(No Model.) 3 Sheets—Sheet 1.

F. TEAGUE.

ELECTRIC METER.

No. 482,324. Patented Sept. 6, 1892.

FIG. 2.

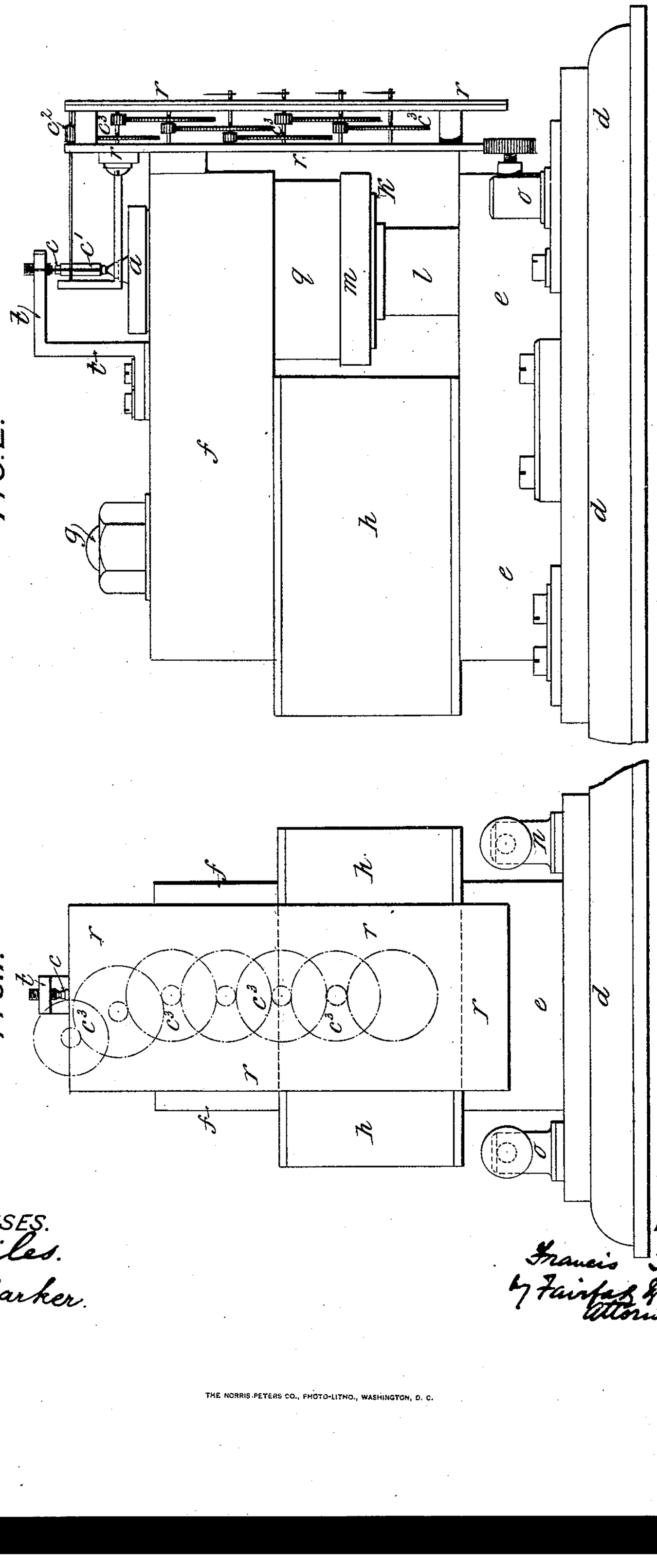


FIG. 1.

WITNESSES.
C. A. Giles.
E. C. Barker.

INVENTOR
Francis Teague
by Fairfax & Wetter
Attorneys.

(No Model.) 3 Sheets—Sheet 2.

F. TEAGUE.

ELECTRIC METER.

No. 482,324 Patented Sept. 6, 1892.

FIG. 6.

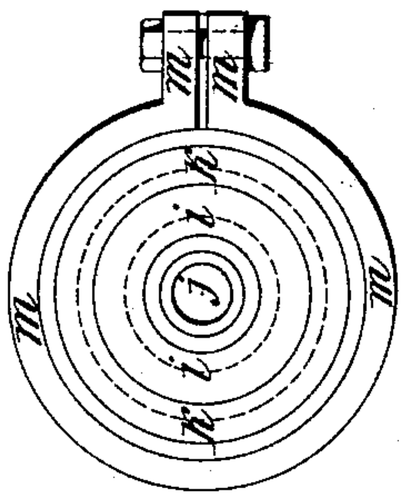
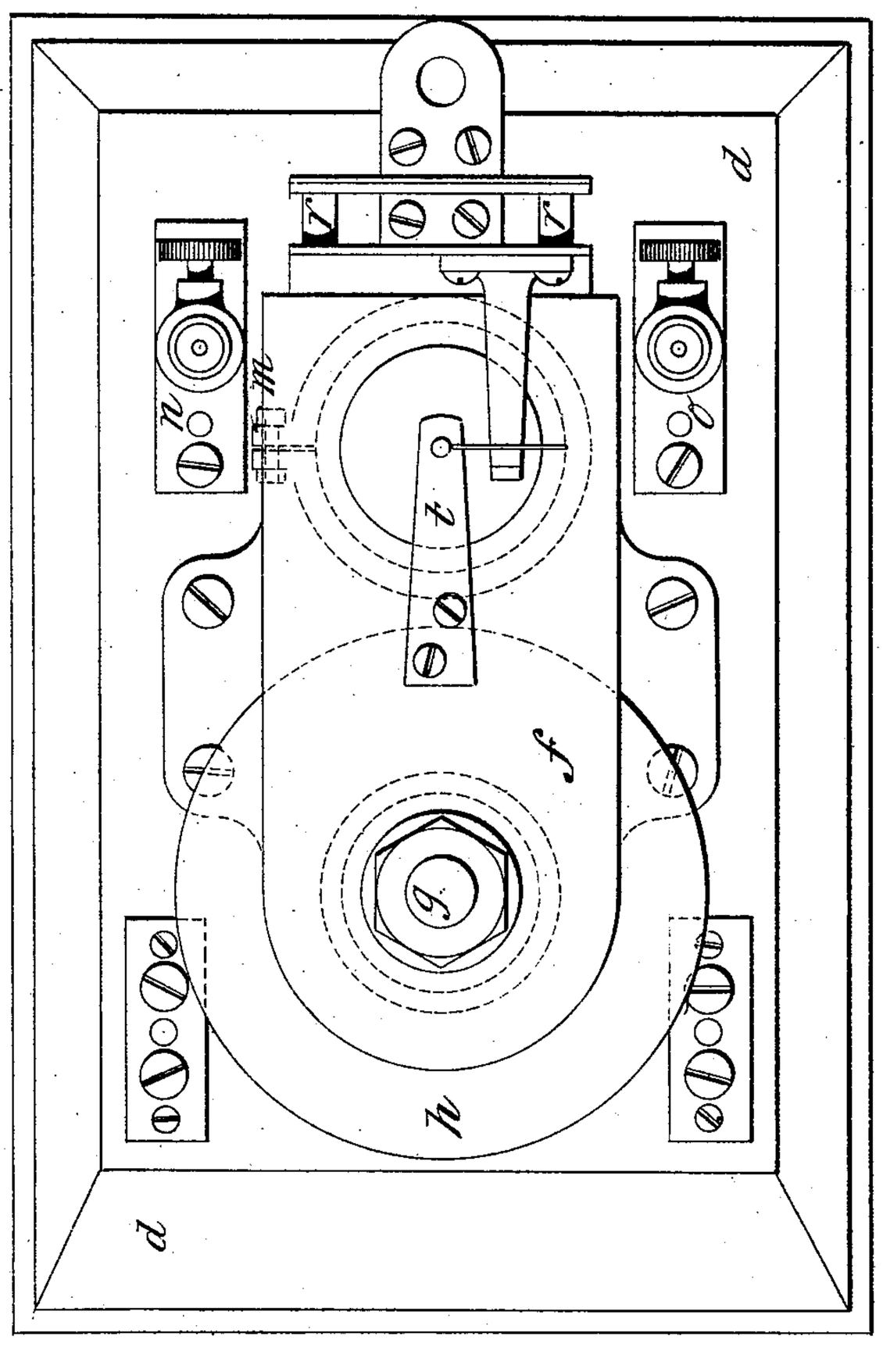


FIG. 3.



WITNESSES.
C. A. Giles.
E. C. Barker.

INVENTOR
Francis Teague
by Fairfax & Wetter
Attorneys.

(No Model.)

3 Sheets—Sheet 3.

F. TEAGUE.

ELECTRIC METER.

No. 482,324.

Patented Sept. 6, 1892.

FIG. 5.

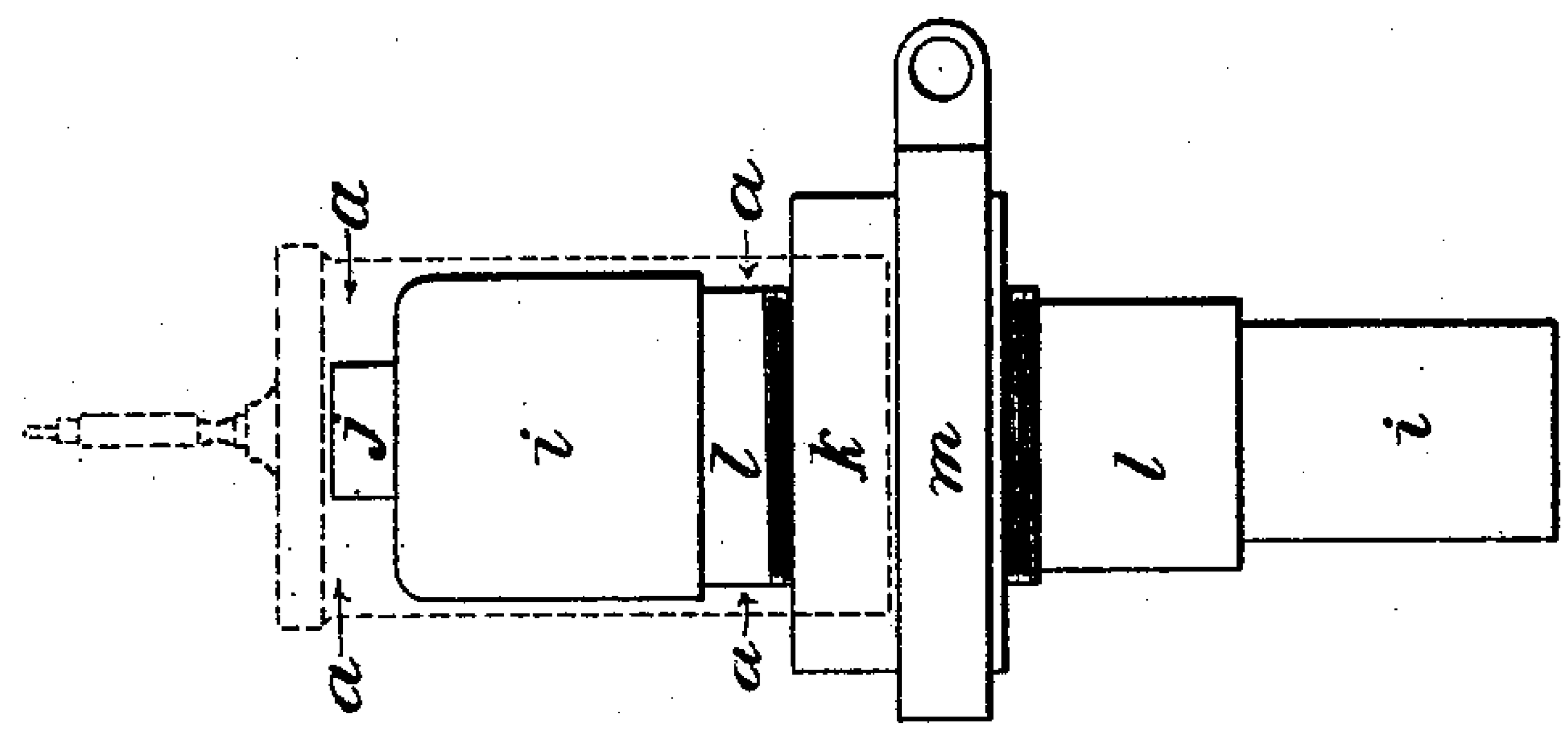
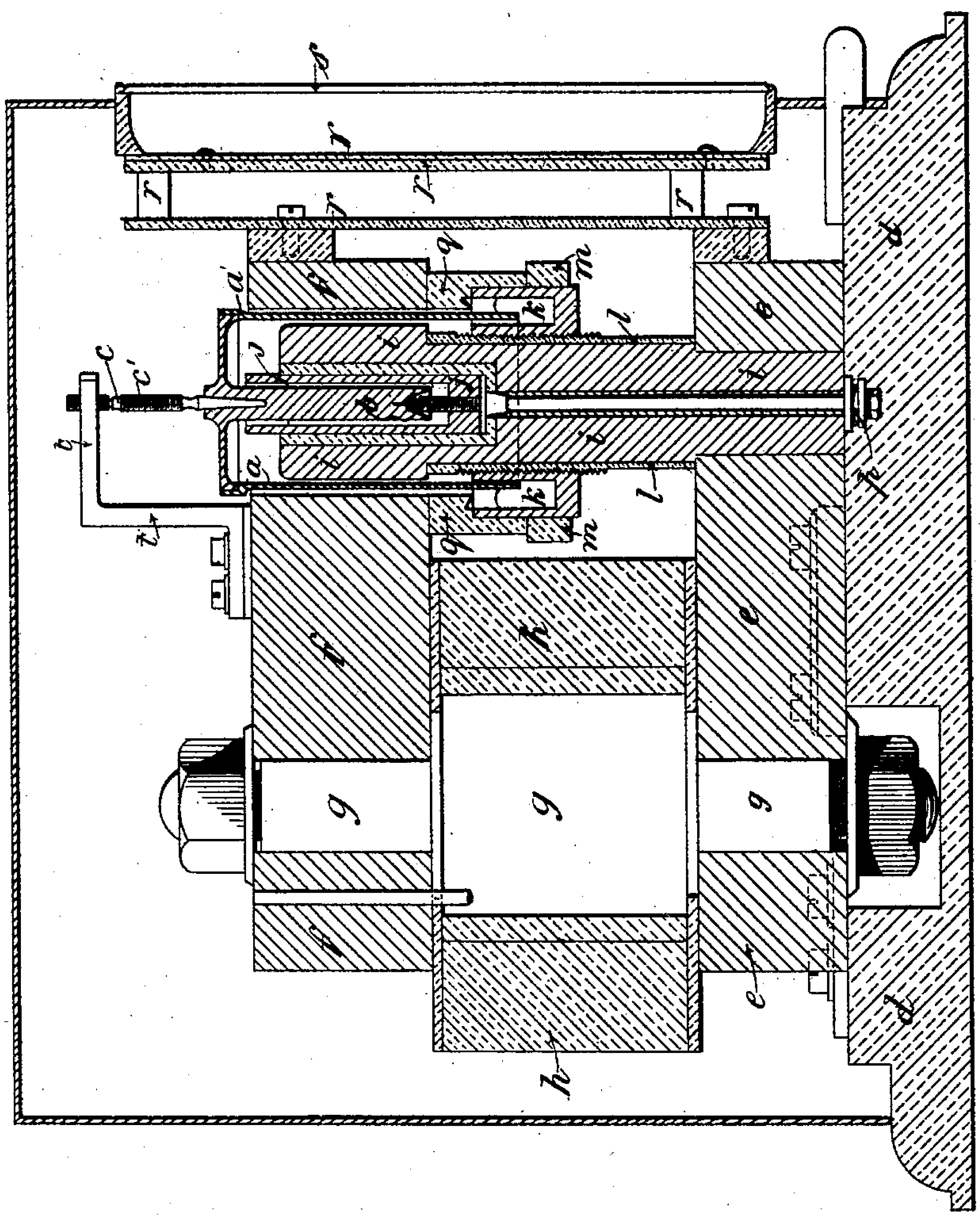


FIG. 4.



WITNESSES.

C.H. Giles.

E.C. Barker.

INVENTOR

Francis Teague

by Fairfax & Wetter

attorneys.

UNITED STATES PATENT OFFICE.

FRANCIS TEAGUE, OF LONDON, ENGLAND, ASSIGNOR TO JOHN ABBOTT ILIFFE, OF SAME PLACE.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 482,324, dated September 6, 1892.

Application filed November 17, 1891. Serial No. 412,186. (No model.) Patented in England January 8, 1891, No. 389; in France February 26, 1891, No. 211,733; in Germany May 2, 1891, No. 60,792, and in Italy June 30, 1891, No. 29,640/265.

To all whom it may concern:

Be it known that I, FRANCIS TEAGUE, a subject of the Queen of England, residing at Ferdinand Street, Chalk Farm, in the county of London, England, have invented certain new and useful Improvements in Electric Meters, (for which I have obtained Letters Patent in England, No. 389, dated January 8, 1891; in France, No. 211,733, dated February 26, 1891; in Italy, No. 29,640/265, dated June 30, 1891, and in Germany, No. 60,792, dated May 2, 1891,) of which the following is a specification.

My invention relates to meters used for measuring or recording electricity or the electric energy expended in any working circuit with which a meter is connected.

A meter constructed according to this invention consists of a small motor actuated by current from the said working circuit and adapted (through the intervention of a train of wheels) to indicate the energy expended in any desired units by means of index-fingers moving over suitably-marked dials. The working principle of the motor is the known one of the rotation of currents by magnets experimentally shown by Faraday.

In the accompanying drawings, Figure 1 is a front elevation of a meter, showing the dial-face, but with the relative positions and dimensions of the train of wheels and pinions indicated by dotted lines. Fig. 2 is a side elevation. Fig. 3 is a plan. Fig. 4 is a longitudinal section. Fig. 5 is an elevation of an iron cylindrical magnet extension, showing the relative position of the armature by dotted lines; and Fig. 6 is a plan of a ring-clip on the said magnet extension.

Similar letters of reference indicate similar parts throughout the figures.

The cylindrical armature *a* is of aluminium or copper vertically supported between jeweled pivotal bearings *b* and *c*, which are properly insulated. A horseshoe electro-magnet is provided and fixed upon a base *d* of wood, slate, or other non-conducting material, and the lower limb of the magnet *e* is secured thereto. Both the lower limb *e* and the upper limb *f* of the magnet are made of flat soft iron, and are connected together by a turned yoke or stud *g*, which also forms the core of the exciting-coil *h*. A circular hole is bored through the polar ends of the magnet-limbs *e* and *f*, and a circular or cylindrical iron extension *i* is fitted to the bottom one *e*, which extends upward into the hole in *f*. This upper hole is large enough to provide for the enlarged extremity of the polar extension *i* and a narrow annular space (truly concentric) surrounding the same in which the armature *a* may rotate, and as the shell of the armature is very thin a strong magnetic field is obtained to act upon the armature.

The polar extension *i* is bored out to receive a central mercury-trough *j*, (properly insulated), in which is the lower pivotal bearing *b* of the armature *a*. The armature-axle is bored cup-shaped at the bottom to receive the jewel for the lower pivot, and the space thus formed is made sufficiently deep to form a small air-chamber. This air-chamber (by the compression of air therein) serves to protect the lower pivotal bearing *b* from actual contact with the mercury, and consequently both the bearing and the mercury are kept clean. As the armature-axle is of an appreciable size, it follows that the mercury in the central mercury-trough *j* surrounds the axle and, together with the mercury in the outer annular trough *k* at the bottom of the armature, exerts a buoyant effect on the armature, and which by regulating the immersion may be made to balance the weight thereof, and thus to reduce the friction from that source to a minimum. The lower and outer mercury-trough *k* is of iron, of annular form, and screwed with a fine thread in the bore. This is made to screw upon a correspondingly-screwed section of an insulating-tube *l* of vulcanite or vulcanized fiber, fitted upon the central part of the polar extension *i*. By screwing the annular trough *k* up or down upon the tube *l* the dip of the armature *a* in the mercury is increased or reduced, as required. Around the trough *k* is a brass ring-clip *m*, which is secured upon the trough by screwing together the open ends of the clip. The circuit connection is made from a terminal

n to the clip m, so that by screwing the latter tight good electrical contact is made with the mercury-trough k through the armature a and central mercury-trough j, which is connected with the other terminal o by an insulated conductor p, carried through the center of the polar extension i. Surrounding the upper portion of the trough k and resting upon the clip m is a ring of insulating material q, having an overhanging lip closely conforming to the armature a, which keeps the mercury in position whenever the meter is out of level. The clip m further serves to keep the trough from moving when properly adjusted.

The upper portion of the armature-axle c is provided with a worm c' for actuating a worm-wheel, pinion c^2, and train of wheels c^3 c^3, carried by a framework r, as shown in Fig. 2, the outward or dial face of which is covered with glass s, as shown in Fig. 4, for protection. The framework r, with its train of wheels c^3, being self-contained, can be removed bodily from the polar ends of the magnet, and by the removal of the overhung bearing t the armature can be lifted out clear of its mercury-contacts for inspection or otherwise, as required.

With the solid-iron magnet-limbs shown the meter is adapted for continuous currents; but, if required for alternating currents, the magnet is built up of laminated plates in the manner well known. It is adapted for measuring watts (or energy) with a compound winding upon the coil h, or for a current-meter by a series winding, for as the electro-motive force rises or falls, so does the current rise and fall, (assuming the resistance of the circuit to be unaltered,) and I find that the rotation of the armature, and therefore of the index-fingers, is proportionate thereto.

What I claim, and desire to secure by United States Letters Patent, is—

1. An electric meter operating on the known principle of the rotation of currents by magnets, comprising an electro-magnet of horseshoe form with a hole through and near the end of the upper limb, a polar extension from the lower limb into the said hole to form an annular field therein, an insulated annular mercury-cup surrounding the said polar extension, and an insulated mercury-cup sunk axially in the center of the said polar extension with a step-pivot therein, a vertically-pivoted armature supported on said pivot and making electrical contact within the said mercury-cups, circuit connections, and a train of wheels and indexes mounted in a framework upon the said magnet and driven from the armature-axle, substantially as and for the purpose herein described.

2. An armature vertically suspended on pivots and rotatable in a truly concentric annular field, the armature-axle being immersed nearly the whole of its length in an insulated central mercury-cup sunk within a polar extension and the outer part of the said armature immersed in an adjustable annular mercury-cup, substantially as and for the purpose herein described.

3. In an electric meter, the combination of a polar extension within a cylindrical polar space forming a truly concentric annular field, an insulated central mercury-cup sunk axially in the said polar extension, a vertically-arranged armature supported upon a pivot at the bottom of said cup, and an outer annular mercury-cup vertically adjustable upon said polar extension and adapted for the rotation therein of the edge of the armature, substantially as and for the purpose herein described.

4. In an electric meter, the combination of a magnetic field of force with an armature having a central mercury contact and an outer annular mercury-trough adjustable to regulate the immersion therein of the armature, substantially as herein described.

5. In an electric meter, the combination of a truly concentric annular field, with an armature pivotally supported within a central mercury-cup, an air-chamber situated at the base of the armature-axle and protecting its pivot from mercurial contact, an outer mercury contact, and circuit connections, substantially as and for the purpose herein described.

6. In an electric meter, the combination of an electro-magnet of horseshoe form with a detachable framework containing indicating devices, said framework being secured in a vertical position against the upper and lower limbs of the said magnet, an armature rotatable in an annular field, and a driving-shaft communicating motion from the armature-spindle to the said indicating devices, substantially as and for the purpose herein described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANCIS TEAGUE.

Witnesses:
CHAS. ROCHE,
FREDK. C. VENN.