

J. L. McQUARRIE.
SERVICE METER FOR TELEPHONE EXCHANGES.

APPLICATION FILED DEC. 11, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

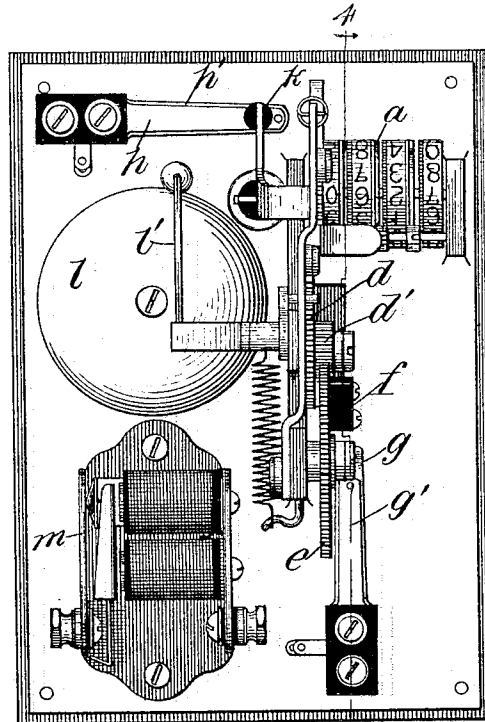


Fig. 2.

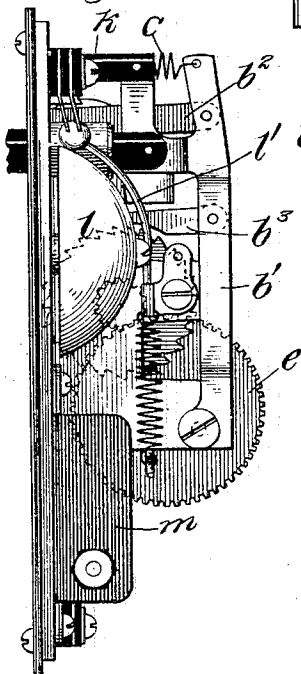


Fig. 3.

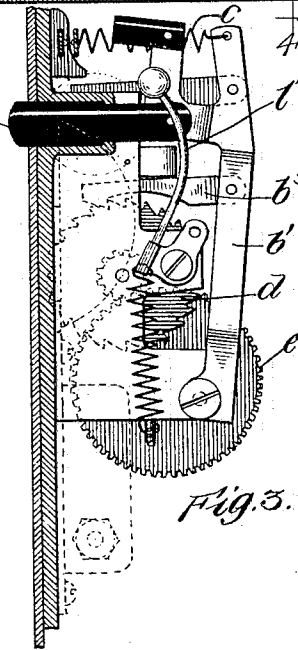
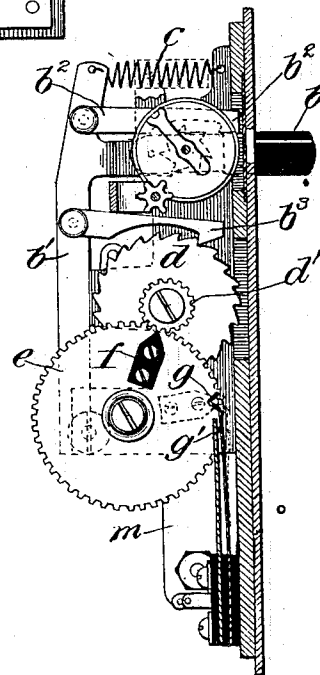


Fig. 4.



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No. 766,375.

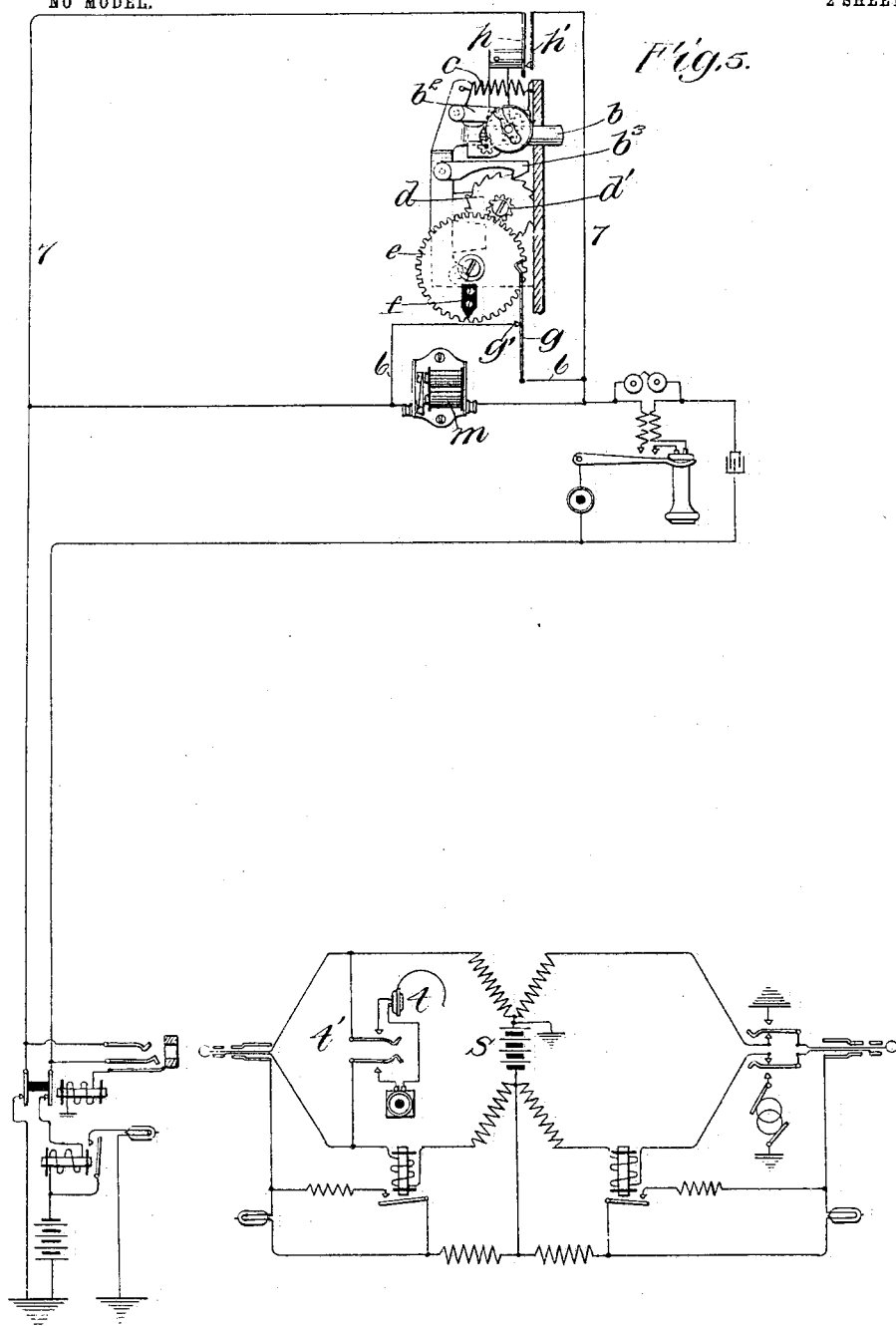
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SERVICE METER FOR TELEPHONE EXCHANGES.

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NO MODEL.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JAMES L. McQUARRIE, OF SOUTH ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SERVICE-METER FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 766,375, dated August 2, 1904.

Application filed December 11, 1903. Serial No. 184,739. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. McQUARRIE, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Service-Meters for Telephone-Exchanges, of which the following is a full, clear, concise, and exact description.

My invention relates to the measurement of telephone-service; and its object is to provide improved service-meter apparatus by which signaling or other mechanism may be automatically actuated when the calls from a given substation exceed a certain predetermined number.

In a system equipped in accordance with my invention the subscriber may purchase a certain number of calls. Each call will be counted, and when the allotted number have been made mechanism—such, for example, as a signal-transmitter—will automatically be brought into action.

I will describe my invention particularly by reference to the accompanying drawings, in which—

Figure 1 is a view in elevation of a service-meter and associated apparatus constructed in accordance with my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical section showing the parts in an alternative position. Fig. 4 is a vertical sectional view on line 4-4 of Fig. 1; and Fig. 5 is a diagram illustrating a telephone-line extending from a substation to a central office, the system being equipped with my improved service-meter apparatus.

The same characters of reference are used to designate the same parts wherever shown.

Referring first to Figs. 1 to 4, inclusive, the counting-train *a* is adapted to be advanced step by step by a pawl-and-ratchet mechanism actuated by a manual push-button *b*. A gear-train is provided in association with the service-meter to be advanced step by step as the counting-train is advanced. The push-button *b* is connected to operate the lever *b'*, which carries pawls *b²* *b³* for advancing the counting-train and gear-train, respectively. The lever

b' is normally held in its retracted position by a spring *c*. The ratchet-wheel *d* of the gear-train, which is actuated by the pawl *b³*, carries a pinion *d'*, which meshes with the larger gear-wheel *e*. As the counting-train is advanced step by step, therefore, the gear-wheel *e* is gradually rotated.

An insulating-stud *f* is carried upon the gear-wheel *e* in position to engage the end of a contact-spring *g* and separate the same from its normal contact-anvil *g'* when the gear-wheel reaches a given point in its rotation. A pair of contact-springs *h* *h'* are mounted in position to be normally closed together by an insulating-stud *k*, carried upon an extension of the operating-lever *b'*. Normally said contacts are closed together; but when the push-button *b* is pressed in to actuate the service-meter the stud *k* is moved away, so that the contact-spring *h* is raised by its own elasticity from the other contact-spring *h'*. A gong *l* is provided, in association with the service-meter, with a tapper *l'* for striking the same, said tapper being arranged to be actuated through the agency of a pawl which is in position to be moved by the teeth of the ratchet-wheel *d* in its rotation. Each time the button *b* is pushed in, therefore, the counting-train is advanced one step, the gong *l* is struck to sound a signal, and the gear-wheel *e* is advanced through a certain definite arc.

The apparatus above described may be associated with a telephone-line in the manner illustrated in Fig. 5. The service-meter is intended to be mounted at the substation in proximity to the subscriber's transmitting-telephone. A buzzer *m*, associated with the service-meter, is connected serially in the circuit of the telephone-line. The contacts *g* *g'* control a normally closed shunt or short circuit 6 around the buzzer *m*, and a second shunt or short circuit 7 around said buzzer is controlled by the contact-springs *h* *h'*.

The apparatus at the central office is of the usual type and needs no particular description. It includes the usual operator's telephone *t*, which is adapted to be brought into circuit with the telephone-line through the

agency of a plug and spring-jack switch and the usual listening-key *z'*, associated with the plug-circuit. The system shown is a central-battery system in which the source of current
 5 *s* at the central office is connected in a bridge of the plug-circuit, and so with the line when connection is made therewith.

In the operation of the system shown the subscriber is required to manually operate
 10 his service-meter to record each call at some stage in the course of the connection, usually upon the response of the called party. When the service-meter is actuated, the gong *l* is sounded, which being near the transmitter is
 15 heard in the operator's telephone at the central office. The operator after directing the subscriber to push the button of his service-meter knows from hearing the sound of the gong in her telephone that the registration has
 20 been duly made. When a certain allotted number of calls have been registered—that is, when the stud *f*, carried by the gear-wheel *e*, is advanced until it engages the spring *g*—the shunt *6* is thus opened. Now when the but-
 25 ton of the service-meter is pressed both shunts *6* *7* will be opened and the buzzer *m* will be included directly in the circuit. Said buzzer being transversely by current will rapidly interrupt the circuit, and so transmit a signal
 30 which will be heard in the operator's telephone as well as by the subscriber. This signal will indicate that further service will be in excess of the allotted number of calls previously determined upon.

35 Having thus described my invention, I claim—

1. The combination with a service-meter having step-by-step counting mechanism adapted for manual operation in the registra-
 40 tion of connections, of a signal-transmitting device actuated in the advance of said mechanism a given number of steps.

2. The combination with a telephone-line
 45 extending from a substation to a central office, of a service-meter for the line at the substation, said meter having step-by-step counting mechanism, a signal-transmitting device actuated by the advance of said mechanism a predetermined number of steps, and an instru-
 50 ment at the central office responsive to the signal transmitted, whereby the operator is

automatically informed when the predetermined number of calls have been registered.

3. The combination with substation apparatus in a central-battery telephone-exchange
 55 system, of a service-meter having step-by-step counting mechanism, a buzzer and a switch adapted to bring the same into operative connection with the line, said switch being auto-
 60 matically actuated by the step-by-step mechanism at a given stage in its advance.

4. The combination with a service-meter for telephone-exchange substations, said meter having step-by-step counting mechanism adapted for manual operation by the sub-
 65 scriber, of a signaling instrument actuated in each advance of the counting mechanism, and a special-signal-transmitting instrument actuated in the advance of said counting mechanism a predetermined number of steps.
 70

5. The combination with a telephone-line and the substation apparatus thereof in a central-battery telephone-exchange system, of a subscriber's service-meter having step-by-step counting mechanism adapted for manual oper-
 75 ation, a signal device and means for actuating the same in each advance of the counting mechanism, a buzzer connected in the line-circuit, switch-contacts controlling a shunt of the buzzer, said contacts being opened in each
 80 actuation of the counting mechanism, other switch-contacts controlling a second shunt of said buzzer, a gear-train arranged to be advanced a step in each advance of the counting mechanism, and a stud carried by the gear-
 85 train in position to engage and open said last-mentioned switch-contacts as the gear-train is advanced to a predetermined stage.

6. The combination with a telephone service-meter having a counting-train, of mech-
 90 anism adapted to effect the movement of the same step by step in the registration of connections, a switch, a circuit controlled thereby, and means associated with said counting-train adapted to actuate said switch at a given point
 95 in the advance of the train.

In witness whereof I hereunto subscribe my name this 5th day of December, A. D. 1903.

JAMES L. McQUARRIE.

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