May 11, 1926. 1,584,414

J. WHALEN

ELECTRICAL SERVICE TIMING METER

Filed Sept. 30, 1922 3 Sheets-Sheet 1

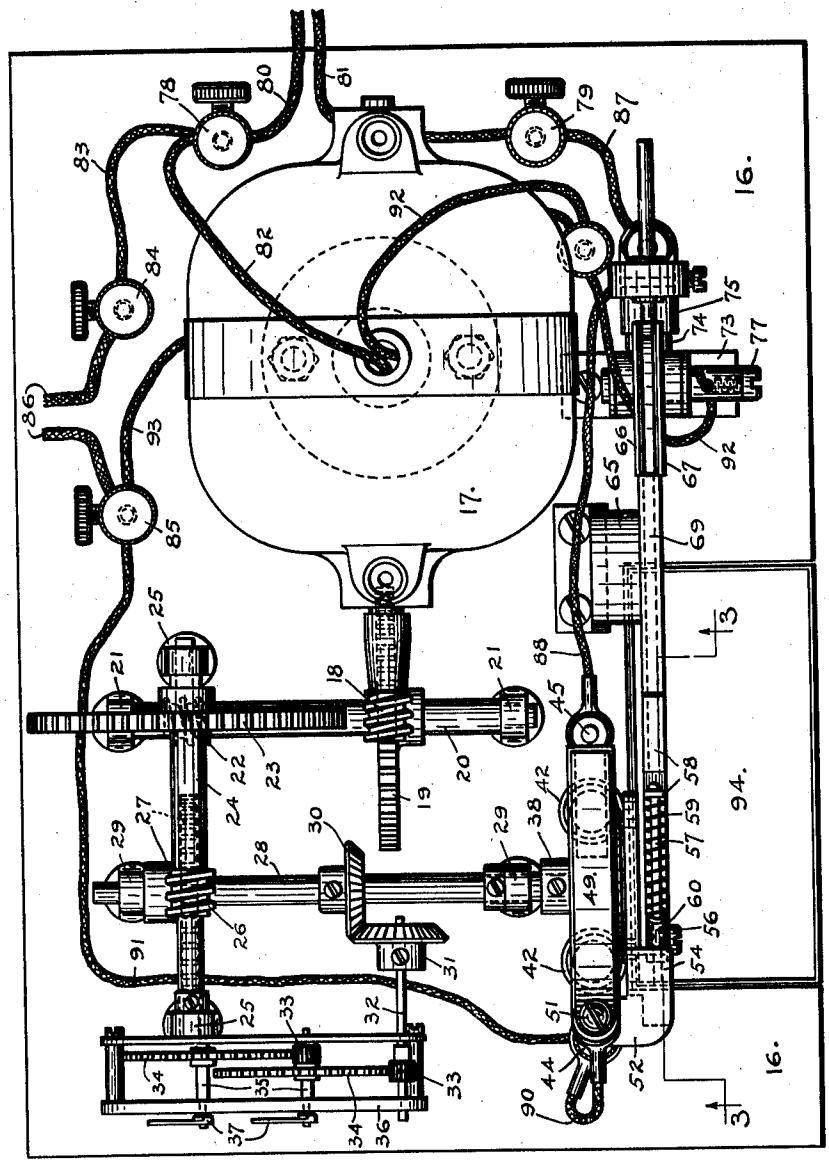


Fig. 1.

Inventor:

JAMES WHALEN.

Witness:
R. J. Honomichl.

By David O. Bamell.
Attorney

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J. WHALEN

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Filed Sept. 30, 1922 3 Sheets-Sheet 2

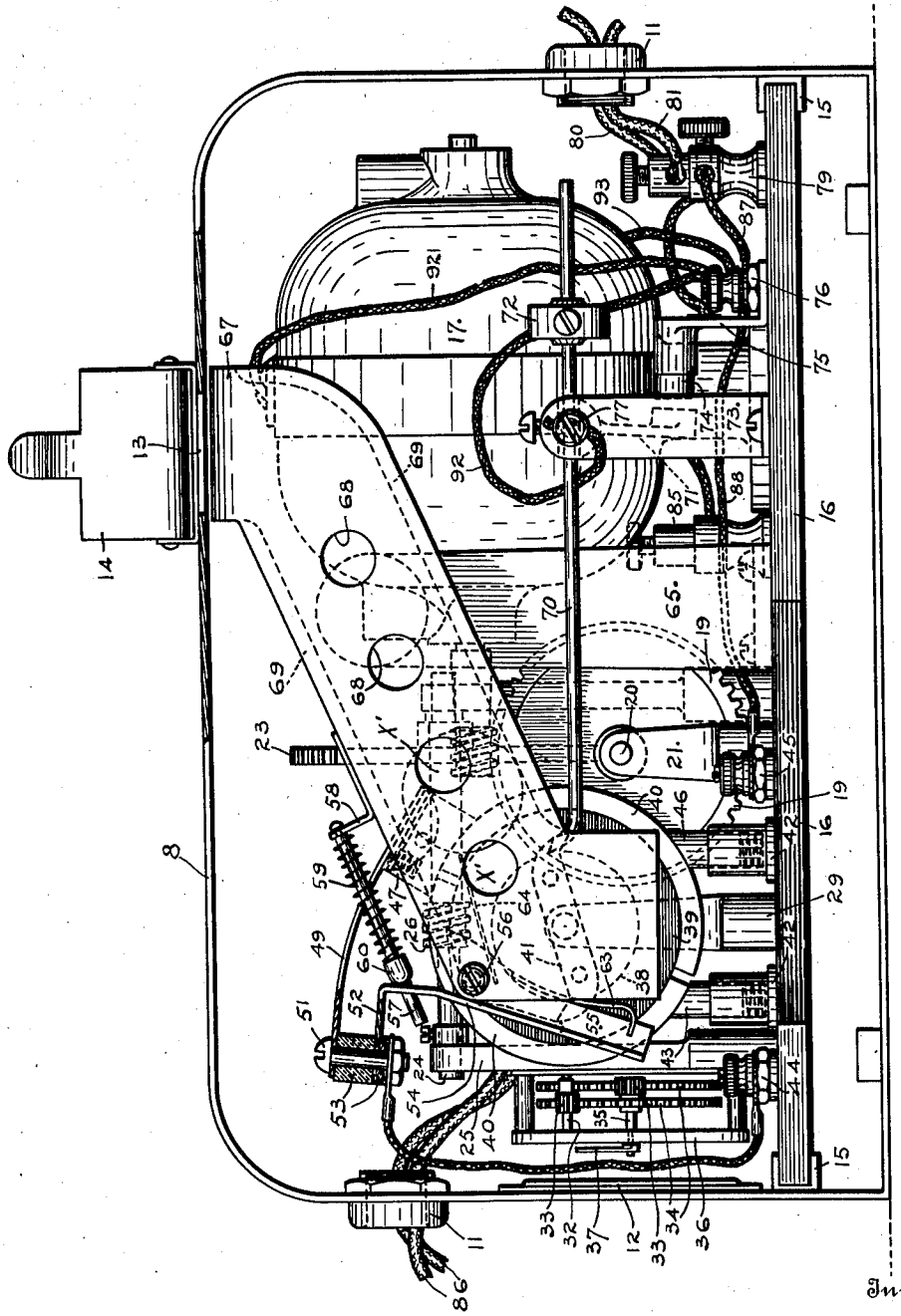


Fig. 2.

Inventor:
JAMES WHALEN.

Witness:
R. J. Honomichl.

By David O. Barnell
Attorney

May 11, 1926. 1,584,414

J. WHALEN

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Filed Sept. 30, 1922 3 Sheets-Sheet 3

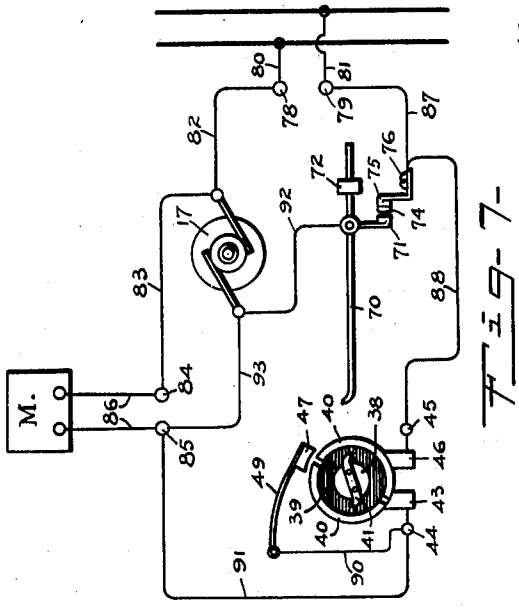


FIG. 7.

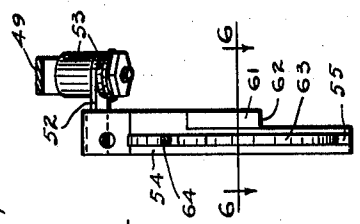


FIG. 5.

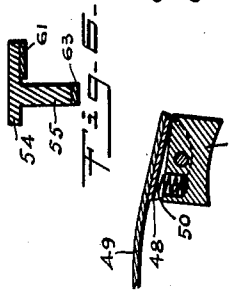


FIG. 6.

FIG. 4.

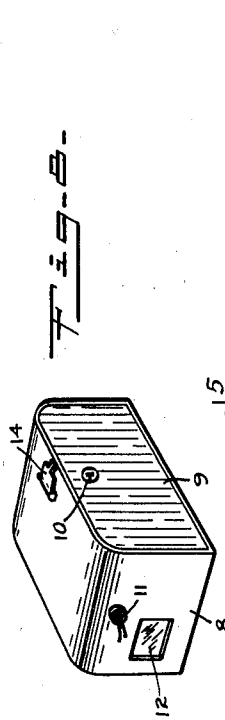


FIG. 8.

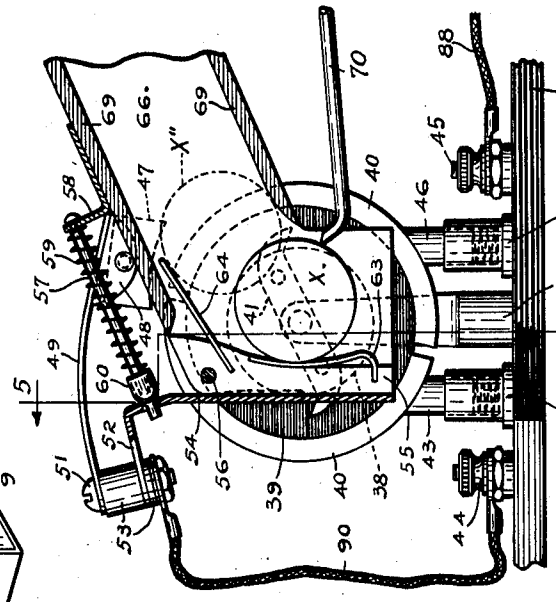


FIG. 3.

Witness:
R. J. Konomichl.

Inventor:
JAMES WHALEN.
By David O. Barnell
Attorney

Patented May 11, 1926. 1,584,414

UNITED STATES PATENT OFFICE.

JAMES WHALEN, OF OMAHA, NEBRASKA.

ELECTRICAL SERVICE-TIMING METER.

Application filed September 30, 1922. Serial No. 591,656.

My invention relates to electrical-service measuring instruments and it is the object thereof to provide a coin-controlled device for timing electrical service, whereby a motor or other electrical energy-consuming apparatus may be operated for a predetermined time by current passing through the meter, the supply of electrical energy being available after the deposit of a suitable coin, and being automatically discontinued after the supply has been used for the established time. More particular objects of my invention are to provide in a device of the class indicated a compound switch mechanism having a circuit-closing element controlled directly by the deposit of a coin, a second circuit-closing element which becomes operative after a short duration of the movement initiated by the coin-controlled device, and a third circuit-closing or shunting device which comes into action near the end of the operation period and which serves to open the circuit at the end of said period. Further objects of my invention relate to structural details for attaining simplicity and inexpensiveness of construction, durability of the working parts, safety of operation, and security against fraudulent tampering and the like, and will be more fully set forth hereinafter.

A structure embodying my invention is illustrated in the accompanying drawings, in which Fig. 1 is a plan view of the operating mechanism, removed from the casing, Fig. 2 is a front view with the door of the casing removed, certain portions being in section, Fig. 3 is a detail vertical section through the coin-controlling device on the line 3—3 of Fig. 1, Fig. 4 is a detail vertical section of the circuit-breaker brush-holder, Fig. 5 is a detail section of the stop-lever on the plane of the line 5—5 of Fig. 3, Fig. 6 is a horizontal section of the same on the line 6—6 of Fig. 5, Fig. 7 is a diagram of the electrical connections, and Fig. 8 is a perspective view of the casing.

In the illustrated structure I provide a metal casing 8 having at one side a removable cover or door 9 with a suitable lock 10 by which the casing is secured against unauthorized opening. At the ends of the casing are openings lined with insulating bushings 11, through which the wires of the feed and output circuits are extended into and out of the inclosure. At one end the casing has a small transparent window 12 through which the dials and hands of the register device may observed. In the top of the casing there is a coin-slot 13, and adjoining said slot there is a hinged flap or cover 14 which normally covers the slot and which may be raised as shown in Fig. 2 when a coin is to be inserted in the slot. Channel-shaped guides 15 are secured on the inside of the casing near the bottom at the ends thereof, said guides being adapted to receive slidably the ends of the insulating base 16 on which the operating mechanism is mounted, said base and the parts thereon being removable from the casing through the open side thereof when the door or cover 9 is unlocked and opened.

Upon the base 16 near one end thereof is mounted a smaller motor 17 of which the armature-shaft carries at one end a worm 18. Said worm meshes operatively with a worm-wheel 19 carried on a transverse shaft 20, said shaft being journaled in bearing-posts 21 extended up from the base. A worm 22 on the shaft 20 meshes with a worm-wheel 23 on a shaft 24 which is journaled in bearing-posts 25 similar to the posts 21. A worm 26 on the shaft 24 meshes with a worm-wheel 27 on a second transverse shaft 28, the latter being mounted on bearing-posts 29. On the intermediate portion of the shaft 28 is a small miter-gear 30 which meshes with a similar gear 31 carried on the drive-shaft 32 of the register device. The latter comprises a gear-train having pinions 33 and gears 34 mounted on arbors 35 which extend through a dial-plate 36 and carry indicating hands 37 of which the positions relative to the dials show the travel of the gears, the device as a whole being adapted to show the number of revolutions of the shaft 28. The speed-reducing gear-train consisting of the worms 18, 22 and 26, and the worm-wheels 19, 23 and 27, is so proportioned to the speed of the motor 17 that the shaft 28 will make one revolution in a definite period of time, such as one or two hours or more, according to the requirements of the service for which the meter is to be used.

At the front end of the shaft 28 there is secured the time-wheel, comprising a central hub-member 38, a pair of contact-segments 40 and an annular member 39 of non-conducting material which serves to insulate the contact-segments from the hub-member. On

the front side of the hub-member 38 is secured the stop-lever-cam 41 which comprises symmetrical radially extending portions with pointed ends which are curved rearwardly with respect to the direction in which the time-wheel is rotated. On the base 16 below the time-wheel there is mounted a pair of brush-holders 42, the same being electrically connected with the adjacent binding-posts 44 and 45. Brushes 43 and 46 disposed in said holders are pressed yieldingly against the contact-segments 40. A third brush, 47, is also adapted for engagement with the segments 40, said brush being pivoted in a holder 48 which is secured at the end of a spring-arm 49 extending above the time-wheel. A small coil spring 50 is seated in a recess in the brush, and presses against the holder 48 so as to tilt the opposite end of the brush upwardly, as indicated in Fig. 4. The spring-arm 49 is attached by means of a bolt 51 to a member 52 which is extended laterally and rearwardly from the upper portion of the stop-lever, the arm being insulated from said member 52 by suitable non-conducting material 53. The stop-lever comprises a plate-portion 54 which extends downwardly from the member 52 and normally lies against the end of the coin-chute as shown in Fig. 3, and a blade-portion 55 which extends between the front and rear side-plates of the coin-chute, being pivoted thereto by means of a screw 56 passing through the upper part thereof. In the portion 54 which extends above the pivot-screw 56 there is an opening through which is extended the end of the guide-rod 57, the opposite end of said rod being secured to a bracket 58 on the upper side of the coin-chute. A coil-spring 59 is disposed around the guide-rod and presses a slidable collar 60 against the stop-lever to yieldingly retain the same in the normal position shown in Fig. 3. The rear part of the plate-portion 54 of the stop-lever lies in the path of the cam 41 and is provided with a hard steel facing-strip 61 which terminates at the offset or shoulder 62, as shown in Fig. 5. The edge of the blade-portion 55 from the intermediate to the lower part thereof is also provided with a hard steel facing-strip 63, and at the upper part of said blade-portion 55 there is a pin or finger 64 which extends diagonally upward into the coin-passage, as best shown in Fig. 3. The coin-chute is mounted upon a supporting standard 65, and comprises a back-plate 66 and front-plate 67 which are of similar form except that the front-plate has a series of openings 68 therein, the main portion of said plates extending diagonally and being connected at their upper and lower edges by strips 69, whereby to form a substantially rectangular tube of which the internal dimensions are such as to allow a coin of the required denomination to pass freely through the same. The upper end of the chute is turned upwardly and terminates beneath the slot 13 of the casing, so that a coin dropped through said slot will enter the chute and roll down the inclined portion thereof. At the lower end of the inclined portion the edge-strips 69 terminate, while the side-plates have downwardly extended vertical portions, the stop-lever-blade 55 working between said vertical portions at one side, and the end of the coin-lever 70 working between the same at the other side. The coin-lever comprises a rod having a slightly upturned end-portion adjoining the coin-chute, the intermediate portion of said rod extending through the hub of the switch-arm 71 and being insulated therefrom by a suitable non-conducting bushing, and the opposite end of the rod carrying an adjustable counterpoise or weight 72. The switch-arm 71 is mounted pivotally between a pair of standards 73 secured to the base 16, the arm extending downwardly between the same as indicated by dotted lines in Fig. 2. Opposite the lower end of the switch-arm is the contact 74 which is carried by a holder 75 secured to the base. A binding-post 76 is associated with the holder 75, as shown, and the front end of the pivot-shaft of the arm 71 is extended through the bearing-standard and provided with a screw 77 for connecting a wire thereto. The weight 72 keeps the opposite end of the coin-lever normally in the raised position shown in Fig. 2, or so that the same rests against the end of the lower edge-strip 69 of the coin-chute, and when the lever is in this normal position the arm 71 is held out of engagement with the contact 74.

At one end of the base 16 there is mounted a pair of binding-posts 78 and 79, for convenience in connecting the terminals 80 and 81 of the feed or supply circuit. From the binding-post 78 a conductor 82 is connected with the motor 17, and a conductor 83 is extended to a binding-post 84 mounted on the rear portion of the base 16. The binding-post 84 and a similar post 85 are used for the attachment of the terminals 86 of the output or working-circuit extending to a motor M or other energy-consuming device which is to be controlled by the instrument. From the binding-post 79 a conductor 87 is extended to the binding-post 76, and from the latter a conductor 88 extends to the binding-post 45. From the binding-post 44 a conductor 90 is extended to the spring-arm 49 which carries the brush 47, and a conductor 91 is extended to the binding-post 85. A conductor 92 connects the switch-arm 71 with the motor 17, and a conductor 93 connects the same with the binding-post 85. Referring to Fig. 7, wherein the described electrical connections are indicated diagram-

matically, it will be seen that the timing-motor 17 and the motor M or working device are connected in parallel; that the switch or circuit-closer formed by the arm 71 and contact 74 is in parallel with the main controller or circuit-closer formed by the time-wheel-segments 40 and the brushes 43 and 46; and that the brushes 43 and 47 are also connected in parallel.

In the normal or quiescent position of the mechanism the time-wheel is in a position such as shown in Fig. 3, at which each of the segments 40 is engaged with only one of the brushes 43 and 46; the stop-lever is also in the position shown in said Fig. 3, so that the brush 47 is not engaged with the segments 40; and the coin-lever is in the raised position shown in Fig. 2, so that the switch formed by the arm 71 and contact 74 is open. When the parts are in said positions, a suitable coin X dropped into the slot 13 will roll down the coin-chute until it engages the coin-lever 70 and depresses the same as represented in Fig. 3, from which it will be noted that the coin rests against the facing-strip 63 of the stop-lever-blade, the passage between said facing-strip and the end of the lever 70 being smaller than the diameter of the coin. The depression of the coin-lever 70 causes the arm 71 to engage the contact 74 and thus closes the working-circuit, thereby starting the operation of the timing-motor 17 and making available to the user the motor M or like device which is connected with the output terminals 86. The operation of the timing-motor causes a slow rotation of the time-wheel carrying the segments 40 and the stop-lever-cam 41, and after said wheel has been in motion for a short time the position of the segments 40 will be such that one of the same will be in contact with both of the brushes 43 and 46, thereby forming a second path of closure of the working-circuit, or a shunt for the coin-controlled switch formed by the arm 71 and contact 74. Subsequent to the closing of the working-circuit by the main controller or circuit-closer comprising the brushes 43 and 46 and the segment 40, the cam 41 engages the facing-plate 61 on the stop-lever and pushes said lever outwardly to a position such as that shown in Fig. 2. This movement of the stop-lever releases the coin X which drops into a suitable box or receptacle 94 disposed beneath the coin-chute in a recess at the front of the base 16, the receptacle being indicated in Fig. 1 but omitted from Fig. 2. The releasing of the coin X allows the coin-lever to return to its normal raised position and opens the switch 71—74. At the same time the movement of the stop-lever about its pivot 56 causes the brush 47 to be pressed down against the segments 40 of the time-wheel. A shunt-circuit is thus formed through said brush 47, the holder 48, spring-arm 49 and conductor 90, and said circuit remains closed after the time-wheel has rotated to a position at which the segment 40 engaged by the brush 46 has passed out of contact with the brush 43, the positions of the parts then being as indicated in Fig. 2. Finally, when the point of the cam 41 passes the shoulder 62 at the lower end of the facing-strip 61, the stop-lever is suddenly released, so that the pressure of the spring 59 may rapidly return the same to its normal position. By said movement of the stop-lever the brush 47 is moved quickly out of engagement with the segment 40, to effect the opening of the working-circuit without arcing.

When the stop-lever is moved by the cam 41 to release the coin, the parts being in the position shown in Fig. 2 if another coin X' be dropped into the chute it will be prevented from passing through the same by the finger 64, which serves as an escapement device to prevent more than one coin at a time being released or permitted to drop into the receptacle 94. When the drop-lever is returned to its normal position, said finger 64 is raised to a position such that the coin may pass beneath the same at the position X'' indicated by the dotted circle in Fig. 3.

From the foregoing it will be apparent that my invention provides a simple and reliable means for furnishing electrical service for a definite time in consideration of a coin deposited therein, but independently of the amount of electrical energy that may be consumed by the working device M connected with the meter. If a manually controlled switch be installed at the input side of the meter, the service measured may be intermittent or discontinuous, since the timing-motor 17 will be operated only during the continuance of the supply. If a manually-controlled switch be installed between the meter and the working device M, the service will be available only for the established time, regardless of whether or not the working device M is operated during all or only a portion of such time, since the timing-motor will run continuously until the working-circuit is opened by the operation of the circuit-breaker controlled by the time-wheel.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. An instrument of the class described, comprising a timing-motor, a slow-moving rotary switch-member actuated by said motor, a cam carried by said switch-member, a working-circuit having the timing motor connected therein, a coin-actuated switch for closing said working-circuit, a movable brush adapted to engage the rotary switch-member to close the working-circuit, supporting means for said brush actuatable by said cam to move the brush to circuit-closing position, and means for rapidly actuating said

brush-supporting means to disengage the brush from the rotary switch-member and open the circuit.

2. In an instrument of the class described, a motor, a working-circuit in which said motor is connected, a slow-moving rotary member driven by said motor, insulated contact-segments carried on said member, a pair of brushes arranged to constantly engage said contact segments and connected to close the working-circuit when both brushes engage the same segment, a third brush movable into and out of engagement with the segments and connected in parallel with one of said pair of brushes, means tending to hold the movable brush out of engagement with the segments, and a cam carried by the rotary member and adapted to periodically press the third brush against the segments to maintain the working-circuit while the pair of brushes engage different contact-segments, and then to suddenly release said movable brush and enable movement thereof to circuit-opening position.

3. In an instrument of the class described, a working-circuit, a main circuit-closing means therefor, coin-actuated circuit-closing means connected in parallel with said main circuit-closing means, a shunt device for the main circuit-closing means operable to maintain the working-circuit when said main circuit-closing means is in open position, a timing-member controlling said main circuit-closing means and said shunt device, means for rapidly actuating the shunt device to open the working-circuit, coin-controlling means actuated by said timing-member, and a motor controlled by the working-circuit and actuating said timing-member.

4. In an instrument of the class described, a coin-chute, a circuit-closing device having a member extending into said chute and movable to closing position when engaged by a coin therein, a stop-lever for retaining a coin in engagement with said circuit-closer, a rotary timing-member for actuating said stop-lever to release a coin retained thereby, a second circuit-closing means movable by the timing-member to closing position prior to the coin-releasing movement of the stop-lever, a third circuit-closing means actuated to closing position by the coin-releasing movement of the stop-lever, means for moving the third circuit-closing means to open position after the second means is in open position, and a working-circuit controlled by said circuit-closing means.

JAMES WHALEN.