

(No Model.)

F. P. COX.
ELECTRIC METER.

No. 585,257.

Patented June 29, 1897.

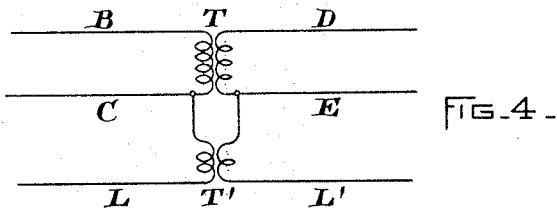


FIG. 1.

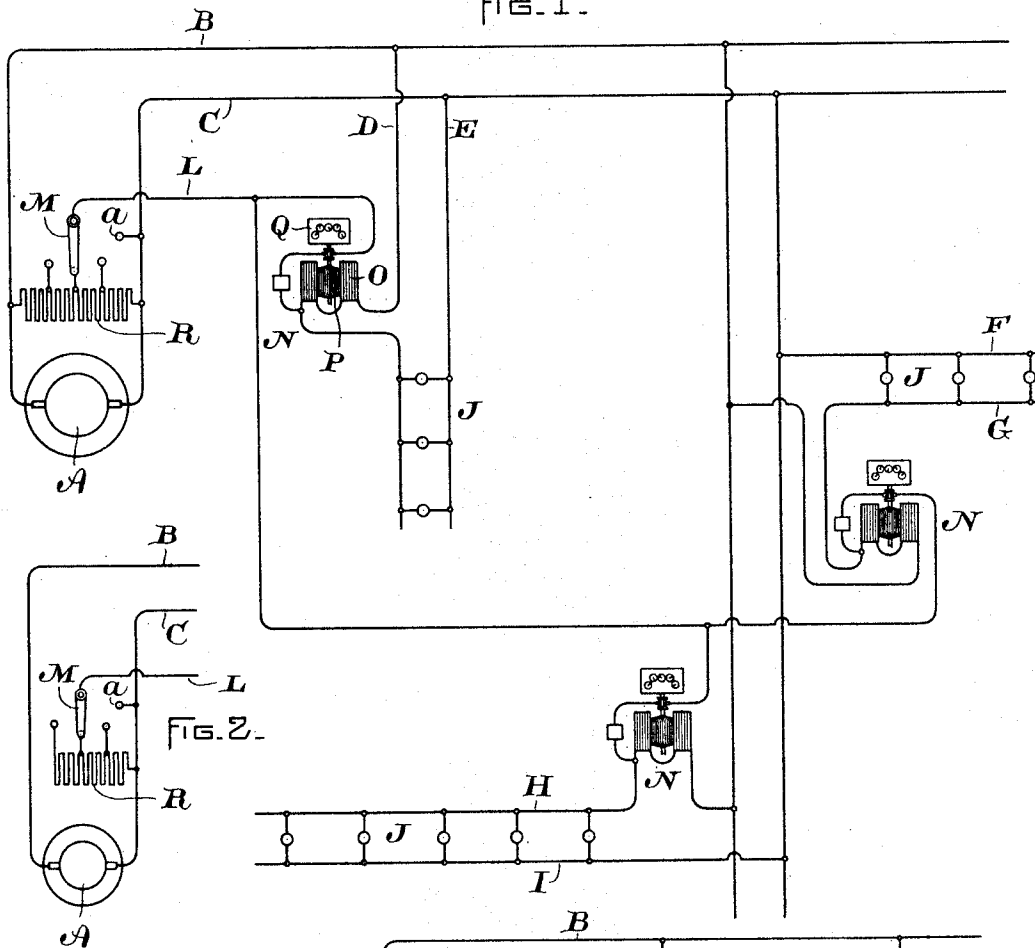


FIG. 2.

FIG. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 585,257, dated June 29, 1897.

Application filed March 6, 1897. Serial No. 626,183. (No model.)

To all whom it may concern:

Be it known that I, FRANK P. COX, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have
5 invented certain new and useful Improvements in Electric Meters, (Case No. 514,) of which the following is a specification.

The present invention relates to electric meters which are employed for measuring the consumption of energy in electric lighting or power systems.

In electric light and power systems where the mid-day load is light it is desirable to offer inducements to the consumers to use power at that time; and to this end it has been proposed to charge them at a less rate during a certain period or periods of the day. A variety of meters have been proposed to accomplish this, but they are either of special construction or else require an attachment more
20 or less expensive.

The present invention has for its object to utilize standard meters and to so arrange the circuits that at different times during the day
25 the meters can be made to register at different rates. This I accomplish by connecting one element of the meters in circuit with the load and the other element or elements in circuit with a source of electromotive force
30 which can be varied independent of the load-circuit.

In a motor-meter the speed of the armature varies substantially in proportion to the voltage supplied thereto, so it is evident that by
35 changing the voltage at any time the meters can be made to register at a greater or less speed.

In the accompanying drawings, attached to and made a part of this specification, Figure 1 is a diagrammatic view of a system of distribution, and Figs. 2, 3, and 4 are modifications.

In Fig. 1 the generator A is a direct-current machine, but in so far as the operation of my
45 invention is concerned any type of generator can be employed. Extending from the generator are mains B C, and branching therefrom are auxiliary mains D E, F G, and H I, supplying current to translating devices J, shown as lamps, but which may be heaters,
50 motors, or other electrical apparatus. Be-

tween the auxiliary wire L and one of the mains, as B, extending from the generator A, is maintained an electromotive force which may be varied as desired. Connected across
55 the mains B C is a resistance R, to which are connected a number of stationary terminals adapted to be engaged by the switch-arm M. The latter is connected to the auxiliary wire L. With the arm in the position shown the
60 voltage between the main B and the auxiliary wire L would be approximately one-half the voltage between the mains B and C. A movement of the arm M to the left decreases the voltage between the main B and the auxiliary
65 wire L, and a movement to the right increases it until the arm rests upon the contact a, when the voltage will be the same as that of the system. It will be seen that the voltage main-
70 tained between the main B and the auxiliary wire is readily adjusted and is independent of the main-line voltage.

In circuit with the translating devices J are motor-meters N. Each meter is provided with a pair of field-coils O, connected in series with
75 one of the mains, or, if desired, a field-coil can be connected in each main. Mounted for rotary movement between the coils is an armature P, which is geared to a single registering device Q. One terminal of the arma-
80 ture is connected through a resistance to the main D, and the other terminal is connected to the auxiliary wire L.

Where it is desired to utilize my invention on systems already existing, the meters are
85 allowed to remain in their positions undisturbed, and the auxiliary wire L is introduced into the building where they are located and one armature-terminal of each meter changed from the main C to the auxiliary
90 wire L. The auxiliary wire L carries only a small current, and it is therefore of limited cross-section, so that the additional cost of installation is small. Assuming, for example,
95 that the consumer is to pay at half-rates between the hours of nine in the morning and four in the afternoon, the arm M is adjusted to the position shown, which simultaneously affects all the meters and the armatures receive current at one-half the former poten-
100 tial, causing the meters to register at one-half the normal rate. At four o'clock by

moving the arm M to the contact *a* the meter-armatures are again subjected to the full potential and register accordingly.

The switch-arm M and resistance R are shown as located at the same point with the generator A, but this is not necessary, for a number of such switches and resistances can be provided and located in the several buildings, or the system can be divided into districts and a switch-arm and resistance provided for each district. It is preferable in practice to have the switch-arm M controlled by some automatic means—as a clock, for example—to insure its operation at predetermined times.

In Fig. 2 is shown a slight modification of the connections which in small installations is preferred. The generator A supplies current to the system by mains B and C, as before, but the resistance R, instead of being connected directly across the mains, as in Fig. 1, is connected to one main only, so that there is no direct transfer of energy from one main to another. The resistance is provided with a number of fixed contacts which are so arranged that the potential between the auxiliary wire L and the main C can be adjusted.

In Fig. 3 I have shown the preferred method where a large number of meters are employed. The generator A is connected to the mains B and C, which supply current to the translating devices. To vary the voltage of the auxiliary wire L, a separate generator A' of small capacity is provided, having one armature-terminal connected to main B and the other to the auxiliary wire. The machine A may be either shunt or series wound, and the voltage is adjusted by a suitable rheostat.

In Fig. 4 I have shown my invention applied to an alternating-current system in which a transformer T is provided between the mains B C and the work-circuit D E and a transformer T' for the armature-circuit, the primary of which is connected between the auxiliary wire L and the main C. I have shown the transformers arranged to reduce the voltage on the secondary side, but it is within the spirit of my invention to employ a one-to-one ratio of transformation or even to transform the potential of the secondary to a point above that of the primary.

The fields of the meters are connected to the secondary wires D E in the usual manner and their armatures between one of the wires and the auxiliary wire L'. The action of the meters is the same as described above and further description is unnecessary.

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

1. The combination of a meter for registering at different rates at different times, consisting of a single motor mechanism and single registering mechanism, and means for controlling the speed of the motor for a given load from a point distant from the meter, as for example, from the station or a substation.

2. The combination in an electric system,

of a number of motor-meters distributed at various points for metering different branch circuits fed from the system, and a third wire leading to such a group of meters, and means for controlling the speed of the meters for a given load by regulating the voltage on said third wire.

3. The combination of a number or group of motor-meters metering different branch circuits or portions of an electric system, with means for regulating the speed of all such motors from a common distant point, for example, a station or substation, without varying the voltage on the main circuit or its branches.

4. In an electric system, the combination of a meter, an element therefor connected to the circuit in such a manner as to be influenced by the current flowing therein, a second element so arranged as to be influenced by the potential, and means for varying the potential to which the second member is subjected, independent of the potential of the system.

5. In an electric system, the combination of a meter, an element therefor so connected to the circuit as to be influenced by the current flowing in the system, a second element so arranged as to be influenced by the potential, an auxiliary wire to which the second element is connected, and means for maintaining an electromotive force between one of the mains of the system and the auxiliary wire.

6. In an electric system, the combination of a motor-meter, comprising field-coils connected in series with the circuit-mains, a rotating armature within the influence of the field-coils, an auxiliary wire to which one terminal of the armature is connected, means for maintaining an electromotive force between the auxiliary wire and one of the mains, and means for varying the electromotive force independent of that of the system.

7. In an electric system the energy of which is to be measured, the combination of a meter, field-coils therefor included in circuit with the mains supplying current to the work-circuit, an armature revoluble within the influence of the field-coils, a registering device actuated by the armature, and means for varying the armature electromotive force independent of the main-line voltage.

8. In an electric metering system, the combination of a source of supply, mains extending therefrom carrying current to translating devices, an auxiliary wire independent of the work-circuit extending from a point near the source of supply, meters in the different branches of the work-circuit for recording the consumption of energy, field-coils for each meter included in the work-circuit, an armature for each meter connected to a main and the auxiliary wire, a recording device actuated by each armature, and an auxiliary source of electromotive force connected between the auxiliary wire and one of the mains.

9. In an electric metering system, the combination of a meter, field-coils therefor included in the work-circuit, an armature mounted for movement within the influence
5 of field-coils, a recording mechanism actuated by the armature, means for subjecting the armature to the full potential of the system when it is desired to record the entire consumption of energy on the work-circuit, and
10 means for subjecting the armature to a po-

tential other than that of the work-circuit when it is desired to give a discount to the consumers.

In witness whereof I have hereunto set my hand this 3d day of March, 1897.

FRANK P. COX.

Witnesses:

B. B. HULL,
E. W. CADY.