4 Sheets—Sheet 1.

R. M. HOE.

MACHINE FOR PRINTING RAILROAD AND OTHER TICKETS.

No. 23,172. **Patented Mar. 8, 1859.**

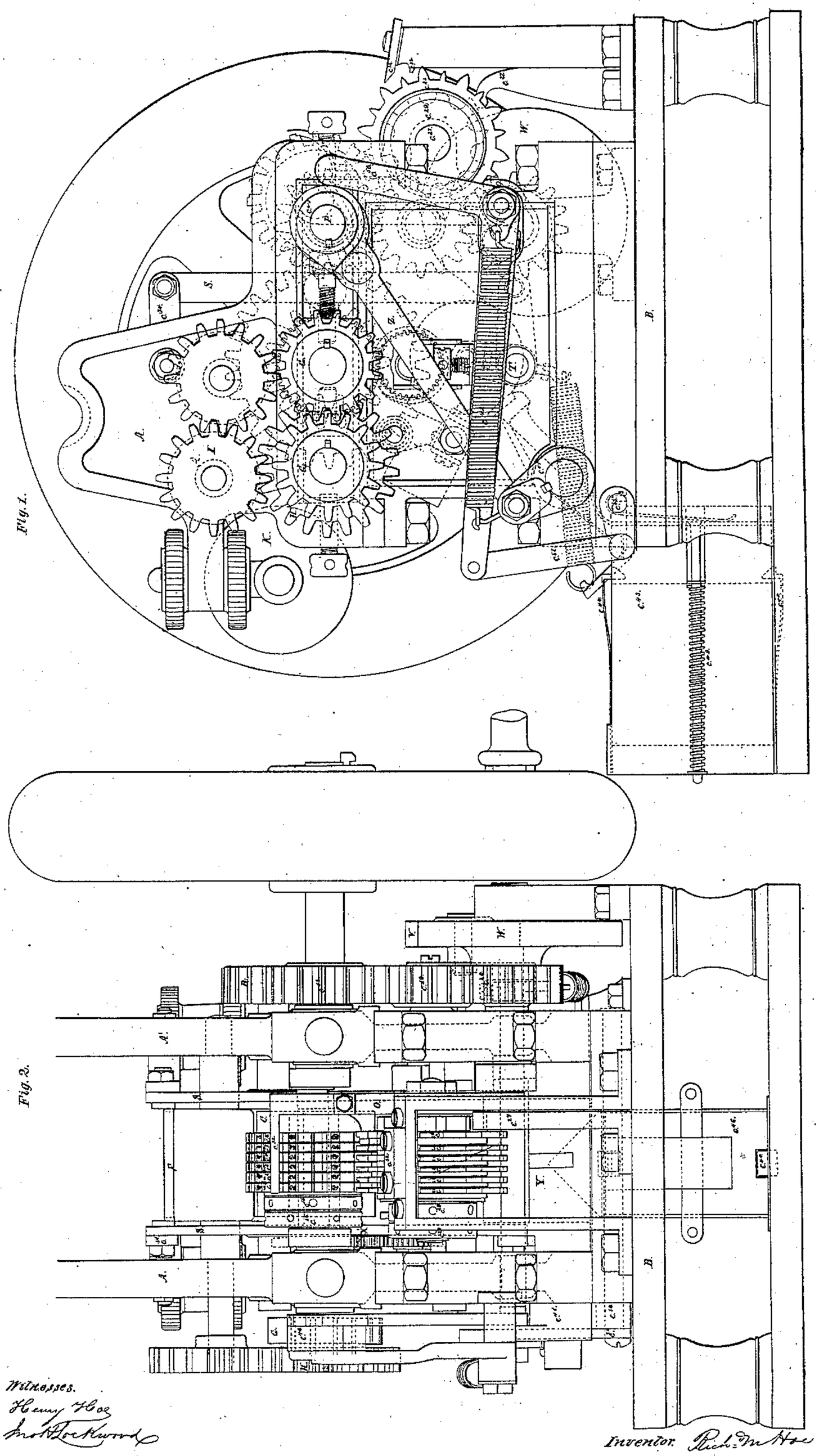

Fig. 1.

Fig. 2.

Witnesses.
Henry Hoe
Jno. Rockwood

Inventor. Richd. M. Hoe

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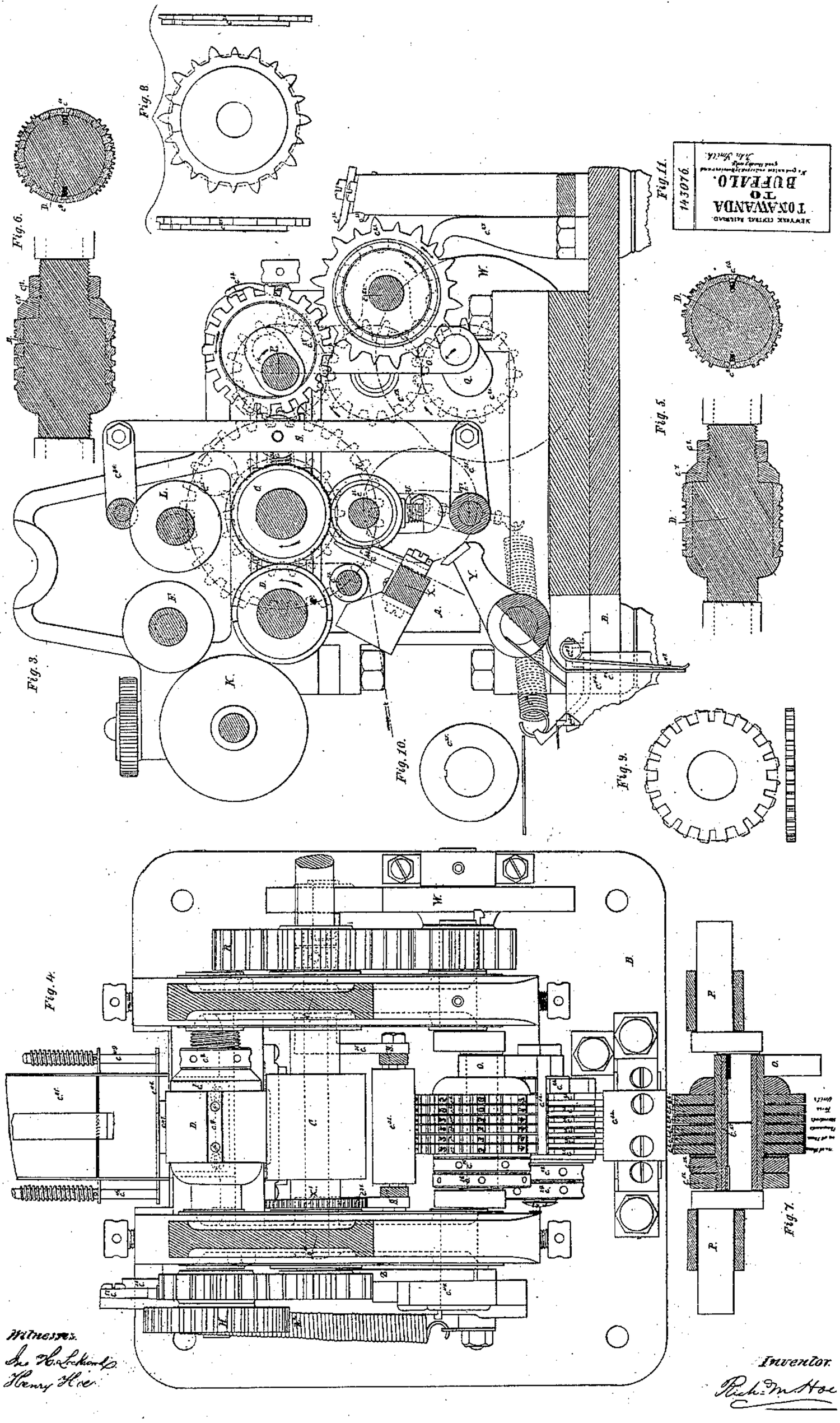

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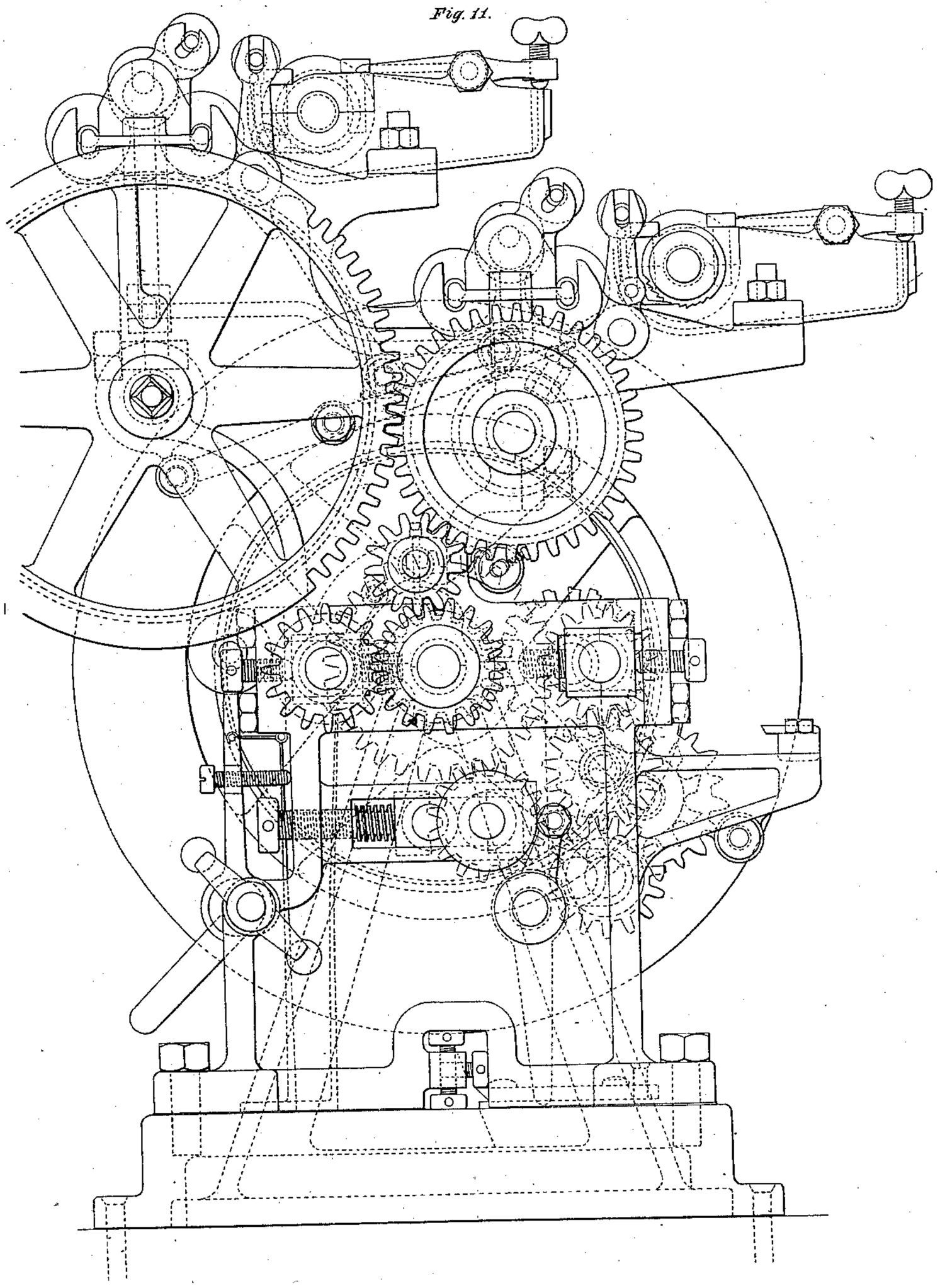
Fig. 11.



Witnesses.
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Henry Hoe

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Richd. M. Hoe

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R. M. HOE.

MACHINE FOR PRINTING RAILROAD AND OTHER TICKETS.

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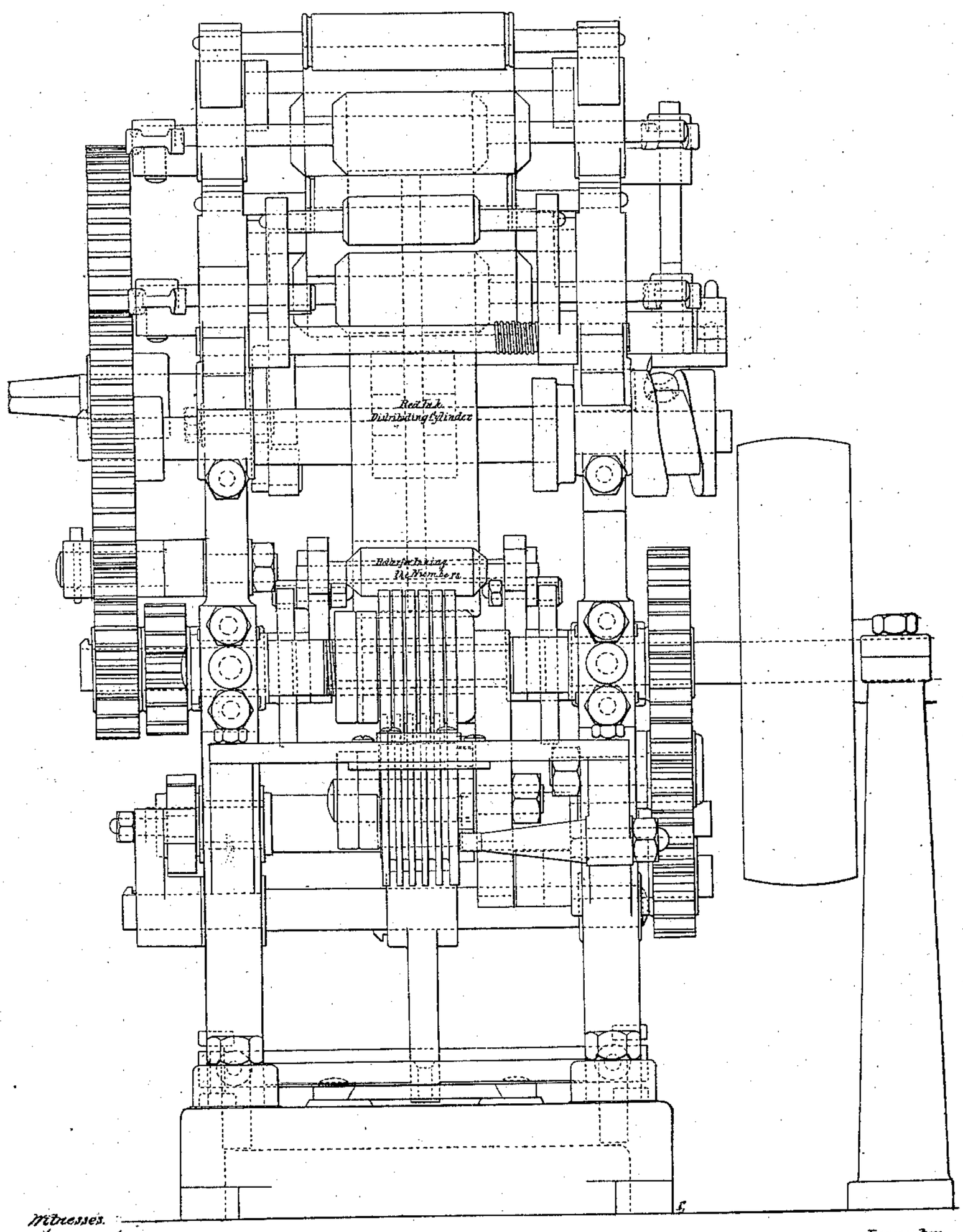
Fig. 12.



Witnesses.
Jno. H. Lockwood
Henry Hoe

Inventor.
Rich. M. Hoe

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RICHARD M. HOE, OF NEW YORK, N. Y.

MACHINE FOR PRINTING RAILROAD AND OTHER TICKETS.

Specification forming part of Letters Patent No. **23,172**, dated March 8, 1859.

To all whom it may concern:

Be it known that I, RICHARD M. HOE, of the city and county of New York, in the State of New York, have invented a new and useful Machine for Printing and Numbering Railroad and other Tickets and for Similar Purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in printing railroad and other tickets on a strip or roll of paper by types, or stereotype-plates, or solid raised or sunken letters, or any combination of them, on a revolving cylinder and numbering said tickets with successive numbers by a registering apparatus, and then cutting them from the roll and depositing them in a receptacle in numerical order.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure 1 is a side elevation. Fig. 2 is an end elevation. Fig. 3 is a sectional elevation, and Fig. 4 is a sectional plan of the machine. Figs. 5 and 6 are the type-cylinders, and Figs. 7, 8, 9, and 10 are parts of the registering apparatus shown in detail. Fig. 11 represents a ticket printed and numbered by the machine. Figs. 12 and 13 are a modification of the machine in which the type-cylinder and the figures of the registering apparatus are supplied with ink from separate ink-fountains, so that the body of the ticket and the number may be printed in different colors.

The same letters refer to like parts in all the figures.

A A′ are the side frames of the machine fixed on the bed-plate B.

C is the impression-cylinder (around which the paper passes) having the type-cylinder D on one side of it and the registering-disks c', c^2, c^3, c^4, c^5, and c^6 on the other side.

F is an ink-distributing cylinder. The type-cylinder B is made large enough to receive two (it may be more or less) forms of type or stereotype-plates, and consequently will print two tickets to each revolution, and the impression-cylinder C is of the same size and the two cylinders are geared together by the equal-sized wheels G G.

H is a pinion fixed on the end of the shaft of type-cylinder D, and gears into the wheel I, fixed on one end of the shaft of the distributing-cylinder F, the respective sizes of the wheels being such as to make the surfaces of the type and distributing cylinders move with the same velocity.

K is a composition-roller running in contact with the distributing-cylinder F and also with the type-cylinder D, its object being to supply ink to the latter cylinder.

In Figs. 5 and 6 the type-cylinder D is shown in detail. In Fig. 5 the forms are stereotyped, each one forming nearly one-half the circumference and curved to conform to the body of the cylinder. The ends of the stereotype-plates are beveled to fit under the solid raised flange at one end of the cylinder and the loose flange c^7 at the other end, and are kept in place by the nut c^8, screwed up against the flange c^7. c^9 c^{10} are two thin strips of metal screwed to the body of the cylinder to keep the plates in their proper positions around the cylinder, and the space on the paper which comes opposite to these strips being left blank receives afterward the impression of the number from the registering apparatus. It is obvious that in order to change the stereotype plates or forms it is only necessary to back off the nut c^8 and flange c^7 a little distance and they are liberated, when others can be put in their places and screwed fast.

In Fig. 6 the type-cylinder D is composed partly of solid letters raised upon its surface or stereotype-plates and partly of short radial type fitted in rabbeted groove.

The words "New York Central Railroad" at the head of the ticket, and the word "to" between the names of the stations, also the fine reading matter and the fac-simile signature, being permanent, they may be raised upon the surface of the cylinder or may be stereotyped and permanently fixed in their places. The names of the stations, being frequently changed, are made of short radial type, fitted into the aforesaid grooves and secured in their places by the metal strips c^9 c^{10}. It will be seen that one of these metal strips, which in this case are fitted into longitudinal grooves in the body of the cylinder, must be removed in order to get the types out

of their grooves into said longitudinal grooves, when they are free to be lifted out and others inserted in their places.

L is another distributing-cylinder (see Fig. 3) driven by means of a wheel M (see Fig. 1) on one end of its shaft gearing into the wheel I on the shaft of the distributer F. The distributer L supplies ink to the registering-dials by means of an inking-roller c^{31}, (see Fig. 3,) and as the two distributing-cylinders F and L do not touch each other the body of the ticket may be printed in one color and the figures or registers in another color.

The numbering or registering of the tickets is effected by means of the six registering-disks c' to c^6, (see Fig. 7,) one of the disks shown in detail at Fig. 9. These disks have the figures from 0 to 9, inclusive, raised in regular succession on their peripheries, and are fitted loosely on the tube projecting from one end of the plate O, with a thin washer c^{15} (shown in detail at Fig. 10) between each of them, and the whole are screwed up sufficiently tight against a shoulder on the tube by means of the nuts c^{16} c^{16}. The washers c^{15} are prevented from turning on the tube by having a projecting rib that enters into a longitudinal groove cut in the surface of the tube, and thus they prevent a registering-disk when moved from turning its neighbor by friction.

P P are two cranked shafts facing each other and running in opposite side frames A A', (see Figs. 4 and 7,) and their cranks are connected together in the center of the machine by the long coupling c^{17}, and thus become as one cranked shaft. On this coupling the tube projecting from the plate O, together with the registering-disks, are placed, while the other end of the plate O is attached to another cranked shaft Q, running in the side frame A', and these cranks are made to revolve simultaneously in the same direction by means of the three pinions c^{18}, c^{19}, and c^{20}. (See Figs. 2 and 3.) By this it will be seen that as the cranks revolve in the direction of the arrow, Fig. 3, the plate O, together with the registering-disks, will have a circular movement the velocity of which is made to coincide very nearly with the velocity of the periphery of the impression-cylinder C.

The cranked shafts P P are so adjusted by regulating-screws that the disks in their circuit press against the impression-cylinder, and thus give an impression of certain figures or marks to the printed strip of paper and pass on around to again come in contact with the paper as before. As a ticket is printed at each half-revolution of the impression-cylinder, it follows that the registering-disks must come in contact with it twice during each of its revolutions, and to accomplish this the driving-wheel R on the impression-cylinder shaft has twice the number of teeth of the pinion c^{18} on the cranked shaft P, into which it gears.

The changing of the figures on the registering-disks is effected by means of the six toothed wheels c^{21}, c^{22}, c^{23}, c^{24}, c^{53}, and c^{25}, the ratchet-wheel c^{26}, and the stationary pawl c^{27}, in combination with the rotative motion of the cranks P, P, and Q. (See Figs. 2 and 3.) The toothed wheels c^{21} and c have each twenty teeth—ten large and ten smaller teeth—which gear into corresponding spaces cut between the figures on the registering-disks c', &c., (See Figs. 8 and 9.) These wheels are mounted on a stud c^{28}, fastened to that part of the plate O that extends to the lower crank, (see Figs. 3 and 4,) with thin washers between each of the wheels and the whole screwed up together sufficiently tight against a shoulder on the stud c^{28} by means of the nuts c^{29} c^{29}, in the same manner as the registering-disks. They are (except the one that gears into the first disk, or disk of units) of the same thickness as the disks. (See Fig. 8, c^{21}.) One-half of this thickness is turned to a diameter a little smaller than the bottoms of the teeth. The wheel c^{25}, gearing into the disk of units, is one-half thicker than the others, and one-third of its thickness is turned to a smaller diameter, and the ratchet-wheel c^{26}, having ten teeth, is fastened to its outer side. (See Figs. 2, 3, and 4.) One large tooth on each wheel is made up again to its original thickness. (See Fig. 3.) The large teeth are made of such a length that they will just engage into the registering-disks, move them one-tenth of a revolution, disengage themselves, and pass on around. The first wheel, gearing into the disk of units, is so placed that the toothed part of its thickness coincides with the thickness of this disk, (see Figs. 2 and 4,) so that when the thick tooth comes in gear with the disk of units it also falls in gear with the second disk, or disk of tens, to the extent of half the thickness of said disk, the other half thickness of this disk being engaged with the toothed portion of the second wheel. The thick tooth of the second wheel, when it comes in gear with the disk of tens, also falls in gear with the third disk, or disk of hundreds, to the extent of one-half thickness of said disk, and so of all the others, and there may be as many registering-disks as necessity demands. This one with six disks will register a million, minus one. As the plate O, together with the disks, wheels, &c., move in their circuit, as already explained, (see Fig. 3,) the stationary pawl c^{27}, which is fastened to the bed-plate of the machine, is placed in such a position that it engages into one of the teeth of the ratchet c^{26} and causes it, and, of course, the first wheel, to which it is fixed, as also the disks and wheels that may then be engaged in gear, to turn just one-tenth of a revolution before the pawl is disengaged. This changing is effected while the disks are receding, after having given an impression to the strip of paper, and is completed at the time the disks are at the farthest point from the impression-cylinder. There is then a sufficient distance between the registering-disks and the impression-cylinder to allow the little

inking-roller c^{31} to come down to the position shown in Fig. 3 and ink the figures on the disks that are to give the next impression on the paper, when it again rises to its original position in contact with the ink-distributer L, as shown by the dotted lines, by mechanism to be described hereinafter.

Before starting the machine the disks should all be set with the half-point (a little projection midway between the figures) between the figures 0 and 1, directly opposite the impression-cylinder when the cranks are in either horizontal position. A little guide-piece c^{52}, (see Fig. 4,) fixed to the plate O, serves to set them by and with the figure 4 just above that guide. They will be in the position desired—that is, they will print nothing but lines on the paper until they are moved by the ratchet coming in contact with the stationary pawl c^{27}, which moves the first wheel and disk one-half tooth only for the first time, (because they were already set at half-way,) and thus brings the figure 1 on the first or disk of units to the position to give the impression. As the disks continue their circuit, the figure 1 is printed on the ticket, and they recede, change, ink, and print 2, and so on up to 9. When that figure is printed, the next change brings down 0 on the disk of units, and at the same time the thick tooth of the first wheel engages with the disk of tens and moves it from its neutral position one-half a space, bringing down figure 1 on that disk, which, with the 0 on the disk of units, prints 10. Now, this figure 1 on the disk of tens remains stationary in its position for printing, while the disk of units continues on, changing at every revolution of the cranks, thus printing successively the figures or numbers 11, 12, and so on to 19, when the next change brings down 0 again on the disk of units, and again the thick tooth of the first wheel engages with the disk of tens, bringing down the figure 2 on that disk, thus printing the number 20, and so on, as before. It will be perceived that when the thick tooth of the first wheel engages with the disk of tens that disk in turn, being geared into the second wheel, imparts the same motion to it that it receives from the thick tooth of the first wheel—viz., one-tenth of a revolution—each time, and so it goes on until the number 99 is printed. The change this time brings down 0 on the disk of units, while the thick tooth of the first wheel, engaging with the disk of tens, brings down 0 on that disk, and that disk having already acted nine times on the second wheel, now causes the thick tooth of that wheel to engage with the disk of hundreds, changing it from its neutral position and bringing down 1 on that disk, which figure, in connection with the 0 on the disk of tens and the 0 on the disk of units, prints 100 on the ticket, and this is the operation all through. These disks are readily changed to any number desired when the machine is at rest by turning each one separately to the number required.

It will be seen that in order to insure accuracy of execution any change of position of the disks on their axes while in their stationary position (they being thus kept by friction only) either from contact with the paper, jar of the machine, or any other cause must be immediately corrected. To accomplish this the cranks P, P, and Q are made of such a length as to cause the disks to move in their circuit a very little faster than the paper to be printed, which has the effect at each impression of turning the disks a little backward, and they in turn act on the toothed wheels c^{21}, &c., turning them a little forward, when they are corrected by their large teeth coming in contact with the plate c^{32} when in their neutral positions, (see Fig. 3,) or the plate c^{33} when in the positions for printing, which plates gently wipe them back to their proper places. The small roller c^{31}, which inks the printing-figures, is carried by two upright bars S, the upper ends of which are connected to the two arms c^{34}, jointed to the side frames, while the lower ends of said bars are connected to two other arms c^{35}, keyed on the shaft T. This shaft runs across the machine and has a bearing in each side frame, but projects sufficiently far through the side frame A′ to receive the lever U, which is keyed to it and carries the anti-friction roller V, which runs on the periphery of the cam W, fixed on the outer end of the cranked shaft Q. Thus the cam W lifts the roller c^{31} to the position of contact with the ink-distributer L to receive a supply of ink and to vacate the space immediately to be filled by the registering-disks and allows it to descend to ink the printing-figures by the action of the spiral spring c^{36}, while the arms c^{34} c^{34} and c^{35} c^{35} by their curved path keep the roller c^{31} at just a safe distance from the paper on the impression-cylinder. The strip of paper as it enters the machine is guided sidewise by two wings attached to the stationary cutter-bar X, and the small roller c^{37} causes it to pass between the type and impression cylinders at right angles to their line of centers.

The paper after it is printed and numbered is gripped by the flanged drawing-roller c^{38} This roller is pressed against the impression-cylinder, or, rather, against the strip of paper that passes between them, by springs or screws, and is driven by the toothed wheel X′ on the impression-cylinder shaft. It is reduced in diameter in so much of its length as the printed matter occupies, leaving a bearing on each side margin only, so as not to efface or injure the printing. The paper then passes on through a guide c^{69} to the front of the cutter-bar X, where it is cut by the action of the swinging cutter Y. This cutter turns in bearings in the side frames of the machine and receives its motion from a cam c^{40}, fixed on the outer end of the cranked shaft P, (see Fig. 1,) acting on an anti-friction roller on the forked end of the connecting-rod Z, the other end of which rod is jointed to the crank c^{41},

keyed on the end of the cutter-shaft, that projects through the frame for that purpose. The cutter is drawn back by the spiral spring c^{42}. The tickets as fast as they are cut drop on end into a trough c^{43}, (see Fig. 1,) having at the top and bottom the spring-catches c^{44} c^{44} and a sliding block c^{45}. Each ticket as it drops into the trough is pushed forward by the slide c^{46} (see Figs. 3 and 4) past the spring-catches and against the sliding block, which slowly recedes as the tickets accumulate in the trough. The slide c^{46} is pushed forward by a toe c^{47}, fixed on the vibrating shaft c^{48}, and is thrown back by the spiral springs c^{49} c^{49} on the sides of the trough. (See Fig. 4.) c^{50} is a bell-crank for operating the shaft c^{48}. Its short arm carries a stud against which the cam c^{40} acts, and its long arm is connected to a fixed crank on the shaft c^{48} by means of the connecting-rod c^{51}

I claim—

1. The peculiar mechanism or its equivalent for moving the registering-disks on their axes at the proper times, by which means the tickets are numbered consecutively, substantially as described.

2. Giving such a movement to the registering-disks as will cause said disks to approach, press against, and travel with the impression-cylinder, thus giving an impression to the roll of paper, then recede to change the figures of the disks and allow the inking-roller c^{31} to perform, and then again to approach the impression-cylinder, and so on, as before, substantially as before described.

3. The adjustment of any derangement of the registering-disks caused by slip, jar of the machine, or other cause, by means of the plates c^{32} and c^{33}, or any other means substantially the same.

4. Inking in a different color the registering-figures by means of a separate inking apparatus, substantially as described.

5. The printing the numbers on the tickets while the said tickets are continuously advancing, in the manner substantially as above described.

6. The guide c^{39}, placed between the impression-cylinder and the cutter Y or its equivalent, for retaining the strip of continually-advancing paper in its proper direction, while its lower end is stopped by the action of the cutter when separating a ticket from the roll.

7. The combination of the parts by which the tickets are deposited after being cut in a vertical position in contradistinction to flatwise in the trough c^{43} destined to receive them.

8. The combination of the slide c^{46}, the spring-catches c^{44} c^{44}, and the sliding block c^{45}, by which the accumulating tickets are kept in a vertical position.

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Witnesses:
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