

No. 826,814.

PATENTED JULY 24, 1906.

J. J. WOOD.

PREPAYMENT METER.

APPLICATION FILED MAY 25, 1905.

2 SHEETS—SHEET 1.

FIG. 1.

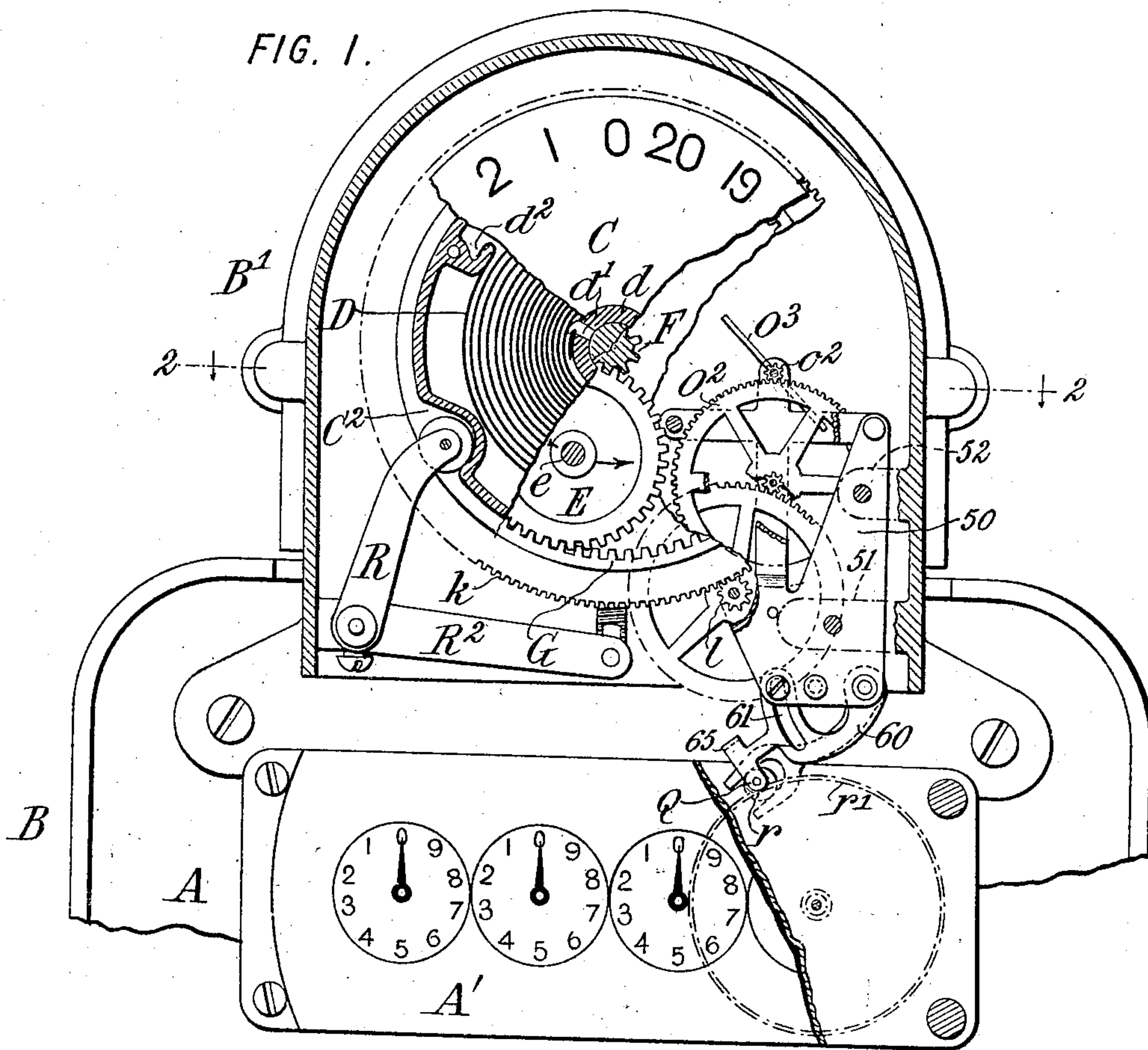
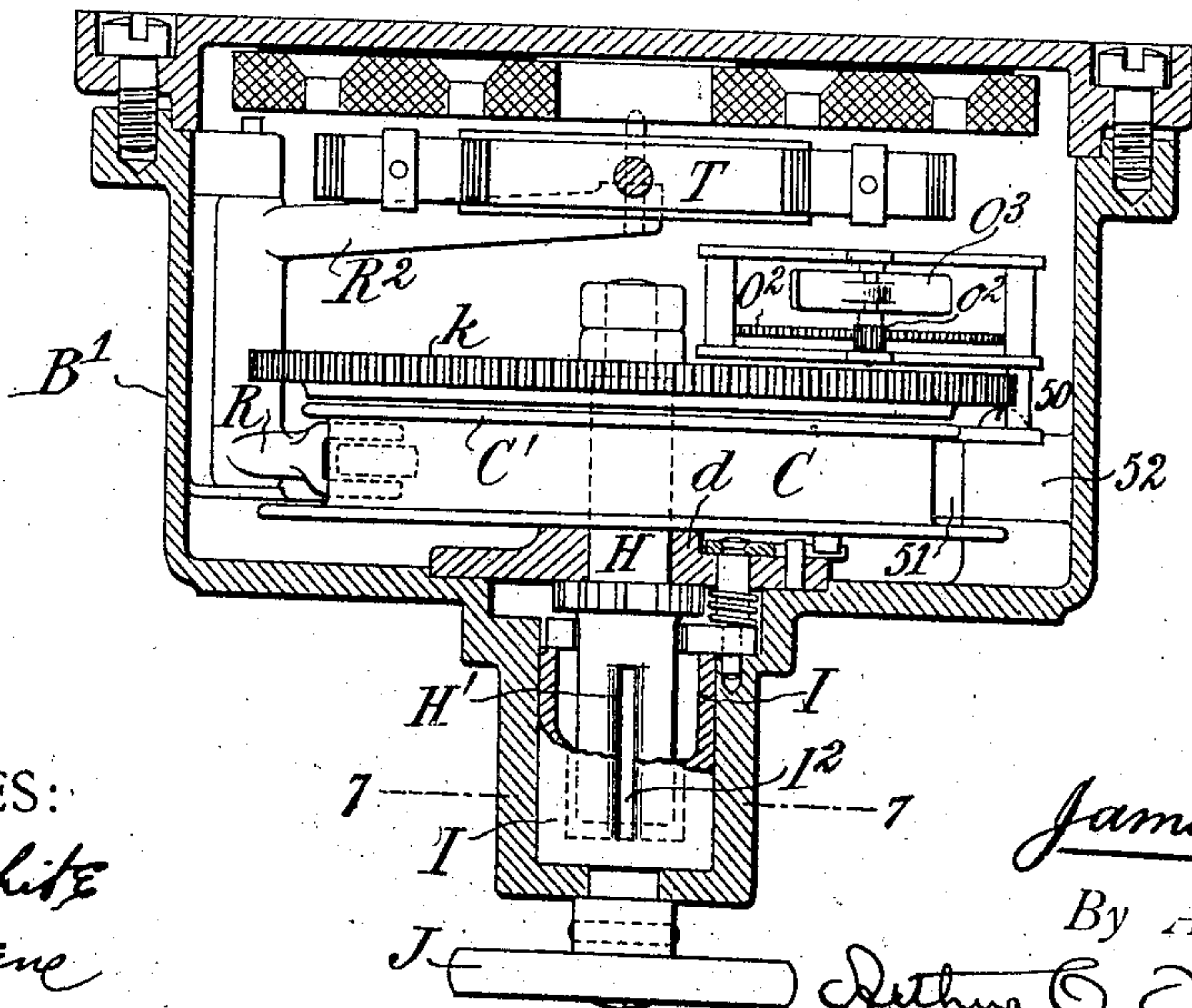


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

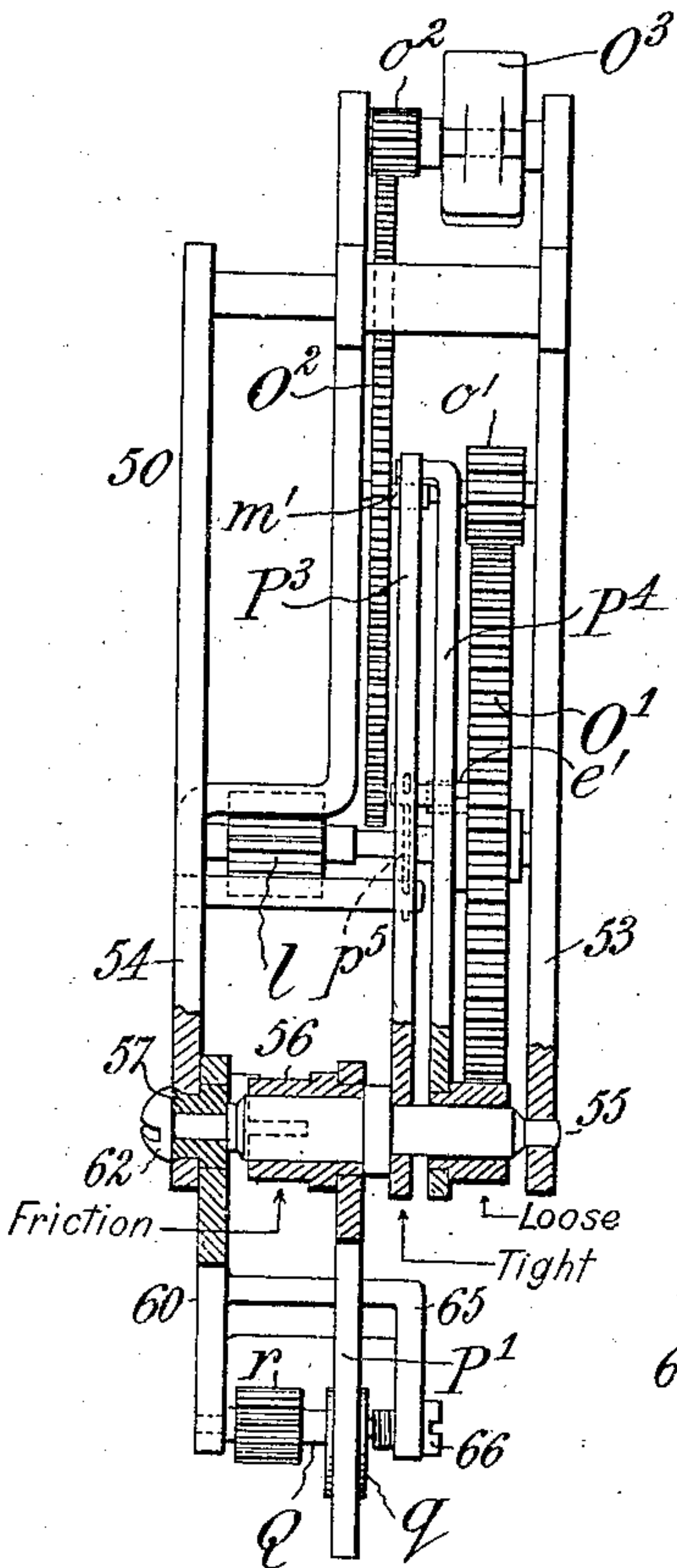


FIG. 4.

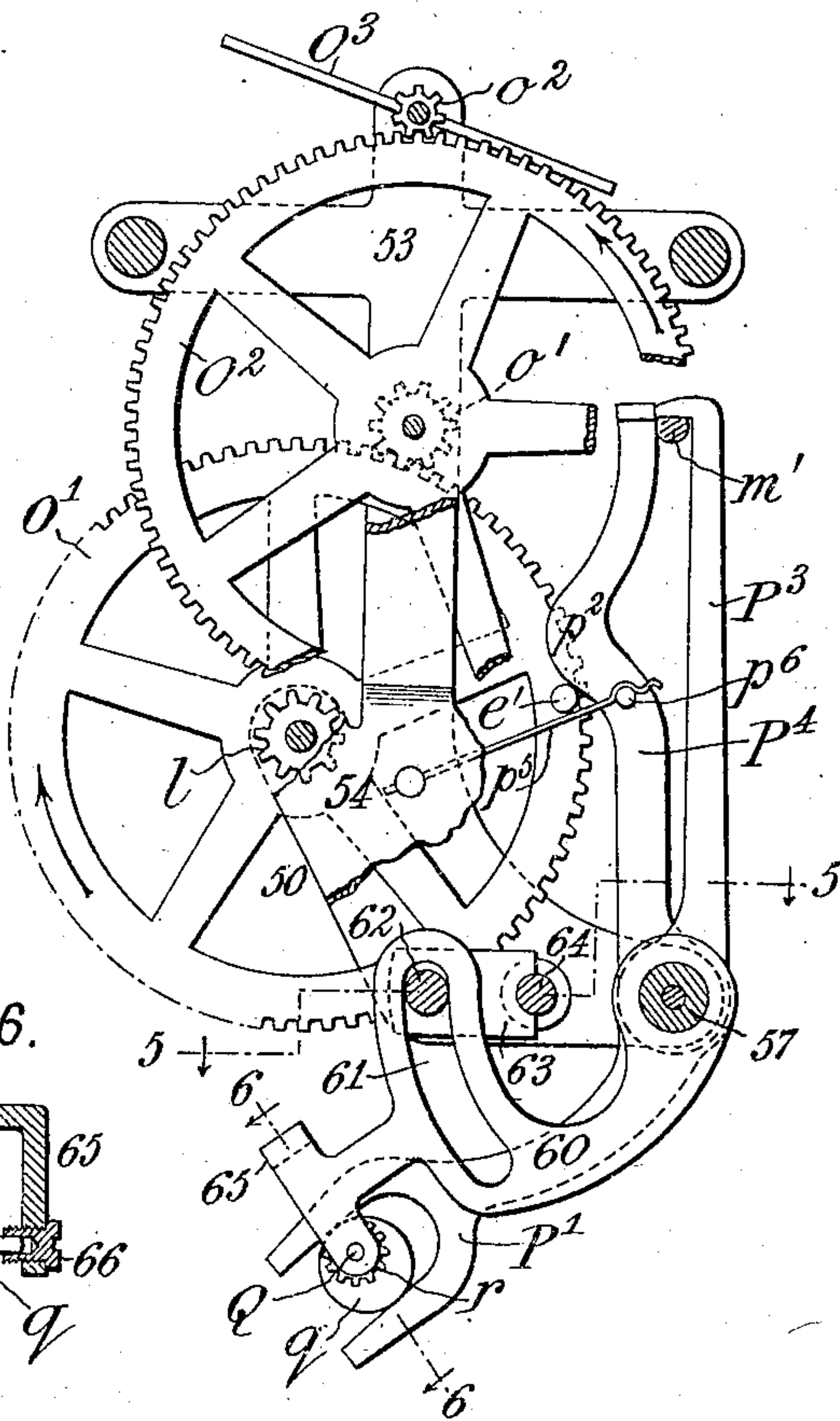


FIG. 6.

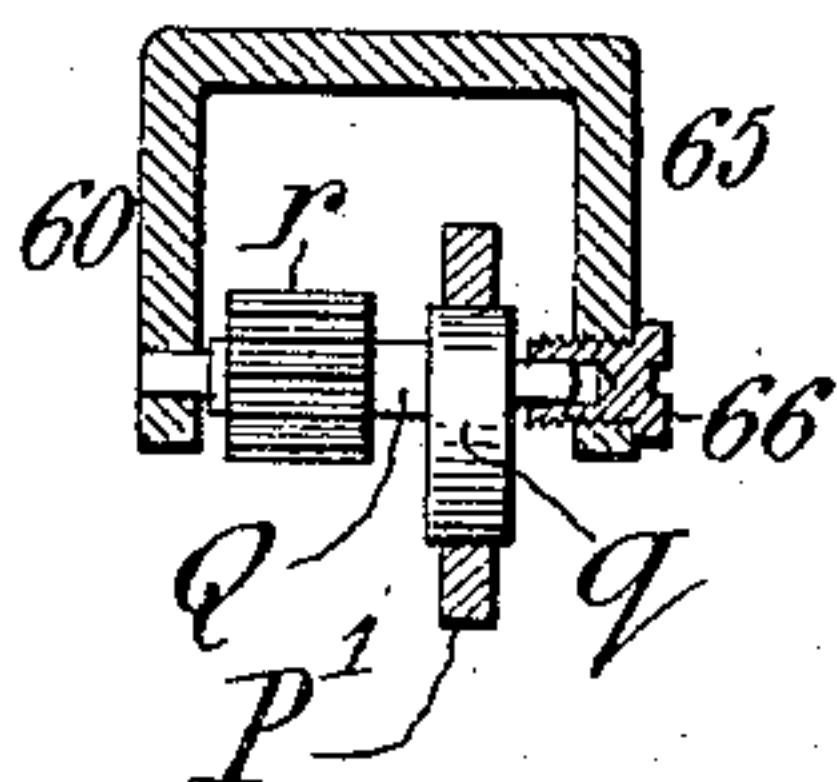


FIG. 7.

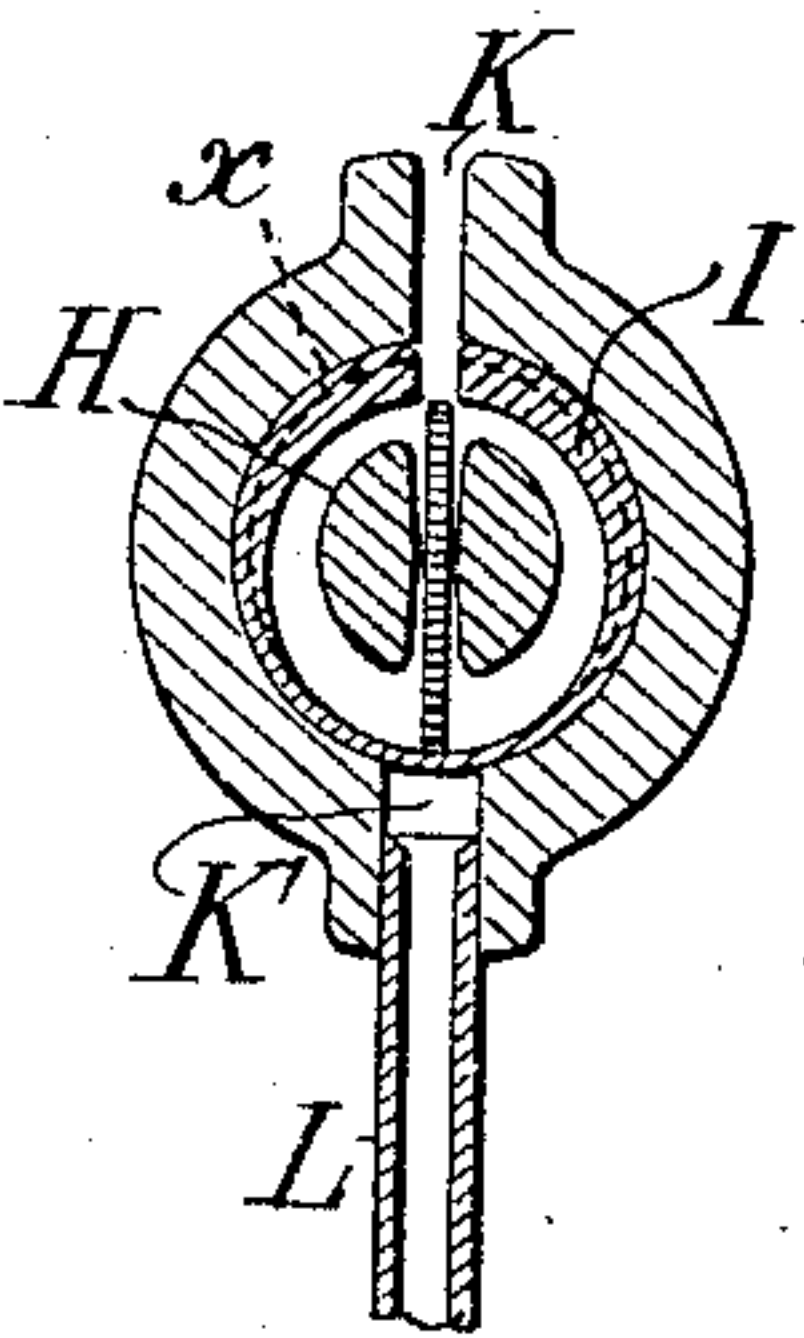


FIG. 8.

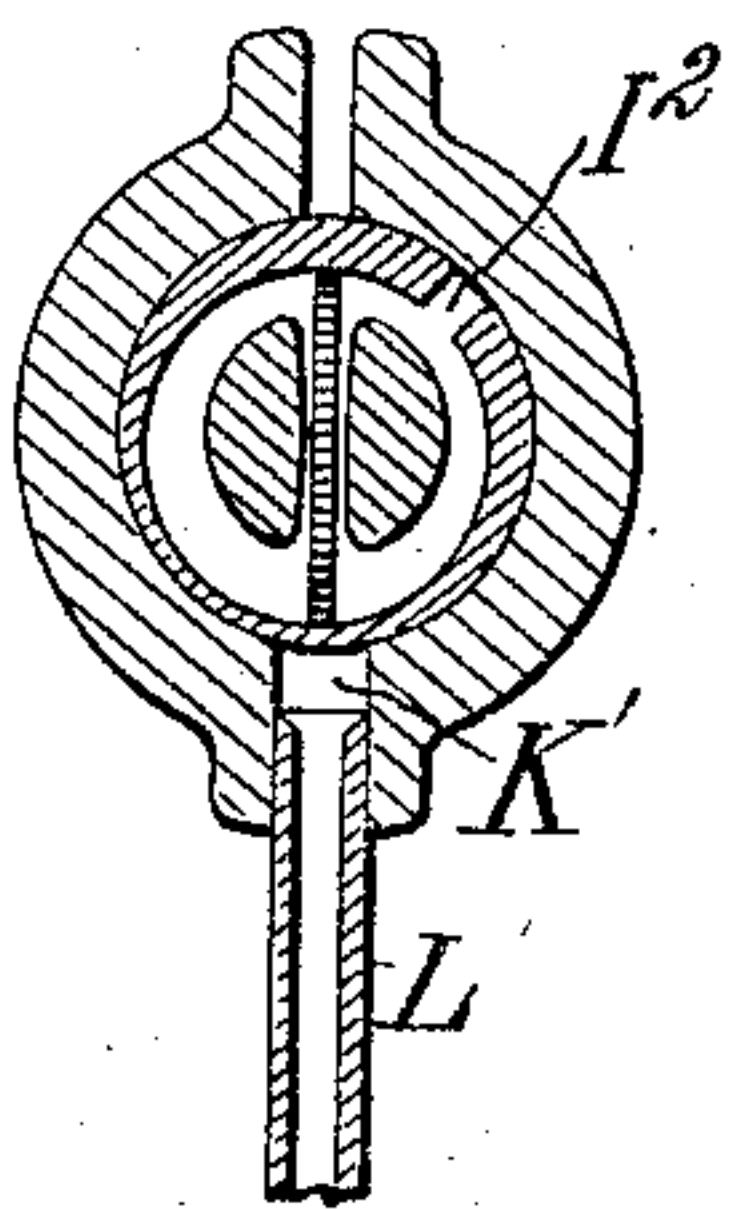


FIG. 9.

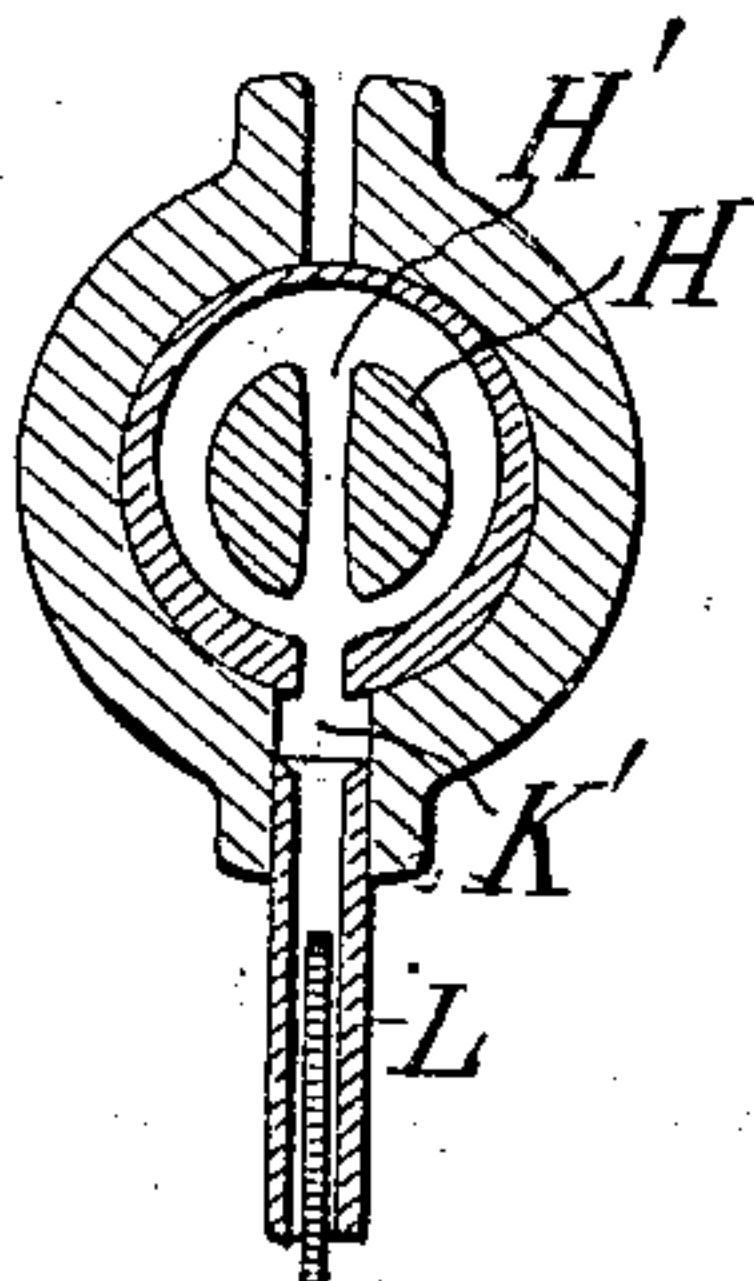


FIG. 5.

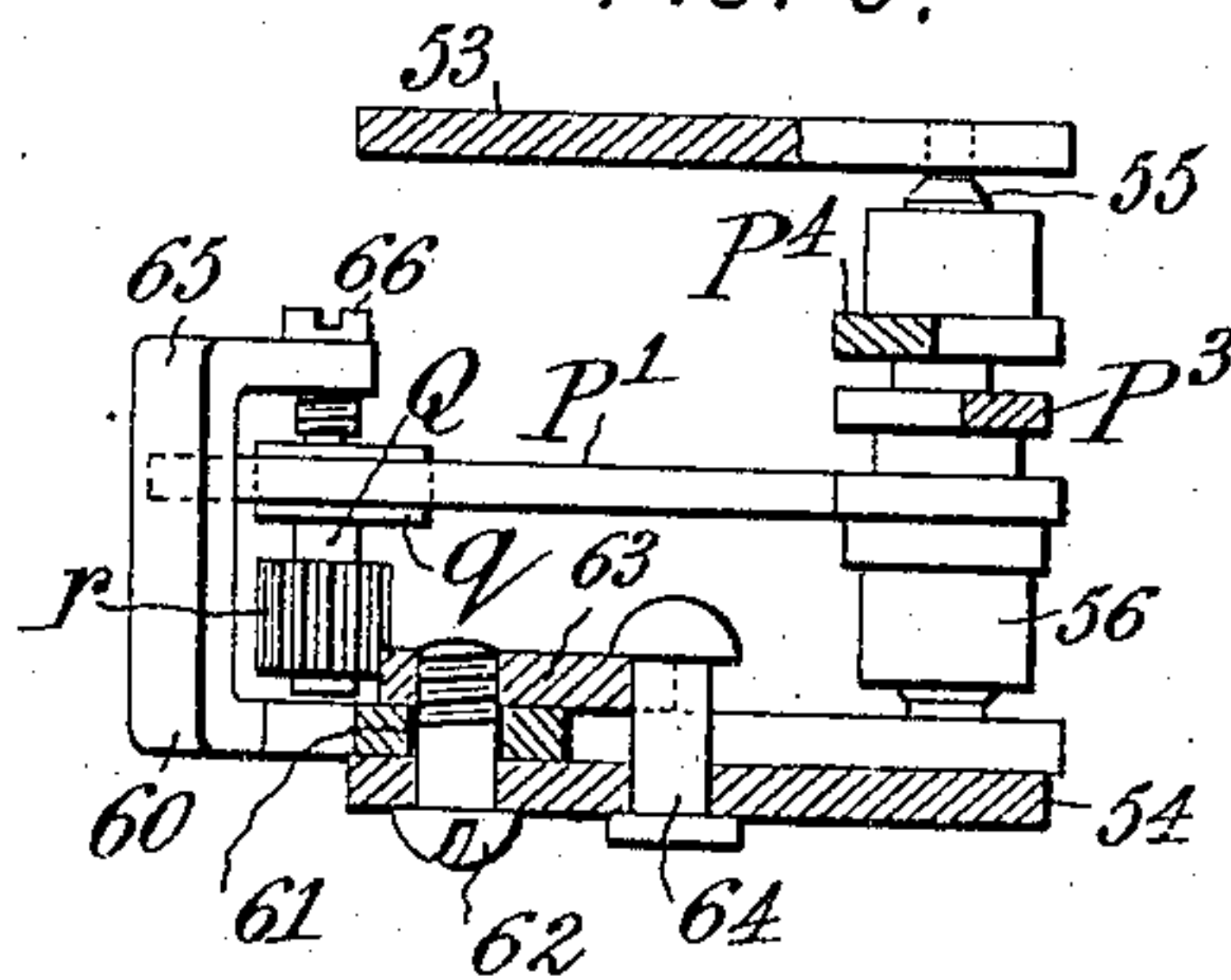
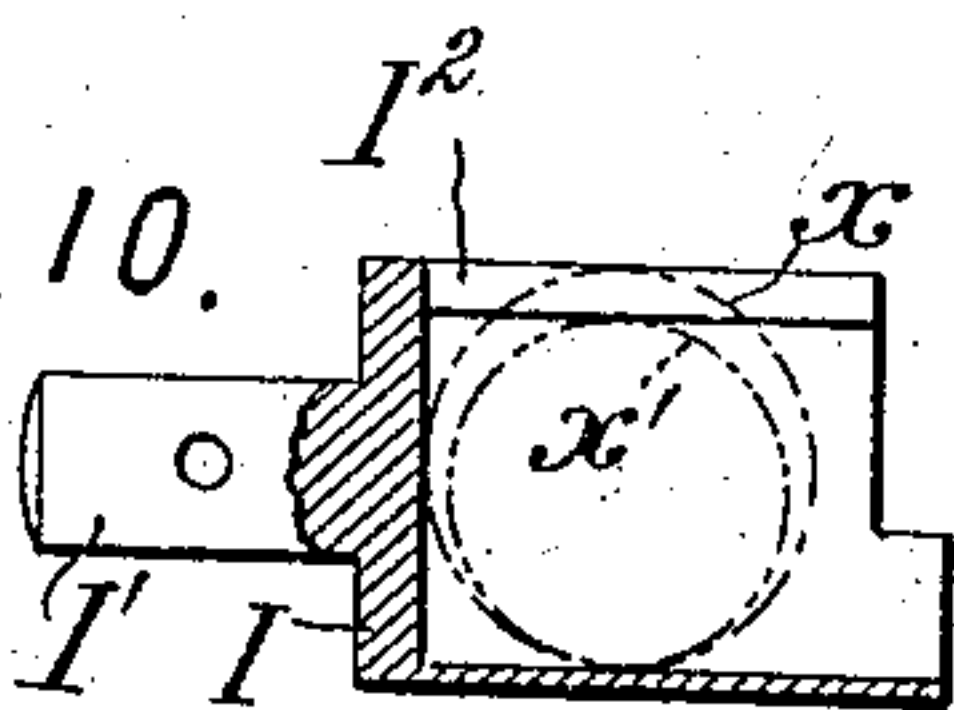


FIG. 10.



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PREPAYMENT-METER.

No. 826,814.

Specification of Letters Patent.

Patented July 24, 1906.

Application filed May 25, 1905. Serial No. 262,194.

To all whom it may concern:

Be it known that I, JAMES J. WOOD, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Prepayment-Meters, of which the following is a specification.

This invention relates to meters for measuring electricity, gas, &c., of the kind known as "prepayment-meters," which are provided with means for counting up coins or the like which the consumer inserts by way of prepayment for the commodity. The operation of the meter counts off or diminishes the prepayment credit at a rate proportional to the price charged for the commodity. In my application, Serial No. 235,412, filed December 3, 1904, patented December 5, 1905, No. 806,722, is set forth such a prepayment-meter.

The present invention provides certain improvements applicable especially to the meter set forth in my said patent and also adaptable in other connections.

The present improvements relate to an adjustable or variable connection between the prepayment mechanism and the totalizing mechanism of the meter.

Figure 1 of the accompanying drawings is a front elevation of the interior mechanism, the front plate of the casing being removed and the mechanism more or less dissected to better show its several parts. Fig. 2 is a horizontal section on the line 2 2 of Fig. 1, showing some of the parts in plan. Fig. 3 shows in side elevation, partly in vertical section, the counting-down part of the prepayment mechanism comprising the escapement and connected parts viewed from the right in Figs. 1 and 2, the view being on a larger scale. Fig. 4 is a dissected sectional front elevation of the same mechanism. Fig. 5 is a fragmentary section thereof on the line 5 5 in Fig. 4. Fig. 6 is an oblique section on the line 6 6 in Fig. 4. Figs. 4, 5, and 6 are on the same scale as Fig. 3. Figs. 7, 8, and 9 are cross-sections through the coin admission and discharging slots on the line 7 7 in Fig. 2. Fig. 10 is a sectional side view of the coin-driving part or barrel.

I will first designate those parts which are identical, or substantially so, with those in my said patent and for convenience of reference will identify them by the same reference letters or numbers.

A designates the meter as a whole—for example, any ordinary electric meter to which the prepayment mechanism is applied—and B any usual or suitable casing therefor. This casing has an upward extension B' for inclosing the prepayment mechanism. The only working part of the meter which is shown in Fig. 1 is the totalizer A'.

The prepayment mechanism within the upper casing B' comprises a movable part, which I call a "credit-indicator," C being a rotative disk or cylinder carrying numbers displayed through an opening in the front of the casing and inclosing an involute spring D, the inner end of which is fixed to a pin d^1 on a stationary sleeve d , while the outer end of the spring is connected to the indicator-disk by hooking it over a lug d^2 , Fig. 1. In the precise construction shown the indicator disk or barrel has a back plate C', which on a pivotal stud e carries a planet-wheel E, which wheel meshes with a central pinion F and with a large outer internal gear G. The pinion F is formed on the end of a shaft H, Fig. 2, which turns within the fixed sleeve d and forms the coin-driven part of the mechanism, its front part being slotted through at H' and this slotted part entering freely within a barrel-shaped coin-driving part I, (shown separately in Fig. 10,) having a neck or journal I', on which is fixed an operating handle or knob J, projecting at the front, where it may be easily turned.

On dropping a coin through a coin-admission slot K, Fig. 7, and turning the knob backward as far as it will go, so as to bring the slot I² through the barrel I into coincidence therewith, the coin falls through both slots and into the slot H' in the shaft H. A coin too small to operate the parts is shown in this position in Fig. 7. If the coin be of the proper size—namely, that indicated by the dotted line x in Fig. 10—its upper edge will rest in this coin-slot I², and it will lock together the coin-actuating barrel I and the coin-actuated shaft H. If the operator then turns the handle J to the right, the coin imparts rotation from the former to the latter, and the shaft H and pinion F are turned a half-revolution until the coin-slot in the barrel has become inverted, Fig. 9, whereupon the coin falls out through a bottom slot K' and through a discharge-conduit L, which conducts it to a suitable coin-receptacle. The turning of the pinion F a half-revolution

turns the planet-wheel E through the corresponding number of teeth, and the gear G being held stationary the planet-wheel rolls around within this gear and communicates a movement to the indicator-barrel sufficient to displace it from one figure to the next, so that the inserted coin is counted up or indicated to the credit of the consumer. At the first movement from the zero position (shown in Fig. 1) a device is operated for turning on the commodity to be supplied—in an electric meter for closing the circuit. As shown, a cam-notch C² acts on a roller on an arm R, connected to an arm R², to displace these arms and actuate the switch, the latter being indicated by the letter T in Fig. 2. At the final movement responding to the utmost number of coins for which the instrument is designed a stop device is introduced to prevent the insertion of any more coins. For an understanding of these features reference is made to my said patent.

As the electric current or other commodity is consumed the operation of the meter causes the prepayment mechanism at intervals to execute a counting-down movement by which the indicator C turns in the contrary direction and counts down or diminishes the indicated credit. During this operation the pinion F remains stationary, and the spring D serves as the actuating-spring of a clock-work which is restrained by an escapement, the latter being controlled by the totalizer of the meter. In the construction shown the internal gear G is provided with external teeth *k*, meshing with a pinion *l*, fixed on the spindle of a gear O', which in turn is geared to a pinion o' on the spindle of an escape-wheel O², carrying an escape tooth or pin *m*'. This tooth is normally held by the hooked end of a releasing-arm P³. Another arm P⁴ has at its upper end a stop-pallet and is curved at *p*² to form a cam-surface to be acted on by a cam-pin *e*' on the wheel O'. This is essentially the same "three-motion escapement" as shown in Figs. 16 to 21 of my former application. Connected to the arm P³ is an actuating-arm P', having a forked end in which works an eccentric *q*, fixed on a spindle Q, which is geared to the totalizer-train, having a pinion *r*, which meshes with a gear *r*', Fig. 1, on the units-arbor of the totalizer.

As the current is consumed the meter drives its totalizer, which rotates the spindle Q in any predetermined ratio, according to the price fixed for the current. To each revolution of this spindle the eccentric vibrates the forked arm P' back and forth. This vibration being communicated to the releasing-arm P³ withdraws its hooked upper end from the escape-tooth *m*', so that the latter escapes and being driven by the spring D makes as many turns as correspond to one rotation of the wheel O'. During the last turn of the escape-wheel the pin *e*' on the wheel O' strikes

the projection *p*³ and throws the stop-arm P⁴ over to the right in Fig. 4, so that its bent-over end comes into the path of the tooth *m*' and stops it. During this time the pinion *l* has made one revolution and the indicator C has moved one space back toward zero, thereby counting down one number. To prevent too rapid motion, the escape-wheel O² is geared by a pinion o² to a fly O³. The next half-revolution of the eccentric *q* restores the arm P³, which pushes aside the stop-arm P⁴, and the parts are restored to their normal position, as shown in Fig. 4. To prevent false movements of the freely-hung arm P⁴, a spring *p*⁵ is provided having bends which engage a pin *p*⁶ in either position of the arm.

The coin after doing its work falls through a conduit L into a coin-receptacle or money-box, as shown in my said patent.

As thus far described the mechanism does not differ from that set forth in my said patent and has been described herein only to make clear the structure to which the improvements constituting my present invention are applied. It is to be understood, however, that my present improvements are not necessarily used solely in connection with the mechanism thus far described. I will now proceed to describe my present improvements.

In one construction shown in my said patent the escapement-train and stop-arms are supported from upward extensions of the totalizer-plates. In another the escapement-train has its own support, while its lever and eccentric have bearings in the totalizer-frame. Either arrangement involves a special construction of the totalizer. It is desirable to make the prepayment mechanism as far as possible distinct from the electric meter proper and applicable to various constructions of meters with the minimum of change in the latter. According to my present invention, therefore, I support the escapement-train and lever and eccentric-spindle in a frame which is hung from the upper section B' of the casing, so that by separating this portion of the casing from the meter-casing proper the entire prepayment mechanism may be separated and removed integrally from the meter. Accordingly I provide a frame 50, which supports the entire escapement mechanism and which is itself supported by the upper part B' of the casing. The frame 50 may conveniently be made of front and back plates united by posts in any well-known manner, as is clearly shown, and may be supported by any suitable attachment to the casing B', as by forming the latter with arms or lugs 51 52, (indicated in dotted lines in Fig. 1,) to which the frame 50 is fastened by screws from the back. The back plate 53 of the frame 50 is shown as a flat plate, while the front plate 54 is partly bent back to carry it behind the wheel G. The frame 50 is

shaped to provide bearings for the spindles of the several gears and pinions of the train in the usual manner. Its lower part forms bearings for the front and rear ends of a spindle 55, Fig. 3, which forms the pivotal support for the escapement-lever—that is, for the arms P' P^s P^4 . This spindle 55 has the arm P^s fixedly united to it by being forced tightly thereon against a collar. It has the arm P' fastened upon it frictionally by means of a hub 56, fixed rigidly to the arm and made to embrace the spindle with a firm fit, but not so tightly as to prevent a forcible relative movement between the arms P' and P^s during the original assembling and adjustment of the mechanism in order to bring the arm P' into proper relation with the eccentric q and the arm P^s into proper relation with the pin m' . The hub 56 is preferably slitted, as shown in dotted lines in Fig. 3, to render it elastic and make a good frictional connection. The arm 54 turns loosely and freely on the spindle 55, its hub being made a free fit therewith. By this construction when the totalizer through the eccentric q and arm P' rocks the releasing-arm P^s the spindle 55 turns or oscillates on its reduced pivotal ends, whereby friction is reduced to the minimum, this being desirable because the power which can be exerted through the totalizer is very slight. When, however, the stop-arm P^4 is moved by the cam-pin e' , the power is ample, being derived from the spring D, and the greater friction of the hub of this arm turning upon the larger bearing against the exterior of the spindle 55 is not objectionable.

Instead of mounting the eccentric-spindle Q in bearings between the plates of the totalizer as formerly I now support this spindle in a separate bearing-frame 60, which is so hung to the frame 50 as to be adjustable in order that the spindle Q may be moved to different positions. This adjustment of the position of the spindle Q is desirable in order that the rate charged for the electricity or other commodity metered may be varied by changing the ratio of the pinion r and gear r' . Thus by changing the gear r' for a larger or smaller one without altering the pinion r it is necessary to locate the spindle Q at a higher or lower point to make the pinion properly mesh with such different gear. The same is usually true if it becomes necessary also to substitute a larger or smaller pinion r . The adjustment of the spindle Q is also desirable in order that the prepayment mechanism may be readily adapted to different electric meters without other change in the latter than the addition to the totalizing-train of a suitably-proportioned gear-wheel r' . In different makes of electric meters the totalizer is mounted higher or lower, and these variations are easily compensated for by adjusting the spindle Q to different elevations by means of the adjustable frame 60. This

frame I construct, preferably, as a swing-frame turning around the same center or axis as the spindle 55 and with means for clamping it in any position after adjustment. In the construction shown a bushing 57 is fixed to the front plate 54, Fig. 3, so that it forms a rearward boss over which fits an annular or pivotal portion of the frame 60. This frame has an arc-shaped extension 61, preferably slotted, which projects upwardly and is engaged by a set-screw 62 and nut 63, the latter being prolonged on one side and notched to engage a fixed stud 64, by which it is held against turning. Thus by adjusting the screw 62 the swing-frame may be clamped at any height. The swing-frame 60 is formed with a forked portion which affords bearings for the opposite ends of the spindle Q, this forked portion being formed by bending a part 65 rearwardly and downwardly, as shown. To make the spindle Q easily removable in order that it may be substituted by another one having a pinion r of a different number of teeth for changing the price rate, the bearing for the rear end of the spindle Q is made as a removable screw-bushing 66. By unscrewing this bearing the spindle Q may be displaced rearwardly, so as to free its front journal, so that it may be removed. By the cooperation of the swing-frame 60 with the frictional engagement between the arms P' and P^s a readjustment may be very easily and quickly made, it being only necessary to loosen the screw 62, set the frame 60 to the right position to bring the pinion r correctly into mesh with its gear, and then with the eccentric q in the position shown to move the arm P^s into proper engagement with its escape-tooth m' .

Figs. 7 to 10 illustrate means for preventing the operation of the prepayment mechanism by the insertion of a smaller coin than that prescribed, such coin not being engaged by the coin-slot i^2 as the barrel I is turned, so that it is discharged without having turned the driven part H. This construction is not claimed herein, having been made the subject of a divisional application filed September 15, 1905, Serial No. 278,536.

My invention may be variously modified by the substitution of equivalents and variations of mechanical construction, such as will be understood by those skilled in the art, and certain features thereof may be omitted without necessarily impairing the operation of the features retained.

What I claim is—

1. In a prepayment-meter, the combination with the meter mechanism having a totalizer, of an escapement mechanism operated directly by said totalizer, a frame for said escapement mechanism independent of the totalizer-frame, and a casing separable from the meter-casing and supporting said escapement-frame, whereby the removal of

said separable casing separates the escapement mechanism from the totalizer.

2. In a prepayment-meter, the combination with the meter mechanism having a totalizer, and the meter-casing, of a counting-down mechanism operated from said totalizer, a casing B' therefor, separable from the meter-casing, and a frame 50 fastened to said separable casing and supporting said counting-down mechanism, whereby the removal of said casing B' separates the counting-down mechanism from its engagement with the totalizer.

3. In a prepayment-meter having a totalizer and an escapement counting-down mechanism, an eccentric and escapement arm through which said mechanism is controlled by the totalizer, the combination therewith of a frame for said mechanism distinct from the totalizer-frame and formed with bearings for the spindle of said eccentric, whereby said spindle is hung from the escapement-frame.

4. In a prepayment-meter having a totalizer and an escapement counting-down mechanism, an eccentric and escapement arm through which said mechanism is controlled by the totalizer, the combination therewith of a frame for said mechanism, and an adjustable frame forming bearings for the spindle of said eccentric, whereby said spindle may be adjusted relatively to the totalizer.

5. In a prepayment-meter having a totalizer and an escapement counting-down mechanism, an eccentric and escapement arm through which said mechanism is controlled by the totalizer, the combination therewith of a frame for said mechanism, and an adjustable frame forming bearings for the spindle of said eccentric, hung from the escapement-frame and adapted to swing around its pivotal engagement.

6. In a prepayment-meter comprising a totalizer and an escapement controlled thereby, the combination therewith of a frame for said escapement, a swing-frame hung therefrom, an eccentric-spindle having bearings in said swing-frame and adjustable thereby relatively to the totalizer, and fastening means for said swing-frame.

7. In a prepayment-meter having a totalizer and a counting-down mechanism controlled thereby, the combination therewith of a frame for said mechanism, and an adjustable frame fastened thereto forming bearings for the spindle of said mechanism which engages the totalizer mechanism, whereby the position of said spindle may be adjusted.

8. In a prepayment-meter, the combination with an escapement comprising an escapement-arm, of a frame for said escapement forming a pivotal support for said arm, a swing-frame hung thereto concentrically with said pivotal support, and the spindle controlling the escapement hung in said swing-frame.

9. In a prepayment-meter, the combination with an escapement comprising an escapement-arm, of an actuating-arm adjustably connected thereto, an escapement-frame forming a pivotal support for said arms, a swing-frame hung therefrom concentrically with said pivotal support, and a spindle for operating said actuating-arm having bearings in said swing-frame.

10. In a prepayment-meter comprising an escapement, an eccentric operating it, an adjustable frame carrying the spindle of said eccentric, and an adjustable bearing for said spindle whereby the spindle may be readily removed and replaced.

11. In a prepayment-meter, an escapement mechanism and its frame 50, a swing-frame 60 hung thereto, an eccentric-spindle Q carried by said frame, and an adjustable bearing 66 therefor.

12. In a prepayment-meter having an escapement mechanism, its supporting-frame 50, a swing-frame 60 hung thereto having an arc-shaped portion 61, and a clamping-screw engaging said arc-shaped portion for fastening the swing-frame.

13. In a prepayment-meter having an escapement mechanism, its supporting-frame 50, a swing-frame 60 hung thereto having an arc-shaped portion 61, and clamping means for fastening it in place comprising a screw 62 engaging a threaded piece 63 with means for restraining the latter from turning.

14. In a prepayment-meter having an escapement mechanism, its supporting-frame 50, a swing-frame 60 hung thereto, a bushing 57 forming a boss on which said swing-frame is hung, and a spindle 55 having one of its bearings in said bushing.

15. In a prepayment-meter having an escapement comprising a releasing-arm, a stop-arm and an actuating-arm, a frame 50 for said mechanism, a spindle 55 having reduced end journals turning in bearings in said frame, with the actuating and releasing arms tightly applied on said spindle, so that normally these arms and the spindle turn together, and the stop-arm mounted to turn loosely on said spindle.

16. In a prepayment-meter having an escapement comprising a releasing-arm, a stop-arm and an actuating-arm, a frame 50 for said mechanism, a spindle 55 having reduced end journals turning in bearings in said frame with the releasing-arm tightly applied on said spindle, and the actuating-arm engaged therewith by a frictional connection so as to normally turn therewith, and a stop-arm mounted loosely on said spindle.

17. In a prepayment-meter having an escapement mechanism controlled by the totalizer through an eccentric operating an escapement-arm, the combination therewith of a frame for said escapement mechanism, a swing-frame carrying the spindle of said ec-

centric and adjustable to bring said spindle into varying relations with the totalizer, and an actuating-arm hung concentrically with said swing-frame, engaging said eccentric, and having a frictional connection with the escapement-arm, whereby it may swing with the swing-frame during such adjustments.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES J. WOOD.

Witnesses:

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P. C. MORGANTHALER.