United States Patent

Stevens

[15] **3,655,109**

[45] **Apr. 11, 1972**

[54] STAMP DISPENSING MACHINE

[72] Inventor: **Bernard Stevens,** Skokie, Ill.

[73] Assignee: **General American Transportation Corporation,** Chicago, Ill.

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[21] Appl. No.: **845,258**

[52] **U.S. Cl.** **226/46,** 226/135, 226/76, 226/100

[51] **Int. Cl.** **B65h 25/00**

[58] **Field of Search** 226/135, 76, 46, 47, 134

[56] **References Cited**

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Primary Examiner—Allen N. Knowles

Attorney—Prangley, Clayton, Mullin, Dithmar & Vogel

[57] **ABSTRACT**

A coin-actuated machine including a plurality of dispensing modules dispenses one or more perforated strips of stamps from rolls, each module comprising a feed wheel having rows of evenly spaced projections for engaging the associated strip at the interstamp perforations and moving it past a solenoid-operated cutter, a shaded-pole electric motor for driving the feed wheel in a stepwise fashion through a Geneva cam mechanism and for intermittently operating a stepping switch and counter, a control circuit cooperating with the stepping switch for stopping the machine when a predetermined number of stamps has been dispensed, and a lock engaging the feed wheel either after each intermittent operation thereof or after each dispensing cycle.

18 Claims, 17 Drawing Figures

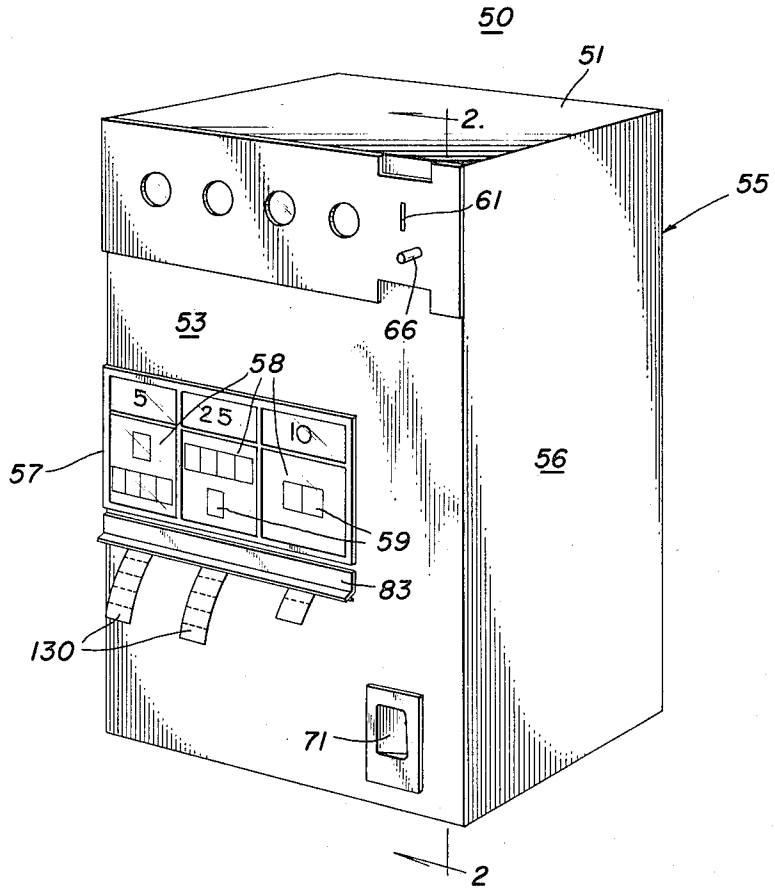


FIG. 1

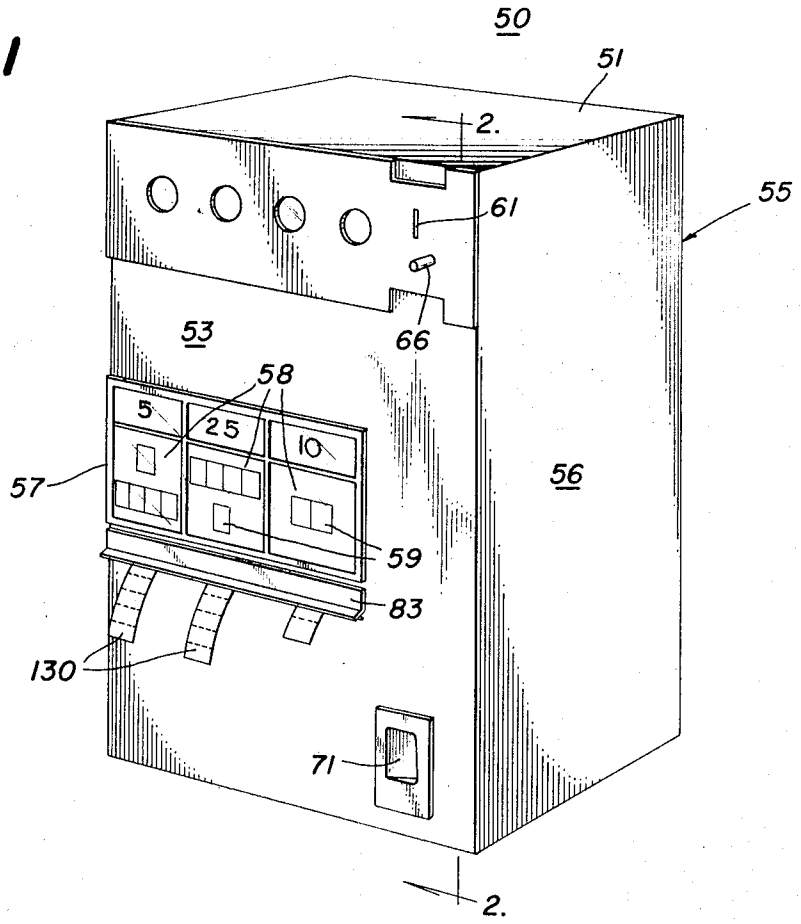
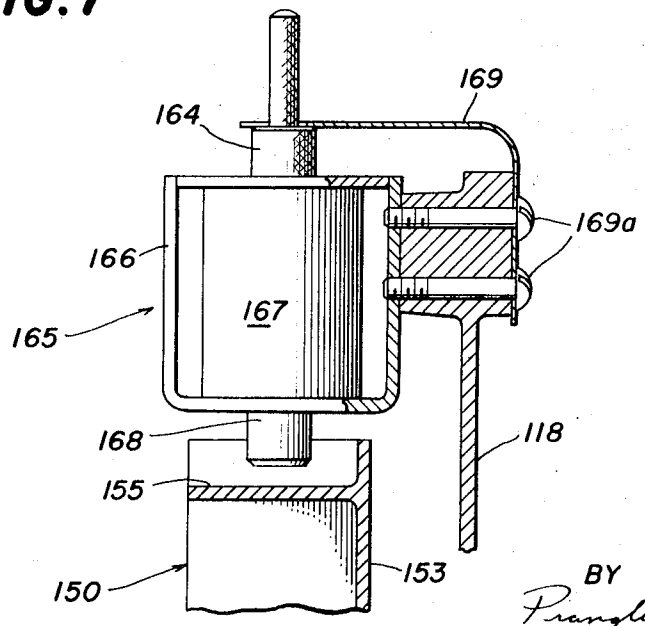


FIG. 7



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Dithmar & Vogel
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FIG. 2

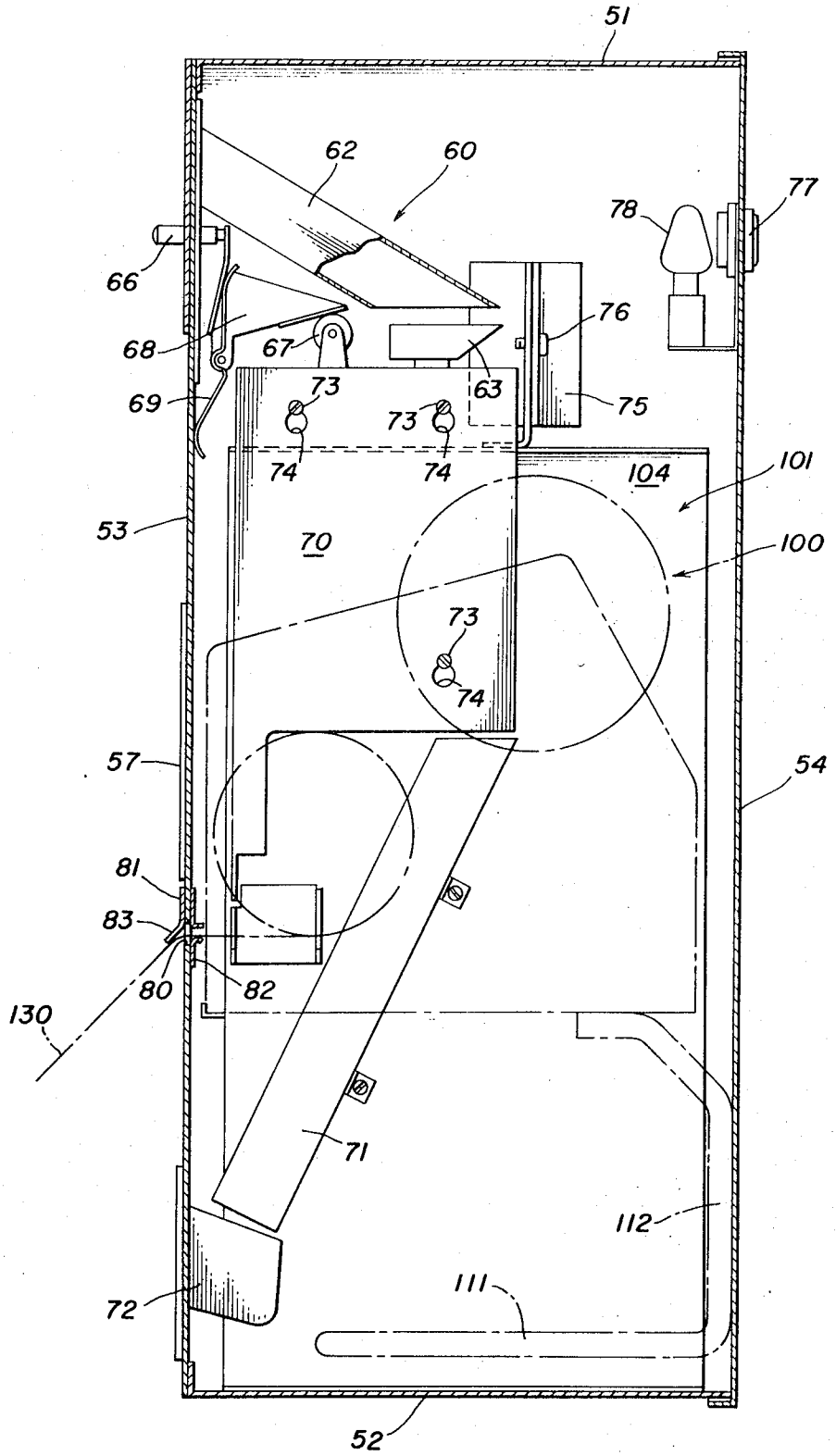

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FIG. 3

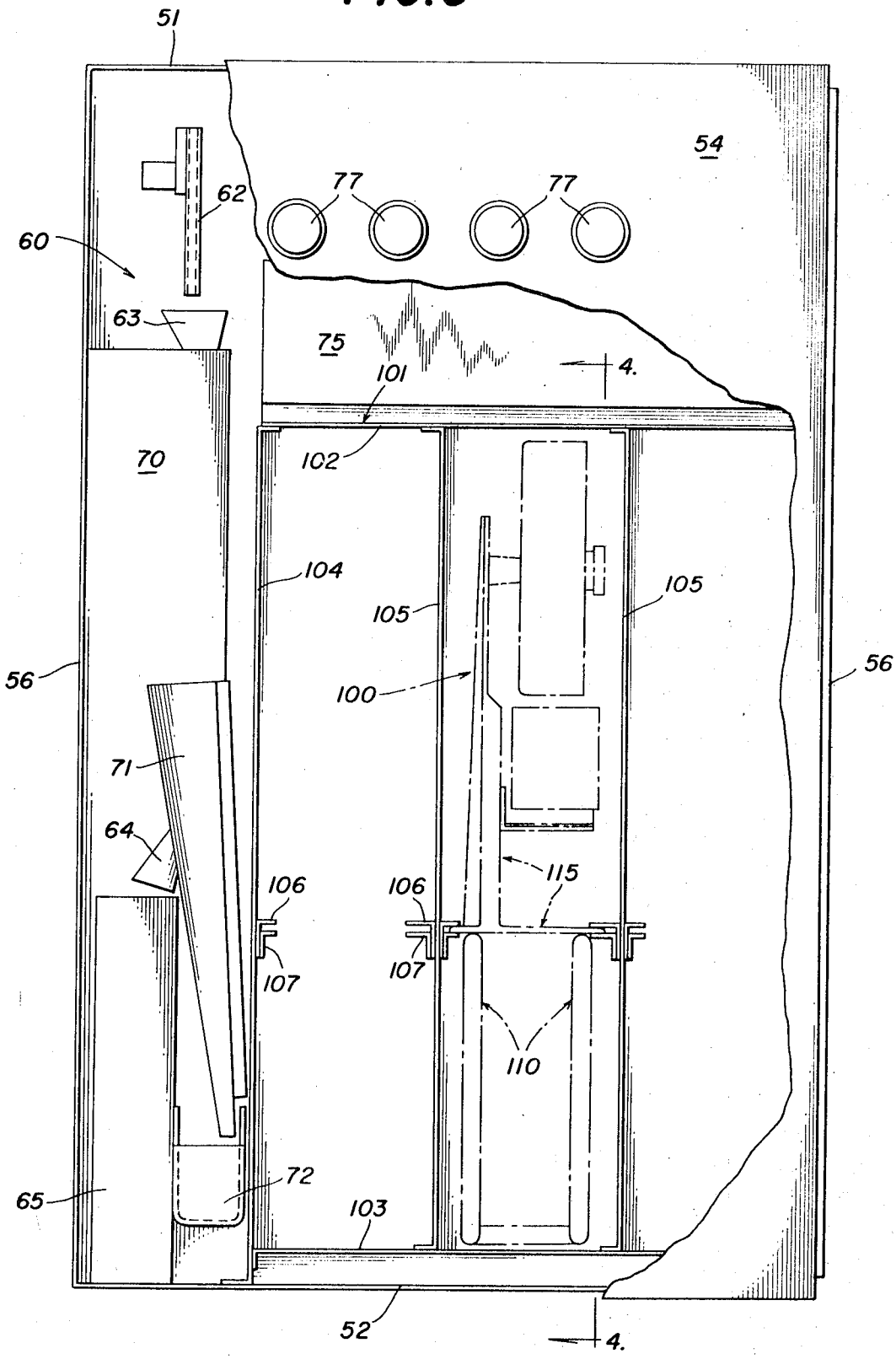

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FIG. 4

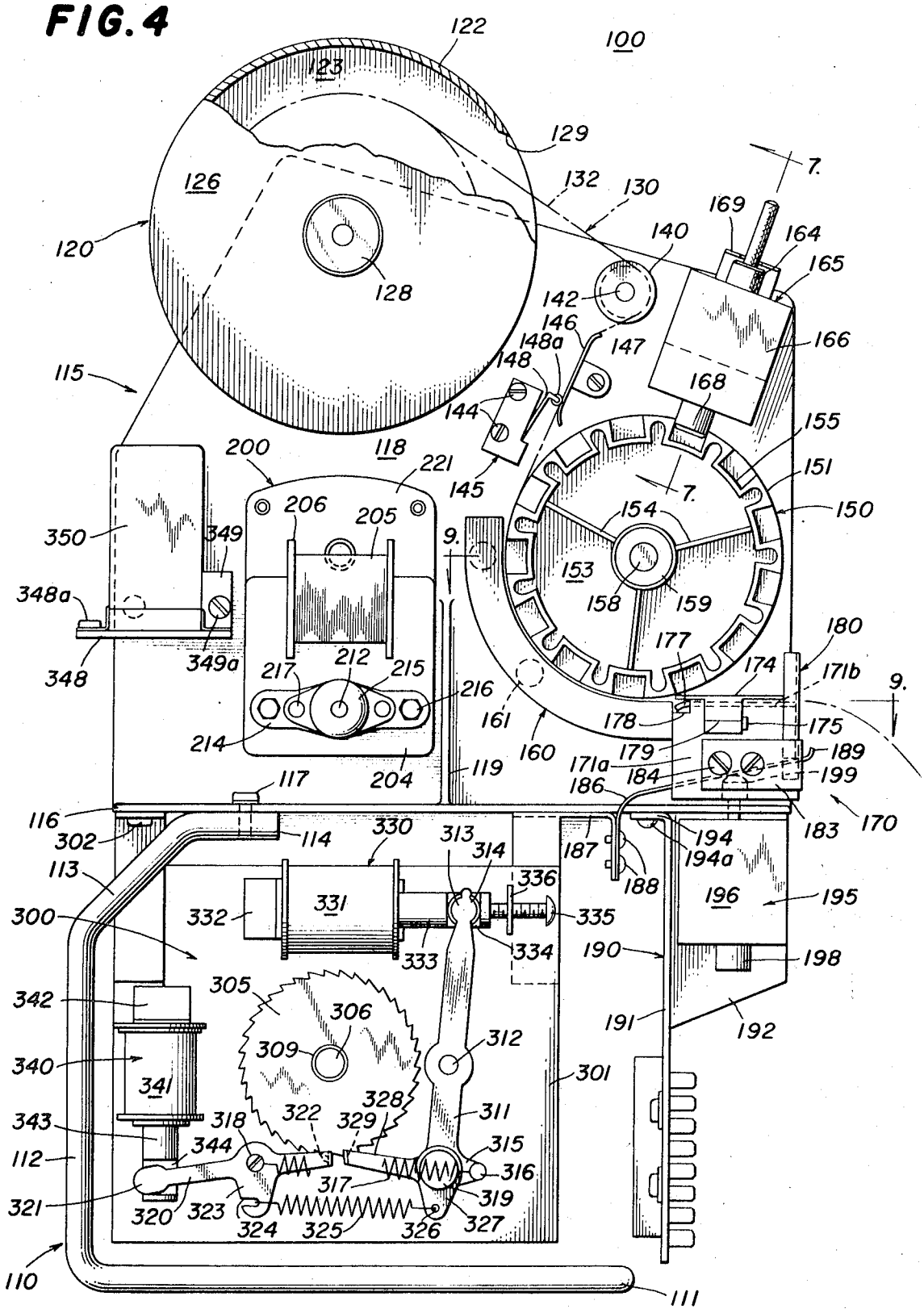

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FIG. 5

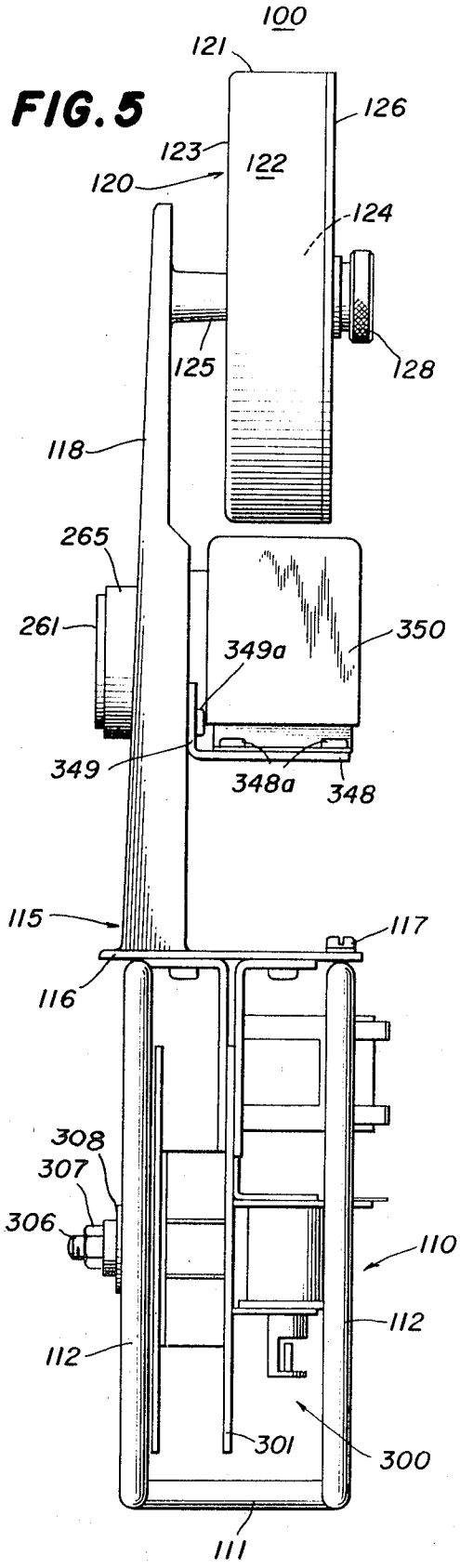

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FIG. 6

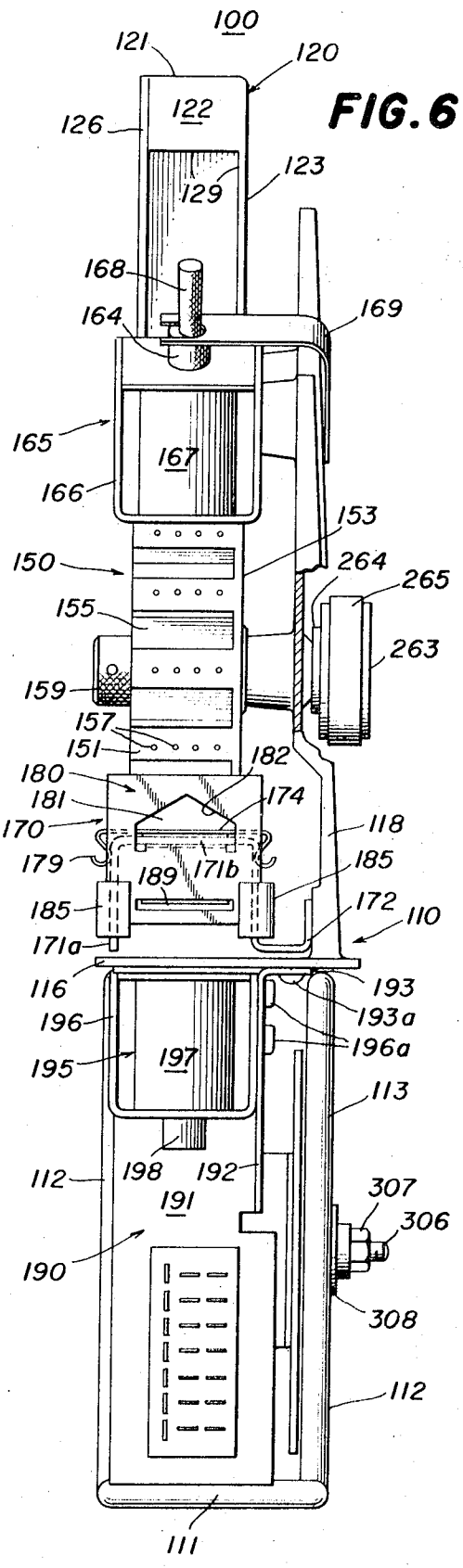

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FIG. 8

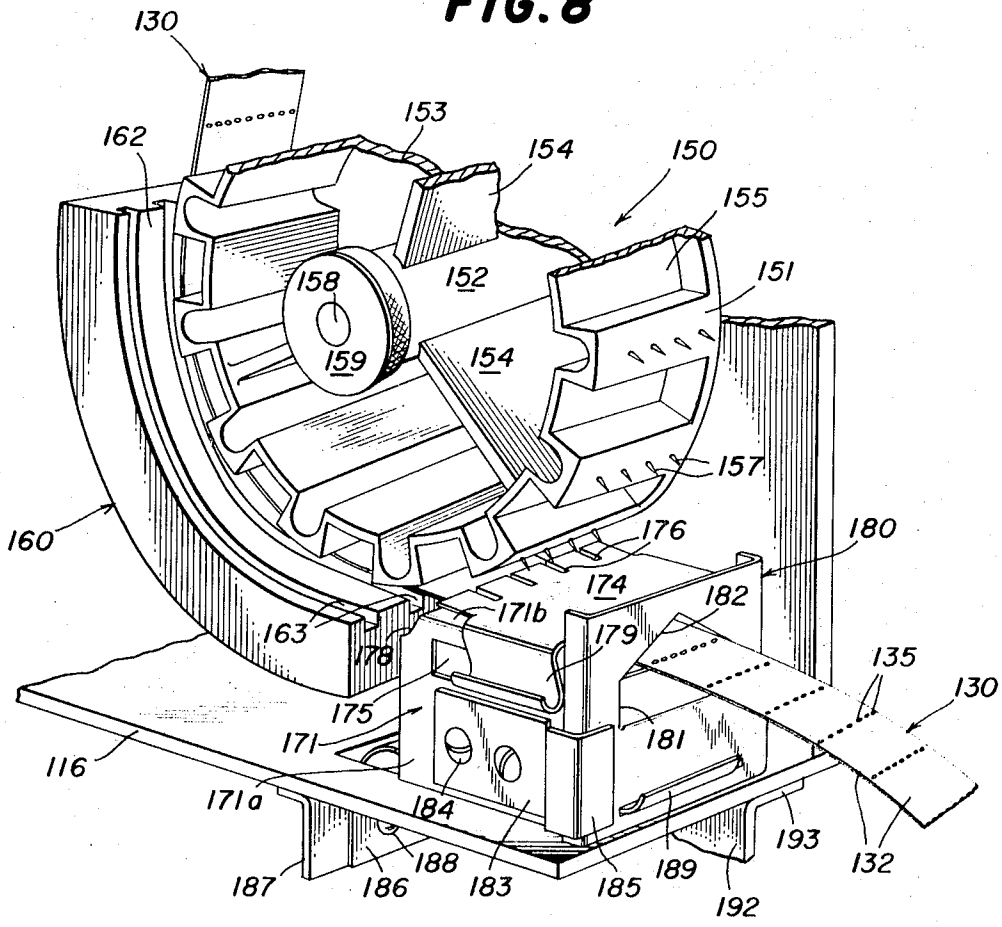

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FIG. 9

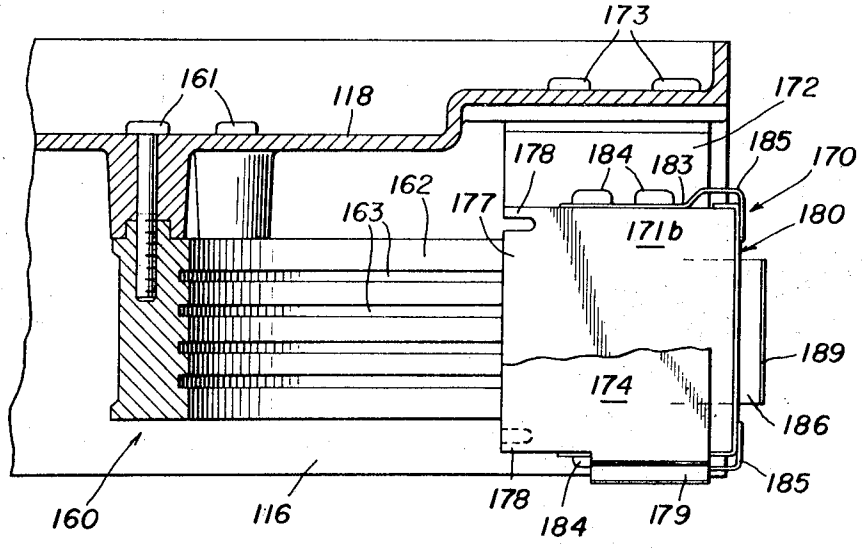

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FIG. 10

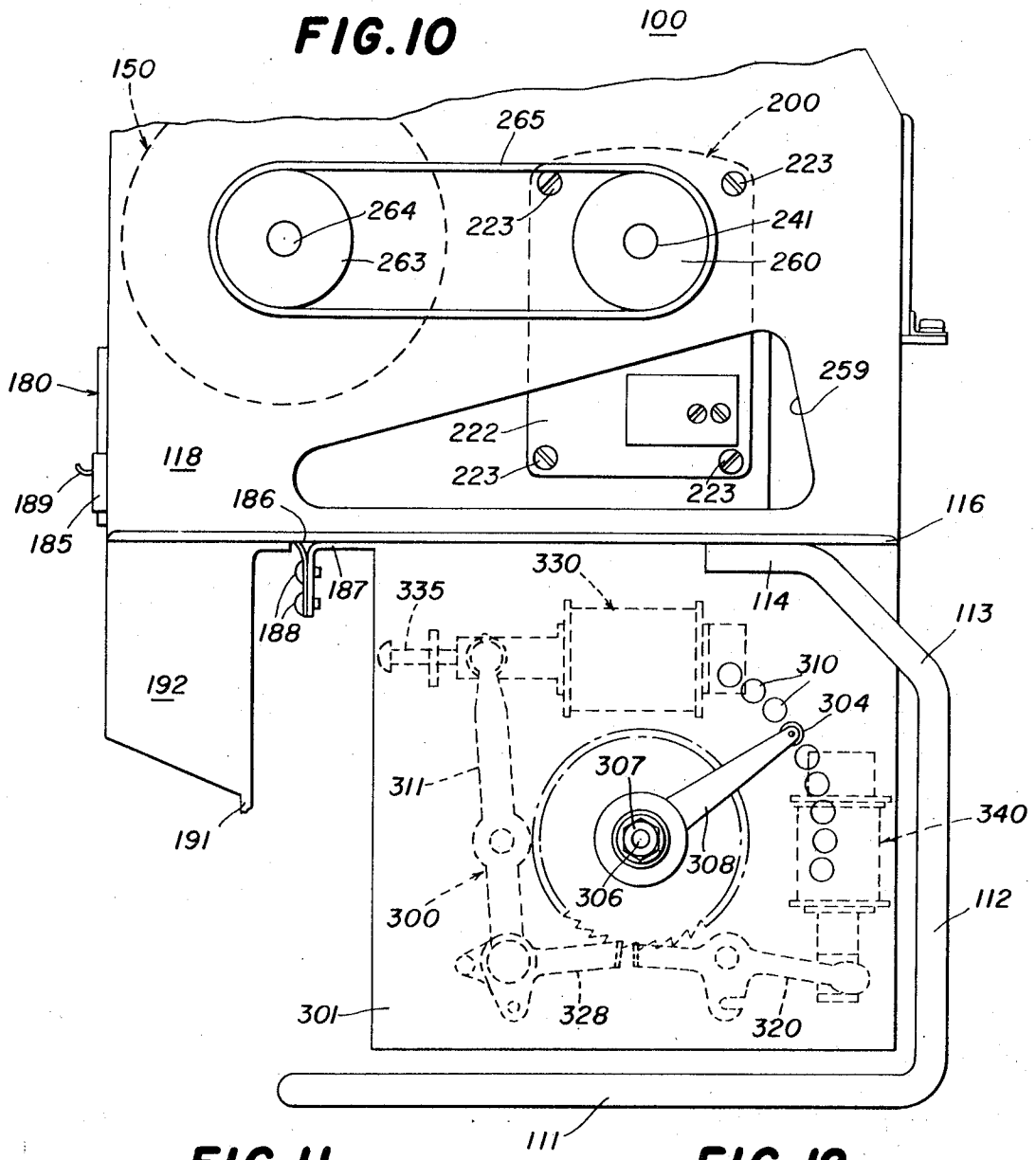


FIG. 11

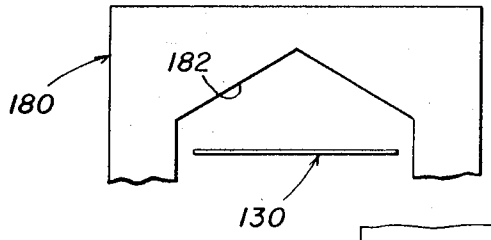
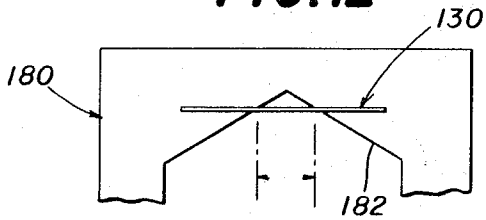


FIG. 12



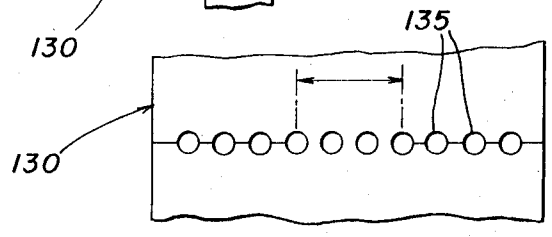


FIG. 13

FIG. 15

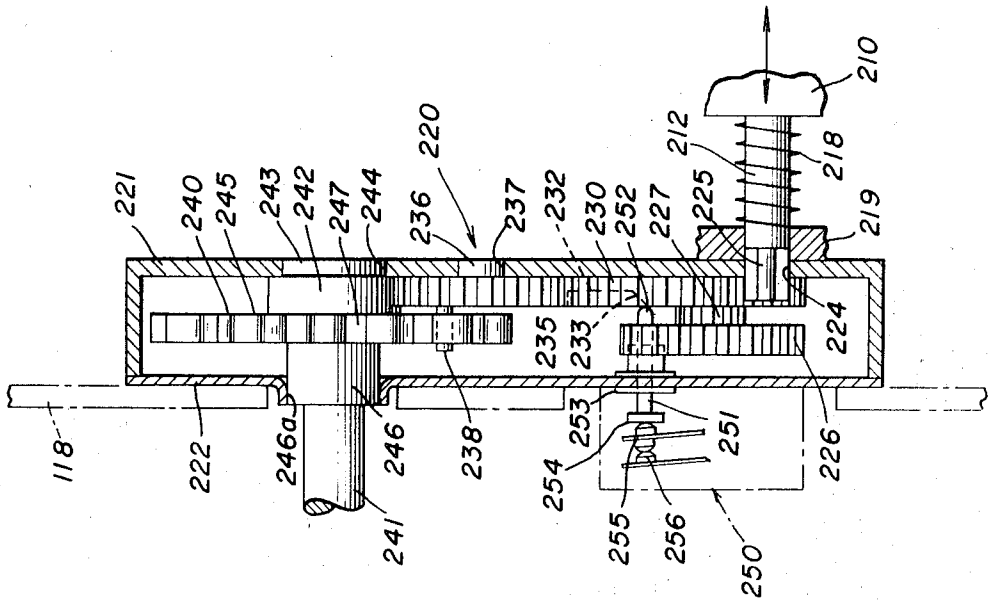
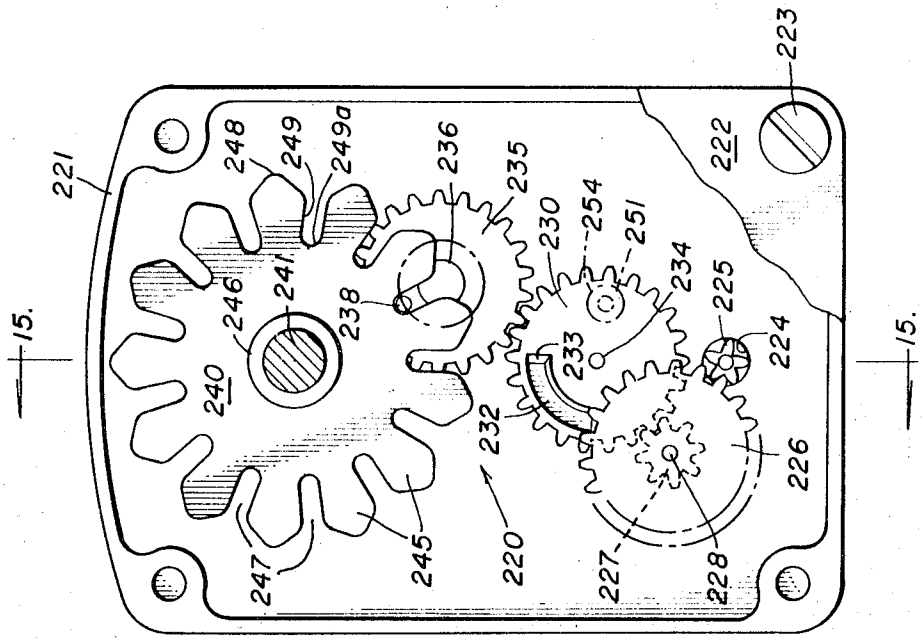
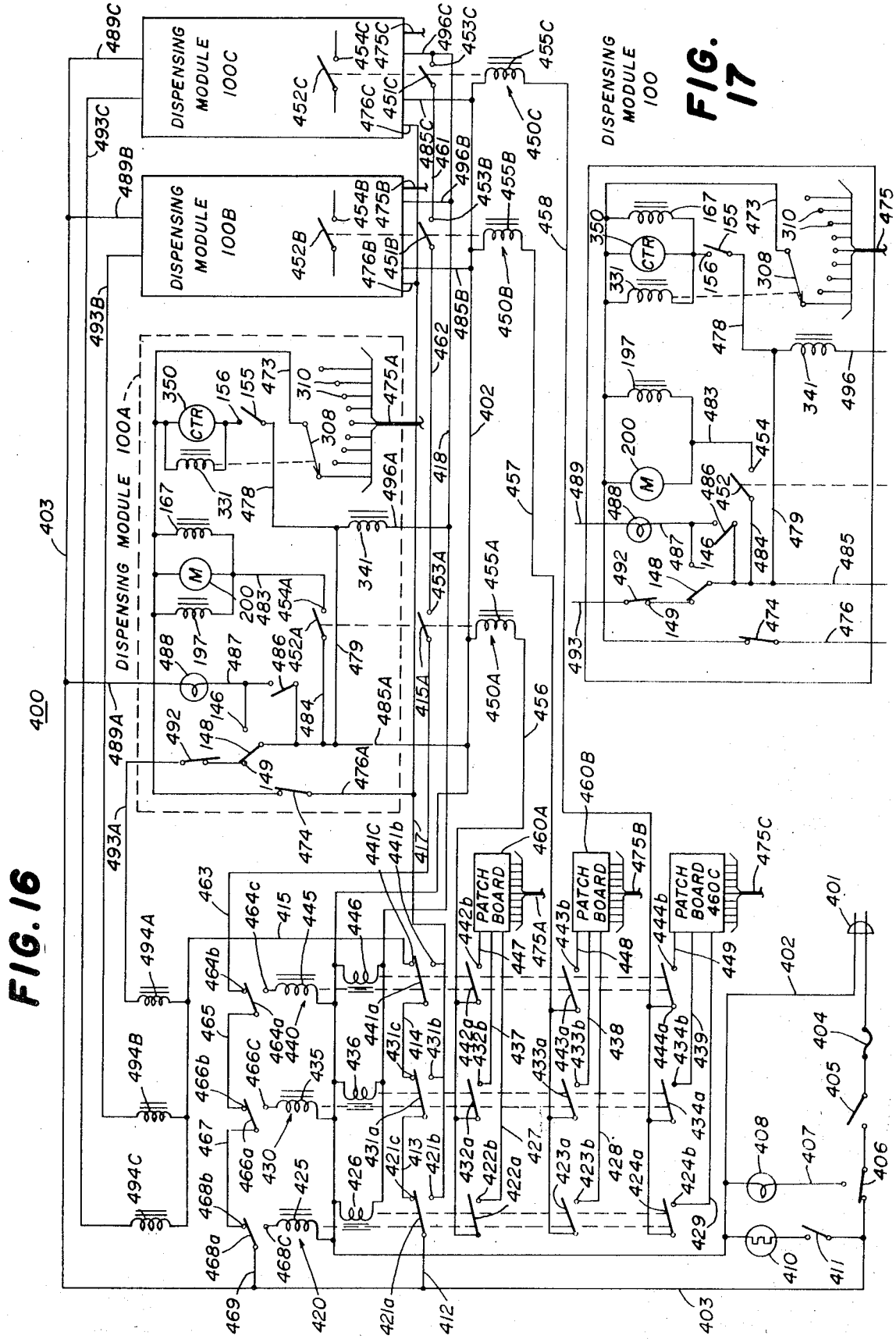

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FIG. 14


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DISPENSING MODULE 100C
DISPENSING MODULE 100B
DISPENSING MODULE 100A
DISPENSING MODULE 100
PATCH BOARD
PATCH BOARD
PATCH BOARD 460C
CTR
M
400
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421a
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FIG. 16
FIG. 17

STAMP DISPENSING MACHINE

This invention relates to machines for dispensing units of material from perforated strips of such units. In particular, this invention relates to coin-actuated apparatus for dispensing a predetermined number of units from a strip thereof.

It is a general object of this invention to provide an apparatus for dispensing a predetermined number of units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, the apparatus providing smooth controlled motion of the strip, an error-free dispensing count and protection against unauthorized dispensing of the units.

An important object of this invention is to provide a dispensing apparatus of the type set forth, the apparatus comprising a main supporting frame, a strip magazine carried by the frame, a dispensing outlet providing an opening for delivery of the strip to the exterior of the apparatus, feed structure mounted on the frame for stepwise feeding of the strip from the magazine to the dispensing outlet, drive mechanism mounted on the frame and coupled to the feed structure for stepwise operation thereof to feed the strip a distance equal to one unit, a counter for counting the number of stepwise operations of the feed structure and thus the number of units dispensed by the apparatus, and a control circuit coupled to the drive mechanism and the counter, the control circuit being responsive to a predetermined number of operations of the counter corresponding to the predetermined number of the units to be dispensed from the magazine for interrupting the operation of the drive mechanism and thus interrupting the dispensing of the units.

Another object of this invention is to provide a dispensing apparatus of the type set forth, the apparatus comprising a main supporting frame, a strip magazine carried by the frame, a dispensing outlet providing an opening for delivery of the strip to the exterior of the apparatus, a feed member mounted on the frame for feeding the strip from the magazine to the dispensing outlet, the plurality of transverse rows of projections carried by and extending outwardly from the feed member and spaced apart longitudinally of the feed member a distance equal to an integral number of the units, the projections in each of the rows being spaced apart transversely of the member a distance equal to an integral number of the perforations of the strip, mechanism for holding a portion of the strip in engagement with a plurality of the rows of projections of the feed member with the projections extending into the corresponding rows of perforations of the strip, and drive mechanism mounted on the frame and coupled to the feed member for operation thereof to feed the strip from the magazine to the dispensing outlet.

In connection with the foregoing object, still another object of this invention is to provide a dispensing apparatus of the type set forth wherein the feed member comprises a cylindrical feed wheel rotatably mounted on the frame and wherein the plurality of transverse rows of projections are spaced apart circumferentially of the feed wheel.

In connection with the foregoing objects, yet another object of this invention is to provide a dispensing apparatus of the type set forth wherein the rows of projections extend outwardly from the feed member a predetermined distance and wherein the mechanism for holding a portion of the strip in engagement with the projections of the feed member comprises a holding shoe spaced from the feed member a distance no greater than the predetermined distance and shaped complimentary to the adjacent surface of the feed member for supporting the strip in engagement with a plurality of the rows of projections of the feed member.

In connection with the foregoing objects, it is another object of this invention to provide a dispensing apparatus of the type set forth wherein the feed member comprises a cylindrical feed wheel rotatably mounted on the frame for feeding the strip from the magazine to the dispensing outlet and wherein the holding shoe is arcuate in shape, the concave surface of the holding shoe having a plurality of equidistantly spaced-apart grooves therein extending circumferentially thereof and

being equal in number to the number of projections in each row on the feed wheel for receiving the outer ends of the projections when they are in engagement with the strip.

In connection with the foregoing object, it is another object of this invention to provide a dispensing apparatus of the type set forth, and further including a counter for counting the number of stepwise operations of the feed wheel and thus the number of units dispensed by the apparatus and a control circuit coupled to the drive mechanism and the counter, the control circuit being responsive to a predetermined number of operations of the counter corresponding to the predetermined number of units to be dispensed from the magazine for interrupting the operation of the drive mechanism and thus interrupting the dispensing of the units.

It is another object of this invention to provide an apparatus for dispensing a predetermined number of units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, the apparatus comprising a main supporting frame, a strip magazine carried by the frame, a dispensing outlet providing an opening for delivery of the strip to the exterior of the apparatus, feed structure mounted on the frame for feeding of the strip from the magazine to the dispensing outlet, drive mechanism mounted on the frame and coupled to the feed structure for operation thereof, lock structure comprising a first lock member carried by the feed structure and a second lock member carried by the frame, lock operating means for moving the first and second lock members into and out of engagement with each other, and a control circuit coupled to the drive mechanism and the lock operating means, the control circuit being responsive to the initiation of operation of the feed structure for moving the lock members out of engatement with each other and being responsive to the feeding of the predetermined number of units by the feed structure for moving the lock members into engagement with each other, whereby the feed structure is operable to dispense the predetermined number of units when the lock members are out of engagement with each other and is inoperable when the lock members are in engagement with each other.

In connection with the foregoing object, it is another object of this invention to provide a dispensing apparatus of the type set forth wherein the feed structure is operated stepwise by the drive mechanism to feed the strip a distance equal to one unit and further including a counter for counting the number of stepwise operations of the feed structure and thus the number of units dispensed by the apparatus, the control circuit being coupled to the drive mechanism and the counter and the lock operating means, the control circuit being responsive to a predetermined number of operations of the counter corresponding to the predetermined number of units to be dispensed from the magazine for interrupting the operation of the drive mechanism and thus interrupting the dispensing of the units, the control circuit being responsive to the initiation of operation of the feed structure for moving the lock members out of engagement with each other and being responsive to the interruption of operation of the drive mechanism after the predetermined number of units has been dispensed for moving the lock members into engagement with each other, whereby the feed structure is operable to dispense the predetermined number of units when the lock members are out of engagement with each other and is inoperable when the lock members are in engagement with each other.

In connection with the foregoing object, it is still another object of this invention to provide a dispensing apparatus of the type set forth wherein the control circuit is responsive to the stepwise operation of the feed structure for moving the lock members out of engagement with each other immediately prior to each of the stepwise operations and for moving the lock members into engagement with each other immediately after each of the stepwise operations for preventing movement of the feed structure between the stepwise operations thereof.

Still another object of this invention is to provide an apparatus of the type set forth wherein the outer surface of the

feed wheel has a plurality of recesses therein spaced alternatively with the transverse rows of projections, and further comprising a locking solenoid including a movable armature mounted on the frame adjacent to the feed wheel and coupled to the control circuit, the armature of the locking solenoid being movable into and out of the recesses in the feed wheel, the control circuit being responsive to the initiation of operation of the feed wheel for moving the armature of the locking solenoid out of the adjacent recess in the feed wheel and being responsive to the feeding of the predetermined number of units by the feed wheel for moving the armature of the locking solenoid into the adjacent recess of the feed wheel for preventing further operation thereof.

A further object of this invention is to provide an apparatus of the type set forth, wherein the drive mechanism includes a motor having a drive shaft coupled thereto, a reduction gear train including a drive gear and at least one driven gear and being driven by the drive shaft for reducing the output speed thereof, a drive member carried by the gear train, a Geneva cam output shaft intermittently driven in rotary fashion by the drive member, and means coupling the Geneva cam output shaft to the feed structure for stepwise operation thereof to feed the strip a distance equal to one unit.

Yet another object of this invention is to provide an apparatus of the type set forth, and further including a coin-actuated starting switch, a coin chute for carrying coins to the starting switch, coin diverting means disposed in the coin chute and having first and second conditions, the coin diverting means in the first condition thereof allowing coins to pass to the starting switch and in the second condition thereof diverting coins away from the starting switch, and a control circuit coupled to the drive mechanism and the counter and the coin diverting means, the control circuit being responsive to the actuation of the starting switch for beginning operation of the drive mechanism and the feed structure and the counter and for operating the coin diverting means for the first condition to the second condition thereof to prevent further actuation of the starting switch while the dispensing apparatus is in operation, the control circuit being responsive to a predetermined number of operations of the counter corresponding to the predetermined number of the units to be dispensed from the magazine for interrupting the operation of the drive mechanism and thus interrupting the dispensing of the units and for operating the coin diverting means from the second condition to the first condition thereof to permit initiation of another dispensing operation.

It is another object of the invention to provide an apparatus for dispensing a predetermined number of units from any of several strips each having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, the apparatus comprising a plurality of dispensing modules, each of the modules being of the type set forth, and further including program means coupled to each of the control circuits for selective operation of the dispensing modules individually and simultaneously.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a dispensing apparatus according to this invention and including three dispensing modules;

FIG. 2 is an enlarged view in vertical section taken along the line 2—2 in FIG. 1;

FIG. 3 is an enlarged rear elevational view of the dispensing apparatus of FIG. 1 with a portion of the back panel cut away;

FIG. 4 is a further enlarged view of one of the dispensing modules taken along the line 4—4 in FIG. 3;

FIG. 5 is a side elevational view of the left side of the dispensing module as shown in FIG. 4;

FIG. 6 is a side elevational view of the right side of the dispensing module as shown in FIG. 4;

FIG. 7 is an enlarged view of the locking solenoid in partial section taken along the line 7—7 in FIG. 4;

FIG. 8 is an enlarged fragmentary perspective view of the feed mechanism and cutter assembly of the dispensing module of FIG. 4 with the holding shoe exploded away from the feed wheel;

FIG. 9 is an enlarged sectional view of the holding shoe and cutter assembly taken along the line 9—9 in FIG. 4;

FIG. 10 is a fragmentary rear elevational view of the dispensing module as shown in FIG. 4;

FIG. 11 is an enlarged fragmentary view of the cutter blade in the raised position;

FIG. 12 is an enlarged fragmentary view of the cutter blade in the cutting position;

FIG. 13 is an enlarged view of a portion of the strip indicating the perforations which are severed by the cutter blade;

FIG. 14 is an enlarged rear elevational view of the gear train housing as shown in FIG. 4 with the cover plate partially cut away to expose the gear train;

FIG. 15 is a view of the drive train in vertical section taken along the line 15—15 in FIG. 14;

FIG. 16 is a schematic diagram of the electrical control circuit of a three-module dispensing apparatus according to one embodiment of the invention; and

FIG. 17 is a schematic diagram of the control circuit of one of the dispensing modules of FIG. 16 according to an alternative embodiment of the invention.

Referring to FIGS. 1 to 3 of the drawings, there is shown a stamp dispensing apparatus, generally designated by the numeral 50, according to this invention. While the dispensing apparatus 50 is adapted for dispensing units of any type which are arranged in transversely perforated webs or strips, e.g., postage stamps, trading stamps, tickets etc., for the sake of simplicity the term "stamps" alone will be used hereinafter in the specification, and it should be understood that this term embraces all units arranged in perforated strips or webs. The dispensing apparatus 50 is housed in an upstanding substantially box-like cabinet 55 comprising a top wall 51, a bottom wall 52, a front wall 53, a rear wall 54 and a pair of opposed side walls 56. The rear wall 54 is preferably hinged at one side to form a door providing access to the cabinet 55. On the front wall 53 of the cabinet 55 is mounted a face plate 57 providing a plurality of display windows 58 in which samples 59 of the different denomination stamps to be dispensed may be displayed. Mounted inside the cabinet 55 adjacent to the top thereof is a standard coin mechanism, generally designated by the numeral 60, and including a coin slot 61 in the front wall 53 for a deposit of coins into the dispensing apparatus 50. The coin slot 61 communicates with a downwardly and rearwardly extending coin chute 62 having a substantially rectangular cross section. The lower end of the coin chute 62 overlies a coin receiving hopper 63 which in turn communicates with a coin control unit 70. Depending from the lower end of the coin control unit 70 is a coin collecting chute 64 which leads into a coin collecting box 65 for accumulation of deposited coins. Extending outwardly from the front wall 53 of the cabinet 55 is a coin return button 66 which is movably disposed through an opening in the front wall 53. A coin return lever 68 is pivotally mounted within the cabinet 55 and is yieldably held in engagement with the inner end of the coin return button 66 by a spring member 69. The lever 68 also engages a coin reject release arm 67. A coin return chute 71 extends downwardly and forwardly from the bottom of the coin control unit 70 and empties into a coin return cup 72 which communicates with the front of the dispensing apparatus 50 through an opening in the front wall 53. The coin control unit 70 is mounted on a plurality of mounting studs 73 carried by adjacent side wall 56 of the cabinet 55. For this purpose, a plurality of mounting slots 74 are formed in one wall of the coin control unit 70, for respectively receiving therein the mounting studs 73.

In operation, coins deposited in the coin slot 61 are carried by the coin chute 62 into the coin receiving hopper 63 and

thence to the coin control unit **70**. The coin control unit **70** includes a plurality of coin switches and a coin diverting means (not shown) to be described more fully hereinafter in connection with FIG. **16**. This coin diverting means has two stable conditions, and when the dispensing apparatus **50** is not in operation, the diverting means will be in its first condition and will direct deposited coins to the coin switches for actuation of the dispensing apparatus. After momentarily actuating the coin switches, the coins fall into the coin collecting chute **64** and thence to the coin collecting box **65** from which they may be periodically retrieved by an attendant. Upon actuation of the dispensing apparatus **50** the diverting means is moved into its second condition by control means to be described below for diverting the coins away from the coin switches into a coin reject chamber (not shown). These coins may be retrieved by the user of the apparatus by pushing the coin return button **66**. This movement of the coin return button **66** will move the lever **68** clockwise against the bias of the spring **69** to depress the coin reject release arm **67**. The release arm **67** will release the coins from the coin reject chamber into the coin return chute **71** and thence to the coin return cup **72** from which they may be retrieved by the user.

The front wall **53** of the cabinet **55** has a horizontal output opening **80** therein immediately below the bottom edge of the face plate **57** through which stamps are dispensed, the opening **80** being framed along the upper and lower inside edges thereof by guide brackets **81** and **82**, respectively and along the upper outer edge thereof by a guide plate **83** for directing the strip downwardly upon its issue from the opening **80**.

Mounted on the rear wall **54** of the cabinet are a plurality of lamps **78**. Adjacent to each lamp **78** and mounted in an opening in the rear wall **54** is a corresponding lens piece **77** whereby the condition of the lamps **78** may be viewed from outside the cabinet **55**. Preferably the lens pieces **77** will be marked with a designation of significance of the corresponding lamps. Four lamps are used in the preferred embodiment, one to indicate when the cabinet door is open and one for each dispensing module to indicate when it is out of stamps. A mounting frame **75** is provided in the upper portion of the cabinet **55** for maintaining part of the electrical circuitry for the dispensing apparatus **50**.

Within the cabinet **55** are disposed a plurality of dispensing modules, generally designated by the numeral **100**, and respectively mounted in corresponding compartments of a module housing **101**, the module housing **101** having a common top wall **102**, a common bottom wall **103**, opposed side walls **104** and interior partitions **105** evenly spaced apart between the side walls **404** parallel thereto to form a plurality of compartments. The side walls **104** and partitions **105** are respectively connected to the top wall **101** and bottom wall **103** by suitable means such as welding. Mounted on the inner surfaces of the side walls **104** and on both sides of each of the partitions **105** are pairs of right angle brackets, each pair comprising a larger bracket **106** and a smaller bracket **107**. The horizontal legs of the angle brackets **106** are spaced slightly above the horizontal legs of the angle brackets **107** and cooperate respectively therewith to form mounting tracks on each side of each module compartment. While in the preferred embodiment there is shown a dispensing apparatus **50** comprising three dispensing modules **100**, it will of course be recognized that any number of dispensing modules **100** may be provided. The dispensing modules **100** are all identical in construction and, therefore, only one of them will be described in detail.

The dispensing module **100** includes a supporting frame comprising a lower rod-like frame member generally designated by the numeral **110** and an upper plate-like member, generally designated by the numeral **115**. The rod-like frame member **110** is bent to form a horizontal substantially U-shaped base portion **111** and a pair of vertically extending upright portions **112** respectively integral with the ends of the legs of the U-shaped portion **111**. The upper end of each of the upstanding portions **112** is further bent back in the direction of the bight of the U-shaped base portion **111** to form an inclined portion **113** and a short horizontal top portion **114** disposed substantially parallel to the base portion **111**. The upper frame member **115** is mounted on the top portions **114** of the frame member **110**, by means of mounting screws **117**. The upper frame member **115** comprises a flat horizontal platform **116** and an upstanding mounting wall or flange integral therewith adjacent to one edge thereof and extending substantially normal thereto and having a vertical extent substantially greater than the width of the platform **116**. A stiffening web **119**, substantially triangular in shape, and integral with both the platform **116** and the side wall **118** is provided approximately midway between the ends thereof. The opposite edges of the platform **116** parallel to the wall **118** are fitted into the tracks formed by the pairs of angle brackets **106** and **107** whereby the module frame is supported in its compartment.

Referring now to FIGS. **4–9** of the drawings, there is mounted on what will hereinafter be referred to as the front side of the wall **118** of the frame member **115**, adjacent to the upper end thereof a hollow cylindrical magazine or cassette **120**. The magazine **120** comprises a cup-shaped housing **121** having a cylindrical side wall **122** integral with a circular flat bottom wall **123** along the periphery thereof. The housing **121** is mounted on a shaft **125** and carries therein a rotatable hub **124** concentric with the peripheral wall **122**. A circular cover plate **126** is mounted on the shaft **125** parallel to the bottom wall **123** of the housing **121** and covering the open end thereof for closing the magazine. The cover plate **126** is held in place by a locking knob **128** threadedly engaged with the end of the shaft **125**. An opening **129** is formed in the cylindrical wall **122** of the housing **121** to permit the feeding of stored material therefrom.

In the preferred embodiment an elongated strip of stamps generally designated by the numeral **130** is wound into a roll which is mounted on the rotatable hub **124** of the magazine **120**. The strip **130** comprises a plurality of stamps **132** connected end to end and divided from one another by transverse rows of circular perforations **135**. (See Fig. **13**). The free end of the strip **130** is fed out through the opening **129** in the housing **121** whereby the strip may be unwound from the roll as the roll rotates on the hub **124**.

In loading the dispensing module **100**, the free end of the strip of material **130** is first fed over a guide roller **140** which is rotatably mounted on a stub shaft **142** attached to the wall **118** of the frame member **115**. The strip **130** is then guided between the contacts of a microswitch mechanism **145**. The microswitch mechanism **145** comprises a fixed contact plate **146** formed of electrically conductive material and mounted on the side wall **118** by means of a mounting screw **147**. A movable electrically conductive contact arm **148** is resiliently mounted on the wall **118** by means of mounting screws **144** and carries at one end thereof an electrically conductive roller **148*a*** resiliently held against the conductive plate **146**. An electrical circuit is completed through the microswitch mechanism **145** when the conductive roller **148*a*** is held in contact with the conductive plate **146** by means of the resilient contact arm **148**. When the strip **130** is fed between the roller **148*a*** and the conductive plate **146** it opens this electrical circuit, but closes another electrical circuit through the contact arm **148** and another fixed contact **149** (see FIG. **16**). When the strip **130** has been completely unwound from the magazine **120**, and after the trailing end of the strip **130** is passed through the microswitch mechanism **145**, the roller **138** will again contact the plate **146** to thereby complete the electrical circuit therethrough and light one of the lamps **78** to give an indication that the strip material is exhausted as will be more fully described hereinafter.

A cylindrical feed wheel **150** is rotatably mounted on a shaft **158** which extends through a bearing in the wall **118** of the frame member **115**. The feed wheel **150** comprises a substantially cylindrical outer surface **151** integral with a flat circular bottom wall **153** and extending outwardly from the periphery

thereof substantially normal thereto. Disposed centrally of the bottom wall **153** and extending upwardly therefrom concentric with the cylindrical surface **151** is a cylindrical hub **152** which is fitted over the shaft **158** for rotation with respect thereto. The peripheral surface **151** of the feed wheel **150** has a plurality of recesses **155** therein, the recesses **155** being substantially rectangular in shape and extending transversely of the cylindrical surface **151**. The recesses **155** are equidistantly spaced about the circumference of the feed wheel **150** and serve to separate the cylindrical surface **151** into a plurality of raised portions alternating with a plurality of recessed portions. Extending radially outwardly from the hub **152** are a plurality of spokes or webs **154**, each connected to the inner surface of an adjacent one of the recesses **155** of the cylindrical surface **151**. Each of the unrecessed portions of the cylindrical surface **151** carries a transverse row of spikes or projections **157** each having a thickness less than the diameter of one of the perforations **135** in the strip **130**, and each row preferably containing four such projections **157** evenly spaced transversely of the surface **151** and extending radially outwardly therefrom a predetermined distance greater than the thickness of the strip **130**. The transverse spacing of the projections **157** is such that each of the projections **157** will register with a corresponding one of the perforations **135** in a row of such perforations of the strip **130**. The rows of projections **157** are spaced circumferentially of the feed wheel **150** so that the circumferential distance between rows is equal to the longitudinal distance between rows of perforations in the strip **130**, whereby the rows of projections **157** may register with and extend into the corresponding rows of perforations **135** when the strip **130** is wrapped around the surface **151**. The feed wheel **150** is held in place on the shaft **158** by means of a locking knob **159** threadedly engaged therewith.

An arcuate restraining shoe **160** is fixedly mounted on mounting posts on the side wall **118** by means of mounting screws **161**. The holding shoe **160** is shaped complimentary to the feed wheel **150** and is disposed in closely spaced relationship thereto. The holding shoe **160** has a concave inner surface **162** in which are formed a plurality of channels or grooves **163** extending circumferentially of the surface **162** and equidistantly spaced apart transversely thereof. The inner surface **162** of the holding shoe **160** is spaced from the cylindrical surface **151** of the feed wheel **150** a distance only slightly greater than the thickness of the strip **130** and less than the outward extent of the projections **157** on the feed wheel **150**. The grooves **163** in the concave inner surface **162** of the holding shoe **160** are equal in number and transverse spacing to the number and spacing of the projections **157** in each row thereof on the feed wheel **150**, whereby the projections **157** adjacent to the holding shoe **160** extend into the corresponding grooves **163**. The holding shoe **160** is preferably of such a length that several rows of projections **157** will always be adjacent thereto and extending into the grooves **163** thereof.

In loading the dispensing module **100**, the free end of the strip **130**, after being fed through the microswitch mechanism **145**, is threaded between the holding shoe **161** and the adjacent portion of the feed wheel **150**, the rows of projections **157** extending through the corresponding rows of perforations **135** of the strip **130** and into the corresponding grooves **163** in the holding shoe **160**. In this manner the strip **130** is held firmly in engagement with the projections **157** and is fed along the concave surface **162** of the holding surface **150** as the feed wheel **150** is rotated counterclockwise as viewed in FIG. 4. It will be noted that since several (preferably three or more) rows of projections **157** are always in engagement with the strip **130** and since there are several (preferably four) projections in each row, the driving force imparted to the strip **130** by the feed wheel **150** is distributed over a wide area of the strip **130** thereby preventing the projections **157** from damaging the strip **130** as the feed wheel **150** rotates. Similarly, these same features of the strip feeding apparatus reduce the possibility of theft of stamps when the feed wheel is stopped, since only stamps which have been fed beyond the front end of the shoe **160** could be torn off and their number is limited by the distance between the forward end of the shoe **160** and the outlet opening **82**.

Mounted on the front side of the wall **118** of the frame member **115** above the feed wheel **150** is a locking solenoid, generally designated by the numeral **165**, comprising an electromagnetic coil **167** surrounding an axially movable cylindrical armature **168** (see FIGS. **4**, **6** and **7**). The solenoid **165** is supported in a mounting bracket **166** which is attached to the wall **118** by means of mounting screws **169***a*. A cylindrical spacer **164** having a diameter greater than the diameter of the upper end of the armature **168** is carried thereby concentric therewith. The armature **168** of the solenoid **165** is resiliently urged into a downward position as viewed in FIG. **4** by means of a strip of spring steel **169** having a notched end which fits around the upper end of the armature **168**, and bears against the upper surface of the spacer **164** for urging the armature **168** downwardly. The spring **169** is mounted on the back side of the wall **118** by means of the mounting screws **169***a*.

The lower end of the armature **168** of the solenoid **165** has a diameter slightly less than the width of the recesses **155** in the feed wheel **150**. When the armature **168** is in its downward position, as shown in FIG. **4**, the lower end thereof fits into the adjacent one of the recesses **155** thereby engaging the feed wheel **150** and preventing rotational movement thereof. When the solenoid coil **167** is energized by circuit means to be described more fully hereinafter, the armature **168** is raised against the urging of the spring **169** out of the recess **155** thereby disengaging the feed wheel **150** and permitting rotational movement thereof. When the solenoid coil **169** is deenergized the armature **168** again drops into the adjacent recess **155** for again locking the feed wheel **150** against rotation. As will be described more fully below, the spacing of the recesses **155** and the motion of the feed wheel **150** are such that whenever the feed wheel **150** stops rotating, a recess **155** will be positioned axially beneath the lower end of the armature **168**.

A guide unit **170** is mounted on the platform **116** abutting the lower end of he holding shoe **160**. The guide unit **170** includes a substantially U-shaped strip guide bracket **171** having a pair of upstanding legs **171***a* substantially parallel to the wall **118** and connected at the upper edges thereof by a flat bight portion **171***b*. Integral with the lower edge of the leg **171***a* closest to the wall **118** is a right angle mounting flange **172** attached to the side wall **118** by means of mounting screws **173**. Each of the legs **171***a* of the strip guide bracket **171** has a substantially rectangular opening **175** therethrough adjacent to the upper end thereof. Overlying the bight portion **171***b* of the strip guide bracket **171** is a flat strip retaining clip **174** having a pair of substantially S-shaped resilient depending flanges **179** which extend downwardly along the legs **171***a* of the strip guide bracket **171** and are resiliently urged into the openings **175** for holding the clip **174** in engagement with the strip guide bracket **171**. In this engaged position, the flat upper surface of the retaining clip **174** is substantially parallel to the flat bight portion **171***b* of the strip guide bracket **171** and is spaced vertically therefrom a distance slightly greater than the thickness of the strip **130**. The edge of the clip **174** disposed toward the holding shoe **160** is spaced only a slight distance from the lower end thereof and has a plurality of notches **176** therein equal in number and spacing to the number and spacing of the projections **157** on the feed wheel **150** and allowing passage of the projections **157** therethrough as the feed wheel **150** is rotated. The upper surface of the bight portion **171***a* of the strip guide bracket **171** registers with the lower end of the concave surface **162** of the holding shoe **160** and has a downturned lip portion **177** adjacent to the holding shoe **160** to allow free passage of the strip **130** between the bight portion **171***b* and the retaining clip **174**. Disposed at the outer end of the strip guide bracket **171** is a guillotine blade member generally designated by the numeral **180** and having an opening **181** therethrough, the upper edge of the opening **181**

forming an inverted V-shaped cutting edge **182**. The blade member **180** has a pair of flanges respectively integral with the opposite sides thereof which loosely overlap the opposite legs **171***a* of the strip guide bracket **171**, the blade member **180** being held in place adjacent to the strip guide bracket **171** by means of a pair of blade retaining clips **183** respectively fastened to the opposite legs **171***a* of the strip guide bracket **171** by means of screws **184**. The outer ends of the blade retaining clips **183** are bent to form retaining flanges **185** which loosely overlap the opposite sides of the blade member **180** for slidably holding the blade member **180** in place, the blade member **180** being movable vertically between the guide bracket **171** and the retaining flanges **185**. A spring steel member **186** is mounted on a mounting bracket **187** by means of mounting screws **188**, the mounting bracket **187** being attached to the under side of the platform **116**. The spring member **186** extends upwardly through an opening in the platform **116** and is bent and preloaded downwardly to a position substantially parallel to the upper surface thereof. The outer end of the spring member **186** is bent to form an upturned lip **189** which extends through an opening in the lower portion of the blade member **180** and resiliently holds the blade member **180** in a lowered position as shown in FIG. **12**.

Depending from the under side of the platform **116** is a mounting plate generally designated by the numeral **190** and comprising a pair of mutually perpendicular flanges **191** and **192** respectively disposed perpendicular to and parallel to the wall **118**. Along the upper edges of the mounting flanges **191** and **192** are attachment flanges **193** and **194**, respectively secured to the under side of the platform **116** by means of mounting screws **193***a* and **194***a*. A solenoid generally designated by the numeral **195** is disposed beneath the platform **116** adjacent to the cutting unit **170**. The solenoid **195** comprises a coil **197** and an armature **198** and is supported in a mounting bracket **196** which is attached to the flange **192** of the mounting plate **190** by means of mounting screws **196***a*. At the upper end of the armature **198** is a knob **199** which engages the under side of the spring member **186**. When the solenoid coil **197** is energized, the armature **198** is moved upwardly against the bias of the spring member **186** thereby moving the spring member **186** upwardly and carrying the cutting blade member **180** into the raised position as shown in FIGS. **4** and **6**. When the solenoid coil **197** is de-energized, the armature **198** drops back down and the cutter blade **180** is pulled into its downward position by the spring member **186**, thereby partially severing the strip **130**.

A drive system is mounted on the wall **118** of the frame member **115** and provides the motive power for the dispensing module **100**. An electric motor, which is preferably a shaded-pole motor and generally designated by the numeral **200** is mounted on a drive train housing **201**, the motor **200** comprising a substantially rectangular pole magnet **204**, a field coil **205** wound on a field coil spool **206** and a cylindrical rotor **210**. The field coil **205** surrounds the upper portion of the pole magnet **204** while the armature **210** is disposed through an opening in the lower portion of the pole magnet **204**. The armature **210** is mounted on a drive shaft **212**, one end of which is supported in a bearing housing **215** and the opposite end of which is supported in a bearing **219** in the drive train housing **201**. A substantially U-shaped bearing bracket **214** is mounted on the pole magnet **204** by means of a pair of mounting screws **216** and the bearing housing **215** is attached to the bight portion of the bearing bracket **214** by means of a pair of rivets **217**. A coil spring **218** is disposed concentrically about the inner end of the drive shaft **212** between the bearing **219** and the inner surface of the armature **210** and resiliently urges the armature **210** outwardly or to the right as viewed in FIG. **15**.

A drive train assembly generally designated by the numeral **220**, is housed in the housing **201** and is driven by the motor drive shaft **212**. The housing **201** is closed by a backing plate **222** which is mounted on the side wall **118** and attached to the housing **201** by means of four mounting screws **223**. The drive shaft **212** of the motor **202** extends through an opening **224** in the lower portion of the housing **201** and carries on the inner end thereof a drive gear **225**. Spaced a slight distance axially from the drive gear **225** is an idler gear **226** rotatably mounted on a shaft **228**. Also mounted on the shaft **228** concentric with the idler gear **227** is a reduction gear **227**. A cam gear **230** is mounted on a shaft **234** and meshes with the reduction gear **227**. The rear surface of the cam gear **230** has an arcuate camming recess **232** therein, the recess **232** having inwardly sloping end walls **233**. Meshing with the cam gear **230** is an idler gear **235** rotatably mounted on a shaft **236** which is supported in a bearing opening **237** in the housing **201**. Disposed approximately midway between the axis and the periphery of the idler gear **235** is a cylindrical drive pin **238** which extends outwardly from the rear surface of the idler gear **235** substantially normal thereto.

A Geneva cam wheel **240** is mounted on a shaft **246**, the inner end of the shaft **246** being rotatably carried in a bearing opening **246***a* in the backing plate **222** of the housing **201**. The shaft **246** has a recessed inner end portion **241** which extends inwardly beyond the side wall **118**. On the other side of the Geneva cam wheel **240**, the shaft **246** has an enlarged diameter portion **242** which bears against the inner surface of the housing **201** in order to limit axial movement of the Geneva cam wheel **240** in the direction of the housing **201**. A slightly recessed portion **243** of the shaft **246** is carried in a bearing opening **244** in the housing **201** for rotatably supporting the shaft **246**. A plurality of cam teeth **245** are formed around the periphery of the Geneva cam wheel **240**. Each of the cam teeth **245** is bilaterally symmetrical about a radius of the cam wheel **240** with each of the symmetrical halves of the cam teeth **245** comprising a short straight section **248** extending inwardly from the apex of the cam tooth **245** a short distance and forming an acute angle with the line of bilateral symmetry of the cam tooth **245**, and a relatively long straight portion **249** extending inwardly and forming an obtuse angle with the short straight portion **248** and an acute angle with the line of bilateral symmetry of the tooth **245**. The long straight portions **249** of adjacent teeth **245** are connected at their lower ends by arcuate connecting portions **249***a* each having a radius of curvature slightly greater than the radius of the drive pin **238**. The cam teeth **245** are so shaped that the long straight portions **249** of adjacent teeth are parallel to each other and to the radius of curvature of the connecting portion **249***a* and are separated from each other by a distance slightly greater than the diameter of the drive pin **238**, whereby the long straight portions **249** and arcuate connecting portions **249***a* of adjacent teeth **245** define slots **247** for receiving the drive pin **238**. As the gear **235** rotates, the drive pin **238** is moved into an adjacent slot **247** and into engagement with the long straight portion **249** of the adjacent cam tooth **245**. As the gear **235** continues to rotate counterclockwise the drive pin **238** drives the Geneva cam wheel **240** clockwise for a predetermined short radial distance, after which the drive pin **238** moves downwardly out of engagement with the Geneva cam wheel **240**. The motion of the Geneva cam wheel **240** is therefore stopped until the drive pin **238** again engages it on the next rotation of the gear **235**. Thus a stepwise rotational movement is imparted to the Geneva cam wheel **240**.

Mounted on the outside of the backing plate **222** adjacent to the lower end thereof is a Geneva switch assembly **250**, which includes a cam follower pin **251** extending through a bearing **253** in the backing plate **222** and having a rounded inner end **252**. At the outer end of the cam follower pin **251** is a flat contact actuating head **254**. A pair of switch contacts **255** and **256** are mounted on the backing plate **222**, the inner one of the switch contacts **256** being resiliently held in engagement with the contact actuating head **254** of the drive pin **251**. The cam follower pin **251** is axially movable in the bearing **253** and is so positioned that under the urging of the switch contact **256** the rounded inner end **252** is held in engagement with the surface of the cam gear **230** at a point along the circumferential track of the recess **232**. In operation, as the cam wheel **230** rotates the rounded end **252** of the cam follower

pin 251 rides into and out of the recess 232. More particularly, as the rounded end 252 of the cam follower pin 251 is approached by recess 232 it is slid into the recess 232 along the sloping side wall 233 under the urging of the contact switch 256, the resulting inward axial movement of the cam follower pin 251 allowing the contact switch 256 to move inwardly out of engagement with the contact switch 255, thereby opening an electrical circuit through the contact switches 255 and 256. When the opposite end of the recess 232 is rotated under the rounded end 252 of the cam follower pin 251, the rotational movement of the cam gear 230 slides the cam follower pin 251 back out of the recess 232 along the sloping side wall 233, thereby moving the cam follower pin 251 axially outwardly against the bias of the switch contact 256 for moving the switch contact 256 into engagement with the switch contact 255 thereby reclosing the electrical circuit through the contacts 255 and 256. A construction hole 259 is formed in the side wall 118 of the frame member 115 to allow access to the Geneva switch assembly 250 as can best be seen in FIG. 10.

Mounted on the rear end of the Geneva cam shaft 241 is a pulley 260, a similar pulley 263 being mounted on the inner end 264 of the feed wheel shaft 158. A drive belt 265 interconnects the pulleys 260 and 263 for transferring the stepwise rotational motion of the Geneva cam shaft 241 to the feed wheel shaft 158.

Referring now to FIGS. 4 and 10 of the drawings, a rotary stepping switch assembly 300 is mounted on a mounting plate 301 beneath the mounting platform 116, the mounting plate 301 being disposed substantially parallel to the wall 118 of the frame member 115 and being attached to the under side of the platform 116 by means of mounting screws 302. A ratchet wheel 305 rotatably mounted on a shaft 306 adjacent to the front side of the mounting plate 301, the shaft 306 extending through the mounting plate 301 and carrying on the back side thereof a wiper arm assembly 308 which is held in place by a lock nut 307. Surrounding the front end of the shaft 306 and attached thereto is a torsion spring 309 which biases the shaft 306 into counterclockwise rotation as viewed in FIG. 4. The wiper arm 308 extends radially outwardly from the shaft 306 and carries at the outer end thereof a fixed switch contact 304 which moves in an arcuate path as the shaft 306 rotates. Arranged along the arcuate path of the fixed contact 304 are a plurality of fixed contacts 310 which are serially engaged by the movable contacts 304 as the shaft 306 rotates. A first-class flat lever arm 311 is pivotally mounted on a shaft 312 adjacent to the ratchet wheel 305, the lever arm 311 having a rounded end 313 which carries along the periphery thereof a pair of arcuate flanges 314 extending normal to the surface of the lever arm 311. At the opposite end of the lever arm 311 is a tab portion 315 carrying an upstanding pin 316. Attached to the pin 316 is one end of a coil spring 317, the opposite end thereof being attached to a shaft 318. At the lower end of the lever arm 311, adjacent to the pin 316 is a stub shaft 319. Pivotally mounted on the shaft 318 is a first-class flat lever arm 320, one end thereof having an oval-shaped enlargement 321 and the opposite end thereof forming a pawl and carrying an integral flange 322 for engagement with the teeth of the ratchet wheel 305. Depending from the lever arm 320 adjacent the shaft 318 is a tab portion 323 having a slot 324 therein. Secured in the slot 324 is one end of a coil spring 325. Pivotally mounted on the stub shaft 319 is a first-class bell crank lever 327, one arm of the bell crank lever 327 having an opening 326 therein in which is attached the other end of the coil spring 325. The second arm 328 of the bell crank lever 327 forms a pawl having at the outer end thereof an integral flange 329 for engagement with the teeth of the ratchet wheel 305.

Mounted on the mounting plate 301 adjacent to the upper edge thereof by means of a mounting bracket 332 is a solenoid 330 comprising a coil 331 and an armature 333. Adjacent to one end of the armature 333 is a notch 334 receiving therein the rounded end 313 of the lever arm 311, the arcuate flanges 314 of the lever arm 311 bearing against the sides of the notch 334. A set screw 335 is mounted on the mounting plate 301 by means of a mounting bracket 336 and is screwed into engagement with the outer end of the armature 333 adjacent to the notch 334 for adjusting the outer extremity of the axial movement of the armature 333. Another solenoid 340 is mounted on the mounting plate 301 by means of a mounting bracket 342 adjacent to the lever arm 320, the solenoid 340 comprising a coil 341 and an armature 343. Adjacent to the outer end of the armature 343 is a notch 344 receiving therein the oval end 321 of the lever arm 320. The solenoid 340 is shown in FIG. 4 in its normally energized condition with the armature 343 in its downwardly extended position.

The ratchet wheel 305 is held in its home position by means of a torsion spring 309. When the solenoid 330 is energized, the armature 333 thereof is pulled inwardly, thereby pivoting the lever arm 311 counterclockwise on its pivot point 312 and moving the lower end thereof to the right as shown in FIG. 4 against the bias of the coil spring 317. This movement carries the bell crank lever arm 328 out of engagement with the lowermost tooth of the ratchet wheel 305, but under the clockwise urging of the coil spring 325 the bell crank lever arm 328 is pivoted clockwise a small predetermined distance into a position adjacent to the next tooth counterclockwise on the ratchet wheel 305. When the solenoid 330 is deenergized the armature 333 thereof moves outwardly thereby pivoting the lever arm clockwise and moving the bell crank lever arm 328 to the left as shown in FIG. 4 into engagement with the adjacent tooth of the ratchet wheel 305 and rotating the ratchet wheel 305 clockwise a short distance against the urging of the torsion spring 309. The ratchet wheel 305 is prevented from returning to its home position under the bias of the torsion spring 309 by means of the flange 322 of the lever arm 320 which is held in engagement with the ratchet wheel 305 by the armature 343 of the normally energized solenoid 340 and thereby prevents counterclockwise rotation of the ratchet wheel 305. The set screw 335 is so adjusted that the outward movement of the armature 333 on de-energization of the solenoid 330 is just sufficient to allow the ratchet wheel 305 to be moved through an angle equal to the angular distance between the home fixed contact and the second fixed contact of the contacts 310. As the solenoid 330 is alternately energized and de-energized the ratchet wheel 305 is rotated stepwise in a clockwise direction as viewed in FIG. 4 and the movable contact 304 on the wiper arm 308 is stepped from one fixed contact 310 to the next until a predetermined fixed contact 310 is reached. At this point the solenoid 340 will be de-energized by control circuit means to be described more fully hereinafter, the armature 343 thereby being retracted upwardly as viewed in FIG. 4 by suitable biasing means (not shown) for pivoting the lever arm 320 clockwise and pulling the flange 322 thereof out of engagement with the ratchet wheel 305. Thus freed, the ratchet wheel 305 will be returned to its home position by means of the torsion spring 309.

A counter mechanism 350 is secured to a mounting bracket 348 by means of screws 348*a*, the mounting bracket 348 having an attachment flange 349 which is secured to the wall 118 of the frame member 115 by means of mounting screws 349*a*. The counter mechanism 350 is of the standard type having a solenoid-actuated indicator wheel and is electrically coupled to the stepping switch assembly 300 so that for each step of the stepping switch 300 the counter 350 is energized and registers a count of one unit.

The mechanical operation of the dispensing module 100 will now be described in detail. When the field coil 205 of the motor 200 is energized, the armature 210 begins to rotate. As the armature 210 approaches its normal operating speed, the drive shaft 212 is carried axially inwardly against the urging of the coil spring 218 to an equilibrium position with respect to the magnetic field generated by the pole magnet 204. As the drive shaft 212 is moved into this equilibrium position, the drive gear 225 carried on the inner end thereof and rotating clockwise as viewed in FIG. 14, is moved into meshing engagement with the idler gear 226 of the drive train. As the idler gear 226 rotated counterclockwise, the reduction gear 227,

mounted coaxially therewith, rotates the cam gear **230** clockwise, the cam gear **230** in turn rotating the gear **235** counterclockwise. The rotation of the gear **235** carries the drive pin **238** counterclockwise along a circular path during approximately one-half of which the pin **238** is in engagement with the teeth **245** of the Geneva cam wheel **240**. As the drive pin **238** begins to move upward along its circular path as viewed in FIG. **14**, it first engages the adjacent cam **245** along the short straight portion **248** thereof. As the drive pin **238** continues along its circular path it slides downwardly along the portion **248** and into the slot **247**. Upon further rotation, the drive pin **238** bears against the long straight portion **249** of the cam tooth **245** and carries the Geneva cam wheel **240** clockwise as viewed in FIG. **14**. As the drive pin **238** approaches the lower portion of its circular path is moves out of engagement with the long straight portion **249** and, accordingly, the clockwise rotation of the Geneva cam wheel **240** ceases for a short period of time until the drive pin **238**, on the next rotation of the gear **235**, comes into engagement with the next cam tooth **245**. In this manner, the continuous rotation of the motor armature **210** is converted into an intermittent or stepwise rotation of the Geneva cam wheel **240**.

This stepwise rotational movement of the Geneva cam wheel **240** is carried via the shaft **241**, the pulley **260**, the drive belt **265**, the pulley **263** and the shaft **158** to the feed wheel **150**. In this manner, a stepwise counterclockwise rotational movement is imparted to the feed wheel **150** as viewed in FIG. **4**. The angular extent of this rotational movement is such that with each stepwise operation of the feed wheel **150** the strip **130** is moved a linear distance equal to the length of one stamp. As the strip **130** is fed over the guide shoe **160** by means of the feed wheel **150**, it passes over the downturned lip **177** and bight portion **171***b* of the strip guide bracket **171** and under the strip retaining clip **174**, whereby it is directed outwardly toward the cutter member **180**. This sandwiching action of the retaining clip **174** and the guide bracket **171** keeps the strip **130** moving in a straight horizontal path toward the cutter **180** and prevents it from curling upward after it passes over the end of the guide bracket **160**. The strip **130** then is passed out through the opening **181** in the cutter member **180** and through the output opening **80** in the front wall **53** of the cabinet **55**.

As the cam wheel **230** is rotated, the switch actuating pin **251** is moved into and out of the cam recess **232** as described above, whereby the Geneva switch contacts **255** and **256** are alternately opened and closed. The switch contacts **255** and **256** are connected in series circuit with the coil **331** of the solenoid **330** as will be described below, whereby when the switch contacts **255** and **256** are closed the solenoid coil **331** is energized and when the switch contacts **255** and **256** are opened the solenoid coil **331** is de-energized. The alternate opening and closing of the switch contacts **255** and **256** by the cam follower pin **251** serves to alternately energize and de-energize the solenoid **330** for stepping the rotational stepping switch apparatus **300** along the fixed contacts **310** thereof as described above. Simultaneously with each step of the stepping switch apparatus **300**, a count of one unit is registered by the counter **350**. Each of the fixed contacts **310** is connected in a control circuit to be described more fully hereinafter, and all but a predetermined one of the fixed contacts **310** maintains the control circuit closed through the movable contact **304**. However, when the wiper arm **308** reaches the predetermined one of the fixed contacts **310**, the control circuit will be opened, thereby de-energizing the motor **200** and terminating the stepwise operation of the feed wheel **150**. At this predetermined position, the reset solenoid **340** will be de-energized, thereby releasing the ratchet wheel **305** and allowing it to return to its home position under the urging of the torsion spring **309**. At this point the dispensing cycle is completed and the dispensing module **100** is in condition to begin another dispensing cycle. Simultaneously with the opening of the control circuit when the wiper arm **308** reaches the predetermined fixed contact **310**, the cutter solenoid **195** is de-energized thereby allowing the cutter member **180** to drop and thereby sever the dispensed portion of the strip **130**.

Referring to FIGS. **11** to **13** of the drawings, it will be seen that when the cutter **180** is dropped to the cutting or lower position thereof as shown in FIG. **12**, it does not completely sever the strip **130** across the entire width thereof. Rather, the inverted V-shape of the cutting blade **182** severs only the outer edges of the strip **130**, the central portion of the strip remaining attached. The cutter blade **180** is so positioned with respect to the feed wheel **150**, that when the dispensing cycle is completed the cutter blade will lie directly over one of the rows of perforations **135** in the strip **130** and will, therefore, sever the strip **130** along this row of perforations. As shown in FIG. **13**, the center four perforations of the row of perforations **135** will remain connected after the cutting operation. In this manner, the dispensed portion of the strip **130** can be easily removed from the remainder of the strip but will not be allowed to fall off after the dispensing operation.

It should be noted that the control circuit is such that immediately prior to the first stepwise operation of the feed wheel **150**, the locking solenoid **165** is energized, thereby pulling the armature **168** thereof out of engatement with the feed wheel **150** against the bias of the spring **169**. This frees the feed wheel **150** for rotation by the drive mechanism. The control circuit may be such that the locking solenoid **165** will be de-energized either after the dispensing cycle is completed or, immediately after each of the intermittent operations of the feed wheel **150** as will be described more fully hereinafter. In either case, upon de-energization of the locking solenoid **165**, the armature **168** thereof will drop back into the adjacent recess **155** in the feed wheel **150** for preventing further rotational movement thereof. The recesses **155** are so positioned along the periphery of the feed wheel **150** that with each stepwise operation of the feed wheel **150** one of the recesses **155** will be positioned directly under the lower end of the locking solenoid armature **168**.

Referring now to FIGS. **16** and **17** of the drawings, the control circuitry for the dispensing apparatus **50** and each of the dispensing modules **100** will now be described. Electrical power for the operation of the dispensing apparatus **50** is drawn from a standard 60-cycle, 115 volt A.C. source by means of a wall plug **401**. Connected to the plug **401** is a pair of supply lines **402** and **403**. Connected in series with the line **403** is a fuse **404**, an on-off switch **405** and two normally closed contacts of a three-contact door-interlock switch **406**. An open door indicator lamp **408** is connected between the third contact of the door-interlock switch **406** and the supply line **402** by means of a line **407**. Whenever the rear door of the cabinet **55** is opened, the movable contact of the door-interlock switch is moved to the third contact thereof, thereby opening the supply line **403** for de-energizing the dispensing apparatus **50** and at the same time energizing the indicator lamp **408** to signal that the door is open and there is no power being delivered to the dispensing apparatus **50**. Connected in parallel with the indicator lamp **408** across the supply lines **402** and **403** is a series combination of a heater **410** and a heater switch **411**. The heater switch **411** is thermostatically controlled to connect and disconnect the heater **410** in response to the temperature within the cabinet **55** for maintaining the ambient temperature and humidity therein at acceptable levels.

The supply line **402** is connected to the coils of the two-coil relays generally designated by the numerals **420**, **430** and **440**, each of these relays having an operate coil and a reset coil. More particularly, one terminal of each of the operate coils **425**, **435** and **445** and one terminal of each of the reset coils **426**, **436** and **446** of the relays **420**, **430** and **440** respectively is connected to the supply line **402**. Each of the relays **420**, **430** and **440** has a plurality of ganged banks of contacts. More specifically, each of the relays **420**, **430** and **440** has four banks of contacts, each bank comprising a movable contact and a fixed contact and one bank having an additional fixed

contact. The four banks of contacts of relay 420 respectively comprise movable contacts 421*a*, 422*a*, 423*a* and 424*a* and corresponding fixed contacts 421*b*, 421*c*, 422*b*, 423*b* and 424*b*. The contacts of relays 430 and 440 are identically arranged and comprise banks respectively designated by the numerals 431, 432, 433 and 434 for the relay 430 and 441, 422, 443 and 444 for the relay 440, the suffix "*a*" being used to indicate movable contacts and the suffixes "*b*" and "*c* " being used to indicate fixed contacts. The "*a*" and "*b*" contacts of the relays 420, 430 and 440 are normally open, while the "*c*" contact in the first bank of each of these relays is normally connected to the corresponding "*a*" contact as shown in FIG. 16. The fixed contact 421*c* of the relay 420 is connected by a line 413 to the movable contact 431*a* of relay 430, the fixed contact 431*c* of relay 430 is connected by line 414 to the movable contact 441*a* of the relay 440, and the fixed contact 441*c* of relay 440 is connected to a line 415. The fixed contacts 421*b*, 431*b* and 441*b* in the first banks of the relays 420, 430 and 440 are commonly connected to a line 417. The fixed contacts 422*b*, 432*b* and 442*b* in the second banks are connected respectively by lines 427, 437 and 447 to a patch board 460A. Similarly, the fixed contacts 423*b*, 433*b* and 443*b* in the third banks are connected by lines 428, 438 and 448 respectively to a patch board 460B while the fixed contacts 424*b*, 434*b* and 444*b* in the fourth banks are respectively connected by lines 429, 439 and 449 to a patch board 460C.

A plurality of relays generally designated by the numerals 450A, 450B and 450C are connected in parallel to the supply line 402. More particularly, one terminal of each of the coils 455A, 455B and 455C of the relays 450A, 450B and 450C, respectively, is connected to the supply line 402, the other terminals thereof being respectively connected to lines 456, 457 and 458. The line 456 is in turn connected to the movable contacts 422*a*, 432*a* and 442*a* of the relays 420, 430 and 440, the line 457 being in turn connected to the movable contacts 423*a*, 433*a* and 443*a* and the line 458 being in turn connected to the movable contacts 424*a*, 434*a* and 444*a*. Each of the relays 450A, 450B and 450C has two banks of contacts, each bank comprising a movable contact and a fixed contact. The first bank of contacts in each of the relays 450A, 450B and 450C comprises a movable contact 451 and a fixed contact 453 while the second bank comprises a movable contact 452 and a fixed contact 454, the suffixes "A", "B" and "C" being used in each case to indicate the one of the relays 450A, 450B or 450C with which the contacts are associated.

The opposite terminals of the reset coils 426, 436 and 446 of the relays 420, 430 and 440 respectively, are commonly connected to a line 418 which is in turn connected to the fixed contact 453C of the relay 450C. The movable contact 451C is connected by a line 461 to the fixed contact 453B, the movable contact 451B being connected to the fixed contact 453A by a line 462, and the movable contact 451A being connected to a line 463. A plurality of coin switches respectively designated by the numerals 464, 466 and 468 are provided, each of these switches having a movable contact designated by the suffix "*a*" and a pair of fixed contacts respectively designated by the suffixes "*b*" and "*C*". The line 463 is connected to the fixed contact 464*b*, the movable contact 464*a* is connected by a line 465 to the fixed contact 466*b*, the movable contact 466*a* is connected by a line 467 to the fixed contact 468*b*, and the movable contact 468*a* is connected by a line 469 to the supply line 403. The other fixed contacts 464*c*, 466*c* and 468*c* of the coin switches are respectively connected to the opposite terminals of the operate coils 445, 435 and 425 of the relays 440, 430 and 420.

The supply line 402 is also connected to each of three dispensing modules 100A, 100B and 100C by lines 485A 485B and 485C, respectively. Since the control circuits of each of these dispensing modules 100 is identical, only one will be described in detail. Referring, therefore, to the dispensing module 100A, for example, the line 485A is connected to the movable contact 148 of the microswitch mechanism 145 described above in connection with FIG. 4. This movable contact 148 is normally biased into engagement with the fixed contact 146, but when the dispensing module 100 is loaded with stamps (the condition depicted in FIG. 16) the movable contact 148 will be held by the strip 130 in engagement with the other fixed contact 149 of the microswitch mechanism 145. The fixed contact 149 is in turn connected to a normally closed circuit breaker 492 which is in turn connected by a line 493A to one terminal of a coin magnet coil 494A. Similarly, corresponding lines 493B and 493C from the other dispensing modules are respectively connected to one terminal of each of coin magnet coils 494B and 494C, the other terminals of the coin magnet coils 494 being commonly connected to the line 415. The fixed contact 146 of the microswitch mechanism 145 is connected by a line 487 to an indicator lamp 488 which is in turn connected by a line 489A to the supply line 403. Similarly, corresponding lines 489B and 489C from the other dispensing modules 100 are also connected to the supply line 403. Connected between the lines 485A and 487, in parallel with the microswitch mechanism 145 is a normally open circuit breaker 486.

The fixed contacts 310 of the stepping switch mechanism 300 are respectively connected by a plurality of lines to corresponding terminals in the patch board 460A, these connecting lines being indicated as gathered into a single cable 475A. Similarly, the fixed contacts 310 of the stepping switches 300 in the other dispensing modules 100 are connected by cables 475B and 475C to corresponding terminals in the patch boards 460B and 460C. The wiper arm 308 of the stepping switch assembly 300 is connected by a line 473 to a normally closed circuit breaker 474 which is in turn connected by a line 476A to the line 417. Similarly, the wiper arms 308 of the stepping switch assemblies 300 in the other dispensing modules 100 are connected through normally closed circuit breakers to the line 417 by lines 476B and 476C, respectively. Also connected to the line 473, in parallel combination, are one terminal of each of the counter 350 and the stepping solenoid coil 331, the opposite terminals of these elements being commonly connected to the fixed contact 156 of the Geneva switch, the movable contact 155 thereof being connected to a line 478. The line 478 is in turn connected to one terminal of the stepping switch reset solenoid coil 341 and, by a line 479 to the line 485A. The other terminal of the stepping switch reset solenoid coil 341 is connected by a line 496A to the line 418. Similarly, the stepping switch reset solenoid coils 341 of the other dispensing modules 100 are connected to the line 418 by lines 496B and 496C, respectively. Also connected to the line 473 is one terminal of the parallel combination of the locking solenoid coil 167, the motor 200 and the cutter blade solenoid coil 197, the other terminal of this parallel combination being connected by a line 483 to the fixed contact 454A of the relay 450A, the movable contact 452A thereof being connected by a line 484 to the line 485A.

The fixed contacts 310 of the stepping switch assembly 300 are so connected to the terminals of the corresponding patch board 460 that a closed energizing circuit for the dispensing module 100 will be maintained through the patch board 460 and the stepping switch assembly 300 for all but one predetermined position of the wiper arm 308. For this predetermined position, there will be an open circuit in the patch board 460. This predetermined position may be different in each of the dispensing modules 100, whereby different numbers of stamps may be dispensed by each of these dispensing modules in a single dispensing cycle.

Each of the coin magnets 494 forms a part of the coin diverting means in the coin control unit 70 of its corresponding dispensing module 100. When energized, the coin magnet 494 holds the diverting means in the first condition thereof, thereby allowing deposited coins to pass to the coin switches 464, 466 and 468 for actuation thereof. When the magnets 494 are de-energized, the corresponding diverting means are allowed to assume the second conditions thereof, thereby diverting subsequently deposited coins away from the coin switches 464, 466 and 468 and into the coin return apparatus

as described above. Further, the coin mechanism **60** is such that different denomination coins will be channeled to different ones of the coin switches when the diverting means are in the first conditions thereof. For example, nickels may be channeled to the switch **464**, dimes to the switch **466** and quarters to the switch **468**. Any one of or any combination of the dispensing modules **100** may be actuated by the deposit of a coin depending upon which one of the coin switches is actuated, these combinations being predetermined by connections in the patch boards **460**. For example, the dispensing apparatus **50** may be set up so that upon deposit of a quarter four 6-cent stamps and one 1-cent stamp will be dispensed by the apparatus. In such a situation the dispensing module **100A** may dispense 5-cent stamps and the dispensing module **100B** may dispense 1-cent stamps and the connections in the patch boards **460** will be such that upon actuation of the dispensing modules, the module **100A** will cease operation after five steps of its stepping switch apparatus **300** and the dispensing module **100B** will cease actuation after two steps of its stepping switch **300**. In this case, the stepping switch **300** in the dispensing module **100C** will be presented with an open circuit in its home position whereby the dispensing module **100C** will not be activated. It will, of course, be understood that this is only an example, and that any combination of stamps may be dispensed from the dispensing modules **100** depending upon what denomination stamps each module is loaded with and the connections made in the patch boards **460**, both of which parameters may be altered at will to change the dispensing combinations of the dispensing apparatus **50**.

In operation, when the plug **401** is connected to a source of alternating current, and the on-off switch **405** is closed the dispensing apparatus **50** will be energized and ready for operation, assuming, of course, that the cabinet door is closed so that the door-interlock switch **406** is in the position shown in FIG. **16**. If the cabinet door is open, the door-interlock switch **406** will be in its other position thereby shorting out the dispensing apparatus **50** and energizing the indicator lamp **408** thus indicating that the door must be closed. It should be noted that the door-interlock switch **406** may also be manually operated into either of its positions so that the dispensing apparatus **50** may be operated with the cabinet door open for purposes of servicing the apparatus. With the cabinet closed, and the dispensing apparatus **50** energized, the coin magnets **494A**, **494B** and **494C** will all be energized through their corresponding dispensing modules **100**. By way of example, the coin magnet **494A** will be energized by a circuit comprising lead line **402**, line **485A**, microswitch contacts **148** and **149**, circuit breaker **492**, magnet coil **494A**, line **415**, relay contacts **441***c* and **441***a*, line **414**, relay contacts **431***c* and **431***a*, line **413** relay contacts **421***c* and **421***a*, line **412** and supply line **403**. Thus, the diverting means for each of the dispensing modules **100** will be in the first conditions thereof allowing deposited coins to pass to the coin switches. Upon deposit of a coin, which for purposes of illustration will be assumed to pass to the coin switch **468**, the movable contact **468***a* will be moved downwardly out of contact with the fixed contact **468***b* and into contact with the fixed contact **468***c*, resulting in a momentary energization of the relay operate coil **425** through a circuit including supply line **402**, relay coil **425**, coin switch contacts **468***c* and **468***a*, line **469** and supply line **403**. Upon this momentary energization of the relay operate coil **425**, each of the ganged movable contacts **421***a*, **422***a*, **423***a* and **424***a* will be moved downwardly and into engagement with their corresponding fixed "*b*" contacts, thereby opening the energizing circuits to the coin magnets **494**, and thus de-energizing these magnets. Thus, the diverting means in each of the dispensing modules **100** will assume its second condition and any further coins deposited in the apparatus **50** will be passed to the coin return apparatus and will not further actuate the coin switches.

Each of the relays **420**, **430** and **440** are of the latching type, the reset coils **426**, **436** and **446** thereof serving, when energized, to hold a latching member (not shown) in position so as to be engaged by the movable "*a*" contacts when these contacts are moved downwardly by the energization of the operate coils **425**, **435** and **445**. Thus, once operated, (i.e., with the "*a*" and "*b*" contacts closed) the relays **420**, **430** and **440** will remain latched in their operated position even after the operate coils thereof are de-energized until such time as the reset coils are de-energized, thereby releasing the latching mechanisms and allowing the movable "*a*" contacts to return to their original positions under the urging of suitable biasing means (not shown).

After momentarily energizing the relay **420**, the deposited coin will roll off the coin switch **468** and into the coin collecting box **65** via the coin collecting chute **64**, thereby allowing the movable contact **468***a* to return upward out of engagement with the fixed contact **468***c* and back into engagement with the fixed contact **468***b* under the urging of suitable biasing means, thereby de-energizing the operate coil **425** of the relay **420**. It will be noted that prior to deposit of the coin, the reset coil **426** of the relay **420** was energized through a circuit comprising the supply line **420**, the reset coil **426**, the line **496A**, stepping switch reset coil **341**, the line **479**, the line **485A**, the microswitch contacts **148** and **149**, the circuit breaker **492**, the line **493A**, the coin magnet **494A**, the line **415**, the interconnected first-bank relay contacts **421**, **431** and **441**, the line **412** and the supply line **403**. It will be apparent that this circuit also maintains the stepping switch reset coil **341** energized. After operation of the relay **420**, this energizing circuit is opened but the reset coil **426** remains energized through the line **418**, the stepping switch reset coil **341**, (which accordingly, also remains energized) the line **479**, the line **485A**, the line **402**, the relay coil **455A**, the line **456**, the relay contacts **422***a* and **422***b*, the patch board **460A**, the cable **475A**, the stepping switch contacts **310** and wiper arm **308**, the line **473**, the circuit breaker **474**, the line **476A**, the line **417**, the relay contacts **421***a* and **421***c* and the line **412** and the supply line **403**. Therefore, the latch mechanism is maintained in position and the movable "*a*" contacts of the relay **420** remain latched in the downward positions thereof after de-energization of the operate coil **425**.

The operation of the relay **420**, also serves to energize the relay **450A** of the dispensing module **100** through the following path: supply line **402**, relay coil **455A**, line **456**, relay contacts **422***a* and **422***b*, line **427**, patch board **460A**, cable **475***a*, stepping switch home contact **310** and wiper arm **308**, line **473**, circuit breaker **474**, line **476A**, line **417**, relay contacts **421***b* and **421***a*, line **412** and supply line **403**. Upon such energization of the relay **450A**, the normally open movable contacts **451A** and **452A** thereof are moved downwardly as viewed in FIG. **16** into the closed position thereof in contact with the corresponding fixed contacts **453A** and **454A**. It will be noted that this provides an alternative energizing path for the reset coil **426** of the relay **420** along line **418**, the interconnected relay contacts **451** and **453** and the interconnected coin switch contacts **464**, **466** and **468**. Also this closing of the relay **450A** serves to energize the motor **200** of the dispensing module **100** along a path from the supply line **402** through the relay coil **455A** and patch board **460A** to the stepping switch home contact **310** and wiper arm **308**, the line **473**, the motor **200**, the line **483**, the closed relay contacts **452A** and **454A**, the line **484**, the line **485A**, the line **479**, the stepping switch reset coil **341**, the line **418**, the interconnected relay contacts **451** and **453** and the interconnected relay contacts **464**, **466** and **468** to the supply line **403**. Thus, the motor **200** will begin running and when it reaches normal operating speed will be automatically clutched into engagement with the gear train as described above for beginning the stepwise rotation of the feed wheel **150**. It will be noted, that the same path which energized the motor **200** also simultaneously energizes the parallel-connected locking solenoid coil **167** and cutter blade solenoid coil **197** whereby the armature **168** of the locking solenoid **165** is pulled out of engagement with the feed wheel **150** for permitting rotation thereof and the cutter blade **180**

will be raised to the position as shown in FIGS. 4, 6 and 11 to permit passage of the strip 130 through the opening 182 therein all as described above.

At this point the contact actuating pin 251 will be out of the recess 232 of the gear 230, whereby the Geneva switch contacts 155 and 156 will be closed for immediately energizing the counter 350 and the stepping switch advance solenoid coil 331. At the same time that the coil 331 is energized, the counter 350 is actuated to register one count corresponding to a single stamp to be fed from the dispensing module 100. Shortly after the gear train begins moving, the drive pin 238 will engage the Geneva cam wheel 240 and move it an angular distance corresponding to the width of one cam tooth 245, as described above. Thus, the feed wheel 50 is moved a distance, corresponding to the length of one stamp and, one stamp is, accordingly, fed from the module 100. Shortly after this stepwise rotation of the Geneva cam wheel 240, the gear 230 will have rotated sufficiently for the switch actuating pin 251 to fall back into the recess 232 on the cam wheel 230, thereby opening the Geneva switch contacts 155 and 156 and de-energizing the stepping switch relay coil 331. Upon de-energization of the solenoid coil 331, the stepping switch wiper arm 308 is stepped from the home position thereof to the next fixed contact 310 as described above, the wiper arm 308 being prevented from homing by the action of the latch mechanism which is engaged by the energized reset coil 341 as described above. For purposes of illustration it will be assumed that the deposited coin was of such a value that five stamps will be dispensed from the dispensing module 100A. Accordingly, the second fixed contact 310 of the stepping switch apparatus 300 will maintain a closed energizing circuit through the patch board 460A and the motor 200 will continue operating.

As the gear 230 continues to rotate the Geneva switch contacts 155 and 156 will be intermittently closed and opened, thereby registering unitary counts in the counter 340 and stepping the wiper arm 308 along the fixed contacts 310 of the stepping switch 300 until the wiper arm 308 reaches the fifth contact 310. At this point, five stamps will have been fed from the dispensing module 100 and five counts will have been registered in the counter 350 and an open circuit will be presented to the dispensing module 100 through the patch board 460A. It will be noted that this open circuit will occur after the fifth stepwise operation of the feed wheel 150, thereby de-energizing the relay coil 455A and the motor 200, the locking solenoid coil 167 and the cutter blade solenoid coil 197. At this point, rotation of the drive train will cease, the armature 168 of the locking solenoid 165 will drop back into the adjacent recess 155 of the feed wheel 150 for locking the feed wheel 150 against further rotation and the cutter blade 180 will drop to its lowered position thereby partially severing the five dispensed stamps from the remainder of the strip 130. After de-energization of the motor 200, the inertia of the armature 210 will cause it to continue rotating for a short time, sufficient to rotate the cam gear 230 about one-fourth of a rotation, thereby moving the cam follower pin 241 back out of the recess 232 and reclosing the Geneva switch contacts 255 and 256. Thus, when the next dispensing cycle is begun, the stepping solenoid coil 331 will be immediately energized as described above. The opening of the relay switches 451A and 453A by the de-energization of the relay coil 455A will open the energizing circuit for the relay reset coil 426, thereby de-energizing the reset coils 426 for releasing the latch thereof and allowing the movable "*a*" contacts of the relay 420 to return to their initial positions. The opening of the relay contacts 451 and 453 will also open the energizing circuit for the stepping switch reset coil 341 thereby de-energizing the reset coil 341 for releasing the ratchet wheel 305 and allowing the wiper arm 308 to return to its home position as described above. It will be noted also, that the resetting of the relay 420 recloses the energizing circuit for the coin magnets 494 thereby moving the respective diverting means back to the first conditions thereof and placing the dispensing apparatus 50 in condition for the beginning of another dispensing cycle upon the deposit of additional coins.

When the strip of stamps 130 is nearly exhausted, the end of the strip will pass through the microswitch mechanism 145, thereby allowing the movable contact 148 thereof to move out of engagement with the fixed contact 149 and back into engagement with the fixed contact 146. Thus, the energizing path for the coin magnets 494 will be opened, thereby de-energizing these magnets and preventing the initiation of further dispensing cycles since subsequently deposited coins will be diverted to the coin return apparatus as described above. Also, this switching of the microswitch mechanism 145 connects the indicator lamp 488 across the supply lines 402 and 403, thereby lighting the lamp 488 and giving an indication that the strip of stamps 130 is nearly exhausted and that the magazine must be refilled. It will be noted, that if the microswitch mechanism 145 is actuated during a dispensing cycle, the cycle will be completed and will not be effected by the opening of the coin magnet energizing circuit, since this circuit was already opened at the beginning of the dispensing cycle as described above.

The circuit breaker 474, 486 and 492 are preferably arranged as ganged contacts of a single switch. Thus, if the circuitry of anyone of the dispensing modules 100 becomes overloaded, the contacts of the corresponding circuit breaker will all be actuated simultaneously, thereby opening the normally closed breaker contacts 479 and 492 and closing the normally open contact 486. The opening of the contact 492 will de-energize the coin magnets 494 for preventing the initiation of further dispensing cycles; the opening of the contact 474 will prevent energization of the dispensing module 100; and the closing of the contact 486 will connect the indicator lamp 488 across the supply lines 402 and 403 for giving an indication that there is trouble within the dispensing module 100. When the attendant opens the dispensing apparatus 50, it will be immediately apparent that if the stamp magazine is not empty, the lighting of the lamp 488 must have been caused by the actuation of the circuit breaker. It will be noted that if the circuit breaker is actuated during a dispensing cycle, the cycle will be completed since the coin magnet energizing circuit was already opened at the beginning of the dispensing cycle and since the motor 200, the stepping switch solenoid coil 331, the counter 350, the locking solenoid coil 167 and the cutter solenoid coil 197 are all connected in parallel with the breaker contact 474 and are energized over alternate paths through the contacts of the relay 450A, once the dispensing cycle is started. However, once the cycle is ended and the contacts of the relay 450A are opened, the next cycle cannot begin since the initial energizing path for the dispensing module 100 is through the breaker contact 474 as described above.

While the operation of only the dispensing module 100A has been described, it will, of course, be understood that either or both of the dispensing modules 100B and 100C may have been operated simultaneously therewith through the patch boards 460B and 460C depending upon the internal connections therein. Similarly, it will be understood that, as mentioned above, different numbers of stamps may be simultaneously dispensed by the different dispensing modules, each dispensing module 100 being shut off upon the completion of its own dispensing cycle. When the last dispensing cycle has been completed, all of the relays 420, 430 and 440 will be reset thereby reclosing the energizing circuit for the coin magnets 494. It will be observed, however, that the coin magnets 494 will not be re-energized until all of the relays 420, 430 and 440 are reset.

Finally, while the operation of the dispensing apparatus 50 has been described only in response to the actuation of the coin switch 468, the dispensing apparatus 50 will be identically operated in response to actuation of either the coin switch 464 or the coin switch 466.

While, in the preferred embodiment described above the locking solenoid 165 is disengaged from the feed wheel 150 for the entire dispensing cycle, there is shown in FIG. 17 an alternative embodiment wherein the locking solenoid 165 is engaged with the feed wheel 150 after each of the stepwise operations thereof. The schematic circuit of this embodiment

is identical to that for the preferred embodiment, with one exception. As shown in FIG. **17** the locking solenoid coil **167** is there connected in parallel with the counter **350** and stepping switch solenoid coil **331**, rather than in parallel with the motor **200**. Therefore, it will readily be apparent that the energization of the locking solenoid coil **167** will be controlled by the intermittent operation of the Geneva switch contacts **155** and **156** so as to be energized for unlocking the feed wheel **150** immediately before each stepwise operation thereof and de-energized for locking the feed wheel **150** immediately after each stepwise operation thereof. This embodiment provides additional security against possible theft of stamps from the dispensing module **100** since it makes it more difficult to pull the strip **130** from the dispensing outlet while the dispensing module **100** is in operation. In all other respects, the operation of this embodiment is identical to the preferred embodiment as described above in connection with FIG. **16**.

As disclosed above, the preferred embodiment of the dispensing apparatus **50** utilizes electrical patch boards for predetermining the number of stamps to be dispensed in a dispensing cycle for each of the dispensing modules **100**. However, this same function can be accomplished by the use of a manually operated key board, a tap switch, a rotary dial switch or other manual or automatic programming means. Also, while the use of relays and other electromechanical devices has been described in the preferred embodiment, it will, of course, be understood that solid state or other electronic elements could be used in place of these electromechanical devices as is well known in the art.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various other modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An apparatus for automatically dispensing one unit or a plurality of connected units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of said strip to the exterior of said apparatus, rotary feed structure mounted on said frame for stepwise feeding of the strip from said magazine to said dispensing outlet, drive mechanism mounted on said frame and coupled to said feed structure for stepwise operation thereof to feed the strip a distance equal to one unit for automatically feeding one unit or a plurality of connected units to said dispensing outlet, a counter for counting the number of stepwise operations of said feed structure and thus the number of units dispensed by said apparatus, and a control circuit coupled to said drive mechanism and said counter, said control circuit being responsive to a predetermined number of operations of said counter corresponding to a predetermined number of the units to be dispensed from said magazine for automatically interrupting the operation of said drive mechanism only at the end of said predetermined number of operations and thus interrupting the dispensing of the units.

2. The apparatus set forth in claim **1**, wherein said control circuit comprises a stepping switch including a wiper and a plurality of contacts and being coupled to said counter and said drive mechanism for stepping in response to the operations of said counter, the stepping switch contact corresponding to said predetermined number presenting an open circuit to said counter and said drive mechanism, each of the other contacts of said stepping switch presenting a closed circuit to said counter and said drive mechanism for energization thereof, whereby when said stepping switch has been stepped to the contact corresponding to the predetermined number the operation of said drive mechanism said counter is interrupted.

3. The apparatus set forth in claim **1**, and further including means coupled to said control circuit for predetermining the number of units to be dispensed by said apparatus.

4. An apparatus for dispensing a predetermined number of units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of said strip to the exterior of said apparatus, a cylindrical feed wheel rotatably mounted on said frame for feeding the strip from said magazine to said dispensing outlet, a plurality of transverse rows of projections carried by and extending a predetermined distance outwardly from the outer surface of said feed wheel and spaced apart circumferentially of said feed wheel a distance equal to an integral number of said units, the projections in each of said rows being spaced apart transversely of said feed wheel a distance equal to an integral number of the perforations in the strip, an arcuate holding shoe disposed concentric with said feed wheel and having a concave surface spaced from the outer surface of said feed wheel a distance less than the predetermined distance for supporting a portion of the strip in engagement with a plurality of the rows of projections of said feed member with said projections extending into the corresponding rows of perforations of the strip, the concave surface of said holding shoe having a plurality of equidistantly spaced-apart grooves therein extending circumferentially thereof and being equal in number to the number of projections in each row of said feed wheel for receiving the outer ends of said projections when they are in engagement with the strip, drive mechanism mounted on said frame and coupled to said feed wheel for stepwise operation thereof to feed the strip a distance equal to one unit, a counter for counting the number of stepwise operations of said feed wheel and thus the number of units dispensed by said apparatus, and a control circuit coupled to said drive mechanism and said counter, said control circuit being responsive to a predetermined number of operations of said counter corresponding to the predetermined number of the units to be dispensed from said magazine for interrupting the operation of said drive mechanism and thus interrupting the dispensing of the units.

5. The apparatus set forth in claim **4**, wherein said transverse rows of projections are spaced apart a distance equal to one unit.

6. The apparatus set forth in claim **4**, wherein the integral number of perforations separating adjacent projections in each of said rows is greater than one.

7. The apparatus set forth in claim **4**, and further including means for providing an indication when said magazine is empty.

8. An apparatus for dispensing a predetermined number of units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of said strip to the exterior of said apparatus, a cylindrical feed wheel rotatably mounted on said frame for feeding the strip from said magazine to said dispensing outlet, a plurality of transverse rows of projections carried by and extending a predetermined distance outwardly from the outer surface of said feed wheel and spaced apart circumferentially of said feed wheel a distance equal to an integral number of said units, the projections in each of said rows being spaced apart transversely of said feed wheel a distance equal to an integral number of perforations in the strip, the outer surface of said feed wheel having a plurality of recesses therein spaced alternately with said transverse rows of projections, an arcuate holding shoe disposed concentric with said feed wheel and having a concave surface spaced from the outer surface of said feed wheel a distance less than the predetermined distance for supporting a portion of the strip in engagement with a plurality of the rows of projections of said feed wheel with said projections extending into the cor-

responding rows of perforations of the strip, the concave surface of said holding shoe having a plurality of equidistantly spaced-apart grooves therein extending circumferentially thereof and being equal in number to the number of projections in each row of said feed wheel for receiving the outer ends of said projections when said projections are in engagement with the strip, drive mechanism mounted on said frame and coupled to said feed wheel for operation thereof to feed the strip from said magazine to said dispensing outlet, a locking solenoid including a movable armature mounted on said frame adjacent to said feed wheel and coupled to said control circuit, the armature of said locking solenoid being movable into and out of the recesses in said feed wheel, said control circuit being responsive to the initiation of operation of said feed wheel for moving the armature of said locking solenoid out of the adjacent recess in said feed wheel and being responsive to the operation of said feed wheel to feed the predetermined number of units for moving the armature of said locking solenoid into the adjacent recess of said feed wheel for preventing further operation thereof.

9. An apparatus for dispensing a predetermined number of units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of the strip to the exterior of said apparatus, feed structure mounted on said frame for stepwise feeding of the strip from said magazine to said dispensing outlet, a motor having a drive shaft coupled thereto, a reduction gear train including a drive gear and at least one driven gear and being driven by said drive shaft for reducing the output speed thereof, a drive member carried by said gear train, a Geneva cam output shaft intermittently driven in rotary fashion by said drive member, and means coupling said Geneva cam output shaft to said feed structure for stepwise operation thereof to feed the strip a distance equal to one unit, a counter for counting the number of stepwise operations of said feed structure and thus the number of units dispensed by said apparatus, and a control circuit coupled to said motor and said counter, said control circuit being responsive to a predetermined number of operations of said counter corresponding to the predetermined number of the units to be dispensed from said magazine for interrupting the operation of said drive mechanism and thus interrupting the dispensing of the units.

10. The apparatus set forth in claim 9, wherein said means for coupling said Geneva cam output shaft to said feed structure includes first and second pulleys respectively coupled to said Geneva cam output shaft and said feed structure, and a drive belt coupling said first and second pulleys.

11. The apparatus set forth in claim 9, wherein said motor comprises a shaded-pole motor including a stator and a rotor and wherein said drive shaft is coupled to said rotor axially thereof, said rotor being movable axially thereof and assuming an equilibrium position relative to said stator when said motor is running at full speed, and means biasing said rotor to a position axially displaced from said equilibrium position, said drive gear being carried by said drive shaft concentric therewith adjacent one end thereof, said rotor moving into the equilibrium position thereof against the action of said biasing means as said rotor accelerates to its normal operating speed for engaging said drive gear with said driven gear, whereby operation of said feed structure is prevented until said motor has achieved its normal operating speed.

12. The apparatus set forth in claim 9, wherein said drive member comprises a pin carried by said driven gear and extending outwardly therefrom parallel to the axis thereof, and wherein said Geneva cam output shaft includes a Geneva cam wheel member, said drive pin moving periodically into and out of engagement with said Geneva cam wheel as the driven gear of said gear train is rotated for providing intermittent rotation of said Geneva cam output shaft.

13. The apparatus set forth in claim 9, and further including a counter cam carried by said reduction gear train, a counter switch having a pair of contacts coupled to said counter, one of said contacts engaging said counter cam for stepwise operation of said counter switch under the camming action of said counter cam in synchronism with the stepwise operation of said feed structure, whereby said counter is actuated once for each unit dispensed by said dispensing apparatus.

14. An apparatus for automatically dispensing one unit or a plurality of connected units from any of several strips each having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a plurality of dispensing modules; each of said modules including a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of the strip to the exterior of said apparatus, rotary feed structure mounted on said frame for stepwise feeding of the strip from said magazine to said dispensing outlet, drive mechanism mounted on said frame and coupled to said feed structure for stepwise operation thereof to feed the strip a distance equal to one unit for automatically feeding one unit or a plurality of connected units to said dispensing outlet, a counter for counting the number of stepwise operations of said feed structure and thus the number of units dispensed by said apparatus, and a control circuit coupled to said drive mechanism and said counter, said control circuit being responsive to a predetermined number of operations of said counter corresponding to a predetermined number of the units to be dispensed from said magazine for automatically interrupting the operations of said drive mechanism only at the end of said predetermined number of operations and thus interrupting the dispensing of the units; and program means, coupled to each of said control circuits for selective operation of said dispensing modules individually and simultaneously.

15. The apparatus set forth in claim 14, wherein said program means is manually resettable for altering the predetermined number of units to be dispensed from any of said dispensing modules.

16. The apparatus set forth in claim 14, wherein said program means comprises a plurality of patch boards equal in number to said dispensing modules and corresponding respectively thereof.

17. An apparatus for automatically dispensing one unit or a plurality of connected units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of said strip to the exterior of said apparatus, feed structure mounted on said frame for stepwise feeding of the strip from said magazine to said dispensing outlet, drive mechanism mounted on said frame and coupled to said feed structure for stepwise operation thereof to feed the strip a distance equal to one unit for automatically feeding one unit or a plurality of connected units to said dispensing outlet, a counter for counting the number of stepwise operations of said feed structure and thus the number of units dispensed by said apparatus, lock structure comprising first lock member carried by said feed structure and a second lock member carried by said frame, lock operating means for moving said first and second lock members into and out of engagement with each other, and a control circuit coupled to said drive mechanism and said counter and said lock operating means, said control circuit being responsive to a predetermined number of operations of said counter corresponding to a predetermined number of the units to be dispensed from said magazine for automatically interrupting the operation of said drive mechanism only at the end of said predetermined number of operations and thus interrupting the dispensing of the units, said control circuit being responsive to the initiation of operation of said feed structure for moving said lock members out of engagement with each other and being responsive to the interruption of operation of said drive mechanism after the predetermined

number of units has been dispensed for moving said lock members into engagement with each other, whereby said feed structure is operable to dispense the predetermined number of units when said lock members are out of engagement with each other and is inoperable when said lock members are in engagement with each other.

18. An apparatus for automatically dispensing one unit or a plurality of connected units from a strip having equidistantly spaced-apart transverse rows of perforations providing a connected series of units, said apparatus comprising a main supporting frame, a strip magazine carried by said frame, a dispensing outlet providing an opening for delivery of said strip to the exterior of said apparatus, feed structure mounted on said frame for stepwise feeding of the strip from said magazine to said dispensing outlet, drive mechanism mounted on said frame and coupled to said feed structure for stepwise operation thereof to feed the strip a distance equal to one unit for automatically feeding one unit or a plurality of connected units to said dispensing outlet, a counter for counting the number of stepwise operations of said feed structure and thus the number of units dispensed by said apparatus, lock structure comprising first lock member carried by said feed structure and a second lock member carried by said frame, lock operating means for moving said first and second lock members into and out of engagement with each other, and a control circuit coupled to said drive mechanism and said counter and said lock operating means, said control circuit being responsive to a predetermined number of operations of said counter corresponding to a predetermined number of the units to be dispensed from said magazine for automatically interrupting the operation of said drive mechanism only at the end of said predetermined number of operations and thus interrupting the dispensing of the units, said control circuit being responsive to the stepwise operations of said feed structure for moving said lock members out of engagement with each other immediately prior to each of said intermittent operations and to move said lock members into engagement with each other immediately after each of said intermittent operations for preventing movement of said feed structure between the intermittent operation thereof.

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