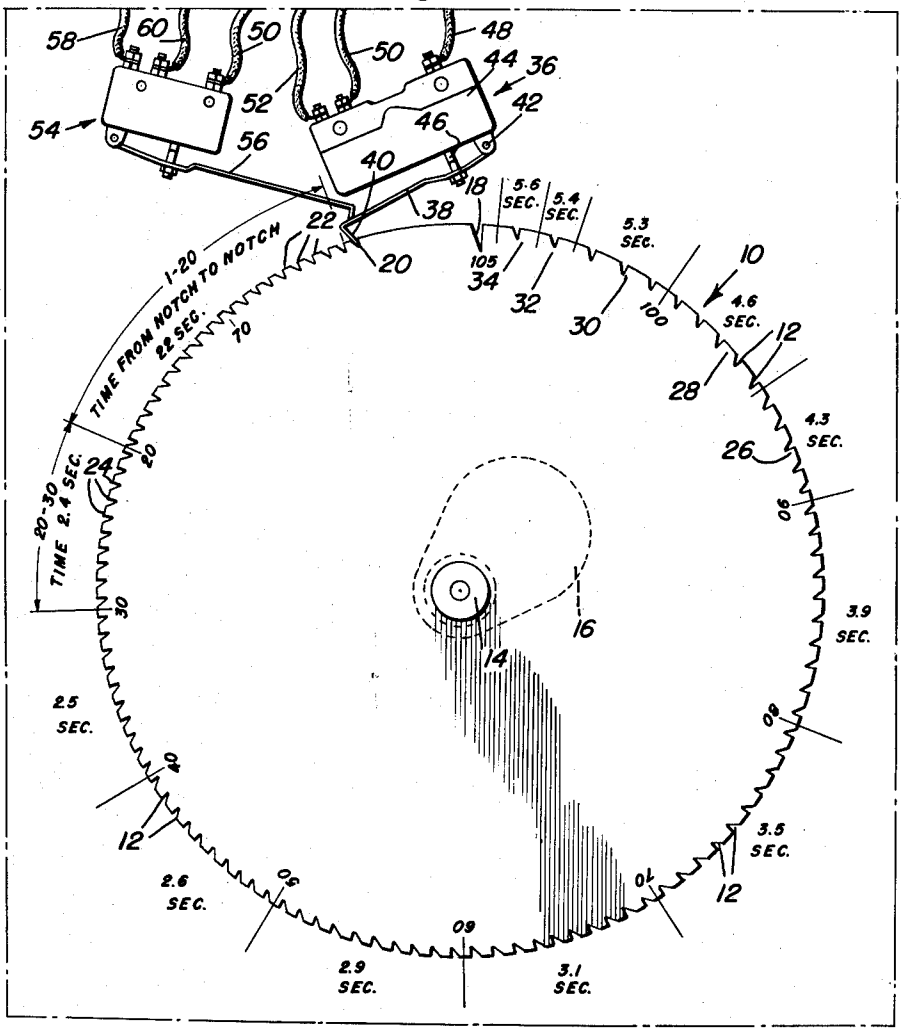
Sept. 25, 1962 R. A. EMMONS 3,055,552

PROGRESSIVE TIMER FOR DISPENSING APPARATUS

Filed Sept. 23, 1954 2 Sheets-Sheet 1

Fig. 1



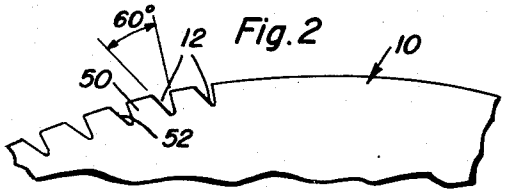


Fig. 2

Robert A. Emmons
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Sept. 25, 1962 R. A. EMMONS 3,055,552

PROGRESSIVE TIMER FOR DISPENSING APPARATUS

Filed Sept. 23, 1954 2 Sheets-Sheet 2

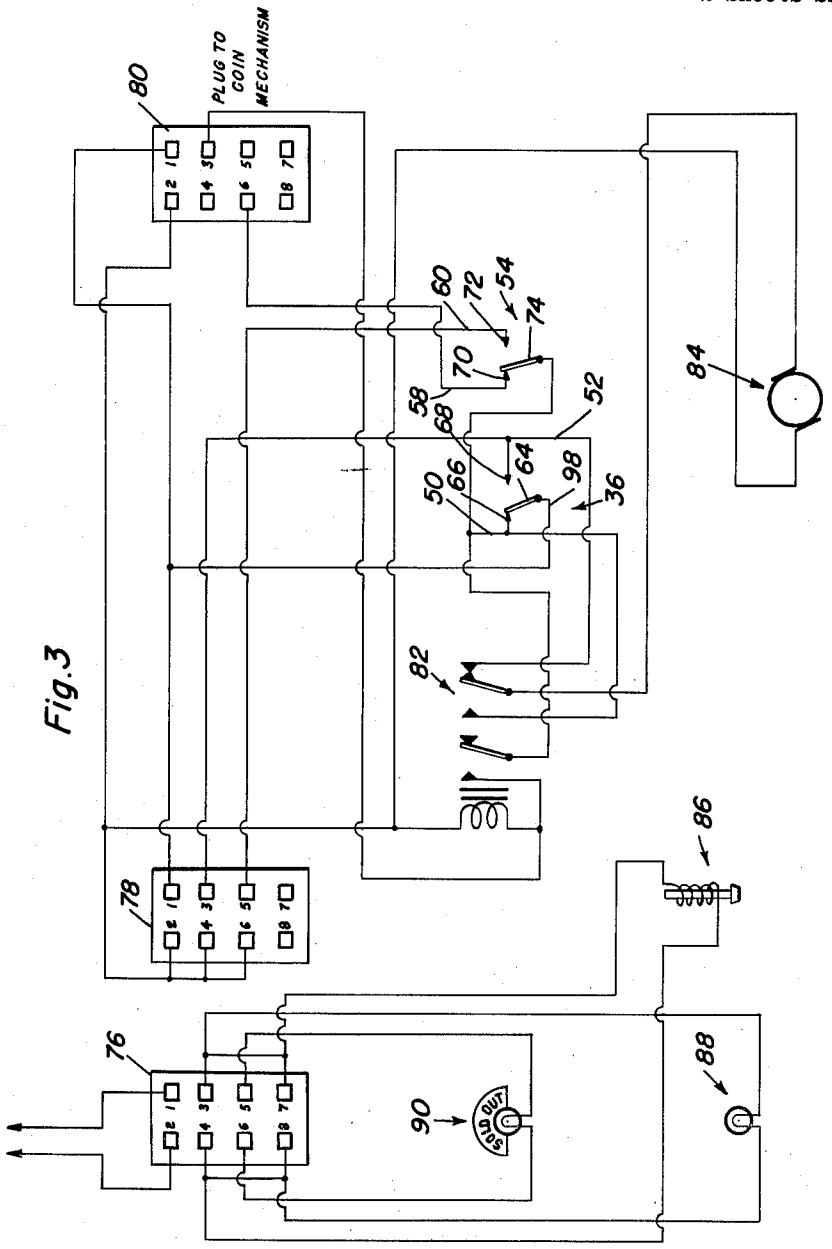


Fig. 3

Robert A. Emmons

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office 3,055,552
Patented Sept. 25, 1962

3,055,552
PROGRESSIVE TIMER FOR DISPENSING APPARATUS

Robert A. Emmons, Omaha, Nebr., assignor to S and L Sales, Inc., Omaha, Nebr., a corporation of Nebraska

Filed Sept. 23, 1954, Ser. No. 457,811
4 Claims. (Cl. 222—70)

This invention relates generally to timing mechanisms and pertains more particularly to improvements in timing mechanisms particularly adapted for use with liquid dispensers.

At the present time, considerable difficulty is encountered in accomplishing satisfactory dispensing operations from gravity flow type liquid dispensers inasmuch as variations in hydrostatic pressure of a liquid within a container tend to cause less material to be dispensed as the level of fluid within the container drops.

It is the primary object of this invention to provide an improved form of timing mechanism for utilization in connection with a liquid dispenser of the gravity flow type.

It is a further object of this invention to provide an improved timer mechanism which will progressively increase the duration or dwell of a timing cycle to compensate for variations in hydrostatic pressure within a dispenser container.

Still another object of this invention resides in the improvement in timing mechanisms wherein a disk, rotatable about its geometric center, is provided with a plurality of circumferentially spaced cam surfaces of progressively increasing length for operation upon an associated switch arm to increase the duration of timing cycles.

A further object of this invention is to provide an improved timing mechanism for utilization in conjunction with liquid dispensers of the gravity flow type in which a series of notches formed in the periphery of a cam disk present cam surfaces therebetween of progressively greater length for increasing the duration of a time dispensing action and in which the end notch of the series of notches is of greater depth than the remainder of the notches such that an associated switch actuating arm, when engaged within the notch, will operate a circuit to shut off the entire dispensing mechanism.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is an elevational view showing the improved timing mechanism;

FIGURE 2 is an enlarged elevational view showing a section of the periphery of a cam disk; and

FIGURE 3 is a diagrammatic view showing a portion of the wiring circuit for the dispensing mechanism.

Referring now more particularly to FIGURES 1 and 2, the reference numeral **10** indicates generally the cam disk which forms the main portion of this invention. In the preferred embodiment illustrated in the drawings, the cam member is of circular configuration and is formed with a plurality of notches **12** in its preiphery. The disk is supported on a shaft member **14** driven preferably by a synchronous electric motor, and it is preferred that a clutch mechanism, shown diagrammatically in FIGURE 1 and indicated by the reference numeral **16**, be provided for effecting resetting of the timing disk, as will be more readily apparent hereinafter.

It is extremely important that the shaft **14** support and rotate the disk assembly **10** about is geometrical center

and is equally important that the various grooves **12** be of uniform depth with the exception of the end groove **18** which is of substantially greater depth than any of the remainder of the notches, this construction being explained more fully hereinafter.

The notches **12** are arranged in groups, as will be most readily apparent from a study of FIGURE 1, such that the first twenty notches from that point which is indicated by reference character **20** are of uniform spacing so as to present a plurality of cam surfaces **22** therebetween of equal length. The next ten notches **12** are spaced apart slightly further than the preceding notches **12** to present cam surfaces **24** therebetween of slightly greater length than the first mentioned cam surfaces **22**. Thereafter, the notches in every ten additional in number are spaced progressively further apart to provide progressively longer cam surfaces therebetween.

This sequence of notch spacing is continued until near the end of the series of notches where in the section **26** the sequence of equally spaced notches numbers five as does the sequence in the section indicated by the reference character **28**. The sections **30**, **32** and **34** contain three, one and one notch respectively.

Associated with the cam disk **10** is a timer switch indicated generally by the reference character **36**, which includes an actuating arm **38** having a laterally offset finger portion **40** engageable with the various grooves **12** and upon the cam surfaces **22**, **24** and so forth. The actuating arm **38** is pivoted at **42** to the case **44** of the switch, and intermediate its ends is connected to a plunger mechanism **46** which is adapted to actuate a movable switch contact housed within the switch assembly **36**. The movable switch contact is connected to a conductor member **48** and is adapted to engage with fixed contact members **66** and **68** in turn connected to the conductors **50** and **52**. As will be seen most clearly in FIGURE 2, each of the notches **12** is formed such that its sides **50** and **52** include an angle of approximately 60° therebetween. Although this particular angle is not critical, it has been found that the smoothest operation results therefrom, and when the side **50** of the notches is formed along the line passing through the center of the shaft **14**, the side **52** is formed along a line to the desired 60° angle and the desired depth of the notches.

The construction of the switch mechanism **36** will be set forth in greater detail hereafter. In brief it is such that when the finger portion **40** is engaged with one of the notches **12**, the movable contact connected to the conductor **48** is engaged with the fixed contact connected to the conductor **50**. On the other hand, when the synchronous motor is started and shaft **14** is rotated as a result of a coin operated circuit connection, the rotation of the disk **10** will cause the detent or finger portion **40** to ride up over the next adjacent cam surface and swing the actuating arm **38** to move the movable contact connected to the conductor **48** to the fixed contact which is connected to the conductor **52**. The rotation will continue until such time as the finger portion **40** of the actuating arm drops into the next notch, wherein the circuit will be broken and dispensing operation will be discontinued. Thus, the duration of dwell of the dispensing operation will be a direct function of the length of the cam surfaces, providing the rotational speed of the shaft **14** is constant. To this end, it is to be understood that a synchronous motor is preferred in providing a drive for the cam disk **10**.

Operating in conjunction with the switch mechanism **36** is a further switch **54** which includes a movable operating finger **56** engaged upon the finger **38** of the switch **36**. The switch **54** is a "sold-out" switch mechanism and is adapted, when actuated, to energize a circuit which will visually apprise a prospective customer

that the unit has been exhausted of its commodity. The switch 54 includes a movable contact and two fixed contacts 70 and 72, the fixed contacts 70 and 72 being connected to the conductors 58 and 60. The operation of the switch 54 is such as to maintain the movable contact thereof in engagement with one of the fixed contacts until such time as the end notch 18 is encountered, whereupon the movable contact will be actuated such as to engage the other fixed contact to energize the aforementioned sold out circuit.

In regard to the end of notch 18 and the sold out switch 54, it is to be appreciated that the sold out switch need not necessarily be operated directly in conjunction with the vending switch 36. That is, the sold out switch may be so positioned as to be actuated by its actuating finger dropping into a slot or hole in the face of the disk 10 remote from any of the notches provided in the periphery thereof. In that case, it is to be understood that all of the notches in the periphery of the disk could be of the same depth. Or, it would also be possible to provide a slot in the bottom of the end notch 18 into which the actuating finger 56 of the sold out switch 54 independently moves as the timer disk reaches the fully dispensed position, at which time the slot would be indexed beneath the actuating finger 56.

Referring now more particularly to FIGURE 3 wherein the circuit diagram for the dispensing mechanism is shown, the reference numeral 64 indicates the movable contact of the switch mechanism 36, whereas the reference characters 66 and 68 indicate the fixed contacts thereof. The reference numerals 70 and 72 indicate the fixed contacts of the switch mechanism 54, and the reference character 74 indicates the movable contact thereof.

Reference numerals 76 and 78 indicate terminal block mechanisms which are interconnected in the numerical order shown, the inter-connection for the sake of simplicity being not illustrated. Reference character 80 indicates a terminal block which is connected electrically to a conventional coin mechanism, the operation of which forms no part of this invention. Suffice it to say that the operation of placing the coin in the coin mechanism completes the circuit to the relay switch assembly 82 which energizes the relay switch to throw both of the two blades thereof to the left. This coin operation is conventional but for present purposes it may be assumed that the coin momentarily connects the terminals 1 and 3 in the terminal block 80. As indicated, terminals 1 and 2 of the block 76 are connected to the two power lines which means that terminals 1 and 2 of the block 76 are similarly so connected. Taking terminal 1 as the first power line in block 76 and 78 it can easily be seen that the circuit would extend from the power line through the terminals 1 and thence to the terminal of the block 80 and also to the switch blade 64 of the switch 36. The switch blade 64, at any starting time, is in one of the notches 12 so that the power is carried instantly at this time by the blade 64 through the wires 66 and 50. From the top of the wire 50 the power would be carried over to the right over to the blade 74 which at this time is in its left hand position which is connected to an open circuit. The wire 58 leads to the terminal 6 of the terminal block 80 but this is open. However, from the top of the wire 50 leading from the blade 64 of the switch 36 to the left, the power is conducted to the left hand blade of the relay 82. When the relay is deenergized as illustradted in FIGURE 3, the circuit is open. Moving along the line 50 from a switch blade of the relay 82 but with the relay deenergized this is an open circuit.

The foregoing illustrates that all the circuits open when the blade 64 of the switch 36 is to the left and the relay 82 is deenergized.

The coin in a coin mechanism will be assumed, as is normally true in such mechanisms, to momentarily connect the contacts 1 and 3. This puts the power from the power line connected to the terminal of the block 76 onto the contact 3 of the block 80 for an instant and then leftward downward further and then to the bottom of the coil of the relay 82. The top of the coil of the relay 82 is always connected to the other line because all three of the terminals 2, 4 and 6 of the block 78 are connected together; and when that block is plugged into the block 76 they are all connected to the terminal 2 of the block 76, which is connected as illustrated to the other power line.

Therefore, the coin momentarily energizes the relay 82 and draws its two blades to the left.

We had previously observed that the left hand blade, at this time, is connected to power through the switch blade 64 of the switch 36 and so when the left hand blade is pulled to the left by the energization of the relay for an instant, it introduces an alternative power line to the bottom of the relay coil and also holds the terminal 3 of the coin mechanism of the terminal block 80 energized. However, the purpose of the circuit is merely to provide a holding circuit for the relay 82 until the timing motor comes into operation, and despite the fact that the contact provided by the coin is only momentary.

As soon as the relay coil 82 is energized, the right hand switch of the relay 82 is pulled to the left and this closes a circuit to the middle contact of that relay which, as heretofore observed, is connected to power through the switch blade 64 when the blade 38 is in one of the notches as we have already assumed it to be. Therefore power is conducted through this middle switch blade of the relay 82 to the motor 84. The left hand side of the motor is connected to the upper wire from the relay coil of the relay 82 which, as heretofore noted, is connected to the other power line. Therefore the motor 84 starts in motion, and this will cause it to rotate the cam 10. In a very short while the rotation of the cam 10 will lift the blade 38 out of the notch and throw the switch blade 64 to the right. This, of course, breaks the holding circuit to the relay 82 which thereupon drops out. It also breaks the foregoing circuit to the motor 84. However, when the blade 64 of the switch 36 is moved with the typical action into engagement with the terminal 68 on that switch, it carries power immediately by the wire 52 downwardly and leftwardly to the right hand terminal of the relay switch 82 which is now closed with the movable relay blade that supplies an alternative power source to the motor 84 which is thereby kept in operation. In other words, when the cam lifts the cam follower 38, it moves the switch 64 to the right in FIGURE 3, but provides a circuit for the motor 84 that is held in operation as long as the blade 64 remains to the right, which means as long as the follower 38 remains out of a notch.

Another circuit supplied by the blade 64 in its right hand position is made by following the wire 52 upwardly and leftwardly to the terminals 3 of the blocks 76 and 78. These terminals 3 are also connected with the terminal 7 of the block 76. Following the terminal 3 completely to the right and downwardly, it will be seen that the lamp 88 is then connected to the power line L–1. The left hand side of the lamp 88 is connected to the left hand power line because the terminals 8 and 4 are connected together in the block 76 and the terminal 4 in the block 78 is connected to the terminal 2 which in turn is connected to the terminal 2 of the block 76. Therefore the lamp 88 lights, illustrating that the cycle is in operation. The energization of the terminal 7 of the block 76, as aforesaid, provides a circuit to the right and downwardly and to the right of the valve coil 86, the left hand side of which is connected to the left hand power line to the terminals 4 of the blocks 76 and 78 and the terminals 2 thereof, as aforesaid.

From the foregoing it is evident that putting a coin in the coin mechanism will start the motor 84, will light the lamp 88 and will open the discharge valve so that the coffee or other material may be dispensed. It will

also keep these various devices in operation so long as the cam follower is kept out of a notch.

When the cam follower **38** falls back into a notch **12**, the blade **64** is again moved to the left which is the position it is illustrated to occupy in FIGURE 3. At the outset it was observed that such position of the switch blade **64** provided only open circuits when the relay **82** is deenergized. Since no coin is passing through the device at that point, this shifting back of the switch blade **64**, produced by the cycling of the timing motor **84**, reopens the circuits to the timing motor, the lamp **88** and the valve **86**. Thereupon the machine stops its operation, but it is prepared for a new cycle as soon as a new coin is put into the coin receptacle.

After a full rotation of the cam disc **10**, blade **20** may fall into the deep notch **18**. This causes the blade or follower **56** to move an extra distance and that in turn causes a shifting of the blade **74** of the switch **54** from the terminal **70** to the terminal **72** in FIGURE 3. When this happens, the blade **64** of the switch **36** is in its left hand position as illustrated and so the blade **74** is connected to the right hand power line of the terminal **1**. When blade **74** introduces such power to the terminal **72** of the switch **54** it is conducted by the line **60** to the terminals **5** of the blocks **76** and **78**. The block **76** has its terminal **5** connected to the "sold-out" lamp, the other side of which is connected to the terminals **6** which are readily observed to be connected to the terminals **2** in the other power line. Therefore when the container is emptied, the "sold-out" light will indicate that fact.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. In a liquid dispenser: a dispensing valve movable to liquid dispensing position to permit liquid to flow from a tank under pressure of the descending liquid head in the tank; means to open and close the valve including a synchronous motor, a rotary cam rotated by the motor, the cam having a succession of circularly arranged short, cam elements, means to cause the motor to rotate and the valve to open coordinately, including switch means held by each cam element in position to keep the motor operating to the end of the cam element, and to keep the valve open; the cam elements being increasingly longer as the cam reaches positions corresponding to lower liquid heads in the tank.

2. The combination of claim 1 with a further switch, means on the cam to operate the further switch when the liquid is all dispensed, and means operated by the further switch to indicate that the liquid is all gone.

3. In a dispensing apparatus for dispensing liquids from containers: delivery means operable to effect delivery of liquid from a container, metering means for operating the delivery means to cause it to deliver substantially a predetermined quantity of liquid each time the delivery means is operated, despite variations in liquid head in the container, the metering means having elements to cause the delivery means to operate for short intervals when the container is well-filled and the liquid head is large, and successively longer intervals as it is emptied and the liquid head is small, said metering means including a member put into movement at predetermined speed each time the delivery means is put into operation so that the member moves distances coordinated with the intervals of time the delivery means is operated, and a control element operably associated with the member, spaced means on the member to engage the element to cause the latter to operate the delivery means to stop the flow, the spaced means being spaced at different distances apart on the member so as to cause the delivery means to operate for shorter intervals when the container is well-filled and longer intervals as it is emptied.

4. In a dispensing apparatus for dispensing liquids from containers: delivery means operable to effect delivery of liquid from a container, metering means for operating the delivery means to cause it to deliver substantially a predetermined quantity of liquid each time the delivery means is operated, despite variations in liquid head in the container, the metering means having elements to cause the delivery means to operate for short intervals when the container is well-filled and the liquid head is large, and successively longer intervals as it is emptied and the liquid head is small, said metering means including a member put into movement at predetermined speed each time the delivery means is put into operation so that the member moves distances coordinated with the intervals of time the delivery means is operated, and a control element operably associated with the member, spaced means on the member to engage the element to cause the latter to operate the delivery means to stop the flow, the spaced means being spaced at different distances apart on the member so as to cause the delivery means to operate for shorter intervals when the container is well-filled and longer intervals as it is emptied, said member comprising a rotary cam and a synchronous motor rotating it, and said control member comprising a switch with a switch actuating arm engageable onto the rotary cam, and actuated by the spaced means thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

1,639,679	Zsoldos	Aug. 23, 1927
2,045,251	Raber	June 23, 1936
2,159,650	Alker	May 23, 1939
2,550,102	Weiskopf	Apr. 24, 1951
2,619,169	Anderson	Nov. 25, 1952