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ELECTRONIC MALFUNCTION CONTROL FOR VENDING MACHINES

Filed Nov. 8, 1967

2 Sheets-Sheet 1

THESE ARROWS
POINT TO
SIMILAR CIRCUITS
FOR SELECTIONS
#3, 4, 5, ETC

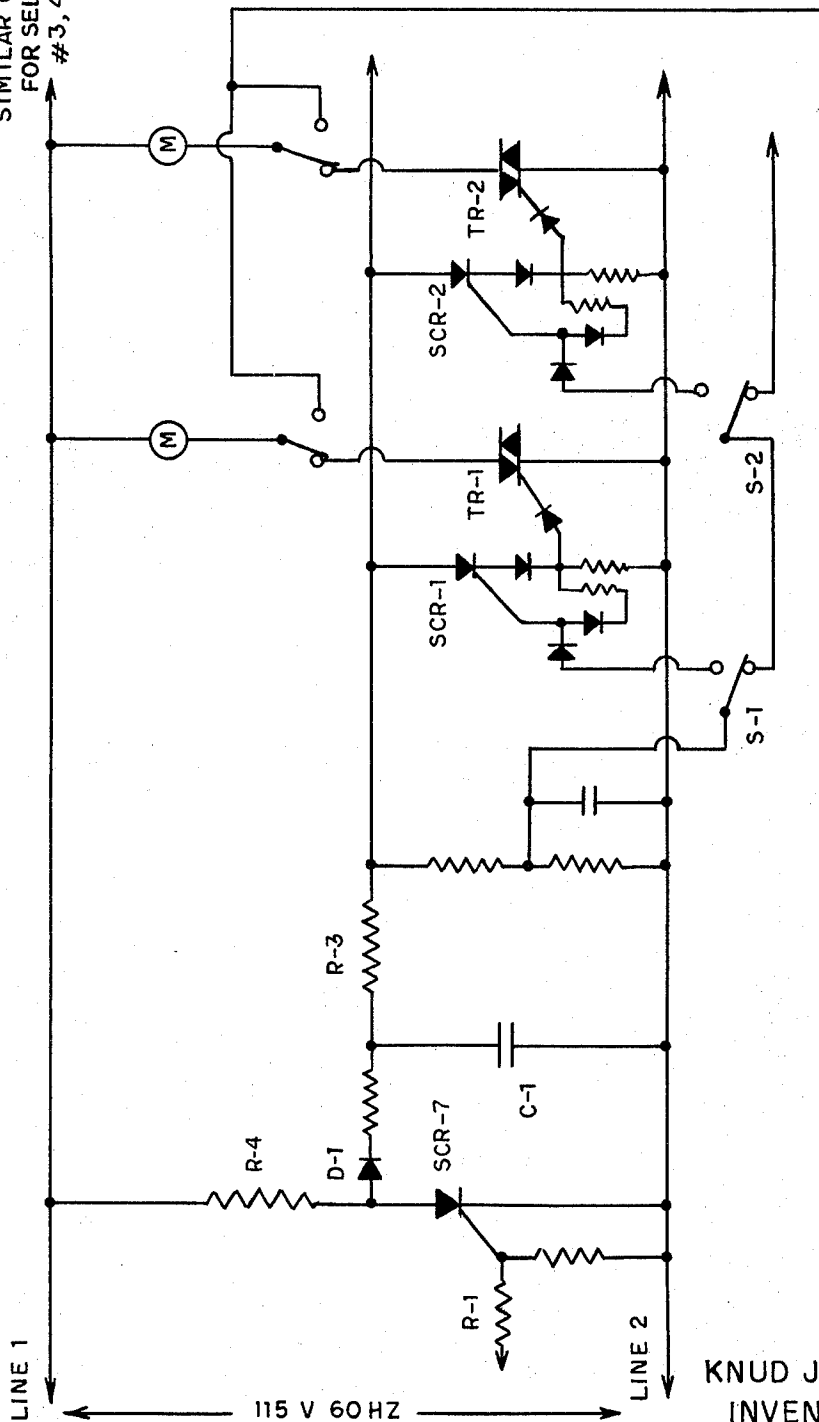


FIG. 1

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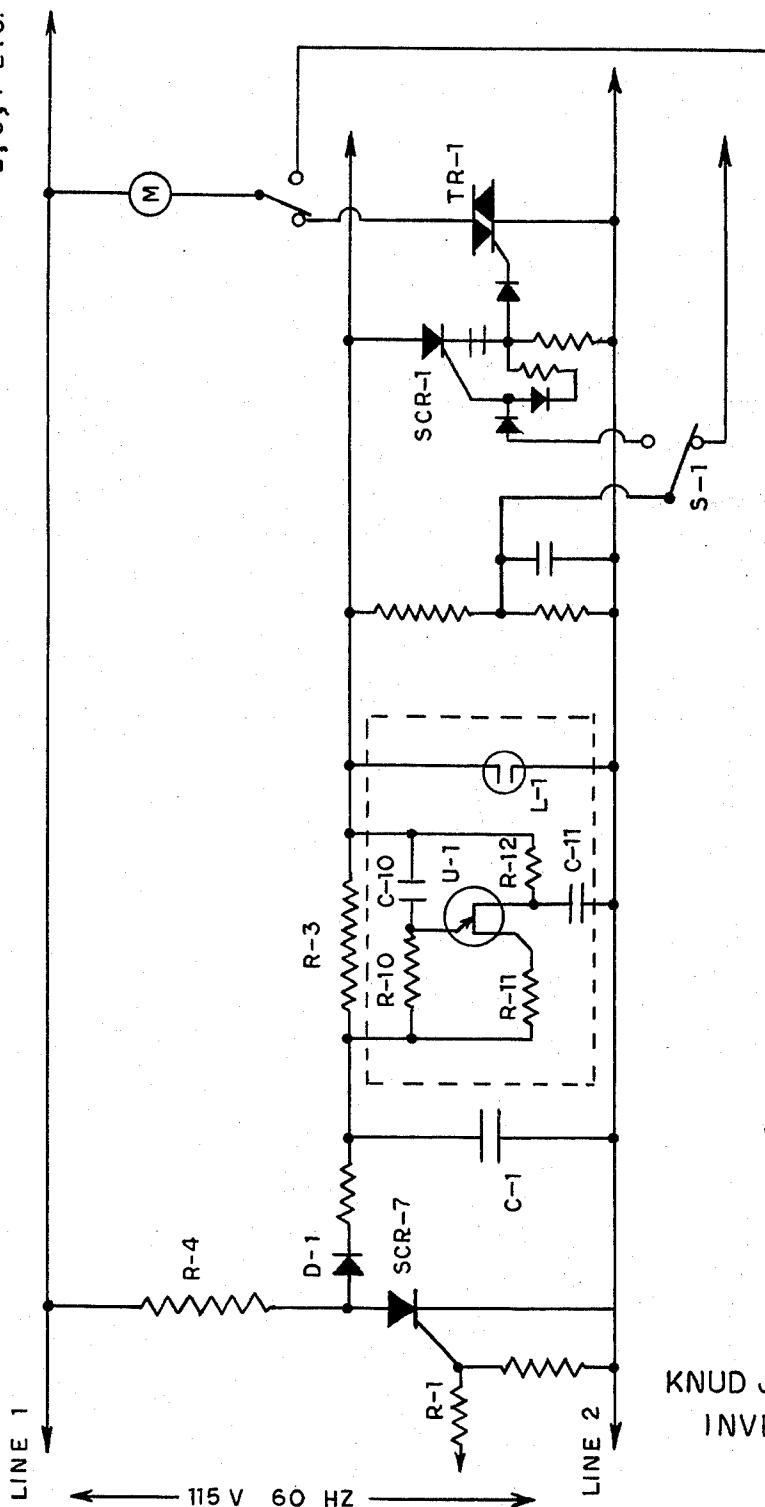
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ELECTRONIC MALFUNCTION CONTROL FOR VENDING MACHINES

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2 Claims. (Cl. 340-309.1)

ABSTRACT OF THE DISCLOSURE

A vending machine malfunction control circuit is disclosed. A timer circuit is activated when a selection is made after a coin has been deposited. If the vending cycle is not completed by the end of the timer period a malfunction has occurred and the timer circuit effects a control function which allows the customer to make another selection.

This invention covers the design of a solid-state timer to sense that a selection is in trouble and to automatically permit an alternate selection to be made, and to signal to the customer that an alternate selection may be made.

In a control system for a multiple-selection device such as a vending machine, it is desirable to provide the opportunity to make an alternate selection if for some reason the first selection made fails to perform its function. Conventional methods previously used utilized a motor-driven timer to terminate the action cycle in case the dispensing motor failed to complete its cycle, or else used a circuit breaker to sense the fact that a dispensing motor was stalled, and by the opening of the circuit breaker deactivated the section in trouble, permitting continued use of the balance of the machine. They did not, however, preclude the possibility of one customer failing to get a product for his money when the mechanism jam or motor failure occurred in the process of making a vend. This invention automatically assures a vend for each insertion of proper coinage.

In order to explain the context in which this timing device is used, I will first describe the operation of the select circuit without the timer, as developed and designed by others.

First referring to FIGURE 1, this covers the basic selecting circuit with solid-state components. Under quiescent conditions, SCR-7 has a positive voltage applied to its gate via the resistor R-1 and is therefore conducting during each positive half-cycle so the voltage in the control circuit to the right of this point is essentially zero. When a coin has been accepted (or on other types of equipment when it is desired to energize the select circuits) the gate of R-1 is grounded to L-2, and SCR-7 stops conducting. This results in a voltage being applied to diode D-1 and filter capacitor C-1, and the circuit to the right of this point now has a filtered DC potential. Now the closing of any select switch S-1, S-2, S-3, etc., will trigger its corresponding SCR-1, SCR-2 or SCR-3, etc. This in turn results in a suitable bias voltage being imposed on the gate of the associated Triac, which goes into a conducting state to permit the associated motor M to run. The current drawn by the conducting SCR is sufficient to cause enough voltage drop across resistor R-3 that there is no longer sufficient potential available to trigger a second SCR into a conducting state; this prevents cheating or getting two selections for one coin. After the motor M has driven the dispensing mechanism the proper distance, it operates a switch which sends an appropriate signal to the circuits to the left of these shown, to reset the entire control circuit to its quiescent state, with SCR-7 conducting and essentially zero voltage on the select circuitry.

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The above describes the normal operation of the circuit which is not a part of this invention but to which the invention is applied.

Under certain abnormal conditions one motor might fail to operate either because the mechanism is jammed, the motor circuit is open, the motor is burned out, or for some other reason. This invention covers a method of using an electronic timer to (a) de-energize a selected circuit if the desired vend action is not completed within a specified time, (b) signal the customer that he can again make a selection, and (c) re-energize the selection circuit so as to permit another selection to be made.

Referring to FIG. 2, we see the same basic select circuit with the solid-state components inside the dotted line added. The timing function is performed by a conventional timer consisting of a unijunction transistor U-1 with capacitor C-10, resistor R-10 and resistors R-11 and R-12; the time interval to trip is determined by the voltage drop across R-3, the values of resistor R-10 and capacitor C-10, and the cutoff voltage of U-1. The operation is as follows:

After a coin has been accepted and the select circuits are set up, neon lamp L-1 (located on the front of the vendor) glows and signals the customer "Make Selection." As soon as a selection has been made, the current passing through resistors R-4 and R-3 create a voltage drop and the voltage to the right of R-3 is entirely too low to keep lamp L-1 glowing, so it goes out. The voltage drop across R-3 results in current passing through resistor R-10 to charge capacitor C-10. When the voltage across capacitor C-10 reaches the voltage at which the emitter triggers U-1 into a conducting state, capacitor C-10 discharges through resistor R-12 and sends a pulse through coupling capacitor C-11. The discharging of capacitor C-10 creates a momentary negative voltage pulse in the circuit to the right of R-3, so the SCR which has been conducting current shuts off and blocks further passage of current. This, of course, also results in shutting off its associated Triac. With the blocking of current flow, there is no longer a voltage drop across resistors R-4 and R-3 so select power is again available to make another selection, and neon lamp L-1 again glows to signal the customer to make a selection.

The above timing action goes through to the triggering point only if the vend cycle is not completed within the predetermined time established for the electronic timer. In other words, the above described action occurs only if the vend motor fails to complete a vend cycle in its normal time. As long as the vendor is functioning correctly, the selected vend motor will complete its cycle well ahead of the timer setting, and no resetting of the select power circuit will occur.

The above describes the circuit and function of the components. Advantages of this scheme over others previously proposed or used are:

(1) In event of trouble of any kind preventing completion of an operating cycle, the select circuit resets, permitting a second selection to be made. In a vending machine, this means that the customer does not get cheated.

(2) The reset action is a function of time rather than motor current, so takes place regardless of the reason for the failure of the operating cycle to be completed in a specified time.

(3) All components used are solid-state with no moving parts, so less vulnerable to dirt, impact, vibration and other mechanical causes of damage.

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

1. In a selective vending machine incorporating two or more electric motors, each driving a single section of

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the vendor, with an electrical selection circuit which is energized by insertion of proper coinage and is de-energized by completion of a vend cycle of any one motor; the utilization of the voltage drop resulting from passage of selection current through a resistor, to activate a timer; means whereby the timer creates a negative voltage pulse at the end of the timer period; and means whereby this negative voltage pulse cancels the selection then in effect and re-establishes conditions whereby another selection can be made.

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2. In a vending machine as in claim 1, a signal light visible to the customer, connected in said selection circuit so that the light is energized when power is available for making a selection.

No references cited.

JOHN W. CALDWELL, *Primary Examiner*.

H. I. PITTS, *Assistant Examiner*.

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