United States Patent [19]

Stewart

[11] **3,746,018**

[45] **July 17, 1973**

[54] **CHANGE MAKING DEVICE**

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[22] Filed: **Oct. 26, 1971**

[21] Appl. No.: **192,056**

[52] **U.S. Cl.** ..... **133/4 A,** 194/10

[51] **Int. Cl.** **G07d 1/00**

[58] **Field of Search** ..... 133/4 R, 4 A, 5 R; 194/10

[56] **References Cited**

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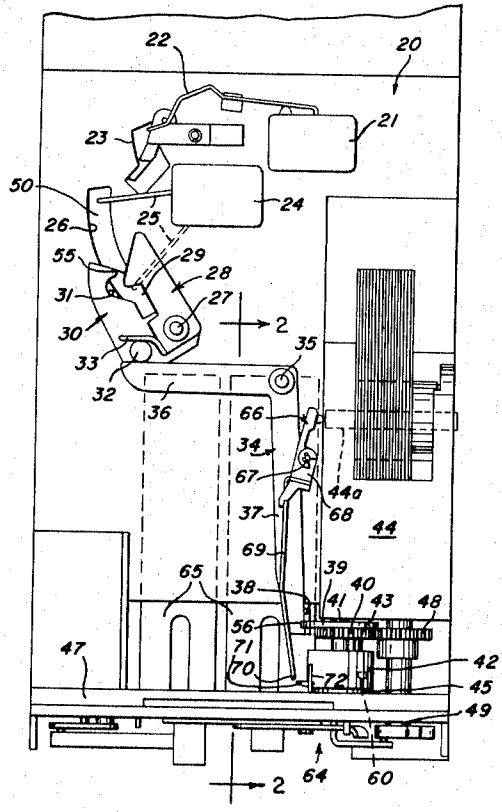
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Primary Examiner—Samuel F. Coleman
Assistant Examiner—David A. Scherbel
Attorney—Christopher Robinson, Russel S. Smart et al.

[57] **ABSTRACT**

A device is disclosed which is adapted to cut off the flow of energization current to a change-making device when it continues to function in the change-making cycle, instead of stopping when it is supposed to. Associated with a motor that operates the device there is a cylinder and piston arrangement. The initial cut-off to stop the device is effected by a cam lobe, associated with a gear driven by the motor, actuating a lever that moves latches, which have ensnared a switch lever arm, to free the switch lever arm. When the switch lever arm becomes jammed or the normally open switch attached to the arm remains in the closed position for any reason, a cam lobe, formed on the cylinder which is moved from an inoperative to an operative position when rotated in unison with the first mentioned cam, wipes the actuating button of a normally closed switch, which is incorporated in the motor energizing circuit in series with the initial actuating switch, to break the circuit and shut the machine off. The cylinder is slidably mounted on a piston which is provided with a cam track that co-acts with a cam follower formed in the cylinder to raise the cylinder from an inoperative to an operative position. In normal operation the cam follower leaves the cam track and the cylinder descends from the operative position before the cam lobe thereon has reached the actuating button of the normally closed switch. The cylinder, however, has a lateral projection and a wire rod engages under this projection to maintain the cylinder in the operative position after the cam follower has left the cam track, if the motor continues to run after it should have been stopped. The wire rod is normally biassed to a position under the projection, it forming the lower part of a pivotally mounted arrangement, the upper part of which is normally spaced from an end of the motor armature. The motor is of the type which has a longitudinally movable armature and the latter moves to hold the wire rod in its normal position when the motor is energized. If the motor is de-energized at the proper time, the wire rod is simply displaced by the projection as the cylinder descends.

9 Claims, 7 Drawing Figures



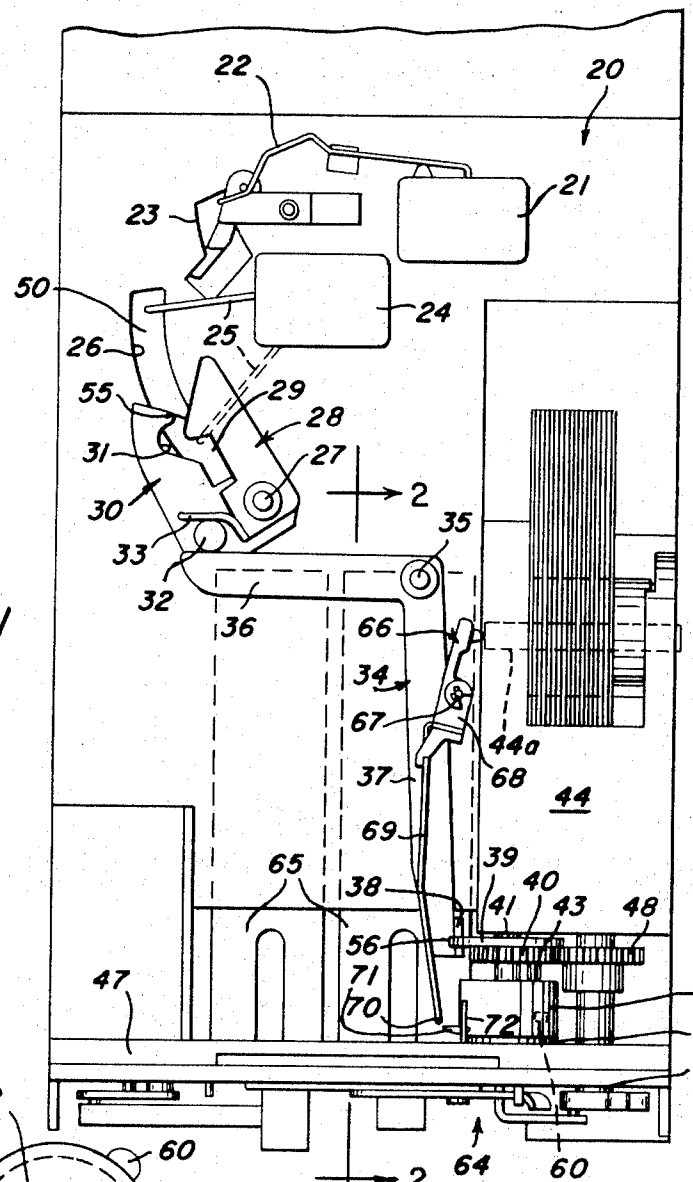


FIG. 1

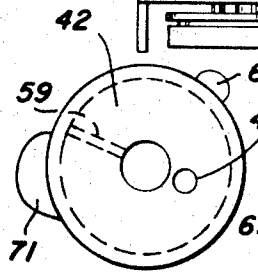


FIG. 6

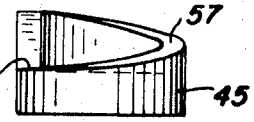


FIG. 7

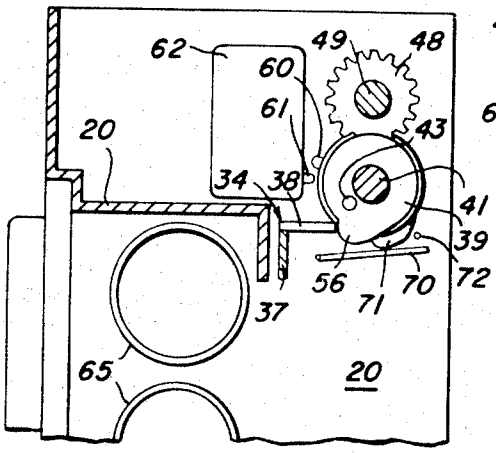


FIG. 3

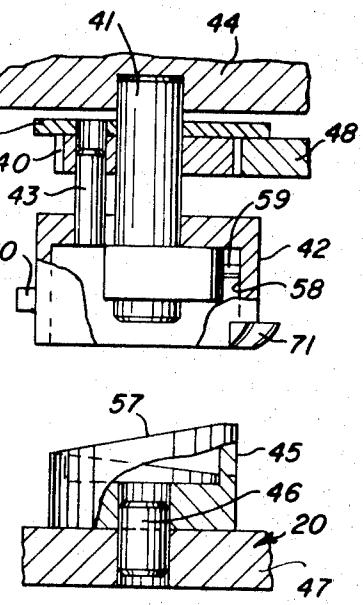


FIG. 4

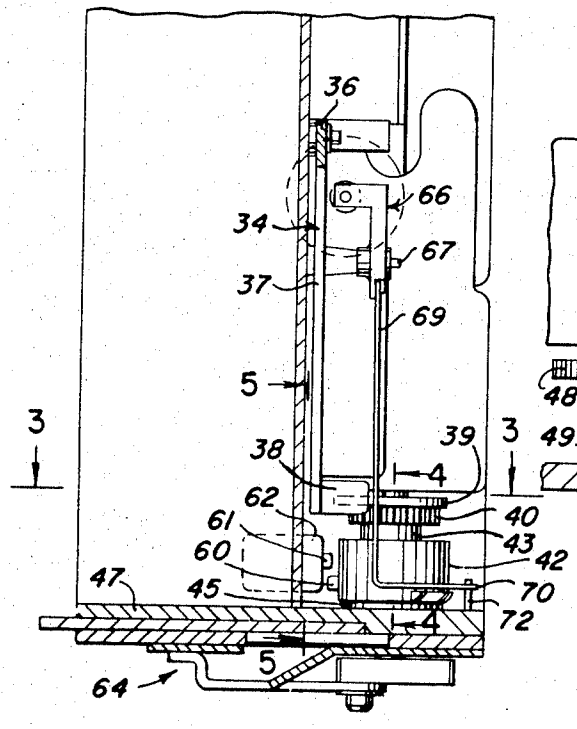


FIG. 2

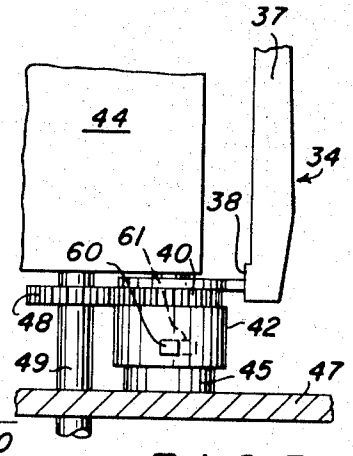


FIG. 5

CHANGE MAKING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a change-making device.

Change-making devices presently in use, due to the failure of certain of the components, may jam in the change-making position to produce what is known to the trade as a "jack-pot." Furthermore, unscrupulous persons have developed certain techniques and means that will jam the machine, again to produce the so-called "jack-pot."

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a mechanism to guard against the occurrence of "jack-pots."

Another object of the present invention is to provide a simple arrangement that is adapted to permit the change-making device to operate through a complete change-making cycle, but one which is also adapted, when the apparatus overruns and commences a further cycle, to interrupt the circuit and close the machine down.

With these and other objects in view the invention may be defined as a change making device comprising a frame, a plate member secured to said frame and defining a passageway for a coin of a pre-selected denomination therebetween, a coin tube means mounted on said frame for storing coins of smaller denomination, a dispensing means for dispensing coins from said tube means, a motor mounted on said frame, driving means connecting said motor and said dispensing means, a circuit including said motor, a first switch in said circuit being arranged to be closed by a coin passing through said passageway and thereby connecting said motor to a source of energy, holding means for maintaining said first switch closed until said motor has driven said dispensing means through a complete cycle to dispense a pre-selected number of coins from said tube means, a second switch in said circuit in series with said first switch, said second switch being normally closed, a second switch actuator member movable between a first position and a second position, said actuator member being moved to said second position by said motor when it is running but being normally biased to said first position, said second switch being actuated to stop the motor if said motor continues to run after completion of said complete cycle.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a fragmentary elevational view of a change-making device according to a presently preferred embodiment of the invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is an exploded sectional view taken on the line 4—4 of FIG. 2;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 2, but showing a different stage of the operation of the device;

FIG. 6 is a top plan view of a cylinder having a switch operating lobe, a lateral projection and cam follower, and

FIG. 7 is a side elevation of a piston having a cam track.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 the device comprises a frame 20 upon which there is mounted a "vend" switch 21 provided with an arm 22 which proturdes into an arcuate slot 23 formed in said frame 20. A "changing dispensing" switch 24, mounted below switch 21, is provided with a switch arm 25 which protrudes into an arcuate slot 26 formed in frame 20. Overlying the slot 26 there is pivotally mounted on a pintle 27, and latch 28. The latch as shown in FIG. 1 extends upwardly from the pintle to about midway of the slot. The latch 28 has formed therein a recess 29 which is adapted to snare the switch arm 25 when it has been depressed. A second latch 30 having formed therein a recess 31 is also pivoted on pintle 27. The recesses 29 and 31 respectively face inwardly toward the slot 26. Secured to the second latch 30 is a stub shaft 32 which abuts against an arm 33 integrally formed on latch 28.

A bell-crank 34 fulcrumed on a pintle 35 has the free end of arm 36 abutting against the under surface of stub-shaft 32. The free end of arm 37 is bent at a right angle to form a pad 38 which is adapted to contact a cam 39. The cam 39 is secured to and rotates with a gear 40. The gear 40 is mounted on and secured to a shaft 41 which also has slidably mounted thereon a cylinder 42. The cylinder 42 is provided with a bore 42*a* which is adapted to slidably engage with a dowel 43 secured to gear 40 and cam 39. The shaft 41, as shown, has its upper end rotatably mounted in the casing of a motor 44. The lower end of shaft 41 protrudes through the top of cylinder 42 to seat in a piston 45. The piston 45, see FIG. 4, is secured on a stub shaft 46 which is secured in a flange 47 formed on the frame 20. The gear 40 meshes with and is driven by a gear 48 mounted on and secured to the output shaft 49 of motor 44.

Immediately behind frame 20 there is mounted a plate 50 which together with the back face of frame 20 forms a passageway for coins entering the device. A coin entering the passageway descends and depresses the end of the arm 22 which protrudes into said passageway through a slot 23, thus closing switch 21 which initiates the vending cycle of a vending machine in which the device is mounted. The coin, after it has depressed switch arm 22, descends further to depress switch arm 25 and is then guided by the passageway into a storage compartment below the device. Depression of switch arm 25 actuates switch 24 which energizes motor 44, setting the change dispensing mechanism 64 in motion.

When the switch arm 25 is depressed it contacts inclined surface 55 of latch 28 causing the latch to pivot towards the right of FIG. 1 until the arm reaches the entrance to recess 29. The latch 28, due to the action of gravity thereon, then swings towards the left, snaring switch arm 25. When the motor 44 has turned the shaft 49 through a complete revolution, a cam lobe 56 formed on cam 39 wipes against pad 38 formed on bell-crank 34, forcing the latter to rock on its pintle 35. The lever arm 36 of the bell-crank moves upwardly and forces stub-shaft 32 and the contacting arm 33 upwardly, which causes latches 30 and 28 to pivot on pintle 27. The movement of latch 28 towards the right frees switch arm 25 from recess 29 but it is then snared

in recess 31 of latch 30 where it is held until the cam lobe 56 has passed beyond pad 38. When the cam lobe 56 passes beyond pad 38 the bell-crank 34 immediately swings back toward the right, FIG. 1, against the non-operative dwell of the cam 39, and the switch arm 25 excapes from the recess 31 formed in latch 30 and returns to its normal upward position, opening switch 24 and thereby de-energizing the motor circuit. If, however, the switch 24 short-circuits or the switch arm 25 remains, even after being released by the action of cam lobe 56, in the depressed position, provision is made to stop the motor in any event. Thus, cylinder 42, driven by gears 40 and 48, is raised upwardly by a cam track 57 formed on the periphery of piston 45, bearing against a cam follower 59 in the form of a radial web in cylinder 42. Under normal conditions, that is, when the device is functioning properly, a cam lobe 60 formed on cylinder 42 moves adjacent to switch button 61 of switch 62 but is stopped short of actuating the switch when the motor is stopped at the completion of a cycle, the follower 59 then having passed the high point of cam track 57 so that the cylinder is free to descend, placing lobe 60 at a lower level than button 61. When, however, as above mentioned, the switch arm 25 is not cleared from the latches or becomes defective and the motor 44 overruns, the cam lobe 60 wipes the button 61 of switch 62, which is wired in series with switch 24, opening the contacts of said switch 62 and stopping the motor.

The actuation of switch 62 on overrunning of the motor is achieved by an arrangement which will now be described. The motor 44 is of the type which has a longitudinally displaceable armature 44*a*. Thus, when the motor is energized, the armature 44*a* is displaced to the left from the position in which it is shown in FIG. 1. In the FIG. 1 position it permits clockwise movement, to the illustrated position, of a rocker arrangement 66, pivotally mounted at 67, as a projection 71 on cylinder 42 displaces a horizontal extension arm 70 of a wire rod 69 forming the lower part of the rocker arrangement 66. The rocker arrangement 66 has an upper part 68 which carries the wire rod 69 and it has its weight distributed so that it is normally biased to a position in which the extension arm 70 underlies the projection 71 at the completion of a cycle, but the weight of the cylinder is sufficient to displace the arm 70 and rock the arrangement 66 to the FIG. 1 position as the cylinder descends, the cam follower at the completion of the cycle having passed the high point of cam track 57 and being situated over low point 63. However, if the motor remains energized at the completion of a cycle, the armature 44*a* will be in its displaced position and will not permit the aforesaid clockwise rocking of the arrangement 66. Thus, the arm 70 will not be displaced from its position underlying the projection 71 but will hold the latter, and hence the cylinder 42 and lobe 60, in the raised position which they occupied when the follower 59 was at the high point of the track 57. In this raised position, of course, the lobe 60 is at the same level as the button 61 of switch 62 and will actuate same as the cylinder continues to rotate, thus interrupting the energizing circuit for motor 44 and bringing the latter to a stop.

The dispensing mechanism 64 which is driven by the motor 44, to dispense coins from tubes 65, as change, may be of a type well known in the art and no further description thereof is deemed to be necessary for an understanding of the present invention.

The underside of projection 71 is rounded, as shown, to facilitate displacement of arm 70 thereby and an upright pin 72 is fixed to the base of frame 20 to limit the anti-clockwise movement of arm 70 to ensure that it properly underlies the projection 71.

What I claim:

1. A change-making device comprising a frame, a plate member secured to said frame and defining a passageway for a coin of a pre-selected denomination therebetween, coin tube means mounted on said frame for storing coins of smaller denomination, a dispensing means for dispensing coins from said tube means, a motor mounted on said frame, driving means connecting said motor and said dispensing means, a circuit including said motor, a first switch in said circuit being arranged to be closed by a coin passing through said passageway and thereby connecting said motor to a source of energy, holding means for maintaining said first switch closed until said motor has driven said dispensing means through a complete cycle to dispense a pre-selected number of coins from said tube means, a second switch in said circuit in series with said first switch, said second switch being normally closed, a second switch acutator member movable between a first position and a second position, said actuator member being moved to said second position by said motor when it is running but being normally biased to said first position, said second switch being actuated by said actuator member in its second position to stop the motor if said motor continues to run after completion of a said complete cycle, said actuator member for said second switch comprising a cylinder adapted to slide on a piston secured to said frame, cam means formed on one of said piston and cylinder adapted to coact with a cam follower on the other of said piston and cylinder when said cylinder is rotated, to raise said cylinder from an inoperative position to an operative position, and a cam lobe formed on the exterior of said cylinder adapted to actuate said second switch when the first mentioned switch fails to open said circuit.

2. A change-making device as defined in claim 1, wherein said first switch has a switching arm extending into said passageway, said switching arm being normally biased to a first position in which said first switch is open, said switching arm being arranged to be moved by a coin passing through said passageway to a second position for closing said first switch.

3. A change-making device as defined in claim 1, wherein said first switch has a switching arm extending into said passageway, said switching arm being normally biased to a first position in which said first switch is open, said switching arm being arranged to be moved to a second position for closing said switch by a coin passing through said passageway, and wherein said holding means includes a latch arranged to hold said switching arm in its second position, and means driven by said motor for releasing said switching arm from said latch at the end of said cycle.

4. A change-making device as defined in claim 3, wherein said latch is pivotally attached to said frame and is biased to a first position, and wherein a recess is provided in said latch for receiving and holding said switching arm when said latch is in its first position, said latch being arranged to be pivoted from its first position by said switching arm as said switching arm is moved

by said coin to the second position of the switching arm to permit said switching arm to move into said recess.

5. A change-making device as defined in claim **4**, wherein the switching arm releasing means includes a disc cam mounted on a shaft, said shaft being geared to said driving means so as to revolve once during each dispensing cycle, a lever pivotally connected to said frame, said lever being arranged to be engaged and disengaged by a lobe on said cam as said cam revolves, the engagement and disengagement causing said lever to rock from an initial position and then to return to the initial position, repectively, and means enabling said lever to act on said latch, whereby said rocking of said lever from its initial position moves said latch from said first position to release said switching arm.

6. A change-making device as defined in claim **5**, wherein said holding means further comprises a second latch, said second latch being pivotally attached to said frame and normally resting in a first position, said second latch having a recess arranged to receive and hold said switching arm in its second position when said second latch is moved from its first position to a second position, and wherein said lever engages said second latch and moves it to its second position as said lever is engaged by the lobe of said disc cam, whereby said second latch receives and holds said switching arm in said second positions as said first latch moves from its first position, said second latch being arranged to return to its first position when said lobe disenagaes said lever, whereby said switching arm is released by said second latch.

7. A change-making device as claimed in claim **1**, including holding means adapted to hold said cylinder in said operative position when said motor continues to run after completion of a said cycle.

8. A change-making device as claimed in claim **7**, wherein said motor has an armature which is displaced longitudinally from a first position to a second position when said motor is energized, said cylinder has a lateral projection thereon and said holding means has a member which normally occupies a position underlying said projection as the end of a said cycle, said member being displaceable from said position by said projection when the motor has ceased to run but being held in said position by said armature as the motor is running.

9. A change-making device as claimed in claim **8**, wherein said holding means comprises a rocker arrangement pivotally mounted on said frame and having an upper part aligned with said armature, said member being in the form of a horizontal arm at the lower end of said rocker arrangement.

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