(No Model.)

G. WESTINGHOUSE, Jr.

ELECTRIC METER.

No. 383,678. Patented May 29, 1888.

Fig. 1,

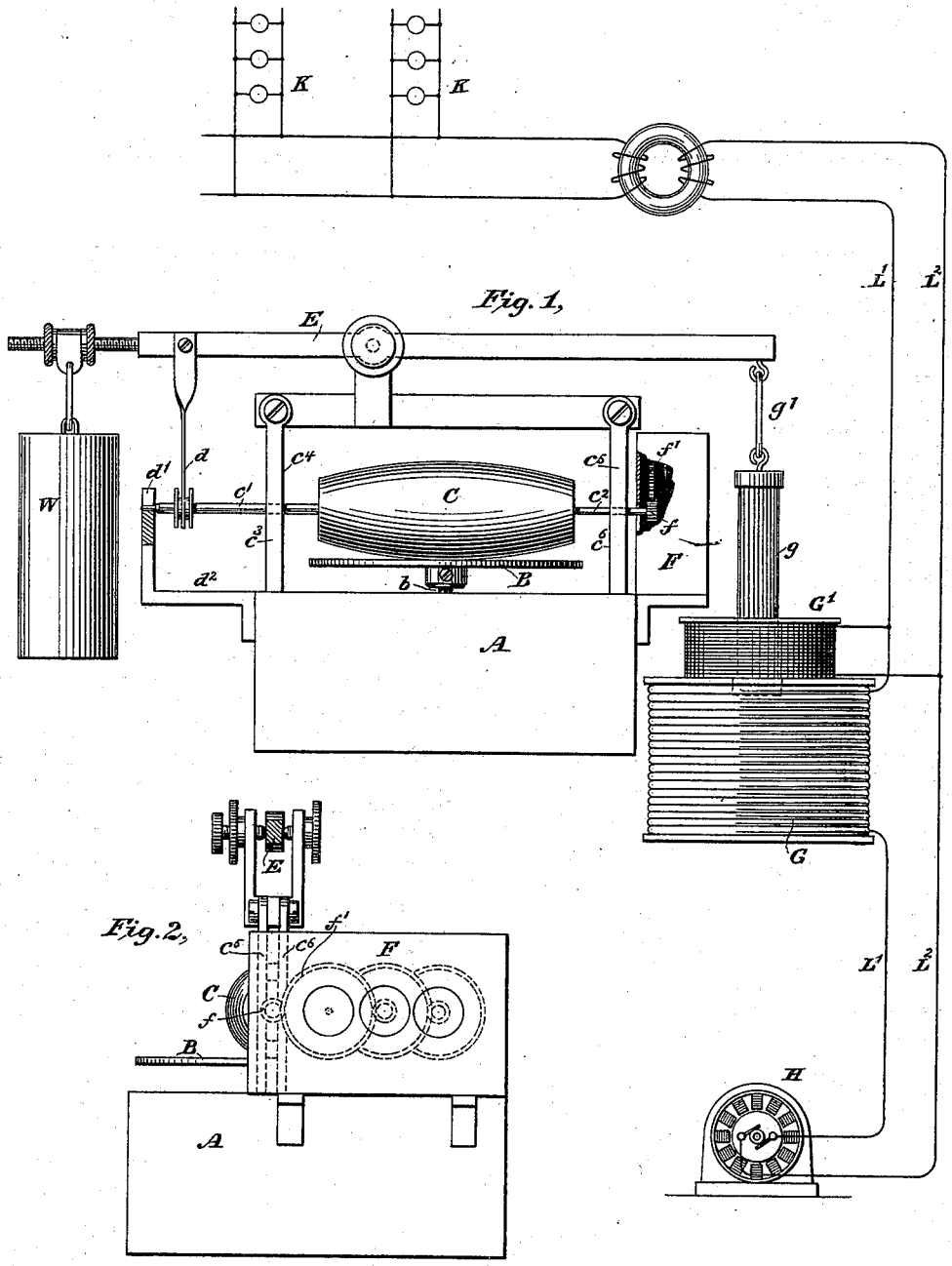

Fig. 2,

Witnesses.

Geo. W. Breer.

Eugene J. Reilly.

Inventor.

Geo. Westinghouse Jr.

By his Attorneys

Pope Edgecomb & Terry

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 383,678, dated May 29, 1888.

Application filed June 16, 1887. Serial No. 241,459. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., a citizen of the United States, residing in Pittsburg, Allegheny county, and State of Pennsylvania, have invented certain new and useful Improvements in Electric Meters, of which the following is a specification.

The invention relates to apparatus for registering the quantity of electricity used for operating translating devices or consumed in any given circuit.

The invention comprises a disk or circular plane which is caused to revolve at a determinate and uniform speed, against the face of which bears a roller having in some instances the general form of a prolate spheroid. The periphery of this roller is in frictional contact with the face of the disk or revolving surface at a point which is more or less distant from its center by the action of appropriate mechanism as the current traversing the apparatus is increased or diminished. The roller receives a movement of rotation from the disk by friction, and is thus caused to turn upon its axis at a rate of rotation dependent upon the distance of its periphery contact from the center of the revolving surface against which it bears. The rate of revolution is further dependent upon the circumferential measure of the roller in the plane of its point of contact with the face of the disk at any given moment. The revolutions of the roller are communicated to appropriate registering devices, which serve to show at any time the quantity of electricity which has traversed the apparatus.

In the accompanying drawings, Figure 1 is a front elevation of such portions of a meter as are necessary to illustrate the invention, and Fig. 2 is a side view of the same.

Referring to the figures, A represents a suitable box or case inclosing a chronometric movement of any suitable character adapted to revolve a disk, B, upon its axis *b* at a determinate and uniform rate of speed. A roller, C, bears against the face of the disk B. This roller has the general form of a prolate spheroid, and turns upon its axis c' c^2, one end, c', of which is mounted in a stirrup, *d*, depending from the shorter arm of a lever, E. The same end of the axis passes between two vertical guides, c^3 c^4, and is capable of vertical but not of lateral movement with reference to them. The other end, c^2, of the axis passes between similar guides, c^5 and c^6. The extremity c' of the axis is journaled at d' in a bracket, d^2, fixed to the case A and serving to support the axis when no electric current is passing.

It will be evident that when the axis of the spheriodical roller C is horizontal and its greatest diameter is coincident with the center of rotation of the disk B no movement will be communicated to it by the revolution of the disk. If, however, the end c' of the axis be raised and the end c^2 lowered, the point of contact both upon the disk and upon the roller will be changed, and the latter will revolve at a rate of speed dependent upon two separate factors—namely, the radial distance from the center of revolution of the disk to the point of contact, and upon the circumference of the roller in the plane intersecting its point of contact. This last factor may be modified, or may be made to suit the requirements of individual cases, by varying the proportions of the ellipse which forms the longitudinal section of the roller. The rate of revolution will be proportionally greater as the circumference at the point of contact becomes less, and vice versa.

The motion of the roller C is communicated to a counting, indicating, or registering mechanism of any suitable character or of any well-known construction. This may be effected through the instrumentality of a pinion, *f*, upon the end of the axis of the roller C, which engages with a toothed wheel, f', of the indicating mechanism. The engagement of the pinion *f* with the wheel is such that the movements arising from the rocking of the roller C will not interfere with the proper transmission of the motion, and it is for this purpose preferably placed on one side of the wheel, as shown.

In order to shift the point of contact between the roller C and the disk B, so that its position will bear a definite relation to the strength of current which is being measured, a coil or solenoid, G, of thick conducting-wire, is included in the direct circuit of the generator or other source of supply, H. For instance, a conductor, L', may lead from one pole of the source through the coil G to the

work-circuit K K. The current flowing through to the circuit will necessarily traverse the coil G. A core, *g*, preferably composed of a bundle of soft-iron wires insulated from each other, extends axially into the coil G, and will be drawn a greater or less distance into the coil in a manner well understood, according to the strength or volume of current which is passing through to supply the work-circuit K K. A supplementary coil, G′, of thin insulated wire having a large number of turns, may be connected across from the conductor L to the return-conductor L^2, and this coil also acts in the same manner upon the core *g*.

The core *g* is suspended by a link, *g′*, from one arm of the pivoted lever E in such manner that as it is drawn farther into the coils the lever will turn upon its fulcrum *e*, and thus raise the opposite end *c′* of the axis of the roller C against the action of the adjustable counter-balance W, applied to the other arm of the lever E; hence it will be understood that the angular position of the axis of the roller C depends upon the value of the current traversing the apparatus, and the rate of revolution of the roller C will be determined by its position with reference to the center of revolution of the disk B.

The several parts are so adjusted that when no current is being consumed in the work-circuit the roller C will bear directly against the center of revolution of the disk B, and consequently no motion will be communicated thereto, and the registering devices will remain stationary.

It is obvious that the construction of the apparatus might be modified without departing from the principle of the invention by interchanging the respective positions of the driving mechanism A and the registering mechanism F with reference to the revolving disk B and roller C, in which case the former will receive its motion from the latter; but in other respects the action will remain unchanged.

I claim as my invention—

1. The combination, with a revolving plane, of a spheroidical roller in frictional contact with the face thereof, registering mechanism receiving its motion through said contact, and means for adjusting the angular position of the axis of said roller with reference to the plane of the disk in accordance with variations in the force to be measured.

2. In a meter, the combination, with a revolving plane, of a spheroidical roller in frictional contact with the face thereof, and means for varying the angular position of the axis of said roller with reference to the plane of the disk, thereby causing the point of contact to be moved toward and from the center of revolution of said plane.

3. In a meter, the combination, with the revolving disk B, of the spheroidical roller C, in frictional contact with the face of said disk, the stirrup *d*, supporting one end of the axis of said roller, and means for raising and lowering said end through said stirrup by variations in the force to be measured.

4. The combination of a revolving plane, a spheroidical roller in frictional contact with the face thereof, a magnetizing solenoid and core movable with relation to each other under the influence of an electric current, and means for communicating movements thus produced to the roller, thereby changing its point of contact with the revolving plane.

5. The combination of a revolving plane, spheroidical roller in frictional contact with the face thereof, guides for retaining the axis of the roller in a plane perpendicular to the axis of revolution of said plane, and mechanism actuated by electricity for moving said axis in said perpendicular plane.

In testimony whereof I have hereunto subscribed my name this 3d day of June, A. D. 1887.

GEO. WESTINGHOUSE, JR.

Witnesses:

DANL. W. EDGECOMB,

CHARLES A. TERRY.