No. 667,066. Patented Jan. 29, 1901.

F. P. COX.

PREPAYMENT ELECTRIC METER.

(Application filed Sept. 13, 1897.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

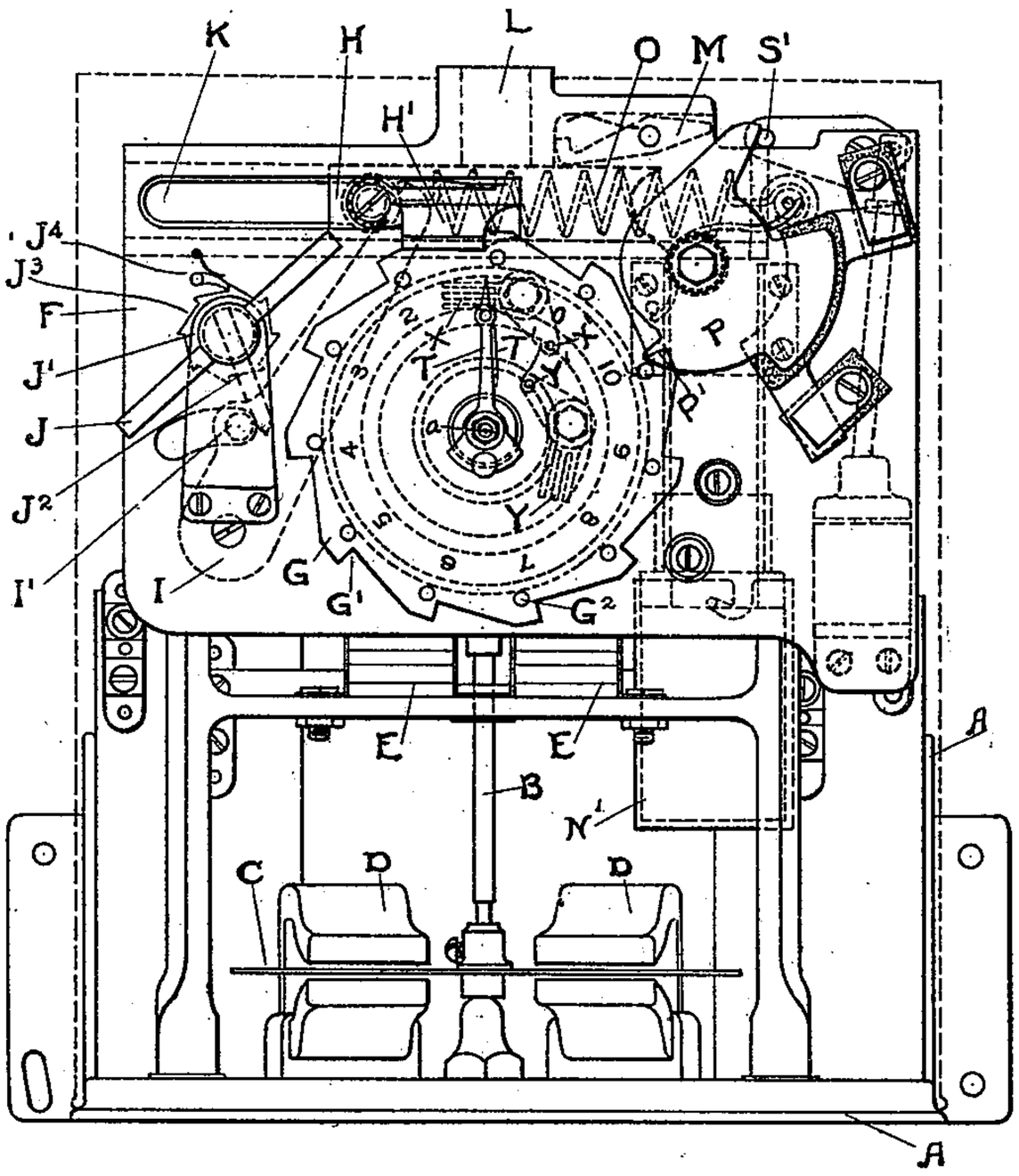


FIG. 2.

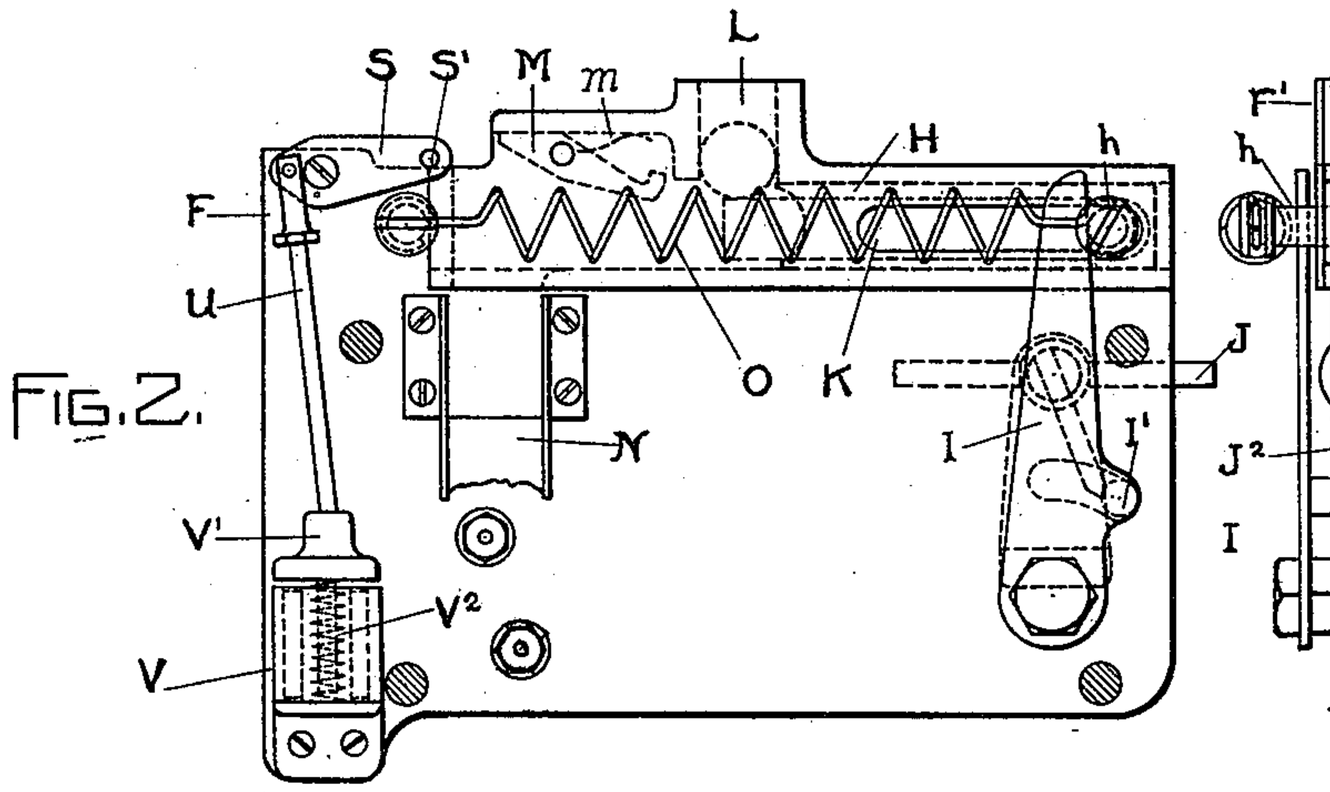
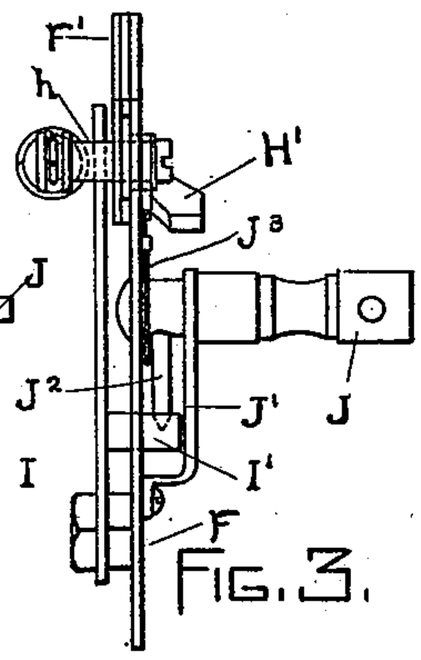


FIG. 3.



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(No Model.) 2 Sheets—Sheet 2.

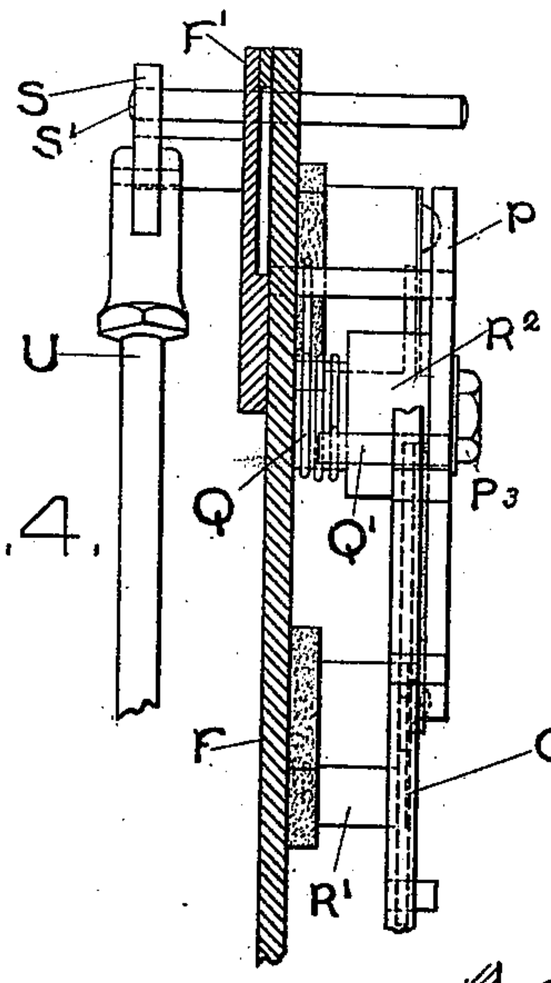

FIG. 4.

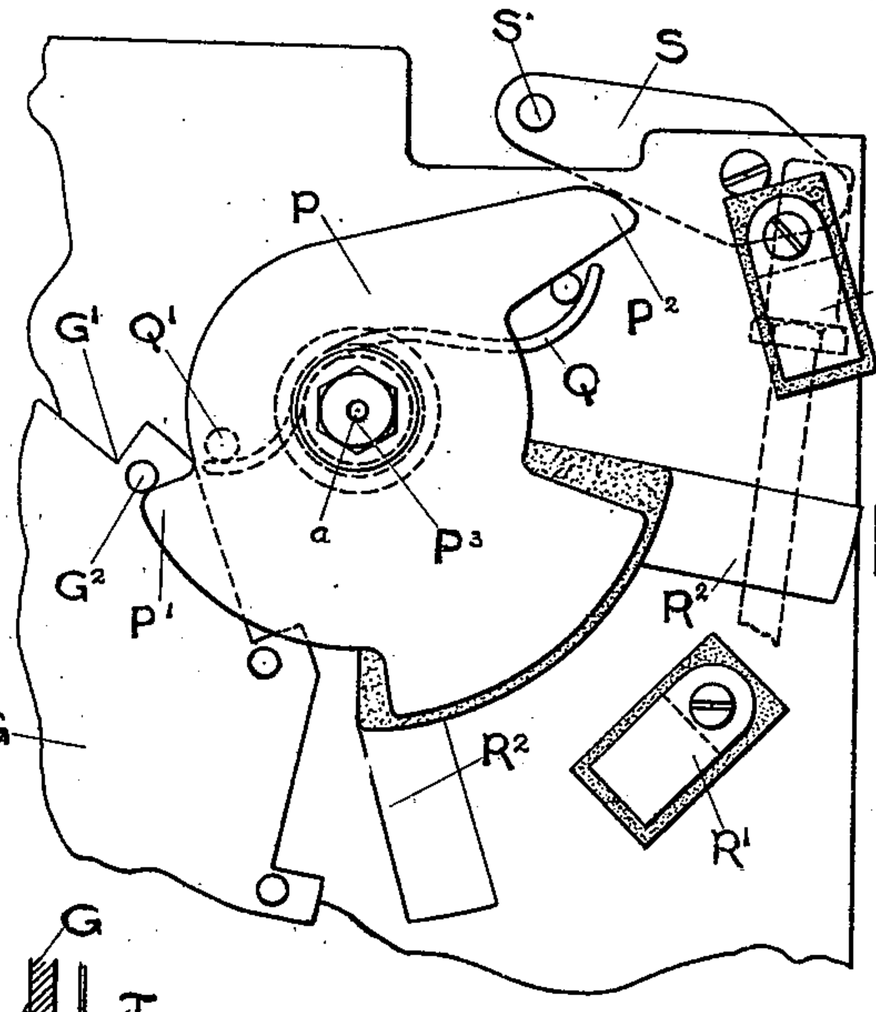

FIG. 5.

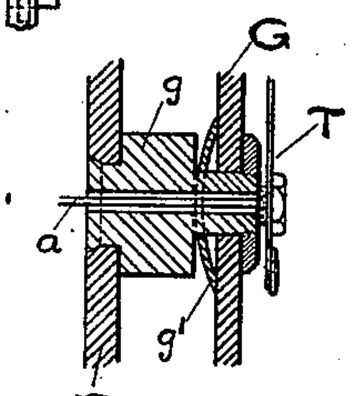

FIG. 8.

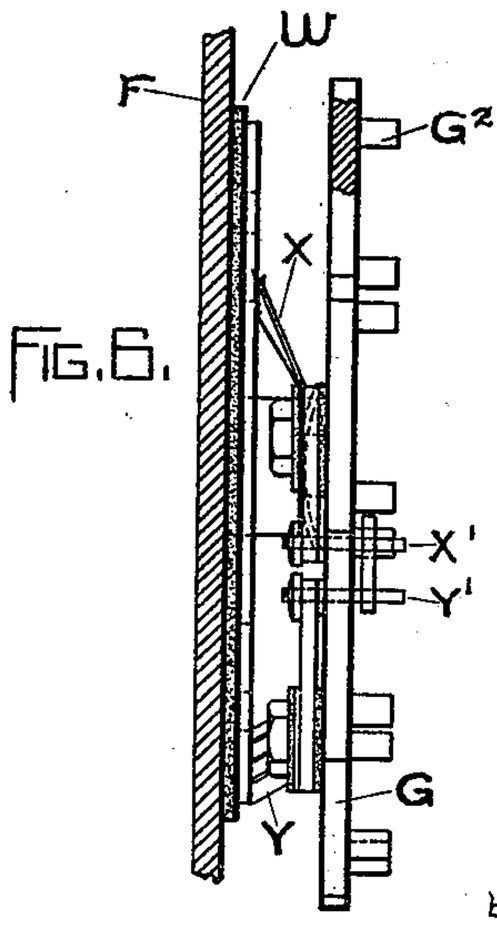

FIG. 6.

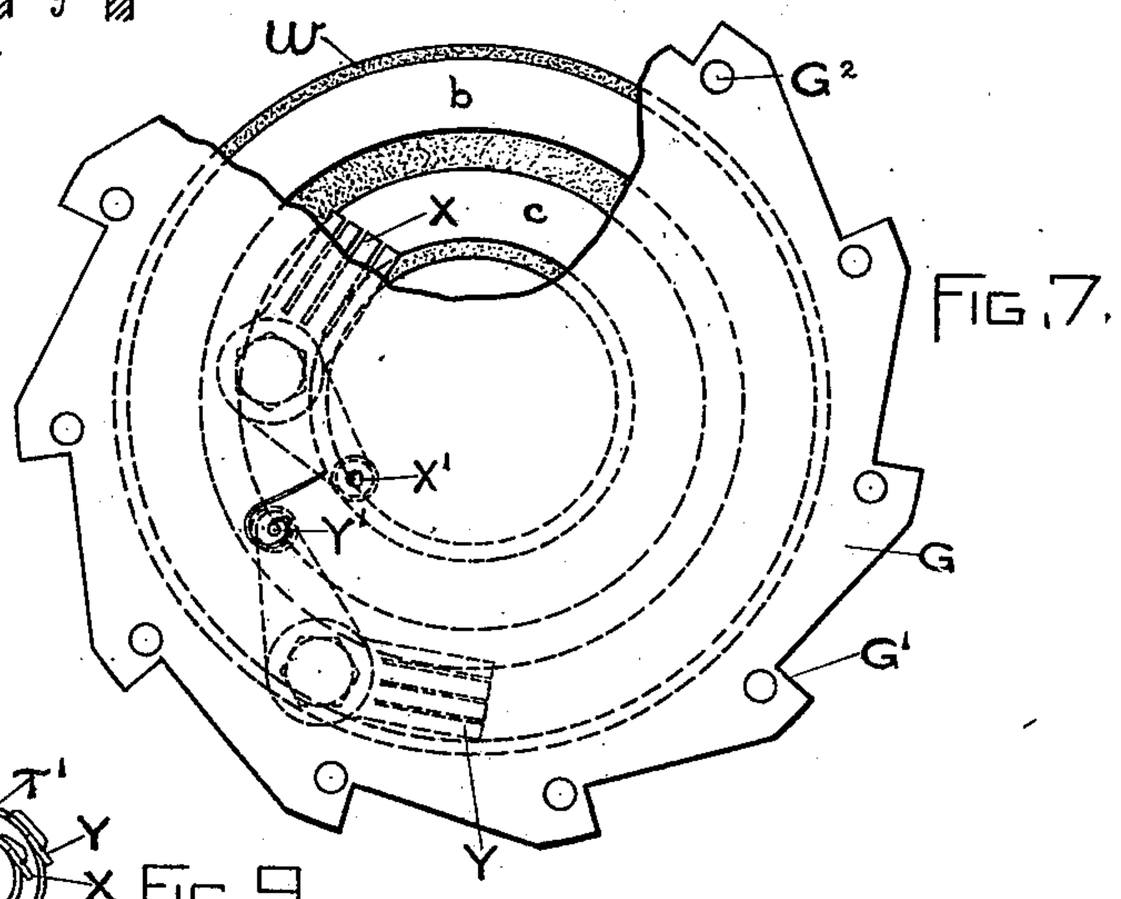

FIG. 7.

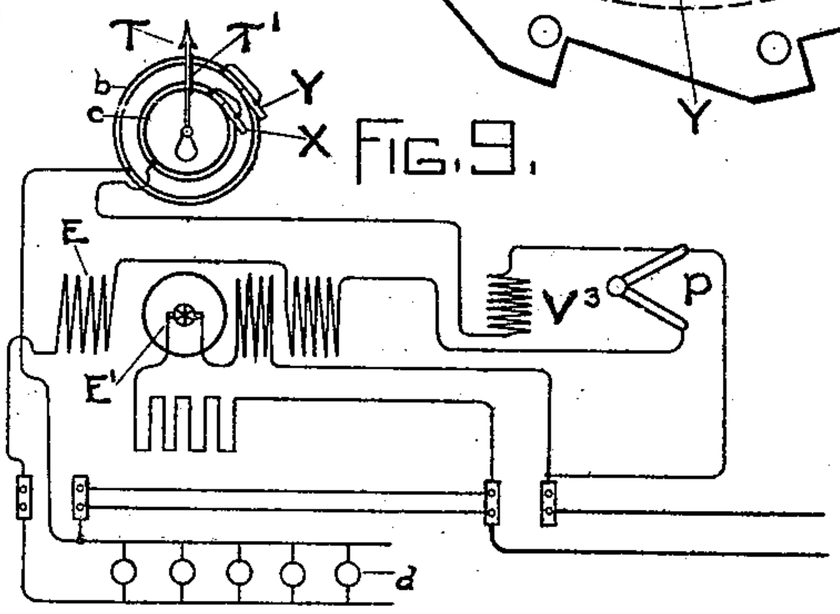

FIG. 9.

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UNITED STATES PATENT OFFICE.

FRANK P. COX, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

PREPAYMENT ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 667,066, dated January 29, 1901.

Application filed September 13, 1897. Serial No. 651,401. (No model.)

To all whom it may concern:

Be it known that I, FRANK P. COX, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Prepayment Electric Meters, (Case No. 643,) of which the following is a specification.

The present invention has for its object to improve the construction of prepayment electric meters, particular reference being had to the mechanism which is controlled by a coin or other token, and is employed to establish the circuit of the meter and consumer. It is desirable to provide some means whereby the operation of the circuit-closing switch is rendered automatic and beyond the control of the person who inserts the coin within the meter. It is also desirable to so arrange the parts that the switch in closing each time is actuated by a definite force instead of being dependent upon the force applied to an operating-handle, thereby preventing damage to the operating parts of the meter and at the same time insuring the proper relation of parts.

In the accompanying drawings I have shown an embodiment of my invention, in which—

Figure 1 is a front elevation of a meter; Figs. 2 and 3, details of the switch and dial-actuating mechanism; Figs. 4 and 5, details of the switch mechanism; Figs. 6, 7, and 8, details of the dial and contact, and Fig. 9 is a diagram of connections.

My invention is shown as applied to the well-known Thomson recording-wattmeter, in which A represents the cast-metal frame forming a support for the various parts of the meter. Mounted upon the armature-shaft B is a thin disk C of good conducting material and is adapted to revolve within the influence of damping-magnets D and damp the rotation of the armature. The armature E′ (shown in diagram Fig. 9) is mounted on the shaft B and revolves within the field-coils E. Situated on the front side of plate F is a dial G, having eleven notches G′ and a corresponding number of pins G^2. The dial is sleeved upon a stud *g*, Fig. 8, which is mounted upon the plate F, and is provided with a central opening to permit the shaft *a* to pass through. Between a shoulder on stud *g* and the dial is a spring-washer *g′* to prevent the dial from turning more than the angular distance between two notches each time it is actuated by the sliding piece H. Mounted upon the shaft *a*, which is geared to the armature-shaft B in any desired manner, is a hand T, adapted to move in a clockwise direction as energy is consumed by the load. It will be readily seen that the dial, being mounted on an independent support, is free to turn irrespective of the position of hand T. Mounted for reciprocating movement on the plate F is a slidable actuator H, adapted when moved to the right to engage with a notch on the dial and advance it one step at a time in a clockwise direction. To insure the engagement of the slide with the dial, a spring-lip H′ is provided, which when released from the position shown in Fig. 1 drops to a point in line with the adjacent rear notch of the dial.

Pivotally secured to the back of the plate F is an arm I, engaging at its upper end with a stud *h*, secured to the slide H and carrying near its lower end a pin I′, which projects through a slot in the plate and engages with arm J^2, forming a tripping device. The manual operating-handle J is supported by the bracket J′ and plate F, and situated between them and secured to the operating-handle is the arm J^2. Secured to the portion of the handle which carries arm J^2 is a ratchet J^3, engaged by pawl J^4 and adapted to prevent the backward rotation of handle J. Mounted in a slot formed between plates F and F′ is an extension of the slide H, having a curved inner end adapted to receive the coin as it falls through chute L. To prevent the insertion of improper coins or tokens into the meter, a gage M (shown in dotted lines) is provided, which consists of a flat metal plate pivotally supported within the extension of the coin-slot K and is normally retained in the position shown in the flat spring *m*. If the token is not of the proper diameter, it will fail to raise the gage, and slide H will strike the end of the gage and prevent starting the meter. If the coin is the right size or even smaller, it will pass through the slot to the opening at the end and drop into the chute

N and thence into receptacle N′, secured in place by a bayonet-joint, rendering it easy of removal when it is desired to obtain the coins.

As the handle J is rotated to the right the arm J^2 engages with pin I′ on the arm I and forces the arm toward the left against the action of spiral spring O, which is secured at one end to a fixed part of the meter and at the other end to stud *h* on the slide H. Fig. 2 shows arm I in its extreme outward position, and a continued movement of handle J to the right will cause arm J^2 to slip past the pin, thereby releasing the arm, and slide H (with a proper token in the slot) under the action of spring O will advance the dial one division. If now the rotation of the handle is continued in a right-hand direction, arm I will move the slide H back to the position shown in Fig. 2, and a continued movement will release the same, as before; but if no coin is inserted in the meter the end of slide H will advance to a point where it will strike the gage M. This, however, is not sufficient to cause the lip H′ on the slide to advance the dial. In the normal operation of the meter the movement of slide H after actuating the dial is arrested by striking the end of slot K.

Thus far the description has been limited to the manner of moving the dial; but in addition to this the mechanism already described actuates switch P. Mounted on the dial are as many pins G^2 as there are notches, and as the dial is advanced they engage with projection P′ on the switch-plate and move the switch to the position shown in Fig. 1.

In Figs. 4 and 5 the switch is shown drawn to full scale. The switch is pivotally supported on stud P^3 and normally—that is, with the circuit broken—is in the position shown and is held there by the action of spring Q, which rests against a pin mounted in plate F at one end and at the other against pin Q′, secured to the switch-plate. One of the pins G^2 on dial G is shown in engagement with the projection P′, and when the dial is advanced it throws the switch anticlockwise, and the circuit is closed between fixed contacts R R′ through switch-blade R^2. The contacts and switch-blade are all insulated from the balance of the meter. Pivoted to the back of plate F is a lever S, carrying at one end a pin S′ and secured at the other to a magnetic releasing device by rod U. After switch P has been closed by the dial the pin S′ engages with the projection P^2, holding the switch against the action of spring Q. Mounted in the rear of plate F is an iron-clad magnet V, having an armature V′ connected to rod U. The armature V′ is normally held in the position shown by means of a spring V^2. (Shown in dotted lines in Fig. 2.)

Mounted upon a circular piece of insulation W, situated upon the front of plate F, are two contact-rings *b* and *c*, connected, respectively, to the positive and negative sides of the circuit. Mounted on the dial and bearing on the contact-rings are brushes X and Y. These are insulated from each other and the dial. Brush X is provided with a contact-point X′, projecting through to the front of the dial, and brush Y is provided with contact-spring Y′. Mounted upon the hand T is a silver contact T′, adapted to establish an electrical connection between the contact-point X′ and the contact-spring Y′. In circuit with the wire leading from switch P to the contact-ring X is the coil V^3 of the magnetic releasing device.

The operation of the meter is as follows: A coin or other token is inserted in slot L and the handle J rotated to the right. This extends spring O, and when arm J^2 passes the pin I′ the spring snaps the slide-piece H against a notch on the dial and advances the dial one step to the right. At the same time one of the pins G^2 on the dial strikes the projection P′ and closes the switch P, thereby establishing the circuit through the meter and to the consumer. During this operation the hand T has remained in the same position, but the dial has moved one notch to the right. As soon as the consumer turns on the lights *d* or other translating devices the armature commences to revolve, and the hand T being geared thereto moves in a clockwise direction until the silver contact T′, carried thereby, closes the circuit between contacts X′ and Y′. This completes the circuit through the magnet-coil V^3, the armature V′ is attracted, the pin S′ releases the projection P^2 of switch P, and spring Q opens the switch and interrupts the circuit of both meter and consumer.

If desired, more than one coin can be inserted in the meter at a given time and the amount of energy received by the consumer be in accordance therewith. After the circuit is first closed the insertion of each subsequent coin will have no effect upon the switch, but will advance the dial one notch for each coin inserted.

From the foregoing it will be seen that the force which actuates the dial and closes the switch is a definite one, and it is impossible for the person actuating the handle to injure the meter by rough usage. Neither can he hold the switch in a half-way position and burn the contacts or in any way tamper with the meter.

The invention has been described in connection with an electric meter; but it is evident that certain of my improvements could be applied to meters employed for other purposes.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a prepayment-meter the combination of an indicator moved by the meter mechanism, a pivoted rotating dial, means for imparting movement to the dial with a predetermined force which is independent of the force

applied to the operating-handle, and means for causing the mechanism to be responsive to a deposited coin or token.

2. In a prepayment-meter, the combination of an indicator, moved by the meter mechanism, a dial, an operating-handle, a spring for imparting a rotary movement to the dial with a predetermined force which is independent of that applied to the operating-handle, and means for causing the mechanism to be responsive to a deposited coin or token.

3. In a prepayment-meter, the combination of an indicator, a dial mounted for rotary step-by-step movement independent of the indicator, a slide actuated by a spring for moving the dial, a handle for moving the slide against the action of the spring, and means for causing the mechanism to be responsive to a deposited coin or token.

4. In a prepayment-meter, an indicator, a dial mounted for rotary step-by-step movement independent of the indicator, a spring-actuated slide for moving the dial, a handle arranged to move the slide a certain distance away from the dial against the action of a spring, after which the slide is automatically released from the handle and the spring advances on the dial one step, and means for causing the mechanism to be responsive to a deposited coin or token.

5. In a prepayment-meter, the combination of an indicator, a rotary dial, a spring-actuated slide controlled by a coin or other token, a handle for moving the slide away from the dial and extending the spring, and a tripping device between the handle and slide which permits the slide to actuate the dial independent of any further movement of the handle.

6. In a prepayment electric meter, the combination of a rotary dial, an indicating device, a switch for closing the circuit of the meter and consumer, operated by the dial, and means for causing the mechanism to be responsive to a deposited coin or token.

7. In a prepayment electric meter, the combination of a rotary dial, an indicator, a switch for closing the meter and consumption circuits, an operating-handle, and a spring-actuated device which device is controlled by a deposited coin or token and is so arranged that the spring performs the work of closing the switch and moving the dial.

8. In a prepayment electric meter, the combination of a rotating dial, an indicator, an actuator controlled by a coin or other token for moving the dial, an operating-handle, and a tripping device located between the handle and the actuator permitting a rotary movement of the handle independent of the actuator when no coin or token is inserted in the meter.

9. In a prepayment electric meter, the combination of an indicator, a coin or token controlled dial mounted for rotary step-by-step movement, a switch operated by the dial, a spring for advancing the dial and closing the switch, fixed contact-rings mounted on a stationary part of the meter, brushes carried by the dial making contact with the rings, and a contact carried by the indicator for connecting the brushes when it is desired to operate the switch-releasing magnet.

10. In a prepayment electric meter, the combination of a notched dial mounted for rotary step-by-step movement, a spring-pressed slide for actuating the dial, a pivoted arm adapted to engage with the slide, a handle for moving the arm and slide, a tripping device between the arm and handle, and means for causing the mechanism to be responsive to a deposited coin or token.

11. In a prepayment electric meter, the combination of a dial mounted for rotary step-by-step movement, a switch operated by the dial, a coin-controlled spring-actuator for moving the dial and switch simultaneously the first time a coin is inserted in the meter, and the dial only with each subsequent coin.

12. In a mechanism actuated by a coin or other token, the combination of a supply-circuit, a moving element which controls the delivery of the prepaid energy or article, means for moving the said element with a definite force, irrespective of the pressure applied by the actuator, and means controlled by the delivery of the prepaid amount of energy or article for canceling the value of the coin or token and opening the supply-circuit.

13. In a prepayment mechanism, the combination of a member mounted for movement about a center, a cam mounted on an independent support and actuated by the said member for closing an electric switch, an electric switch secured to the cam, and means controlling the operation of said member.

14. In a prepayment mechanism, the combination of a rotary notched disk, projections thereon for closing a switch, a switch, a coin-controlled manual actuator located back of the disk, and a spring-lip carried by one of the parts and acting as a mechanical connection between the disk and the actuator.

15. In a prepayment mechanism, the combination of a rotary toothed disk, an oscillating switch which engages with, and is actuated by, the disk, a coin-controlled slidable actuator mounted in guides directly back of the disk, and a spring-pressed lip mounted on the side of the actuator and arranged to engage with the tooth on the disk each time the actuator moves a predetermined amount.

16. In a prepayment mechanism, the combination of a pivoted arm mounted on a suitable support, a slidable actuator moved by the arm, a stop on the actuator arranged to engage with the arm, and a coin-controlled handle for moving the arm and the slidable actuator.

17. In a prepayment mechanism, the combination of a slotted supporting-plate, an arm mounted on the back of the plate, a coin-controlled slidable actuator, a pin or projection

extending through the slot in the plate for connecting the arm with the slidable actuator, a manual actuator located on the front of the plate and arranged to move said pin and arm.

18. In a prepayment mechanism, the combination of a pivoted coin-controlled toothed disk, a pivoted switch, and a cam for moving the switch to an operative position when the toothed disk is advanced a certain amount, the said cam being out of the way of the disk after the initial movement of the latter.

19. In a prepayment mechanism, the combination of a switch for closing an electric circuit, a cam for actuating the switch, insulation between the cam and the switch, and a coin-controlled rotary disk having projections thereon which engage with the cam and close the switch.

20. In a prepayment mechanism, the combination of a pivoted switch-blade, a support therefor, a pivoted stop also located on the support for holding the switch closed, a coin-controlled means for closing the switch, and an electromagnet for actuating the stop and releasing the switch.

In witness whereof I have hereunto set my hand this 10th day of September, 1897.

FRANK P. COX.

Witnesses:
JOHN W. GIBBONEY,
JAMES A. DALZELL.