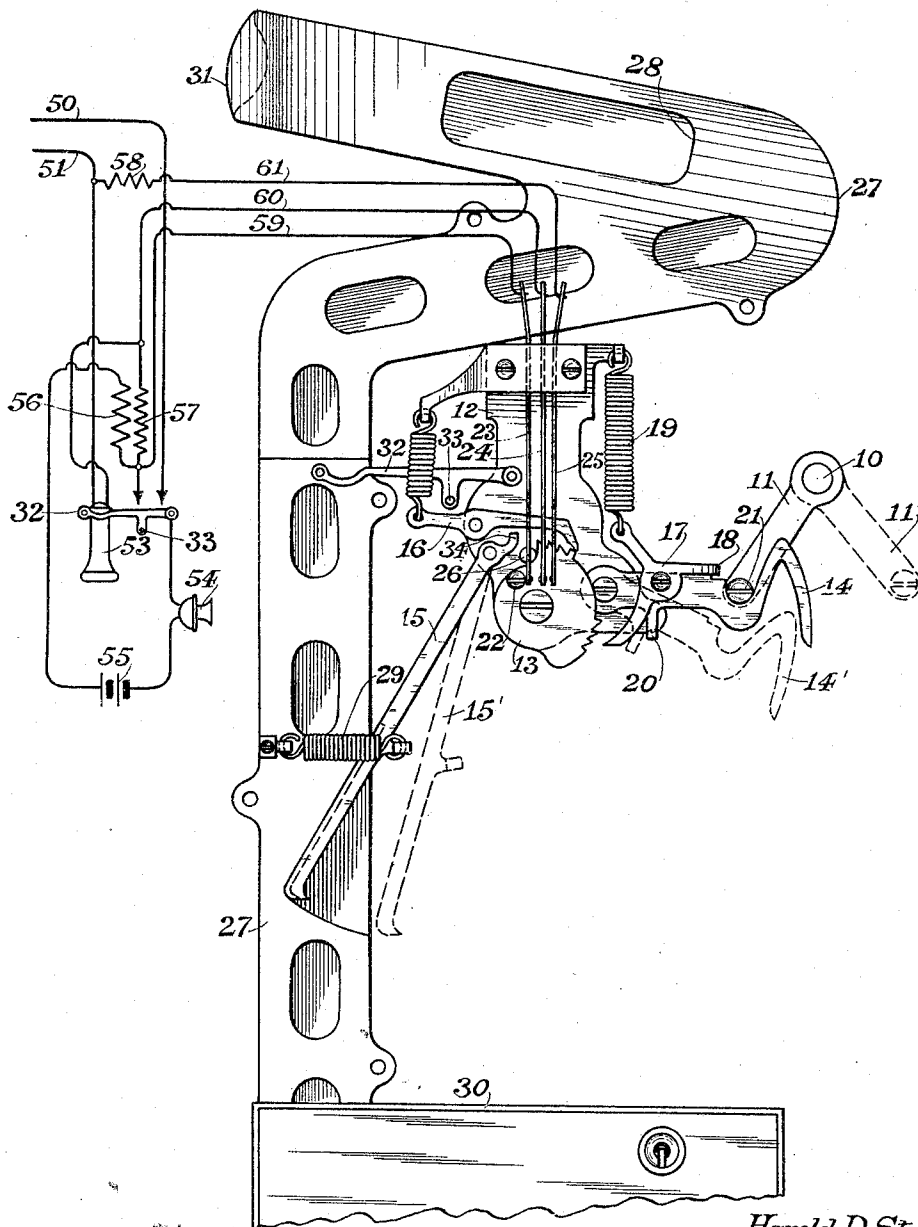


965,047.

Patented July 19, 1910.



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UNITED STATES PATENT OFFICE.

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SYSTEM AND APPARATUS FOR MEASURING TELEPHONE SERVICE.

965,047.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HAROLD D. STROUD and CHARLES W. MAHON, citizens of the United States of America, and residents of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Systems and Apparatus for Measuring Telephone Service, of which the following is a specification.

Our invention relates to telephones in which payment for service is made according to the amount of service given, and to those classes of such telephones in which a coin or token is deposited by the telephone user at the time of each telephone connection.

Our invention relates particularly also to those systems of telephone exchanges in which the connections between the different telephone lines are affected by automatic devices at a central office, said central office devices being controlled by devices associated with the substation telephone and operated by the telephone patron.

The object of our invention is to enable a subscriber whose station is equipped with mechanism operating in conjunction with automatic mechanism, to connect his line with that of a desired substation, and to cause said subscriber to deposit a proper coin or token in the coin collector, if he secures the conversation for which the charge becomes payable.

A further object of our invention is to enable the telephone company to furnish certain service or classes of service free of charge, by adapting the coin collecting means at the substation to require collection for certain classes of calls and not to require it for other classes of calls.

The method adopted by us in securing collection at the substation is so to connect the calling apparatus with the transmitter and receiver circuits of the substation telephone that when a call is made by the operation of the calling devices the transmitter is rendered inoperative, and the receiver which normally could be used as a transmitter of low efficiency is shunted to reduce its efficiency so far that its use as a transmitter is practically impossible, yet permitting it to retain sufficient of its power to inform the calling patron of the purpose of his call, such as the answering of the called station, or the

placing of the busy tone upon his line; having thus caused the making of the call to render the substation capable of receiving speech but not of transmitting it, we provide means whereby the transmitter and receiver are restored to full efficiency by depositing a coin or token, or by hanging up the receiver.

The method adopted by us to permit the telephone company to furnish from the same automatic substation telephone equipment service of some classes which will not require the deposit of a coin and service of some classes which will require such deposit, is applicable to such types of automatic calling devices as repeat the calling operation for each digit of the directory number. In such a system, we cause the transmitter to be made inoperative upon the sending of the second, third or fourth digit, thereby requiring deposit for directory number of a given number of digits, or more, but giving service without charge to calls for directory numbers of a fewer number of digits.

In the drawings, the figure shows our invention as used for coins or tokens, the figure being drawn with reference to a calling device in which for effecting a connection at the central office a shaft is revolved through at least a minimum arc and then permitted to return, this operation being performed at least twice for a connection for which a charge becomes payable.

In the figure, 10 is a shaft forming a part of calling devices of the automatic telephone equipment; to this shaft is attached, for the purpose of operating our device, and forming a part thereof, the arm 11 normally reposing in the position as shown at 11, but attached rigidly to the shaft 10 and moving with that shaft in the operation of the calling device. It is assumed in this description that the shaft 10 revolves for each telephone call in a counter-clockwise direction far enough to move arm 11 to the position shown dotted at 11', and then return to normal position of rest, such movement and return occurring at least twice in each call involving the collection of a coin or token.

12 is a base plate supporting pivotally the ratchet 13, the arm 14, the arm 15 and the holding pawl 16. Operating arm 14 sustains pivotally driving pawl 17 which has dog 18 engaging the arm 14 as a stop to limit the

motion of the pawl 17 against its tension spring 19. Spring 19 acting upon pawl 17, also acts through that pawl to draw arm 14 to its normal position by reason of pawl 17

5 being mounted upon arm 14; the motion of arm 14 under tension of spring 19 is limited by dog 20 which engages the base plate 12. 21 is a stud with friction roller sustained by arm 11 for the purpose of communicating

10 motion to arm 14.

Ratchet disk 13 has two sets of four teeth each, one set adapted to be engaged by the driving pawl 17, and the other set adapted to be engaged by the holding pawl 16. Ratchet disk 13 also sustains insulating stud 22 adapted to engage electrical contact spring 23; the tension of electrical contact spring 23 also tends to return ratchet disk 13 to its position of rest, the motion of the

20 ratchet disk under tension of the spring being limited by engagement of a shoulder of the disk with the stud 26 rigidly sustained by the base plate 12. Electrical contact springs 23, 24 and 25 are held upon the base plate 12, insulated from each other and from the base plate, their mechanical relations to other parts being such that when the insulating stud 22 presses contact spring 23, contact spring 23 moves into contact with

30 contact spring 24 and then continuing presses contact spring 24 into contact with contact spring 25, thus making contact of the three springs with each other.

27 is a coin chute with window 28. Arm 15 projects into the path of a coin in channel 27, and is adapted to be pressed by such a coin outwardly into the position shown dotted at 15', being restored after the passage of the coin by the tension of the spring 29. All of the apparatus shown is mounted within a protecting cover, from which the end 31 of the coin chute 27 projects, to receive a coin or token from the patron; that portion of coin chute 27 containing window

45 28, is in cross section inclined from the vertical so that the window 28 is on the under inclined side of the chute; the upper edge of the window 28 is so gaged that a coin or token smaller than a predetermined size is not supported by said upper edge, and therefore falls through the window and does not pass into the lower portion of the coin chute; a coin of proper size passes the window and thence passes throughout the

55 length of the coin chute 27 into the coin receptacle 30, having operated the arm 15 *en route*.

In the operation of the calling device and consequent partial rotation of shaft 10, arm 11 in passing from position 11 into position 11' or farther, would have depressed arm 14 into position 14' by action of stud 21, whence after the passing of stud 21 arm 14 would have been restored to position 14 by action of

65 spring 19; as arm 14 approached position

14', carrying pawl 17, pawl 17 would engage a tooth of ratchet disk 13, moving said disk the distance of one tooth by the time arm 14 reached position 14'; upon the return to rest of arm 14 and pawl 17, holding pawl 16 would hold ratchet disk in its new position; thus by the movement of arm 11 to position 11' or farther, ratchet disk 13 has been advanced the distance of one tooth; now by the return of arm 11 from position 11' to position 11, arm 14 is again depressed and released, repeating the action of pawl 17 upon ratchet disk 13, which now has been advanced two teeth. Insulating stud 22 has advanced and has bent electrical contact spring 23, but not into contact with contact spring 24, since by design these two springs are so spaced that two steps of ratchet disk 13 and stud 22 will not close the gap between them. Thus it is possible for the telephone user to make a call involving only one operation of the shaft 10 without completing the cycle of operations involving the deposit of a coin or token. If, however, the connection desired is such as to require the second operation of the shaft 10 with its consequent action of arm 11, arm 14, pawl 17, ratchet disk 13 and stud 22, the stud 22 will be advanced to such a point as will make electrical contact of the three springs, 23, 24 and 25. Upon further operations of pawl 17, the ratchet disk will not be advanced, as no teeth are provided in ratchet disk 13 for such further advancement.

The electrical condition set up by the connecting of the contact springs, 23, 24 and 25 is as follows: 50 and 51 are the line wires of the telephone set of which the coin equipment forms a part; receiver 53, transmitter 54, battery 55, and induction coil 56—57 are the usual parts of the telephone equipment, to which is added the shunt coil 58 and the conductors 59, 60 and 61, connecting with the electrical contact springs 23, 24 and 25 respectively, of the coin equipment. In the induction coil, 56 is the primary and 57 the secondary; the design of the induction coil and transmitting circuits is that electrical speech currents shall be generated in the secondary 57 and thence transmitted over the line wires 50—51, but the contact of springs 23—24 connected with conductors 59—60 has short circuited the ends of secondary 57 and therefore such speech transmission by the usual method is not possible. Also, contact of springs 24—25 connected to conductors 60—61, has placed shunt coil 58 as a shunt upon receiver 53, so that the efficiency of the receiver as a receiver is reduced, and the efficiency of the receiver as a transmitter of speech, to which use it might be adapted by default of the ordinary method of transmission, is very greatly reduced. It is observed, therefore, that the use of the calling device involving two operations of the shaft

10 has practically destroyed the speech-transmission capacities of the substation telephone, while the patron still by the use of the receiver 53 is informed of whatever may happen upon his line, such as the answering of the station called for, or the presence of the busy tone upon the line.

It remains to note that a coin or token of proper size passed into the coin chute 27 at the open end 31, will pass into the coin receptacle 30 and *en route* will deflect the arm 15 into the position 15', thus causing its projection 34 to engage and lift the pawl 16 and to lift the pawl out of engagement with the teeth of the ratchet disk 13, permitting said disk to return to its normal position and permitting electrical contact springs 23, 24 and 25 to separate, restoring speech transmission functions to the telephone equipment of the substation.

If, having connected with a telephone line and having received no response, the calling patron abandon the call and hang his receiver upon the switchhook, the hook, 32, in the downward motion will by engagement of its projection, 33, move the holding pawl 16 to release ratchet disk 13, thereby restoring all parts to normal. Since in most modern automatic telephone systems, the downward movement of the switchhook severs the central office connection, the patron is not permitted to restore his transmitter by the movement of the hook and at the same time retain connection with the called substation.

Although in the drawings and in the description of this invention we have shown the transmitting circuit rendered inoperative by short circuiting the secondary winding of the induction coil, we do not wish to limit ourselves to this method of effecting the desired result, as we understand that this may be accomplished in a variety of ways; as, for instance, in a local battery system, by opening the primary circuit, or in a common battery system by short circuiting the transmitter, or in any system by mechanically placing a damper on the diaphragm of the transmitter.

We understand that many devices of varying mechanical construction might be construed to accomplish practically the results herein shown, but we do not wish to limit ourselves to any specific construction.

What we claim as new and desire to secure by United States patent is:

1. In a coin controlled telephone, transmitting circuits, a receiving circuit, a calling device requiring successive operations to complete a call for which payment is required, means for rendering said transmitting circuits inoperative upon the second or later operation of said calling device, and means for restoring said transmitting circuits to operative conditions by the deposit of a coin or token, substantially as described.

2. In an automatic substation telephone equipment, the combination of a transmitter forming a part of said equipment, a calling mechanism forming a part of said equipment; a movable part of said calling mechanism adapted to be moved successively to obtain a telephone connection of a class for which a charge becomes payable, and means in connection with said movable part adapted to render said transmitter inoperative upon the second or subsequent moving of said movable part, substantially as described.

3. In an automatic substation telephone equipment, the combination of a transmitter forming a part of said equipment, a calling mechanism forming a part of said equipment, a movable part of said calling mechanism adapted to be moved successively to obtain a telephone connection of a class for which a charge becomes payable, means in connection with said movable part adapted to render said transmitter inoperative upon the second or subsequent moving of said movable part, and means for rendering said transmitter operative upon the deposit of a coin or token of predetermined characteristics, substantially as described.

Signed by me at Chicago, county of Cook, and State of Illinois, in the presence of two witnesses.

HAROLD D. STROUD.

Witnesses:

JAMES L. DWYER,
B. R. WERDEN.

Signed by me at Sandusky, county of Erie and State of Ohio, in the presence of two witnesses.

CHARLES W. MAHON.

Witnesses:

CLAUDE B. DE WITT,
H. L. HARRIS.