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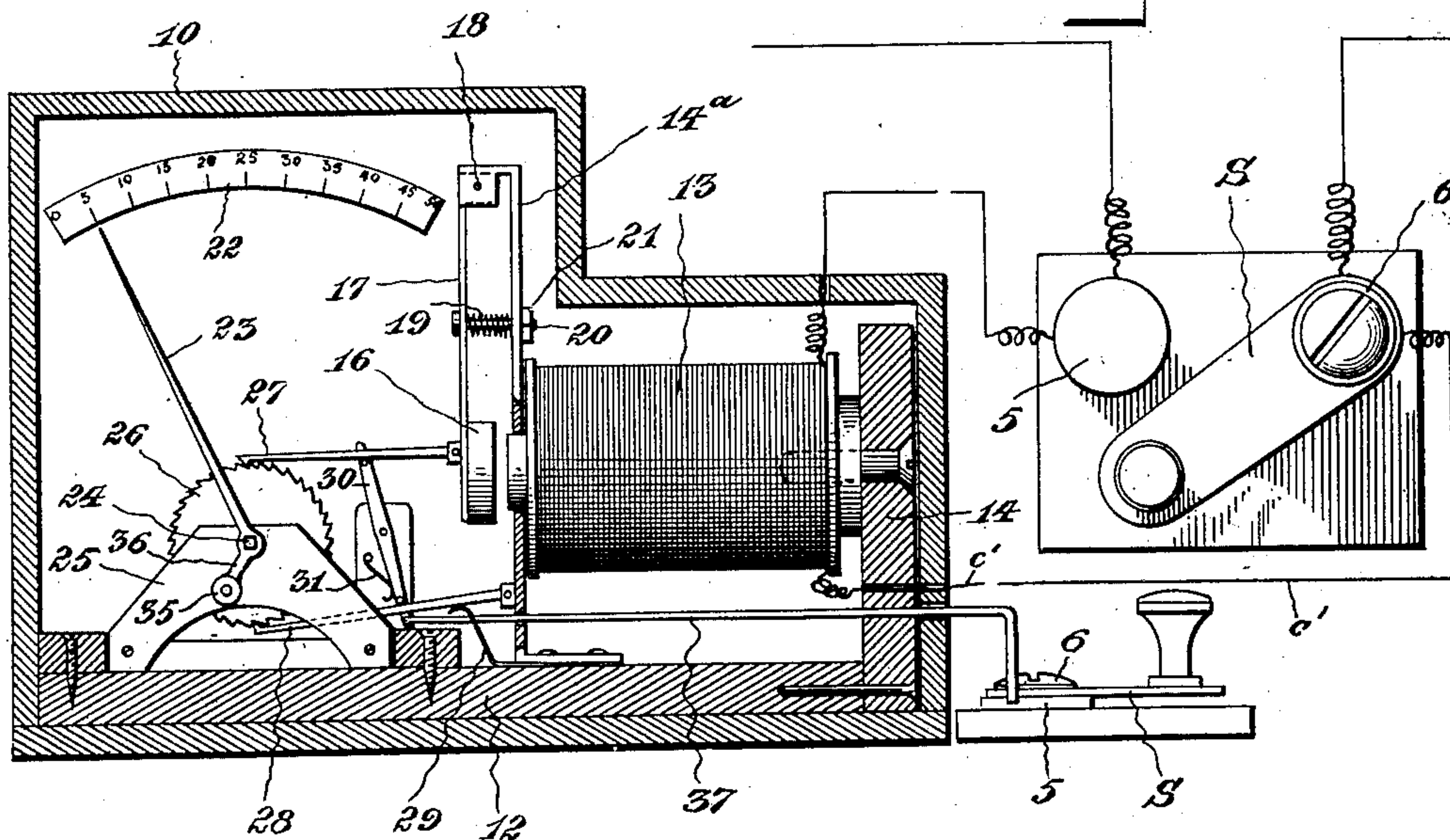
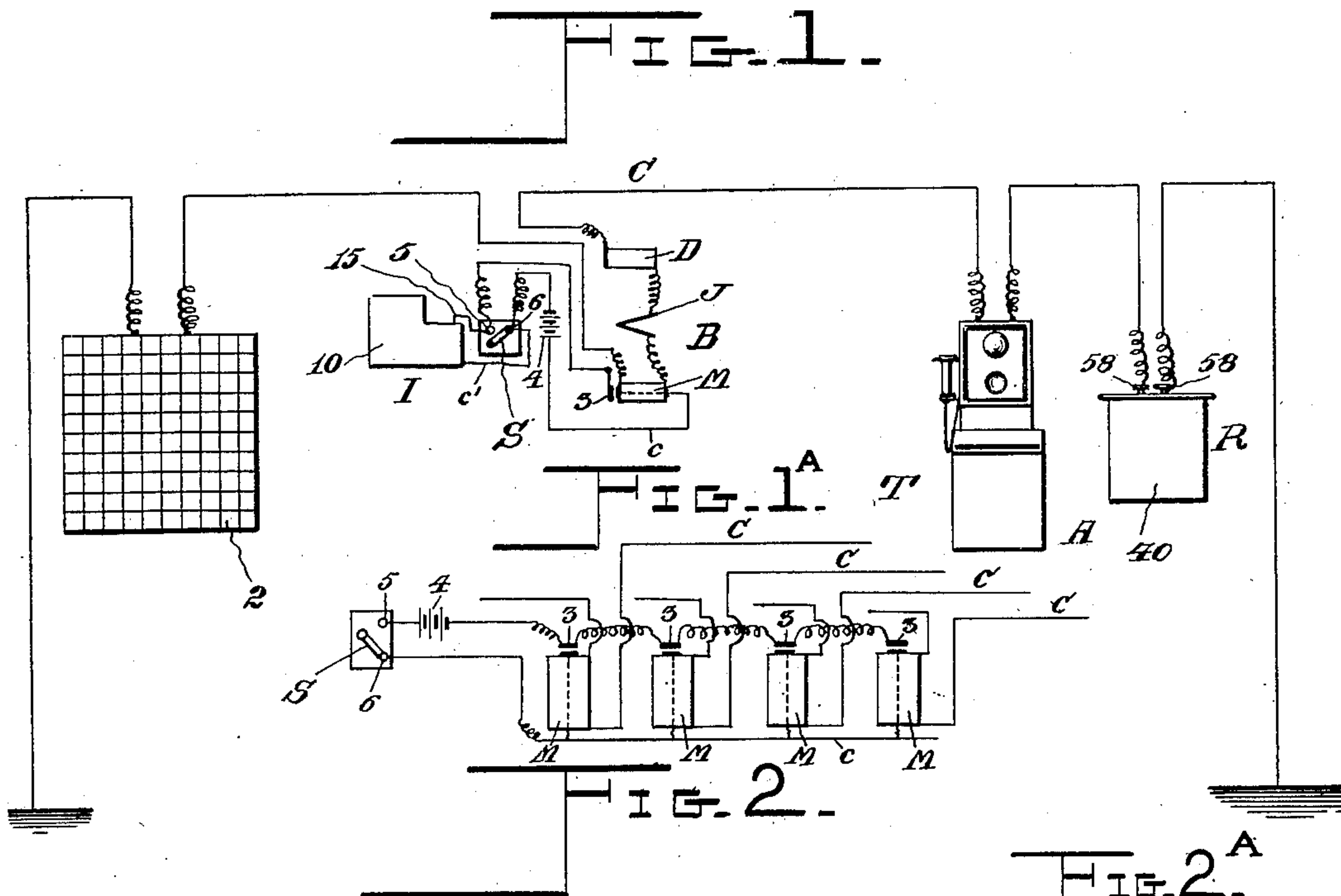
Patented June 26, 1900.

J. A. JOHNSON.
TELEPHONE TOLL SYSTEM.

(Application filed May 1, 1899.)

2 Sheets—Sheet 1.

(No Model.)



Witnesses
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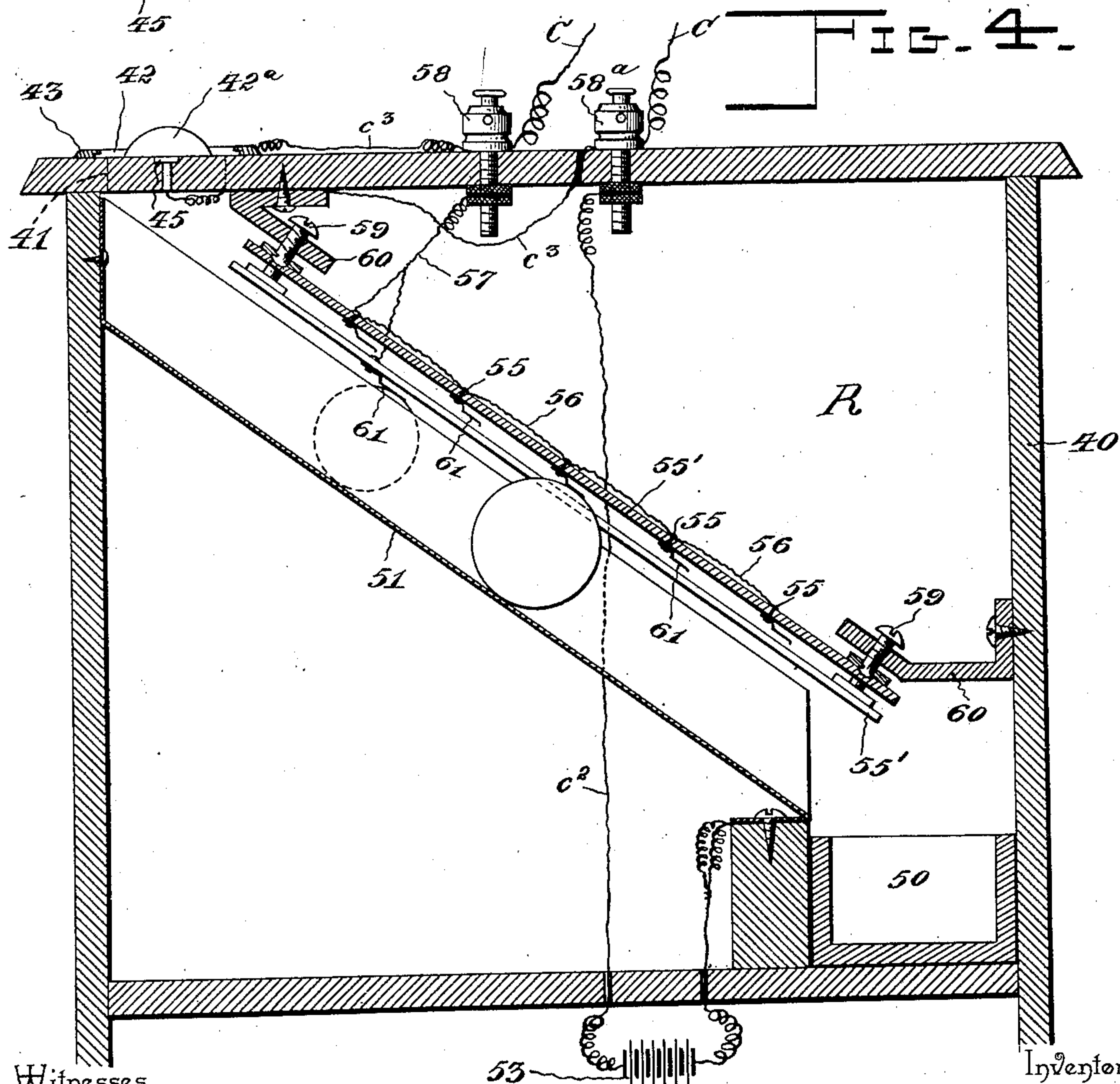
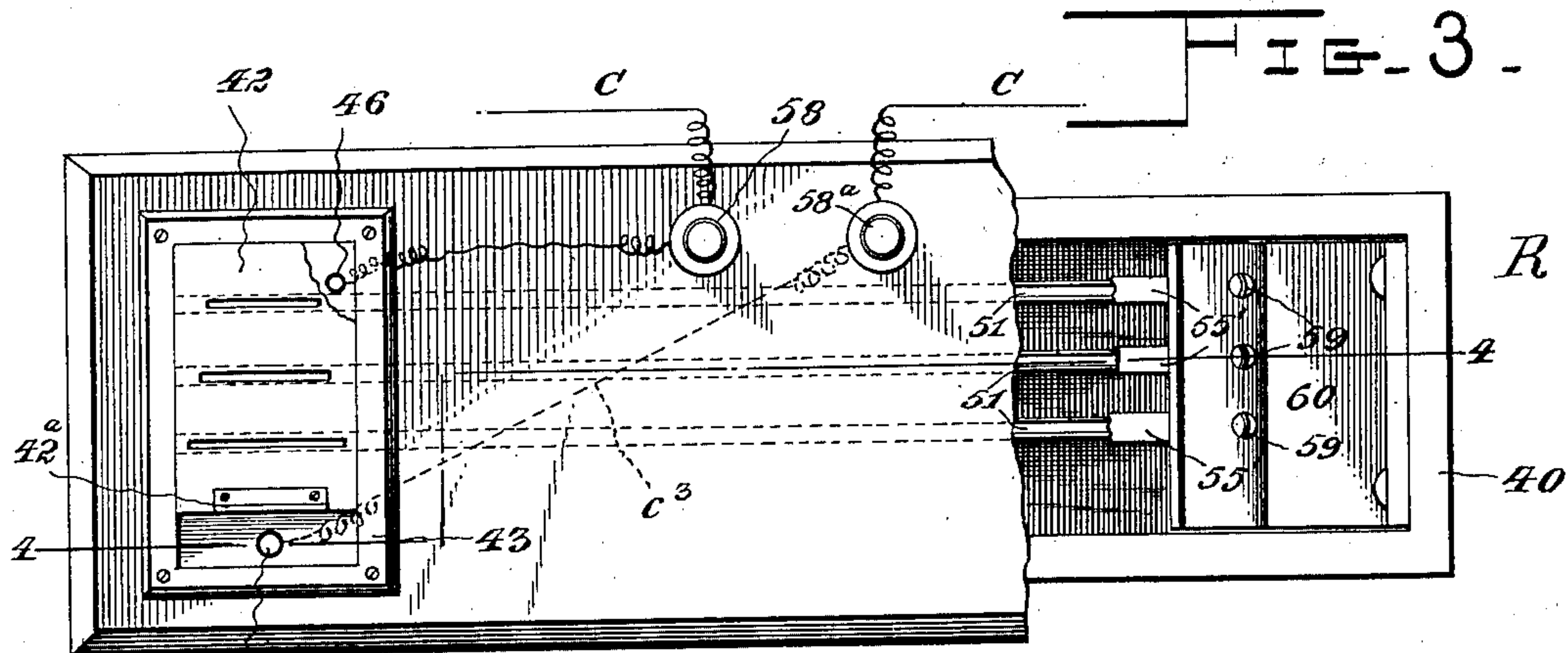
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2 Sheets—Sheet 2



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN A. JOHNSON, OF WAVELAND, INDIANA.

TELEPHONE TOLL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 652,272, dated June 26, 1900.

Application filed May 1, 1899. Serial No. 715,126. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. JOHNSON, a citizen of the United States, residing at Waveland, in the county of Montgomery and State of Indiana, have invented a new and useful Telephone Toll System, of which the following is a specification.

My invention relates to toll-indicating apparatus for use in connection with telephones or similar instruments, and it is to be used, primarily, in a central office and to be connected electrically to different stations, whereby an operator at a switchboard in the central office can determine at a glance whether or not the correct amount has been placed by a customer or subscriber in the receptacle adapted for the deposit of the coin, said apparatus being simple and not interfering with the ordinary use of the lines—that is, where no charges are to be made for the transmission of messages—and also being adapted to be easily and quickly installed at a comparatively-low cost. The appliance includes in its construction an indicating device, a pointer, step-by-step feed mechanism for controlling the action of the pointer, a magnet, the armature of which serves to operate the step-by-step feed mechanism, and means governed by a coin for closing an electrical circuit through the magnet, the step-by-step operation of the pointer depending upon the denomination of the coin inserted. In addition to the coin-circuit-closing means a switch is employed which is within the reach of the central-office operator and which serves to throw the indicator mechanism out of or into the circuit. Normally said indicator mechanism is out of the circuit; but when a call is made it may be switched in so that the coin may operate to control the actuating devices of the indicator. At the subscriber's or customer's telephone is arranged a coin-receptacle having a series of coin-chutes provided with one or more spaced contact devices adapted to be struck by the coin, whereby the latter is successively brought into the circuit for the purpose of making the proper indication at the central office. Therefore the coin serves as the agent for securing the action of the magnet which controls the operation of the pointer, the latter moving

step by step in accordance with the denomination of the coin.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a diagrammatic view of a telephone system, including toll-indicating mechanism constructed in accordance with my invention. Fig. 1^a is a diagrammatic view of a portion of the apparatus at the exchange-station to indicate the arrangement of parts when a single indicating device is used in connection with a plurality of circuits or lines. Fig. 2 is a longitudinal central section of an indicating mechanism constructed in accordance with my invention. Fig. 2^a is a plan view of the switch by which the relay shunt-circuit is controlled to cut out or cut in the indicating or registering device. Fig. 3 is a plan view, partly in section, of the coin-receptacle. Fig. 4 is a longitudinal section of the coin-receptacle, taken on the plane indicated by the line 4 4 of Fig. 3.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

In the drawings I have illustrated a telephone system (see Fig. 1) in the circuit of which are represented a single transmitting-station A and the exchange-station B, it being understood that any number of transmitting-stations may be employed in the same circuit as in the ordinary practice.

C represents the main or telephone circuit wire, connected at the exchange-station with a switchboard 2 of the ordinary or any preferred construction, a drop-coil or automatic drop D and a spring-jack J also being arranged in the main or telephone circuit, all of said parts being represented diagrammatically in Fig. 1. Furthermore, arranged in the main or telephone circuit is an electromagnet M, adapted to be energized to attract an armature 3 when the main or telephone circuit is closed by any of the ordinary means, as in the ordinary practice upon the removal of the telephone-receiver from its support on the telephone-box, T representing a telephone

of the ordinary construction and having arranged adjacent thereto at the transmitting-station a coin-receptacle or automatic coin-controlled circuit-closing apparatus R.

5 The armature 3 is included in a secondary or relay circuit *c*, having a relay-battery 4 and a contact 5 for said armature, which constitutes a current-controlled circuit-closer adapted to close the circuit through the re-
10 lay-battery. Preferably the arms or elements of the relay-circuit wire are connected with contact-points 5 and 6, adapted to be bridged by a short-circuiting switch S, and also connected with said contact-points are the ele-
15 ments of a shunt-circuit wire *c'*, an indicating or registering device I being included in the shunt-circuit. By closing the switch S the indicating or registering device is short-circuited; but by opening said switch the short
20 circuit is removed to adapt the indicating device for actuation by the relay-battery. Thus when the main or telephone circuit is closed either by the usual circuit-closer, which is controlled by the telephone-receiver, or by the
25 automatic coin-controlled circuit-closer R the magnet M is energized to close the relay-circuit, and if the switch S is open the current of the relay-circuit is adapted to actuate said indicator.

30 In the drawings I have illustrated an indicating apparatus which includes in its construction a casing 10, adapted to be secured to a wall or other support in the exchange-room, and a base or bottom 12, upon which
35 the operating parts of the indicating device are mounted. Said operating devices include a magnet 13, supported by lugs 14 and 14^a, attached to the base and included in the circuit or branch *c'*. In cooperative relation
40 with the magnet is an armature 16, supported by a pendent arm 17, pivotally mounted, as at 18, to the lug or bracket 14^a. The armature is yieldingly held in its normal position out of contact with the magnet by means
45 of a retracting or return spring 19, coiled, in the construction illustrated, upon a bolt 20, extending through registering openings in said arm 17 and bracket 14^a. I also preferably provide the bolt 20 with an adjusting-
50 nut 21, by which the backward throw of the arm may be regulated, the head of the bolt forming a suitable stop for limiting said throw.

Arranged to traverse a scale 22, which is exposed so as to be visible from the outside
55 of the indicator-casing, is a pointer or movable indicating element 23, carried by the spindle 24 of a ratchet-wheel 26, said spindle being mounted in bearings in suitable brackets 25 and the pointer having an extension
60 or arm 36, provided with or terminating in a return-weight 35. Arranged in operative relation with the ratchet-wheel is an operating-pawl 27, connected with the armature 16 or with the arm by which said armature is carried, and also pivotally mounted upon a fixed
65 support, such as the bracket 14^a, is a stop or holding pawl 28, adapted to maintain the

ratchet-wheel in its adjusted positions against return movement and yieldingly held in its operative position by an actuating-spring 29. 70
In connection with the operating and stop pawls is arranged a releasing lever or rocker 30, preferably fulcrumed at an intermediate point, engaged adjacent to the extremities of its arms with said pawls and yieldingly held 75
by a spring 31 in its normal position, and connected with said releasing lever or rocker is a releasing pin or rod 37, of which the outer end is disposed in the path of the switch S, whereby when said switch is turned to con- 80
nect the contact-points 5 and 6, and thus close the relay-circuit to short-circuit the indicating device, said releasing-rod will be actuated to turn the rocker 30 and remove the ex- 85
tremities of the operating and holding pawls from engagement with the teeth of the ratchet-wheel, whereby the pointer may be returned by its weight to the normal or initial posi-
tion. The switch S is opened only when the operation of the indicator is desired to show 90
the denomination of the coin which is deposited in the receptacle R, and hence at other times the switch is allowed to remain in its normal position, in which the indicator is short-circuited. Therefore the convenience 95
of the above-described arrangement, wherein the opening of the switch S to remove the short circuit of the indicator removes said switch from operative relation with the re- 100
leasing device, while the return of the switch to its closed position causes the simultaneous operation of the releasing device to allow the return of the members of the indicating mechanism to their normal positions, will be ap- 105
parent.

The construction of the coin-receptacle in so far as the number of slots provided therein for the reception of the coins is concerned may be varied to suit the demands of the public and the regulations of the company 110
under whose authority the telephone system is operated, the denominations of the coins varying from a nickel upward; but for the purpose of illustrating the construction and advantages of my invention I have deemed 115
it sufficient to show a three-slot receptacle adapted for the reception of coins of the denominations of a nickel, a dime, and a quarter, and the automatic circuit-closing devices employed at the transmitting-stations and of 120
which the coins form operative elements are so constructed as to periodically close the circuit in which the magnet M is included a number of times corresponding with the number of units of toll represented by each coin. 125
Assuming five cents as the unit of toll, it is my object to devise an automatic coin-controlled circuit-closing mechanism wherein a nickel will cause one operation or one step of the actuating devices of the indicating- 130
pointer, while a dime will cause two steps of the operating mechanism and a quarter five steps of the same, it being understood that the same operation may be accomplished in

connection with coin-receptacles designed for the reception of coins of still higher denominations.

In the preferred embodiment of the invention the coin-receptacle or circuit-closing mechanism comprises a casing 40, containing a coin-box 50, and which casing is provided with binding-posts 58 and 58^a, which are connected in the circuit of the telephone. The binding-post 58^a is connected with a plurality of metallic coin-chutes 51, leading to the box 50, said connection being directly through a common battery 53, which battery is adapted to be brought into the talking-circuit in series with the telephone instrument during the operation of the coin-circuit-closing apparatus. Above each chute 51 and parallel therewith is supported a plate 55', each of which plates bears one or more contact springs or fingers 61, which project toward the base of the chutes and in the direction of passage of a coin, said fingers being directly connected with the binding-post 58. The plate 55' above the nickel-chute is provided with one contact-finger, the plate above the dime-chute is provided with two contact-fingers, and the plate above the quarter-chute is provided with five contact-fingers, and thus as the proper coin passes down a chute it will contact with its respective finger or fingers a number of times equaling its multiple of the unit, which is five in this instance. As before mentioned, the fingers 61 are connected with the binding-post 58, and thus if a quarter be passed down its chute it will cut the battery 53 into the talking-circuit, which includes the binding-posts 58 and 58^a, five times, thus energizing the indicating mechanism five times in the central office, which mechanism will then indicate that a quarter has been contributed to the box 50. As shown in the drawings, the plates 55' are disposed at different elevations above the bottoms of the chutes in order that the contact-fingers may be engaged by coins of different diameters. In order to adjust the position of the plates to insure contact of the coins with the spring-fingers, the plates are carried by brackets 60, secured to the inner faces of the casing 40, and with which brackets the plates are adjustably connected through the medium of the screws 59.

In order to insure the cutting out of the telephone instrument from the talking-circuit, including the conductor C, and previous to the introduction of the circuit-closing mechanism just described, a switch is provided. One element of this switch is formed by a slotted plate 42, slidably mounted in a slotted frame 43, secured upon the upper surface of the cover of the casing 40 and in such a position that the slots in the plate 42 may be brought into or out of alinement with corresponding openings through the cover, and through which openings access is had to their respective coin-chutes 51. The binding-post 58 is connected with a binding-screw 46, car-

ried by the plate 42, which latter is of conducting material, said plate when moved to throw its slots out of alinement with the slots of the casing-cover engaging a contact 45, and which contact-point is in direct electrical connection with the binding-post 58^a. The plate 42 is provided with a handle 42^a to facilitate the manipulation thereof, and thus it will be seen that when the plate 42 is in the position shown in Fig. 3 of the drawings to permit access to the coin-chutes the circuit-closing mechanism will be in series with the telephone instrument in the talking-circuit. Hence the introduction of a particular coin will close the circuit of battery 53 through the talking-circuit to operate the indicating mechanism. Also it will be seen that when the plate 42 is moved to the opposite position to throw its slots out of registration with the slots in the casing-cover the plate will make contact with the point 45, and thus will short-circuit the coin-circuit-closing mechanism and will close the talking-circuit through the telephone.

This being the construction of the toll-indicating apparatus embodying my invention, the operation thereof is substantially as follows: A subscriber or customer having called the exchange-station by any of the usual methods and communicated the connection which he desires and having been instructed by the operator at the exchange-station the value of coin which is required to entitle such subscriber to transmit a message, the subscriber moves the switch 42, as by means of a finger-hold 42^a, and deposits the required coin in its proper slot. The operator at the exchange-station having turned the switch S to remove the short circuit of the indicating device I as soon as the subscriber was instructed as to the value of the coin to be deposited, the coin in traversing the chute successively engages the contacts and thus successively and temporarily closes the main or telephone circuit, it being understood that the secondary or shunt circuit c² has been cut into the main circuit by the opening of the switch 42, and at each engagement of the coin with a contact the magnet M is energized, the armature 3 is attracted to close the relay-circuit through the indicator, and the indicator-magnet 13 attracts the armature 16, and thus advances the ratchet-wheel and the cooperating pointer through one step. As a coin of unitary toll value will engage but one contact, it is obvious that the pointer will be advanced only one step, as shown in Fig. 2, to indicate the value of said coin, whereas if the coin is of a multiple toll value the relay-circuit will be closed a number of times corresponding with the value of the coin and the pointer 23 will be advanced through a succession of steps to designate that value. As soon as the coin has been deposited in the receptacle the subscriber may close the switch 42 to cut out the coin-controlled shunt or chute circuit, and also the operator at the exchange-

station having ascertained that the proper coin has been deposited may close the switch S to short-circuit the indicator, whereupon the telephone system is in condition for use as
5 under ordinary circumstances.

It will be understood that as a coin traverses its proper chute it successively closes the main or telephone circuit as it engages the several contacts, said coin itself forming
10 an element of the circuit. Not only is this construction efficient and adapted to a certain extent to reduce the chances of fraud, but it is a simplification in view of other devices of which I am aware wherein the coin
15 serves to actuate a circuit-closer to indicate to the operator at the exchange-station that a coin has been deposited. Furthermore, the construction described provides for an absolute indication of the value of the coin, owing
20 to the step-by-step actuation of the indicating devices.

In Fig. 1^a I have shown in diagram an arrangement whereby a single indicating device may be used in connection with a plu-
25 rality of telephone-circuits, from which it will be seen that in each telephone-circuit is arranged a magnet M, while a single relay-circuit is employed with a number of armatures 3, corresponding in number with the
30 magnets M arranged therein. The closing of the telephone-circuit through either of said magnets will attract the coöperating armature, and thus close the relay-circuit.

Among the advantages which I gain by the
35 peculiar construction and arrangement of parts as disclosed in the drawings is the comparatively-small battery-power which is required, owing to the secondary circuits which I have established in connection with the in-
40 dicating and coin-receiving devices. The telephone-circuit is required simply to energize the magnet M sufficiently to attract the coöperating armature by which the relay-circuit is closed. In other words, the telephone-
45 circuit is not utilized in operating the indicating device or register, but simply to close the circuit by which said device is actuated. Obviously any required number of batteries
50 may be arranged in the relay-circuit to make the actions of the register positive and reliable, whereby no mistake due to an unusually abrupt engagement of the coin with the contact can occur. It will be understood, fur-
55 thermore, that in practice various changes in the form, proportion, size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

60 Having described my invention, what I claim is—

1. In an apparatus of the class described, the combination with an electrical circuit and indicating devices controlled thereby, of coin-
65 controlled circuit-closing means including a series of contact-points, a coin-chute, and an

adjustably-mounted carrier for the contact-points, substantially as specified.

2. In an apparatus of the class described, the combination with an electrical circuit and
70 indicating devices controlled thereby, of coin-controlled circuit-closing means including a chute, a series of contact devices, a carrier for the contact devices, brackets, and adjust-
75 ing-screws mounted in the brackets and connected with the carrier, substantially as specified.

3. In an apparatus of the class described, the combination with an electrical circuit and an indicator controlled by said circuit, of a
80 coin-receptacle having a coin-slot, and a circuit-closer controlling and adapted to normally close the slot, substantially as specified.

4. In an apparatus of the class described, the combination with an electrical circuit and
85 an indicator controlled by said circuit, of a coin-receptacle having a coin-slot, and a circuit-closer controlling said slot whereby the circuit is closed when the coin-slot is closed,
90 substantially as specified.

5. In an apparatus of the class described, the combination with an electrical circuit and an indicator controlled by said circuit, of a
95 coin-receptacle having coin-slots, a short circuit, a slide adapted to cover and uncover the coin-slots and comprising a switch controlling the short circuit and adapted to complete the
100 main circuit, and a coin-chute and spaced contacts included in the short circuit, and adapted to be connected to close the circuit
by a coin traversing the chute and engaging a contact, substantially as specified.

6. In an apparatus of the class described, the combination with an electrical circuit and an indicator controlled by said circuit, of a
105 coin-receptacle having coin-slots, a short circuit, a coin-slot-controlling switch for closing the main circuit to cut out the short circuit, and a coin-chute and spaced contacts included
110 in the short circuit, and adapted to be connected to close the circuit by a coin traversing the chute and engaging a contact, substantially as specified.

7. In an apparatus of the class specified, the combination with a telephone-circuit, of
115 indicator means, electrically-operated mechanism for controlling the action of the indicator means, a coin-receptacle having a coin-chute and also having a slot, and a circuit-closing slide normally covering the slot, sub-
120 stantially as specified.

8. In an apparatus of the class specified, the combination with a telephone-circuit, of indicator means, electrically-operated mechanism for controlling the action of the indi-
125 cator means, a coin-receptacle having a series of coin-chutes provided respectively with one or more contact-points and also having a corresponding series of coin-receiving slots, and a circuit-closing device normally covering all
130 the slots, substantially as specified.

9. In an apparatus of the class described,

the combination with a telephone-circuit, of indicator means, electrically-operative mechanism for controlling the action of the indicator means, a coin-receptacle having a series of coin-chutes provided respectively with one or more contact devices, and also having a corresponding series of coin-receiving slots, a frame surrounding the slots, and a circuit-controlling slide normally covering all the slots and guided by said frame, substantially as specified.

10. In an apparatus of the class described, the combination with an electrical circuit and a toll-indicator actuated thereby, of a coin-receiver having a coin-chute and one or more contacts included in said circuit, and adapted to be electrically connected, to close said circuit, by a coin traversing the chute, and a switch for cutting the chute, contacts, and connections out of said circuit, substantially as specified.

11. In an apparatus of the class described, the combination with an electrical circuit and a toll-indicator actuated thereby, of a coin-receiver having a coin-chute and one or more contacts included in said circuit, and adapted to be electrically connected, to close said circuit, by a coin traversing the chute, and a switch for cutting said chute and contacts out of the circuit, said switch being constructed to control access to the chute, substantially as specified.

12. In an apparatus of the class described, the combination with an electrical circuit and a toll-indicator actuated thereby, of a coin-receiver having a coin-chute and one or more contacts included in said circuit, and adapted to be electrically connected, to close said circuit, by a coin traversing the chute, and a switch for cutting said chute and contacts out of the circuit, said switch having a slot for registration with a coin-slot in communication with the chute, substantially as specified.

13. In an apparatus of the class described, the combination with an electrical circuit and a toll-indicator actuated thereby, of a coin-receiver having a coin-chute and one or more contacts included in said circuit, and adapted to be electrically connected, to close said circuit, by a coin traversing the chute, and a switch for cutting said chute and contacts out of the circuit, said switch having a coin-slot for registration with a coin-slot in communication with the chute, said slots being out of registration when the switch is adjusted to cut out the chute and contacts, substantially as specified.

14. In an apparatus of the class specified, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, and a device for throwing the pawl out of engagement with the

ratchet when a registration has been made, substantially as specified.

15. In an apparatus of the class specified, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, a switch, and means connected with the switch and operated thereby for throwing the pawl out of engagement with the ratchet when a registration has been made, substantially as specified.

16. In an apparatus of the class specified, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, a switch, a detent adapted to engage the ratchet, and means connected with the pawl and with the detent for throwing them both out of engagement with the ratchet when a registration has been made, substantially as specified.

17. In an apparatus of the class described, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a detent located to prevent retractive movement of the ratchet when operated by the pawl, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, a lever connected respectively with the pawl and with the detent, and means for operating said last-mentioned lever, substantially as described.

18. In an apparatus of the class specified, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a detent located to prevent retractive movement of the ratchet when operated by the pawl, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, a lever connected respectively with the pawl and with the detent, a switch, and a rod connected respectively with said last-mentioned lever and with the switch, substantially as specified.

19. In an apparatus of the class specified, the combination with a telephone-circuit, of an indicator device, a pointer, a ratchet co-operative with the pointer, a pawl for operating the ratchet, a detent located to prevent retractive movement of the ratchet when operated by the pawl, a magnet, a lever carrying the armature of said magnet, a spring acting against said lever, means for varying the stroke of the lever, coin-controlled circuit-closing means, a lever connected respectively with the pawl and with the detent, and means for operating said last-mentioned lever, substantially as specified.

20. In an apparatus of the class specified, the combination with a telephone-circuit, of

an indicator device, a ratchet and its arbor, a pointer secured to said arbor, a pawl for operating the ratchet, a detent located normally to prevent retractive movement of the
5 ratchet, a magnet, a lever carrying the armature of said magnet, coin-controlled circuit-closing means, a lever connected respectively with the pawl and with the detent, means for operating said last-mentioned lever, a bolt
10 connected with the armature-lever and with the framing and provided with a nut, and a coiled spring surrounding the bolt and bearing respectively against said armature-lever and the framing, substantially as specified.
15 21. In an automatic toll-box for telephone systems, the combination with a plurality of series of electric contacts adapted for engagement by coins of different denominations, of

means for conveying the coins into engagement with the contacts, an electric circuit 20 having one terminal connected with the conveying means and the other terminal connected with the series of contacts, an electromagnet in said circuit, an armature for the magnet having an index connected there- 25 with, and a dial over which the index is adapted to travel, whereby said dial and index will visibly register each coin contributed to the toll-box.

In testimony that I claim the foregoing as 30 my own I have hereto affixed my signature in the presence of two witnesses.

JOHN A. JOHNSON.

Witnesses:

JOHN O. ROSEBAUM,
FOUNTAIN N. JOHNSON.