(Model.)

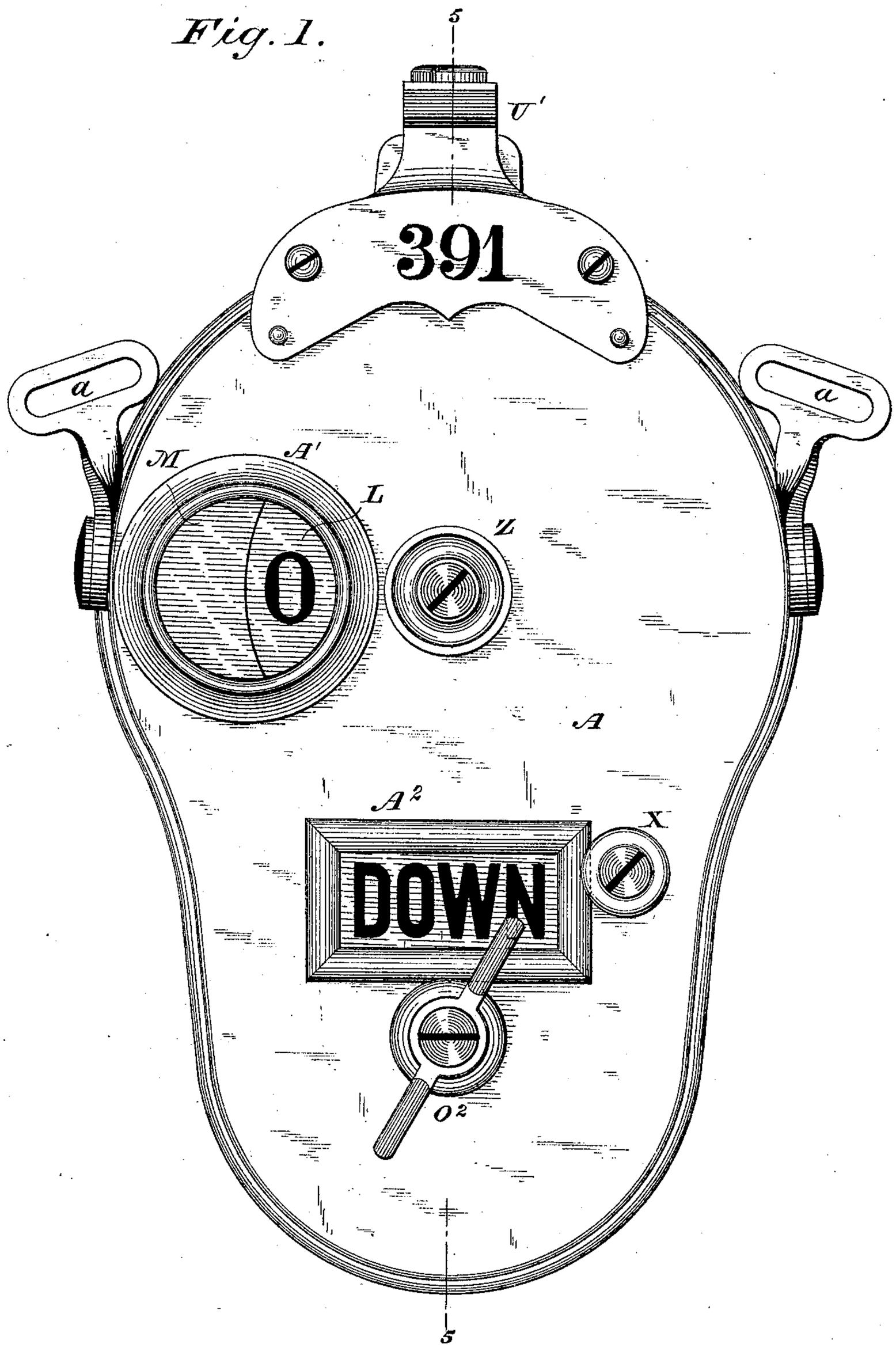
4 Sheets—Sheet 1.

J. B. BENTON.

FARE REGISTER.

No. 252,417. Patented Jan. 17, 1882.

Fig. 1.



WITNESSES

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(Model.)

4 Sheets—Sheet 2.

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Fig. 2.

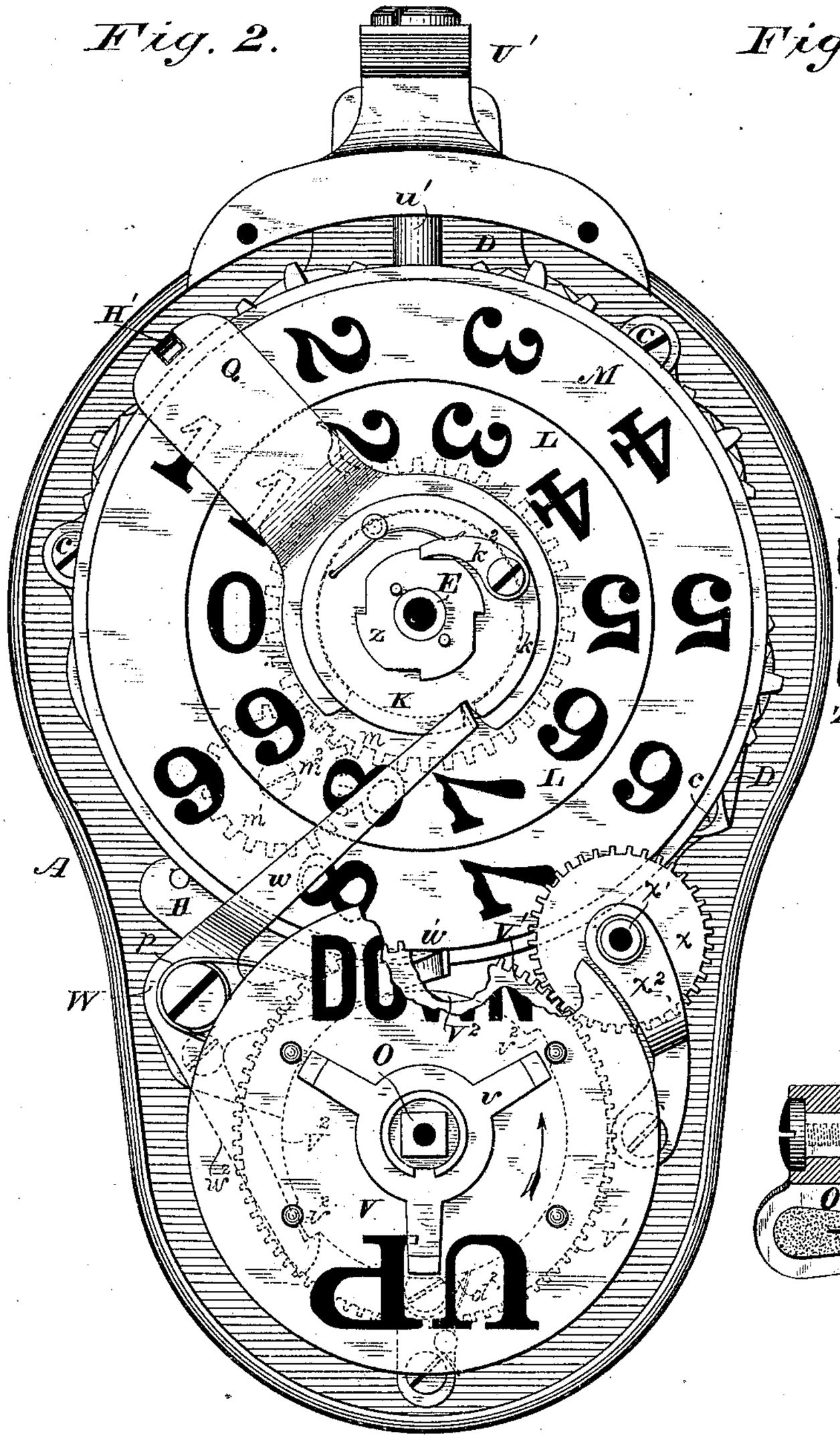
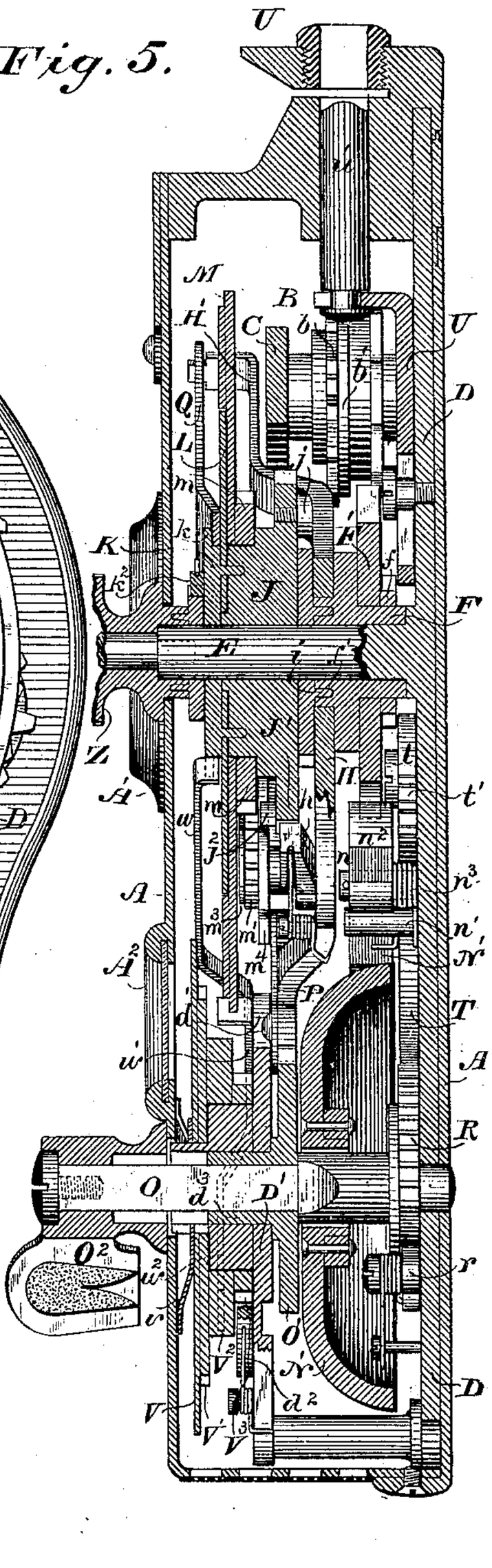


Fig. 5.



WITNESSES

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(Model.)

4 Sheets—Sheet 3.

J. B. BENTON.

FARE REGISTER.

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Fig. 3.

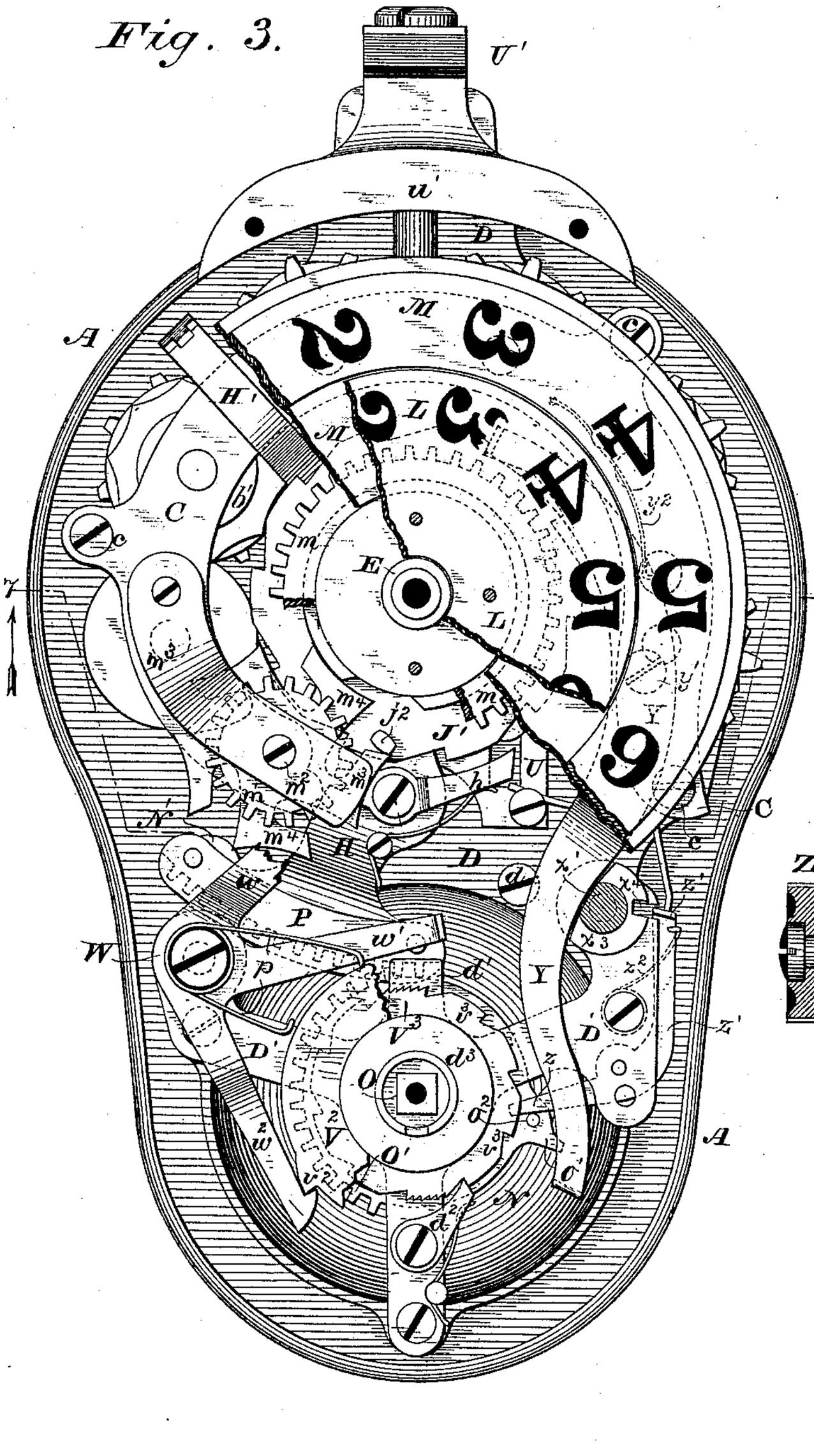
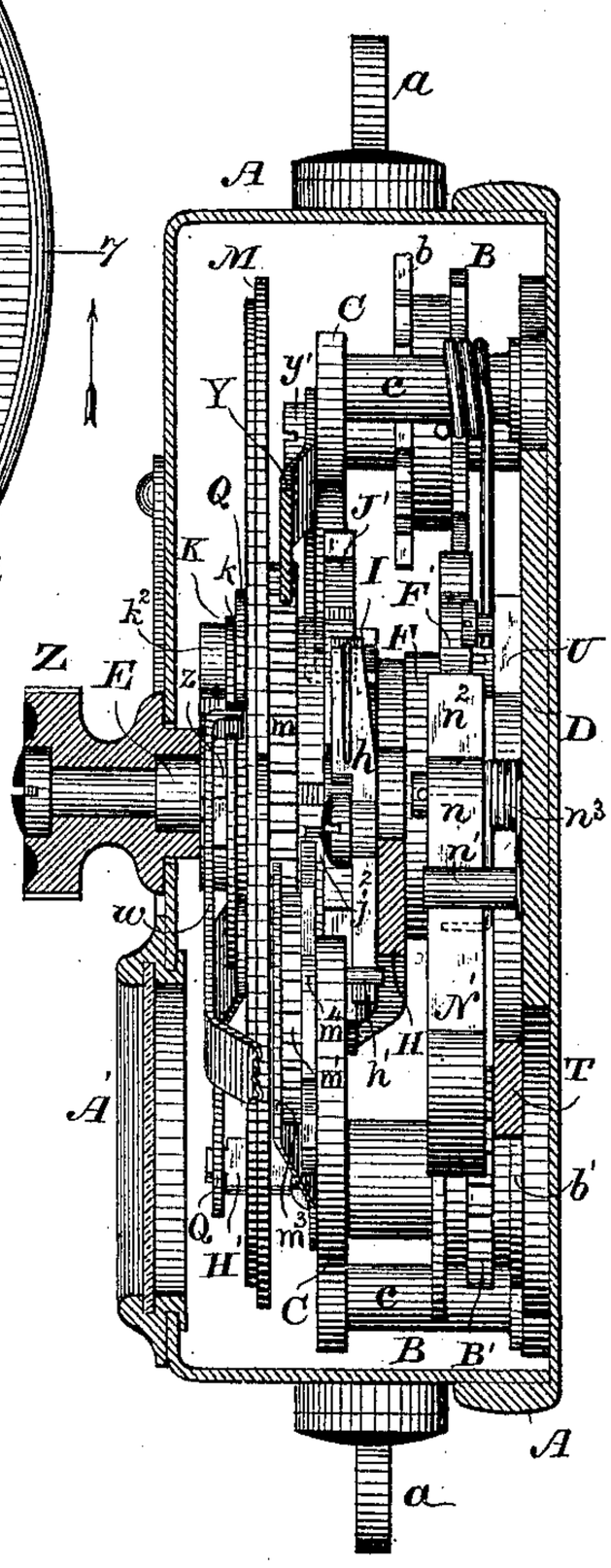


Fig. 7.



WITNESSES

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(Model.)

4 Sheets—Sheet 4.

J. B. BENTON.

FARE REGISTER.

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Fig. 4.

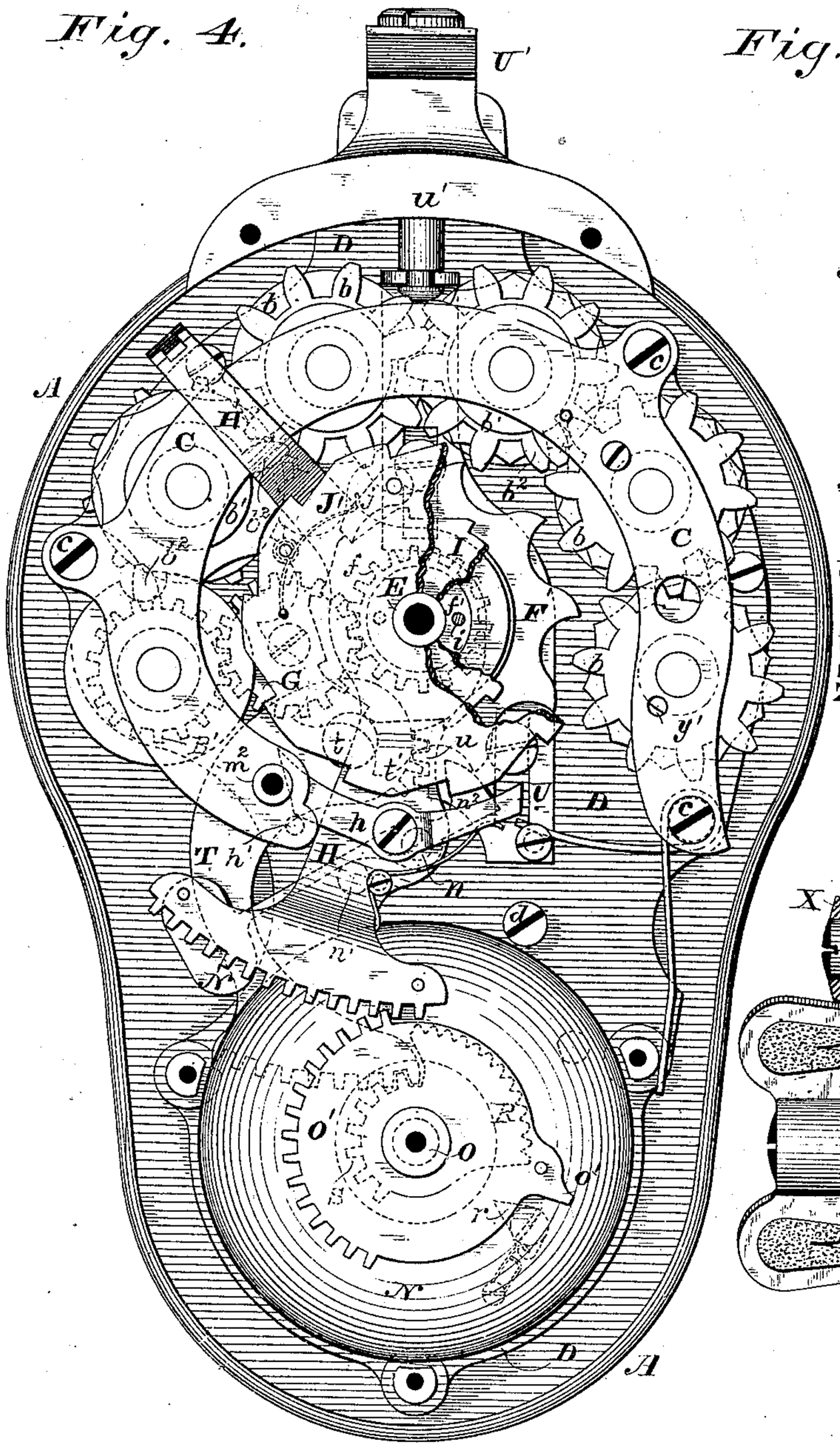
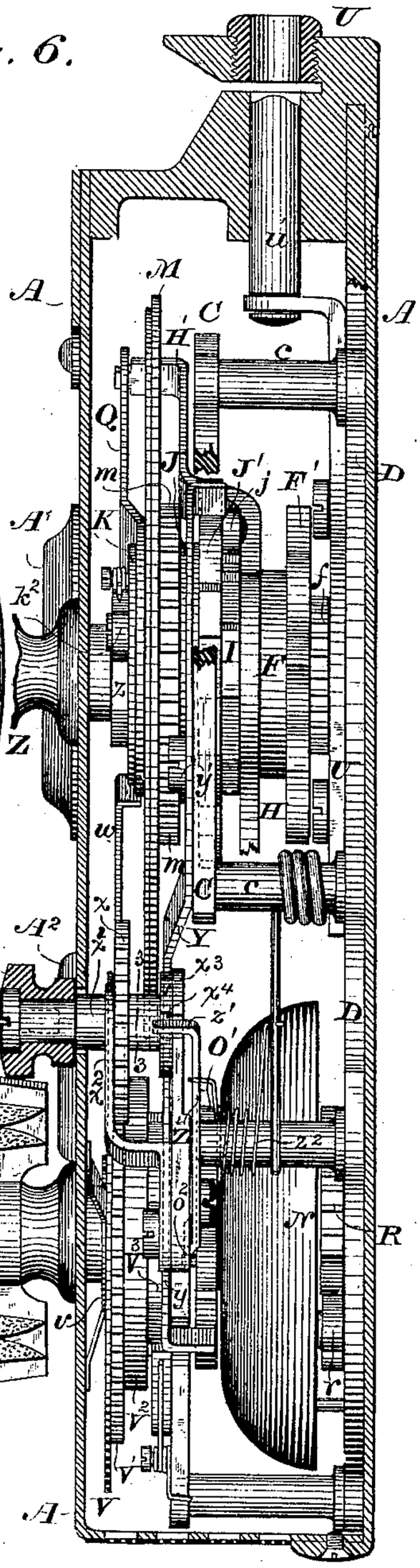


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN B. BENTON, OF NEW YORK, N. Y.

FARE-REGISTER.

SPECIFICATION forming part of Letters Patent No. 252,417, dated January 17, 1882.

Application filed August 22, 1881. (Model.)

To all whom it may concern:

Be it known that I, JOHN B. BENTON, of the city, county, and State of New York, have invented certain new and useful Improvements in Fare-Registers, of which the following is a specification.

My invention relates to registering machines of the class organized for the purpose of registering, counting, or tallying the number of fares received by conductors or collectors on passenger-cars or vehicles, the conductor or collector being required, as each fare is received, to operate the machine, which operation registers or tallies the fare and sounds an alarm to notify those in the car that a registration has been properly made.

My invention more especially belongs to fare-registering machines of the duplex type—that is to say, to registering-machines in which are combined two or duplex sets of registering mechanisms and an alarm apparatus, simultaneously operated by a common actuator or prime mover. One of said registering mechanisms, which is what is commonly called a "general" or "permanent" register, is for the purpose of permanently and consecutively registering the fares collected or received on a great number of trips or partial trips of the car or vehicle, it being capable of consecutively registering or tallying a large number of fares, so as to show in the aggregate the fares collected on a large number or series of trips, while the other of said registering mechanisms, which is what is commonly called a "trip" or "adjustable" register, is for the purpose of consecutively registering the fares collected on each trip or direction of travel only of the car or vehicle, the said trip-register having the capacity of being set to zero or the starting-point at the beginning of each trip or direction of travel without disturbing the integrity of the record of the general register, to commence tallying or registering anew.

My said invention is designed more particularly as an improvement upon the duplex register patented to me March 2, 1880, as No. 225,044. Its object is to provide a fare-registering machine more thoroughly reliable and effective in the prevention of fraud and cheating or pilfering on the part of the conductor, and to compel him either to render a true and faithful account or be detected in his dishonest practices; and it consists in certain new constructions, organizations, and combinations of devices which are particularly recited at the close of this specification.

In the machine shown in my said Letters Patent No. 225,044 there are embodied a general register, a trip or adjustable register, an alarm, a punch, mechanism for simultaneously operating said registers, alarm, and punch, and a direction-indicator. My present machine also embodies in its organization all these instrumentalities, and it resembles closely in some respects the machine patented to me as above stated.

The accompanying drawings show all my present improvements as organized in the best way now known to me. Some of my said improvements, however, may be used without the others and in registering-machines differing somewhat from the one organized as represented in said drawings.

In said drawings, Figure 1 represents a face or front view of my improved fare-register, the trip-register being shown as at zero or the starting-point, and the direction of travel being indicated as down. Fig. 2 is a similar view of the apparatus with the face plate or cover removed and part of the direction-indicator plate broken away to show the parts beneath. Fig. 3 is a similar view with a portion of the trip-disks broken away or removed to show the parts beneath, and with the direction-indicator plate and a portion of its carrying and actuating mechanism also broken away; and Fig. 4 is a similar view with the trip-disks and direction-indicator plate removed and a portion of the works or actuating parts below the trip-disks broken away to more clearly show the operative parts of the machine below said disks and plate. Fig. 5 is a longitudinal central section through the machine on the line 5 5 of Fig. 1. Fig. 6 is a longitudinal section through the casing, showing an edge or side view of some of the inclosed operative parts of the machine; and Fig. 7 is a transverse section through the apparatus on the line 7 7 of Fig. 3, looking in the direction indicated by the arrows in said figure.

The inclosing casing A is preferably of a flat, tapering, curvilinear form, like the casing of

my register patented as hereinbefore mentioned, and the operative parts of the mechanism inclosed by the casing are organized, in the present instance, upon the same general principle as those shown in said patent. The two registering mechanisms and the punch are arranged in the upper enlarged end of the casing, while the alarm mechanism, the actuator of the machine, and the direction-indicator are arranged in the lower and smaller end of said casing. The casing is provided with the usual pivoted loops, *a a*, by which to attach the register to or suspend it from the person of the conductor or collector.

The registering mechanism proper consists of two sets: first, a trip or temporary register to consecutively record, count, or tally the number of fares collected on each trip or direction of travel of the car or vehicle, said trip-register having the capacity of being readily set or adjusted to zero or the starting point; and, second, a general, permanent, or continuously-counting register to consecutively record, count, or tally the whole number of fares collected on all or a great number of trips, said general register showing the aggregate of the fares collected, and being incapable of the resetting or adjustable movements of the trip-register.

The general register is composed of a train or series of registering-wheels, B, (six in number in this instance, arranged in a semicircle,) of well-known construction, and preferably operating on the principle of the well-known Geneva stop-wheels. Said wheels are mounted upon and turn with suitable shafts or axles having their bearings in front in a suitable horseshoe-shaped supporting-plate, C, fixed upon posts *c* rising from a base-plate, D, upon which the operative parts of the register are mounted, (or from the back plate of the machine, if preferred,) and in rear in said base-plate D, or in the said back plate of the register-casing. This general or continuously-counting register is capable of registering or tallying a large number of fares. The first wheel registers units, the next tens, the next hundreds, and so on, each wheel except the units-wheel being provided with ten teeth or notches, *b*, and all except the last wheel with a plate, *b'*, having an actuating tongue or projection, b^2, which at every complete revolution of its wheel turns the next highest counting-wheel the distance of one tooth, or one-tenth of a revolution. The construction and operation of this class of multiplying-registering mechanism are so well understood as not to need elaborate description, and the concentric arrangement of the wheels is clearly shown in my aforesaid patent. The rear ends of the shafts of the said register-wheels extend through the base-plate D and back plate of the casing, and lie flush with the exterior surface of said back plate, as shown and described in my aforesaid Letters Patent, being preferably provided each with a notch or mark in lieu of index-fingers or pointers, which notches, in connection with suitable dials (graduated to correspond with the teeth in the wheels) formed upon the casing, one dial for each wheel, enable the indications of the general register to be read off at a glance and obviate all danger of successful tampering with or manipulation of said register.

Within the central space created by the concentric or semicircular arrangement of the general register-wheels B is mounted a shaft, axle, or arbor, E, the rear end of which is firmly fixed or fastened to the stationary supporting base-plate D, which plate is firmly fastened by suitable devices—screws *d*, for example—to the inner side of the back plate of the register-casing. Upon this fixed arbor or shaft E, next the base-plate, is mounted a circular hub or wheel, F, having the capacity of turning around said arbor as an axis when actuated in the process of counting, as will be presently explained. Said hub F carries, near its inner or rear end, a toothed or spur wheel, *f*, firmly fixed thereto or forming part thereof. Said spur-wheel *f* meshes with the teeth of an idle spur-wheel, G, turning upon a stud-axle projecting from the base-plate D, and said idle-wheel G in turn meshes with a spur-wheel, B', fixed to the shaft of the units-wheel B of the general register and actuates said units-wheel in the process of registering. Said hub F is also provided with a ratchet-wheel, F', either firmly fixed to or formed with the hub above or in front of the spur or gear wheel *f*, said ratchet-wheel F' having ten teeth or notches in the present instance, and being for a purpose hereinafter explained.

The inner or upper end of a sector-arm, H, is fitted over the central arbor, E, upon the reduced cylindrical front end of the hub F, so that said sector-arm may be turned or vibrated about said hub as an axis. This sector-arm H carries the driving or actuating pawl *h* of the register. In the face of said front end of the hub F are formed two or more holes or pits, *f'*, as shown in Fig. 5, for the reception of two or more locking lugs or pins, *i*, projecting from the back face of a ratchet-wheel, I, fitted upon the central arbor, E, in front of the hub F, so that a firm connection between said ratchet-wheel and said hub is formed to lock the two together, and so that when the ratchet-wheel I (which has ten teeth) is turned about the arbor E in the counting process hereinafter explained said hub F will be caused to turn correspondingly to communicate motion to the general register-train.

Mounted upon the arbor E so as to turn thereon in front of the ratchet-wheel I of the hub F is a hub, J, carrying at its inner or rear end a ratchet-wheel, J', either formed with the hub or securely fastened thereto. Said ratchet-wheel J' has ten teeth in its edge, and is the actuating ratchet-wheel of the register, with which the actuating or driving pawl *h* of the sector-arm H engages, as will be explained.

Upon the rear face of the hub J, or of its ratchet-wheel J′, a pawl, *j*, is pivoted, (see Figs. 4, 5, and 6,) which pawl, when the hub is turned by the actuating-pawl *h* in the counting direction, engages with the teeth of the ratchet-wheel I, so as to turn said wheel and the hub F, while, when said hub J is turned backward in the opposite direction, said pawl *j* slips over the teeth of the ratchet-wheel I, and has no effect thereon.

The front face of the hub J is provided with holes or pits for the reception of pins or lugs projecting from the rear face of a circular cap-plate, K, so that said hub and cap-plate will be locked together as against independent turning movements. Interposed between the front face of the hub J and said cap plate K is the units-disk L of the trip-register, said units-disk being firmly held or locked to the said hub so as to turn with it by the pins of the cap-plate K, which pass through the disk on their way to the openings or pits in the face of the hub. (See Fig. 5.)

Immediately back of the units disk L, and surrounding a reduced cylindrical portion of the hub J, so as to turn freely about said hub as an axis, is the tens-disk M of the trip-register, which is somewhat larger in diameter than the units-disk L. Formed with or secured to the rear face of the tens-disk M of the trip register is a gear wheel or ring, *m*, and this gear-wheel meshes with a spur-pinion, *m′*, mounted to turn freely upon a stud-axle, m^2, rising from one end of the horseshoe supporting-plate C, a cover-plate, m^3, being fastened down over said wheel to keep it in place and in gear with the wheel *m*.

Connecting with or forming part of the pinion-wheel *m′* is a notched wheel, m^4, the ends of the arms of which, or of its periphery, are hollowed out (like a Geneva stop-wheel) to fit closely the circumference of the cylindrical portion of the hub J, between the ratchet-wheel J′ and the gear-wheel *m* of the tens-dial of the trip-register, whereby said wheels *m′* m^4 will be locked from turning, except when positively operated by a lug or pin, J^2, on the front face of the ratchet-wheel J′, which lug engages one of the notches in said wheel m^4 at each revolution of the ratchet-wheel J′ to turn the tens-disk one-tenth of a revolution. It will thus be understood that the tens-disk is partially turned around the hub J of the units-disk once for each entire revolution of said hub through the medium of the lug or pin j^2, the wheel m^4, and the gear-wheels *m m′*.

The units-disk L is smaller than the tens-disk, and is provided on its front face, around the edge, with the figures 0 to 9, inclusive, while the tens-disk M is provided with the numerals 1 to 9, inclusive, a blank space being left between 9 and 1, as usual.

For convenience in reading or inspecting the indications of the trip-register, and to enable the passengers to see that the fares are properly registered, I provide a window or opening, A′, in the front plate of the casing and cover it with some transparent substance, such as glass, to prevent tampering with the disks, or with the mechanism which governs and controls their movements.

Below the registering mechanisms, and in the smaller end of the casing, is secured the alarm apparatus, which preferably consists of a stationary bell, N, and a bell-hammer, N′, the arm or lever of which is pivoted at *n* to a suitable post or stud upon the base-plate D, and is normally held slightly out of contact with the bell by a suitable post or projection, *n′*. The hammer is actuated by the teeth of the ratchet-wheel F′, fixed upon or formed with the hub F of the general register, as before described, the end n^2 of the hammer-arm, which is acted upon by the teeth of the ratchet-wheel to raise it against the tension or force of an impelling-spring, n^3, being formed so as to act as a detent or dog to prevent back movement of the hub F, and consequently of the wheels of the general register-train.

The actuator or prime mover of the apparatus, which is common to both sets of registering mechanism (the trip and general registers) and to the alarm, and actuates them simultaneously, or nearly so, consists of a turning center shaft, O, organized for operation below the registering mechanism, the shaft passing through a central opening in the bell N into a bearing in the base-plate D, in which its lower end turns, while the upper end of said shaft is supported in a bearing above the alarm-bell in a suitable supporting-plate, D′, secured to posts rising from the base-plate D. This turning shaft has fixed upon it, above the alarm-bell and below or behind the plate D′, a partial spur-wheel, O′, the teeth of which mesh with spur-teeth formed upon the lower or outer end of the actuating or sector arm H, the inner end of which arm, as before stated, is mounted upon the cylindrical front end of the hub F and turns or vibrates thereon when actuated by the turning shaft O.

The vibrating actuating or sector arm H carries a single driving or actuating pawl, *h*, (clearly shown in Figs. 3, 4, 5, and 7,) which drives or actuates the actuating ratchet-wheel J′, and consequently the trip-register, and also the general register, through the medium of the pawl *j* on the rear face of the wheel J′, said pawl *j* engaging with the teeth of the ratchet-wheel I, firmly connected with the hub F, as before described, each actuation of the turning shaft O and vibration of the actuating or sector arm H turning the units-disk one-tenth of a revolution to bring its next consecutive number before the window in the casing, and also turning the hub F one-tenth of a revolution, which movement of said hub is communicated through the gearing to the units-wheel of the general register. As the hub F is turned it will be obvious that the hammer-lever N′ will be tripped or raised by each successive tooth of the ratchet-wheel F′

during the rotation of said wheel, whereby, owing to the force of the impelling-spring, n^3, the hammer, when released from the tooth that raises it, will be brought down quickly upon the bell and sound the alarm. At the tenth actuation or movement of the actuating sector-arm H its actuating-pawl *h* will complete the entire revolution of the ratchet-wheel J′, hub J, and units-disk L of the trip-register, and at the commencement of said tenth actuation, if the register has been started at zero, the lug or pin J^2 on the wheel J′ will engage one of the notches in the wheel m^4 and turn said wheel one point, or the distance between two notches, whereby, owing to the near connection between said notched wheel m^4 and the tens-disk or the trip-register, said tens-disk will be moved one point, and the trip register will show at the window in the casing a record of 10, it being understood that at each complete revolution of the units-disk the tens-disk by its gearing will be turned one point, whereby the trip-register will be capable of registering ninety-nine fares.

The actuating-pawl *h* is pivoted at or about its center, and is a double-armed pawl, the actuating end of which is acted upon by a spring to throw it in engagement with the actuating ratchet-wheel J′ when the sector-arm moves forward, while its opposite beveled arm rides against a pin, *h′*, projecting from the under side of the supporting-plate C when the sector-arm is moved back to its normal position, in order to raise and keep the actuating-point of the pawl out of engagement with the actuating ratchet-wheel until the proper time after the commencement of the forward movement of the sector-arm, whereby no obstruction will exist to the turning or setting of the trip-register backward to zero when the actuator is in its normal position.

The turning-shaft actuator O is provided outside the register-casing with a suitable handle or knob, O^2, to turn it, a movement of the knob to the right from its normal position, as shown in Fig. 1, causing the pawl *h* to carry the registers forward in the counting process one point, or the distance of one tooth, while a reverse or return movement of the knob, or a movement to the left, carries the sector-arm H to its proper position to permit the actuating-pawl *h* to engage the ratchet-wheel J′ when a new forward movement of said arm H is commenced. The return movement of the actuating-knob is preferably accomplished automatically by a spring. The movement of the turning actuating-knob is limited to about one-third of a revolution in the example shown.

In order to keep the outer or lower toothed end of the sector-arm H in proper engagement or mesh with the toothed wheel O′ of the actuator-shaft O, I rivet or secure upon the upper or front face of the sector-arm a plate, P, curved to correspond with the curve of the toothed end of the sector-arm, said plate slightly extending beyond the end or teeth of said arm, so as to rest upon the upper or front surface of the said wheel O′, whereby the toothed end of the arm H cannot move toward the bell nor rest thereon, while owing to the projection *d′* of the plate D′, under or back of which the said plate P moves, said end of the sector-arm H cannot move outward away from the bell. Hence it will be seen that the teeth of the sector-arm H and those of the wheel O′ are always kept in perfect mesh.

Upon the lower or inner end of the turning-shaft actuator O, next the base-plate D, is formed or mounted a sector-plate, R, having preferably V-shaped teeth formed in its curved edge, which, in connection with a shifting detent-dog, *r*, pivoted to the base-plate and acted upon by a spring, compels a complete movement of the register knob or handle in either direction of its movement before it can be reversed, it being necessary to carry the toothed sector out of engagement with the detent-dog to reverse the movement of the handle or knob and its shaft, whereby a full movement of the knob must be made in both directions, and consequently all danger of sounding the alarm without actuating the registers is avoided. The lower end of said actuator-shaft O also carries another spur-toothed sector, S, the teeth of which, when the shaft is moved in the process of registering, mesh with similar teeth formed in the edge of the curved end of the long arm of a double sector-lever, T, fulcrumed at *t*, the teeth *t′* of the short arm of said lever meshing with spur-teeth *u*, formed in the edge of a slide-bar, U, carrying at its upper end a punch or cutter-bar, *u′*, the upper end of the punch-bar, upon the upstroke of the slide-bar U, being carried across a ticket-slot in the ticket-head or punch-frame U′, outside the register-casing, the punch-bar moving endwise in an axial bore of the ticket-head in a well known way.

The punch organization and the mechanism to compel a full movement of the actuator I have here described are the same as those of my Patent No. 225,044.

In order to prevent the conductor from committing frauds by moving the actuator or handle far enough to show a new number through the trip-register window upon the receipt of a fare, but not far enough to complete the movement to sound the bell and permit the actuator to be returned to its position for a new actuation, and then, upon the receipt of the next fare, to complete the movement of the actuator to sound the bell, whereby deception may be practiced, I provide the machine with a signal or sign which moves with the registering mechanism when actuated and remains in sight before the trip-register window in the casing until a complete movement of the actuator is effected and the alarm sounded, the said signal being then removed by the return of the actuator to its starting position, leaving the record of the register or the new figure plainly exposed to view. Such a signal, broadly con-

sidered, was patented to me November 23, 1880, as No. 234,742. As in said patent, I in the present instance connect a metal plate or arm, H′, with the upper or inner end of the sector-arm H and extend said plate outward beneath the trip-disks; but instead of bending the end of said plate or arm over the face of the disks to form the signal, I merely carry its end outward a short distance beyond or in front of the edge of the trip-disks, as clearly shown in the drawings, and provide it with a tongue to fit a recess in the outer end of a plate, Q, (clearly shown in Figs. 2, 5, 6, and 7,) the inner end of said plate being fitted around a cylindrical portion of the cap-plate K, so as to turn upon it between a circular flange, *k*, of said cap-plate and the face of the units-disk L of the trip-register. When the actuator of the machine is in its normal position the signal-plate Q is above the window A′ and is unseen, while when said actuator is turned to operate the machine the outer end of the plate Q is carried around by the arm H′ with the advancing numeral of the trip-disk in front of the window, where it obscures the figure and prevents its being seen until, by a completion of the movement of the actuator, the actuator is permitted, by its detent arrangement, to be returned to its normal position. This return of the actuator withdraws the signal-plate Q from in front of the window and permits the record of the register to be readily seen.

The operation of the machine thus far described is as follows: At each movement of the actuating-knob O² from left to right the sector or gear-wheel O′, meshing with the actuating or sector arm H, vibrates or moves said sector arm from left to right, engaging its actuating-pawl *h* with the ratchet-wheel J′, thereby turning the units disks or wheels of both the trip and general registers the distance of one tooth or one-tenth of a revolution, the hammer being tripped at the same time to sound the alarm by the teeth of the ratchet-wheel F′, while the punch is reciprocated by the sector S through the intermediate lever-connection. The movement of the knob, when completed, is then reversed—that is, said knob is turned toward the left to bring the parts into position for a new actuation, the actuations continuing consecutively as each fare is received. At the tenth actuation of the knob the units-wheel of the general register turns the tens-wheel of that register one point, as before described, which operation continues throughout the series of wheels, while at every tenth actuation of the units-disk of the trip-register the tens-disk is turned one point or one tenth of a revolution, as before described, the trip-register then showing a record of ten actuations of the knob or actuator, and consequently that number of fares collected, while a like record or increase is shown by the permament register.

A direction-indicator consisting of a circular plate or disk, V, and its carrying devices is mounted in front or above the alarm-bell upon the upper end of the actuating-shaft O, around which, or a tubular extension, d^3, of the supporting-plate D′, in which the upper end of the shaft O is supported, the said direction-plate V and its carrying devices are free to turn, so as to change at the proper time the visible indications upon the face of said plate which indicate different directions of travel or trips of the car or vehicle. The face of the direction-plate has in this instance near its periphery and at two points directly opposite each other the words "Up" and "Down," which would be the proper signs to employ on a road or route running in those directions; but it will be obvious that other words, signs, letters, or marks may be employed as occasion or circumstances require. In order to afford a conspicuous display of the indication or sign of the direction-indicator, a suitable glass-covered window, A², is formed in the front plate of the casing, as shown in Fig. 1, beneath which one only at a time of the signs or indications of the direction-plate can be brought.

A suitable spring or friction washer, *v*, is interposed between the upper or front face of the direction-plate V and the back of the face-plate of the casing, in order to preserve the proper working position of said indicator.

The carrying devices of the direction-indicator plate consist of a gear-wheel, V′, firmly connected to the back of said plate, a circular wheel or ring, V², firmly connected to the back of said gear-wheel V′ and having two stop teeth or projections, v^2, in its circumference, and a circular ring or wheel, V³, firmly connected to the back of said wheel V² and provided in its edge or circumference with ratchet-teeth v^3.

It will be understood, of course, that the wheels V′ V² V³ may be formed of one piece and connected to the direction-plate V, instead of being formed separately and then connected together and to said direction-plate.

A pivoted detent pawl or dog, d^2, mounted on the upper surface of the supporting-plate D′, engages the ratchet-teeth v^3 of the wheel V³ and prevents back movement of the direction-plate, thus compelling it to travel in a forward direction only (indicated by the arrow in Fig. 2) to change its indication.

A three-armed lever, W, is pivoted at its central portion, from which the three arms radiate, to the upper surface of the supporting-plate D′, (see Figs. 2, 3, 5, 6, and 7,) so that the inwardly or downwardly bent end of one of said arms, *w*, rides upon the cylindrical surface or edge of the flange *k* of the cap-plate K, connected with the hub J of the trip-disk L, while the upwardly or outwardly bent end of another of said arms *w′* rides upon the edge of the tens-disk M of the trip-register, the said bent ends respectively of the arms *w w′* of said three-armed lever W falling into notches formed in the flange *k* of the cap-plate K and in the edge of the tens-disk when the trip-disks stand at zero or the starting-point, as shown in Fig.

2, into which notches said bent ends of the lever-arms are forced by the action of a spring, *p*, coiled about the pivot-post of the lever, and having one of its ends connected with the arm *w'* of said lever, and its other end compressed so as to engage the supporting-plate D'. The third arm, w^2, of the lever W terminates in a hooked end, and its function is to engage one of the stops or projections v^2 of the wheel V^2 of the direction-plate, as shown in Figs. 2 and 3, to limit the turning of the direction-plate when being shifted to half a rotation, which is the distance said plate is to be moved in order to change its indication. Said direction-plate V is shifted to change its indication by means of a pinion-wheel, *x*, meshing with the gear-wheel V', said pinion being firmly keyed to a shaft, *x'*, having a bearing at its inner end in the supporting-plate D', and at its outer or front end in a bracket-plate, x^2, fastened to the said supporting-plate D', the pinion-wheel *x* being between said bracket x^2 and said plate D'. The outer end of the shaft *x'* of the actuating pinion-wheel of the direction-plate is extended outward or forward, and receives a knob or finger-wheel, X, on the outside of the casing, said knob being firmly secured to the front end of the shaft *x'* in order to turn it. It has been stated that the direction-plate is locked from backward rotation by a detent or dog, and consequently the knob X can be turned in one direction only to shift the direction-indicator plate.

Keyed to the shaft *x'*, and interposed between the pinion-wheel *x* and the supporting-plate D', is a cam-piece, x^3, (shown clearly in Figs. 3 and 6,) a notch, x^4, being formed in the outer curved edge of said cam-piece, as shown in the first of said figures. This cam-piece x^3 is for the purpose of acting upon the long arm *y* of a detent-lever, Y, pivoted at *y'* to the upper or front surface of the supporting-plate C, the upper short arm of said lever terminating in a rearwardly or inwardly bent end, which engages the teeth of the actuating ratchet-wheel J' of the register to lock it, and consequently the trip-register, from back rotation or movement during the counting process. (See Figs. 3, 6, and 7.) A spring, y^2, acts upon said lever Y to keep its upper end normally in engagement with the ratchet-wheel J'. Suppose, now, that the car has made the down-trip, and that fifty fares have been registered. It is the conductor's duty before proceeding on the up-trip not only to change his direction-indicator to show "Up," or the reverse direction of travel, but also to reset his trip-register to the zero or starting-point, so as to commence registering anew. He therefore turns the knob X, which causes the cam-piece x^3 to force the long arm *y* of the detent-lever Y inward toward the center of the machine, and consequently rock the upper end of said lever out of engagement with the teeth of the actuating ratchet-wheel J', thus leaving the trip-register free to be turned backward to zero. The turning of said knob also begins the rotation of the direction-plate through the pinion-wheel; but the direction plate, before completing its half-turn necessary to show a new indication at its window, is stopped by one of its stops or projections v^2 of the wheel V^2 coming in contact with the bent end of the arm *w'* of the three-pronged lever W, and this owing to the fact that said arm has been moved or cammed out into the path of said projection owing to the counting operations of the trip-disks, the notch in the cap-plate K, into which the bent end of the arm *w* is projected when the trip-register stands at zero, camming said arm and the other arms of the lever W outward upon the first actuation of the trip-disk, as will be obvious. It is therefore necessary in order to complete the shifting of the direction-indicator, and so as not to leave the indicator in a partially-shifted position, as it cannot be turned backward, to first reset the trip-register to zero, so that the arms *w w'* of the lever W will be permitted to be forced by their spring into the notches in the cap-plate K and tens-disk before described. Upon the arrival of the trip disks at zero the ends of the arms *w w'* will be forced into their said notches, and this carries the said arm *w'* out of the path of the projection v^2 of the wheel V^2 and permits the direction-plate to be turned its entire half-rotation to show its new indication at the window, beyond which point it cannot be turned, as the hooked end of the arm w^2 of the three-pronged lever will catch the projection or stop v^2 and stop the direction-plate from further movement.

It will be obvious that when a new shifting operation of the direction-indicator plate is to take place at the end of a trip the hooked end of the arm w^2 will be out of the way of the projections v^2, so as to permit the commencement of the shifting movement, and this owing to the camming outward of the lever W by the rotation of the cap-plate K and tens-disk M of the trip-register in the counting process, while as soon as the arms *w w'* of said lever are forced into their notches in said cap-plate and tens-disk, when the trip-register is at zero, the hooked end of said arm w^2 will be thrown into the path of the projection v^2, to prevent movement of the direction-indicator plate beyond the proper point.

The trip-register is reset backward in the organization I have described, and this is accomplished by means of a knob, Z, upon the outside of the case, which connects, by a pin-connection preferably, with a ratchet-wheel, *z*, mounted upon the front end of the arbor E, in front of the cap-plate K, said ratchet-wheel, when the knob is turned in one direction, moving around the arbor without any effect upon the trip-disks, while when turned in the opposite direction its teeth engage a pawl, k^2, pivoted upon the face of the cap-plate K, and turn said cap-plate, and with it the trip disks, in a backward direction until the zero-point is reached, at which point the trip-register is

stopped, owing to the engagement of the arm *w'* of three-armed lever W with the notch in the edge of the tens-disk before described. At the commencement of the turning movement of the knob X to shift the direction-plate the upper end of the lever Y, as before stated, is rocked outward from engagement with the ratchet-wheel J' by the cam x^3, to permit the trip-register to be reset or turned backward, and this rocking action carries the lower end of said lever Y, which is bent inwardly to form a stop, inwardly in front of a projection, *o'*, of the wheel O' of the actuator O, and constitutes a positive stop or barrier against the actuation or operation of the actuator and of the register until removed, and this barrier continues as long as the trip-register is in a condition to be moved by the resetting mechanism. The lever Y cannot be moved by its spring to its normal position with its upper end in engagement with the ratchet-wheel J' until the direction-plate is fully shifted, and said direction-plate cannot be shifted until the trip-register is reset. As soon as the shifting of the direction-indicator plate is accomplished the cam x^3 is in the position shown in Fig. 3, and the lever Y is then thrown by its spring into its normal position, as shown in said figure, thus releasing the actuator and locking the trip-register positively against back rotation or a resetting movement.

In order to prevent the shifting-knob X of the direction-indicator from being turned when the actuator has been moved forward in the counting process and before it is returned to its normal position, I pivot a bent lever, Z', to the plate D', the upper outwardly-bent end *z'* of which engages the notch x^4 in the cam-piece x^3 of the direction-plate-shifting mechanism (see Figs. 3 and 6) and locks said cam-piece from turning when the actuator is moved forward to make a count, while, when the said actuator is reversed and reaches its normal position in readiness for a new actuation of the register, a pin or lug, o^2, projecting from the upper surface of the wheel O', comes in contact with the lower or tail end of said lever and lifts its upper end out of the notch in the cam-piece x^3 to release said cam and its actuating-knob X, which may then be turned to shift the direction-indicator. A spring, z^2, acts upon said lever Z' to throw its locking end into the notch of the cam x^3 as soon as the tail end of the lever is released from the pressure of the pin o^2 consequent upon the forward movement of the actuator and wheel O' thereof.

In addition to the usual fastening devices to secure the front and back plates of the casing together, I prefer to use the fastening-screw passing through the set-back knob Z into the front end of the arbor or shaft E, as described and claimed in my aforesaid Patent No. 225,044.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the arbor or shaft, the hub provided with a connection to rotate the general register-wheels, mounted so as to turn around said arbor, the hub to rotate the trip-register wheels or disks, also mounted so as to turn around said arbor, and the ratchet-and-pawl connection between said hubs, whereby the turning movements of the hub of the trip-register in the counting direction may be communicated to the hub of the general register, while its turning movements in the opposite direction are independent and free of said general register.

2. The combination, substantially as hereinbefore set forth, of the arbor or shaft, the hub to drive the general register, mounted so as to turn upon said arbor, the actuating or sector arm fitted to turn or vibrate upon the front end of said hub, and a ratchet-wheel connected with said hub in front of said arm to drive the hub when said arm is vibrated.

3. The combination, substantially as hereinbefore set forth, of the arbor or shaft, the hub provided with a connection to rotate the general register-wheels, mounted so as to turn around said arbor, the hub to rotate the trip register wheels or disks, also mounted so as to turn around said arbor, the ratchet-and-pawl connection between said general-register and trip-register hubs, the actuating ratchet-wheel of said trip-register hub, and the actuating or sector arm having a single driving or actuating pawl to engage the teeth of said actuating ratchet-wheel, whereby the vibration or movement of said actuating-arm suffices by its single driving-pawl to actuate the trip and general registers simultaneously, or nearly so, while said trip-register may be set independently of said general register.

4. The combination, substantially as hereinbefore set forth, of the arbor or shaft, the trip-register hub, mounted so as to turn around said arbor, the actuating ratchet teeth or wheel of said hub, the sector-arm, carrying a pawl to engage said teeth or wheel to turn said hub, the units-disk, connected with the front end of said hub by a cap-plate so as to turn with it, the tens-disk, mounted so as to turn upon said hub below or in rear of the units-disk, the gearing by which said tens-disk is turned one point for each complete revolution of the units-disk, and the set-back knob upon the outside of the casing, connected with said cap-plate by a pawl-and-ratchet connection.

5. The combination, substantially as hereinbefore set forth, of the arbor or shaft, the actuating-wheel of the trip-register, turning about said arbor, the actuating or sector arm, also turning about said arbor as a center, and the double-armed actuating or driving pawl of said sector-arm, one end of which engages said actuating-wheel of the register on the forward stroke of the arm to move the register in the counting process, while the opposite end of said pawl engages or strikes a stationary pin or abutment on the back stroke of the sector-arm to throw the pawl out of engagement with the ratchet-wheel, so as to afford no obstruction to the backward movement of the trip-register when reset.

6. The combination, substantially as here-

inbefore set forth, of the arbor or shaft, the trip-register hub turning upon said arbor, the actuating ratchet-wheel of said hub, the driving-pawl engaging said ratchet-wheel to turn it in the proces of counting, the units-disk connected with the front end of said hub, the tens-disk fitted to turn around said hub, the gear-wheel forming part of said tens-disk, the toothed wheel with which said gear-wheel meshes, the notched wheel connected with said toothed wheel to turn it, and overlapping the front face of the actuating ratchet-wheel of the hub, so as to engage a curved surface of said hub to lock the notched wheel, and the lug or pin on the front face of said actuating ratchet-wheel to engage said notched wheel to positively turn it the distance between two of its notches once for each complete rotation of said actuating ratchet wheel.

7. The combination, substantially as hereinbefore set forth, of the trip-register disks, the actuating or sector arm to actuate said disks, and the signal-plate Q, fitted at one end to turn about a support in front of said disks and jointed at the other end to said actuating-arm, so as to move therewith.

8. The combination, substantially as hereinbefore set forth, with a trip-register and its actuator, of a pivoted lever which in one position prevents a backward resetting movement of the trip-register while freeing the actuator of the machine, while in another position it permits the register to be reset in a backward direction while locking the actuator against its counting movement or actuation.

9. The combination, substantially as hereinbefore set forth, of the trip register, the actuating ratchet-wheel of said register, the pivoted detent-lever, the upper end of which normally engages said ratchet-wheel through the influence of a spring, and a cam controlled by a knob upon the outside of the register casing to rock said lever to disengage it from said actuating ratchet-wheel.

10. The combination, substantially as hereinbefore set forth, of the trip-register, the actuating ratchet wheel or teeth of said register, the actuator of said register, and the pivoted lever, one end of which in one position of the lever engages said ratchet wheel or teeth to prevent back movement of the register, while the opposite end, in another position of the lever, engages the actuator to lock it while permitting of a resetting movement of said trip-register.

11. The combination, substantially as hereinbefore set forth, of the trip-register, the actuating or sector-arm carrying a driving-pawl to actuate said register in the counting process, the turning shaft-actuator vibrating said sector-arm by means of a gear-wheel meshing with the teeth of said sector-arm, a tongue or projection on said gear-wheel, and a locking device to engage said projection to lock the actuator from turning when the trip-register is free to be turned to zero or the starting-point.

12. The combination, substantially as hereinbefore set forth, of a register, the actuator of said register, a direction-indicator, the shifting or setting mechanism of said indicator, and a locking mechanism which permits said shifting or setting mechanism to be operated to shift or set said indicator when the actuator is in its normal position in readiness to actuate the register, while it automatically locks said shifting mechanism when the actuator is moved forward in its counting direction.

13. The combination, substantially as hereinbefore set forth, of the trip-register, the actuator of said register, the detent-lever to prevent back movement of said register, the knob or device to rock said detent-lever to permit the register to be moved backward or reset, and a locking device which in one position permits said knob or device to be moved to rock the detent-lever, while in another position it engages said knob or device and positively locks it from movement.

14. The combination, substantially as hereinbefore set forth, of the direction-indicator plate with the wheel or portion connected therewith provided with projections or surfaces to positively limit the shifting or turning movement of said indicator.

15. The combination, substantially as hereinbefore set forth, of the direction-indicator plate, the gear-wheel of said plate, the pinion-wheel meshing with said gear-wheel, and turned by a knob outside the case to shift the indicator, the ratchet-wheel of said indicator, and the detent-pawl engaging said ratchet-wheel to prevent back movement of said indicator.

16. The combination, substantially as hereinbefore set forth, of the direction-indicator plate, the gear-wheel to shift said indicator, the wheel or portion provided with projections or stops to limit the shifting movement of said indicator, and the ratchet-wheel or teeth to prevent back movement of said indicator.

17. The combination, substantially as hereinbefore set forth, of the trip-register, the direction-indicator, the three-armed lever, two arms of which engage said trip-register and one of which engages the direction-indicator, the notches in said trip-register, into which the two arms which engage the trip-register are automatically forced when said register stands at zero, and the projection or stop on said direction-indicator, with which the arm which engages the said indicator connects to stop the indicator at the proper point when being reset or shifted.

18. The combination, substantially as hereinbefore set forth, of the trip-register, its actuator, the detent-lever to prevent backward movement of said register, the direction-indicator plate locked from back movement, the knob to shift said indicator and rock said detent-lever to permit the register to be reset, the wheel or portion of said indicator provided with projections or stops to limit its shifting-movement, and the three-armed lever,

two arms of which engage the trip-register and are forced into notches therein when the trip-register is at zero, while the third arm engages the one of the projections of the indicator to limit its movement, whereby a movement of the knob to shift the indicator releases the detent-lever from the trip-register, carries a stop of the direction-indicator against one of the arms of said three-armed lever, and necessitates resetting the trip-register to zero before the shifting of the indicator can be completed.

In testimony whereof I have hereunto subscribed my name.

JOHN B. BENTON.

Witnesses:

GEO. H. EVANS,

WM. A. POLLOCK.