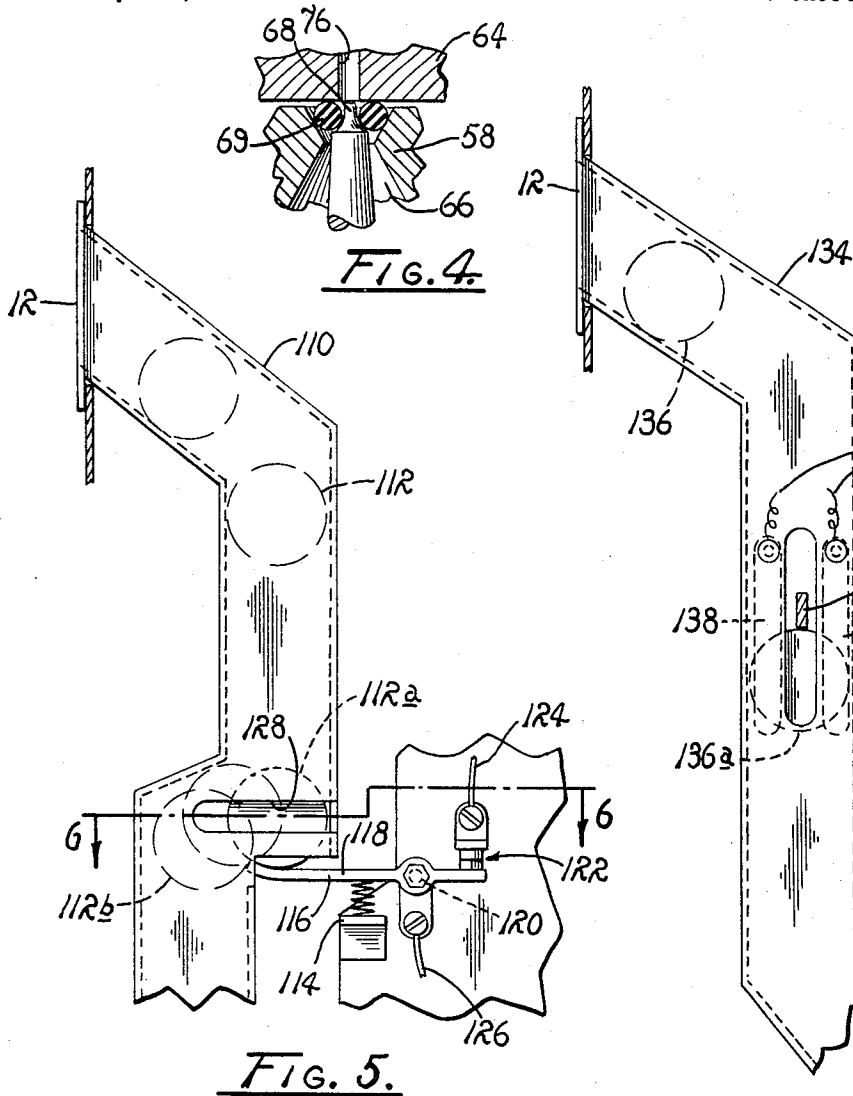
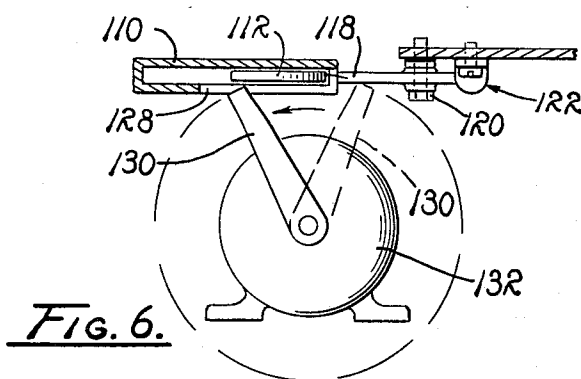
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CONTROL ASSEMBLY FOR A LIQUID DISPENSER

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5 Claims. (Cl. 194—6)

ABSTRACT OF THE DISCLOSURE

A liquid dispensing device providing a dispensing nozzle connected to a source of fluid and including an electrical control circuit connected to the nozzle having an aggregate time measuring device actuated by a coin and adapted to release the coin upon the expiration of a predetermined aggregate time, and a manually controlled switch electrically connected in series arrangement with the aggregate time measuring device to permit actuation of the nozzle in selected increments of operation until said increments equal the predetermined aggregate time afforded by the measuring device.

The present invention is extremely well suited for machines of the type of coin vending machines, adapted for dispensing liquids in the nature of hair sprays, perfumes, hair and face dressings and lotions, and other similar substances which in general consist of a sticky substance which has caused problems by creating malfunctioning of dispensing valves or the like.

An object of the present invention is to provide a liquid dispensing machine of the character described wherein dual interconnected electrical control means are provided, which require the utilization of a coin to prime an electrical circuit and render it operable prior to operation of a dispensing nozzle. Additional structural means are incorporated in the dispensing nozzle whereby, subsequent to deposition of a coin in the machine, a separate control mechanism, such as a button, must be actuated prior to actual dispensing of a desired liquid.

A still further object of the present invention is the incorporation in a liquid dispensing machine and apparatus of an electrical circuit necessitating initial deposition of a coin to actuate a time control dispensing circuit, and further including a dispensing nozzle control circuit which is operable to activate or deactivate liquid dispensing operation of a nozzle selectively, irrespective of the time control circuit but incorporated therein, to insure an over-all liquid dispensing time increment which is not affected by non-dispensing time periods, but which cumulatively assures an over-all predetermined liquid dispensing period.

Another feature of the present invention resides in a valving mechanism in a dispensing nozzle which insures proper and prompt functioning for dispensing and non-dispensing periods for a liquid through the dispensing nozzle, and which valving mechanism is especially designed to prevent sticking or jamming due to the nature of liquid being dispensed, and to insure prompt opening and closing of a discharge conduit and opening in the dispensing mechanism, in conjunction with a selectively operable electrical circuit for controlling periods of opening and closing of the dispensing mechanism.

Another object of the present invention is the provision of a liquid dispensing mechanism and liquid dispensing nozzle of a simple, inexpensive and failure proof nature, particularly suitable for operation as a coin vending machine for general use by the public for dispensing liquids of various types, and which gives optimum and fail safe operations over a protracted period of time,

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with a desired operational control cycle functioning at the desire of a user of the apparatus.

Additional objects and features of the present invention will be more readily apparent from the following detailed description of preferred embodiments thereof when taken together with the accompanying drawings in which:

FIG. 1 is a perspective view of a liquid dispensing machine in accordance with the present invention, including a liquid dispensing nozzle connected thereto;

FIG. 2 is an enlarged view, partially in section, of a liquid dispensing nozzle in accordance with the present invention;

FIG. 3 is a schematic view of an electrical circuit for control of the dispensing machine of the invention;

FIG. 4 is a fragmentary enlarged view, partly in section, of a valving construction particularly suitable for use in the dispensing nozzle of the present invention;

FIG. 5 is a schematic view of coin operable mechanism adapted for actuation of a portion of the dispensing machine;

FIG. 6 is a view taken on line 6—6 of FIG. 5; and

FIG. 7 is a view similar to FIG. 5 and showing a modified coin actuatable circuit operating mechanism.

Referring now in more detail to the drawings, there is shown in FIG. 1 a cabinet, generally designated 10, adapted for containing the mechanism of the present invention, and of a usual construction suitable for vending machine purposes. A coin slot 12 serves for introduction therein of a coin adapted for actuation of the mechanism, and a light 14 is arranged on the face of the cabinet to indicate a condition or period of operability of the device. A dispensing nozzle, generally designated 16, is interconnected with fluid dispensing mechanism in the cabinet by means of a flexible tube or hose 18, and a storage compartment 20 is formed in the front of the cabinet for storage of the dispensing nozzle 16 when in inoperable or stored condition.

The dispensing nozzle has an actuating button 22 disposed at an end thereof adaptable, as will be described in more detail hereinafter, for controlling dispensing and non-dispensing periods of a liquid from the nozzle. A liquid outlet orifice 24 is located in a side of the dispensing nozzle through which liquid to be dispensed is emitted during periods of operation of the dispensing nozzle.

The construction of the dispensing nozzle 16 is more readily observable from the cross-sectional view of FIG. 2. This nozzle consists of a central body portion 26, and upper and lower end portions 28 and 30, respectively, secured to one another in any desired and known manner. The flexible tube or hose 18 has the end thereof inserted within the lower end 30 and terminates in a wavilinear cupped attachment end 32. A tube 34, connected to a source of liquid to be dispensed, not shown, passes through the tube 18 and terminates in an end 36 which is frictionally engaged on a lower end 38 of a metal member 40 which is rigidly mounted within the dispenser casing. The member 40, being of metal, is a magnetic conductor, for purposes hereinafter to be set forth. The upper end of the member 40 terminates in an upper tubular portion 42, and a central bore 44 extends through the length of the member 40 and is adapted for passage therethrough of a liquid to be dispensed. A coil 46 of a usual type utilized in solenoid valves is contained within the dispensing head, and within a central hollow bore 48 therein a metal solenoid valve 50 is slidably disposed. A bore 52 extends through the valve 50 which is additionally provided with a cylindrical recess 54 in the lower end thereof which opens into the bore 52, and which additionally serves for co-

action with the tubular portion 42 as a guide and restraining interconnection of the members.

A spring 56 is interposed between the valve 50 and the metal member 40, and serves the function of maintaining the valve in normally closed position against action of the armature when energized, and which tends to draw the valve downwardly against the pressure of spring 56 to open the dispensing valve. The bore 52 terminates in branched passageways 52a and 52b adapted for better dissemination of liquid passing through the bore 52 from a source of liquid. A truncated conical shaped nozzle head 58 is fixed in the dispensing head by means of an adjustable collar 60 coaxing with a flange 62 and a plug 64. The nozzle head 58 is in open communication with a space 66 above the valve 50. The valve 50 at its upper nose portion has a generally tapering curvilinear configuration as shown at 68.

An O-ring 69 is interposed between plug 64 and the upper opening through nozzle head 58, and coacts with the curvilinear nose portion 68 to form a shut-off valve to prevent fluid flow through the dispensing head. A second O-ring 70 is likewise interposed between the plug and valve head in conjunction with the collar 60 to form an additional liquid seal in the dispensing head. A chamber 72 is provided interiorly of the upper end 28 of the dispensing nozzle 16 and in which a spray nozzle 74 is operatively secured and having a passage 76 therethrough adapted for emitting a spray of fluid in the nature off an atomizer, as generally indicated at 78, which passes through the liquid outlet orifice 24. In order to operate the dispensing nozzle, the actuating button 22 is operatively associated with a switch, generally designated 80, which is connected to coil 46 in a circuit to be described hereinafter, and the other of which is operatively interconnected into the actuating circuit for the device. Operation of the dispensing head will be described hereinafter in connection with the operation of the over-all unit.

The actual valve arrangement is better shown in FIG. 4 of the drawings which shows the shape and arrangement of the valve seat or head, in conjunction with the plug 64, the O-ring 69 and the intercommunicating passage 76 which opens into the outlet between the valve and the inner O-ring. It is quite important that the configuration of the upper end of the valve 50 be as shown in FIG. 4, especially when using the mechanism for dispensing sticky liquids and the like. If the point, for example, were constructed as a needle nose point, it could wedge into the sealing O-ring and possibly result in a radical and non-working unit. If the point were round or oval, for example, then under some applications the hydraulic force covered by the area of the external point surface would be larger than the magnetic force available in the assembly for opening or closing the valve. By utilizing the point construction of the present invention, the hydraulic force is operative only over the area of the point extending through the O-ring, which is very small and provides no complications in operation. In actuation, when the coil is energized, the O-ring will commence to take a true round form upon withdrawal of the valve stem, thereby decreasing the hydraulic pressure until the valve is open. The particular configuration and arrangement additionally provides for a cleaning or wiping action between the valve point and the O-ring, which prevents deposition of liquid materials being sprayed through the dispensing head. The cavity 84 surrounding the spray nozzle 74 helps in utilizing all of the available aerosol pressure material in the liquid supply or source by pulling a minute vacuum to aid in proper atomization and spraying of the material.

An operable electrical circuit for the dispensing mechanism of the present invention is shown in FIG. 3 of the drawings. Leads 86 are connectable to a suitable source of alternating current, such as 110 volts and are interconnected to a coin controlled 2-pole relay switch 88

having a solenoid 89 associated therewith, adapted for actuation and closing of the switch by a coin inserted in the machine as will be described hereinafter, and thence are operatively connected to a gear head motor 90. A transformer 92 is connected into the circuit and operatively connected to diodes, generally designated 94, the latter arrangement being for the purpose of converting alternating current power to direct current for actuation of the dispensing mechanisms. The light 14 is connected in the circuit and adapted for indicating when the circuit is operable for energization of the dispensing nozzle per se. As shown in the lower part of FIG. 3, the dispensing nozzle 16 has coil 46 connected into the circuit, and the switch 80 is operable by means of the actuating button 22 to operatively close the circuit when it is desired to spray a liquid through the dispensing nozzle.

A coin chute is generally indicated at 98 in FIG. 3 and shows a coin 100 inserted therein in operable engagement with each of a pair of contact points 102 to establish a circuit therebetween. The diodes 94 are constructed of two adjacently disposed four-way bridge type rectifying diodes 95 and 96. Diode 95 is fed current from the transformer 92 at its maximum output voltage through a pair of output leads 92a and 92b which are respectively connected to a pair of intermediate poles 95a and 95b. The diode 95 further includes a pair of opposite end poles 95c and 95d which are respectively internally connected through the diode in current conducting relation to the intermediate poles 95b and 95a. A third intermediate output lead 92c is connected for supplying approximately one-half of the maximum output voltage of the transformer 92 to an intermediate pole 96a of the diode 96. The intermediate pole 96a is associated in current conducting relation through the diode to an end pole 96b and are the only poles of diode 96 which are utilized in the present system.

The electrical circuit for the dispensing mechanism of the present invention further includes a branch lead 92d which is connected to the output lead 92b from the transformer for connection through the coil 46, the nozzle switch 80, and the light 14 to the end pole 95c of the diode 95. A branch line 102a is connected between the line 92d at a point between the nozzle switch 80 and the lower contact 102 of the coin switch within the coin chute 98. The upper contact 102 is connected by a conductor line 102b to the end pole 96b of the diode 96. A branch line 89a is connected to the line 102b between the coin switch and the diode for connection through the coil of the solenoid 89 to the end pole 95d of the diode 95. In operation, when a coin is inserted in slot 12, it will pass into chute 98 to the operative circuit position shown in FIG. 3 where the coin establishes contact between the contact points 102 to close the circuit. Such closing of the contacts 102 by the coin is effective only to energize the light 14 to indicate that the circuit is pre-conditioned for selective operation of the nozzle 16. Electric current from the transformer 92 for energizing the light flows through the intermediate lead 92c and into the diode 96 at its intermediate pole 96a and through the diode to its end pole 96b. Such flow of current is directed through the line 102b, the coin switch contacts 102, the branch line 102a, the branch lead 92d and thence to the end pole 95c of the diode 95 for passage through the diode to its companion intermediate pole 95b in order to complete the circuit back to the transformer 92 through its output lead 92b. As previously described, the voltage through the transformer output lead 92c supplies only approximately one-half of the maximum output voltage of the transformer so that while such current is permitted to flow through the coil of the solenoid 89 through the line 89a, such voltage is not sufficient to provide a force necessary to close the motor switch 88.

With the electrical system preconditioned for operation by the insertion of the coin 100 into the chute 98 to close

the contacts 102, the button 22 may be depressed by the operator to close the nozzle switch 80 which, by virtue of its series connection with the coin switch contacts 102 and the motor switch 88, is effective to activate the nozzle and to energize the motor 90. During such operation, the maximum output voltage from the transformer 92 is directed through the branch lead 92d, the coil 46, the switch 80, and through the coin 100 between the contacts 102. Such current proceeds through the line 102b, and the branch line 89a for energizing the solenoid coil 89, and thence travels back to the end pole 95d of the diode 95. The circuit is completed through the diode 95 with the flow of current being directed from the end pole 95d to its companion pole 95a and back to the transformer by way of lead 92a. With the full output voltage of the transformer energizing the solenoid coil 89, the motor switch 88 is closed to direct the primary 110 volt current in the leads 86 from the power source to the motor 90. Operation of the motor, when only the coin switch is closed, cannot take place until the switch 80 is closed by means of the actuating button 22. When the actuating button 22 is closed and a coin is operatively positioned in the chute so as to close the remainder of the circuit including switch 88, then the motor 90 can rotate as long as the double controlled circuit is entirely operable. If the actuating button 22 is not depressed, or if a coin is not operatively positioned in chute 98, the motor will not rotate.

An arm 104 is carried on the shaft of motor 90 for rotation upon actuation thereby. A rotatably mounted lever 106 is operatively associated with chute 98 and may be spring biased to a chute closing and coin retaining position such as shown in FIG. 3. Subsequent to a complete rotation of motor 90 in the direction of the arrow shown at 108, the outer end of arm 104 will engage with an end of lever 106 to move it in such manner as to disengage the coin 100 in the chute 98 and permit passage of the coin downwardly in the chute, which thereby breaks contact with contact points 102 to open the circuit and prevent further operation of the dispensing mechanism. Another coin must be inserted in the mechanism in order to prepare the electrical circuit for subsequent operation to rotate motor 90 by depressing the actuating button 22 to close the spring biased switch 80 and thereby establish the proper motor and dispensing circuit, while at the same time serving to open the valve structure by intercoaction between the coil 46 and solenoid valve 50 in a known usual manner to permit flow of liquid through the valve to be dispensed from the dispensing head. The time increment of spraying is therefore governed by the cumulative over-all period of time during which the actuating button 22 is held in a depressed position, and when the button is released the motor will not rotate and the desired time interval of the motor which governs the over-all dispensing time is not affected. In other words, both switches 80 and 88 and the contacts 102 must be closed before the dispensing head is operable.

FIGS. 5 through 7, inclusive, disclose coin chute and switch mechanisms which can be utilized in the circuit schematically shown in FIG. 3. In the device of FIG. 5 a coin chute is shown at 110, and a coin is shown at 112 in different positions therein. A bracket 114 is mounted in the cabinet in any desired manner, and has a spring 116 mounted thereon for supporting coaction with an arm 118 pivotally mounted at 120 adapted to have its outer end engage and retain a coin at the position indicated at 112a, after it has fallen through the chute 110. The spring 116 normally maintains the arm 118 in a rotated position to open points 112 which are connected into the electrical circuit by means of leads 124, 126 and open the circuit. The points 122 in effect constitute the switch 88 shown in FIG. 3. When a coin falls into the position shown at 112a this serves to pivot the arm 118 into the position shown in FIG. 5, which closes the circuit by establishing contact between the points at 122 to there-

by permit subsequent energization of the circuit by means of actuating button 22. A slot 128 is formed in chute 110, adapted for passage therethrough of the end of arm 130 attached to the shaft of motor 132. Upon actuation of the motor over the predesigned rotational period thereof, by means of the actuating button 22, the arm 130 will pass into the slot 128 to engage a coin in the chute, as at 112a, resting on the free end of arm 118 and displace it to the position shown at 112b where it is out of engagement with the arm, and the spring 116 thereupon opens contact between the points 122 to de-energize the circuit until such time as another coin is inserted in the chute and the operating cycle thereby re-established.

A different type of mechanism for closing the switch 88 of FIG. 3 is shown in FIG. 7 of the drawings. Here the chute 134 is again adapted for the passage therethrough of a coin 136, into operative position 136a. Stripping or points 138 are operatively positioned in the chute, as shown at dotted lines in FIG. 7, and are adapted for engagement with a coin positioned at 136a to close the circuit through leads 140 by passage of current through the coin when in contact with points 138. This mechanism acting as switch 88 of FIG. 3 is operable in a clearly understandable manner. Slot 142 is provided in the chute into which an end of arm 144, operatively associated with the shaft of the motor, extends and operable in the same manner as the mechanism of FIG. 6. Upon rotation of the motor through a complete cycle, dependent upon cumulative time of actuation of actuating button 22, the arm will enter the slot 128 and engage the rearward end of the coin positioned at 136a to force it out of contact with the contacts 138 to open the circuit, and thereby prevent further actuation of the dispensing mechanism until a further coin is inserted in the slot.

In either of the constructions shown in FIGS. 5 and 7 the purpose and result is the same. The principle involved is that a coin is held in place and establishes a circuit until a desired time period has elapsed, whereupon the circuit is opened due to discharge or displacement of the coin from the circuit establishing position.

It is believed that operation of the device will be apparent from the foregoing description of operative embodiments of the invention. The operation and sequence of events to operate the machine might briefly, however, be described as follows: When a coin is placed in the coin slot 12 it passes into a coin chute described with reference to FIGS. 3, 5 and 7, thereby establishing a circuit including the switches 80 and 88. The light 14 can, if desired, be actuated during this operation and the coil 46 is energized. The motor and the arm connected thereto will thereupon begin to rotate at a preselected r.p.m. which can be established in any desired manner. If current in the circuit is discontinued by an opening of the dispensing head switch, the motor will stop and the dispensing valve will be closed due to inactivating the coil. The light can still remain on. The machine during this time interval can remain in a dormant stage for any desired length of time, while still maintaining the established time cycle period without the possibility of injuring or burning component parts of the circuit and mechanisms connected therein due to the fact that the time cycle has not been completed and a complete circuit has not been established. The remaining time left in the timing mechanism of the motor is not affected when the actuator button is opened. When the actuator button is closed the circuit is again completed, whereupon rotation of the motor recommences and the time cycle again starts to run. The machine will thereupon continue to operate until the arm actuated by the motor breaks the circuit upon dislodgment of a coin from its operating position in a chute. At this time the circuit is de-energized thereby stopping the motor and closing the dispensing valve as well as inactivating the indicator light.

Although the invention has been herein shown and described in what are conceived to be the most practical

and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A dispensing device comprising:

- (A) a source of fluid;
- (B) an electrically controlled valve connected to said source of fluid; and
- (C) an electrical control circuit connected to the valve having
 - (1) an aggregate time measuring device actuated by a coin and adapted to release the coin upon expiration of a predetermined aggregate time,
 - (2) a manually controlled switch connected electrically in series with the aggregate time measuring device operable to actuate the valve in selected increments until said increments equal said predetermined aggregate time, and
 - (3) a coin chute, said control circuit having a coin switch providing a pair of electrical contacts disposed in predetermined spaced relation within the chute, said aggregate time measuring device including a lever pivotally mounted in said chute for movement between a position supporting a coin in the chute in bridging current conducting relation between said contacts and a position retracted therefrom for releasing the coin.

2. The dispensing device of claim 1 in which said aggregate time measuring device includes a lever actuating arm rotatable through a predetermined path of travel, and said lever being disposed in said path of travel for engagement by the arm to move the lever to its coin releasing position coincident with the expiration of said predetermined aggregate time.

3. The dispensing device of claim 2 including an electric motor disposed in driving relation to said arm, and a motor switch disposed within said control circuit in series relation to said coin switch and to said manually controlled switch.

4. A dispensing device comprising:

- (A) a source of fluid under pressure;
- (B) an electrically controlled valve connected to the source of fluid and having an operating solenoid;

- (C) a timing motor;
- (D) an energizing circuit connected to the motor and having a control switch in series with the motor actuated by a control solenoid;
- (E) a coin operated switch;
- (F) means for releasably retaining a coin in operating relation to said coin switch operably associated with the motor to release the coin upon operation of the motor for a predetermined aggregated period, said means provides an arm rotatably driven by the motor through a predetermined path, and a pivotally mounted coin supporting lever disposed within said path for engagement by the arm to release the coin;
- (G) a manually operated switch; and
- (H) a control circuit connecting the operating solenoid of the control switch, the coin switch, the manual switch and the operating solenoid of the valve electrically in series.

5. A dispensing device comprising a source of liquid under pressure; liquid dispensing means connected to said source of liquid; valve means in said dispensing means; a coin chute; an electrical circuit providing first switch means operably associated with said chute, a second switch means in the circuit in series relation to said first switch means and operably associated with said dispensing means; an electric motor in said electrical circuit; and an arm rotatably driven by said motor for rotation upon the closing of said first and second switch means, said first switch means including a pivotally mounted lever having a contact on an end thereof engageable with another contact in said first switch means, and an opposite end engageable by a coin inserted in said chute, and being pivotable thereby to close said contacts.

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