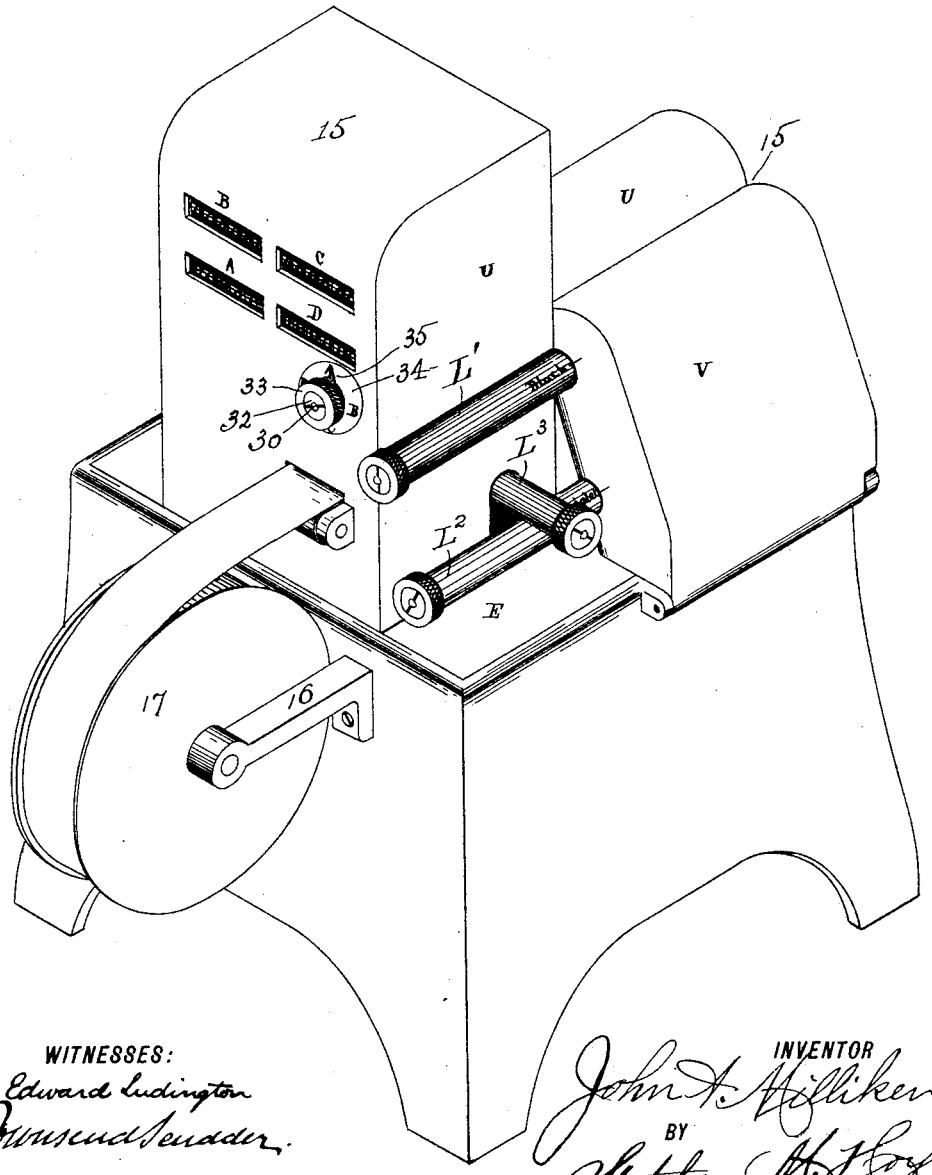
(No Model.) 7 Sheets—Sheet 1.

J. A. MILLIKEN.

TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

Fig. 1.



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(No Model.) 7 Sheets—Sheet 2.

J. A. MILLIKEN.

TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

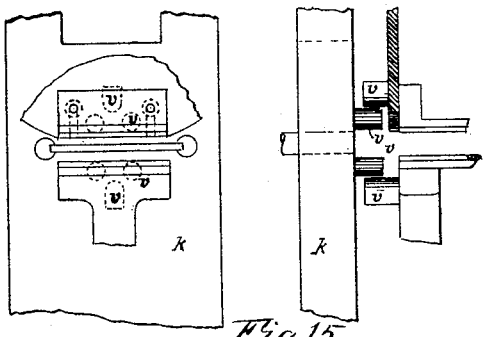
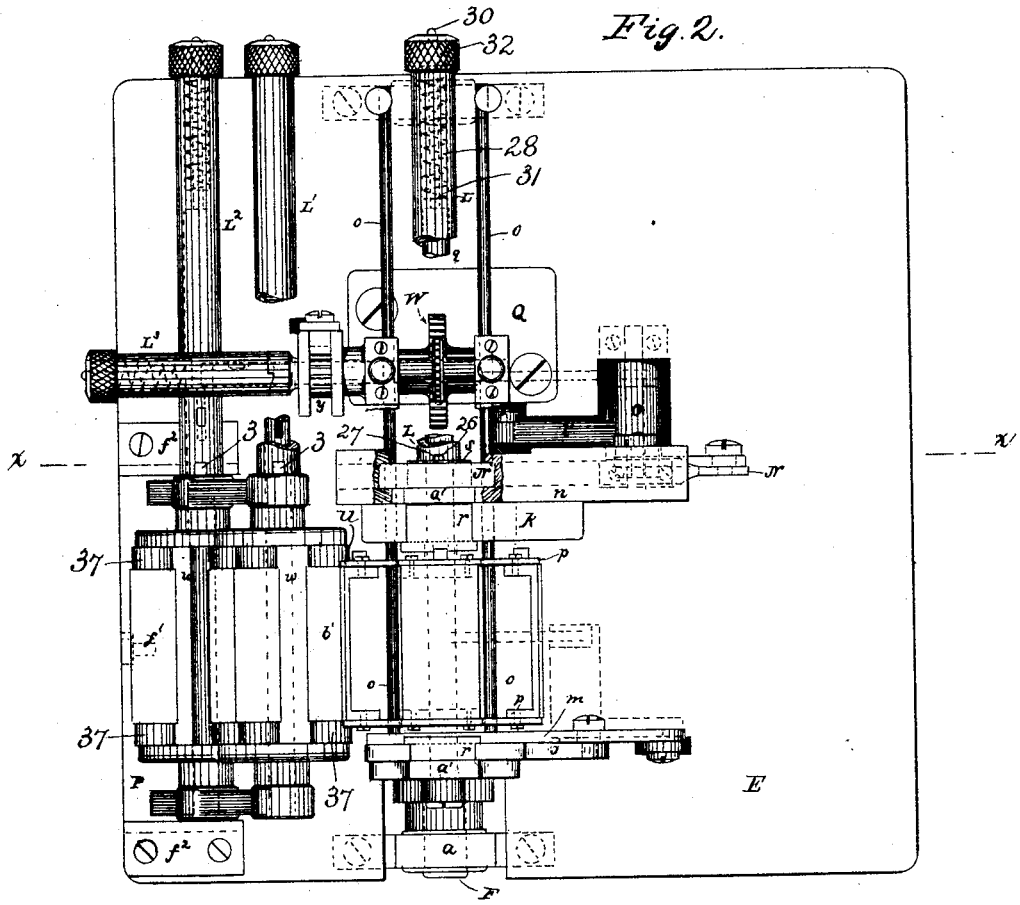


Fig. 15.

Fig. 2.



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(No Model.) 7 Sheets—Sheet 3.

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TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

Fig. 11

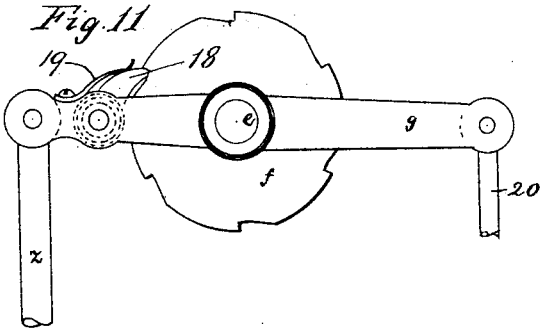

Fig. 12.

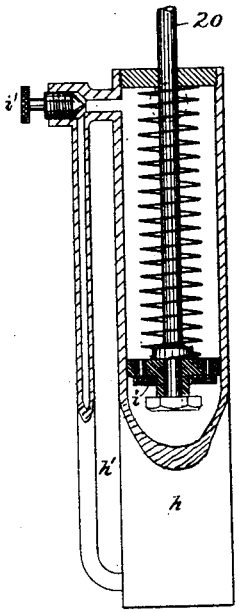

Fig. 3.

(No Model.) 7 Sheets—Sheet 4.

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TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

Fig. 13.

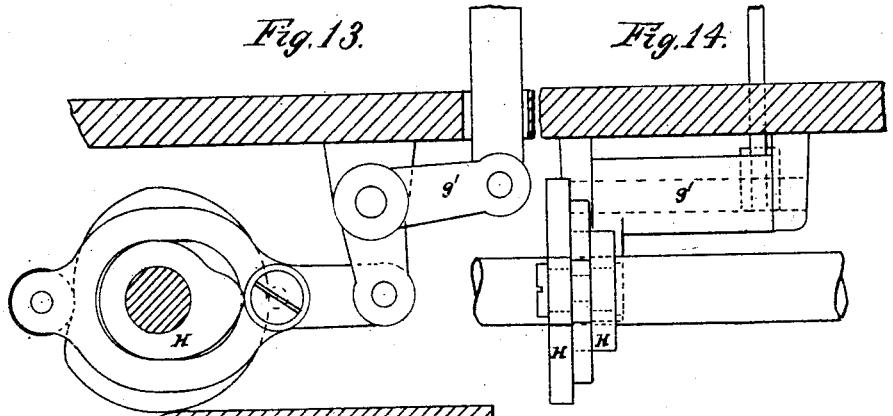
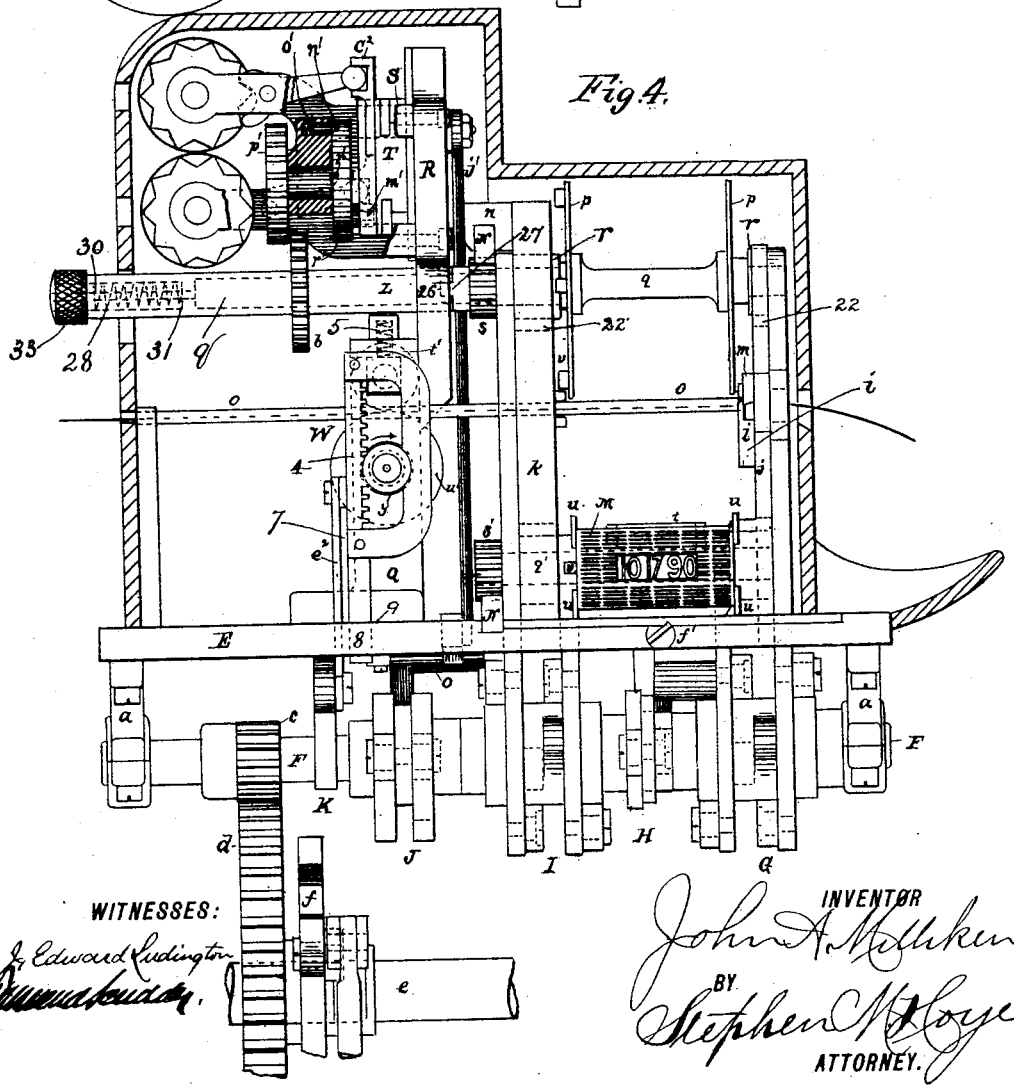


Fig. 14.

Fig. 4.



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(No Model.) 7 Sheets—Sheet 5.

J. A. MILLIKEN.

TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

Fig. 9.

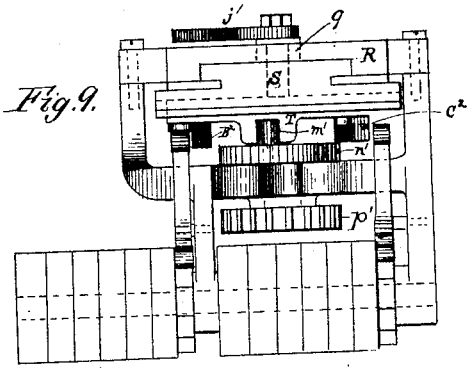

Fig. 10.

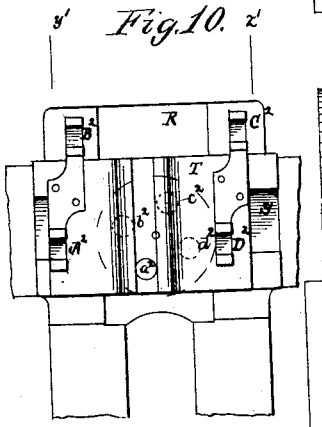

Fig. 5.

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(No Model.) 7 Sheets—Sheet 6

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TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

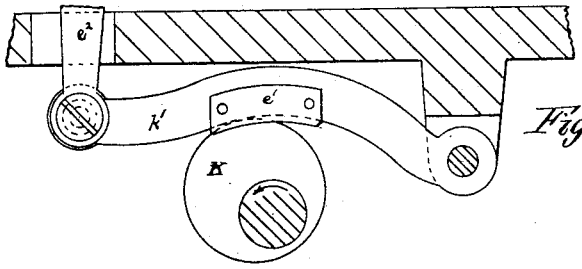


Fig. 8.

Fig. 6.

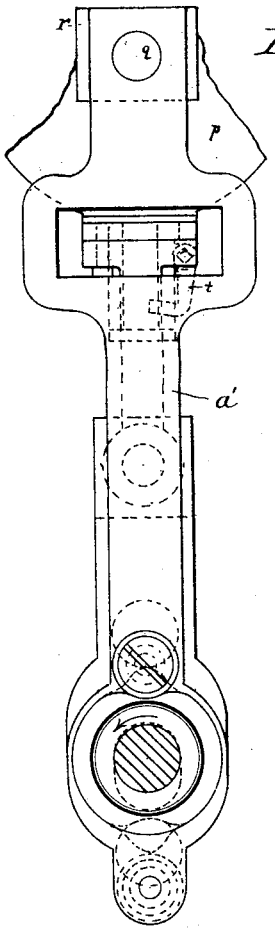
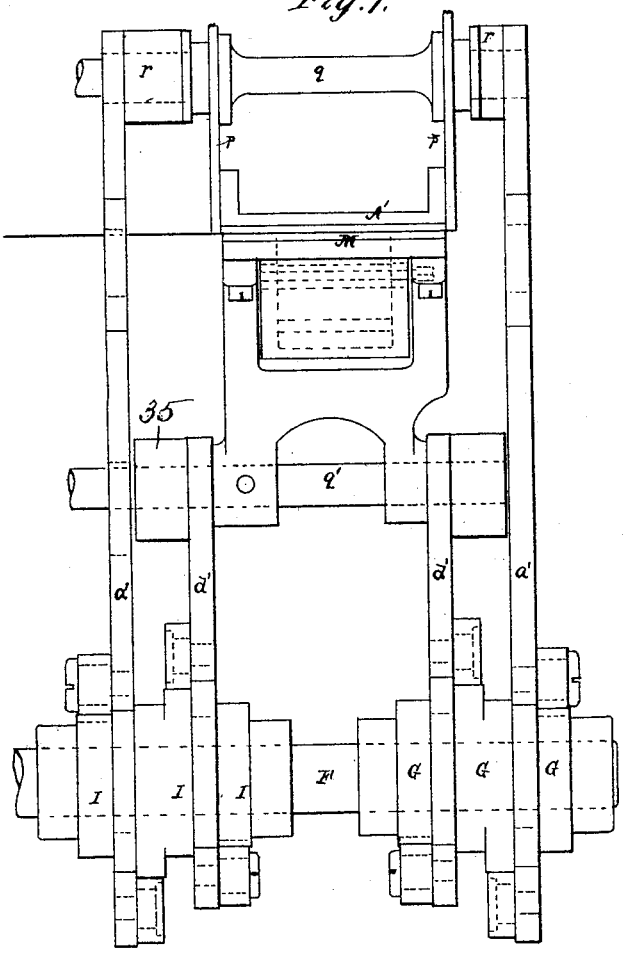


Fig. 7.



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(No Model.) 7 Sheets—Sheet 7.

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TICKET PRINTING AND REGISTERING MACHINE.

No. 457,207. Patented Aug. 4, 1891.

Fig 17

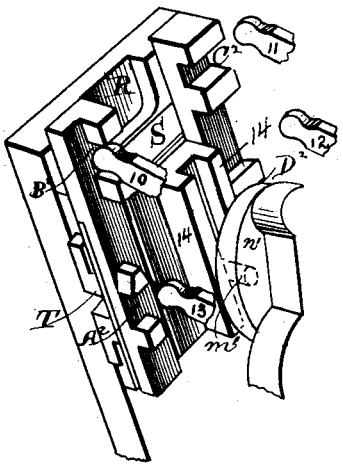


Fig 16

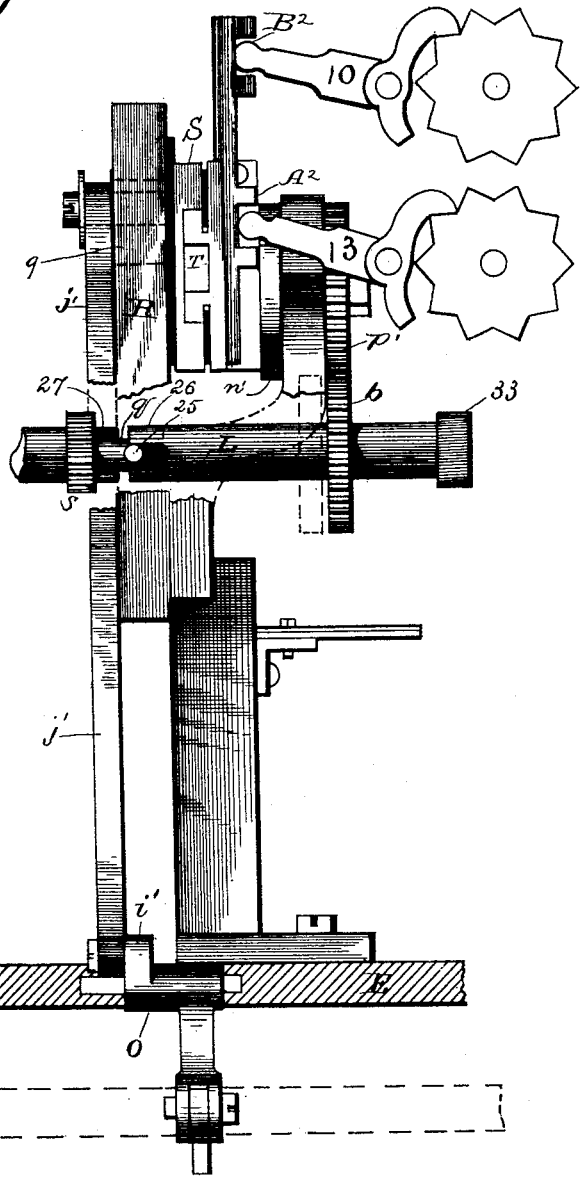
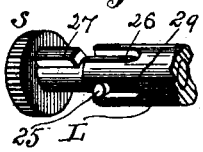


Fig 18.



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R. G. DeBois,
Assistant Atty

UNITED STATES PATENT OFFICE.

JOHN A. MILLIKEN, OF BROOKLYN, ASSIGNOR OF ONE-HALF TO MORRIS RUBENS, OF NEW YORK, N. Y.

TICKET PRINTING AND REGISTERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,207, dated August 4, 1891.

Application filed February 20, 1890. Renewed February 20, 1891. Serial No. 382,195. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MILLIKEN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improved Ticket Printing and Registering Machine, of which the following is a specification.

My invention relates to an improved ticket printing and registering machine, the object being, in general, to provide a machine which shall feed the paper, print both sides, cut off the printed ticket, and register the same, all automatically producing the complete ticket from a roll of paper and by the simple act of the operator depressing a lever.

The further objects of my invention are to provide a die for the reverse side of the ticket with conveniently changeable date-types, to arrange a system of inking-rolls whereby combining different colors for the opposite sides of the ticket counterfeiting may be circumvented, and to arrange a number of different dies for printing the obverse side of different classes of tickets in such a manner that each may be readily brought into position for use, and when any die is brought into position for use the same movement which changes the die will throw in gear the register for that die, so that each class of tickets will be registered on its separate register.

The invention consists in a novel arrangement of printing-dies and in novel combinations, as are hereinafter more fully described.

In the drawings, Figure 1 is an isometric projection of my machine in its case, showing the rear and left sides. Fig. 2 is a plan view with the cases removed, showing principally the parts above the bed, with the exception of the registers. Fig. 3 is a front elevation, and Fig. 4 is a left elevation with the ink-rolls and upper print-dies removed, and shows the case in section. Fig. 5 is a section through the bed on line *x*, Fig. 2, showing the inking and registering movement. Figs. 6 and 7 are front and left elevations of the printing-cams and connections, and Fig. 8 is a sectional view showing the feed-eccentric and contiguous parts. Figs. 9 and 10 are detail views of the register movement, Fig. 9 being a plan view. Fig. 11 is a reduced view of the driving device; and Fig. 12 is a view, partly in section, of the dash-pot. Figs. 13 and 14 are detail views of the cutter-cam and connections. Fig. 15 is a detail of the print-die guides; Fig. 16, a detail view in elevation of the mechanism for changing the registers; Fig. 17, a perspective view in detail of the lever-actuating slide, and Fig. 18 a detail view of the clutch for shifting said slide and stamps or dies.

The machine is inclosed in a cast-iron case 15, made in three pieces. The lower part of the case has legs on which it stands and two arms 16 extending to the rear, in which the axles of paper roll 17 rest. The bed E is set into the lower casing flush with the upper edge. The upper case U, which incloses all the parts above the bed except the clutches and ink-rolls, has four openings A B C D for viewing the registers, and is designed to be locked to the machine, so that no impression can be taken from the upper dies by the operator. The casing V, over the ink-rolls, is hinged to the lower casing, and is to be locked also. It will be seen in Fig. 1 that the dies and ink-rolls may be changed and the paper fed in without opening the case.

The paper on which the tickets are to be printed is fed into the machine from the roll in a continuous strip of the width of the ticket. It enters an opening in the rear side of the case, passing over a roll, as shown in Fig. 1. It passes between guides *o* in a plane parallel to the bed through the opening in the upright *k*, Figs. 4 and 5, and between the upper and lower printing dies or stamps A′ M, Figs. 6 and 7. Both faces of the ticket are printed at the same time by the stamps or dies coming together with the paper between. The strip is then fed the length of a ticket, and the printed part being then beyond the knife, as shown in Fig. 4, is severed from the strip.

The driving-shaft *e* has its bearings in the lower frame and has a gear *d* fastened to it and a ratchet *f*. The gear *d* is in proportion to the pinion *c* as the number of teeth in the ratchet is to one, so that one stroke of the lever *g* makes one complete turn of the cam-shaft F, Figs. 3 and 11. The lever *g* is free to ro-

tate on the shaft *e*, and to one end is attached a rod *z*, which may be connected to a treadle or its equivalent. Near this end is pivoted a pawl 18, which engages the teeth of the ratchet *f* to rotate the same, the pawl being held in engagement by a spring 19. The opposite end of the lever *g* is connected to the piston-rod 20 of any suitable dash, such as *h*, which will regulate the speed of the machine to prevent excessive speed and consequent breakage. The lever *g*, after being depressed by the treadle, is returned by a spring acting against the piston in the dash-pot. The dash-pot is one of the well-known forms and needs no description, being clearly shown by the drawings, Fig. 12. When the pawl end of the lever *g* is depressed by treadle or otherwise, it compresses the spring in the dash-pot *h*, the oil or other fluid in the upper part of the cylinder flowing rapidly through the valve *i* to the bottom of the cylinder, and when the spring reacts, driving the machine, the valve *i* closes, compelling the oil to traverse through the tube *h'* to the top of the cylinder. The flow of oil, and consequently of the speed of the machine, may be regulated by the valve *i'*.

The parts are all arranged on a rectangular bed E, with the exception of the driving-shaft and dash-pot. A cam-shaft F, Figs. 2, 3, and 4, extends along the under side of the bed from front to rear and parallel to the under side of the bed. It turns in bearings in the hangers *a*, which are attached to the under side of the bed at each end. The cams in order, beginning at the front, are front print-cams G, Fig. 4, knife-cams H, rear print-cams I, inking and register cams J, and feed-eccentric K. To the rear of the feed-eccentric K a pinion *c* is fixed to the shaft F and is in mesh with the gear *d* on the driving-shaft *e*.

On the top of the bed E, Figs. 3 and 4, two uprights *j k* are erected, the upright *j* fastened by screws to upwardly-extending ears near the front end of the bed and the upright *k* fastened by screws to the bed near the middle part. These uprights *j k* are the guides for the boxes of both upper and lower print-die shafts. The upright *j* is formed from a thin sheet of metal, preferably of steel or iron, and has an arm extending to the right, into which the pivot of the swinging knife *m* is screwed. It also has a rectangular opening a short distance above the bed, through which the printed ticket passes. In the upper and lower ends are rectangular openings in which the boxes for the print-die shafts slide. The stationary knife *l* is fastened to the inside of the upright *j*, and the inner surface of the upright serves as a guide for the free end of the swinging knife *m*. The upright *k* may be made of cast-iron and has feet at the lower end, through which screws pass to hold it to the bed. At the extreme upper end it has an arm extending to the right, to which one end of the gib *n* is secured. In the upper and lower ends are rectangular openings coincident to those in upright *j* and for the same purpose. A short distance from the lower end of the upright *k* is a narrow horizontal opening, Fig. 5, through which the paper passes, and at each end of this slit is a round hole, into which the guides *o* are fixed.

The four upper printing-dies A A' A'' A''', which are for the obverse side of the ticket, are arranged between flanges *p*, mounted on and turning with a shaft *q*. The machine shown in the accompanying drawings is arranged for four of these dies, so that without any alteration in the machine four different classes of tickets may be printed at pleasure. These dies are adjustable, and may be easily removed and others substituted for them at a slight cost, so that the machine is adapted to the requirements of any. The shaft *q* turns in bearings in the square boxes *r*, Fig. 7, which slide vertically in the uprights *j k*, Fig. 2, and extends rearward, protruding through the case. It is reduced in diameter to receive the pinion *s*, Fig. 4, and the clutch L, and further reduced at the rear end.

As seen more clearly in Figs. 2, 4, 16, and 18, the shaft *q*, which carries the printing-stamps, projects through the casing and is provided with a sleeve L, movable endwise thereon and secured to turn therewith by a pin 25, arranged to enter an open slot or recess 29 in the end of the sleeve, and the sleeve is still further provided with recesses 26, which receive projections 27 upon a loose pinion *s*, thus forming a clutch, whereby the sleeve engages the pinion and actuates the stamp-shaft *q*. This clutch is normally held in engagement with the pinion by a coil-spring 28, located within the sleeve and surrounding a rod 30, and its opposite ends bear against a shoulder 31 and a head 32, respectively, upon the end of rod 30. The end of the sleeve L is provided with a milled head 33, by means of which it is operated. A gear-wheel *b* is also secured to rotate with the sleeve, and by drawing the sleeve out of engagement with the loose pinion the wheel *b* will be thrown into gear with the wheel *p'*, and a turn to the right or left will simultaneously rotate the stamps and move the slide T into position to engage one of the register-levers 10, 11, 12, or 13, as desired. A dial 34, having letters corresponding with the different registers A B C D, is located upon the exterior of the casing 15, and a pointer 35 is secured to the shaft, so that the operator can readily adjust the stamps to print the ticket desired.

The lower print-die M, Figs. 6 and 7, is fastened to a frame fixed on a shaft *q'*, turning in boxes like those for the upper shaft. Attached to the corners of the frame are thin projections *u*, Fig. 4, which come against the metal flanges 37 of the ink-rolls and which act as a cam, forcing the ink-roll back, so that it will not strike the edge of the print-die too hard. The circular part of the flanges *p* perform the same function for the upper print-die. The

shaft extends far enough to the rear to receive the pinion s', which is fixed to it. The print-die M has a rectangular opening in it to receive the date-types. The upper and lower print-dies, preferably, I make of metal with rubber face, the upper formed to be held between flanges p and the lower formed to be held in the frame and to receive the bodies of the date-types, as shown in Fig. 7. I use metal-bodied rubber type for the daters and hold them in the rectangular box, into which they fit, by a pivoted key t, as shown in Figs. 6 and 7, which enters nicks in the bodies of the type. The key t is prevented from swinging out by a spring 36, and the types are released by turning the shaft to which the key is fixed. The space around the date may be formed to print an imitation of engraved work or any design, the only limitation being that enough surface must be left to support the paper for printing the obverse side. The upper dies bear any lettering suitable for the class of tickets which they are to print, price of ticket, &c.

The dies are carried to and from the paper vertically by links or connections a' and d', attached to the boxes r of the shafts q and q', which links are moved by groups of cams G and I. (Shown in detail in Figs. 6 and 7.) The cams are of well-known forms and need no description. Mention may be made, however, that the cams are formed to act as quickly as practical, are keyed or pinned to the shaft F, and are positive in their action. The links are guided at the upper ends by the boxes to which they are attached and at the lower ends by encompassing shaft F and by the sides of the separate cams. The links a' have rectangular openings in them at the proper place to allow the passage of the strip of paper.

When the machine is at rest, the print-dies are in the position shown in Fig. 3, the die A′ of the upper series being the one in gear to print.

The dies are inked by being rotated past the ink-rolls. This is effected by the pinions s and s' and the double rack N. The lower part of the rack N slides in a groove planed in the bed and the upper part in a gib or way n, and it is driven by a lever O, actuated by a double cam J. It will be seen by referring to Fig. 6 that as the cam moves in the direction of the arrow the dies are immediately moved by the rack into position for printing, Fig. 15, and as they pass the ink-rolls b' c' they are inked by the rolls rolling over the faces of the dies. When the dies reach the position for printing, the rack is at rest and remains so until the printing is completed, when the rack returns the dies to the first position.

Guides v, Fig. 15, are provided for the upper and lower print-dies to steady the same as they approach the paper and to insure alignment, for as the pinions leave the rack there otherwise would be nothing to guide the dies. They are made by driving two pins v v for each into the upright k and an oblong beveled projection v' with rounded face into the frames for the dies, the projection sliding between the pins and being so placed to swing clear of the pins when the dies are withdrawn from paper, and the ink-rolls are mounted on shafts supported in radially-slotted arms which are fastened to shafts w, Fig. 3, and the rolls are made of several pieces of felt cut out in the form of washers and clamped between metal flanges 37 at each end of the roll, and are held at the outer extremity of the slots in the arms by springs 1, coming against half-boxes 2, which slide in the slots. The shafts w turn in bearings in a frame P, which slides into a seat formed by a recess in the bed and gibs f^2. The frame is held in place laterally by the head of the screw f', Figs. 2 and 4, one side of which is cut away, so that the frame P may be removed without entirely removing the screw. The shafts w extend to the rear of the machine and have clutches L′ L², which are like clutch L, hereinbefore described, the projection 3, which enters the indentations, being on the frame. The rolls are eight in number, four on each shaft, and are "set up" or inked by being rolled over a pad covered with prepared ink. One inking of a roll will print several thousand tickets. Each roll may bear a different color, so that should a counterfeit appear a change of ticket by color may be quickly effected. In the present instance eight rollers are shown, four for the upper stamps and four for the lower stamps, whereby many combinations of colors may be printed on the tickets. Letters are stamped on the clutches, which when brought opposite the lines on the case indicate the color of the roll in position to ink. The paper is fed automatically by a feeding device W, arranged in a frame Q, secured to the bed and operated by a cam or eccentric K on shaft F, as shown in Fig. 4.

The feeding device W consists, essentially, of two knurled rolls t' u', one above the paper and one below, one only of which is driven by the machine. In the machine herewith represented the lower roll u' is driven by a rack 4 and pinion y, the rack moving vertically, being driven by a lever resting on an eccentric K, as shown in Fig. 8. The upper roll t' simply acts as a pressure-roll, being free to rotate as fast as the paper moves. It has its bearings in square boxes which slide vertically in the feed-frame Q and receives its pressure from coil-springs 5, set into the caps on the frame Q and coming against the boxes. The shaft L³, to which the lower roll is attached, turns in journals in the feed-frame and extends to the left, Fig. 2, protruding beyond the clutch L² on lower ink-rolls. It is splined, reduced in size at the end to the left, and threaded like the ink-frame shafts w, and has a sleeve L⁵, similar save the indentations. The feed-pinion y is free to rotate on the shaft and is turned down on each side to the bottom of the teeth, leaving a hub to the right

and a groove to the left, on which sheet-metal guides 7, riveted to the rack, bear to guide the upper end of the rack. The lower end 8 of the rack slides in a hole 9 in the bed, Fig. 4. To the left of the pinion *y* beyond the groove the hub increases in diameter to the size of the sleeve L^3. The sleeve L^3 has two ratchet-teeth formed on the end adjacent to the hub of the pinion, which enter corresponding indentations in the hub, the teeth being formed so that the pinion turns the sleeve when it rotates in the direction of the arrow and escapes when it turns in the opposite direction. The lower roll is of such diameter that one-half a rotation gives the proper length of feed for the paper, so that only two teeth are required on the sleeve L^3. The sleeve is pressed toward the hub by a light coil-spring arranged like that in clutch L. When putting in a new strip of paper, the sleeve is turned by the fingers, feeding the paper into the machine until it comes against the knife *m*, which is down when the machine is at rest. As seen in Fig. 8, the lever *k'* swings in a vertical plane on a pin in ears on the under side of the bed, and is driven upward by eccentric K and downward by gravity or a spring. It has guides *e'*, which overlap the sides of the eccentric to prevent lateral motion, and is connected to the rack by the rod e^2. The eccentric is timed to commence feeding at the termination of the printing and to complete before the knife descends.

The paper-guides *o* are made from rods which have a groove planed in them, and they are supported by upright *k*, by a part of the stationary knife *l*, Fig. 4, by feed-frame Q, and by upright rods in the bed at the rear ends.

The cutting device X consists of a stationary blade *l* and a movable blade *m*. The knife *m* is driven by cam H and lever *g'*. (Shown in detail in Figs. 13 and 14.) The cutting off is the last operation and should be done by a sudden stroke, the knife returning more leisurely. It has a shearing cut passing by the lower blade *l*, Fig. 4, which is fastened to the upright *j*. The vertical slide S for moving the registers fits in a frame R with the feed-frame Q. It is moved by connection *j'*, Figs. 3 and 4, from arm *i'* of lever O, thus being driven by the same cam J that inks the dies. The upper end of connection *j'* fits on a stud which is screwed into the slide S and passes through an oblong hole 9 in the frame R. In the slide S is a second slide T at right angles to the first, which bears the lugs A^2 B^2 C^2 D^2, which engage the levers 10, 11, 12, and 13 of the registers. This slide T is moved horizontally by crank-pin *m'* in disk *n'*, the crank-pin entering a vertical groove formed by raised parts 14 on the slide T. This arrangement allows the slide T to move vertically with slide S. The disk *n'* is made in one piece with a shaft, on which also a spur-wheel *p'* is keyed. A spring-stop *o'*, Fig. 4, is inserted in the frame and enters the four equidistant countersinks *r'* in the back of the disk to hold the disk from turning too easily. It is obvious from Figs. 10, 16, and 17 that the crank-pin being turned into the four positions $a^2 b^2 c^2 d^2$, the levers 10, 11, 12, and 13 of the registers being on lines *y' z'*, the dogs A^2 B^2 C^2 D^2 will engage, respectively, the levers which turn the registers. In Fig. 4 will be seen the spur-wheels *b* and *p'* in side elevation, which are of equal diameter and pitch. Now as the sleeve-clutch L is drawn back, as in Fig. 16, to bring another of the series of upper print-dies into use it will be seen that the spur-wheels *b* and *p'* will come into gear, and as the clutch L is turned it changes the slide T throwing the proper register into gear.

The registers may be any of the well-known forms manufactured for the trade, and they are held in a frame adapted to them, which is fastened by screws to the frame R.

I do not limit myself to the precise construction shown. For instance, either one or both of the knives may be movable, or a different kind of ratchet may be used for the feed.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a ticket-printing machine, a pair of reciprocating type-forms or stamps located upon opposite sides of the paper, one of said forms being arranged to serve as a platen for the other, in the manner and for the purpose substantially as described.

2. In a ticket-printing machine, a pair of oscillating stamps or type-forms having reciprocating axes movable toward and from each other upon opposite sides of the paper and one serving as a platen for the other, in combination with guides arranged to keep the face of the stamps in true horizontal alignment during the printing operation, as set forth.

3. In combination with two or more registers provided with escapement-levers, a vertically-reciprocating slide carrying a horizontally-reciprocating slide having lugs so arranged upon the latter as to be thrown in and out of engagement with said levers, in the manner and for the purpose substantially as described.

4. In a ticket-printing machine, a pair of oscillating stamps having reciprocating axes arranged to move toward and away from each other, whereby the stamps are brought together upon opposite sides of the ticket, in combination with lugs, pins, or guides adapted to enter corresponding recesses to steady the stamps during the printing operation, as described.

5. In combination with one or more printing stamps, forms, or type-surfaces, a frame provided with a series of inking-rollers for inking said stamps, a casing for inclosing said stamps and rollers, and a handle located outside of said casing, whereby the rollers can be changed to supply a different-colored ink

to the stamps, in the manner and for the purpose substantially as described.

6. In a ticket-printing machine, a series of rollers mounted in a rotary frame provided with a device for locking the frame in different positions, in combination with a movable stamp adapted to be separately inked by any one of said rollers, whereby different-colored inks may be used as desired.

7. In combination with a pair of oscillating stamps having axes movable toward and away from each other, a pair of independent rotary frames carrying inking-rollers, and means, substantially as described, for adjusting said frames, whereby various-colored inks can be applied to said stamps, as set forth.

8. In combination with a pair of printing-stamps adapted to print upon opposite sides of a ticket-strip, a series of adjustable inking-rollers arranged to supply various-colored inks to said stamps, in the manner and for the purpose substantially as described.

9. In a ticket-printing machine, an oscillating printing-stamp or type-form having its axis movable toward and from the ticket-strip, in combination with a loose pinion located upon said axis, a sliding clutch secured to turn with said pinion, and a reciprocating rack adapted to intermittently engage said pinion, in the manner and for the purpose substantially as described.

10. In a ticket-printing machine, the combination, with a ticket strip, way, or guide, of a printing-stamp or type-form secured to and turning with a shaft, a spring-actuated sleeve fitting over said shaft, a loose pinion mounted thereon, a rack, and clutch mechanism for rotating said stamp independent of the pinion, in the manner and for the purpose substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 18th day of February, A. D. 1890.

JOHN A. MILLIKEN.

Witnesses:
WINTHROP PARKER,
TOWNSEND SCUDDER.