

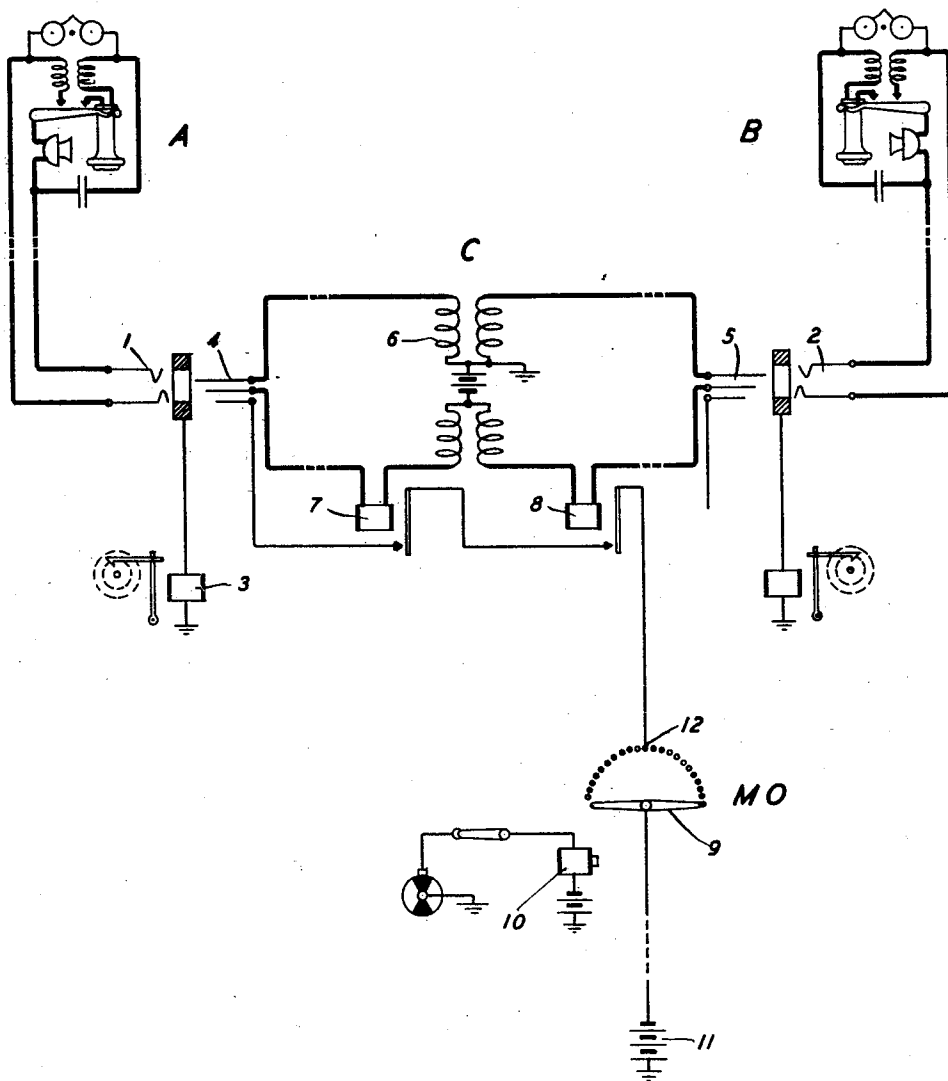
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COMMUNICATION SYSTEM

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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 employed therein to make the necessary charges for the service rendered.

The objects of the invention are to simplify and to render more reliable the equipment employed in communication systems for making service charges based on the duration of the communication and to otherwise effect improvements in systems and apparatus of this character.

It has been proposed heretofore to charge the calling subscribers in a telephone system for the service rendered by providing in common to a plurality of link circuits a meter-operating device which automatically becomes associated with each link utilized in establishing a telephone connection and serves to periodically operate the calling subscriber's meter during the time the connection is held for conversation.

According to the present invention, improvements and advantages are secured over these prior arrangements by means of a system in which the common meter-operating device, instead of definitely associating itself with any link throughout the duration of a conversation held over such link, makes a periodic survey of all links to which it is common, and, upon finding any link involved in a connection between two subscribers' lines, proceeds to operate the meter of the calling subscriber. By regulating the cycle of operation of the common meter operator, the interval between successive tests of any link circuit may be fixed at any desired value, such as one minute, three minutes, five minutes, or a fractional part of a minute.

The drawing accompanying this specification illustrates a portion of a telephone exchange system, showing two subscribers' lines and one of a plurality of operator's cord circuits for joining the lines in conversation, together with the common meter-operating device.

The subscriber's lines, including the lines A and B, appear at the operator's position in the jacks at the central office, line A terminating in the jack 1 and the line B terminating

in the jack 2. Each subscriber's line is equipped with a service meter such as the meter 3 connected to the line A. The operator's position is provided with a plurality of cord circuits C, any one of which may be employed by her for establishing a conversational connection between two subscribers' lines. The cord circuit C comprises the answering plug 4, the calling plug 5, the repeating coil 6, and answering and calling supervisory relays 7 and 8, respectively.

The central office is also equipped with a meter operator MO which is common to a plurality of operators' cord circuit C. The meter operator MO comprises a stepping switch or contact maker consisting of a brush 9 and a contact bank, the brush 9 being driven by any suitable means such as a stepping magnet 10, and also a source of meter-operating current 11. The terminals of the contact bank of the meter operator are connected to the various cord circuits to which the device is common. The speed of operation of the brush 9 is such that it makes engagement with any given terminal once in a predetermined interval, such as once in one minute, three minutes, or five minutes. If, at the time the brush 9 encounters the terminal individual to any particular cord circuit C, that cord is involved in a conversational connection between two subscribers' lines and the parties are actually conversing, a circuit is established through the supervisory relays for effecting a single operation of the subscriber's meter.

Assume, for example, that the subscriber of line A desires to hold a conversation with the subscriber of line B. When the call is initiated, the operator responds to the usual calling signal by inserting the answering plug 4 in the jack 1 of the subscriber's line. After ascertaining the designation of the wanted line, the operator inserts the calling plug 5 of the cord C in the jack 2 of the subscriber's line B and applies signaling current in the well-known manner. The answering supervisory relay 7 is operated by means of a circuit from the positive pole of the battery through the upper left winding of repeating coil 6, thence over the tip of the plug

4 and jack 1, over the loop of the calling line A, and returning through the jack and plug, through the supervisory relay 7, lower left winding of the coil 6 to the opposite pole of battery. Relay 7 operates in this circuit. When the called subscriber answers, the loop of substation B is closed, and a circuit is completed from positive pole of battery through the upper right winding of coil 6, thence over the called subscriber's loop, and returning through the winding of relay 8 and the lower right winding of the coil 6 to the opposite pole of battery. The supervisory relay 8 operates in this circuit.

In the meantime, the meter operator MO is advancing from one terminal to another. As soon after both supervisory relays 7 and 8 have operated as the brush 9 encounters the terminal 12, a circuit is established from the meter-operating battery 11, brush 9, terminal 12, contacts of relay 8 and 7, through the sleeve of the plug 4 and jack 1 and the winding of the meter 3 to ground. The meter 3 operates in this circuit to assess a single charge against the calling line A. The meter operator MO continues to advance over succeeding terminals, making the same test and operating the meters of such lines as are found to be involved in conversations. Should the conversation between the subscribers of lines A and B continue for a full predetermined interval, the brush 9 completes its cycle and again advances to the terminal 12, and a second charge is made. This process will continue so long as the subscribers have their receivers off the switchhooks.

At the end of conversation, the subscribers replace their receivers on the switchhooks, and the supervisory relays 7 and 8 release whereby no further operation of the meter 3 can take place. The operator disestablishes the connection by removing the plugs 4 and 5 from the respective jacks.

Although the operator's cord circuit has been shown in diagrammatic manner, it will be understood that any suitable type of cord circuit may be employed, that the manner in which the test is made to determine whether the cord is involved in a conversation may be accomplished in numerous ways, and that the operating circuit for the meter may be established in any suitable manner. It will also be understood that the invention is not limited to a system employing operators' cord circuits but is applicable as well to automatic systems in which links terminating in automatic switches are involved. It will also be understood that the meter-operating device may take numerous forms and is not limited to the particular embodiment shown in the drawing.

What is claimed is:

1. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits, a

meter operator common to and periodically surveying said circuits in succession, and means associated with said circuits for rendering said operator effective to register time intervals of service.

2. The combination of stations to be connected for communication service, individual meters for said stations, connecting circuits for joining two stations, a meter operator common to said connecting circuits and serving to make periodic tests of said circuits in succession, and means associated with said circuits for rendering said meter operator effective to register intervals of service.

3. In combination, lines to be connected for communication service, meters associated with said lines, link circuits for joining any two of said lines, a contacting device common to and periodically surveying said circuits in succession, and means dependent upon the condition of said circuits for rendering said contacting device effective to operate one of said meters.

4. In combination, subscribers' lines, meters associated with said lines, a plurality of cord circuits for joining said lines for conversation, a meter operator common to said cord circuits and actuated to periodically survey said circuits in succession, and means dependent upon the condition of a cord circuit for rendering said meter operator effective to actuate one of said meters.

5. The combination of lines to be connected for communication service, meters associated with said lines, connecting circuits, a meter operator common to said circuits including a step-by-step device for periodically surveying said circuits in succession, and means associated with said circuits for rendering said operator effective to register time intervals of service.

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

AMOS F. DIXON.