June 24, 1969 M. E. SCHNEIDER 3,451,518

MERCHANDISE RELEASE CONTROL FOR A COIN VENDING MACHINE

Filed Aug. 17, 1967 Sheet 1 of 2

FIG.1

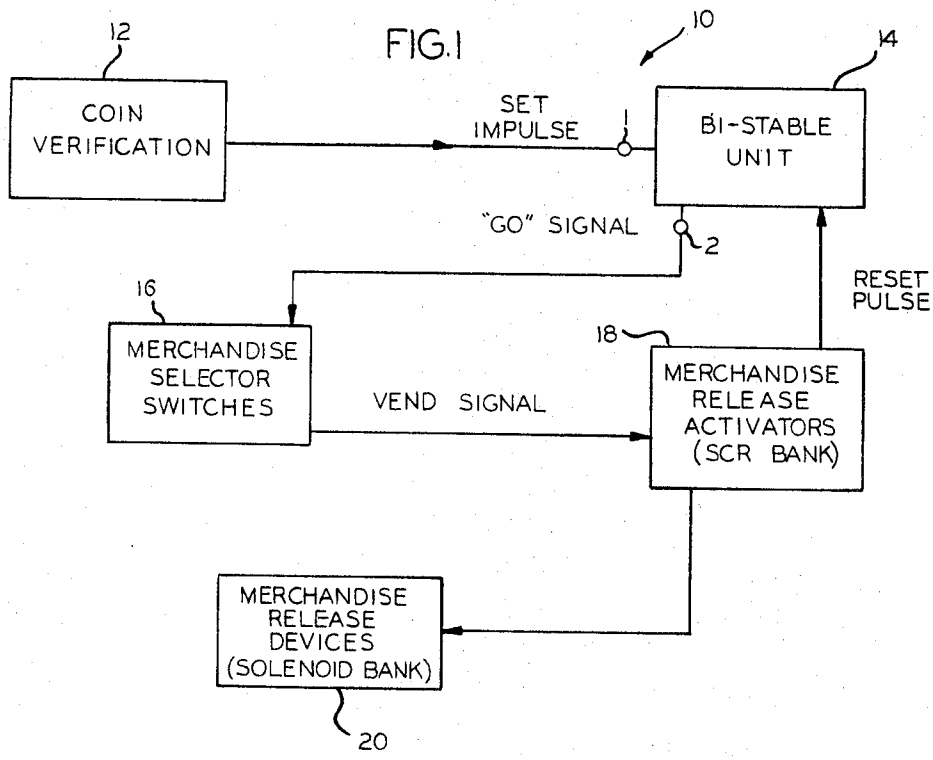
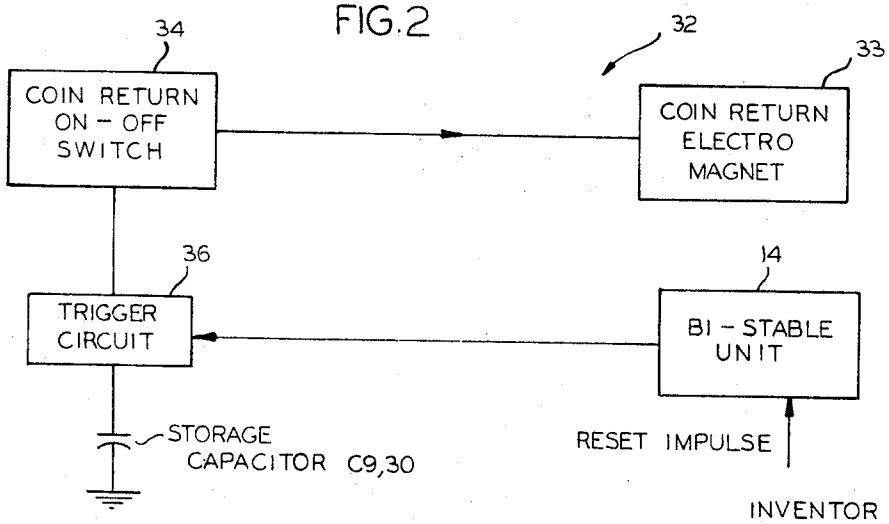


FIG.2



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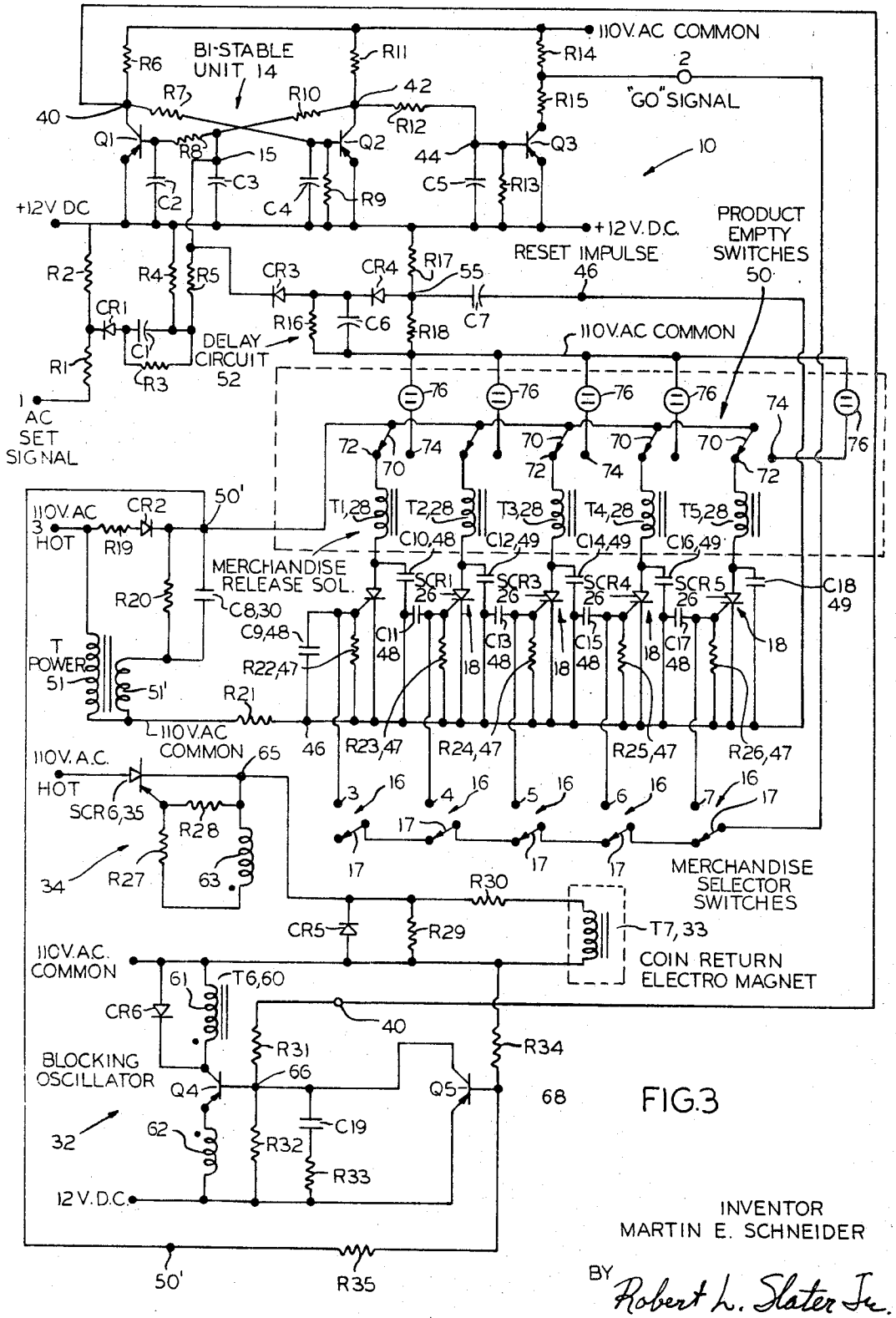


FIG.3

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MERCHANDISE RELEASE CONTROL FOR A COIN VENDING MACHINE

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Int. Cl. G07f 11/00
U.S. Cl. 194—2 13 Claims

ABSTRACT OF THE DISCLOSURE

A coin operated vending machine producing an electrical drive signal upon the acceptance of the proper coinage inserted into the machine. The drive signal becomes a vend signal when a product selection is made, to close an electronic switch and provide a discharge path for a storage capacitor whereby a merchandise release solenoid is energized causing the selected product to be dispensed.

BACKGROUND OF THE INVENTION

The invention relates generally to a coin operated vending machine for dispensing more than one product and more particularly relates to a selection system for a coin operated vending machine having solid state control circuitry.

In the prior merchandise selection systems, switching arrangements comprising solenoids and relays were used to control the product selection. Due to the movement of the mechanical parts of these switches whenever a product selection was made, frequent repair and maintenance were required. Moreover, the down time because of the inoperation of the vending machine resulted in substantial losses of revenue. The invention herein overcomes the inherent unreliability of the prior systems by adapting solid state circuitry for controlling the release of the selected product.

Furthermore, the prior product selection systems for vending machines were generally custom designed for particular vending siutations. Thus, it was required to materially modify or even redesign the operation of the system for any deviation from the original design. In fact, very little standardization evolved from the prior electrical and electromechanical selection systems. Therefore, in order that design costs should not prohibit the conversion of the prior merchandise selection systems to their solid state equivalents, the invention herein is designed to afford standard circuitry which may be readily modified or adapted to operate for substantially any vending situation.

Another undesirable feature of the previous product selection systems was the long time interval between the activation of the means for releasing the product and the resetting of the selection system. Thus, multiple product delivery or jackpotting frequently occurred.

Another problem with the prior vending machines was that normally coins were lost and not returned if inserted at a time when the machine was unable to provide a selection. This condition was present if a coin was inserted before the machine had reset to its original position after completing a vend. The invention herein overcomes this problem by providing means which automatically returns coins inserted before the vending machine is capable of providing a vend.

SUMMARY OF THE INVENTION

The product selection system for coin operated vending machines of this invention provides solid state circuitry for controlling product selection and release. When a product is selected, an electronic switch is closed to provide a discharge path through the corresponding product release solenoid for a charge stored on a storage capacitor. The discharge current energizes the solenoid which causes a release mechanism to dispense the product.

A drive or "go" signal is produced when the proper coin is inserted into the vending machine. The "go" signal becomes a vend signal when the product selection is made and causes the closing of the electronic switch to provide a discharge path for the storage capacitor. A reset means disposed in said discharge path generates a reset pulse to turn off the "go" signal at substantially the instant a selection is made; thus affording a positive safeguard from the occurrence of multiple product delivery (jackpotting).

It is therefore a primary object of this invention to provide solid state switching and control circuitry for a merchandise selection system of a coin operated vending machine.

It is another object to provide standard solid state circuitry for a merchandise selection system which may be readily modified or adapted to accommodate substantially any vending situation.

Another object is to provide drive means for triggering the merchandise release activator which is reset when the product selection is made, thereby preventing multiple product delivery.

Another object is to energize a solenoid for releasing a selected product by providing a discharge path through the solenoid for a charge stored on a storage capacitor.

Another object is to provide a solid state switch which closes in response to a vend signal and remains closed after the drive signal is removed.

Still another object is to prevent the vending machine from accepting coins for only a minimum time interval. Thus, the machine accepts coins at the instant the selection system is capable of providing another vend.

Still another object is to provide safeguards for preventing the vending machine from losing coins. Thus, after a first coin is accepted by the vending machine and produces a drive signal, a second coin will not be accepted until the machine is capable of providing another vend.

These and other objects and advantages of the invention will become apparent from the illustrations in the accompanying drawings and the following specification and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings.

FIGURE 1 is a block diagram of the merchandise selection system of a coin operated vending machine embodying the principles of the invention;

FIGURE 2 is a block diagram of the control circuitry for the coin return electromagnet; and

FIGURE 3 is a schematic drawing of the circuitry comprising the block diagrams of FIGURES 1 and 2.

PREFERRED EMBODIMENT

Brief description

Referring now particularly to FIGURES 1 and 3 of the drawings, the reference numeral **10** indicates generally a merchandise selection system for a coin operated vending machine. The selection system **10** comprises a coin verification unit **12** which produces a coin or set impulse upon the acceptance of a coin inserted into the vending machine. The set impulse is rectified and applied to a bistable unit **14** at point **15** which changes the bistable unit from a normally "off" condition to an "on" condition.

When the bistable unit is in the "on" condition, it credits the inserting of the coin and yields a drive or "go" signal which is applied to a plurality of merchandise selector switches indicated generally by the reference numeral **16**. As shown in FIGURE 3, the "go" signal appears at the output point **2** which is connected with the selector arms **17** of the selector switches **16**. The selector arms **17** are connected together in series. Now a product selection may be made.

A bank of merchandise release activators indicated generally by the reference numeral **18** are provided to energize the merchandise release devices **20** which cause the dispensing of the selected product. The merchandise release activators **18** function as ON-OFF electronic switches. As will be seen from FIGURE 3, the merchandise release activators **18** in the illustrative embodiment comprise silicon controlled rectifiers SCR **1** to **5**, **26**. The merchandise release devices **20** comprise merchandise release solenoids **T1** to **T5**, **28**. When a product is selected by activating one of the selector switches **16**, the "go" signal is coupled from the bistable unit **14** to the gate of the SCR **26** corresponding to the selected product to trigger the SCR "on." Thus, the "go" signal becomes a vend signal when the selection switch is activated.

As shown in FIGURE 3 the gates of SCR **1** to **5**, **26** are connected respectively to terminals **3** to **7** of the selector switches **16**. When the SCR **26** is "on," a storage capacitor **C8**, **30** is discharged through the corresponding solenoid **28** and SCR **26**. The discharge of the capacitor **C8**, **30** energizes solenoid **28** causing the dispensing of the selected product.

When the product selection is made, a reset pulse caused by the discharge current of storage capacitor **C8**, **30** is coupled back to the bistable unit **14** to switch the bistable unit from the "on" condition back to its original or "off" condition. This removes the "go" signal from the selector arms **17** of the selector switches **16**. Thus, the same current that energizes the merchandise release solenoid also creates the reset pulse.

Referring now to FIGURES 2 and 3, the control circuitry indicated generally by the reference numeral **32** (FIGURE 2) for the coin return electromagnet **T7**, **33** will be described. After a coin is accepted by the vending machine and the bistable unit **14** is turned "on," an electronic coin return switch **34** is turned "off" from an originally "on" position and the coin return electromagnet **T7**, **33** is de-energized. When the electromagnet is in the de-energized state, the vending machine will not accept coins.

After a vend has been completed and the selection system **10** is capable of providing another vent, the coin-return switch **34** is turned "on" to permit the vending machine to again accept coins. Therefore, switch **34** is turned "on" only after the bistable unit **14** is "off" and the storage capacitor **C8**, **30** has a sufficient charge to provide another vend. This delay in energizing the coin return electromagnet, prevents loss of coins due to insufficient charge on the storage capacitor **C8**, **30**.

The coin return switch **34** comprises a silicon controlled rectifier SCR **6**, **35**, which is turned on by a trigger circuit indicated generally by the reference numeral **36** (FIGURE 2). The triggers circuit **36** comprises a blocking oscillator **37** which triggers the gate of SCR **6**, **35**. The "on" condition for the bistable unit **14** biases the blocking oscillator **37** "off" which removes the trigger from the gate of SCR **6**, **35**. Without the trigger, SCR **6**, **35** stops conducting causing the de-energizing of the coin return electromagnet **33**. The blocking oscillator is biased "on" when bistable **14** is reset to the "off" condition and the capacitor **C8**, **30** has recharged to the proper voltage level.

Detailed description

Turning now specifically to FIGURE 3, the circuitry for the selection system **10** for the vending machine will be described with more detail. After a coin is inserted into the vending machine and accepted, a coin switch (not shown) in the coin verification unit **12** provides an AC set pulse at input point **1**. The AC set pulse is rectified to a negative DC voltage with respect to a positive reference voltage, shown as +12 volts DC, and applied to the bistable unit **14** at point **15**. The rectified set pulse turns the bistable "on" from its original "off" condition.

The AC set pulse at point **1** is reduced in magnitude essentially by the ratio of resistors **R1** and **R2**. The AC set pulse appearing at the junction of **R1**, **R2** and diode **CR1** is rectified by the diode **CR1**. The cooperation of capacitor **C1**, resistors **R3**, **R4** and **R5** and capacitor **C3** provides the desired DC level for turning the bistable to the "on" condition.

The bistable unit **14** is comprised of PNP transistors **Q1** and **Q2**. Resistors **R6** and **R11** are connected respectively from the collectors **40**, **42** of **Q1** and **Q2** to the 110 volts AC common line. The emitters for **Q1** and **Q2** are connected to the +12 v. DC. The collector **40** of **Q1** is connected to the base of **Q2** by resistor **R7**. The collector **42** of **Q2** is connected to the base of **Q1** by resistors **R10** and **R8**. The capacitor **C3** and the resistor **R5** are connected at the junction of the resistors **R8** and **R10**. A capacitor **C2** is connected at one end to the junction of the base of **Q1** and resistor **R8** and at the other end to the +12 v. DC.

A resistor **R12** couples the collector **42** of **Q2** to the base **44** of a PNP output transistor **Q3**. A capacitor **C5** and a resistor **R13** are connected between the base **44** and the +12 v. DC. The emitter of **Q3** is connected to the +12 v. DC.

A resistor **R15** is connected between the collector of **Q3** and a resistor **R14**. The opposite end of resistor **R14** is connected to the 110 v. AC common line. An output indicated by the numeral **2** is taken from the junction of **R14** and **R15** and connected to the selector arms **17** of the merchandise selector switches **16** (FIGURES 1 and 3). As shown, the selector arms are connected in series.

The drive signal or "go" signal for triggering the merchandise release activator **18** appears at the output **2** after the proper coin has been accepted by the machine. Transistors **Q1** and **Q2** operate as a "flip-flop" and function as a memory device for crediting the inserting of a coin. After the coin is credited, **Q3** is switched from cutoff to conduction and a +12 v. DC "go" signal appears at the output point **2**.

For purposes of example only, the illustrative embodiment shows five possible product selections. The merchandise release activator **18** comprises a plurality of identical activator circuits for releasing one of the various products in the vending machine. Each activator comprises the silicon controlled rectifier **26** (SCR **1** to SCR **5**) having a gate, an anode and cathode. The cathodes of the SCR's are tied together at point **46**. A resistance **47** (**R22**, **R23**, **R24**, **R25** or **R26**) and a capacitor **48** (**C9**, **C11**, **C13**, **C15** or **C17**) are connected between the gate and the cathode of each SCR **26**. A capacitor **49** (**C10**, **C12**, **C14**, **C16** or **C18**) is connected from the anode to the SCR cathode. The gates of SCR **1** to **5**, **26** are connected respectively to terminals **3** to **7** of the selector switches **16**.

Solenoids **T1** to **5**, **28** have one end connected respectively to SCR **1** to **5**, **26**. The opposite ends of solenoids **T1** to **5** are each connected to one of a plurality of product "empty" switches indicated generally by the reference numeral **50**. Therefore, the solenoids are connected to one end of the storage capacitor **C8**, **30** at point **50'** when the switches **50** are in their "nonempty" positions as shown in FIGURE 3. The product "empty" switches **50** will be discussed in more detail further in the description.

The power transformer **Tp**, **51** includes a secondary winding **51'** properly phased to bring the voltage at point **50'** below zero to turn "off" the SCR **26** corresponding to the selected product, after the storage capacitor has dis-

charged. A resistor R20 is shunted across the storage capacitor C8, 30.

A resistor R19 couples the 110 v. AC-hot from point 3 to a rectifier CR2. The rectifying of the AC voltage by CR2 charges capacitor C8, 30 to approximately 150 v. DC at point 50'.

A resistor R21 is connected between the common connection for the cathodes of SCR 1 to 5, 26 at point 46 and the 110 v. AC common line. A reset pulse for the bistable 14 is produced across R21 after capacitor C8, 30 is discharged through the solenoid 28 and SCR 26.

A delay circuit indicated generally by the reference numeral 52 is connected to the junction of R5 and C3 to prevent the bistable 14 from switching due to noise pulses or stray high frequency signals. The delay circuit 52 comprises a diode CR3 connected at the cathode side to point 15, and at the anode side 53 to the cathode of a diode CR4, a resistor R16 and a capacitor C6. The opposite sides of R16 and C6 are tied to the 110 v. AC common. The anode side of diode CR4 at 55 is connected to resistors R17 and R18 and a capacitor C7. The other side of R17 is tied to the +12 v. DC and the other side of R18 is connected to the 110 v. AC common.

When the bistable unit 14 is "off" and capacitor C8, 30 is charged to a sufficient level to provide a vend, the control circuitry 32 (FIGURE 2) for the coin return electromagnet T7, 33 maintains the electromagnet "on" so that the vending machine accepts coins to provide the vend. The blocking oscillator 37 triggers the SCR 6, 35 to provide current flow for energizing the electromagnet T7, 33.

The blocking oscillator 37 comprises a PNP transistor Q4 so connected to a transformer indicated generally by the designation T6, 60, to produce the desired regenerative feedback. Therefore, a collector winding 61 of T6 is connected between the 110 v. AC common and the collector of Q4. A diode CR6 is connected across the collector winding 61 to minimize spikes and transients. An emitter winding 62 of T6 is connected between the emitter of Q4 and the +12 v. DC. A third winding 63 of T6, 60 is positioned in the gate circuit of SCR 6, 35 to provide the trigger pulse for turning SCR 6, 35 "on."

The gate circuit of SCR 6, 35 comprises resistors R27 and R28 connected to the gate at point 64. Winding 63 of T6, 60 is connected at one side to R28 and on the other side to R27. The junction of R28 and winding 63 is tied to the cathode of SCR 6, 35 at point 65. A resistor R30 is connected between the cathode 65 of SCR 6, 35 and the high voltage side of the winding for the coin return electromagnet T7, 33. The other side of the electromagnet 33 is connected to the 110 v. AC common. A resistor R29 and diode CR5 are both connected from the cathode 65 of SCR 6, 35 to the 110 v. AC common. The anode of CR5 connects to the common line. The 110 v. AC-hot is connected to the anode side of SCR 6.

The biasing circuit for transistor Q4 of the blocking oscillator 37, comprises resistors R31 and R32 connected together at the base 66 of Q4. The opposite end of R32 is connected to the +12 v. DC and the opposite end of R31 is connected to the collector 40 of Q1. Resistor R33 and capacitor C19 are series connected and shunted across the resistor R32.

The collector of a transistor Q5 is connected to the base 66 of Q4. The emitter of transistor Q5 is connected to the +12 v. DC. The biasing circuit for Q5 comprises resistors R34 and R35 connected to the base 68 of Q5. The opposite end of R34 is tied to the 110 v. AC common and the opposite side of R35 is connected to the storage capacitor C8, 30 at point 50'. Thus, the blocking oscillator 37 operates when C8, 30 is recharged to 150 v. DC and transistor Q1 of the bistable 14 is cutoff.

Each control circuit for the release of the merchandise includes one of the product "empty" switches 50. Each of the switches 50 includes a selector arm 70 which connects with the associated solenoid at terminal 72 when there is at least one of the corresponding products in the vending machine. When the vending machine is empty of the product, the selector switch 70 switches to terminal 74 to sever the connection of solenoid 28 with capacitor C8, 30. When the selector arm 70 is in contact with terminal 74, the voltage from capacitor C8, 30 is connected across a lamp 76 causing the lamp to light and visually indicating the product empty condition.

Circuit operation

Turning now specifically to FIGURE 3, the circuit operation will be described with more particularity. The initial application of electrical power applied to the selector system 10 will always cause transistor Q2 to conduct and transistor Q1 to be cut off. This is due to the bias developed across the resistance divider of R6, R7 and R9.

The inserting of the proper coin into the vending machine produces an AC impulse at point 1. The impulse is rectified to a negative DC voltage with respect to the +12 v. DC and applied to the bistable unit at point 15 and to the base of Q1 through resistor R8. This causes the transistor Q1 to conduct, the transistor Q2 to become cut off, and the output transistor Q3 to conduct. Thus, the "go" or drive signal of approximately +12 v. DC is produced at point 2. The "go" signal appears on each of the series connected selector arms 17 of the merchandise selector switches 16. Now the user of the vending machine may make any one of the five selections illustrated in FIGURE 3.

When a selection is made the selector arm 17 corresponding to the selected product momentarily connects with the corresponding activator switch terminal 3, 4, 5, 6 or 7. Thus, the +12 v. DC, "go" signal is connected to the gate of the corresponding SCR 26 (SCR 1, 2, 3, 4 or 5); thereby becoming the vend signal. The vend signal triggers the SCR 26 switch "on" to provide a discharge path for the charge on storage capacitor C8, 30 to the 110 v. AC common through the corresponding solenoid 28 (T1, T2, T3, T4 or T5), the triggered SCR 26, and the resistor R21. The discharge current of capacitor C8, 30 energizes the solenoid 28 which causes the dispensing of the selected product.

The voltage across resistor R21 due to the discharge current provides a positive reset pulse which is coupled back to the bistable 14 via capacitor C7, the delay circuit 52 comprising the diodes CR3, CR4, resistors R16, R17 and R18, capacitor C6, and finally through the resistor R8 to the base of Q1. The positive reset pulse biases Q1 "off," causing Q2 to turn "on" and Q3 to cut "off." This occurs since the presence of the reset pulse at point 15 causes Q1 to stop conducting and the collector 40 drops to approximately zero volts. Thus, the voltage at the base of Q2 due to the voltage divides of R6, R7 and R8 causes Q2 to conduct. When Q2 conducts, the collector 42 rises to approximately +12 v. DC. Therefore the voltage at the base of Q3 due to the voltage divider of R12 and R13 is essentially +12 v. DC which biases Q3 off. The collector of Q3 drops to zero volts and thus the +12 v. DC "go" signal is removed from the selector arms 17 of the selector switches 16.

After the storage capacitor C8, 30 has discharged, the "on" SCR 26 automatically turns "off." This occurs because as the voltage on the storage capacitor decays, the secondary winding 51' of the power transformer Tp, 51 is phased to bring the voltage below zero. The resulting current reversal automatically turns the SCR 26 off.

When the storage capacitor C8, 30 is charged to the +150 v. DC level and the bistable unit 14 is "off," the blocking oscillator 37 operates and the coin return switch SCR 6, 35 is "on." The conducting of the SCR 6, 35 maintains the coin return electromagnet T7, 33 energized. In the energized state of the electromagnet,

the vending machine accepts the proper coin inserted therein. As soon as the bistable unit **14** is turned "on" and the voltage at the collector **40** of Q**1** rises to +12 v. DC, the blocking oscillator transistor Q**4** is biased "off," thereby removing the trigger from the SCR **6**, **35**. Without the trigger, the SCR **6**, **35** automatically turns off and the electromagnet T**7**, **33** de-energizes.

After the reset pulse turns the bistable unit **14** "off," the blocking oscillator transistor Q**4** is still biased "off" due to the +12 v. DC appearing at the base **66** of Q**4** from the "on" condition of Q**5** caused when the storage capacitor C**8**, **30** is discharged. Thus, the voltage at the base **68** of Q**5** due to the resistance divider of R**34** and R**35** connected between point **50'** at the capacitor C**8**, **30** and the common line, biases Q**5** "on" until the capacitor recharges. When the storage capacitor has recharged to a level sufficient for providing another vend, Q**5** is cut off and Q**4** is then biased "on," triggering the coin return switch SCR **6**, **35** "on" to energize the coin return electromagnet T**7**, **33**. Thus, during the time interval that the bistable is turned "on" until the capacitor C**8**, **30** is recharged, the elecromagnet T**7**, **33** is de-energized and the vending machine will not accept any coins. Using the component values given below for the circuit in FIGURE 3, it will take approximately two and one-half (2½) seconds for capacitor C**8**, **30** to recharge after being discharged to provide a vend.

The solid state control circuitry is preferably assembled apart from the merchandise release solenoids **28**, coin return electromagnet T**7**, **33**, the "empty" switches **50**, the empty indicating lamps **76** and merchandise selector switches **17** but associated together by suitable wiring and connectors. In this manner, standard layout arrangements and standard solid state circuitry could be readily modified or adapted for substantially any vending situation.

Some typical values for the elements illustrated in the circuit of FIGURE 3 are as follows.

Resistors: R**1**, 10K; R**2**, 1K; R**3**, 100K; R**4**, 390; R**5**, 2.2K; R**6**, 1K; R**7**, 10K; R**8**, 1K; R**9**, 47K; R**10**, 5.6 K; R**11**,1K; R**12**, 8.2K; R**13**, 8.2K; R**14**, 10K; R**15**, 560; R**16**, 56K; R**17**, 2.7K; R**18**, 18K; R**19**, 500 (8W wire wound); R**20**, 68K; R**21**, 1.0 (3W wire wound); R**23**, **22**, **24** **25**, **26**, 1K; R**27**, 150; R**28**, 1K; R**29**, 10K (1W); R**30**, 47 (1W); R**31**, 47K; R**32**, 47K; R**33**, 100; R**34**, 10K (5%); and R**35**, 82K (5%)

The resistors are ½ watt, 10% tolerance unless otherwise stated.

Capacitors: C**1**, 4 (25 v.); C**2**, .1; C**3**, .47; C**4**, .1; C**5**, .1; C**6**, 50 (25 v.); C**7**, 200 (15 v.); C**8**, 800 (20 v.); C**9**, **11**, **13**, **15** and **17**, .1; C**10**, **12**, **14**, **16** and **18**, .01; and C**19**, .01

All capacitors are in microfarads unless otherwise stated.

Semiconductors: CR**1**, ER181; CR**2**, ER184; CR**3** and **4**, ER181; CR**5**, ER184; and CR**6**, ER181
Q**1**, **2**, **3**, **4**, **5**, 2N3638
SCR **1**, **2**, **3**, **4**, **5** and **6**, 115–112

Accordingly, the above-described and illustrated preferred embodiment of the invention are intended as merely illustrative of the invention, the scope of which is set forth in the following claims.

We claim:

1. In a vending machine having a credit means for producing an electrical drive signal when a coin is accepted by the vending machine, a merchandise release device having a merchandise release means, the herein improvement comprising:

a storage capacitor associated with said merchandise release means to store an electrical charge for energizing said solenoid to provide a vend;

a switch associated with the merchandise release means, said switch being closed by said drive signal to provide a current discharge path for said charge through said merchandise release means to energize said merchandise release means; and

reset means coupled to said credit means, said reset means being positioned in the discharge path of said discharge current to provide an electrical reset signal causing said credit means to remove said drive signal.

2. The vending machine of claim **1** wherein:

coin return means is associated with said credit means and said capacitor, said coin return means returning said coins inserted into the machine when said credit means produces said drive signal and prior to the recharge of said storage capacitor to a magnitude capable of providing another vend.

3. The vending machine of claim **1**, wherein said reset means comprises a resistance means disposed in the discharge path of said storage capacitor and coupled to said credit means, said discharge current passing through said resistance means providing said reset signal to remove said drive signal.

4. The vending machine of claim **1** wherein said switch comprises a bistate device having an on-condition and an off-condition, said drive signal triggering said bistate device to the on-condition from the off-condition and thereby providing said discharge path for the charge stored in said storage capacitor through said merchandise release means and said bistate device.

5. The vending machine of claim **3** wherein said credit means comprises:

a bistable unit having an "on" condition and an "off" condition, said drive signal being produced when said bistable is in said "on" condition;

an AC signal is provided to indicate the acceptance of a coin; and

rectifying means converting said AC signal to a DC voltage for turning said bistable "on" from the "off" condition.

6. The vending machine of claim **4**, wherein:

an AC voltage is attached to one end of said storage capacitor, the opposite end of said storage capacitor is associated with said release means, said AC voltage causing a reverse current with respect to the discharge current of said capacitor to flow in said discharge path after the energizing of said release means and thereby turning off said SCR to permit the recharge of the storage capacitor.

7. In a vending machine having credit means for producing an electrical drive signal when a coin is accepted by the vending machine, a merchandise release device having a merchandise release means, a drive means for said release means, said drive means comprising:

a storage capacitor associated with the merchandise release means to store an electrical charge for energizing said release means to provide a vend;

a switch associated with the release means, said switch being closed after said drive signal is produced to provide a current discharge path for said charge through said release means and thereby energizing the release means;

a bistable unit having an "on" condition and an "off" condition, said drive signal being produced when said bistable unit is in said "on" condition;

means for switching said bistable unit from the off condition to the on condition when the vending machine accepts a coin;

coin return means associated with said credit means and said capacitor, said coin return means comprising an electromagnet means having an energized state and a de-energized state, said coin return means accepting coins inserted therein when said electromagnet means is in one of said states and returning coins when the electromagnet means is in the other of said states, said electromagnet means being associated with said bistable unit and said storage

capacitor, said bistable unit being switched into the "on" condition causes said electromagnet means to switch from said one state to said other state, said electromagnet means returning to said one state when said bistable unit is in the "off" condition and said storage capacitor has recharged to a magnitude capable of providing another vend.

8. The vending machine of claim **7** wherein:

an electronic switch causes the de-energizing and energizing of the electromagnet;

an oscillator associated with the electronic switch, said oscillator triggering the switch "on" to energize the electromagnet, said bistable unit and said storage capacitor being associated with the oscillator, said bistable unit biasing said oscillator "off" when in said "on" condition, said oscillator being turned on to trigger the electronic switch when said bistable is "off" and said capacitor has recharged to said magnitude to provide another vend.

9. The vending machine of claim **8** wherein:

said electronic switch is a silicon controlled rectifier (SCR), said SCR being triggered on by said oscillator;

an AC voltage coupled to the anode side of said SCR, said AC voltage turning said SCR "off" when said oscillator is "off" and thereby causing the de-energizing of the coin return electromagnet.

10. In a vending machine having a credit means for producing an electrical drive signal when a coin is accepted by the vending machine, a merchandise release device having a merchandise release means, said release means having an energized state and a de-energized state, a drive means for said release means, said drive means comprising:

a storage capacitor to store an electrical charge for energizing said release means;

a bistate device associated with said release means and said capacitor, said drive signal triggering said bistate device to an "on" condition to provide a discharge path for said discharge through the release means and the bistate device and thereby energizing said release means and the bistate device to dispense the selected product.

11. The vending machine of claim **10** wherein:

said credit means comprises a bistable unit having an "on" condition and an "off" condition, said drive signal being produced when said bistable is in the "on" condition; and

reset means is coupled to said credit means, said reset means comprising resistance means disposed in the discharge path of the storage capacitor, said discharge current passing through said resistance means providing said reset signal to turn said bistable "off" and thereby removing the drive signal.

12. The vending machine of claim **10** wherein a coin return means is associated with said credit means and said storage capacitor, said coin return means returning said coin when said credit means produces said drive signal or prior to the recharge of said storage capacitor.

13. The vending machine of claim **10** wherein said merchandise release means comprises a solenoid and said bistate means comprises a silicon controlled rectifier (SCR).

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S. H. TOLLBERG, *Primary Examiner.*

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