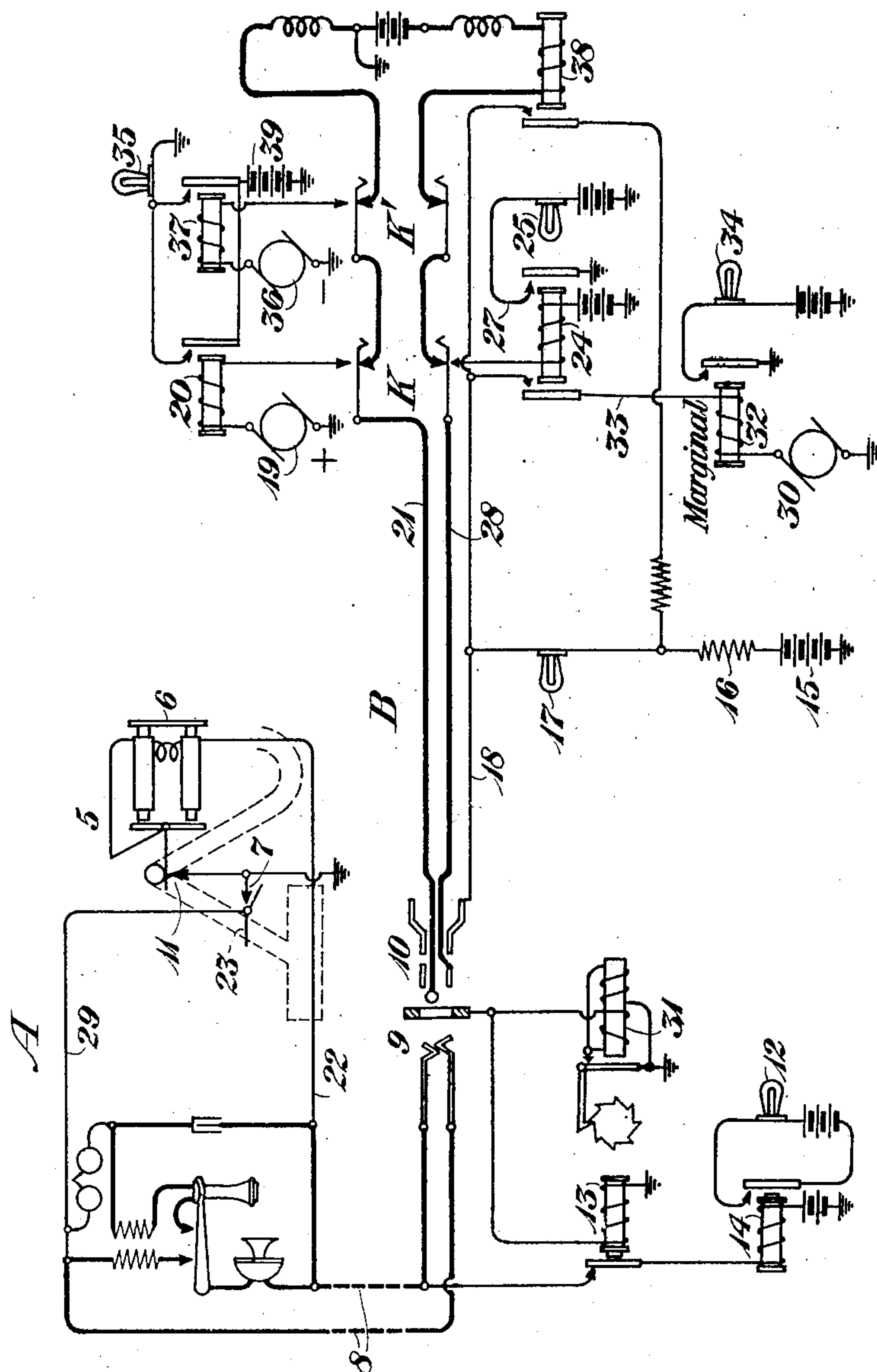


G. K. THOMPSON.
 REGISTERING CIRCUITS FOR COIN BOXES.
 APPLICATION FILED OCT. 17, 1918.

1,340,260.

Patented May 18, 1920.



INVENTOR.
G. K. Thompson
 BY *G. E. Folk*
 ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. THOMPSON, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

REGISTERING-CIRCUITS FOR COIN-BOXES.

1,340,260.

Specification of Letters Patent.

Patented May 18, 1920.

Application filed October 17, 1918. Serial No. 253,637.

To all whom it may concern:

Be it known that I, GEORGE K. THOMPSON, residing at Maplewood, in the county of Essex and State of New Jersey, have invented certain Improvements in Registering-Circuits for Coin-Boxes, of which the following is a specification.

This invention concerns telephone systems in which the prepayment or registration of a coin or other token is necessary to obtain a desired connection. This is usually effected by the calling subscriber depositing in a coin box a coin of the required denomination, thereby signaling a telephone operator by means of a circuit from ground at the substation, through a coin box magnet, over one side of the line to grounded battery at the central office. This circuit energizes a relay and lights a line signal at the central office and informs the operator thereat that a connection is desired. In systems of this character attempts have been made to fraudulently obtain free telephone service by grounding the telephone line independently of the coin box, and losses have also been experienced in collections from coin box service. One of the principal objects of this invention is the detection and prevention of the fraudulent and unauthorized free use of telephone service, this object being accomplished by provision of means whereby the operator is apprised in an unmistakable and simple manner of the abnormal condition of the line. The invention further consists in the provision of means for the registration of all coins that are deposited in the coin box at a sub-station whereby a record is produced at the central office.

In the accompanying drawing is diagrammatically illustrated one embodiment of this invention.

At A is shown a telephone sub-station, and, in addition to the standard telephones and apparatus, a toll apparatus consisting of a coin box 5 having a coin collection and refund magnet 6. The coin box 5 is equipped with a contact 11 by means of which one side of the line may be grounded by the deposit of a coin or token of the required character. The sub-station A is connected by line conductors 8 to jack 9 at a central station B the line also being provided at said station with the usual line and cut-off relays and other equipment in-

cidental thereto, as well as a register 31 for recording the deposit of coins in the coin box. A suitable number of cord or connecting circuits are provided at station B, said cord circuits being adapted for use in switching lines between which connections are desired. In accordance with this invention these cord circuits are equipped with means to detect fraudulent attempts to obtain free service over the line. This circuit with all equipment being of a simple nature will be readily understood from the following description of the operation of the apparatus used in carrying out the invention.

It will be assumed that a subscriber at station A makes a legitimate call in the usual manner—by taking down the receiver and inserting an approved coin in the coin box 5. This closes a contact 11 carried by the armature of the magnet 6 and completes a circuit for the line relay 14 from ground, contact 11, through the windings of the magnet 6, over one side of the line 8, contact and armature of cut-off relay 13, winding of line relay 14 to battery and ground. The line relay 14 is thereby energized and attracts its armature which causes the illumination of lamp 12 thereby attracting the attention of the operator at central station B, who responds by inserting the plug 10 of the cord circuit in the jack 9. A path for current is now provided from ground, battery 15, resistance 16, supervisory lamp 17, conductor 18, sleeve contacts of plug 10 and jack 9, and winding of cut-off relay 13 of the calling line to ground. The lamp 17 is thus caused to be illuminated and the cut-off relay 13 is energized and performs its usual function.

The operator being now connected to the calling subscriber by means of her head set (not shown) and having ascertained the number desired completes the connection in the usual manner. The operator is provided with the usual deposit and refund keys K and K' and upon the completion of a call operates deposit key K so that positive current of 110 volts is sent over the line from ground, source 19, winding of relay 20, upper make contact of key K, conductor 21, tip contacts of plug 10 and jack 9, one side of line conductor 8, conductor 22, through the windings of the polarized magnet 6 and its armature-contact 11 to ground.

The polarized magnet 6 is energized and operates its armature which tilts in a direction to deposit the coin by way of the chute leading to the cash compartment. Auxiliary contacts on the armature which are clearly illustrated and described in Patent No. 846,604, Oswald, March 12, 1907, maintain the circuit through the magnet after the contact 11 has been opened by the coin falling from it, and the armature is held in operated position until key K is released. The relay 20 is also energized over the circuit above traced, thereby causing lamp 35 to glow until the key K is released. The chute leading to the cash receptacle is provided with a lever 23 and upon the passage of a coin to the cash compartment said lever makes momentary contact at 7, and as the operation of the coin deposit key K also closed its lower make contact, the relay 24 is energized over a path for current as follows: from grounded battery, winding of relay 24, lower make contact of key K, conductor 28, ring contacts of plug 10 and jack 9, one side of conductor 8, conductor 29, contact 7 of lever 23 to ground. The energization of relay 24 causes a momentary flash of lamp 25 and also temporarily connects a 39 volt source of current 30 to the sleeve conductor 18 which energizes a register magnet 31 by the following circuit: from ground, source of current 30, winding of relay 32, conductor 33, armature and contact of relay 24, conductor 18, sleeve contacts of the plug and jack, through the windings of the register magnet to ground. The register magnet will thus be energized, thereby setting the register in a well known manner. Upon attracting its armature the register magnet short circuits its right hand high resistance winding, thus increasing the current flow over the circuit above traced so that the marginal relay 32 is operated and causes the lamp 34 to momentarily glow during the energization of relay 24. A record will thus be kept at the central office of the number of coins deposited at that particular substation, furnishing a check on the collections made therefrom and preventing theft by dishonest collectors. By the arrangement just set forth the operator will be informed that a call has been made in a legitimate manner by the sequential illumination of the following lamps: The deposition of a proper coin causes line lamp 12 to light, but this signal is withdrawn by the operator inserting her plug in the jack, and upon the operation of the key K the illumination of the lamp 35 immediately followed by a flash from the lamps 25 and 34 indicates the proper deposit, collection and registration of a coin.

If for any reason it is desired to refund the deposited coin to the subscriber, the refund key K¹ is operated which results in

sending a negative 110 volt current from the source 36 over the line, causing the armature of the coin box magnet to operate and be tilted in a direction opposite that described in connection with the operation of the deposit key K, so that the coin is returned through the refund chute to the subscriber. The circuit for accomplishing this is as follows: from ground and source 36, winding of relay 37, upper make contact of key K¹ through key K, conductor 21, tip contacts of the plug and jack, one side of line 8, conductor 22, windings of the coin magnet and armature 6 to ground. Upon the energization of relay 37 the lamp 35 will be caused to light by a circuit from ground, battery 39, armature and contact of relay 37, through lamp 35 to ground.

Considering now the unauthorized or fraudulent calling conditions or methods of procedure, other than the deposition of a proper coin in the manner prescribed above, and such irregularity would be detected as follows:

If in the attempt to evade payment the conductor 22 is grounded through any other medium than the required coin, the line lamp 12 would be operated as before, but the operator would be apprised of the condition of the line upon the actuation of the deposit key K or refund key K¹. If the ground were removed during conversation the operator upon depressing the key K or K¹ to deposit or return the supposed coin after having received a disconnect signal by means of the relay 38 would obtain no signal from lamps 35, 25 and 34 since no circuit would be completed to ground for the relays controlling these lamps. Should the conductor 22 be grounded again at the close of the conversation to deceive the operator she will, upon actuating the deposit key for depositing the supposed coin cause the lamp 35 to be lighted so long as key K is operated by a circuit from ground and battery 19, winding of relay 20, upper make contact of key K, conductor 21, tip contacts of the plug 10 and jack 9, one side of line 8 to the point grounded. No indications would be had from lamps 25 or 34, however since no ground connection would be established over the ring conductor of the line.

If at the termination of the conversation an attempt should be made to ground the conductor 29, the operator upon actuating the deposit key K would obtain no light from lamp 35, but the lamps 25 and 34 would be permanently illuminated as long as the key K was depressed and the conductor 29 was grounded. If under the above conditions the refund key K¹ should be depressed there would be no signals.

In case the conductor 29 is grounded while the receiver is off the hook both sides

of the line will be grounded and upon the operator actuating the deposit key K to deposit a supposed coin the lamps 35, 25 and 34 will be lighted and remain so until the ground is removed or the deposit key K is returned to normal position. The lamp 35 will light upon the actuation of the deposit key K upon the energization of the relay 20 over a circuit from ground, battery 19, upper make contact of key K , conductor 21, tip contact of plug 10 and jack 9, over one side of the talking conductor 8, switch hook and its contact at the sub-station to the point grounded on conductor 29. The lamp 25 will be lighted under these conditions by the energization of relay 24 over a circuit from grounded battery through winding of relay 24, lower make contact of key K , conductor 28, sleeve contacts of plug 10 and jack 9, over one side of the talking conductor 8 to the grounded point on conductor 29. The energization of relay 24 would in turn cause the energization of the relay 32 which would attract its armature and cause the lamp 34 to be continuously lighted. If the refund key K^1 should for any reason be actuated under the above conditions only the lamp 35 would light. The actuation of the key K^1 would energize the relay 37 and provide a path for current for the lamp 35 from ground, through said lamp, contact and armature of relay 37, battery 39 to ground. Upon the release of the key K^1 relay 37 will be deenergized and retire the light 35. The operator noting the irregular manner in which the lights are illuminated will know that an attempt has been made to evade payment and will report the matter for investigation.

Although in the drawing a number of batteries are indicated, this is merely for clearness and to avoid the delineation of complex circuit arrangements, but in practice as is well recognized, the same battery feeds all of the several circuits.

It will be obvious from the above description that by this improved circuit an effectual means will be furnished for preventing and detecting attempts to evade payment for telephone service, and at the same time to provide means whereby a record of all calls is made and thus serve as a check upon the coins collected from the substation.

While the arrangements of this invention have been illustrated as embodied in certain specific arrangements which have been deemed desirable, it will be understood that they are capable of embodiment in many and widely varied forms without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a telephone toll system, the combination of a central station, a substation, a

line connecting the central station and substation, and a toll device at the substation of a register at the central station, signals at the central station, means at the central station for sequentially operating said signals upon the legitimate operation of the toll device, and means whereby said register is actuated by said means upon the legitimate operation of the toll device.

2. In a telephone toll system, the combination with a central station, a substation, a line connecting the central station and substation, a toll device at the substation, a ground connection for the toll device, a second ground connection for said device, a signal at the central station operable by the first ground connection, and a second signal at said station momentarily operable by the second ground connection.

3. In a telephone toll system, the combination with a central station, a substation, a line connecting the central station and substation, a toll device at the substation provided with a chute leading to a cash receptacle, a ground connection for the toll device operable by a deposited coin, a second ground connection momentarily operable upon the passage of the coin into the cash receptacle, a line signal at the central station operable by the first ground connection, and a plurality of signals at said station sequentially operable by the passage of said coin into the cash receptacle of the toll device.

4. In a telephone toll system, the combination with a central station, a substation, a line connecting the central station and substation, a toll device at the substation, provided with a chute leading to a cash receptacle, a ground connection for the toll device operable by a deposited coin, a second ground connection momentarily operable upon the passage of the coin into the cash receptacle, a register associated with the line at the central station, coin deposit means at the central station, plurality of signals at said station, means responsive to the operation of the coin deposit means for actuating said signals by a circuit extending over one side of the line and said first mentioned ground connection, means for thereafter completing a circuit over the other side of the line and said second ground connection for operating a second signal, means included in said last mentioned circuit for operating said register upon the deposit of a coin at the substation, and means responsive to said register for actuating a third signal.

5. In a telephone toll system, the combination with a central station, a substation, a line connecting the central station and substation, a toll device at the substation, a ground connection therefor operable by a coin, a second ground connection operable upon the completed deposition of said coin,

signaling means at the central station operable over one side of the line by the first ground connection, and sequential signaling means at said station operable by the
5 second ground connection over the opposite side of the line.

6. In a telephone toll system, the combination with a central station, a sub-station, a line connecting the central station and
10 sub-station, a toll device at the sub-station, a ground connection for the toll device operable by a coin, a second ground connection for said device operable by the completed deposition of said coin, a signal at
15 the central station operable by the first ground connection over one side of the line, sequential signaling means at said station, and coin deposit means thereat whereby the sequential signaling means are controlled
20 over the other side of the line.

7. In a telephone toll system, the combination with a central station, a sub-station, a line connecting the central station and sub-station, a device at the sub-station op-

erable by a coin, a ground connection for the
25 device, a second ground connection for said device, successive signaling means at the central station, coin deposit means, and coin refund means, both at said station, whereby the successive signaling means are op-
30 erated in different sequence by the actuation of the coin deposit and coin refund means respectively.

8. In a telephone toll system, the combination with a central station, a register
35 thereat, a sub-station, a line connecting the central station and sub-station, a toll device at the sub-station, coin deposit means at the central station, and signaling means thereat operable upon the actuation of the toll de-
40 vice, and means responding to the deposit of a coin by the coin deposit means to operate said register.

In testimony whereof, I have signed my name of this specification this 15th day of
45 October, 1918.

GEORGE K. THOMPSON.