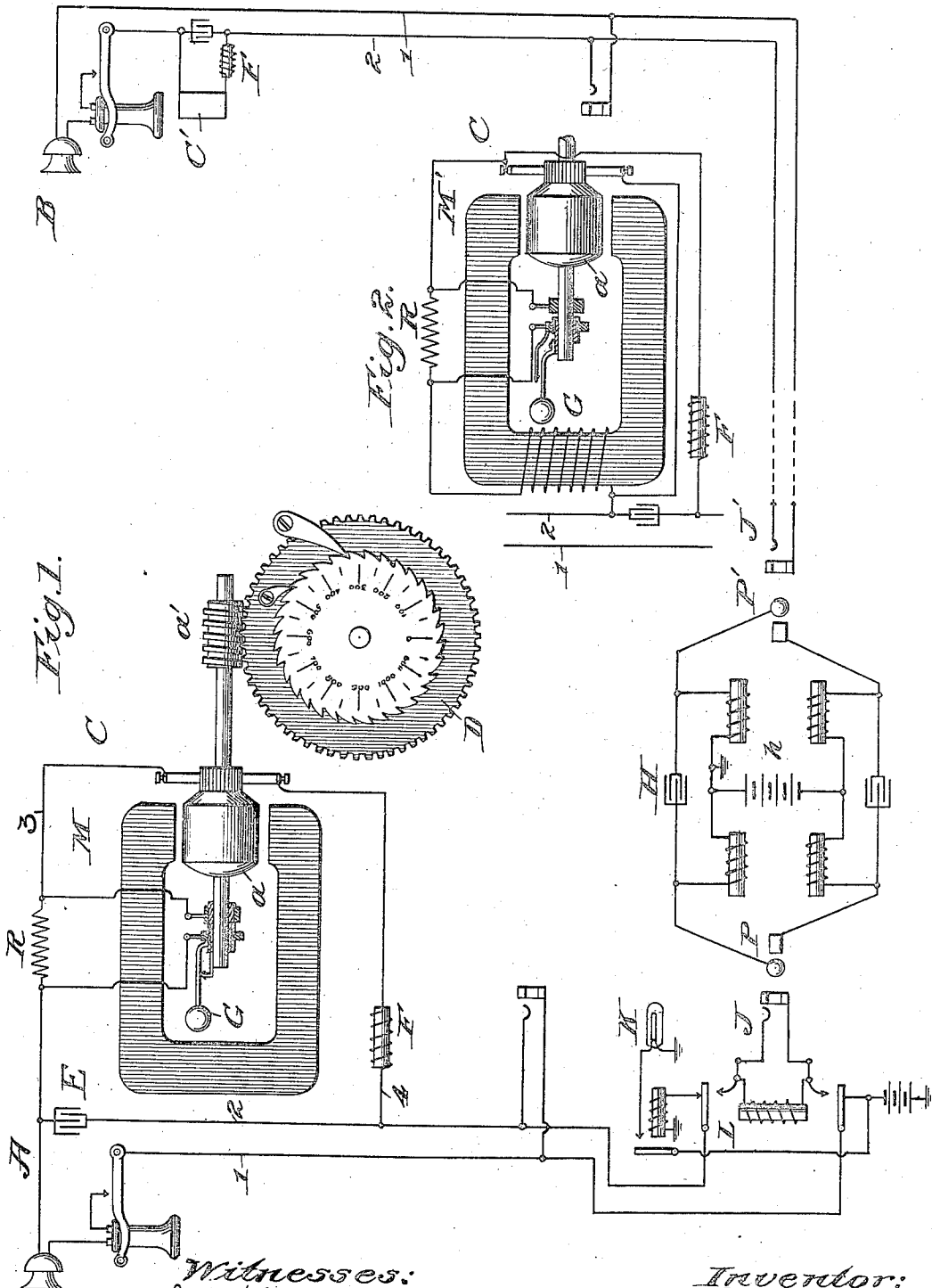


R. H. MANSON.
 TELEPHONE METER SYSTEM AND APPARATUS.
 APPLICATION FILED APR. 18, 1907.

958,145.

Patented May 17, 1910.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-METER SYSTEM AND APPARATUS.

958,145.

Specification of Letters Patent. Patented May 17, 1910.

Application filed April 18, 1907. Serial No. 369,015.

To all whom it may concern:

Be it known that I, RAY H. MANSON, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Telephone-Meter Systems and Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to telephone meter systems and apparatus in general, and particularly to such as are designed and constructed for measuring and registering the duration or length of time the telephone is in use, as distinguished from the number of times it is used. Meters used for my present purpose are generally designated as "elapsed time meters."

The principal object of my invention is to provide an electrically driven registering meter connected to the line circuit of the telephone instruments and designed to be operated by a current in the line to record the total length of time that the instruments are used.

In carrying out my invention I provide an electric motor for operating the registering mechanism of the meter, this motor being connected in series in the line with the telephone instrument and operated by current flowing in the line when the receiver is off the hook. It will thus be seen that the meter will register the entire time that the receiver is off the hook, which will include of course the time required in making the connection with the called subscriber as well as the time actually consumed in the conversation. The charge for this service is arranged, in practice, on an equitable basis determined by experience, by deducting a percentage of the total time registered by the meter, so that the subscriber will not be overcharged.

The invention consists in the novel features and construction of the electrically operated registering meter and the combination of circuits and connections of the same in a telephone system as hereinafter described and illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic representation of a telephone system and meter, the meter mechanism being shown in enlarged detail. Fig. 2 is a diagram illustrating another type of electric motor for driving the registering mechanism of the meter.

Referring to the drawings, A represents a subscriber's station of a telephone system which includes the regular transmitting and receiving instruments, and in addition thereto the electric meter C. The subscribers' instruments are connected as usual with the central office by line wires 1 and 2 which terminate in spring jack J on the switchboard. Any preferred line indicator and cut-off represented by K and L may be employed at the central office in connection with jack J, those shown being of a well known type which need not be described, as they form no part of the present invention. A second subscriber's station, representing the called subscriber, is diagrammatically shown at B and connected by line wires with spring jack J' through line indicator and cut-off K', L' at central, these latter parts being represented merely by dotted lines to avoid complication of the drawings.

The meter C comprises an electric motor M and a registering mechanism indicated diagrammatically by the registering disk D. The motor armature *a* is geared through the worm wheel *a'* directly, as shown in the drawing, to the indicating disk D, but it will be understood that any other suitable gearing may be employed either in this same ratio, or to further multiply the gear relation of the armature to the indicating disk. The electric motor is shown in Fig. 1 as a series motor having its leads 3 and 4 connected in the line 2 of the subscribers' instruments and bridged by a condenser E. This condenser E breaks the continuity of the line current between the motor terminals, but permits the passage of voice currents in the line.

An inductive resistance or retardation coil F is inserted in the motor circuit in series with the armature to choke back and eliminate any noises that might be produced and impressed upon the line from the commutator of the motor.

In order to insure a constant speed for the motor I provide a regulating resistance, shown diagrammatically at R, and controlled in any suitable manner, such as by a centrifugal governor G mounted upon or controlled by the armature shaft of the motor as shown. In the series type of motor this regulating resistance R is normally short circuited through the governor G, this short circuit being opened by the governor

to insert the resistance when the motor exceeds a predetermined speed.

The cord circuit at the central office, represented at H, is merely representative of any suitable circuit that may be employed, being shown as the well known 4-relay common battery type, having battery $\mathcal{H}$ connected thereto.

In Fig. 2 I have shown a shunt motor M' arranged for use in the meter instead of the series motor shown in Fig. 1. In this arrangement the regulating resistance R is normally included in the field circuit and adapted to be short circuited by the centrifugal governor to strengthen the field and thereby reduce the speed of the motor when it has exceeded a predetermined limit.

The operation of the system and meter is as follows: When the calling subscriber A removes his receiver from the hook, the line circuit is closed from the line battery at central through conductors 1 and 2, motor lead 3, the windings of motor C, motor lead 4, inductive resistance F and returned to battery. The motor M is thus started and begins registering the use of the instrument. The voice currents of course pass directly from the subscriber's instruments over conductors 1 and 2 through condenser E to central. When the operator at central plugs in, the battery $\mathcal{H}$ is connected to line and replaces the line battery which is removed by the cut-off relay L. Having ascertained the number of the wanted subscriber, the calling plug is inserted in the calling jack J' of subscriber B. When subscriber B removes the receiver from the hook his meter C' is set in operation and registers in a manner similar to that described in connection with subscriber A. This registering of both meters is, however, adjusted in the settlement on an equitable basis, as above stated.

I have described the meter as located at the subscribers' stations, but this is not essential, as the meter may be located at the central office. I have also described the meter as beginning to operate by current from the line battery when the calling subscriber removes his receiver from the hook, but if it is preferred, a line battery may be employed of insufficient strength to operate the meter motor so that the motor will not begin to operate until the operator at central plugs in and connects the battery of the cord circuit to line. Also, although I have described but two types of motor, namely, a series motor and a shunt motor, I wish it understood that I may employ other types when found desirable, such as the compound wound motor. Many other modifications may be made, moreover, without departing from the spirit of the invention, and these I wish it understood fall strictly within the scope and purview thereof.

Having thus described my invention what I claim and desire to secure by Letters Patent is—

1. In a telephone system, a time registering device, an electric motor for driving the same, speech transmitting and receiving instruments, and circuit connections completed by initiating the use of said instruments to operate said motor.

2. In a telephone system, a line circuit, a time registering device, an electric motor connected to said line circuit for driving said registering device, speech transmitting and receiving instruments, and a condenser in the line circuit bridged across the motor terminals.

3. In a telephone system, a line circuit, a time registering device, an electric motor connected to said line circuit and having a rotatable armature geared to said registering device, speech transmitting and receiving instruments and means to complete the motor circuit to line when said instruments are in use, and an inductive resistance included in the armature circuit of said motor.

4. In a telephone system, a line circuit, a time registering device, an electric motor connected to said line circuit and having a rotatable armature geared to said registering device, speech transmitting and receiving instruments and means to complete the motor circuit to line when said instruments are in use, a condenser in the line circuit bridged across the motor terminals, and an inductive resistance included in the armature circuit of the motor.

5. In a telephone system, a line circuit, a time registering device, an electric motor connected to said line circuit and having a rotatable armature geared to said registering device, and automatic means for governing the speed of said motor.

6. In a telephone system, a line circuit, a time registering device, an electric motor connected to said line circuit and having a rotatable armature geared to said registering device, speech transmitting and receiving instruments and means to complete the motor circuit to line when said instruments are in use, and means controlled by the rotation of said armature to govern the speed of said motor.

7. In a telephone system, a subscriber's station and a central office, a time registering device at the subscriber's station, an electric motor for driving the same, speech transmitting and receiving instruments at the subscriber's station, a source of electric current at the central office, and contacts closed by initiating the use of said instruments to complete the circuit of said motor while said instruments are in use.

8. As a means for registering the time a telephone line is in use, talking apparatus

associated with the line, time registering mechanism, an electric motor for such mechanism, and means for closing the circuit of such motor by initiating the use of the talking apparatus.

9. As a means for registering the time a telephone line is in use, talking apparatus associated with the line, time registering mechanism, an electric motor for such mechanism, and a switch operated by the talking apparatus for directly controlling the motor circuit.

10. As a means for registering the time a telephone line is in use, talking apparatus associated with the line, time registering mechanism, an electric motor in circuit with the talking apparatus for controlling said mechanism, and a switch governed by the use of the talking apparatus for controlling the motor circuit.

11. As a means for registering the time a telephone line is in use, talking apparatus associated with the line, means controlling the use of the talking apparatus, time registering mechanism, a rotary motor for such mechanism, and an operating circuit for the motor directly controlled by the talking apparatus controlling means.

12. As a means for registering the time a telephone line is in use, talking apparatus associated with the line, time registering mechanism, an electric motor controlling said time registering mechanism, and switch contacts in circuit with said motor for controlling said motor, said switch contacts operated by the telephone switch hook.

13. As a means for registering the time a telephone line is in use, talking apparatus associated with the line, time registering mechanism, an electric motor in circuit with the talking apparatus for controlling said

mechanism, and a switch governed by the use of the talking apparatus for controlling the motor circuit, said switch being located in the motor circuit.

14. As a means for registering the time a telephone line is in use, time registering mechanism, a motor controlling said mechanism connected in the line circuit, talking apparatus in the line circuit, and a switch governed by the use thereof controlling said motor.

15. As a means for registering the time a telephone line is in use, the combination of a telephone line, a substation on said line, a central station, a source of current at said central station adapted to be connected in circuit with said line, time registering mechanism at the substation, an electric motor in said line controlling the time registering mechanism operated by current from said source, substation talking apparatus depending for its operation on current from said source, and a switch governed by the use of the talking apparatus, controlling said motor.

16. As a means for registering the time a telephone line is in use, substation apparatus, a central station, a telephone line therebetween, a source of current at the central station, time registering mechanism, an electric motor controlling such mechanism, said substation apparatus depending for its operation upon said central source, the operation of the motor being controlled by the use of the substation talking apparatus.

In testimony whereof I affix my signature in presence of two witnesses.

RAY H. MANSON.

Witnesses:

A. J. ROBERTS,

GEO. A. SCOVILLE.