

No. 753,903.

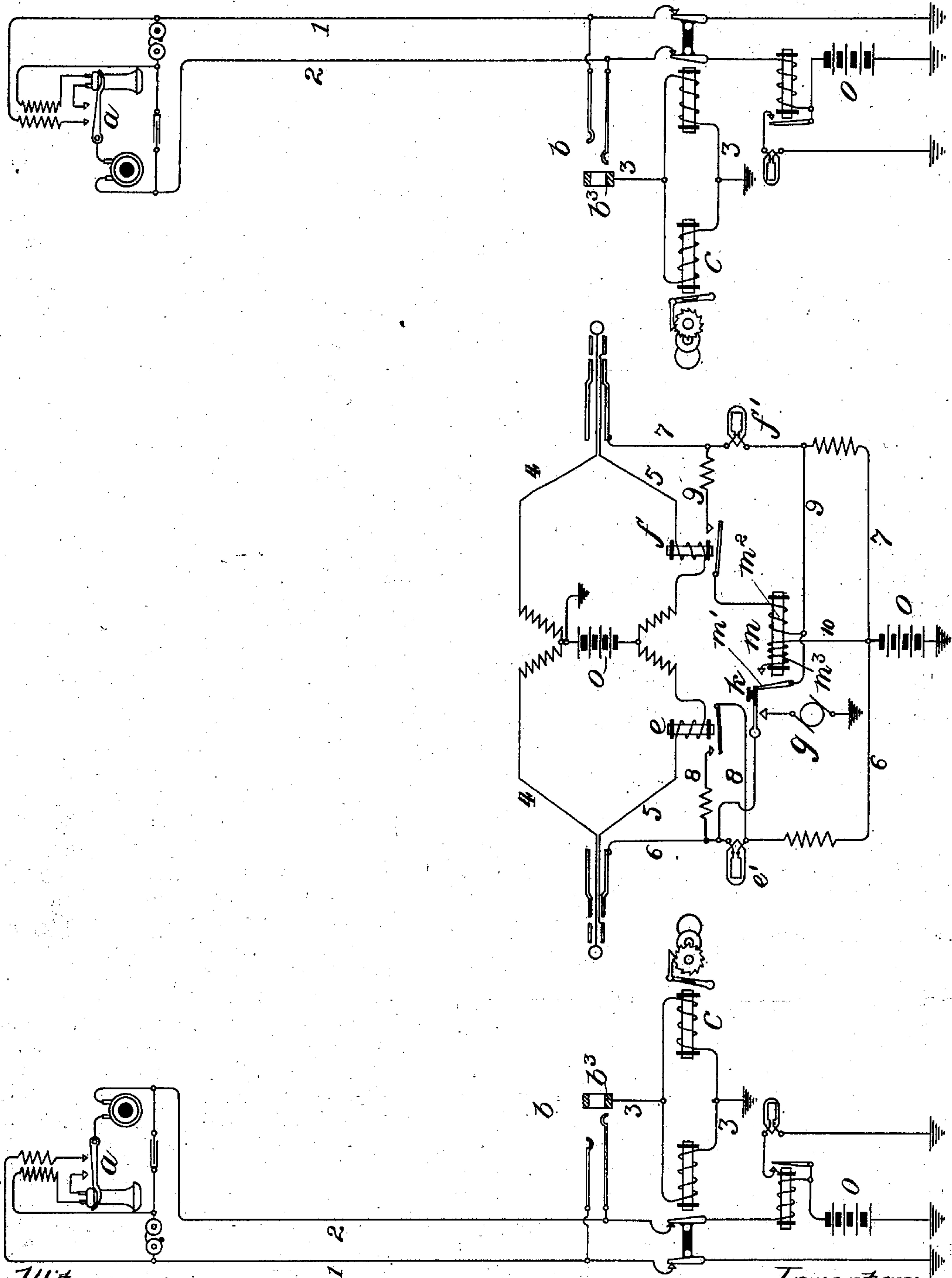
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F. R. McBERTY.

TOLL APPARATUS FOR TELEPHONE EXCHANGES.

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NO MODEL.



Witnesses:

E. H. Elliott, Jr.

Matt S. Thornton.

Inventor:

Frank R. McBerty,
By *James P. Barton*,
Attorney

UNITED STATES PATENT OFFICE.

FRANK R. McBERTY, OF EVANSTON, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TOLL APPARATUS FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 753,903, dated March 8, 1904.

Application filed May 9, 1902. Serial No. 106,565. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. McBERTY, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Toll Apparatus for Telephone-Exchanges, of which the following is a full, clear, concise, and exact description.

My invention relates to toll apparatus for telephone-exchanges, and more particularly to a system wherein a toll device is arranged to be actuated through the agency of a manual key, which is depressed by the operator in the course of connecting two lines at the switchboard, whereby the subscriber may be charged for each exchange connection obtained by him. In systems of this character it has been found that the service-meter or other toll device will occasionally be actuated by accident or otherwise under circumstances which do not require it, so that improper charges are made.

It is the object of this invention to provide means whereby the actuation of the toll device is prevented except at the time when it is intended that the charge should be made.

My invention consists, briefly, in an electromagnetic lock for preventing the actuation of the toll device and means operated automatically in the course of a connection for controlling said lock, whereby at a certain stage in the operation of connecting two lines at the switchboard the toll device is automatically unlocked and the actuation thereof through the agency of the manual key made possible. For example, I may provide a magnet in association with the manual key and a lock for the key adapted to be withdrawn by the magnet when excited and a circuit for the unlocking-magnet controlled by the supervisory relay which is associated with the calling-plug and which is responsive to the flow of current in the called line. In this case the service-meter or other toll device will remain locked until a connection between the calling and the called line has been completed and the called party has responded to the signal.

I will describe my invention more particu-

larly by reference to the accompanying drawing, which is a diagram illustrating two telephone-lines extending from substations to a central-office switchboard, the system being equipped with my improved toll apparatus.

Each of the telephone-lines is of a type well known in the art, extending in two limbs from the usual substation apparatus to spring-jacks or terminal switches at the central office and thence through the usual line-signaling apparatus to the poles of a central battery. The circuit of the line is controlled at the substation by the usual telephone-switch. A cut-off relay is shown for each line, connected in a conductor 3, which leads to ground from the third contact or test-ring b^3 of the spring-jack b . I have shown a service-meter c connected in multiple with the cut-off relay in the ground branch from the test-ring of the jack.

The operator is provided with the usual pair of plugs for uniting lines by plugging into the respective spring-jacks thereof, each plug having the usual tip, ring, and sleeve contacts. The tip and ring contacts of each plug are united, respectively, with the corresponding contacts of the mate plug by the link conductors 4 5, which include the windings of a repeating-coil in accordance with the usual practice, the central battery being connected in a bridge of said link conductors between the windings of said repeating-coil. One pole of the battery is grounded and the free pole thereof is connected by conductors 6 7 with the sleeve-contacts of the answering and calling plugs, respectively, which contacts are adapted to register with the test-rings of the jacks in which the plugs are inserted. The usual supervisory relays $e f$ are included in the ring-strand 5 of the plug-circuit between the bridge containing the battery and the two plugs, respectively, so that each supervisory relay is in the path of current to the line with which its associated plug may be connected, the supervisory relay being excited when the telephone-switch at the substation of the line is closed, as during the use of the telephone. Supervisory signal-lamps $e' f'$ are included in the conductors 6 7, respectively, the circuits

whereof are completed to earth in the registering contacts of the corresponding plugs and the spring-jacks of the lines with which said plugs may be connected. The circuit 6 3
 5 (or 7 3, as the case may be) thus established includes the supervisory lamp in the plug-circuit and the cut-off relay and service-meter of the line whose spring-jack is plugged into. The cut-off relay is designed to be actuated by
 10 current from the central battery, while the service-meter is not responsive to such current, but requires for its actuation the current from a special source of current g of higher voltage. The supervisory relays e, f
 15 control shunts 8 9, respectively, about their subsidiary lamp-signals e', f' , so that said lamps are not illuminated until the supervisory relays have become deenergized, as when the substation-telephones have been re-
 20 placed on their switch-hooks.

An operator's service-meter key k is provided in association with the answering-plug, said key being adapted when depressed to connect the free pole of the grounded source of
 25 current g with the sleeve-contact of the answering-plug to actuate the service-meter of the line in whose spring-jack said plug may be inserted. I have provided in association with said key an electromagnetically-controlled lock, which normally prevents its ac-
 30 tuation. A magnet m is provided with an armature m' , which is normally interposed in the path of the lever of key k to prevent the movement of said lever; but when the mag-
 35 net is excited the armature m' is withdrawn, so that the key may be depressed. I have shown the magnet m provided with two windings m^2, m^3 , one of these windings, which may be of low resistance, being included in the
 40 shunt 9 about the supervisory signal f' , which is associated with the calling-plug. The other winding m^3 is a locking-winding. It may be of high resistance—say two hundred ohms—and connected in a local circuit 10, which is
 45 controlled at a front contact of the armature m' .

The locking-circuit may be traced from the free pole of battery o by way of conductor 10 through winding m^3 of relay m to the front
 50 contact of said relay and thence through armature m' (when the same is attracted) to shunt 9 and conductor 7 to the sleeve of the connecting-plug and thence to earth through the conductor 3 of the line plugged into.

55 The operation of the system shown is as follows: Assuming that a call has been transmitted to the central office in the usual way, the operator responds by inserting her answering-plug in the spring-jack of the calling-line, and
 60 thereafter, having received the number of the subscriber wanted, she completes the connection by inserting the calling-plug of the same pair into the spring-jack of the line wanted. Until the called party responds the supervisory
 65 signal-lamp f' , associated with the calling-

plug, remains lighted; but when the telephone is taken for use at the called station the circuit of the line is completed, so that the supervisory relay f becomes excited and closes the shunt 9, whereby said lamp is extinguished. The wind-
 70 ing m^2 of the unlocking-magnet being included in this shunt, said magnet is excited and draws up its armature, whereby the key is unlocked to permit its actuation. The locking-circuit 10 is completed when the armature m' is drawn
 75 up, so that the magnet m thereafter remains excited as long as the calling-plug remains in the spring-jack. Up to the time the called party responds the key k for actuating the service-meter is locked, so that the service-meter
 80 cannot by accident or otherwise be actuated; but upon the response of the called party the key is unlocked, and the operator, being informed of the fact by the darkening of the lamp f' , depresses said key, and so brings about
 85 the actuation of the toll device.

It is evident that any desired form of toll device may be used in practicing my invention, although I have shown a service-meter the action of which is to register on a count-
 90 ing-dial each connection which has been made. The automatic unlocking of the key k need not necessarily be brought about by the response of the called party. In different telephone-exchanges giving measured service dif-
 95 ferent rules may be required as to the particular stage of the operation of completing a connection at which the charge should be made. In some cases, for example, it is considered
 100 best to make the charge as soon as the calling-plug is inserted in the jack of the called line without waiting for the response of the called party.

It is evident that my invention by suitable modifications, which will readily suggest themselves to those skilled in the art, may be adapted to varying requirements of this character.

I claim—

1. The combination with telephone-lines and a switchboard therefor, of a toll device for one of the lines, a manual key and mechanism controlled thereby for actuating said toll device, an electromagnetic lock for preventing the actuation of the toll device, an electric
 115 circuit for said lock and a switch controlling the said circuit, automatically actuated at the switchboard in the course of a connection between the line having the toll device and another line.

2. The combination with the calling and a called line and link conductors at the switchboard for uniting them, of a toll device for the calling-line, a key for actuating the same, an electromagnetic lock for said key, a source
 125 of current connected with the link conductors, a switch at the substation of the called line controlling the flow of current therein, a relay f in the path of current so controlled, and a circuit for said electromagnetic lock controlled
 130

by said relay, whereby the key is automatically unlocked through the agency of the switch at the called station.

3. The combination with a calling and a
5 called line and link conductors at the switch-
board for uniting them, of a toll device for
the calling-line, a key for actuating the same,
an electromagnetic lock for said key, a source
of current connected with the link conductors,
10 a switch at the substation of the called line
controlling the flow of current therein, a relay
in the path of current so controlled, and a
circuit for said electromagnetic lock controlled
by said relay, whereby the key is automatic-
15 ally unlocked through the agency of the switch
at the called station, and a locking-circuit for
said magnet closed in the excitation thereof.

4. The combination with telephone-lines and
a switchboard therefor, of a toll device for one
of the lines, a manual key and mechanism 20
controlled thereby for actuating said toll de-
vice, means for preventing the actuation of
said toll device, a source of current, a switch
at the substation of the called line controlling
the flow of current therein, and electromag- 25
netic mechanism actuated by said switch, con-
trolling the aforesaid preventing means.

In witness whereof I hereunto subscribe my
name this 1st day of March, A. D. 1902.

FRANK R. McBERTY.

Witnesses:

GEORGE PRESTON BARTON,
DE WITT C. TANNER.