No. 667,089. Patented Jan. 29, 1901.

C. E. HOLMES.

COIN CONTROLLED METER.

(Application filed Mar. 26, 1898.)

(No Model.)

FIG. 1.

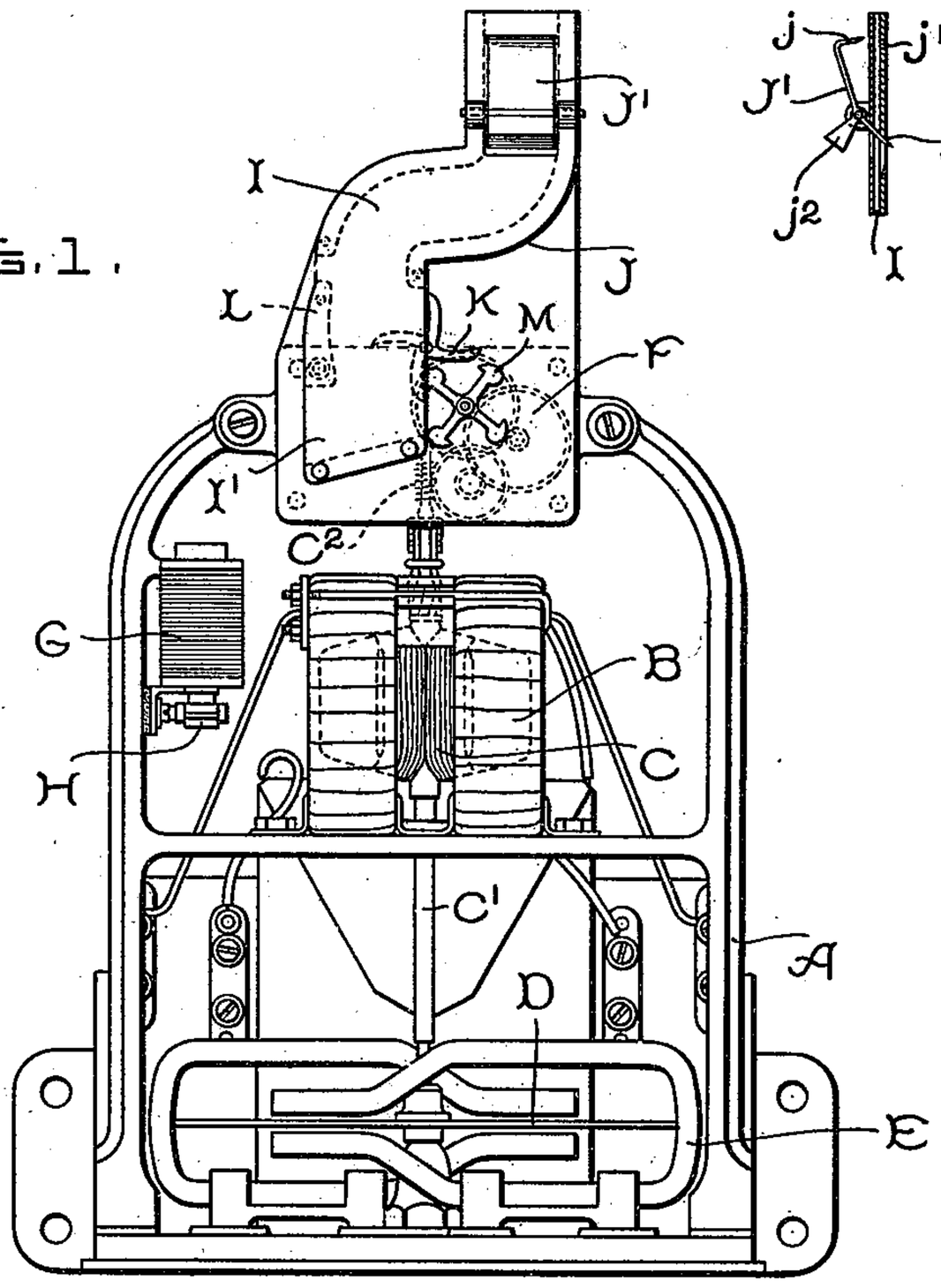


FIG. 1a.

FIG. 2.

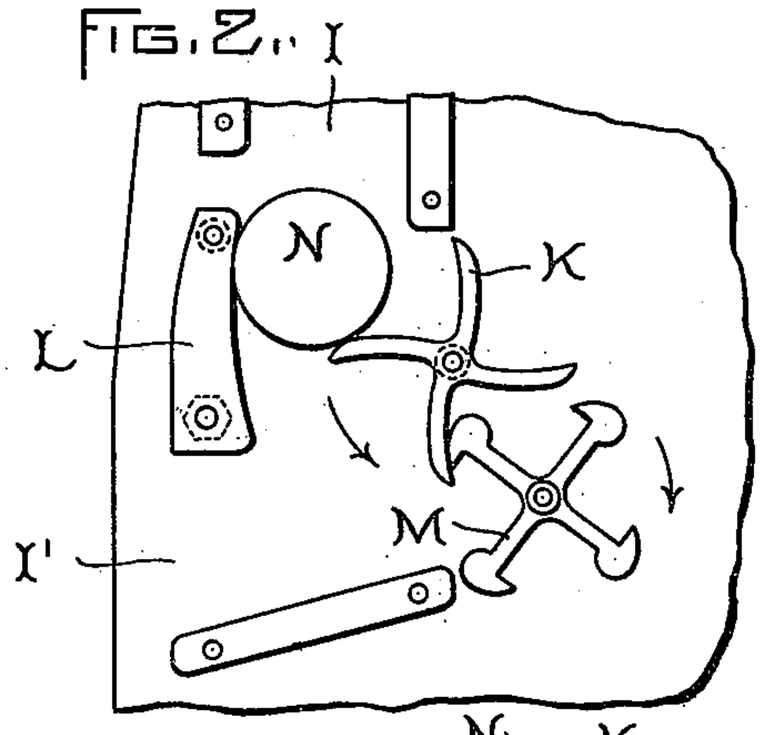


FIG. 3.

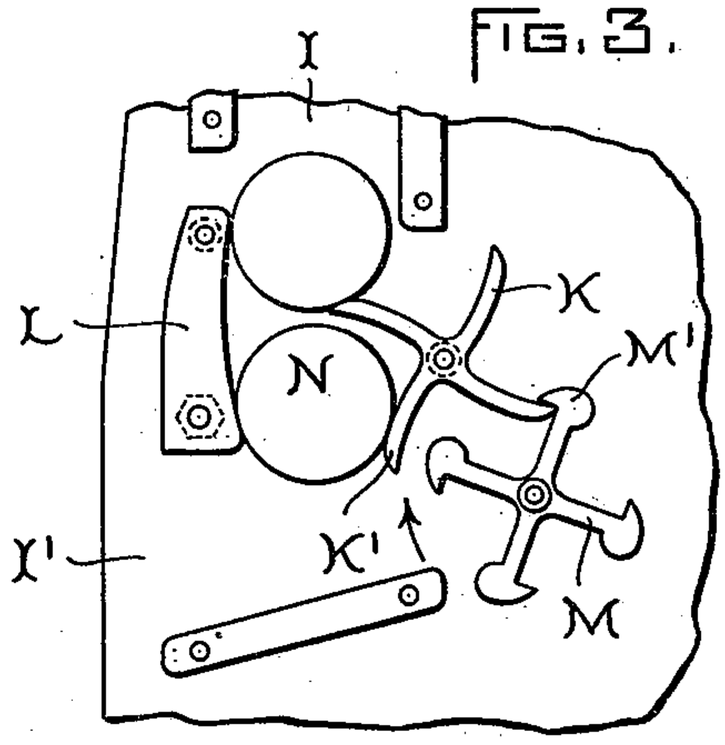
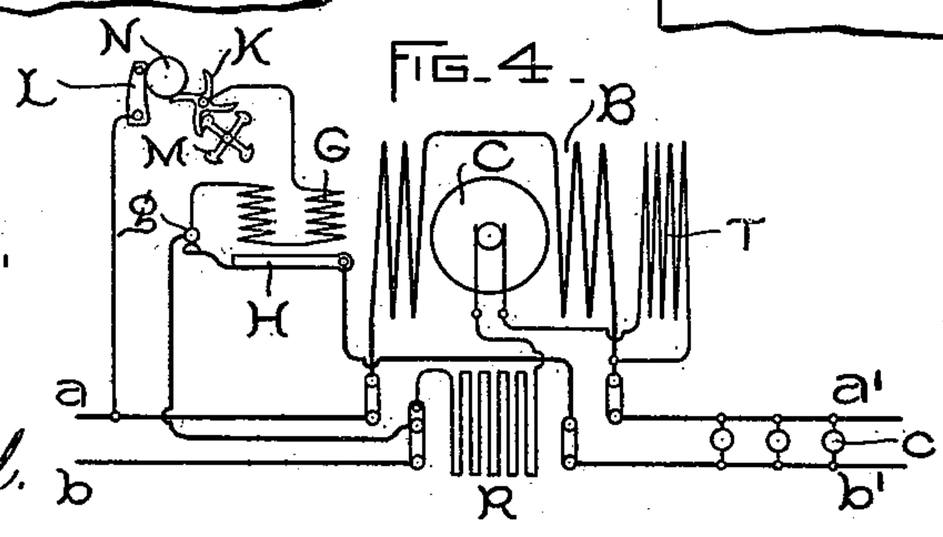


FIG. 4.



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UNITED STATES PATENT OFFICE.

CHARLES E. HOLMES, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

COIN-CONTROLLED METER.

SPECIFICATION forming part of Letters Patent No. 667,089, dated January 29, 1901.

Application filed March 26, 1898. Serial No. 675,236. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HOLMES, 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 Coin-Controlled Meters, (Case No. 670,) of which the following is a specification.

The present invention relates to coin-controlled meters or similar devices in which the insertion of a proper coin or token in a receptacle adjusts the operating parts of the meter or other device, so that the depositor of the coin or token may receive an equivalent in the form of electric or other energy.

Owing to the small torque developed by meters on small loads—as one lamp, for example—it is necessary to arrange the coin-controlled mechanism in such manner that it does not increase the friction of the moving parts of the meter; otherwise the meter may upon light loads fail to register and the customer may take without paying for it a considerable amount of energy in the aggregate, providing the amount used is at all times small as compared with the capacity of the meter. If, however, the torque of the meter is sufficient to overcome the friction of the coin-controlled mechanism, the meter will register in the ordinary manner, and, further, if the friction of the coin-controlled mechanism is of any substantial amount the readings of the meter will be slow at all loads, resulting in a loss to the central station.

My invention has for one of its objects to provide a coin-controlled meter which is so arranged that it will accurately register the consumption of energy at all loads.

A further object of my invention is to provide, in a coin-controlled mechanism in which the coin or token is employed to form part of an electric circuit, an arrangement such that any ordinary variation in the size of the coin or token—as, for example, a variation caused by wear—will not affect the operation of the device nor affect the length of time during which the circuit is maintained closed in any apparatus in which time is an element, nor, in general, affect the amount of electric energy or other service received for a given coin. Further, I provide apparatus by which several coins may be inserted at once, if preferred, and will then be retained in a receptacle and fed to the coin-controlled mechanism one at a time, each as the effect of the prior coin is exhausted.

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

Figure 1 is a front elevation of a recording-wattmeter with my improvements applied. Fig. 1ª is a detail view of a device for preventing the improper manipulation of the coin-controlled mechanism. Figs. 2 and 3 are details of the coin-controlled mechanism, and Fig. 4 is a diagram of the circuit connections.

My invention is shown as applied to a recording-wattmeter for electric circuits, as it has great utility in connection therewith; but it is applicable also to other types of coin-controlled devices, and particularly those requiring a very delicate arrangement of parts, so as not to interfere with the operation of the apparatus to be controlled.

Mounted upon a cast-metal base A are the working parts of the meter, comprising a pair of field-coils B, within which revolves the armature C. The armature is mounted upon shaft C′ and is provided at its lower end with a metal disk D, arranged to rotate between the poles of the stationary maguets E and damp the rotations of the armature. On the upper end of the armature-shaft is a worm C^2, (shown in dotted lines,) which meshes with one of the gears in the registering mechanism F. On the side of frame A is a relay-magnet G, arranged to control the action of the meter-switch H. The front plate of the registering mechanism is extended upward to form the back part of the coin-chute I, and plate J forms the front part of the chute.

To prevent the improper manipulation of the coin-controlled mechanism, an automatic device is placed in the upper end of the chute and so arranged that if a coin or token is lowered on the end of a fine string or thread with the idea of withdrawing it after the meter has been set in operation it will be severed as soon as the attempt is made, and if the thread or string is of any substantial size it is impossible to drop the coin into operative posi-

tion. This is accomplished by means of a pivoted lever J′, which is provided with a portion *j*, making a right angle with the general plane of the lever and having a knife-edge on the part which passes through the slot *i* in the coin-chute. On the lower end of the lever is a second edge *j′*, which normally stands across the chute I in the position shown, the counterweight j^2 acting to return it to place as soon as a coin passes. When a coin enters the upper end of the chute, it drops freely until its lower edge strikes the lower portion of lever J′. This causes the lever to be deflected, permitting the passage of the coin at the same time the upper end of the lever passes through the slot *j′*. The upper and lower ends of lever J are so shaped that the upper knife end *j* must cross the coin-slot before the lower knife end j^3 leaves it. By this arrangement any coin or token will be prevented from passing into operative position unless it is entirely free, and any string or thread will be severed by the knife-edge.

At the lower end of the coin-chute is a four-armed wheel K, which is loosely mounted on a shaft and acts, together with the stationary contact-piece L, to form a coin-receiver. The arms of the wheel K are slightly curved and form cam-surfaces, with which the arms of the cam-wheel M engage. The coin on passing through the upper part of the chute I drops upon the wheel K and is held by one of its arms, in the manner shown in Fig. 2, until after the cam-wheel M, which is geared to some part of the motor mechanism, has made a certain portion of a revolution, (it being understood that the wheel M may be directly connected to the motor mechanism or geared thereto by any form of gearing,) after which the coin drops to the position shown in Fig. 3 and is retained until the hooked end M′ disengages the arm of the wheel K and allows it to revolve to a position corresponding to that of Fig. 2, thus releasing the coin N. It will be seen that the weight of the coin N is employed to drive the four-armed wheel K, which in turn tends to drive the cam-wheel M and the meter mechanism. The arrangement of the parts is such that the wheel M controls the rotary movement of the wheel K. Under ordinary circumstances the armed wheel K tends to drive the cam-wheel M; but if for any cause the armed wheel sticks the cam-wheel M will drive it.

The wheel K is connected electrically to one side of the relay-magnet circuit and stationary piece L to the other, the coin or token N forming the bridge between them. Practically any variation in the diameter, thickness, or weight of the coin or token has no effect upon the successful operation of the mechanism. In other words, a coin or token can be so much worn that it is scarcely recognizable and still it will operate the meter. This is accomplished by the peculiar shape of the arms of the wheel K and also of the cam-wheel M. The space between the lower end of the stationary contact-piece L and arm K′ of the wheel is considerably less than the diameter of the determined coin or token, no matter how much it is worn, and the coin will be held in the position shown in Fig. 3 until the hooked arm M′ of the cam releases the arm of wheel K. The wheel K being loosely mounted on its spindle is free to move until one of its arms strikes an arm of the cam-wheel M. This position is represented by Fig. 2. The lost motion between positions 1 and 2 of the wheel K has no effect upon the registration of the meter, for the rotation of the wheel M is controlled by the moving part of the meter.

If more than one coin or token is deposited in the meter at any time, the second one will advance to an operative position and form a circuit for the current in multiple with the first before the first coin drops into the lower chute I′ and passes to a suitable receiver. This prevents the temporary interruption of the lights which would be occasioned if the circuit were broken during the interval between the changing of the coins.

The cam-wheel M is rotated in the direction of the arrow by the meter mechanism, and by referring to Fig. 2 it will be seen that by reason of the coin N resting on an arm of wheel K its weight is utilized to assist the operation of the meter. In practice the parts are so proportioned that the weight of the coin is sufficient to balance the friction of the moving parts, so that the meter will register accurately for all loads.

In Fig. 4 I have illustrated the circuit connections of my improved meter. *a b* are the main circuit-wires, and *a′ b′* are the circuit-wires supplying current to the translating devices *c*. The field-coils B are connected in series with the mains *a a′*, and the armature C is connected between mains *b* and *a′*. In series with the armature is a resistance R for reducing the flow of current therein and a starting-coil T, which is so arranged that it will balance the friction of the armature. The circuit of the meter and also that of the consumer is controlled by means of the switch H, the operation of which is regulated by the relay-magnet G. The fixed terminal L is connected to the main *a*, and the wheel K is connected to one end of the winding of the relay-magnet G, the other end of the winding being connected to the contact-terminal *g*. With the circuits arranged as described the current flows from main *a* to terminal L, through the coin or token N to the wheel K, through the winding of the relay-magnet G to contact-terminal *g*, and to the opposite side of the circuit. This energizes the magnet, which attracts its armature and closes the circuit of the meter and also of the consumer, and the circuit will remain closed until the coin or token is released by the cam-wheel M after a certain predetermined amount of energy has been consumed.

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

1. In a mechanism controlled by a coin or other token, the combination of a normally open circuit arranged to be bridged by a coin or token, a second circuit controlled by the first, a motor mechanism, and a coin-receiver which is so arranged that the weight of the coin is continuously utilized to assist the motor mechanism in addition to closing the circuit.

2. In a mechanism controlled by a coin or other token, the combination of a motor mechanism, terminals arranged to be bridged by a coin or token to complete an electric circuit, a second or main circuit controlled by the first, and a receiver for the coin, comprising a moving and a stationary part, so arranged that the weight of the coin is continuously utilized to assist the motor mechanism.

3. In a coin-controlled motor mechanism, the combination of a normally open circuit which is arranged to be bridged by a coin or token, a main circuit controlled by the first, a train of registering-gears, and a coin-receiver which is so arranged that upon the insertion of a coin or token the circuit is closed through the coin, and the weight of the coin is continuously utilized to assist the motor mechanism.

4. In a coin-controlled mechanism, the combination of a normally open circuited relay-magnet, a switch for opening and closing a second circuit controlled thereby, and a coin-receiver which is so arranged that the coins are received and held in a position to close the circuit of the magnet, and their weight utilized to assist the action of said mechanism.

5. In a mechanism controlled by the insertion of a coin or other token, the combination of a coin-holder composed of a moving and a stationary part respectively connected to opposite sides of the circuit and arranged to be electrically connected by the coin or token, and an actuator for the moving part of the holder, which is so arranged that the circuit is maintained through the coin until it has traveled a certain distance irrespective of the exact size of the coin.

6. In a mechanism controlled by the insertion of a coin or other token, the combination of a coin-holder composed of a stationary and a rotary part between which the coin is held, and a second rotary part loosely meshing with the first for driving it, the arrangement being such that the coin or token is held until a certain operation has been performed, irrespective of its diameter or thickness.

7. In a mechanism controlled by the insertion of a coin or token, the combination of a coin-holder composed of a stationary part, an armed wheel, and an armed actuator meshing with the driving or armed wheel through a lost motion.

8. In a mechanism controlled by the insertion of a coin or other token, the combination of a rotary armed wheel forming one terminal of a circuit, a stationary piece forming the terminal for the opposite side of the circuit, a cam for controlling the movement of the armed wheel, arranged to have a certain amount of lost motion between it and the armed wheel, and a motor for driving the cam.

9. In a mechanism controlled by the insertion of a coin or other token, the combination of a rotary armed wheel forming one terminal of a circuit, a stationary piece forming the terminal for the opposite side of the circuit, a rotary cam having a number of hooked arms corresponding to the arms of the wheel, the hooks being arranged to engage with the arms and prevent the coin or token from being released until the cam has moved a certain angular distance.

10. In a prepayment electric meter, the combination of a coin-chute, a fixed and a loosely-mounted terminal respectively connected to opposite sides of an electric circuit, and arranged to be bridged by a coin, a cam for actuating the movable terminal having a certain amount of lost motion between it and the terminal, and gearing between the motor and the cam.

11. In a prepayment motor mechanism, the combination of a fixed terminal connected to one side of an electric circuit, a rotating terminal connected to the opposite side of the circuit, and having a plurality of projections or extensions for receiving the coin or token to close the circuit, a rotary cam-wheel having a number of arms corresponding to the number of projections on the terminal and so arranged that there is a certain amount of lost motion between each arm and the projections on the rotary terminal.

12. In a prepayment mechanism, in which a coin or token is employed to complete an electric circuit, the combination of a pair of terminals arranged to receive and hold the coin in a position to complete the circuit, a second circuit controlled by the first, and means for including the succeeding coin or token in circuit before the first one leaves.

13. In a prepayment mechanism in which a coin or token is employed to complete an electric circuit, the combination of a pair of terminals arranged to receive and hold the coin in a position to complete the circuit, a second circuit controlled by the first, means for advancing the coin or token which is forming a part of the circuit, at the same time moving the next succeeding coin into a position where it will form a multiple circuit with the first coin or token and prevent the interruption of either circuit at the time the first coin or token is released.

14. In a prepayment-meter in which a coin or token is employed to complete the circuit of a relay-magnet, a main circuit controlled by the relay, a pair of terminals arranged to receive and hold a coin for completing the

relay-circuit, and means for closing the relay-circuit through the succeeding coin or token before the first one is released.

15. In a prepayment-meter, in which a coin or token is employed to complete the circuit of a relay-magnet, a main circuit controlled by the relay, a moving and a stationary terminal, arranged to receive and hold a coin for completing the relay-circuit, and means for actuating the moving terminal so that it will advance the coin or token which is then closing the circuit, and also the next succeeding coin, so that the latter will form a path for the current in multiple to the first, to prevent the interruption of the circuit.

16. In a mechanism controlled by a coin or other token, the combination of a normally open relay-circuit arranged to be bridged by a coin or token, and a meter mechanism with a separate circuit therefor controlled by the relay-circuit, and a coin-receiver which is so arranged that the weight of the coin is utilized to assist the meter mechanism in addition to closing the circuit.

17. In a mechanism controlled by a coin or other token, the combination of an electric-meter mechanism, terminals arranged to be bridged by a coin or token to complete an electric circuit, a second circuit including the electric meter which is controlled by the first, and a receiver for the coin, comprising a moving and a stationary part, so arranged that the weight of the coin is utilized to assist the meter mechanism.

18. In a coin-controlled meter mechanism, the combination of a normally open relay-circuit which is arranged to be bridged by a coin or token, a circuit for the meter mechanism, a train of registering-gears, and a coin-receiver which is so arranged that upon the insertion of a coin or token the circuit is closed through the coin, and the weight of the coin compensates for the friction of the gears in the register.

19. In a coin-controlled device, the combination of an armed wheel for receiving and holding the coin, a second armed wheel loosely meshing with the first, and means controlled by the coin for driving the second wheel.

20. In a prepayment-meter, a fixed and a movable contact arranged to be bridged by a coin, a locking device controlling the movement of the movable contact, and a mechanical connection between the meter proper and the locking device.

21. The combination of a fixed and a movable contact arranged to be bridged by a coin, of a motive device controlled by said coin and contacts, and a locking device for the movable contact controlled by the motive device, such that the coin is retained by the contacts until the device has made a predetermined movement.

In witness whereof I have hereunto set my hand this 22d day of March, 1898.

CHARLES E. HOLMES.

Witnesses:
DUGALD MCKILLOP,
JOHN MCMANUS.