This invention relates to improvements in auxiliary coin changing machines, and particularly to a mechanism for such machines that is adapted to use for making change in association with an article vending machine or primarily for coin changing purposes. An object of my invention is to provide a coin changer adapted to use in conjunction with a vending machine and that will return a preselected amount of change when a coin of determined denomination is inserted in the vending machine, and which coin changer has provision for readily and easily effecting a variation of the amount of change returned. The amount of change given may have to be varied because of variation in price of the commodity handled by the vending machine; A further object is the provision of a coin changer constructed and arranged so that the amount of change delivered at a single operation can be varied, and yet will always deliver change from its entire supply. Thus when delivering less than the maximum of change, the coin changer can be operated more times before refilling or requiring some special adjustment to utilize the full supply.

Another object of the invention is to provide a coin changer that can completely empty its entire supply of coins, arranged in a plurality of groups, by delivering in a single operation a number of coins less than the said plurality of groups, which number can be varied. This enables the coin changer to be more compact and to occupy less space.

My invention has for a further object the provision of a coin changer in which the dispenser is enabled to handle worn coins, new coins, and bent coins without the stacked coins catching on coin-filled recesses of the dispenser.

As another object my invention provides a coin changer in which friction is reduced between the dispenser and coins therein and portions over which the dispenser and the coins travel.

Other objects of the invention relate to various features of construction and arrangement of parts which will be apparent from a consideration of the following specification and accompanying drawings. wherein:

Fig. 1 is a perspective view of a casing for the improved coin changer of my invention which is adapted for use in conjunction with a commodity-vending machine, not shown;

Fig. 2 is a view taken generally on the line 2-2 of Fig. 1 and in the direction of the arrows, showing certain parts in section and other parts in elevation;

Fig. 3 is a diagrammatic view showing the electrical circuit by which the motor for the coin dispenser is driven and controlled;

Fig. 4 is a fragmentary front elevational view of the interior of the lower portion of the coin changer and its casing;

Fig. 5 is a sectional view taken substantially on the line 5-5 of Fig. 1 in the direction of the arrows, showing the coin changer and the casing from the top;

Fig. 6 is a sectional view taken on the line 6-6 of Fig. 5 in the direction of the arrows, showing the mounting of a member which acts between the periphery of the coin dispenser and a switch in the circuit of the motor driving the coin dispenser;

Fig. 7 is a sectional view taken substantially on the line 7-7 of Fig. 5 in the direction of the arrows, showing the manner in which the coin dispenser is supported below the coin tubes;

Fig. 8 is a developed sectional view taken substantially on the line 8-8 of Fig. 5 in the direction of the arrows, showing how the coin dispenser is shaped to prevent a coin stack from becoming caught on a coin in a recess in the coin dispenser.

Fig. 9 is a sectional view taken substantially on the line 9-9 of Fig. 5 in the direction of the arrows, showing the driving connection of the coin dispenser with a motor-operated shaft;

Fig. 10 is a plan view of a base member on which the coin dispenser rests; and

Figs. 11, 12, 13 and 14 are plan views of three different forms of coin dispensers adapted to use in the disclosed mechanism.

The drawings illustrate exemplary embodiments of my invention which are depicted for illustrative purposes.

The coin dispensing machine of my invention has a casing or housing comprising a back 20 and a hollow cover 21, which is hinged to the back 20 in the closed position of Fig. 1, by means of a key-operated lock 23, which controls, as shown in Fig. 2, an angularly shiftable shaft member 24, to which is secured a latch member 25, which engages an angular retaining member 26 secured to the back 20. The cover 21 except at the hinges 22 has its edges 27 reinforced by being flanged and inwardly offset. These edges are received between inner and outer flanges 28 and 29 on the edges of the back 21, as shown in Fig. 5. The inner flanges 28 may be discontinuous and may be composed of angle members secured, as by welding, to the back 21 along the top, the bottom, and the side away from the hinges 22. The outer flanges 29 may be continuous and may be bent from the edges of the back along the top, the bottom, and the side away from the hinges 22.

The coin-handling mechanism proper, of the present invention, is supported on the back 20 and will now be described. As shown in Figs. 2, 4 and 5, two flanged triangular brackets 30 and 31 are secured as by welding to the lower portion of the back 20 near the hinges 22 and the side edge opposite the hinge and carry a base 32 which takes the form of a plate and is secured to the brackets 30 and 31 by screws 33. A support plate 34 is carried by and above the base plate 32 in spaced relation thereto by washers 35 and 36 which are positioned at the corners of the support, as shown in Figs. 2, 4, 5 and 7. Bolts 37 and nuts 38 secure the base 32, the support 34, and the washers 35 and 36 together, the bolts extending through these parts. Preferably, the bolts 37 are threaded into the base plate 32, so that they remain in place when the nuts are removed therefrom. The support 34 is adapted to support a plurality of coin tubes 39, of which, in the embodiment shown, there are six in number. As illustrated in Figs. 7 and 8, the lower end of each tube 39 is received in a counterebored opening 40 in the support 34 and rests against a shoulder 41 in the opening between the upper and lower surfaces of the support plate 34, the upper region of each opening having a diameter generally equal to the outside diameter of the tube 39 and a lower portion of a smaller diameter generally equal to the inner diameter of the tube and somewhat larger than the coins to be passed therethrough. The ends of the tubes are arranged in a circle very close to one another so as to
leave a relatively large space between two adjacent tubes for a purpose that will be described presently. The tubes 39 are supported in parallel relationship with their upper ends extending through a bracket 42 secured as by welding to an upper portion of the back 20. The tubes 39, in the disclosed structure, are held against the support plate 34 by a disk 43 which engages the upper ends of the tubes and is secured to the bracket 42 by means of a nut 44 and a bolt 45. The bolt goes through the disk 43 and is secured to the bracket 42 by a nut 46 which cooperates with the head, not shown, of the bolt to clamp the bracket 42 between the nut 46 and the bolt head.

The base 32 has on its upper surface three circular ribs 47 upon which the dispenser 48 rests. The dispenser which is in the form of a generally circular plate or disk in the embodiments shown, has one or more coin-receiving recesses or openings 49 and one or more peripheral notches or depressions 50, depending upon the number of coins to be dispensed at each operation of the mechanism.

In the dispenser 48c of Fig. 12, there are two coin recesses 49 and one peripheral notch 50. In the dispenser 48d of Fig. 12, there are four coin recesses 49 and two peripheral notches 50. In the dispenser 48e of Fig. 13, there are three coin recesses 49 and one peripheral notch 50. In the dispenser 48f of Fig. 14, there are three coin recesses 49 and three peripheral notches 50. The base 32 has an opening 51 which, as shown in Figs. 5 and 8, is beneath the portion of the tube support 34 which is between the two widely spaced adjacent coin tubes 39. A chute 52 is secured, as by welding, to the underside of the base 32 beneath the opening 51 and is over a coin receptacle 53 which is secured to the cover 21 and permits access from the outer side thereof. As shown in Figs. 11 to 14, each form of coin dispenser has a central slot 54 which is rectangular at its ends and arched and enlarged at its mid-region. As shown in Fig. 9, the slot receives the slotted end of a shaft 55 and a disk 56 which centers the dispenser 48 on the shaft 55 and establishes a driving connection therewith. The base 32 has an opening 57 through which the shaft 55 and disk 56 extend and which permits the disk 56 to rotate with the shaft 55. The tube support 34, as shown, has a chamfered opening 57 therein which provides ample space for the disk to rotate freely.

As shown in Fig. 7, the washers 35 on the bolts 37 at the corners of the support 34 are relatively small in diameter so as not to interfere with rotation of the dispenser 48 with the shaft 55, and are thicker than the dispenser so as to keep the washers 35 somewhat above the dispenser 48. The washers 36 are of relatively large diameter upon which dispenser 48 rests. They prevent it from moving upward and to space it from the support 34. As shown in Fig. 7, the dispenser 48 is thinner than any coin 57a, whether new, worn, or bent, which is to receive in its recesses. At one side of each coin recess, the dispenser is provided with a rounded and tapered edge 65 which may be formed by pressing. Each protruberance presents a smoothly curved upper surface and makes the dispenser thicker at this region than any coin to be received in the adjoining recess.

The shaft 55 is driven from an electric motor 59 through a series of speed-reducing gears and pinions indicated generally by numeral 60, as shown in Fig. 4. The shaft, motor, and gearing are shown as constituting a sub-assembly carried by a pair of plates 61 secured by bolts and spacing studs or sleeves to the underside of the base 32. The control circuit for the motor 59, shown diagrammatically in Fig. 3, a pair of contacts 62 is enclosed with in a vending machine under control of a switch 66, and is adapted to be in operation thereof, such as by deposit of a coin therein. The momentary closing of the contacts 62 causes the motor 59 to be operated from lines 63 and 64 and through normally closed contacts of a switch 66, whereby the dispenser 48 is angularly shifted to move the peripheral notch 50 away from an actuating button 65 on the switch 66. This makes the button move a contact element 67 in the switch to open the normally closed contacts thereof and to a position in which normally open contacts of the switch are closed to establish a direct connection of the motor to the line 63. Now, although the switch 62 opens, the lines 63 and 64 are still connected with the motor 59, the dispensing machine completes a revolution and stops when the notch 50 again comes opposite the button 65, whereupon the contact element 67 returns to the position shown in Fig. 3, thus breaking the circuit to the motor 59 which stops and causes the dispenser 48 to stop.

Actually, in the structure disclosed, the button 65 does not contact the dispenser periphery directly, as diagrammatically indicated in Fig. 3, but indirectly through a U-shaped member 68 which is shown in Figs. 5 and 6. This member has a short leg 69 about which it pivots and which extends through holes in the support 34 and the base 32. The member 68 is supported by a long leg 70 the end of which rests against the top one of the plates 61 which carry the gear 60 and the motor 59. A recess 71 in an edge of the support 34 and a large opening 72 in the base 32 accommodate the leg 70 and allow room for the movement thereof, as effected by the dispenser and the biasing force of the switch button 65 and dispenser being on opposite sides of the leg 70. As shown in Fig. 4, the switch button 65 and the dispenser 48 are at different levels, and so the button could not directly contact the periphery of the dispenser.

When the machine of the present invention is to be operated, one or more of the tubes 39 are supplied with stacks of coins 57a. Let it be assumed that the vending machine is to supply a commodity such as a soft drink for six cents. Then when a dime is deposited in the vending machine, the auxiliary coin machine of my invention is to return four pennies. If this is the case the coin dispenser used is 48e, shown in Fig. 11, with four coin recesses 49 and one peripheral notch 50. This same dispenser is shown in Figs. 3 and 5. The dime deposited closes the contacts 62, causing the motor 59 to start rotation of the switch 66, from which the switch 66 is moved away from the button 65, causing the button to shift the switch element 67 to the right as viewed in Fig. 3. The dispenser makes a complete revolution moving each of the four coin recesses 49 past a given point. Each of the four coin recesses moves past the first tube 39 to the left of the discharge opening 51 in the plate 32, as viewed as in Fig. 8, and receives from this tube a penny. Each coin recess moves past the discharge opening 51 and so drops a penny through that discharge opening into the chute 52, whence it goes to the coin receptacle 53 where the person who has deposited the dime in the vending machine may take each of the four pennies with his fingers. Until the first tube 39 to the left of the discharge opening 51 is emptied of pennies, none will be taken from the next tube 39 to the left. This tube must be emptied before any coins will be taken from the next tube to the left and so on until pennies are taken from the last tube, which is the one just to the right of the discharge opening 51 in Fig. 8.

The protruberances 58 on the dispenser just outside each of the openings 49 are on the forward side of the openings in the direction of rotation of the dispenser and act as stops to prevent the bottom coin in the stacks in the tubes 39 from catching on the forward edges of the coins that are already in the coin recesses 49. The coins being thicker than the dispenser prevent the bottom coins in the stacks from becoming caught on the trailing edges of the coin recesses.

If the commodity being vended is to cost eight cents, then the dispenser 48c of Fig. 12 is used in place of the dispenser 48e. Because the dispenser 48c has two peripheral notches 50 and there are only two coin recesses 49 between them, only two pennies will be dispensed. This will be the case, because the motor 59 will be op-
erated only for the half revolution between the notches 50. After a half revolution the other notch 50 will come opposite the switch button 65 to receive it, whereby the switch element 67 moves back as a result of biasing force to the position shown in Fig. 3 in which the motor circuit is interrupted.

If the commodity being vended is to cost seven cents, three pennies are to be dispensed, and the dispenser 48c of Fig. 13 is used. Since there is only one peripheral notch 50, the dispenser makes a complete revolution for each closure of the contacts 62 by deposit of a coin in the vending machine. One complete revolution will cause each of the three coin recesses 49 to dispense a penny, and so three pennies will be dispensed.

If the commodity being vended is to cost nine cents, one penny will be dispensed, and the dispenser 48d of Fig. 14 is used. Here there is only a single coin recess 49 between adjacent peripheral notches 50, and so only one coin is dispensed.

Since coins are withdrawn from all of the tubes 39 regardless of the number of coins dispensed at a given time, for a given capacity of coins in the machine, the overall height of the machine may be reduced if the number of coins dispensed at a given time is reduced. Note that the present machine accommodates six coin tubes 39, whereas the number of coins dispensed at a given time will generally not exceed four and may be as low as one.

As shown in Fig. 5, the tubes 39 are crowded relatively close together in a circle so that a maximum spacing can be obtained between two of the adjacent tubes at the discharge opening 51 in the base 32. Thus these adjacent tubes overlap the discharge opening as little as possible, and a coin is prevented from getting stuck in a vertical position in a coin recess 49 in the dispenser, the discharge opening 51, and one of these adjacent tubes 39.

The three ribs 47 on the base 32, upon which the dispenser 48 and the coins in the recesses 49 slide as the dispenser is rotated, reduce the area of contact between the base 32 and the dispenser 48 and the coins and thus decrease friction between these parts.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a change-making apparatus having a stacked-coin holder, a dispenser having a coin recess therein adapted to be moved past one end of the holder, said dispenser being formed of material which is thinner than the thinnest coin to be received in the coin recess, such that a coin disposed in the said recess normally protrudes above the surface of the dispenser, and means on the dispenser disposed adjacent the leading edge of the coin recess for raising the leading edge of the coin in the holder above the leading edge of the coin in the dispenser, whereby to prevent engagement between a coin in the holder and a coin in the dispenser as the dispenser moves past the end of the holder as aforesaid.

2. In a change-making apparatus having a stacked-coin holder, a dispenser as described in claim 1, said means comprising a cone-shaped protuberance.

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