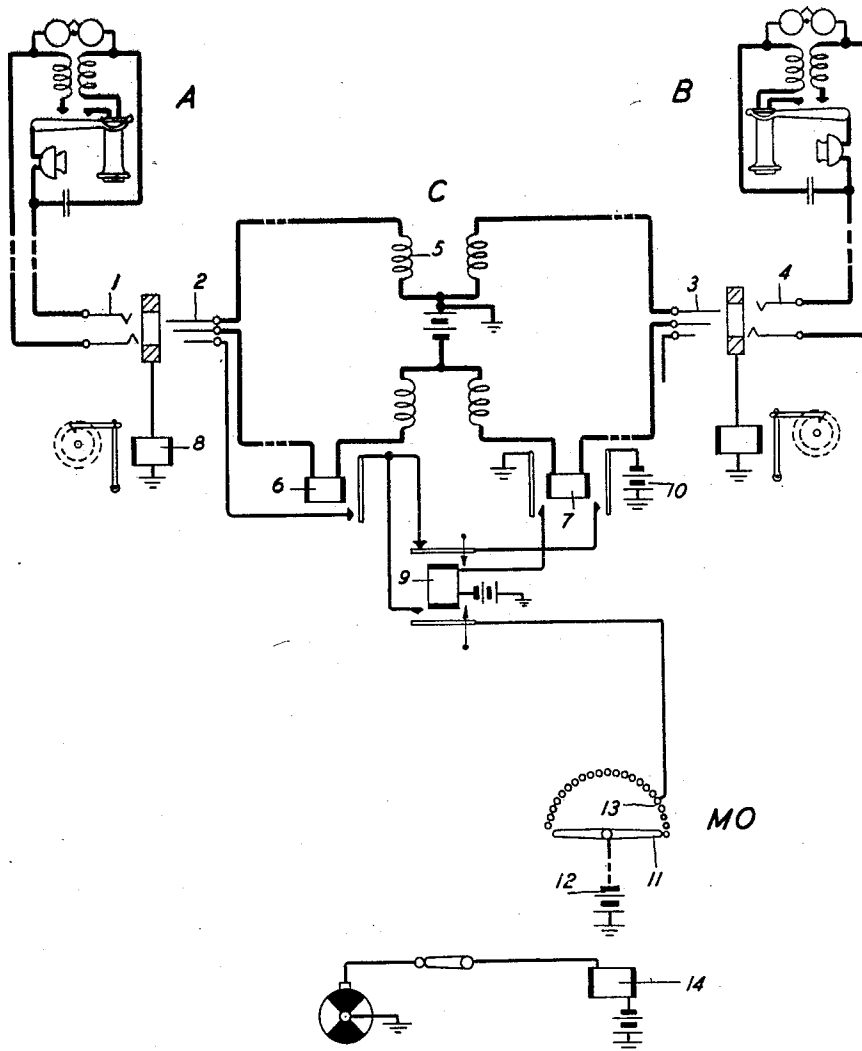


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COMMUNICATION SYSTEM

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COMMUNICATION SYSTEM

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This invention relates to communication systems, such as telephone and telegraph systems, and particularly to service-charging arrangements utilized therein to make the necessary charges for the service rendered.

The objects are to secure a more equitable plan of charging for the use of the equipment involved in the establishment and maintenance of a communication connection, to simplify and improve the apparatus used for making a service connection charge and for making repeated charges based on the duration of the communication, and to otherwise effect improvements in systems and apparatus of this character.

It has been suggested heretofore to make service charges against the calling subscribers in a telephone system by means of a meter-operating device which is common to a plurality of link circuits and which associates itself with each link taken for use in the establishment of the connection and remains associated with the link throughout the conversation to effect repeated operations of the subscriber's meter.

According to the present invention, improvements and advantages are secured over these prior arrangements by means of a system in which the calling subscriber's meter is automatically operated to make a single charge for the establishment of a service connection with a called subscriber, and in which a common meter-operating device, repeatedly making a survey of all link circuits, becomes effective to cause the operation of the calling subscriber's meter each time during the continuance of the conversation that the device encounters the link circuit involved.

The drawing accompanying this specification illustrates a portion of a telephone exchange system in which subscribers' lines appear at an operator's position equipped with a plurality of cord circuits for effecting connections between said lines. The drawing

also illustrates a meter operator common to the cord circuits.

The subscribers' lines such as the lines A and B, appear at the operator's position, the lines A and B terminating in jacks 1 and 4 respectively. The lines are equipped with service meters, the meter 8 being individual to subscriber's line A. The operator's position is provided with a plurality of cord circuits, such as the cord C having the answering plug 2 and calling plug 3. The cord C further comprises a repeating coil 5 and answering and calling supervisory relays 6 and 7 respectively. The meter operator MO is common to a plurality of cord circuits C and is continuously operating to advance the brush 11 from terminal to terminal, thus making a repeated survey of all cords C to determine which ones are carrying calls and to make the necessary charges against the calling lines. The operator MO is controlled by any suitable clock mechanism and may be so timed as to repeat the test of any cord circuit at the end of a desired interval, such as a one minute, three minute, or five minute interval.

Assume that the subscriber of line A desires to hold conversation with the subscriber of line B. The operator responds to the initiation of the call by inserting the plug 2 of the idle cord circuit C in the jack 1. The insertion of the plug in the jack closes a circuit from the positive pole of battery through the upper left winding of repeating coil 5, thence over the tip of the plug 2 and jack 1, over the loop of the line A, and returning over the ring side of the connection through the supervisory relay 6 and the lower left winding of coil 5 to the opposite pole of battery. Relay 6 operates in this circuit. The operator ascertains the designation of the called line and completes the connection by inserting the plug 3 in the jack 4. The insertion of this plug completes a similar circuit through the right windings

of the repeating coil 5, and relay 7 operates when the called subscriber answers.

A service connection having thus been established, it is desirable to charge the calling subscriber therefor whether conversation ensues or not. This initial service charge is effected by means of the meter-operating battery 10. As soon as the supervisory relay 7 operates as above described, it completes a circuit from battery 10 through the right contact of said relay, upper contact of slow-to-operate relay 9, contact of relay 6 through the sleeve of the plug 2 and jack 1 and the winding of the service meter 8 to ground. The meter 8 is operated in this circuit to make the initial service charge. The relay 7 at its left contact also closes an obvious circuit for relay 9. Relay 9, however, being slow to operate, maintains its upper contact closed for an interval sufficient to insure the actuation of the meter 8. When relay 9 finally operates, it disconnects the metering source 10 and permits the meter 8 to release its armature.

Relay 9 at its lower contact connects the circuit extending from meter 8 to the terminal 13 in the meter operator MO. As soon thereafter as the brush 11 is driven by the magnet 14 to the terminal 13, a circuit is completed from the meter-operating battery 12 through the brush 11, terminal 13, lower contact of relay 9, contact of relay 6, and thence through the winding of meter 8 to ground. The meter 8 is operated in this circuit to establish the first charge based on the duration of conversation. The brush 11 continues to advance from position to position testing the successive cord circuits C and operating all meters of calling subscribers' lines involved in conversation. If the connection between the lines A and B continues for a full conversational interval, brush 11 again returns to the contact 13, and a second charge is made against the subscriber's line 1. This operation continues so long as the conversational connection is maintained.

At the end of conversation the subscribers replace their receivers on the switchhook and relays 6 and 7 release. Relay 7 permits the release of relay 9 and also disconnects the metering battery 10 to prevent a false operation of the calling subscriber's meter. Relay 6 on releasing opens the metering circuit at a second point. The operator disconnects the subscribers' lines by removing the plugs 2 and 3 from the respective jacks.

While the invention has been illustrated in connection with a manual system, it will be understood it is not so limited but may be applied equally as well to automatic telephone systems or to other types of systems. It will also be understood that various types of switching circuits and cord circuits may be employed and that numerous modifications of the meter operator may be utilized

without departing from the scope of the invention.

What is claimed is:

1. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits, meter-operating means associated with said circuits and adapted to register the establishment of service connections for said lines, a meter operator common to and periodically surveying said circuits, and means associated with said circuits for rendering said operator effective to register time intervals of service.

2. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits, individual meter-operating means for each of said circuits for causing a registration for the establishment of a service connection over one of said connecting circuits, a meter operator common to and periodically surveying said connecting circuits, and means associated with said connecting circuits for rendering said operator effective to register time intervals of service.

3. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits for establishing a communication connection between any two of said lines, means responsive to the establishment of a connection between a calling line and a called line for operating the meter of the calling line, a meter-operating device common to and periodically surveying said connecting circuits, and means dependent upon the condition of said connecting circuits for rendering said operator effective to repeatedly operate the meters of said lines.

4. In combination, telephone lines, meters associated with said lines, cord circuits for establishing connections between calling lines and called lines, meter-operating means for causing the operation of a calling line meter in response to the establishment of a service connection with a called line, a meter operator common to said cord circuits and operating to periodically survey said circuits to determine which ones are involved in conversational connections, and means controlled by the cord circuits involved in conversational connections for rendering said operator effective to cause the operation of the calling line meters.

5. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits, meter operating means associated with said circuits and adapted to register the establishment of service connections for said lines, a meter operator common to said circuits for periodically surveying said circuits in succession and means associated with said circuits for rendering said operator effective to register time intervals of service.

6. The combination of lines to be connect-
ed for communication service, meters associ-
ated with said lines, connecting circuits, me-
ter operating means associated with said cir-
cuits and adapted to register the establish-
ment of service connections for said lines, a
meter operator common to said circuits in-
cluding a step-by-step switch for periodically
surveying said circuits in succession, and
means associated with said circuits for ren-
dering said operator effective to register time
intervals of service.

In witness whereof, I hereunto subscribe
my name, this 12th day of May, 1930.

JOHN G. ROBERTS.