(No Model.)

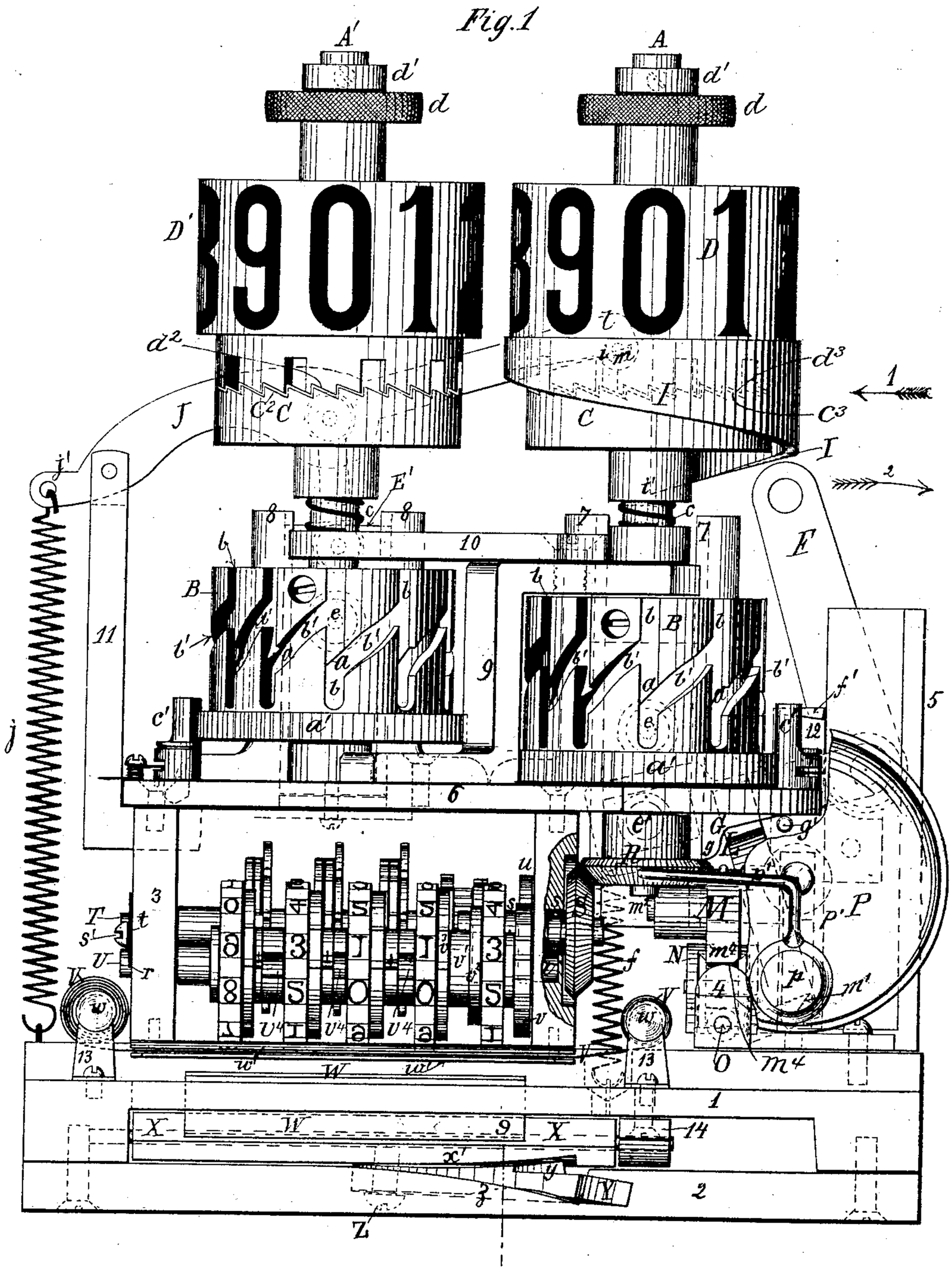
5 Sheets—Sheet 1.

A. PFAFF.

FARE REGISTER.

No. 549,328. Patented Nov. 5, 1895.

Fig. 1



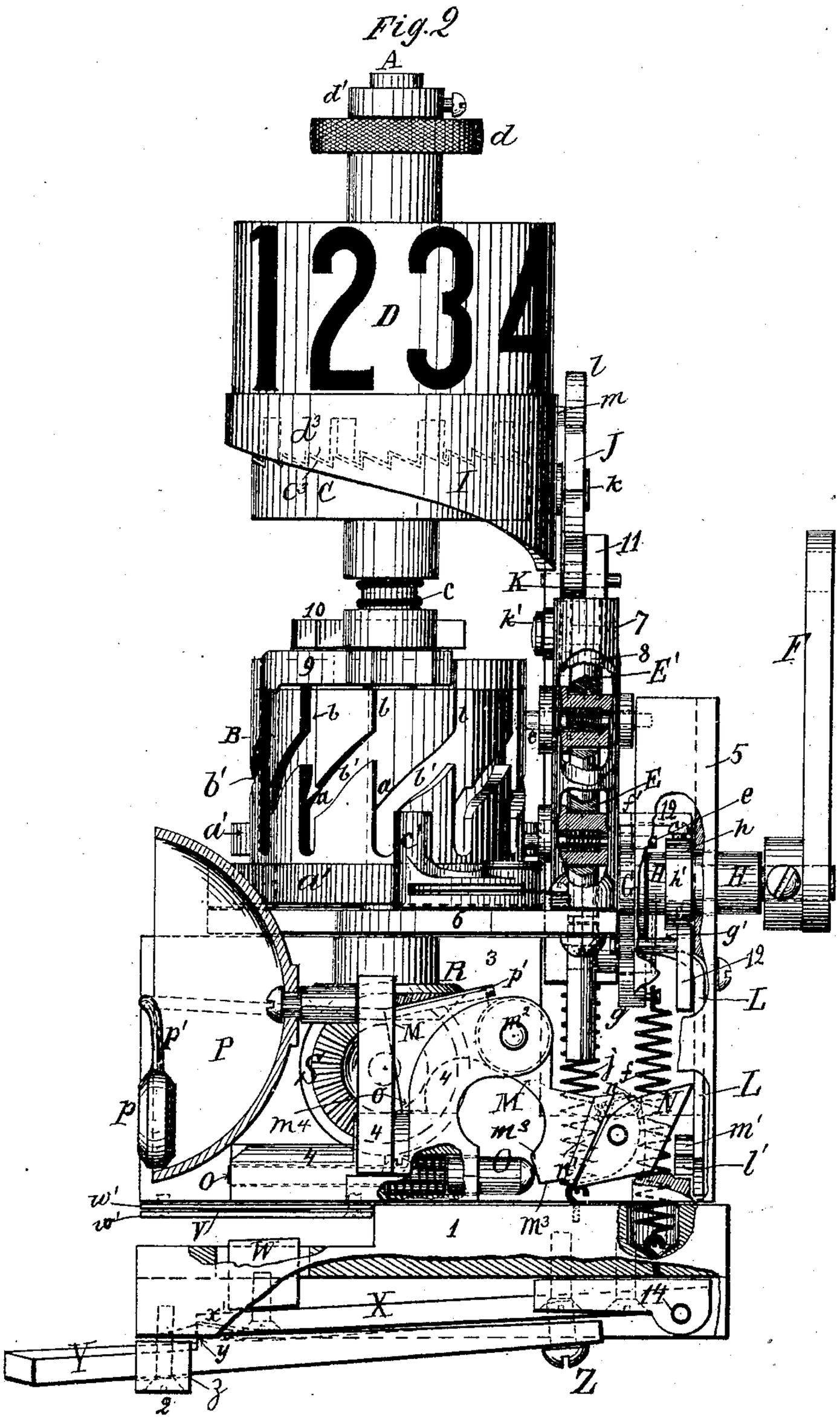
(No Model.) 5 Sheets—Sheet 2.

A. PFAFF.

FARE REGISTER.

No. 549,328. Patented Nov. 5, 1895.

Fig. 2



Witnesses
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A. Wahlberg.

By his Attorney
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A. W. Almqvist

(No Model.) 5 Sheets—Sheet 3.

A. PFAFF.

FARE REGISTER.

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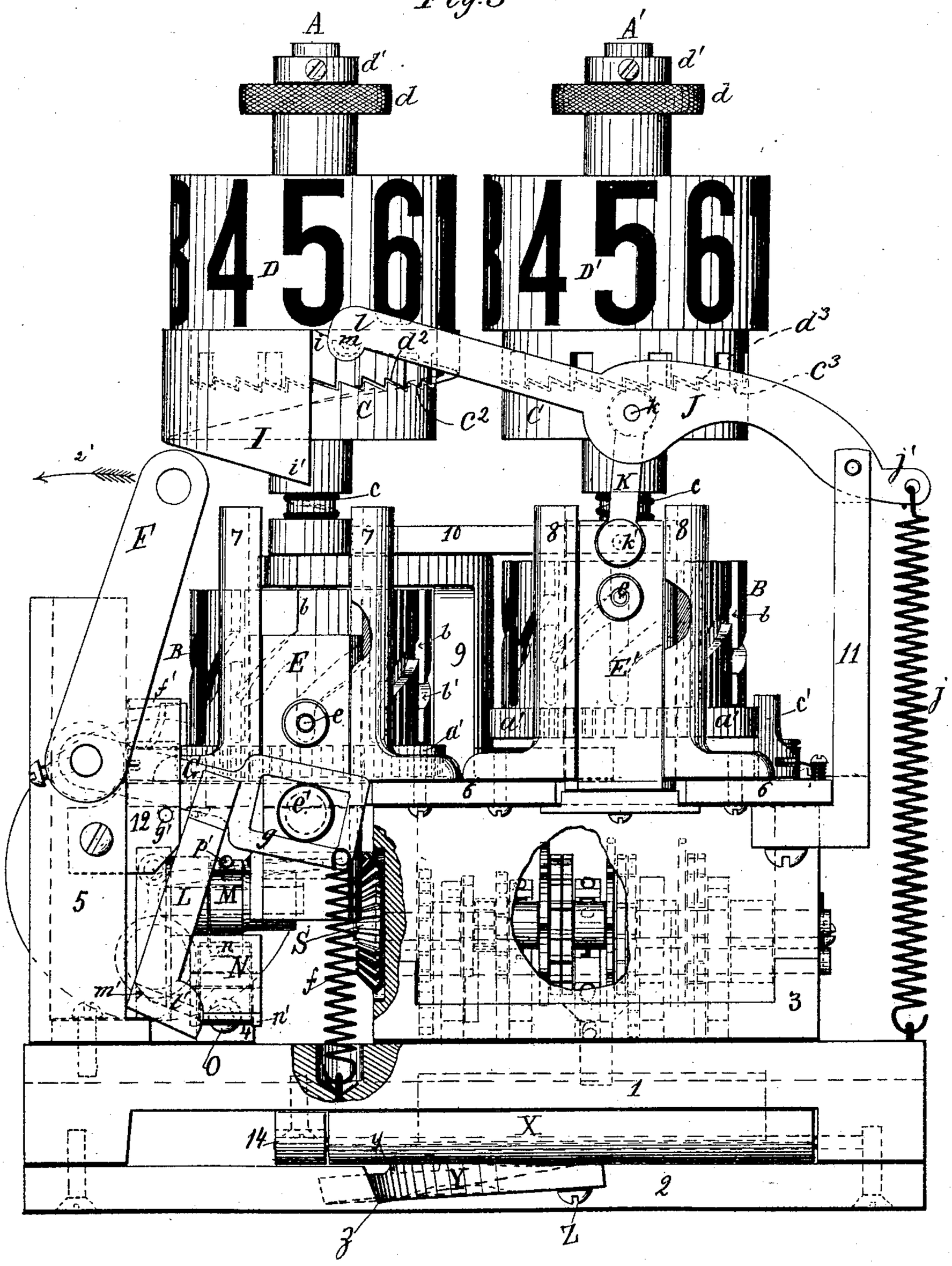
Fig. 3



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(No Model.) 5 Sheets—Sheet 4.

A. PFAFF.

FARE REGISTER.

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Fig. 4

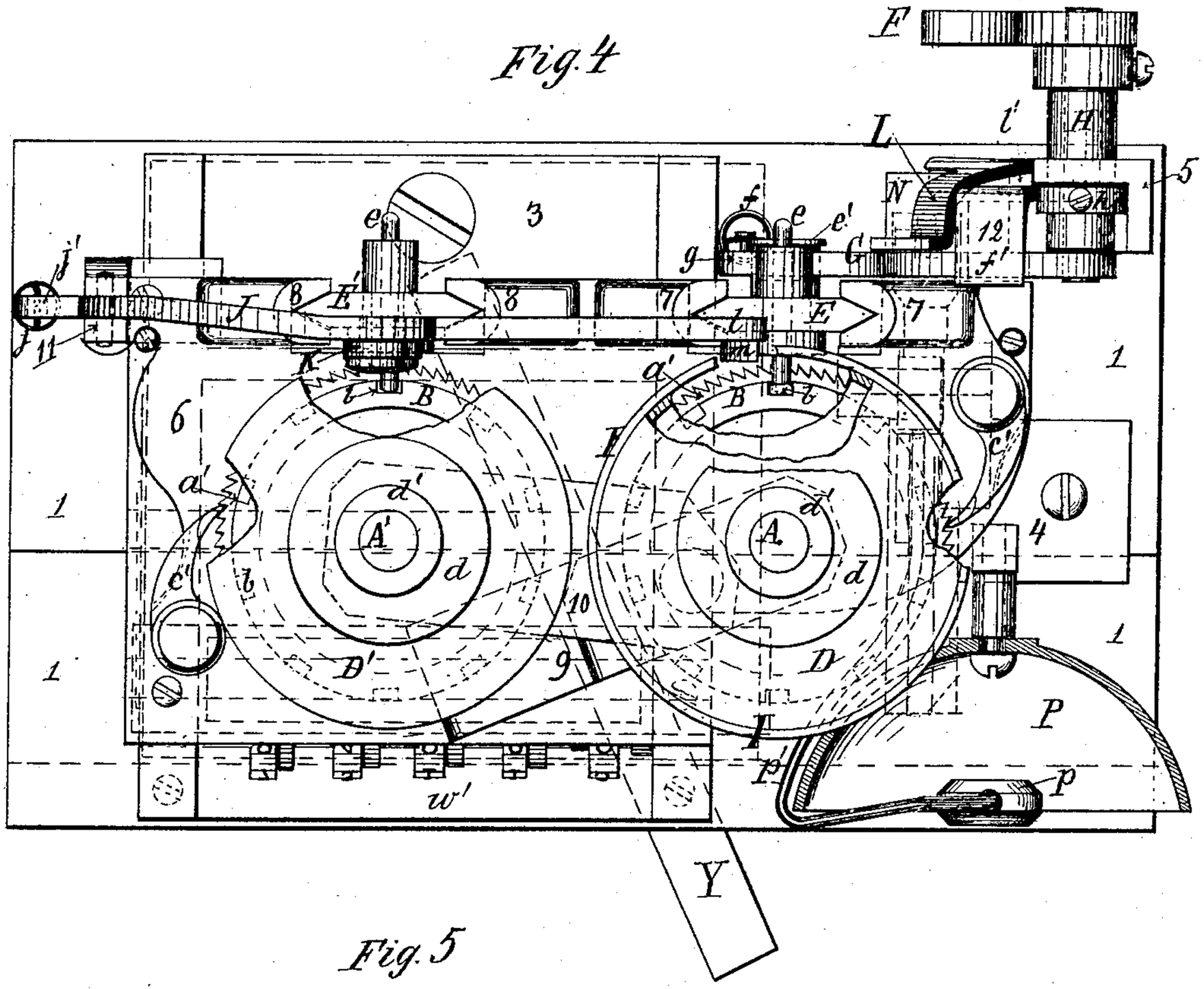


Fig. 5

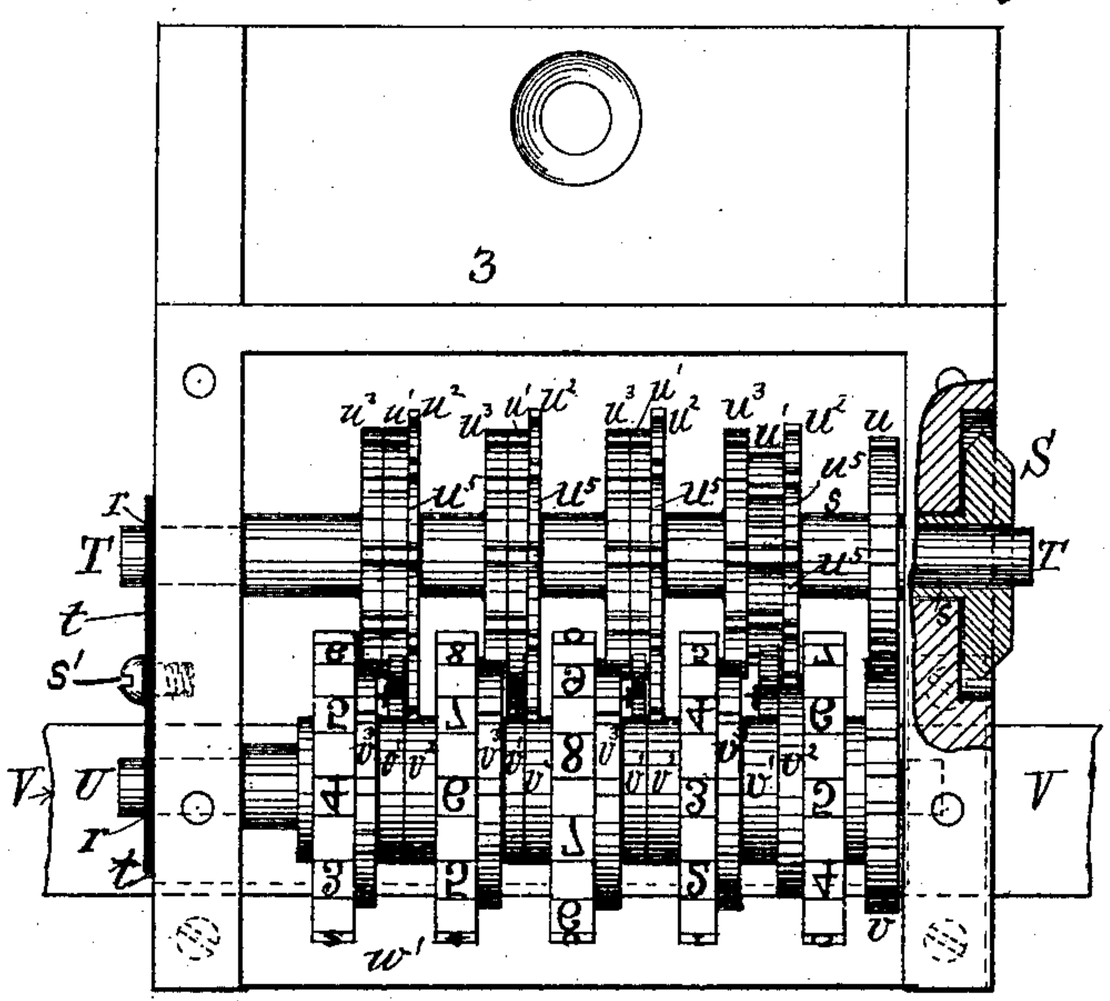
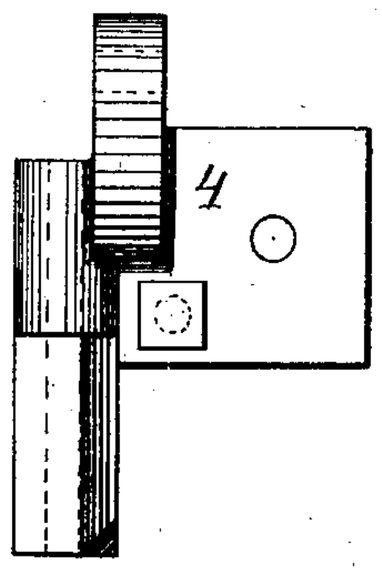


Fig. 6



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(No Model.) 5 Sheets—Sheet 5.

A. PFAFF.

FARE REGISTER.

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Fig. 7

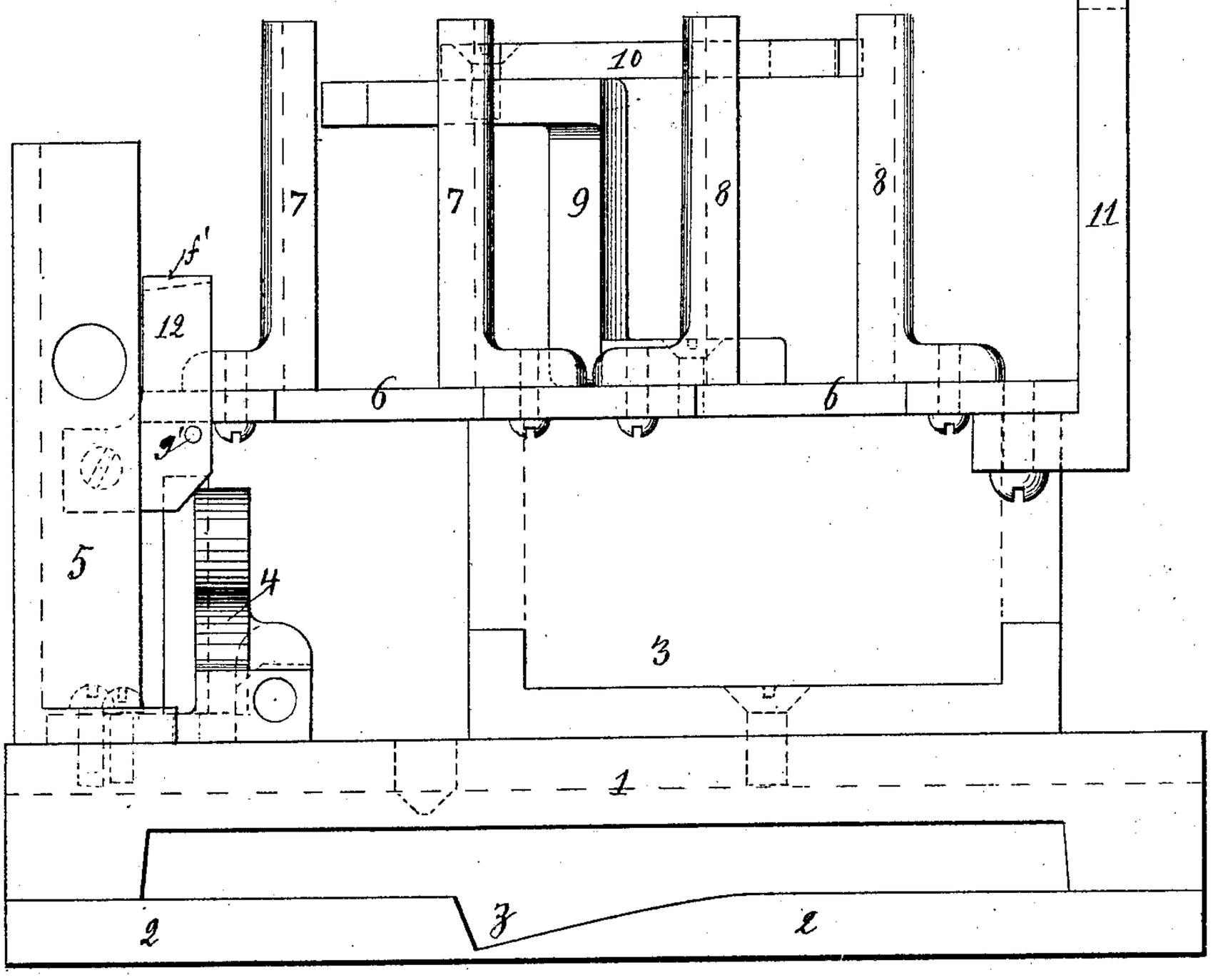

Fig. 9

Fig. 10.

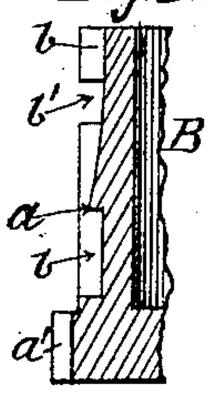

Fig. 8

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UNITED STATES PATENT OFFICE.

ALBERT PFAFF, OF NEWARK, NEW JERSEY.

FARE-REGISTER.

SPECIFICATION forming part of Letters Patent No. 549,328, dated November 5, 1895.

Application filed March 31, 1894. Serial No. 505,868. (No model.)

To all whom it may concern:

Be it known that I, ALBERT PFAFF, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Fare-Registers, of which the following is a specification.

My invention relates to apparatus for counting and registering the number of car-fares sold or passengers carried between two or more stations as well as the total number during a round trip; also for controlling tickets sold at the entrance of ferries, bridges, elevated railroads, theaters, &c.

The improved register, which will be hereinafter described and specifically claimed, one register counting up to, say, one hundred, and exposed to view, and which can readily be turned back to zero, is so combined with a second continuous counting and printing register that both are operated simultaneously by a movement of the same handle or lever, which also sounds a gong or bell for each unit registered. A platen operated by a cam or lever is arranged in juxtaposition to the type-face of the said continuous register, and an ink-tape is arranged adjacently to the said type-face, thus enabling the inspector at intervals of distance or time by placing a paper strip or card upon the platen and manipulating its lever to take a print of the last total figured up, at which time he also returns the exposed register to zero. By the differences in amount between the successive impressions taken he can always tell the number of fares or tickets registered between any two inspections.

In the accompanying five sheets of drawings, Figure 1 represents a front elevation, in full size, of my improved fare-register partly broken out, the casing to contain the machine, and which, as usual, exposes to view only the central front digits of the returnable register, being left out from the drawings. Fig. 2 is an end elevation of the same, seen in the direction of arrow 1 of Fig. 1 and partly broken out to show various details. Fig. 3 is a rear elevation partly broken out. Fig. 4 is a top or plan view of the same. Fig. 5 is a top view of the continuous register and the frame part supporting the same. Fig. 6 is a detail top view of the bracket which supports the bell, the bell-crank, the spring-bolt for returning and the stop or rest for retaining the said crank in the normal position. Fig. 7 is a rear elevation, as in Fig. 3, of the framework only. Fig. 8 is a top view (of parts seen in Fig. 7) of the upper plate of the frame with the guides thereon for the feed-slides and the upper bearings for the vertical feed-cylinder shafts. Fig. 9 is a cross-section on 9 9 in Fig. 1 of the platen-raising lever. Fig. 10 is a section along one of the vertical grooves of the feed-cylinder, showing its profile.

Although the construction of the framework is, of course, of minor importance so long as it supports all the working parts in their proper positions relatively to each other, I have shown separate views of the framework and its detachable parts in order to avoid crowding the main sheets with reference-letters and evade perplexity in recognizing the working details.

1 is the bottom plate of the frame, which is suitably cut away in the under side, extending from front to rear edge to leave room for the platen and a bar 2, secured across said opening and supporting the platen-operating lever. On plate 1 (see frame elevation, Fig. 7) are secured the frame 3 and bracket 4, Figs. 5 and 6, and bracket 5 for the hand-operating lever F. Upon frame 3 is secured the top plate 6, and upon the latter the two pairs 7 and 8 of feed-slides, the bracket 9, and plate 10 thereon, which bear the shafts A and A′ of the feed-cylinders B, and the angular bracket 11 for the lever, which transmits motion from the first feed-cylinder to the second. To the bracket 5 is secured the stop-plate 12, which limits the throw of the hand-operating lever F. 13 (see Fig. 1) represents brackets supporting the ink-tape rollers V, and 14 (see Figs. 1 and 2 under the bottom plate) is a pivoting or hinge lug for the platen. The above-numbered details are all stationary parts pertaining to the framework.

The shafts A A′ of the units and tens wheels of the trip-register rotate in vertical bearings in the top plate and brackets 6, 9, and 10, and between said vertical bearings are firmly secured on the said shafts A and A′ the feed-cylinders B, one of which is an exact counterpart of the other. Above the upper bearings in said plate 10 are the hubbed ratchet-wheels C, each having thirty teeth (or other multiple

of ten) upon its upper surface. The wheels C are splined, so that they can slide vertically but not turn upon the shafts, and are upheld by springs *c*, interposed between their hubs and the bearings.

D and D′ are the trip-registers or drums, bearing on their cylindrical surfaces the digits from "0" to "9," inclusive, spaced equally apart. These registers are provided with ratchet-teeth d^2 and d^3, equal in size and number to the ratchet-teeth c^2 and c^3 on the wheels C, on which latter they rest in meshing contact, and by which they are turned around when the shafts move. A hub extends above each drum, and is provided with a knurled thumb-wheel *d* for setting the register.

A set-ring or collar *d′* on the shaft above the thumb-wheel keeps the drum down in contact with the wheel C and the latter normally depressed upon the spring *c*.

The drum is loose upon the shaft in order to be turned by the thumb-wheel *d* to set the register back to zero after inspection, the upper teeth (when thus setting the drum) sliding over the inclines of the lower, while the wheel C recedes for the depth of the teeth by the elastic yielding of the spring *c*.

The shafts A A′ are rotated for the space of one-tenth of a turn or rotation at each upward stroke of their respective feed-slides E E′, working in the vertical guides 7 and 8, respectively, a pin *e* in the slide, passing on the upstroke throughout an oblique groove *b′* in the circumference of the feed-cylinder B, thus partly turning the latter by pushing its periphery laterally, but returning throughout a vertical groove *b*, and thus transmitting no motion on the downstroke.

Each feed-cylinder has ten of the said vertical grooves *b*, spaced equidistant and connected by oblique grooves *b′*. From the point where the upper end of an oblique groove enters a vertical groove the latter gradually grows shallower downward, until at *a* it abruptly resumes its full depth, leaving a shoulder, which forms an extension across the vertical groove of the upper wall of the lower end of the oblique groove where the latter issues from said vertical groove, as seen in Figs. 1 and 2 and in profile in Fig. 10.

The aforesaid pin *e* is mounted to slide horizontally through the vertical feed-slide and is held by the force of a small spring (see Figs. 2 and 4) in normal contact with the bottom of the grooves. Thus it will readily be understood that on the downstroke of the feed-slide the pin *e* does not move the cylinder, but simply travels in the vertical groove *b*, receding while passing the incline of the bottom and projecting again on leaving the shoulder or step *a* into the deeper part of the groove below the said step; but on the upstroke the pin *e* engages the abrupt oblique shoulder *a*, is thereby guided into the oblique groove *b′*, and while ascending in a vertical line presses against the upper wall of said groove, thereby pushing the periphery of the cylinder laterally until entering the upper part of the next vertical groove *b*, (where the grooves at their junction are of equal depths,) having then turned the cylinder one-tenth of a turn or rotation, and thereby the drum above one digit forward on the register. Ratchet-wheels *a′* on the cylinders B, toothed in multiples of ten and engaged by spring-pawls *c′*, pivoted on the plate 6, retain the cylinders in position until the next upward stroke of the corresponding slide E or E′.

The upward or feed stroke is effected by pulling the hand-lever F in direction of arrow 2, Figs. 1 and 2, and the return stroke by a spring *f*, whose lower end is secured to the bottom plate 1. The upper end of said spring is connected with the free end of an arm G, which is secured upon the same shaft as the lever F and by a yoke *g* is made to embrace and engage the opposite sides of a pin *e′*, secured to the feed-slide, thereby carrying the latter with it. The throw of the arm G, and also that of the lever F, is limited by the stops *f′* and *g′* upon plate 12, respectively above and below the arm G. (See Figs. 2, 3, and 7.)

The shaft of the lever F and arm G has its bearing in a sleeve H, fitted tightly in a hole in the bracket 5, (see Fig. 2,) and is further prevented from turning loose by a set-ring *h*, which is flat upon one side at *h′*, bearing against the flat surface of the bracket 5.

In order to effect one-tenth of one rotation of the second register-drum D′ for each complete rotation of the first drum D, the following means are provided: It will be noticed that when the feed-slides are in their normal positions, as in Fig. 3, slide E is at the lower limit of its stroke and slide E′ at its upper limit. Hence the cylinders B B being alike the slide E′ may be made to descend gradually, with its pin *e* traveling in a vertical groove *b*, (thus effecting no movement of its cylinder,) while the slide E completes ten feed-strokes and the drum D makes one rotation. This is accomplished by means of a helical cam I, secured circumferentially upon the ratchet-wheel C of the drum D. This cam has a dip or throw from *i* to *i′* equal to the stroke of the slide E′.

A lever J, fulcrumed upon the bracket 11 and kept normally elevated by the contractive tendency of a spring *j*, (stretched between the end *j′* of the lever and an eye-screw in the bottom plate *l*,) is connected to the slide E′ by a link K, pivoted at *k* and *k′* to the middle part of the lever and to the slide E′, respectively, and is provided at its end *l* with a pin *m*, bearing against the surface of the helical cam I. The force of the spring *j* thus keeps the slide E′ normally raised and the pin *m* against the cam.

It is evident that during its rotation the cam I gradually stretches the spring *j* and depresses the end *l* of the lever J and the slide E′ until on the completion of one rotation

(the slide E′ having reached its lowest limit) the pin *m*, liberated at *i′* from the lowest point of the cam I, is by the force of the spring *j* thrown up to the highest point at *i*, and by the same force the slide E′ makes an upstroke, its pin *e* passing through the oblique groove *b′* to the next vertical groove *b* of the cylinder, and the drum D′ makes one-tenth of a rotation, and so on continuously.

The counting of each digit by the operating-lever F, after being indicated on the register by a feed stroke of slide E, is announced automatically by a bell-tap sound operated by the following-described mechanism.

A pendant L, firm upon the yoked arm G, has at the inside, on its lower end, a jog or catch *l′*, which is cut away or chamfered, as at *m′*, which, on the downstroke of the arm G, engages, depresses, and then slides past the upper edge of a toe N, which is pivoted to the bell-crank M, fulcrumed on a horizontal pin m^2 on bracket 4. (See Fig. 2.) A spring-pressed pin O, sliding in a socket in bracket 4, bears against a butt m^3 on one arm of the bell-crank M and keeps it normally in the position shown in the drawings, (see Fig. 2,) a butt m^4 on the other arm being thereby pressed down upon the surface of the bracket 4, thus limiting further movement by the force of the spring of the pin O at a point which stops the striker *p* nearly, but not quite, in contact with the bell P. The bell is secured by a stud and screw to bracket 4, and the striker in the bell is fast upon one end of a wire *p′*, bent around the edge of the bell without touching it, its other end being soldered or otherwise firmly secured to the bell-crank. The toe N is held in normal position, as in Fig. 2, by a small spring-pin *n*, interposed in a socket in the bell-crank between the same and the back of the toe N above the fulcrum of said toe, the lower end of the toe bearing against a stop *n′* upon the bell-crank. The toe N is undercut below its point, so that its upper and lower horizontal front edges are about equidistant from the fulcrum of the bell-crank. This is done to insure clearance of the jog *l′* before the latter has reached the extreme limit of its throw in depressing the toe.

The operation will now readily be understood. In pulling the hand-lever F in the direction of the arrow 2 the jog *l′*, rising, touches the face of the toe N, which, yielding to the touch, simply turns on its pivot until the jog has passed the toe-point, when it resumes its normal position. When the lever F is let go, the jog *l′*, descending, by the force of spring *f* (and in a circular path around the fulcrum of lever F and arm G) engages by its undercut end *m′* the front top edge of the toe N and depresses the same until having passed it in sliding contact thereby, thus compressing also the spring of pin O, oscillating the bell-crank, and raising the striker. The toe N being released from the jog *l′*, the spring-pin O throws the bell-crank back in normal position, and the wire *p′*, vibrated by the sudden impulse, causes momentary impact by the striker, which sounds the bell. The spring of slide-pin O is of course weaker than the spring *f*.

Motion is imparted to the continuous counting or permanent and printing register (mounted in the frame 3) by a pair of miter-wheels, one R of which is fast upon the lower end of the shaft A of the first feed-cylinder, which shaft projects below the frame-plate 6, and the other wheel S is fast upon a sleeve or tubular wheel-hub *s*, which rotates through one of the side walls of the frame 3, and also serves as a bearing for one end of a stationary shaft T, whose other end goes through the opposite side wall of frame 3. (See Figs. 1 and 5.) At the side of and parallel with the shaft T, but at a less elevation, is another shaft U, also supported in the two opposite side walls of frame 3. The shafts T U are secured against turning and sliding by slotting them crosswise at *r*, lodging a strip of metal plate *t* in the two slots, and securing said strip to the frame 3 by a screw, as at *s*.

On the hub or sleeve *s* of the miter-wheel S is secured a cog-wheel *u*, which meshes into a larger cog-wheel *v*, on whose elongated sleeve-hub, rotating on the shaft U, are secured the units-wheel or first type-wheel of the printing-register, the tens-registering wheel *v′*, which operates the register by means of said wheel *v*, and the wheel v^2. For the sake of space and convenience the type-wheels are smaller in diameter than the feed-cylinder B. Hence the sizes of the wheels *u* and *v* must be different and so proportioned that the units type-wheel shall move through the smaller space of exactly one-tenth of its circumference for each larger space between two consecutive vertical grooves *b* of the feed-cylinder B.

In order to transmit to the second or tens type-wheel a movement of one-tenth of one rotation for each complete rotation of the first type-wheel, the tens-recording wheel *v′* has only one tooth + and consequently makes just one complete turn to engage and pass one of the ten teeth of the cog-wheel *u′*, which it turns upon shaft T. On the elongated sleeve-hub of wheel *u′* are also secured the wheel u^2 and the cog-wheel u^3, which latter has ten teeth (or a multiple of ten) and meshes into another exactly like wheel v^3 of the second or tens type-wheel on shaft U. To prevent accidental displacement—for instance, by jar or the momentum of rapid feed movement—of a tooth of wheel *u′* beyond the position in which left by the tooth + of the wheel *v′* while the latter turns out of gear, the wheel u^2 has on its periphery ten equally-spaced concave spaces u^4, curved to fit snugly and bear one at a time against the cylindrical smooth wheel *v′*, thus allowing the latter to turn, while the wheel u^2 is held stationary until the tooth + again gets into

gear. At that moment the point formed by the junction of two adjacent concaves u^5 enters and turns freely into a groove or cavity v^4 in the surface of wheel v' until the tooth + has again ceased to act after turning the wheels far enough to bring the next concave space u^5 in bearing contact with the disk or wheel v'.

The gearings which transmit motion or carry the tens between the second type-wheel and the third, the third and fourth, and the fourth and fifth, respectively, are only duplicates of that described between the first and second type-wheels. Each set of wheels $u'\,u^2\,u^3$ is fast upon the same sleeve and rotates upon the shaft T independent of the other similar sets, and upon the sleeve-hub of each type-wheel is fast a set of the wheels $v^3\,v'\,v^2$, which rotates on shaft U independent of the other similar sets. Of each set on shaft T the wheels $u'\,u^2$ work, respectively, against the wheels $v'\,v^2$ of one type-wheel set on shaft U and the wheel u^3 against the first wheel v^3 of the next type-wheel set.

The printed copies or record of the reading of the continuous counting and printing register is taken by impression against the face of the row of digits at the time in line vertically underneath and parallel with the axis of shaft U by means of the following device: An ordinary inked tape V, adjustable on rollers w, is arranged underneath and in proximity to the type-face line. The tape is held straight and prevented from sagging by clamping its outer edge lightly between two angular strips w' of metal, secured across the open front of the frame 3, by screws beneath, to its side walls, as seen in Figs. 1, 2, 4, and 5. Subjacent to the type and type-face is a rubber cushion W, secured upon the platen X, which latter is pivoted in the bottom plate 1 and lug 14, and by raising said platen the cushion (and a strip of paper placed thereon to receive the print) may be brought up against the tape and this latter against the type. The platen X rests upon a lever Y, pivoted to it at Z, and whose handle end is supported by the cross-bar 2 under bottom plate 1, the handle projecting in front of said bar accessible to manipulation. The front edge of the platen is undercut, as at x', and the adjacent surface of the bar 2 is cut away, as at z, thus forming between them a space converging to the left—for instance, as in Fig. 1—and diverging toward the right, where the end of the cut leaves a shoulder, which limits the releasing movement of the lever Y in lowering the platen X to its normal position after taking an impression. The lever Y is undercut to suit the incline z and has above at y a rise increasing toward the right to suit the upper incline x', thus appearing in cross-section, as in Fig. 9, like a truncated wedge, by moving which toward the left the platen is "wedged away," so to speak, from the stationary bar 2 and pressed up against the type, and by moving toward the right the platen is withdrawn from the type, its gravity being free to act and cause it to drop.

I claim as of my invention—

1. In a fare register, the combination, with one or more feed cylinders having vertical grooves in the periphery thereof, and joined by oblique grooves, of one or more trip registers or numbered drums, and mechanism engaging with said grooves in said feed-wheel or wheels, to operate the same when in engagement with said oblique grooves, and connected with and to rotate said trip registers or numbered drums, substantially as and for the purposes set forth.

2. In a fare register, the combination, with one or more feed cylinders having vertical grooves in the periphery thereof, and joined by oblique grooves, of one or more trip registers or numbered drums, and mechanism engaging with said grooves in said feed wheel or wheels, to operate the same when in engagement with said oblique grooves and connected with and to operate said trip registers or numbered drums, comprising therein, a slide adapted to reciprocate in a guide, an arm pivotally connected with said slide, and a lever for operating said arm, substantially as and for the purposes set forth.

3. In combination with a shaft of a counting register: a feed cylinder B fixed upon the shaft and having longitudinal grooves b joined by oblique grooves b'; a spring-pin or projection e engaging said grooves and guided to travel reciprocally in always the same line at right angles to the rotation of the cylinder; and means substantially as described for effecting the travel of said pin, each groove b having a gradual rise ending abruptly, as at a, into one end of an oblique groove b', and the other end of the latter entering evenly the next groove b.

4. In combination, with the shaft of a trip register having mounted thereon a feed-cylinder B provided longitudinally and obliquely with joined grooves $b\,b'$ constructed as described: stop-wheel and pawl $a'\,c'$ to prevent back action: slide, as E, traveling, in stationary guides, at right angles to the rotation of the cylinder and carrying a spring-pin e in engagement with said grooves; a hand lever F; an arm G firm with the hand lever and movably connected (as by yoke and pin $g\,e'$) to and to operate the slide; and a spring f for returning and retaining the slide in its normal position.

5. In combination, with a trip register or numbered drum D having a full-turn helical cam I, and with another drum D′ mounted on a shaft A′ having feed-cylinder B constructed and actuated by slide E′ and spring-pin e as before described: a pivoted lever J having a pin or projection m to engage the said cam; a link K pivoted with one end, as at k', to the slide E′ and with the other end to the lever J at a point k between the fulcrum and the pin m; and a spring j normally raising

said lever; for the purpose of transmitting motion from the former index drum to the latter.

6. In a fare register, the combination, with a feed cylinder having vertical grooves in the periphery thereof, and joined by oblique grooves, of a slide, as E, traveling in a stationary guide, a pin on said slide adapted to slide in said vertical grooves without rotating said feed cylinder, but in operative engagement with said oblique grooves, a pin e' on said slide, a yoke-arm G operatively connected with said pin e', and an operating lever connected with said yoke-arm to operate said slide, substantially as and for the purposes set forth.

7. In a fare-register, the combination, with a feed cylinder having vertical grooves in the periphery thereof, and joined by oblique grooves, of a slide, as E, traveling in a stationary guide, a pin on said slide adapted to slide in said vertical grooves without rotating said feed cylinder, but in operative engagement with said oblique grooves, a pin e' on said slide, a yoke-arm G operatively connected with said pin e', and an operating lever connected with said yoke-arm to operate said slide, a gong P, and a jog l' fixed firmly to move with said operating lever, a bell crank carrying at one end a striker and having a stop at the other end, a pivoted toe N and a pin for actuating the same, said parts, being arranged and operating for the purpose of raising said striker on the return stroke of said operating lever and slide E, substantially as and for the purposes set forth.

8. The combination (on the stationary shafts T U secured to frame 3) of: the shaft T, having separate free-turning sets of wheels mounted thereon, each set consisting of three wheels, viz. a lock-wheel u^2 and two cog wheels u', u^3 secured to move together; the shaft U, having also separate free-turning sets of wheels mounted thereon, each set consisting of four wheels, viz. a cog wheel, as v^3, a type wheel, a lock-wheel v^2 and a feed wheel v', secured to move together, the wheels u', u^2, working, respectively, against the wheels v', v^2, of one type-wheel-set and the wheel u^3 against wheel v^3 of the next type-wheel-set; the cog wheel u meshing with the first cog wheel v of the type wheel shaft and secured on the elongated hub s of the miter wheel S revolving on shaft T; and the miter wheel R meshing with wheel S and secured upon the units shaft A of the primary index; for the purpose of transmitting motion to the printing index of one unit-count for each unit counted on the primary index.

9. In a fare-register, the combination, with a feed cylinder having vertical grooves in the periphery thereof, and joined by oblique grooves, of a slide, as E, traveling in a stationary guide, a pin on said slide adapted to slide in said vertical grooves without rotating said feed cylinder, but in operative engagement with said oblique grooves, a pin e' on said slide, a yoke-arm G operatively connected with said pin e', and an operating lever connected with said yoke-arm to operate said slide, a gong P, and a jog l' fixed firmly to move with said operating lever, a bell crank carrying at one end a striker and having a stop at the other end, a pivoted toe N and a pin for actuating the same, said parts being arranged and operating for the purpose of raising said striker on the return stroke of said operating lever and slide E, a butt m^3 and a spring-actuated sliding bolt O actuating said butt, for the purpose of bringing down the striker with impulse to sound the gong, when the jog l', after depressing the toe N, has released it, and thereby return said bell-crank to its normal position, substantially as and for the purpose set forth.

10. In a fare-register, the combination with one or more feed cylinders having vertical grooves in the periphery thereof, and joined by oblique grooves, of one or more trip registers or number drums, mechanism engaging with said grooves in said feed wheel or wheels to operate the same when in engagement with said oblique grooves and connected with and to operate said trip registers or numbered drums, a continuous counting and printing register, and means for operating the same, connected with the shaft of one of said feed cylinders, substantially as and for the purposes set forth.

11. In a fare-register, the combination with one or more feed cylinders having vertical grooves in the periphery thereof, and joined by oblique grooves, of one or more trip registers or number drums, mechanism engaging with said grooves in said feed wheel or wheels to operate the same when in engagement with said oblique grooves and connected with and to operate said trip registers or number drums, a continuous counting and printing register, and means for operating the same, connected with the shaft of one of said feed cylinders, and consisting essentially, of a miter wheel R on the shaft of said feed cylinder, and a miter wheel S on the shaft of said continuous counting and printing register, substantially as and for the purposes set forth.

Signed at Dayton, in the county of Montgomery and State of Ohio, this 15th day of March, A. D. 1894.

ALBERT PFAFF.

Witnesses:
WILLIAM JAHN,
JOHN HANITCH.