June 2, 1953 D. A. PIANO 2,640,575

COIN CHANGER

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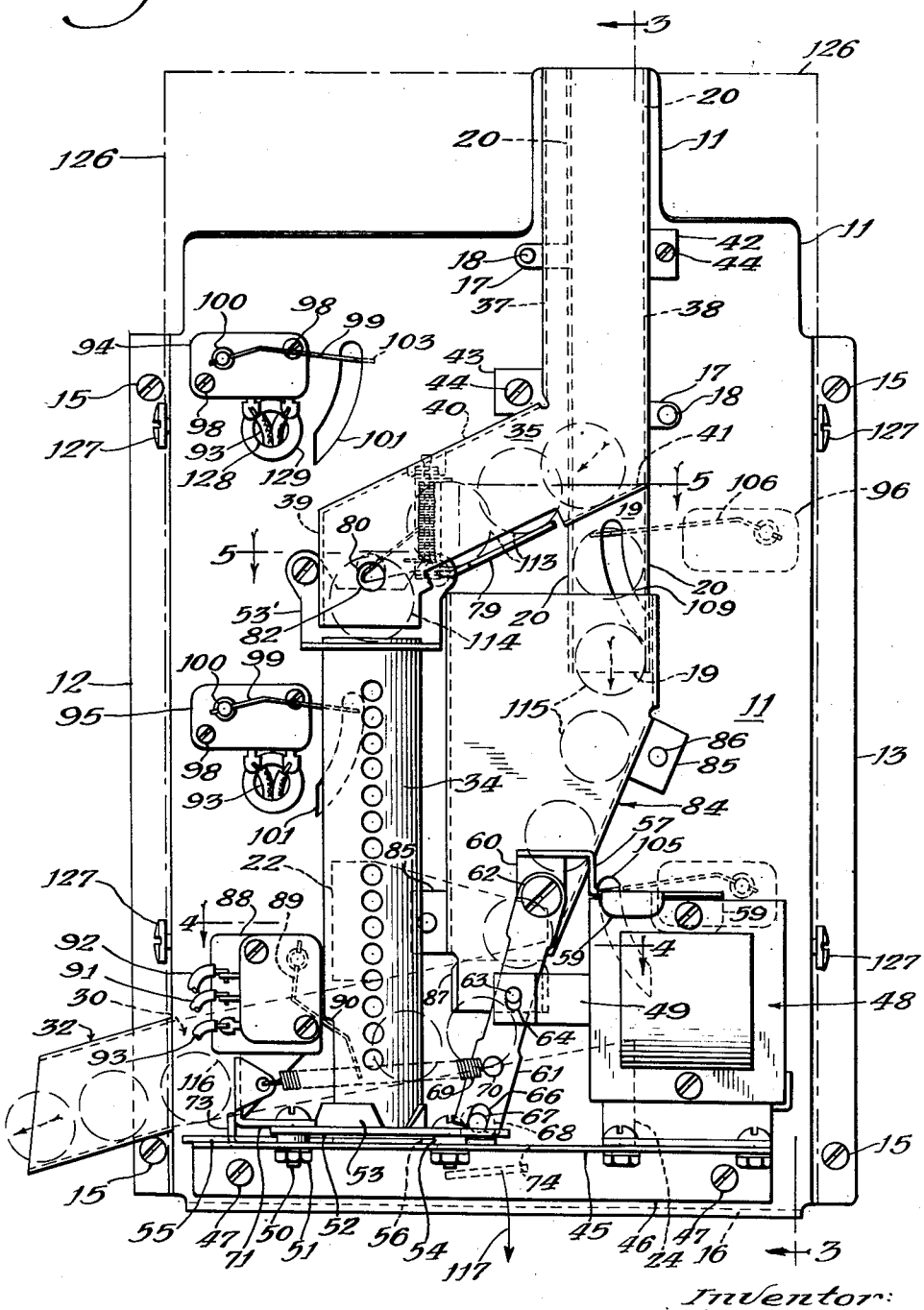
Fig. 1.



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COIN CHANGER

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Fig. 2.

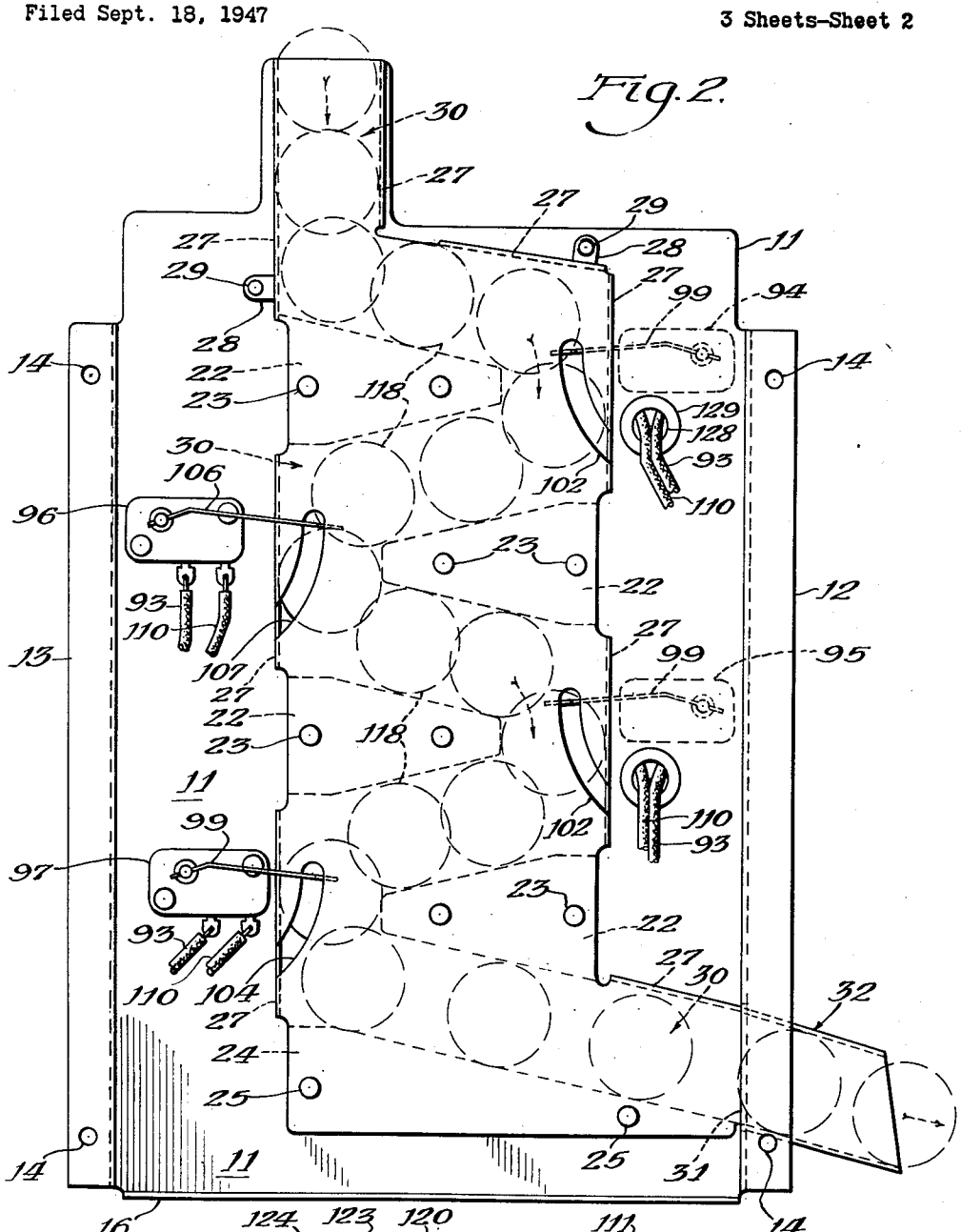
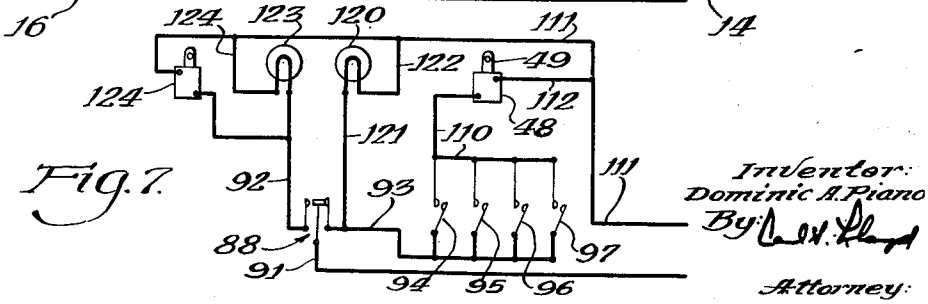


Fig. 7.



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COIN CHANGER

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Fig. 3.

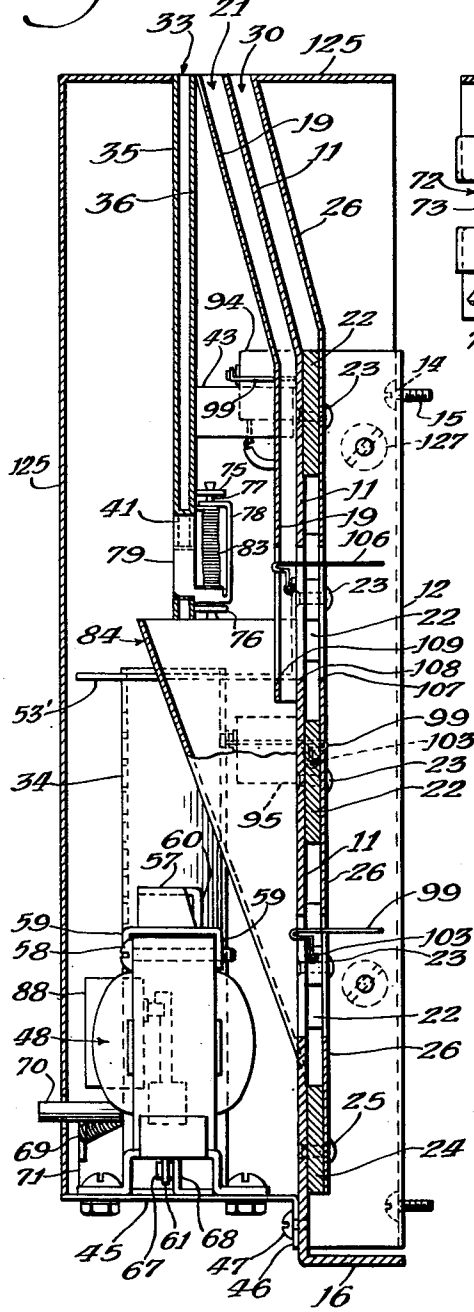


Fig. 4.

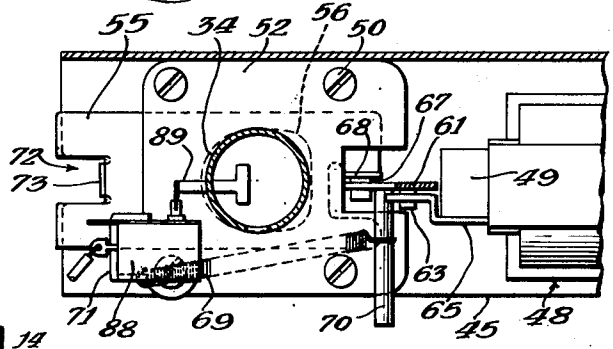


Fig. 5.

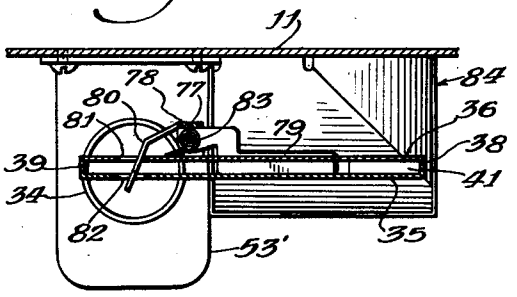
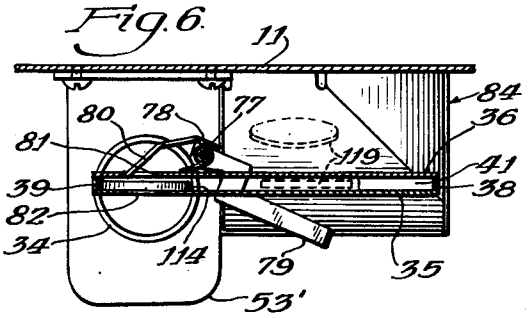


Fig. 6.



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COIN CHANGER

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Application September 18, 1947, Serial No. 774,731

3 Claims. (Cl. 194—10)

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This invention relates to coin changers and more particularly to an automatic coin changer adapted for use with coin-operated merchandise vending machines and similar mechanisms which are constructed to receive coins of several denominations and which require deliveries of various amounts of change in return for certain of such coins. A vending machine typical of mechanisms of this character is one adapted, for example, to vend a five-cent article of merchandise upon the insertion of either a nickel, dime or quarter, the correct amount of change being delivered to a customer with the article when a dime or quarter has been inserted.

In general the device of my invention comprises a plurality of coin chutes each of which is adapted to receive coins of a different denomination. Movable members are provided in each of the chutes arranged to receive coins which require change, the number of members in any one of said chutes being relative to the amount of change required for each coin to be received thereby. Said members are disposed within the chutes so as to be sequentially activated by each passing coin and are individually adapted upon activation to cause the operation of a change pay-out slide.

The primary object of my invention is to provide an improved and reliable automatic coin changer of the general character described which is adapted to quickly deliver a predetermined number of small coins as change for coins of larger denominations.

Another object of my invention is to provide a device of this type having a simple and inexpensive construction.

A further object of my invention is to provide in such a coin changer means for making the movable members and the pay-out slide inoperative when the supply of coins therein available for change-making has been reduced to a minimum.

Other objects and advantages of the invention will be apparent from the following description, which, taken in connection with the accompanying drawings, discloses an embodiment thereof adapted for use with vending machines or other mechanisms operatable by nickels, dimes and quarters and requiring a delivery of change for coins of the two latter denominations.

Referring to the drawings:

Fig. 1 is a front elevational view of a coin changer incorporating my invention;

Fig. 2 is a like view of the back of said coin changer;

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Fig. 3 is a sectional view of the same taken on the line 3—3 in Fig. 1 showing the arrangement of the coin chutes and illustrating the position of a cover which may be placed over the device;

Fig. 4 is a sectional view taken substantially on the line 4—4 in Fig. 1 to illustrate certain of the parts associated with the change supply tube;

Figs. 5 and 6 are sectional views taken substantially on the line 5—5 in Fig. 1 to show in detail the structure and operation of the means for controlling the replenishment of coins in the change supply tube; and

Fig. 7 is a schematic diagram of an electric circuit for my coin changer.

As thus illustrated, the device has a vertical wall plate 11, the upper portion of which is bent forwardly at approximately thirty degrees from the vertical. On the side edges of said plate are found L-shaped mounting flanges 12 and 13 each of which may be provided with holes 14 to receive mounting screws 15 which may be threaded into any suitable structure for supporting the plate 11. The lower edge of the plate may be provided with a flange 16 which may also serve for mounting purposes if desired.

On the forward side of said plate is attached, as by brackets 17 and rivets 18, a channel member comprising a wall 19 and sides 20. Said channel is adapted to conform to the shape of the wall plate 11 so that the sides 20 abut the forward face of said plate. The channel together with the plate 11 forms a coin passage (indicated generally by the numeral 21 in Fig. 3) extending downwardly from the uppermost edge of said plate 11 and being of suitable size, for example, to accommodate U. S. dimes.

On the rear side of the wall plate 11 (see Fig. 2) are a series of staggered symmetrically wedge shaped blocks 22 of fiber or other suitable material attached to said plate as by rivets 23. Below the blocks 22 another block 24 of similar material is fixed to the plate 11 by rivets 25. A plate 26 is disposed over said blocks and is provided with flanged edges 27 which abut the rear surface of the wall plate 11. Said plate 26 may be attached to the wall plate by means of brackets 28 and rivets 29 as well as by the rivets 23 and 25. The wall plate 11, the blocks 22 and 24, and the plate 26 with its flanged edges 27 comprise a staggered coin passage (indicated generally by the numeral 30) extending downwardly from the uppermost edge of the plate 11 to the lower right edge of said plate as

viewed in the Fig. 2. Said passage 30 is of suitable size, in the device illustrated, to accommodate U. S. quarters. Opposite the lower end of the passage 30 a slot 31 of proper size is provided in one side of the L-shaped flange 12 to allow coins to pass from said passage and drop into a cash box (not shown). If desired, a coin chute extension 32 may be spot welded, for example, to the flange 12 for purposes of conducting said coins from the passage 30 to a coin operated device (also not shown) or to said cash box.

A third coin passage 33 which may be adapted to receive U. S. nickels, for example, extends downwardly vertically from a position adjacent and forward of the upper edge of the coin chute channel wall 19 to a level below the sloping and bent upper portion of the wall plate 11. From this level said passage extends diagonally downwardly to a position directly above a coin supply tube 34 to be hereinafter described, and then vertically to an open upper end of said tube. The passage 33 may be formed by two walls 35 and 36 and by sides 37, 38, 39, 40 and 41, the side 40 serving as the top for the diagonal portion of the passage and the side 41 serving as a floor for part of said diagonal portion. The walls and sides of the passage may be assembled as by soldering and the entire assembly supported upon the plate 11 by means of brackets 42 and 43 and by screws 44 passed through said brackets and threaded into said plate.

A horizontal base plate 45 having a flange 46 extending at a right angle from the rear edge thereof is attached to the wall plate 11 by means of screws 47 passed through the flange and threaded into said wall plate. Mounted upon said base plate is a solenoid 48 of well known construction having an armature 49 adapted to be drawn into said solenoid when electric current is supplied to the latter. Also mounted upon the base plate, by means of four bolts 50 and nuts 51, is a support plate 52 having a base ring 53 formed thereon and adapted to receive an open lower end of the vertically positioned coin tube 34. Said coin tube may have an internal diameter slightly greater than that of a U. S. nickel and may be supported at its upper end by means of a ring bracket 53' attached by bolts to the plate 11.

Spacers 54 are provided on each of the bolts 50 between the base plate and the support plate 52 to provide space for a pay-out slide 55 which may be of a thickness equal, for example, to a U. S. nickel. Said slide is provided with a coin receiving hole 56 positioned so as to be directly below the open end of the coin tube when said slide is in its inactive position, as illustrated best in Fig. 4. The support plate 52 has therein a similar disposed hole (not shown in the drawings) whereby coins may pass from the coin tube into the hole 56 in the pay-out slide and rest on the upper surface of the base plate 45.

A bracket 57 may be mounted upon the upper side of the solenoid 48 in any suitable manner, as, for example, by means of a bolt 58 which may be a part of the solenoid structure. The bracket may be provided with ears 59 adapted to fit snugly over opposite upper edges of the solenoid to receive said bolt and to add to the rigidity of the mounting. Said bracket extends from the solenoid to a position above the armature 49 and is provided with another ear 60 to which an end of an arm 61 is pivotably mounted by means of a bolt 62. Said arm has a pin 63 fixedly mounted thereon which is adapted to ride in a slot 64 in a bracket 65 attached as by welding to the armature 49 (Figs. 1 and 4). The other end of the arm 61 is provided with a slot 66 in which rides a pin 67 fixed to a bracket 68 on an end of the pay-out slide. A tension spring 69 has one of its ends attached about another pin 70 fixed to the arm 61 between the slot 66 and the pin 63. Said spring is attached at its other end to an appropriately shaped bracket 71 mounted upon the support plate 52 as by one of the bolts 50.

It will readily be understood that when electric current is applied to the solenoid 48, the armature will be drawn into the latter to cause the arm 61 to pivot about the bolt 62 and move the pay-out slide toward the solenoid. When said current is interrupted, the tension spring 69 will cause the pay-out slide, the arm, and the solenoid armature to return to their inactive positions.

A cutout portion shown generally at 72 (Fig. 4) is provided in an end of the pay-out slide to receive a stop 73 formed on the base plate 45 to limit the return travel of said pay-out slide. Also formed in the base plate is a hole 74 over which the coin receiving hole 56 in the pay-out slide will pass as the latter is moved toward the solenoid. Any coin resting in the hole 56 will thus fall through the hole 74 when the pay-out chute is moved in the manner above described.

Ears 75 and 76 are formed on the rear side of the wall 36 of the coin passage 33 and are adapted to receive a pin 77 upon which is pivotably mounted a bracket 78. Said bracket has an extension on one side thereof forming a coin trap floor 79 and has on its other side a finger 80 which may extend through a hole 81 in the wall 36 directly above said coin tube and through a hole 82 in the wall 35 opposite said hole 81. In its normal positions, the finger 80 protrudes through said holes to form a barrier in the coin passage 33, and the floor 79 provides a bottom in conjunction with the side 41 for the diagonal portion of said coin passage. A spring 83 may be disposed about the pin 77 to retain the floor and finger in said normal positions except while a coin is in contact with said finger, at which time the latter will be forced out of the passage 33, and the floor 79 will be moved to provide an opening in the bottom of the diagonal portion of the passage as illustrated in Fig. 6.

A hopper shown generally at 84 is attached to the forward face of the plate 11, as by brackets 85 and rivets 86. Said hopper is positioned directly below the coin trap floor 79 and is arranged to receive coins from the coin passage 21. The lower end of said hopper is open and extends through a hole 87 in said plate 11 and into the coin passage 30 on the rear side of said plate. It will thus be understood that all coins which may drop into the hopper will be discharged therefrom into the passage 30 and will roll from the latter into a coin box or other device.

A double contact electric switch 88 of well known construction is mounted on the bracket 71 adjacent the base of the coin tube 34. The switch is provided with an actuating arm 89 which may extend into said tube through an opening 90 in the side of the latter (Figs. 1 and 4). Terminals are provided on the switch 88 to receive a power line 91 and leads 92 and 93, the latter of which extends from said switch to four single contact switches 94, 95, 96 and 97 of suit-

able commercial construction. Said arm 89 is arranged to be expelled from the interior of the tube 34 by the presence therein of four or more coins, for example. In being so expelled the arm will cause said switch 88 to break a contact between the line 91 and the lead 92 and make a contact between said line 91 and the lead 93. When less than four coins, for example, remain in the tube, spring loading in the switch 88 will cause the arm to again extend into said tube whereupon contact between the line 91 and the lead 93 will be broken and contact will be made between said line 91 and the lead 92.

The switches 94 and 95 are mounted on the forward face of the plate 11 by screws 98. Both of said switches are provided with an arm 99 constructed of stiff wire or the like which is attached at one end to a shaft 100, the latter being an integral part of each switch. Said switches are of a spring loaded type having normally open contact points which will be closed by a rotation of the shaft 100 and which will remain in a closed position only for so long as said shaft is held in a rotated position. The free ends of the arms 99 are bent at a right angle and extend through arc shaped slots 101 in the plate 11 and through similar slots 102 in the plate 26 to form movable barriers in the coin passage 30. It will readily be understood that a coin passing downwardly through said passage will momentarily depress each of the arms 99 in passing the same. Said arms will in turn momentarily rotate the switch shafts 100 to close the contacts in the switches. Each of the arms may have a small loop 103 formed on the extremity thereof to increase its rigidity.

The switches 96 and 97 are identical to the switches 94 and 95 and are mounted in a similar way on the rear face of the plate 11. The switch 97 is provided with an arm 99 which extends through an arc shaped slot 104 in the plate 26 and through a similar slot 105 in the wall plate 11 to form another movable barrier in the coin passage 30. The switch 96 is provided with an arm 106 which differs from the arms 99 in that its free end is bent to extend across both of the coin passages 30 and 21 through an arc shaped slot 107 in the plate 26, a similar slot 108 in the plate 11 and a slot 109 in the wall 19. The contacts in the switch 96 may thus be momentarily closed by the passing of a coin through either the passage 30 or 21.

When there are sufficient coins in the tube 34 to expel the actuating arm 89 of the switch 88, electric current will flow from a power source (not shown) through the power line 91, through said switch 88 to the lead 93 and hence to each of the switches 94, 95, 96 and 97 (Fig. 7). In this condition the depression of any one of the arms 99 or the arm 106 by the passage of a coin will close the contacts in the corresponding switch and allow the current to flow through a lead 110 which is connected to each of the switches 94, 95, 96 and 97 in parallel. Said lead 110 is connected to one side of the solenoid 48, the other side of said solenoid being connected to a power return line 111 by a lead 112. It will therefore be understood that while power is supplied to the switches 94, 95, 96 and 97, the solenoid 48 will be energized to operate the pay-out slide 55 each time any one of said switches is closed.

In a typical installation my new coin changer may be suitably positioned and provided with auxiliary coin chutes (not shown) which will conduct coins to the top openings of the coin passages 21, 30 and 33. The embodiment of the invention I have described above is ideally suited, for example, for installation in a coin operated machine adapted to vend a five-cent article of merchandise in return for a nickel, dime or quarter. A mechanism for ejecting slugs and the like is usually incorporated in such machines and my coin changer may be positioned so as to receive the genuine coins as they leave a mechanism of that character. In other installations the changer may, for example, be placed so as to receive coins emerging from a coin controlled device such as is sometimes used to set a vending apparatus in motion. In any such arrangement said auxiliary coin chutes may conduct all nickels to the top of the coin passage 33, dimes to the passage 21, and quarters to the passage 30. All of said nickels will fall downwardly through the passage 33 to reach the diagonal portion thereof and then roll downwardly across the coin trap floor 79 as illustrated in Fig. 1 by the broken outline of coins 113. Said nickels will roll off of the lower edge of the floor 79 (as indicated by the outline of coin 114) and in so doing will contact the finger 80 and cause the same to move out of the passage. The nickels will then drop downwardly into the coin supply tube 34 and the finger 80 will return to its normal position across the passage. The first of said nickels to drop into the tube will come to rest horizontally in the coin receiving hole 56 in the pay-out slide 55. Other nickels so received will stack themselves one upon another in the tube.

When four or more nickels, for example, are in the tube 34, the actuating arm 89 on the switch 88 will be moved out of said tube by the presence of the coins and electric current will be supplied to the switches 94, 95, 96 and 97. If a dime, for example, is then conducted to the top of the passage 21, it will fall downwardly therethrough, momentarily depress the arm 106 on the switch 96, and fall (as shown by the outline of coins 115) into the hopper 84. From the latter, said dime will be conducted into the lower portion of the coin passage 30 and will roll down and out of said passage (outline of coins 116) and fall into the cash box. Upon the depression of the arm 106, however, contacts in the switch 106 will have been momentarily closed to energize the solenoid 48 to operate the pay-out slide and cause a nickel to fall through the hole 74 in the base plate 45 as indicated by the arrow 117. A nickel thus discharged may fall into a cup or the like (not shown) from which it may be removed by a customer as change for the dime.

A quarter, upon being introduced into the staggered coin passage 30, will roll down the same in the path indicated by the broken outline of coins 118 in Fig. 2 and will sequentially and momentarily depress each of the arms 99 and the arm 106 to repeatedly energize the solenoid 48. With each energization of the solenoid the pay-out slide will be operated and four nickels will consequently be discharged in the manner hereinbefore described, said nickels being the proper amount of change for the quarter. It will readily be understood that the staggering of the coin passage 30 will provide a sufficient time delay after each energization of the solenoid to allow the pay-out slide to return to its normal position before said solenoid is again energized. It will also be apparent that said

quarters may roll from the lower end of the passage 30 and be received by the cash box.

When the coin tube 34 is substantially filled with nickels, a nickel introduced into the passage 33 will come to rest vertically on the uppermost coin in the tube in the position shown by the outline of the coin 114 in Figs. 1 and 6. So long as the level of coins in the tube remains in this condition the finger 80 will be held out of the passage 33 by said coin 114. The trap floor 79 will be pivoted with the finger about the pin 77 to an open position and nickels thereafter received in the passage will fall through the open floor of the diagonal portion of said passage and into the hopper 84 in a path illustrated by the outline of coins 119 in Fig. 6. From the hopper said nickels will be conducted into the lower portion of the coin passage 30 and roll therefrom into the cash box. When the level of coins in the tube is lowered by the operation of the pay-out slide, the coin 114 will fall into the tube and the finger 80 and trap floor 79 will return to their normal positions. In this manner the supply of coins in said tube is automatically replenished and controlled.

When the supply of coins in the tube is reduced to less than four, for example, the actuating arm 89 on the switch 88 will pivot into said tube, and contact in said switch between the power line 91 and the lead 93 will be broken to interrupt the circuit to the switches 94, 95, 96 and 97, thus making said switches, the solenoid 48 and the pay-out slide inoperative.

In certain installations of my device it may be desirable to provide means for indicating whether the level of coins in the tube is such that the pay-out slide will operate if coins requiring change are inserted. For this purpose an electric lamp 120 may be attached at one of its sides to the lead 93 by means of a lead 121. The other side of the lamp may be connected to the power return line 111 as by a lead 122 (Fig. 7). Said lamp will be lighted when power is supplied to the switches 94, 95, 96 and 97, and may be used to illuminate a sign, for example, indicating that nickels, dimes or quarters may be inserted. Another lamp 123 may have one of its sides attached to the lead 92 and the other side to the power return line 111 by means of a lead 124. Said lamp 123 will be illuminated when the switches 94, 95, 96 and 97, as well as the solenoid and pay-out slide, are inoperative. The latter lamp may be used to light a sign indicating that only nickels should be inserted. A solenoid 124' may also be incorporated in the circuit in parallel with the lamp 123 to operate suitable apparatus (not shown) which will block the auxiliary coin chutes leading to the coin passages 21 and 30 and thus prevent the insertion of coins requiring change at times when an insufficient number of coins available for change remain in the coin tube 34.

A cover 125 for enclosing the front, top and sides of my device may be installed if desired. Such a cover is shown in cross-section in the Fig. 3 and is indicated by the broken lines 126 in Fig. 1. Screws 127 may be threaded into the flanges 12 and 13 for securing said cover to the device. Appropriately arranged holes 128 may also be formed in the plate 11 and provided with rubber grommets 129 through which the leads 93 and 110 may be directed from the switches 94 and 95 to the rear of the device.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom, but the appending claims should be construed as broadly as permissible in view of the prior art.

I claim:

1. A coin changer comprising: a plurality of coin chutes, each being adapted to receive a coin of a different denomination to be changed; electric switches disposed contiguously to said chutes in differential numbers relative to said denominations whereby any one of said coins in passing through an appropriate one of said chutes will sequentially actuate those of said switches contiguous thereto; at least one of said chutes being adapted to receive coins of a denomination requiring a plurality of coins as change and having a plurality of bends therein, certain of said switches being located adjacent said bends; a container for receiving coins suitable for change; a coin dispensing slide in association with said container; and electrical devices controlled by said switches for operating said coin dispensing slide to eject from said container a coin as change each time any one of said switches is actuated.

2. A coin changer comprising: a supply container for coins suitable for change; a dispensing means associated with said container; a plurality of coin chutes, each being adapted to receive a coin of a different denomination to be changed; electric switches disposed contiguously to said chutes in differential numbers relative to said denominations whereby any one of said coins in passing through an appropriate one of said chutes will sequentially and momentarily close those of said switches contiguous thereto; one of said chutes being adapted to receive coins of a denomination requiring a plurality of coins as change and being of zig-zag formation, the momentary switches operable by coins passing through said chute being disposed, respectively, at the turning points in the chute to assure adequate time interval between operation of the successive switches to allow intervening operations of said dispensing means; and an electrical device controlled by said switches for ejecting therefrom a coin as change each time any one of the switches is closed.

3. A coin changer comprising: a plurality of coin chutes, each being adapted to receive a coin of a different denomination to be changed; electric switches disposed contiguously to said chutes in differential numbers relative to said denominations whereby any one of said coins in passing through an appropriate one of said chutes will sequentially and momentarily close those of said switches contiguous thereto; at least one of said chutes being adapted to receive coins of a denomination requiring a plurality of coins as change and having a plurality of bends therein, one between each two adjacent switches, the switches being located at said bends; individual dust-proof casings for said switches; switch arms extending therefrom into said chutes, respectively; arcuate guiding means for said arms; a supply container for coins suitable for change; a dispensing means associated with said container; and an electrical device controlled by said switches for ejecting therefrom a coin as change each time any one of the switches is closed.

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