

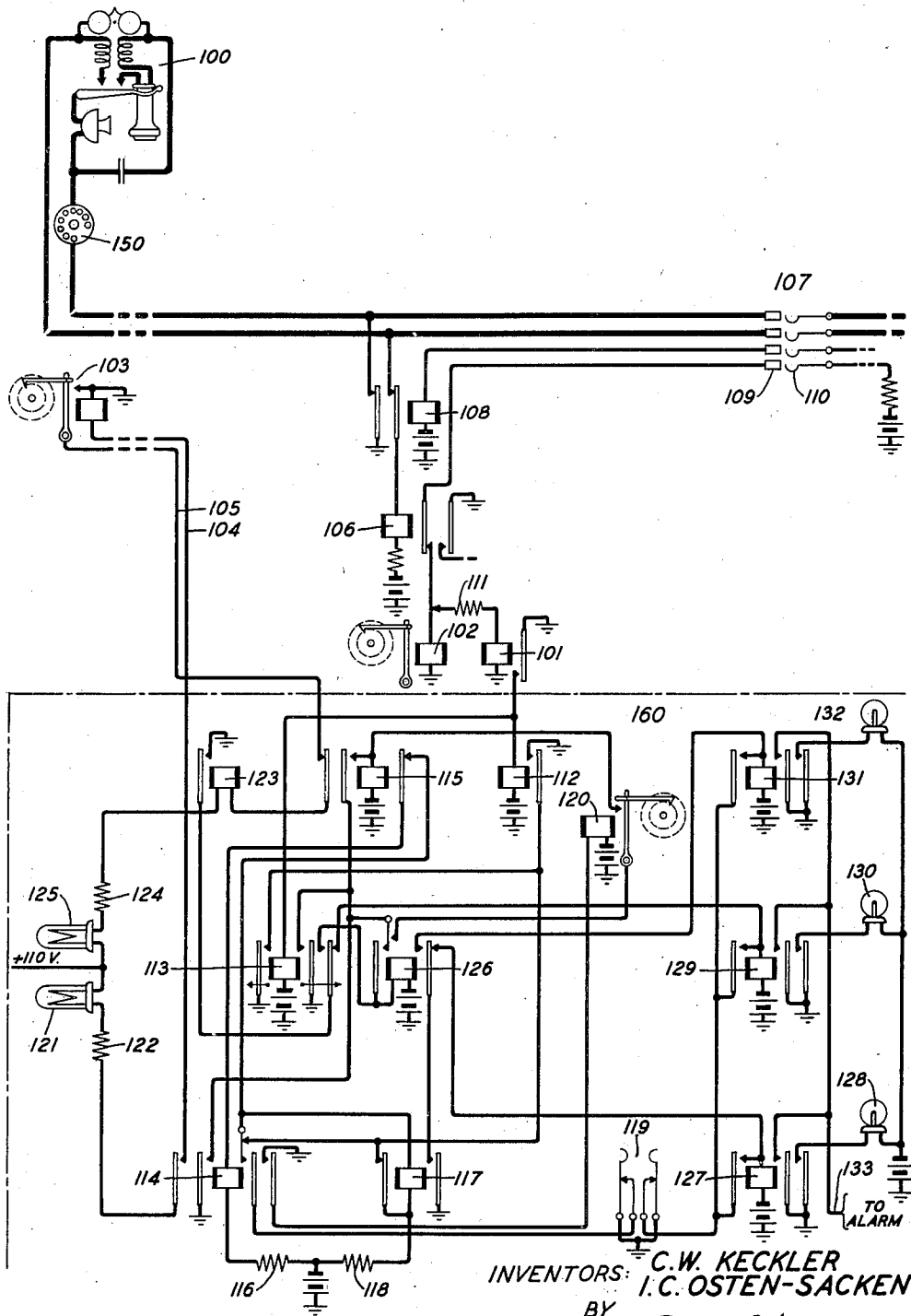
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MESSAGE REGISTRATION CHECKING SYSTEM

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MESSAGE REGISTRATION CHECKING
SYSTEM

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This invention relates to telephone systems and more particularly to a circuit for checking the message registration circuits thereof.

In dial switching telephone areas in which telephone service is sold to subscribers on a metered basis each subscriber's line is equipped at the central office with a message register which is operated to register each successfully completed call from the line. In certain areas the operation of the message register is also dependent upon the zone of the exchange area into which a call is completed and upon the length of time the established connection is held for conversation. For example, if the exchange area is divided into six zones the message register would be operated from one to six times on each call for the initial period of conversation which might be three minutes, dependent upon the zone into which the call is completed and also operated again one or more times, dependent also on the zone, for each overtime period of conversation, for example of five minutes duration.

Circuits for controlling message registration on a zone and overtime basis might be of the character disclosed in Patent No. 1,837,206 granted December 22, 1931 to R. E. Collis. Such circuits are particularly designed to accurately control the message register of a calling subscriber's line to obviate so far as possible false operations thereof which might result in overcharging the subscriber for telephone service. Subscribers at times, however, are not satisfied that they have been correctly billed for service and in order that complaints made by such subscribers may be answered to their satisfaction and to the satisfaction of the operating telephone company, the checking circuit forming the basis of this invention has been designed.

In accordance with the invention, for making a check on the operation of the central office message register of the line of a subscriber who has entered such a complaint, a message register is temporarily installed at the subscriber's substation which he may observe and is connected to the central office in which the line terminates over a spare line circuit in the cable extending to the immediate vicinity of the subscriber's premises. A relay is also connected in parallel with the central office message register of the subscriber's line which operates each time that the central office register operates to establish an operating circuit over one conductor of the spare line circuit for the message register at the subscriber's substation. Thus each operation of the central office register results in an opera-

tion of the register at the subscriber's substation. In order that a check may be made on the operation of the message register at the subscriber's premises a circuit over the other conductor of the spare line circuit is closed on each operation thereof for operating a checking equipment at the central office. This equipment is provided with a checking meter which operates each time that the central office message register operates signal lamps and an alarm circuit for indicating if the substation message register fails to operate or operates falsely or if the checking meter in the checking equipment fails to operate when the subscriber's central office and substation registers both operate.

For a clearer understanding of the invention reference may be had to the following detailed description thereof and the mode of its operation taken in connection with the drawing.

Since the invention is not primarily concerned with the manner in which a connection is extended from a calling subscriber's line to a desired subscriber's line, only so much of the switching equipment has been diagrammatically disclosed as is deemed necessary to illustrate the applicability of the present invention. For a complete disclosure of such switching equipment reference may be had to Patent No. 1,837,206 to Collis hereinbefore referred to. A subscriber's substation equipment of the standard dial type, the central office relay equipment of the subscriber's line and the brushes of a line-finder having access to the terminals of the line are disclosed in the upper portion of the drawing and the message register checking equipment is disclosed in the dot-dash rectangle in the lower portion of the drawing.

It will be assumed that the subscriber whose substation is disclosed at 100 has entered a complaint that he is being overcharged for telephone service and that in response to such complaint the operating telephone company wishes to conduct a check of the service rendered such subscriber. For this purpose the relay 101 is temporarily connected in parallel with the central office message register 102 allocated to the subscriber's line and the contacts thereof are connected to the checking equipment 100. Also a message register 103 is temporarily installed at the subscriber's premises which the subscriber may observe, the operating circuit of which is connected to the checking equipment over one conductor 104 of a spare line circuit extending to the subscriber's premises and the armature contacts of which are connected to the checking equipment over the other

conductor 105 of the spare line circuit. The circuits are now conditioned for checking the metering of service rendered to the complaining subscriber.

It will now be assumed that the subscriber initiates a call by removing his receiver from the switch-hook resulting in the operation of line relay 106 and the starting of the line-finder 107 to search for the terminals of the calling line. When the line-finder finds the line the cut-off relay 108 is operated thereby releasing the line relay 106. As soon as the calling subscriber receives the usual dial tone he proceeds to operate his dial 150 in accordance with the digits of the directory number of the line with which he desires to obtain a connection and the connection is then completed to such desired line in the usual manner. It will be assumed that this line is located in a zone of the exchange which will require that the calling subscriber's message register will be operated twice for the initial three minutes of conversation and twice thereafter for each following five minutes of conversation.

As soon as the called subscriber responds, thus indicating a successfully completed call, the calling subscriber's message register 102 will be operated twice, to register two conversational unit charges, over a circuit extending from ground, winding of register 102, the back contact of line relay 106, brush 109 and terminal 110 of the line-finder 107 to battery. Since the winding of relay 101 is connected through resistance 111 in parallel with the winding of message register 102, relay 101 will also operate and close its contacts twice. Upon each closure of its contacts obvious circuits are established through the windings of relays 112 and 113 in parallel to battery. Relay 112 is quick to operate and release and relay 113 is slightly slow to release but both relays follow the operations and releases of relay 101.

Upon the first operation of relay 112 a circuit is established from ground over its contacts, normal contacts of relay 114, right back contact of relay 115, winding of relay 114, resistance 116 to battery and from ground over the contacts of relay 112, normal contacts of relay 114, winding of relay 117, resistance 118 to battery and, to insure that relay 114 will fully operate to close its locking contacts before relay 112 releases, a second operating ground is supplied to the operating circuit of relay 114 from the left front contact of relay 113. Relay 114 upon operating locks independently of relays 112 and 113 in a circuit from battery through resistance 116, winding of relay 114, right back contact of relay 115, right alternate contacts of relay 114 to ground at the left normal contacts of release key 119. Relay 117, however, does not operate at this time since its winding is shunted over a circuit from ground at the left front contact of relay 113, back contact and winding of relay 117, normal contacts of relay 114 to ground at the front contact of relay 113 or after relay 114 operates over the right alternate contacts thereof to ground at the left contacts of key 119.

When relay 114 operates it closes over its outer right front contact an obvious circuit for checking meter 120 and also closes a circuit extending from the central office source of 110-volt positive potential through ballast lamp 121, resistance 122, outer left front contact of relay 114, spare line conductor 104 to ground through the message register 103 at the subscriber's premises. Thus in response to the first operation of the subscriber's central office message register 102 and relay

101 the subscriber's substation message register 103 and the checking meter 120 should both operate. After the opening of the operating circuit of message register 102, relays 101 and 112 release but relay 113 being slow to release remains operated for a long enough interval to insure that the message register 103 has been operated.

If the message register 103 operates a circuit is closed thereby from ground over conductor 105, left back contact of relay 115, winding of relay 123, through resistance 124 and ballast lamp 125 to the source of 110-volt positive potential thus operating relay 123. When relay 123 operates and before relay 113 has time to release, a circuit is established from ground over the contacts of relay 123, outer right front contact of relay 113, winding of relay 126 to battery. Relay 126 operates locking over its outer left front contact to ground at the inner left contact of relay 114 and closing a circuit for operating relay 115 if the checking meter 120 has operated. This circuit extends from ground over the inner left front contact of relay 114, left contacts of relay 126, contacts closed by the operation of meter 120, winding of relay 115 to battery. Relay 115 upon operating locks over its left front contact to ground at the inner left front contact of relay 114 and at its back contacts opens the operating circuit of relay 123 and the locking circuit of relay 114 and these relays now release, relay 114 opening the operating circuits of meter 120 and message register 103. Since by this time relay 113 will have released relay 114 opens the locking circuits of relays 115 and 126 which also release.

On each subsequent operation of message register 102 the circuits function in the manner described whereby the message register 103 at the subscriber's substation and the checking meter 120 operate each time that the subscriber's central office message register 102 operates.

Should the substation message register 103 fail to operate during the interval that relays 112 and 113 remain operated no operating circuit for relay 123 will be closed and therefore relays 126 and 115 will not be operated and relay 114 will remain locked under the control of key 119. When thereafter relays 112 and 113 release the shunt around the winding of relay 117 will be opened and relay 117 will thereupon operate in a circuit from battery through resistance 118, winding of relay 117, alternate contacts of relay 114 to ground at the left contacts of key 119. With relay 117 operated and relay 126 released a circuit is established from ground at the right contacts of relay 117, right back contact of relay 126, winding of relay 127 to battery. Relay 127 operates and locks over its left front contact, to ground at the right contacts of release key 119 and at its right contacts closes the circuit of signal lamp 128 and a circuit to an alarm device 133. An attendant hearing the alarm device and noting lamp 128 lighted knows that the substation message register has failed to operate.

Should the substation message register 103 be operated falsely or its armature becomes grounded or should a cross occur between the conductors 104 and 105 of the spare line circuit, relay 123 will be operated and with relay 113 unoperated a circuit will be established from ground over the contacts of relay 123, back contacts of relay 113, winding of relay 129 to battery. Relay 129 will operate, lock over its left front contact to ground at the right contacts of key 119, close the circuit of alarm device 133 and

close the circuit of lamp 130. The attendant noting that lamp 130 is lighted will know that an unstandard condition exists at the substation message register or on the spare line circuit.

Should the checking meter 120 fail to operate while the message registers 102 and 103 are both operated and relays 101, 112, 113, and 114 are operated relay 123 will operate as before described, upon the operation of the substation message register 103, and will in turn cause relay 126 to operate and lock until the control of relay 114. Relay 115 will not operate, however, since its circuit is dependent on the operation of meter 120 and meter 120 has failed to operate. Since relay 115 does not operate relay 114 remains locked up under the control of key 119 and when relays 112 and 113 have both released following the operation of message register 102 the shunt will be removed from the winding of relay 117 and relay 117 will operate. A circuit is now established from ground over the right contacts of relay 117, right front contacts of relay 126, winding of relay 131 to battery. Relay 131 operates, locks over its left front contact to ground at the right contacts of key 119 and closes the circuit of alarm device 133 and the circuit of lamp 132. The lighting of lamp 132 indicates to the attendant that the checking meter 120 has failed to operate.

The attendant may cause the restoration of operated relays in the checking circuit by operating the release key 119, the release of an operated alarm relay 127, 129 or 131 extinguishing the signal lamp controlled thereby and stilling the alarm device 133.

At the end of an observation period the three message registers 102, 103, and 120 should have registered the same number of conversational units. The subscriber may therefore check the number of units for which he is billed against the number or units registered by the register at his substation and the checking attendant may check the reading of the checking meter 120 with the readings of the register 102. The signal devices afford means for detecting any unstandard conditions existing at the substation message register or control line circuit extending to the subscriber's premises, caused either accidentally or by the subscriber, which would cause a discrepancy between the readings of the substation register 103 and the central office register 102.

What is claimed is:

1. In a telephone system, a subscriber's line, a call registering device for said line at the central office, means at the central office for operating said registering device and a checking circuit comprising a registering device located at the substation of said line and a checking meter at the central office both operable in response to the operation of said first registering device.

2. In a telephone system, a subscriber's line, a call registering device for said line at the central office, a call registering device for said line at the subscriber's station, means at the central office for operating said first registering device, means controlled in the operation of said first

registering device to operate said second registering device, means at said central office responsive to the operation of said second registering device and a signal operable if said means fail to respond to indicate an operating failure of said second registering device.

3. In a telephone system, a subscriber's line, a call registering device for said line at the central office, a call registering device for said line at the subscriber's station, means at the central office for operating said first registering device, means controlled in the operation of said first registering device to operate said second registering device, a relay at said central office responsive to the operation of said second registering device and a signal operated thereby if said second registering device has operated while said first registering device is unoperated to indicate a false operation of said second registering device.

4. In a telephone system, a subscriber's line, a call registering device for said line at the central office, means at the central office for operating said registering device, a call registering device for said line at the subscriber's station, a two-conductor control circuit extending from the central office thereto, means controlled in the operation of said first registering device to operate said second registering device over one of said conductors, a relay at said central office operable over the other of said conductors and a signal operable in response to said relay if an unstandard condition exists at said second registering device or on the control circuit extending thereto.

5. In a telephone system, a subscriber's line, a call registering device for said line at the central office, a call registering device for said line at the subscriber's station, a checking meter at the central office, means at the central office for operating said first registering device and means controlled in the operation of said first registering device to operate said second registering device and said checking meter.

6. In a telephone system, a subscriber's line, a call registering device for said line at the central office, a call registering device for said line at the subscriber's station, a checking meter at the central office, means at the central office for operating said first registering device, means controlled in the operation of said first registering device to operate said second registering device and said checking meter, signaling means and means for operating said signaling means if at the time said first and second registering devices operate said checking meter fails to operate.

7. In a telephone system, a subscriber's line, a call registering device for said line at the central office, means at the central office for operating said registering device and a checking circuit comprising a registering device located at the substation of said line, a checking meter at the central office both operable in response to the operation of said first registering device, and signals for indicating if said substation registering device fails to operate or operates falsely or if said checking meter fails to operate.

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