

No. 677,807.

Patented July 2, 1901.

C. E. SCRIBNER.

COIN COLLECTOR FOR TELEPHONE TOLL LINES.

(Application filed Nov. 30, 1900.)

(No Model.)

3 Sheets—Sheet 1.

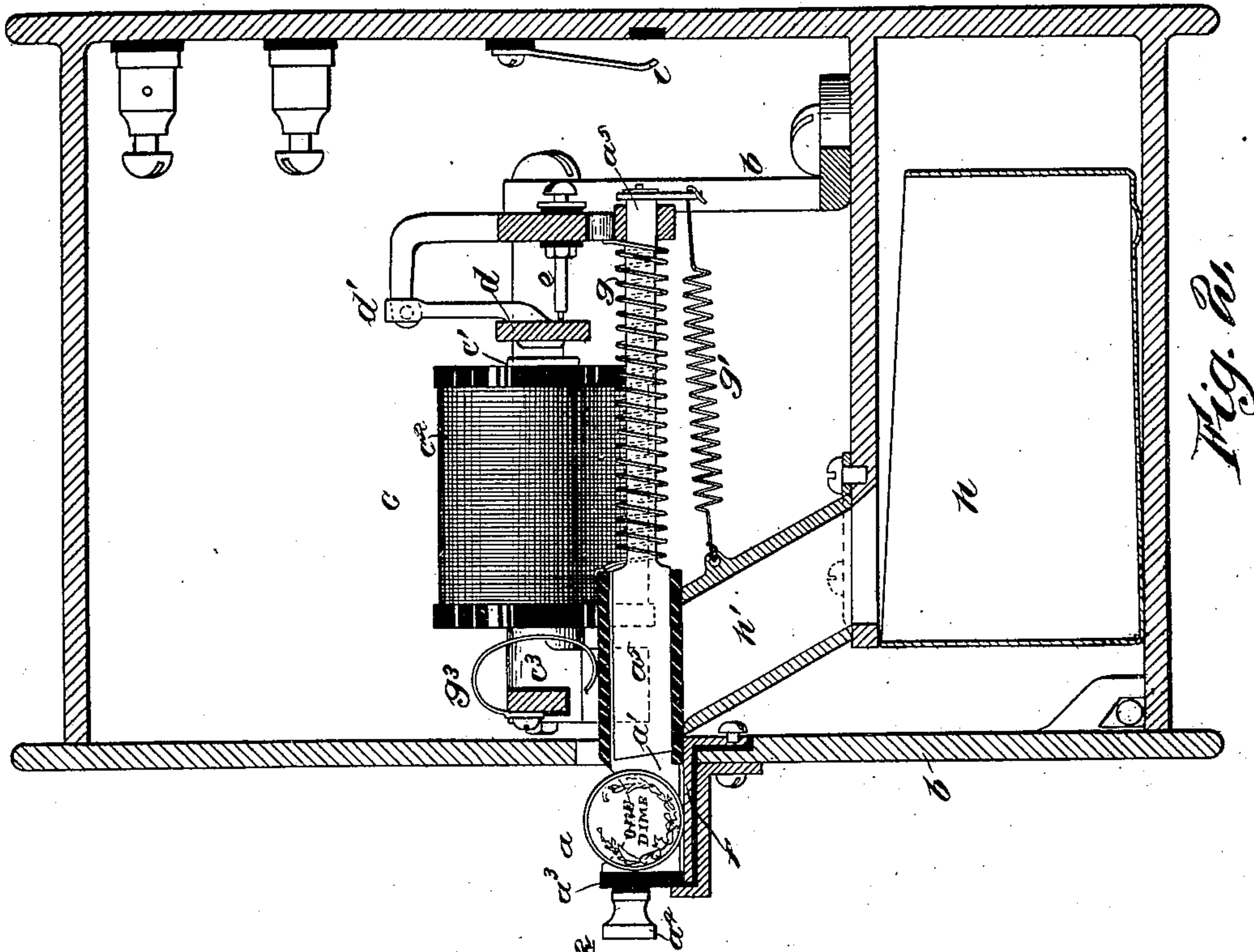


Fig. 2.

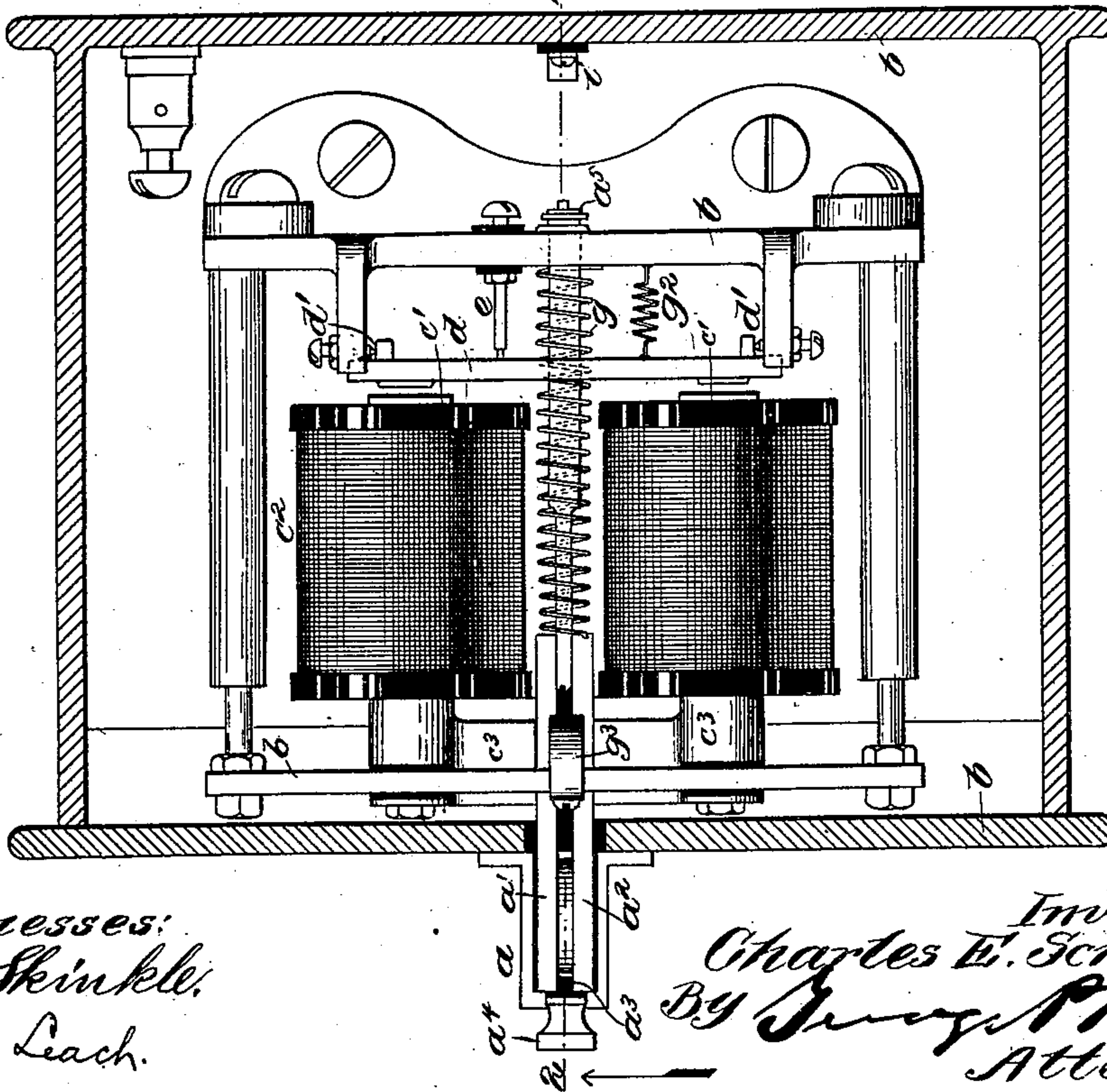


Fig. 1.

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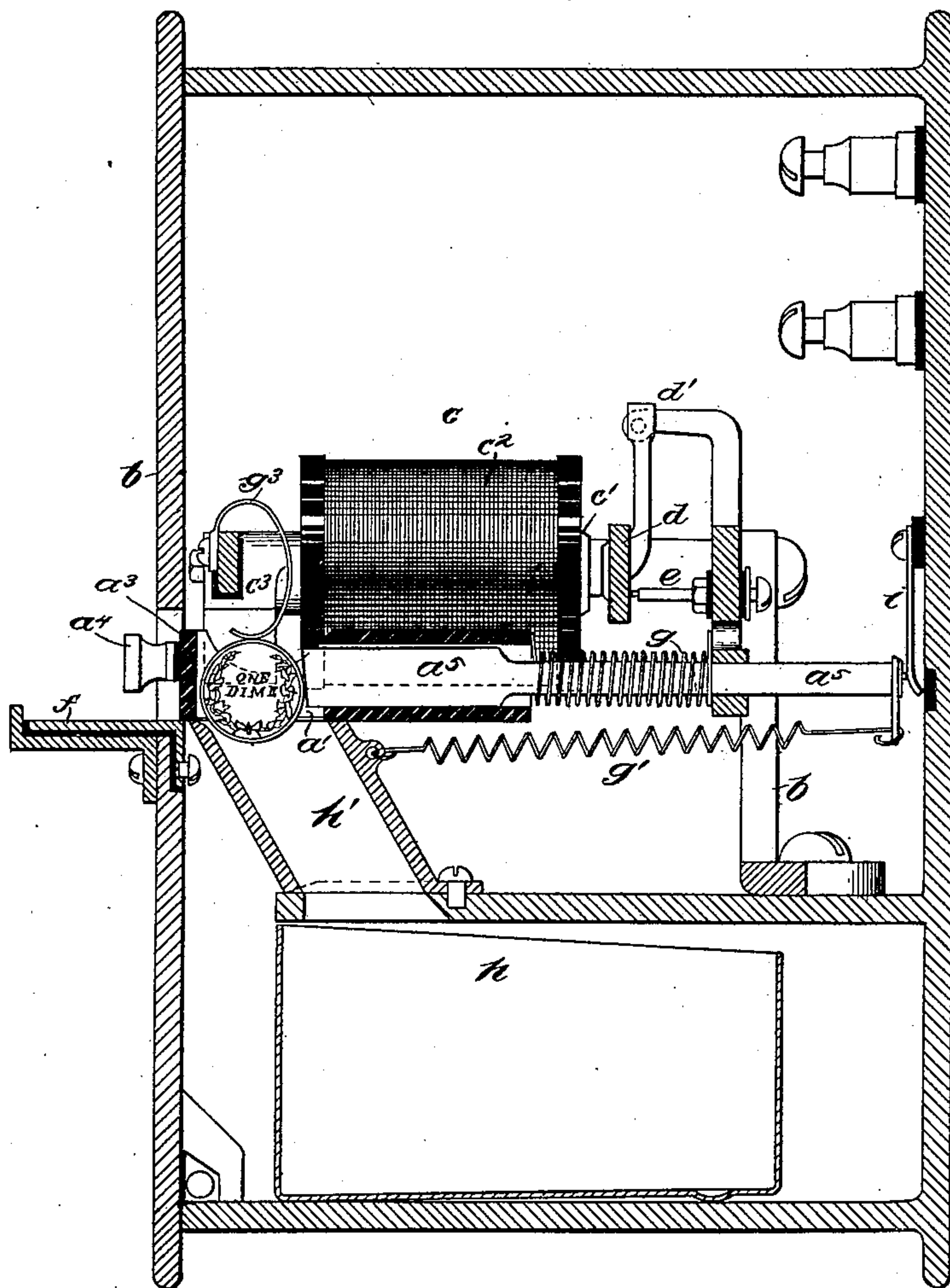


Fig. 3.

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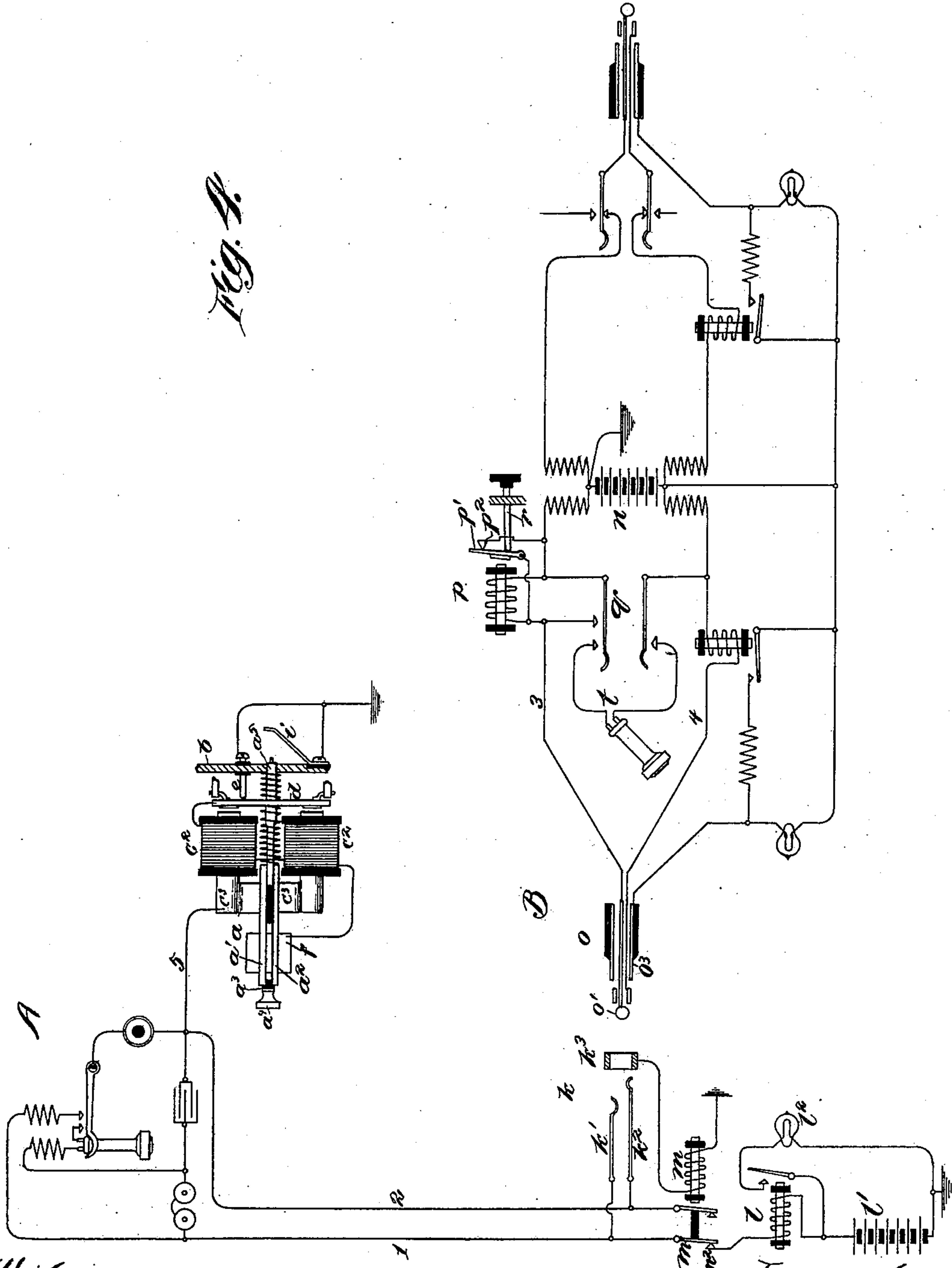
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

COIN-COLLECTOR FOR TELEPHONE TOLL-LINES.

SPECIFICATION forming part of Letters Patent No. 677,807, dated July 2, 1901.

Application filed November 30, 1900. Serial No. 38,101. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Coin-Collectors for Telephone Toll-Lines, (Case No. 491,) of which the following is a full, clear, concise, and exact description.

My invention relates to a telephone-toll-line system; and its object is to provide means whereby the use of blanks or slugs instead of money may be detected and prevented.

A frequent cause of loss to telephone companies operating toll-line systems, wherein the subscriber is required to deposit a coin in the toll-box before using the telephone, has been the fraudulent use of iron slugs—usually boiler-punchings—to operate the toll-collecting apparatus. In accordance with my invention means are provided whereby an iron blank deposited in place of a coin in the coin-receiving apparatus at the substation will automatically cause the transmission of a signal to the central office. The operator upon perceiving this signal will tell the telephone-user to take out the slug and put in a good coin, and may refuse to make the desired connection until her request has been complied with. If the telephone-operator is enabled immediately to detect the use of an iron slug in place of a coin and to warn the person perpetrating the fraud, considerable loss to the telephone company is saved, not only by the rejection of iron slugs, but also because of the tendency which the discovery of such an act has to discourage other attempts.

Generally speaking, my invention consists of a toll-collecting appliance at the substation adapted to receive coins and an electromagnetic signal apparatus associated with said toll-collecting appliance adapted to be actuated by an iron blank, said signal apparatus being connected with the telephone-line and adapted when actuated by the presence of an iron blank to change the electrical condition of the telephone-line and to transmit a signal of distinctive character over the line, the operator at the central office being

provided with a signal-receiving appliance responsive to such signal.

I will describe my invention more particularly by reference to the accompanying drawings, wherein—

Figure 1 is a sectional plan view of a toll-box provided with the slug-detecting apparatus of my invention. Fig. 2 is a vertical sectional view on line 2 2 of Fig. 1. Fig. 3 is a similar view showing an alternative position of the parts; and Fig. 4 is a diagram illustrating, by means of conventional symbols, a telephone toll-line extending from a substation to a central office, together with a portion of the central-office apparatus, the system being equipped with the detective signal apparatus of my invention.

Similar letters of reference are used to designate the same parts wherever they are shown.

Referring first to Figs. 1 and 2, the sliding coin-receiver *a* is made of two plates *a'* *a''*, joined together in front by a non-magnetic yoke *a'''*, the two plates being mounted parallel to one another and separated a sufficient distance to allow a coin to be placed between them. The coin-receiver is adapted to slide to and fro in the frame *b* of the toll-box and is provided upon its outer end with a thumb-piece *a⁴*, by which it may be pushed. A plunger *a⁵* is associated with the coin-receiver, said plunger being adapted to slide to and fro in the framework *b* of the toll-box. The coin-receiver and plunger telescope with one another, the forward end of the plunger being adapted to slide to and fro between the plates *a'* *a''* of the coin-receiver. A strip *f* of conducting material is mounted upon but insulated from the framework of the toll-box immediately below the opening in the coin-receiver when the latter is in its outer position, so that a coin placed in the slot between the plates *a'* *a''* of the coin-receiver will rest upon said strip. An electrical connection may thus be established between the strip and the metallic coin-receiver, these two parts being otherwise insulated from one another. A compression-spring *g*, surrounding the plunger *a⁵* and pressing against the inner end of the coin-receiver, tends to keep the latter in its outer

position, as illustrated in Fig. 1. A spring g' , fastened to the plunger a^5 , pulls the plunger in the same direction. A contact-spring i is mounted upon the framework b and is adapted to be engaged by the inner end of the plunger a^5 when said plunger is pushed clear in. If no coin is placed in the coin-receiver, said receiver may be pushed in without causing any movement of the plunger, merely sliding along the plunger and telescoping therewith; but when a coin is in place, after the coin-receiver is moved in a short distance, carrying the coin with it, the edge of the coin strikes the outer end of the plunger a^5 , and upon further movement in the said direction the plunger and coin-receiver are moved together. After the coin-receiver has been pushed in as far as it will go—that is, until the coin has passed beyond the edge of the strip f —the coin is struck by the end of the spring g^3 , which is mounted upon the framework of the toll-box and presses down upon the upper edge of the coin-receiver. The coin is thus forced free from its engagement with the plunger a^5 and falls, through the chute h' , into the cash-box h . The plunger a^5 immediately snaps back within the coin-receiver, impelled by the spring g' . An electromagnet c is mounted upon the framework of the toll-box and is provided with core-pieces c' c' , about which the magnetizing-helices c^2 c^2 are wound. Pole-pieces or rear core extensions c^3 c^3 are formed upon the ends of the cores c' c' , as seen in Fig. 1, and the coin-receiver is mounted to slide between them, the plates a' a^2 of the coin-receiver forming extensions of said pole-pieces. In other words, the rear core extensions and the coin-receiver mounted between them form a heel-piece for said magnet, the magnetic circuit through the said heel-piece being broken by the gap between the plates a' a^2 . The presence of a piece of iron—such as an iron coin-blank, disk, or slug—in place of a coin in the receiver will close the gap in the magnetic circuit between the pole-pieces c^3 c^3 . An armature d is pivoted at d' d' to the framework b , said armature being mounted in front of the ends of the core-pieces c' c' and being adapted to be drawn up to said core-pieces when the attractive force exerted by the magnet is sufficiently strong. The armature d normally rests in engagement with a relay-contact e , a spring g^2 serving to yieldingly maintain the armature in this position.

Referring to Fig. 4, the telephone-line, which extends from the substation A to the central office B, comprises limbs 1 2, between which the usual telephone talking and signal-receiving apparatus is connected in a bridge of the line at the substation, a telephone switch-hook being provided for controlling the circuits through such apparatus. The limb 2 of the telephone-line is connected with a branch conductor 5, which leads to ground by way of the toll-collecting appliance and includes the windings c^2 c^2 of the magnet c .

The circuit of said branch 5 to ground may be traced from the limb 2 of the telephone-line to the pole-piece c^3 of the coin-collecting apparatus and thence to the plates a' a^2 of the coin-receiver a . When a coin is inserted in the coin-receiver, the circuit is thereby completed through the coin to the strip f . The strip f is connected with the armature d by way of the windings c^2 c^2 of the magnet, and the relay-contact e , against which the armature d normally rests, is connected directly to ground. The plunger a^5 is always in electrical connection with the framework of the machine and is adapted when pushed clear in to make engagement with the contact-spring i , which is grounded. It will be understood, therefore, that when the plunger is pushed in to throw the coin into the cash-box the coils c^2 c^2 of the magnet c will be short-circuited, and the limb 2 of the telephone-line will be directly grounded by way of the plunger a^5 and contact-spring i .

At the central-office switchboard the limbs 1 2 of the telephone-line terminate in line-springs k' k^2 , respectively, of a spring-jack k . The limb 1 of the telephone-line is connected to ground at the central office through the line-relay l and line-signal battery l' by way of the armature m' and back contact m^2 of the cut-off relay m . The helix of the cut-off relay is included in a grounded branch from the third contact or test-ring k^3 of the spring-jack k . A line-signal lamp l^2 is included, together with a source of current l' , in a local circuit controlled by the armature of the line-relay l , so that when said relay is energized the local circuit will be closed and the lamp l^2 lighted.

The central-office operator is provided with the usual pair of plugs and their cord-circuit for making connection with the spring-jacks of telephone-lines terminating at the switchboard. A centralized battery n is connected in a bridge across the tip and sleeve strands 3 4 of the cord-circuit between the windings of an induction-coil in the usual manner. The side of the battery which is connected with the tip-strand 3 is grounded, and the opposite pole of the battery is connected, through the supervisory signal-lamp and its shunt, with the third contact o^3 of the plug o . The operator is provided with the usual telephone-set t and a listening-key q for connecting the same in a bridge of the line.

A relay p of high resistance—say five hundred ohms—and sufficient impedance to prevent the passage of telephonic voice-currents through the same is serially included in the tip-strand 3 of the plug-circuit between the battery n and the tip o' of the plug o . Two short circuits are provided for said relay, whereby the same may be cut out of the talking-circuit, one of said short circuits being controlled by switch-contacts actuated by the operator's listening-key q and the other short circuit controlled by an armature-lever p' .

and back contact p^2 of the relay itself. A plunger r is provided whereby the operator may "set" the armature p' , so that it will be held by the relay-magnet until the magnet is deprived of current.

The operation of the system may be described as follows: When a person at substation A desires to use his telephone, he first inserts a coin in the coin-receiver a , whereby the circuit of the branch 5 is completed from the coin-receiver a to the strip f , coils $c^2 c^2$ of the magnet c , armature d of said magnet, relay-contact e thereof, and to ground. The telephone-receiver is now removed from its hook, whereby the circuit of the line-signal battery l' is completed from ground at the central office, through the line-relay l , to the limb 1 of the telephone-line by way of the armature m' and contact m^2 of the cut-off relay, through the subscriber's telephone apparatus at the sub-station A, to the other limb 2 of the telephone-line, and thence to ground by way of the branch circuit 5. The line-relay l is thus energized and attracts its armature, closing the local circuit which includes the line-signal lamp l^2 , whereby the latter is lighted, indicating to the central-office operator that a connection is desired. The operator observing the signal inserts her answering-plug o in the spring-jack k and, depressing her listening-key q , inquires of the person at substation A the number of the subscriber wanted. The depression of her listening-key, as before explained, serves to close the short circuit around the relay p , so that the telephonic voice-currents are not obliged to pass through the said relay. Current from the centralized battery n of the operator's cord-circuit flows from the ground at the central office to the limb 2 of the telephone-line by way of the sleeve-strand 4 of the cord-circuit and over the branch conductor 5 at the substation to ground through the coils $c^2 c^2$ of the magnet c . If instead of putting a coin in the coin-receiver a the person attempting to use the telephone has inserted an iron blank or slug, the circuit of the branch 5 will be completed to ground and a signal will be transmitted, as above described; but the iron body between the plates $a' a^2$ of the coin-receiver will serve to lower the resistance of the magnetic field of the magnet c , closing the gap in the magnetic circuit between the pole-pieces $c' c^3$ thereof and increasing the attractive force of the magnet. Ordinarily the effect of the current from battery n flowing through the helices $c^2 c^2$ of the magnet c will not be sufficient to cause said magnet to attract its armature d ; but if the resistance of the magnetic circuit of said magnet be decreased by the presence of an iron body between the plates $a' a^2$ the attractive force of the magnet exerted upon the armature d will be materially increased, the tension of the spring g^2 will be overcome, and the armature will move toward the pole-pieces

$c' c'$, breaking its engagement with the sleeve-contact e . The circuit through the branch 5 will thus be interrupted and the magnet c de-energized, so that the relay-armature will fall back again against the contact e , establishing the circuit once more, whereupon the armature will again be attracted. The effect, in other words, will be the same as if an ordinary vibrator or interrupter were included in the circuit. The rapid interruption of the circuit thus produced will cause a rattle in the operator's telephone-receiver, thus notifying her that the person at station A has transmitted his signal by illegitimate means and has not deposited a proper coin in the coin-receiver. The operator will then warn the telephone user of her discovery of the attempted fraud and insist upon the slug being taken out and a proper coin substituted before completing the connection. If a suitable coin is inserted in the coin-receiver, no effect will be produced upon the magnet c , since a coin being non-magnetic will not close the gap in the magnetic circuit between the pole-pieces $c^3 c^3$. My invention thus comprises, in combination with a telephone-line extending between a substation and a central station, a call-signal circuit for the telephone-line, coin-controlled mechanism determining the continuity of the said call-signal circuit, and an electromagnetic characteristic signal-transmitting device irresponsible to the deposition of appropriate coins, but responsive to and actuated by the deposition of iron coin blanks, disks, or slugs. The operator after completing the connection to the called subscriber's line by means of the other plug of the pair tells the person at substation A to push in on the thumb-piece a^4 to deposit the coin in the cash-box and then releases her listening-key, thus removing the short circuit around the relay p , controlled by the said key, and leaving said relay in series in the talking-circuit. She then depresses her plunger r , setting the armature p' of the relay p , said armature being held up by the relay-magnet. The high-impedance relay is thus maintained in series in the talking-circuit until the plunger a^5 at the substation has been pushed clear in to engage with the contact-spring i . When the subscriber pushes in on his thumb-piece a^4 , if a coin is in the coin-receiver the plunger a^5 will be forced in, as before explained, until it makes engagement with the contact-spring i , after which the coin will be struck by the spring g^3 and thrown into the cash-box. As soon as the connection is established between the plunger a^5 and the spring i a dead-ground is thus thrown on the limb 2 of the telephone-line. The establishment of this path to ground affords a low-resistance path for the current from battery n , whereby the relay p is deprived of current. The armature p' therefore falls back against its contact p^2 , thus establishing a permanent short circuit

of the relay to permit the passage of telephonic currents. As the coin is thrown into the cash-box at the substation the plunger a^5 being released breaks the engagement with the grounded contact i and reestablishes the former circuit conditions.

If the subscriber at substation A has removed the coin from the coin-receiver before pushing it in, the coin-receiver will simply telescope with the plunger a^5 , and the latter will not be pushed in. The presence of a coin in the coin-receiver is necessary in order that the plunger a^5 may be moved.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. The combination with a telephone-line extending between a substation and a central station; and a coin-controlled mechanism determining the continuity of a call-signal circuit of said telephone-line; of an electromagnetic characteristic signal-transmitting device irresponsive to the deposition of appropriate coins, but responsive to, and actuated by the deposition of iron coin blanks, disks, or slugs; substantially as set forth.

2. The combination with a telephone toll-line extending from a substation to a central office, of a toll-collector at the substation for receiving coins, an electromagnetic signal-transmitting device connected with the telephone-line at the substation, in association with the toll-collector, said signal-transmitting device being unaffected by non-magnetic coins, but being adapted to be actuated by an iron coin blank or slug, to transmit a signal over the telephone-line, and a signal-receiving appliance t connected with the line at the central office, responsive to such signal, whereby the use of iron blanks instead of coins in the toll-collector may be detected by the central-office operator, as set forth.

3. The combination with a coin-receiver a comprising a pair of plates a' a^2 insulated magnetically from one another and separated to receive a coin between them, of an electromagnet c having rear core extensions between which said coin-receiver is mounted, said extensions forming a heel-piece for said magnet having a normal magnetic gap adapted to be closed on the deposition of an iron coin-blank, an electric circuit including the winding of said electromagnet, including a source of current and a signal-receiving instrument t , a relay-armature for the magnet and switch-contacts operated thereby controlling said circuit, said armature being normally irresponsive to the magnet, but being responsive to the increased attractive force thereof when the magnetic gap in the heel-piece of the magnet is closed by an iron coin blank or slug; whereby the deposition of an iron blank instead of coin in the coin-receiver causes the transmission of a signal, as set forth.

4. The combination with a telephone-line extending between a substation and a central station, of a toll device at the substation having a coin-receiver a comprising a pair of magnetic plates a' a^2 adapted to receive a coin between them, a magnet c having rear core extensions between which said coin-receiver is mounted, said extensions forming the heel-piece for said magnet having a normal magnetic gap between the plates a' a^2 adapted to be closed by an iron coin-blank deposited in the coin-receiver, a call-signal circuit for the telephone-line, switching mechanism adapted to be actuated by a coin in the coin-receiver for controlling said call-signal circuit, an armature for the said electromagnet c , normally inert but adapted to be drawn up when the attractive force of the magnet is increased by the closing of the magnetic gap in the heel-piece of said magnet, a signal-transmitting device controlled by said relay-armature, and a signal-receiving appliance at the central office responsive to the characteristic signal transmitted thereby, substantially as set forth.

5. The combination with a telephone toll-line extending from a substation to a central office, of an operator's telephone instrument at the central office and means for connecting the same with the line, a toll-collector at the substation for receiving coins, and an electromagnetic signal-transmitting device at the substation connected with the telephone-line, in association with said toll-collector, said signal-transmitting device being unaffected by non-magnetic coins, but being adapted to be actuated by iron coin-blanks used in place of coins, said signal-transmitter being adapted when actuated to change the electrical condition of the line, whereby a signal is produced in the telephone-receiver which may be perceived by the operator, substantially as set forth.

6. The combination with a telephone toll-line and a coin-collecting appliance at the station thereof having a socket or channel for the reception of the coin, of a magnet having its magnetic field directed upon said channel or socket, whereby the resistance of the magnetic circuit is reduced by a token or mass of magnetic material in the channel or socket, a magnetically-operated switch responsive to increased magnetization of said magnet, and an electric signal-circuit controlled by said switch at the substation containing a signal-indicating device at the central office, substantially as described.

7. The combination with a telephone-line and a coin-collecting appliance at the station thereof, a calling-circuit and a switch of the said coin-collecting appliance operated with the aid of a deposited coin controlling said signaling-circuit, said coin-collecting appliance having a socket or channel for the deposit of a coin, of a magnet and an armature

therefor adapted to remain unattracted by
the normal field of said magnet, the field of
said magnet being directed upon said channel
or socket, whereby the field of the magnet is
5 increased and the armature is attracted when
a mass of iron is placed in the socket or chan-
nel, a switch controlled by said armature, and
a signal-circuit containing a signal-indicating

appliance at the central office controlled by
said switch of the armature, as described. 10

In witness whereof I hereunto subscribe my
name this 16th day of November, A. D. 1900.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

DUNCAN E. WILLETT.