

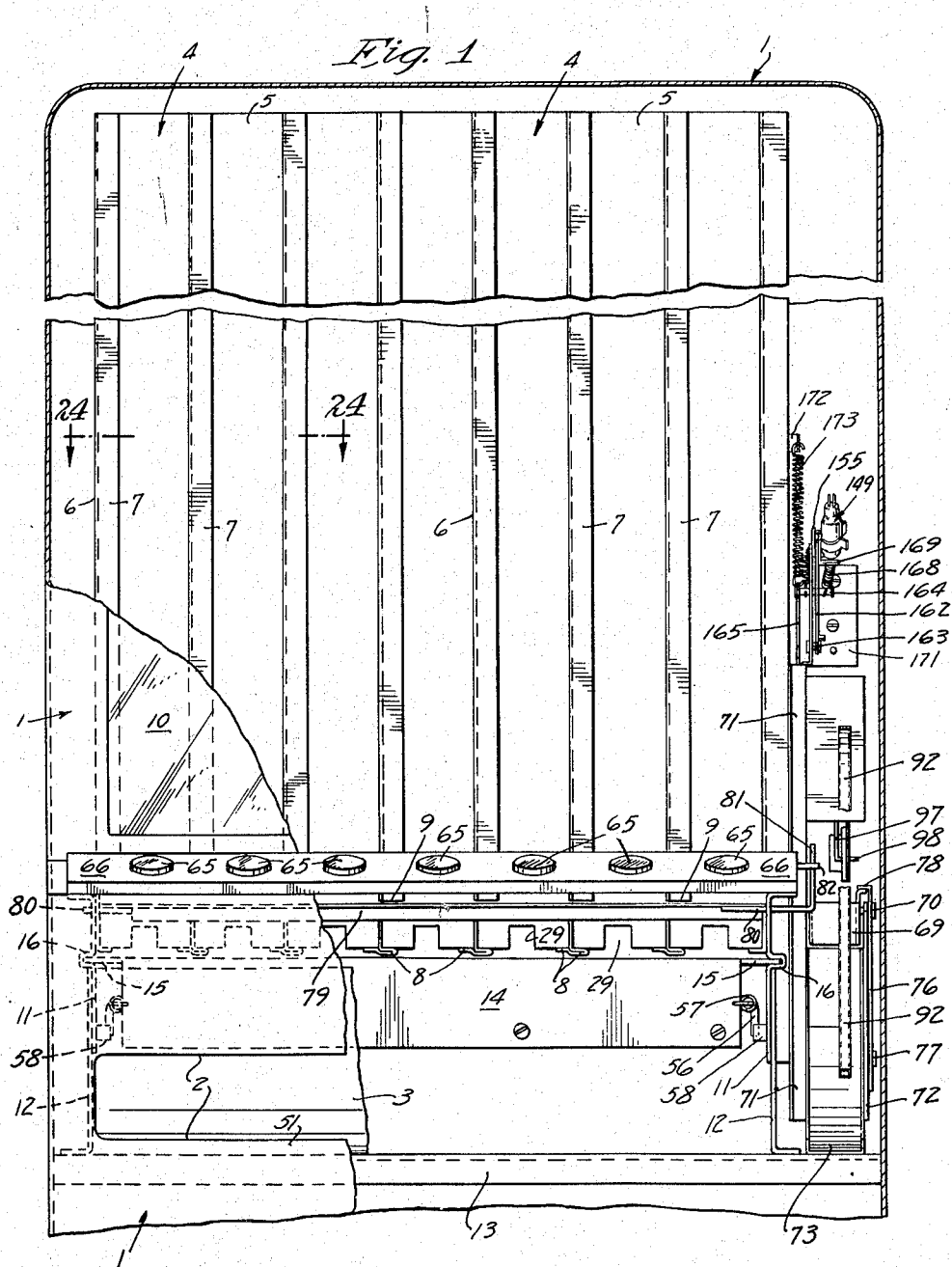
Nov. 24, 1953

A. R. GROSS
VENDING MACHINE

2,660,282

Original Filed Dec. 30, 1948

10 Sheets-Sheet 1



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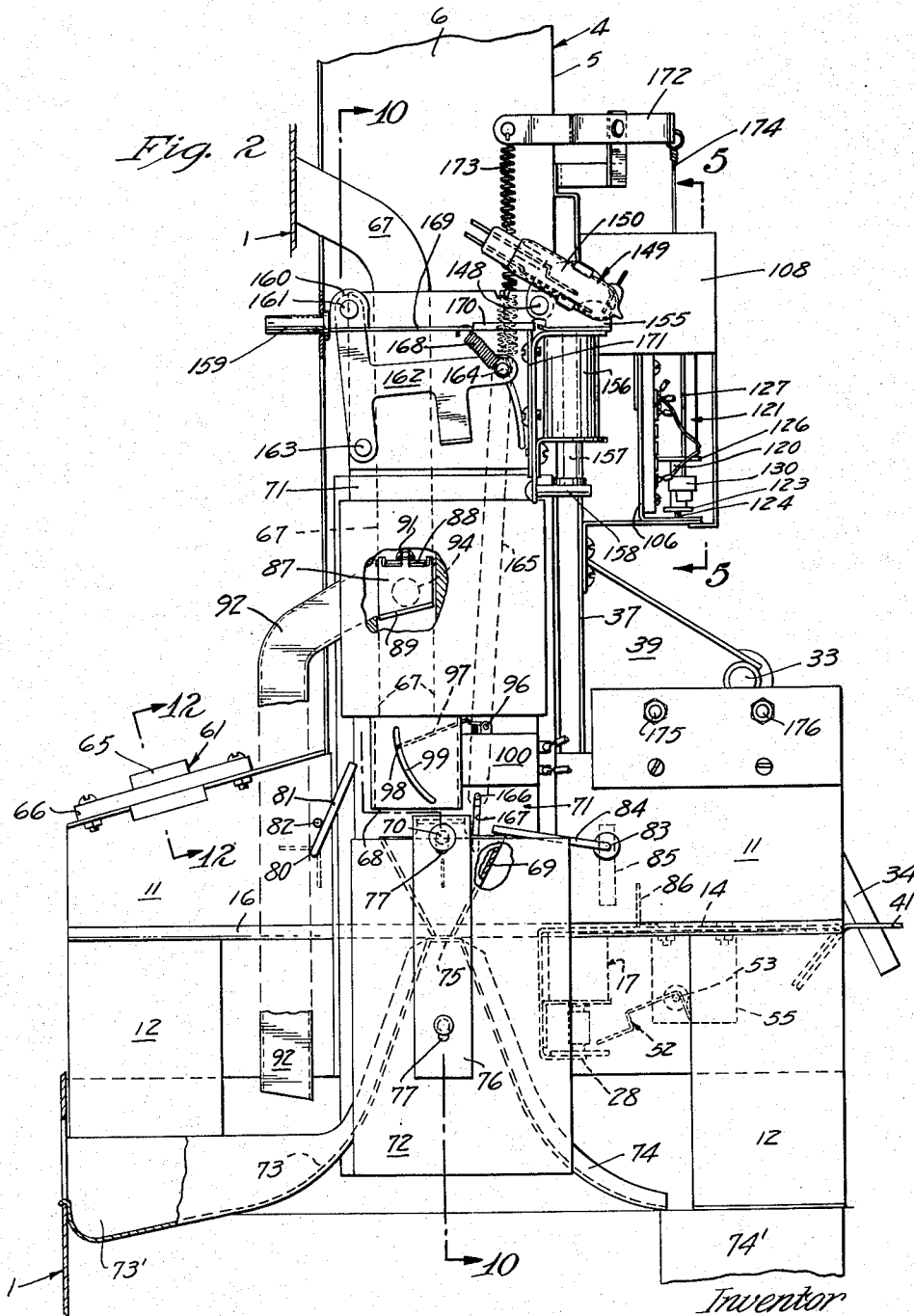
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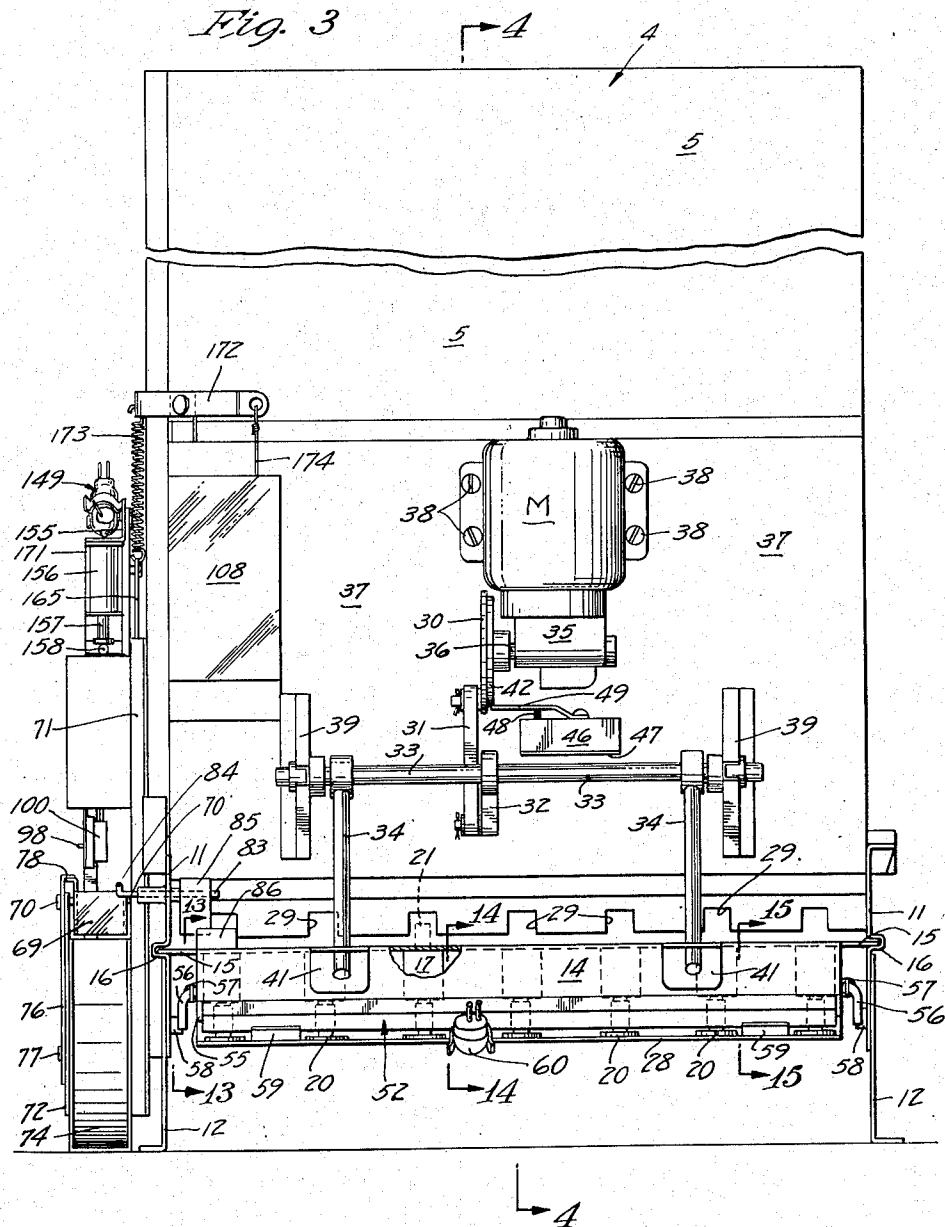
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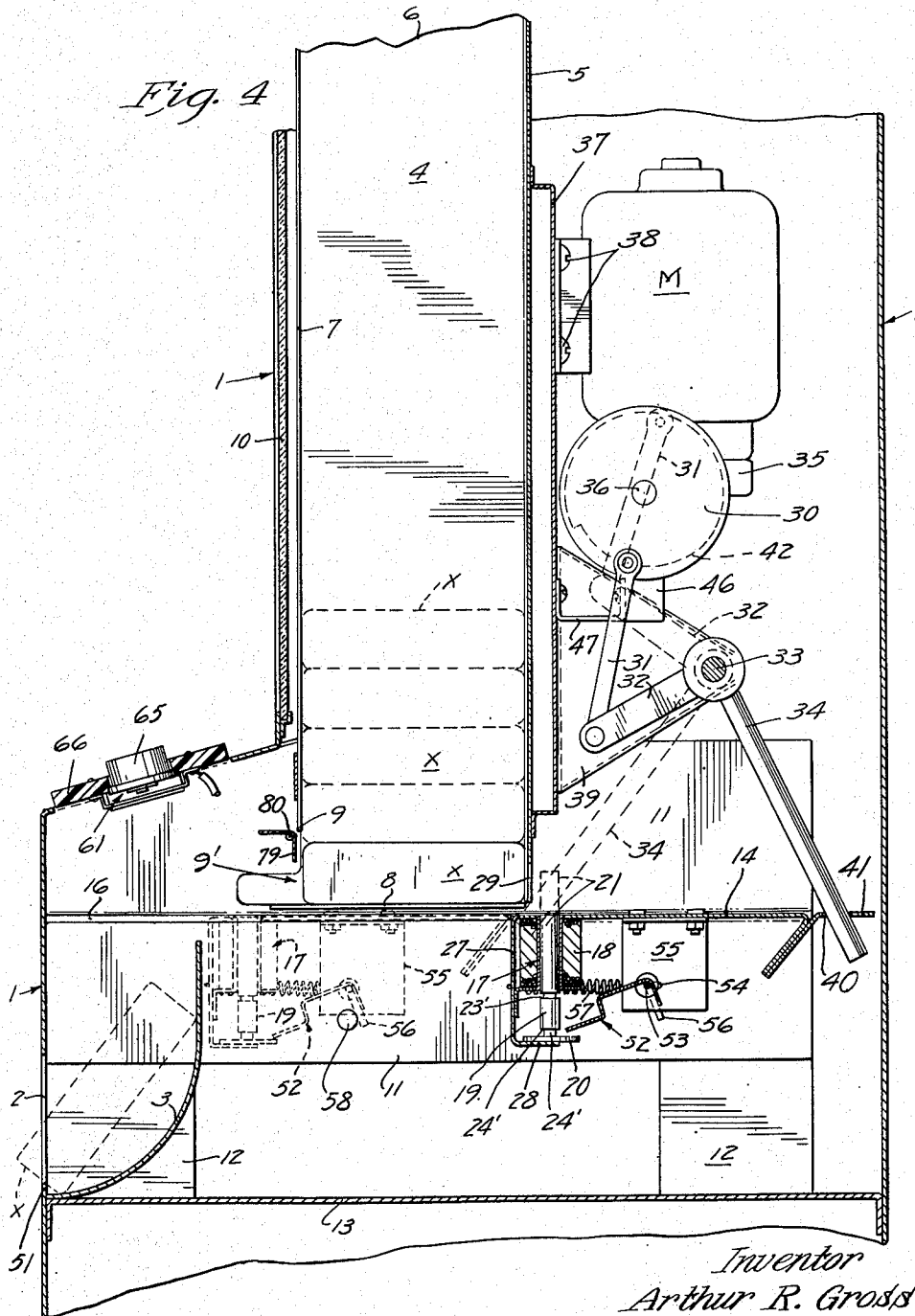
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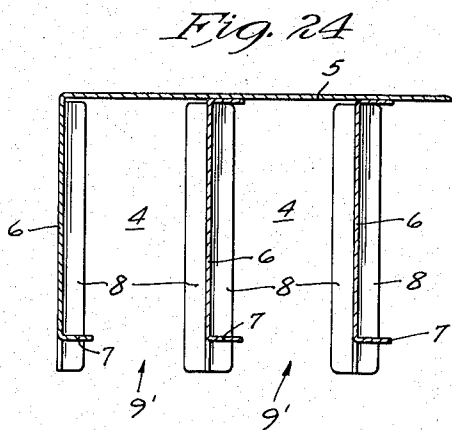
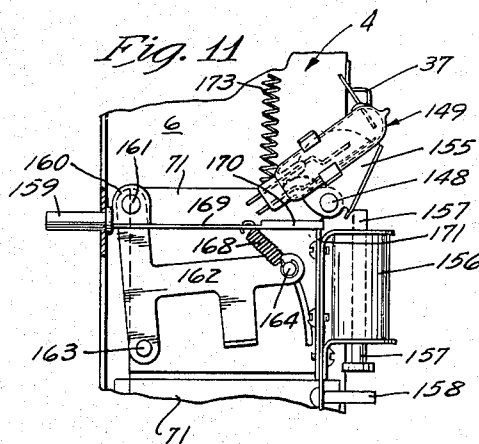
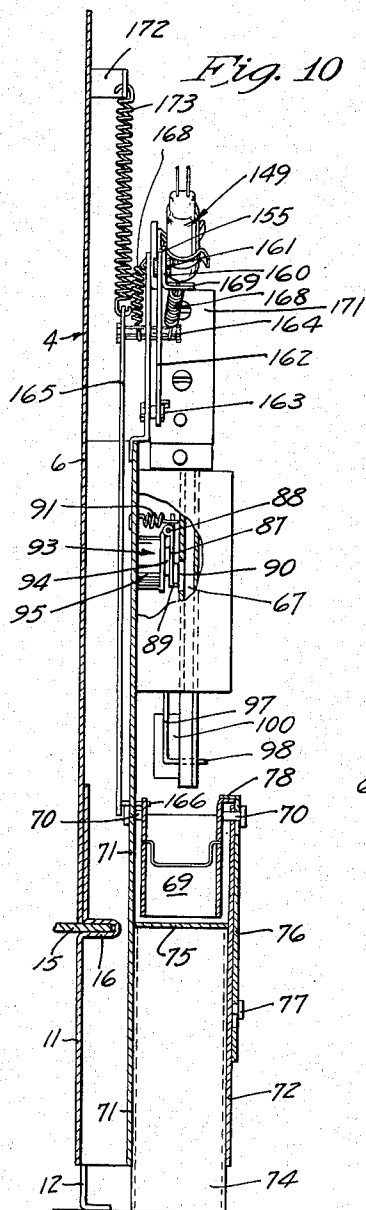
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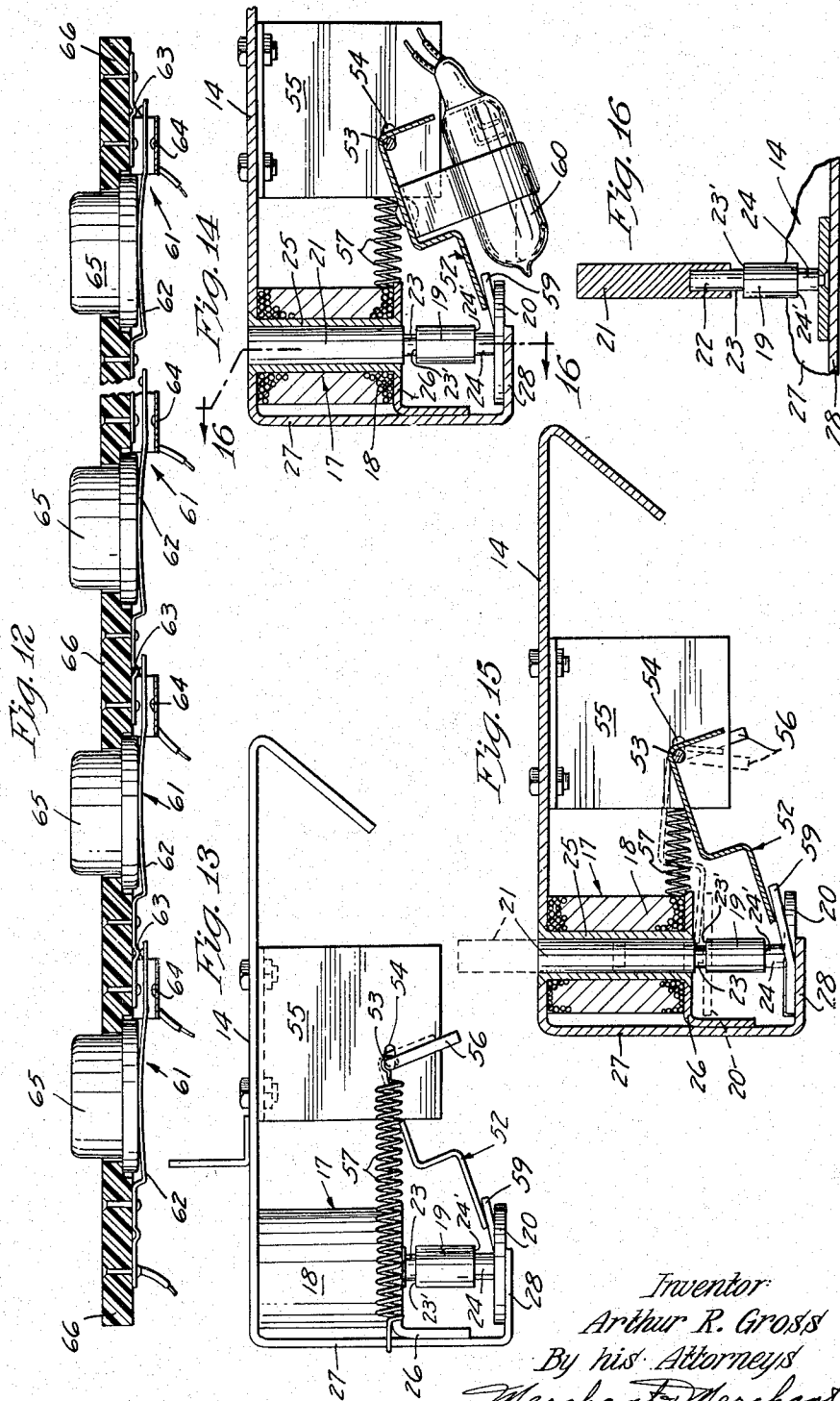
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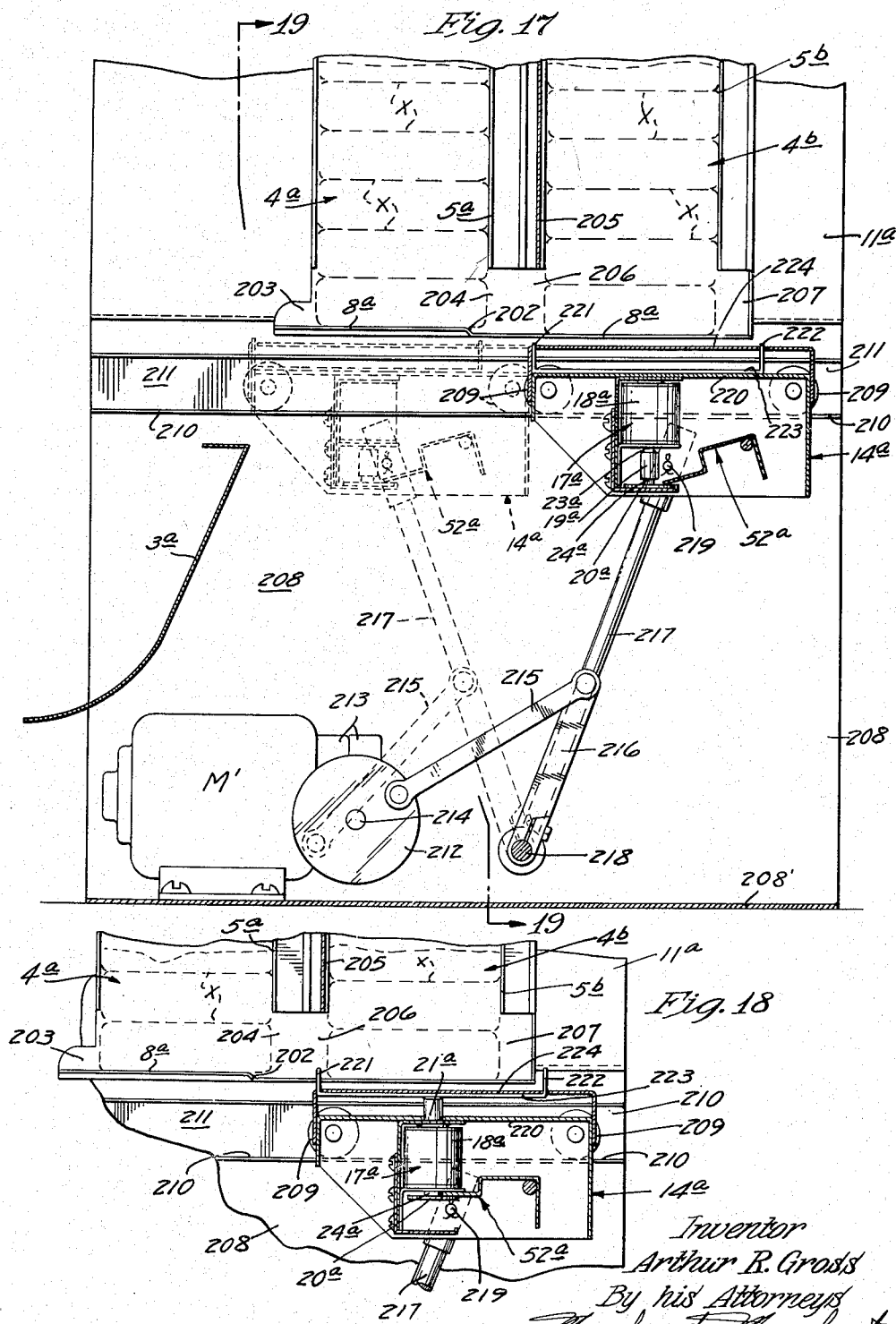
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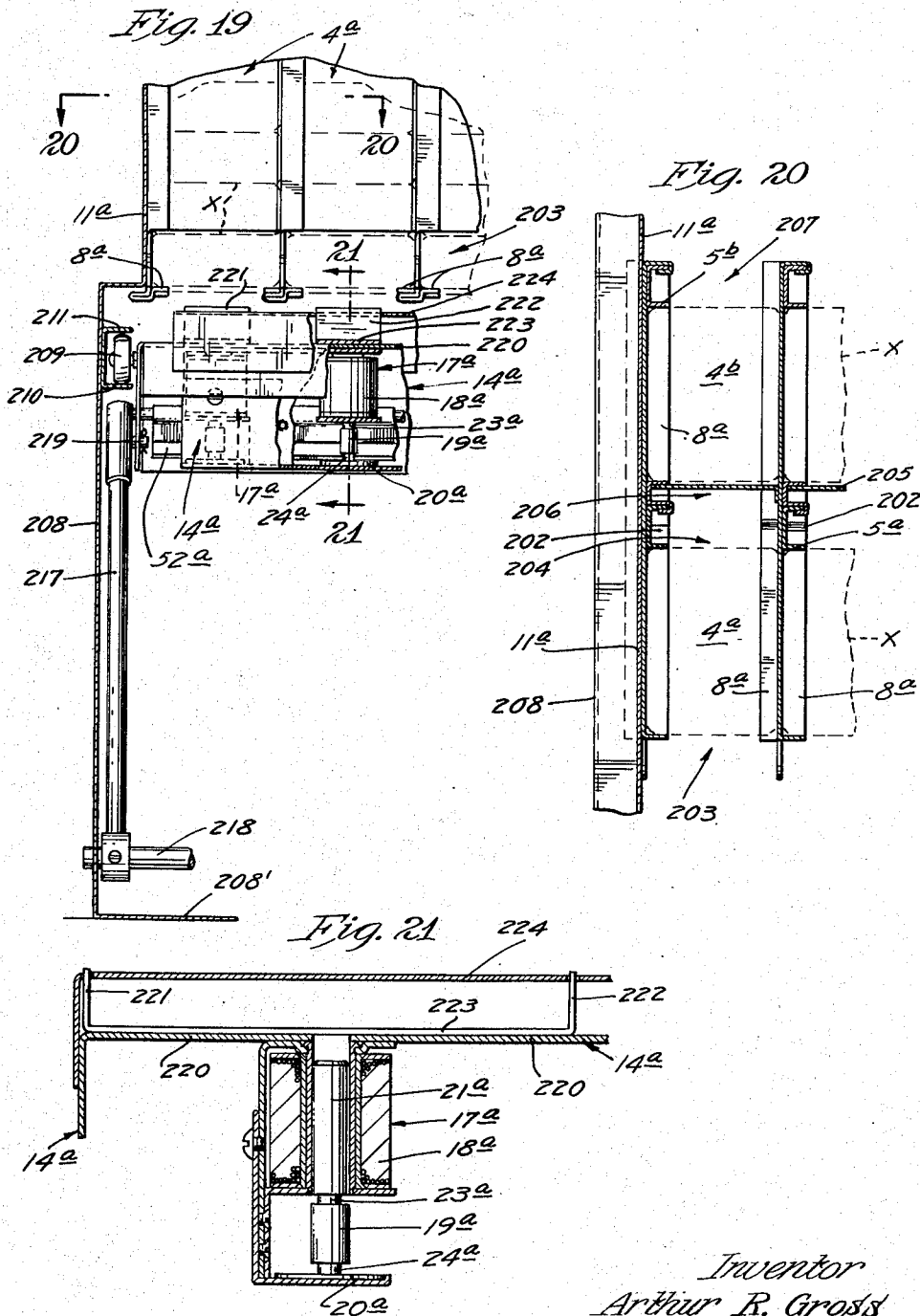
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10 Sheets-Sheet 9



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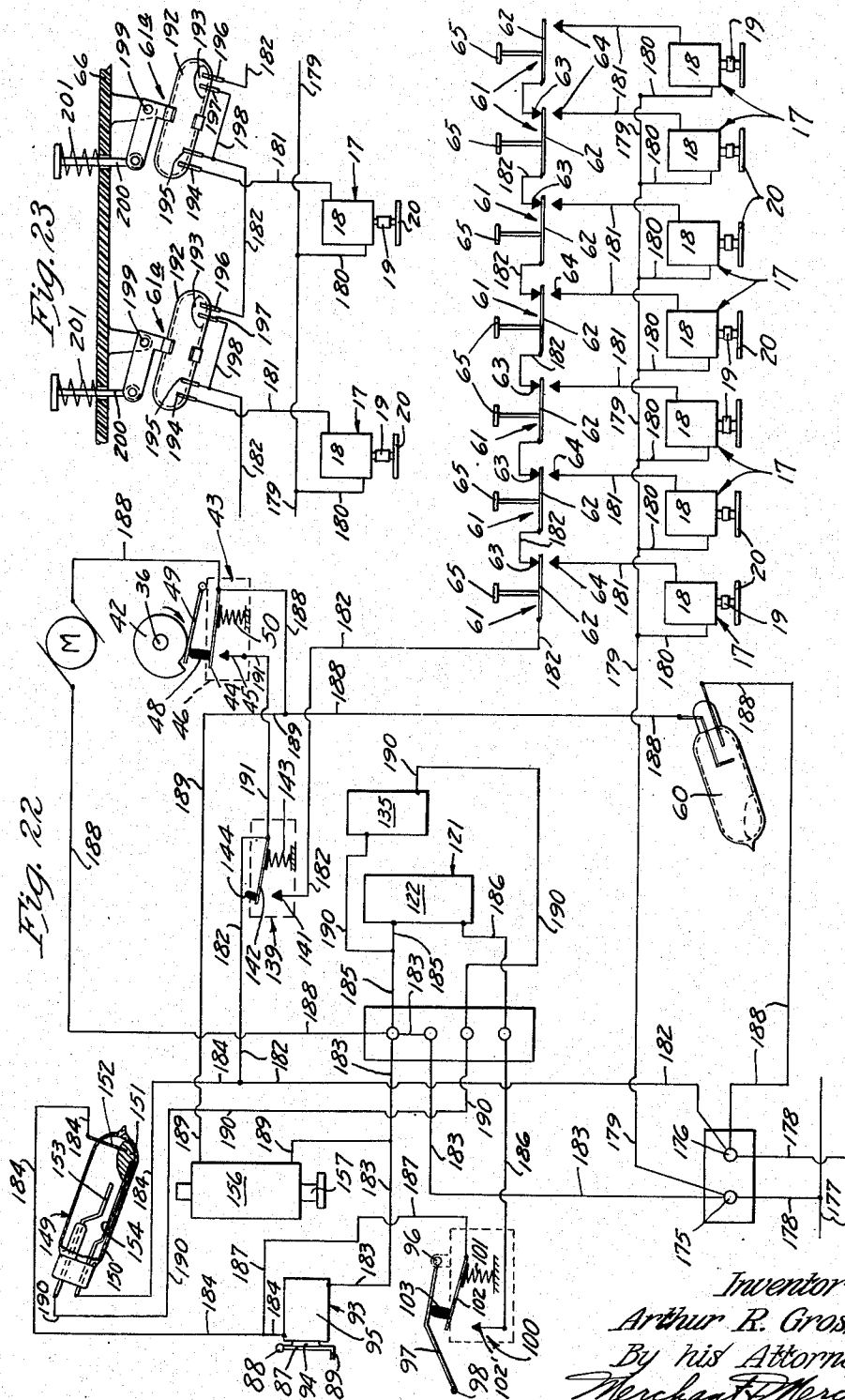
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UNITED STATES PATENT OFFICE

2,660,282

VENDING MACHINE

Arthur R. Gross, St. Paul, Minn.

Original application December 30, 1948, Serial No. 68,331. Divided and this application November 10, 1949, Serial No. 126,520

1 Claim. (Cl. 194-10)

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This application is a division of my co-pending application, Serial No. 68,331, filed December 30, 1948, under title "Dispensing Machine," and relates, particularly to improvements in coin-controlled vending machines.

An important objective of the instant invention is the provision, in a machine of the class described, of means for automatically returning to the operator his coin or coins upon completion of delivery function of the machine in case of delivery failure, and this as distinguished from the general prior art practice whereby delivery failure merely conditions the machine for return of the coins to the operator dependent upon some manual manipulation by the operator.

The above and other highly important objects and advantages of the invention will be made further apparent from the following specification, claims and appended drawings.

In the accompanying drawings, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view in front elevation, with some parts broken away and some parts shown in section, of a machine embodying a preferred form of the invention;

Fig. 2 is an enlarged fragmentary view in side elevation, with some parts broken away, some parts shown in section, and some parts omitted, of the machine shown in Fig. 1, looking from the right toward the left with respect to Fig. 1;

Fig. 3 is a view in rear elevation, with some parts broken away and some parts omitted, of the machine shown in Fig. 1;

Fig. 4 is an enlarged sectional view, with some parts broken away, taken on the vertical line 4-4 of Fig. 3;

Fig. 5 is a greatly enlarged fragmentary detail view, taken substantially on the vertical line 5-5 of Fig. 2;

Fig. 6 is a detail sectional view taken approximately on the line 6-6 of Fig. 5;

Fig. 7 is a similarly enlarged detail sectional view taken on the horizontal line 7-7 of Fig. 5;

Fig. 8 is a similarly enlarged detail sectional view taken approximately on the horizontal line 8-8 of Fig. 7;

Fig. 9 is a similarly enlarged detail view taken approximately on the line 9-9 of Fig. 7, with some parts on the section line shown in elevation;

Fig. 10 is a fragmentary detail in vertical section, taken substantially on the line 10-10 of Fig. 2;

Fig. 11 is a fragmentary view corresponding to

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part of Fig. 2, but showing certain of the parts in opposite extreme positions from those of Fig. 2;

Fig. 12 is a greatly enlarged detail sectional view taken on the line 12-12 of Fig. 2;

Fig. 13 is a greatly enlarged fragmentary view in side elevation, as seen from the line 13-13 of Fig. 3;

Fig. 14 is an enlarged detail sectional view taken substantially on the line 14-14 of Fig. 3;

Fig. 15 is a similarly enlarged detail sectional view taken approximately on the line 15-15 of Fig. 3;

Fig. 16 is an enlarged detail view taken on the section line 16-16 of Fig. 14, but with some parts broken away and some parts on the section line, shown in full;

Fig. 17 is a fragmentary vertical sectional view corresponding to Fig. 4, but showing a modified form of the invention;

Fig. 18 is a fragmentary detail view corresponding to a portion of Fig. 17, but showing a different position of some of the parts;

Fig. 19 is a fragmentary detail view taken approximately on the irregular line 19-19 of Fig. 17;

Fig. 20 is a detail sectional view taken on the horizontal line 20-20 of Fig. 19;

Fig. 21 is an enlarged detail sectional view taken on the line 21-21 of Fig. 19;

Fig. 22 is a schematic wiring diagram showing the electrical hook-up of the mechanisms of the foregoing figures;

Fig. 23 is a fragmentary diagrammatic view illustrating the use of a different form of selector switches, which can be used as a substitute for those shown in Fig. 22 in connection with certain of the previously described figures; and

Fig. 24 is a detail sectional view taken on the horizontal line 24-24 of Fig. 1.

Description, Figs. 1 to 16, inclusive and Figs. 22 and 24

In these figures, the exterior casing or shell of the machine is indicated as an entirety by 1, and is provided in its lower front portion with an elongated horizontally extending discharge or delivery opening 2, leading downwardly and forwardly to which is a delivery chute 3, which is positioned to receive merchandise articles or units, such as packages of cigarettes X, from each of several laterally spaced, generally parallel magazines 4. The magazines 4 are generally of the type common to cigarette package dispensing magazines, and each comprises a rear wall 5, side walls 6, and a front wall-forming

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flange 7 formed integrally and turned inwardly from one of the walls 6, but spaced from the opposite wall of that magazine to afford an elongated inspection opening in the front of each magazine. The magazines 4 are open at their tops for loading and are customarily loaded each with a single row stack of cigarette packages of different brand. The several magazines 4 are partially closed at their bottoms by supporting flanges 8 extending from the bottoms of the side walls 6 and serving as supports for the stacks of cigarette packages therein. The front wall-forming flanges 7 of the magazines downwardly terminate at 9 sufficiently above the bottom-forming flanges 8 to provide a discharge passage 9' in the bottom front portion of each magazine for singular dispensing of cigarette packages onto the discharge chute 3. Although the shell 1 has not been shown in detail, it may be assumed that the entire internal mechanism of the machine, including the magazines 4, is removable for filling of the machine and servicing and repairing of the mechanism. Also, it will be noted that, in accordance with conventional practice, the outer casing or shell 1 is provided with a transparent front wall 10 giving a clear view of the merchandise contained within the several magazines 4.

The rear walls 5 of the several magazines are formed by a common rear wall-forming plate so that the several magazines comprise a single magazine unit. This magazine unit is mounted on and supported by a base structure comprising side plates 11 and legs 12. The side plates 11 may be assumed to be welded or otherwise rigidly secured to the bottom of the magazine unit, and the legs 12 may be assumed to be similarly anchored fast to the side plates 11. The legs 12 of the supporting base rest upon a shelf 13 of the shell 1 and may be assumed to be slidable thereon for removal of the mechanism when the case is open.

The dispensing mechanism illustrated in the figures being described comprises a forwardly and rearwardly reciprocatory ejector carriage 14 located below the planes of the bottoms of the several magazines 4 and mounted and guided for forward and rearward reciprocating motion by means of integrally formed, laterally projecting guide flanges 15 slidably mounted in suitable guide channels 16 formed in the base side plates 11 (see particularly Figs. 1, 3 and 4). As will be seen by reference particularly to Fig. 4, the ejector carriage 14 is movable from a normal retracted position, shown by full lines in said Fig. 4, to an advanced position, shown by dotted lines in said Fig. 4. The ejector carriage 14 functions in common with the several magazines and carries a plurality of electromagnetic ejectors 17 of which there is one for each magazine 4, the ejector 17 for each magazine being located slightly rearwardly of the plane of the rear wall of that magazine in a normal retracted position of the ejector carriage 14, as shown by full lines in Fig. 4. Each of the said ejectors 17 comprises a solenoid coil or winding 18 and a magnetically responsive reciprocatory armature 19 working therein and provided at its lower end with a disc-like non-magnetic head 20, which is preferably of non-magnetic material, such as aluminum. The upper end portion of each armature 19 is reduced in diameter and equipped with an extension-acting ejector pin 21 of non-magnetic material, such as aluminum. The pins 21 are

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preferably press-fit on the reduced diameter portions 22 of the armatures 19 so as to become a permanent part thereof and define the upper wall of an annular groove or channel 23 having a stop shoulder 23'. The lower portion of the armatures 19 are also reduced in diameter so as to define, together with their respective heads 20, lower annular channels 24 axially spaced from the channels 23 and having a stop shoulder 24'. The ejector windings or coils 18 are wound upon non-magnetic metallic sleeves 25 in which the ejector pins 21 are slidably mounted. The ejectors 17 are all mounted on the ejector carriage 14, as shown best in Fig. 15, wherein it will be seen that the windings 18 are disposed between the flat undersurface of the ejector carriage 14 and mounting brackets 26 carried by and projecting inwardly from the vertical front wall 27 of the ejector carriage 14. By further reference to Fig. 15, it will be seen that the upper and lower ends of the sleeves 25 respectively project through the flat upper wall of the ejector carriage 14 and bracket 26 to thereby lock the ejectors in position. By further reference to the drawings, and particularly Figs. 13 to 16, inclusive, it will be seen that the front wall 27 of the ejector carriage 14 is formed at its bottom to provide an intumed shelf-like flange 28, which underlies and is engaged by the armature heads 20 of the ejector 17 when the same are at rest in their retracted inoperative positions, and in which positions the armatures 19 are largely below the planes of the bottoms of their respective solenoid coils 18, but are, nevertheless, in the magnetic fields of said coils. Also, it will be noted, particularly by reference to Figs. 13, 14 and 15, that the upper ends of the ejector pins 21 are substantially flush with the upper surface of the ejector carriage 14 when the armatures 19 are in their said normal retracted positions.

The ejectors 17 each cooperate with a different magazine 4 and are so orientated on the carriage that the ejector pin 21 of a different ejector 17 will be located just to the rear of the vertical plane of the rear wall 5 of a different magazine 4 in a retracted position of the ejector carriage 14, as shown by full lines in Fig. 4. With further reference to this Fig. 4, it will be seen that the said rear wall 5 of each magazine 4 is provided at its lower end portion with a downwardly opening ejector pin-receiving notch 29 for passage of a cooperating ejector pin 21 when the same is in projected position during advance movements of the ejector carriage 14. The driving mechanism for the reciprocatory ejector carriage 14 comprises an electric motor M, a crank-acting disc 30, a pitman arm 31, a crank arm 32, a rock shaft 33, and a pair of oscillatory drive arms 34. The motor M is of the conventional type carrying a speed-reducing transmission mechanism, not shown, but which may be assumed to be contained within a transmission case 35 rigid with the case of the motor M, and the crank-acting disc 30 is mounted fast on a slow-speed shaft 36 journaled in the transmission case 35 of the motor M and driven at reduced speed from said motor M. The entire drive mechanism just described is carried by a mounting plate or bracket 37 anchored to the common rear wall 5 of the several magazines 4, the motor M being mounted on said plate 37 by screws or the like 38 and the rock shaft 33 being journaled in bearing brackets 39 which are, in turn, mounted fast on said plate or bracket 37. The crank arm

32 and oscillatory arms 34 are, of course, mounted fast on rock shaft 32. The free end portions of arms 34 work axially slidably in suitable receiving apertures 40 therefor in brackets 41 anchored to the rear portion of the reciprocatory ejector carriage 14. For each cycle of operation of this drive mechanism, the oscillating arms 34 and ejector carriage 14, together with the several ejectors 17 thereof, will move from their normal retracted positions, shown by full lines in Fig. 4, to their advanced positions, shown by dotted lines in Fig. 4, and back to their respective normal positions represented by full lines in said figure, this complete cycle of operation requiring one complete revolution or 360° movement of the crank-acting disc 30.

The motor driven crank-acting disc 30 is formed on its inner surface to provide a cam 42, which operates a motor-holding switch 43 comprising switch arm 44 and cooperating fixed contact 45 (see schematic diagram Fig. 22), mounted in a switch housing 46, mounted on the bracket plate 37 through the medium of a bracket 47 (see particularly Fig. 4). The switch arm 44 rigidly carries a finger 48 for engagement with a swinging cam follower arm 49. The switch 43 is a normally open type, being yieldingly biased toward an open position by a spring or the like 50.

From the description thus far, it will be clear that advancing and retracting movements of the ejector carriage 14 are in a path generally parallel to the direction of discharge of cigarette packages X from the several magazines 4, and that the ejector pins 21 of the ejector 17 are respectively projectable into and retractable from a path each through the adjacent end portion of a cooperating magazine. It will also be obvious from the above description that whenever an ejector pin 21 is projected or extended and maintained in such position during an advance movement of the ejector carriage, the bottom package of cigarettes X in a cooperating magazine 4 will be advanced therewith and discharged from the magazine through the discharge package 9' in front of that magazine into the common chute 3 where it will come to rest against a shoulder 51 (see Fig. 4) from which position it may be readily removed by the operator through opening 2. Of course, such extending movements of the ejector pins 21 will be responsive to energization of the coils 18 of their respective ejectors 17.

As earlier indicated, an important objective of the instant invention is the provision of novel mechanical means for automatically locking a selected ejector pin 21 in its extended operative position during advance movements of the ejector carriage 14 while simultaneously locking all other than a selected one of the ejector pins 21 in their retracted inoperative positions. This multiple-function locking mechanism, preferably and as shown, comprises a damper plate 52 mounted for vertical swinging movements on rigidly carried oppositely projecting trunnions 53 that work in horizontally elongated slots 54 in spaced mounting brackets 55, which depend from the top portion of carriage 14 (see Figs. 4 and 13 to 15, inclusive), one of said mounting brackets 55 and one of said cooperating trunnions 53 being shown in Fig. 13, and the other of said mounting brackets 55 and trunnions 53 being shown in Figs. 14 and 15. By reference particularly to Figs. 13 and 15, it will be seen that the damper trunnions 53 are downturned at their outer ends beyond the brackets 55 to provide stop arms 56, and are

yieldingly biased toward the front ends of slots 54 by coil tension springs 57 each anchored to a trunnion 53 at one end and to the front wall 27 of the carriage 14 at its other end. The normal inoperative position of the damper 52 is shown by full lines, particularly in Figs. 4 and 13 to 15, inclusive, and the upper operative position of said damper is shown particularly by dotted lines in Fig. 15. By further reference to the drawings, and particularly to the figures mentioned above, it will be seen that when the damper plate 52 is in its normal lower position, its free front edge portion is orientated slightly above the upper surfaces of the armature heads 20 and slightly rearwardly of the lower channels 24 of the armatures 19. It is, however, important to note that the upper channels 23 of the several retracted ejector pin-equipped armatures 19 fall within the arc of a circle concentric with the axes of forwardly positioned trunnions 52 and extending upwardly from the free edge of the damper plate 52. With this structure and arrangement, the immediate result of energization of the winding 18 of any one of the ejectors 17 will be as follows: The ejector pin-equipped armature 21 of the energized solenoid winding 18 will be projected from its lower retracted position to its upper extreme position, shown particularly by dotted lines in Figs. 4 and 15. The head 20 of the projected armature 19 will engage the free end portion of damper plate 52 and be moved upwardly therewith to its operative upper position, shown by dotted lines in Fig. 15. During the upward movement of the free end portion of the damper plate 52 under the motivating energy of the armature head 20 of a selected ejector, the said free edge portion of the damper 52 will come into camming engagement with the adjacent portions of the several other armatures 19 in a zone intermediate the channels 23 and 24 thereof. After initial engagement of the free edge of damper 52 with the said intermediate portions of the several inoperative armatures 19 and during the balance of the upward movement thereof, the damper plate 52 will partake of a slight rearward movement against the yielding action of biasing springs 57, such rearward movement of the damper 52 being permitted by rearward movement of the trunnions 53 in their respective slots 54. When the armature 19 of the selected ejector 17 and the damper 52 reach their extreme upper positions, shown by dotted lines in Fig. 15, the free edge of said damper will then be aligned with the lower channel 24 of the single projected armature 19 and with the upper channels 23 of the armatures 19 of the several other ejectors 17, and will move forwardly into the several said aligned channels under the yielding action of biasing springs 57. The damper will now be locked in its upper position by engagement in the upper channels 23 of the stop shoulders 23' of the several retracted armatures 19 and will, in turn, positively lock the single extended armature 19 in its upper position due to the interlocking engagement of the free edge of the damper 52 in the lower channel 24 and against the stop shoulder 24' of the projected plunger. The damper plate 52 and the ejector pin-equipped armatures 19 of the several ejectors 17 will remain locked in their last said positions during the immediately succeeding forwardly advancing ejecting stroke of the ejector carriage, and, of course, a package of cigarettes X will be ejected by the projected ejector pin 21 from the bottom of its cooperatively associated magazine 4 during such forward stroke of the carriage 14,

However, as the carriage 14 approaches the extreme limit of its forward ejecting movement, the stop arms 56 of the trunnions 53 of damper 52 will engage stop projections 58, each laterally inwardly projecting from an opposite side plate 11 (see particularly Figs. 1, 3 and 4), which will thereupon stop forward movement of the damper plate 52 with the carriage 14, so that the slight remaining forward movement of the carriage 14 will be independent of the damper 52 and will result in retraction of the free edge of the damper plate 52 from the several engaged armature channels 23 and 24. Of course, the above-described slight forward movement of the carriage 14 independently of the damper plate 52 will result in a relative rearward movement of the damper trunnions 53 in their respective slots 54 and will be against the yielding action of the biasing springs 57. Upon being thus released from the channels 23 and 24, the damper 52 will immediately return to its lower inoperative position under the action of gravity, as will also the projected ejector pin 21 of the selected ejector 17. By reference particularly to Figs. 3, 4 and 13 to 15, inclusive, it will be seen that the free edge portion of the damper plate 52 rests upon a pair of laterally spaced ears 59 carried by and projecting angularly from the intumed bottom flange 23 of carriage 14.

Carried by the pivotally swinging damper plate 52 is a normally open mercury switch 60 which is closed only when the damper is in an operative position. As will hereinafter be seen, the primary function of this damper switch 60 is to initiate a supply circuit for the motor M, and a second and equally important function of this normally open switch 60 is to complete a circuit, setting in motion elements which immediately render all circuits of the selector mechanism, yet to be described, incapable of being closed, or opposite any thereof which may at the moment be closed.

For selectively controlling operation of the several ejectors 17, there is provided on the front of the magazine a series of manually operated button-type selector switches 61 of which there is one for each ejector 17. As will be seen by reference to the drawings, the switch 61 for each ejector 17 is situated directly opposite its respective cooperative ejector 17. Each of the several switches 61 comprises a movable spring contact 62, cooperating spaced fixed contacts 63 and 64, and a pushbutton 65. The contacts of the several switches 63 and 64 of each of the several switches 61 are mounted on switchboard 66 of insulating material and which is anchored adjacent its ends to opposite side plates 11 of the machine. The movable spring contacts 62 of each of the several switches are normally closed with their cooperating fixed contacts 63 and are yieldingly self-biased in this direction, but are selectively movable into engagement with their respective cooperating fixed contacts 64 through the medium of their respective cooperating pushbuttons 65. By reference to the drawings, it will be seen that the movable contacts 62 of the several switches 61 are connected in series when the several switches are in their normal inoperative positions, shown in said figures, and this by virtue of the fact that the fixed contacts 63 of each of the several switches, except the extreme right-hand switch, is formed on an extended stationary part of the movable switch contact 62 of an adjacent switch. As shown, the contact 63 of the extreme right-hand switch series only is a stop and has no func-

tion insofar as the operation of the machine is concerned.

The coin-operated control mechanism of the machine illustrated involves a primary coin conveyor in the nature of a coin channel 67, the receiving upper end of which is readily accessible from the front of the magazine in the usual fashion, which is downwardly directed, and has its lower end portion 68 orientated above and arranged to feed into a pivoted coin-receiving hopper 69 providing a transfer station. The hopper 69 is pivoted on a horizontal axis for swinging movements generally forwardly and rearwardly of the machine through means of trunnions 70, one making bearing in coin mechanism mounting plate 71 rigidly carried by an outside hopper magazine side wall 6, and the other making bearing in the plate 72 mounted in spaced relation to the plate 71 through the medium of interposed coin chutes or conveyors 73 and 74.

When the hopper 69 is in its normal position shown in Figs. 2 and 10, for example, its open bottom is disposed directly above and is effectively closed by a horizontally-disposed bridge element or platform 75 connecting the upper ends of chutes 73 and 74. The chute 73 extends downwardly and forwardly from the platform 75 and delivers to a coin-return pocket or station 73' in the front wall of the machine. The chute 74 extends downwardly and rearwardly from the platform 75 and discharges into a suitable coin receiver or depository 74' contained internally of the machine. It will now be clear that when the swingable pivoted hopper 69 is swung forwardly from its normal position shown in the drawings, that it will discharge into the return chute 73, and that when said hopper 69 is swung or tipped rearwardly, that it will discharge into the chute 74 leading to the coin receiver 74'. The hopper 69 is, of course, gravity biased toward its normal intermediate position shown in the drawings, but it is desirable to increase such bias and to stabilize the action of the hopper 69, and it is for such purpose that I provide gravity actuated stabilizer bar 76 mounted on the plate 72 for limited vertical movements by means of slot and pin connections 77 and having an intumed upper end 78 overlying and resting upon the upper edge of hopper 69. The stabilizer 76 not only facilitates the return of the hopper but brings the same to a stop quickly and prevents accidental swinging thereof.

Whenever the carriage 14 advances forwardly from its normal retracted position, shown by full lines in Figs. 2 and 4, to its advanced position, shown by dotted lines in Fig. 4, with a selected one of the ejector plungers 21 projected to its dotted line position of Fig. 4, and assuming that there is at least one package of cigarettes X in the magazine cooperatively associated with the projected plunger 21, the said projected plunger will engage the rear of and will cause forward movement of an ejection of the engaged package of cigarettes X from the cooperating magazine through the discharge passage 9', from where it will fall by gravity into the chute 3, all as previously described. During forward movements of the package of cigarettes X being ejected, it will engage the downwardly extending free portion of a horizontally pivoted rigid flap 79 and cause the same to swing nearly 90° in a clockwise direction with respect to Fig. 4. The flap 79 extends in front of all of the magazines 4 and covers the upper portions of the discharge openings 9' of the several magazines being pivoted

adjacent its opposite ends on trunnions 80 journaled in opposite side plates 11 of the machine. It will be noted that the axis of the trunnions 80 is located in a horizontal plane near the tops of the magazine discharge openings 9' and slightly above the horizontal plane of the upper surface of the bottom packages of cigarettes X. As will be seen, particularly by reference to Figs. 1 and 2, one of the flap trunnions 80 is integrally formed outwardly of the plate 11 of which it is journaled with a rock arm 81, which will, when the flap 79 partakes of the aforementioned clockwise pivotal movement of approximately 90°, partake of corresponding clockwise movement, bringing the same into engagement with the front upper edge portion of the hopper 69 and cause the same to tip in a counterclockwise direction with respect to Fig. 2. This counterclockwise oscillatory movement of hopper 69 will move the open bottom of the hopper out of registration with the shelf or platform 75 and into discharge position above chute 74 so that any coin or coins in the said hopper 69 will then be discharged into chute 74 and lodged in the coin receiver of the machine. At this point it is important to note that the swingable flap 79 is subject to the yielding action of gravity to be returned to its normal position, shown by full lines in Fig. 4, wherein the rock arm 81 thereof comes to rest against a suitable stop pin 82. Obviously then, the flap 79 will automatically return to its normal starting position of Fig. 4 as soon as the engaged package of cigarettes is moved therepast under ejecting movements of the latter.

During return movements of the carriage from its advanced dotted line position of Fig. 4, the flap 79 will remain undisturbed in its normal position to which it has been returned. The hopper 69 will always be oscillated or rocked in a clockwise direction sufficiently to bring its open bottom out of registration with the platform 75 and into registration with the upper end of coin return chute 73, by a mechanism presently to be described, so that any coin or coins placed in said hopper 69 and which remain there by reason of non-delivery of merchandise bargained for will be automatically returned to the operator. The mechanism for performing this last described oscillatory coin return movement of the hopper 69 comprises a short shaft or spindle 83 horizontally journaled in one of the magazine side plates 11 (see particularly Figs. 32 and 33) and carrying a rock arm 84 on its outer end, and rigidly carrying a depending rock arm 85 on its inner end, and which is sufficiently heavy to bias the parts 83, 84 and 85 toward their normal positions shown in Figs. 2 and 3. By reference particularly to Fig. 2, it will be seen that in a normal position of the parts 83, 84 and 85, the rock arm 84 rests on the rear upper edge of the hopper 69 and that the rock arm 85 depends substantially vertically from the shaft or spindle 83 and depends into the path of travel of an upstanding lug 86 projecting from the upper surface of the carriage 14. Under forward or advancing movements of the carriage 14, the carriage lug 86 imparts a clockwise rotation to rock arm 85 and parts rigid therewith, and moves beyond said rock arm 85, all without affecting the hopper 69, by reason of the fact that the rock arm 84 is merely lifted off of and returned to the upper edge of hopper 69. However, on the return movement of the carriage 14, the carriage lug 86 again contacts the rock arm 85 and this time causes a counterclockwise oscillatory movement to be imparted to the parts 83,

84 and 85. Under such counterclockwise movement, with respect to Fig. 2, of the rock arms 84, it will bear downward upon the rear edge of hopper 69 and impart a pivotal oscillatory movement to the hopper in a clockwise direction sufficiently to bring its open bottom out of registration with platform 75 and into registration with the upper end portion of coin-return chute 73, the hopper 69 being automatically returned to its normal position upon passage of lug 86 through the action of gravity.

For the purpose of insuring return of coins to the operator in case certain circuits of the machine are dead, such as by reason of failure to connect the machine to a suitable source of potential, or in case an operator drops into the chute 67 an additional coin or coins during an operating cycle of the machine, I provide the following described mechanism: This mechanism comprises a pivoted valve-acting member 87 (Figs. 2 and 10) which depends from a pivot 88 and is located externally of one side of the coin chute channel 67. This valve-acting member 87 carries at its lower edge portion a laterally projecting coin intercepting flange 89, which works through a suitable opening 90 in the adjacent side of coin channel 67. The valve-acting member 87 is subject to the yielding biasing action of coil tension spring 91 to move in a clockwise direction with respect to Fig. 1 to a normal position wherein the intercepting flange 89 thereof projects into and effectively closes off coin channel 67, and in which position the said flange 89 will intercept any coin or coins dropped thereonto and will direct the same into a branch coin channel 92, which discharges into the lower end portion of coin-return chute 73. By reference particularly to Fig. 2, it will be noted that the coin-intercepting flange 89 is forwardly inclined in the direction of branch channel 92. Cooperating with the valve-acting member 87 is an electromagnet 93 comprising a corepiece 94 and winding 95. The valve-acting member 87 is magnetically responsive and, as will be seen by reference to Fig. 10, is so associated with the core 94 of electromagnet 93 so that it will be moved to an inoperative position under the influence of magnet 93 when the winding 95 thereof is energized, and when in operative position the intercepting flange 89 is moved out of the coin channel 67 to permit free passage of coins, and this against the yielding action of the spring 91.

Pivoted adjacent the lower end of the coin channel 67 at 96 is a switch-actuating gate element 97 having laterally offset free end portion 98 extending laterally through the coin channel 67 and working in segmental slots 99 in the side walls thereof (see particularly Figs. 1, 2 and 10). This gate-acting arm 97 operates a totalizer control switch 100 (see Fig. 22), which is normally biased to its open position by a spring 101 (see Fig. 22). The gate-acting arm 97 engages the movable arm 102 of the switch 100 through the medium of an upstanding insulating lug 103 on the switch arm 102. When the switch 100 is in its normal open position, the free end 98 of gate-acting element 97 will project across the coin channel 67, as shown best in Fig. 2, where it will intercept each coin passing through the lower portion of the coin channel 67. Each coin engaging the free end 98 of gate element 97 will move the element 97—98 on its way through to the hopper 69 and will thereby momentarily close the totalizer control switch 100. After passage

of the coin, the gate-acting element 97-98 will be returned to its normal coin-intercepting position shown in Fig. 2.

The totalizer referred to, and which is largely of conventional character, comprises a toothed ratchet wheel 104 (Fig. 5) mounted fast on a shaft 105 journaled in a totalizer mounting plate 106 and a bearing bracket 107 carried by the mounting plate 106. The mounting plate 106 is mounted on the motor mounting plate or bracket 37. The entire totalizer mechanism exclusive of the switch 130 is shown as enclosed within a removable shelf or casing 108. Journaled on one projected end portion of the shaft 105 (see Fig. 7) is an oppositely extending pair of arms indicated respectively by 109 and 110. By reference particularly to Fig. 7, it will be seen that the journaled arms 109 and 110 are connected for common oscillatory movements by interlocking rigid part 111. These oscillatory arms 109 and 110 are yieldingly biased toward their normal positions shown in Fig. 5 by a coil tension spring 112 extending from arm 110 to a stud 113 mounted on plate 106. Pivoted to the free end of arm 110 at 114 is a pawl 115 for cooperation with ratchet wheel 104. The pawl 115 is yieldingly biased toward engagement with the teeth of ratchet wheel 104 by a coil tension spring 116, but the said pawl 115 is normally held out of engagement with the teeth of ratchet wheel 104 by the stud 113 (see Fig. 5). The shaft 105 which is mounted for rotation with the ratchet wheel 104 is yieldingly biased to rotate in a clockwise direction with respect to Fig. 5 by a torsion spring 117 (see Fig. 9), and clockwise movement with respect to Fig. 5 of the ratchet wheel 104 and shaft 105 is limited by engagement of co-operating stop pins 118 and 119, the former being carried by mounting plate 106 and the latter being carried by ratchet wheel 104. Step by step actuation of the totalizer ratchet wheel 104 and shaft 105 in a counterclockwise direction is accomplished by plunger 120 of a solenoid 121, the winding of which is indicated by 122.

The magnetically responsive plunger 120 of the solenoid 121 works loosely through the winding 122 and is provided at its opposite ends with heads 123. In Fig. 5, the solenoid plunger 120 is shown in its retracted normal position assumed when the coil 122 is de-energized and to which position it is always returned by gravity. By further reference to Fig. 5, it will be seen that the upper head 123 of the plunger 120 normally engages or substantially engages the free end of arm 109. Downward retracting movements of the plunger 120 are limited by a stop 124. The solenoid winding 122 is mounted in a bracket 125 from plate 106. Vertically slidably mounted in the upper and lower flanges 126 of bracket 125 is a reciprocatory brake rod 127 having an offset end portion 128 slidably guided in a slot 129 in plate 106 for movements from a normal retracted position shown in Fig. 5 to an extended operative position wherein it becomes engaged between two adjacent teeth of ratchet 104 to positively stop the ratchet wheel 104 after a predetermined movement. The rod 127 is normally maintained in its lower inoperative position of Fig. 5 through the action of gravity acting upon the same and a relatively heavy head 130 adjacent its lower end (see Fig. 5), and which head lies in the path of travel of the lower head 123 of solenoid plunger 120. As will hereinafter be seen, the winding 122 of solenoid 121 is energized through a circuit under control of

coin-closed switch 130 so that plunger 120 of solenoid 121 will be extended and retracted once for each one of a predetermined number of coins passing through the coin channel 67. Of course, this will result in a counterclockwise step of movement being imparted to the totalizer ratchet wheel 104 for each of the required number of coins passing through the channel 67. To prevent uncalled for reverse or return movements of the ratchet wheel 104 under the action of its biasing spring 117, there is provided a pawl 131 pivoted at 132 to the plate 106 and biased toward engagement with the teeth of ratchet wheel 104 by a coil spring 133 extending from plate 106 to an extending operating arm 134 of pawl 131. For the purpose of automatically releasing the pawl 131 to permit return movements of the ratchet wheel 104 to normal starting position of Fig. 5, there is provided a solenoid winding 135 and plunger 136 mounted for reciprocation in the winding 135. Plunger 136 is normally gravity biased to its normal retracted position, shown in Fig. 5, wherein it is at rest against a stop 137. By reference to Fig. 5, it will be seen that the upper end of plunger 136 is disposed immediately under the free end of pawl arm 134 so that extending movements thereof responsive to energization of solenoid 135 will release the pawl 131 from engagement with the teeth of ratchet 104. Upwardly projecting movements of the plunger 136 are limited by engagement thereof with a stop pin 138. The function of the totalizer mechanism described is the operation of a switch 139 which, in turn, controls initiation of the circuits, not yet described. This totalizer mechanism operated switch 139 is mounted on the totalizer mounting plate 106 through the medium of a U-shaped bracket 140 and comprises a fixed contact 141 (Fig. 22) and a cooperating switch arm 142 which is yieldingly biased toward open position by a spring 143. The switch arm 142 is provided at its free end with an upstanding lug 144 for engagement with a rock arm 145 that is intermediately pivoted at 146 in the U-shaped bracket 140. One free end portion of the rock arm 145 cooperates with the peripheral portion of a cam 147 fast on the totalizer ratchet shaft 105. When the totalizer ratchet wheel 104 is in its normal position, shown in Fig. 5, the cam 147 is positioned as in Fig. 8, and in this position of parts, the switch 141 is open, as shown in Fig. 22. However, when the ratchet wheel 104 partakes of a degree of counterclockwise rotation with respect to Figs. 5 and 8, the rock arm 145 will be rocked sufficiently in a clockwise direction to close the switch 141. For the purpose of the present example, it is assumed that the machine is set to deliver a package of cigarettes X for the sum of twenty cents represented by two dimes successively placed in the coin channel 67. As heretofore pointed out, each of these two coins, dimes in the present instance, will produce a single step of movement of the ratchet wheel 104, shaft 105 and cam 147 in a counterclockwise direction with respect to Figs. 5 and 8, making a total of two such steps of movement. Under these conditions, the cam is so angularly set on shaft 105 that the switch 139 will be closed as a result of these two steps of movement of the ratchet wheel 104, shaft 105 and cam 147, thereby placing the machine in condition for operation responsive to manipulation of a selected one of the selector switches 61.

Pivotally mounted for rocking movements on

the upper portion of coin mechanism mounting plate 71 at 148 is a mercury switch 149, which is believed to be of novel design and comprises (see Figs. 2, 11 and 22), the usual elongated tube or envelope 150, a globule of mercury 151, a contact 152 projecting through one end of the tube 150, and laterally spaced parallel contacts 153 and 154 projecting through the other end of the tube 150. The dual function of this switch 149 is important and will be made clear in connection with the subsequent description of the operation of the machine. It will be noted, however, that in its normal position shown in Figs. 2 and 22, the globule of mercury 151 closes contacts 152 and 154, whereas in the opposite extreme position of switch 149, all contacts are effectively open. However, it will be noted that the intermediate portion of elongated contact 154 is in closely spaced parallel relation to an elongated portion of contact 153 so that the mercury 151 will close contacts 153 and 154 for an extended interval during its passage from right to left hand ends of tube 150, with respect to Figs. 2, 11 and 22, the object here being to make a momentary contact of sufficient duration to positively operate solenoid 135, it having been found that a short flash contact could not be depended upon for the purpose. At this point it should be noted that the mercury switch 149 is mounted fast on a bracket 155 which, in turn, is pivoted at 143.

For rocking the switch from its normal position shown in Figs. 2 and 22 to its other extreme position shown in Fig. 11, there is provided a solenoid 156 equipped with a gravity retracted plunger 157. Solenoid 156 is mounted on the coin mechanism, as best shown in Fig. 2. When the solenoid 156 is de-energized, the plunger 157 thereof rests upon a stop pin 158. The pivoted bracket 155 of the switch 149 normally rests upon the upper end of the solenoid 156 and overlies the upper end of the then retracted plunger 157. With this arrangement, when the solenoid 156 is energized, the plunger 157 moves upwardly and rocks the switch 149 from its position of Figs. 2 and 22 to its position of Fig. 11. This causes the mercury 151 to move out of closing engagement with contacts 154 and 152 to the other end of the tube, during the course of which travel, the mercury momentarily makes contact between contacts 153 and 154. This momentary closing of contacts 153 and 154 of switch 149 energizes solenoid 135 for a sufficient period to produce a single actuation of solenoid plunger 136, which, in turn, actuates the pawl 131 and permits resetting of the ratchet wheel 104 through the action of spring 117. This, of course, returns cam 147 to its normal starting position of Fig. 8, which, in turn, results in opening of switch 139.

To provide for the return to the operator through coin chute 73 of a coin or coins, which, by reason of improper selection of the coin or coins, or in case the operator changes his mind with regard to the purchase before he makes an actual selection by pressing a switch button 65, I provide manually-operated coin-return mechanism immediately to be described. This manual coin-return mechanism comprises a slidably mounted push button 159 having an integrally formed bearing flange 160 that is pivoted at 161 to one arm of a bell crank 162. Another arm of the bell crank 162 is pivoted at 163 to the coin mechanism mounting plate 71 (see Fig. 2). The free end of another arm of the bell crank 162 is

pivoted at 164 to the upper end of a push rod 165, shown by dotted lines in Fig. 2 and by full lines in Fig. 10. The lower end of this push rod 165 is equipped with a laterally projecting pin 166 that works through a slot 167 in the plate 71 (see particularly Fig. 2) and overlies the rear upper portion of the hopper 69. The bell crank 162 and push rod 165 are biased toward their upper inoperative positions, shown in Figs. 2 and 10, by a pair of coil tension springs 168 (see Figs. 2 and 10). With this arrangement, whenever the push button 159 is inwardly pressed from the position shown in Fig. 2, the push rod 165 will be moved downwardly to bring the pin 166 at the lower end thereof into engagement with the hopper 69 and sufficiently beyond this point to cause the hopper to tip to a position whenever it will discharge into chute 73.

Of course, each time the coins are returned to the operator through manual control by manipulation of push button 159, it is imperative that the totalizer mechanism be automatically reset to its starting point, and this is automatically accomplished as follows: In this respect it will be noted that the bearing flange 160 of push button 159 is integrally formed with a laterally projecting and inwardly extending push arm 169 to the upper end of which one of the springs 168 is anchored. The head 170 of this push arm 169 normally rests upon an upper end portion of part of the bracket 171 supporting solenoid 156 and in closely spaced relation to the pivoted mounting bracket 155 of mercury switch 149. Hence, whenever the coin-return push button 159 is operated, the head 170 of push arm 169 is automatically moved into engagement with bracket 155 of switch 149, and will cause the same to rock from its position of Figs. 2 and 22 to the position of Fig. 11, except as follows: In case the mercury switch 149 is already tilted to its position of Fig. 11, when the coin-return plunger 159 is inwardly pressed, the above described mechanical actuation of switch 149 cannot take place, and in such event the delivery of a package of cigarettes will already have been initiated, and it is therefore very important that the manual return of the operator's coin or coins be made impossible. In the present illustration, this is simply accomplished by so locating the plunger 157 of solenoid 156 so that its path of travel will intersect the path of travel of the head 170 of push arm 169 at a point in the travel of the head 170 reached before the pin 166 of push rod 165 has moved into tipping engagement with the hopper 69.

One of the tricks sometimes employed on prior art machines of this type to cheat the machine is to drop into the coin channel the proper coins to properly actuate the totalizer, and to thereafter completely de-energize the machine by breaking its connection to the power source externally thereof. When the machine is electrically dead, the unscrupulous operator will manipulate the manual coin return and get repossession of coin or coins, after which he will re-energize the machine which will then deliver the goods selected. To prevent this kind of trickery in the mechanism illustrated, I provide an intermediately pivoted rock arm 172, one end of which is connected by a coil tension spring 173 to the upper end of push rod 165, and the other end of which is connected to one end of said rock arm 172. The other end of the rock arm 172 is connected by a tension link 174 to the extended arm 134 of pawl 131. Hence, whenever the coin-return plunger

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159 is manually operated while the pawl 131 is in engagement with the totalizer ratchet wheel 104, the said pawl 131 will be released from engagement with the teeth of ratchet 104 to permit recycling or return of the ratchet wheel 104 and parts movable therewith to the normal starting position of Fig. 5.

To facilitate the description of the operation, it will be seen by reference to the schematic diagram of Fig. 22 that the machine is provided with power terminals 175 and 176 that are adapted to be connected to a suitable source of potential, such as a domestic power line or the like 177, by leads 178. Also, it will be seen by reference to this figure 22 that the terminal 175 is connected in parallel to one end of each of the several solenoid windings 18 by a power lead 179 and branch leads 180. The other end of each of the solenoid windings 18 is connected by a lead 181 to a fixed contact 64 of a different but cooperating switch 61. The cooperating normally closed contacts 62 and 63 of the several switches 61 are serially connected in a lead 182 extending from terminal 179 through and having serially interposed therein contacts 142 and 141 of coin-closed totalizer switch 139. As will be seen by reference to Fig. 22, the lead 182 normally terminates in a dead end at the contact 62 of extreme right-hand switch 61 of said figure.

The electrical hook-up of the various electrical components of the machine will be described below in connection with the operation.

Operation of Figs. 1 to 16, inclusive, 22 and 24

When the terminals 175 and 176 are connected to a source of potential, the winding 95 of solenoid 93 will automatically be energized through a circuit comprising a lead 183 to one end of solenoid winding 93, a lead 184 having interposed therein now-closed contacts 152 and 154 of switch 149 and returning to terminal 176 through a portion of lead 182. As a result of the closing of the circuit through and energization of winding 95 of solenoid 93, the coin intercepting flange of valve-acting member 94 will be retracted out of the coin channel 67 and the machine will be in condition for operation, responsive to subsequent insertion by the operator of the required coin or coins into the coin-receiving channel 67.

An operator wishing to make a purchase from the machine will now place in the coin channel the required kind and number of coins which, for the purpose of the present example, will be assumed to be two United States dimes. Assuming that the required two dimes have been successively placed in the coin channel 67 while the terminals 175 are connected to a power source as indicated, they will fall straight through the coin channel and lodge in the hopper 69, but in so doing, each coin will have acted on gate element 97-98 to close switch 100 twice. As previously indicated, each closing of coin-operated switch 100 will momentarily establish a circuit through solenoid 121 comprising a portion of lead 183 from terminal 175, a short lead 185 to one end of solenoid winding 122, a lead 186 from the other end of winding 122 to fixed contact 132' of coin-operated switch 100, switch arm 102 of switch 100, a lead 187, part of lead 184 through now-closed contacts 152 and 154 of switch 149 to lead 182, and to terminal 176 through part of lead 182. This sets up two successive electrical impulses in solenoid coil winding 122, which results in two successive corresponding counter-clockwise steps of movement being imparted to

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totalizer ratchet wheel 104 and cam 147 through plunger 120, arms 109 and 110 and pawl 115. These two steps of movement of cam 147 result in closing of contacts 141 and 142 of switch 139 by the action thereon of cam 147 acting through arm 145 (see Fig. 8). This closing of cam-operated switch 139 completes lead 182 to the movable spring contact 62 of the extreme left-hand switch 61 of Fig. 22, said lead now being completed to and through the several cooperating contacts 62 and 63 of the several switches 61. For the first time, the machine is now in condition for delivery operation responsive to manipulation of a selected one of the selector switches 61.

As previously indicated, and for the purpose of the present example, it is assumed that each of the magazines 4 contains a different brand of cigarettes and that each of the push button operated switches 61 represents a different one of said magazines. Now let us assume that the operator who has already dropped his coins into the coin receiving channel 67, and having mentally made a selection of the brand of cigarettes desired, presses a push button 65 of a switch 61 representing the brand of cigarettes selected. This manual manipulation of a selected one of the selector switches 61 will immediately move the spring contact 62 of the selected switch out of engagement with its normally engaged fixed contact 63 and into closing engagement with its cooperating fixed contact 64, thereby breaking lead 182 at the selected switch and establishing a circuit as follows: Lead 182 from terminal 179 through now-closed contacts 142 and 141 of switch 139 to and through now-closed contacts 62 and 64 of the selector switch 61, a lead 181 to the solenoid winding 18 of the ejector 17 cooperating with the selector switch 61, through said winding 18 and a connected lead 180, to lead 179 and from thence to terminal 175 through said lead 179. The solenoid winding 18 of the selected ejector being now engaged, and this to the exclusion of the windings 18 of all of the other ejectors 17, will result in instantaneous upward projection to operative position, shown by dotted lines in Fig. 15 of the armature 19 and ejector pin 21 of the selected ejector 17. It will be understood that the upwardly projected ejector pin 21 will be positioned directly behind the lowermost package of cigarettes X in the magazine containing the selected brand of cigarettes, and is in position to eject the said brand of cigarettes upon subsequent advance movement of the carriage 14. The first and immediate result of the upward projection of the armature 19 and ejector pin 21 of a selected ejector 17 will be to raise the damper 52 (see particularly Fig. 15) from its lower inoperative position, shown by full lines in Fig. 15, to its operative upper position, shown by dotted lines in Fig. 15, and in which latter position the free front edge portion of the damper 52 is interlocked in the aligned lower channel 24 of the selected ejector armature 19 and the upper channels 23 of the remaining or non-selected ejector armatures 19. As previously indicated, the damper will be locked in its upper operative position, shown by dotted lines in Fig. 15, because of its engagement with stop shoulder 23' in the aligned channels 23 of the non-selected ejector armatures 19, and during such time will maintain the selected armature 19 in its operative projected position.

Upon raising to its operative dotted line position of Fig. 15, the normally open mercury switch 60 will be rocked to closed position. This clos-

ing of damper-carried mercury switch 60 simultaneously closes two circuits, to wit:

(A) A motor energizing circuit comprising a lead 188 through now-closed switch 60 and motor M to lead 183 and through part thereof to terminal 175; and

(B) Part of lead 188 from terminal 176 through switch 60 to a lead 189, and through said lead and interposed solenoid winding 156 to lead 183 and through part thereof to terminal 175.

The motor M is now rendered operative and commences advancement of the carriage 14 through operating mechanism previously described. The simultaneous energization of solenoid 156 results in upward projection of its plunger or armature 157, which, in turn, results in tipping of mercury switch 149 from its normal position to its position of Fig. 11. The first result of the said tipping of switch 149 from its position of Figs. 2 and 22 to its position of Fig. 11 is the opening of contacts 152 and 154 of switch 149 and the opening of the then-closed circuit through winding 95 of solenoid 93, and the further breaking of the circuit of solenoid 122 which is, incidentally, already broken by normally-open switch 100. Assuming that the machine is functioning normally, the coin-intercepting flange of valve-acting member 87 will now be returned to its coin-intercepting position in coin channel 67 under the yielding action of spring 91 (see Fig. 10), so that any further coins which may be inserted into the coin channel 67 during the cycle of operation now in process will be returned through branch coin channel 92 and coin chute 73. The opening of that portion of the circuit of solenoid 122 in which the contacts 152 and 154 of switch 149 are located is primarily as a safety precaution against positive sticking of valve-acting member 87 in its retracted non-intercepting position with respect to the coin channel 67, and in which event the closing of switch 100 by insertion of coins into the coin channel 67 after opening of switch contacts 152 and 154 of switch 149 will fail to close the circuit through solenoid 122 to operate the totalizer mechanism.

The second result of tipping of switch 149 from its position of Figs. 2 and 22 to its position of Fig. 11 is to momentarily close the circuit through the totalizer resetting solenoid 135 by simultaneous passage of the mercury over the parallel portions of contacts 153 and 154. This momentarily closed circuit through solenoid 135 comprises lead 183 from terminal 175, part of lead 185, a lead 190 to and through solenoid 135 to contact 153 of switch 149, momentarily closed contacts 153 and 154 of said switch 149, a portion of lead 184 and a portion of lead 182 to terminal 176. This momentary energization of solenoid 135 causes a single upward projecting movement of its cooperating plunger 136 which, in turn, releases the pawl 131 from the totalizer ratchet wheel 104 and permits return of the latter to its normal starting position shown in Fig. 5, and wherein stop pins 118 and 119 are in engagement. This return of the totalizer ratchet to its starting position is accompanied by a corresponding return movement of cam 147 to its starting position of Fig. 8, which, in its turn, results in opening of switch 139. This opening of switch 139 is, for all practical purposes, instantaneous with the manual closing of a selector switch 61 and produces a break in lead 182 making it impossible to thereafter establish a circuit through any one of the ejector solenoids 18 during this cycle of operation. In other

words, the selector mechanism is now completely dead.

During the forward advance movement of the carriage 14 under the action of motor M and transmission connections therefrom, the motor-driven cam 42 will close switch 43, thereby establishing a holding circuit for the motor M comprising a portion of lead 182 from terminal 176 to a lead 191, said lead 191 through switch 43, a portion of lead 183 through motor M, and a portion of lead 183 to terminal 175. This holding circuit for motor M is in parallel with the now complete, previously described circuit through motor M and will take over upon breaking of the initially established circuit through motor M. When the carriage approaches the extreme of its advanced delivery movement, stop arms 56 on opposite trunnions 53 of the damper 52 will contact the stationary stop projections 56 which will result in a relative rearward movement of the stop arms 56, trunnions 53 and damper 52 with respect to the carriage 14, such movement being permitted by travel of trunnions 53 in slots 54 against the action of biasing springs 57. This relative rearward movement of damper 52 results in releasing the same from its interlocked position with upper stop shoulder 23' of the several non-selected armatures 19 and the lower shoulder 24' of the single selected and projected armature 19. Upon thus being released, the damper 52 returns by gravity to its lower full-line position of Fig. 15, thereby returning switch 60 to its normal open position of Fig. 14 and permitting return of the projected ejector plunger 21 and its cooperating armature 19 to be returned under the action of gravity to its lower inoperative position of Figs. 14 and 15. It will be understood that at this time the delivery of a selected package of cigarettes will have been completed. This opening of switch 60 breaks the initially established and before-described circuit through the motor M, which latter remains in operation due to the establishment of the holding circuit described. Another result of opening of damper carried mercury switch 60 is the opening of the circuit through solenoid 156, which results in gravity retraction of its plunger or armature 157 and return of switch 149 to its normal starting position of Figs. 2 and 22. The momentary closing of contacts 153 and 154 of switch 149 produced by return of switch 149 to its starting position momentarily energizes solenoid 135 producing a single projection of plunger 136 and a momentary release of totalizer pawl 131 from ratchet 104, but this action is of no consequence since the totalizer has already been reset. However, the closing of contacts 152 and 154 of switch 149 upon return to its starting position of Figs. 2 and 22 does produce the following important results, to wit:

(A) The circuit through the solenoid 93 is again energized, which, in turn, produces a retraction of coin-intercepting flange 89 of valve-acting member 87 from the coin channel 67; and

(B) The switch 100 is again rendered operative to close the circuit through solenoid winding 122 upon insertion of a coin in the coin-receiving channel 67.

The motor-holding circuit described, still being closed, the motor continues to operate to return the carriage 14 to its retracted starting position, and when this is accomplished, the cam 42 is so angularly disposed as to permit opening of switch 43 thereby breaking the holding circuit for the motor, thereby completing one cycle of operation

and placing the machine in condition for the beginning of a new cycle.

As indicated in the description of the mechanism earlier herein, the delivery of a package of cigarettes X from any one of the magazines 4 imparts to the flap 79 and its trunnions 80 approximately 90 degrees of movement in a clockwise direction with respect to Figs. 2 and 4, which brings the rock arm 81 (see Fig. 2) into engagement with the front edge portion of hopper 89 and tips or rocks the hopper 69 in a counterclockwise direction with respect to Fig. 2 sufficiently to move the open bottom thereof out of registration with the platform 75 and into registration with the coin chute 74 leading to the coin receptacle within the machine. Hence, if the machine has successfully delivered the selected merchandise, the coin or coins inserted into the coin channel 67 and lodged in the hopper 69 will always be retained. However, and as previously indicated herein, if the machine does not deliver the selected merchandise upon advance movement of the carriage 14 to its delivery position by reason of an exhausted supply in the particular magazine normally containing the selected merchandise, the above-described rearward tipping of the hopper 69 will not take place and the coin or coins within the hopper 69 will be retained therein during the initial rearward or return movement of the carriage 14. During the return movement of the carriage, the upstanding carriage lug 86 contacts, rocks, and moves past the depending inner rock arm 85, thereby causing a counterclockwise rocking movement to be imparted to the outer rock arm 84, which latter, being in engagement with the rear edge of hopper 69, imparts a forward or clockwise oscillatory tipping movement to hopper 69 bringing the open bottom thereof out of registration with the platform 75 and into registration with coin-return chute 73. Hence, if delivery has been unsuccessful, the coin or coins deposited in hopper 69 will be retained therein until the hopper partakes of the last tipping movement on the return stroke of the carriage, and will discharge its coin or coins into the return chute 73, which delivers said coins within convenient reach of the operator. Hence, in this machine, no manual manipulation is required to obtain return of the operator's coins, should the machine fail, by reason of an exhausted supply, to deliver the goods.

Description, modification of Fig. 23

In Fig. 23, I show a modified arrangement wherein switches 61a are substituted for the switches 61 of figures previously described and shown best in Figs. 12 and 22. These switches 61a, while differing physically from the switches 61 do, nevertheless, accomplish identical functions and are, therefore, considered as the mechanical equivalents of the switches 61. Each of the switches 61a comprises the usual elongated tube or envelope 192, globule of mercury 193, a closely associated pair of contacts 194 and 195 in one end of the tube, and a closely associated pair of contacts 196 and 197 in the other end portion of the tube 192. In this arrangement, the contacts 195 and 197 of each tube are connected and made common by a lead 198, which, in reality, forms part of the power lead 182. Mercury switches 61a are pivotally mounted on the switch-board 66 at 199 and are operated by button-equipped push rods 200. Switches 61a are yieldingly biased to their normal positions, shown in Fig. 23, by coil compression springs 201.

Description, modification of Figs. 17 to 20, inclusive

In these figures, I show a modified arrangement whereby the merchandise capacity of the machine is doubled without increasing the physical dimensions of the machine and without appreciably complicating the mechanism. Referring particularly to Figs. 18 and 20, it will be seen that I provide a front row of laterally spaced parallel magazines 4a which is the equivalent of the row of magazines 4 of previously-described figures and, in addition, thereto, a rear row of magazines 4b, substantially like the row of magazines 4a, and located directly rearwardly of the latter, there being one magazine 4b directly back of each magazine 4a. Each magazine 4a and its rearwardly aligned cooperating magazine 4b are provided with common unbroken bottom-forming flanges 8a, which, in cross-section, are substantially identical to the flanges 8 of the previous figures. It will be noted that the front portions of these bottom-forming flanges 8a forming the bottoms of the magazines 4a are in a slightly higher plane than most portions of flanges 8a forming the bottoms of magazines 4b, and are connected by inclined portions 202. The front of each magazine 4a is provided with a discharge passage 203, which is the equivalent of the discharge passage 5' of previous figures. Additionally, however, each magazine 4a is provided in the common rear wall 5a of the several front magazines 4a with a receiving passage 204 in alignment with the discharge passage 203 in the front thereof. Each magazine 4b of the rear row of magazines is provided in the common front wall 205 of the several magazines 4b with a discharge passage 206, and in its rear with a receiving passage 207, the passages 206 and 207 being aligned with one another and the passages 203 and 204 of the cooperating forwardly adjacent magazine 4a. For the purpose of the present example, it is assumed that the several magazines 4a and 4b will each be filled with suitable merchandise units, such as cigarette packages X. For the purpose of the present example, it will be assumed that each forwardly and rearwardly spaced pair of magazines will contain a like brand of cigarettes differing from the brands in other forwardly and rearwardly spaced pairs of magazines 4a and 4b. In this instance, the magazines 4a and 4b are mounted between laterally spaced parallel side plates 11a, which are broadly equivalents to the side plates 11 of previously-described figures, but which have integrally-formed downwardly extending portions 208, which serve as legs and connect to a mounting base 208'.

Mounted for horizontal forward and rearward sliding movements below the bottoms of the several magazines 4a and 4b is a carriage 14a, which is broadly the equivalent of the carriage 14 in previously-described figures. This carriage is provided with wheels or rollers 209 at its opposite ends, which run over the bottom flanges 210 of inwardly opening guide channels 211.

The carriage 14a is forwardly and rearwardly reciprocated in the manner of the carriage 14 of previous figures by mechanism comprising a motor M' driving a crank-acting disc 212 through speed-reducing mechanism, not shown, but contained within a transmission case 213, a low-speed shaft 214, on which the crank-acting disc 212 is directly mounted, a pitman arm 215, a short rock arm 216, and a long rock arm 217. The rock

arms 216 and 217 are mounted on a rock shaft 218 journaled in extensions 208. The pitman arm 215 extends from the crank-acting disc 212 to the outer end of short rock arm 216, and the upper end of long rock arm 217 is pivotally connected to the carriage 14a at 219. For the sake of simplicity of illustration, only one rock arm 217 has been shown, but in practice, there would be one at each end of the carriage. With the mechanism described, the carriage 14a is forwardly and rearwardly reciprocated in exactly the same manner as is the carriage 14 of previously-described figures and has the same throw.

Mounted on the underside of the top plate 220 of the carriage 14a is a plurality of electromagnetically-operated ejectors each indicated as an entirety by 17a, and of which there is one for each forwardly and rearwardly aligned pair of magazines 4a and 4b. The ejectors 17a each comprise a solenoid 18a corresponding to solenoid 13 of previously-described figures, a reciprocatory armature 19a corresponding to the armature 19 of previously-described figures and rigidly carrying an ejector pin 21a corresponding to the ejector pin 21 of previously-described figures. The head of the armature 19a is indicated by 20a, the lower annular channel thereof by 24a and the upper annular channel thereof by 23a. The ejectors 17a each further comprise a forwardly and rearwardly spaced pair of projectable and retractable elements 221 and 222 that are integrally formed with and connected for common movements by rigid bar 223. The rigid arm 223 of each ejector 17a normally rests on the upper surface of the top plate 220 (see particularly Figs. 18 and 21) and has its intermediate portion disposed over the upper end of the cooperating ejector pin 21a. The upwardly ejecting projector elements 221—222 of each of the several ejectors 17a work through suitable guide apertures in a bridge plate 224 mounted fast on the carriage 14a.

In a retracted position of the carriage 14a (see Fig. 17), the ejector elements 221 and 222, respectively, lie in vertical planes somewhat rearward of their cooperating magazines 4a and 4b and the packages of cigarettes X therein. The ejector elements 221 and 222 are normally gravity retracted to the position shown in Fig. 17, and when so retracted, the upper ends thereof are disposed below the horizontal planes of the bottoms of their cooperating magazines 4a and 4b. When the winding 18 of any one ejector 17a is energized, the armature 19a, ejector pin 21a and ejector elements 221 and 222 will be projected, as shown by full lines in Fig. 18, so that the upper ends of the ejector elements 221 and 222 are then disposed in paths through the aligned cooperating magazines 4a and 4b.

Operation, Figs. 17 to 21, inclusive

With the arrangement described in connection with Figs. 17 to 21, inclusive, the windings 18a of each ejector 17a will be connected in a selector circuit corresponding to the selector circuit described in connection with the ejector 17 of previously-described figures and the entire electrical hook-up of the machine will, in fact, be identical with the electrical hook-up of previously described figures. With this arrangement, whenever the winding 18a of an ejector 17a is energized, the ejector elements 221 and 222 will be projected, as shown in Fig. 18, and the projected armature 19a of the selected ejector 17a will be locked in its upper position by the damper 52a, which corresponds exactly to the damper 52 of

previously described figures. This damper, of course, will also lock the plungers 19a of the non-selected ejectors 17a against upward projecting movements. With the form of the invention shown in Figs. 17 to 21, inclusive, whenever a selection is made by manipulation of a selector switch 61, the ejector elements 221—222 of the selected ejector 17a will be projected to the operative position of Fig. 18 while the carriage 14a is at rest in its retracted position, shown in Fig. 17, and will be retained in this position during the subsequent advance movement of the carriage to its dotted line position of Fig. 17. During this forward movement of the carriage, the projected ejector element 221 of the selected ejector 17a will engage the rear portion of a package of package X above the bottom package in the magazines 4a, and the cooperating projected ejector element 222 will simultaneously engage the rear of the bottom package of cigarettes X in the cooperating rear magazine 4b.

Under continued forward movement of the ejector carriage 14a, the ejector element 221 will slide the engaged package of cigarettes in a magazine 4a out through the discharge opening 203 of the magazine 4a where it will be discharged into chute 3a corresponding to chute 3 of previously described figures, and the projected ejector element 222 will impart a corresponding degree of forward sliding movement to the package of cigarettes in the cooperating rear magazine 4b. This corresponding forward sliding movement of the bottom package of cigarettes in the rear magazine 4b will move the said rear package of cigarettes X from the rear magazine through the discharge opening 206 thereof and into the cooperating front magazine 4a through the receiving opening 204 thereof. By reference to Fig. 17, it will be seen that the cooperating front and rear magazines 4a and 4b are so spaced that the package of cigarettes X from the rear magazine will enter the front magazine 4a while the cigarette package X above the bottom package in the front magazine 4a is still supported above the bottom by the bottom package of cigarettes in that magazine. Due to the slight difference in elevation between the bottom 8a of the front magazine 4a and the bottom 8a of the rear magazine 4b, the package of cigarettes from the rear magazine will initially enter the front magazine 4a without resistance from the packages of cigarettes X supported by the bottom package thereof in the front magazine 4a. With the arrangement illustrated, the bottom package of cigarettes from the rear magazine 4b is simply moved into position to take the place of the package of cigarettes discharged from the front of the front magazine 4a during the same cycle of operation. Hence, the front magazine 4a will remain filled to capacity until its cooperating rear magazine 4b has exhausted its supply of cigarette packages X, after which the machine will function just as does the machine of previously-described figures.

What I claim is:

65 In a machine of the class described, a magazine for merchandise to be dispensed, electrically-operated delivery mechanism for effecting delivery of a predetermined amount of merchandise from the magazine for each cycle of operation, said delivery mechanism comprising an electric motor, a normally open initiating circuit for said motor, a control circuit for said initiating circuit comprising normally open serially connected first and second switches, the closing of the initiating circuit being dependent upon and responsive to

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coincidental closing of the said first and second switches, coin controlled mechanism for closing the first switch responsive to payment of predetermined money in coin, the said coin-controlled mechanism comprising a switch actuating device having a normal switch open position and an operative switch closed position, means yieldingly biasing said device toward its normal position, means releasably retaining said device in its operative switch closed position, mechanism responsive to the said coincidental closing of the first and second switches to reset the switch actuating device of the coin controlled mechanism to its normal switch open position immediately upon initiation of delivery mechanism operation, means defining a transfer station for temporary retention of coins after they have acted upon the coin controlled mechanism, means defining a coin return station, a depository internally of the machine, a mechanism for delivering coins from the transfer station to the depository responsive to operation of the delivery mechanism, and manually operated mechanism

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for releasing the releasable means for retaining the coin controlled mechanism for the first switch in its operative switch closed position prior to closing of the control circuit to permit return of the first switch to its open position and for simultaneously returning coins from the transfer station to the coin return station.

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