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COIN-CONTROLLED CREDIT SYSTEM

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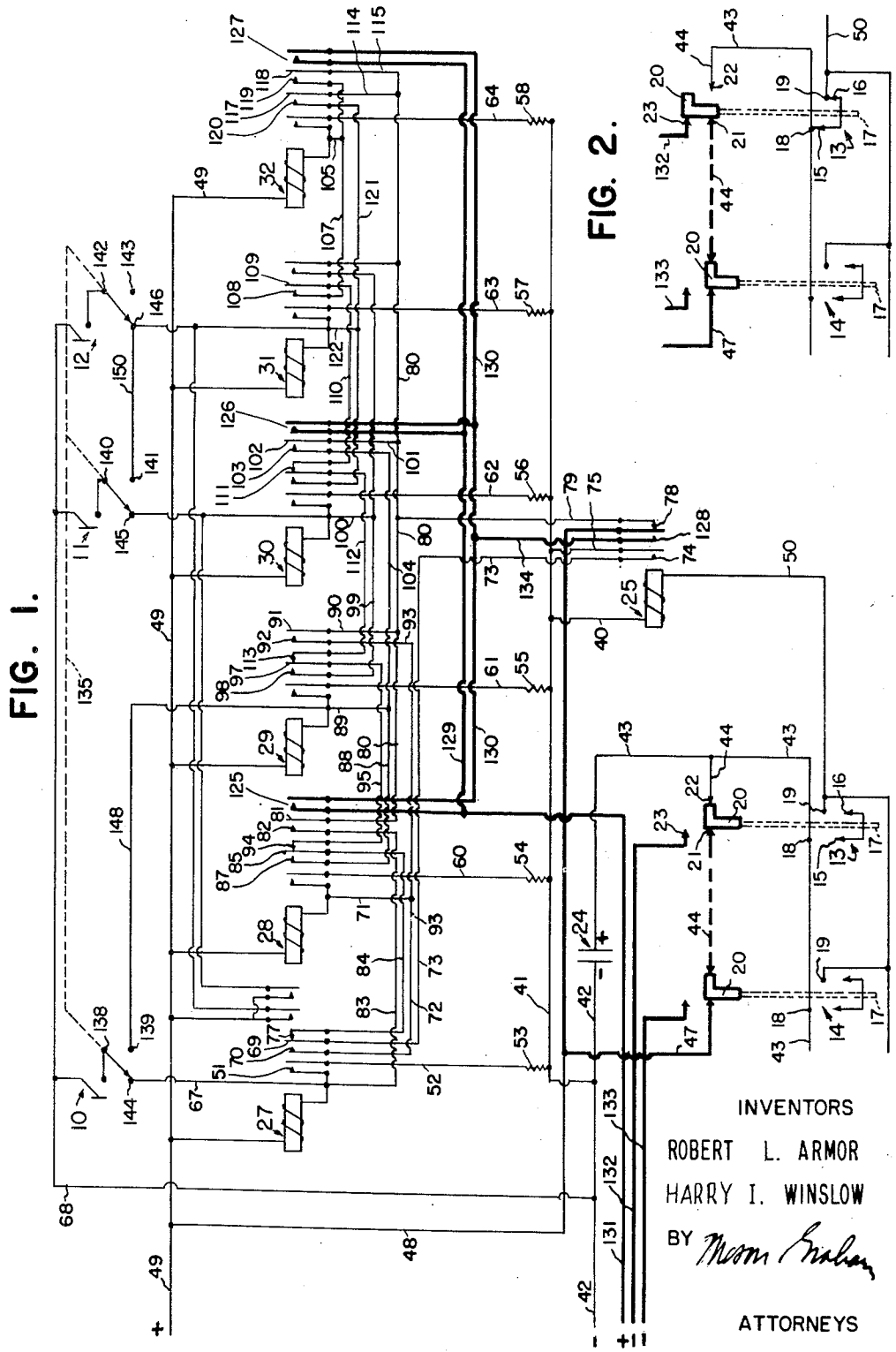


FIG. 1.

FIG. 2.

INVENTORS
ROBERT L. ARMOR
HARRY I. WINSLOW
BY Mason Fenwick & Lawrence
ATTORNEYS

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COIN-CONTROLLED CREDIT SYSTEM

Robert L. Armor, Los Angeles, and Harry I. Winslow, North Hollywood, Calif., assignors of one-half to E. T. Mape, San Francisco, Calif.

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The present invention relates to a coin controlled credit system, and more particularly to an electronic credit system for use in coin controlled mechanisms whereby different selected numbers of operations of a coin controlled mechanism may be had, the number being determined by the denomination of a coin deposited therein.

In the past a number of developments have been made whereby successive operations of a coin controlled instrument could be regulated by depositing coins of different denominations therein. Such credit systems usually have been mechanical, and subject therefore to the substantial cost and necessity for close adjustment and frequent repairs which such mechanisms usually entail. Where attempts have been made to produce electrical credit systems, they usually have involved circuits that are so complicated as to invite undue service and performance difficulties.

An object of the present invention is to make an improved and simplified coin controlled multiple stage credit system.

Another object is to make a coin controlled credit system whereby a plurality of operations of a controlled device may be regulated by the denominations of coins deposited in the credit system.

Another object is to make a relay chain credit system in which operation of various stages of the system, and therefore the amount of credit established, is controlled by the denominations of coins deposited therein.

Another object is to make a coin controlled credit system which is operated electrically, and which is arranged so that the functional control of the system is removed from the hands of an operator.

Another object is to make a coin controlled credit system in which successive operational impulses result in exhausting successively a credit storage arrangement of the system.

Another object is to operate successive stages of a multiple stage credit system by short time electrical impulses.

These and other objects and advantages of the invention will be brought out more fully in the following description and in the accompanying drawings, comprising one sheet. In the drawings:

Fig. 1 illustrates a schematic layout for a coin controlled credit system embodying the present invention, a signal operating circuit being shown in heavier lines; and

Fig. 2 shows a portion of the circuit of Fig. 1 with a pair of operating switches, which are illustrated in their normal position in Fig. 1, as they would appear when one of them is moved to an operated position.

The present illustrative circuit is shown as connected to a selection system of a usual type

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such as may be employed on coin controlled music boxes. Only a portion of the selection system is shown however, and it will be clear to those familiar with the art that the present credit system is adapted equally well to other coin controlled functions, such, for example, as coin changing systems and the operation of other coin controlled mechanisms. Such functions may include the selective operation of a plurality of circuit instrumentalities, or the repetition of the operation of a single instrumentality.

In the circuit illustrated, the coin selecting and testing mechanism is not illustrated, since any suitable mechanism of this character may be employed. Three coin operated switches are illustrated, however, and these switches are designated by numerals 10, 11 and 12. The switch 10 is intended to be closed by the insertion of a quarter; switch 11 by a dime; and switch 12 by a nickel.

A plurality of selectively operated push button switches 13 and 14 have individual push button extensions 17, as illustrated. Each switch has a pair of switch points 15 and 16 which are adapted to close with contact members 18 and 19, respectively, on an operation of the switch. The push button portion 17 of each selector switch is connected by an insulative mechanical connection to a sliding contact member 20, which normally connects line contacts 21 and 22.

When a push button 17 is pushed in to operate the switch, it connects the switch points 15 and 16 to the contact members 18 and 19. At the same time it disconnects the slide 20 from the contact member 22 and connects the contact 21 with a contact 23, as illustrated in Fig. 2. The contact 23 is connected to a conductor of the selector signal circuit to be described later herein.

A condenser 24 is connected into the signal circuit so that when all the selector switches are in normal condition the condenser will receive a charge, while, when any of the selector switches is operated, the charge of the condenser will be employed to operate, momentarily, a master relay 25. When the system has a credit established therein, such operation of the master relay will operate the selector signal circuit and exhaust one stage of its credit.

A plurality of operating relays 27, 28, 29, 30, 31 and 32 also are provided to control the operation of the system. The various conductors which are employed in the system will be given designating numerals in connection with a description of their respective functions.

One side of the coil of the master relay 25 is connected through conductors 40 and 41 to a line conductor 42 which in turn is connected to the negative terminal of a suitable source of direct current electricity. This same negative

line conductor 42 also, it will be noted, is connected to one side of the condenser 24.

When all of the selector signal switches, such as 13 and 14, are in their normal positions, as illustrated in Fig. 1, the condenser 24 will receive a charge by a circuit which runs from the negative line conductor 42 to the condenser, and thence from the other side of the condenser through intermediate conductors 43 and 44, the normally closed switch slides 20, and conductors 47 and 48, to a positive line conductor 49. The positive line conductor 49 may be connected to the positive terminal of the current source to which the other line conductor 42 is connected.

When any of the selector switches, such as 13 or 14, is moved to an operated position, as shown in Fig. 2, the movement of the slide 20 breaks the charging circuit to the condenser, and closes the switch points 15 and 16, with the contacts 18 and 19. This completes a circuit from one side of the condenser 24 through the conductor 43, thence through the contacts 15, 16, 18 and 19 to a conductor 50 which is connected to one side of the operating coil of the relay 25. From the other side of the coil of relay 25 the conductors 40, 41 and 42 complete the circuit to the other side of the condenser 24. The charge which is accumulated in the condenser 24, while it is on the line, thus is permitted to flow through the coil of the relay 25, causing a momentary energization of relay 25 which is sufficient to operate it.

It is apparent from the above description that it makes no difference how one operates the buttons 13 and 14; whether he operates them violently, or slowly, or trickily in any manner. The most and least that can occur is the momentary pulsation of the master relay 25 caused by the discharge of the condenser 24. When the switch button 17 is released, the switch restores to normal, the condenser is placed back on the line, as previously explained, and the condenser again becomes recharged.

With no coins inserted in the device to close any of the switches 10, 11 and 12, and none of the other relays operated, operation of the selector buttons 13 and 14 merely causes a momentary pulsation of the master relay 25, and does not produce an energization of the selector signal circuit controlled by the present credit system.

In order to establish a credit in this system, it is necessary to operate one or more of the relays 27—32 inclusive. The operation of these relays is accomplished as follows: It will be noted that one terminal of the coil of each of these six relays is connected to the positive line conductor 49. The other terminal of the coil of each of these relays is connected to the normally open inner pair of points of the relay. This is illustrated, for example, in relay 27 where the coil of the relay is connected to the inner, normally open, pair of contacts 51. From the other of these points a conductor 52 is connected through a resistance element 53 and the conductor 41 to the negative line conductor 42. This inner pair of points 51 comprises a holding circuit. Similar resistors 54, 55, 56, 57 and 58 are connected to similar conductors 60, 61, 62, 63 and 64 for the other relays 28, 29, 30, 31 and 32, respectively.

Since it requires less current to hold a relay in an operated condition than it does to operate it, the resistor associated with each of the relays is of a resistance to allow the holding circuit to hold the relay operated after it initially has been closed by another or operating circuit to be described later herein. Preferably the current permitted to flow through the resistor is about half of the normal full line current.

To proceed with a description of the operation of the credit system, let us assume that the switch 10 has been closed by the insertion of a proper 25¢ coin. The relay 27 thereupon will be closed by a flow of current from the positive conductor 49 through the coil of the relay 27 through a conductor 67, the closed points of switch 10 and thence through a conductor 68 to the negative line conductor 42.

This operates the relay 27 and the relay will be held closed by the holding circuit through the inner pair 51 of contacts of the relay 27, and through the resistor 53, as previously described. This holding of the relay 27 is necessary since the closing of the switch 10 is only a momentary closing and switch 10 restores to normal as soon as the actuating coin passes it.

Closing of the relay 27 brings an outer movable contact member 69 thereof into contact with a contact point 70. With the relay 27 thus operated, on operating any one of the selector control switches, such as the switches 13 or 14, an operating circuit through the coil of the relay 28 will be completed on the closing of the master relay 25. It will be noted that the relay 25 has points which close in both directions of operation of the relay. Therefore, both the energizing and releasing, or closing and opening operations of master relay 25 must be considered in the operation of the present credit system.

Thus, with relay 27 actuated, on an energizing of the master relay 25, an operating circuit is completed through the coil of relay 28, as follows: From the positive line conductor 49 through the coil of relay 28, through a conductor 71, and a conductor 72, to the closed relay point 70, thence from the movable contact member 69 through a conductor 73 to an inner contact member 74 of the relay 25. Since this inner contact closes on operation of the relay 25, the circuit continues through a conductor 75 and the conductors 41 and 42 to the negative side of the circuit. On closing of the relay 28, the relay holding circuit is completed through its inner set of points and the conductor 60 and resistance element 54.

The operation of the relay 29 is prevented at this point due to the fact that the outer movable contact member 69 of relay 27 is not in contact with an outer contact point 77. This is true because the relay 27 remains closed until the master relay 25 is de-energized.

The opening of the relay 27 on the return to normal of relay 25 is accomplished by shorting out the coil of relay 27, as follows: From the upper side of the coil of the relay 27 the shorting circuit is through the conductors 49 and 48, normally closed outer contact points 78 of the master relay 25, thence through a conductor 79 and a conductor 80 to the next to the outer movable contact member 81 of relay 28. Since, as previously described, relay 28 now is closed, the shorting circuit is completed, through a contact point 82 and a conductor 83 to the other side of the coil of the relay 27.

From the above description it will be apparent that the purpose of the resistor in each of the relay holding circuits is to prevent a flow of current through the holding circuit from constituting a direct short across the supply voltage.

The credit circuit now has been established as above set forth and the operation of the first push button has produced a pulse, or make and break actuation, of the master relay 25. This actuation of the master relay has transferred the holding of relay 27 to relay 28 which on the completion of the above actuation is the only relay in the circuit which is held closed.

On the actuation of a second selector switch button 17, with the relay 28 held in actuated condition, a circuit will be completed from the condenser 24 through the actuating coil of relay 25, as above described, and the charge on the condenser 24 will cause a pulsation or make and break action of the master relay 25. On this actuation of the relay 25, the relay 29 will be energized by a current flowing from the negative line conductor 42 through the conductor 41, the closed inner points 74 of the master relay 25, thence through the conductor 73, the normally closed outer contacts 69 and 77 of relay 27, thence through a conductor 84, a closed intermediate contact member 85 and contact point 87 of relay 28, since this relay is closed at this time, thence through conductors 88 and 89 and the coil of relay 29 to the positive line conductor 49. On the restoring of master relay 25 to normal on the completion of its pulse, the relay 28 will be restored to normal by shorting out its coil. This shorting circuit is from one side of the coil of relay 28 through the line conductor 49 and the conductor 48 to the normally closed outer contact points 78 of the master relay 25. Since these contact points close when the master relay returns to normal on the completion of its pulse, this shorting circuit will continue through the conductors 79 and 80 and a conductor 90 to an outer movable contact member 91 of now actuated relay 29. Thence through a contact point 92, through a conductor 93 and the conductor 71 to the other side of the relay 28. This shorts out the relay 28 which was being held by the holding circuit through the resistor 54.

It will be noted that the relay 30 is not operated on this last mentioned pulse of the relay 25, since on the actuation of the master relay 25, the relay 28 was still closed. Therefore, the intermediate movable contact member 85 of the relay 28 was still in its operated position and out of contact with its outer contact point 94, which it would be necessary to have closed in order to complete the operating circuit for the relay 30.

On again operating one of the selector switch buttons 17, the master relay 25 again will be operated by a pulse from the condenser 24, as previously described. On actuation of the master relay 25, the relay 30 will be energized by a circuit from the negative line conductor 42, the conductor 41, the closed inner points 74 of the master relay 25, the conductor 73 to the normally closed outer contact points 69 and 77 of the relay 27. Since this relay now is unoperated, and its outer points are closed, the circuit will continue through the conductor 84 to the intermediate movable contact member 85 of the relay 28. Since this relay also now has been restored to normal, the circuit will continue through the contact point 94 and a conductor 95 to an intermediate movable contact member 97 of the relay 29. The relay 29, as above described, now is closed, so the circuit will continue through the inner contact point 98 for this contact member and thence through a conductor 99, a conductor 100 and the coil of relay 30 to the positive line conductor 49.

On the restoring of the master relay 25 to normal after the condenser 24 has been discharged, the coil of relay 29 will be shorted out by a circuit from one side of the coil 29 through the line conductor 49 and the conductor 48, the normally closed outer points 78 of the master relay 25, thence through the conductors 79 and 80 and a conductor 101 to an intermediate movable contact member 102 of the relay 30. Since the relay 30 now is closed, the circuit will continue through an inward contact point 103 of relay 30 and thence through a conductor 104 and the conductor 89 to the other side of the coil of relay 29. This exhausts three of the five stages of credit established in the circuit by inserting the 25¢ coin to close the switch 10.

On the next subsequent actuation of a selector button 17, the relay 31 will be closed and relay 30 will be opened in the same general manner as that described for the advancing of the relays from 27 to 30. Since such manner of operation will now be clear to one familiar with the art, it is believed to be unnecessary to trace the circuit in detail. Therefore, after four selections have been made the relay 31 will be the only one in the circuit which will be closed.

On the operation of a selector switch button 17 for the fifth selection, the master relay 25 again will be closed momentarily and then released by a pulse from the condenser 24. On closing of the contacts of the relay 25, the relay 31 being closed, the relay 32 will be energized by a circuit, as follows: From the positive line conductor 49 through the coil of relay 32, thence through conductors 105 and 107, a closed intermediate contact point 108 and contact member 109 of relay 31, thence through a conductor 110, the normally closed contacts 111 of relay 30, a conductor 112, the normally closed contact point 113 and the contact member 97 of relay 29, the conductor 95, the normally closed contacts 94 and 85 of relay 28, the conductor 84, the normally closed outer contacts 77 and 69 of the relay 27, and thence through the conductor 73 to the inner contacts 74 of the master relay 25. From here the circuit is completed through the conductors 75 and 41 to the negative line conductor 42. On the closing of relay 32, a holding circuit is completed in the usual manner through the conductor 64 and the resistance element 58.

On the return of the master relay 25 to normal at the completion of its pulse cycle, the coils of relays 31 and 32 both will be shorted out by circuits as follows: From the normally closed outer contacts 78 of the master relay 25, through the conductors 79 and 80 and conductors 114 and 115, respectively, to the two intermediate movable contact members 117 and 118 of relay 32. Since relay 32 now is closed, the shorting circuit for relay 32 continues from the movable contact member 118, its associated inner contact point 119 and the conductors 107 and 105 to the coil of relay 32, while from the movable contact member 117 the shorting circuit for the relay 31 continues through an inner contact point 120 and is completed through conductors 121 and 122 to the coil of relay 31. From the other sides of the relays 31 and 32 the shorting circuit is completed back to the outer contact points 78 of master relay 25 through the conductors 49 and 48. On the completion of the fifth step of actuation of the relay circuit, namely, the restoration of the relays 31 and 32, the entire circuit is restored to normal.

Instead of the five stage credit established by

the closing of the switch 10 on the insertion of a 25¢ coin, a two-step credit can be established by the closing of the switch 11 by the insertion of a 10¢ coin. A single step credit also can be established by the insertion of a 5¢ coin to close the switch 12. On the closing of switch 11 a circuit will be completed to energize the relay 30, while on the closing of switch 12 a circuit will be completed to energize the relay 31. Since the subsequent operations for exhausting the one and two stage credits thus established have already been described, it is believed the operation of these switches will be clear without further description.

The heavier lines on the circuit drawings designate the signal operating circuit for transmitting a credit signal to the selective mechanism. It will be noted that there are but three pairs of signal operating contacts in the six relays 27—32 inclusive, namely the points 125, 126 and 127. It will also be noted that there is but a single pair of contact points in the master relay 25 which control the signal circuit. The contact points 125, 126 and 127 in the relays 28, 30 and 32 respectively are connected in parallel to signal conductors 129 and 130. These parallel pairs of contact points also are connected in series with the signal circuit contact 128 on the master relay 25. A conductor 131 may be considered as common to one side of the selector or signal circuit, while individual signal circuit selector conductors 132 and 133 are connected one to each of a plurality of selector signal circuits. By this arrangement, when a credit is established in the circuit so that any of the three pairs of signal circuit relay contacts 125, 126 or 127 is closed upon the operation of the master switch 25 to close the signal contact 128 thereon, a signal will be transmitted from the common conductor 131 through any of the parallel contacts 125, 126 and 127 which is closed at the time, thence through the conductor 130 and a conductor 134, the closed contact 128 of the master relay, the conductor 49, the conductor 47, and thence through the slide 20 of any push button switch which is actuated. From here the signal circuit is completed as through a conductor 132 or 133 to the signal control apparatus. The signal control apparatus is of the usual type and is not illustrated in order to avoid unduly complicating the drawings and description.

Since the credit stage relay which is newly actuated on each pulse of the master relay 25 is actuated on the closing of the master relay, and since the previously actuated credit stage relay is not shorted out until the restoration of the master relay to normal, one of the signal circuit relays 28, 30 or 32 will be in a closed condition upon the operation of the master relay by the pushing of any of the push buttons 17 as long as there remains a credit in the system. While the actuation of these relays is too rapid for the eye to see, nevertheless the time is more than adequate to accomplish the functions of the circuit.

In some locations it is desired to provide only three operations of the machine for a 25¢ coin and one operation for a 10¢ coin. In order to permit such operation without revising the presently described system, a switching circuit is provided as indicated in dotted lines at the upper portion of Fig. 1. By this arrangement, when the switch handle indicated in dotted lines 135 is in the position illustrated in Fig. 1, the circuit will operate as previously described. By moving switch handle 135 so as to connect contact members 138 and 139 of switch 10, contact members 140 and 141 of switch 11, and contact members 142 and 143 of switch 12, at the same time disconnecting contact members 138 and 144 of switch 10, 140 and 145 of switch 11, and 142 and 146 of switch 12, it will be noted that on closing of switch 10 by the insertion of a 25¢ coin a circuit is completed from the negative line conductor 42 through the conductor 68 through the switch 10 to a conductor 148, thence through the coil of relay 29 to the positive line conductor 49. This closes the relay 29 on the operation of switch 10 instead of the relay 27.

With relay 29 thus closed, on the first actuation of a selector button 17, relay 30 will be closed and relay 29 will be opened. The circuit then continues through two more stages of operation by closing of relays 31 and 32 successively, as previously described. Thus, for a 25¢ coin but three operations of the selector signal circuit are permitted. On the insertion of a 10¢ coin a circuit will be completed in a similar manner through a conductor 150 and the coil of the relay 31 to the positive side of the line. When thus established the actuation of but one selector button 17 will exhaust the credit of the system.

Switch 12 is not connected to any actuating circuit with this alternative arrangement, and the 5¢ coin slot (not shown) should be closed off by suitable means.

While we have illustrated and described a preferred embodiment of our invention, it will be apparent to those familiar with the art that numerous modifications and changes may be made without departing from our invention. It is desired, therefore, not to limit the invention except as specifically set forth in the following claims.

We claim:

1. In a coin controlled credit system, a source of direct current, a normally closed capacitance circuit connected to said source, a normally open signal circuit, a master relay, a normally open master relay energizing circuit including the capacitance of said capacitance circuit, a manually operable selector means operable to close a selected switch in said signal circuit, to disconnect said capacitance from said source and to close said master relay energizing circuit to momentarily energize the master relay, a plurality of credit relays including a first credit relay, coin controlled switch means for selectively initially energizing a credit relay, a holding circuit for each credit relay closed by energization of the relay, a normally open credit relay energizing circuit for each but said first credit relay, means operated by the energization of a preceding adjacent credit relay and said master relay to complete the energizing circuit for a given credit relay, and a shorting circuit for each credit relay closable by deenergization of the master relay and energization of a successive credit relay, said shorting circuit including a normally open switch closable by energization of the successive credit relay and a normally closed switch openable by energization of said master relay, said signal circuit including a normally open credit relay operated switch means associated with certain of said credit relays and closable upon energization of one of said certain relays and a normally open switch controlled by said master relay, said last two switches and the switch operable by the manually operable selector means completing said signal circuit.

2. In a coin controlled credit system, a source of direct current, a normally closed capacitance circuit connected to said source, a normally open signal circuit, a master relay, a normally open master relay energizing circuit including the capacitance of said capacitance circuit, manually operable selective switch means operable to close a selected switch in said signal circuit, to disconnect said capacitance from said source and to close said master relay energizing circuit for momentarily energizing the master relay, a first and a second credit relay, a coin controlled switch and circuit means for initially energizing the first credit relay, a holding circuit for each credit relay, an energizing circuit for the second credit relay including a normally open switch controlled by said first credit relay and a normally open switch controlled by said master relay and adapted to be completed by closure of said switches, a shorting circuit for each of said credit relays including a normally open switch means closable by energization of said second relay and including a normally closed switch controlled by said master relay, said signal circuit including a normally open switch controlled by one of said credit relays and closable by energization thereof and a normally open switch controlled by said master relay, said signal circuit being completed by the closing of the last-two-mentioned switches and operation of said manually operable selective switch means.

3. In a coin controlled credit system, a source of direct current, a normally closed capacitance circuit, a master relay, a normally open master relay energizing circuit including the capacitance of said capacitance circuit, manually operable selective switch means operable to close a selected switch in said signal circuit, to disconnect said capacitance from said source and to close said master relay energizing circuit for momentarily energizing the master relay, a first, a second and a third credit relay, a first coin controlled switch and circuit means for initially energizing said first credit relay, a second coin controlled switch and circuit means for initially energizing said second credit relay, a holding circuit for each credit relay, an auxiliary energizing circuit for the second credit relay including a normally open switch controlled by said first credit relay and a normally open switch controlled by said master relay and adapted to be completed by closure of said switches, an energizing circuit for the third credit relay including a normally open switch controlled by said second credit relay and a normally open switch controlled by said master relay and adapted to be completed by closure of said switches, a first shorting circuit for said first credit relay including a normally open switch associated with the second credit relay closable upon energization thereof and a normally closed switch controlled by said master relay, and a shorting circuit for said second and third credit relays including a normally open switch associated with each of said second and third credit relays closable upon energization thereof and a normally closed switch controlled by said master relay, said signal circuit including a normally open first signal switch controlled by said first credit relay and a normally open second signal switch controlled by said third credit relay, said signal switches being in parallel, said signal circuit including a normally open signal switch controlled by said master relay, said signal circuit being completed by closing of said last-mentioned signal switch, closing of either said first or second signal switches and operation of said manually operable selective switch means.

4. In an electrical system providing a plurality of successively operable operating relays for controlling a given circuit or circuits, a source of direct current, a normally closed capacitance circuit connected to said source, a master relay, a normally open master relay energizing circuit including the capacitance of said capacitance circuit, manually operable switch means operable to disconnect said capacitance from said source and to close said master relay energizing circuit for momentarily energizing the master relay, a plurality of operating relays including a first operating relay, switch means for selectively initially energizing an operating relay, a holding circuit for each operating relay closed by energization of the relay, a normally open operating relay energizing circuit for each but said first operating relay, means operated by the energization of a preceding adjacent credit relay and said master relay to complete the energizing circuit for a given credit relay, and a shorting circuit for each operating relay closable by deenergization of the master relay and energization of a successive operating relay, said shorting circuit including a normally open switch closable by energization of the successive operating relay and a normally closed switch openable by energization of said master relay.

5. In an electrical system providing a plurality of successively operable operating relays for controlling a given circuit, a source of current, a master relay, a plurality of operating relays including a first operating relay, means including a manually operable switch for only momentarily energizing the master relay at will, means including a switch for initially energizing a selected one of certain of said operating relays, a holding circuit for each operating relay, energizing circuits for all but said first operating relay, means operated by the energization of a preceding adjacent credit relay and said master relay to complete the energizing circuit for a given credit relay, and a shorting circuit for each operating relay, said shorting circuit including a normally open switch closed by energization of a successive operating relay and a normally closed switch openable by energization of said master relay.

6. An electrical system as set forth in claim 5 in which the given circuit to be controlled includes a normally open switch controlled by the master relay, normally open switches connected in parallel and associated with certain of said operating relays, and a manually operable normally open switch.

ROBERT L. ARMOR.
HARRY I. WINSLOW.

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