

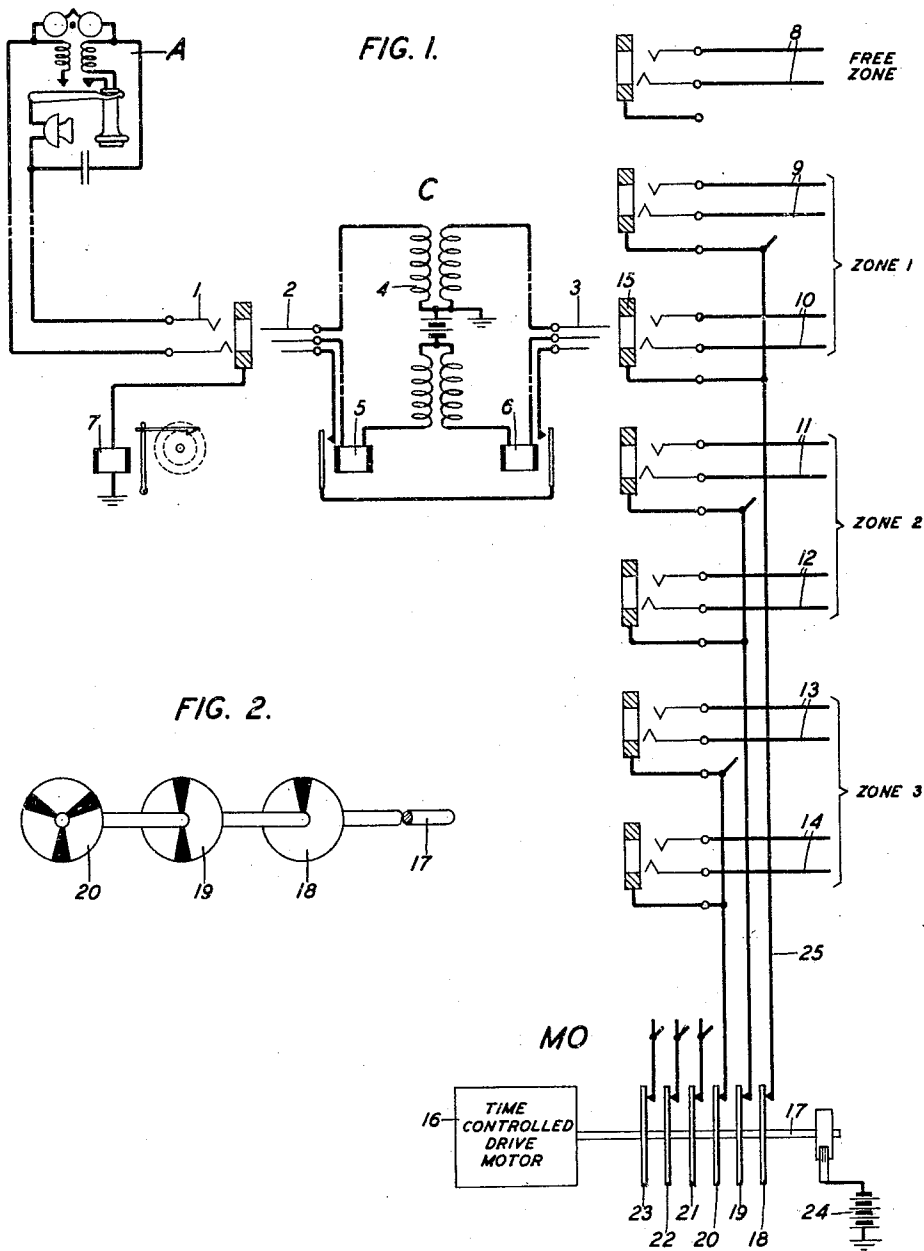
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L. KELLER

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COMMUNICATION SYSTEM

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MO

TIME CONTROLLED
DRIVE
MOTOR

INVENTOR
L. KELLER

BY

M. P. McFadden

ATTORNEY

UNITED STATES PATENT OFFICE

LEO KELLER, OF NEW YORK, N. Y., ASSIGNOR TO BELL TELEPHONE LABORATORIES,
INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

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 for making the necessary charges for the service rendered.

The objects of the invention are to simplify and to render more reliable the equipment utilized in communication systems for making service charges based on such factors as the duration of the communication and the distance involved, to render this equipment more efficient, and to otherwise improve systems and apparatus of this nature.

It has been proposed heretofore to charge the calling subscriber in a telephone system for his telephone service on the basis of the duration of a telephone call and the distance or length of line involved between the calling and called stations. It has also been proposed to employ meter-operating devices common to a number of link circuits for assessing periodic charges during the conversation.

According to the present invention, improvements and advantages are secured over these prior arrangements by means of a system in which a meter-operating device is provided in common to various groups of trunks outgoing to different zones or destinations, which device makes repeated and periodic surveys of all trunk circuits, and, upon finding any one thereof involved in a conversational connection, proceeds to operate the meter of the calling subscriber's line. The meter-operating device is also arranged to distinguish between different zones or classes of connections and to operate the subscriber's meter a variable number of times for each predetermined period, the number of operations so made depending upon the nature of the zone.

In the drawings, Fig. 1 illustrates a portion of a telephone system involving a subscriber's line, a plurality of trunks outgoing to different zones, and one of a plurality of operator's cord circuits for establishing connections between calling lines and said trunks,

together with a meter-operating device common to the trunks.

The subscribers' lines appear in the central office in jacks before an operator's position, the line A, for instance, terminating in the jack 1. These lines are equipped with service meters, the meter 7 being individual to the line A. Also appearing in the operator's position are a plurality of groups of trunk circuits. Four different groups of trunks are illustrated in the drawings. The trunk 8, for instance, represents a group of trunks which extend to a free zone, that is to say, calls extended over any of these trunks are not chargeable to the calling subscriber. The next group of trunks extends to zone 1, two of these trunks, 9 and 10, being illustrated. The next group extending to zone 2 includes the trunks 11 and 12. The next group extending to zone 3 includes the trunks 13 and 14.

The operator's position is also equipped with a plurality of cord circuits such as the cord C for extending calling subscribers' lines over any of the trunks outgoing from the position. The cord C includes the answering plug 2, the calling plug 3, a repeating coil 4, and the supervisory relays 5 and 6.

The central office is provided with the meter operator MO, which is common to all trunk circuits and comprises a plurality of circuit closing discs 18 to 23 inclusive together with a time-controlled driving device 16 and a meter-operating battery 24. The discs 18 to 23, as more clearly seen in Fig. 2, are provided with different numbers of conducting segments for the purpose of closing a meter-operating circuit a variable number of times depending upon the disc over which the circuit extends. The disc 18, for example, closes the operating circuit once for each revolution of the shaft 17. The disc 19 closes the circuit twice per revolution and disc 20 three times per revolution of the shaft. By assigning the disc 18 to the trunks of zone 1,

the subscribers' meters will be operated once for each rotation of the shaft 17, the speed of which may be selected such that an interval of a fraction of a minute, one minute, three minutes, or five minutes, or any other desired number of minutes, is measured by one rotation of the shaft. The disc 19 may be assigned to zone 2, which means that the subscriber's meter will be operated twice for each predetermined interval of conversation when a call is extended into this zone. Similarly, a call extended into zone 3 will involve three operations of the subscriber's meter per interval.

Assume that the subscriber of line A desires to establish a connection into zone 1. In response to the initiation of the call, the operator inserts the plug 2 of cord circuit C into the jack 1. The insertion of the plug in the jack completes a circuit from the positive pole of the battery through the upper left winding of repeating coil 4, through the tip of the plug and jack, over the loop of the line A and returning through the ring of the jack and plug, winding of supervisory relay 5, lower left winding of the coil 4 to the opposite pole of battery. Relay 5, operates in this circuit. Upon ascertaining the destination of the call, the operator inserts the calling plug 3 in the jack 15 of an idle trunk 10 extending into zone 1. When the called subscriber answers the loop is closed in the well-known manner and current flows through the supervisory relay 6 causing it to operate.

In the meantime, the meter operator MO is continuing to advance the impulse discs. As soon after the operation of relays 5 and 6 as the impulse disc 18 closes a metallic segment, a circuit is completed from the meter-operating battery 24, through the shaft 16, thence through the metallic segment of disc 18, conductor 25, through the sleeve of the jack 15 and plug 3, contacts of relays 6 and 5, sleeve of the plug 2 and jack 1, winding of the meter 7 to ground. Meter 7 operates to make one assessment against the subscriber for the predetermined interval. At the end of this interval, shaft 17 will have made a complete revolution bringing the insulating segment into the circuit, permitting the release of the register 7. If the conversation continues for more than the predetermined interval, the impulse disc 18 again closes its metallic segment to cause a second operation of the meter 7. This process will continue as long as the supervisory relays 5 and 6 are operated.

At the end of conversation, the subscribers replace their receivers on the switchhooks, and relays 5 and 6 release, thereby preventing the further operation of the calling subscriber's meter 7. The operator disestablishes the connection by removing the plugs 2 and 3 from their respective jacks.

Should the connection be extended into zone 2, the disc 19 becomes effective and closes the meter-operating circuit three times for each predetermined interval. Similarly, should the connection be extended into zone 3, the calling subscriber's meter is operated four times per interval. Should a connection be extended into the free zone over trunk 8, no assessment is made since the sleeve of this trunk is not connected to any one of the impulse discs of the meter operator MO.

It will also be noted that as many connections may be established into any one zone as there are trunks in that zone. The meter operating device NO causes the operation simultaneously of all subscribers' meters involved in connections into such zone.

While the invention has been illustrated in connection with a manual system, it will be understood that it is not so limited, but may be applied equally as well to automatic 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 various modifications of the meter operator may be utilized without departing from the spirit of the invention.

What is claimed is:

1. The combination of lines to be connected for communication, meters associated with said lines, a plurality of groups of connecting circuits extending to different zones, a zone meter operator common to and periodically surveying the circuits of each group, and means associated with said circuits for rendering said operator effective in accordance with the zone to register time intervals of service.

2. The combination of lines to be connected for communication, meters associated with said lines, a plurality of groups of connecting circuits of different character, a meter operator for periodically surveying the circuits of each group and for operating said meters in accordance with the group used for communication, and means associated with said circuits for rendering said operator effective to register time intervals of service.

3. In combination, subscribers' lines to be connected for communication, meters associated with said lines, a plurality of groups of trunks, each group extending to a different zone, a meter-operating mechanism common to and operating to periodically survey the trunks of each of said groups, and means depending upon the groups of trunks over which subscribers' lines are connected for rendering said operator effective to variably operate said meters to register time intervals of service.

4. In combination, a plurality of subscribers' telephone lines, an operator's position in which said lines terminate, cord circuits at said position, a plurality of groups of trunks outgoing from said position, each group ex-

tending to a different zone, a meter-operating device common to said trunks and periodically surveying the trunks of each group, and means depending upon the trunk group over which a connection is extended and depending upon the condition of the cord circuit involved in such connection for rendering said operating device effective to variably operate the meter of the calling subscriber's line to register time intervals of service.

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

LEO KELLER.