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2,872,075

DISPENSER TIMING APPARATUS

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FIG. 1

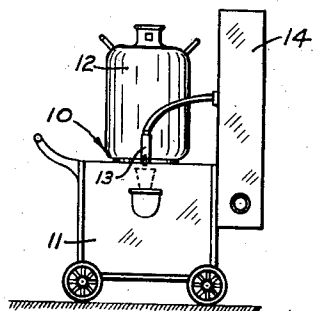


FIG. 2

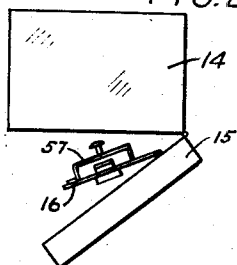


FIG. 4

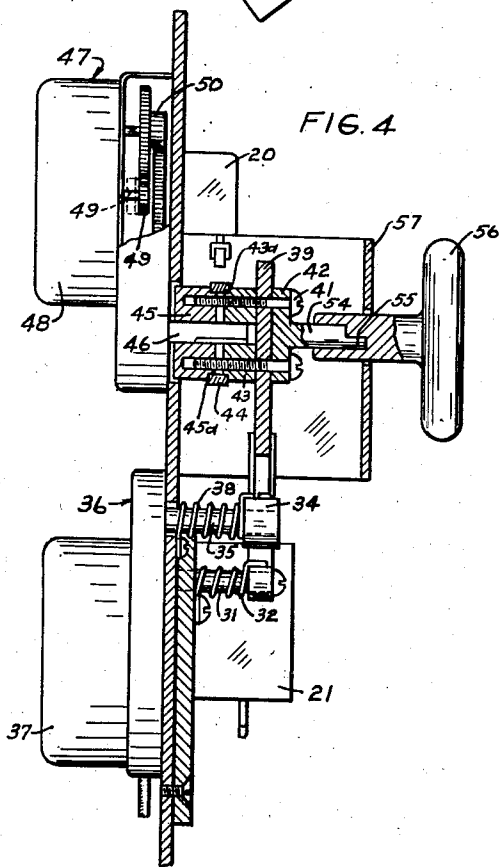


FIG. 3

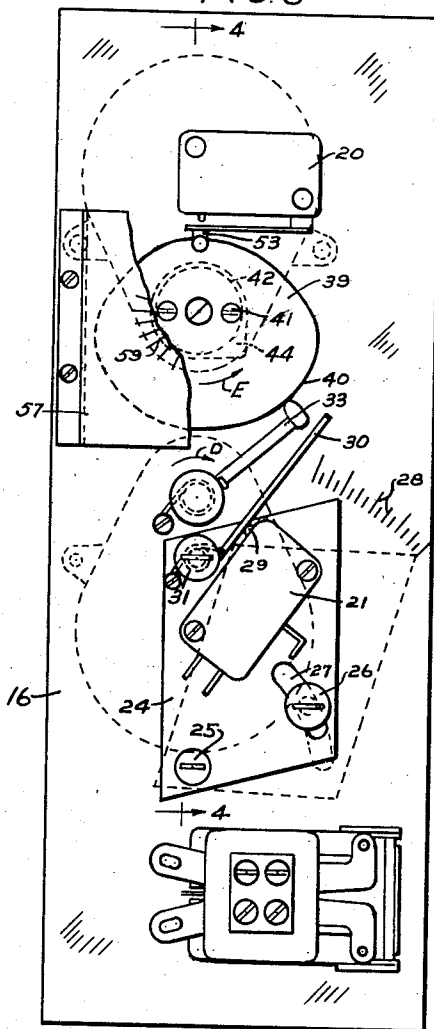
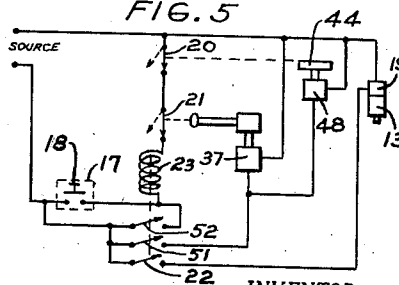


FIG. 5



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DISPENSER TIMING APPARATUS

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5 Claims. (Cl. 222—70)

This invention relates to liquid dispensers and more specifically relates to timing apparatus for liquid dispensers and the like wherein the flow rate of the liquid changes with the varying pressure head of the liquid.

Although various timing mechanisms for variable head liquid dispensers have been developed in the past, substantially all of these mechanisms have had distinct disadvantages. One definite disadvantage of such mechanisms is that they have been unduly complicated and therefore extremely expensive to manufacture and construct. Another definite disadvantage of certain of such mechanisms is that substantial difficulty is encountered when the mechanisms are adjusted so as to adjust the dispensing time for containers having different pressure heads, and for adjusting the mechanisms to dispense different quantities of liquids. More specifically in such machines as coffee dispensing machines, the coffee is supplied to the dispensing machine in a replaceable container. In some dispensers the container may be of a large size so as to hold approximately ten gallons of coffee, and in other dispensers the container may be of smaller size so as to dispense approximately five gallons of coffee from the container. The dispensing time control mechanisms known in the past have been difficult to adjust from usage with ten gallon containers to five gallon containers and vice versa. Furthermore it is sometimes desirable to change the quantity of liquid dispensed for each operation of the dispensing machine. In some installations it is desired to dispense seven ounce cups of coffee and in other installations it may be desirable to dispense five ounce cups of coffee. Dispensing time control mechanisms in the past have been somewhat difficult to adjust so as to vary this quantity of liquid dispensed for each time the machine is operated.

With these comments in mind it is to the elimination of these and other disadvantages that my invention is directed along with the inclusion therein of other novel and desirable features.

An object of my invention is to provide a new and improved liquid dispensing control mechanism of simple and inexpensive construction and operation and for use with liquid dispensers where the pressure head of the liquid varies.

Another object of my invention is to provide in a timing device for a variable pressure head liquid dispenser, a novel cam control mechanism for varying the period during which the control valve of the dispenser is open so as to dispense a full measure of liquid each time the dispenser is operated.

Still another object of my invention is to provide in a cam controlled liquid dispensing time control mechanism for use with a liquid dispensing machine wherein the pressure head of the liquid varies each time liquid is dispensed, of a new and novel cam controlling mechanism which is readily and easily manually adjustable in accordance with the pressure head of the liquid contained in the dispensing machine and which is rotatably driven each time liquid is dispensed for a period of time

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which is proportional to the head of liquid remaining in the machine so as to cause the proper amount of liquid to be dispensed during the next succeeding cycle of operation of the machine.

A further object of my invention is the provision of a novel cam controlled liquid dispensing time control mechanism for use with a liquid dispensing machine wherein the pressure head of liquid varies each time liquid is dispensed and which mechanism is adjustable for dispensing different quantities of liquid each time the machine is operated.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a side elevation view of a liquid dispenser incorporating the present invention;

Fig. 2 is a top plan view of a portion of the control mechanism of the present invention;

Fig. 3 is a detail elevation view of the control mechanism of the present invention;

Fig. 4 is a detail section view with portions broken away on a substantially vertical plane as indicated at 4—4 of Fig. 3; and

Fig. 5 is a diagrammatic electrical diagram of the control mechanism.

One form of the present invention is shown in the accompanying drawings and is described herein. The liquid dispenser shown in Fig. 1 and indicated in general by numeral 10 is provided with a supporting structure 11, a removable container 12 which may be insulated and substantially sealed to maintain the liquid such as coffee contained therein at a substantially constant temperature, a dispensing solenoid operated valve 13 which is connected to the container 12 and is operated by the control mechanism shown in detail in Figs. 3, 4 and 5. As seen in Figs. 1 and 2 the control mechanism housing 14 has a swingable front cover or door 15 and a mounting plate 16 comprising a portion of the supporting structure which is hingedly secured to the door 15. The container 12 is supplied with a quantity of liquid and as the liquid is dispensed from the container the pressure head of the liquid at the valve decreases. In order to dispense a uniform quantity of liquid under various pressure heads the time during which the valve 13 remains open must be lengthened as the liquid is dispensed. The mechanism shown in detail in Figs. 3 to 5 causes the time during which the valve is open to be varied as the pressure head of the liquid decreases.

A manual control is provided for initiating the operation of the timing mechanism and for opening the valve 13. In the form shown, the manual control 17 includes a push button switch 18 which energizes the relay 23 through the normally closed liquid runout limit switch 20 and the time controlled valve closing switch 21. Contact 22 of relay 23 controls the solenoid 19 of dispensing valve 13.

Valve closing mechanism is provided for closing valve 13 and in the form shown such mechanism includes a mounting plate 24 which is adjustably secured on plate 16 by screw 25 and by screw 26 which extends through a slot opening 27 in the plate 24 for holding the plate in a desired position. Indicating means such as scale 28 may be provided on the plate 16 to provide for ready and easy adjustment of plate 24. Switch 21 is of conventional design and may be known as a microswitch and switch 21, which is mounted on plate 24, is normally closed. The switch 21 has a button 29 which, when pressed, opens switch 21. A switch actuating element 30 is carried on a mounting pin 31 which is secure to plate 24. The actuating element 30 bears

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against the switch button 29 and is held thereagainst by means of spring 32. Spring 32 has insufficient strength to cause element 30 to push the button 29 and operate switch 21, and therefore additional impetus must be supplied. As best seen in Fig. 5, the solenoid 19 is de-energized when switch 21 is opened to thereby cause valve 13 to close.

Timed mechanism is provided for moving actuating element 30 and operating the switch 21 and in the form shown, a travel element or arm 33 is mounted in a substantially radial position upon hub 34 which is keyed to drive shaft 35 of a driving mechanism which is indicated in general by numeral 36. Drive mechanism 36 includes a motor 37 which is connected to the drive shaft 35 through a speed reducing gear train. The drive mechanism 36 is of conventional type to drive the travel element 33 at a substantially uniform rate toward and into driving engagement with actuating element 30 for moving the element 30 and button 29 so as to open the switch 21. In the form of the invention shown, the rotary drive mechanism 36 turns the drive shaft at approximately two revolutions per minute. The motor 37 of driving mechanism 36 is connected with the normally open contact 51 of relay 23 to be energized thereby when the manual control 17 is operated. As seen in Fig. 3, the hub 34 and driven element 33 move in the direction of arrow D when driven by the driving mechanism 36. A torsion spring 38 is connected to the plate 16 and to the arm 33 to move the travel element 33 away from actuating element 30 when the motor 37 is de-energized and to swing the travel element 33 back to its starting position.

Means are provided for defining the starting position of travel element 33 and for moving the starting position in accordance with the quantity of liquid in the container 12 so as to vary the amount of time for travel element 33 to move from its starting position to the actuating element 30. In the form shown such means include a rotary cam or camming abutment 39 having an outer peripheral abutting surface 40 against which the travel arm 33 is normally held by spring 38. The rotary cam 39 is shaped so that the outer peripheral surface 40 thereof is disposed at varying distances from the axis of rotation thereof. It will be seen that as the rotary cam 39 moves in the direction of arrow E, the travel element 33 is moved closer to the rotation axis of the cam and farther from the actuating element 30. Cam 39 is secured as by screws 41 between a pair of mounting discs 42 and 43. Another cam 44 is carried between the mounting discs 43 and 45 and is held in position by screws 41 which urge all of the mounting discs 42, 43 and 45 toward each other. The cam 44 is generally ring shaped and is mounted in suitably provided recesses 43a and 45a in mounting discs 43 and 45 respectively. Mounting discs 43 and 45 are keyed on to drive shaft 46 of a rotary driving mechanism indicated in general by numeral 47. The rotary drive mechanism 47 includes a motor 48 having a drive gear 49 on the spindle thereof which is drivably connected with drive shaft 46 through a speed reducing gear train indicated in general by numeral 50. Motor 48 is of a substantially conventional type wherein the rotary spindle and drive gear 49 thereof are retracted into the dotted position shown when the motor is de-energized and the drive gear 49 is projected into the full line position shown in Fig. 4 when the motor is energized. The drive shaft 46 is thereby turned only when the motor 48 is energized and the driving gear is retracted to prevent driving of the gear train 50 and of rotary shaft 46 as the motor is coasting to a stop after having been de-energized. Rotary driving mechanism 47 in the form shown is constructed to rotate the drive shaft 46 and cam 39 at the rate of one-tenth of a revolution per minute. The motor 48 of driving mechanism 47 is connected

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to contact 51 of relay 23 to be energized when manual control 17 is operated.

Cam 44 revolves with shaft 46 and cam 39, and when all of the liquid from container 12 has been dispensed, cam 44 is in such a position as to engage the actuator 53 of switch 20 and thereby open switch 20 to preclude operation of relay 23. The motors 37 and 48 and solenoid 19 are thereby precluded from operating.

Mounting disc 42 has a shaft 54 extending outwardly therefrom which has a keyway 55 formed therein for receiving a manually operated key 56. A plate 57 is mounted on mounting plate 16 and has an aperture 58 therein for receiving the key 56 therethrough. Plate 57 provides dial markings surrounding the aperture 58 to indicate the orientation of cam 39. The dial indications 59 may be calibrated in cups or gallons, which has reference to the number of cups or gallons of liquid remaining in the container 12.

The electric circuit shown in Fig. 5 provides a control relay 23 connected to one side of the source of power through the time controlled valve closing switch 21 and the normally closed liquid limit runout switch 20, and is connected to the other side of the source through manual control switch 18. The relay holding contact 52 shunts manual control switch 18. Motors 37 and 48 are connected in parallel relation and are connected directly to one side of the source. The other side of motors 37 and 48 are connectible to the other side of the source through contact 51 of relay 23. Valve operating solenoid 19 is connected directly to one side of the source and is connectible through contact 22 of relay 23 to the other side of the source.

Operation

In operation, the key 56 will be operated to turn the cam 39 to an approximate position shown in Fig. 3. In this position, the travel element 33 is positioned so that the time of travel thereof to engagement with actuating element 30 is equal to the length of time necessary to dispense one cup of liquid when the container 12 is full. Key 56 may thereupon be removed. When the manual control 17 is operated, the relay 23 will be energized causing the contacts thereof to shift into closed position. The contact 52 will hold the relay closed. Contacts 22 and 51 will respectively energize the solenoid 19 and motors 37 and 48. The valve will thereupon be opened, the travel element 33 will commence to move in the direction of arrow D and the cam 39 will commence to move in the direction of arrow E. While the travel element 33 is progressing toward the actuating element 30 the valve 13 remains open and liquid is dispensed. When the travel element 33 engages the actuating element 30, the switch 21 is opened, whereupon the relay 23 is de-energized and the contacts thereof open to de-energize the solenoid 19 and de-energize motors 37 and 48. When solenoid 19 is de-energized valve 13 closes. When motor 37 is de-energized the spring 38 swings the travel element 33 in a counterclockwise direction and into engagement with camming abutment 39.

When motor 48 was energized with the operation of manual control 17, the driving spindle and gear 49 shifted from the dotted line position shown in to the full line position shown for driving the gear train 50 and turning the camming abutment 39. The cam 39 turns at an extremely low rate of speed while the travel element 33 is progressing toward the actuating element 30. The starting position of travel element 33 is thereby moved so that when the travel element 33 is returned by spring 38 to the compensating cam 39, the travel element 33 will be disposed further from the actuating element 30 than in the previous cycle of operation. Therefore during the next cycle of operation, the travel element 33, which moves at a uniform rate of speed, will necessarily have to travel a further distance in order to move the actuating element 30 and therefore a greater period of time

will elapse between the operation of the manual control, which opens valve 13, to the closing of valve 13. This compensates for the loss of pressure head of the liquid in container 12.

When the motor 48 is again de-energized, the driving gear 49 is quickly retracted into the dotted position thereof and the gear train 50 immediately stops, and stops the cam 39 and positively holds the cam in the desired position until again positively driven by motor 48. The gear train 50 exerts a drag upon the cam 39, restricting any tendency thereof to revolve.

It will be seen that I have provided a new and improved timing mechanism to compensate in the dispensing of liquid, for the loss of head of liquid in the storage container wherein such mechanism is provided with a gear train which is disconnectible from the driving motor and which is connected to the compensating cam or camming abutment for moving the camming abutment an incremental and predetermined distance each time the valve is operated and for holding the cam in the desired position until the valve and dispensing mechanism is again operated.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention which consists of the matter shown and described herein and set forth in the appended claims.

What is claimed is:

1. In a liquid dispensing machine, the combination of a liquid storing container having a controllable dispensing valve, valve-opening means connected with said valve, valve closing mechanism having a moving actuating element, said mechanism being constructed and arranged to close said valve when said actuating element is moved, a camming abutment, a spring-pressed travel element normally held in starting position in engagement with said camming abutment and mounted for movement into driving engagement with said actuating element for operating said valve-closing mechanism, said camming abutment being movable to change the starting position of said spring-pressed travel element and thereby change the travel distance thereof to said actuating element, driving mechanism connected with said travel element and being constructed and arranged for moving the same in a substantially uniform rate toward said actuating element, the travel time of said travel element to said actuating element changing when said camming abutment is moved to change said starting position, a rotary power unit including a speed reducing gear train drivably connected with said camming abutment and also including a motor constructed and arranged to be disconnected from said gear train when de-energized, said power unit moving said camming abutment to change the starting position of said travel element, and said speed reducing gear train stopping and holding said travel element when said motor is disconnected, said motor and said driving mechanism being connected with said valve to be de-energized when said valve is closed and control means connected with said valve for opening the same and also connected with said driving mechanism and with said motor for operating the same, whereby said camming abutment is moved and held in a new position each time said valve is operated to change the starting position of said travel element and thereby change the time during which the valve is open in accordance with the change of head of liquid in said container.

2. In timed control apparatus for operating the dispensing valve of a liquid container wherein the head of liquid varies as the liquid is dispensed, said apparatus having in combination valve opening means connectible with such a valve, a frame, valve closing means connectible with such valve and including a movable actuating element mounted on said frame, said valve closing mechanism being constructed and arranged to close the valve when said actuating element is moved, an operative

control connected with said valve opening means for operating the same, timing mechanism for moving said actuating element and including a spring-pressed travel member mounted on said frame for movement between a starting position and driving engagement with said actuating element, said travel member being normally urged toward the starting position, an operable drive mechanism connected with said control to be rendered operative thereby and also connected with said valve closing means to be rendered inoperative thereby, said drive mechanism being connected in driving relation with said travel member and being constructed and arranged to move said travel member at a uniform rate from the starting position thereof into driving engagement with said actuating element, a camming abutment movably mounted on said frame and engaging said travel element in holding the same in starting position thereof, said camming abutment being movable to change the starting position of said travel member, operable driving means connected with said control to be rendered operative thereby and also connected with said valve closing means to be rendered inoperative thereby, said driving means including a gear train connected in driving relation with said camming abutment and also including a driving motor constructed and arranged for disconnection from said gear train when the motor is de-energized, said driving means incrementally and progressively moving said camming abutment each time said control is operated, and said gear train being disconnected from said driving motor each time the same is de-energized and said gear train stopping and holding said camming abutment each time said valve is closed whereby to change the starting position of said travel member to change the travel time thereof and thereby change the time during which the valve remains open.

3. The structure recited in claim 2 wherein said camming abutment is constructed and arranged to progressively move the starting position of said travel member away from said actuating element as the camming abutment is progressively moved and thereby progressively increase the travel time of said travel member and the time during which the valve remains open whereby to compensate for the decrease in the pressure head of the liquid as the liquid is dispensed from the container.

4. In timed control apparatus for operating the liquid dispensing valve of a liquid container to dispense predetermined quantities of liquid regardless of the liquid pressure head in the container, said apparatus having in combination, an operable control for initiating operation of said apparatus, valve opening means connected with said control to be operated thereby, a supporting structure, valve closing mechanism having a movable actuating element carried by said supporting structure, said valve closing mechanism being constructed and arranged to close said valve when said actuating element is moved, a camming abutment mounted on said supporting structure and defining a starting position, a spring-pressed travel element mounted on said supporting structure and normally held against said camming abutment in starting position, said travel element being movable into driving engagement with said actuating element for operating said valve closing mechanism, driving mechanism connected with said control to be operated thereby, and also connected in driving relation with said travel element, said driving mechanism being constructed and arranged for moving said travel element at a substantially uniform rate toward said actuating element, said camming abutment being movable to move said starting position of the travel element and thereby change the time required by the travel element to travel from the starting position to said actuating element, abutment driving means connected with said control to be operated thereby and also connected in driving relation with said camming abutment, said driving means being constructed and arranged to progressively and incrementally move said camming abutment

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and thereby progressively move the starting position of said travel element, and said actuating element being adjustably positionable upon said supporting structure in directions toward and away from said travel element whereby the position of said actuating element may be changed to vary the time during which said valve remains open and to thereby vary the quantity of liquid dispensed from said valve each time the valve is operated.

5. The structure recited in claim 4 wherein said valve opening means includes an electric solenoid connected in controlling relation with the valve, and said valve closing mechanism including a mounting plate mounted on said supporting structure and being adjustably positionable, a

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normally closed electric switch mounted on said plate and being connected in controlling relation with said electric solenoid for de-energizing the same and permitting the valve to close, and said actuating element being movably secured on said plate and positioned for operating said switch when engaged by said travel element, whereby the position of said mounting plate, switch, and actuating element may be changed to vary the time and distance of travel of said travel element and thereby vary the time during which said valve is open.

No references cited.