

No. 671,167.

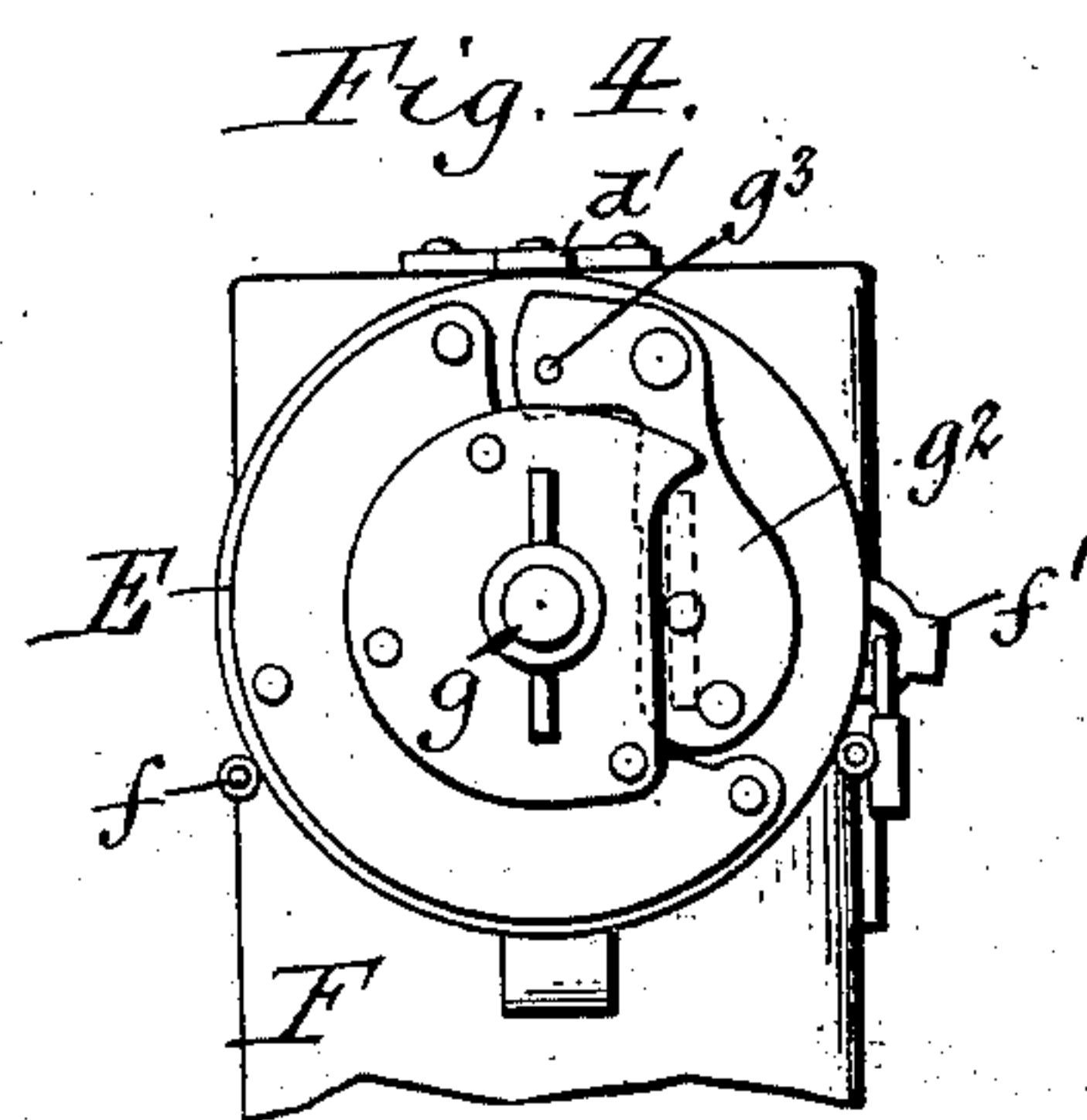
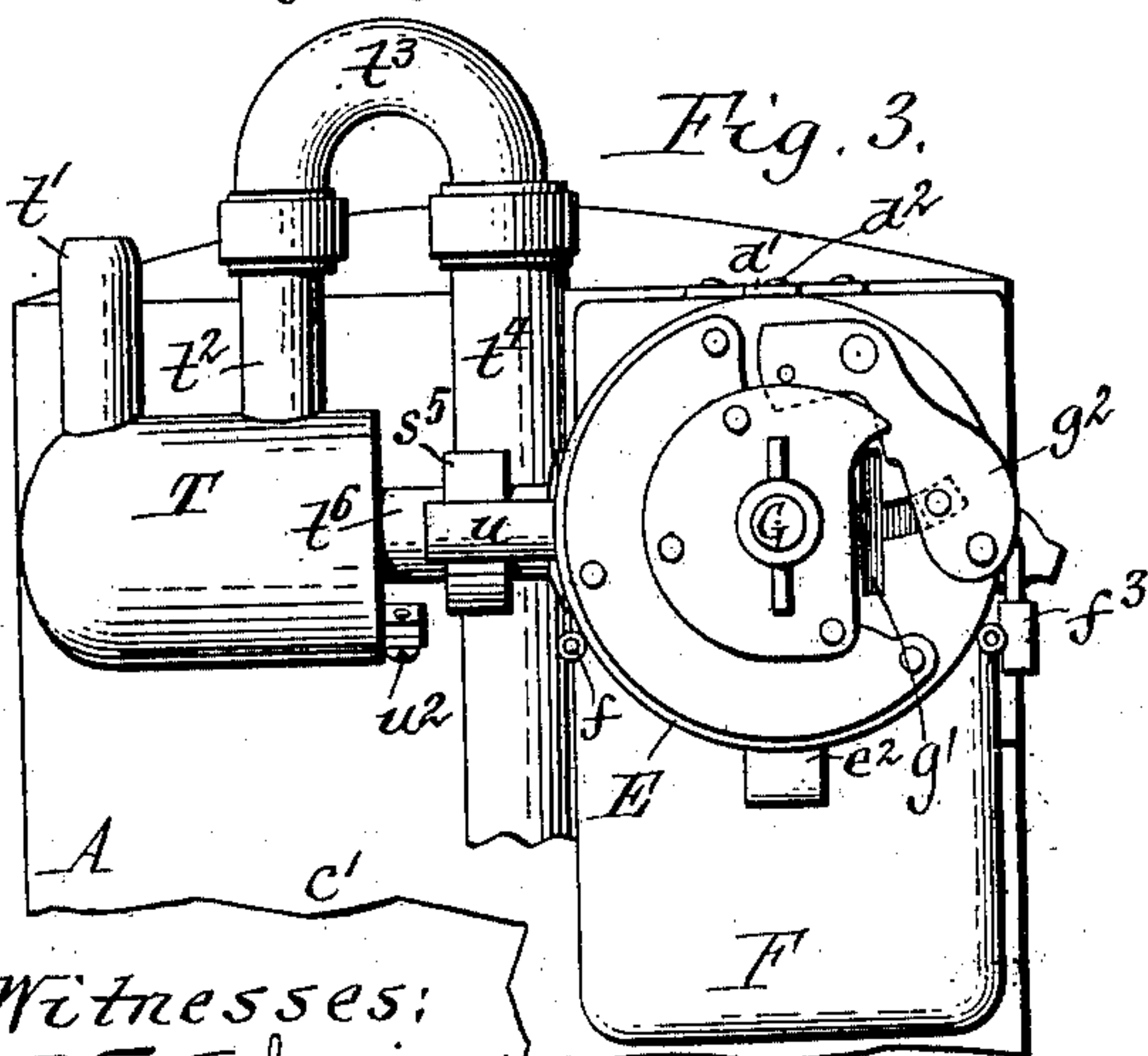
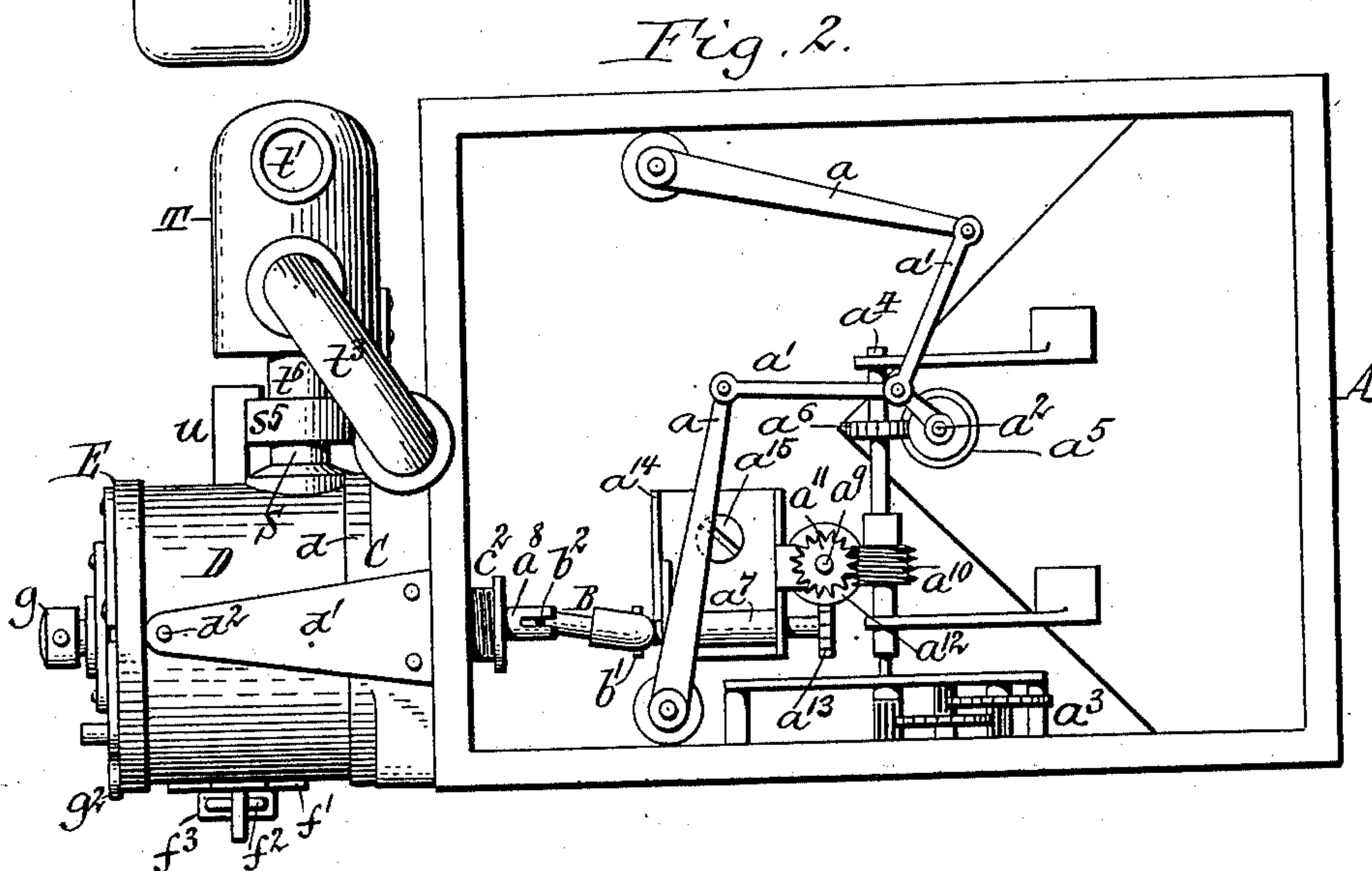
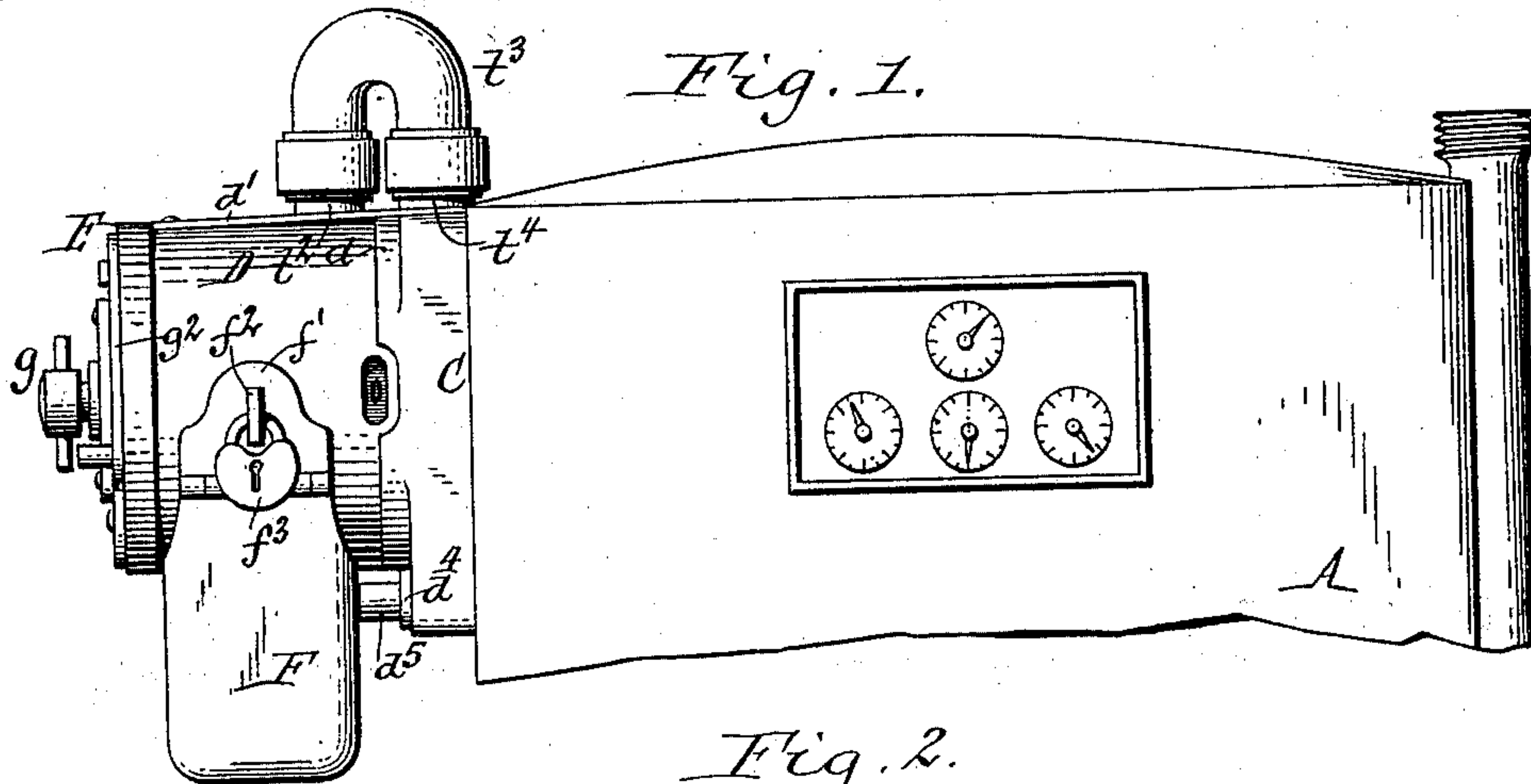
Patented Apr. 2, 1901.

F. E. MORGAN.
PREPAYMENT VENDING APPARATUS.

(Application filed Aug. 7, 1900.)

3 Sheets—Sheet 1.

(No Model.)



Witnesses:
F. F. Scherzinger
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(Application filed Aug. 7, 1900.)

(No Model.)

3 Sheets—Sheet 2.

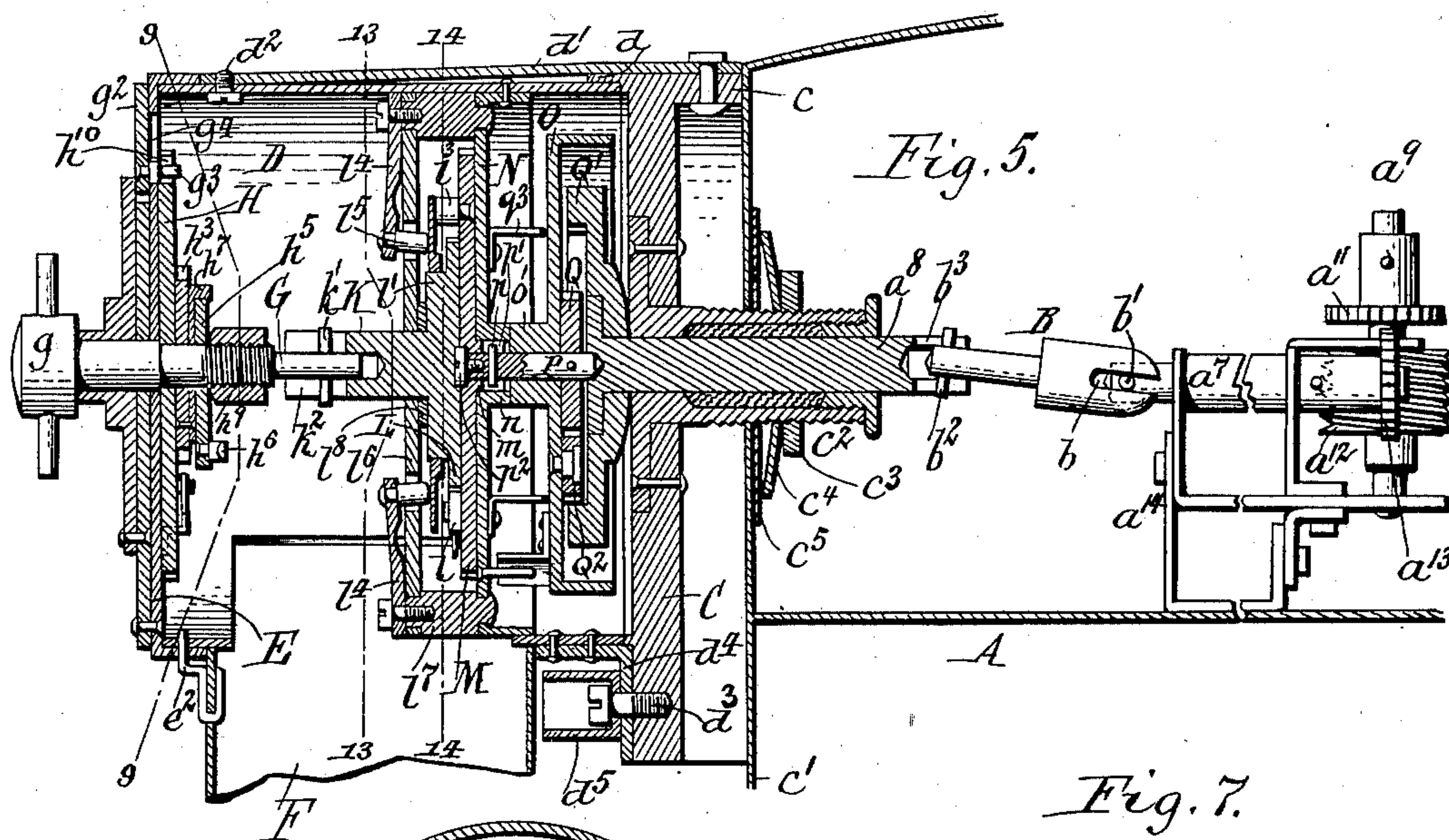


Fig. 7.

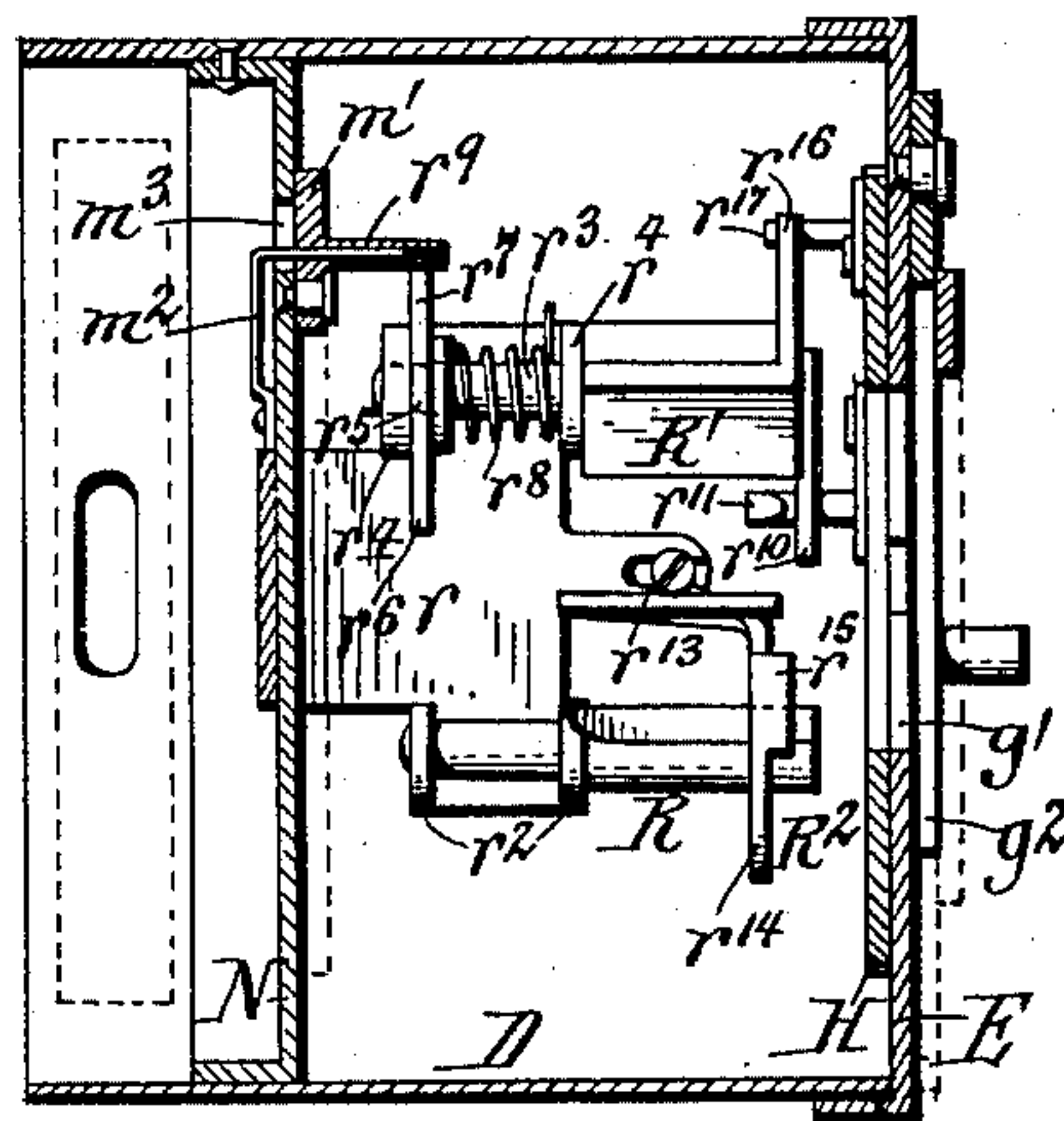
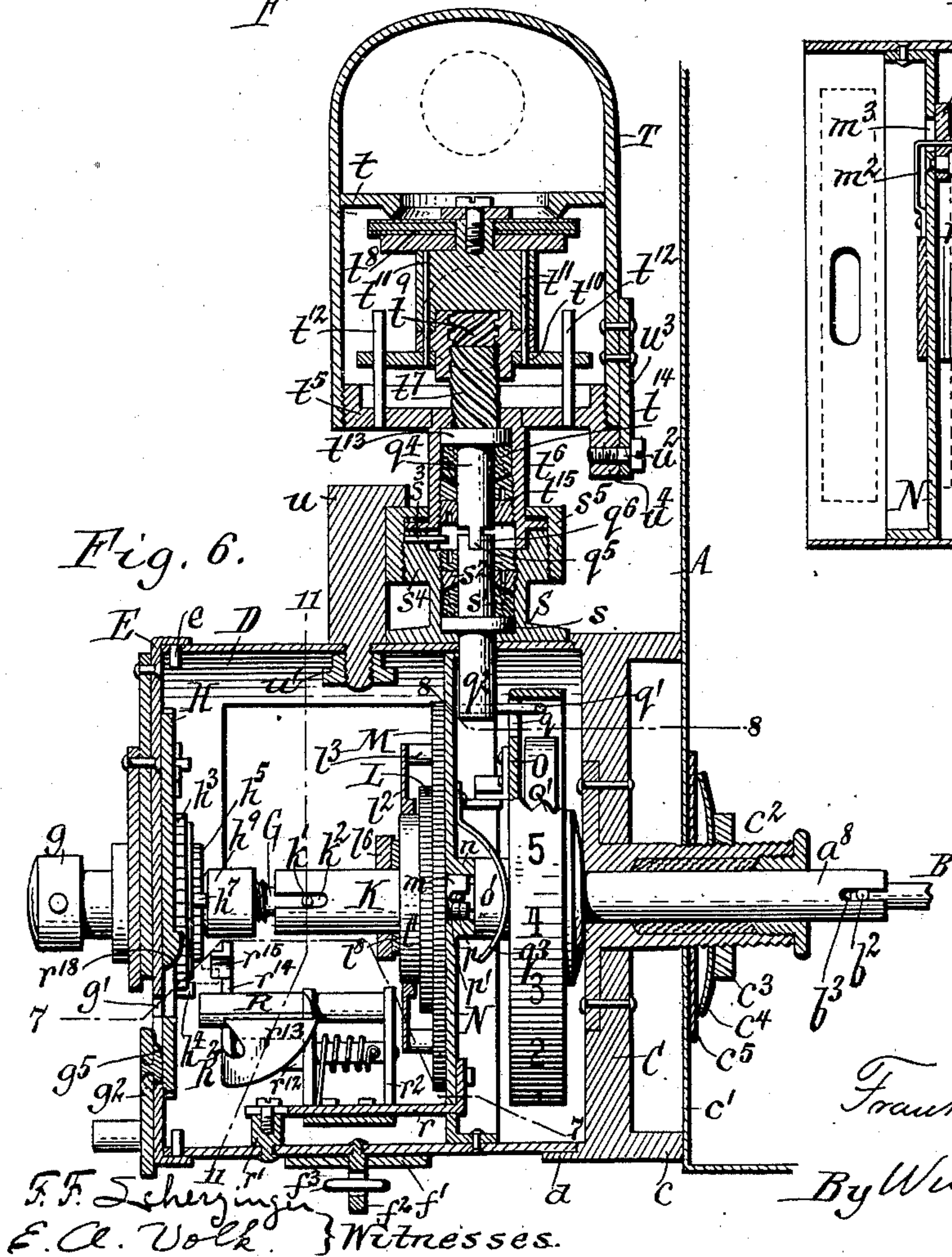
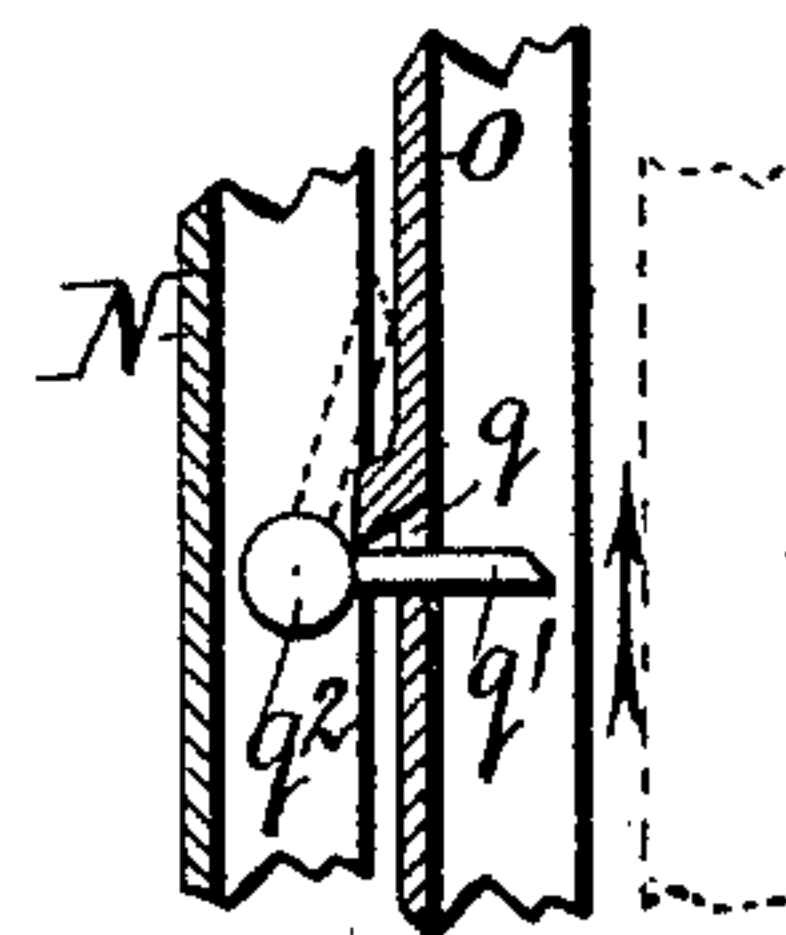


Fig. 8.



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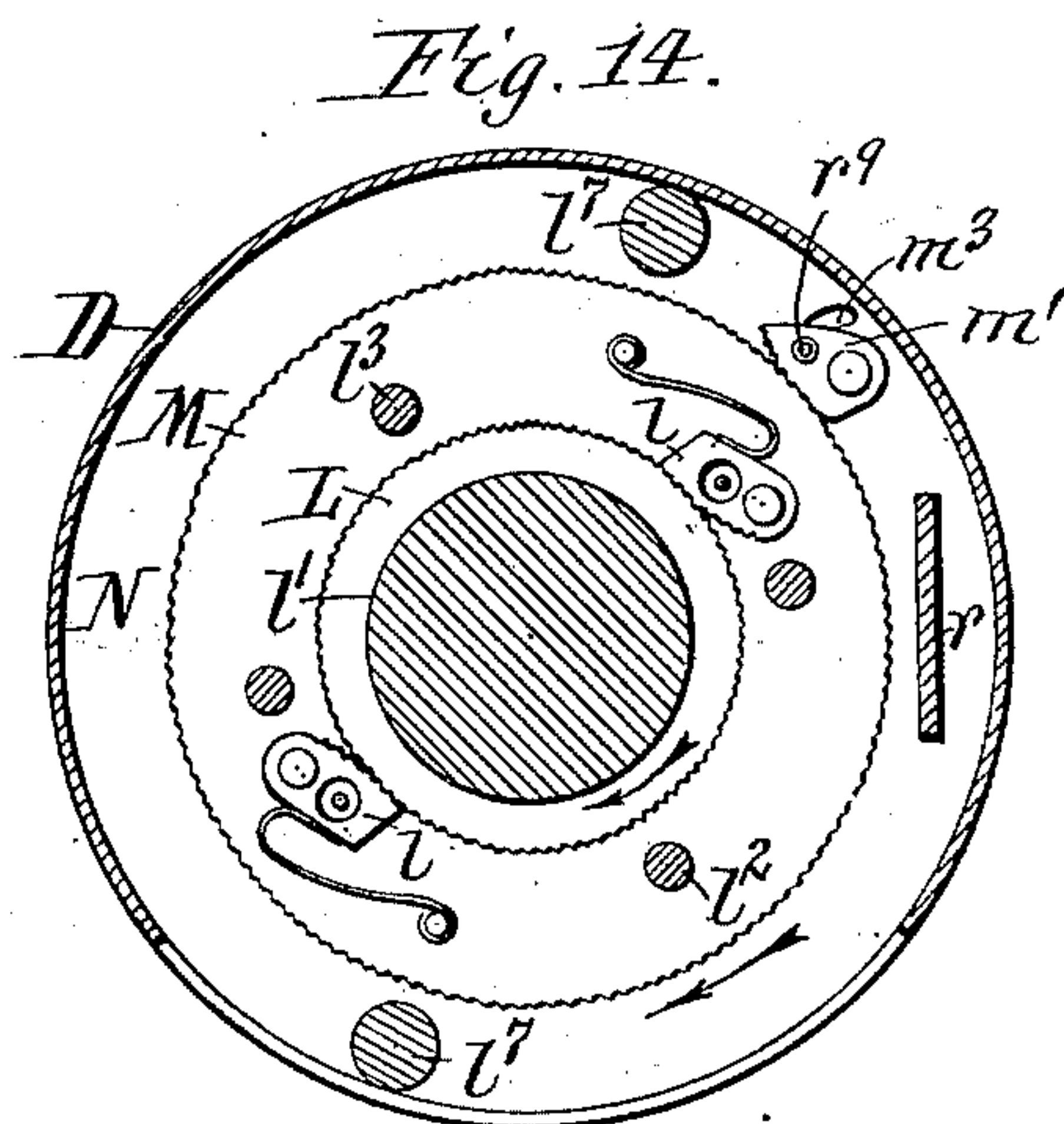
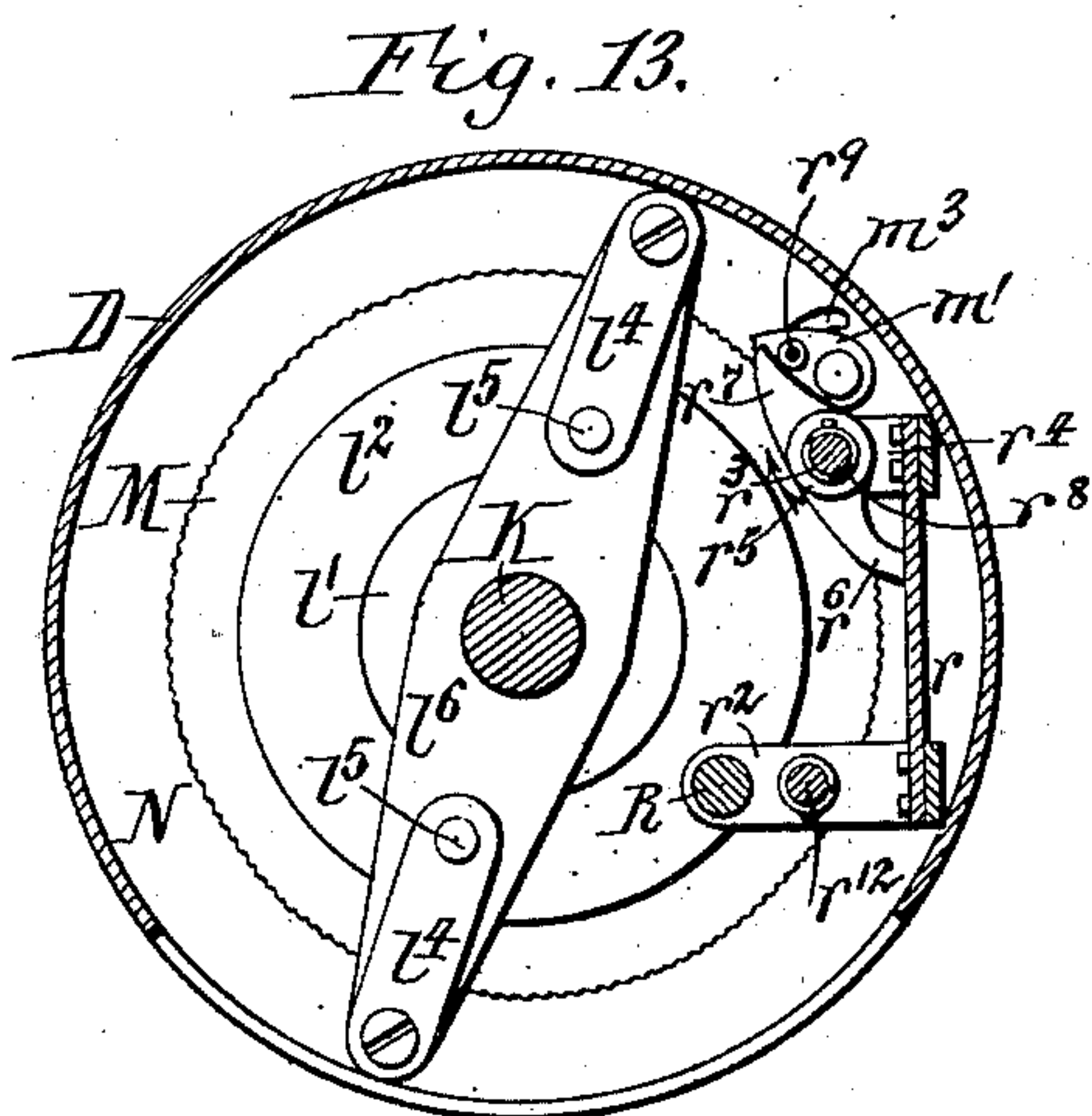
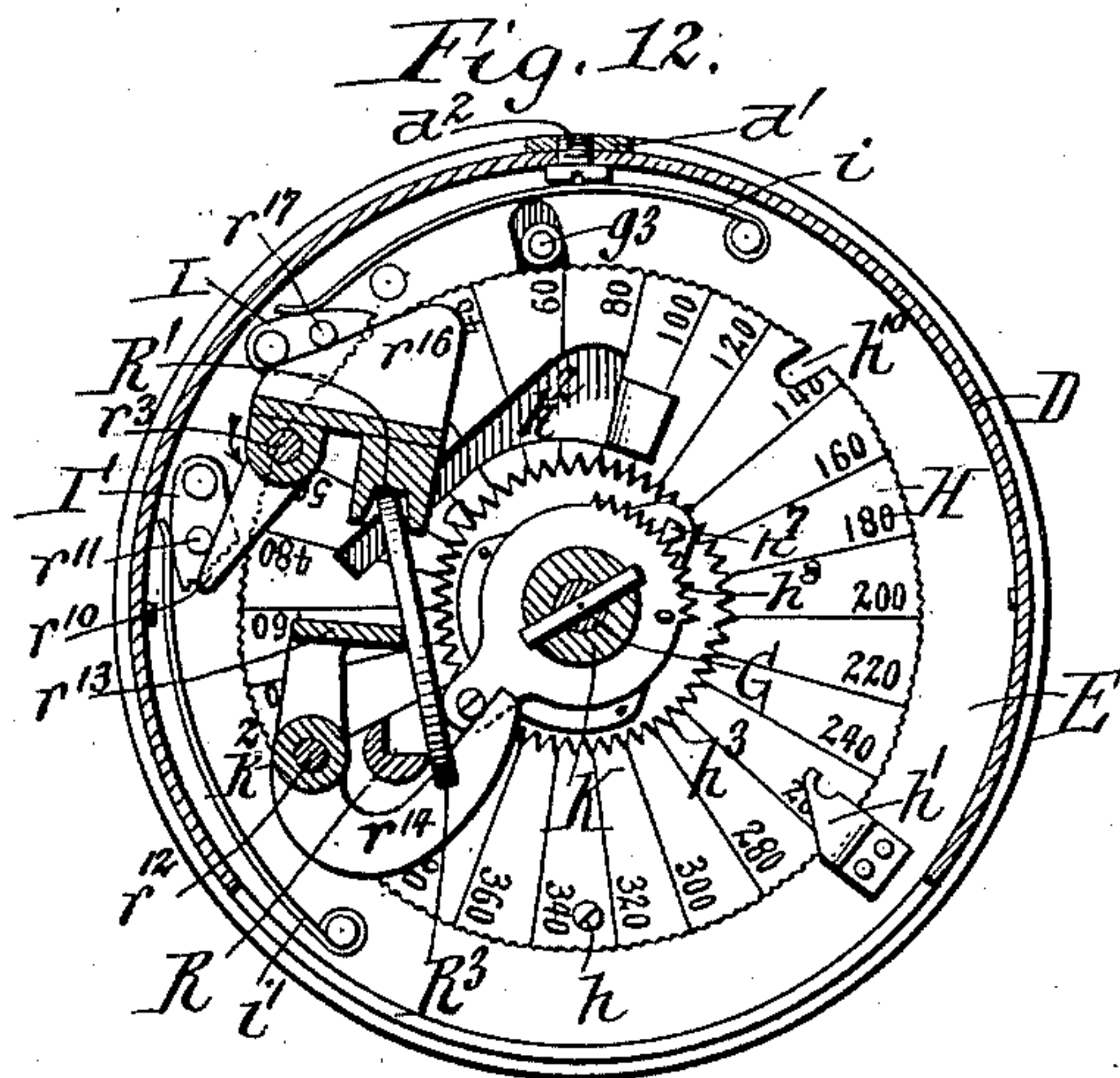
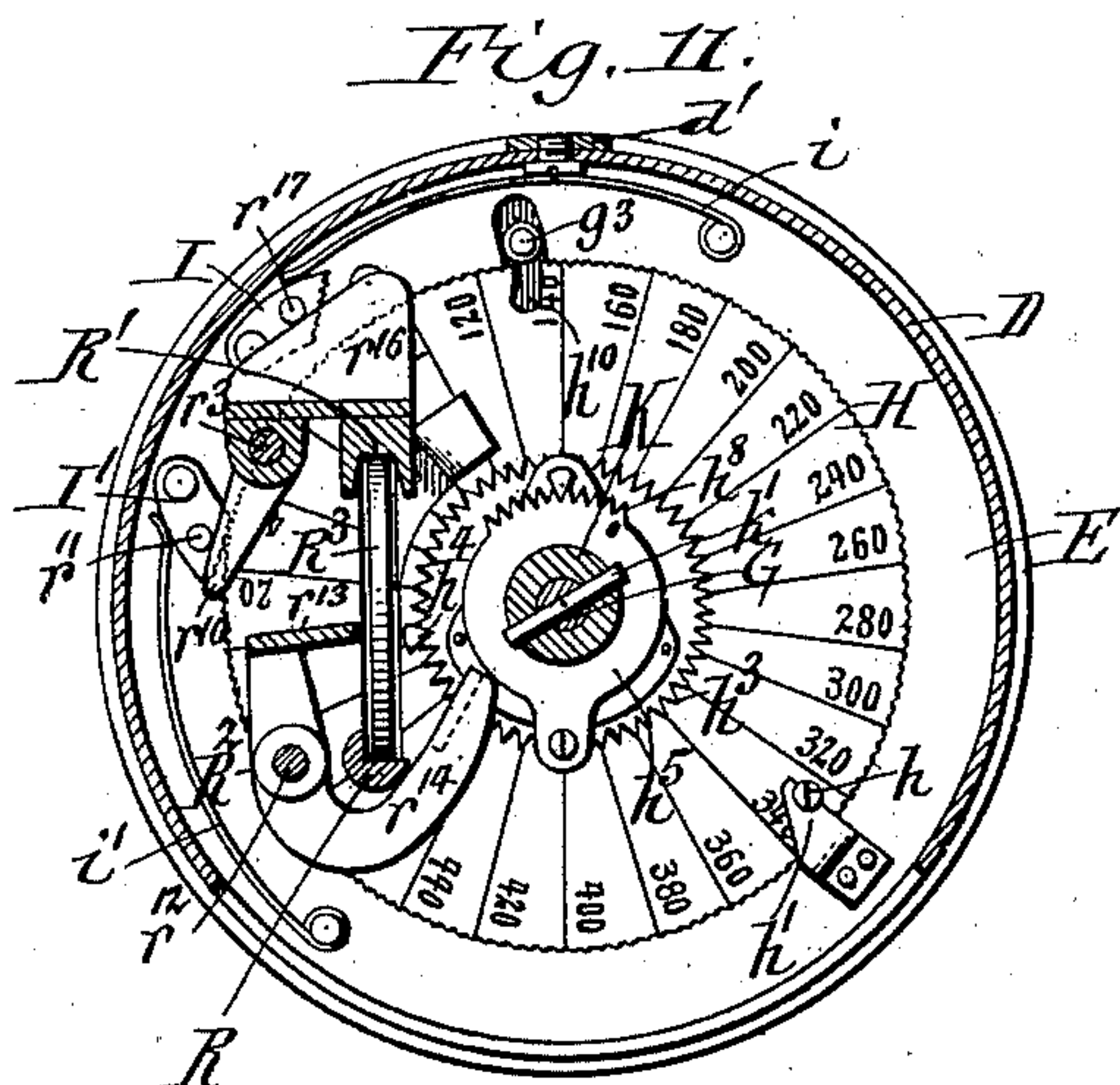
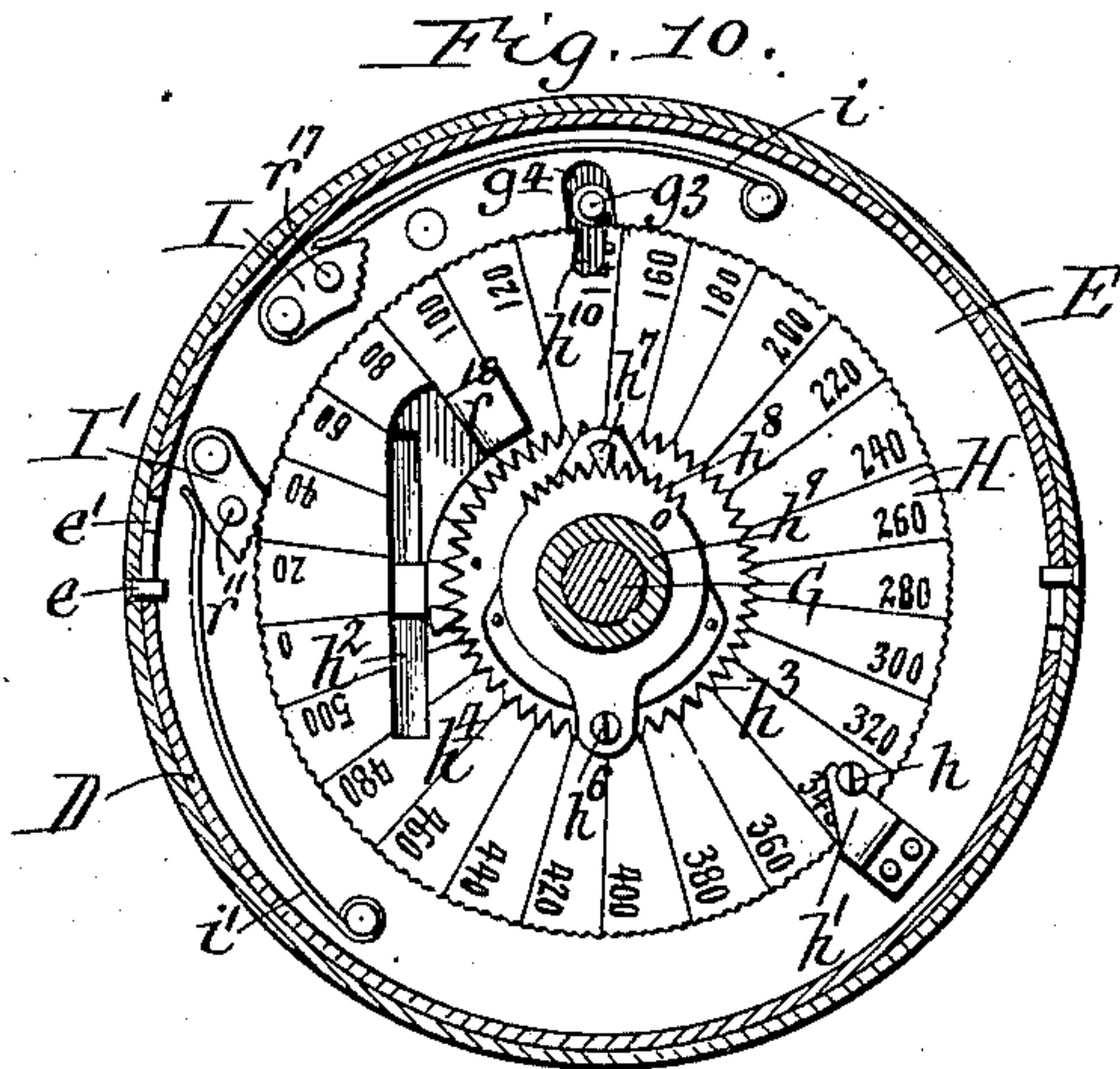
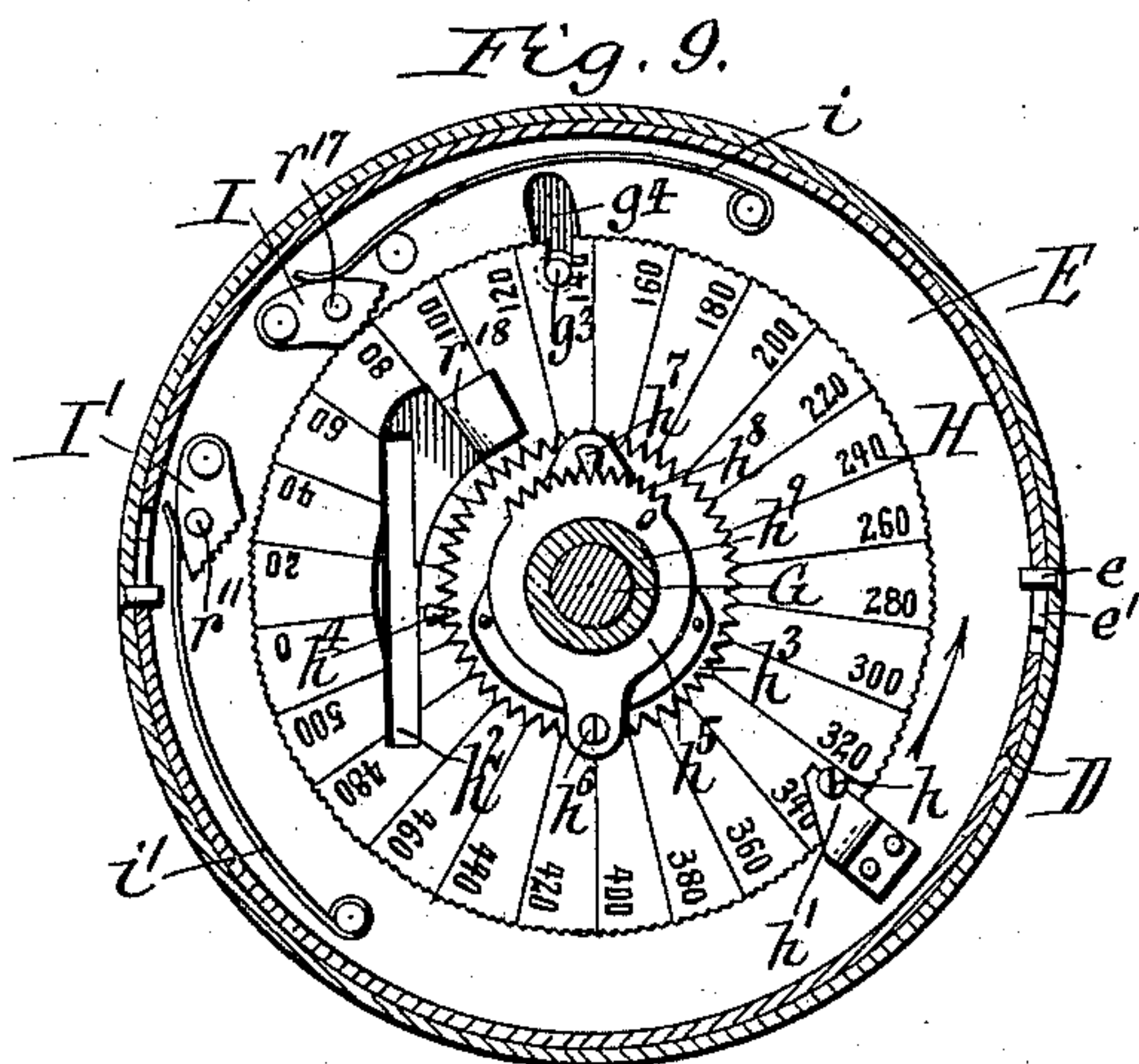
S. F. Scherzinger
E. A. Volk } Witnesses.

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PREPAYMENT VENDING APPARATUS.

(Application filed Aug. 7, 1900.)

3 Sheets—Sheet 3.

(No Model.)



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UNITED STATES PATENT OFFICE.

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PREPAYMENT VENDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 671,167, dated April 2, 1901.

Application filed August 7, 1900. Serial No. 26,163. (No model.)

To all whom it may concern.

Be it known that I, FRANK E. MORGAN, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Prepayment Vending Apparatus, of which the following is a specification.

This invention relates to a prepayment vending apparatus which is mainly designed for use in connection with meters—for instance, gas-meters—and relates more particularly to a prepayment apparatus having the main features of the apparatus which is described and shown in Letters Patent No. 637,401, granted November 21, 1899, to Frederic A. Lane and myself. The apparatus of this patent comprises a stationary or non-rotary coin-holder into which the coin is inserted by the purchaser; a hand-actuated purchasing-shaft which is unlocked by a lever, against which the coin acts upon inserting the latter, whereupon the purchasing rotation can be performed by the hand-actuated shaft; a movable lower jaw in the coin-holder, which is released for discharging the coin from the holder when the purchasing rotation has been completed, whereby the unlocking-lever is released and caused to lock the shaft against further rotation in the purchasing direction, while the shaft is free to be returned to the starting-point; an intermediate purchasing-shaft to which only the purchasing rotation is transmitted from the hand-actuated shaft; a meter-actuated shaft, and a rotatable disk which actuates the valve and which is connected both with the intermediate shaft and the meter-actuated shaft by gears in such manner that this disk receives the purchasing movement, which opens the gas-valve, from the intermediate purchasing-shaft, and the return movement, which closes the valve when the purchased volume of gas has been delivered, from the meter-actuated shaft.

My present invention has an object to improve this apparatus in several respects, and while most of the features of my present invention are mainly designed to improve this particular style of apparatus most of these features are also capable of use in prepay-

ment apparatus of different organization or construction.

Another object of my present invention is to construct the mechanism whereby the purchasing rotation is arrested in such manner that the point at which the rotation is stopped can be more closely regulated than heretofore, the possible regulation being so close that in a gas-meter one cubic foot of gas can be taken as the unit of adjustment. This enables the apparatus to be adjusted for delivering the exact quantity of gas called for by a certain coin, leaving out of consideration fractions of a foot, and this is rendered possible although the coin may be large and call for a large number of cubic feet.

Other objects of my invention are to render the mechanism quick, sensitive, and reliable in its operation, easy to assemble and separate, while protected against tampering, and simple and economical in construction.

In the accompanying drawings, consisting of three sheets, Figure 1 is a front elevation, on a reduced scale, of the upper part of a gas-meter which is provided with my improved prepayment vending apparatus. Fig. 2 is a top plan view of the same with the top plate of the meter removed. Fig. 3 is an end elevation of the same, showing the cover of the coin-slot open and the parts in the position for inserting the coin. Fig. 4 is a similar view showing the cover closed. Fig. 5 is a vertical longitudinal central section of the vending apparatus with the coin-receptacle or till broken off. Fig. 6 is a central horizontal section showing the parts of the vending apparatus in the position for inserting the coin and also showing the valve mechanism. Fig. 7 is a sectional elevation of the coin-holder located in the front portion of the casing and viewed from the center of the latter in line 7 7, Fig. 6. Fig. 8 is a vertical section through the valve-actuating disk and connecting parts in line 8 8, Fig. 6. Fig. 9 is a vertical cross-section through the casing and hand-actuated shaft in line 9 9, Fig. 5, looking forwardly and showing the adjusting mechanism arranged on the rear side of the front head of the casing, this figure showing the parts in the position in which the cover

of the coin-slot is open for inserting the coin. Fig. 10 is a similar view showing the parts in the position in which the cover of the coin-slot is closed after the coin has been inserted. Fig. 11 is a cross-section through the coin-receptacle looking forwardly, the section being taken in line 11 11, Fig. 6, and showing the parts in the position in which the coin is in place in the coin-holder. Fig. 12 is a similar view, showing the parts in the position in which the coin is ejected from the coin-holder. Fig. 13 is a cross-section in line 13 13, Fig. 5, looking rearwardly and showing the front side of the purchasing-disk and parts arranged in front of the same. Fig. 14 is a similar sectional view in line 14 14, Fig. 5, showing the front side of the purchasing-disk and the driving-disk of the same.

Like letters of reference refer to like parts in the several figures.

A represents the casing of an ordinary gas-meter, provided in its upper portion with the usual chamber, which contains the flag-arms a and rods a' , the vertical shaft a^2 , operated thereby, and the registering mechanism a^3 . The latter is operated from the vertical shaft a^2 by the usual forwardly-extending horizontal shaft a^4 , which is driven from the vertical shaft a^2 by a worm a^5 and gear-wheel a^6 .

a^7 represents a horizontal shaft which is arranged at right angles to the shaft a^4 and connects with the shaft a^8 of the prepayment apparatus. The shaft a^7 is rotated from the registering mechanism or any other moving part of the meter by any suitable means. As shown in the drawings, Figs. 2 and 5, this shaft a^7 is rotated from the horizontal shaft a^4 by an upright counter-shaft a^9 , which is geared with the shaft a^4 by a worm a^{10} on the latter and a horizontal gear-wheel a^{11} on the shaft a^9 and with the shaft a^7 by a worm-wheel a^{12} on the counter-shaft a^9 and a vertical gear-wheel a^{13} on the shaft a^7 .

The horizontal shaft a^7 and vertical counter-shaft a^9 are mounted and journaled in a frame a^{14} , which is secured to the bottom plate or floor of the upper chamber or attic of the meter by a screw a^{15} .

B represents a coupling-bar which connects the shaft a^7 with the shaft a^8 of the prepayment apparatus. This bar is provided adjacent to the shaft a^7 with a socket, which receives the end of this shaft loosely, and with a diametrical slot b , which receives coupling-pins b' , projecting from diametrically opposite sides of the shaft a^7 , near the end thereof. The bar B is provided near its opposite end with coupling-pins b^2 , which are arranged at right angles to the slot b . These coupling-pins enter a slot b^3 , formed diametrically in the end of the shaft a^8 of the prepayment apparatus. This shaft is provided in its end with a socket which receives the end of the coupling-bar B loosely. The ends of the coupling-bar and of the shaft a^7 which enter these sockets are preferably conical to prevent binding. This universal coupling or

joint connecting the shafts a^7 and a^8 permits of considerable variation in the position of these shafts vertically and horizontally and greatly simplifies the operation of connecting the prepayment device with the meter. This is advantageous in the case of meters which are already in use and where the work is required to be done at the place of use, where the conveniences for doing such work accurately are not often available. By simply securing the worm a^{10} upon the shaft a^4 , then securing the frame a^{14} in position so that the wheel a^{11} meshes with said worm, securing the prepayment apparatus to the meter in approximate alinement with the shaft a^7 , and connecting the respective shafts by the universal coupling the parts are properly connected without requiring any nicety or accuracy of alinement and operate freely and without binding.

C represents the back plate of the casing of the prepayment apparatus. This plate is provided with a rearwardly-projecting marginal flange c , by which it bears against the upright side wall c' of the meter-casing. The shaft a^8 of the prepayment apparatus extends rearwardly through this back plate and is journaled in a rearwardly-projecting stuffing-box c^2 , formed on or secured to the same, Figs. 5 and 6. This stuffing-box extends through the upright wall c' of the meter. For the purpose of attaching the prepayment apparatus to the meter an opening is cut in the wall of the meter to receive the stuffing-box. The latter is then inserted and secured by a screw-nut c^3 , which is applied to the externally-threaded stuffing-box on the inner side of the meter. A gas-tight joint is made around the stuffing-box by packing-washers c^4 c^5 , interposed between the nut and the wall of the meter.

The back plate C of the casing is permanently secured to the wall of the meter by soldering or other suitable means. The stuffing-box prevents leakage of gas from the attic of the meter along the shaft into the prepayment apparatus, and the packing around the stuffing-box prevents leakage outside of the stuffing-box.

D represents the cylindrical body of the casing of the prepayment apparatus, and E the front plate or head thereof.

F represents the coin-receptacle or till, which is attached to the lower portion of the body D of the casing on one side by a hinge f and on the other side by a hasp and staple f' f^2 and lock f^3 .

The front head E is detachably secured to the body D of the casing by any suitable means in such manner that the head can only be detached after unlocking the coin-receptacle. The means which may be employed for this purpose may be those shown and described in said Letters Patent, consisting of pins e and slots e' , Figs. 6, 9, and 10, and a lip e^2 on the coin-receptacle, Fig. 5. The body of the casing is detachably connected with the

back plate in such manner that the body can only be detached from the back plate after unlocking the coin-receptacle. This permits the removal of the casing and the mechanism contained therein from the back plate only by an authorized person. For that purpose the following parts (shown in Figs. 1, 2, 5, and 11) are employed:

d is an annular flange formed on the front side of the back plate and surrounding the rear portion of the body D of the casing, which is slipped into this flange.

d' is an arm which is permanently secured at its rear end to the top of the back plate and which extends forwardly over the body of the casing and terminates near the front head thereof.

d^2 is a screw which secures the front portion of the body D to the front end of this arm and which is inserted upwardly from the interior of the casing, so that the head is located within the latter and is not accessible when the front head and coin-receptacle are in place.

d^3 is a horizontal screw which secures the rear end of the body D to the lower portion of the back plate. This screw is arranged in rear of the coin-receptacle and passes through an ear d^4 , secured to the lower portion of the body D. This screw is covered by the coin-receptacle, which prevents the application of a screw-driver to the head of this screw. The latter can be further guarded against tampering by a tubular washer d^5 , which surrounds the head of the screw. Upon unlocking the coin-receptacle and swinging the latter down on its hinge the lower screw d^3 is exposed and upon removing the front head the upper screw d^2 is also exposed. These screws can now be withdrawn if it is desired to remove the prepayment apparatus.

As in the apparatus of my said patent the purchasing movement is applied by the purchaser, after inserting the coin, to a hand-actuated shaft, which is capable of rotary movement either in the purchasing or in the return direction. This purchasing movement is transmitted to the valve-actuating disk by an intermediate shaft, which is capable of rotary movement only in the purchasing direction, while the return movement is imparted to the valve-actuating disk by gearing connecting it with the meter-actuated shaft.

For convenience in assembling and separating the parts the hand-actuated shaft is made in two parts, the front part G of which is journaled in the front head and provided at its front end with a knob or handle g .

g' represents the coin-slot, which is formed vertically in the front head on one side of the shaft G.

g^2 represents the pivoted cover for the coin-slot, which is arranged in a well-known manner on the front side of the front head and provided at its upper end with a well-known locking-pin g^3 , which projects rearwardly

through a slot g^4 in the front head, Figs. 3 to 5 and 9 to 12.

The device for adjusting the apparatus to the price of gas is arranged on the rear side of the front head. It is most clearly represented in Figs. 5 and 6 and 9 to 12, and is constructed as follows:

H represents a graduated or dial disk which is arranged against the rear side of the front head and secured to the hand-actuated shaft G, so as to turn therewith. This disk is provided on its rear side with a stop h , which rests against a stop h' on the front head when the disk is in its initial position, in which the coin-slot h^2 of the disk coincides with the coin-slot g' of the front head. This disk is provided with a circular graduation indicating the number of feet in coarse or large units—for instance, a unit of twenty feet, as shown. h^3 is a toothed wheel or disk which is arranged against the inner side of this dial-disk and which I call the "throw-off" wheel or disk, because it controls primarily the position of the throw-off pin by which the coin-ejector is actuated which throws the coin from the coin-holder. This toothed throw-off wheel is circumferentially adjustable on the disk H and shaft G and is coupled or interlocked with the disk by any suitable means—for instance, a projection h^4 on the disk entering one of the tooth-spaces in the throw-off wheel. The teeth of the latter are made of such size circumferentially that each tooth corresponds with ten feet of gas on the dial-disk H, so that by shifting the throw-off wheel one tooth or space the throw-off pin is shifted through a distance which produces a change of ten feet in the volume of gas which is delivered.

h^5 is a toothed vernier plate or disk which rests against the inner side of the throw-off wheel and is circumferentially adjustable on the latter and the shaft G. This vernier carries the throw-off pin h^6 and is interlocked with the throw-off wheel by any suitable means—for instance, by a pin h^7 on the wheel engaging in one of the spaces of the toothed vernier-segment h^8 . This pin h^7 may be formed on a separate plate which is riveted to the throw-off wheel on the rear side thereof, as shown in the drawings, particularly in Fig. 5. The teeth of the vernier are made of such size circumferentially that each tooth represents a certain odd number of feet on the disk H, either three, seven, nine, or eleven feet. This enables the vernier to furnish the adjustment for any desired odd number of feet, as the multiples of these numerals furnish all the digits.

For illustration we will assume that each tooth on the vernier represents eleven feet of gas, each tooth on the throw-off wheel ten feet, and that the apparatus is to be adjusted for delivering one hundred and eighty-three feet for a quarter of a dollar. In that case the vernier is shifted three teeth, represent-

ing thirty-three feet, and the throw-off wheel is shifted fifteen teeth, representing one hundred and fifty feet. This combined adjustment of the two parts furnishes the desired
 5 number of feet and places the throw-off pin in the proper position with reference to the starting-point to act when a purchasing rotation equal to one hundred and eighty-three feet has been made by the shaft G. If each
 10 tooth on the vernier represented three feet of gas, the vernier would be shifted either one tooth and the throw-off wheel eighteen teeth or the vernier would be shifted eleven teeth and the throw-off wheel fifteen teeth to ad-
 15 just the apparatus to one hundred and eighty-three feet. The vernier and the throw-off wheel are clamped against the dial-disk H and held in engagement with their respective locking projections by a screw-nut h^9 , which
 20 is applied to the inner threaded portion of the shaft G and bears against the vernier. When the throw-off pin is to be adjusted, the front head is removed with the adjusting device from the casing D. The nut h^9 is then re-
 25 leased, whereupon the parts can be separated by a movement lengthwise of the shaft. By this means the apparatus is reduced to a single foot, which is a much smaller unit than could formerly be obtained in apparatus de-
 30 signed to receive a coin as large as a quarter of a dollar.

The dial-disk H is provided in its peripheral face with the usual notch h^{10} , in which the locking-pin g^3 of the cover g^2 engages
 35 when the cover is opened for exposing the coin-slot, thereby preventing the hand-shaft from being turned before the cover is again closed.

I and I' represent two clamping pawls or cams
 40 which are pivoted to the rear or inner side of the front head of the casing and engage in opposite directions with the peripheral face of the dial-disk H. The pawl I holds the disk H against the purchasing rotation and
 45 the pawl I' holds it against the return rotation. The pawl I will therefore be called the "purchasing-pawl" and the pawl I' the "return-pawl." The face of the dial-disk H is not provided with ratchet-teeth, but is simply knurled or roughened, and the pawls
 50 have long slightly-convex faces, which are similarly knurled or roughened. This enables the pawls to clamp the disk instantly and at any point and to release the disk instantly, thereby avoiding the dead movement
 55 which results when ratchet-teeth and pawls are employed and which represents usually a number of feet of gas, rendering the apparatus inaccurate in delivery to that extent.
 60 The bearing-faces of the pawls are made so long as to bridge the locking-notch h^{10} in the periphery of the dial-disk H. The purchasing-pawl I is pressed toward the disk by a spring i and the return-pawl by a spring i' .

65 K represents the rear or inner portion of the hand-actuated shaft. This rear portion is provided in its front end with a socket, in

which the rear end of the front part G of the shaft engages. The two parts G and K of the shaft are coupled by pins k' , secured to
 70 the front part G and entering a transverse slot k^2 in the rear part K, as shown in Figs. 5 and 6. This enables the front part to be removed with the front head for adjusting the apparatus or other purposes and to be
 75 quickly replaced for use.

L is a driving-disk secured to or formed on the rear end of the rear portion K of the hand-shaft, Figs. 5, 6, 13, and 14. This driving-disk is arranged on the front side of a
 80 disk M, which is somewhat larger in diameter than the driving-disk. The disk M is rotatable only in the purchasing direction and will therefore be called the "purchasing-disk." The latter is arranged on the front
 85 side of a transverse partition N, which is secured in the body D of the casing somewhat nearer the rear end than the front. The purchasing-disk M is journaled in this partition by its hub m , which turns in a central hub
 90 n , formed on the partition. The purchasing rotation is transmitted from the driving-disk L to the purchasing-disk M by one or more pawls l , which are pivoted to the purchasing-disk on the front side thereof, Fig. 14, and
 95 engage with the peripheral face of the driving-disk. These pawls allow the latter to perform its return rotation without affecting the purchasing-disk.

m' is a pawl which is pivoted on the front
 100 side of the partition N and which engages the peripheral face of the purchasing-disk in such direction that it prevents the latter from rotating in the purchasing direction unless this pawl is released. The faces of the
 105 disks L and M are knurled or roughened, as described, instead of being provided with ratchet-teeth, and their pawls are correspondingly constructed; but while I prefer this construction in order to secure the greatest pos-
 110 sible precision of action I do not wish to exclude ratchet-teeth and ordinary pawls, as they can be used when their dead movement is not objectionable.

l' is a circular hub formed on the front side
 115 of the driving-disk L, Figs. 5, 6, 13, and 14. l^2 is an elastic or flexible washer, preferably of spring metal, which surrounds this hub and bears with its marginal portion against studs l^3 , projecting forwardly from the front
 120 side of the purchasing-disk. This washer is pressed rearwardly against these studs by spring-arms l^4 , which have bearing-pins l^5 at their inner ends and are secured with their outer ends to a bridge-piece l^6 . The latter is
 125 supported from the front side of the partition N by posts l^7 and is provided with openings through which the bearing-pins l^5 project rearwardly to the washer l^2 . The bridge-piece l^6 is provided at its middle with an open-
 130 ing through which the shaft K passes. The middle portion of the bridge-piece bears against the front side of the hub l' by one or more interposed washers l^8 . These devices

apply a frictional resistance to the driving-disk M, thereby preventing dead movement or play of these parts, which would result in a lack of accuracy in the action of the apparatus.

O represents the valve-actuating disk, which is arranged in the rear portion of the casing between the partition N and the back plate C and in line with the purchasing-disk M. The valve-actuating disk is provided on its front side with a hub o' , which bears against the hub of the partition N.

P represents the purchasing-shaft, which is interposed between the hand-actuated shaft and the meter-actuated shaft and which is rotatable only in the purchasing direction from the hand-actuated shaft. This purchasing-shaft is arranged with its front end centrally in the purchasing-disk and is coupled with the hub of the latter by coupling-pins p , engaging in a diametrical slot p' in the hub of the purchasing-disk, Figs 5 and 6. The latter is held on the front end of the purchasing-shaft by a screw p^2 . The purchasing-shaft extends rearwardly through the hub of the valve-actuating disk and into a socket in the front end of the meter-actuated shaft a^8 for holding the shafts in alinement.

Q is a gear-wheel which is secured to the rear end of the purchasing-shaft P in rear of the valve-actuating disk O.

Q' is an internally-toothed gear-wheel secured to the front end of the meter-actuated shaft a^8 .

Q² is an idler journaled on the rear side of the valve-actuating disk and meshing with the gear-wheel Q and internal gear Q', as described and shown in my said Letters Patent. The valve-actuating disk operates as described in said Letters Patent in opening and closing the valve and is provided for that purpose with an opening q , in which the arm q' of the valve-spindle q^2 engages, Figs. 6 and 8.

q^3 , Figs. 5 and 6, indicates yielding friction-arms, which are secured to the rear side of the partition N and which bear against the front side of the valve-actuating disk for preventing dead movement of the latter. The bearing in which the valve-disk O turns is rather short for the sake of compactness, and the disk is therefore liable to wobble. The spring-arms q^3 , which bear against the front side of the disk, steady the latter and compel it to run true.

The coin which is inserted through the coin-slot in the front head enters a coin-holder which is most clearly shown in Figs. 6, 8, 11, 12, and 13 and which is constructed as follows: This coin-holder is composed of a lower fixed jaw R and an upper tilting jaw R' and is provided between these jaws with an ejecting-lever R², by which the coin R³ is ejected from the holder when the hand-actuated shaft has completed the purchasing rotation. The jaws of the coin-holder and the ejecting-lever are supported from a vertical plate r , which is arranged lengthwise in the front portion of the casing

near one side thereof and secured at its rear end to the partition N and at its front end by a horizontal stud r' to the side of the body D of the casing. The fixed jaw R of the coin-holder is secured to the inner ends of horizontal arms r^2 , which project inwardly from the lower end of the plate r . The fixed jaw R is secured with its rear portion in these two arms, the rear portion of the jaw having the form of a round stem, as shown in Figs. 6, 7, and 13, and the jaw projecting forwardly beyond the front arm r^2 . The bearing-face of the lower jaw is angular in form, as shown in Figs. 11 and 12, having a lower horizontal portion on which the coin rests and an upper vertical portion which rises from the horizontal portion and which confines the coin against movement outwardly or toward the adjacent side of the casing. The upper jaw R' is grooved on its under side, so as to confine the coin laterally in both directions. This jaw is secured to a horizontal shaft r^3 , which is arranged longitudinally between the jaw and the adjacent side of the casing. This shaft is journaled in two lugs r^4 , which project inwardly from the upper portion of the vertical plate r . The upper jaw rocks or tilts vertically with its shaft r^3 and stands normally when no coin is present in the holder in a slightly-inclined position, as shown in Fig. 12. The jaw is supported in this position by a lever r^5 , which bears with its lower arm r^6 against the plate r , as shown in Fig. 13, in which position the jaw is held yieldingly by a spring r^8 , which is coiled around the shaft and fastened to the same and to the support in which the shaft is journaled. The upper arm r^7 of the lever r^5 bears against the detent-pawl or cam m' of the purchasing-disk M, which pawl or cam is provided with a pin r^9 for engagement with the upper arm r^7 of the lever r^5 . The pawl m' is yieldingly held in engagement with the purchasing-disk M by a spring m^2 , secured to the rear side of the partition N and projecting through a slot m^3 in the partition and into engagement with the pawl m' , as shown in Figs. 7 and 13. The shaft r^3 of the upper jaw is provided at its front end with an arm r^{10} , which in the normal inclined position of the jaw bears against a pin r^{11} on the return pawl or cam I' of the graduated disk H and holds the pawl I' out of engagement with the disk in the normal position of the upper jaw, as represented in Fig. 12. By inserting the coin between the two jaws the upper jaw is wedged upwardly and raised to the horizontal position. (Shown in Fig. 11.) This rocking movement of the upper jaw turns the shaft of the jaw in the direction of the arrows, Figs. 12 and 13, and this turning movement of the shaft swings the detent-pawl or cam m' of the purchasing-disk M away from the latter and releases the same for the purchasing movement and also swings the front arm r^{11} of the shaft away from the return-pawl I' of the graduated disk H and allows this pawl to engage with this disk, as shown in Fig. 11, there-

by preventing return movement of this shaft while the purchasing rotation is being made.

The coin-ejecting lever R^2 is secured to a horizontal shaft r^{12} , which is arranged longitudinally upon the outer side of the fixed jaw and parallel therewith and journaled in the lower arms r^2 , to which the fixed jaw is secured, as shown in Figs. 6 and 13. The ejecting-lever is provided with an elongated head r^{13} , which is arranged lengthwise and outside of the two jaws and at a suitable height above the lower jaw, so that an inward movement of this head will press the coin inwardly and remove it from the lower jaw, as shown in Fig. 12. The lower arm r^{14} of the ejecting-lever extends from the shaft r^{12} outwardly and inwardly and then upwardly on the inner side of the lower jaw into the path of the throw-off pin h^6 on the vernier-disk. The lower arm of the ejecting-lever is provided at its end with an angular head r^{15} for engagement with the throw-off pin. When the purchasing rotation of the hand-actuated shaft has been completed, the throw-off pin engages with the ejecting-lever and depresses the lower arm of the same, thereby swinging the head r^{13} of the lever inwardly, which movement of this head ejects the coin from the holder and allows the coin to drop into the receiver below. The removal of the coin from the holder allows the upper jaw to descend until its movement is stopped by the lower arm r^6 of the lever r^5 at the rear end of the shaft of the upper jaw striking against the plate r , as shown in Fig. 13. This turning movement of the shaft of the upper jaw releases the detent-pawl or cam m' and allows the latter to engage again with the purchasing-disk M, thereby preventing further rotation of the latter in the purchasing direction. The same movement of the shaft of the upper jaw also raises the return-pawl I' from the graduated disk H and frees the latter for the return movement. The upper jaw is provided on its upper side and at its front end with an inclined nose r^{16} , which engages the purchasing-pawl I of the graduated or dial disk H. In the normal tilted position of the upper jaw this nose allows the purchasing-pawl I to engage with the dial-disk H, as shown in Fig. 12, and the disk is thereby prevented from being rotated in the purchasing direction until a coin is inserted and the upper jaw is thereby raised. The upward movement of the upper jaw produced by the insertion of the coin raises the purchasing-pawl I out of engagement with the disk H by the nose r^{16} of the jaw engaging against the pin r^{17} of the pawl, and the disk is now free for the purchasing movement. The same movement of the upper jaw causes the engagement of the return-pawl I' with the disk, whereby backward movement of the disk is prevented when it is released for the purchasing movement.

In order to insure the complete insertion of the coin between the jaws of the coin-holder, the movable cover g^2 of the casing is provided

on its inner edge with an incline g^5 , which engages the coin as the cover is closed and presses the coin backwardly or into the coin-holder, and the dial-disk H is also provided with an incline or cam r^{18} , which engages the coin after the cover has been closed and presses the coin still farther back into the coin-holder. These two cams are most clearly shown in Fig. 6, and the cam r^{18} is also shown in Figs. 9 and 12.

The detent-pawl or cam m' of the purchasing-disk M operates in the same direction in which the purchasing-pawl I of the dial-disk H operates—that is to say, both of these pawls or cams prevent rotation of the disk in the purchasing direction. As the shaft G to which the dial-disk H is secured is coupled with the purchasing-disk M by the intermediate parts in such manner that both of these disks are compelled to move together in the purchasing direction, the purchasing-pawl I of the dial-disk H can be omitted, since the pawl m' of the purchasing-disk M prevents rotation of the dial-disk with the purchasing-disk M in the purchasing direction. It will thus be seen that the movable jaw of the coin-holder performs the function of causing the locking and releasing of the purchasing-disk M and the hand-actuated shaft. The purchasing-disk M is directly released when the coin is inserted by releasing the pawl or cam m' , and the hand-actuated shaft is indirectly released by this releasing of the purchasing-disk unless the purchasing-pawl I is employed in connection with the dial-disk H, in which case the hand-actuated shaft is also directly released; but, as stated above, this is not necessary.

The valve mechanism is connected with the body D of the casing on one side thereof where the horizontal valve-spindle q^2 passes through the same and is constructed as follows:

S, Fig. 6, is a stuffing-box which is secured to the side of the body D of the casing and in which the valve-spindle q^2 turns. The valve-spindle is composed of two separate parts—the part q^2 , already mentioned, which is connected with the casing D of the prepayment apparatus, and a part q^4 , which is connected with the valve and valve-casing and which is separable from the part q^2 . The two parts are provided at their adjacent ends with an interlocking tenon and groove q^5 q^6 , by which the rotary movement of the part q^2 is transmitted to the part q^4 . The part q^2 of the spindle is provided with a collar s , which rests against the bottom of the stuffing-box S and is packed gas-tight by a packing s' and gland s^2 , by which parts the spindle q^2 is also held against longitudinal movement.

T, Figs. 2, 3, and 6, represents the valve-casing, provided with a partition t , containing the valve-seat, an inlet-nipple t' on one side of the partition, and an outlet-nipple t^2 on the other side, which latter nipple is connected by a U-piece t^3 with the inlet-pipe t^4 of the meter.

t^5 is the head of the valve-casing which is

arranged nearest the prepayment apparatus and provided with a stuffing-box t^6 , in which the part q^4 of the valve-spindle is journaled. This part q^4 of the valve-spindle is provided at its inner end with a steep-screw t^7 , by which the valve t^8 is actuated. This screw engages in a screw-nut t^9 , secured to the valve in any suitable manner—for instance, as shown in Fig. 6, by a collar t^{10} and pins t^{11} , passing through the collar and the nut and into the body of the valve. The valve is guided and held against turning by rods t^{12} , secured to the head t^5 of the valve-casing and entering openings in the collar t^{10} . The part q^4 of the valve-spindle is provided with a collar t^{13} and the stuffing-box t^6 with a packing t^{14} and gland t^{15} , similar to the corresponding parts of the stuffing-box S. The end of the stuffing-box t^6 of the valve-casing is reduced and enters a recess in the end of the stuffing-box S for alining these parts, and the two stuffing-boxes are registered or prevented from turning on each other by suitable interlocking devices—for instance, as shown in Fig. 6, by a radial pin s^3 on one stuffing-box entering a recess in the end of the other. The outer end s^4 of the stuffing-box S is enlarged and provided with an external screw-thread, to which a union-nut s^5 is applied which bears against a collar on the end of the stuffing-box t^6 of the valve-casing. Suitable packing-washers are applied to the union-joint to render it gas-tight. By simply placing the valve-casing with its spindle and stuffing-box against the spindle and stuffing-box of the prepayment apparatus and connecting the stuffing-boxes by the union-joint the parts are securely connected; so that the valve is operated from the prepayment apparatus. Leakage of gas along the valve-spindle is prevented by the stuffing-box of the valve-casing and in addition thereto by the stuffing-box of the casing of the prepayment apparatus and the inclosing union.

The union-nut is held against unscrewing by a hook-bolt u , which overlaps the nut, and is attached to the body D of the prepayment-casing by a screw-nut u' , applied to the threaded end of the bolt on the inner side of this casing. The union-nut cannot be unscrewed until the bolt is released, and the latter cannot be released by unauthorized persons.

When the valve-casing is secured to the head by a screw-joint, as shown in Fig. 6, the parts are preferably further secured by a screw u^2 , which passes through an ear u^3 on the casing into an ear u^4 on the head. These parts are arranged on the rear side of the valve casing, where the screw is rendered inaccessible by the side wall of the meter.

Upon disconnecting the valve-casing from the casing of the prepayment apparatus each of these parts is separated from the other and each can be removed as an entirety upon disconnecting its fastenings without disturbing

the other part. This enables repairs to be made in the valve and casing or the valve and casing to be renewed without disturbing the prepayment apparatus and also permits the prepayment apparatus to be removed for repairs, alterations, or renewals without disturbing the valve-casing.

I claim as my invention—

1. In a prepayment apparatus, the combination with a throw-off device which limits the purchasing movement, of a differential adjusting means for setting the throw-off device, substantially as set forth.

2. In a prepayment apparatus, the combination with a throw-off device which limits the purchasing movement, of a support for the throw-off device consisting of two members, each of which is separately adjustable, substantially as set forth.

3. In a prepayment apparatus, the combination with a coin-holder and a throw-off device which controls the discharge of the coin therefrom at the completion of the purchasing movement, of an adjustable support whereby the position of the throw-off device is regulated, said support consisting of two members, each of which is separately adjustable, whereby part of the required adjustment can be furnished by each member of said support, substantially as set forth.

4. In a prepayment apparatus, the combination with a coin-holder and a throw-off device which controls the discharge of the coin therefrom at the completion of the purchasing movement, of an adjustable support whereby the position of the throw-off device is regulated, said support consisting of two members, each of which is capable of rotary adjustment toward and from the starting-point, substantially as set forth.

5. In a prepayment apparatus, the combination with a coin-holder and a throw-off device which controls the discharge of the coin therefrom at the completion of the purchasing movement, of an adjustable support whereby the position of the throw-off device is regulated, said support consisting of a member capable of rotary adjustment, and a vernier which is adjustably secured to said member and which supports the throw-off device, substantially as set forth.

6. In a prepayment apparatus, the combination with a coin-holder and a throw-off device which controls the discharge of the coin therefrom at the completion of the purchasing movement, of a throw-off disk capable of rotary adjustment, and a vernier capable of rotary adjustment on the throw-off disk and carrying the throw-off device, substantially as set forth.

7. In a prepayment apparatus, the combination with a coin-holder and a throw-off device which controls the discharge of the coin therefrom at the completion of the purchasing movement, of a toothed throw-off disk capable of rotary adjustment, and a toothed

vernier capable of rotary adjustment on said disk and carrying the throw-off device, substantially as set forth.

8. The combination with a coin-holder, a throw-off device which controls the discharge of the coin therefrom, and the actuating-shaft, of a supporting-disk secured to said shaft and provided with a locking-tooth, a toothed throw-off disk capable of rotary adjustment about said shaft and held in position by said tooth, a locking-tooth secured to said throw-off disk, a toothed vernier capable of rotary adjustment on said throw-off disk and held in position by the locking-tooth of the same, said vernier carrying said throw-off device, and means for holding the parts in position when the locking-teeth are in engagement, substantially as set forth.

9. The combination with a coin-holder, a throw-off device which controls the discharge of the coin therefrom, and the actuating-shaft, of a supporting-disk secured to said shaft and provided with a locking-tooth, a toothed throw-off disk arranged loosely on said shaft and resting against said disk with its toothed face in engagement with said locking-tooth, a locking-tooth secured to said throw-off disk, a toothed vernier-disk which carries said throw-off device and which is arranged loosely on said shaft and rests against said throw-off disk with its toothed face in engagement with the locking-tooth thereof, and a screw-nut applied to said shaft and holding the parts in engagement after adjustment, substantially as set forth.

10. In a prepayment apparatus, the combination with the casing and its detachable front plate, of a hand-actuated purchasing-shaft mounted on said plate, a throw-off device which controls the discharge of the coin from the coin-holder, and an adjustable support for said throw-off device mounted on the rear side of said front plate and removable therewith from the casing, said support consisting of two members each of which is separately adjustable, substantially as set forth.

11. In a prepayment apparatus, the combination with the casing and its detachable front plate, of a hand-actuated shaft capable of rotation in either direction and composed of a front section which is mounted on said front plate and removable therewith, a rear section which is mounted in said casing and a separable coupling which connects both sections when said front plate is applied to said casing and compels the rear section to turn with the front section in either direction, and means whereby only the purchasing movement is transmitted from said rear section, substantially as set forth.

12. In a prepayment apparatus, the combination with the casing and its detachable front plate, of a hand-actuated shaft capable of rotation in either direction and composed of a front section which is mounted on said front plate and removable therewith, a rear section which is mounted in said casing, and

a projection and slot arranged in the adjacent ends of said sections, coupling the same and compelling the rear section to turn with the front section in either direction, and means for transmitting the purchasing movement only from said rear section, substantially as set forth.

13. In a prepayment apparatus, the combination with the casing and its detachable front plate, of a hand-actuated shaft capable of rotation in either direction and composed of a front section which is mounted on said front plate and removable therewith, a rear section which is mounted in said casing and a separable coupling which connects both sections, a throw-off device which controls the discharge of the coin from the coin-holder, and an adjustable support for said throw-off device arranged on the rear side of said front plate and connected with the front section of said shaft, substantially as set forth.

14. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, of a locking-wheel secured to said shaft and provided with a frictional face, a releasable clamping-cam engaging said face and locking the wheel against backward rotation, and a throw-off device which limits the purchasing movement of said shaft, whereby the measurement is controlled solely by the throw-off device, substantially as set forth.

15. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, of a locking-wheel secured to said shaft and provided with a frictional peripheral face, releasable clamping-cams acting in opposite directions and alternately engaging the face of said wheel, one to lock the wheel against rotation in the purchasing direction and the other against rotation in the return direction, and a throw-off device which limits the purchasing movement of said shaft, substantially as set forth.

16. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a throw-off device which limits the purchasing movement of said shaft, of a purchasing-disk which receives only the purchasing rotation from said hand-actuated shaft and which is provided with a frictional face, and a releasable clamping-cam which engages the face of said disk and locks the same against movement in the purchasing direction, substantially as set forth.

17. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, of a purchasing-shaft which receives only the purchasing rotation from said hand-actuated shaft, a releasable locking device which locks said purchasing-shaft against rotation in the

purchasing direction, and a coin-actuated device which releases said locking device and unlocks said purchasing-shaft upon the insertion of the coin, substantially as set forth.

5 18. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a releasable locking device which locks said shaft against return movement, a purchasing-shaft which receives only the purchasing rotation from said hand-actuated shaft, and a releasable locking device which prevents such rotation of the purchasing-shaft, of a coin-actuated device which normally holds said locking device of the hand-actuated shaft unlocked and said locking device of the purchasing-shaft locked, and which, upon the insertion of the coin, causes the engagement of said locking device of the hand-actuated shaft and the disengagement of the locking device of the purchasing-shaft, substantially as set forth.

19. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a releasable locking device which locks said shaft against movement in the purchasing direction, a purchasing-shaft which receives only the purchasing rotation from said hand-actuated shaft, and a releasable locking device which locks said purchasing-shaft against such rotation, of a coin-actuated device which releases both locking devices simultaneously upon the insertion of the coin, substantially as set forth.

20. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, of a driving-disk secured to the rear end of said shaft, a purchasing-shaft and disk arranged in rear of said driving-disk, a driving device transmitting only the purchasing movement from said driving-disk to said purchasing-disk, a releasable locking device which locks said purchasing-disk against rotation in the purchasing direction, and a coin-actuated device which releases said locking device upon the insertion of the coin, substantially as set forth.

21. In a prepayment apparatus, the combination with a shaft provided with a releasable locking device, of a stationary coin-holder having a movable jaw which is moved by inserting the coin into the holder, and means whereby such movement of the jaw is transmitted to the locking device and caused to release the same, substantially as set forth.

22. In a prepayment apparatus, the combination with a shaft provided with a releasable locking device which locks the shaft against movement in the purchasing direction, of a stationary coin-holder having a movable jaw which is moved by inserting the coin into the holder, and means whereby such movement of the jaw is transmitted to the locking device and caused to release the same, substantially as set forth.

23. In a prepayment apparatus, the combination with a shaft capable of rotation in the purchasing direction and also in the return direction, and a releasable locking device which locks the shaft against rotation in the return direction, of a stationary coin-holder having a movable jaw which is moved by inserting the coin into the holder, and means whereby such movement of the jaw is transmitted to the locking device and caused to release the same, substantially as set forth.

24. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a locking device which holds said shaft against return rotation, of a purchasing-shaft which receives only the purchasing rotation from said hand-actuated shaft, a locking device which locks said purchasing-shaft against rotation in the purchasing direction, and a stationary coin-holder having a movable jaw which is connected with both locking devices and releases and applies the same alternately, substantially as set forth.

25. In a prepayment apparatus, the combination with a shaft and a releasable locking device which locks said shaft against rotation, of a stationary coin-holder having a pivoted jaw which is tilted by inserting the coin, and means connecting said jaw with said locking device, substantially as set forth.

26. In a prepayment apparatus, the combination with a shaft and a releasable locking device which locks said shaft against rotation, of a stationary coin-holder having a fixed lower jaw and an upper jaw which is movable toward and from the lower jaw and which is raised by inserting the coin between the jaws, and means whereby the movement of the upper jaw is transmitted to said locking device, substantially as set forth.

27. In a prepayment apparatus, the combination with a coin-controlled shaft arranged lengthwise in the apparatus, and a locking device which locks said shaft against rotation, of a stationary coin-holder having one of its jaws mounted on a shaft which is journaled lengthwise in the apparatus and provided with a projection by which said locking device is shifted, substantially as set forth.

28. In a prepayment apparatus, the combination with a hand-actuated shaft provided with a releasable locking device which prevents return rotation of said shaft, and a purchasing-shaft arranged behind said hand-actuated shaft and provided with a releasable locking device which prevents the purchasing rotation of said purchasing-shaft, of a stationary coin-holder having a journaled jaw which is provided at one end with means for shifting the locking device of said hand-actuated shaft and at the other end with means for shifting the locking device of said purchasing-shaft, substantially as set forth.

29. In a prepayment apparatus, the combi-

nation with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a releasable locking device which prevents rotation of said shaft in the purchasing direction, of a stationary coin-holder having its upper jaw journaled parallel with said shaft and provided with an upwardly-projecting nose which engages said locking device and releases the same when said jaw is swung upwardly by inserting the coin, substantially as set forth.

30. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a releasable locking device which prevents return rotation of said shaft, of a stationary coin-holder having its upper jaw journaled parallel with said shaft and provided with a downwardly-projecting arm which holds said locking device out of engagement in the normal position of said journaled jaw and allows said locking device to engage when the jaw is moved upwardly by inserting the coin between the jaws, substantially as set forth.

31. In a prepayment apparatus, the combination with a coin-controlled shaft which receives only the purchasing rotation, and a releasable locking device which prevents such rotation of said shaft, of a stationary coin-holder having a fixed jaw and a movable jaw journaled parallel with said shaft and provided with an arm which engages said locking device and releases the same upon inserting the coin between the jaws, and a stop whereby said journaled jaw is held in its normal position, nearest the fixed jaw, when no coin is inserted, substantially as set forth.

32. In a prepayment apparatus, the combination with a stationary coin-holder having two jaws between which the coin is inserted, of an ejecting device arranged between said jaws and adapted to eject the coin from the holder when the purchasing movement has been completed, substantially as set forth.

33. In a prepayment apparatus, the combination with a stationary coin-holder having a grooved jaw which confines the coin laterally in both directions, and an opposing jaw which confines the coin in only one direction, of an ejecting device arranged with its head between said jaws and adapted to eject the coin from the same, substantially as set forth.

34. In a prepayment apparatus, the combination with a stationary coin-holder having an upper grooved jaw and a lower jaw which is open on one side, of a coin-ejecting device arranged between said jaws, substantially as set forth.

35. In a prepayment apparatus, the combination with a stationary coin-holder having two opposing jaws between which the coin is inserted, of a coin-ejecting device having its head arranged between said jaws, a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a throw-off device connected with

said shaft and actuating said ejecting device when the purchasing movement has been completed, substantially as set forth.

36. In a prepayment apparatus, the combination with a stationary coin-holder having an upper and a lower jaw between which the coin is inserted, of a coin-ejecting lever pivoted outside of said lower jaw and having its head arranged outside of and between said jaws and its lower arm inside of said lower jaw, a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, and a throw-off device connected with said shaft and engaging the lower arm of said ejecting-lever when the purchasing movement has been completed, substantially as set forth.

37. In a prepayment apparatus, the combination with a coin-controlled shaft and the releasable locking device whereby said shaft is locked against purchasing movement, of a stationary coin-holder having a movable jaw which is moved by inserting the coin in the holder, means whereby the movement of said jaw is transmitted to said locking device for releasing the same, and a coin-ejector whereby the coin is ejected from the holder when the purchasing movement has been completed, substantially as set forth.

38. In a prepayment apparatus, the combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a releasable locking device which prevents return rotation of said shaft, a throw-off device connected with said shaft, a purchasing-shaft which receives only the purchasing rotation from said shaft, a releasable locking device which locks said purchasing-shaft against such rotation, a stationary coin-holder having a movable jaw which is moved by inserting the coin into the holder, means whereby such movement of said jaw is transmitted to the locking device of the hand-actuated shaft for locking the same against return movement, means whereby such movement of said jaw is transmitted to the locking device of the purchasing-shaft for unlocking the same, and a coin-ejecting device which is actuated when the purchasing movement has been completed, substantially as set forth.

39. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a purchasing disk and shaft which receive only the purchasing rotation from said hand-actuated shaft, and a friction device bearing against said purchasing-disk and preventing dead movement of the same, substantially as set forth.

40. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a purchasing disk and shaft which receive only the purchasing rotation from said hand-actuated shaft, projections formed on the side of said disk, a washer bearing against said pro-

jections, and means for pressing said washer yieldingly against said projections, substantially as set forth.

41. The combination with a hand-actuated shaft capable of rotation in the purchasing direction and also in the return direction, a driving-disk secured to the rear end of said shaft, a purchasing disk and shaft arranged in rear of said driving-disk, means whereby only the purchasing movement is transmitted from said driving-disk to said purchasing-disk, projections formed on the front side of said purchasing-disk, a washer surrounding said driving-disk and bearing against said projections, and yielding arms bearing against the front side of said washer and pressing the same against the projections of the purchasing-disk, substantially as set forth.

42. The combination with a meter, a meter-actuated shaft extending through the wall of the meter, and a prepayment apparatus having a rear plate which is secured to the wall of the meter, of a stuffing-box for said shaft attached to said rear plate and extending rearwardly therefrom through an opening in the wall of the meter, and a packed fastening connecting said stuffing-box with the wall of the meter, substantially as set forth.

43. The combination with a prepayment apparatus, a meter, and a meter-actuated shaft extending through the wall of the meter to the prepayment apparatus, of a stuffing-box inclosing said shaft and projecting rearwardly from the prepayment apparatus through the wall of the meter, and a fastening whereby said stuffing-box is secured to the wall of the meter on the inner side thereof, substantially as set forth.

44. The combination with a prepayment apparatus, a meter, and a meter-actuated shaft extending through the wall of the meter to the prepayment apparatus, of a screw-threaded stuffing-box for said shaft projecting rearwardly from the back plate of the prepayment apparatus through an opening in the wall of the meter, and a screw-nut applied to said box on the inner side of said wall, substantially as set forth.

45. The combination with a prepayment apparatus, its inclosing casing and the upright back plate thereof adapted to be secured to the wall of the meter and provided on its front side with a seat for the rear end of said casing, of an arm secured at its rear end to the upper part of said back plate and extending forwardly over said casing, and a fastening device inserted from the interior of said casing into the front portion of said arm, substantially as set forth.

46. The combination with a prepayment apparatus, its inclosing casing, the upright back plate thereof extending below said casing and adapted to be secured to the wall of the meter, a coin-receptacle releasably attached to the lower part of said casing and arranged in front of the lower part of said back plate, and means whereby said receptacle is locked, of

a releasable fastening connecting the lower part of said casing with the lower part of said back plate and arranged in rear of said receptacle and protected thereby when the same is locked but exposed when the receptacle is released, substantially as set forth.

47. The combination with a meter having a driving-shaft for a prepayment apparatus actuated by the meter and provided with a gear-wheel, of a prepayment apparatus secured to the meter and having a meter-actuated shaft, a connecting-gearing meshing with said gear-wheel on the meter-shaft and mounted in a frame which is secured to the meter, and a detachable coupling-bar connecting said meter-actuated shaft of the prepayment apparatus with said connecting-gearing by open-ended universal-joint connections arranged at both ends of said bar, whereby said bar can be readily inserted between the meter-actuated shaft of the prepayment apparatus and the connecting-gearing, substantially as set forth.

48. The combination with a meter having a driving-shaft for a prepayment apparatus actuated by the meter and provided with a gear-wheel, of a prepayment apparatus secured to the meter and having a meter-actuated shaft, a connecting-gearing mounted in a frame which is secured to the meter and comprising a vertical shaft having a gear-wheel which meshes with said gear-wheel on the meter-shaft and a horizontal shaft connected by gear-wheels with said vertical shaft, and a detachable coupling-bar connecting said meter-actuated shaft of the prepayment apparatus with said horizontal shaft of the connecting-gearing by open-ended universal-joint connections, arranged at both ends of said bar, substantially as set forth.

49. The combination with a prepayment apparatus having a valve-spindle, of a detachable valve-casing, a valve arranged therein and a valve-spindle carried by said casing and adapted to connect with the spindle of the prepayment apparatus, whereby the prepayment apparatus and the valve apparatus can be each applied or removed independently, substantially as set forth.

50. The combination with a prepayment apparatus having a valve-spindle, and means for supporting said apparatus, of a valve-casing, a valve arranged therein, a valve-spindle carried by said casing and adapted to connect with the spindle of the prepayment apparatus, and means for supporting said valve-casing independently of said prepayment apparatus, whereby the prepayment apparatus and the valve apparatus can be each applied and removed independently, substantially as set forth.

51. The combination with a prepayment apparatus having a valve-spindle and a stuffing-box inclosing said spindle, of a valve-casing carrying a valve and spindle and a stuffing-box inclosing said spindle, and means for independently supporting said prepayment ap-

paratus and valve-casing, substantially as set forth.

52. The combination with a prepayment apparatus having a valve-spindle and a stuffing-box inclosing said spindle, of a valve-casing carrying a valve and spindle and a stuffing-box inclosing said spindle, and means for connecting both stuffing-boxes, substantially as set forth.

53. The combination with a prepayment apparatus having a valve-spindle and a stuffing-box inclosing said spindle, of a valve-casing carrying a valve and spindle and a stuffing-box inclosing said spindle, a union-nut connecting said stuffing-boxes, and means for independently supporting said prepayment apparatus and valve apparatus, substantially as set forth.

54. The combination with a prepayment apparatus, a valve-casing containing a valve, means whereby said prepayment apparatus and said valve-casing are independently supported, and a divided valve-actuating device arranged partly in the prepayment apparatus and partly in the valve-casing, substantially as set forth.

55. The combination with a prepayment apparatus, of a valve-casing containing a valve, a divided valve-actuating device arranged partly in the prepayment apparatus and partly in the valve-casing, and a locking device by which the valve-casing is locked to the prepayment apparatus and which is releasable from the interior of the latter, substantially as set forth.

56. The combination with a prepayment apparatus, a valve-casing containing a valve, and a coupling device securing said valve-casing to said prepayment apparatus, of a

locking-bolt which engages said coupling device and which is releasably secured on the inner side of the prepayment apparatus, substantially as set forth.

57. The combination with a prepayment apparatus having a valve-spindle and a stuffing-box inclosing said spindle, of a valve-casing carrying a valve and spindle and a stuffing-box inclosing said spindle, a union-nut connecting said stuffing-boxes, and a locking-bolt engaging said union-nut and secured by a screw-nut on the inner side of the prepayment apparatus, substantially as set forth.

58. The combination with a prepayment apparatus, its casing and a valve-actuating device arranged transversely in one side thereof, of a detachable valve-casing containing a valve and valve-actuating device and arranged on one side of the prepayment apparatus, and means whereby said valve-actuating devices are coupled together, substantially as set forth.

59. The combination with a prepayment apparatus, its casing and a valve actuating device arranged transversely in one side thereof, of a detachable valve-casing containing a valve and valve-actuating device and arranged on one side of the prepayment apparatus, means whereby said valve-actuating devices are coupled together, and independent supporting means for said prepayment apparatus and said valve-casing, substantially as set forth.

Witness my hand this 3d day of August, 1900.

FRANK E. MORGAN.

Witnesses:

F. A. LANE,

EDWARD WILHELM.