

No. 654,748.

Patented July 31, 1900.

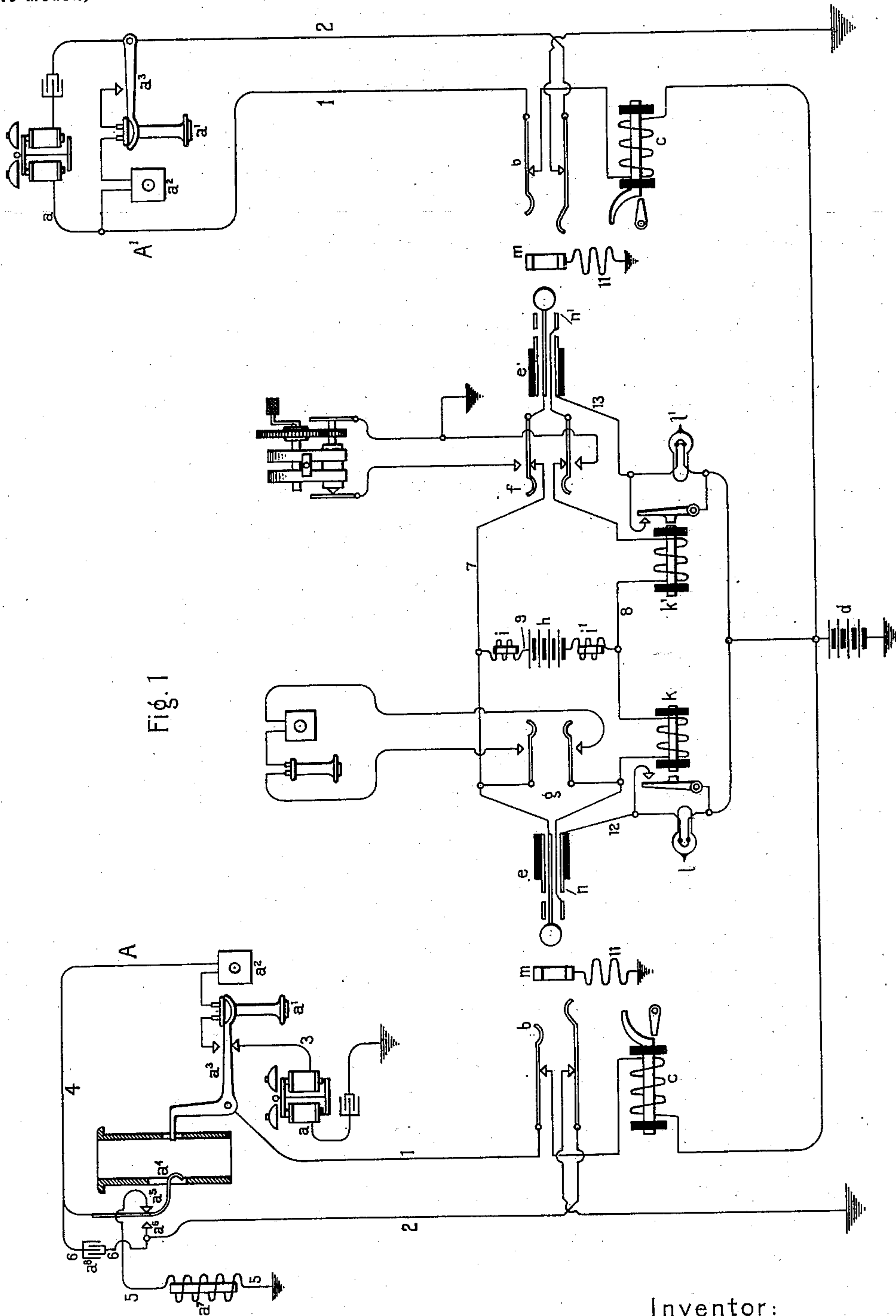
F. R. McBERTY.

TELEPHONE TOLL APPARATUS.

(Application filed Nov. 13, 1897.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 3

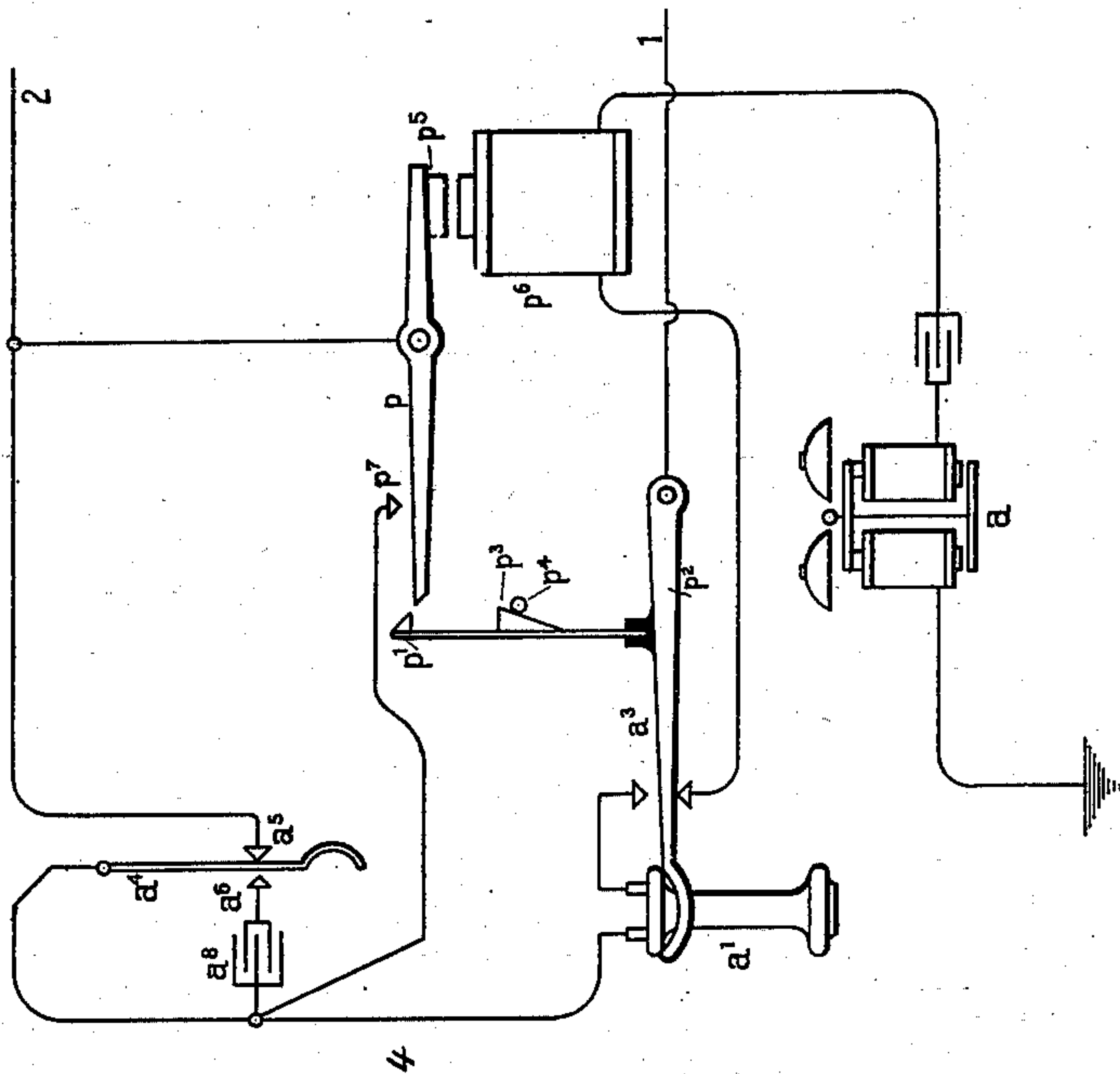
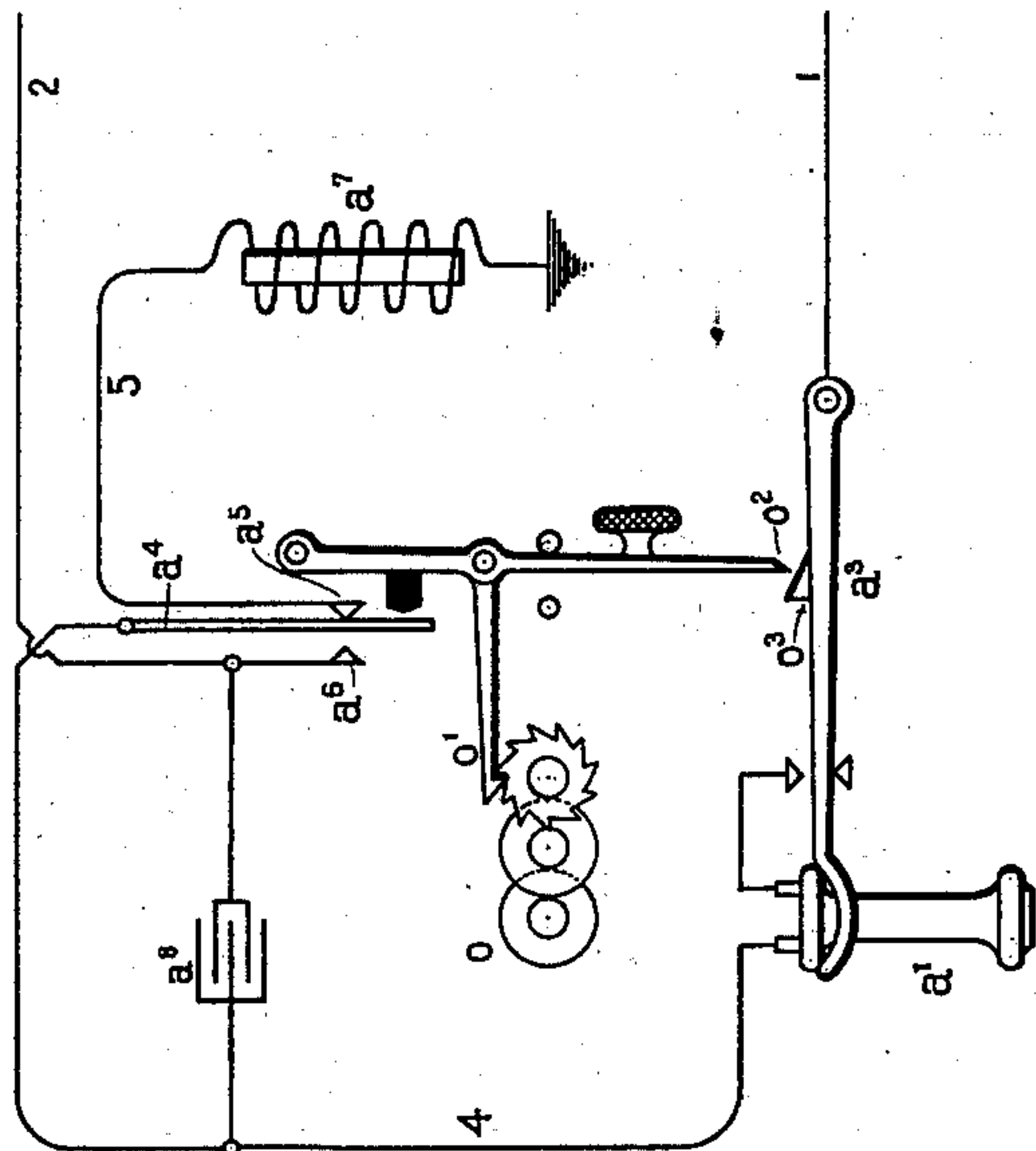


Fig. 2



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UNITED STATES PATENT OFFICE.

FRANK R. MCBERTY, OF DOWNER'S GROVE, ILLINOIS, ASSIGNOR TO THE
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TELEPHONE TOLL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 654,748, dated July 31, 1900.

Application filed November 13, 1897. Serial No. 658,399. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. MCBERTY, a citizen of the United States, residing at Downer's Grove, in the county of Du Page and State of Illinois, have invented a certain new and useful Improvement in Supervisory Appliances for Telephone-Lines, (Case No. 57,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention concerns the apparatus of telephone-lines for the use of which a toll is exacted or a registration of the use is required; and it consists in an appliance for signaling to the operator having charge of the line the deposit of the toll or the act of registering the use of the line at the substation.

Hitherto it has been usual in telephone-switchboards to supervise connected telephone-lines or to determine the condition of use or disuse of the line by means of the telephone at which the attendant listened which was temporarily connected with the different pairs of united telephone-lines under her care. In the case of telephone-lines for the use of which a fixed toll was exacted an appliance has been provided at the substation to receive the required coin or to effect registration of the use of the line, which in its operation transmitted an audible signal to the operator, so that an operator after completing connection from a toll or pay station to the desired correspondent would instruct the calling subscriber to deposit a coin or to work a register, and would then listen for the signal showing that the required act had been performed. Switchboards of more modern type, however, are provided with visible signals before the operator indicating the condition of use or disuse of the telephones at the substations of two connected lines, the signals being operated by means of currents in the telephone-lines determined by the position of the telephones at the substations. These signals are termed "supervisory" signals. By means of them the operator is continuously informed of the condition of the apparatus at the substations and is enabled to transmit call-signals at suitable times and to disconnect the lines without bringing her telephone into con-

nection with united lines after completing connection between the lines. Her efficiency in receiving orders for connections and making the required connections is thereby very greatly increased. Prior to the present invention no means has been provided whereby an operator employed in making connections at such a switchboard as that just described could insure the collection of a toll at a pay-station or the registration of the use of the line. It is obvious that the link-conductors in such a switchboard must be employed in a uniform manner to make connections between lines of usual character or between toll-lines and such ordinary lines, so that whatever signals may be transmitted from toll-stations should be capable of operating the supervisory signals in the usual way. The present invention is addressed to this requirement of exchange systems wherein it is designed to associate with united lines supervisory signals for showing the operator the condition of the line.

The invention consists generally in the combination, with the appliances at the substation and the supervisory signal temporarily associated with the line in the central office, of circuits whose condition is changed in the act of depositing a required toll or other act in lieu thereof at the substation to operate the supervisory signal.

It further consists in the combination, with a telephone line, a signal in the switchboard permanently associated with the line, and means for operating the signal to initiate a connection, of a supervisory signal designed for temporary association with the line, and circuits changed in the act of depositing a coin or other equivalent means to operate the supervisory signal.

It also contemplates the combination of two telephone-lines and a supervisory signal associated with each line, that referring to the called line being adapted to indicate to the operator the response of the party called and that referring to the calling line or toll-station being adapted to indicate the deposit of a toll in payment for the use of the line, whereby the operator is informed of the response of the called subscriber and is able to compel payment at the calling station.

A form of the invention is shown in the attached drawings.

Figure 1 of the drawings represents the apparatus at two telephone-stations connected by line-circuits with signaling instruments and appliances for uniting the lines in a switchboard. One of the stations represents a toll-station and is equipped with means for insuring the payment of toll. Fig. 2 illustrates a modification of the equipment at the toll-station; whereby the use of the line is registered, the intention being to require the payment of a sum proportionate to the number of usages of the line. Fig. 3 represents an appliance designed for use at toll-stations, which are employed as receiving-stations as well as for transmitting messages, whereby messages may be received without payment of toll and the uniform operation of the supervisory signals is maintained.

The apparatus at the substations comprises the usual call-bell a , telephones a' and a'' , and telephone-switch a^3 . The appliances at station A are of the usual and well-known character and arrangement. The line conductors 1 and 2 are permanently united through the call-bell; but a condenser is interposed in the circuit to prevent the flow of continuous current in the line when it is not in use. The switch is constructed to close a bridge of the line-circuit through the telephones when the telephone is removed from the switch for use, permitting the flow of battery-current in the line. Thus there will normally be no current in the line-circuit; but the removal of the telephone from its switch for use will permit the propagation of a current in the line by a suitable source of current at the central office. The line conductors 1 and 2 from the station are led through the switch-contacts of a spring-jack b in the switchboard. The conductor 1 is extended through the magnet-winding of a line-signal c to the free pole of a grounded battery d , which is common to the different lines of the exchange, while the other line conductor 2 is led directly to earth. The functions of the parts at station A, which represents the toll-station, are essentially similar, but the arrangement of circuits is different. There is also in addition to the usual appliances a coin-chute and a switch located therein. The coin-chute may be arranged in proximity to the telephone-switch and combined therewith in such a way that a stop is introduced into the path of the coin by the telephone-switch when relieved of the weight of the receiving-telephone. A switch-lever a^4 projects into the coin-chute in position to engage and be forced outward by a coin deposited in the chute and resting against the before-mentioned stop. This switch-lever a^4 oscillates between a normal contact-anvil a^5 and an alternate anvil a^6 . Line conductor 1 is connected with the lever of a telephone-switch a^3 , whence its circuit is ordinarily complete through a grounded conductor 3 to earth. The wire 3 includes the call-bell a ,

together with a condenser. The alternate contact-point of telephone-switch a^3 forms the terminal of a wire 4, which leads to the switch-lever a^4 . Resting anvil a^5 of this lever forms the terminal of a wire 5, leading to earth, an impedance-coil a^7 being interposed in this wire. The alternate anvil a^6 of lever a^4 forms the normally-open terminal of line conductor 2. Wires 4 and 2 are united by a bridge 6, including a condenser a^8 , designed to permit telephonic communication through the circuit when switch-lever a^4 and contacts a^6 are separated, while preventing the flow of battery-current in the circuit. It will be understood that the transmitting-telephone may be of any well-known or usual construction. It should preferably be provided with an induction-coil whose secondary winding is placed in the line conductors, its primary winding being included, together with the transmitting-telephone, in a local circuit controlled by the telephone-switch a^3 . Line conductors 1 and 2 of this line are led through a spring-jack b to a signal c and to battery d , like those of line to station A'. The switchboard is furnished with pairs of plugs e and e' , adapted for insertion into spring-jacks b , whose like contact-pieces are united by conductors 7 and 8, which constitute the plug-circuit. The usual calling-key f and listening-key g have their switch-contacts connected with the plug-circuit for the purpose of connecting a generator of calling current with plug e' or of bringing the operator's telephone into connection with the plug-circuit, respectively. A wire 9 forms a bridge of the plug-circuit 7 8. This wire includes a battery h or other source of current, together with impedance-coils i and i' for preventing the shunting of telephonic current through the bridge. In the conductor 8 of the plug-circuit, which is designed to unite wires 2 of the line-circuits, the magnet-windings of two relays k and k' are interposed, one at each side of the bridge 9. These relays control local circuits containing supervisory signals in the form of incandescent lamps l and l' , one of which is associated with each of the plugs e and e' . The spring-jacks b are provided with ring-contacts m in addition to the usual line-contacts, and the plugs e and e' are furnished with sleeves n and n' , adapted to register with these ring-contacts m when the plugs are inserted in the spring-jacks. The ring-contacts of the spring-jacks are grounded through conductors 11, including resistance-coils. The sleeves n and n' form the terminals of wires 12 and 13, leading to a suitable battery, as d , and including the supervisory signal-lamps l and l' , respectively, of the corresponding plugs. The relay k controls a shunt about lamp l , while relay k' is similarly related to signal l' .

In telephone-exchanges lines having toll-collecting appliances or instruments for registering the use of the lines form a comparatively-small proportion of the telephone-lines. Hence a very great proportion of connections

made by means of plugs e and e' will be with lines like that to station A' , which may be taken as representing the normal exchange-line. The subscriber at the station of such a line will call for a connection by removing his telephone from its switch, whereupon the operator will insert the answering-plug e of a pair into the spring-jack b , cutting off the line-signal c , and having learned the calling subscriber's order will complete the connection with another line similar to that to station A' by inserting calling plug e' into the spring-jack b of the line called for, at the same time transmitting a signaling-current to ring the bell at the called station. The insertion of these plugs into the spring-jacks of the correspondent lines will complete a circuit between the stations of the line, including the line-wires 1 and 2 and the plug-circuit 78. At the same time, however, a circuit will be completed through wires 12 and 11 of the answering-plug and calling line, including the supervisory signal l . The relay k will, however, be excited, inasmuch as the bridge of the line-circuit through the telephone is closed at the calling station, so that the signal l will be shunted and will remain dark. Similarly a circuit made up of wires 13, terminating in the calling plug and 11 of the called line, will be formed, including lamp l' associated with the line called for. The signal l' will remain lighted until the called subscriber responds to the call by removing his telephone from its switch, when the line-circuit will be closed at his station and the relay k' will become excited.

The mode of operation of supervisory signals in switchboards of the type to which this invention refers, as hereinbefore described, is well known and familiar to those versed in telephony. It has been thus briefly traced in order that it may be contrasted with the mode of operation in connection with the present invention, which is as follows: A party desiring to use the telephone at station A to initiate a connection will signal the office in the usual way by merely removing the telephone from its switch. Thereby a circuit will be completed from line conductor 1 through wires 4 and 5 to earth, whereby the line-signal will be displayed. In compliance with the call the operator will insert the answering-plug e into the spring-jack b of the calling line and will call for the number of the required correspondent. The insertion of plug e into spring-jack b brings the wires 12 and 11 into connection and creates a closed circuit of the battery d through the signal l . It will be observed, however, that in this case there is no complete circuit for the battery h in the plug-circuit, inasmuch as line-wire 2, which is connected with the conductor 8 of the plug-circuit which includes the relay k , is open at the contact-piece a^6 of the toll-collecting appliance. Hence the signal l will remain lighted as long as the apparatus at the substation remains in the condition just described. The

operator is able to converse with the subscriber at the toll-station, since telephonic currents produced by her transmitting-telephone and by that at the substation are readily propagated through the condenser a^8 . Having learned the order, the operator will insert calling-plug e' into the spring-jack of the line called for—for example, that to station A' —and will ring the bell at that station. After performing this work she will disconnect her telephone from the circuit and proceed to attend to other calls. When the subscriber at the called station removes his telephone from its switch, he permits current to flow from battery h through the line-circuit, which excites the relay k' , and thus brings about the shunting of signal-lamp l' . If desired, the operator may be required to observe this indication of the response of the correspondent and to instruct the user of the telephone at the calling station to deposit the required toll or do any equivalent act. It is preferable, however, that the subscriber at the called station shall be permitted to make the usual oral response to the call, which will be heard by the waiting party at the toll-station. After receiving the operator's instructions or after hearing the oral response of his correspondent the party at the calling station will deposit a coin in the coin-chute, which, falling against the stop fixed to the telephone-switch, will press the switch-lever a^4 away from the contact-piece a^5 and against contact a^6 , whereby a conductive connection will be established between line conductors 1 and 2, including the telephones. Current from battery h will now flow through the conductors 7 and 8 of the plug-circuit to the toll-station and thence through the wire 4 there. Relay k will then become excited and will close its shunt about the lamp-signal l . The disappearance of the signal will indicate to the operator that the required act has been performed at the toll-station. If the signal l should fail to disappear within a reasonable interval after the disappearance of signal l' , which latter indicates the response of the called party, the operator may bring her telephone into connection with the line to ascertain the cause of the failure on the part of the user of the telephone at the toll-station to deposit the toll, or she may withdraw the plugs and disconnect the lines. In the normal operation of the appliances, however, the signal l will become dark very soon after the disappearance of signal l' . After the completion of conversation between the correspondents the telephones at both stations will be replaced on their switches, whereby both supervisory relays k and k' will be deprived of current and both lamps l and l' will become lighted. The simultaneous illumination of these lamps may be accepted by the operator as a signal for disconnection, to be followed by the removal of the plugs from the spring-jacks. The replacement of the telephone on the switch at the toll-station will withdraw the

stop carried by the switch from the coin-chute, permitting the coin to drop into a cash-box, whereby the switch-lever a^4 will be allowed to return to its normal position. Thus the operator is permitted to use her ordinary appliances in effecting connection between toll-lines and other lines and is enabled to visually supervise the acts of the users of the telephones. Her work in connection with toll-lines is performed with the same degree of efficiency which characterizes her work in making connection between lines of ordinary character.

I have mentioned the use of registering instruments for counting the number of times a toll-line is used or for some other similar purpose as an alternative for the coin-collecting appliance before described. Such an instrument is illustrated in Fig. 2. The counting mechanism comprises a train of counting-wheels o , a pawl o' , impelled by a push-button, for actuating the counting-wheels, and a dog o^2 , carried by the push-button, in position to engage a stud o^3 on the telephone-switch when the latter is in its upper position relieved from the weight of the telephone. Thus if the push-button be pressed while the telephone is off its hook the counting-train will be advanced to record the pressure of the button and the dog o^2 will engage the stud o^3 on the lever of the telephone-switch, whereby the mechanism will be retained in the position of depression until the telephone is replaced on its switch. Associated with the push-button is a switch comprising levers a^4 and resting and alternate contacts a^5 and a^6 , as before described. The push-button in its normal position permits the switch-lever a^4 to close against the contact-piece a^5 and complete connection between wires 4 and 5. When it has been pushed inward, the telephone having been previously removed from its support, the switch-lever will be thrust against contact-anvil a^6 , closing connection between wires 4 and 2, in which position it will be retained until the telephone is returned to its support. In other words, taking the telephone from its switch for use in initiating a call permits the telephone-switch to close a circuit from limb 1 through the receiving-telephone a' and wires 4 and 5 to earth, the switch-lever a^4 and the anvil a^5 being in contact. When after receiving an order the operator directs that the connection be registered by pushing the button at the substation, a subscriber must depress the button, whereby the ground-circuit through wire 5 will be broken and a new circuit will be completed from the lever a^4 to the contact a^6 , which will bring the telephone-receiver a' into a closed bridge of the line and permit the flow of current through the line-circuit for conversation. This movement of the lever by the button will bring the lever o^2 into engagement with catch o^3 of the telephone-switch, so that the lever will be held by the telephone-switch as long as the telephone re-

mains off its hook. When the telephone is replaced on the switch-hook, the lever o^2 will be returned to its normal position by the force of the switch-spring a^4 or otherwise, and its return movement will operate the counting-train o to register the use of the telephone.

In certain instances it is desirable that the toll-station may be used as a receiving-station, in which case the use of the telephone should not involve the payment of a toll or the register of such use. Fig. 3 shows an appliance for permitting the closure of the line-circuit by the telephone-switch independently of the registering or coin-collecting apparatus after a call has been received at the station. A switch-lever p , pivoted with friction near its center, has one extremity provided with a dog which projects into the path of a spring-catch p' , carried on the lever p^2 of the telephone-switch. The flat spring p' , which terminates in the catch, carries also a wedge-shaped cam p^3 , which is adapted to register with a fixed pin or stud p^4 . The lever p carries the armature p^5 of an electromagnet p^6 . While the lever of the telephone-switch is in its lower position, the wedge p^3 is in engagement with the stud p^4 and the catch p' is moved out of the path of movement of the extremity of lever p . Hence the lever is free to respond to the attraction of the magnet on armature p^5 . The lever p^2 of the telephone-switch is free to move throughout its range in either direction without engaging the lever p to move it. If, however, the magnet p^6 be excited to move the lever p while the telephone is on its switch, the extremity of lever p will be brought into a path of the catch p' . Then when the telephone-switch is permitted to rise the catch p' will pass the end of lever p , after which, when the telephone-switch is again depressed, the lever p will be carried to its normal position. Lever p controls the continuity of a circuit by means of a contact-anvil p^7 , against which it may be brought through the action of magnet p^6 . The magnet p^6 is connected in series with the call-bell a at the toll-station in order that it may be excited by a calling-current sent to the substation. The lever p and contact p^7 form the terminals of a shunt-circuit from the conductor 2 to the wire 4, so that when the lever p is thrust against its anvil the line-circuit is closed independently of the coin-controlled switch, but subject to the action of the telephone-switch. It will be apparent that an incoming call-signal will place the appliances at the substation in such position that when the telephone is removed from its switch in response to a call the line-circuit will be closed and will work the supervisory signal associated with the calling-plug e' in the usual way, so that connections made to toll-stations equipped with apparatus like that shown in Fig. 3 may be treated like connections made to lines of ordinary arrangement.

The means disclosed in Fig. 3 for placing

the apparatus at a called toll-station in position for communication without the deposit of a toll of course is obviously representative of a large class of devices which might be employed to effect the same end—namely, to permit the operator's act of making connection to the line as a called line to place the appliances at the called toll-station in a special relation whereby the operation of the signals in the switchboard should be independent of the deposit of tolls or other equivalent acts ordinarily necessitated in the use of the telephone. It will further be apparent that the circuits for initiating a call and those whereby the operation of the supervisory signal is made consequent on the deposit of a coin are merely examples of many arrangements and appliances which are familiar to those versed in telephony which could be caused to exercise the same functions which constitute the novel mode of operation in the present invention.

I claim as new and desire to secure by Letters Patent—

1. The combination with a telephone-line and a coin collecting or registering appliance at the station thereof, of a supervisory visible signal at a central office associated with the line, and circuit connections changed through the agency of said coin-collecting appliance adapted to operate the supervisory signal; whereby the required act of payment is signaled to the operator without the use of her telephone, as described.

2. The combination with a telephone-line and a coin collecting or registering appliance at the station thereof, said line extending to a central office, of a source of current applied to the line at the central office, an electromagnet in the path of current in the line from said source controlling a visible supervisory signal associated with the line, and circuit connections adapted to be changed in the operation of said toll-collecting appliance to determine the flow of current from said source and thus to operate the supervisory signal, as described.

3. The combination with a telephone-line extending between a substation and a central office, a line-signal for the line and a supervisory signal temporarily associated with the line in the central station, and a switch at the substation for controlling the operation of the said line and supervisory signals to call the office and to indicate the use of the telephone, respectively, of a toll-collecting appliance at the substation, normal circuit connections permitting the operation of the line-signal by the switch at the substation, and other circuit connections and means for changing the same in the act of payment of the toll adapted to cause the operation of the supervisory signal, as described.

4. The combination with a telephone-line having a toll-collecting appliance at its substation, and means for making connection with the line through the agency of a plug

and plug-circuit, of a visible supervisory signal associated with the plug, a source of current and a magnet controlling the signal in the path of current from the said source through the telephone-line, of a switch in the toll-collecting appliance actuated in payment of toll, and circuit connections at the substation adapted to determine the flow of current in the line controlled jointly by the said switch in the toll-collecting appliance and the telephone-switch, as described.

5. In combination, telephone-lines, each provided at its station with a switch for determining the flow of current in the line in the use of the telephone, spring-jacks for the lines in a switchboard, a pair of plugs and a plug-circuit for making connection between any two lines, and a supervisory signal associated with the answering-plug of said pair adapted to indicate current in the line with which it may be connected, a toll-collecting appliance at one of the stations, and a device associated with the said appliance and controlled in the act of payment of the toll adapted to prevent the closure of the telephone-circuit by the telephone-switch until the toll is paid; whereby the supervisory signal associated with the answering-plug will indicate the position of the telephone-switch at all stations except the toll-line, but will indicate the payment of toll at the toll-station, as described.

6. The combination with a telephone-line, a toll-collecting appliance at the substation thereof, a supervisory signal associated with the line at the central office, and means for bringing an operator's telephone into circuit with the line, of a switch associated with the toll-collecting appliance to be actuated in the payment of toll, circuit connections and appliances completing the circuit as to telephonic currents only, and other circuit connections adapted to permit the flow of battery-current controlled by the said switch associated with the toll-collecting appliance; whereby a user of the telephone may talk with an operator, and the payment of toll will be signaled to the operator without the use of her telephone, as described.

7. The combination with a telephone-line, a toll-collecting appliance at its substation, and a supervisory signal at a central office associated with the line, of an inductive device interposed in the telephone-circuit to transmit telephone-currents, a switch connected with the toll-collecting appliance and actuated in the payment of toll, and circuit connections completed by the said switch to operate the supervisory signal, as described.

8. In combination, two telephone-lines, one of which is a toll-line, united in a complete circuit through link conductors to the central office, a supervisory signal associated with each line at the central office, and means at the called station for determining the flow of current in the line automatically in the use of the telephone and for controlling the su-

pervisory signal associated with the same line, a toll-collecting appliance at the toll-station, a switch associated therewith to be actuated in the payment of toll, and circuit connections controlled by the switch adapted to operate the supervisory signal associated with the toll-line when the required payment is made; whereby the response of the called subscriber is signaled to the operator and she is enabled to insure the payment of the required toll, as described.

9. In combination, two telephone-lines, one of which is a toll-line, united through the agency of an answering-plug connected with the toll-line, and a calling-plug connected with the other line, of a supervisory signal associated with each of the plugs controlled by current in the corresponding line, and a source of current connected with the line, a toll-collecting appliance at the toll-station and a switch associated therewith to be actuated in the payment of toll, said switch being adapted to complete the line-circuit when payment is made, and a telephone-switch at the called substation adapted to complete the line during the use of the telephone; whereby the operator is informed of the response of the called subscriber and of the payment of toll by the user of the toll-line, as described.

10. The combination with a telephone-line, a line-signal permanently associated therewith in a switchboard, a supervisory signal adapted for temporary association with the line in making connection with the line in a switchboard, of a telephone-switch at the substation adapted to put circuit connections of the line in condition to operate either of the said signals when the telephone is removed from the hook, a toll-collecting appliance and a switch associated therewith to be actuated in the payment of toll and circuit connections thereof adapted to break the circuit of the line involved in the operation of the supervisory signal until the required payment is made, as described.

11. In combination, telephone-lines extending between different substations and a telephone-switchboard in a central office, link conductors for making connection between any two lines in the switchboard, and two supervisory signals, one for each of two connected lines associated with the said lines in the switchboard, a switch at each substation adapted to change the circuits of the line to operate the said supervisory signal, one of said stations being a toll-station and being equipped with a toll-collecting appliance, the switch at said station being associated with the said appliance and actuated in the payment of toll, the switches at the other stations being adapted for actuation automatically in the use of the telephone; whereby the operator is enabled to supervise connections between any two lines in a uniform manner and to determine the payment of the toll at the toll-station after the response of the called sub-

scriber without aid of her telephone, as described.

12. The combination with a telephone-line having a toll-collecting appliance at its station, a supervisory signal associated with the line in a switchboard, and a switch connected with the toll-collecting appliance to be actuated in the payment of toll to operate the said supervisory signal, of a device at the substation controlled at the central office adapted to change the circuits at the substation to cause the operation of said supervisory signal; whereby the operation of the supervisory signal may be rendered independent of the said switch in the toll-collecting appliance, as described.

13. The combination with a telephone-line, a toll-collecting appliance at the station thereof, a supervisory signal adapted for connection with the line in the switchboard at the central office to respond to current in the line, and a source of current in the line, of a telephone-switch and a switch in the toll-collecting appliance adapted to cooperate in changing the line-circuit to cause the operation of the supervisory signal, an electromagnetic switch adapted to make a change in the circuits equivalent to that produced by the switch associated with the toll-collecting appliance, and means for exciting the said electromagnetic switch automatically in making connection to the line; whereby the supervisory signal may be caused to indicate the use of the telephone independently of the switch in the toll-collecting appliance, as described.

14. In combination, a toll-line and another line united in a circuit through the agency of a calling-plug connected with the toll-line, of an answering-plug connected with the said other line, a supervisory signal associated with each of said plugs, each adapted to indicate the flow of current in the corresponding line, a toll-collecting appliance at the toll-station, a telephone-switch and a switch in said toll-collecting appliance to be actuated in the payment of toll, circuit connections to complete the line controlled in the cooperation of said telephone-switch and said switch in the toll-collecting appliance, being completed when both switches are operated, an electromagnetic switch at the toll-station adapted when excited to effect the changes of the circuit connections equivalent to those produced by the said switch in the toll-collecting appliance, and means controlled through the agency of the calling-plug for applying current to the line to excite the said electromagnetic switch; whereby the operation of the supervisory signal of the calling-plug is made dependent on the position of the telephone-switch when the toll-station is called, but is dependent on the payment of toll in connections initiated at the toll-station, as described.

15. The combination with a telephone toll-line, of an answering appliance for making connection with the line as a calling-line, and a

calling appliance for making connection with the line in response to a call from another line; a supervisory signal associated with each of said appliances, a toll-collecting appliance at the substation, a telephone-switch adapted to change the circuits of the line to determine the flow of current in the line to operate the supervisory signal which may be associated with the line, a device in the toll-collecting appliance adapted to be operated in the payment of toll and constructed to prevent the said change of circuits by the telephone-switch until the toll is paid, an electromagnetic switch adapted, when excited, to make changes in the circuit equivalent to those produced by the said switch when moved in the payment of toll, and means for applying current to the telephone-line in making connection therewith to excite the electromagnetic switch, said means being made operative automatically in the use of the said calling appliance to make connection to the line; whereby the operation of the supervisory signal of the answering appliance is made dependent on the payment of toll while the operation of the supervisory signal of the calling appliance is made dependent only on the use of the telephone, as described.

16. The combination with telephone-lines and an answering and calling plug with their

plug-circuit for uniting them, of a register or collecting device and a switch controlled thereby at one of the stations, said switch being adapted to close the path for current through the telephones at the substation, whereby the payment or registration may be insured, of a relay controlling circuit connections adapted to permit the passage of current in the telephones, and means for applying current to the calling-plug, to operate the said relay when the station provided with the same is called, as described.

17. The combination at a telephone pay-station with the telephone-switch, of circuit connections of the telephone-line normally broken, adapted, when closed, to permit the circulation of current through the telephones, a toll collecting or registering device, and a switch operated in the actuation of said device, controlling said circuit connections, said switch being adapted to engage the telephone-switch when operated, to be held thereby while the telephone is removed from the hook, substantially as described.

In witness whereof I hereunto subscribe my name this 28th day of September, A. D. 1897.

FRANK R. MCBERTY.

Witnesses:

ELLA EDLER,

DUNCAN E. WILLETT.