

E. H. MARTIN.
TELEPHONE METERING SYSTEM.
APPLICATION FILED MAR. 17, 1911.

1,059,745.

Patented Apr. 22, 1913.

Fig. 1.

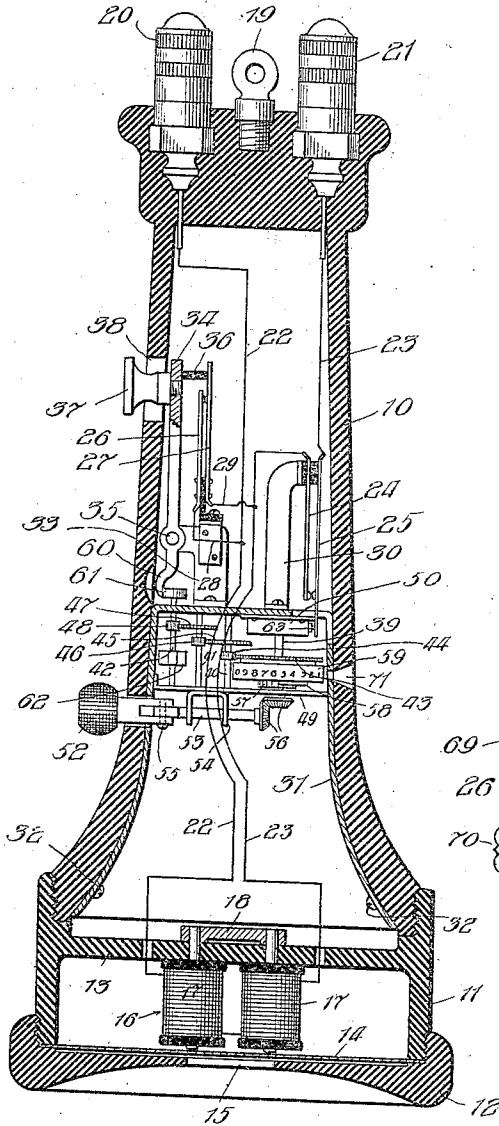


Fig. 2.

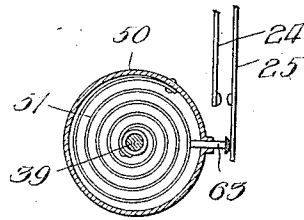
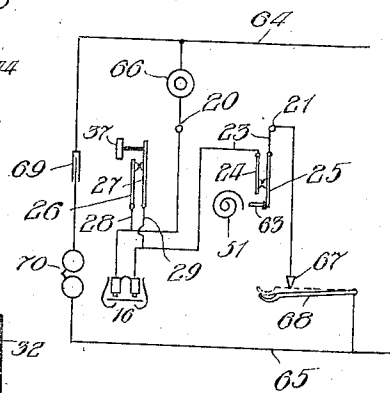


Fig. 3.



WITNESSES

Harry S. Gaither
Carolyn Weber

INVENTOR

Edward H. Martin
by Thomas H. Ferguson
att'y

UNITED STATES PATENT OFFICE.

EDWARD H. MARTIN, OF WEBSTER CITY, IOWA.

TELEPHONE METERING SYSTEM.

1,059,745.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed March 17, 1911. Serial No. 615,104.

To all whom it may concern:

Be it known that I, EDWARD H. MARTIN, a citizen of the United States, residing at Webster City, in the county of Hamilton and State of Iowa, have invented certain new and useful Improvements in Telephone Metering Systems, of which the following is a specification.

The present invention relates to telephone metering devices and has for its object to provide a telephone receiver having both metering mechanism and associated control means carried by the receiver shell and preferably mounted for the most part within it, only those parts protruding beyond the shell which are to be manipulated in the ordinary use of the receiver.

In carrying out my invention, I arrange the mechanism and the electrical connections so that the meter will operate at all times that an operative listening circuit extends through the electromagnet windings of the receiver. In this way, an accurate record is kept.

The specific character of the invention will be best understood upon reference to the following detailed description taken in connection with the accompanying drawings, and its scope will be particularly pointed out in the appended claims.

In said drawings, Figure 1 is a vertical section of a receiver constructed in accordance with the present invention, parts being shown in elevation; Fig. 2 is a sectional view illustrating the main driving spring of the meter mechanism in conjunction with associated contacts which serve to control the listening circuit through the receiver magnet windings; and Fig. 3 is a diagram of the electrical receiver circuit of Fig. 1 in association with the transmitter and other elements of the usual substation telephone circuit. Throughout these views, like characters refer to like parts.

Referring to the drawing in detail, 10 designates a portion of the shell, which is of the usual shape and construction, and 11 designates the remainder of the shell, which is screwed on to the end of the portion 10. The latter is provided with threads for the reception of the cap 12, and with a bridge 13. A diaphragm 14 is peripherally held between the cap 12 and the shell 11, as illustrated, and, at a point opposite the opening 15 in the cap, is subjected to the action of the receiver magnet 16, which comprises the

windings 17 upon the U-shaped core 18, which passes through suitable openings in the bridge 13. This magnet structure may be variously constructed in order to meet the requirements of the service. The structure here illustrated is merely typical. At the opposite end of the receiver, the usual eye 19 and terminals 20, 21, are provided. The latter are connected in series with the windings 17, by the wires 22 and 23, the latter including spring contacts 24, 25. The magnet windings are adapted to be short-circuited by other spring contacts 26 and 27, connecting with the wires 22 and 23, respectively, by wires 28 and 29. The spring contacts 24 and 25 are rigidly secured at one end to an arm 30 and maintained insulated from each other and said arm. The arm is secured to the bottom of a cup 31, which fits into the portion 10 of the receiver shell and is held therein by screws 32, or other suitable means. The spring contacts 26 and 27 are also rigidly secured at one end to an arm 33 and are maintained insulated from each other and from said arm. This arm 33 is also secured to the under side of the cup 31. The spring contacts 26 and 27 are normally in engagement, but are adapted to be separated, to break the short-circuit about the magnet 16, by a lever 34, pivoted at 35 to the arm 33 and having an insulating projection 36 which engages the outer end of the spring contact 27, which is a little longer than spring contact 26. The lever 34 is provided with a button 37, which is screwed into it at a point adjacent to the projection 36 and extends through an opening 38 in the adjacent portion of the shell into a position to be engaged by the hand of the subscriber when he removes the receiver from its hook to engage in conversation.

The meter mechanism of the device is located in the bottom of the cup 31 and consists of a clock train having parallel shafts 39, 40, 41, and 42, carrying, respectively, intermeshing gears and pinions 43, 44, 45, 46, 47 and 48. These shafts are suitably journaled, at one end, in the bottom of the cup 31, and, at the other, in the bridging member 49, and the gear train is such as to drive the last of the series of shafts at a much higher rate of speed than the first. The first shaft, 39, is provided with a spring case 50, which contains a spiral spring 51, secured, at one end, to the case and, at the other end, to the shaft 39. The spring case

is firmly secured to the bottom of the cup. The shaft 39 is wound from a winding head 52, mounted upon a stem 53, journaled in a frame 54, mounted upon the bridge member 49. The head 52 is secured to the stem 53 by a screw 55 after the cup and the other parts have been inserted into the shell of the receiver. Beveled gears 56 transmit motion from stem 53 to shaft 39 and the winding head extends beyond the exterior of the receiver shell so that it may be engaged by the finger and thumb to wind up the spring 51. In order to hold the spring against return while it is being wound, shaft 39 is provided with a ratchet 57, rigidly secured to it and adapted to be engaged by a pawl 58, pivoted to one side of the indicator wheel 59 of the meter mechanism, the latter being directly connected to, and movable with, the gear wheel 43. When the spring 51 is once wound, it tends to unwind itself and the shaft 39 carrying the wheels 43 and 59 around with the shaft. The movement of the latter, however, is normally prevented by the end 60 of the lever 34 engaging a friction wheel 61, mounted upon the last shaft, 42, of the gear train. When the button 37 is depressed, the end 60 moves from engagement with the wheel 61 and frees the clock train. The wheels 43 and 59 (the latter the indicating wheel) are then free to rotate under the unwinding action of the spring 51. Such movement, however, is regulated in speed by the fan governor 62 carried by the shaft 42. As soon as the button 37 is released, the end 60 will engage the wheel 61 and the further movement of the indicating wheel of the meter mechanism will be stopped. Whenever the spring 51 runs down, and consequently whenever the mechanism gets in such condition that the indicating wheel will not register, the wire 23 is interrupted at spring contacts 24 and 25 by a pin 63 which cooperates between the spring 52 and the spring contact 25. This pin extends through an opening in the spring case 50 and is slidable back and forth therein. When the spring 51 is wound up, the spring contact 25, pressing against the insulated end of the pin 63, forces it into the case 50 and spring contacts 24 and 25 come into engagement. When, however, the spring 51 is run down, it expands within the case 50 and presses against the opposite end of the pin 63 and forces it outward against the spring 25 with sufficient pressure to cause the latter to disengage its spring contact 24. In this way, the running down of spring 51 separates spring contacts 24 and 25.

In the diagram of Fig. 3, the parts, heretofore described, are illustrated diagrammatically in a substitution telephone circuit, the terminals 20 and 21 of the receiver being connected to the line limbs 64 and 65, re-

spectively, the former through transmitter 66, and the latter through contact 67 and switch-hook 68. A second path from limb 64 to limb 65 is provided through condenser 69 and call bell 70. The latter path is open to ringing current, but not to talking current. Whenever the receiver is removed from the hook 68 and the spring 51 of the meter mechanism is wound up, a path extends from limb 64 to limb 65, through transmitter 66, terminal 20, wire 22, wire 28, closed contacts 26, 27, wire 29, wire 23, closed contacts 24, 25, terminal 21, contact 67 and switch-hook 68. This path does not provide an operative circuit for the receiver magnet 16. The short-circuit through closed contacts 26 and 27 prevents the operation of the magnet 16. It is necessary, therefore, for the party holding the receiver, in order to obtain a listening circuit, to depress button 37 and thereby separate contacts 26 and 27 to open the short-circuit and allow current to pass through the windings of magnet 16. As soon, however, as this is done, the meter mechanism is released and begins to register against the subscriber. The operation of the meter mechanism and the existence of the listening circuit are, therefore, co-extensive. As before explained, when the spring of the meter mechanism runs down, the circuit is opened at contacts 24, 25, and consequently the bridge between the limbs 64 and 65, via the transmitter and receiver, is interrupted and no conversation can be had. It is then necessary to wind up the meter mechanism before a new listening circuit can be established. As soon as this is done, the meter mechanism is again free to record. Consequently, an accurate record is kept. This record is indicated upon the wheel 59 by any suitable characters, which may be observed through a suitable opening 71 in the adjacent portion of the shell 10. The units of measurement will, of course, depend upon the speed of rotation of the wheel 59 which may be variously mounted in the gear train, as will be apparent. It will also be apparent that many other alterations and modifications may be made in the details of the mechanism herein disclosed without departing from the spirit and scope of the invention. I, therefore, do not wish to be limited to the exact matter illustrated, but aim to cover all such alterations and modifications by the terms of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, terminals upon said shell, electrical connections within said shell for establishing a listening circuit between said terminals

through said magnet, meter mechanism carried by said shell, and means operative independently of the electrical potential of said connections and of the position of said receiver for insuring the operation of said meter mechanism coextensively with the existence of said listening circuit.

2. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said magnet, meter mechanism mounted within said shell, and a manually operated member mounted upon said shell for controlling said mechanism and varying said circuit connections.

3. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said magnet, spring actuated meter mechanism mounted within said shell, and a manually operated member mounted upon said shell for controlling said mechanism and varying said circuit connections.

4. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for establishing a listening circuit through said magnet, spring actuated meter mechanism mounted within said shell, means for freeing said mechanism during the existence of said listening circuit, a winding stem for said mechanism extending through an opening in said shell, and means mounted upon said shell for varying said circuit connections whenever said mechanism runs down.

5. A telephone receiver comprising a shell; a cup fitting into the interior of said shell; meter mechanism, spring contacts and a control lever mounted upon said cup; a diaphragm and an actuating magnet for said diaphragm mounted in said shell adjacent to the open end of said cup; terminals; and circuit connections between said magnet, spring contacts, and terminals.

6. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch-hook for controlling said connections, meter mechanism, and a manually operated member mounted upon said receiver for mechanically controlling said mechanism and varying said connections.

7. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch-hook for controlling said connections, meter mechanism operative independently of the electrical condition of said line, and a manually operated member mounted

upon said receiver for controlling said mechanism and varying said connections.

8. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, terminals upon said shell, electrical connections within said shell for establishing a listening circuit between said terminals through said magnet, spring actuated meter mechanism carried by said shell, and means mounted upon said shell for controlling said mechanism and insuring its operation coextensively with the existence of said listening circuit.

9. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said magnet, spring actuated meter mechanism carried by said shell, and a manually operated member mounted upon said shell for controlling said mechanism and varying said circuit connections.

10. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch hook for controlling a listening circuit for said receiver, meter mechanism, and means upon said receiver operative independently of the position of said receiver for mechanically controlling said mechanism and insuring its operation coextensively with the existence of said listening circuit.

11. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch hook for controlling a listening circuit for said receiver, meter mechanism operative independently of the electrical condition of said line and of the position of said receiver, and means upon said receiver for insuring the operation of said mechanism coextensively with the existence of said listening circuit.

12. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, terminals upon said shell, electrical connections within said shell for establishing a listening circuit between said terminals through said magnet, meter mechanism carried by said shell and requiring for its operation to be wound, and means for winding said mechanism and insuring its operation coextensively with the existence of said listening circuit independently of the position of said receiver.

13. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said

magnet, meter mechanism carried by said shell and requiring for its operation to be wound, and manually operated means upon said shell for winding and controlling said circuit connections.

14. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said magnet, spring actuated meter mechanism carried by said shell and requiring for its operation to be wound, and manually operated means upon said shell for winding and controlling said mechanism and controlling said circuit connections.

15. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch hook for controlling said connections, meter mechanism requiring for its operation to be wound, and manually operated means for winding and controlling said mechanism and varying said connections.

16. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, terminals upon said shell, electrical connections within said shell for establishing a listening circuit between said terminals through said magnet, meter mechanism carried by said shell, means for storing energy for the operation of said mechanism, and means operative independently of the position of said receiver for effecting the operation of said mechanism by said stored energy co-extensively with the existence of said listening circuit.

17. A telephone receiver comprising a shell, a diaphragm carried by said shell, an actuating magnet for said diaphragm mounted in said shell adjacent to said diaphragm, circuit connections within said shell for said magnet, meter mechanism carried by said

shell, means for storing energy for the operation of said mechanism, and means upon said shell for controlling the operation of said mechanism by said stored energy and also controlling said circuit connections.

18. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch hook for controlling said connections, meter mechanism, means for storing energy for the operation of said mechanism, and means upon said shell for controlling the operation of said mechanism by said stored energy and also controlling said circuit connections.

19. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch-hook for controlling a listening circuit for said receiver through said connections, meter mechanism, and means operative independently of the electrical condition of said line and of the position of said receiver to insure the operation of said meter mechanism coextensively with the existence of said listening circuit.

20. A telephone system including a telephone line, a telephone receiver, electrical connections between said line and receiver, a switch-hook for controlling a listening circuit for said receiver through said connections, meter mechanism, means for storing energy for the operation of said mechanism, and means operative independently of the position of said receiver for effecting the operation of said mechanism by said stored energy coextensively with the existence of said listening circuit.

In witness whereof, I hereunto subscribe my name this 11th day of March, 1911.

EDWARD H. MARTIN.

Witnesses:

E. F. KING,

WILL L. CLIFTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."