

H. ARON.
PREPAYMENT ELECTRICITY METER.
APPLICATION FILED DEC. 12, 1906.

957,534.

Patented May 10, 1910.

3 SHEETS—SHEET 1.

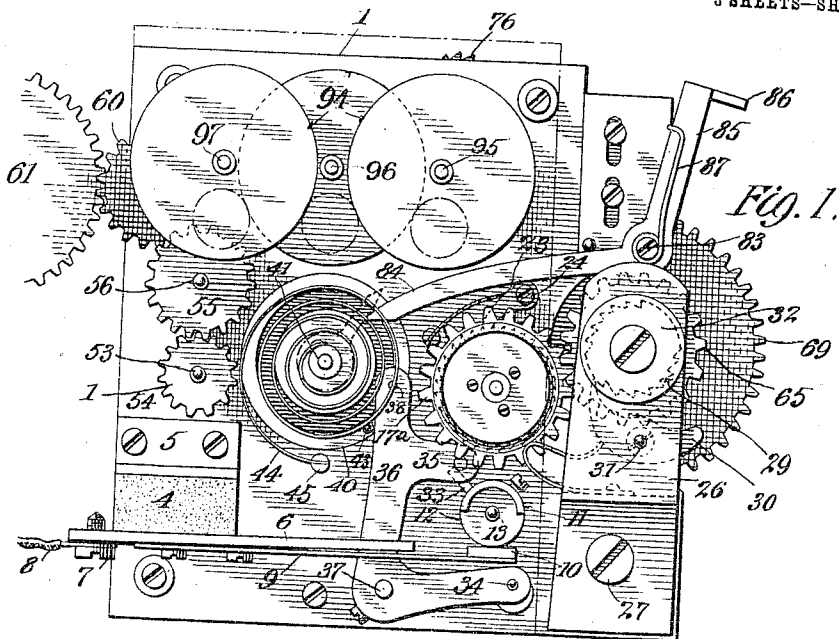
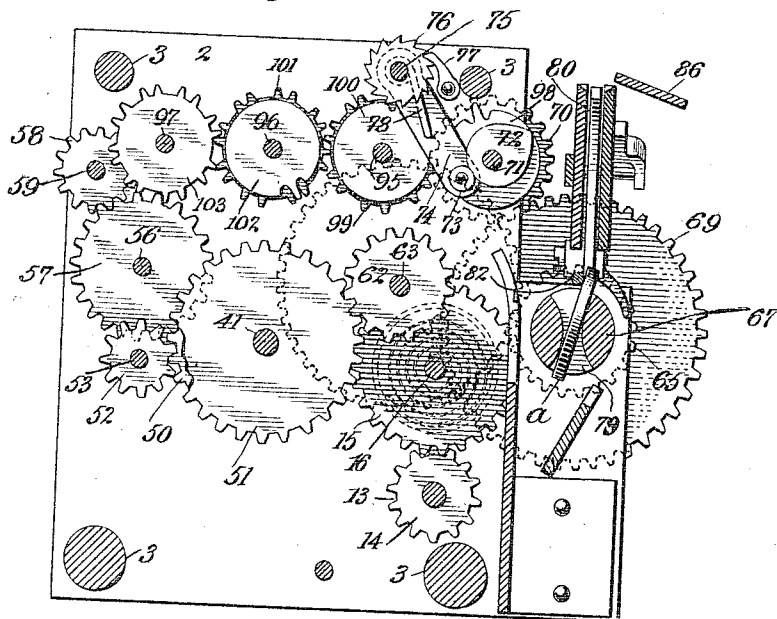


Fig. 2.



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3 SHEETS—SHEET 3.

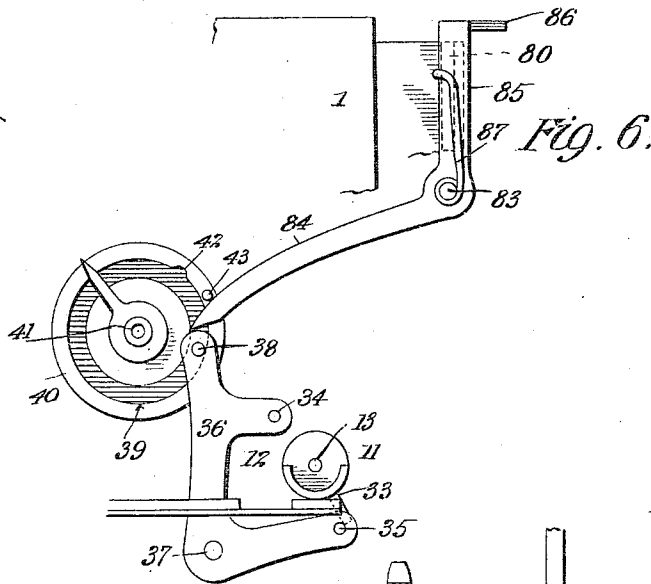


Fig. 6.

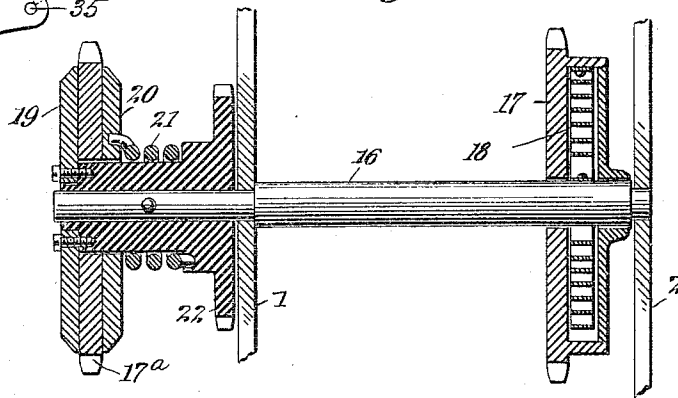


Fig. 7.

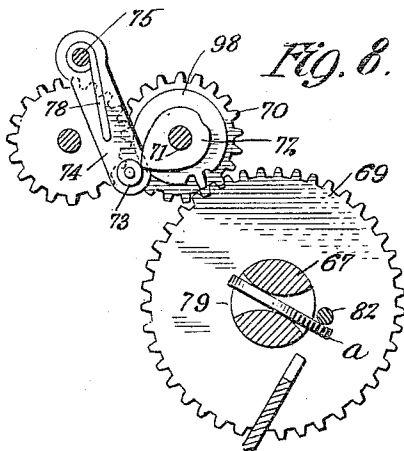


Fig. 8.

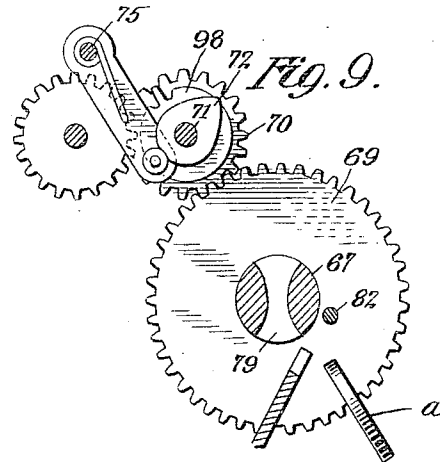


Fig. 9.

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UNITED STATES PATENT OFFICE.

HERMANN ARON, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO THE AMERICAN ARON ELECTRICITY METER COMPANY, A CORPORATION OF NEW JERSEY.

PREPAYMENT ELECTRICITY-METER.

957,534.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed December 12, 1906. Serial No. 347,433.

To all whom it may concern:

Be it known that I, HERMANN ARON, a citizen of the German Empire, residing at Charlottenburg, in the Kingdom of Prussia and Empire of Germany, have invented certain new and useful Improvements in Prepayment Electricity-Meters, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in coin-controlled vending machines, and more particularly to means for regulating the supply of the commodity to be sold through the measuring device therefor.

The invention has for its primary object to provide an effective device of this character for controlling the flow of electric current through an electricity meter.

In its preferred embodiment, the present improvement comprises an electric switch formed of a pair of relatively insulated brushes adapted to be electrically connected together and disconnected by means of a spring-actuated rotary commutator controlled in its movements by an escapement or let-off device which is in turn governed by measuring and recording mechanism adapted to be set by hand upon the introduction of a coin or coins and driven by a connection with the current-measuring mechanism. The controlling mechanism is provided with means whereby the coin-receiving member is maintained yielding in coin-receiving position and means for preventing the introduction of coins after the controlling mechanism has been set to its maximum capacity by previous introduction of coins. It is also provided with recording means whereby the quantity of the commodity to be vended which has already been paid for is indicated to the user at all times and whereby the total number of coins introduced into the apparatus is also recorded.

The invention will be understood by reference to the accompanying drawings in which—

Figure 1 is a front elevation of a controlling device constructed in accordance with the present invention, with the usual casing omitted. Fig. 2 is a similar view with the front plate of the frame omitted. Fig. 3 is an elevation showing the gearing at the back of the frame. Fig. 4 is a plan view of the apparatus, and Fig. 5 an edge elevation of the same taken from the

right in Fig. 1. Fig. 6 is a face view of the dial plate and the parts coöperating therewith. Figs. 7 to 9 inclusive are detail views showing certain of the parts of the mechanism.

The frame of the apparatus is constructed with two substantially parallel rectangular plates 1 and 2 rigidly secured in such relation by means of the usual shouldered spacing studs 3, and each provided with a number of apertures in alinement to receive the several shafts or spindles of the mechanism. The front frame plate is provided in its lower left hand corner with a block 4 of insulating material secured thereto by a suitable angle piece 5. To the under side of the block 4 are secured two separated conductor bars 6 each having at one end a fastening-screw 7 for one of the terminals of the conductor wire 8 carrying the electric current to be measured, and having secured to their lower sides the spring blades 9 to the outer ends of which are secured the contact blocks 10 one of which latter is adapted to lie permanently in contact with the cylindrical portion of a commutator cylinder 11 and the other of which is adapted to bear upon the segmental outer portion 12 of the commutator. The commutator is mounted upon the forward end of a shaft 13 provided near the rearward end with a small gear-wheel 14 meshing with a larger gear-wheel 15 loosely mounted upon a shaft 16 and carrying a drum 17 to which is connected one end of a spiral-spring 18 having its opposite end connected with the shaft 16. The shaft 16 has loosely mounted upon its forward end a gear-wheel 17 frictionally held between a fixed disk 19 and a loose disk or washer 20 pressed against said wheel by means of a spring 21 interposed between said disk or washer and the hub of a ratchet-wheel 22 engaged by a pawl 23 pivotally mounted by means of a screw-pin 24 upon the front frame-plate 1. A rotary spindle 25, journaled in the bracket 26, secured by a screw 27 to the front of the frame-plate 1, has fixed upon its inner end a gear-wheel 28 meshing with the loose gear-wheel 17 and having fixed upon its hub a mutilated ratchet-wheel 29 engaged by the spring-pressed pawl 30 pivotally mounted upon the bracket 26 by means of the screw-pin 31. The spindle 25 is shown provided with a milled disk 32 by which it may be turned by

the operator for winding up the spring 18 to store the motive power for turning the commutator 11, the gear-wheel 17 being allowed to slip upon its supporting spindle after such spring has been placed under the desired degree of tension, in order to avoid injury to the mechanism by the continued turning of the manually-actuated spindle 25.

The rotation of the commutator is controlled by means of an escapement or let-off device comprising a radial pin 33 carried by the hub of the commutator and adapted to engage alternately one of two stop-pins 34 and 35 each carried by a lateral arm of an angular-lever 36 pivotally mounted at 37 upon the frame-plate 1, such stop-pins being arranged diametrically opposite each other and at substantially equal distances from the commutator shaft 13. The lever 36 is adapted to rock in opposite directions to throw its respective stop-pins beyond the outer end of the escapement-pin 33, in order to enable the commutator to make a semi-rotation, by the engagement of a pin 38 with the outer wall 39 of a cam-groove formed in the forward face of a cam-disk 40 mounted upon a rotary spindle 41. The cam-member 39 is concentric with the spindle 41 excepting at one point in its circumference where it is provided with a recess 42 adapted to receive the pin 38 when the adjacent edge of the lever 36 is engaged by a pin 43 projecting from the rim of the cam-disk 40. The pin 43 is thrown into and yieldingly maintained in engagement with the rock-lever 36 by means of a coiled spring 44 having its inner end secured to the hub of the cam-disk 40 and its outer end secured to a post 45 projecting from the front face of the cam-plate 1, thereby maintaining the lever 36 in such position that the stop-pin 34 is retracted from the path of the escapement-pin 33 while the stop-pin 35 is within the path of movement of the latter and serves to maintain the commutator normally in inoperative position with its contact-segment 12 disengaged from its respective contact-block 10.

Like the spindle 26 in my United States Patent No. 813,685, dated Feb. 27, 1906, the cam-spindle 41 has fixed upon its inner end portion a rigid arm 46 carrying at its outer end a planet-wheel 47 meshing upon opposite sides with the crown-wheels 48 and 49 carried by gear-wheels 50 and 51, respectively, whose hubs are loosely mounted upon the shaft 41. The gear-wheel 50 meshes with a similar wheel 52 mounted upon the inner end of a spindle 53 having at its outer end a gear-wheel 54 which in turn meshes with a wheel 55 mounted upon a spindle 56 and carrying a wheel 57 intermeshing with a wheel 58 upon a spindle 59. The spindle 59 carries at its forward end a gear-wheel 60 which meshes with an initial recording

gear-wheel 61 of the meter. This gear-wheel 61 is or may be applied to the spindle 38 of the measuring instrument forming the subject of my said United States Patent No. 813,685, but may be applied to and actuated by a corresponding member of any measuring instrument with which the present improvement may be associated. The gear-wheel 51 meshes with a similar gear-wheel 62 fixed upon a spindle 63 carrying a second gear-wheel 64 which in turn meshes with a gear-wheel 65 fixed upon a rearwardly projecting hub 66 of the slotted coin-receiving member 67 whose opposite end is provided with an endwise adjustable bearing-pin 68 entering and supported by the hub of the gear-wheel 28. Upon the hub of the gear-wheel 65 is fixed a gear-wheel 69 meshing with a gear-wheel 70 upon a spindle 71 carrying a heart-shaped cam 72 engaged by a roller-stud 73 carried by the outer end of a lever 74 fixed upon a shaft 75. The shaft 75 is provided with a fixed ratchet-wheel 76 engaged by a pawl 77 pivotally mounted upon the front frame-plate, the hub of such ratchet-wheel having secured thereto one end of a spiral spring 78 whose opposite end terminates in a lateral arm attached to the lever 74, acting to maintain the roller-stud 73 in contact with the cam 72, which latter is so arranged upon its shaft that when the roller-stud 73 is in the lower or recessed-portion of the cam the coin-member is yieldingly maintained with its coin-receiving slot 79 vertically disposed to receive the coin delivered edgewise from the vertical coin-chute 80. The coin-slot 79 is provided at its rearward end with a transverse pin 81 between which and the rearward end of the pin 68 the edges of the coin are supported within the slot as it drops from the coin-chute 80, being retained in such slot with a portion projecting above the same, in the path of movement of a rearwardly projecting pin 82 carried by the gear-wheel 28.

A coin having been introduced and resting in the coin-slot of the coin-receiving member, as represented in Fig. 4, the operator turns the disk 32 and thereby engages the pin 82 with the coin *a*, thus simultaneously turning the gears 65 and 69 with their connected trains of gearing. As the shaft 71 is thus rotated, the arm 74 is shifted in opposition to its spring 78 until the roller-stud 73 rides over the highest point or apex of the cam 72, when its pressure upon the cam serves to throw the same forwardly a half-revolution until the roller-stud regains its initial position in the lowest point of the cam and completes a full rotation of the shaft and the connected parts. By this means the coin is thrown in advance of its propelling-pin 82 from which it becomes detached and is permitted to drop by gravity

into such coin receptacle as may be provided in the casing of the instrument, the coin-receiving member being thus returned to its coin-receiving position in readiness for a second operation. The gear-wheel 65 having thus made a full rotation, while the measuring mechanism comprising the gear-wheel 61 has been maintained substantially or actually immovable, the partial rotation of the gear-wheel 51 through its connections with the gear-wheel 65 has produced a partial revolution of the planet-wheel 47 and thus a partial rotation of the cam-wheel 40 in opposition to the spring 44, whereby the pin 38 of the lever 36 has been thrown inwardly from the notch 42 so as to rock such lever and thereby release the escapement pin 33 from engagement with the stop-pin 35 and enable the same to perform a half revolution and engage the stop-pin 34. By this means an electrical connection is made between the contact springs 6 through the commutator and flow of current is thus established through the circuit with which the commutator is connected, as for instance through normally disconnected portions of the leading-in wire *a* of my said Patent No. 813,685. The flow of current now causes the meter to perform its measuring operation in the usual way, and through the gear 61 operates to rotate the gear-wheel 50 in the opposite direction from that manually communicated to the gear-wheel 51, thereby serving, through the crown-wheels 48 and 49 and planet-wheel 47 to communicate to the cam-wheel 40 a retrograde movement to initial position, the circuit being maintained through the switching device until the lever 36 is engaged by the pin 43 upon the cam 40, when the pin 38 is thrust into the cam recess 42, thereby rocking the lever 36 and withdrawing the stop-pin from contact with the escapement-pin 33 and allowing the commutator to make a semi-rotation, whereby the electrical connection between the bars 6 is interrupted and the instrument ceases to operate.

As will be evident, a number of coins may be introduced successively in setting the instrument for the introduction of several units of work equivalent to nearly a complete rotation of the cam-wheel 40. In order that the instrument may not be injured or clogged by the introduction of too many coins at one time, I provide an angle-lever pivotally mounted upon the frame at the junction of its arms by means of a pin 83 and having a lateral arm 84 lying normally in the path of movement of the pin 43 upon the cam-wheel 40 and an upright arm 85 carrying at its upper end a shutter-plate 86 retained normally at one side of the mouth of the coin-chute 80 by means of a spring 87 coiled around and attached at one end to the pivotal pin 83 and terminating at its

other end in an extension engaging the arm 85 of the angle-lever. After a sufficient number of coins have been introduced into the chute to enable the cam 40 to be turned far enough to cause the pin 43 to engage the upper edge of the arm 84 of the angle-lever, the latter is rocked upon its pivotal pin 83 and the shutter-plate is shifted so as to cover the mouth of the coin-chute thereby preventing the insertion of additional coins until the operation of the meter in performing its normal function produces a sufficient movement of the cam-wheel 40 to disengage the pin 43 from the angle-lever arm 84, when the spring 87 operates to shift the shutter-plate 86 aside into its normal inoperative position.

The coin-chute is represented as open at its rearward edge opposite which is hung by means of a pivotal pin 88, a swinging gate 89 formed of a curved plate, the engagement of the lower end of which by the coin throws the same outwardly and the upper end inwardly so as to sufficiently contract the coin-slot to prevent the insertion of a succeeding coin until the preceding coin has been ejected from the coin-receiving member 67.

The instrument is provided with a dial-plate 90 having a perforation through which passes the outer end of the cam-wheel spindle 41 carrying a pointer 91 operating in conjunction with a scale 92 thereon in indicating the position of the cam-wheel 40 and thus showing the number of units of current paid for at any given time. Above the circular scale 92 is disposed a row of apertures 93 through each of which may be seen singly one of the characters upon the corresponding disk of a series of recording disks 94 mounted upon rotary spindles 95, 96, 97, respectively.

The cam-spindle 71 is provided with a mutilated gear-wheel 98 having a single peripheral tooth adapted to enter the space between the pairs of teeth of a mutilated gear-wheel 99 provided with ten pairs of such peripheral teeth and mounted upon the spindle 95 which also carries a single toothed-wheel 100 meshing with a ten-double-toothed wheel 101 upon the spindle 96 which also carries a single toothed wheel 102 meshing in turn with a ten-double-toothed wheel 103 fixed upon the spindle 97. As will be observed, each complete rotation of the cam-spindle 71, corresponding with the insertion of a single coin, produces one-tenth of a rotation of the spindle 95, whose recording disk 94 is thus advanced one number and records an advance payment of a single unit. As the gearing intermediate the shafts 71, 95, 96 and 97 is in the ratio of ten to one, the three recording disks 94 indicate the total number of units of current paid for in figures representing units, tens

and hundreds, from right to left. It will thus be seen that not only does the controlling mechanism indicate the total amount of current which has been paid for, but it provides means whereby the existing condition of the apparatus is shown, the two recording mechanisms deriving their actuations independently from the coin-receiving member the extent of whose forward movement is ultimately governed by the operation of the meter connected therewith through the gear-wheel 61.

In practice, the spring 44 connected with the cam 40 is made sufficiently strong to overcome the frictional resistance of that portion of the prepayment mechanism intermediate said cam and the gear-wheel 61 rotated by the meter, so that such frictional resistance shall not operate as a drag upon the measuring device to impair its effectiveness in performing its normal function, its strength being also sufficient to carry such cam to initial position and thereby engage the pin 43 with the escapement lever 36 so as to release the escapement pin 33 of the commutator and permit the latter to move under the action of its spring 18 into its inoperative or cut-out position.

From the foregoing description it will be observed that the present improvement is not limited to a supply member for the commodity to be delivered comprising an electric switch, but is readily adapted for application to various other kinds of vending machines involving mechanically or otherwise actuated switching or controlling devices for the commodity to be delivered. It is further evident that the measuring device in conjunction with which the present improvement is designed to operate need not be of that class actuated by the delivery of the commodity to be vended, but may be associated with a time clock having a clutch connection therewith controlled by the prepayment mechanism of the present invention.

Having thus set forth the nature of my invention what I claim herein is,—

1. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, an oscillatory controlling member therefor and connections intermediate the same and the supply member whereby the latter may be thrown into and out of operative or commodity-supplying position, actuating means adapted to be rendered operative by the introduction of a coin in setting the controlling member out of initial position to cause the supply member to assume its supply position, and means acting independently of the energizing influence of said actuating means whereby said controlling member is returned to initial position to cause the cutting off of the supply of commodity.

2. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, an oscillatory member therefor and connections intermediate the same and the supply member whereby the latter may be thrown into and out of operative or commodity-supplying position, actuating means positively connected with the controlling member and comprising a manually operated propelling member adapted to operate in one direction only, an independently moving member adapted to be connected therewith by introduction of a coin for setting the controlling mechanism out of initial position to cause the supply member to assume its supply position, an accelerator comprising a rotary cam connected with said independently moving member and a spring-pressed follower therefor whereby the independently moving member is caused to advance into and remain yieldingly in initial position, and mechanically actuated means whereby said controlling member is returned to initial position to cause the cutting off of the supply of commodity.

3. A coin-controlled vending machine, comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, a controlling member therefor adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position and including a rotary coin-receiving member and an independently movable propelling member adapted to engage a coin carried by the coin-receiving member to effect the rotation of the same, and means mechanically driven for returning said controlling member to initial position.

4. A coin-controlled vending machine, comprising a supply member for establishing and interrupting the supply of the commodity to be delivered and prepayment mechanism including a controlling member for said supply member adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position including a rotary coin-receiving member and an independently movable propelling member adapted to successively engage the individual coins of a series corresponding with the full capacity of the prepayment mechanism, means actuated by said controlling member for preventing the introduction of coins in excess of the capacity of the prepayment mechanism, and means mechanically driven whereby said controlling member may be returned to initial position.

5. A coin-controlled vending machine, comprising a supply member for establishing and interrupting the supply of the com-

modity to be delivered, a controlling member therefor adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position including a rotary coin-receiving member and an independently movable propelling member adapted to engage a coin carried by the coin-receiving member to effect the rotation of the same, means acting independently of said propelling member, for returning said coin-receiving member to initial position in advance of its propelling member, and means mechanically driven for returning said controlling member to its initial position.

6. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, a controlling member therefor adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position including a rotary coin-receiving member and an independently movable propelling member adapted to engage a coin carried by the coin-receiving member to effect the rotation of the same, a rotary shaft connected with said coin-receiving member and carrying a cam, and a spring-pressed follower for said cam, the same acting independently of said propelling member, for accelerating the motion of said coin-receiving member to disengage the coin from said propelling member and to return said coin-receiving member to initial position, and means mechanically driven for returning said controlling member to its initial position.

7. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, a controlling member therefor adapted to maintain the same normally in initial cut-off position, a spring connected with said controlling member and tending to yieldingly maintain the same in initial position, actuating means acting in opposition to said spring for moving said controlling member from its initial position and including a rotary coin-receiving member and an independently movable propelling member adapted to engage a coin carried by the coin-receiving member to effect the rotation of the same, and means mechanically driven for returning said controlling member to initial position.

8. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, and prepayment mechanism including a controlling member for said supply member adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position including

a rotary coin-receiving member and an independently movable propelling member adapted to successively engage the individual coins of a series corresponding with the full capacity of the prepayment mechanism, means mechanically driven whereby said controlling member may be returned to initial position, and independent means for registering the extent of prepayment for a particular measuring operation and the aggregate prepayment including previous measuring operations.

9. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, and prepayment mechanism including a controlling member for said supply member adapted to maintain the same normally in initial cut-off position, actuating means for moving said controlling member from its initial position including a rotary coin-receiving member and an independently movable member adapted to successively engage the individual coins of a series corresponding with the full capacity of the prepayment mechanism, means actuated by said controlling member for preventing the introduction of coins in excess of the capacity of the prepayment mechanism, means mechanically driven whereby said controlling member may be returned to initial position, and independent means for registering the extent of prepayment for a particular measuring operation and the aggregate prepayment including previous measuring operations.

10. A coin-controlled vending machine comprising a plurality of relatively insulated electric brushes, a rotary commutator adapted to make and break electrical connection between said brushes, a spring for rotating said commutator, an escapement or let-off device for successively arresting and releasing said commutator in its alternately operative and inoperative relation with said brushes, a rotary cam for controlling said escapement or let-off device, provided with an operative portion adapted to actuate the escapement only in initial position for the interruption and reestablishment of electrical connection between the brushes through the commutator, actuating means adapted to be rendered operative by the introduction of a coin in moving the said cam out of initial position, and means mechanically driven for returning said cam to initial position.

11. A coin-controlled vending machine comprising a plurality of relatively insulated electric brushes, a rotary commutator adapted to make and break electrical connection between said brushes, a spring for rotating said commutator, an escapement or let-off device for successively arresting and releasing said commutator in its alternately operative and inoperative relation with said

brushes, a rotary cam for controlling said escapement or let-off device, a planet-wheel connected to revolve with said cam, two independently rotating crown-wheels meshing with said planet-wheels upon opposite sides, 5 actuating means connected with one of said crown-wheels and adapted to be rendered operative by the introduction of a coin in causing the rotation of said crown-wheel, 10 and means operatively connected with the other of said crown-wheels for turning the same in the reverse direction.

12. A coin-controlled vending machine comprising a supply member for establishing and interrupting the supply of the commodity to be delivered, a controlling member, a shaft upon which the same is mounted, planet mechanism comprising an arm fixed upon said shaft, a planet-gear mounted thereon, and two independently movable 20 toothed wheels loosely mounted upon said shaft upon opposite sides of said planet-gear and meshing therewith, operative connec-

tions intermediate the controlling member and the supply member whereby the latter 25 may be thrown into and out of operative or commodity-supplying position, actuating means positively connected with one of said loosely mounted toothed wheels of the planet mechanism and adapted to be rendered op- 30 erative by the introduction of a coin in setting the controlling member out of initial position to cause the supply member to assume its supply position, and independently operating means connected with the other 35 of the loosely mounted toothed wheels of the planet mechanism acting to return the controlling member to initial position to cause the cutting off of the supply of commodity.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 40

HERMANN ARON.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.