No. 751,081. PATENTED FEB. 2, 1904.

S. J. LARNED.

COIN CONTROLLED TELEPHONE APPARATUS.

APPLICATION FILED DEC. 3, 1903.

NO MODEL.

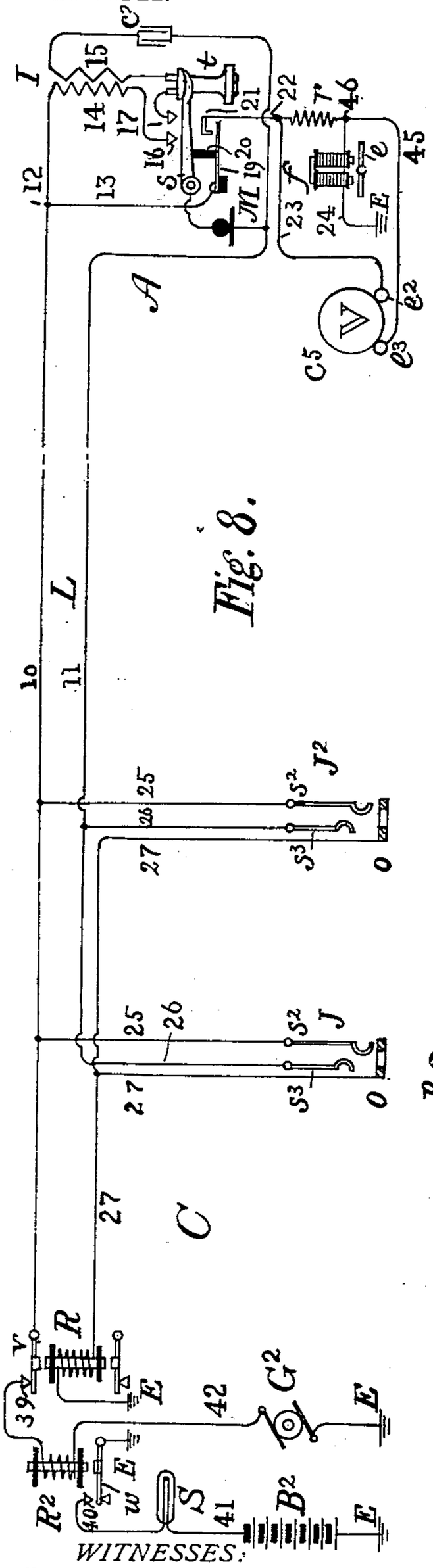

Fig. 8.

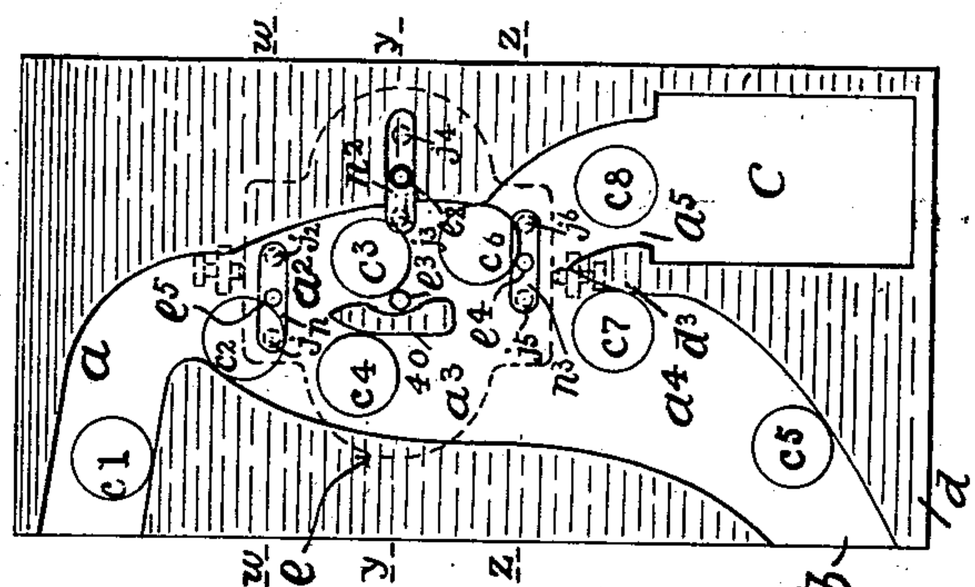

Fig. 2.

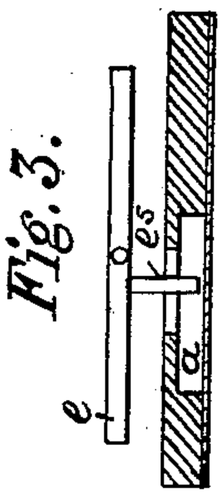

Fig. 3.

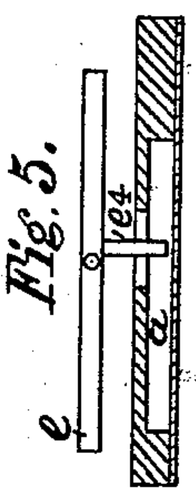

Fig. 5.

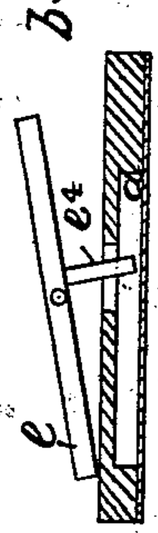

Fig. 6.

Fig. 4.

Fig. 7.

Fig. 1.

WITNESSES:

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No. 751,081. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

SHERWOOD J. LARNED, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

COIN-CONTROLLED TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 751,081, dated February 2, 1904.

Application filed December 3, 1903. Serial No. 183,626. (No model.)

To all whom it may concern:

Be it known that I, SHERWOOD J. LARNED, residing at Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Coin-Controlled Telephone Apparatus, of which the following is a specification.

My invention is an improvement in the type of toll-boxes for pay-stations of telephone-exchanges shown in the patents to A. M. Bullard, No. 665,874, dated January 15, 1901, and to C. E. Scribner, No. 728,309, dated May 19, 1903. In this style of toll-box the deposit of a coin is necessary to transmit a signal to the central station and the coin is arrested in its passage within the box, electromagnetic mechanism being provided, under the control of the central-station operator, for diverting the coin into a cash-box or, if the desired connection cannot be obtained, for directing the coin into a return-chute leading to the outside of the toll-box. A polarized electromagnet is provided the armature of which is normally maintained in a central position, but is adapted to tilt to one side or the other, according to the direction in which electric current flows through the magnet-coils. This tilting armature is connected with mechanism by means of which its movement in one direction will permit the coin to fall into the cash-box, while a movement in the opposite direction directs the coin into the return-chute.

The present invention, therefore, has reference to coin-collecting apparatus for telephone pay-stations, in which it is necessary for the user to first deposit a coin before the attention of the operator at the central station can be had, and it comprises distributing mechanism for controlling the disposition of coins so deposited whereby, first, if the instrument or the line is out of order the coin will be returned immediately to the user and, second, if the apparatus is all right and the telephone-receiver off the hook-switch the coin will close a circuit through the line-relay and cause the line lamp-signal to glow to attract the notice of the operator, and subsequently after the signal is effaced by the connection of an operator's cord-circuit with the line the coin may be returned to the calling person or secured in the cash-box in a similar manner to that disclosed in said patents, all of which I will now proceed to describe, and point out in the claims.

The accompanying drawings, which illustrate the invention, are based generally upon the drawings of the hereinbefore-mentioned patents, especially those of the patent to C. E. Scribner.

Figure 1 is a sectional view of the toll-box similar to Fig. 1 in said patent. Fig. 2 is a section on line *x x* of Fig. 1, showing the coin-chute and the mechanism therein for arresting a deposited coin and directing its course. Figs. 3, 4, 5, 6, and 7 are respectively sections on lines *w w*, *y y*, and *z z* of Fig. 2 to illustrate the disposition of an inserted coin; and Fig. 8 is a diagram of a telephone-circuit containing the invention.

Referring to Figs. 1 and 2, it will be seen that the coin-chute *a* is a narrow slot-shaped passage leading in a zigzag path from the top of the box to an outlet *b* at the bottom, where in the complete instrument is a cup adapted to hold a returned coin or alternatively to a continuation-channel a^5, through which coins to be retained pass into the cash-box. This chute is formed by a shallow channel or recess in the framework *d*, supporting the coin-distributing mechanism. The framework is secured to the body of the box by the screws d^3 d^3, and the outer wall of the coin-chute is formed by the thin metal plate d^2, which is secured to the face of the plate *d*, the recessed portions in the face of the plate *d* forming the coin-channel. It will be observed that this coin-channel, starting at the top on one side of the frame *d*, leads diagonally downward in a gentle slope to the center thereof and then swells out to the front and rear to form two passages a^2 and a^3, which are separated from each other for a short distance by the partition 40 below, which they coalesce into the passage a^4, which is continued alternatively either through the egress or return opening *b* or through the passage a^5 into the

cash-box *c*. The portion *a* of the chute combined with the portions a^3 and a^4 constitute under certain circumstances or conditions a passage for a coin from the entrance directly to the discharge-channel or return-exit *b*, and under other circumstances the portion *a* and the portions a^2 and a^4 form another coin-passage to the said return-exit, while the portions *a* a^2 and a^5 in series are a coin-passage terminating in the cash-box *c*. The disposition of a coin after its deposition in the passage *a* is controlled and regulated by the distributing mechanism, hereinafter to be described, arranged at three points within the coin-chute, one above the other. The distributing mechanism is actuated by the polarized electromagnet *f* in the rear of the frame *d*, to which it is secured, and between the frame and the poles of the magnet is the tilting lever or armature *e*, which is supported in the pivots *g* by lugs upon the frame. This armature is kept in a position parallel with the poles of the magnet by a spring *h*, which is secured to and insulated from the upper part of the frame and whose free end bears upon a plate *k*, insulated from the armature, and it may be tilted to one side or the other by the polarized magnet.

Looking at Fig. 2, the outline of the armature *e* is shown in dotted lines in the rear of the frame *d*, in which are the elongated orifices *n* n^2 and n^3, one above the other, through which extend the pins e^5, e^2, and e^4, respectively, the said pins being secured in the armature *e*, which is shown as in its normal position, the pin e^5 being on the left side of the axial line of the armature, while the pins e^2 and e^4 are on the right side of the line, so that when the armature is tilted on one side or the other the pins may assume the positions indicated in dotted circles on each side of their normal positions, (shown in full lines.) Therefore pin e^5 may occupy positions j and j^2, pin e^2 positions j^3 and j^4, and pin e^4 positions j^5 and j^6. The pin e^2 is in connection with the plate k^3 and is insulated from the armature *e* by a tube, of insulating material, as seen in Fig. 1.

Fig. 8 represents a common-battery telephone-circuit connecting a substation A with the central station C. The apparatus at the substation is of the usual character. The line conductor 10 terminates at the upper stop 16 of the hook-switch *s* and includes the secondary 14 of an induction-coil I, while the conductor 11 has in its circuit the transmitter M and connects with the said switch, there being a local circuit set off from the main-line conductors and extending from the main conductor 11 near the transmitter to the contact-stop 17, in which are connected the condenser c^7, primary 15 of the coil I, and the receiving-telephone *t*. There is a branch conductor 13 from point 12 on conductor 10 to a spring 19, which is held away from the stop 21 when the switch *s* is depressed by the block of insulation 20, attached to the switch. The stop 21 is connected by conductor 45 with the pin e^3, secured in the frame, the pin e^2 being connected by wire 23 to point 22 on the wire 45. The polarized electromagnet *f* in the toll-box is connected in conductor 24, which is grounded on one side of said magnet and connected on the other side to point 46 on conductor 45, a resistance *r* of about three thousand ohms being included in the conductor 45 between the points 22 and 46. At the central station are branches 25 26 from the respective conductors 10 and 11 to the springs s^2 s^3 in the line-jacks J J^2, the conductor 10 terminating at the armature *v* of the cut-off relay R, whose winding is grounded at one end, while its other end is continued by conductor 27, which branches to the test-rings *o o* of the jacks. The conductor 42 connects the stop 39 of the armature *v* with ground and has in series the line-signal relay R^2 and generator G^2 of higher voltage than the battery used for talking and connected in the cord-circuit. It may have an electromotive force of, say, one hundred and ten volts. The line lamp-signal S is in a local circuit 41 of the battery B^2, controlled by the relay R^2 and passing through the armature-contact *w* and the forward contact-stop 40 thereof.

Only those portions of the central-station apparatus are shown which are necessary to describe the invention, and in the cord-circuit D but one side thereof is drawn. The conductors of the circuit D from the tip and sleeve of the plug P are in circuit with windings of the repeating-coil to the respective poles of the common battery B, as usual, and in the sleeve-cord conductor 29 are interposed the keys *k* k^2. The key *k* when depressed to its contact-stop 34 is adapted to conduct current of definite polarity from the grounded generator G over the conductor 10 to the substation and the key k^2 when in contact with stop 36 to conduct current of opposite polarity or direction from said generator to the substation.

The condition of the circuits when not in use is indicated in Figs. 1, 2, and 3, in which the several pins in the armature *e* are in the position shown in full circles.

In the operation of the substation apparatus to make a call the preliminary act of the calling person is to remove the telephone from the switch *s* and then insert a coin into the chute *a*. In many of the coin devices in use it frequently happens that an inserted coin is lost to the calling person and no service obtained, because the apparatus may be out of order or the caller has failed to observe some necessary requirement whereby the connection can be made. In the present invention, however, if a coin, as *c'*, is placed in the chute *a* while the telephone remains on the switch it will roll down and strike the side of the chute and the pin e^5 and be deflected, as c^2, into the front portion a^3 of the chute and

continue, as c^4, through the portion a^4, appearing at the exit b of the chute, as c^5, for the telephone being on its switch s prevents the spring 19 from connecting with the stop 21 and closing a circuit to the electromagnet f. Therefore the armature e will not be tilted, and the pin e^5 will remain in the central position and block the entrance to passage a^2 and open the entrance to passage a^3, and if for any reason the mechanism was out of order or the circuit L opened or disturbed, so as to effect its proper relation with the electromagnet f, the coin so inserted would be immediately returned whether the hook-switch was down or up, as for the reason just given the electromagnet remains passive because no current can reach it. In case, however, the apparatus and circuits are in order the switch when relieved of the weight of the receiver rises and makes contact with the stops 16 and 17, and at the same time the spring 19 also rises and makes contact with the stop 21. A circuit is thus established from ground at the substation by way of conductor 24, electromagnet f, resistance r, stop 21, spring 19, conductors 13 and 10, armature v, stop 39, conductor 42, generator G^2 to ground at the central station, which circuit is, however, so obstructed by the resistance r that the current from the generator G^2 is too weak to energize the relay R^2 and to produce the attraction of its armature, and the consequent closure of the local circuit containing the lamp-signal S, so that the said signal for the present does not glow. This current in the circuit described is, however, sufficiently strong to energize the polarized magnet f, and being of the proper polarity, say plus, to cause the armature to tilt to the left—that is, in a direction to turn the pin e^5 into the position shown, as j—the upper part of the portion a^3 of the coin-chute is thus obstructed and the upper part of the portion a^2 correspondingly widened, so that the coin is deflected into the said portion a^2, as c^3, while at the same time the pin e^2 is moved to the left, as shown in dotted circle in Fig. 2, to the position j^3, so that the coin is caught upon the pins e^2 and e^3, as seen in Fig. 4, and constitutes a conductive connection between them, thus closing a shunt-circuit round the resistance r through a portion of conductor 45, pins e^3 e^2, its own substance, and conductor 23 to point 22 on said conductor 45, which continues by way of stop 21, spring 19, and conductors 13 and 10 to the generator, as previously described. The resistance r being thus shunted from the circuit, the relay R^2 is operated and its armature w closes the signal-circuit of the battery B^2 and the lamp S is lighted. The operator responds to the signal by inserting the plug P of the cord-circuit into the answering-jack J to ascertain the wants of the calling person, forming a local circuit through the relay R in a manner well understood and withdrawing the line-signal S by switching off the source of current G^2. When relay R is operated by the closure of its circuit through the plug and jack contacts, the armature e of the polarized magnet f, moved by the spring h, resumes its normal or central position, (seen in Fig. 5,) for although current continues to flow through the circuit from battery B in the cord-circuit it is not of sufficient strength to operate the magnet. In consequence of the return of the armature e to its normal and central position the pins e^2 and e^4 are moved from positions j^3 and j^5 to their central full-circle positions, and the coin, which has been supported upon the pins e^2 and e^3, falls into the position c^6 and rests upon the pin e^4 and upon the rear wall of the chute.

Ascertaining the number of the line wanted, the operator makes the usual busy test. Should the line when tested prove to be engaged, the operator so informs the caller and presses key k, whereupon a minus current is transmitted from the generator G to the polarized magnet f over the following circuit: conductor 35, stop 34, key k, conductor 29, sleeve p^2 of plug P, spring s^2 of jack J, conductors 25, 10, and 13, spring 19, stop 21, conductor 45, resistance r, conductor 24, and relay f to ground, and the armature is turned to the right, as shown in Fig. 6, causing the pin e^4 to move into the position j^6, thus removing the support of the coin, which drops down, as c^7 and c^5, to the outlet b to be returned to the calling person; but should the line be disengaged the operator so informs the waiting person and then presses the key k^2 and a plus current is sent over the same circuit from the generator B to the polarized magnet f by way of stop 36, key k^2, conductor 31, and stop 30 to key k^2 and the armature is turned, as shown in Fig. 7, so that the pin e^4 moves into the position j^5, and the coin then falls, as c^8, into the cash-box c, and the operator then makes the desired connection.

Resistances 37 and 38 are placed in the branches to the generator G to graduate the current.

Having thus described my invention, I claim—

1. In a coin-collector, the combination with a main coin-chute whose upper part is separated by a partition into two portions, one of which leads directly to a discharge-channel or return-exit, while the second portion below the partition has an entrance into the said discharge-channel and also an entrance into the cash-box; of three stops projecting into said coin-chute one above the other, one of which is adapted to block the entrances of the said two portions respectively, the second to block the said second portion, and the third to block the divisions of the second portion, with mechanism for operating said stops, whereby the disposition of a deposited coin may be controlled.

2. In a coin-collector, the combination with a main coin-chute separated at its upper part by a partition into two portions, one of which leads from the entrance to the exit, while the second portion below the partition has an entrance into the first portion and an entrance into the cash-box, of three stops projecting into said coin-chute one above the other, one of which is adapted to divert a coin into either of the said two portions, the second stop adapted to approach to and recede from a pin to arrest, retain and release a coin and thereby close and open electrical contacts, the third stop adapted to arrest and release the coin and direct the same into the return-chute or into the cash-box, as set forth.

3. In a coin-collector, the combination with a main coin-chute whose upper part is separated by a partition into two portions, one of which leads from the entrance directly to the exit, while the second portion below the partition has an entrance into the first portion and an entrance into the cash-box; of three stops projecting into said coin-chute each in different planes; with means for operating said stops, to control and dispose of a deposited coin, whereby first a coin is diverted into either of said two portions, second, the coin is arrested and released while in the said second portion and closes and opens electrical contacts, and finally the coin is again arrested and directed into the return-chute or into the cash-box, as set forth.

4. In a coin-collector, the combination with a main coin-chute whose upper part is separated by a partition into two portions, one of which leads from the entrance to the exit, while the second portion below the partition has an entrance into the first portion and an entrance into the cash-box; of three stops projecting into said coin-chute in different planes adapted respectively to block the entrances of the said two portions, to block the said second portion, and to block the divisions of the second portion; with mechanism for actuating said stops consisting of a pivoted lever-armature adjacent to the coin-chute, in which the stops are fixed, and a polarized electromagnet associated with said lever-armature adapted to move the same, as set forth.

5. In a coin-controlled telephone system, the combination of a main circuit extending between a substation and a central station, and normally open at said substation; a call-signal in a local circuit, a relay controlling said call-signal and a source of current in the said main circuit at the central station; with a coin-guiding electromagnet, and a resistance device in said main circuit at the substation; a switch for closing said main circuit actuated by the removal of the receiver from its hook; and means controlled by a deposited coin for shunting said resistance device and thereby increasing the strength of current in said main circuit; substantially as and for the purposes set forth.

6. In combination with a metallic telephone-circuit extending between a substation and a central station, and having one of its conductors organized as a normally open earth-return signaling-circuit; a coin-controlled telephone apparatus at said substation comprising a telephone-supporting hook, a switch actuated by the removal of the receiver from said hook to close said earth-return circuit, a coin-chute and a coin-guiding electromagnetic mechanism; of a resistance device also in said earth-return circuit, at said substation, in a normally discontinuous shunt therefor; means controlled by a deposited coin for closing said shunt and short-circuiting said resistance; a signal-lamp in a local circuit at the central station; a source of current in said earth-return signaling-circuit; and a call-signal relay also in said signaling-circuit at said central station, controlling said local circuit and signal-lamp, the said relay being irresponsive to the normal current of said source, but responsive to such current when the said resistance is shunted; substantially as set forth.

7. The combination with a metallic circuit between a substation and a central station, the same being provided with spring-jacks, a cut-off relay, a line-relay, and a line lamp-signal in a circuit controlled by the line-relay, and a cord-circuit; of a signaling-circuit formed in part of one of the main conductors of said metallic circuit normally open at the substation telephone-switch and including at the said central station the said line-relay and a source of current; and substation apparatus comprising a coin-chute, a coin-guiding polarized magnet, an armature therefor, studs fixed in said armature and projecting into said coin-chute, a resistance in said signaling-circuit, means for returning a coin directly if the circuits are not in order, and other means adapted when the circuits are in order to shunt said resistance and thereby display the central-station lamp-signal and to thereafter return the coin or deposit the same in the cash-box; as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of November, 1903.

SHERWOOD J. LARNED.

Witnesses:

WALTER D. HERRICK,

GEORGE E. CHIPMAN.