

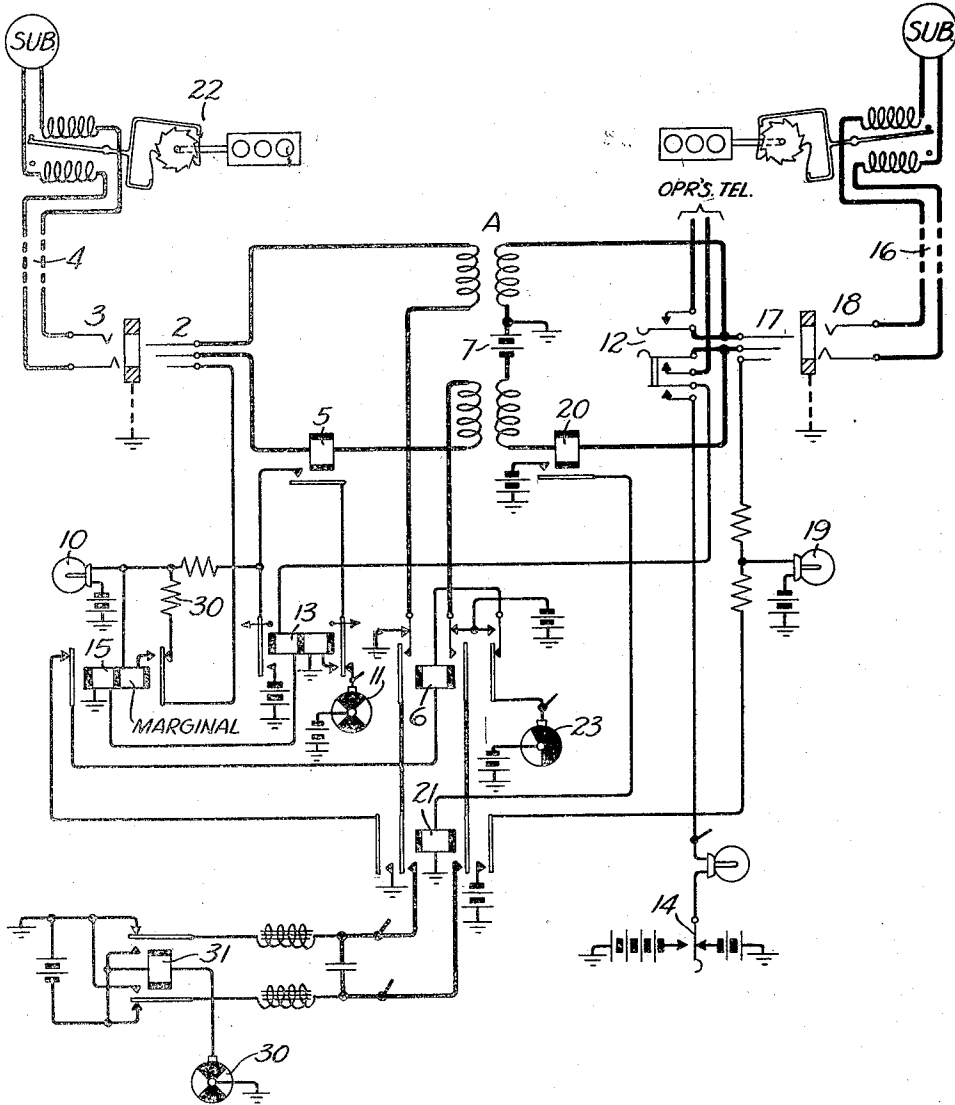
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TELEPHONE EXCHANGE SYSTEM

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TELEPHONE EXCHANGE SYSTEM

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This invention relates to telephone exchange systems and particularly to systems in which the service charge is based on the duration of conversation.

5 The object of the invention is to simplify the equipment used at the central office for controlling and operating the service charging devices and to otherwise improve systems of the above mentioned character.

10 It has been proposed in the past to charge a calling subscriber for the service rendered by means of a meter, located at his substation, which operates in response to reversals of current in the calling line at successive intervals during the period the conversational connection is established between his line and the called line. To this end a current reversing device is provided at the central office and is rendered effective either when connection is completed to the calling line, as by the insertion of the answering plug of a cord circuit, or when the called party answers.

25 In the event the call is one for which the calling subscriber should not be charged, it has been proposed to employ a key in the operator's cord circuit to cancel the charging operation.

30 According to the present invention, an improvement is secured over prior systems by the provision of a cancellation key which is common to a number of connecting circuits, such as operators' cords, and which in conjunction with the individual talking key prepares a circuit to render the registration operation ineffective.

40 This invention has been shown in the accompanying drawing in which it has been incorporated in a cord circuit well known in the art. A calling subscriber's line and a called subscriber's line have also been shown equipped with service meters.

45 A description of a connection through this cord circuit from a calling subscriber to a called subscriber will now be made; first, in connection with a call to be charged for and second, in connection with a free call. When the operator at cord A inserts plug 2 in jack 3 of a calling subscriber's line 4, supervisory relay 5 is operated over a circuit from bat-

tery, right hand inner make-before-break contacts of relay 6, lower left hand winding of repeating coil 7, winding of relay 5, over the calling subscriber's loop back through plug 2 and jack 3 upper left hand winding of repeating coil 7, left hand make-before-break contacts of relay 6 to ground. An obvious circuit for lighting lamp 10 is also completed by the insertion of plug 2 into jack 3. The operation of relay 5 closes an obvious shunt circuit to battery for supervisory lamp 10 through a common interrupter 11. This interrupter alternately closes and opens this shunt circuit and thereby causes lamp 10 to be intermittently lighted and extinguished for supervisory purposes as is well known in the art. The operator now actuates talking key 12 to connect her telephone set across the tip and ring conductors of the cord and to ascertain the number of the desired subscriber. The operation of key 12 also causes the operation of relay 13 over a circuit from battery through the no-charge key 14 which is common to a plurality of cords, over contacts at key 12, left hand winding of relay 13, left hand winding of relay 15 to ground. Relay 15 being marginal does not operate under these circumstances due to the low voltage of the battery at the common key 14. Relay 13 in operating provides a locking circuit for itself through its right hand winding under control of relay 5 and disconnects the interrupter 11 from the circuit for lamp 10 which is now extinguished due to the shunt path to battery established at the inner left hand armature and front contact of relay 13.

55 When the operator receives the number of the wanted subscriber she may complete the connection to this subscriber's line 16 by inserting plug 17 into jack 18. The supervisory lamp 19 is thereby lighted through the sleeve circuit established through plug 17 and jack 18. The desired subscriber may now be rung in the usual manner through the operation of a ringing key (not shown). When the subscriber answers the call, the supervisory relay 20 is operated through the subscriber's loop in the usual manner. Relay 20 in operating closes an obvious circuit for the operation of relay 21 to prepare for

the connection of the meter operating battery to the calling subscriber's meter 22. This battery is also used as the talking battery for the calling subscriber's line in place of the normal connected battery at relay 6. Relay 21 in operating establishes a connection from ground to one side of the relay 6, through the left hand armature and back contact of relay 15. Relay 6 will now operate as soon as the circuit for this relay is completed through its winding and outer right hand armature and back contact, by a common interrupter device 23 when this interrupter connects its live segment to battery. Relay 6 in operating provides a locking circuit for itself independent of the interrupter 23 through its outer right hand make-before-break contacts to battery. This relay also opens the connections to the normal talking battery supplied for the tip and ring conductors of the cord and connects these conductors to the meter operating and talking through the inner right and left hand armatures and front contacts of relay 21 and the armatures of relay 3. The polarity of this battery is reversed at periodic intervals under control of interrupter 30 and relay 31 and will, as is well known in the art, cause the periodic operation of the meter 22 in the calling subscriber's line. Relay 5 may release momentarily during the reversal of battery and in order to prevent the signal 10 from being lighted during these periods relay 13 is made slow to release to remain operated.

When the called party disconnects relay 20 is released, causing the release of relay 21 and thereby disconnects the meter operating and talking battery from the cord circuit. Relay 21 in releasing also causes the release of relay 6 to reconnect the normal talking battery to the calling subscriber's line and when the calling subscriber hangs up his receiver relays 5 and 13 are released, thus removing the shunt for lamp 10 which is now lighted steadily through the sleeve circuit. In case the calling party should recall by operating his switch hook, relay 5 will be re-operated and cause lamp 10 to be alternately lighted and extinguished. The operator would then answer this call by the operation of the talking key 12 and cause relay 13 to operate to again shunt lamp 10 as hereinbefore described.

In case the connection to the desired subscriber is one for which no charge is to be made, the operator will actuate the common no-charge key 14 to cause relay 15 to operate in series with relay 13 when the talking key 12 has been operated. Relay 15 in operating opens at its left hand armature and back contact the circuit for relay 6 and thus prevent its operation when relay 21 is operated at the time the called subscriber answers. As relay 6 does not operate the normal talking battery can not change to the meter op-

erating and talking battery and no charge can be made on meter 22 during this connection. Relay 15 in operating provides a locking circuit for itself through its right hand winding under control of the sleeve circuit. The resistance of this winding replaces the resistance 30 in the sleeve circuit.

It should be understood that while the invention has only been disclosed in connection with one cord circuit it may readily be applied to other systems without departing from the spirit thereof.

What is claimed is:

1. In a telephone system, calling lines, called lines, a plurality of connecting circuits for interconnecting calling lines and called lines for conversation, meters for the calling lines, a device for operating said meters during conversation, and means common to said connecting circuits for rendering said meter operating device ineffective to operate the meter of any one of said calling lines.

2. In a telephone system, calling lines, called lines, a plurality of connecting circuits for connecting calling lines with called lines, meters for said calling lines, means for operating the calling subscriber's meter during conversation, and a key common to a plurality of connecting circuits for controlling the operation or non-operation of any of said meters.

3. In a telephone system, calling lines, called lines, a plurality of connecting circuits for interconnecting calling lines with called lines, a marginal relay in each connecting circuit, meters for said calling lines, means for operating the calling subscriber's meter during conversation, and a key common to a plurality of connecting circuits for actuating the marginal relay of any connecting circuit to render the meter of the connected calling subscriber's line ineffective.

4. In a telephone system, calling lines, called lines, a plurality of connecting circuits for connecting calling lines with called lines, a key in each connecting circuit, meters for said calling lines, means for operating calling line meters while a connection is established, a key common to a plurality of connecting circuits, and means responsive to the operation of the individual key and the common key for disabling said meter operating means.

5. In a telephone system, calling lines, called lines, a plurality of connecting circuits for connecting calling lines with called lines, a key in each connecting circuit, meters for said calling lines, means for operating calling line meters while a connection is established, a marginal relay in each connecting circuit, a key common to a plurality of connecting circuits, and means responsive to the operation of the individual key and the

common key for actuating said marginal relay to disable said meter operating means.

5 6. In a telephone system, calling lines, called lines, a plurality of connecting circuits for connecting calling lines with called
10 lines, a key in each connecting circuit, meters for said calling lines, means for operating the meter of the calling line while a connection is established, a key common to a plu-
15 rality of connecting circuits, and means responsive to the momentary operation of said keys for disabling said meter operating means while a connection is established.

7. In a telephone system, calling lines,
15 called lines, a plurality of connecting circuits for interconnecting calling lines and called lines, meters for the calling lines, a device for operating said meters, and means
20 common to said connecting circuits for rendering said meter operating device ineffective to operate the meter of any one of said calling lines.

8. In a telephone system, calling lines, called lines, a plurality of connecting cir-
25 cuits for connecting calling lines to called lines, meters for said calling lines, means for operating the calling subscriber's meter and a key common to a plurality of connecting circuits for controlling the operation or non-
30 operation of any of said meters.

In witness whereof, I hereunto subscribe my name this 10th day of February, 1930.

CLARENCE B. FOWLER.

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