

July 6, 1943.

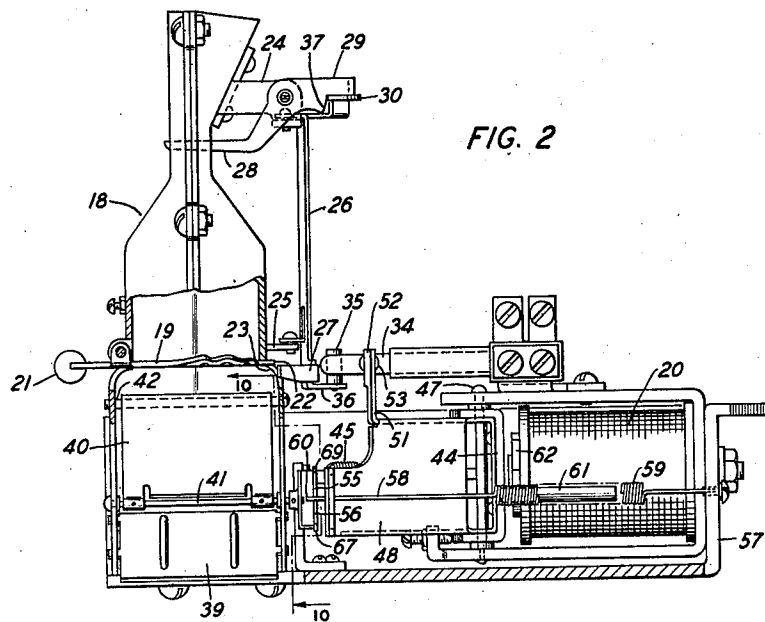
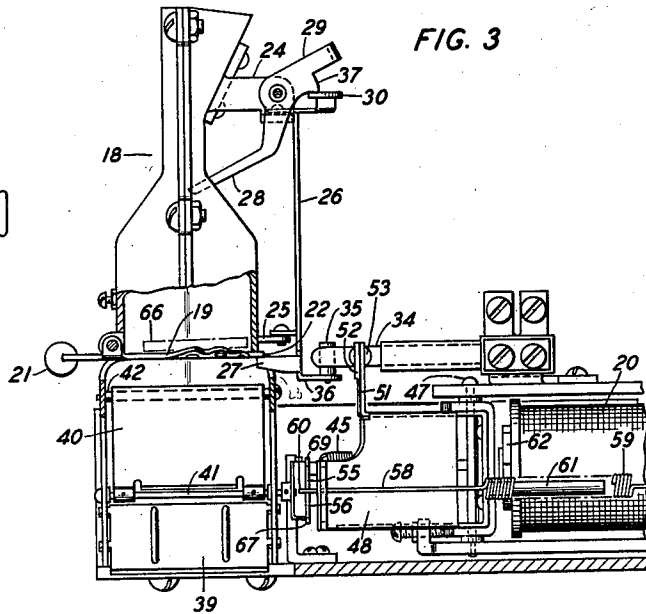
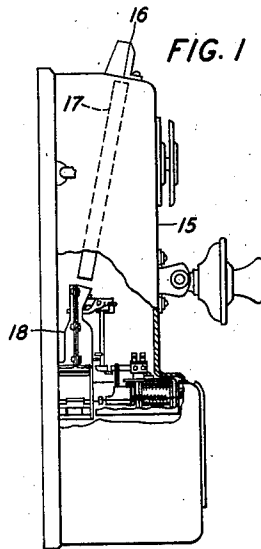
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2,323,657

COIN DISPOSAL UNIT

Filed Nov. 27, 1941

4 Sheets-Sheet 1



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FIG. 4

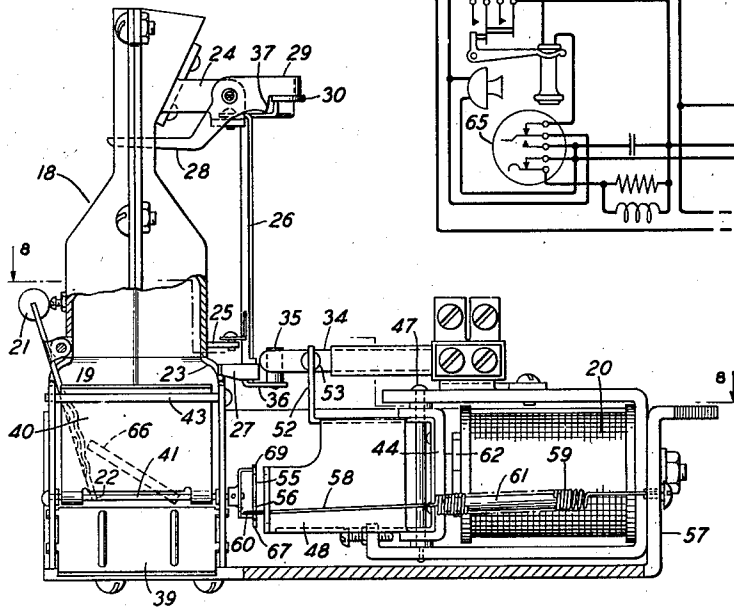


FIG. 5

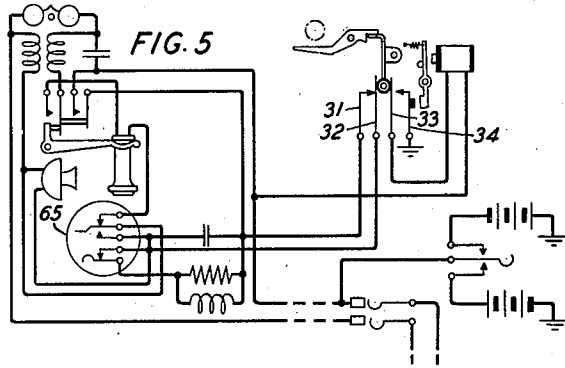
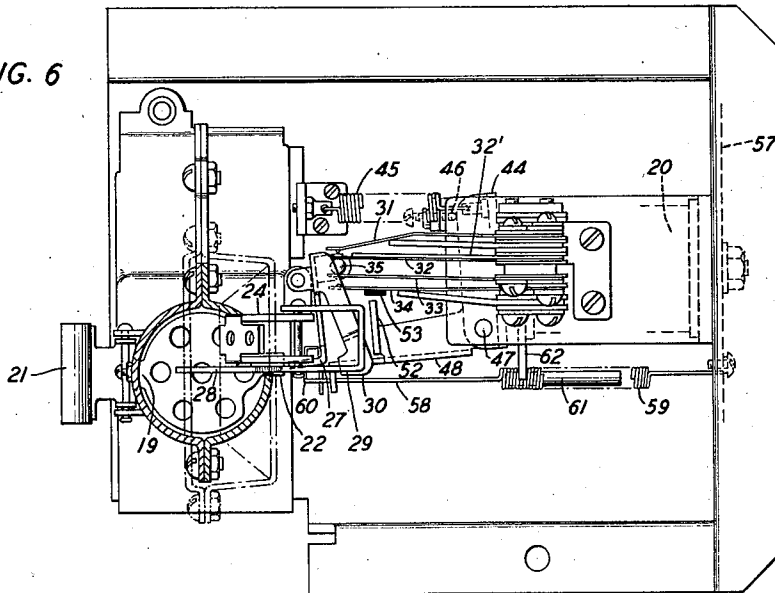


FIG. 6



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FIG. 7

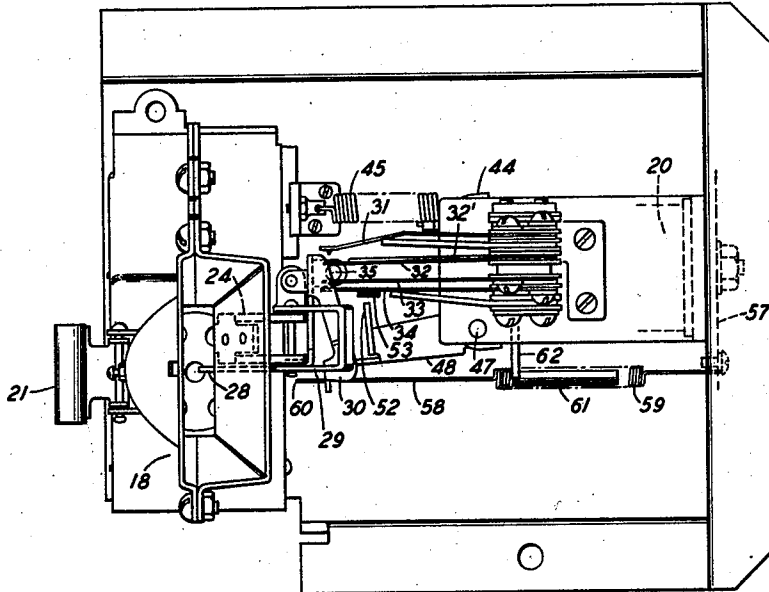
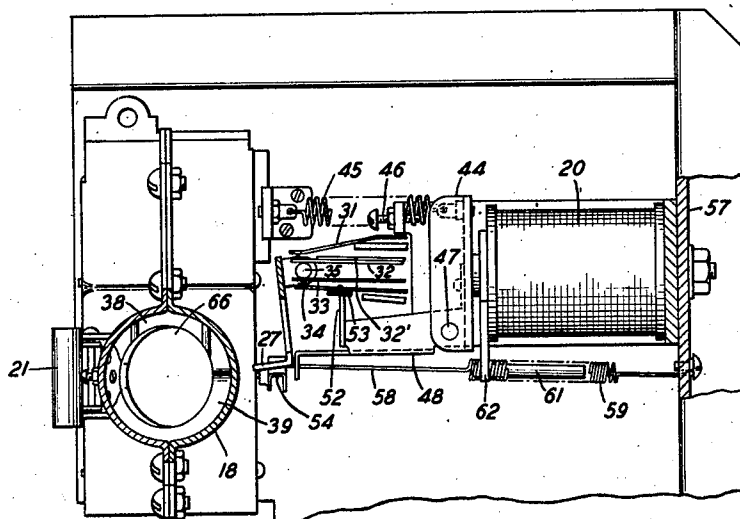


FIG. 8



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FIG. 9

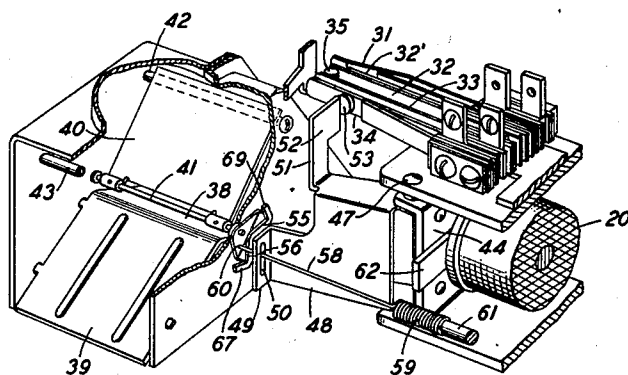


FIG. 10

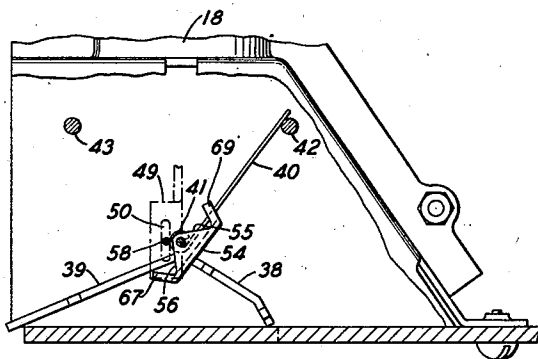
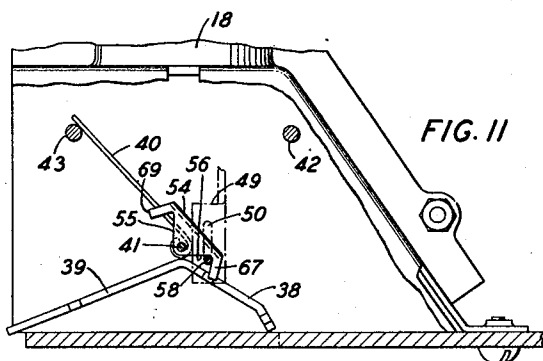


FIG. 11



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UNITED STATES PATENT OFFICE

2,323,657

COIN DISPOSAL UNIT

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Application November 27, 1941, Serial No. 420,622

11 Claims. (Cl. 194—9)

This invention relates to a coin disposal unit adapted for use in coin operated devices such as in a telephone coin collector.

An object of the invention is to provide a simplified mechanism of increased efficiency for disposing of the coins deposited in a coin operated device.

In accordance with one embodiment of this invention as applied to a telephone coin collector, the coin disposal unit comprises a coin hopper having a normally unsupported coin trap below which lies the entrance to a coin collect chute and the entrance to a coin refund chute. Adjacent the two entrances is a vane biased to either of two positions, in one position closing the entrance to the collect chute and directing coins from the coin trap into the refund chute and in a second position closing the entrance to the refund chute and directing coins from the coin trap into the collect chute. The initial coin deposited in the hopper before reaching the coin trap actuates a coin trigger to release means for latching the coin trap and for closing electrical contacts which establish a control circuit for an associated coin relay. Subsequent to coin deposit the relay may be energized by collect current or refund current and the relay armature, in operating, performs three functions: (1) to move the deflecting vane to collect or refund position as the case may be, unless the vane already occupies the desired position, in which event the vane is undisturbed by the relay armature either in its attractive movement or restoring movement; (2) unlatches the coin trap; and (3) re-sets the coin trigger so that upon armature retraction the electrical contacts will be reopened and the coin trap latch held in an ineffective position. Other aspects of the invention will appear from the detail description which follows.

Referring to the drawings:

Fig. 1 is a side view of a telephone coin collector employing the coin disposal unit of this invention;

Fig. 2 is an enlarged side view, partly in section, of the coin disposal unit in its normal unoperated position;

Fig. 3 is similar to Fig. 2 except that certain parts are shown in their actuated positions after coin deposit and before the operation of the associated relay;

Fig. 4 is similar to Fig. 3 except that the relay has been operated for coin collection;

Fig. 5 is a schematic wiring diagram of the coin collector;

Fig. 6 is a top view of the apparatus of Fig.

2 with the various parts in their normal positions before coin deposit;

Fig. 7 is a top view of the apparatus of Fig. 3 after coin deposit and before relay operation;

5 Fig. 8 is a top view of the apparatus of Fig. 4 after relay operation;

Fig. 9 is a view in perspective of the lower portion of the coin disposal unit showing in greater detail the coupling mechanism between the relay armature and the coin deflecting vane with the relay in its unoperated position;

Fig. 10 is an end view, partly in section, of the coin deflecting vane and associated armature controlled mechanism taken in the direction indicated by arrows 10, 10 of Fig. 2 and shows the coin deflecting vane in coin refunding position; and

Fig. 11 is similar to the showing of Fig. 10 except that the coin deflecting vane lies in coin collect position due to relay operation.

Except for the coin disposal unit, the coin collector of Fig. 1 is essentially the same as that disclosed in the O. F. Forsberg Patent 1,043,219, issued November 5, 1912. Mounted on the upper housing 15 is a coin gauge 16 for receiving coins of various denominations and for directing them into a multicoin chute 17 where they are guided into selective engagement with suitable sound signals before being discharged into a vertically arranged coin hopper 18 where the coins are held in suspense on a pivoted coin trap 19 for subsequent collection or refund under the control of the associated polarized relay 20.

Coin trap 19 is biased to a substantially horizontal position by its counterweight 21 with its narrowed free end 22 lying in a slot 23 and resting against the upper edge of the slot; but the weight of a single coin on the trap is sufficient to overcome the bias of the counterweight and cause the trap to drop downwardly to coin discharging position, since trap 19 is not positively supported in its horizontal position as in the Forsberg patent. Mounted externally of the coin hopper are two spaced brackets 24, 25 on which is pivotally supported a vertical member 26 having at its lower end a laterally projecting arm 27 which is adapted to enter slot 23 beneath the trap and latch the trap in coin supporting position but member 26 is normally biased to a position as in Fig. 2 in which the trap is not engaged by latch 27.

Bracket 24 also supports a pivoted coin trigger 28 which projects into the coin hopper at a point a substantial distance above the coin trap for actuation by a deposited coin, with the trigger hav-

ing a counterweight 29 which normally rests on the laterally extending arm 30 of pivoted member 26. Adjacent the lower end of member 26 is a horizontally disposed spring pile-up in which spring contacts 31, 32 are normally closed and spring contacts 33, 34 are normally open, as shown in Fig. 6. Lying between springs 32 and 33 is a vertical stud 35 carried by an arm 36 of pivoted member 26. The contact spring 32 is tensioned by a tensioning spring 32' so that spring 32 is biased to move towards spring 33 carrying stud 35 with it, but spring 32 and stud 35 are normally held in their positions of Fig. 6 by reason of the fact that clockwise movement of member 26 is restrained by the engagement of arm 30 with coin trigger shoulder 37 as shown in Fig. 2.

Below the coin trap 19 the lower portion of the coin hopper is divided into a collect chute 38 and a refund chute 39 (Figs. 10 and 11) while above the entrance to chutes 38 and 39 is a coin deflecting vane 40 fastened at its lower end to a horizontal rotatable pin 41. As shown in Fig. 2, the upper edge of vane 40 lies well below the coin trap 19 when the trap is in its normal horizontal position of Fig. 2. Vane 40 under the control of relay 20 is adapted to assume either the position of Fig. 10 or the position of Fig. 11 but no intermediate position. In Fig. 10, the upper end of vane 40 is lying against a stationary pin 42 to close the entrance to collect chute 38 and to serve as a means for deflecting deposited coins into refund chute 39. In Fig. 11, vane 40 lies against a stationary pin 43 to close the entrance to the refund chute 39 and to serve as a means for deflecting the deposited coins into collect chute 38.

The electromagnet 20 has an armature 44 pivoted about a stationary pin 47 and biased by a spring 45 to lie in its unoperated position against a stop screw 46. Armature 44 has an extension plate 48 extending in a general direction parallel to the axis of relay coil 20 and the outer end of plate 48 has a laterally projecting piece 49 containing a vertical slot 50 (Fig. 9). Armature plate 48 also has an upwardly extending arm 51 carrying a lateral extension 52 adapted when the armature is attracted to engage insulating stud 53 carried by spring 34 and move the spring pile-up from its position of Fig. 6 to its advanced position of Fig. 8.

Fastened to the portion of the vane pin 41 external to the coin hopper is a cam member 54 which has a V-shaped cam surface with the two arms of the V consisting of the angularly disposed surfaces 55, 56 which meet at a point substantially aligned with pin 41. Rigidly fastened to the relay supporting framework 57 is one end of a pin or wire 56 the other end 60 of which passes through slot 50 in armature plate extension 49 to lie adjacent the cam surfaces 55, 56. Intermediate its ends, pin 58 is wound in a helix 59 to permit its free end 60 to be readily displaced either in a vertical plane or in a horizontal plane. Helix 59 encloses and supports a small permanent magnet 61 in the shape of a cylindrical rod with one end of magnet 61 adjacent the lateral extension 62 of the magnetic core for relay winding 20.

The operation of the coin disposal unit may now be described. The first deposited coin falling into hopper 18 strikes trigger 28 to move the trigger from its normal position of Fig. 2 to its operated position of Fig. 3. Arm 30 of vertical member 26 is thereby free from the re-

straining action of trigger shoulder 37 and the tensioning spring 32' now becomes free to move spring 32 from its normal position of Fig. 6 to an advanced position shown in Fig. 7. Spring 32, in advancing to its position of Fig. 7, not only opens its electrical contact with spring 31 but because of its engagement with stud 35 of vertical member 26 causes the closure of contacts 33, 34. This movement of stud 35 by biasing spring 32' causes arm 27 of vertical member 26 to enter slot 23 and latch trap 19 in its supporting position (Fig. 3) before the coin which actuated trigger 28 has had time to reach the trap 19. With vertical member 26 moved to its advanced position of Fig. 3, as soon as trigger shoulder 37 has been raised far enough to release arm 30, it follows that after the passage of the coin the trigger counterweight 29 cannot immediately restore the trigger to normal since arm 30 is now interposed and hence in Fig. 3 the lower edge of shoulder 37 is shown resting on top of arm 30.

It will be apparent from Fig. 5 that the above-described coin actuation of trigger 28 in opening contacts 31, 32 serves to remove a short circuit around the pulsing contacts of calling dial 65; and in closing contacts 33 and 34 serves to establish a connection to ground through the winding of relay 20 whereby apparatus at the central office is prepared for extending the calling line to the called line represented by the operation of dial 65. In the event the desired connection is established, coin collect current will subsequently be applied to relay winding 20 to collect coin 66 of Fig. 3, while if the called line cannot be secured, relay 20 will be energized with refund current to refund coin 66. The manner in which relay 20 operates to collect or refund the coin will now be described.

With relay 20 deenergized, pin 58 is of sufficient stiffness that the pin extends substantially horizontally from its fixed point of support 57 to have its free end 60 substantially aligned with the deflecting vane pin 41 (Figs. 2 and 10). For illustrative purposes, it may be assumed that after the last relay operation prior to the deposit of coin 66 the coin deflecting vane 40 was left in the refund position of Figs. 2, 3, and 10. If, now, after the deposit of coin 66 collect current is applied to relay 20 the polarity of pole-piece 62 is the same as the polarity of the adjacent end of pilot magnet 61 which lies immediately below pole-piece 62 and hence magnetic forces are developed which move pilot magnet 61 and the supporting wire 58 downwardly to cause the free end 60 of the pin to change its position from the approximate center of the vertical slot 50 to the lower end of the said slot prior to the time the main armature 44 has moved appreciably towards the relay core. Then as armature 44 continues its attractive movement wire end 60 will be moved laterally due to the fact that the wire traverses a slot 50 in armature extension 49 and this lateral movement will cause wire end 60 to engage cam surface 56 and flip vane 40 from its refund position of Fig. 10 to its collect position of Fig. 11 to prepare for the collection of the money to be discharged from trap 19; and when the armature is fully attracted, wire end 60 lies substantially in the position of Fig. 11 against shoulder 67.

Also armature 44 in moving from its deenergized position of Fig. 7 to its attracted position of Fig. 8 will cause armature extension 52 to engage insulating stud 68 on contact spring 34

to laterally move the free ends of the spring pile-up from their positions of Fig. 7 to their positions of Fig. 8; and since stud 35 lies between springs 32 and 33 it follows that this lateral movement of armature extension 52 will rotate vertical member 26 counter-clockwise as viewed in Fig. 7 to remove latch 27 from beneath the coin trap 19, whereby the coin trap under the weight of coin 66 drops downwardly to its coin discharging position of Fig. 4. This counter-clockwise rotation of vertical member 26 will also move its upper arm 30 from its position of Fig. 3 to its advanced position of Fig. 4, whereby the coin trigger 28 is freed from the restraining action of arm 30 to permit counterweight 29 to restore the coin trigger to its normal position of Figs. 1 and 4.

As soon as relay 20 is deenergized, its armature 44 will be restored to normal due to restoring spring 45, thereby permitting the spring pile-up to move from its advanced position of Fig. 8 to its normal position of Fig. 6 where contacts 31 and 32 are closed and where the biasing action of spring 32' in tending to cause further movement of stud 35 is prevented because arm 30 of vertical member 26 is again restrained by trigger shoulder 37.

In the above-described operation of the coin disposal unit, it has been assumed that vane 40 was found in its refund position of Fig. 10 and that the relay was operated to move vane 40 to its collect position of Fig. 11. However, if with the vane in its position of Fig. 10 the relay is operated by a voltage of the opposite polarity from that previously assumed, then the relay armature performs no work on vane 40 and permits vane 40 to remain in its position of Fig. 10. Thus, with refund current the pole-piece 62 would be of the opposite polarity to the polarity of the adjacent end of pilot magnet 61, whereby the pilot magnet is attracted upwardly to move wire 58 to the upper end of armature slot 50; and with wire end 60 in the upper portion of slot 50 the subsequent attraction of the main armature 44 to move armature extension 49 to the right, as seen in Fig. 10, will merely cause wire end 60 to move above cam surface 55 to lie at the junction of cam surface 55 and the angular arm 69, whereby the operation of relay 20 permits vane 40 to remain in the coin refunding position of Fig. 10 which it occupied prior to relay operation.

It will be noted that when relay 20 is deenergized vane 40 remains in its operated position and continues in that position until the relay is operated by a voltage of a polarity which requires a change in the location of the vane.

Before pointing out certain of the outstanding advantages of the above construction, a brief summary of its operation cycle will be repeated. The trigger 28 is upset by the first coin as the coin enters the hopper 18, thus closing the ground contacts 33, 34 and opening the dial shorting contacts 31, 32. Simultaneously, a latch 27 is moved under the free end of coin trap 19 so as to support the trap by the time the coin reaches it. The trigger operating coin and any other coins that follow are held in suspense on trap 19. When the coins are to be disposed of, the relay 20 is energized through the ground circuit contacts 33, 34 causing the pilot magnet operated selector pin 60 to orient for collect or refund depending upon the polarity of the applied voltage. The relay armature 44 begins to close, bringing selector pin 60 against

an extension 55, 56 of the coin deflecting vane 40 which vane then swings under the coin trap for the chosen position for coin disposal but vane 40 does not move if it is already in the desired position. The armature arm 53 opens the trap catch 27 by a force exerted through the ground contacts 33, 34 and the coin trigger 28 then resets. While the coins are being discharged the relay magnet 20 may be deenergized in which case the armature 44 is restored by the retractile spring 45 and the ground contacts 33, 34 are opened. The vane 40, however, remains at rest and the trap catch 27 remains open permitting any number of coins to be discharged even though the remainder of the coin disposal unit is reset for the next call. As the last coin leaves trap 19, the trap swings shut and the cycle of operation is completed.

The load on the above-described relay 20 is such that the relay will work satisfactorily on a narrow margin between operate and non-operate voltages; for example, it may be adjusted to operate on an applied voltage of 45 volts and yet not operate on an applied voltage of 40 volts. This close operating margin comes about by virtue of the distribution and magnitude of the forces which must be overcome. The relay armature starts against the predetermined force of the retractile spring 45, then moves the lightweight deflecting vane 40 and finally displaces the contact springs and the trap catch 27. Therefore, the force required to move the coin trap 19 is practically independent of the coin load and in any case is less than the force required to move the contact spring pile-up. It will also be apparent that the above-described device will operate satisfactorily with any current pulse which is of sufficient duration to reset the coin trigger 28 for if the trigger is reset the trap is free to dump. Conversely, a coin cannot be caught on the trap if the trigger has been reset, thus avoiding a possibility of losing control of the relay before the coins have been properly disposed of. It will be seen that according to the principle upon which this invention operates the driving force for the coin mechanism is obtained by the closing of a simple armature 44 and the coin piloting is accomplished by an auxiliary mechanical device which does not influence the operating characteristics of the relay, and the relay armature begins its motion free of all variable loads.

What is claimed is:

1. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin supporting position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, means biased to latch said trap in coin supporting position, cam means normally engaging said latching means to hold said latching means in trap freeing position and means projecting into said hopper above said trap for actuation by a deposited coin for moving said cam means to a position releasing said latching means.

2. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin obstructing position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, a pivoted coin trigger biased to a normal position and having an arm projecting into a portion of said hopper a substantial distance above said trap for actuation by a deposited coin to an advanced position, latching means adapted to hold

said trap in said coin supporting position and cam means on said trigger normally engaged by said latching means for holding said latching means in an ineffective position, said cam means when said trigger is in said advanced position releasing said latching means to trap locking position.

3. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin supporting position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, a pivoted coin trigger normally projecting into said hopper above said trap for actuation to an advanced position by a deposited coin, a counterweight for said trigger biasing said trigger to a coin obstructing position, a shoulder on said counterweight, a rotatable member adapted to be rotated about a substantially vertical axis, an arm on said member adapted to latch said trap in coin supporting position, spring means urging said arm to trap latching position, a second arm on said member engaging said shoulder in the normal position of said trigger whereby said arm is held in trap freeing position, said shoulder in the advanced position of said trigger releasing said member to permit said second arm to latch said trap.

4. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin supporting position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, said trap after coin discharge being restored to its normal coin supporting position solely by the bias acting on said trap, a normally ineffective means for latching said trap in coin supporting position, means actuated by a coin traversing said hopper above said trap for directing said latching means to a trap latching position, and relay means for restoring said latching means to its normal ineffective position.

5. In a coin collector, a coin hopper having a main coin receiving channel, a collect chute and refund chute branched from said main channel, a coin trap in said main channel, a deflecting vane below said trap biased to either of two positions, said vane in one position closing said refund chute and deflecting coins into said collect chute, said vane in its second position closing said collect chute and deflecting coins into said refund chute, a polarized relay and means controlled by said relay when energized by applied voltage of one polarity for moving said vane from a certain one of said positions to the other of said positions while retaining said vane in said certain position when the relay is energized by voltage of the opposite polarity.

6. In a coin collector, a coin hopper having a main coin receiving channel, a collect chute and refund chute branched from said main channel, a coin trap in said main channel, a deflecting vane below said trap biased to either of two positions, said vane in one position closing said refund chute and deflecting coins into said collect chute, said vane in its second position closing said collect chute and deflecting coins into said refund chute, a polarized relay and means controlled by said relay for moving said vane to collect position when collect current is applied to said relay unless said vane is already located in said collect position and for moving said vane to refund position when refund current is applied to said relay unless said vane is already located in said refund position.

7. In a coin collector, a coin hopper having a main coin receiving channel, a collect chute and a refund chute branched from said main channel, a coin trap in said main channel, a deflecting vane below said trap biased to either of two positions, said vane in one position closing said refund chute and deflecting coins into said collect chute, said vane in its second position closing said collect chute and deflecting coins into said refund chute, a polarized relay having an armature, means actuated in one plane by said armature when the voltage applied to said relay is of one polarity and actuated in a different plane by said armature when the applied voltage is of the opposite polarity, said vane when in said first position having a first arm lying in the path of said means in said first plane and having a second arm lying out of the path of said means in said second plane, said second arm when said vane is in said second position lying in the path of said means in said second plane with said first arm out of the path of said means in said first plane.

8. In a coin collector, a coin hopper having a main coin receiving channel, a collect chute and a refund chute branched from said main channel, a coin trap in said main channel adapted to support a deposited coin, a deflecting vane below said trap and normally out of engagement with said trap, said vane being biased to either of two positions but no intermediate position, said vane in a first position closing said refund chute and deflecting coins into said collect chute, said vane in a second position closing said collect chute and deflecting coins into said refund chute, a polarized relay, means actuated by a deposited coin for establishing a control circuit for said relay, and means controlled by said relay for discharging the deposited coin from said trap and for establishing said vane in that one of said two positions which corresponds to the polarity of the energizing voltage applied to said relay.

9. In a coin collector, a coin deflecting member pivoted about a substantially horizontal axis, two radial arms on said member projecting in substantially opposite directions from the pivoting axis of said member, a coin relay having an armature pivoted about a substantially vertical axis, said armature remote from its pivot and adjacent said arms containing a substantially vertical slot extending both above and below the pivoting axis of said member, a flexible pin projecting through said slot for engaging one of said arms during armature attraction when said pin lies in the upper portion of said slot and for engaging the other of said arms during armature attraction when said pin lies in the lower portion of said slot, said pin being normally biased to occupy an intermediate position with respect to the length of said slot, and means for moving said pin along said slot in a direction dependent upon the polarity of the voltage applied to said relay.

10. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin supporting position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, a spring biased member having an arm adapted to latch said trap in coin supporting position, a coin trigger biased to a normal position in which an extension of said trigger projects into said hopper above said trap for actuation by a deposited coin to an advanced position, a second arm on said member adjacent said

trigger, a shoulder on said trigger engaging said second arm in the normal position of said trigger to hold said first arm away from trap latching position but releasing said member to latch said trap when said trigger is in its advanced position, said member in its trap latching position also latching said trigger in its actuated position and relay means for moving said member to a retracted position unlatching said trigger.

11. In a coin collector, a coin hopper, a pivoted coin trap in said hopper biased to a coin supporting position but normally free to drop downwardly to coin discharging position when its bias is overcome by the weight of a coin on said trap, a spring biased member having an arm adapted to latch said trap in coin supporting po-

sition, a coin trigger biased to a normal position in which an extension of said trigger projects into said hopper above said trap for actuation by a deposited coin to an advanced position, a shoulder on said trigger, means on said member coacting with said shoulder whereby said shoulder in its normal position holds said member in a retracted trap freeing position and whereby upon the coin actuation of said trigger to its advanced position said shoulder releases said member to its trap latching position and said member latches said trigger in its advanced position, and relay means for temporarily retracting said member to a position permitting said trigger to be restored to normal.

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