

Jan. 10, 1933.

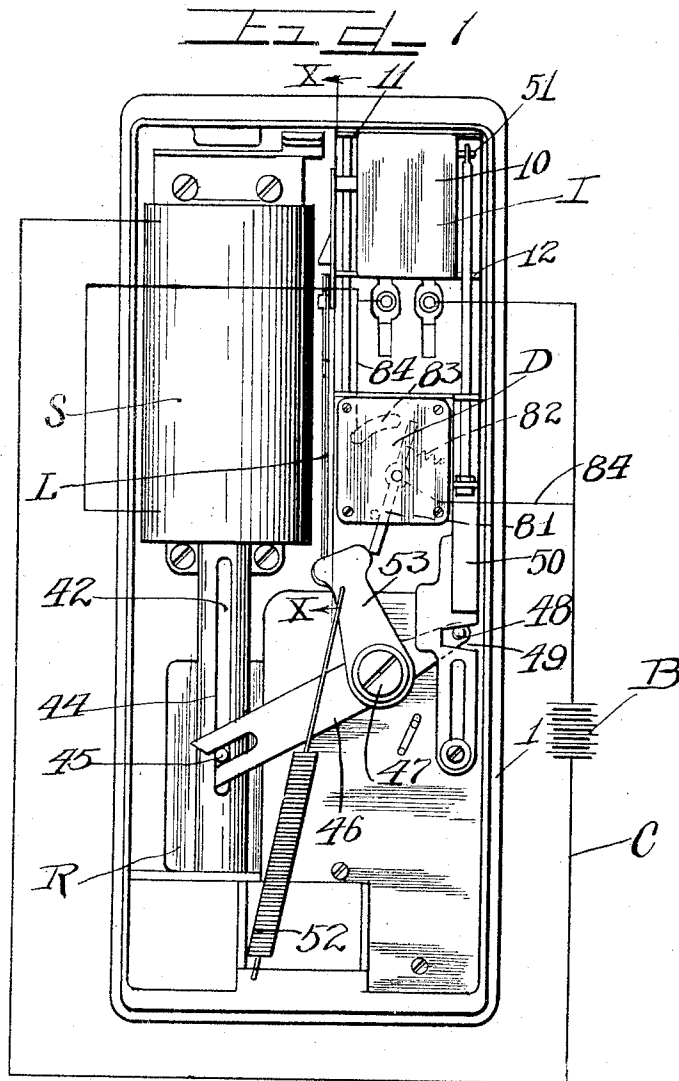
E. H. THOMPSON

1,894,071

FARE BOX

Filed Sept. 15, 1930

4 Sheets-Sheet 1



INVENTOR
Ernest H. Thompson.

W. H. Charles Hill Attys.

Jan. 10, 1933.

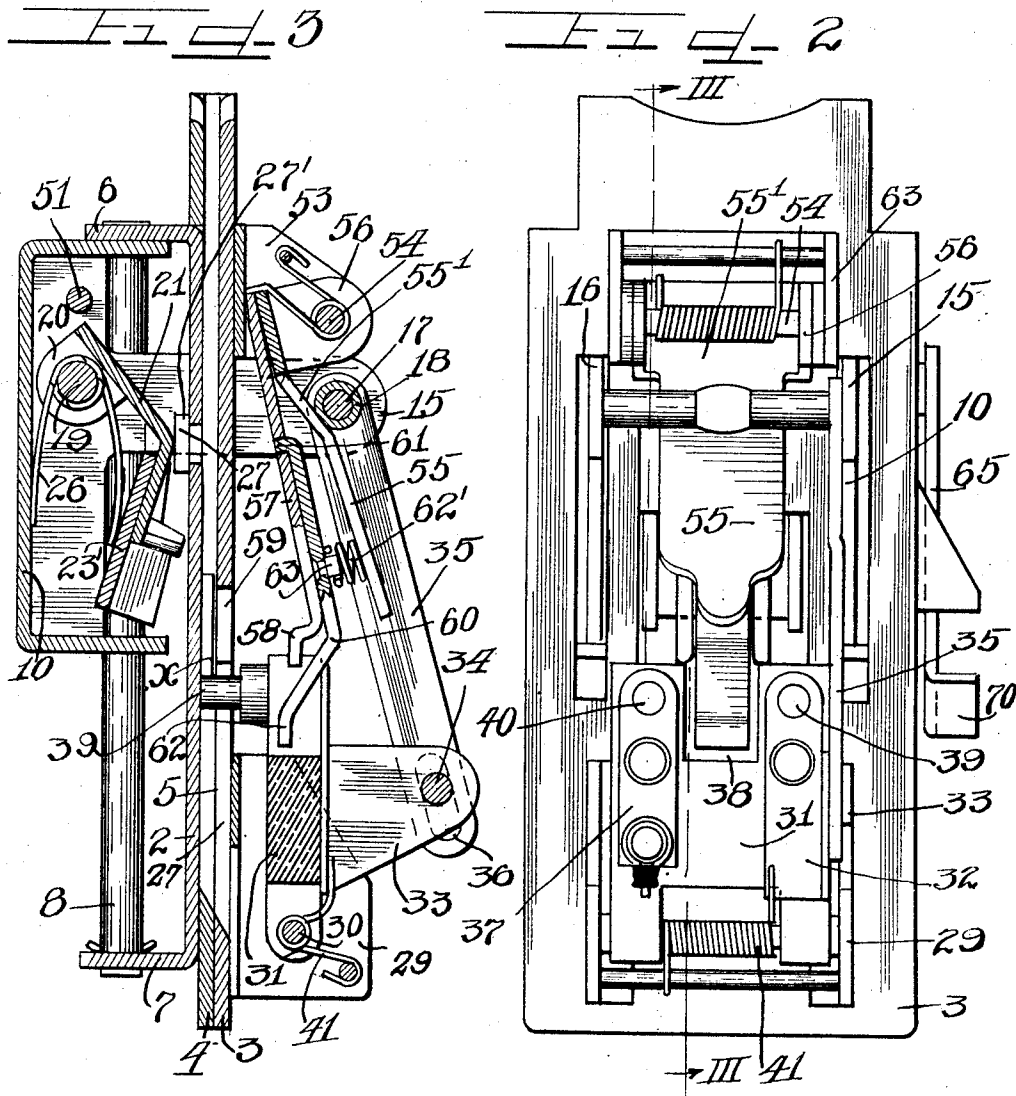
E. H. THOMPSON

1,894,071

FARE BOX

Filed Sept. 15, 1930

4 Sheets-Sheet 2



INVENTOR
Ernest H. Thompson

Charles H. Allen

ATTY.

Jan. 10, 1933.

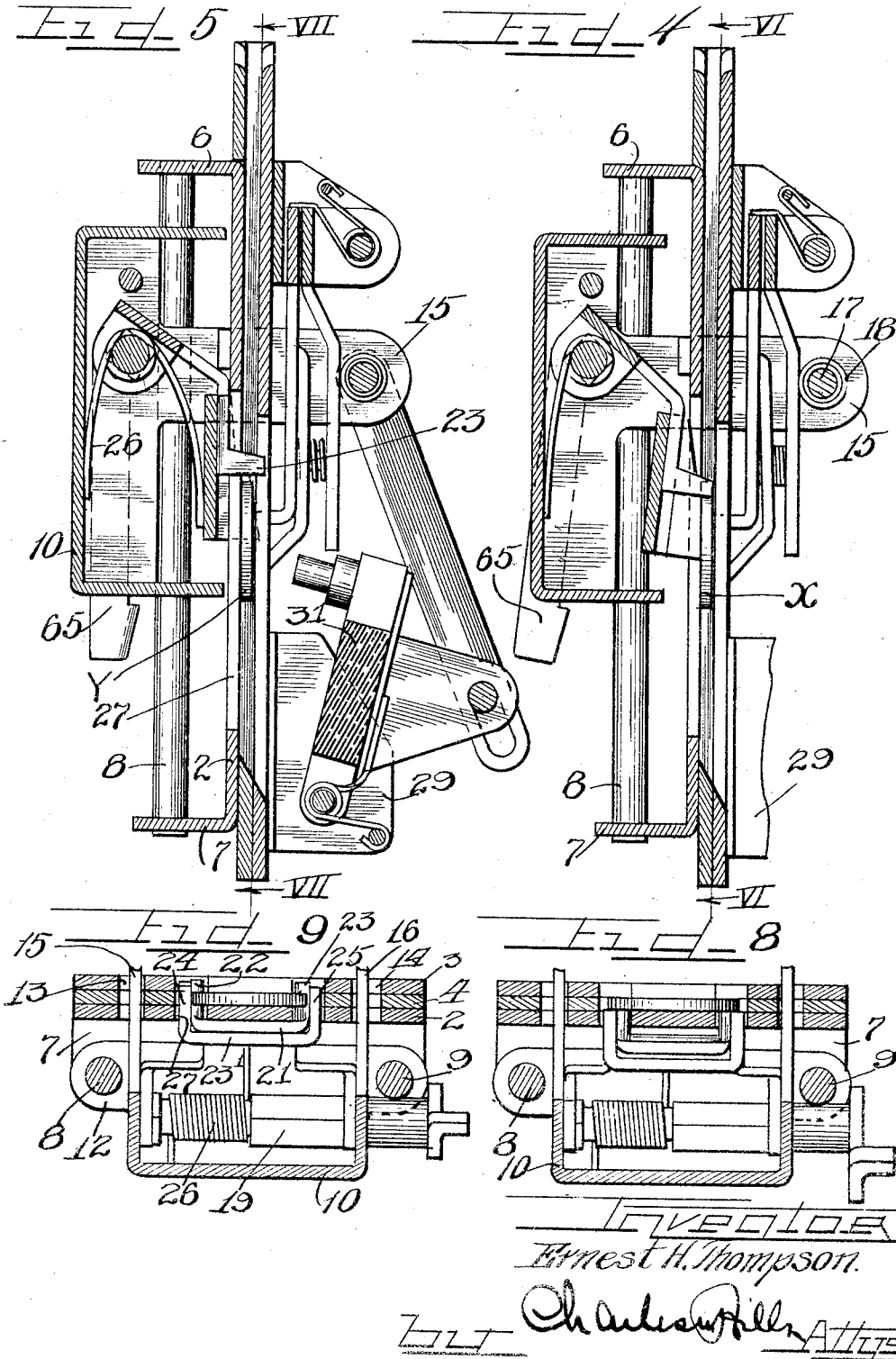
E. H. THOMPSON

1,894,071

FARE BOX

Filed Sept. 15, 1930

4 Sheets-Sheet 3



Jan. 10, 1933.

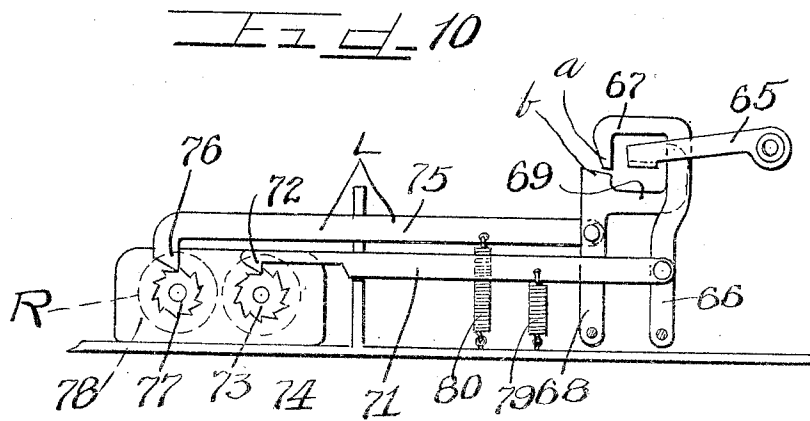
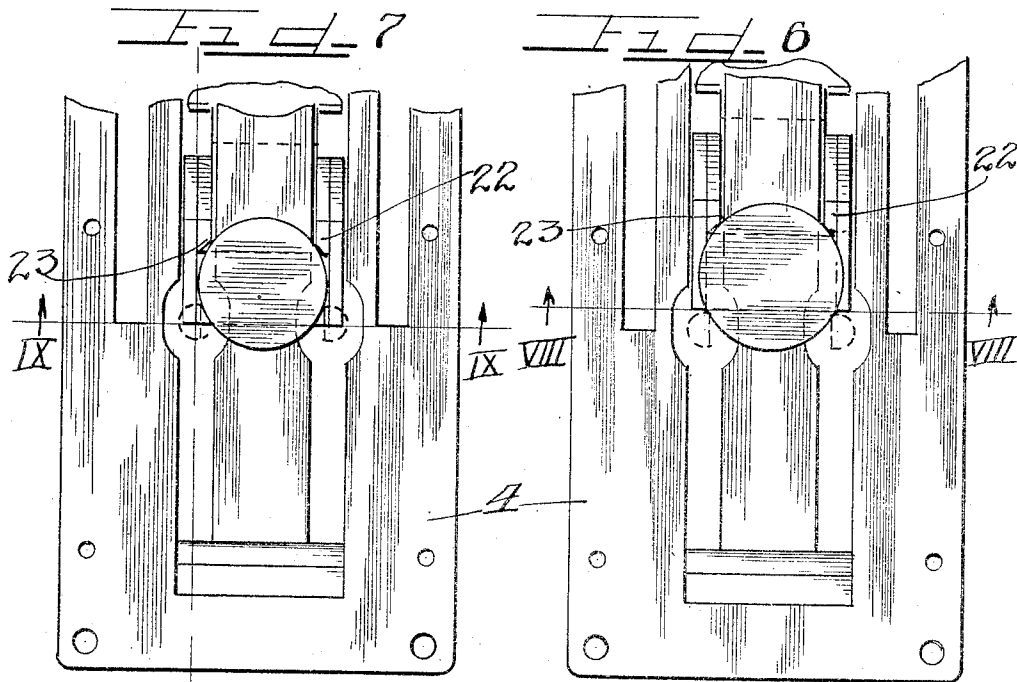
E. H. THOMPSON

1,894,071

FARE BOX

Filed Sept. 15, 1930

4 Sheets-Sheet 4



Inventor
Ernest H. Thompson

By Charles H. Hill Attys.

UNITED STATES PATENT OFFICE

ERNEST H. THOMPSON, OF WINNETKA, ILLINOIS, ASSIGNOR TO JOHNSON FARE BOX COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK

FARE BOX

Application filed September 15, 1930. Serial No. 481,913.

This invention relates to fare boxes for electric cars, buses, theaters, or other vehicles or places where fares or admission fees are required, and particularly to solenoid operated fare boxes of the type disclosed in my Patent No. 1,699,930, issued January 22, 1929.

An important object of the invention is to devise a box adapted to receive a coin or token of one diameter and a coin or token of a smaller diameter with means for automatically and selectively discharging the coins or tokens and causing registration on independent registers of the smaller and larger coins or tokens.

A further object of the invention is to improve and simplify the arrangement and operation to insure certain and accurate propulsion of the coins or tokens and the correct selective registration thereof.

A further object is to provide means automatically controlled by the size of the coin or token for effecting the operation of the proper registering device.

With the above and other objects in view, the various features of my invention will become apparent from the following description and disclosures in the drawings.

On the drawings:

Figure 1 is a front elevation of a fare box with the cover removed to show the general arrangement of the parts therein;

Figure 2 is an enlarged rear elevation of the coin impeller and registration controlling mechanism;

Figure 3 is a section on plane III—III of Figure 2;

Figure 4 is a section similar to Figure 3 showing an advanced stage of operation of the impeller mechanism in conjunction with a coin of larger diameter;

Figure 5 is a section similar to Figure 4 showing the operation with a coin of lesser diameter;

Figure 6 is a section on plane VI—VI of Figure 4;

Figure 7 is a section on plane VII—VII of Figure 5;

Figure 8 is a section on plane VIII—VIII of Figure 6;

Figure 9 is a section on plane IX—IX of Figure 7; and

Figure 10 is an enlarged side elevation taken substantially on plane X—X of Figure 1 to show the register operating train.

Referring to Figure 1, the housing 1 containing the various parts is rectangular. At one side thereof is the solenoid mechanism S, alongside of which at the other side of the housing is the impeller mechanism designated as a whole I, and below the impeller mechanism, toward the bottom of the housing is the register mechanism R (Figure 10) connected with the impeller mechanism by linkage L.

The supporting body for the impeller mechanism comprises a front plate 2, a rear plate 3, and a spacing plate 4, the plates being rigidly secured together and the spacer plate being cut away to receive the coin chute 5 which is open to the exterior of the housing 1 above the top thereof for the insertion of coins or tokens.

The front plate 2 has upper and lower forwardly extending flanges 6 and 7 between which extend the guide rods 8 and 9 for supporting the impeller carriage frame 10 for vertical reciprocation, upper and lower ears 11 and 12 on the carriage receiving the rods. Extending rearwardly from the side walls of the impeller carriage and through vertical slots 13 and 14 in the impeller mechanism supporting body are the arms 15 and 16 which at their lower ends receive and journal a cam shaft 17 on which is the cam roller 18.

On a shaft 19 extending horizontally through the impeller carriage and journaled by the side walls thereof is secured by its ears 20 the coin impeller frame 21, this frame being of L shape and at its lower end having its sides deflected rearwardly to provide abutment or impeller fingers 22 and 23. A support or shoe 23' of U-shaped cross-section receives and is secured to the lower end of the impeller frame 21, its sides 24 and 25 extending alongside of and a distance below the impeller fingers 22 and 23, the impeller fingers projecting a short distance beyond the outer faces of the sides. The distance between the supporting sides 24 and 25 is such that coins or tokens of larger diameter will bridge and rest against the outer faces of the sides

in advance of the impeller fingers, but the coins or tokens of smaller diameter will engage between the sides and in advance of the impeller fingers.

5 A spring 26 encircling the shaft 19 and abutting against the impeller carriage frame and the supporting shoe 23' tends to swing the impeller structure towards the coin chute 5, but when the impeller carriage is at its upper position such inward swing is prevented 10 by the abutment of the impeller frame against the ridge or knob 27' extending forwardly from the plate 2. When the carriage 10 is moved downwardly the impeller frame 15 will be released from the knob as indicated in Figures 4 and 5. Upon such release of the impeller frame the impeller fingers 22 and 23 will be projected through longitudinal slots 27 and 28 in the impeller mechanism 20 supporting body and into the coin chute 5 and into engagement with a coin or token which has been deposited in the chute. As will be fully explained later, a deposited coin is held in a certain position within the chute, 25 within the range of movement of the impeller frame. If, as indicated in Figures 3 and 4 a coin or token X of larger diameter was deposited, the outward swing of the impeller frame will be limited by the engagement 30 of the outer faces of the sides 24 and 25 with the coin, but if a coin or token of smaller diameter was deposited then the sides 24 and 25 will pass the coin edges and receive the coin between them, the impeller frame 35 thus swinging out a greater distance.

Against the back of the plate 3 near the bottom thereof is secured a U-shaped bracket 29 supporting a shaft 30 in its sides, a block 31 of insulating material being mounted at 40 its lower end on the shaft and extending upwardly. At one side this insulating block has secured thereto a terminal plate 32 having an ear 33 extending therefrom which supports a pin 34. A link 35 has an elongated 45 slot 36 at its lower end receiving the pin, and this link at its upper end is received by the cam shaft 17 so that as the impeller carriage 10 is shifted downwardly the insulating block 31 will be swung outwardly 50 from the plate 3.

At its opposite side the insulating block 31 has secured thereto a terminal plate 37, the terminal plates 32 and 37 being on opposite sides of the slot 38 in the upper end of 55 the block. Extending forwardly from the terminal plate 32 and through the block is a contact post 39, and a contact post 40 extends forwardly from the terminal plate 37 and through the block, these contact posts extending 60 respectively through the slots 27 and 28 in the impeller mechanism supporting body so that they may normally project into the coin chute 5, as shown in Figure 3, to be in the path of coins or tokens deposited in the 65 chute. A spring 41 tends to hold the insu-

lating block normally in its inner position with its contact posts within the coin chute.

The contact posts 39 and 40 form the terminals of an electrical circuit C supplied with 70 current from a source B (Figure 1), this circuit also including the winding of the solenoid structure S. The armature core or plunger 42 for the solenoid is guided in a tube 43 having the slot 44 through which a pin 45 75 extends from the plunger, the pin engaging the slotted end of a lever 46 fulcrumed intermediate its ends at 47. At its other end the lever 46 has an abutment pin 48 engaging in a slot 49 in the link structure 50. At its upper 80 end this link structure is connected with the outer end of a pin 51 extending from the impeller carriage 10. A spring 52 suitably anchored at one end to the housing 1 and connected at its other end with an arm 53 on the 85 lever 46 tends to normally hold the left end of the lever down as indicated in Figure 1, in which position the solenoid plunger is down and the link structure 50 is up to hold the impeller carriage in its upper position. When a coin is deposited and engages with the contact 90 posts 39 and 40 the circuit C will be closed and the solenoid will be energized to draw up its plunger whereupon the lever 46 will rotate and by drawing down the link structure 50 will cause the impeller carriage 10 to 95 move downwardly. When the circuit is broken the spring 52 will assist the weight of the solenoid plunger in restoring the impeller carriage to its upper position.

Secured to the back of the plate 3 above 100 the shaft 17 is a U-shaped bracket 53 securing between its sides the shaft 54. A cam lever 55 has ears 56 receiving the shaft 54 and the lever extends downwardly behind the shaft 17 and the cam roller 18 thereon. 105 Below the ears 56 the cam lever has the inclined section 55' in front of which the cam roller is positioned when the impeller carriage is in its upper position, as indicated in Figure 3. 110

A pressure lever 57 extends between the cam lever and the plate 3 and is also pivoted on the shaft 54, the pressure deflection or foot 58 at the lower end of the lever being 115 opposite the clearance space or slot 59 in the plate 3 through which the pressure foot may pass for engagement with a coin deposited in the coin chute 5.

Between the cam lever and the pressure lever is an auxiliary lever 60 having fulcrum connection at its upper end with the lever 57 as 120 indicated at 61 and at its lower end having the foot 62 below the pressure foot 58 for assisting the pressure foot in aligning and holding a coin during discharge thereof from 125 the chute after the contact posts 39 and 40 have been withdrawn from the coin. The levers 57 and 60 are yieldingly held against the coin by means of a spring 62 interposed between the cam lever 55 and the lever 60, the 130

spring being held in position by a post 63 extending from the lever 57, as best shown in Figure 3. During initial downward movement of the impeller carriage 10 the cam roller 18 engaging with the incline 55' of the cam lever will quickly swing the levers inwardly to bring the feet 58 and 62 into association with and to hold a deposited coin, and then during further downward travel of the impeller carriage and the cam roller, the cam lever will be held in its inner position and the pressure levers will be yieldingly held in association with the coin by the pressure exerted by the spring 62' directly against the lever 57 through the fulcrum connection 61.

As has already been explained, a coin or token of larger diameter will permit forward swing of the impeller frame 21 a certain distance when the impeller carriage is shifted downwardly, while a coin or token of smaller diameter will permit further movement of the impeller frame. This difference in travel of the impeller frame is utilized for controlling the selective registration of the larger and smaller diameter coins or tokens. Secured to the end of the impeller supporting shafts 19 at the outside of the impeller carriage frame 10 is an actuating arm 65 whose distance of swing is determined by the distance of swing of the impeller frame 21. At the rear wall of the housing 1 is pivoted a lever 66 which extends forwardly and terminates in a rectangular hook end 67. Below this lever a lever 68 is pivoted near the back of the housing 1 and extends forwardly and terminates in a rectangular hook end 69, the hook ends normally enclosing a rectangular space into which projects the laterally extending abutment flange 70 at the outer end of the arm 65. When a coin of larger diameter is deposited in the chute 5 and the impeller carriage is then shifted downwardly to release the impeller member 21, this member can swing only a limited distance and the arm 65 will be correspondingly limited in its inward swing. As shown in Figure 10 the end *a* of the hook of the lever 66 will be in the path of the abutment flange 20 on the arm and the lever 66 will be swung. If a coin of smaller diameter is deposited the impeller member 21 may swing farther and the arm 65 can correspondingly swing a greater distance inwardly and then its end 70 will be clear of the end *a* of the lever 66 and the end *b* of the lever 68 will be in the path of the flange 70 so that upon downward shift of the impeller carriage the lever 68 will be swung downwardly.

Extending from the lever 66 is a link 71 having a pawl end 72 for engaging the ratchet wheel 73 at the end of a cyclometer or counter structure 74 forming part of the register mechanism R. From the lever 78 a link 75 extends and terminates in a pawl 76 for engaging with the ratchet wheel 77 on the

cyclometer or counter 78. Springs 79 and 80 connect with the links and tend to hold the pawl ends thereof in operative engagement with the ratchet wheels. Now when the arm 65 is in position to engage the end *a* of lever 66 when the impeller carriage is shifted downwardly, resulting swing of the lever 66 will shift the pawl link 71 into engagement with the next tooth of the ratchet wheel 73 and then when the impeller carriage is returned to its upper position the flange 70 of the arm 65 will engage with the upper side of the lever 66 and the resulting upward pull of the link 71 will cause advancement of the ratchet wheel 73 a distance to cause rotation of the cyclometer or counter 74 to register one point so as to count the coin which was deposited during such stroke of the impeller carriage. On the other hand, if the arm 65 is in position to cooperate with the end *b* of the lever 68, the link 75 will be operated and the cyclometer or counter 78 will be advanced one point, the cyclometer 74 thus counting the coins of larger diameter and the cyclometer 78 counting or registering the coins or tokens of smaller diameter.

Describing now the operation, suppose that the box is designed for the reception of dimes and tokens of somewhat smaller diameter than that of dimes. Assume now that a dime has been deposited. As shown in Figure 3 this dime will travel through the chute 5 and come to rest against the contact posts 39 and 40 causing closure of the circuit C and energization of the solenoid S. As the solenoid plunger is drawn upwardly, the impeller carriage will travel downwardly. During the short initial movement of the impeller carriage the cam roller 18 will engage with the incline 55' of the cam lever 55 and the levers 57 and 60 will be swung inwardly to bring the pressure foot 58 against the face of the dime and the foot 62 below the edge of the dime, the dime being thus held in position independently of the contact posts. During such initial downward travel of the impeller carriage the impeller member 21 will also be released from the knob 27 and will be swung inwardly by the spring 26 with its impeller fingers 22 and 23 in the coin chute above the upper edge of the coin and with the ends of the sides 24 and 25 of the shoe 23' engaging against the front face of the dime, as shown in Figures 4, 6, and 8.

During the initial movement of the impeller carriage the link 35 will travel downwardly but until the upper end of the slot 36 reaches the pin 34, the insulating block 31 will remain in normal position to hold the contact posts within the coin chute below the coin. Upon further downward movement of the impeller carriage and the link 35 the block 31 will be swung downwardly to withdraw the contact posts from the coin chute and away from the coin and the coin will then be held

solely by the pressure of the levers 57 and 60 while the cam roller travels along the lower end of the cam lever 55. Shortly after the initial movement of the impeller carriage and projection into the coin chute of the impeller fingers 22 and 23, these fingers will engage the upper edge of the coin and as the impeller carriage continues to travel downwardly the coin will be shifted downwardly in the chute and from underneath the feet of the levers and will then fall by gravity to the bottom of the container 1.

I preferably use the coin or token only for initially closing the circuit C and thereafter a suitable switch D will keep the circuit closed until the impeller carriage has been shifted its full distance downwardly. Referring to Figure 1, the switch D comprises a switch lever 81 pivoted intermediate its ends, its lower end being in the path of the rounded upper end of the arm 53 on the lever 46 which is swung by the upward movement of the solenoid plunger. A spring 82 normally holds the switch lever 81 away from a contact 83. Shortly after the circuit was closed by the engagement of the dime with the contact posts the arm 53 swung the switch lever 81 into contact with the contact 83 to close the circuit 84 in shunt of the contact posts so that the switch structure D will then keep the circuit closed independently of the coin for the operation of the solenoid. After the solenoid plunger has been drawn fully upwardly the arm 53 will have been swung to release the switch lever 81 so that the spring 82 may return the lever to its normal position whereupon the circuit is opened and then the weight of the released plunger and the spring 52 cooperate to restore the impeller carriage to its upper position and the spring 41 finally restore the contact post supporting block 41 to its normal position for the reception of another coin on the posts.

As the dime which has been deposited is of a diameter sufficient to span the ends of the sides 24 and 25 of the impeller shoe 23' the swing of the arm 65 was correspondingly limited and during downward travel of the impeller carriage the flange end 70 of the arm cooperated with the lever 66 to cause downward movement of the link 71 for setting of the pawl end 72 relative to the ratchet wheel 73 and then during return of the impeller carriage to its upper position the ratchet wheel was rotated for a one point turn of the counter or cyclometer 74 to count the deposited and ejected dime.

When a token which is of smaller diameter than a dime is deposited it will be received between and within the sides 24 and 25 when the impeller carriage is shifted downwardly and the impeller frame 21 is swung rearwardly, as indicated in Figures 5, 7, and 9. The arm 65 will then be permitted to swing a greater distance and as the impeller carriage

is shifted downwardly and the impeller fingers 22 and 23 shift the coin downwardly the flange end 70 of the arm 65 will engage with the end b of the lever 68 and the pawl link 75 will be set relative to the ratchet wheel 71 so that during return movement of the impeller carriage to upper position the counter or cyclometer 78 will be advanced one point to count the deposited and discharged token. Thus with a single impeller member either coins of one diameter and tokens of a smaller diameter are accurately received and discharged and independently automatically registered on separate counters.

It is evident that the impeller member may be adapted for cooperation with coins of different diameter, or tokens of different diameters, or a coin and a token of different diameter. Changes and modifications in construction, arrangement and operation may also be made without departing from the scope and principles of the invention.

I claim as my invention:

1. In a fare box having a chute, means normally within said chute for arresting and positioning a deposited token, an impeller member adjacent to said chute, spaced apart arms on said impeller member and impeller fingers at the upper ends of said arms, means to move said impeller member toward said chute, the distance between said arms being greater than the diameter of certain tokens but less than the diameter of other tokens whereby when said impeller member is moved it will project its impeller fingers into the chute above a deposited token and the ends of its arms past a token when of a smaller diameter but against the token when of a larger diameter, means for shifting said impeller member bodily downwardly and withdrawing said arresting means from said chute whereby the token may be ejected from the chute, independent registering devices for the tokens of smaller diameter and the tokens of larger diameter, actuating mechanism controlled by said impeller member for cooperating with said registering devices, the cooperation of said impeller member with a token of small diameter or a token of larger diameter determining the selective cooperation of said actuating mechanism with said registering devices.

2. In a fare box having a chute, means normally within said chute for arresting and positioning a deposited fare token, an impeller member operable adjacent to said chute, means for moving said impeller member laterally, impeller fingers on said impeller member and token cooperating means below said fingers adapted upon lateral movement of said impeller member to be projected into said chute with the fingers above a deposited token, said token cooperating means being adapted to engage with the face of a token of larger diameter whereby to limit

the lateral movement of said impeller member and to pass a token of smaller diameter whereby to permit greater lateral movement of said impeller member, means for shifting
 5 said impeller member downwardly after lateral movement thereof and for withdrawing said arrester means from said chute to permit ejection of the token, individual registering means for tokens of larger diameter and
 10 tokens of smaller diameter, actuating means for said registering means, and means controlled by the degree of lateral movement of said impeller member for selectively operating said actuating means and thereby
 15 said registering means.

3. In a fare box having a chute for fare tokens of different sizes, means normally within said chute for arresting and positioning a deposited token, a single impeller member having impeller abutments thereon,
 20 means for moving said impeller member laterally to project said abutments into said chute, means on said impeller member for cooperating with a deposited token and controlled by the size of the token to determine
 25 the degree of lateral movement of said impeller member, individual register mechanisms for the fare tokens of different sizes, means controlled by the degree of lateral
 30 movement of said impeller member for selecting the corresponding register mechanism for operation, means for withdrawing said arresting means from a deposited token, means for vertically reciprocating said impeller member to cause ejection of a deposited
 35 token, and means operative during such reciprocation to cause operation of the selected register mechanism.

4. In a fare box of the class described having a chute for the reception of fare tokens,
 40 means normally within said chute for arresting and positioning a deposited token, a single impeller member having impeller fingers, means for deflecting said impeller member to carry said fingers into said chute above
 45 a deposited fare token, arms on said impeller member below said impeller fingers adapted upon deflection of said impeller member to project into said chute to abut against a deposited token of larger diameter and to
 50 straddle a token of lesser diameter whereby to determine the degree of deflection of said impeller member, independent register devices for fare tokens of larger and of smaller
 55 diameter, actuating means for said register devices, operating means controlled by the degree of movement of said impeller member to select the actuating means of the corresponding register device for operation, means
 60 for withdrawing said arresting means from a deposited token, means for shifting the impeller member to eject a deposited fare token from the chute, and means for actuating the selected register device to count the ejected
 65 token.

5. In a fare box having a chute for receiving fare tokens of different sizes, means for positioning a deposited token in said chute, individual registering devices for the different
 70 sized tokens, a single impeller and ejecting member and means tending to move said member laterally into ejecting engagement with a deposited token, said impeller having laterally offset seats for the tokens of different
 75 diameter whereby a deposited token will determine the degree of lateral movement of said impeller member, means controlled by the degree of movement of said impeller member for selecting the corresponding registering device for operation, and means for
 80 moving said impeller member longitudinally to eject a token from said chute and to operate the selected registering device.

6. In a fare box having a chute for receiving fare tokens of different sizes, means for positioning a deposited token in said chute, individual registering devices for the different
 85 sized tokens, a single impeller and ejecting member and means tending to swing said member laterally into ejecting engagement with the deposited token, said impeller member having laterally offset seats for receiving deposited tokens of different diameter whereby the degree of swinging movement of said
 90 impeller member is determined, means controlled by the degree of movement of said impeller member for selecting the corresponding registering device for operation, and means for moving said impeller member longitudinally to eject a token from said
 100 chute and to operate the selected registering device.

7. In a fare box having a chute for receiving fare tokens, means for positioning a deposited token in said chute, a single impeller member operable adjacent to said chute and
 105 formed with an ejecting surface arranged to engage with the upper edge of a deposited token, means for deflecting said impeller member in a direction transversely of said chute for ejecting engagement of said ejecting surface with a deposited token, means controlled by the size of a deposited token for determining the degree of deflection of said impeller member, individual register
 110 devices for fare tokens of different sizes, means controlled by the degree of deflection of said impeller member for selecting the corresponding registering device for operation, means for shifting said impeller member in a direction parallel with said chute to eject an engaged token therefrom, and means for actuating the selected register device to count the ejected token.
 115

8. In a fare box having a chute for receiving fare tokens, means for positioning a deposited token in said chute, a single impeller member operable adjacent to said chute and
 125 formed with an ejecting surface arranged to engage with the upper edge of a deposited
 130

token, means for deflecting said impeller member in a direction transversely of said chute for ejecting engagement of said ejecting surface with a deposited token, stop
5 means on said impeller member for engaging with the side face of a deposited token and controlled by the size of the token for determining the degree of deflection of said impeller member, individual register devices
10 for fare tokens of different sizes, means controlled by the degree of deflection of said impeller member for selecting the corresponding registering device for operation, and means for moving said impeller member
15 in a direction parallel with said chute to eject an engaged token therefrom and to operate the selected registering device.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook County,
20 Illinois.

ERNEST H. THOMPSON.

25

30

35

40

45

50

55

60

65