F. L. FULLER.

MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 1.

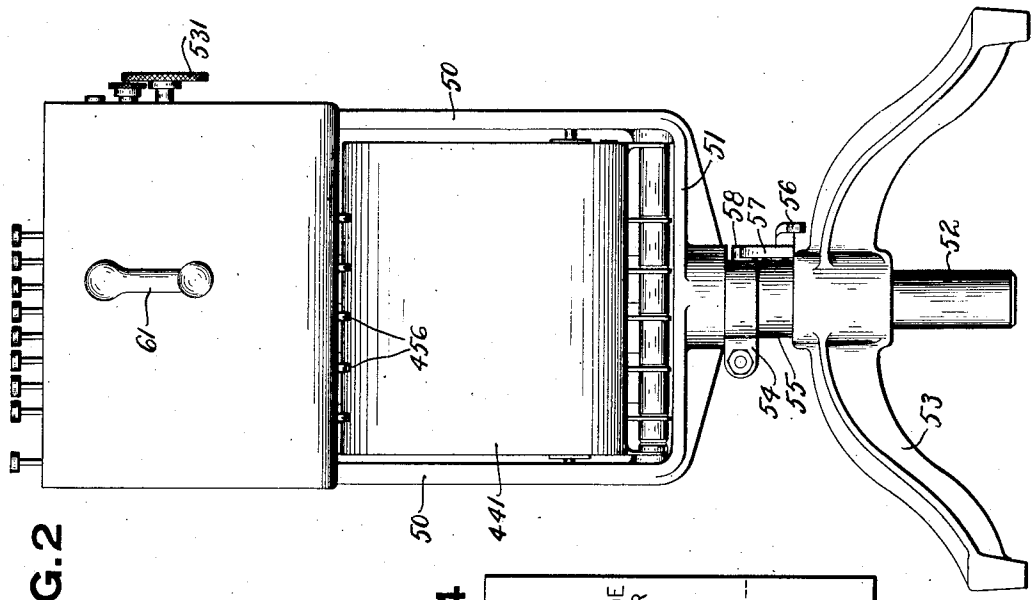


FIG. 2

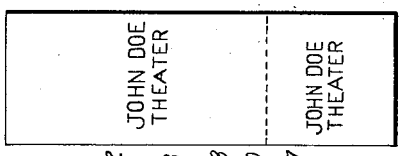


FIG. 4

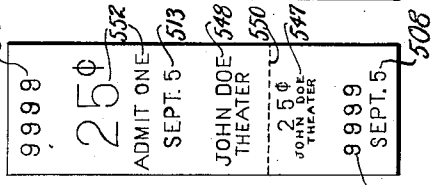


FIG. 3

FIG. 1

Inventor

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by R. C. Sloan

Attorney

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MULTIPLE TICKET ISSUING REGISTER.

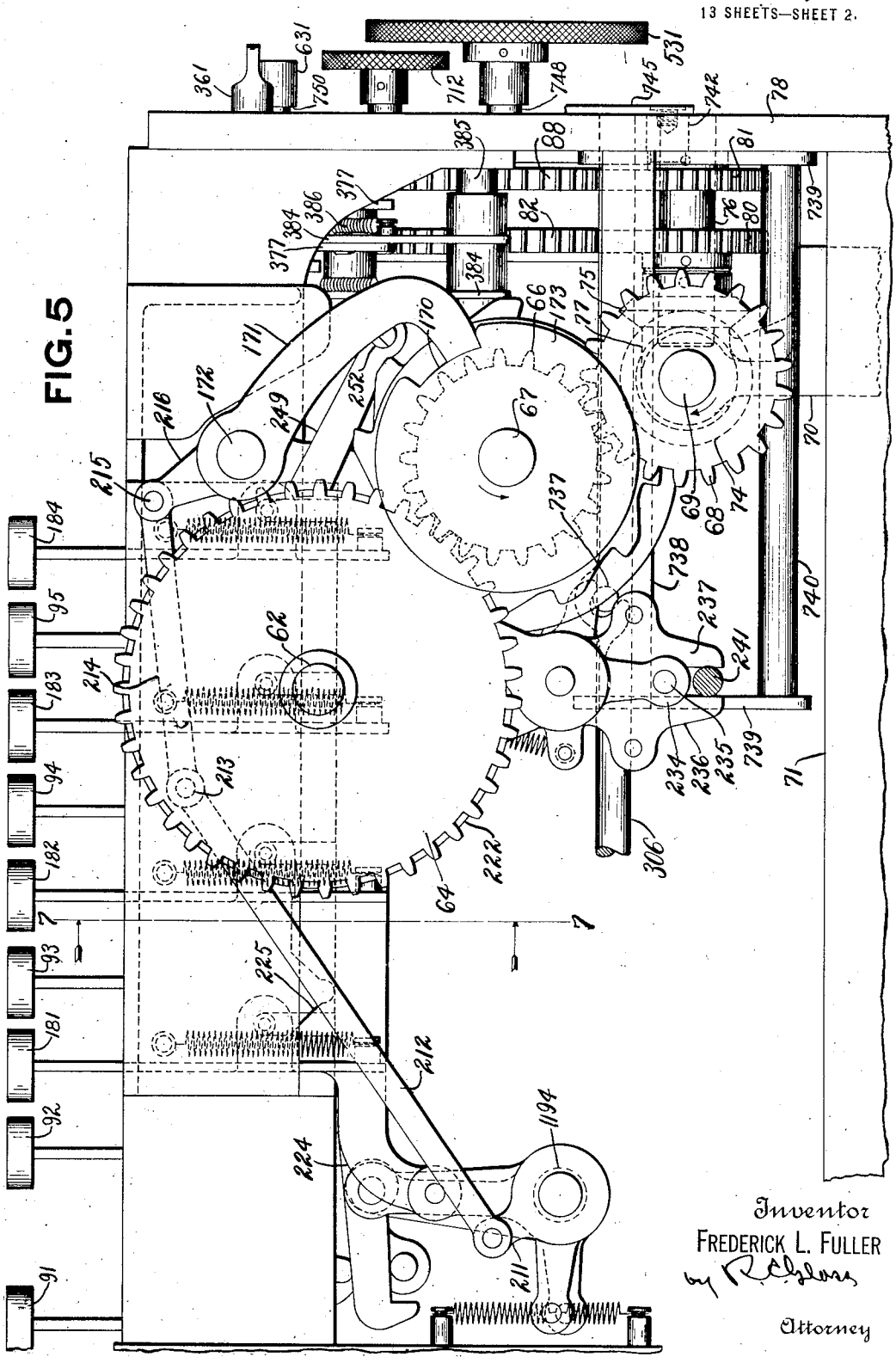
APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 2.

FIG. 5



Inventor

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MULTIPLE TICKET ISSUING REGISTER.

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1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 3.

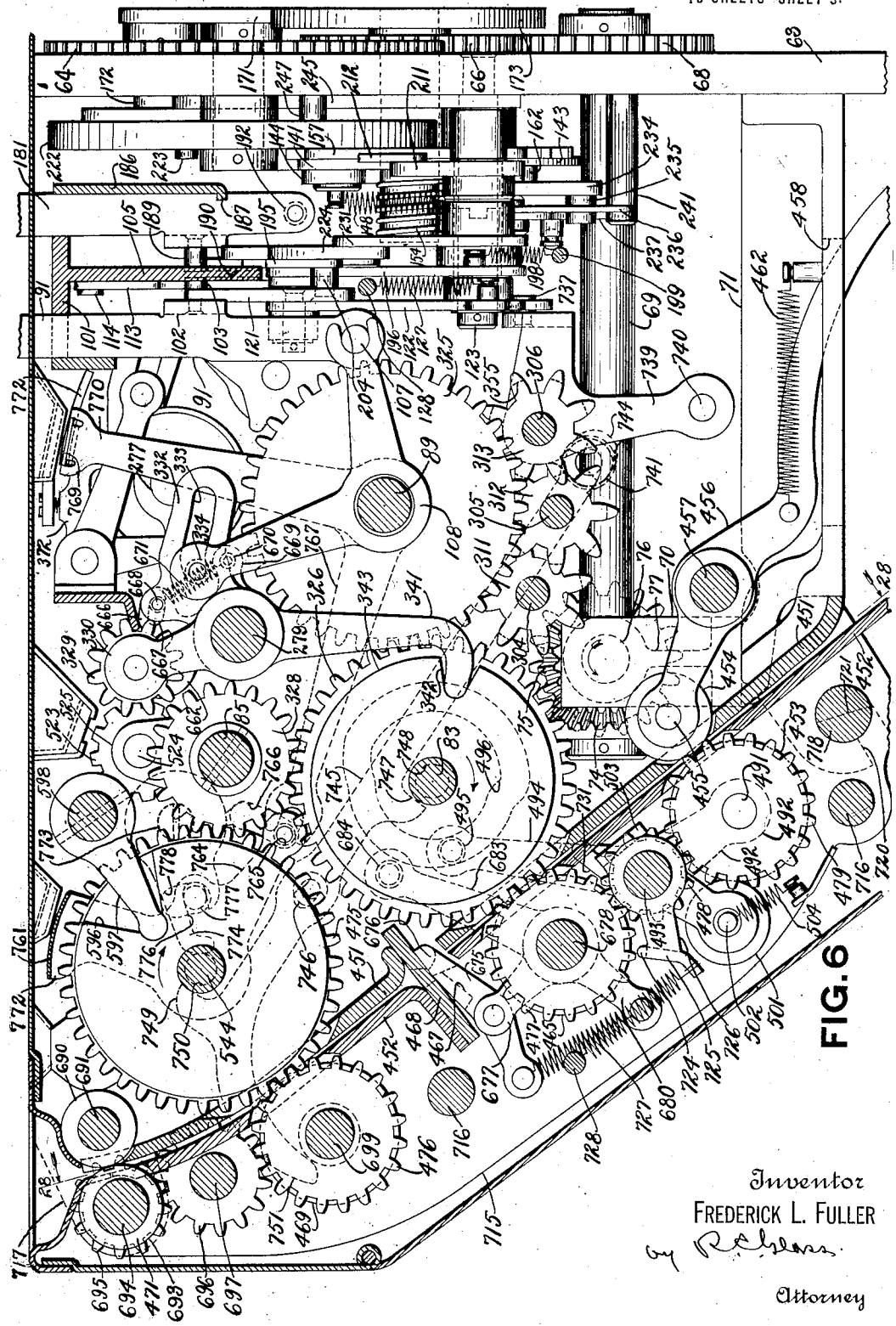


FIG. 6

Inventor

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Attorney

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MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 4.

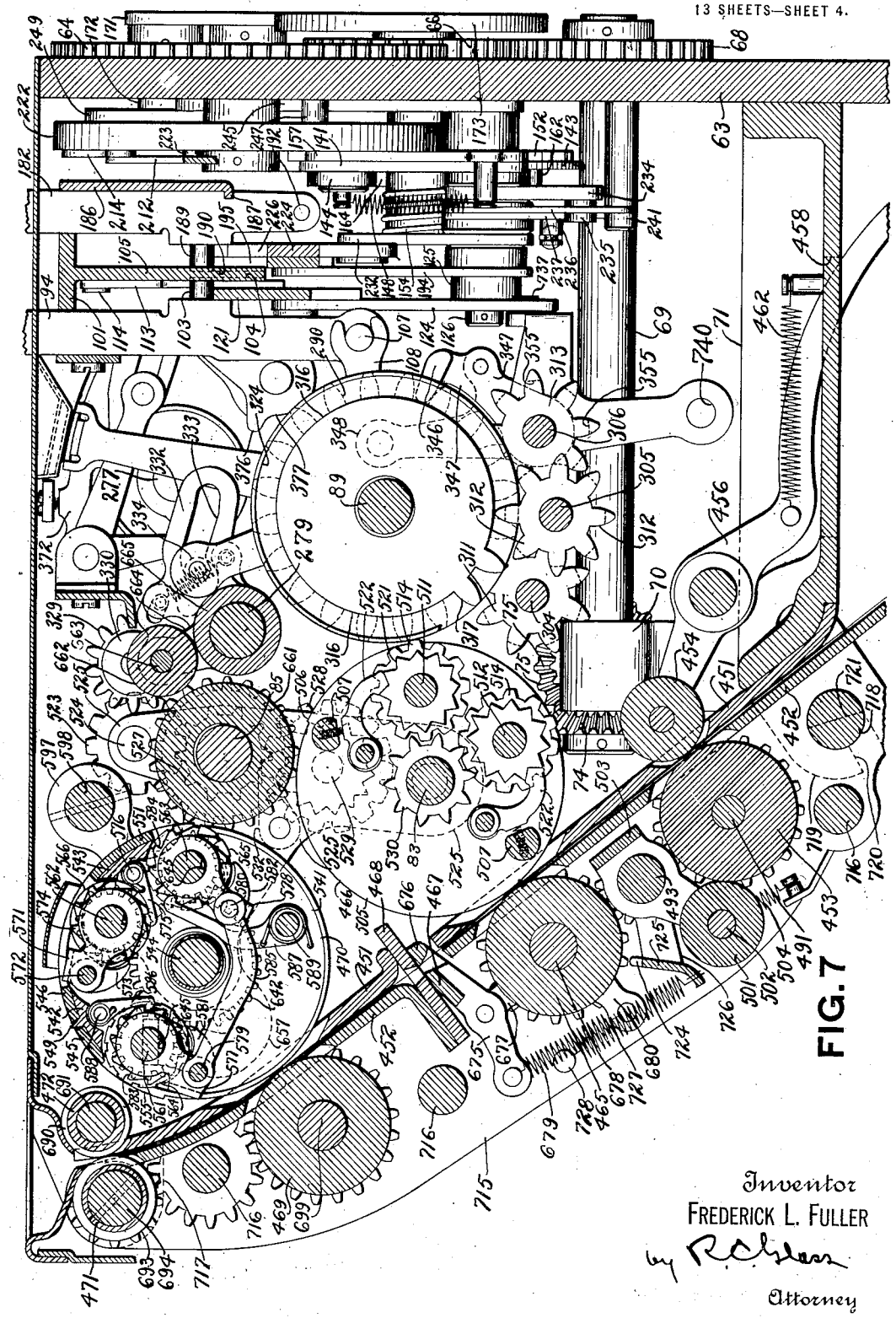


FIG. 7

Inventor

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MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 5.

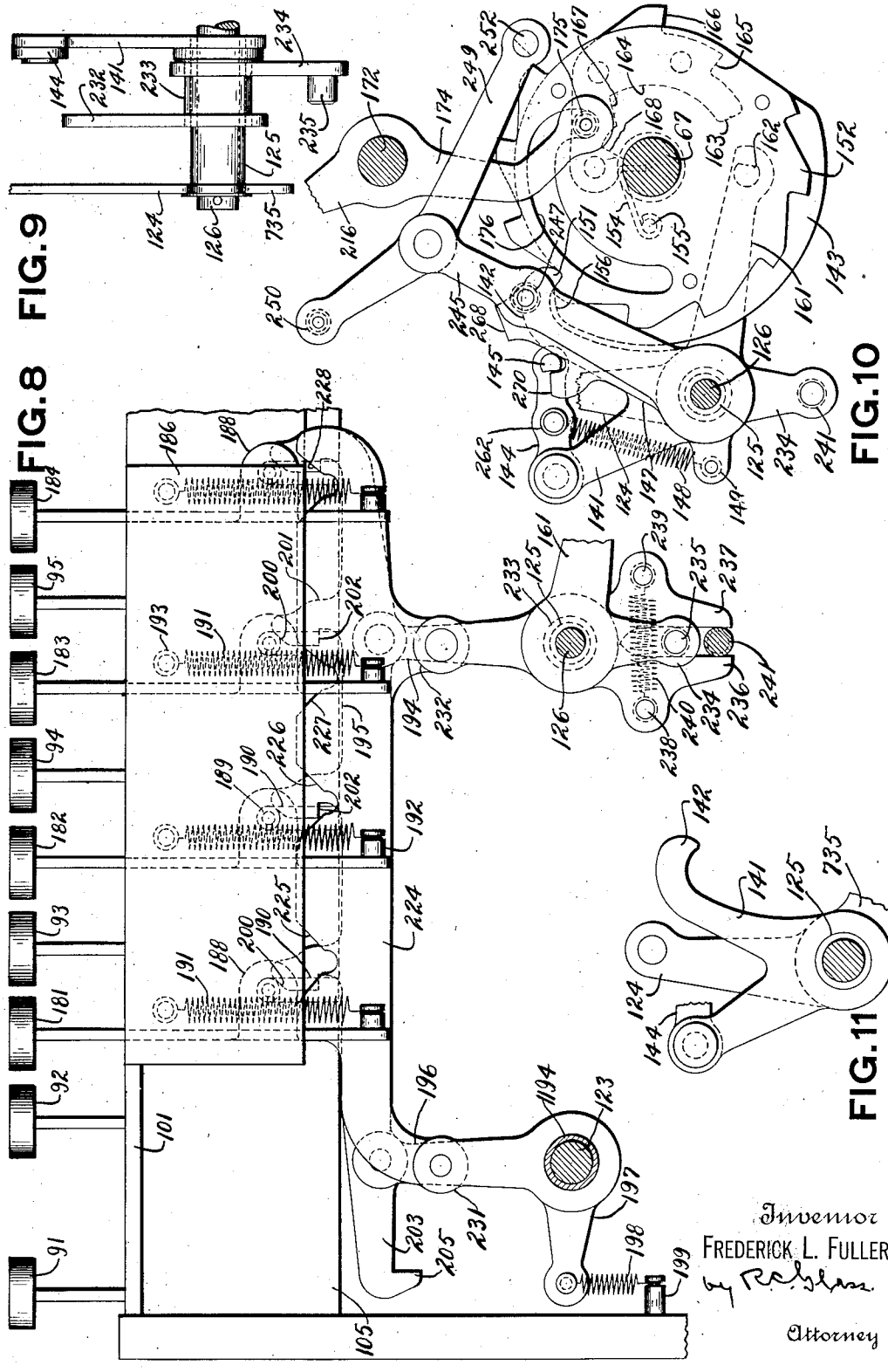


FIG. 8

FIG. 9

FIG. 10

FIG. 11

Inventor

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MULTIPLE TICKET ISSUING REGISTER.

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1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 6.

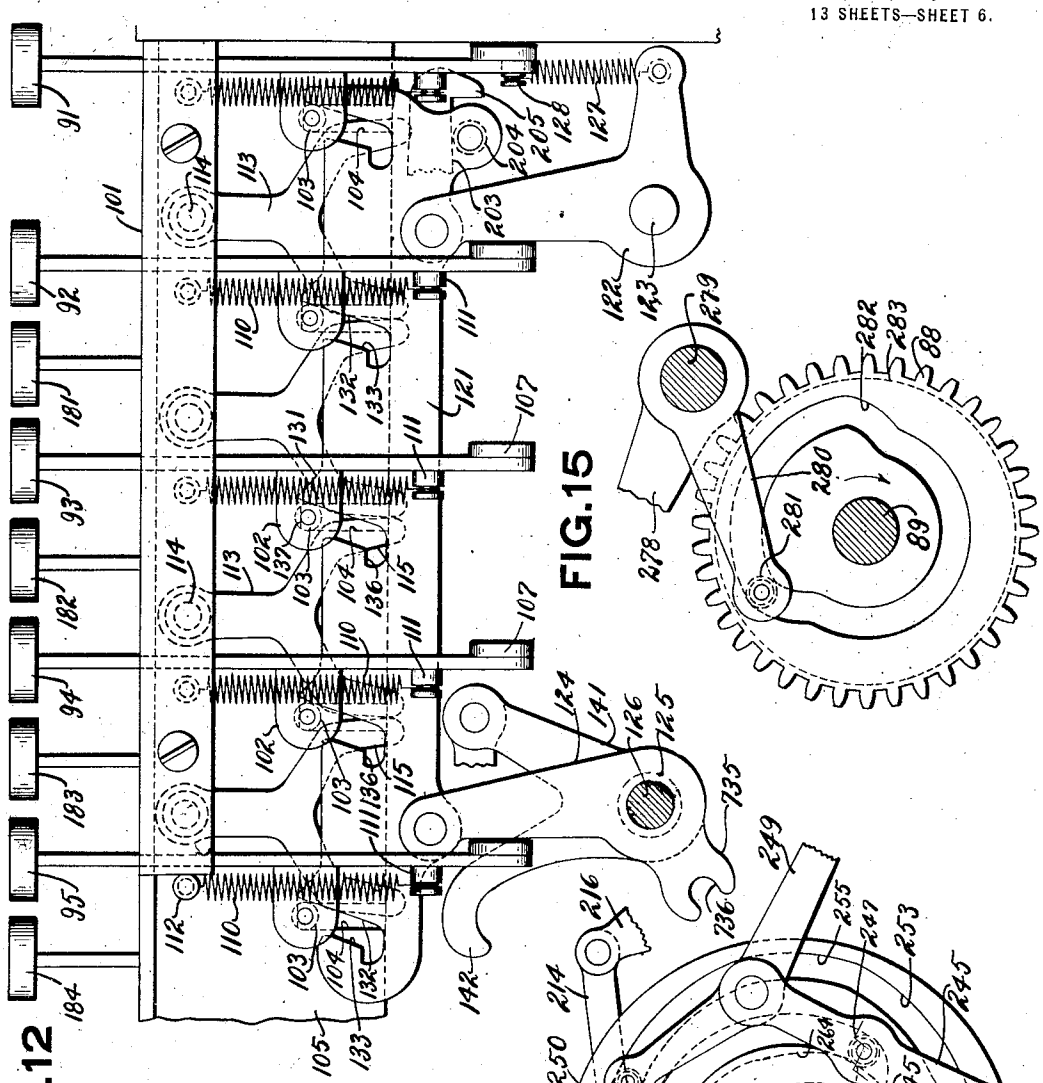


FIG. 12

FIG. 15

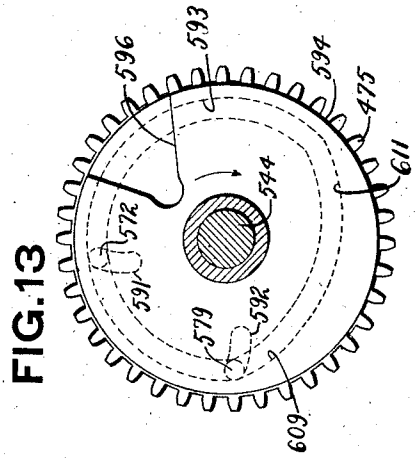


FIG. 13

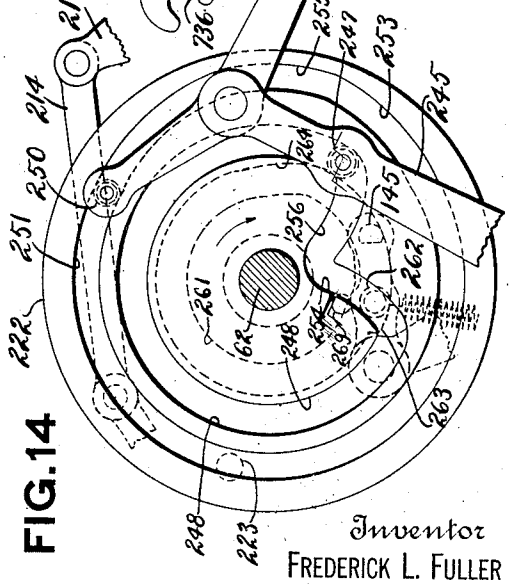


FIG. 14

Inventor

FREDERICK L. FULLER

by R. C. Kraus

Attorney

F. L. FULLER.

MULTIPLE TICKET ISSUING REGISTER.

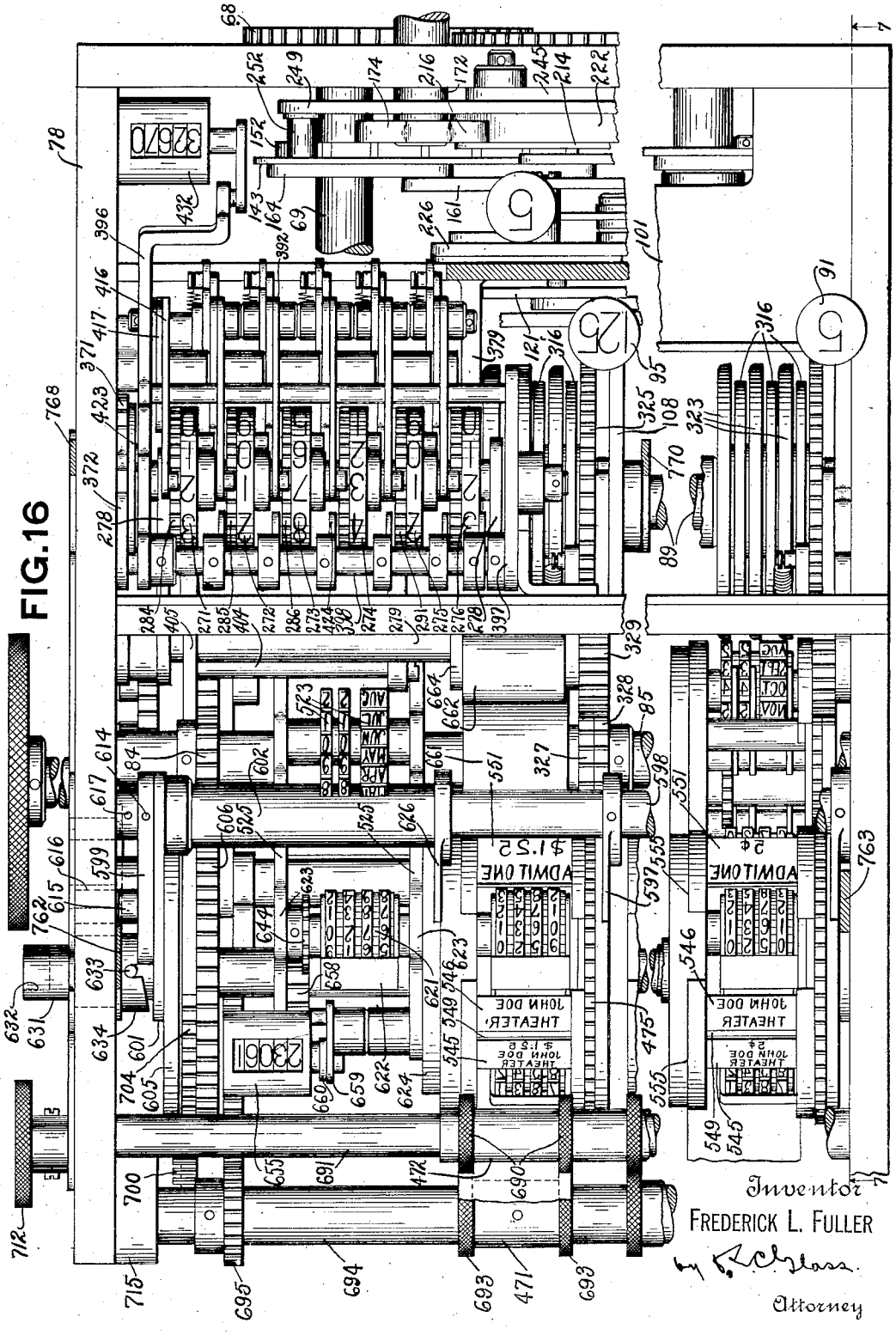
APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 7.

FIG. 16



Inventor
FREDERICK L. FULLER
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MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 8.

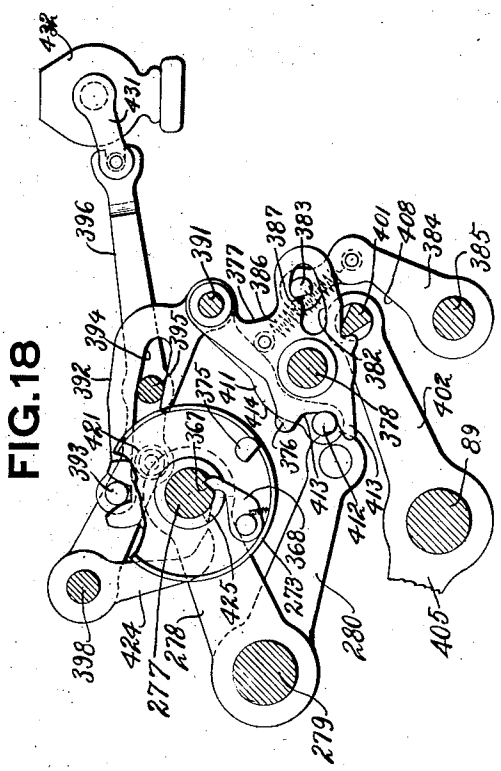


FIG. 18

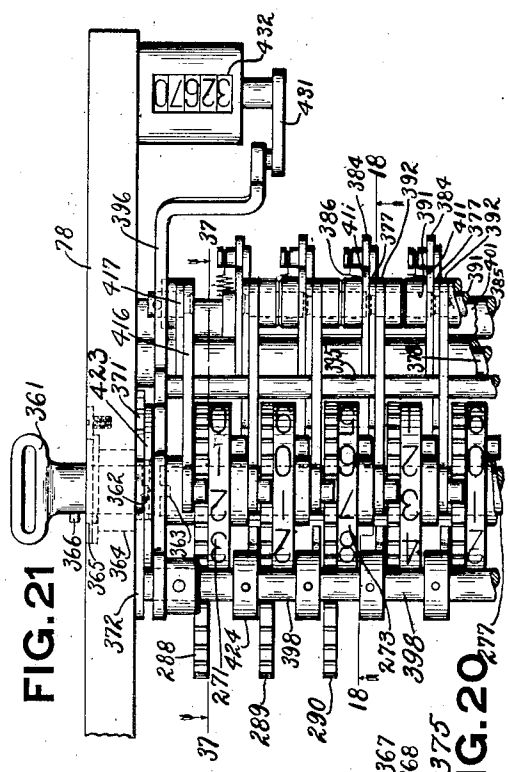


FIG. 21

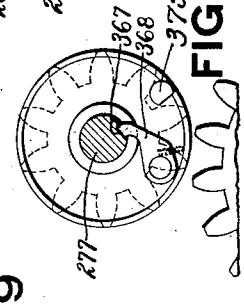


FIG. 20

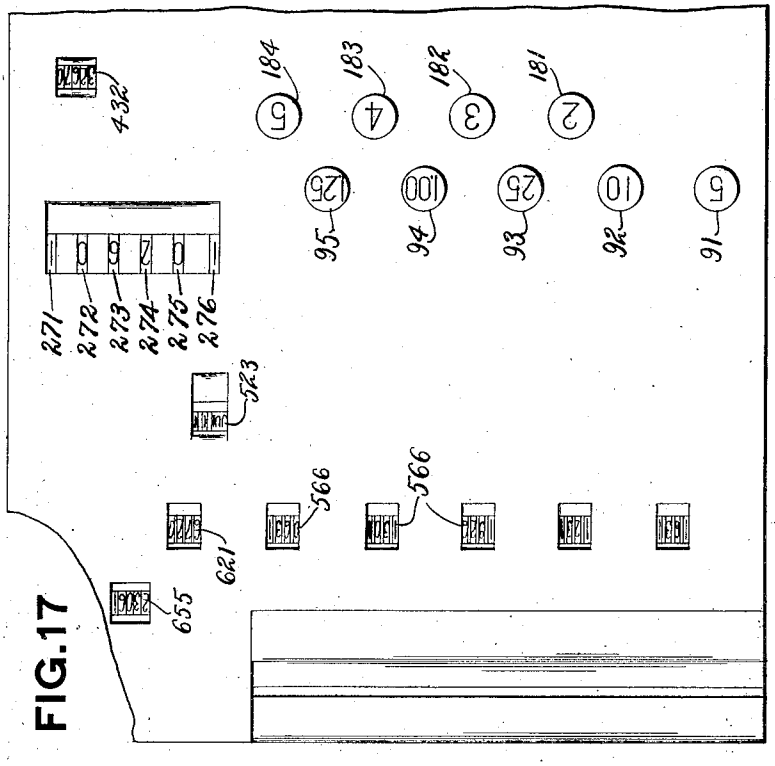


FIG. 17

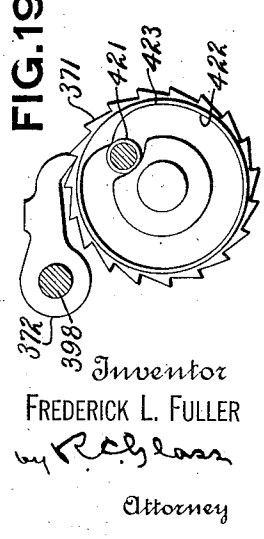


FIG. 19

Inventor

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F. L. FULLER.

MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221. Patented May 18, 1920.

13 SHEETS—SHEET 9.

FIG. 23

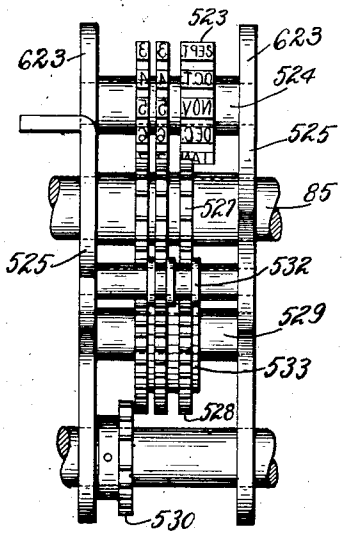


FIG. 24

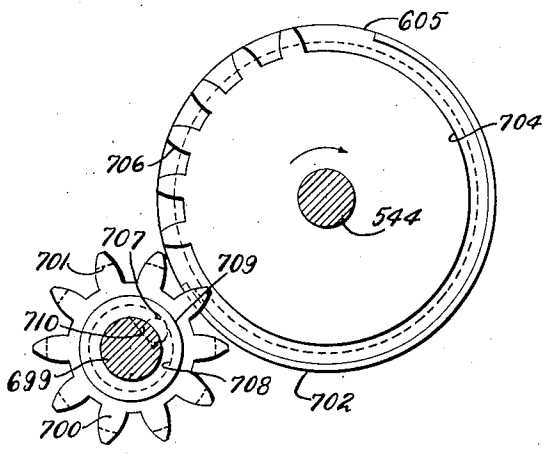
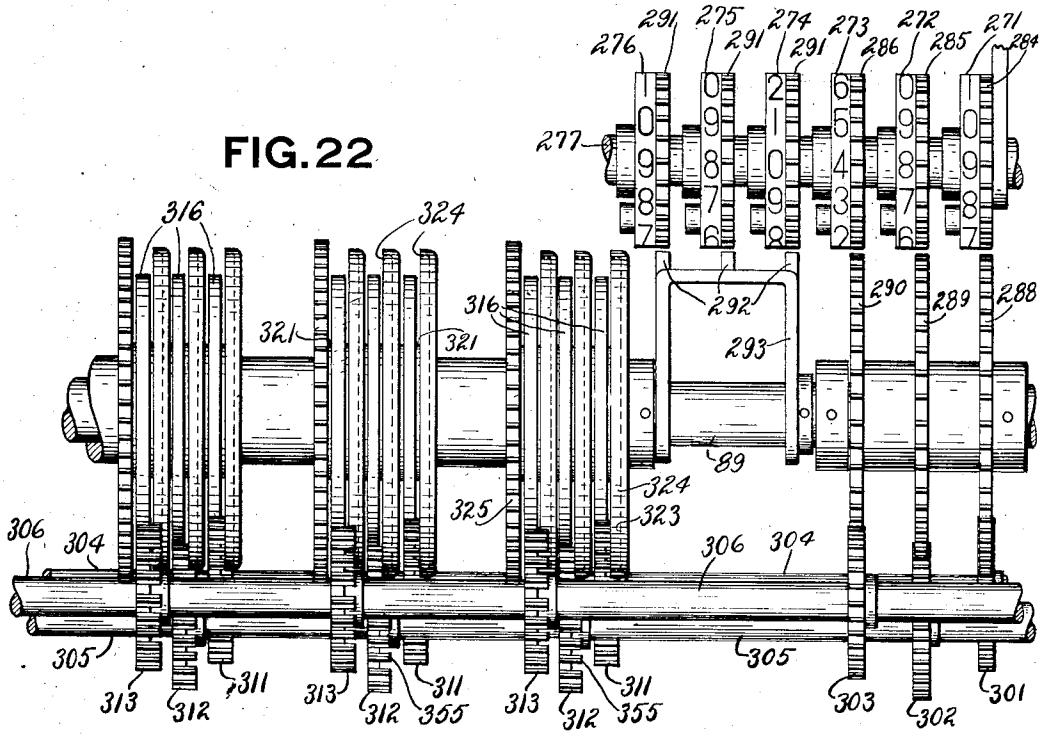


FIG. 22



Inventor

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MULTIPLE TICKET ISSUING REGISTER.

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1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 10.

FIG. 25

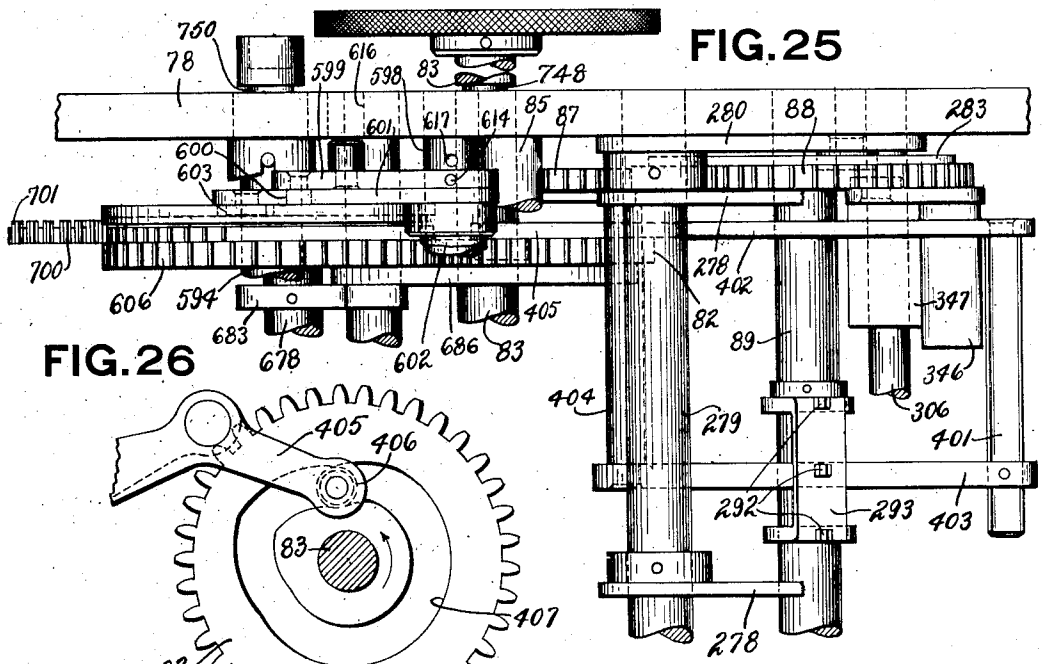
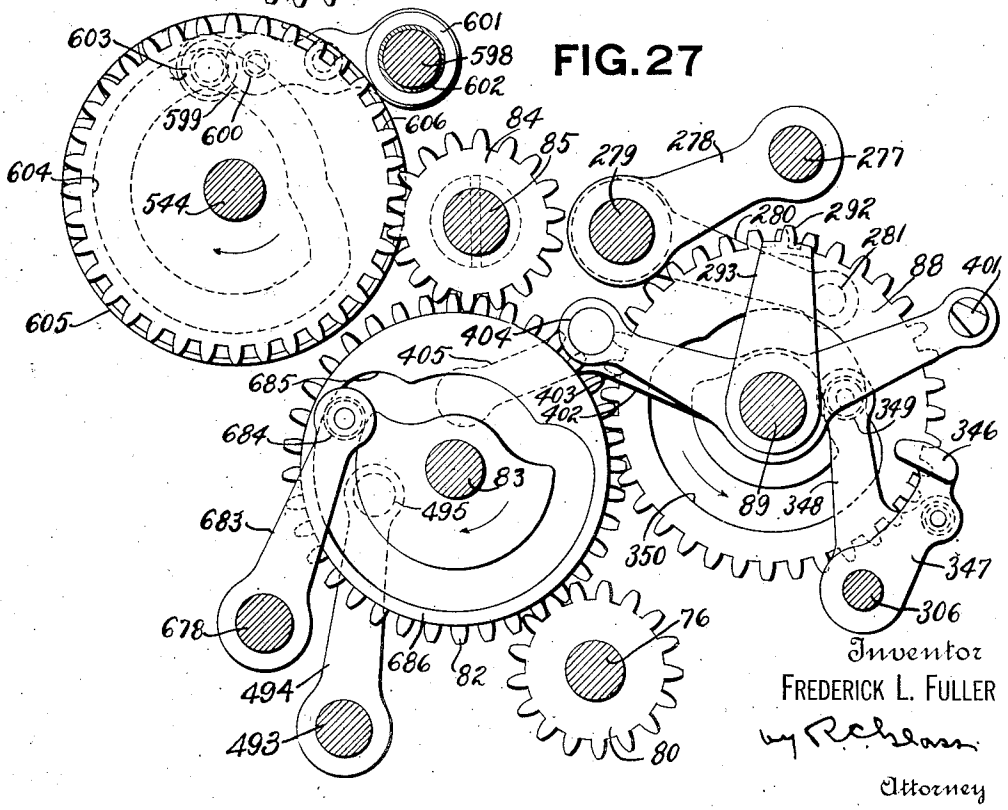


FIG. 26

FIG. 27



Inventor

FREDERICK L. FULLER

by Richson

Attorney

F. L. FULLER.

MULTIPLE TICKET ISSUING REGISTER.

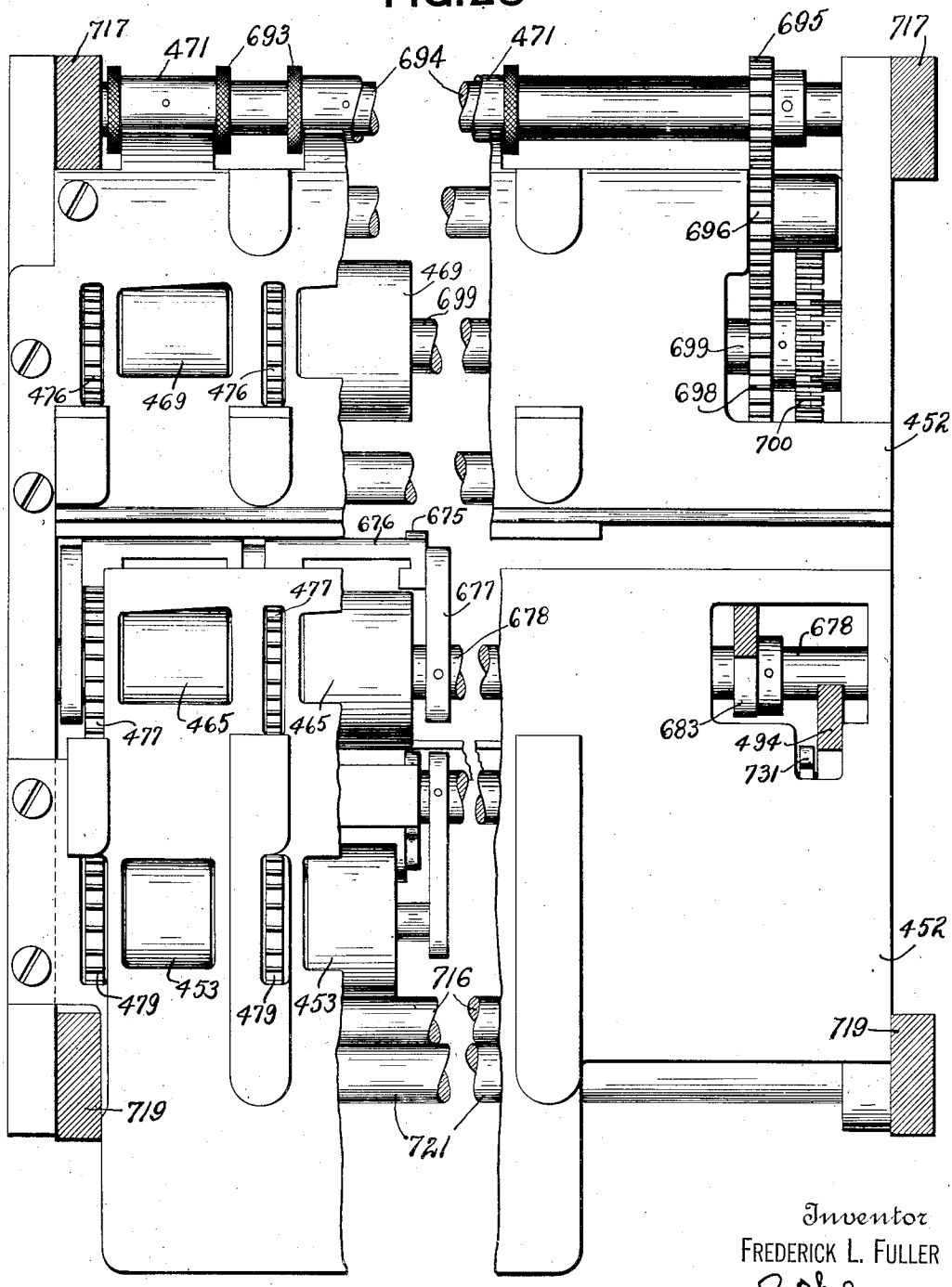
APPLICATION FILED APR. 2, 1917.

1,340,221.

Patented May 18, 1920.

13 SHEETS—SHEET 11.

FIG. 28



Inventor

FREDERICK L. FULLER

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MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221. Patented May 18, 1920.

13 SHEETS—SHEET 12.

FIG. 29

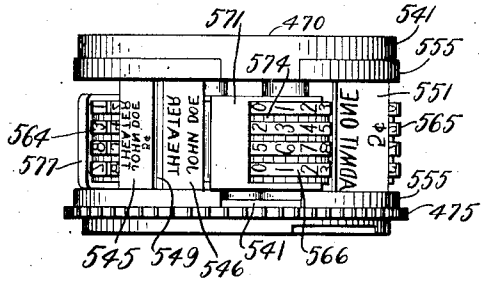


FIG. 30

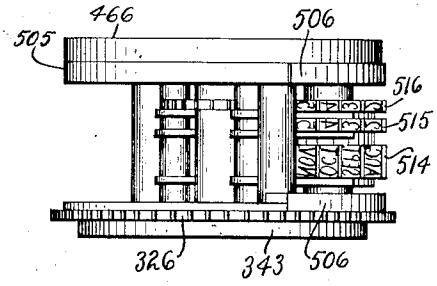


FIG. 31

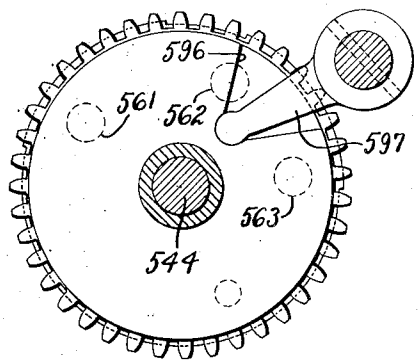


FIG. 32

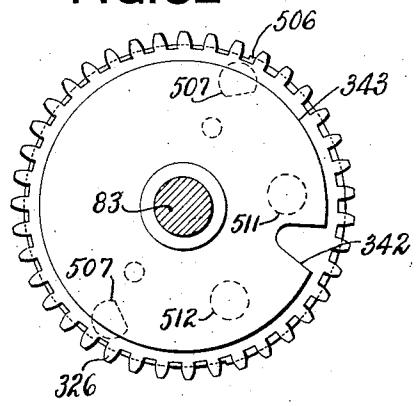


FIG. 33

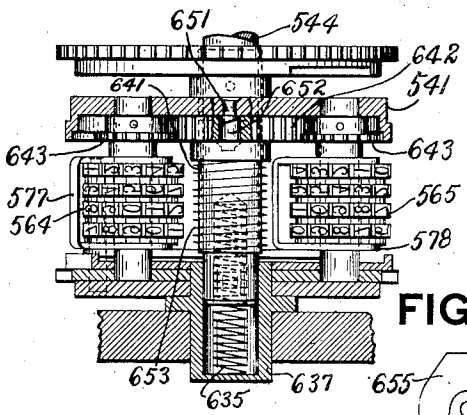


FIG. 34

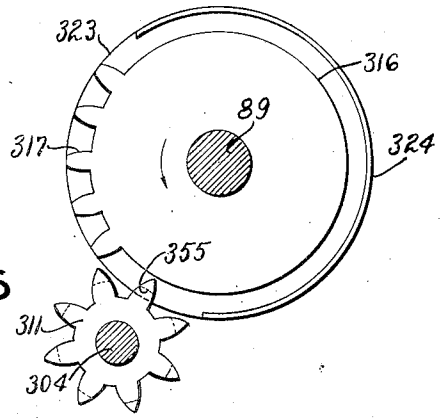


FIG. 35

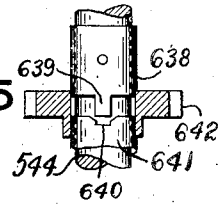
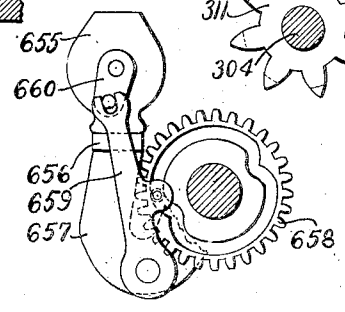


FIG. 36



Inventor

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F. L. FULLER.

MULTIPLE TICKET ISSUING REGISTER.

APPLICATION FILED APR. 2, 1917.

1,340,221. Patented May 18, 1920.

13 SHEETS—SHEET 13.

FIG. 41

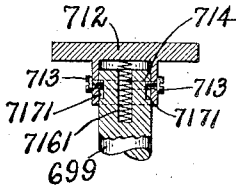


FIG. 37

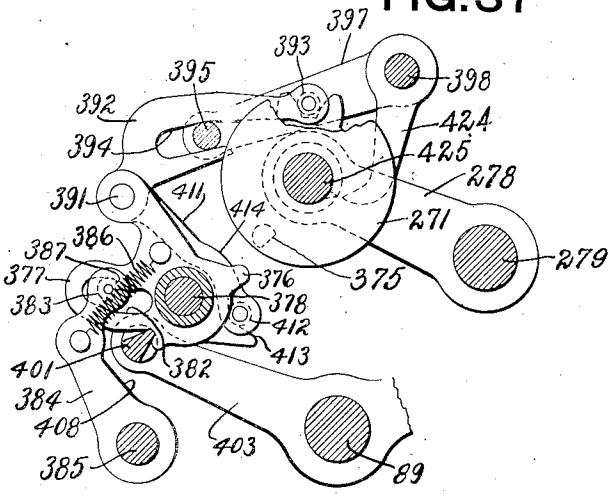


FIG. 38

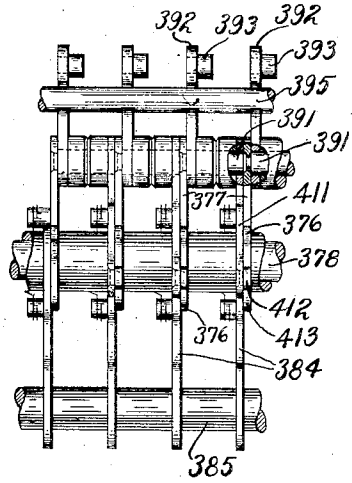


FIG. 39

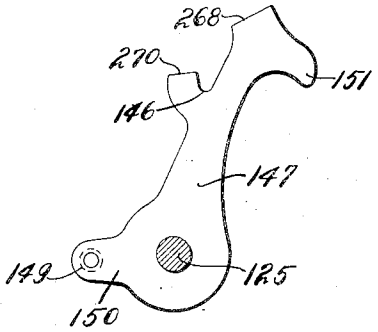
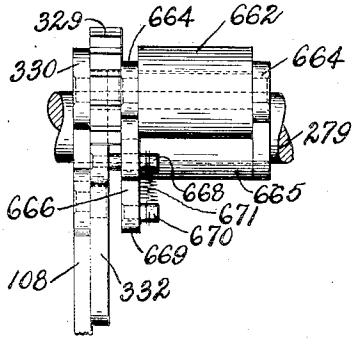


FIG. 40



Inventor

FREDERICK L. FULLER

by R. C. Glass

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK L. FULLER, OF DAYTON, OHIO, ASSIGNOR TO THE NATIONAL CASH REGISTER COMPANY, OF DAYTON, OHIO.

MULTIPLE-TICKET-ISSUING REGISTER.

1,340,221. Specification of Letters Patent. Patented May 18, 1920.

Application filed April 2, 1917. Serial No. 159,282.

To all whom it may concern:

Be it known that I, FREDERICK L. FULLER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Multiple-Ticket-Issuing Registers, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in ticket issuing and accounting machines and has particular reference to machines of the kind constructed to be variably operated to issue one or more tickets of several different classes or prices and add the value of each ticket on a totalizer as the ticket is issued.

One object of the invention is to provide a simple compact machine for use in the ticket offices of theaters and in other places where several different classes of tickets are used.

Another object of the invention is to provide improved mechanism for controlling the variable operation of the machine according to the number of tickets to be issued.

Another object of the invention is to provide improved mechanism for numbering the tickets as they are issued. In the form shown this mechanism is constructed so that it may be prepared to number all the tickets according to a single series of consecutive numbers or to number the tickets of each class according to a series of consecutive numbers peculiar to its class only.

With these and incidental objects in view, the invention consists in certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims, and a preferred form of embodiment of which is hereinafter described with reference to the drawings which accompanying and form part of the specification.

Of said drawings:

Figures 1 and 2 are left side and front views respectively of the complete machine.

Figs. 3 and 4 show respectively the front and back of one of the tickets issued by the machine.

Fig. 5 is a front view of the machine with the outside casing and the front cross frame omitted.

Fig. 6 is a section taken inside of the left hand side frame and looking toward the right side of the machine.

Fig. 7 is a section on the line 7—7 Fig. 5 looking in the direction of the arrows.

Fig. 8 is a front view of the keys and shows particularly the mechanism directly associated with the number keys.

Fig. 9 is a left hand side elevation of connections actuated by the number and price keys.

Fig. 10 is a front elevation of mechanism controlled jointly by the number and price keys and which in turn controls the variable operation of the machine.

Fig. 11 is a detail of some of the parts shown in Fig. 10.

Fig. 12 is a rear elevation of the keys and shows particularly devices immediately associated with the price keys.

Fig. 13 is a detail of one of the cams whereby the consecutive number printing devices may be operated singly or in unison.

Fig. 14 is a front view of a disk containing cam grooves and carrying pins for operating different parts of the mechanism.

Fig. 15 is a right side view of the gear and cam groove for engaging and disengaging the totalizer and the totalizer operating gears.

Fig. 16 is a top plan, as viewed when facing the left hand side of the machine, the casing being omitted and the mechanism broken out through the center so as to show in the same figure mechanism at both the right and left hand sides of the machine.

Fig. 17 is a reduced partial plan view of the assembled machine and is intended particularly to show the relative positions of the keys, the totalizer and the different counters.

Fig. 18 is a section taken on the line 18—18 of Fig. 21 looking in the direction of the arrows.

Fig. 19 is a detail of the ratchet and pawl for preventing reverse rotation of the totalizer clearing shaft and also shows the cam groove for operating the turn to zero counter.

Fig. 20 is a detail of one of the totalizer wheels and devices whereby the wheel may be turned to zero.

Fig. 21 is a partial top plan of the totalizer and counter for keeping a record of the number of times that the totalizer has been turned to zero.

Fig. 22 is a detail in front elevation of the totalizer wheels and some of the devices for actuating them.

Fig. 23 is a rear view of the date indicators and part of the devices whereby the indicators may be turned to different positions.

Fig. 24 shows the intermittent gear mechanism for driving the rollers which feed the tickets out of the machine and for locking the rollers against movement between operations.

Fig. 25 is a top plan view of some of the driving gearing at the right hand side of the machine and also shows some of the devices operated by cams formed in or rigid with different elements of said gearing.

Fig. 26 is a detail in right elevation of the cam for operating tripped transfer devices to turn in transfers and restore the devices to normal position.

Fig. 27 is a left side view of substantially the same mechanism as is shown in Fig. 25.

Fig. 28 is a section, partially broken away, on the line 28—28 Fig. 6 looking in the direction of the arrows.

Fig. 29 is a top view of one of the devices for feeding and counting tickets and printing consecutive numbers and other matter on the faces of the tickets.

Fig. 30 is a top view of one of the devices for printing dates and feeding a ticket strip.

Fig. 31 is a left side view of the mechanism shown in Fig. 29 and also shows one of the arms whereby the consecutive numbering devices may be operated in unison with the other numbering devices or each caused to operate only when it is employed in printing and issuing a ticket.

Fig. 32 is a detail in left side elevation of the mechanism shown in Fig. 30.

Fig. 33 is a sectional view of one of the left hand consecutive number printing devices and mechanism for turning it to zero.

Fig. 34 shows one of the units totalizer actuators and the pinion coöperating therewith, also the devices whereby the pinion is locked against movement during part of the rotation of the actuator.

Fig. 35 is a detail of one of the clutches whereby a consecutive number resetting device may be engaged for operation.

Fig. 36 is a left side view of a counter and devices for operating same to record the number of times that the consecutive numbering devices have been turned to zero.

Fig. 37 is a section taken on the line 37—37 of Fig. 21 looking in the direction of the arrows.

Fig. 38 is a rear view of a part of the devices for effecting transfers from lower to higher order totalizer elements.

Fig. 39 is a detail of the arm for latching the mechanism controlling the variable operation of the machine.

Fig. 40 is a top view in detail of one of the broad tooth pinions for connecting a ticket printing and totalizer actuating section to the main driving mechanism and devices for inking date and consecutive numbering type wheels.

Fig. 41 is a detail of the knob for feeding the ticket paper independently of the regular operating mechanism.

The machine in the drawings is designed for use in the ticket booth of a theater where five different classes or prices of tickets are necessary. The tickets of each price are fed from a separate strip and these strips may, if desired, be of different colors. For each strip there is a set of feeding devices all normally disconnected from a main driving mechanism. Any desired set may be coupled to the driving mechanism by pressing one of a series of price keys provided for that purpose. After a set of feeding devices has been coupled to the driving mechanism it may be operated from one to five times depending upon the number of tickets required and as each ticket is issued its value is entered on a totalizer.

The totalizer is driven by five sets of actuating devices, a set for each price. When one of the sets of ticket feeding and printing devices is coupled to the main driving mechanism by depressing a price key the corresponding set of actuating devices is also coupled to the driving mechanism. Then when the driving mechanism is operated to feed one or more tickets the set of actuating devices so connected will drive the totalizer once for each ticket issued. The sets of actuators may be constructed to add different amounts, but in order to illustrate the construction to the best advantage the present machine has the sets of actuators constructed to add 5¢, 10¢, 25¢, $1 and $1.25, depending upon the set operated.

If only a price key is operated the driving mechanism will operate once and issue a single ticket and enter the price of the ticket on the totalizer. In addition to the price keys the keyboard contains four number keys, any one of which may be operated before the price key is depressed. If a number key is operated the driving mechanism will operate from two to five times depending upon the number key employed and at each operation a ticket will be issued and its value entered on the totalizer.

As shown in Fig. 3 the machine is arranged to print consecutive numbers on the body and coupon portions of the tickets. These numbers are printed from type wheels carried in rotatable ticket feeding and printing devices. Mechanism is provided whereby the consecutive numbering devices for all five sections of the machine may be actuated in unison so that the consecutive number printed on a ticket will show the total num-

ber of tickets issued of all classes. This mechanism can, however, be changed by adjusting a simple connection so that operation of the machine to issue a ticket of a certain price will cause the consecutive numbering device for that price only to be operated, the consecutive numbering devices for tickets of the other four prices or classes not being affected during the operation.

The five sets of totalizer actuators operate through common connections to drive three gears for actuating smaller gears rigid with the units, tens and hundreds totalizer wheels. The totalizer is normally out of engagement with the actuating gears, but is moved into engagement and the gears driven shortly after the operation of the driving mechanism begins. After enough time has elapsed for all of the actuators to perform their functions the totalizer is disengaged from the actuating gears.

The mechanism for effecting transfers from one denominational order to the next comprises a set of arms each carrying a pin which engages the teeth of the corresponding totalizer gear when the totalizer is out of engagement with its driving gears. When the totalizer is moved into engagement with its driving gears the totalizer gears are disengaged from the pins on the transfer arms. Associated with each totalizer wheel is a set of transfer tripping devices whereby when the wheel passes from "9" to "0," the transfer arm previously mentioned will be moved rearward far enough for its pins to engage the tooth next to the one it would engage if the transfer devices had not been tripped. After the totalizer is back in normal position and its gears engaged with the pins on the transfer arms any transfer arms which have been moved rearward will be moved forward to normal position with the result that their totalizer wheels will be given a step of movement in addition to the movement previously given by the actuators.

The transfer devices associated with each totalizer wheel also comprise a normally ineffective connection with the transfer devices of the next higher order, but this connection is rendered effective if the totalizer wheel of next higher order is at "9" when the lower order devices are tripped. As a result, tripping the lower order transfer devices will, through the effective connection mentioned, simultaneously trip the devices of next higher order. This mechanism is so arranged that if the totalizer wheels stand at "9" all the way across the totalizer and units totalizer wheel is then given one or more steps of movement, as the units wheel passes from "9" to "0" the transfer devices all the way across the totalizer will be simultaneously tripped. This will move all of the transfer arms rearward to the position where their pins will engage the next higher value teeth of the totalizer gears when the totalizer is returned to its normal position and all of the arms are then operated simultaneously to restore them to their normal forward positions. As the arms move forward their pins will turn their totalizer wheels one division.

As shown in Figs. 1 and 2 the machine is supported by horizontal arms 50 integral with a vertical bar 51 secured to the upper end of a rod 52 journaled in a tripod 53. Clamped to the rod 52 is a collar 54 normally resting upon collar 55 loose on the rod. Pivoted to the collar 55 is a lever 56 provided with a cam edge 57 coöperating with a stud 58 attached to the collar 54. In preparing a ticket booth to receive one of these machines it is only necessary to cut a slot in the shelf for the tickets to pass through and an opening through which the keys may project. The machine is then placed under the shelf and the lever 56 operated to raise the machine high enough for the keys to project above the surface of the shelf. By adjusting the collar 54 on the rod 52 it is possible to adapt the machine to shelves of different heights. When it is desired to take a statement from the machine or have access to its interior for any other purpose the lever 56 may be returned to the position in which it is shown, thereby lowering the machine far enough to permit drawing it out from under the shelf.

Driving mechanism.

The present machine is constructed to be operated by means of a handle 61 (shown only in Figs. 1 and 2) although, if desired, a motor might readily be employed for driving the machine. The handle 61 is rigid with a short shaft 62 (Fig. 5) journaled in the front cross frame 63 (Figs. 6 and 7) of the machine. Attached to the shaft 62 is a gear 64 (Fig. 5) meshing with a gear 66, loosely mounted on a stud 67 fastened in the frame 63. The gear 66 in turn meshes with a gear 68 fastened to the forward end of a shaft 69 journaled at its forward end in the front cross frame 63 and at its rear end in a bracket 70 extending upward from a base frame 71. Fastened to the rear end of the shaft 69 is a bevel gear 74 (Figs. 6 and 7) meshing with a bevel gear 75 attached to the left hand end of a short shaft 76 (Fig. 5). The shaft 76 is journaled at one end in an extension 77 of the bracket 70 and at the other end is journaled in the right hand machine frame 78.

Fastened to the shaft 76 are two small gears 80 and 81. The gear 80 meshes with a gear 82 (see also Figs. 25 and 27) loosely mounted on a shaft 83. Meshing with the gear 82 is a smaller gear 84 (omitted in Fig. 25) fastened to a shaft 85 journaled in the machine side frames. The gearing as

so far described is so proportioned that for each turn of the handle 61 the shaft 85 will make two complete rotations. The shaft 85 is the main driving shaft of the machine, but it drives the mechanism through other gears which are twice as large as the gear 84 so that for each two rotations of the shaft 85 the driven gears will each make one complete rotation.

The small gear 81 (Fig. 5) meshes with a gear 86 (Fig. 25) loose on the shaft 83 (Fig. 27) and meshing with a gear 88 loose on a rod 89 fastened in the machine frames. The gears 87 and 88 are both twice the diameter of the gear 81 so that for each two rotations given to the gear 81 by a turn of the handle 61 the gears 87 and 88 will each make one complete rotation.

Price keys.

The machine has five price keys, a 5¢ key 91 (Fig. 17), a 10¢ key 92, a 25¢ key 93, a $1.00 key 94 and a $1.25 key 95. For each of these keys there is, as previously stated, a complete set of ticket feeding and printing devices and a set of actuators for driving a common totalizer. When a price key is operated the corresponding printing and feeding devices and set of totalizer actuators will be connected to the driving shaft 85 so that two turns of the driving shaft will cause a ticket of the kind desired to be issued and its value added on the totalizer.

The ticket keys are mounted in a frame 101 (Figs. 6, 7 and 12) and have ears 102 (Figs. 6 and 12) carrying pins 103 projecting into vertical grooves 104 in a plate 105 forming a part of the frame 101. At their lower ends each of the price keys has a stud 107 engaging an open slot in a forwardly extending arm of a bell crank 108 loosely mounted on the rod 89. The construction is such that the price keys are limited to endwise movement. Springs 110 (Fig. 12) stretched between studs 111 attached to the price keys and studs 112 fastened to the frame 101 serve to return depressed keys to normal position after they have been released.

Owing to the fact that the price keys couple different sets of actuators to the driving mechanism to operate a common totalizer it is apparent that it should be impossible to operate more than one price key at a time. For this purpose the machine is provided with four key stops 113 pivoted at 114 to the key frame plate 105. Each key stop is provided with oppositely extending arms 115 normally in contact with the arms 115 of the adjacent stops. The stops 113 are so constructed that when, for example, the key 93, (Fig. 12) is depressed its pin 103 will pass between the arms 115 of the adjacent key stops and separate the stops, thereby carrying the arms 115 of the other stops into the paths of the pins 103 of the other price keys and preventing operation of any of the other price keys until the first key is released.

In addition to clutching the ticket printing and feeding devices and the totalizer actuating devices to the main driving mechanism, depression of one of the keys 91 to 95 inclusive also releases the driving mechanism for operation. For this purpose there is provided a plate 121 (Figs. 6, 7, 12 and 16) loosely supported at one end by an upwardly extending arm of a bell crank 122 loosely mounted on a stud 123 attached to the front machine frame. At its other end the plate 121 is loosely supported by an arm 124 (Figs. 7, 9, 10, 11 and 12) fastened to a sleeve 125 loose on a stud 126 which is also fastened to the front machine frame 63. A spring 127 stretched between the horizontal arm of the bell crank 122 and a stud 128 attached to the left hand machine frame holds the plate 121 in the position shown with shoulders 131 engaging the pins 103 of the price keys.

When a price key is depressed its pin 103 will act against an inclined edge 132 of a slot 133 in the plate 121 and move the plate toward the left hand side of the machine or to the right as viewed in Fig. 12. After the price key has been depressed far enough to bring its pin 103 to the bottom of the slot 133 the plate 121 is given an added movement by mechanism hereinafter described so as to engage a shoulder 136 formed in the slot with a flattened side 137 of the key pin 103 and latch the key in depressed position.

The sleeve 125 (Figs. 6, 9, 10, 11 and 12) has fastened to its forward end an element 141 having the general form of a bell crank. One arm of the element 141 is curved as at 142 to engage a shoulder on the periphery of a plate 143 (see also Figs. 6 and 7) loosely mounted on the rod 67. Pivoted to the other arm of the element 141 is a link 144 carrying a stud 145 normally in engagement with a notch 146 (see also Fig. 39) in an arm 147 loose on the stud 126. A spring 148 (Fig. 10) stretched between the link 144 and a pin 149 attached to an extension on the arm 147 normally holds the stud 145 in engagement with the notch 146 and holds the nose 151 of the arm 147 in engagement with one of the teeth of a ratchet plate 152 (Figs. 6, 7 and 10) attached to the side of the plate 143. By tracing the movement through the various connections described it will be seen that when one of the price keys is depressed and the plate 121 shifted, the element 141 and arm 147 will be rocked as a unit counter clockwise (Fig. 10) far enough to withdraw the nose 151 of the arm 147 from engagement with the tooth on the ratchet plate 152. At the same time the nose 142 (Fig. 11) of the element 141 will

be disengaged from the shoulder on the plate 143. This frees the plates 143 and 152 and the plates are rotated clockwise by a torsion spring 154 wound around the rod 67, one end of the spring being fastened at 155 to the plate 143 and the other end secured to the rod 67. As soon as the plates 143 and 152 begin to move under the influence of the spring 154 the curved portion 156 (Fig. 10) of the periphery of the plate 143 will act upon the curved end 142 of the element 141 to give said element and the arm 147 a farther movement counter clockwise (Fig. 10). This movement will be transmitted back through the intervening connections previously described to the plate 121 and shift the plate to engage the locking shoulder 136 with the pin 103 of the depressed price key.

When the plates 143 and 152 are rotated by the spring 154 they will move from one to five steps depending upon the position of an arm 161 (Fig. 10). In the normal condition of the parts the arm 161 is in position for a stud 162 attached to the side of the arm to engage the end 163 of a stepped plate 164 fastened to the side of the plate 143. This is the position in which the arm 161 rests when the price key only is operated to issue a single ticket. If one of the number keys is operated the arm 161 is swung in one direction or the other to position its stud in the path of steps 165, 166, 167 or 168 on the plate 164 whereby the plates 143 and 152 are limited to from two to five steps of movement depending upon the number key operated. The plates 143 and 152 are then restored one step at each operation of the driving mechanism until they are finally in the position shown in Fig. 10. Just after the first operation of the driving mechanism begins the link 144 is operated to disengage the stud 145 from the notch 146 in the arm 147, whereupon the spring 148 swings the arm to engage its nose 151 with the teeth of the ratchet plate 152. The arm 147 then cooperates with the teeth of the ratchet plate 152 to retain the plates 143 and 152 in the positions to which they are carried by operation of the driving mechanism. The mechanism for positioning the stop arm 161, the device for operating the link 144 to disconnect the element 141 and the retaining arm 147, and the mechanism for restoring the plates 143 and 152 will all be described in detail later. It is sufficient at this point to state that during the entire restoring movement of the parts the nose 151 of the arm 147 is held in contact with the periphery of the plate 143 as the final step of movement of the plates 143 and 152 to their normal position is completed the end 142 of the arm 141 passes above the portion 156 of the periphery of the plate 143 and the spring 127 (Fig. 12) then returns the key latching plate 121 (Fig. 12) far enough toward normal position to disengage the locking shoulder 136 from the pin 103 of the depressed key. The key spring will then return the key to normal position.

Operation of the driving mechanism is normally prevented by an arm 171 (Figs. 5, 6 and 7) fastened to a shaft 172 journaled in the front cross frame 63 and engaging a cut 170 in the periphery of a disk 173 rigid with the gear 66. Attached to the rear end of the shaft 172 is an arm 174 (Fig. 10) carrying a stud 175 projecting into a cam slot 176 in the ratchet plate 152. The slot 176 is so shaped that the first step of movement of the plate 152 when released will rock the arm 174 and shaft 172 counter clockwise (Figs. 10 and 5) thereby withdrawing the locking arm 171 from the cut in the periphery of the disk 173 and freeing the driving mechanism for operation. During the final movement of the plates 143 and 152 when being restored to their starting points the slot 176 will rock the shaft 172 back to its normal position and reëngage the locking arm 171 with the cut 170 in the disk 173 to prevent further movement of the driving mechanism until a price key is again operated.

Number keys.

The machine has four keys 181, 182, 183 and 184 (Figs. 5, 8 and 17) which are operated when more than one ticket is required. As shown in the figure last mentioned, each of these keys bears a numeral indicating the number of tickets which will be issued when the machine is operated with the key depressed. The number keys are all slidably mounted in the key frame 101 (Figs. 5 and 6) and a plate 186 fastened to the frame 101 has a flange 187 provided with notches (not shown) forming guides for the lower ends of the keys. Each key is provided with a laterally extending ear 188 (Fig. 8) carrying a pin 189 projecting into a vertical groove 190 in the key frame plate 106. From this description it is apparent that the number keys are all limited to vertical movement. Springs 191 stretched between studs 192 on the keys and studs 193 on the plate 186 serve to return depressed keys to normal position after they have been released.

When a key is depressed it is latched in depressed position by a plate 195 (Figs. 6, 7 and 8) loosely supported at its right end by an arm 194 loose on the sleeve 125 and at its left end by the vertical arm 196 of a bell crank 197 fastened to a sleeve 1194 loosely mounted on the stud 123. A spring 198 stretched between the horizontal arm of the bell crank 197 and a stud 199 fastened to the left hand machine frame holds the latch-

ing detent 195 in the position shown in Fig. 8 with inclined edges 200 of projections 201 on the detent in contact with the key pins 189. When a number key is depressed its key pin 189 will act against the corresponding inclined portion 200 to move the latching detent 195 to the right (Fig. 8) against the tension of the spring 198. After the key has been depressed the full distance the spring 198 returns the detent 195 to substantially its normal position and carries a locking shoulder 202 above the pin 189 on the operated key.

Owing to the fact that operation of any price key 91 to 95 inclusive releases the machine for operation it is desirable to prevent operation of the number keys after a price key has been depressed. For this purpose the latching detent 195 is provided with an extension 203 to coöperate with a stud 204 (Fig. 12) carried by the plate 121 for the price keys. When the plate 121 has been operated as previously described to latch a price key in depressed position the stud 204 will be in contact with a shoulder 205 on the extension 203 of the latching detent 195 for the number key. The detent 195 will, therefore, be held against movement so that it will be impossible to depress a number key. If, however, the number key is depressed first the fact that the plate 195 is returned to substantially its normal position when it has latched the number key will prevent the shoulder 205 from interfering with the stud 204 when a price key is operated and the machine released.

The number keys are released shortly after the first turn of the operating handle 61 is begun. The mechanism whereby this is effected is best shown in Fig. 5. Fastened to the forward end of the sleeve 1194 is a short arm 211, pivoted to which is one end of a link 212 loosely connected at 213 to a link 214 which is in turn pivoted at 215 to an extension 216 (see also Fig. 10) of the arm 174. Attached to the shaft 62 to which the operating handle is fastened is a large cam disk 222 (Figs. 5, 6, 7 and 14) on the rear side of which is a stud 223. When the shaft 172 is rocked to disengage the locking arm 171 from the disk 173 the pivot 213 connecting the links 212 and 214 will be elevated slightly and when the handle 61 is turned the stud 223 will be carried against the under side of the link 214 thereby elevating the link 214 and serving through the link 212 to rock the arm 211, sleeve 1194 and bell crank 197 clockwise (Fig. 8). This will move the latching detent 195 to the right (Fig. 8) far enough to disengage the locking shoulder 202 from the pin 189 on the depressed key and permit the key spring 191 to restore the key to its normal position.

As before stated the number keys set the stop arm 161 (Fig. 10) in position to engage the different stops on the plate 164. For this purpose there is provided a plate 224 (Figs. 6 and 7) having substantially V-shaped notches 225, 226, 227 and 228 (Fig. 8) coöperating respectively with the pins 189 on the number keys 181, 182, 183 and 184. The notches 225 to 228 inclusive are so positioned that the plate 224 may be given either one or two steps of movement in either direction from a central position by operating the keys.

The plate 224 is supported at one end by an arm 231 loosely mounted on the sleeve 1194. At its other end the plate 224 is supported by an arm 232 fastened to a sleeve 233 (see also Fig. 9) loosely mounted on the sleeve 125. Fastened to the forward end of the sleeve 233 is the stop arm 161.

Integral with the stop arm 161 is a short arm 234 (Figs. 6, 8 and 9) carrying a stud 235 projecting between a pair of arms 236 and 237 pivoted on the sleeve 233. The arms 236 and 237 cross something in the manner of a pair of shears and carry studs 238 and 239 between which is stretched a spring 240 in such a way as normally to hold the lower ends of the arms 236 and 237 in contact with a stud 241 projecting rearward from the front machine frame 63. If the key 181 is depressed its pin will shift the plate 224 to the left (Fig. 8) two steps thereby swinging the arm 234 counterclockwise (Fig. 10) and elevating the arm 161 and stud 162 far enough to be in the path of the step 168 on the plate 164. This will also move the arm 237 counter clockwise and tension the spring 240 because of the fact that the stud 241 will hold the arm 236 stationary. Operation of the key 182 will move the parts in the same direction but to a lesser extent, thereby bringing the arm 161 and stud 162 in position to engage the stop 167. Operation of the keys 183 and 184 will move the parts one or two steps respectively in the opposite direction moving the arm 236 to stretch the spring 240 and positioning the arm 161 and stud 162 in the path of either the stop 165 or 166. In any event when a number key is released the spring 240 will be rendered effective to return the plate 224 and all parts connected thereto to the central position in which they are shown. In this position the arm 161 and stud 162 are in the path of the end 163 of the plate 164 so as to limit the plate 143 and ratchet plate 152 to a single step of movement when a price key only is operated.

It is clear that by providing mechanism for moving the stop arm 161 in either direction from a normal position the stud 162 on the arms will engage the stop surfaces on the plate 164 at such an angle that there is less danger of the arm being displaced

than would be the case if the arm 161 could be moved differentially in one direction only from the normal position. It is also clear that by releasing the operated number key at the beginning of the movement of the operating handle 61 the spring 240 and arm 161 will coöperate with the steps on the plate 164 in the manner of a retaining pawl as the plates 143 and 152 are being restored, thereby increasing the certainty of correct operation.

Mechanism for restoring the devices controlling the variable operation.

At each turn of the operating handle 61 the plates 143, 152 and 164 are given a step of movement from the position to which they are adjusted under the control of the number keys toward the normal position in which they are shown in Fig. 10. The mechanism for doing this comprises an arm 245 (Figs. 6, 10 and 14) loosely mounted on the stud 126 and carrying a roller 247 engaging a cam groove 248 in the front face of the large cam disk 222. Pivoted to the upper end of the arm 245 is a lever 249 provided at one end with a roller 250 engaging a cam groove 251 which is also formed in the front face of the disk 222. At its other end the lever 249 is provided with a square sided stud 252 to engage the teeth on the ratchet plate 152. Near the end of the rotation of the disk 222 the portion 253 (Fig. 14) of the cam groove 251 will act against the roller 250 to rock the lever 249 clockwise (Figs. 10 and 14) to engage the stud 252 with one of the teeth on the ratchet plate 152. While the stud 252 is held in engagement with the teeth a portion 254 (Fig. 14) of the cam groove 248 will swing the arm 245 counterclockwise (Fig. 10) thereby turning the ratchet 152 and parts rigid therewith one division. Before this occurs the link 144 will have been operated to withdraw its stud 145 from engagement with the notch 146 in the retaining arm 147 so that the nose 151 of the arm will be held in contact with the periphery of the plate 152 by the spring 148 so that after each movement of the arms 249 and 245 is completed the arm 147 will engage a tooth of the plate 152 and latch the plate in its new position. The portion 255 of the cam groove 251 will then operate the lever 249 to disengage the stud 252 from the tooth of the ratchet plate 152 and the portion 256 of the cam groove 248 will at about the same time swing the arm 245 back to its normal position. If one of the number keys was depressed at the beginning of the operation this movement of the parts is repeated at each turn of the handle 61 until the ratchet plate 152 has been restored to the position in which it is shown. As it moves to said position it will operate the arm 174 and locking arm 171 (Fig. 5) to stop the driving mechanism.

The link 144 (Fig. 10) is operated to disconnect the element 141 from the retaining arm 147 by a cam groove 261 (Fig. 14) in the rear face of the large disk 222. This cam groove is engaged by a roller 262 mounted on the side of the link 144, the cam groove being cut out as shown at 263 so that when the element 141 is rocked by depression of a price key the cam groove will not cause the stud 145 to be disengaged from the retaining arm 147. Shortly after the rotation of the disk 222 begins a portion 264 of the groove 261 will act against the roller 262 and disengage the stud 145 from the retaining arm 147 and permit the spring 148 to swing the retaining arm into engagement with the periphery of the ratchet plate 152. When near the end of the rotation of the disk 222 the cut away portion 263 is carried under the roller 262 the spring 148 will reengage the stud 145 with the notch 146 ready for the next operation.

If an attempt should be made to manipulate the machine by holding the price key depressed at the end of an operation the element 141 will, of course, be held in rocked position so that when the spring 148 is released by the portion 263 of the cam groove 261 acting on the link 144 the stud 145 will not be in position to engage the notch 146 in the retaining arm 147, but will strike a shoulder 270 on the arm 147 and the machine cannot be released for operation until the finger has been removed from the depressed key and the key allowed to return to its normal position thereby bringing the stud 145 in position to engage the notch 146.

As shown in Figs. 10 and 39, the retaining arm 147 has a beveled portion 268. The cam disk 222 carries a stud 269 (Fig. 14) to engage the beveled portion 268 and cam the arm into engagement with the teeth of the ratchet plate 152. This will only happen, however, if the spring 148 should for any reason fail to operate the arm 147 to retain the ratchet plate in position after it has been restored a step by the operating mechanism. In other words, the stud 269 and beveled portion 268 of the arm 147 are simply added as a precaution to make certain the correct operation of the machine.

Totalizing mechanism.

The totalizer contains six wheels 271 to 276 inclusive (Figs. 16 and 22) loosely mounted on a shaft 277 journaled at its end in arms 278 (see also Figs. 18, 25 and 27) loose on an arm 279. Rigid with the right hand rod 278 is an arm 280 carrying an antifriction roller 281 projecting into a cam groove 282 (Fig. 15) in the gear 88 and a disk 283 integral with the gear. The gear 88, it will be recalled, makes one complete

rotation at each turn of the operating handle 61. The cam groove 282 is so shaped that as soon as the gear 88 begins to turn the arms 278 are rocked to swing the shaft 277 and the totalizer wheels thereon down far enough to engage gears 284, 285 and 286, rigid respectively with the three lower order totalizer wheels 271, 272, and 273, with totalizer driving gears 288, 289 and 290 (Fig. 22). The downward movement of the shaft 277 also causes gears 291 rigid with the three higher order totalizer wheels to engage alining teeth 292 (see also Figs. 25 and 27) formed on a yoke shaped frame 293 fastened to the rod 89.

The totalizer driving gears 288, 289 and 290 are loose on the rod 89 and mesh respectively with pinions 301, 302 and 303 (Fig. 22) fastened to shafts 304, 305 and 306 (see also Fig. 6) extending across the machine. It is clear that if the totalizer is in engagement with the gears 288, 289 and 290 and the shaft 304 is turned the units totalizer wheel 271 will be rotated. It is also clear that the tens wheel 272 and the hundreds wheel 273 of the totalizer may be turned by rotating the shafts 305 and 306. The higher order wheels 274, 275 and 276 are simply to receive transfers and are each given a step of movement by transfer mechanism described later each time the next lower order wheel completes a rotation.

As previously stated, the present machine is arranged to issue five different kinds of tickets and includes five independent totalizer actuating and ticket issuing mechanisms. The shafts 304, 305 and 306 may be driven from any one of the five sections of the machine so that when a section is operated to issue a ticket the value of the ticket will be entered on the cash totalizer. For this reason each of the five sections of the machine includes a group of actuating devices which may be coupled to the driving mechanism when the corresponding price key is operated to determine the kind of ticket to be issued. Then when the driving mechanism is operated to issue a ticket the actuating devices will be driven and enter the price of the ticket on the totalizer wheels.

For each set of actuating devices there is a group of pinions 311, 312 and 313 (Fig. 22) the pinions 311 all being fastened to the units shaft 304 the pinions 312 to the tens shaft 305 and the pinions 313 to the hundreds shaft 306. Each set of actuating devices includes three disks 316 forming part of a unit loose on the rod 89. Each disk may be provided with a different number of teeth 317 (Figs. 7 and 34) according to the value that it is desired to have the disk enter on the totalizer. The disk 316 shown in Fig. 7 has two teeth and is intended to turn the tens shaft 305 two divisions to enter 20¢ on the totalizer wheel 272 while the disk shown in Fig. 34 has five teeth and will drive the units shaft 304 five divisions to enter 5¢ on the units totalizer wheel 271. It is apparent that a machine constructed on this principle may be prepared to enter any desired prices simply by putting in disks 316 having on their peripheries different numbers of teeth 317. In view of the fact that the present machine is constructed to issue 5¢, 10¢, 25¢, $1.00 and $1.25 tickets the disks 316 for the $1.25 tickets will have teeth on the peripheries of all three of the disks 316. Two of the disks 316 for the $1.00 ticket section will have no teeth, while the other, that is, the hundreds disk will have but a single tooth. The hundreds disk for the 25¢ key will have no teeth but the tens and units disks will have respectively two and five teeth. The units and hundreds disks for the 10¢ key will have no teeth but the tens disk will have a single tooth. In the 5¢ section the units disk will have five teeth while the tens and hundreds disk will be without teeth. The reason for using toothless disks instead of omitting the disks altogether in denominational orders where a totalizer wheel is not to be driven is that in case it is necessary to change the machine to issue different prices the disks may be rearranged or others having the proper number of teeth inserted without its being necessary to make a number of other alterations.

As previously stated, the three disks 316 for each price form part of a unit loose on the rod 89. The other parts of the unit consist of spacing disks 321 (Fig. 22) and elements 323 having locking flanges 324 (see also Figs. 7 and 34) referred to more particularly later. The actuating disks 316 spacing disks 321 and locking elements 323 are all rigid with a gear 325 (Figs. 22 and 6) which is, of course, also loose on the rod 89. Each gear 325 meshes with a gear 326 loose on the shaft 83. The gear 326 meshes with a gear 327 (Fig. 16) loose on the driving shaft 85. Adjacent each gear 327 is a gear 328 like the gear 327 but fastened to the driving shaft 85. Coöperating with each pair of gears 327 and 328 is a broad tooth pinion 329 (see also Fig. 6) which, when the corresponding price key is depressed, is thrown into engagement with the gears 327 and 328. This establishes a driving connection so that each time the operating handle 61 is turned the gear 325 and actuating disks 316 rigid therewith will make a complete rotation. During this rotation any teeth on the set of actuating disks 316 will operate the shafts 304, 305 and 306 to drive the totalizer.

The broad tooth pinions 329 are rotatably mounted on arms 330 loose on the rod 279 (Figs. 6 and 40). Rigid with each arm 330 is a plate 332 provided with a cam slot

333 surrounding a roller 334 on the upwardly extending arm of the bell crank 108. The bell crank 108, as previously pointed out, has its forwardly extending arm slotted to engage a stud 107 on the associated price key. When the price key is depressed the bell crank 108 will be rocked and the stud 334 and slot 333 will coöperate to rock the arm 330 in the proper direction to engage the broad tooth pinion 329 with the pair of gears 327 and 328.

It is, of course, apparent that when one of the groups of actuating devices is clutched to the driving shaft as just described the other sets of actuating devices should be held against movement so as to be in proper relation with the rest of the mechanism when they are called upon to perform their functions. For this purpose each of the plates 332 has a downwardly extending arm 341 (Fig. 6) normally in engagement with a notch 342 in the periphery of a disk 343 rigid with the corresponding gear 326. When a price key is depressed and the associated plate 332 operated to engage the broad tooth pinion 329 with the companion gears on the shaft 85 the arm 341 will be disengaged from the notch 342 and its gear 326 freed for rotation while the other gears 326 are, of course, held against movement. As soon as the gear 326 begins to turn the cut or notch 342 in the disk 343 will be carried out of the path of the arm 341 and the periphery of the disk will prevent the arm from returning to normal position until the rotation of the gear is completed. This prevents the broad tooth pinion 329 from being disengaged from the companion gears before operation of the mechanism is completed.

In addition to the arms 341 there is provided a device for holding the totalizer driving gears 288, 289 and 290 against movement except during the time that the gears are to be driven. This consists of a blade 346 (Figs. 7, 25 and 27) on a casting 347 loose on the shaft 306. Rigid with the casting 347 is an arm 348 carrying a roller 349 engaging a cam groove 350 in the left side of the gear 88. The blade 346 is normally in engagement with the gears 288, 289 and 290, but the cam groove 350 is so shaped that as soon as the gear 88 begins to turn the blade is disengaged from the gears. The blade is held out of engagement until time enough has elapsed for all of the totalizer actuating devices to perform their function and is then moved back into engagement so as to again lock the gears.

It is apparent, of course, that the locking arm 341 is held out of engagement until the price key is released at the end of the operation and that the blade 346 (Fig. 27) will leave all of the gears 288, 289 and 290 free during a part of each rotation of the gear 88. In view of the fact that some of the actuating disks 316 may have but a single tooth and others no teeth at all, this would, unless steps were taken to prevent it, leave the gears 288, 289 and 290 free during a part of the actuating period and while they were free they might accidentally be displaced. This condition is prevented by the locking elements 323 (Figs. 22 and 34) previously mentioned. The flanges 324 on the locking elements extend laterally far enough to pass under extensions 355 of the teeth of the pinions 311, 312 and 313 attached to the shafts 304, 305 and 306. The flanges 324 are all cut out so that at the normal position of the parts the flanges will not interfere with rotation of the shafts 304, 305 and 306. When one set of actuating devices begins to turn its teeth 317 will engage the teeth of pinions 311, 312 and 313 and turn the pinions extents depending upon the number of teeth on the disks 316. As soon as the teeth 317 pass out of mesh with the teeth on the pinions, the flanges 324 pass under the extensions 355 of the teeth on the pinions and hold the pinions and, of course, the shafts to which the pinions are attached against rotation until the rotation of the set of actuating devices is about completed. For example, the devices shown in Fig. 34 are so arranged that after the five teeth 317 have performed their function the flange 324 will pass under the extension 355 of a tooth on the pinion and hold the pinion and units shaft 304 against further movement. The disk 316 shown in Fig. 7, on the other hand, is so arranged that after the two teeth 317 have driven the shaft 305 the flange 324 will engage the extension 355 of whichever tooth on the pinion happens to be in position and hold the pinion and shaft 305 against movement during practically the rest of the operation.

Totalizer resetting mechanism.

The totalizer may be cleared whenever desired by rotating the shaft 277 on which the totalizer wheels are mounted. This is accomplished by means of an insertible key or wrench 361 (Fig. 21) the shaft of the wrench is cylindrical and is provided with a rib 362 across its end to engage a slot 363 across the end of the shaft 277. Journaled in the machine frame is a thimble 364 having a notch 365 to receive a pin 366 on the wrench 361. When the wrench is inserted to engage the shaft 277 it passes through a hole (not shown) in the outside casing so shaped that as soon as the operator begins to turn the key the pin 366 is carried behind the casing and the key can not be withdrawn until after a rotation has been completed. The shaft 277 has a square sided longitudinal groove 367 (Figs. 18 and 20) to engage the ends of spring pressed pawls 368 piv-

oted to the sides of the totalizer wheels. It is apparent that when the shaft 277 is rotated clockwise as shown in the figures just mentioned the groove 367 will engage the ends of the pawls 368 and carry the wheels to zero.

In order to prevent reversing the wrench 361 before the shaft 277 has completed a rotation there is fastened to the thimble 364 a ratchet wheel 371 (Figs. 19 and 21) cooperating with a spring pressed pawl 372. The construction is such that the ratchet wheel 371, the pawl 372, the pin 366 carried by the wrench and the outside casing of the machine all coöperate to compel a complete rotation of the shaft 277 after the wrench 361 is inserted and started.

Transfer mechanism.

As previously stated in a general way, the carrying or transfer mechanism associated with the totalizer is so constructed that all higher order totalizer wheels may be simultaneously turned one division if the condition of the totalizer and the amount added call for such an operation. Attached to the side of each of the totalizer wheels is a stud 375 (Fig. 18) which when the wheel passes from 9 to 0 will strike a shoulder 376 (see also Figs. 37 and 38) on a transfer trip plate 377. The transfer trip plates are loosely mounted on a rod 378 supported in the right hand machine frame and a frame member 379 (Fig. 16). The transfer trip plates 377 are provided with slots 382 surrounding studs 383 carried by arms 384 loose on a rod 385. Springs 386 stretched between the transfer trip plates 377 and the arms 384 normally hold the arms and plates in the positions shown, with shoulders 387 in the slots 382 in engagement with the studs 383. When the totalizer is being driven the totalizer wheels turn clockwise (Fig. 18) or counter clockwise (Fig. 37) and when the studs 375 on the wheels strike the projections 376 the transfer trip plates are rocked to disengage the locking shoulders 387 from the studs 383 and the springs 386 will then move the arms 384 rearward to latch the plates 377 in tripped position.

Riveted in an upwardly extending portion of each of the transfer trip plates 377 is a stud 391. Journaled on each stud 391 is a transfer arm 392 carrying a stud 393 which, in the normal position of the parts, is in engagement with the teeth of the next higher order totalizer gear. The transfer arms 392 are shaped to provide slots 394 engaging a rod 395 supported at one end by an arm 396 (Figs. 18 and 21) and at its other end by an arm 397 (Figs. 16 and 37). The arms 396 and 397 are both fastened to a rock shaft 398.

When the totalizer is rocked to carry the wheels from the position shown in Figs. 18 and 37 into engagement with the totalizer driving gears 288 to 290 (Fig. 22) the transfer studs 375 will be carried into position to engage the tripping projections 376 when the totalizer wheels are rotated and the totalizer gears will also be carried out of engagement with the studs 393 on the transfer arms 392. When a transfer stud 375 strikes against the projection 376 on the corresponding trip plate 377 the trip plate will be rocked counter clockwise (Fig. 18), or clockwise (Fig. 37), and move the transfer arm rearward far enough for the stud 393 on the arm to engage the next tooth on the totalizer gear when the totalizer is rocked up to its normal position. All tripped transfer plates 377 are then restored to their original or untripped position, thereby drawing their transfer arms 392 forward and causing the studs 393 on the arms to turn their totalizer wheels one division.

The transfer trip plates 377 are restored and the transfer arms 392 operated as just described by a bar 401 (Figs. 18, 21, 25, 27 and 37) normally engaging notches in the under sides of the plates 377. The bar 401 is supported at its ends by levers 402 and 403 pivoted on the rod 89. At their rear ends the levers 402 and 403 are connected by a rod 404 in such a way that in connection with the bar 401 they form a rigid frame. The lever 402 has a rearwardly extending portion 405 carrying a roller 406 (Fig. 26) engaging a cam grove 407 in the right hand side of the gear 82. The groove 407 is so shaped that the bar 401 will immediately be rocked slightly to disengage it from the notches in the transfer trip plates 377 and free the plates for operation. After the totalizer has been actuated and rocked back into engagement with the studs 393 (Fig. 18) on the transfer arms 392 the bar 401 will be swung down still farther, engaging the edges 408 of the latching arms 384 which have been released and swinging the arms back to their original position. At the beginning of this second movement of the bar 401 the studs 383 on the arms 384 for the plates 377 which have been tripped will be in engagement with the rear or narrower parts of the slots 382 and as the arms 384 are returned to their original position by the bar 401 the tripped plates 377 will be locked about the rod 378 to draw the transfer arms 392 forward and turn the totalizer wheels. When the arms 384 reach their normal position the springs 386 will reëngage the shoulders 387 with the studs 383 and thereby lock the transfer trip plates in normal or untripped position.

It will, of course, often happen that transfers must take place between several of the higher order totalizer wheels when only the lowest order wheel is driven by the actuating mechanism. For example, if the totalizer shows $9.95 and 5¢ is added on the units

wheel the tens, hundreds and thousands wheels must each be turned one division to show $10.00, the correct total. In the present machine the wheels will be turned simultaneously because the construction is such that when the stud 375 on the units wheel is carried from nine to zero the transfer trip plates 377 for the next three wheels will all be tripped simultaneously even though the three wheels are not moving and position their arms 392 to effect transfers when simultaneously restored by the bar 401.

The connections whereby movement of a single transfer trip stud 375 will simultaneously trip a number of plates 377 are in the form of links 411 (Figs. 18, 21, 37 and 38). There is one of these links pivoted on each of the studs 391 carried by the transfer trip plates 377. At its lower end each link 411 carries a stud 412 normally resting upon a shoulder 413 on the rear edge of the transfer trip plate 377 for the next higher denominational order. In order to prevent confusion it is probably advisable to call attention to the fact that the transfer trip plate 377 shown in full lines in Fig. 37 is operated by the units wheel and has no shoulder 413, but the shoulder 413 in said figure is on the tens trip plate 377 and the stud 412 and link 411 shown in said figure are pivoted on the stud 391 carried by the units transfer trip plate 377. When the totalizer is rocked down into engagement with the totalizer actuating gears the transfer studs 375 of any wheels standing at nine will engage the links 411 at about the point indicated by the numeral 414 (Figs. 18 and 37). It is clear that the links so held by the transfer studs form a bond causing the transfer trip plates 377 so connected to move as a unit when the lowest order plate is tripped. For instance, in the example mentioned above where the totalizer stands at $9.95 and 5¢ is added, the units totalizer wheel, as it passes from nine to zero will operate through its link 411 to trip the tens transfer trip plate 377, the link 411 moving with the tens transfer trip plate 377 will in turn actuate the transfer trip plate 377 for the next denominational order, and so on, the movement of all of the plates 377 being simultaneous. After the totalizer is reëngaged with the pins 393 on the arms 392 the bar 401 will be operated to draw the arms 392 forward and this, of course, causes the tens, hundreds and thousands totalizer wheels to turn simultaneously one division.

If when the totalizer is carried down into engagement with the totalizer operating gears none of the totalizer wheels are at a position where the studs 375 are at the nine position the transfer studs 375 will not affect the links 411 and when one of the transfer trip plates 377 is tripped the stud 412 on its link 411 will simply ride along the upper edge of the shoulder 413 on the next higher order transfer trip plate and the trip plate last mentioned will not be disturbed.

It is apparent that the transfer studs 393 must be disengaged from the totalizer gears before the totalizer wheels can be turned to zero. This is done by rocking the transfer arms 392 up about their pivots 391. In order to rock the arms 392 the arm 396 is provided with a roller 421 (Figs. 18 and 19) engaging a groove 422 in the side of a disk 423 rigged with the ratchet wheel 371 turned by operation of the resetting wrench 361 (Fig. 21). As soon as the ratchet wheel begins to turn, the arm 396 is raised, thereby rocking the shaft 398 and raising the arm 397 also fastened to the shaft. The rod 395 supported between the arms 396 and 397 will elevate the transfer arms 392 to disengage their studs 393 from the teeth of the totalizer gears.

In addition to performing transfers the arms 392 and studs 393 serve to retain the higher order totalizer wheels in position between operations. There is, of course, no transfer arm 392 for the units wheel, but in order to retain the units wheel in position there is provided an arm 416 (Figs. 16 and 21) which is similar to the transfer arms 392. Instead of being pivoted to a transfer trip plate 377, however, it is simply pivoted to the upper end of an arm 417 fastened to the rod 378.

When the shaft 398 is rocked to disengage the studs 393 from the totalizer gears it also carries arms 424 fastened to the shaft into the path of teeth 425 rigid with the hubs of the totalizer wheels. The teeth 425 are so positioned with reference to the numerals on the totalizer wheels that they coöperate with the arms 424 to prevent the wheels from being carried past zero when clearing the totalizer.

The arm 396, as shown in Figs. 18 and 21, is formed at its forward end to coöperate with an operating arm 431 for a counter 432 of the Veeder type, a stud on the arm 431 engaging an open slot in the forward end of the arm 396. When the arm 396 is raised and lowered to disengage and engage the transfer pins 393 and the totalizer gears the operating arm 431 will be oscillated and the counter 432 caused to add one to the number thereon so that the counter will always show the number of times that the totalizer has been turned to zero.

Ticket printing and feeding mechanism.

The strips from which the tickets are drawn are carried in rolls 435 (Fig. 1) loosely mounted on studs 436 projecting from members 437 pivoted on a rod 438 mounted in the arms 50 of the machine supporting frame. Each of the members 437 has an arm 439 normally resting upon the

horizontal portion 51 of the machine supporting frame thereby limiting movement of the members 437 in one direction about the rod 438. Forwardly extending arms 440 of the members 437 are normally in contact with the inner surface of a shield 441. This shield extends across all five of the ticket strips and is provided with arms 442 journaled on the rod 438. Hooks 443 pivoted at 444 to the arms 442 are normally in engagement with studs 445 attached to the arms 50.

When it is desired to replace one of the rolls 435 the hooks 443 are disengaged from the studs 445 and the shield 441 may then be lowered to give access to the rolls. The arm 440 of the member 437 for the roll to be replaced may then be used to swing the member 437 forward until a shoulder 446 on the member is resting against the horizontal bar 51.

From the supply rolls 435 the ticket strips pass between plates 451 (Figs. 6 and 7) extending the width of the machine and plates 452 (see also Fig. 28) which also extend the width of the machine. The plates 451 and 452 have openings to accommodate printing rollers, operating arms and other devices described later, and form a chute for the ticket strips. As each strip passes through the chute it is first acted upon by rollers 453 and 454, the roller 453 carrying type (not shown) for printing on the backs of the tickets the matter shown in Fig. 4. The rollers 454 are impression rollers and are mounted on studs 455 projecting from levers 456 pivoted on a rod 457 extending across the machine. The forwardly extending arms of the levers 456 are curved downward and extend through slots 458 in the bottom plate 71. As shown in Figs. 1 and 2 the levers 456 project far enough to permit the operator to grasp and depress them against the tension of springs 462 (Figs. 6 and 7) to swing the rollers 454 out of the path of the ticket strips when the strips are being inserted, the object being, of course, to prevent the rollers 454 from interfering with the insertion of the strips.

From the rollers 453 and 454 the strips pass between impression rollers 465 and devices which are for convenience designated generally by the numeral 466 (Figs. 7 and 30) for printing the dates 508 and 514 (Fig. 3) on the body and stub portions of the tickets. The strips next pass between movable knives 467 and fixed knives 468 for severing the tickets, then between impression rollers 469 and members designated generally by the numeral 470 (Figs. 7 and 29) for printing the consecutive numbers and, lastly, between rollers 471 and 472 which are operated after the printing of the ticket is completed, to feed the tickets from the machine.

When one of the price keys 91 to 95 inclusive is depressed to swing the corresponding broad tooth pinion 329 (Figs. 6 and 16) into engagement with the companion gears 327 and 328 as previously described, a driving connection is established for operating the feeding and printing devices for acting upon the corresponding ticket strip. For this purpose each of the loose gears 327 (Fig. 16) meshes with a gear 475 rigid with the device 470 (Fig. 29). The gear 475 in turn meshes with a gear 476 (see also Fig. 28) rigid with the impression roller 469. The gear 326 which, as previously stated, meshes with the loose gear 327, also meshes with a gear 477 rigid with the impression roller 465. The gear 477 is in mesh with a pinion 478 which in turn meshes with a gear 479 rigid with the printing roller 453, the ratio being such that for each rotation of the gear 327 the roller 453 will also make a complete rotation. By tracing the movement through it will be seen that when a broad tooth pinion 329 is in engagement with its pair of companion gears on the driving shaft 85 and the shaft 85 rotated, the rollers 453, 465 and 469, the date printing devices 466 and the consecutive number devices 470 will all be driven in the proper direction to feed the strip toward the top of the machine. The rollers 471 and 472 for finally feeding the tickets are driven by separate devices described later on.

The rollers 453 are rotatably mounted on studs 491 (Fig. 6) on arms 492 fastened to a rock shaft 493. Attached to the right hand end of the shaft 493 is an arm 494 (see also Fig. 28) carrying an anti-friction roller 495 engaging a groove 496 in the left hand face of the gear 87 (Fig. 25). The groove 496 (Fig. 6) normally holds the shaft 493 in such position that all of the printing rolls 453 are out of feeding relation with the impression rollers 454; but shortly after the driving mechanism is started the shaft 493 is rocked to carry all of the rollers 453 into feeding relation with the impression rollers 454. However, it will be recalled, only the roller for the strip which is to be fed is driven. The type (not shown) on the printing rollers 453 are inked from rollers 501 (Figs. 6 and 7) rotatably mounted on rods 502 supported by the side arms of yokes 503 loosely mounted on the rock shaft 493. Springs 504 hold the inking rollers 501 in contact with the printing rollers 453.

Each of the date printing devices comprises a pair of circular members 505 (Figs. 7 and 30) on the edges of which are feeding flanges 506 coöperating with the impression rollers 465 to feed the tickets. Each pair of members 505 is rigidly connected by tie bars 507. Fastened in each

pair of disks 505 are two rods 511 and 512. On each of these rods is mounted a set of date printing wheels the set on the rod 512 printing the date 513 (Fig. 4) on the body of the ticket and the set on the rod 511 printing the date 508 on the stub or coupon. Each set of date wheels comprises a wheel 514 (Fig. 30) for printing the name of the month and wheels 515 and 516 for printing the days. The date wheels are notched between the printing type to coöperate with setting gears described in detail later on. Rigid with each of the date printing wheels is a toothed alining wheel 521 engaged by a spring operated pawl 522 to retain the wheels in adjusted position.

Near the right side of the machine is a set of date indicators 523 (Figs. 6, 7, 16 and 17) visible through a reading opening in the top of the machine casing. The date indicators 523 are loosely mounted on a rod 524 (see also Fig. 23) supported at its ends by plates 525 mounted on the driving shaft 85, the shaft 83 and a shaft 544 mentioned later. The date indicators 523 are like the date printing type carriers in that they are formed in the manner of gears and mesh with pinions 527 (Fig. 23) loose on the shaft 85. The pinions 527 are constantly in mesh with pinions 528 loose on a rod 529 supported between the plates 525.

The shaft 83 on which the disks 505 carrying the date printing wheels are mounted is both movable endwise and rotatable. Attached to the shaft are six gears 530, one for the set of date indicators 523 and one for each of the five sets of date printing type wheels carried by the disks 505. When it is necessary to change the date the shaft may be moved endwise by means of a wheel or button 531 (Figs. 2 and 5) to engage the gears 530 on the shaft with one of the gears 528 for the date indicators, and with the like pair of date printing wheels in each set. The shaft is then turned until the desired date shows on the date indicators 523. The date printing wheels will of course be turned simultaneously with the indicators 523 so that when the machine is operated to print and issue tickets of any class the new date will appear on the tickets. Spring operated pawls 532 (Figs. 7 and 23) coöperate with retaining ratchets 533 to hold the date indicators 523 in position after adjustment.

The five devices carrying the consecutive numbering mechanism each comprises a pair of circular ends 541 (Figs. 7 and 29) rigidly connected by two bars 542 and 543 (Fig. 7) so as to form a unit rotatable about the shaft 544. Fastened to the bar 542 are type plates 545 and 546 (see also Fig. 16) to print on the faces of the tickets the matter shown at 547 and 548 (Fig. 3). Between these two type plates is a serrated blade 549 for perforating on the line 550 so that the body and coupon portions of the ticket may readily be separated. Fastened to the bar 543 is a type plate 551 for printing on the tickets the matter shown at 552 (Fig. 3). Feeding flanges 555 on the peripheries of the circular ends coöperate with the associated impression roller 469 to feed the tickets.

Rotatably mounted in the circular ends 541 are shafts 561, 562 and 563. Rotatably mounted on the shafts 561 and 563 are sets of consecutive number printing type wheels 564 and 565. Loose on the shaft 562 is a set of counter wheels 566 bearing on their peripheries the usual digits 0 to 9 which are intended to be viewed through openings in the top of the casing (see Fig. 17) so that the proprietor can at any time ascertain the total number of tickets sold of each class. Loosely mounted on the shaft 562 are the side arms of a yoke 571 (Figs. 7 and 29) embracing the set of wheels 566. Fastened in the side arms of the yoke 571 is a rod 572 on which is pivoted a four fingered pawl 573 coöperating with the teeth on ratchet wheels 574 rigid with the number wheels 566. Each time a device 470 is rotated as previously described the yoke 571 will be given a rocking movement about the shaft 462 in a manner explained later, thereby causing the pawl 573 to add one on the wheels 566. The fingers of the pawl 573 are staggered and the ratchet wheels 574 are provided with deep notches for effecting transfers in the manner well known in the art. Spring operated pawls 575 journaled on a stud 576 serve to retain the wheels 566 in position.

Associated with the number printing wheels 564 and 565 are yokes 577 and 578. Supported in the side arms of the yokes 577 and 578 are rods 579 and 580 on which are mounted operating pawls 581 and 582 like those described in connection with the number wheels 566 and coöperating in the same way with ratchet wheels 583 and 584 rigid respectively with the number printing wheels 564 and 565. A link 585 connects the yokes 577 and 578 for movement in unison so that the wheels 564 and 565 are operated simultaneously to add one whenever the yokes are actuated. Spring operated pawls 586 and 587 mounted respectively on rods 588 and 589 retain the wheels 564 and 565 in position.

The rods 572 and 579 extend through slots 591 and 592 (Fig. 13) cut in both the left hand end 541 of the device 470 and in the gear 475 into engagement with a cam groove 593 in a disk 594 loosely mounted on the shaft 544. The disk 594 for each of the devices 470 is provided with a V shaped notch 596 engaged by an arm 597 (Figs. 7, 16 and 31) fastened to a rock shaft 598. Fastened to the right hand end of the shaft

598 is an arm 599 (Figs. 16, 25 and 27) provided with a stud 600 normally engaging a circular hole in an arm 601 fastened to a sleeve 602 loose on the shaft 598. The arm 601 carries an antifriction roller 603 engaging a cam groove 604 in the side of a disk 605 referred to more in detail later. Rigid with the disk 605 is a gear 606 meshing with the gear 84 on the driving shaft 85. The cam groove 604 is formed to rock the shaft 598 during the latter part of an operation, first counter clockwise (Figs. 6 and 27) and then clockwise. This will rock the cam disks 594 (Fig. 13) first clockwise and then counter clockwise so that as to the four devices 470 which are not being rotated the portions 609 of the cam grooves 593 will operate the rod 579 and thereby rock the yokes 577 and 578 (Fig. 7) about the shafts 561 and 563 and cause the pawls 581 and 582 to add one on the number printing wheels 564 and 565. As the fifth device 470 is rotated to feed tickets its rod 572 will be carried along the inclined portion 611 of the cam groove 593 and then along the portion 609 thereby rocking the yoke 571 (Fig. 7) and operating the number wheels 566 to add one. Before the disks 594 are rocked back to their original position the rod 579 in the rotated device 470 will have passed the portion 611 of the cam groove 593 and as the disk 594 is rocked back to its original position the portion 609 of the groove 593 will be coöperating with the rod 579 which is, of course, also moving. This construction results in rocking the yokes 577 and 578 in the rotating device 470 in one direction and as the device 470 completes its rotation the portion 609 of the groove 593 will rock the yokes 577 and 578 back to their normal position. As a result the pawls 581 and 582 in the yokes 577 and 578 will operate their number printing wheels to add one.

As so far described it is clear that at each operation the number printing wheels 564 and 565 in all five of the devices 470 will all be operated to add one each time the machine is operated regardless of the kind of tickets issued and that the counter wheels 566 are only operated when the device 470 carrying them is rotated. As a result the consecutive numbers 613 (Fig. 3) printed on the tickets will show the total number of all tickets sold of all classes while the wheels 566 will show only the number of tickets sold of each separate class.

It may in some instances be desirable to print on the tickets the same number as appears on each set of wheels 566, that is, the number of tickets sold in each class. This may be accomplished by withdrawing the pin 614 (Figs. 16 and 25) fastening the arm 599 to the shaft 598 and shifting the arm 599 laterally on the shaft to disengage the stud 600 on the arm 599 from the hole in the arm 601. As the arm 599 is shifted a stud 615 on the arm 599 is engaged with a circular hole 616 in the right hand side frame 78 of the machine and the pin 614 may then be reinserted through the arm 599 and a hole 617 in the shaft 598 to hold the arm against displacement. When this has been done movement of the arm 601 by its cam groove 604 (Fig. 27) will not affect shaft 598. As a result the cam disks 594 will be held stationary so that only the number printing wheels 564 and 565 in the device 470 which is rotated will be operated.

The machine has a counter designated by the numeral 621 (Figs. 16 and 17) which is operated to add one each time the machine is operated so that it will at all times show a number equal to the total of the numbers appearing on the five sets of wheels 566. The wheels 621 are the same in every respect as the wheels 566 and are operated in the same way by a pawl (not shown) carried in a yoke 622 (Fig. 16). The wheels 621 are rotatably mounted between upwardly extending ears 623 (Fig. 23) of the plates 525 previously mentioned. The yoke 622 is oscillated to operate the wheels 621 by a disk 624 (Fig. 16) loose on the shaft 544 and actuated by an arm 626 fastened to the sleeve 602. The sleeve 602, it will be remembered, has fastened to its other end the arm 601 engaging the cam groove 604 (Fig. 27) so that the sleeve is rocked at every operation of the machine. As a result the disk 624 is oscillated at each operation to actuate the number wheels 621.

The counter 621, the five sets of counter wheels 566, the five sets of number printing wheels 564 and the five sets of number printing wheels 566 may all be simultaneously turned to zero by means of the shaft 544. For this purpose the shaft 544 is both movable endwise and rotatable. The shaft projects through the right hand machine frame 78 as shown at 631 (Fig. 16). In its end is a square recess 632 to be engaged by a correspondingly shaped wrench. Fastened to the shaft is a pin 633 normally engaging a cut in a collar 634 fastened to the machine frame. At its left hand end (see Fig. 33) the shaft 544 is recessed to receive a spring 635 mounted in a support 637 fastened in the left hand machine frame. Attached to the shaft 544 are collars 638 (Fig. 35) provided with square shoulders 639 to engage notches 640 in sleeves 641 loose on the shaft 544 but rigid with pinions 642. The notches 640 are beveled at either side to insure proper engagement of the shoulders 639 therewith. The pinions 642 mesh with pinions 643 fastened to the shafts 561, 562 and 563 (Fig. 7) and a pinion 644 (Fig. 16) on the shaft supporting the number wheels 621. In resetting the wrench is inserted in the recess 632 and the shaft 544 pushed end-

wise against the tension of the spring 635 (Fig. 33) to engage the shoulders 639 (Fig. 35) with the notches 640 in the collars 641 rigid with the pinions 642. This disengages the pin 633 (Fig. 16) from the notch in the collar 634 and connects all of the pinions 642 to the shaft 544 so that when the shaft 544 is rotated by means of the wrench the pinions 643 and the shafts to which the latter pinions are fastened will all be rotated.

As shown in Fig. 7 the shafts last mentioned, that is, the shafts 561, 562 and 563 are provided with square sided grooves 645 which coöperate with spring pressed pawls (not shown) carried by the various number wheels. When the shafts are rotated the square sides of the grooves 645 will engage the ends of the pawls (not shown) and carry the number wheels to zero in a manner well known in the art. Near the end of the rotation of the shaft 544 the spring 635 will reengage the pin 633 (Fig. 16) with the notch in the collar 634 thereby indicating to the operator that the resetting movement has been completed.

It is clear that it is desirable to maintain the pinions 642 (Figs. 33 and 35) and the devices driven thereby in correct relationship to the rest of the mechanism between resetting operations. For this purpose, fastened to the right hand end 541 of each number carrying device is a stud 651 (Fig. 33) normally engaging a hole 652 in the pinion 642. When a number device 470 is being driven the stud 651 will cause the pinion 642 to rotate with the end plate 541 and this of course will cause the pinions 642 and 643 to be carried along. In resetting operations, however, when the shaft 544 is moved endwise the pinions 642 will be shifted on the shaft 544 against the tension of springs 653 far enough to disengage the pinions 642 from the studs 651. When at the end of the resetting rotation of the shaft 544 the spring 635 moves the shaft endwise to its original position the pinions 642 will be reëngaged with the studs 651 thereby reëstablishing the normally effective connection between the number carrying devices 470 and the pinions.

A counter 655 (Figs. 16, 17 and 36) of the Veeder type shows the number of times the consecutive number mechanism has been turned to zero. The counter 655 is fastened to a laterally extending lug 656 formed at the upper end of an arm 657 formed on the right hand one of the pair of plates 525 supporting the date indicators 523 and counter 621. The pinion 644 (Fig. 16) on the resetting shaft for the date indicators drives a gear cam 658 (Fig. 36) a half turn at each rotation of the resetting shaft. At each half turn of the gear cam it oscillates an arm 659 pivoted to the arm 657 and having a slot and pin connection with the operating arm 660 of the counter 655. Each oscillation of the arms 659 and 660 operates the counter 655 to add one.

Ink for the date wheels and consecutive number printing wheels is furnished by rollers 661 (Figs. 7 and 16) which are very loosely mounted on the shaft 85. Coöperating with each roller 661 is a small roller 662 (see also Fig. 40) loose on a rod 663 supported at its ends in arms 664 formed on a sleeve 665 loose on the shaft 279. Formed on the left hand arm 664 of each pair is an extension 666 provided with a slot 667 through which extends a stud 668 projecting from the cam plate 332. The left hand arm 664 of each pair also has formed on it an ear 669. Stretched between the stud 668 and a stud 670 on the ear 669 is a spring 671. When the cam plate 332 is operated as previously described by depressing the corresponding price key the spring 671 will rock the sleeve 665 and arms 664 so as to yieldingly press the roller 662 against the roller 661. This, on account of the loose fit of the roller 661 on the shaft 85, will hold the roller 661 in the proper position for it to ink the type when the devices 466 and 470 are rotated. When the price key is released and the cam plate 332 returned to its original position the stud 668 will coöperate with the slot 667 to swing the small roller 662 out of contact with the roller 661.

The movable knives 467 are carried between the side arms 675 (Figs. 6, 7 and 28) of yokes 676 pivotally supported by arms 677 fastened to a rock shaft 678. One of the arms 675 for each yoke extends rearward and is connected by a spring 679 to an arm 680 fastened to the shaft 678, the spring 679 being provided to hold the movable knife 467 in contact with the stationary knife 468. Fastened to the right hand end of the shaft 678 is an arm 683 (Figs. 6 and 28) carrying an anti-friction roller 684 (Figs. 6 and 27) projecting into a cam groove 685 in the left hand face of a disk 686 rigid with a gear 82 (see also Fig. 25). The cam groove 685 is formed to rock the shaft 678 clockwise (Figs. 6 and 7) after a ticket has been fed past the stationary knife 468 thereby causing the movable knife 467 to pass across the face of the stationary knife 468 with a shearing movement and sever the ticket.

As before stated after the tickets are printed the rollers 471 and 472 (Figs. 7 and 16) are operated to eject the tickets from the machine. The rollers 472 are in the form of spools loose on a rod 691 and having flanges 690 knurled as best shown in the figure last mentioned. Coöperating with the knurled flanges 690 are knurled flanges 693 on the rollers 471, the rollers 471 being fastened to a shaft 694. At its

right hand end the shaft 694 has fastened thereto a gear 695 (Figs. 6, 16 and 28) meshing with a gear 696 loose on a rod 697 and meshing with a gear 698 (Fig. 28) fast on a shaft 699. The impression rollers 469, previously referred to are loose on the shaft 699. Loose on the shaft 699 is a gear 700 (Figs. 24, 25 and 28) the teeth of which are provided with laterally extending portions 701. In the normal conditions of the parts one of the these portions is engaged by a locking flange 702 formed on the disk 605. Rigid with the disk 605 is a partial gear 704 (Fig. 16) the disk 605, it will be recalled, being loose on the shaft 544 but rigid with the gear 606. The gear 606, it will also be remembered, makes a complete revolution at each rotation of the driving shaft. During the larger part of the rotation the locking flange 702 (Fig. 24) simply slides past the projection 701 of the engaged tooth so that the gear 700 is held stationary. Toward the latter part of the operation, however, that is, after the ticket has been printed and severed the teeth 706 of the partial gear 704 engage the teeth of and drive the gear 700.

This movement of the gear 700 is transmitted to the shaft 699 by means of a ball clutch which is so constructed that the gear 700 cannot be rotated without turning the shaft but which permits the shaft to be turned independently of the gear. This clutch comprises a ball 707 (Fig. 24) mounted in a groove 708 around the interior of the hub 709 of the gear 700. The shaft 699 also has a cut 710 to receive the ball 707 and so shaped that when the gear 700 is turned clockwise (Fig. 24) the ball 707 will wedge between the hub 709 and the bottom of the cut 710 in the shaft 699 so that the gear and shaft will turn as a unit.

It is often desirable to feed the ticket strip through the top of the machine without operating the machine and the clutch mechanism just described is to permit turning the shaft and thereby the feeding rollers 471 and 472 independently of the gear 700. For this purpose the right hand end of the shaft 699 is provided with a knurled knob 712 (Figs. 16 and 41) by which the shaft may be manually rotated. When this is done the base of the cut 710 (Fig. 24) in the shaft will carry the ball 707 along but the ball will remain in the position shown and simply move idly in the internal groove 708 in the hub 709 so that the gear 700 will not be affected. By this construction the shaft 699 can be turned manually to any desired extent independently of the operating mechanism.

The knob 712 is held on the shaft 699 by screws 713 (Fig. 41) extending into a peripheral groove 714 in the shaft. In the normal condition of the parts the knob can be turned idly, that is without moving the shaft. When it is desired to manually rotate the shaft the knob 712 is pushed in against the tension of a spring 7161 to engage the inner ends of the screws with notches 7171 opening into the peripheral groove 714, thereby establishing an operating connection between the shaft and knob. The purpose of this form of connection will appear later.

The shafts 493, 678 and 699 are journaled at their ends in plates 715 (Figs. 6 and 7) one at either side of the machine and connected together by tie rods 716 to form a rigid frame pivoted on the shaft 694. The shaft 694 is journaled at its ends in ears 717 projecting rearward from the main side frames of the machine. In the lower ends of the frames 715 is a shaft 718. The main side frames of the machine carry ears 719 provided with open slots 720 leading to circular holes in which the shaft 718 normally rests. The shaft 718 has cuts 721 and may be turned so as to position the cuts with reference to the slots 720 to allow the shaft to be disengaged from the ears 719 by swinging the plates 715 rearward. Before the plates can be swung, however, the pins holding the arms 494 and 683 to their shafts 493 and 678 must be drawn and the arms moved laterally on their shafts far enough to disengage their rollers 495 and 694 from their cam grooves. The plates 715 may then be swung about the shaft 694. This construction permits removing pieces of paper or other material which might otherwise become clogged in the chute formed by the plates 451 and 452.

It is, of course, desirable to prevent the rollers 453 for printing the backs of the tickets from getting out of proper operating relationship with reference to the mechanism when the plates 715 are swung rearward. This is done by locking the gears 477 against movement at the beginning of the swinging movement of the plates. The gears are locked by projections 724 on the upper edge of a plate 725 extending across all of the gears 477 and supported at its end by arms 726 journaled on the shaft 493. Springs 727 stretched between the plates 725 and fixed pins 728 attached to the plates 715 tend at all times to rock the plate 725 clockwise (Figs. 6 and 7). This movement is normally prevented, however, by a projection 731 (Fig. 28) of the right side arm 726 resting against the cross plates 451. When the shaft 721 is turned and the plates 715 swung rearward the springs 727 are freed and engage the projections 724 with the teeth of the gears 477 thereby locking the gears against rotation. This, owing to the connection afforded by the gears 478

and 479 will also hold the printing rollers 453 against movement.

It is apparent that it should be impossible to feed the ticket strip manually, reset the consecutive numbering devices or change the date wheels while the machine is being operated and that on the other hand it should be impossible to operate the machine while the paper is being fed or the consecutive numbering device and date wheels changed. This is accomplished by mechanism preventing endwise movement of the shafts 83 and 544 or movement of the knob 712 to engage the shaft 699 after one of the price keys has been depressed. On the other hand after either the shafts 83 or 544 or the knob 712 has been shifted it becomes impossible to depress any of the price keys to start the machine. For this purpose the arm 124 (Fig. 12) operated through the plate 121 by the price keys has an extension 735 with an open slot 736 engaging a stud 737 (Figs. 5 and 7) fastened to the cross plate 738 of a yoke. The side arms 739 of the yoke are loose on the shaft 306. In order to give the necessary rigidity the lower ends of the arms 739 are connected by a rod 740. The right hand arm 739 has an ear 741 (Fig. 6) in which is fastened a stud 742 (see also Fig. 5) projecting through an opening 744 (Fig. 6) in the right hand machine frame. Pivoted on the stud 742 is one end of an element 745 slidably supported by a stud 746 attached to the right hand machine frame. The element 745 has a shoulder 747 to engage a groove 748 in the periphery of the shaft 83 and a shoulder 749 to engage a groove 750 in the periphery of the shaft 544. At its extreme end the element 745 has a finger 751 which may be carried between the end of the hub of the knob 712 and the machine frame so as to prevent movement of the knob toward the frame. When a price key is operated the yoke arms 739 will be rocked counter clockwise (Fig. 6) thereby drawing the element 745 forward and moving the shoulders 747, 749 and finger 751 to effective position so that preliminary engaging movement of the shafts 83, 544 and the knob 712 will be prevented. On the other hand if the knob 712 or either the shafts 544 or 83 has been moved laterally the element 745 will be held against movement and it will be impossible to depress any of the price keys.

The numeral wheels 271 to 276 inclusive of the totalizer and the ticket counters 566 and 621 (Fig. 17) are normally concealed from view by screens which are withdrawn when the totalizer and counters are to be consulted in ascertaining the amount and nature of the business transacted. The screen for the ticket counters 566 and 621 comprises a plate 761 (Fig. 6) supported at its ends by arms 762 and 763 (Fig. 16) journaled on the shaft 544. Integral with the arm 762 is an arm 764 (Fig. 6) carrying a stud 765 projecting through a slot 766 in the right hand side frame 78. The end of the stud 765 projecting beyond the frame 78 is engaged by a slot in the rear end of an arm 767 integral with an arm 768 loosely mounted on the rod 89 and supporting the right end of a screen 769 for concealing the totalizer wheels. The left hand end of the screen 769 is supported by an arm 770 (Fig. 16) which is also loose on the rod 89. The screen 769 passes through a slot 772 in the frame 78, the slot being of sufficient length to permit the screen 769 to be swung toward the front of the machine far enough to expose the totalizer wheels.

Normally the arm 768 is across the opening through which the totalizer turn to zero wrench 361 (Fig. 5) is to be inserted so that when the screens are in concealing position it is impossible to clear the totalizer. The screens are moved into and out of concealing position by means of a lock (not shown) attached to the outside casing of the machine. Integral with the barrel 773 (Fig. 6) of the lock (not shown) is a plate 774 normally in engagement with the peripheral groove 750 in the consecutive numbering device shaft 544. The plate 774 has a slot 776 engaging a stud 777 fastened to the arm 764 and projecting through a slot 778 in the side frame 78 far enough to be engaged by the plate 774. In taking a statement from the machine the lock (not shown) is operated to turn the barrel 773 clockwise (Fig. 6) thereby disengaging the plate 774 from the groove 750 in the shaft 544 and rocking the screen 761 rearward to expose the ticket counters. This movement is imparted through the stud 765 and arm 767 to the screen 769 over the totalizer wheels swinging the screen 769 forward until the totalizer wheels are exposed. After the various counters and totalizer have been read the parts may be returned to normal position by reverse operation of the devices just described.

Operation.

In order to operate the machine to issue a single ticket it is necessary only to depress one of the price keys 91 to 95 inclusive (Fig. 17) and turn the operating handle 61 (Figs. 1 and 2). When price key only is operated the arm 161 (Fig. 10) remains in the position shown with its stud 162 in position to engage the end 163 of the stepped plate 164. Depression of the price key operates the arm 124 (Figs. 10, 11 and 12) and element 141 rigid therewith so that the connection afforded by the link 144 (Fig. 10) will withdraw the latching arm 147 (see also Fig. 39) from engagement with the teeth of a

ratchet plate 152, the nose 142 of the element 141 being at the same time withdrawn from engagement with a shoulder on the plate 143. As soon as the noses 142 and 151 are withdrawn the spring 154 rotates the unit consisting of the plate 143, ratchet plate 152 and stepped plate 164 until the end 163 of the plate 164 strikes the stud 162. The stud 252 on the arm 249 is then engaged with one of the teeth on the ratchet plate 152 and the arm 249 is then swung by operation of the arm 245 to turn the plates 143, 152 and 164 back to their original positions, where they are retained by the nose 151 of the latching arm 147.

In case it is desired to issue more than one ticket of a class it is necessary before the price key is operated to depress one of the number keys 181 to 184 (Fig. 17). This will position the arm 161 (Fig. 10) to coöperate with the stops 165, 166, 167 and 168 (Fig. 10) on the plate 164 depending upon the number of tickets to be issued. The handle is then given a number of turns corresponding to the tickets to be issued and at each turn the arms 249 and 245 turn the plates 143, 152 and 156 back one division, the plates being retained in each new position by operation of the latching arm 147.

In the drawings the machine is, as before pointed out, prepared to number all of the tickets issued according to a single series of numbers so that the last ticket issued will show the total number of tickets of all classes. If it is desired to change the machine to number the tickets of each class independently that is so that the last ticket issued of a class will show a number indicating only the total number of tickets issued of that class, all that is necessary is to withdraw the pin 614 (Fig. 16) and shift the arm 599 laterally toward the frame 78 and then replace the pin 614 so that it will engage the hole 617 in the shaft 598. The shaft 598 will then remain stationary so that it will not effect the operation of the consecutive number printing devices.

While the form of mechanism herein shown and described, is admirably adapted to fulfil the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, mechanism for operating said sets singly or in unison to advance them, and means for controlling said mechanism.

2. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, mechanism for operating said sets singly or in unison to advance them, and an adjustable device for determining whether the sets of consecutive numbering devices are to be advanced singly or in unison.

3. In a machine of the class described, the combination of a main driving mechanism, a plurality of sets of consecutive numbering devices, mechanism driven by the driving mechanism for actuating said set singly or in unison to advance them, and an adjustable connection between the driving mechanism and the actuating mechanism for determining whether the sets are to be advanced singly or in unison.

4. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices operable singly or in unison to advance them, a common driving mechanism, and an adjustable connection intermediate said driving mechanism and the sets of numbering devices whereby the sets may be advanced singly or in unison at operations of the driving mechanism according to the adjustment of the connection.

5. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, an operating member for each set of consecutive numbering devices, means for moving any desired set of numbering devices relative to its operating member whereby to advance the numbering devices in said moving set, and means for moving the operating members relative to the other numbering devices whereby to advance said other devices.

6. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, an operating cam for each set of consecutive numbering devices, means for moving any desired set of numbering devices relative to its cam whereby to advance the numbering devices in said moving set, and means for moving the cams relative to the other numbering devices whereby to advance said other devices.

7. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, an operating cam for each set of consecutive numbering devices, means for moving any desired set of numbering devices relative to its cam whereby to advance the numbering devices, and means for simultaneously operating the cams to advance all of the numbering devices.

8. In a machine of the class described, the combination of a plurality of consecutive numbering devices, an oscillatory operating cam for each set of consecutive numbering devices, means for moving any desired set of numbering devices relative to its cam where-

by to cause the cam to advance the devices, and means for simultaneously oscillating the cams whereby to advance the numbering devices of the unmoved sets.

9. In a machine of the class described, the combination of a plurality of sets of consecutive numbering devices, an oscillatory operating cam for each set of consecutive numbering devices, means for moving any desired set of numbering devices relative to its cam whereby to cause the cam to advance the devices, means for simultaneously oscillating the cams whereby to advance the numbering devices of the unmoved sets, and an adjustable connection whereby the means last mentioned may be disabled.

10. In a machine of the class described, the combination of a plurality of independently movable ticket printing devices, ticket numbering devices carried by the printing devices, means for selectively moving the printing devices to print tickets, a movable cam cooperating with the numbering devices in each printing device to operate the consecutive numbering devices in the printing device which is moved, and means for simultaneously moving all of the cams to advance the numbering devices in the unmoved printing devices.

11. In a machine of the class described, the combination of a plurality of independently rotatable ticket printing cylinders, consecutive number printing type wheels carried in each cylinder, a movable cam for each cylinder constructed to actuate the consecutive number printing wheels to advance same when the cylinder is rotated relative to the cam or when the cam is moved relative to the cylinder, and means for simultaneously moving the cams relative to the cylinders while one of the cylinders is rotating.

12. In a machine of the class described, the combination of a plurality of independently rotatable ticket feeding and printing cylinders, consecutive number printing type wheels carried in each cylinder, a movable cam for each cylinder constructed to actuate the consecutive number printing wheels to advance same when the cylinder is rotated relative to the cam or when the cam is moved relative to the cylinder, and means for moving all of the cams relative to the cylinders while one of the cylinders is rotating.

13. In a machine of the class described, the combination of a plurality of independently rotatable ticket printing cylinders, consecutive number printing type wheels carried in each cylinder, an oscillating cam for each cylinder constructed to actuate the consecutive number printing wheels to advance same when the cylinder is rotated relative to the cam or when the cam is oscillated while the cylinder is stationary, and means for oscillating all of the cams while one of the cylinders is rotating.

14. In a machine for issuing tickets from a plurality of separate strips, the combination of devices for numbering the tickets either to show the total number of tickets issued or to show only the number issued from each strip, and manually adjustable means for controlling said numbering devices.

15. In a machine for issuing tickets of any one of several classes, the combination of devices for numbering the tickets as they are are issued either according to the total number of tickets of all classes issued or according to the number of tickets issued in the separate classes, and an adjustable connection for determining which system of numbering is to be employed.

16. In a machine for issuing tickets of a plurality of classes, the combination of a counter for each class operated to add one as each ticket of that class is issued, a total counter operated to add one each time a ticket of any class is issued, ticket numbering devices, and devices adjustable to prepare the machine to number the tickets according to either the total counter or the class counters.

17. In a machine for issuing tickets of a plurality of classes, the combination of a counter for each class operated to add one as each ticket of that class is issued, a total counter operated to add one each time a ticket is issued in any class, and means adjustable to automatically print on the tickets the number appearing on the total counter or the number appearing on the counter for the class of the ticket being issued.

18. In a machine for issuing tickets of a plurality of classes, the combination of a counter for each class operated to add one as each ticket of that class is issued, a total counter operated to add one each time a ticket is issued in any class, a set of number printing devices for each class of tickets, and devices adjustable to operate said numbering devices in unison with the total counter or in unison with the class counters as desired.

19. In a machine for issuing tickets of a plurality of classes, the combination of a counter for each class operated to show the number of tickets of that class issued, a counter operated to show the total number of tickets of all classes issued, number printing devices for numbering the tickets, and devices adjustable to cause the numbering devices to print the same numbers as appear on the class counters or to print the same number as appears on the total counter.

20. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably

rotating said shaft to determine the number of tickets to be issued, a series of manipulative devices, a stop adjustable differentially in either direction from a normal position by manipulation of said devices, and means moving with the control shaft and coöperating with said stop to limit variably the rotations of the control shaft.

21. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably rotating said shaft from a normal position to determine the number of tickets to be issued, a series of keys, a stop movable differentially in either direction from a normal position by means of said keys, and means moving with the control shaft and coöperating with said stop to variably limit rotations of the control shaft.

22. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably rotating said shaft to determine the number of tickets to be issued, a series of manipulative devices, a stop adjustable differentially in either direction from a normal position by manipulation of said devices, means moving with the control shaft and coöperating with said stop to limit variably the rotations of the control shaft, and a variably operable main operating mechanism controlled as to extent of movement by the control shaft.

23. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably rotating said shaft from a normal position to determine the number of tickets to be issued, a series of keys, a stop movable in either direction from a normal position by means of said keys, a stepped plate carried by the control shaft and coöperating with said stop to variably limit rotations of the control shaft, and a driving mechanism operable a variable number of cycles determined by the control shaft and having connections for restoring the control shaft a step at each cycle of movement.

24. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably rotating the same from normal position to determine the number of tickets to be issued in one direction, a series of manipulative devices, a stop adjustable differentially in either direction from a normal position by manipulation of said devices, means moving with the control shaft and coöperating with said stop to limit variably the rotations of the control shaft in the one direction, and a driving mechanism variably movable to restore the control shaft to its normal position.

25. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, a spring for variably rotating the shaft from normal position in one direction to determine the number of tickets to be issued, a bank of keys, a stop arm adjustable differentially in either direction from a normal position by operations of the keys, a stepped plate carried by the shaft and coöperating with said stop arm to limit variably the rotations of the control shaft in the one direction, and a driving mechanism variably operable to extents determined by the position of the control shaft.

26. In a machine of the class described, the combination of ticket issuing mechanism adapted to issue a varying number of tickets, a control shaft, means for variably rotating the same from normal position in one direction to determine the number of tickets to be issued, a series of keys, a plate movable differentially in either direction by means of the keys, a stop differentially movable in either direction by said plate to limit movement of the control shaft in the one direction, and a driving mechanism variably operable under the control of said control shaft for moving the shaft in the opposite direction to its normal position.

27. In a machine to print and issue tickets from a plurality of separate strips, the combination of a rotatable ticket printing and feeding element for each strip, said elements being independently rotatable, consecutive number devices carried in each of said elements, and means normally disconnected from said number devices but operable first to engage and then simultaneously to turn the number devices to zero.

28. In a machine to print and issue tickets from a plurality of separate strips, the combination of a rotatable ticket printing and feeding element for each strip, said elements being independently rotatable, consecutive numbering devices carried in each of said elements, and means for simultaneously clearing the numbering devices in all of the elements.

29. In a machine to print and issue tickets from a plurality of separate strips, the combination of a rotatable ticket printing and feeding cylinder for each strip, consecutive numbering devices mounted in each cylinder, and means common to the cylinders for simultaneously clearing the numbering devices in all of the cylinders.

30. In a machine to print and issue tickets from a plurality of separate strips, the combination of a rotatable ticket printing and feeding cylinder for each strip, consecutive numbering devices mounted in each cylinder, a shaft common to the cylinders, and means carried by the shaft for simultane-

ously turning the consecutive numbering devices to zero.

31. In a machine of the class described, the combination with a plurality of independently movable ticket printing devices, of ticket counter and numbering devices carried in each of said printing devices, means for operating the counter and numbering devices to advance same, a shaft common to all of the ticket printing devices, and means whereby all of the counter and numbering devices in all of the printing devices may be simultaneously turned to zero by operating said shaft.

32. In a machine to print and issue tickets from a plurality of separate strips, the combination of a rotatable ticket printing and feeding cylinder for each strip, said cylinders being independently rotatable, a shaft on which the cylinders are mounted, consecutive number devices carried in the cylinder and normally disconnected from said shaft, and means whereby the consecutive number devices in all of the cylinders may first be connected to the shaft by endwise movement of the shaft and then turned simultaneously to zero by rotating the shaft.

In testimony whereof I affix my signature.

FREDERICK L. FULLER.