March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 1

Fig. 1

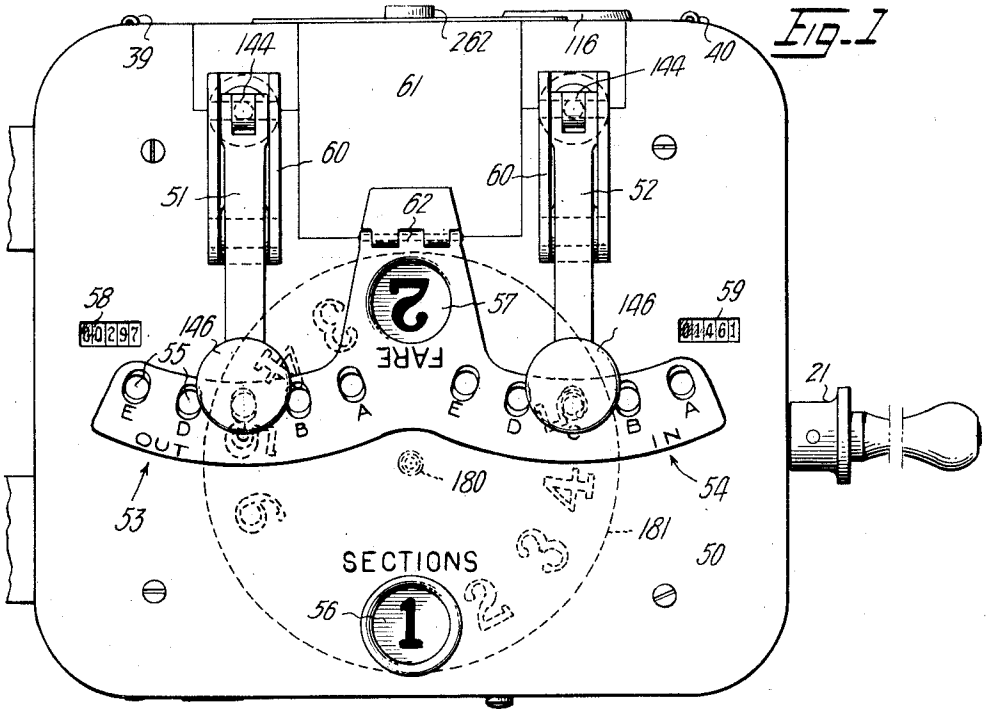
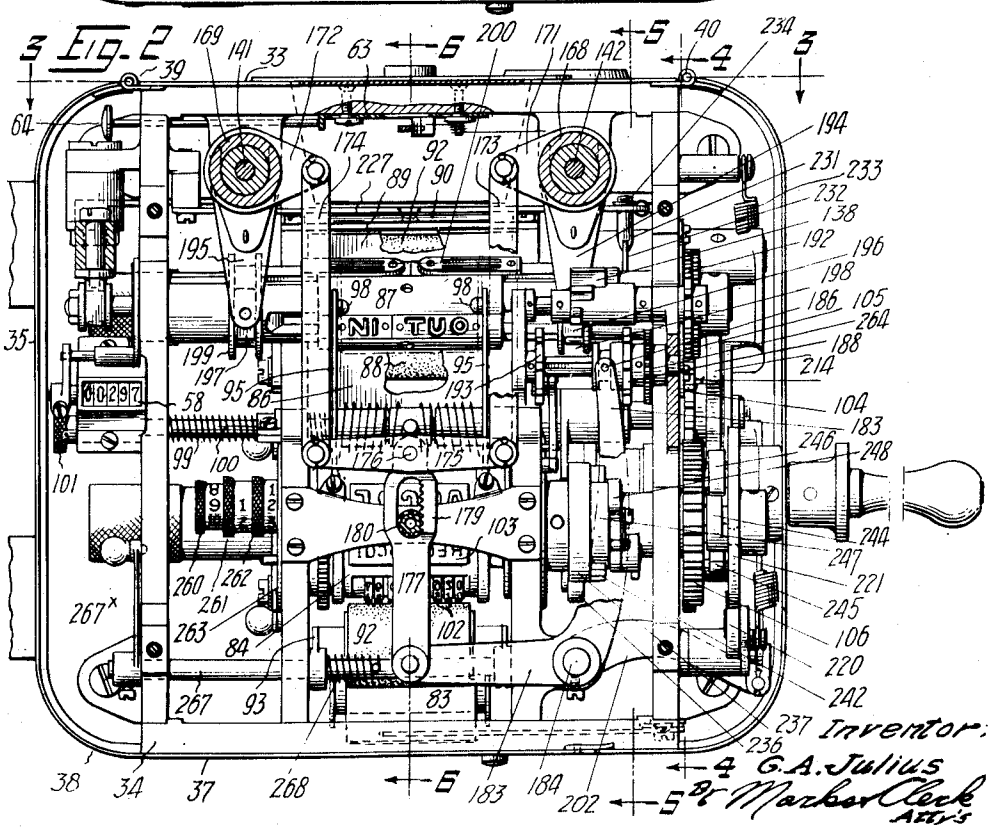


Fig. 2



Inventor:
G. A. Julius
By Marker Clark
Atty's

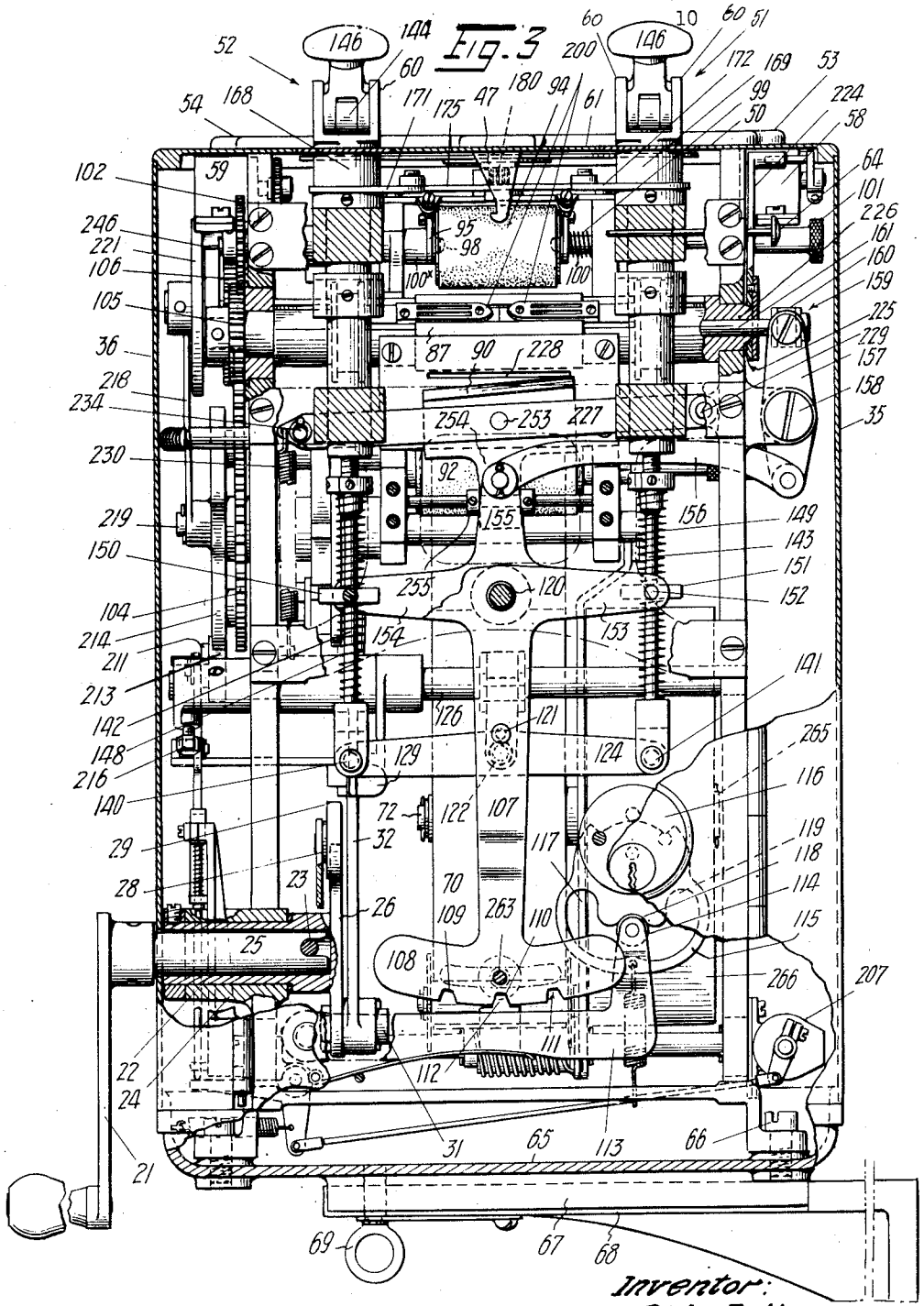
March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12. 1922 10 Sheets-Sheet 2

Fig. 3



Inventor:
G. A. Julius
By Marbor Clerk
Atty's

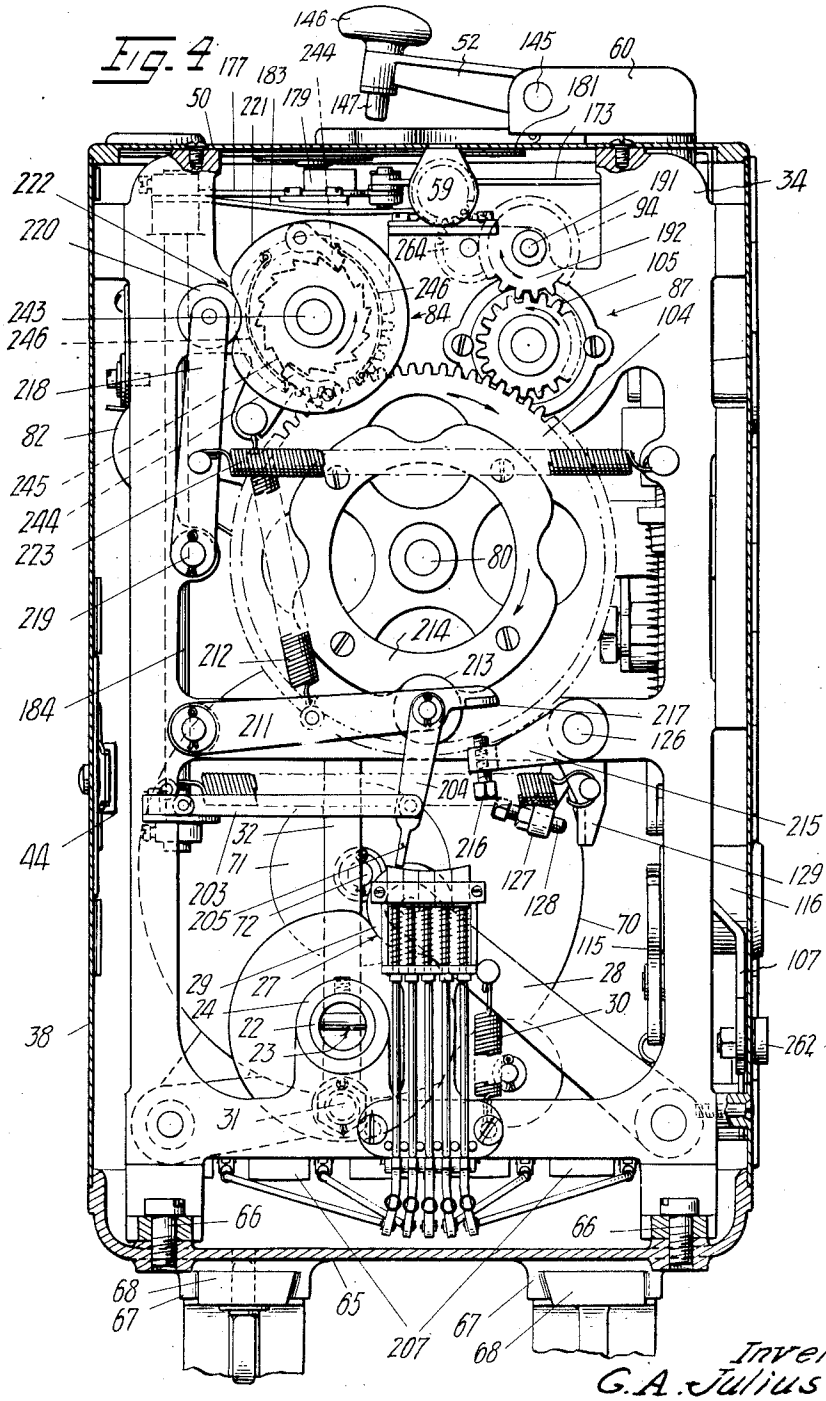
March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 3

Fig. 4



Inventor:
G. A. Julius
By Marber Clark
Atty's

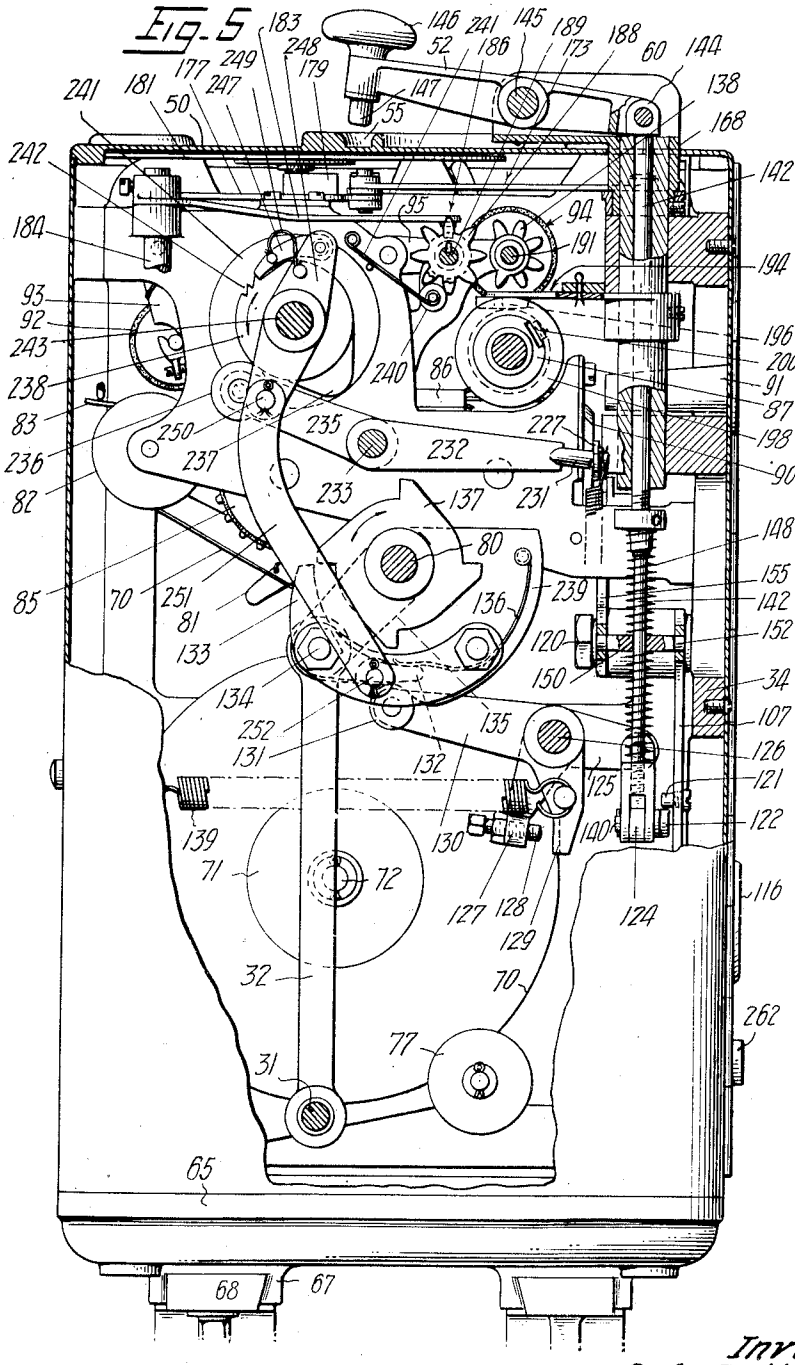
March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 4

Fig. 5



Inventor
G. A. Julius
By Marks & Clerk
Attys

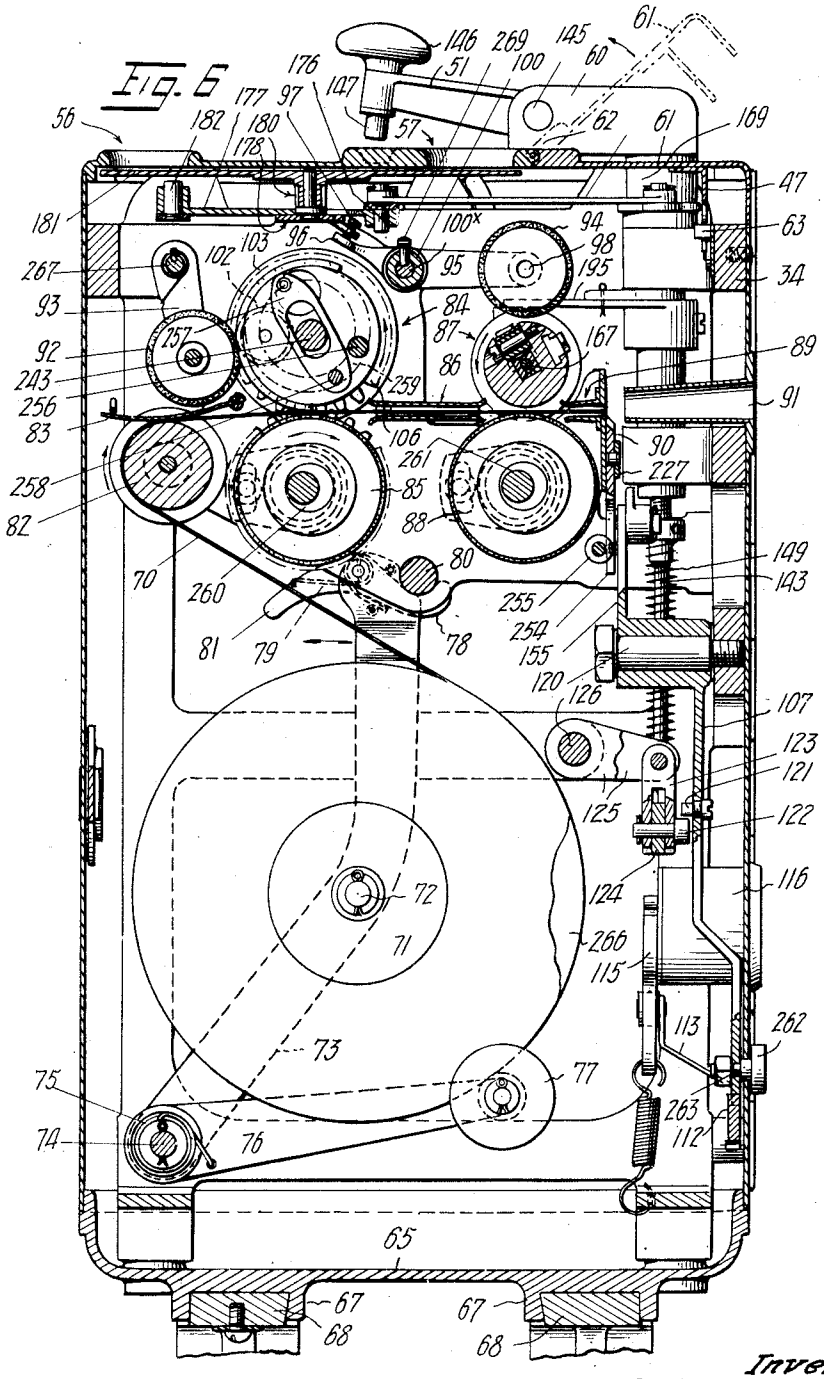
March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 5

Fig. 6



Inventor:
G. A. Julius
By Marks & Clark
Attys

March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12 1922 10 Sheets-Sheet 6

Fig. 7

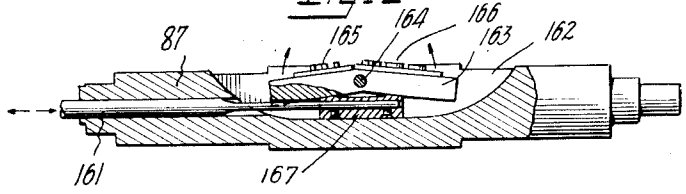


Fig. 8

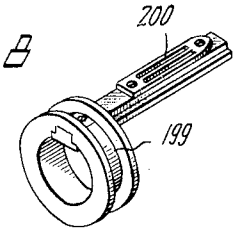


Fig. 9

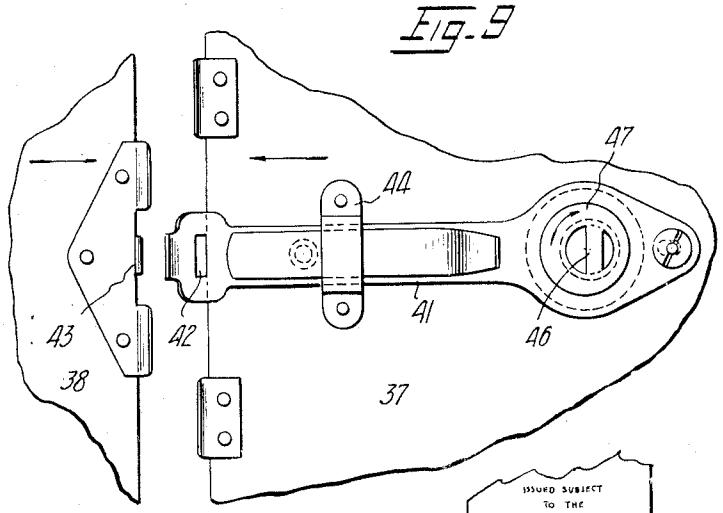


Fig. 10

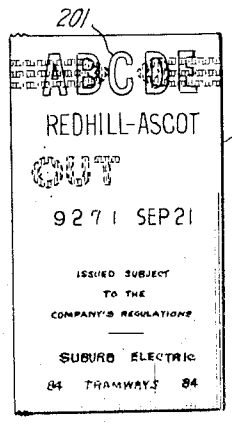
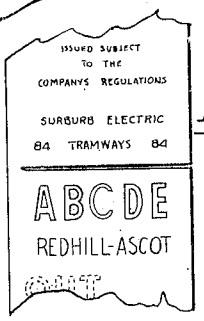


Fig. 10A



Inventor:
G. A. Julius
By Marks & Clerk
Atty's

March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 7

Fig. 11

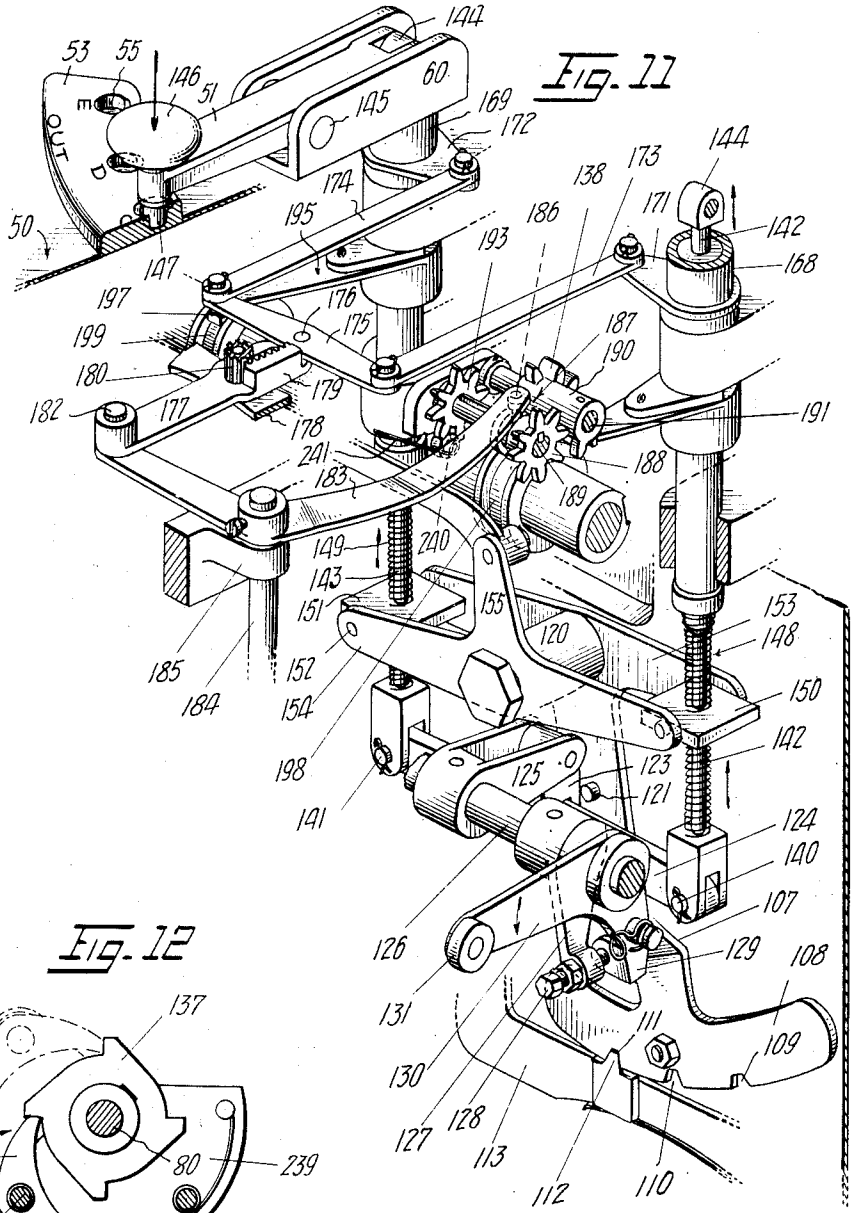
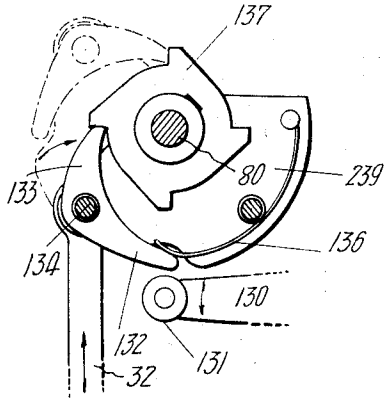


Fig. 12



Inventor
G. A. Julius
By Marks & Clark
Atty's

March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 8

Fig. 14

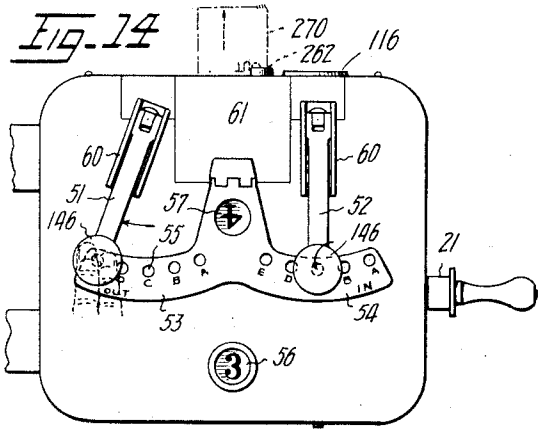


Fig. 13

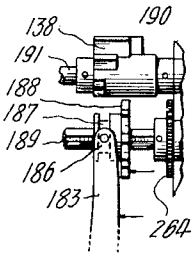


Fig. 15

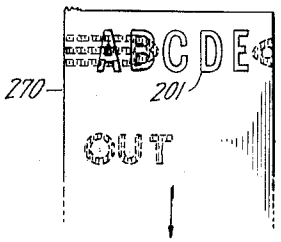


Fig. 16

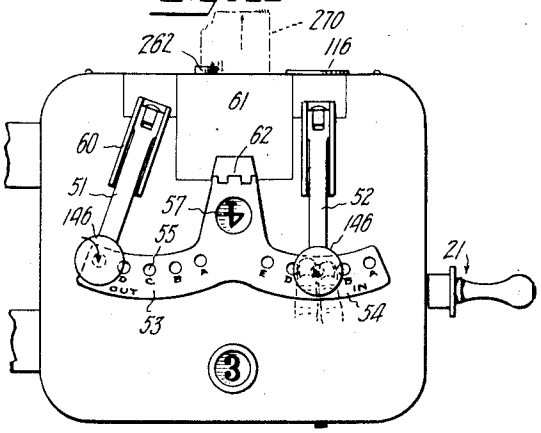
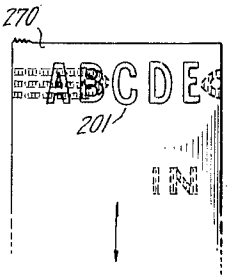


Fig. 17



Inventor
G. A. Julius
By Parker & Clark
Atty's

March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 9

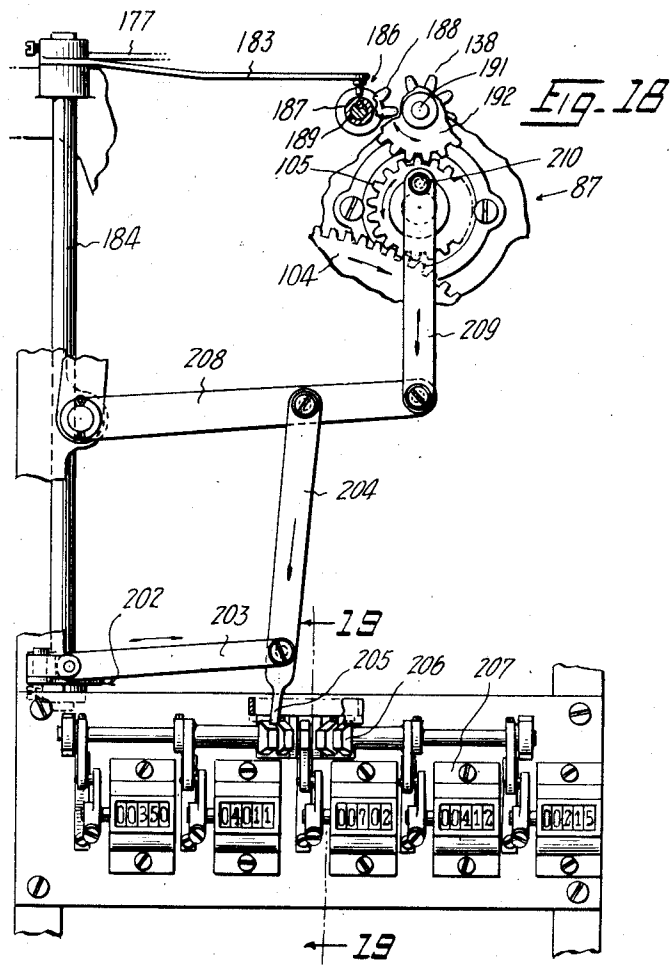


Fig. 18

Fig. 19

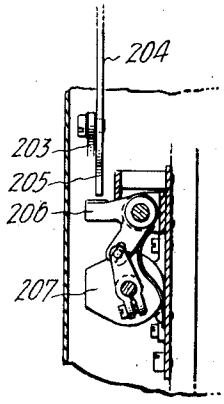
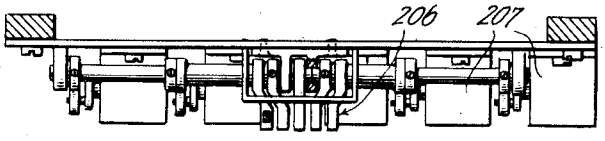


Fig. 20



Inventor:
G. A. Julius
By Marbury Clark
Atty's

March 11, 1924. 1,486,438

G. A. JULIUS

VARIABLE VALUE FARE CHECK PRINTING AND COMPUTING MACHINE

Filed Sept. 12, 1922 10 Sheets-Sheet 10

Fig. 21

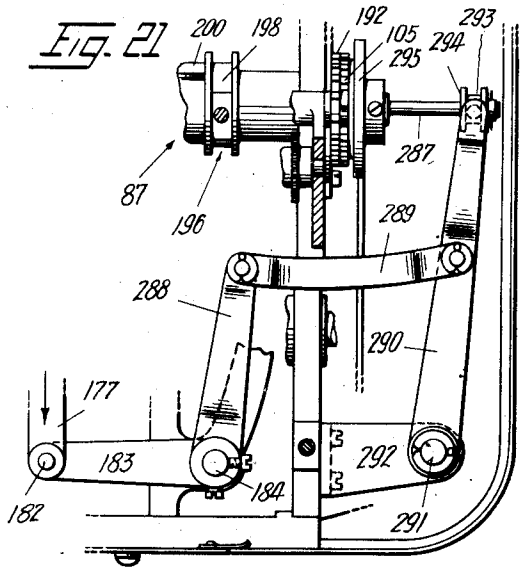


Fig. 26



Fig. 22

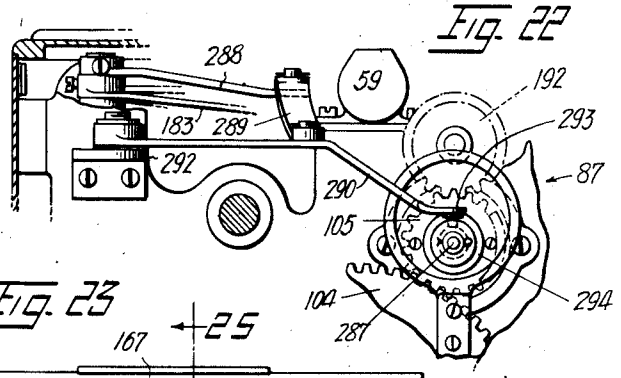


Fig. 23

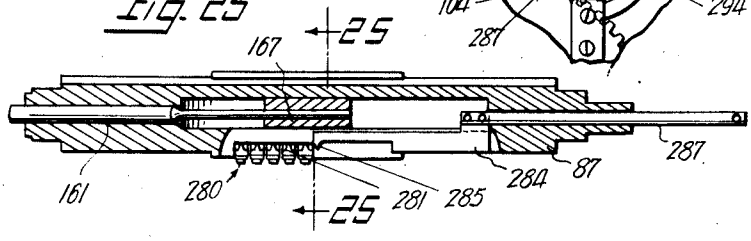


Fig. 24

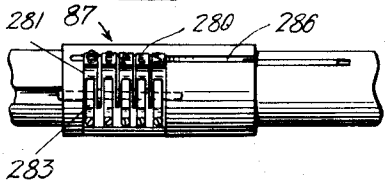
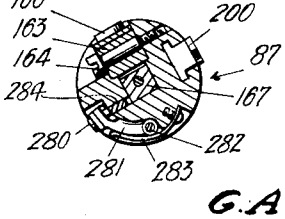


Fig. 25



Inventor:
G. A. Julius
By Parker Clerk

Patented Mar. 11, 1924. 1,486,438

UNITED STATES PATENT OFFICE.

GEORGE ALFRED JULIUS, OF SYDNEY, NEW SOUTH WALES, AUSTRALIA.

VARIABLE-VALUE FARE-CHECK PRINTING AND COMPUTING MACHINE.

Application filed September 12, 1922. Serial No. 587,779.

To all whom it may concern:

Be it known that I, GEORGE ALFRED JULIUS, a subject of the King of Great Britain and Ireland, residing at Culwulla Chambers, Castlereagh Street, Sydney, New South Wales, Australia, have invented certain new and useful Improvements in Variable-Value Fare-Check Printing and Computing Machines, of which the following is a specification.

This machine has been designed primarily for printing, registering, and issuing fare checks on street cars of the "pay-as-you-enter" or "one-man" type, which are operated on a variable fare rate with or without "transfers" (checks authorizing successive riding in cars on different routes); but it is usable for producing receipt tickets or checks for fare and admission payments generally. It is of portable dimensions and is manually controlled to determine the required markings on checks and to effect corresponding registration of numbers and value of checks printed and it may be actuated either by electro-mechanical means or manually.

As constructed for its primary use on street car service on a variable fare rate system, it provides for the following named conditions:—It produces checks by printing same from blank ribbon stock showing on such checks the sections of a car route in respect of which each check is required, the amount of fare paid for same by the passenger, a serial number and a date, an indicator to show whether the journey is "inward" or "outward" and optionally an indicator to identify the conductor; it registers the aggregate number of separate checks issued and the aggregate cash value of those checks, and also registers the number of checks of each separate value. In addition it displays on a dial for observation by the conductor and the passenger the section of the route for which a check is about to be printed and the value of each such check.

The attention to the machine operation demanded of the car conductor is so minimized that his primary duty of driving the car is not inconveniently disturbed. The car is ordinarily at a standstill whilst the conductor is issuing checks on the "pay-as-you-enter" system. When installed on electrically driven cars the machine may be fitted with an electro-mechanical lock which is liberated only when the hand lever of the car motor controller is on the open circuit notch, so that operation of the check printing machine is prevented whilst the car is being driven, and is possible only whilst the car is at rest. Or the machine may be made dependent for its operation on the closing of a local driving motor circuit through a contact on the "off" position of the controller, the motor being wired in series with a lamp or other resistance and therefore capable of being made of miniature size and small weight, though taking current from the trolley line at the usual relatively high voltage.

In the proposed method of use, passengers pay fares on entering the car, the machine being placed so that it delivers out the checks to be taken by the passenger as he passes in. Casual check inspectors may supervise checks held by passengers to prevent fraudulent overriding.

At the beginning of each "in" and "out" journey respectively the conductor sets the controls to change over the marking from "In" to "Out" and vice versa, and at the beginning of each section in each journey sets a control plunger arm which is interlocked with and governs the subsequent operation of a second plunger arm which is manipulated in the operation of the machine for the printing of checks. This setting of the section control plunger arm operates to prevent the check operating plunger arm from being so operated as to cause the printing of checks covering passed sections, and risk of mistake which would otherwise result in the issue of such checks is thus eliminated. When the fare system is figured on a sliding scale basis, as for instance when a payment of say 2d. is called for the first section of the journey and a lesser payment say 1d. for each subsequent section in the same journey, irrespectively of whether such journey begins at the terminus of the route or at any place between its termini, the value computing and printing elements operate to take proper account of the variable amounts received from passengers, and are readily changeable to modify the operation of the machine appropriately to any other fare schedule.

The act of setting the machine for the printing of checks for any certain section or sections, simultaneously effects resetting

of computing mechanism through which the money value of each check issued is caused to be indicated on the dial and added to the registration or the aggregate check value counter.

The whole of the mechanism is encased and secured by a superintendent's lock, provision being made for access to the paper strip spool by the conductor to enable him to refill it when necessary. The registering counters cannot be set back without workshop manipulation, though all the mechanism is offered to access for inspection or regulation.

In use, the preferable arrangement is that each car conductor would have a machine allotted to him and he would bring this machine to the forward or driving platform of his car at each change over at termini, fixing it there on a bracket conveniently located to offer the machine accessibly for his control and conveniently for the delivery of checks direct from the machine to entering passengers.

The machine completely prints checks as called for, and cuts them off from a blank paper ribbon drawn off a spool. The guillotine does not completely sever the checks—it leaves them attached by a short selvedge so that the passenger receiving them must pull them from the machine. Risk of losing issued checks before delivery by blowing away in windy weather is therefore eliminated.

A withdrawable control crank which is turned by the driver's hand, serves also as a locking key for the paper spool door to enable the driver to open said door by operating a special lock thereon; this key is excentrically mouthed to prevent illicit use of an ordinary fork key in place of it.

The operation of the driving crank by which the machine is actuated is either left hand or right hand indifferently, to suit the convenience of particular drivers. The element which is rotated by the hand crank may be rotated uninterruptedly by a motor—or alternatively a pedal may be provided for applying reciprocating motion to a pitman which forms the mechanical link between the hand or motor rotated element and the printing elements of the machine.

The complete machine is illustrated in the several attached figures of drawings, in which:—

Fig. 1 is a top plan of the machine;

Fig. 2 is a top plan of the mechanism within the case; certain parts being shown in section and certain parts omitted;

Fig. 3 is a rear sectional elevation view generally on line 3—3 Fig. 2;

Fig. 4 is a transverse sectional elevation generally on line 4—4 Fig. 2;

Fig. 5 is a transverse sectional elevation generally on line 5—5 Fig. 2;

Fig. 6 is a transverse sectional elevation generally on line 6—6 Fig. 2;

Fig. 7 is a sectional elevational view of one of the check printing barrels containing a tilting type block by which the checks are marked for "in" and "out" journeys respectively. This figure should be read with Figs. 21–25, which show other elements in the same assembly;

Fig. 8 is a perspective view of one of the cancelling type blocks by means of which the uncalled-for travel sections are cancelled on the checks;

Fig. 9 is an elevational view of the conductor's case door lock, viewed from within the case, as it appears when in open position;

Fig. 10 is an enlarged view of a fare check as printed in the machine when the cash value marking element (Fig. 21) is omitted from the mechanism and the controls are set by the car conductor to indicate "out" journey on "C" section only, the check showing "out", the date of issue, the route, the railroad company's name, a serial number, and the driver's number;

Fig. 10[a] is a detailed view of a fragment of the ticket strip showing the cut made therein by the guillotine knife;

Fig. 11 is a perspective view of portion of the mechanism;

Fig. 12 is a fragmentary view of a pawl and dog detent clutch by which the primary drive is communicated to the main shaft of the machine when the controls have been operated to set it for the printing of a check;

Fig. 13 is a fragmentary view of portion of variable gearing, through which a counter registers the aggregate value of all checks issued;

Fig. 14 is a top plan showing the control plunger arm set for the beginning of the "C" or third section of an "out" journey and for the issue of a check to cover "out" journey sections C, D, and E;

Fig. 15 is a partial view of a check as produced when the machine is set as shown in Fig. 14;

Fig. 16 is a top plan showing the control plunger arm set for the beginning of an "in" journey and the issue of a check to cover sections E, D, and C, on the "in" journey;

Fig. 17 is a partial view of a check for the E, D, and C, sections of the "in" journey as produced when the machine is set as shown in Fig. 16;

Fig. 18 is a fragmentary view illustrative of selector actuating mechanism for the counters which register the printing of checks according to values (thus: at 5d. 4d. 3d. 2d. and 1d. respectively); this view shows mechanism which in certain features is alternative to corresponding mechanism shown in Figs. 3 and 4;

Fig. 19 is a fragmentary transverse section on the line 19—19 Fig. 18;

Fig. 20 is a top plan of the counters and selector keys which are shown in Fig. 18;

Fig. 21 is a fragmentary plan view showing the mechanism for changing the value marking type in one of the printing barrels (Fig. 7) in accord with the controls by which the conductor sets the machine for the printing of a check;

Fig. 22 is a fragmentary end elevational view corresponding with Fig. 21;

Fig. 23 is a longitudinal section through the printing barrel which carries the value marking type;

Fig. 24 is a side elevational view showing the detail of mounting of the value marking type in the printing barrel;

Fig. 25 is a cross section through the printing barrel, Fig. 23 on the line 25—25; and

Fig. 26 is a picture of a check carrying all the markings which are applicable to a check in the machine.

The features shown in Figs. 21 to 26 are omitted from earlier figures of the drawing to minimize confusion and facilitate explanation, and it is to be understood that those features are part of the structure of the complete machine.

The mechanism, except the members which are accessible for its manual control and operation is contained within a case which is locked and can only be opened with a key held by an inspecting officer. An operating crank handle 21 is insertible into a tubular journal 22 in one side of the case to engage a key 23, for the transmission of the rotational movement applied by the crank, to machine elements within the case. The tubular journal 22 carries the crank spindle 25 and is rotatable in the bearing 24; this key 23 engages the crank spindle 25 to the tubular journal 22; said journal is integral with a disc 26 having a bay 27 in one portion of its circumference. 28 is a spring loaded arm carrying a locator roller 29 which runs on the periphery of the disc 26, and drops into the bay 27 when the crank handle is at idle position, thereby to locate the parts in the idle position and to hold them against accidental movement. A spring 30 operates to hold the roller 29 in the locating bay 27. The pin 23 is excentric in the bore of the tubular journal 22, and the crank spindle 25 is mouthed excentrically to engage it. The lock in the conductor's door in the enclosing case is made with an excentric engagement piece of corresponding dimensions in order that the hand crank may be used by the conductor as a key to open said door when it is desired to obtain access to it for the purpose of recharging the paper strip spool.

A crank pin 31 is offset from the disc 26 and carries a pitman 32 by which reciprocating motion is transmitted from the disc 26 to the rotary printing mechanism through the medium of a pawl and detent clutch which is shown in Fig. 12.

The case is of sheet metal, the back panel of it 33 being fixed to the frame 34; the side panels 35 and 36 with their inwardly returned portions 37 and 38 which form the front of the case are hinged to the fixed back plate 33 at 39 and 40. The meeting edges of the conductor's door in the front of the case are secured by a slide 41 having an eye 42 engageable with a claw 43, 44 being a guide strap (see Fig 9). The slide 41 is mounted at the rear part of it on an excentric disc 45 having an excentrically disposed bar key 46; this key is engageable by the crank spindle 25 for the purpose of rotating the excentric 45 and so retiring or tightening up the slide 41 to close and hold the edge of the door.

The top 50 of the casing is a casting fixed to the frame 34, and carries upon it two plunger arms 51 and 52 respectively arranged to be traversed over a range of dialling holes 55 in segmental dial plates 54, 53. It is pierced to exhibit two indicators 56, 57, one showing the number of sections called for when the machine is set for the printing of a check, and the other exhibiting the fare value of the check about to be printed. It is also pierced to exhibit the registration effected on counters located below it; one 58 shows the aggregate number of checks issued, and the other 59 shows the aggregate value in pence or other units of the checks issued. The plunger arms 51, 52, are mounted between bracket cheeks 60. An access plate 61 hinged at 62 is provided to enable access to an inking roller 94 for the purpose of removing and replacing it; the location of this roller is such that it could not be conveniently removed except upwardly through the top plate 50. The access plate 61 is held closed by a "hit-and-miss" catch 63 which engages a hook 47 and is operated by a push rod 64 to which access can be obtained only when the main case is open.

The bottom 65 of the case is a casting to which the frame is secured by holding-down screws 66. The bottom 65 is formed with dovetail slot bar feet 67 which are adapted to slide over fixed dovetail brackets 68; these brackets are permanent fixtures on the car. A peg bolt 69, or other latch, is provided to hold the machine on the brackets 68 when it has been set thereon, so as to prevent accidental displacement.

The checks are printed on a strip of paper 70 drawn from a spool reel 71; said reel in use is carried on an axle 72 which is offset from an arm 73 pivotally mounted on the frame at 74, a coiled spring 75 being ar-

ranged to lift an idler arm 76 which carries an idle roller 77 bearing on the face of the paper reeled on the spool 71 so as to prevent slackening and to operate as a brake to maintain the paper strip 70 under tension. The spindle 72 is extended at 265 on the far side of the arm 73 to hold a refill reel of paper 266 which when required is changed over onto the spindle 72. The top end of the arm 73 is fitted with a latch 78 which is engageable with any fixed member or with the shaft 80 in such a manner as not to affect the free rotation of said shaft. The latch 78 is held up by a spring 79 and it is released by applying pressure on the claw 81 which is accessible when the front of the case is open, so that the arm 73 may then be thrown forward, an empty spool 71 taken out and a full spool set in place of it. The paper strip runs over an idle roller 82, thence under a spring loaded shoe 83 which bears upon it so as to hold it gripped on the roller 82 and functions as a brake to prevent the paper springing back during certain periods of the printing movement when it is not under tension at a point forward of the shoe 83. Thence the paper goes under a printing barrel 84, supported below on a platen roller 85, thence through a guide throat 86, and thence under a printing barrel 87, here again supported on a platen roller 88 below it; thence it passes through a guide throat 89, at the face of which it encounters a guillotine knife 90 by which a printed check length is severed, except for a short selvedge portion, the printed length projecting into the delivery muzzle 91 which is located to face the incoming passenger. The printed guillotined check is held by the remaining selvedge and with its leading end protruding a little from the mouth of the muzzle 91 so that it may be grasped by the passenger and pulled off, the selvedge operating to hold it in the muzzle 91 so that it cannot be blown away before delivery. Rearward of the printing barrel 84 is an inking roller 92 which is detachably mounted in swinging arms 93 fixed on a rock spindle 267 Fig. 2, having a setting lever 267× on the end of it, a coiled wire spring 268 being provided to hold the roller up to the barrel face with sufficient pressure to ensure satisfactory inking. Above the printing barrel 87 is an inking roller 94 which is detachably mounted in pin centres 98 between swinging arms 95. The arms 95 are armed with tail pieces 96 which coact with screw stops 97 to limit the downward movement of the roller 94 so that it may be set to contact with the printing face of the barrel 87 but to run clear of the portions of that barrel on which printing faces are not carried. One of the arms 95 is carried on a telescopic portion 100× of the spindle 100, and is held non-rotatably on the spindle 100 by a feather pin 269. A spring 99 is arranged to keep the telescopic element 100× forced home in the tubular element 100 so as to keep the pin centres 98 in the bearing holes in the ends of the roller 94. This telescopic spindle 100× is extended laterally and fitted with a thumb cap 101 which is accessible when the case is opened. To enable removal and replacement of the roller 94 the telescoping spindle 100× is drawn out endwise by means of the cap 101 whereby the movable carrier arm 95 is retired. The arms 95 are respectively fixed one on the tubular spindle 100 and the other on the telescopic spindle 100×; the roller may be lifted and offered conveniently for removal through the access flap 61, by sligthly rotating the thumb cap 101 before moving it endwise to free the pin centres. The inking rollers 92 and 94 are faced with felt. Ink feeders are not provided, as it has been found more effective to remove the felt rollers at intervals and recharge them with ink, as they carry a sufficient supply of ink for satisfactory printing of checks over one or more days. The printing barrel 84 is a barrel of the type used in known cash registers, and it contains no intrinsic structural novelty. In it is mounted a consecutive numbering device consisting of an assembly of decimal progression wheels 102 which serve the purpose of marking each check with a serial number. It also carries a type plate 103 for printing on the check certain matter common to all checks, as for instance certain of the matter shown on the check Fig. 10, such as the words "Redhill-Ascot," indicating the car route, and other words "Issued subject to the company's regulations," "Suburb electric tramways," and in addition, if so desired, a number (such as "84", Fig. 10) to indicate the conductor. The type for the conductor's number is insertible and withdrawable from the block 103. It also prints the indicators for the sections, for instance A, B, C, D, and E, or 1, 2, 3, 4, and 5. When the check is passing under the roller 87, an obliterating mark is printed over all the symbols except that one or more of them which indicates the sections in respect of which the check is issued. The check shown in Fig. 10, by way of example, is cancelled for all sections except section C. This barrel is also fitted up for printing the date of issue (shown in Fig. 10 as September, 1921); the dating type is changeable by means of the three sleeve nuts 260, 261, 262 so that adjustment for alteration of date may be made daily with facility without removing the barrel. The barrel is withdrawable endwise bodily from the assembly by opening the catch plate closure 263 which secures it in bearing holes in the frame.

The driving assembly is engaged to the printing barrel 84 by a dowel 256 on the side of the cam 237; this dowel sets into a

hole in the end of the barrel and the engagement is therefore effected in correct angular relation when the barrel is being set into its bearings in the frame.

The progression movement for changing the figures on the barrel 84 for consecutively numbering the checks is operated by a slide plate 257 Fig. 6 having a laterally offset plunger 258 running in an excentric groove 259 whereby in each rotation of the barrel, a reciprocation is applied to the figure changing mechanism (see Fig. 6).

The platen rollers 85 and 88 are mounted on excentric bearings 260 and 261 to facilitate adjustment in relation to the printing barrel 84 and 87 respectively.

No novelty is claimed as to the withdrawable feature of the barrel mounting.

In passing under the barrel 87 the partially printed check is marked "Out" or "In" according to the direction of the journey and it is also marked with the check value by the devices described hereinafter with reference to Figs. 21 to 25, the complete check so printed being pictured in Fig. 26. The mechanisms by which the cancelling device is set and by which the indicators "in" and "out" are interchanged, will be described subsequently, as they involve mechanical actions associated with the operation of other parts. The printing barrel 84 operates not only to print the check matter on the paper strip but to feed the strip whilst printing it, and it must be noted that the printing faces of the barrels 84 and 87 occupy certain areas on them respectively and are placed in a certain relation in order to ensure printing without crowding the paper, blurring it, or overlapping the type impressions.

Both printing barrels 84 and 87 are driven from a sixty-four toothed wheel 104 Fig. 4; this wheel is keyed on the shaft 80 to which also is keyed the dog detent 137 hereinafter described. The wheel 104 meshes with a sixteen tooth pinion 105 (1:4 ratio) associated with the barrel 87 and with a twenty-six tooth pinion 106 associated with the drive mechanism of the barrel 84. The barrel 87 is directly geared to the wheel 104 by a sixteen tooth pinion 105, but the drive gearing to the barrel 84 is indirect. The printing face on the barrel 84 covers sixteen-twenty-sixths of its periphery, and the barrel 84 performs a rotation in two partial movements, firstly, a sixteen-twenty-sixths movement in which its printing area is in contact with the check strip simultaneously with the rotation of the barrel 87, and secondly a ten-twenty-sixths movement in which a blank clearance space on the barrel is traversed over the paper strip but not contacting with it. The check about to be issued is completed by the printing applied to it by the barrel 87, but the printing applied by the barrel 84 is applied to the next following check length on the strip which when subsequently printed under the barrel 87 before guillotining is completed for issue in the next operation of the machine.

The 90° rotation of the sixty-four tooth wheel 104 does not therefore completely rotate the pinion 106; the direct drive so applied to it carries it through sixteen-twenty-sixths of a complete rotation, and during this partial rotation the printing operation takes place. The remainder of the movement, ten-twenty-sixths of the rotation, is performed subsequently to the printing operation, and is utilized for actuating the guillotine. During the first portion of the movement (sixteen twenty-sixths of a rotation), both printing barrels 84 and 87 move with equal peripheral velocity in printing contact with the paper strip, and at the finish of the printing, the type faces are brought out of contact from the face of the paper. The pinion 106 is freely rotatable on the spindle 243 and the disc 221 Figs. 2, 3 and 4 is fixed to the spindle 243; this disc carries two pawls 244 on the rear side of it, and these pawls engage a detent wheel 245 which is attached to the side of the pinion 106, the pawls being held engaged by wire springs 246. The disc 238, Figs. 2 and 5 on one side of which the cam 237 is fixed, is pinned to the spindle 243, and this disc 238 has three detent teeth 242 cut in it; these teeth are engageable by a click pawl 247 which is pivoted in the rock arm 248 which may be freely oscillated on the shaft 243. 249 is the pawl spring. The end of the arm 248 opposite to that on which the pawl 247 is mounted, is articulated by a pin 250 to a toggle arm 251. The lower end of this toggle arm is pivotally connected at 252 to one side of the cheek plate 239 which carries the pawl 133 on a pin 134 in the top end of the pitman 32. When the sixteen twenty-sixths rotative movement is applied to the pinion 106, that movement is communicated through the pawls 244 and detent wheel 245 to the spindle 243, and consequently the disc 238, which is pinned to the spindle 243, is partially rotated so that the three detent teeth 242 are brought round to the other side of the spindle 243. Meantime, however, the pawl 247 has also been swung round to that position, because in the upward movement of the pitman 32 the toggle arm 251 was pushed upward, thereby swinging the arm 248, which carries the pawl 247, around the shaft 243. In the return movement of the pitman, the oscillating arm 248 is reversely moved, but as it has picked up the disc 238 by means of the pawl 247, engaging one of the detent teeth 242 and as the disc 238 is pinned to the shaft 243, a further rotative movement (ten twenty-sixths) to complete

the 360° rotation is applied to the shaft 243 and to the printing barrel 84 thereon. In that movement, the cam 237, acting upon the striker roller 236, applies an upward movement to the arm 232, thereby operating the guillotine.

Three detents 242 are provided in order to minimize risk of the pawl 247 missing engagement. It is destined to engage the first of the three detents, but if it should skip the first detent, or the first and second detents, it will pick up the third detent. A locaton roller 220 functions to ensure the bringing of the complete assembly associated with the drive of the roller 84 to zero irrespectively of the skipping of one or two of the detents 242 by the pawl 247.

218 is an arm pivotally centered at 219 on the frame and carrying a locating roller 220 in the top end of it; this roller 220 runs on the periphery of the disc 221 and takes into a bay 222 in the zero position of that disc. A spring 223 holds the arm 218 towards the disc 221, thereby to apply pressure on the locating roller 220. The object of this arrangement is to ensure the centering of the printing roller 84 at zero position at the completion of each complete rotation.

The guillotine 90 has its edge angularly disposed to coact with the fixed scissor edge blade 228 which is fixed at the mouth of the ticket chute 89 just rearward of the delivery muzzle 91. It is T-shaped, the cutting edge being the top edge of the arms. It is carried by a pivot 253 on the vertically movable arm 227 which is centered at 229 on the frame. The arm 227 is a lath of spring steel, and is set bent so that it will bear laterally against the guillotine 90 thus to force it to slide closely to the blade 228 to ensure clean cutting. The stem piece 254 is located between a pair of adjustable collars 255 which form slide guides for it. These collars provide a means for angularly setting the cutter edge of the guillotine so that the last part of the cut made by it will be more or less incomplete, to leave a selvedge for holding the guillotined checks to the paper strip from which they have been produced, so that the check does not become fully detached from the strip until pulled by the passenger, when the remaining selvedge will be broken away. The outer end of the arm 227 is loaded with a helical spring 230, the lower end of this spring being hooked to the frame, and the spring set in tension. A finger 231 on the end of an arm 232, which is fixed to the rocking shaft 233, projects through a hole 234 in the end of the guillotine arm 227. A striker arm 235, also keyed to the rock shaft 233, carries a striker roller 236 on the end of it; this striker roller is in the path of movement of the cam 237 on the disc 238, through which disc the final sector of rotational movement is applied to the barrel 84. The cam 237 is so located that it engages the striker roller 236 only during this last sector of the rotational movement of the disc 238. When it contacts with the roller 236 it forces the arm 235 down, rocking the shaft 233, and tipping up the arm 232, and consequently rapidly moving the guillotine blade 90 upward to partially sever the check 270 which has just been printed and is located in the delivery muzzle 91 with the end of it protruding sufficiently to enable the passenger to take hold of it.

The vertical reciprocating movement applied to the pitman 32 in each rotation of the tubular journal 22, which is effected by the crank or by other turning means applied to said journal, is not operative for bringing any of the printing or registering mechanism into operation until the machine has been set for the issue of a required check by manipulation of the plunger arms 51 and 52 on the top of the case, and the machine may be set at neutral so that it is in operation even when the plunger arms 51, 52, have been manipulated and the crank 21 turned. The neutralizing of the mechanism is effected by bringing the "anchor" 107 to mid position as shown in Fig. 3. This adjustment is effected by moving a slide button 262 across a slot in the case back 33, the stem 263 of this button is set in a hole in the arm of the anchor. In Fig. 14, the button is shown set over to move the anchor to set the machine for printing of checks for "out" journey and in Fig. 16 for printing of checks for "in" journey. The arm 108 of the anchor 107 has three notches 109, 110, and 111 cut in its bottom edge; these notches are engageable by a key 112 on the spring mounted arm 113. A roller 114 Fig. 3 on the upwardly offset end of the lock arm 113 runs in a double curved slot formed to accommodate it in a rocking plate 115 which is mounted on the barrel 116 of a key lock. The three bays 117, 118, and 119 in the rocker plate slot are radially disposed around the centre of the lock barrel 116 and when the lock has been operated and brought to either extreme or the middle position, the lock arm 113 is permitted to rise, so that the tooth 112 upon it is engaged with one or other of the notches 109, 110, 111 according to the setting of the anchor effected by moving the button 262. The middle notch is the neutral notch. As the barrel 116 is turned, the key 112 is cleared from the anchor arm 108, so that the anchor may be oscillated on its centre rocker stud 120. In the central position of the anchor, a projecting stop 121 sets above the striker piece 122 which projects rearwardly from the hanger link 123 by which the oscillating beam 124 is hung on an arm 125 which is keyed to the shaft 126. When the stop 121 is in register above the striker 122,

oscillation of the shaft 126 is prevented as the link 123 cannot rise. Another arm 127 keyed on the shaft 126 carries an adjustable screw head 128 in register with the heel 129 of a bell crank lever 130, which is freely rotatable on the shaft 126. Upon the outer end of the bell crank 130 is a striker roller 131; this roller is in the path of movement of the tail 132 of a pawl 133 which is pivotally mounted at 134 in the top end of the pitman 32; its movement is controlled by a freely swinging arm 135 which is freely rotatable on the shaft 80. So long as the bell crank 130 remains in the normal position, that is with the outer end of it carrying the striker roller 131 in the upper position, it bears up the tail 132 of the pawl 133, compressing the light spring 136, which acts oppositely on the tail 132, and by this upward pressure tilts the pawl 133 into the outer or "miss" position shown in Fig. 5, so that the vertical movements of the pitman 32 function only to swing the pawl about the centre 80 without engaging the dog detent 137 or imparting motion to it. When, however, the bell crank 130 is tipped downward, the spring 136 acts to throw the pawl 133 into engagement with one of the four teeth on the dog detent 137, and the next vertical movement of the pitman 32 whilst this condition remains, results in the engagement of the pawl 133 with the detent 137, with the consequent rotation of the detent through an angle of 90°. This movement of the pawl is indicated in Fig 12. So long therefore as the stop 121 holds down the arm 125, the bell crank 130 cannot be moved from the upper position shown in Fig. 5. When, however, the anchor is tipped to right or left about its centre 120, the stop 121 is cleared from the striker 122 and movement of the bell crank 130 may then be effected. The bell crank 130 is normally held up by the tension spring 139. It is tipped downward when the screw toe piece 128 on the arm 127 strikes against the pallet of its heel 129. The machine is consequently operative, subject to the action of its controls only when the anchor 107 is set in either of its lateral positions. When the anchor is tipped in one direction, the machine is adjusted for the issue of checks for an "in" journey; when it is tipped in the opposite direction it is operated for the issue of checks for an "out" journey. It is consequently the duty of the conductor at terminal stations on a route to readjust the anchor by operating the lock 116 and setting the anchor for "in" or "out" journey as the case may be. This resetting from "in" to "out," and vice versa does not effect the registrations of the check numbers or values though it does alter the check marking "In" or "Out" as the case may be.

The oscillating beam 124, which is pivotally suspended midway of its length in the link 123, is pin connected (140, 141) with plunger rods 142, and 143, which, at their top ends, are fitted with knuckles 144 to which respectively the rear ends of the plunger arms 51 and 52 are pivotally attached. Midway of their length, these plunger arms are mounted on pivots 145 in the carrier jaws 60 and at their outer ends are fitted with hand pieces 146, and dialling pegs 147; these pegs register with the dialling holes 55 in the dialling sectors 53, 54 respectively. When the plunger rod 142, or 143 as the case may be, is in the down position, the plunger arm, to which it is attached, is tipped upward at its handle end, and may then be swung over its dialling sector and plunger on any of the dial holes 55 therein when in register above same. If, however, a plunger is forced up its plunger arm is forced downward, so that the peg 147 thereon is held in any one of the dial holes 55 in which it may have been located; the plunger arms are not, however, held rigidly in either position whilst the machine is not actually operating; they are moved through buffer springs 148, 149 sleeved upon them respectively above and below the floating collars 150, 151. These collars are mounted on trunnion pins 152 set in the ends of the "stock" 153 of the anchor 107. When the anchor is tipped to one side or other, one of the plungers is forced under spring pressure to the upper position and the other one is forced oppositely to the lower position by spring pressure. When the machine is set for operation, therefore, one of the plunger arms 51, 52, will be normally up and the other one normally down, depending upon whether the setting is for the "in" or the "out" journey. The anchor is provided with a double stock 154, having an upwardly projecting arm 155, which is pivotally connected by a link 156 to a lever 157, which is fulcrumed on a pin 158, and through a striking fork 159 working within collars 160 on a horizontal rod 161 applies endwise movement to said rod. This rod passes axially through the printing barrel 87 (see Fig. 7). In a longitudinal cavity 162 in one side of this barrel 87 a bent rocking plate 163 is mounted on a pivot 164. On one of its angular faces it carries the type plate 165 for the word "In", and on the other angular face of it it carries the type plate 166 for the word "Out". The end of the rod 161 is attached to a slider 167 which works below the rock plate 163. When the rod 161 is moved outwardly, the slider 167 is brought below that side of the rocker plate 163 which carries the "In" type plate 165, so that the plate 165 is brought up type high whilst the other side of the rocker is depressed and the "Out" plate 166 is then down below type level; and vice versa when the rod 161 is pushed inward, the "Out" type

face 166 is brought up, and the "In" face 165 is retired. The rod 87 thus sets the barrel for printing the word "In" or the word "Out" on checks, as the case may be, according as the anchor 107 has been swung to "in" or "out" position respectively.

The carrier jaws 60 which house the plunger arms 51, 52, laterally, are integral with tubular sleeves 168, 169 which are rotatable in bearings in the frame. The plunger rods 142 and 143 pass up through the hollow centres of these sleeves. Below the casing top, the tubular sleeves 168, 169 respectively carry arms 171, 172; both these arms are positioned at right angles to the respective plunger arms 51, 52, and are directed towards each other. They are connected respectively by pivotal links 173, 174 to an oscillating bar 175 which is pivotally centered at 176 on the end of a slide rod 177; said rod having a locating slide bearing on a rest 178. A toothed rack 179 on the rod 177 meshes with a pinion 180; the spindle of this pinion carries a horizontal disc 181, this disc having on its top face two ranges of figuring, one of which serves to indicate route sections, and the other fare values, the figures being respectively exhibited through the apertures 56, 57 (see Fig. 1) in the case top when they are in register under those apertures. It will be recalled that the mechanism shown provides for the necessities of a fare system in which the first section travelled by the passenger is charged at a double rate and the succeeding sections at a single rate irrespectively of the passengers starting point along the route. Consequently, when the figure "1" appears in the "section" aperture, the figure "2" appears in the fare aperture, and so on, but it will be understood that if a different fare system be adopted, as for instance an equal charge for each section, the location of the figures would in that case be altered so that the same figures would appear under the section aperture and under the fare aperture respectively, and so on with any other fare system for which the machine may be adapted by altering the toothing in the step wheel of the variable gearing hereinafter described. The outer end of the bar 177 is pivotally connected at 182 with a bell crank 183, which is fixed to a vertical spindle 184 rotatable in a frame bearing 185. The work arm of this bell crank 183 is fitted with a striking fork 186 which engages in a collar 187 on a change gear pinion 188, this pinion being slidable along a feather in the spindle 189; this change gear pinion 188 is engageable with any one of the interrupted step gears 138 Figs. 11 and 13 carried on a sleeve 190 which is keyed to the shaft 191. For a five section differential fare machine as shown, five interrupted gears are formed on the sleeve 190 containing respectively two, three, four, five, and six teeth. The shaft 191 is driven by a pinion 192 which gears into the pinion 105 by which the printing roller 87 is driven from the main spur wheel 104. As the printing roller 87 makes one complete rotation for each check issue, and as the pinions 192, 105 are equal, the spindle 191 and consequently the interrupted gear sleeve 190, also perform one complete rotation for each check issue. If, therefore, the striking pinion 188 be set to engage with that one of the interrupted gears which contains two teeth only, the spindle 189 receives only a two-tooth movement, and so on through the intermediate positions to the final interrupted gear, which applies a six tooth movement to the spindle 189; these partial movements of the spindle 189 are transmitted through the pinion 264 to the aggregate value counter 59, where the totality of the partial movements is registered and displayed through the aperture 58 in the top 50 of the case.

The spindle 189 is located at "centre" after each operation by means of a locating roller 240 carried on a spring arm 241; this locating roller engages between two of the teeth of the wheel 193 and imposes sufficient resistance to its rotation to prevent spinning of the shaft 189 at the finish of its engagement by an interrupted pinion on the sleeve 190.

The tubular sleeves 168, 169 respectively carry in addition to the arms 171, 172, two other arms 194, 195 in alignment with the plunger arms 51, 52. At their outer ends, these arms 194, 195, carry forks 196, 197 (see Fig. 2) which engage collars 198, 199 to which are attached the cancelling type bars 200 Figs. 2 and 8; these type bars are slidable longitudinally in the printing barrel 87, the collars 198—199, being sleeved over and slidable on the ends of that barrel (see Figs. 7 and 8). When either plunger arm 51 or 52 is swung laterally to traverse it over the dialling holes the slidable cancelling type bars are moved correspondingly in the printing barrel 87; these cancelling type bars butt end to end, but the cancelling types on them are arranged to leave a minimum space between said types equal to one indicator (201) when the bar ends are butted together; when they are separated more or less, two, three, four, or five spaces are left to exhibit the corresponding number of indicators relating to the sections in respect of which the check is required. In Fig. 10 a check printed when both cancelling bars are in the butted position is shown, one section indicator "C" only being there displayed— that is the condition which obtains when the plunger arms 51, 52, are in parallelism (as for instance as shown in Fig. 1). As they

are swung apart relatively to the anchor (as for instance in Figs. 14 and 16), the cancelling bars are drawn apart to expose a corresponding length of clear space to include two or more of the required section indicators 201. One of the cancelling bars relates to the passed sections on the journey and the other to the sections ahead. The butting contact of those bars checks inward movement of the plunger arms so that said arms cannot be approached beyond parallelism towards each other; this mechanical result is an important feature as upon it depends the functioning of the means for preventing the printing of checks to cover sections of a route over which the car has already passed, simultaneously with means for cancelling any sections ahead on the journey which the passenger does not intend to travel.

The linkage constituted by the arms 171—172, and the oscillating bar 175 which is connected to those arms by the links 173, 174, results in procuring differential movement of the rack bar 177 so that that movement is always relative to the number of sections for which the check is required. So long as the two plunger arms 51, 52, are in parallelism, the oscillating bar 175 merely swings on its pivotal centre 176, and no movement is then applied to the rack bar 177. In that position the bell crank 183 holds the striking pinion 188 for engagement by the two tooth interrupted gear on the sleeve 190. Consequently, when the plunger arms 51, 52 are in parallelism, that is both set over a similarly indicated dialling hole 55 (for instance "C") in their respective dial sectors, the aggregate check value register 59 is geared up to advance two figures when the printing mechanism performs one complete movement. When, however, the plunger arms 51, 52 are set divergently, as for instance in Figs. 14 and 16, a forward movement is applied to the oscillating bar 175 and the rack bar 177 is moved forwardly; this results firstly in correspondingly rotating the pinion 180 and turning the indicator dial 181, thereby to display through the case apertures 56, 57, figures indicating respectively the number of sections in respect of which a check is about to be printed, and the fare charged for such check. It has the further result of moving the bell crank 183 to bring the striking pinion 188 into register with a corresponding interrupted gear on the sleeve 190. When, for instance, the divergence amounts to two notches, that is to say when one of the arms is in register over the "E" dialling hole and the other is in register over the "C" dialling hole, the indicator 181 will display three sections, and 4d. fare charge (see Figs. 14 and 16), and the striking pinion 188 will be slid into register with the four-tooth interrupted gear on the sleeve 190, and the register 59 will then record a payment of 4d.

This differential movement is utilized also for another purpose. The partial rotation of the spindle 184 which forms the fulcrum of the bell crank 183 is applied through an offset arm 202 Figs. 2, 18, 19 and 20 and a pivotal link 203 to a picker 204 to traverse the picker and bring its finger 205 into register with one or other of the five selector keys 206. The centre one of this assembly of five keys is direct connected to one of the counters 207; the other keys are connected respectively each to one other of said counters 207. If now the picker 204 be plunged, it will depress that one of the keys 206 with which it is for the time being in register, and will operate the associated counter 207, whilst the other counters in the assembly 207 will be unaffected; these counters are respectively allocated to indicate the number of checks issued for each respective value, one indicating 2d. checks, another 3d. checks, and so on. The picker movement corresponds with the bell crank movement, and consequently with the movement of the register 59, and also with the indication offered by means of the dial 181, so that the required counter 207 is selected by the swinging movement of the picker obediently to the partial rotation of the rock spindle 184. The operative plunging movement which is applied to the picker is effected through a lever 208 which carries the top end of the picker and is connected by a link 209 to a crank pin 210 on an excentric strap on one end of the printing barrel 87. For the excentric strap arrangement see Fig. 22. As the barrel 87 makes one complete rotation in effecting the printing of a check, one complete plunging movement is applied to the picker 204 during this printing operation, and a record of the printing of the particular check is thus obtained on the appropriate counter, which is moved ahead one figure. An alternative means for plunging the picker 204 is shown in Fig. 4, where the lever 211 (which corresponds with the lever 208, Fig. 18) is actuated against the back pull of a spring 212, which normally holds it up, by means of a cam roller 213, which runs on the periphery of a four bay cam ring 214; this ring is attached to one side of the main spur wheel 104 which is keyed to the shaft 80. In each operative movement of the machine, the wheel 104 receives a one-fourth rotation from the pitman movement, with the result that the cam roller 213 is depressed during the movement, and at the conclusion of the movement is allowed to rise again. In this case the striker roller 213 assists also as a locating mechanism to ensure that the wheel 114 is centered at its rest positions, and in cases where this particular type of picker mechanism is not

used, the arm 211 with its locating roller 213 is nevertheless retained as a locator to ensure return of the wheel 104 to zero position.

The key selector arrangement shown in Fig. 4 is not mechanically identical with the key selector arrangement shown in Figs. 18 and 19, but it is in substance the same arrangement, the selector keys forming a bank over which the picker is traversed by a movement applied through the vertical spindle 184, and a plunging movement being applied from an element which moves through a predetermined distance in each operation of the printing mechanism.

An arm 215 keyed on the spindle 126 carries a screw adjusting stop 216 in register under the pallet 217 on the end of the lever 211. As soon as the operation of the machine for the printing of a check commences, the arm 211 is held down by the contact of the roller 213 on the salient peripheral portion of the cam discs 214, and the pallet 217 is thus held down against the stop pin 216 on the arm 215. The shaft 126 is thus locked against reverse movement during the progress of the printing operation, and as when the shaft 126 is rocked to the operating position the oscillating beam 124 is positively held upward, the plungers 142 and 143 are held up and the plunger arms 51, 52, are thus positively locked and held locked by their pegs in the dial holes in which they were set by the conductor, from the time when printing starts until it has been completed. It is thus made impossible to alter the setting of the plunger arms once printing is commenced, and the operating plunger arm remains set automatically and immovable from the plunging of it until the printing and guillotining of the check is completed. Thus security against fraud is provided as a conductor cannot set the controls to start the machine and alter them during the printing operation so as thereby to effect the registration of the fare value so as to make it different from the value printed on the check.

It has been already explained that it is mechanically impossible for the plunger arms 51, 52 to be approached towards each other nearer than parallelism, though they may be swung divergently. To set the machine for a journey, assuming the journey is an "out" journey, the anchor 107 is tipped clockwise to bring the notch 111 into register with the key 112, the release and relocking movements being performed by means of the key lock 116 operating through the curved slot rocking plate 115. The result of this setting is to clear the key 112, to raise the collar 150, and to depress the collar 151. The lift applied to the collar 150 acting through the spring 148 forces up the spindle 142 and pulls the spindle 143 downward. The result of this setting is that the plunger arm 52 is pushed upwardly at its back end so that its dialling peg 147 is held down under the pressure of the spring 148 in that one of the dialling holes 55 with which for the time being it is in register. It may be moved to another one of the dialling holes in its sector, provided it be lifted up by the hand piece 146 with sufficient force to compress the spring 148, but unless so forcibly moved it will remain held by the dialling peg in the dial hole; it is the "in" plunger arm 52 which is thus latched for setting the machine for an "out" journey. The other ("out") plunger arm 51 is tipped upwards in the same action, so that its dialling peg 147 is held above the level of the dial sector over which it may be swung, and when it is brought into register with one of the dialling holes 55 in that sector (51) it may be plunged, bringing its peg 147 into the selected dialling hole, provided sufficient force is applied upon the hand piece 146 to compress the part of the spring 149 below the collar 151. Upon the arm 51 being plunged and rotation of the wheel 104 commencing, both arms 51 and 52 are thereafter held locked (not merely latched) down until the printing of a check has been completed. At the beginning of any journey the plunger arm relating to the journey just completed, whether "In" or "Out" is set by the conductor in the terminal dial hole of its sector. For the reasons already given the other plunger arm may now be swung over the full range of its dial sector. If a passenger requires a check for the first ("E") section of the "in" journey only, the plunger arm 52 is placed over the "E" section dial hole and plunged. If he requires a check to carry him over E, D, and C sections of the "in" journey it would be set over the C dialling hole and plunged, whereas if he requires a through ticket for the whole "in" journey it would be brought to the "A" dialling hole and plunged there.

As the end of the oscillating bar 124 which is carried on the pin 141 is held in low position by the down pressure of the spring 149 when the anchor is set for "out" journey and is held down resiliently consequent upon the setting of the anchor 107, as will be seen in Fig. 11, a plunging movement applied to the plunger arm 51 will result in moving the oscillating arm 124 upwardly about the pin 140 as a centre, and it is free to make this movement because the stop 121 has been already cleared. In this lifting movement it acts through the link 123 and the arm 125 to rock the shaft 126 and to cause the tappet 128 to strike the pallet on the arm 129 of the bell crank 130, and thereby move the contact roller 131 downward from under the tail 132 of the pawl

133. A movement being now applied to the mechanism to move the pitman 32 upward, the pawl 133 is swept through an angle of 90° from the full line to the dotted line position shown in Fig. 12, and the pawl being forced to engage the dog detent wheel 137 by its spring 136 consequently applies a 90° rotation to the said wheel 137 and to the shaft 80 on which it is keyed. It will be immaterial in the operation whether drive applied to the tubular journal 22 to operate the pitman be continuous or be an individual motion for each printing operation. If it be continuous as by a motor drive, the pitman 32 will be maintained in continuous reciprocation, but there will be no transmission of motion from it to the printing mechanism until the free plunger arm has been plunged, thereby to free the pawl 133 so that it will engage the dog detent wheel 137. Immediately the free plunger arm (51 or 52) is plunged, the spring 136 is freed to set the pawl, and the pawl then engages the available detent tooth, and in the upward movement rotates the detent wheel through an angle of 90°. The carrier cheeks 239 in which this pawl pivot 134 is fixed are freely rotatable about the shaft 80, and therefore oscillate with the movements of the pitman. The 90° rotational movement applied to the shaft 80 turns the wheel 104 thereon through 90°, thereby rotating the printing barrels and operating the counter, registering and indicating mechanisms which are intergeared with the printing barrels.

Operation of the machine is impossible, except, when one of the plunger arms is plunged whilst the pitman is on the beginning of the up stroke. In that case the plunger arms are locked down and a printing movement must be completed before the mechanism is freed so that it can be reset for the issue of another check. Accidental movement of one only of the controls is therefore ineffective for bringing the operative mechanism for check printing into action.

It is to be understood that the particular toothing of the wheels and pinions hereinbefore described may be altered so long as their proportionate relation is maintained. Thus the spur wheel 104 may have any desired number of teeth other than sixty-four, and its partial rotation may be any proportion of 360° other than one-fourth, or indeed, it may be arranged to make one or more rotations for each printing operation, provided always that the printing barrels and other mechanism are appropriately intergeared according to the mechanical principles which are involved in the particular arrangement illustrated.

The check value marking is effected in the secondary printing operation by the barrel 87. Said barrel is armed with five figure types 280 Figs. 23, 24 and 25 respectively mounted on or embossed on the ends of five curved fingers 281, which are mounted on pivots 282 in a recess in one side of the barrel 87. These type fingers are normally held back in the housing recess by leaf springs 283 so that the type faces are below printing level. A bar 284 having a ramp 285 on one end of it is slidably housed in a longitudinal slot 286 underlying the type fingers, and this bar 284 is attached to the end of a round rod 287 contained slidably in a hole drilled axially through one end of the barrel 87. The ramp 285 is proportioned to form a support for one type finger and to raise it to bring its type face to printing bevel when it is brought under the finger. By sliding the bar 284 endwise in its housing slot the ramp is brought under any one of the type fingers 281; sliding movement is applied to it by the rod 287 so as to raise the finger which carries the value type which corresponds with the value displayed in the indicator 57 and registered on the counter 59. This sliding movement is obtained from the vertical rock shaft 184. The arm 288 pinned to the shaft 184 is connected by a link 289 to a rock lever 290 which is fulcrumed on a pin 291 on a frame bracket 292 and is connected to the outer end of the rod 287 by a slide pin 293 working in a grooved collar 294 fixed on said rod. In the picture of a check shown in Fig. 26 the printed fare value (4d.) appears in a full line figure and the positions which would be occupied by other fare value markings are indicated in dotted figures all in alignment with the word "fare" which word may be printed on the check by either printing roller. 295 Figs. 21 and 22 is an excentric strap which takes the place of the crank pin 210 at the top end of the link 209 (see Fig. 18) for operating the classifying counter selector. The crank pin arrangement is a simple one which may be adopted when the printing of the value on the checks is not demanded and the necessity for passing the rod 287 axially through the barrel 87 consequently does not arise.

The counter 58 on which the aggregate number of checks is registered, irrespectively of the individual value of said checks, is actuated by a link 224 Fig. 3 which carries an excentric strap 225 on its lower end, said strap being fitted to the excentric journal 226 on the end of the roller 87; this counter 58 is therefore advanced one figure for each rotation of the roller 87, that is one advance for every check printed.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a fare check printing machine, the combination of mechanism for printing of checks for particular sections only of a jour-

ney, manually controlled means for setting said mechanism, actuating means operatively dependent on and interlocked with said setting means, visible indicators for showing the journey sections for which the printing elements are set and for showing the fare charge relating thereto, counters intergeared with said indicators for registering the aggregate number of checks printed and the aggregate value thereof, typographical barrel printing elements for marking on a paper strip a list of journey sections and for cancelling the unrequired sections thereon, and means for severing the prints from the paper strip.

2. In a machine according to claim 1, means associated with the printing elements therein defined for printing on the checks the cash value, serial number, and date of printing.

3. In a machine according to claim 1, means associated with the printing elements therein defined for printing on the checks an indicator showing the direction of the journey.

4. In a fare check printing machine operative for printing checks on a paper strip drawn from a reel, said checks identifying a journey section or sections, the combination of mechanism for printing checks, driving means, visible indicators, counters intergeared with said indicators for registering the aggregate numbers of checks printed and the aggregate value thereof, actuating means for applying the driving means to the printing mechanism, control means for setting the printing mechanism interlocked with said actuating means, said control means comprising essentially two locating dials, two plunger arms coacting with said two locating dials, one of said arms and dials relating to "in" journey and the other of them to "out" journey, and means for latching one of said plunger arms whilst leaving the other one of them manually operative for changing type elements in the printing mechanism, for setting the visible indicators and for intergearing the registering counters with said printing mechanism and indicators to establish registrations of the check issue and the aggregate value thereof, and for engaging the printing and registering elements to actuating means.

5. In a fare check printing machine, mechanism for printing of checks identifying a journey section or sections, driving means, manual control means for setting the printing mechanism, actuating means interlocked with said manual control means and engaging said driving means, said control means comprising essentially two locating dials, two plunger arms coacting with two locating dials, one of said plunger arms adapted to be set on its locating dial, a linkage connection between said plunger arm and the other plunger arm adapted to prevent movement of said other plunger arm over a portion of its locating dial, thereby to limit the operation of the machine to the production of checks for those sections of a journey to which the free portion of the locating dial of the movable plunger arm relates.

6. In a fare check printing machine, control means comprising two locating dials having a range of dialling holes therein, two interlocked plunger arms respectively traversible over said locating dials and adapted to be plunged on one of the dialling holes therein, each of said dialling holes respectively related to a particular section of a journey, and one of said dialling ranges being allocated to "in" journey and the other to "out" journey, in combination with printing barrels, means for changing type in said printing barrels, a visible indicator movable thereby, and counters geared with the indicators to procure respectively indication, printing, and registration of the number, value, and journey section determined by the manual adjustment of said plunger arms.

7. In a fare check printing machine adapted for producing checks for any one or more sections of a journey, control means including two plunger arms, one relating to "in" journey and the other to "out" journey, and means whereby the idle plunger arm may be set to control the range of movement of the operative arm so as to limit the setting of the machine for the printing of checks covering only the forward sections of the journey.

8. In a fare check printing machine, the combination of means for printing checks, control means therefore, actuating means independent of said control means, and intermediate locking means for rendering the actuating means inoperative or operative and for rendering the control means operative for setting the printing means for the printing of checks for "in" or "out" journey respectively.

9. In a fare check printing machine, the combination of means for printing a check with a series of indicators thereon referring to the several sections of a journey, means for controlling the printing means including two plunger arms one relating to "in" journey and the other to "out" journey, and a cancelling device consisting of a printing barrel, two types slidable longitudinally in said printing barrel, and link connections between said types and arms with the links arranged to limit the approach of said plunger arms to permit the same to be diverged.

10. In a fare check printing machine, a control device comprising two locating dials, two plunger arms respectively mov-

able over said locating dials, a compensating linkage between said arms, an element associated with said linkage and movable proportionately to the angular divergence of said arms, an indicator, a change gear device, a registering counter associated with the change gear device, and means associated with said element for moving the indicator and for setting the change gear device, thereby procuring a visible indication and a registration of the markings on a check printed in the operation of the machine after the machine has been set in operation by plunging one of said plunger arms.

11. In a fare check printing machine according to claim 7, means for printing a check with symbols thereon severally indicating the journey sections and means for cancelling the unrequired sections thereon, said means comprising a printing barrel, slidable type carried in a printing barrel and mechanical elements intermediate said type and said plunger arms for positioning the type in correspondence with the setting of the control plunger arms.

12. In a fare check printing machine, the combination of printing, registering and indicating mechanisms, manually settable control devices therefor, a main driving element, a detent thereon and actuating mechanism operatively connected to the printing and registering and indicating mechanism only when the control devices are manipulated, said actuating mechanism including a reciprocated member, a pawl carried by the reciprocated member and normally held out of engagement with the detent on the main driving element and the pawl withholding device being movable to permit engagement of the pawl with the detent when the control devices have been set for the printing of a check.

13. In combination with the elements set forth in claim 12, a pitman carrying the reciprocating member at one end thereof and a crank pin carrying the other end of the pitman, thereby enabling the actuation of the machine by left hand or right hand revolution of the crank pin indifferently.

14. In a fare check printing machine wherein fare checks are printed on a paper strip and printed checks are severed from the strip immediately after printing, means for severing said checks, so as to cut the strip for a portion only of its width, leaving a narrow tearable selvedge temporarily holding the check to the paper strip.

15. In a fare check printing machine wherein checks are printed on a continuous strip and are individually severed from said strip after printing, a guillotine comprising a knife, a blade, a set spring arm for carrying said blade and for holding the same close up to the edge of the knife, and means for angularly adjusting said blade on said arm to position it to effect severing of the check except at one selvedge.

16. In a fare check printing machine, the combination with a spur driving wheel, of two printing barrels, a spur pinion for directly gearing one of said barrels to said driving wheel, a spur pinion of larger diameter than the first mentioned pinion for indirectly gearing the other of said barrels to said driving wheel, driving means for applying a complete rotation to said direct driven barrel through said spur wheel, a reciprocating member, transmission mechanism associated with the member and including a pawl and detent wheel intermediate said larger diameter pinion and its printing barrel, said pawl operative for completing the rotation of said printing barrel after the completion of the partial rotation applied to it directly through said spur driving wheel, a check delivery vent, a guillotine, lever mechanism associated with said guillotine and a cam turned by the detent wheel and coacting with lever mechanism for causing the guillotine to sever printed checks intermediate said direct driven barrel and the check delivery vent.

17. In a fare check printing machine, separate locating dials, plunger arms movable across the dials, a differential linkage device articulated to the two plunger arms, a check valve counter, variable gearing associated with the counter, a printing barrel, type setting means in the barrel, an element to which differential movement is applied by said linkage consequent upon change in angular relation of said arms connected to said type setting means and to said variable gearing, thereby setting the type for the printing operation and effecting registration of the aggregate values printed on the checks.

18. In a fare check printing machine, printing means actuating means therefor, manually operable control means independent of but interlocked with said actuating means, and an element associated with the actuating means adapted for automatically locking the control means as soon as the operation of the actuating mechanism is begun and maintaining the lock until a complete printing operation has been effected.

19. In a fare check printing machine, the combination, an aggregate value registering counter, a printing barrel, driving mechanism therefor, movable type one for each fare value fitted in the barrel, means for raising any one of said type to printing level on said barrel, a striking gear, an interrupted differentially toothed gear meshable therein, means interlocked with said type raising means for sliding said striking gear to bring it into register with said interrupted differentially toothed gear, a

change wheel, and a driving connection between said change wheel and said aggregate value registering counter.

20. In combination with the elements set forth in claim 19, counters, a bank of selector keys associated therewith, a picker, means operated by the gear changing and type setting means for moving said picker across the bank of selector keys, and means dependent upon rotation of the printing barrel driving mechanism for applying a reciprocating movement to said picker during each rotation of the printing barrel.

21. In a fare check printing machine according to claim 1, a pivotally mounted member adapted to be set in neutral position and angularly at either side of neutral, plunger mechanism, a striker associated with the plunger mechanism, and a check on said member engageable with said striker said check and striker coacting to hold said plunger mechanism from operation whilst said member is in neutral position and when freed by angularly setting said member to permit operation of said plunger mechanism.

22. In a fare check printing machine, in combination, locating dials, plungers, control arms associated with the plungers and movable across the dial, a printing barrel, a tilting type block pivotally mounted therein and a control device for setting said machine for the printing of checks for "in" and "out" journey respectively, said device including an angularly adjustable member, a link and lever connection between the member and the tilting type-block and spring buffers connecting the members with said plungers for setting either one of said arms free for adjustment over the corresponding locating dial whilst latching the other of said plunger arms in plunged position on the other locating dial.

23. In a fare check printing machine, in combination, plungers, control plunger arms associated therewith, a rotary element, a cam disc carried by the element, an arm, a cam carried by the arm for moving the arm, a member locked by the motion of said arm, and an oscillating beam held by said member and in link-connection at its ends to said plungers and adapted to lock said arms when both are in plunged position and to hold same locked until said rotary element has completed a movement and released said cam controlled arm.

In testimony whereof I affix my signature.

GEORGE ALFRED JULIUS.