No. 713,564. Patented Nov. 11, 1902.

J. HARRIS.

ELECTRIC METER.

(Application filed Jan. 23, 1902.)

(No Model.) 2 Sheets—Sheet 1.

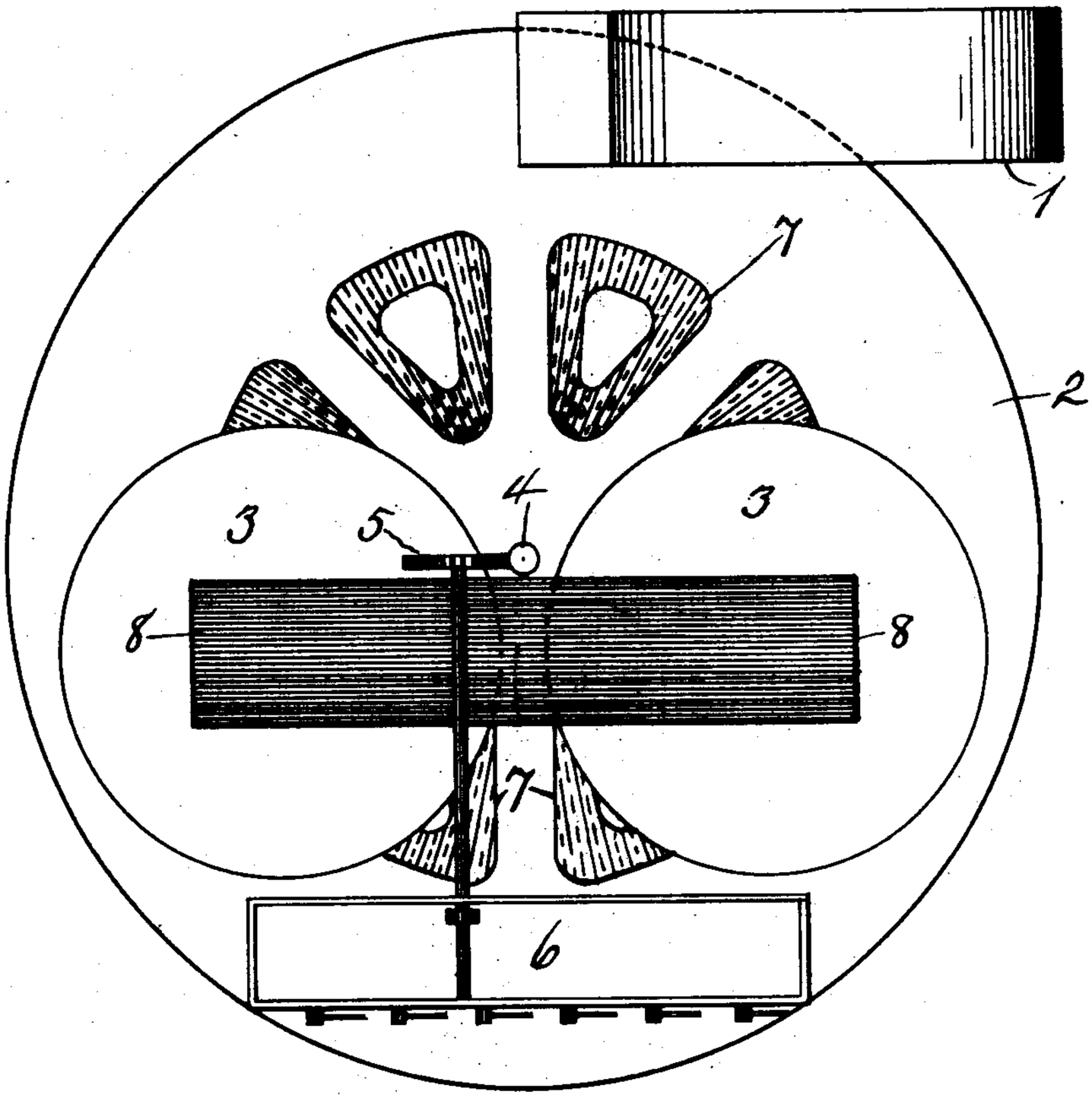

Fig: 1.

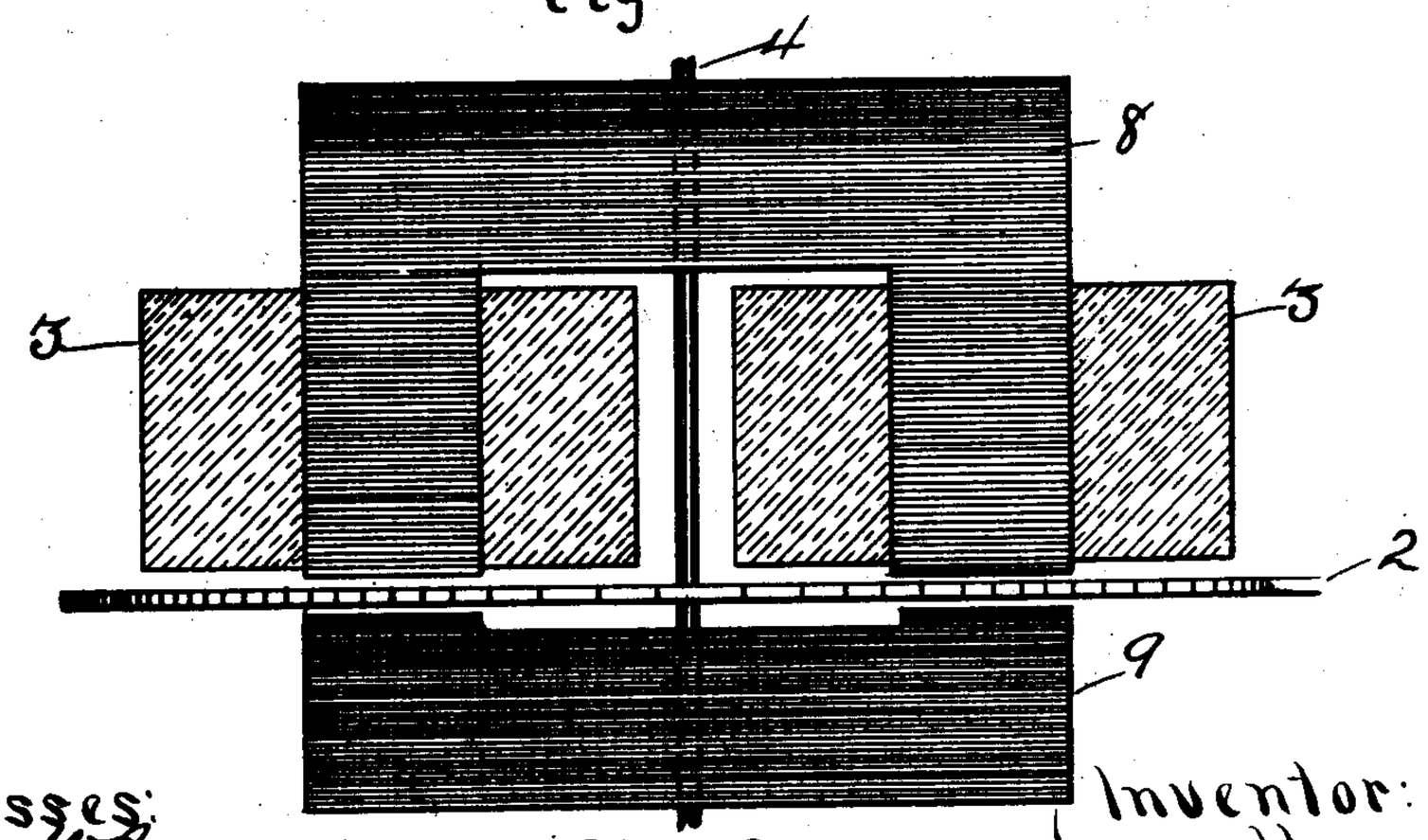

Fig: 2.

Witnesses:
James H. Brown
J. F. Harris.

Inventor:
Jesse Harris:
By W. H. Brown
his Atty:

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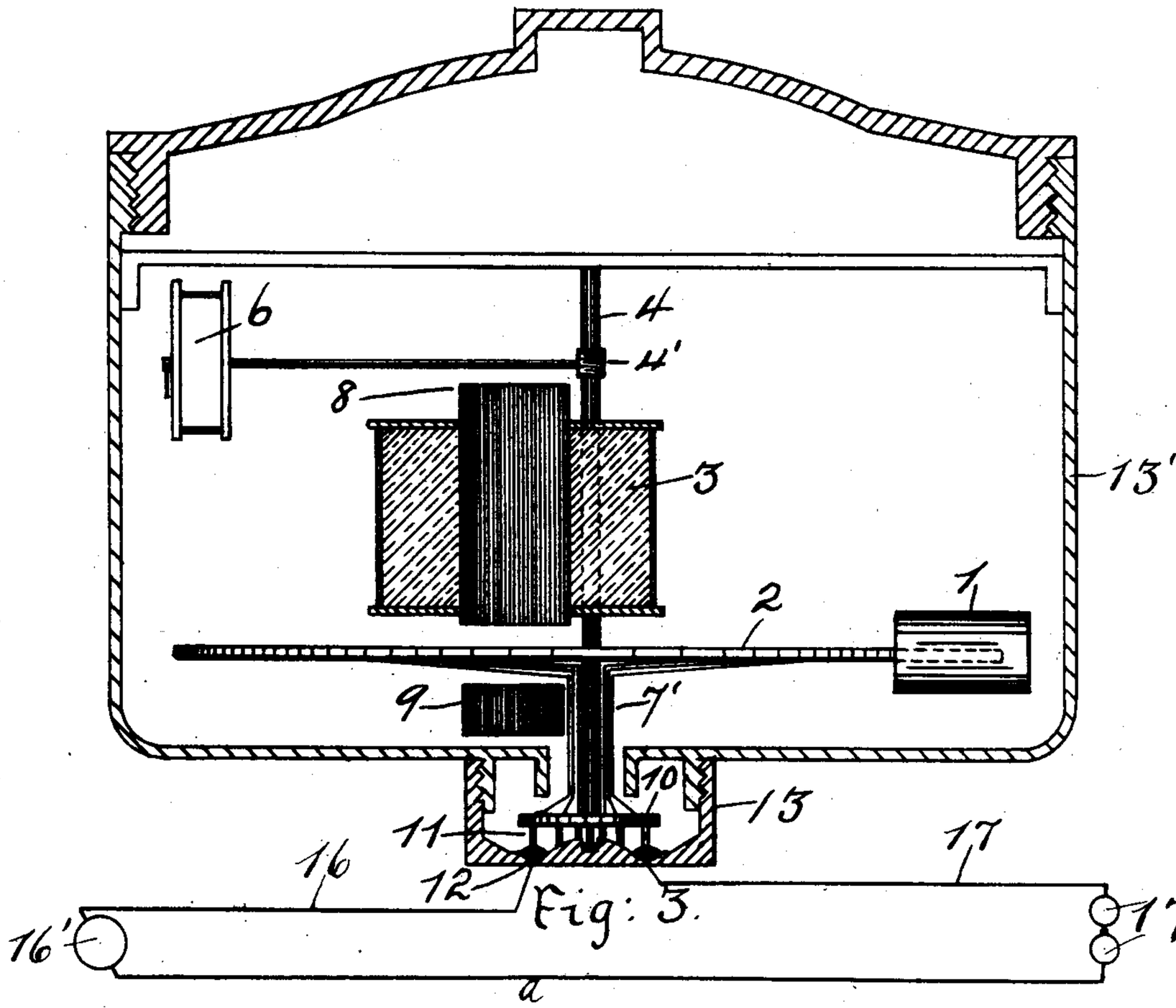

Fig: 3.

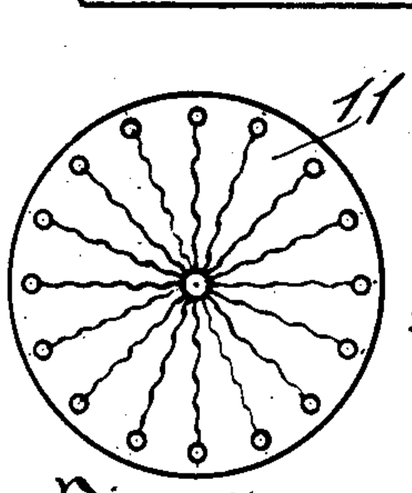

Fig: 4

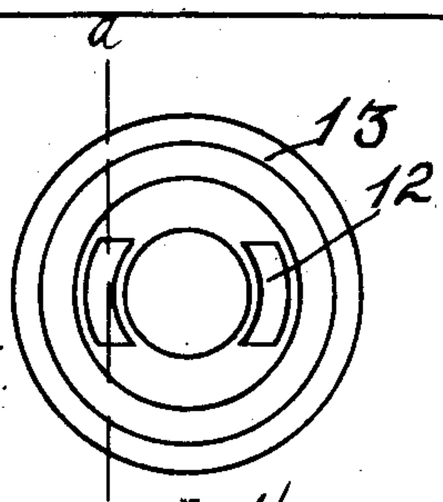

Fig: 5.

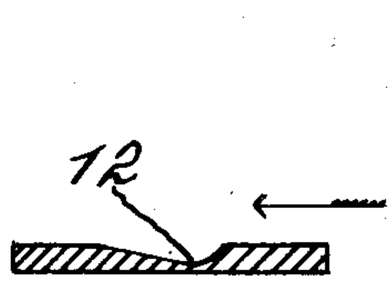

Fig: 6.

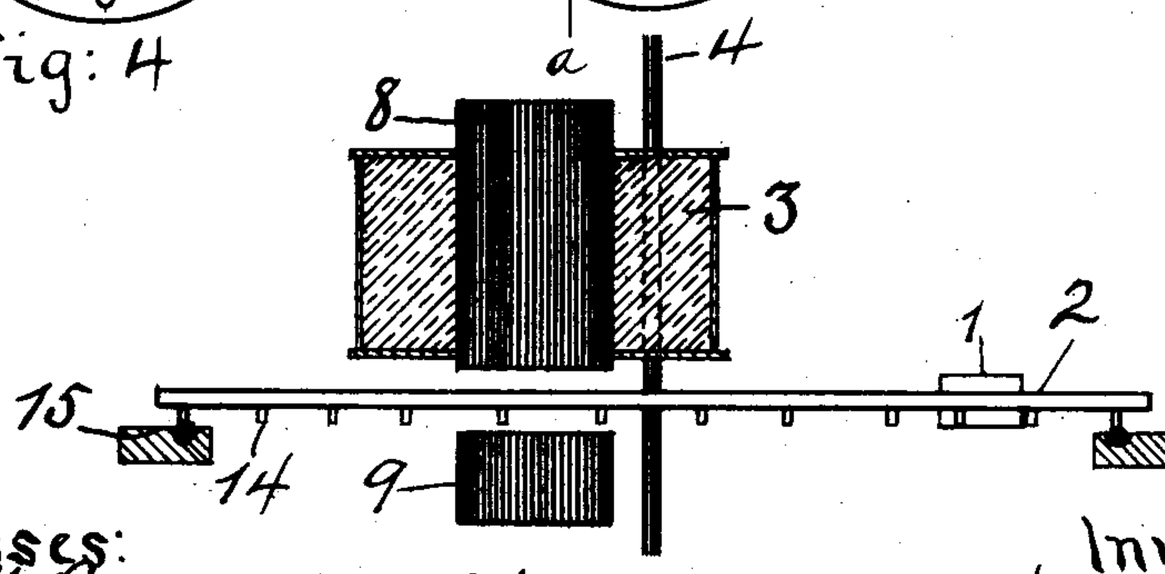

Fig: 7.

Witnesses:
James L. Brown
J. F. Harris

Inventor:
Jesse Harris.
By W. M. Brown
his Atty.

UNITED STATES PATENT OFFICE.

JESSE HARRIS, OF RENSSELAER, NEW YORK.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 713,564, dated November 11, 1902.

Application filed January 23, 1902. Serial No. 90,907. (No model.)

To all whom it may concern:

Be it known that I, JESSE HARRIS, a citizen of the United States, residing at Rensselaer, New York, have invented certain new and useful Improvements in Electric Meters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a new and improved electric meter.

In the drawings, Figure 1 shows a top plan view of my meter, with the coils 7 shown in section; Fig. 2, a vertical sectional view of the field-coils and laminated core and their arrangement; Fig. 3, a vertical sectional view of the meter with its casing; Fig. 4, a plan view of the support or plate for the commutator-pins; Fig. 5, a plan view of the mercury-cup; Fig. 6, a sectional view of Fig. 5, taken on line *a a;* Fig. 7, a vertical sectional view of another form of my device.

The numeral 1 shows a drag-magnet between the poles of which moves the disk 2, said disk having openings therein in which are set coils of wire 7, (shown in section,) which taken with the disk form the armature, the coils of wire 7 being electrically connected in pairs and connected with two of the pins 11, the coils 7 being so connected in pairs that when they revolve with the disk each pair coming under the poles of the laminated core at the same time will be energized by the current being commutated by the pins 11 and the mercury 12.

9 shows a laminated path, preferably, for the magnetic flux.

3 shows the field-coils, and 6 a counting-train, and 4 the driving-shaft, having a worm-gear 4′ operatively connected with the shaft of the counting-train.

The mercury-cup 13 has a peculiar formation to its bottom, whereby the mercury is retained in the most advantageous position, and is formed as follows: The disconnected grooves 12 are made in the bottom, as seen in Fig. 5, and are set oppositely and having one side of each groove inclined, as seen at 12 in Fig. 6. This is so arranged in order that as the revolving pins pass through or in contact with the mercury they will force the mercury forward and up the inclined plane, and when the pins leave it the mercury will run down the incline and place itself in position to take the following pin, the rapidly-moving pins also tending to keep the mercury somewhat upon the long inclined side of the grooves, thus commutating the current in a stronger magnetic field. In Fig. 7 I show the pins 14, which perform similar functions to the pins 11, (seen in Fig. 3,) as being passed through or connected to the disk 2 directly, and mercury cups or grooves 15 set under the disk so the ends of the pins will dip into the mercury as the disk revolves, the disk 2 in Fig. 7 being a solid disk and not having coils set therein, as in that form shown in Figs. 1, 2, and 3, as seen at 7. Instead of pins 11, as seen in Fig. 3, or those seen at 14 in Fig. 7 the edge of the disk may be slit, and the slit portion be turned down, forming depending projections, if desired, or any other means for making contact with the mercury be used; but I prefer the pins, as shown.

The numeral 8 shows a laminated magnet, the poles being surrounded by the coils 3 3, and 9 shows a laminated metallic pole-piece of path conducting the current from one pole to the other, and 17′ shows resistance devices in the circuit, and 16′ a source of electric power.

The operation is as follows: The conductor 16 being the supply-circuit conducts the current to the mercury 12 in one of the grooves in cup 13, and as the support 10 for the pins 11 rotates with shaft 4 and the disk 3 it draws the ends of the pins through the mercury, and the pins take up and conduct the current along the wires 7′ to a coil 7 and across to the opposite or connected coil 7 and down the return wire to the pin on the opposite side of support 10 to the mercury in the opposite groove and from thence out to the work-circuit 17. The field-coils 3 are connected across the line or in shunt. The circuit passing through the coils 7 in pairs produces a magnetic flux which, reacting on the flux produced by the field-coils 3, produces a torque proportional to the relative fluxes, thus setting the disk 2 in motion and communicating motion

to the counting-train by the shaft 4 and worm-gear 4′. In that form shown in Fig. 7, the disk 2 being a solid disk, the current passes through the metal of the disk from the receiving to the discharging pin 14 and the fluxes excited act precisely as in the other forms of the device, as above described. The supporting-plate 10 may be considered with its pins as a commutator and the supply-wire 16 as a brush and the mercury 12 as a practically frictionless medium between the brush and the commutator, and this is one of the features of my invention. It will be noticed that as the support 10, or, as I have also called it, the "commutator," revolves with its pins the current is obliged to travel from the mercury in one cup to the opposite cup connected with it and likewise through the next succeeding pair, and thus it passes through recurring paths or, in other words, through constantly-recurring pins, but without making any break in the current, for the pins are so set that at all times pins will be in contact with the mercury in the grooves or cups, so as to pass the current. It will be observed that the mercury-cup being formed as shown in Fig. 6 and the mercury tending as it does in accordance with its nature to pile up or stand slightly above the rim of the cup or groove the pins touch the mercury without touching the cup and that as the pin spass through or in contact with the mercury they force it more or less to one side or up the inclined side of the cup or groove and into the more dense or stronger magnetic flux existing at or near the poles of the magnet and in the disk and that this movement of the mercury will depend largely upon the speed of the pins 11 as they move through or in contact with the mercury, and in this manner the current will be commutated into a stronger or weaker—*i.e.*, a varying—magnetic flux in proportion to the speed of the pins. The form of cup or groove shown is preferred; but any other means than this particular form of cup may be used to allow this movement of the mercury without departing from the spirit of my invention.

My device therefore practically consists of a source of electrical power and a motor having a magnetic field and a conducting movable member with the field, portions of the movable member making successive electrical contact with a practically frictionless conducting body or member in the circuit, and means for producing a drag on the moving member and means for commutating the current into a stronger or weaker magnetic flux. The cover or casing 13′ consists, preferably, of glass; but any other suitable material may be used, and it is preferably air-tight.

Having described my invention, what I claim is—

1. In an electric motor having a magnetic field; a conducting movable member within that field; conductors for an electric current; a fluid-conducting body in the circuit; portions of the movable member arranged to make successive electrical contacts with the fluid-conducting body in the circuit, the said contacts being arranged to produce a continuous unbroken flow of the current; and a counting device operatively connected with the movable member arranged to register its movements substantially as described.

2. In an electric motor having a magnetic field: a revoluble disk composed of conducting material; a laminated electromagnet and coils embracing its poles; a laminated pole-piece separated from said poles arranged to act as a conductor between them; a drag device arranged to produce a drag on the disk; the disk being in electrical connection with a plurality of separate fluid conductors; a plurality of contacts arranged to enter and leave each of said fluid conductors successively and to maintain a continuous unbroken current, the fluid conductors being in connection with a source of electrical power; a counting device in operative connection with the disk arranged to register its movements substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JESSE HARRIS.

Witnesses:

JAMES M. BROWN,

J. F. HARRIS.