United States Patent [19]

Van Meter

[11] **3,828,905**

[45] **Aug. 13, 1974**

[54] **VENDING MACHINE CIRCUITRY**

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[22] Filed: **June 25, 1973**

[21] Appl. No.: **373,198**

[52] **U.S. Cl.** **194/10,** 194/2, 133/2

[51] **Int. Cl.** **G07f 11/00**

[58] **Field of Search** ..... 194/1 N, 2, 9, 10; 133/2

[56] **References Cited**

UNITED STATES PATENTS

2,607,463 8/1952 Saigh 194/10

3,185,281 5/1965 Gross 194/2

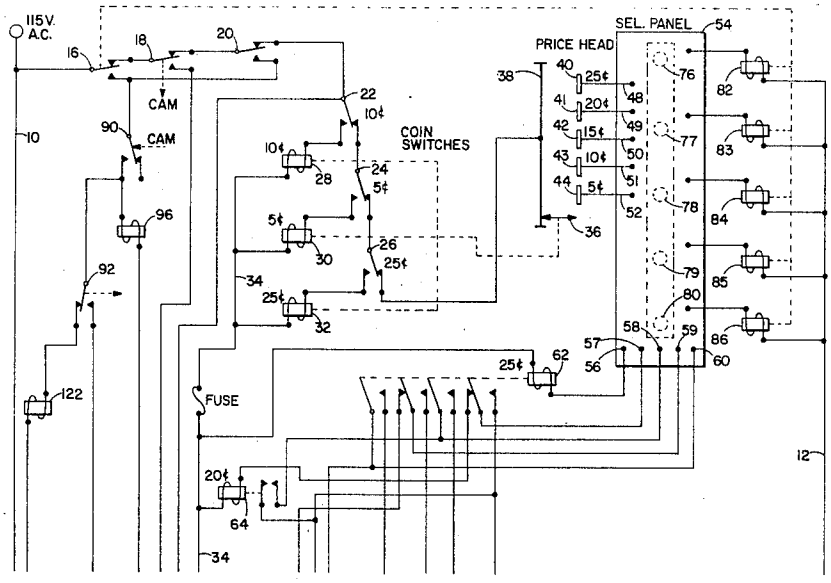
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[57] **ABSTRACT**

Circuitry for controlling a vending machine to prevent cheating. If after the change-maker is set, a vend is not initiated within a predetermined interval, the change-maker is reset.

5 Claims, 2 Drawing Figures



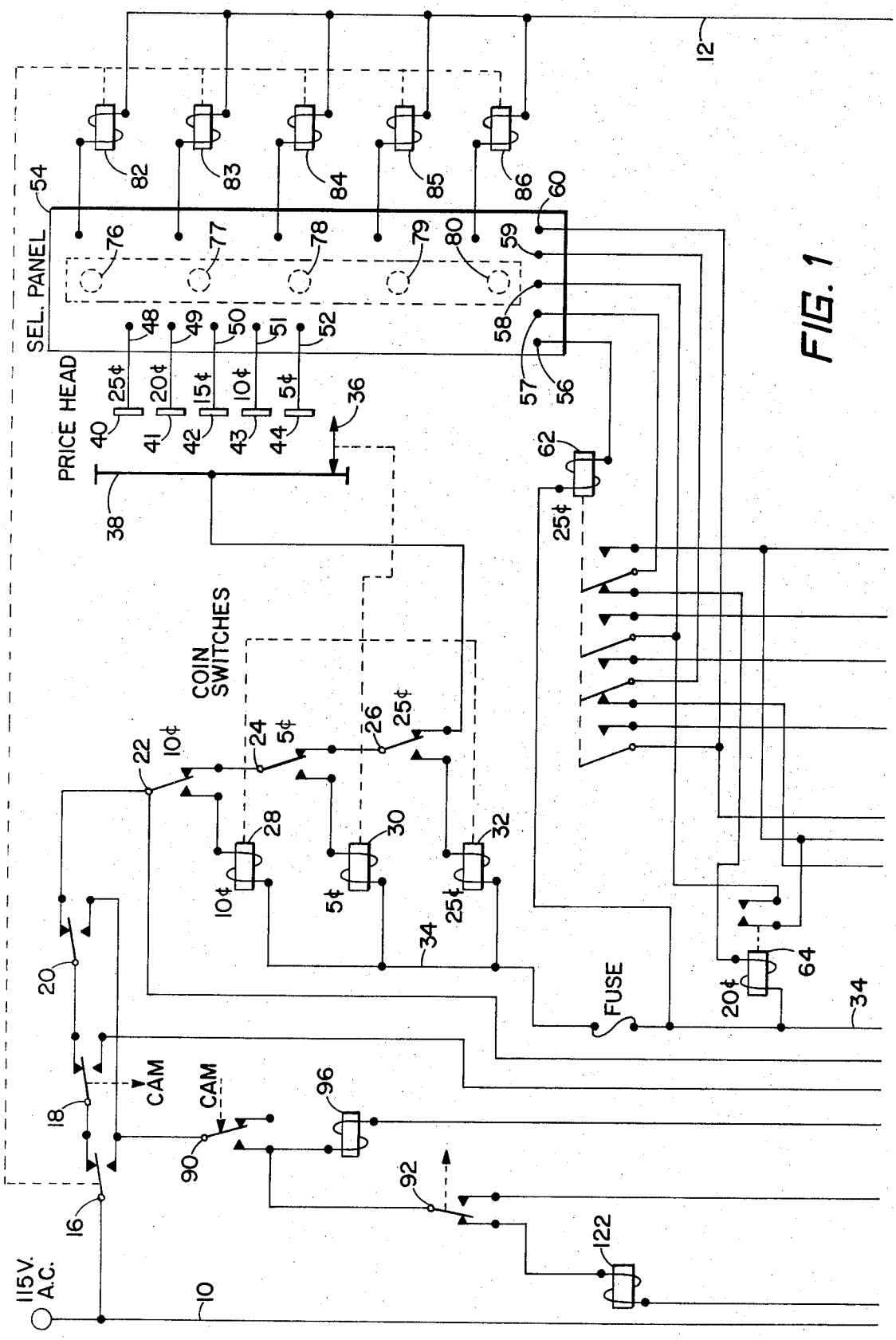
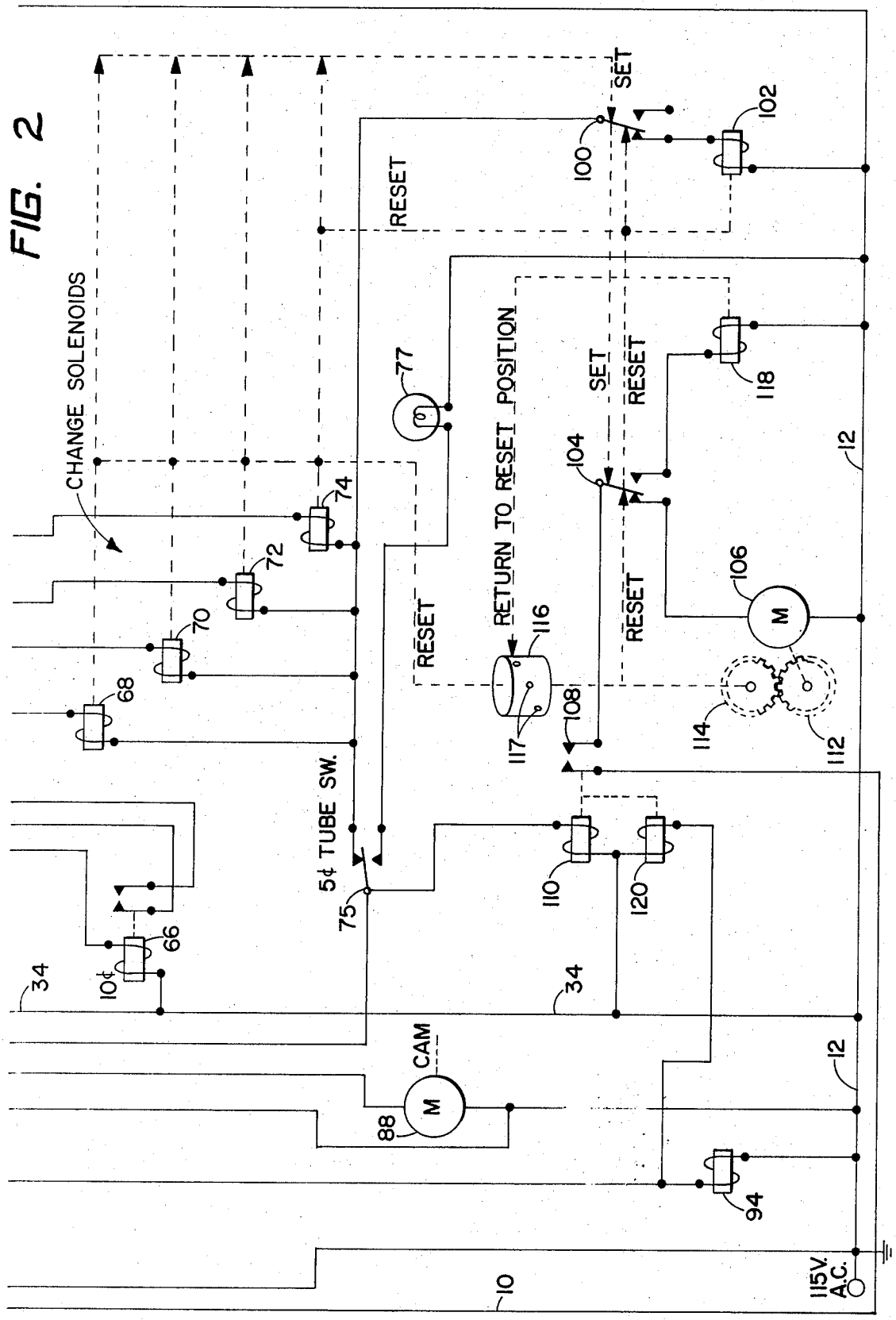

12
SEL. PANEL
54
82
83
84
85
86
60
76
77
78
79
80
59
58
57
56
48
49
50
51
52
PRICE HEAD
25¢
20¢
15¢
10¢
5¢
40
41
42
43
44
36
38
62
25¢
COIN SWITCHES
22
10¢
24
5¢
26
25¢
28
30
32
10¢
5¢
25¢
34
FUSE
64
20¢
34
20
18
16
CAM
CAM
90
96
92
122
115V. A.C.
10

FIG. 1

FIG. 2


CHANGE SOLENOIDS
RESET
SET
100
102
77
RETURN TO RESET POSITION
SET
RESET
104
118
12
74
72
70
68
RESET
116
106
M
117
108
114
112
5¢ TUBE SW.
75
110
120
10¢
66
34
34
CAM
M
88
12
94
10
115V. A.C.

VENDING MACHINE CIRCUITRY

BACKGROUND OF THE INVENTION

The invention pertains to circuitry for controlling vending machines and particularly to improved control circuitry to prevent cheating.

The invention involves improvements to control circuitry of the type described in U.S. Pat. No. 3,185,281 (Gross). It has been discovered that it is possible to cheat the system described in Gross. In the system of Gross the change solenoids and the carriage solenoids are electrically energized in series when a selector button is depressed. The change solenoids set the changemaker and the carriage solenoids actuate a carriage switch which supplies current to the vending motor. The delay associated with the carriage solenoids is greater than that associated with the change solenoids so that if the selector button is depressed momentarily for an instant it is possible to actuate a change solenoid without actuating a carriage solenoid. This sets the change-maker. For example, if a quarter is inserted into the vending machine and the nickel select button is momentarily depressed, the change-maker is set to return twenty cents. If the quarter select button is then depressed in the normal way a **25** cent item is dispensed and **20** cents is returned by the change-maker. So, for a quarter one gets a **25** cent vended item and **20** cents back in change. This kind of cheating is prevented with the improved control circuitry of the present invention.

SUMMARY

In some vending machines the change solenoids in the change-maker and the carriage solenoids are electrically connected in series when a selector button is depressed. The delay associated with the carriage solenoid is greater than that associated with the change solenoid and the change-maker may be set without the carriage solenoid initiating a vend so that the vending machine may be cheated.

The improved control circuitry incorporates a changer reset solenoid having a delay associated therewith greater than that of the carriage solenoids. The changer reset solenoid is energized a short time after a change solenoid is energized and actuated. When the changer reset solenoid is energized and actuated it resets the changer. If a carriage solenoid is energized and actuated as in a proper vend, the electrical energy to the changer reset solenoid is cut off, and the changemaker or changer is reset in the normal way.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. **1** and **2**, placed together, form a schematic diagram of the control circuitry for a vending machine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The vending machine receives its power from a **115** volt AC source (not shown) on lines **10** and **12.** Line **12** is the return and is grounded. Electrical power to the vending machine is controlled by a set of three switches **16, 18,** and **20** connected in series to line **10.** Switch **16** is known as the carriage switch, **18** as the motor hold switch, and **20** as the coin return switch. When the vending machine is ready for a vend, switches **16, 18,** and **20** are in their up positions. Another set of switches, **22, 24,** and **26** are connected in series with the first set of switches. The second set of switches are known as the coin switches and are actuated when coins are deposited in the vending machine. Switch **22** is actuated by dimes, switch **24** by nickels, and switch **26** by quarters. These switches are normally in their right positions and when actuated by a coin are moved to their left positions. Accumulator solenoids **28, 30,** and **32** are momentarily energized when coins momentarily actuate switches **22, 24,** and **26.** These solenoids are connected to AC line **12** by a lead **34.** The plungers associated with solenoids **28, 30,** and **32** actuate a contact plunger **36** in the accumulator price head. Contact plunger **36** is moved upward between a slide contact **38** on the left and a set of five contacts **40–44** on the right. Five price lines **48–52** connect the contacts **40–44** to terminals on a selector panel **54.** Line **48** is known as the **25** cent price line, line **49** the **20** cent price line, line **50** the **15** cent price line, line **51** the **10** cent price line, and line **52** the **5** cent price line.

As an example, when a quarter is deposited in the machine it passes through a slug rejector (not shown) and passes by the **25** cent coin switch **26.** In passing by switch **26** it momentarily actuates switch **26** moving it to its left position. This momentarily completes the electrical circuit to solenoid **32** and it is energized. The plunger associated with solenoid **32** moves contact plunger **36** upward until it is opposite contact **40.** This completes the electrical circuit between price line **48** and AC line **10.** If other coins are deposited, other price lines will be connected.

Connecting a certain price line to one side of AC line **10** causes one of three relays **62, 64,** or **66** to be energized. Relay **62** is known as the **25** cent relay, relay **64** the **20** cent relay, and relay **66** the **10** cent relay. With a quarter having been deposited in the machine and price line **48** connected to AC line **10,** the **25** cent relay **62** is energized and its contactor is moved to the right. The right end of the winding of relay **62** is connected to a terminal **56** at the bottom of selector panel **54.** Terminal **56** is connected internally in selector panel **54** to price line **48.** The left end of the winding of relay **62** is returned to AC line **12.** If **20** cents is deposited in the machine, relay **64** is connected via contacts of relay **62** to a terminal **57** at the bottom of selector panel **54.** Terminal **57** is internally connected in panel **54** to price line **49.** When **10** cents is deposited in the machine, relay **66** is connected via contacts of relay **62** to a terminal **59** at the bottom of selector panel **54.** Terminal **59** is connected internally in panel **54** to price line **51.** The function of relays **62, 64,** and **66** is to set up the change solenoids in the change-maker used in the machine. This machine uses a nickel change-maker of the type described in U.S. Pat. No. 2,848,033 (Gross) and includes four change solenoids **68, 70, 72,** and **74.** These are known respectively as the four-coin, three-coin, two-coin, and one-coin change solenoids. The bottom end of each of the windings associated with the change solenoids is connected through a switch **75,** known as the five-cent tube switch, to the AC line **10.** The five-cent tube switch is in the up position as shown unless the tubes in the change-maker are empty, in which case the five-cent tube switch moves downward causing a lamp **77** to be energized, indicating that correct change must be used. The upper ends of each of the windings of the change solenoids are connected to

contacts in the 25 cent relay 62 and in addition the upper end of the winding of solenoid 74 is connected to contacts in the 20 cent relay 64 and contacts in the 10 cent relay 66. Depending on the coins deposited in the machine and the selection made, a certain change solenoid is energized setting up the changemaker. For example if a quarter is deposited and a nickel selection is made, change solenoid 68, the four-coin solenoid, is energized, and four nickels are returned together with the item selected.

Selector panel 54 includes a set of five selector buttons 76–80. Connected to terminals at the right side of selector panel 54 is a set of five solenoids 82–86. Solenoids 82–86 are known as the carriage solenoids. The plungers associated with these solenoids are connected to the contactor of carriage switch 16. Solenoids 82–86 are returned to AC line 12.

Pressing a selector button momentarily provides an electrical connection between one of the change solenoids and one of the carriage solenoids. Assume for example that a quarter has been deposited and that a nickel item is selected and that button 80 is the nickel select button. When button 80 is pressed, the four-coin solenoid 68 is connected in series with carriage solenoid 86 across the supply voltage. In effect, button 80 momentarily short circuits a terminal 60 at the bottom of selector panel 54 to the top end of the winding on solenoid 86. In the normal course of events, the nickel item selected and four nickels in change are received by the person making the selection.

Energizing the winding of carriage solenoid 86 causes a plunger associated therewith to move carriage switch 16 to its lower position. This places 115 volts across the vending motor 88 and the vend or delivery stroke of the machine is begun. Moving the contactor of carriage switch 16 downward interrupts the current to the coin switches 22, 24, and 26, the accumulator price head, and the carriage solenoids.

When a cam (not shown) on motor 88 has turned about one third of a revolution, a motor cam switch 90 is moved to the left, sending current to a coin acceptance switch 92. The item being vended passes by switch 92 and actuates it such that the contactor is moved to the right, supplying current to the coin acceptance solenoid 94. The money deposited in the machine is then dropped into a cash box (not shown). When motor cam switch 90 is actuated to the left, current is also supplied to an accumulator reset solenoid 96. Energizing solenoid 96 causes the accumulator to be reset to zero, that is, contact plunger 36 drops to the position shown, disconnecting all the price lines 48–52.

As the carriage (not shown) in the vending machine approaches the end of the delivery stroke, carriage switch 16 is actuated and moved upward. Previous to this, the cam associated with vending motor 88 had actuated motor hold switch 18 so that its contactor was moved downward. Therefore when carriage switch 16 is actuated and moved to its upper position the vending motor is still energized through the motor hold switch 18. Motor hold switch 18 continues to energize motor 88 until the cam associated therewith has completed a full revolution. A rise on the cam then actuates motor hold switch 18 moving it to its upper position and breaking the circuit to the vending motor 18. The vending machine is now ready for the next vend.

The resistance and inductance of the carriage solenoids (82–86) is greater than that of the change solenoids (68, 70, 72, 74). Therefore when a change solenoid and a carriage solenoid are electrically connected in series it is possible to actuate the change solenoid before the carriage solenoid is actuated because of the longer delay associated with the carriage solenoid (delay is a function of inductance and resistance). In the past, this could be done by very rapidly pressing and releasing a selector button which would set the change-maker independently of making an actual selection. It was possible to cheat the machine by depositing a coin, a quarter for example, and momentarily depressing the nickel select button. This would set the four-coin solenoid 68 in the nickel change-maker but would not actuate the delivery stroke. To actuate the delivery stroke the quarter selector button would then be depressed, setting up an actual vend. The result would be the reception of the 25 cent item selected and the return of 20 cents in change. In this way a 25 cent item is received for a nickel. The present invention is designed to eliminate this technique for cheating the machine. The plungers of change solenoids 68, 70, 72, and 74 actuate a switch 100 after a slight delay. The delay can be introduced by having the plungers operate a cam associated with the contactor of switch 100. There are a number of ways of introducing such a mechanical delay. Actuation of switch 100 causes the supply voltage to be applied across the winding of the changer reset solenoid 102. The resistance and inductance of the winding of solenoid 102 happen to be greater than that of the windings of the carriage solenoids 82–86. In other words, the delay associated with switch 100 and solenoid 102 when it is energized is greater than that of the carriage solenoids. In effect, solenoid 102 will not be actuated until a short time after a carriage solenoid would normally be actuated. Therefore, if an attempt is made to cheat the vending machine and a carriage solenoid is not actuated a short time after a change solenoid is actuated, the changer reset solenoid is actuated. The plunger of solenoid 102 is mechanically connected directly back to the change solenoids and resets them. The plunger of solenoid 102 is also mechanically connected back to switch 100 so that when solenoid 102 is energized and the plunger is actuated, switch 100 is moved to the right breaking the circuit to solenoid 102. The plunger of solenoid 102 is also mechanically connected to the contactor of switch 104. When switch 100 was moved to the left, switch 104 was also moved left. This is in preparation for energizing change disperser motor 106 in the course of a normal vend. If the vend is improper, i.e., if cheating is attempted, and the change-maker is reset by solenoid 102, switch 104 is moved back to the right.

In a proper vend, 115 volts AC is applied across motor 106 through a pair of contacts 108 associated with an upper latch relay 110. The winding of relay 110 is connected between the AC on line 12 and the AC present at a point between coin switch 22 and coin return switch 20. Motor 106 drives a coin dispensing gear 112 which drives a timing gear 114 which drives a clutch drum 116. Fins 117 on the clutch drum 116 reset the change solenoids 68, 70, 72, and 74 in a normal vending situation. After the change-maker has been reset, a mechanical connection from gear 114 resets switch 104 to the right. This energizes the clutch drum solenoid 118 which returns the clutch drum 116

to the rest position. When a actual vend takes place, a lower latch relay **120** causes contacts **108** to close. If the item selected is not vended, switch **92** supplies current to a coin return solenoid **122** which causes the deposited coins to be returned.

In summary, if an improper vend is attempted the changemaker is reset by changer reset solenoid **102** a short time after the carriage solenoid should normally have been actuated. In a proper vend the changemaker is reset in the normal way by clutch drum **116** which is driven by change dispenser motor **106.**

If the vend is set up properly by the person making the selection the winding of changer reset solenoid **102** is electrically de-energized when carriage switch **16** is actuated and moved downward by a plunger associated with a carriage solenoid. Therefore the reset of the change-maker to prevent cheating is not carried out but the change-maker is reset in the normal way by clutch drum **116.**

A preferred embodiment of the invention is described above and illustrated in the drawings. Those skilled in the art can make modifications to this embodiment and devise equivalent embodiments without departing from the spirit and scope of the invention which is to be limited only by the claims.

What is claimed is:

1. In a vending machine having a carriage, a changemaker and means for resetting the change-maker, the change-maker having change solenoids that are electrically connected in series with carriage solenoids when a selector button is actuated, the delay associated with the carriage solenoids being greater than that associated with the change solenoids so that the changemaker can be set without the carriage solenoids initiating a vend, whereby the vending machine can be cheated, the improvement comprising:

a. delay means having a delay greater than that of the carriage solenoids;

b. means responsive to the change solenoids for energizing the delay means when a change solenoid is energized;

c. means responsive to the delay means for resetting the change-maker independently of the means for resetting the change-maker;

d. means responsive to the carriage solenoids for de-energizing the delay means if a carriage solenoid is actuated during a predetermined interval after a selector button is actuated; and

e. said delay means including a change or reset solenoid, and a switch connected in series with said changer reset solenoid and actuated by the change solenoids.

2. The apparatus as recited in claim **1** in which the switch includes delay means comprising a cam.

3. The apparatus as recited in claim **2** in which the solenoid includes means for opening the series switch and breaking an electrical circuit to the solenoid when the solenoid is actuated.

4. In a coin operated vending machine suitable for dispensing a plurality of differently priced articles and having multiple selector switches, a carriage dispenser including carriage solenoids which are responsive to activation of the selector switches, and a change-maker having change solenoids which are also responsive to activation of the selector switches, the improvement which comprises delay means to temporarily retard the resetting of the change solenoid for a short period of time, until after the selected carriage solenoid has initiated an article-dispensing cycle to such an extent that the dispensing cycle cannot be altered by manipulation of a different selector switch to thereby obtain change for an article priced less than the article actually dispensed.

5. The improved apparatus as recited in claim **4** wherein the delay means comprise:

a. a changer reset solenoid;

b. a switch connected in series with the changer reset solenoid and actuated by the change solenoids;

c. wherein said switch includes delay means comprising a cam; and

d. wherein said changer reset solenoid includes means for opening the series switch and breaking an electrical circuit to the solenoid when the solenoid is actuated.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,828,905 Dated August 13, 1974

Inventor(s) Edmin L. Van Meter

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 2, in line 55, change "2,848,033" to --2,848,003--.

Signed and sealed this 3rd day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.