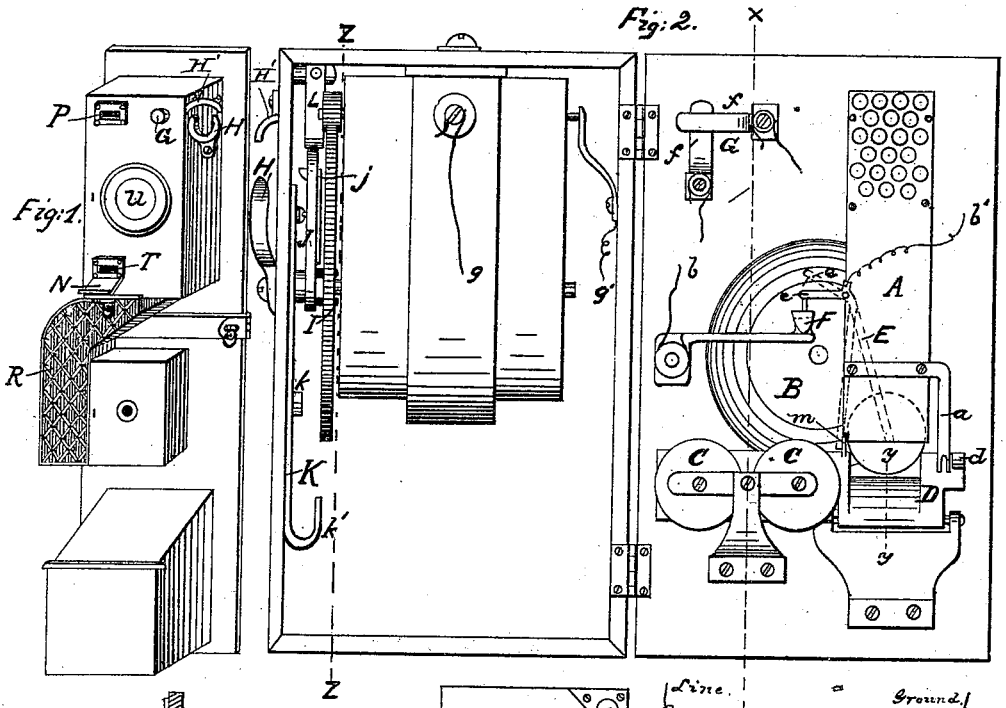
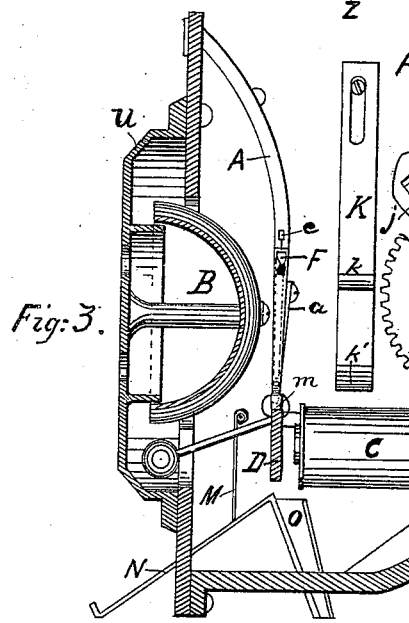
(No Model.)

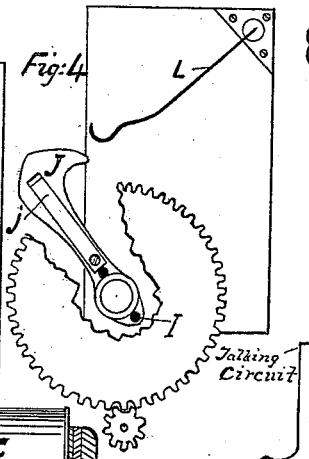
P. L. ROSE & G. REIN.

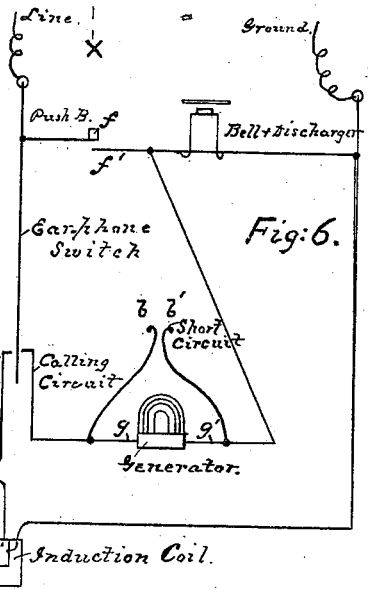
AUTOMATIC TELEPHONE TOLL SYSTEM.

No. 346,865. Patented Aug. 3, 1886.







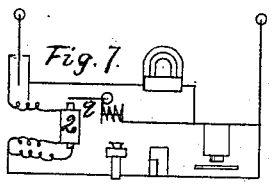


WITNESSES

Chas. Hoyle

E. L. Adreon

Fig: 5.



INVENTORS

Philip L. Rose

Gustavus Rein

UNITED STATES PATENT OFFICE.

PHILIP L. ROSE AND GUSTAVUS REIN, OF ST. LOUIS, MISSOURI, ASSIGNORS OF THREE-FOURTHS TO CHARLES HOYLE, OF SAME PLACE.

AUTOMATIC TELEPHONE-TOLL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 346,865, dated August 3, 1886.

Application filed December 3, 1885. Serial No. 184,628. (No model.)

To all whom it may concern:

Be it known that we, PHILIP L. ROSE and GUSTAVUS REIN, both residing at St. Louis, Missouri, have invented certain new and useful Improvements in Automatic Telephone-Toll Systems, of which the following is a specification.

Our invention relates to that class of telephone systems which comprise a "central office," into which numerous "subscribers'" lines terminate for connection one with the other; and the principal object of this particular invention is to provide a means of automatically collecting an arbitrarily-established fee from every user of a telephone every time the same is used, as a toll for each connection made at the central office; and the object next in importance is to provide a means of compelling the user of a telephone to "ring off" on the completion of a conversation, so as always to insure a disconnection at the central office, and thus prevent subscribers' lines from being reported "busy" when such is not the case, the subscriber of the line so reported having simply neglected to ring off.

The first object is attained by providing the ordinary "generator and bell-box," or "bell and switch box," which forms a part of every telephone outfit, with a device or apparatus whereby the central office cannot be "rung up" or "secured" until a coin of some particular and arbitrarily-determined-upon denomination or a corresponding check or ticket previously determined upon as a sufficient compensation for each use of the telephone has been deposited in said box, and whereby in case the desired connection cannot be obtained the deposited coin, check, or ticket may immediately be returned to the one who deposited it, said operation being under the exclusive control of the "operator" at the central office. It is further so arranged that in case the desired connection has been obtained the mechanical movement resulting from the placing of the "ear" or "hand" phone back on or into its normal position when not in use will mechanically cast said coin, check, or ticket into an entirely separate and detachable receptacle, made preferably of some suitable fire and burglar proof material, which is outside of and which forms no part of the box containing the mechanism and devices aforesaid, but which is locked to the main body of the telephone-instrument in such manner as to suitably preclude the possibility of its being carried off by any other than an authorized agent of the telephone company, and, further, so fastened to the main body of the instrument as to prevent the possibility of the whole telephone-instrument being removed *en masse* from its place of attachment without being forcibly wrenched therefrom.

It is a well-known fact that in all telephone systems employing a magneto-electric current for calling purposes the generator which creates said magneto-electric current is normally "short-circuited," the same being opened by the forward movement of the generator-crank according to one plan, and in other cases by pushing in said crank while turning the same, so that the simple act of turning the generator-crank in both cases operates to open the above-mentioned "short-circuit" normally established around said generator, thus allowing the electric current so generated to go to "line" instead of simply circulating around the short circuit. This short circuit around the generator is established for certain well-known reasons—for instance, it avoids useless resistance in the calling-circuit and the possibility of the generator being destroyed by lightning.

The first object of this invention is attained through employing the above-referred-to coin, check, or ticket to effect the opening of the aforesaid short circuit, in lieu of the methods above mentioned as being heretofore employed for that purpose, thus making the depositing of such an arbitrarily-determined-upon coin, check, or ticket an essential prerequisite to the "signaling" of the central office.

The second object of the present invention is attained by so mechanically connecting the well-known ear or hand phone "support" or "switch" with the shaft or cog-wheel of the "calling-generator" that the movement attending the act of removing and returning the ear or hand phone from and to its normal resting-place will revolve the "armature" of said generator, so that the act of taking down the ear or hand phone

either aurally or optically (according to the system in use) signals the central station, while replacing the ear or hand phone similarly notifies the operator at the central office that the conversation has been completed; or, again, in other systems, the current thus generated by the replacing of the ear or hand phone may itself be used to automatically make the desired "disconnection."

In effecting these objects it has been our endeavor to add as little mechanism to the present telephone instrument or outfit as possible, and to avoid introducing additional electrical resistance in either the calling or talking circuit, and, furthermore, to so avail ourselves of the spare space existing in telephone-instruments as now manufactured as to make it possible to combine said automatic toll-collecting device with the different designs of generator or bell-box now on the market. Furthermore, we have utilized the existing bell-electro magnet and armature to form a part of the mechanism for discharging the coin, check, or ticket either into the company's receptacle or out to the user, as the case may demand. It is also to be noted that we have so arranged matters and things as to make it impossible to enter the money-receptacle without the use of two keys—the one locking the receptacle itself and the other locking the receptacle to the main body of the instrument—and we have further provided for fastening the instrument to any partition or wall in such manner as to make it practically impossible to remove the instrument *en masse* without the key operating the lock which secures the "money-receptacle" to said instrument, unless the instrument be wrenched from its place of attachment. We dwell upon these details because we consider them to be the valuable points about our invention, which will render it practical and give it superior commercial value.

The accompanying drawings, forming a part of this specification, will illustrate our device.

Corresponding parts are similarly lettered in the several figures.

Figure 1 is an exterior view of the complete apparatus. For convenience of illustration, however, the hand-phone support is shown on the opposite side to that upon which it belongs.

Fig. 2 is a view of the bell and generator-box, in which all of the toll collecting or indicating mechanism is placed, with the door swung open to the right. On the interior surface of the door may be seen the arrangement of the working parts designed for the reception of the heretofore-referred-to coin or check, consisting of the vertical chute A, down which the coin or check falls; the bell B, with its exterior cover, *u;* the bell electro-magnet C C; the bell-magnet armature D, on the edge of which the coin, check, or ticket temporarily comes to rest; the springy strip of metal *a*, which holds the armature in its normal position immediately beneath the opening at the bottom of the aforesaid chute; the lever E, the long end of which is operated upon by the weight of the coin or check in its downward course in such manner as to lift the short end and withdraw its point from the mercury-cup F, the circuit-connections of said cup and lever being indicated at *b b'*. G is a push-button switch. In the box may be seen the generator and its shaft and cog-wheels, to which the "circuit-changer switch" or "hand-phone support" H is attached at I. K is a trip for throwing to one side the armature D. J represents a lever which operates said trip, and which also serves, with the aid of the spring L, to lock the "hand-phone switch" in its normal position. Above and concentric with the path of movement of the support H is the curved guard or protector H', between which and the support the hand-phone is held. This protector is of such length and so placed as to prevent the removal of the hand-phone within a certain defined arc, before passing beyond which the support by its movement will operate the circuit-changer switch and will rotate the armature of the magneto-generator.

Fig. 3 is a section through the generator-box door at *x x* of Fig. 2. In this figure, M represents a curtain which prevents the introduction of a wire from without to operate the armature D. N is an inclined course for carrying the coin, check, or ticket out to the depositor, while O represents the chute down which the coin passes in its course to the company's receptacle or cash-box. Fig. 4 is a section through *z z* of Fig. 2, looking toward the cog-wheels. Fig. 5 is a section through Y Y of Fig. 2, showing the manner of cutting away the stop at the bottom of the chute, in order that coins or checks having a diameter less than that of the adopted one may pass through or past said stop unarrested, and therefore without effect.

Fig. 6 shows the arrangement of the circuits when a "push-button" or switch under the control of the user of a telephone is employed to place the "discharger" or bell-magnet in the talking-circuit, so that the coin may be cast out to a disappointed depositor. *f f'* are the terminals through which circuit is completed by the push-button. *g g' b b'* indicate the short circuit around the generator.

Fig. 7 shows the arrangement of the circuits when a device for automatically or electrically accomplishing the purpose of the above-mentioned push-button is employed. The operation of this device is as follows: The hand-phone being down, the "ringing-current" is sent through the "talking-circuit," which includes the electro-magnet Q of this figure, and this current, although not sufficiently strong to affect the bell-magnet, will energize the magnet Q sufficiently to attract its armature *q*, which forms a part of the bell-magnet circuit. Now, since a branch of the talking-circuit reaches from the instrument end of the mag-

net Q to the core of said magnet, it follows that the moment the armature *q* is brought into contact with the core of this magnet a short circuit will be established through the discharger or bell-magnet, and the current instantly attains sufficient strength to cause the discharger or bell-magnet to attract its armature, and thus discharge the coin, check, or ticket last deposited. It is this arrangement which we propose to use in practice, placing, as it does, the return of the coin to the user under the exclusive control of the operator at the central office. We have, however, also deemed it proper to show the push-button arrangement hereinbefore referred to, so that the builder of the instrument may have the information needed to enable him to apply the arrangement, should he see fit to do so.

The method of operating the complete apparatus is as follows: Any person desiring a "connection" first drops the essential coin, check, or ticket—a nickel, for example—into the upper slot, P, of Fig. 1. In falling the nickel comes into contact with the long end of the lever E of Fig. 2, and the weight of the nickel presses the long end of said lever to one side of the vertical chute A, which movement elevates the short end *e* of said lever and causes it to part contact with the mercury in the cup F. The separation of these two points or "electrodes" or "points of contact" opens the short circuit around the generator, heretofore referred to, and diagrammatically shown in Fig. 6. The nickel having come to rest upon the edge of the armature or stop D, this short circuit remains open so long as the said nickel is retained at this point. If the hand-phone be now taken from its support, the rotary motion attending this act revolves the armature of the calling-generator and a magneto-electric current is sent to line, which signals the central-office operator. When the conversation is ended and the hand-phone returned to its normal position, the rotary motion attending this act revolves the armature of the generator, which again creates a current that notifies the central office that a disconnection may take place, and also lifts the trip K, which throws the armature or stop D to one side and allows the nickel to drop into the separate receptacle R, placed beneath the bell-box. The operation of this trip will be understood by reference to Figs. 2 and 4, in which *j* represents a spring projecting through J. This spring engages with the lug *k* on the trip K. In coming down, the spring-projection *j* is pushed back through J by reason of its peculiar bevel, and the trip K is not moved; but in going up the spring-projection *j* engages with the lug *k*, thus lifting the trip K sufficiently to bring the curved part *k'* into contact with the lug or pin *d*, projecting from the armature or stop D. Should it be found impossible to arrange for the desired connection, the operator at the central station reports the line "busy," and at the same time sends the ringing-current to line, while the person who has found it impossible to secure the desired connection presses in upon the push-button G, thus short-circuiting everything but the bell-magnets, which, becoming energized by the operator's ringing-current, attract the armature or stop D, and thus allow the nickel to pass out upon the inclined shelf or tray or way N, which projects from the lower slot, T, of Fig. 1. If, however, the push-button arrangement be dispensed with, and the device shown in Fig. 7 be employed, then the operator at the central station has but to send the ringing-current to line, when the coin, check, or ticket last deposited will appear upon the inclined shelf, tray, or way, and by its appearance give the one who deposited it to understand that the desired connection cannot be had.

It will be noted that the cash box or receptacle is entirely outside of and distinct from the chamber or compartment in which the toll-indicating mechanism is contained. By this arrangement the linemen or inspectors (who constantly are required to get at the switch and indicating mechanism) can do so without at the same time having access to the cash-box. The toll collecting or indicating mechanism is also arranged upon the inner face of the door, so that when the latter is swung open the mechanism is in excellent position for inspection. The mechanism, also, as seen, is placed in the telephone call-box, which thus contains the calling apparatus as well as the toll collector or indicator.

To guard against danger of any one introducing a strip of metal to operate the toll-switch, we give the chute A the curved form indicated in side view, Fig. 3, and we perforate or slit the upper part of the rear or inner face of said chute, as seen in Fig. 2. Under this arrangement a strip of metal or piece of wire inserted into the chute will be apt to pass through one of the holes or openings in the back of the chute, rather than to follow along down the curved interior of the latter. There will be noticed in Fig. 2, just to the left of the cut-away part of the armature D, which forms the stop for the coin, a lug or detent, *m*. This lug is attached to and moves with the armature D, and is so placed that the instant the armature commences the outward movement consequent upon the return of the hand-phone support to normal position it (the lug) will get in front of the tail of the toll-switch lever E. By this arrangement it becomes possible to allow the coin or toll to be dislodged or released at the beginning of the return movement of the hand-phone, and yet at the same time to hold the switch open, after the coin has dropped, long enough to permit the replacing movement of the hand-phone to cause the apparatus to ring off.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. In a telephone-exchange system employing an automatic toll-collecting mechanism, the combination of a chute for conveying the device designed to serve as a toll or indicator to a temporary resting-place or stop, a movable stop at the end of said chute, and a lever or arm forming one with or attached to the ear or hand phone support, in such manner as to operate said stop for the release of said device from its temporary place of rest on causing said hand-phone support to assume its normal condition or position, substantially as herein shown and set forth.

2. In an automatic toll-collecting mechanism for telephone-exchange systems, the combination of a chute or passage-way for the device used as a toll or indicator, a movable stop for said toll, and an electro-magnet operated from the central station, to cause the stop to move in the direction necessary to allow the toll to pass out to the one who deposited it, substantially as and for the purposes set forth.

3. The combination of a chute or passage-way for the device used as a toll or indicator, a movable stop for said toll, and an electro-magnet in the calling-circuit operated from the central station, to cause the stop to move in the direction necessary to allow the toll to return or pass out to the depositor, substantially as and for the purposes set forth.

4. In an automatic toll-collecting mechanism for telephone-exchange systems, the combination, with a chute or passage-way for the device used for a toll or indicator, and a movable stop for said toll, of the movable hand-phone support and stop-operating mechanism connected with and actuated by said support, substantially as hereinbefore described, so that the said stop, by and during the return of said support to its normal position or condition, shall be caused to move in a direction to allow the toll to pass into the cash box or receptacle, substantially as and for the purposes hereinbefore set forth.

5. In an automatic toll-collecting mechanism for telephone-exchange systems, the combination of a movable stop for the device used as a toll or indicator, a chute or passage-way for said toll, which, beyond the stop, divides, one division or portion leading to the cash box or receptacle, and the other division or portion leading to a point where the coin will pass out to the one who deposited it, an electro-magnet operated from the central station to cause the stop to move in a direction to allow the toll to pass into the latter division, and a movable hand-phone support, and mechanism connected with and operated by said support to cause the stop, upon the return movement of the support, to move in a direction to allow the toll to pass into the division leading to the cash-box, substantially as and for the purposes hereinbefore set forth.

6. In a telephone-exchange system employing an automatic toll-collecting mechanism, the combination of a chute for conveying the device designed to serve as a toll or indicator to a temporary resting-place or stop, and a stop at the end of said chute, so cut away as to allow coins, checks, or tickets of less diameter than that designed to be used to pass on, by, or through said stop without coming temporarily to rest, substantially as herein shown and set forth.

7. In a telephone-exchange system employing an automatic toll-collecting mechanism, the combination of the short circuit normally established around the calling magneto-electric generator, a circuit-breaker established therein, a lever attached to or connected with said circuit-breaker, and a chute or way for the passage of a coin or check, to be deposited in its entirety and used as a toll or compensation, for operating said circuit-breaker by the action of its weight upon said lever, substantially as and for the purposes hereinbefore set forth.

8. In a telephone-exchange system employing an automatic toll-collecting mechanism, the combination of a chute for conveying the device designed to serve as a toll or indicator to a temporary resting-place or stop, a movable stop at the end of said chute, and an armature and electro-magnet placed in the calling-circuit, and designed to operate said movable stop for the release of said device from such temporary resting-place, substantially as herein shown and set forth.

9. In a telephone exchange system employing an automatic toll collecting or indicating mechanism, the combination of the talking-circuit, the calling-circuit, a signaling or toll-discharging electro-magnet, a coin or toll rest or stop operated thereby, circuit-connections, substantially as described, and a switch, under control of the user of the telephone, for short-circuiting the talking-circuit and bringing into circuit the said magnet at the time and in the manner substantially as hereinbefore set forth.

10. In a telephone-exchange system employing an automatic toll collecting or indicating mechanism, the combination of a chute or passage-way for the device used as a toll, a movable stop, a bell or signal, and an electro-magnet and its armature, arranged and adapted to operate both the stop and the signal, substantially as and for the purposes hereinbefore set forth.

11. In a telephone-exchange system employing an automatic toll collecting or indicating mechanism, the combination of a calling-circuit, a bell or toll-discharging electro-magnet, an electro-magnet, as Q, included in the talking-circuit, having its armature electrically connected with the calling-circuit, and a branch wire leading from the exit end of the magnet to the latter's core, the arrangement being such that when the magnet Q attracts its armature the talking-circuit will be short-circuited in such manner as to include and hold the dis-

charging-magnet in said short circuit, substantially as and for the purposes hereinbefore set forth.

12. The combination of a telephone call-box, calling apparatus included therein, a swinging door for said box, and a telephone-toll-collecting apparatus attached to the inside of the door, so as to be conveniently accessible to an inspector when the door is opened, substantially as hereinbefore set forth.

13. A combined call and toll apparatus, comprising a telephone call-box, calling apparatus, and a toll switch or apparatus inclosed therein, and a cash box or receptacle distinct from the box or compartment containing the calling and toll-collecting apparatus, but communicating therewith by a passage through which the coin or token dropped as toll into the call-box may pass into the said receptacle, substantially as and for the purposes set forth.

14. The combination, with the movable stop and the mechanism for moving it in the direction necessary to direct the coin or other toll-token into the cash box or receptacle, of the circuit-breaking lever and the lug or detent *m*, whereby said lever is held in circuit-breaking position after the coin has dropped, substantially as and for the purposes hereinbefore set forth.

15. In a telephone-toll-collecting apparatus, the combination of a chute or passage-way divided at its lower end into two branches, one leading to the inside and the other to the outside of the toll-box, and a stop at the junction of the branches occupying normally a position to arrest the coin or other toll-token, and movable to one side and the other of that position, so as to direct the coin into one or the other branch, substantially as and for the purposes hereinbefore set forth.

16. In a telephone-exchange system employing an automatic toll collecting or indicating mechanism, the combination of a vertical or inclined chute, a hinged or pivoted knife-blade with one of its edges forming a stop at the end of said chute, and provision for deflecting said blade or stop to one or the other side of the chute for the release of the deposited coin, check, or ticket to one or the other side of said knife-blade or stop, substantially as herein shown and set forth.

17. In a telephone-exchange system employing an automatic toll collecting or indicating mechanism, a chute or way leading to an outlet in the toll-collecting box, and a curtain hung back of said outlet for preventing the introduction of wires or other devices designed to improperly operate the mechanism within, substantially as herein shown and set forth.

18. In a telephone-exchange system employing an automatic toll collecting or indicating mechanism, a chute having one or more openings opposite the inlet to said chute, designed to divert the course of any wires or other devices which might be introduced by dishonestly-inclined people to improperly operate the mechanism, substantially as herein shown and set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

PHILIP L. ROSE.
GUSTAVUS REIN.

Witnesses:
E. S. ADISON,
C. C. ZIEGLER.