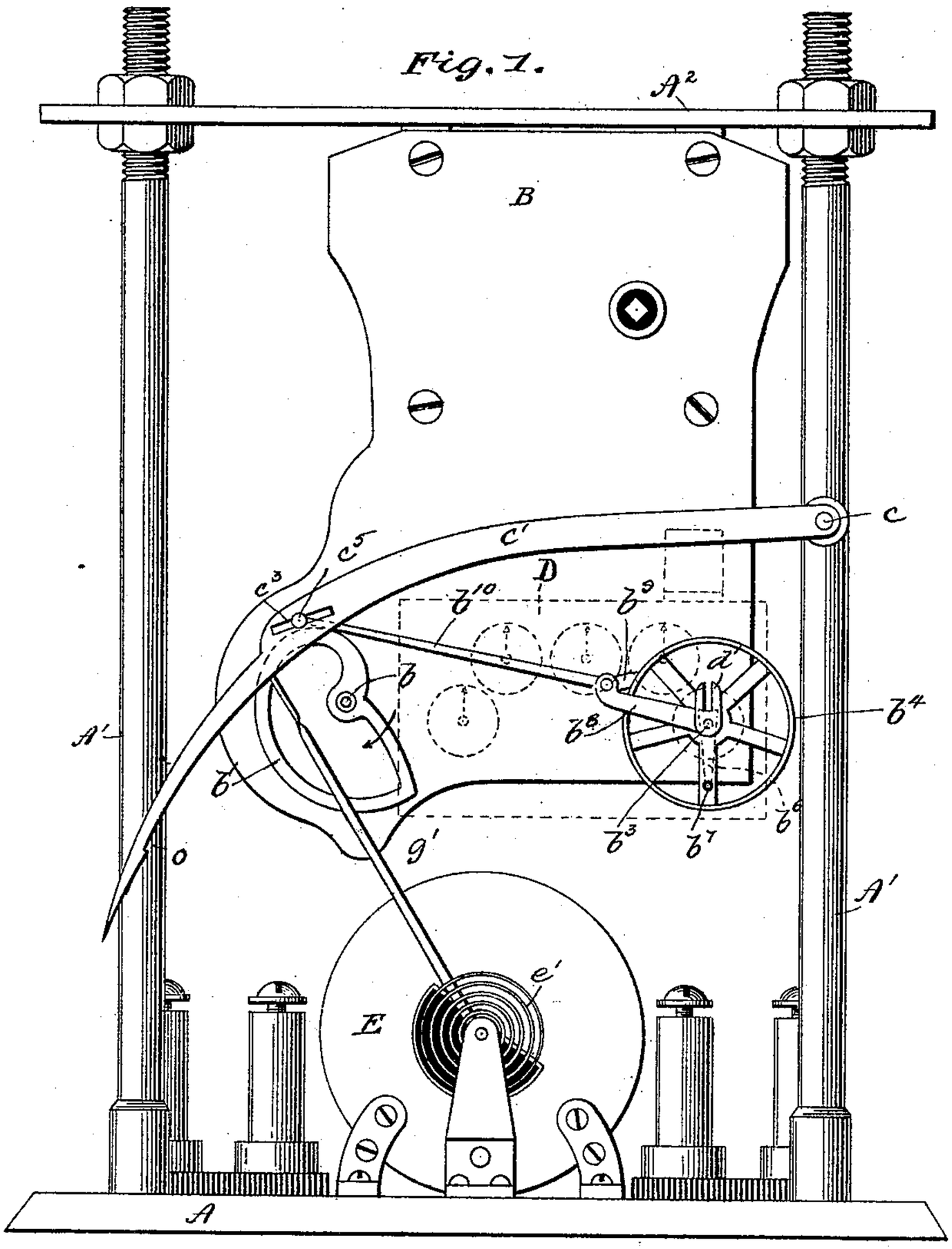
(No Model.) 2 Sheets—Sheet 1.

O. ERICSSON.

ELECTRIC METER.

No. 496,871. Patented May 9, 1893.

Fig. 1.



WITNESSES:

Frank S. Ober

James F. Kavanagh.

INVENTOR

Oscar Ericsson

BY

Munn & Rosenbaum

ATTORNEY.

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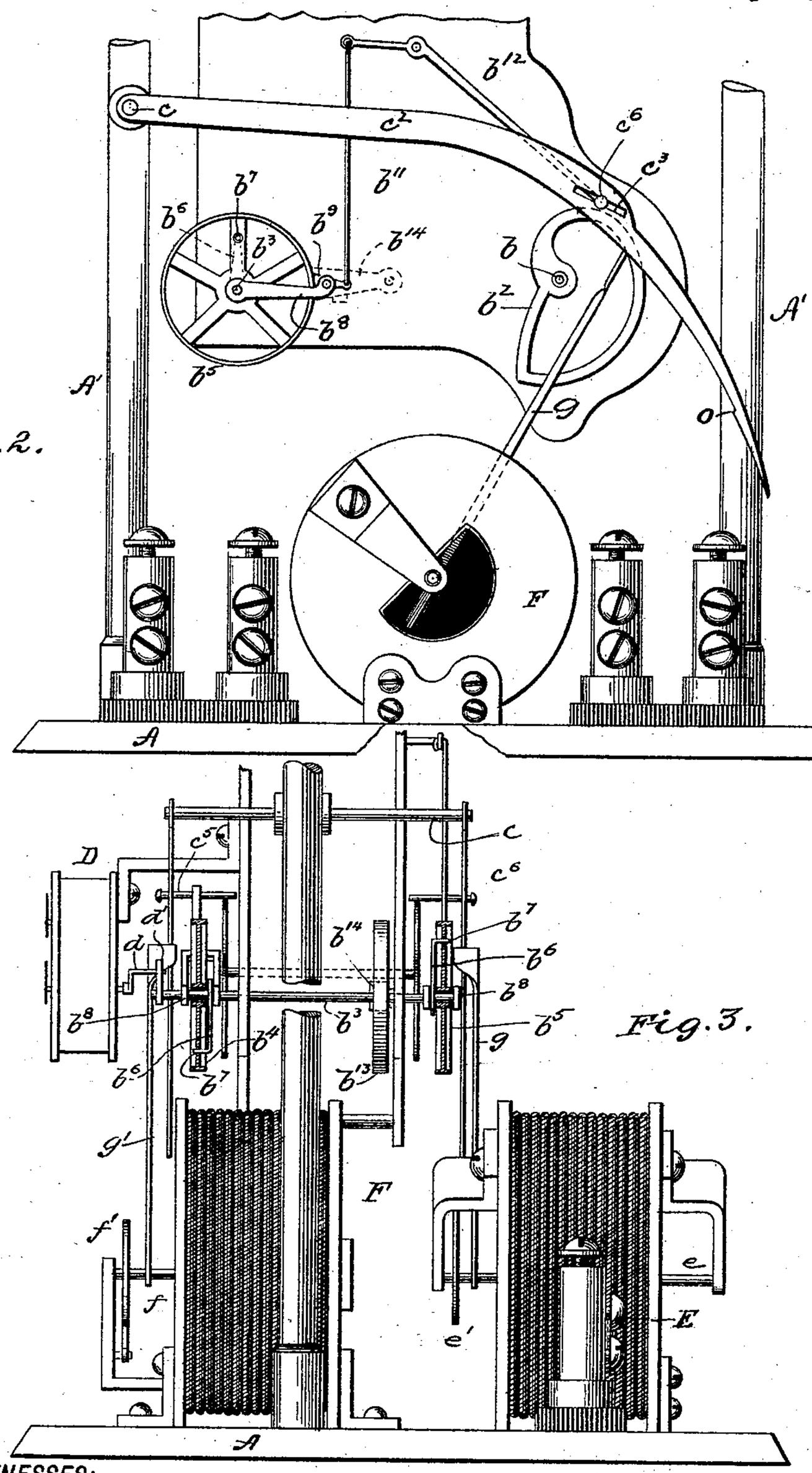

Fig. 2.

Fig. 3.

WITNESSES:

Frank L. Ober.

James F. Kavanagh.

INVENTOR

Oscar Ericsson

BY

Wm. A. Rosenbaum

ATTORNEY.

UNITED STATES PATENT OFFICE.

OSCAR ERICSSON, OF SIOUX FALLS, SOUTH DAKOTA.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 496,871, dated May 9, 1893.

Application filed May 6, 1892. Serial No. 432,011. (No model.)

To all whom it may concern:

Be it known that I, OSCAR ERICSSON, a citizen of the United States, residing at Sioux Falls, in the county of Minnehaha and State of South Dakota, have invented certain new and useful Improvements in Electric Meters, of which the following is a specification.

This invention relates to electric meters, the primary object of which is to provide an accurate and simple meter for registering the consumption of current in what is known as the three wire system. The meter is also adapted for simple two wire circuits.

Meters have been devised heretofore for registering the current of three wire systems, but as constructed they have been more or less incorrect, especially where there is a wide difference in the load of the two sides of the system. My invention is designed to register the entire consumption, whether it be large or small and whether the difference of load on the two sides of the system is large or small.

The details of the invention are an improvement upon the meter described in my patent No. 475,759, granted May 31, 1892.

The invention consists in the construction which will hereinafter be described and claimed.

In the accompanying drawings: Figures 1 and 2 represent views of two opposite sides of the meter, the inclosing case being removed, and Fig. 3 represents an end view of the meter, the upper portion of the clock-work or motor being removed.

Referring to the drawings by letter, A represents a base upon which the apparatus is mounted, and A′, A′, two standards thereupon connected near the top by a cross-plate A^2. To the cross-plate is secured a frame B of a clock-work the wheels and shafts of which are of the ordinary nature and therefore are not shown in detail. One of the shafts b however, which preferably makes one revolution per minute, projects through the sides of the clock-work frame and carries upon each end a cam b', b^2, respectively. These cams are alike and are constructed so that anything loosely resting upon their peripheries will be caused to gradually move out from the shaft to the extreme throw of the cam and then quickly descend to the lowest point of the cam, next to the shaft. The clock frame also supports a shaft b^3 which, however, has no connection with the clock train. This shaft also projects at both ends to the outside and carries at each end loosely adjusted wheels b^4, b^5, respectively. These wheels are locked to the shaft by means of cranks b^6, b^6, attached thereto having pins b^7, b^7, projecting into holes in one of the spokes of the wheel, as shown. These holes are a trifle larger than the pins so that there may be a slight play of the wheels independent of the shaft. A bifurcated lever b^8 embraces each wheel and is pivoted upon the shaft. In the head of each of these levers is pivoted a pawl b^9, the toe of which bears against the smooth periphery of the wheel. The outer end of the pawl on one side of the meter is extended to form an arm b^{10}; the outer end of the pawl on the other side of the meter is very short but connects with one end of a vertical link b^{12}, the other end of which connects with a pivoted lever b^{12}, as shown. Shaft b^3 also carries a brake disk b^{13} against which pawl b^{14} bears in the usual manner to prevent backward motion of the shaft. In one of the standards A′, a cross-stud c projecting in both directions past the clock frame, is secured. Upon each end of this stud is pivoted a long curved lever c', c^2, respectively, near the middle of which there is a slot c^3 in which pins c^5 and c^6 connected respectively with the outer ends of the arm b^{10} and the lever b^{12}, play. The lower edges of these arms c', c^2, along the outer half are curved downward for a purpose which will hereinafter appear.

D represents the frame in which the gear of a counting mechanism is mounted. This with the dials is shown in dotted lines in Fig. 1. The first shaft of the train projects through the back and carries a crank d engaging with a crank d' on one end of the shaft b^3, so that the motion of said shaft b^3 is imparted to the counting mechanism.

Directly upon the base of the meter and underneath the clock-work are supported two coils E, F, respectively, through which the current to be measured flows. In the open center of these coils shafts e and f, respectively, are mounted. The rotation of these shafts in one direction is resisted by the usual

coil spring e', f', and the shaft carries an armature shown in Fig. 2 and pointers or current indicating arms g, g' respectively. These coils with their connections therefore are ordinary ammeters and may be substituted by any other form of ammeter known in the art. The outer ends of the indicating arms g, g' have cross-heads which stand directly underneath the curved edges of the arms c', c^2, respectively, and said arms are adapted to rest upon the ends of the indicating arms for a purpose which will hereinafter appear. The curvature of the arms c', c^2 is such that when the indicators g, g' are at the lowest or zero point, the arms are held at the highest elevation and when the indicators are at the position of full load the arms may fall to the lowest point.

Having now described the construction, the operation is as follows: When the meter is used to register the consumption of current in a three wire system, the ammeter coils are connected respectively in series with the side wires of the system and each is energized by the current flowing in the wire with which it is connected. Consequently the indicating arms will assume angular positions corresponding with the current flowing in the respective sides of the system. The clock is supposed to run continuously and when no current is on, the indicators are at their lowest points, indicated on the drawings by a zero mark. Now when a load is thrown on, the indicating arms have a tendency to move but cannot do so until the highest points of the cams come around and lift the arms; then the indicators will move to a position in accordance with the load. Owing to the slight play which wheels b^4 and b^5 have upon the counting shaft, the wheels are permitted to turn slightly and the arms c', c^2, to rise slightly without imparting motion to the counting mechanism, so that while the indicators are at zero, the cams rotate and simply raise the arms a little without moving the counter every time the highest points of the cams pass under pins c^5 and c^6. This raising of the arms also frees the indicators, so that if current is flowing they may assume the proper position to indicate the fact, and it will be observed they do this without the slightest resistance. I have therefore overcome the fault in some of the present meters of failing to record the smallest loads, and the fault in others of adding to the record when no current is flowing. When the highest points of the cams have passed the pins c^5 and c^6, the arms fall until arrested by the indicators in their new positions. Now in the next revolution of the cams as the arm c' is traveling upward, it causes the wheel b^4 and the shaft b^3 to rotate, by reason of the engagement of the pawl b^9, and therefore imparts motion to the counting mechanism in proportion to the distance traveled and to the current flowing in coil E as indicated by g. But as the arm c^2 is moving upward, the pawl b^9 which it controls through lever b^{12} and link b^{11} is assuming a lower position on the periphery of wheel b^5, without imparting motion to the wheel. When the arms c' and c^2 fall from the highest point of the cam onto the ends of the indicators, the reverse of this operation takes place, *i. e.*: the arm c' gives a new position to the pawl which it controls while the arm c^2 causes its pawl to grip the wheel b^5 and turn it, thereby moving the counting mechanism in proportion to the current flowing in coil F as determined by indicator g'. It will therefore be observed that once every minute the current flowing in each side of the system is registered successively on the same counting mechanism and that the total consumption is thereby measured. It is understood of course, that the cams may rotate once in two minutes or in any desired period without departing from the spirit of my invention; also that any form of motor may be substituted for the clock-work herein described, the only essential point being that the cams shall be rotated at a regular predetermined speed. It is also to be understood that the clock-work may be used to close the circuit at regular intervals, of a separate motor which in turn would rotate the cams.

Although I have described two meters acting upon a single counting mechanism, it is obvious that inasmuch as they record entirely independent of each other, either one of them may be in operation without the other and equally as good results obtained.

Having thus described my invention, I claim—

1. In an electric measuring apparatus, the combination of a plurality of separate meters adapted to measure the current in a plurality of separate circuits, of a single counting mechanism registering the sum of the current flowing through all of the meters.

2. In an electric measuring apparatus, the combination of a plurality of separate respective meters measuring the current in separate circuits, of a single counting mechanism registering the sum of the current flowing through all the meters, the meters acting upon the counting mechanism in succession substantially as described.

3. In an electric measuring apparatus, the combination of two separate meters adapted to measure the current in separate circuits, a single counting mechanism, a shaft geared to said counting mechanism, two wheels on said shaft, two systems of levers for imparting a step by step movement to the wheels and a motor adapted to move said systems of levers, said meters determining the extent of movement which the motor shall impart to the systems of levers substantially as described.

4. In an electric measuring apparatus, the combination of a counting mechanism, mechanical devices through which motion is imparted to the counting mechanism, a motor moving said mechanical devices periodically, and a current indicator determining the dis-

tance which the motor shall move the counters, lost motion being allowed in said mechanical devices whereby they may move a slight distance before the counter is affected.

5. In an electric measuring apparatus, the combination of a motor, a shaft rotated thereby, two cams on said shaft, two systems of levers moved respectively by said cams, a counting mechanism, a driving shaft for the same, two wheels on the driving shaft, said wheels rotated respectively by said systems of levers, and two current indicators determining the distance which said levers shall be moved by the cams.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

OSCAR ERICSSON.

Witnesses:
FRANK S. OBER,
JAMES F. KAVANAGH.