No. 720,152. PATENTED FEB. 10, 1903.

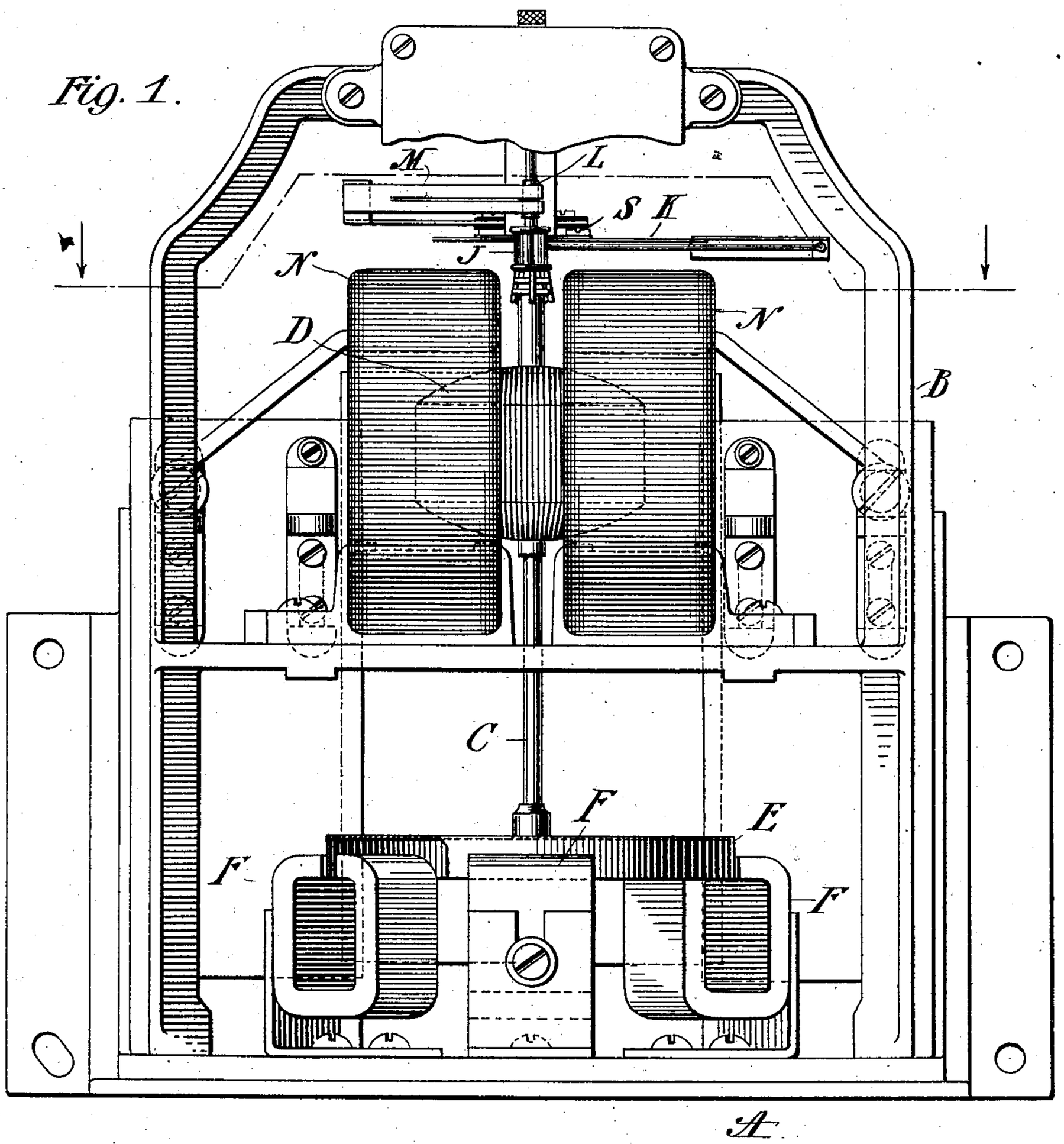
J. F. KELLY.

COMMUTATOR METER.

APPLICATION FILED OCT. 19, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



Witnesses
Frank L. Ober
R. S. Allyn.

Inventor
John F. Kelly.
By his Attorney R. Cunliffe.

No. 720,152. PATENTED FEB. 10, 1903.

J. F. KELLY.

COMMUTATOR METER.

APPLICATION FILED OCT. 19, 1901.

NO MODEL. 3 SHEETS—SHEET 2.

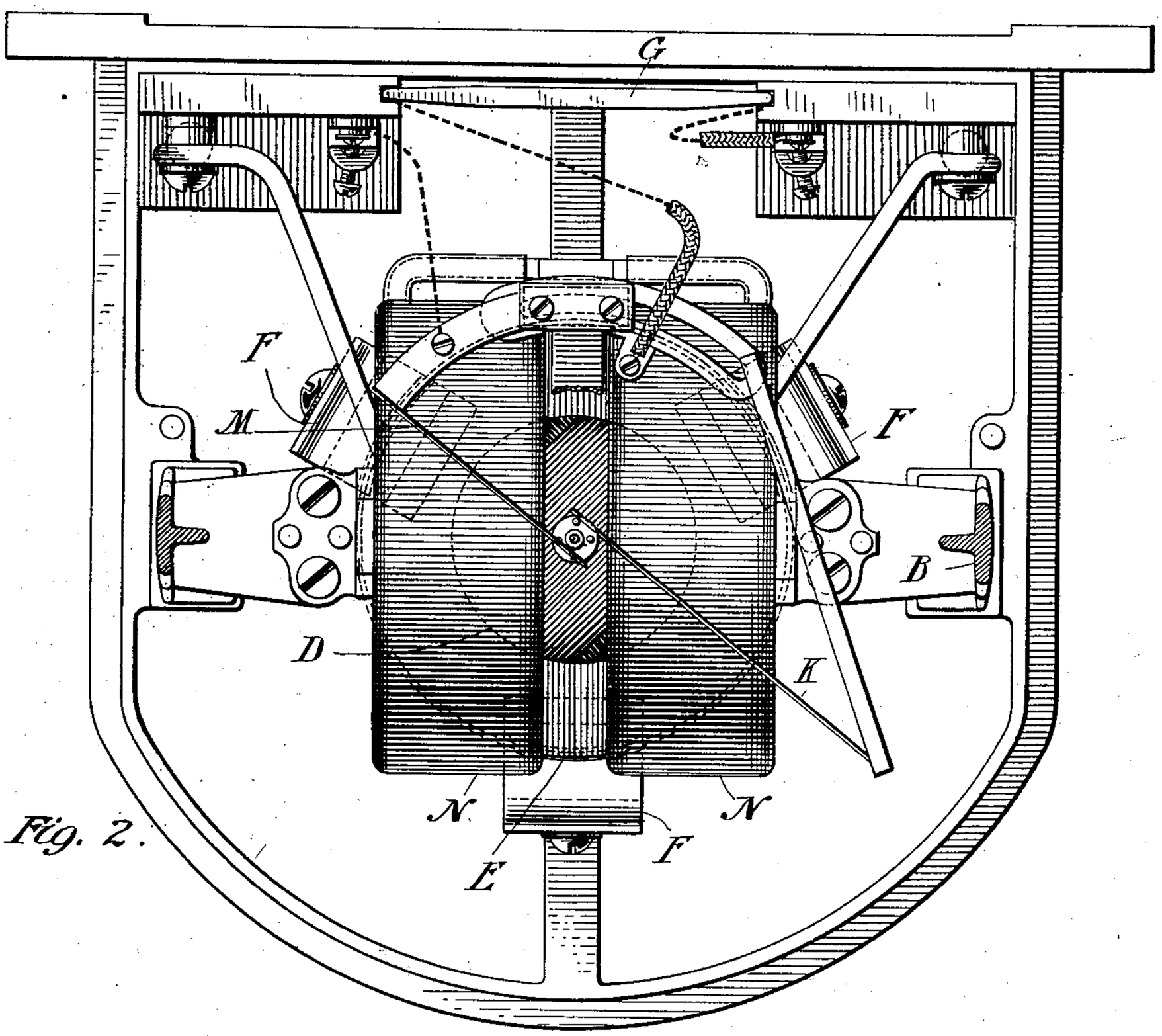
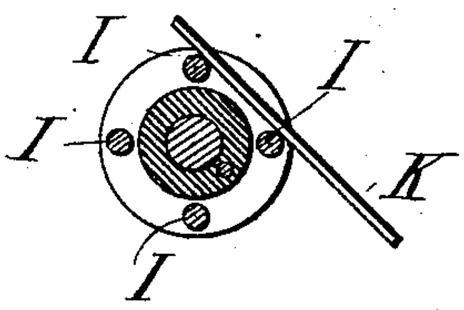


Fig. 2.

Fig. 4.

Fig. 5.



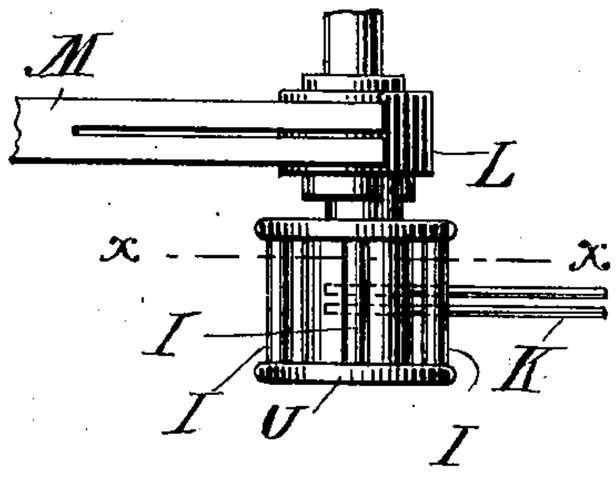
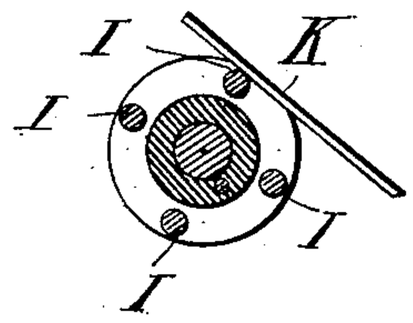


Fig. 6.



Witnesses
Frank S. Ober
H. B. Allyn.

Inventor
John F. Kelly.
By his Attorney
R. Cunliffe.

No. 720,152. PATENTED FEB. 10, 1903.

J. F. KELLY.

COMMUTATOR METER.

APPLICATION FILED OCT. 19, 1901.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

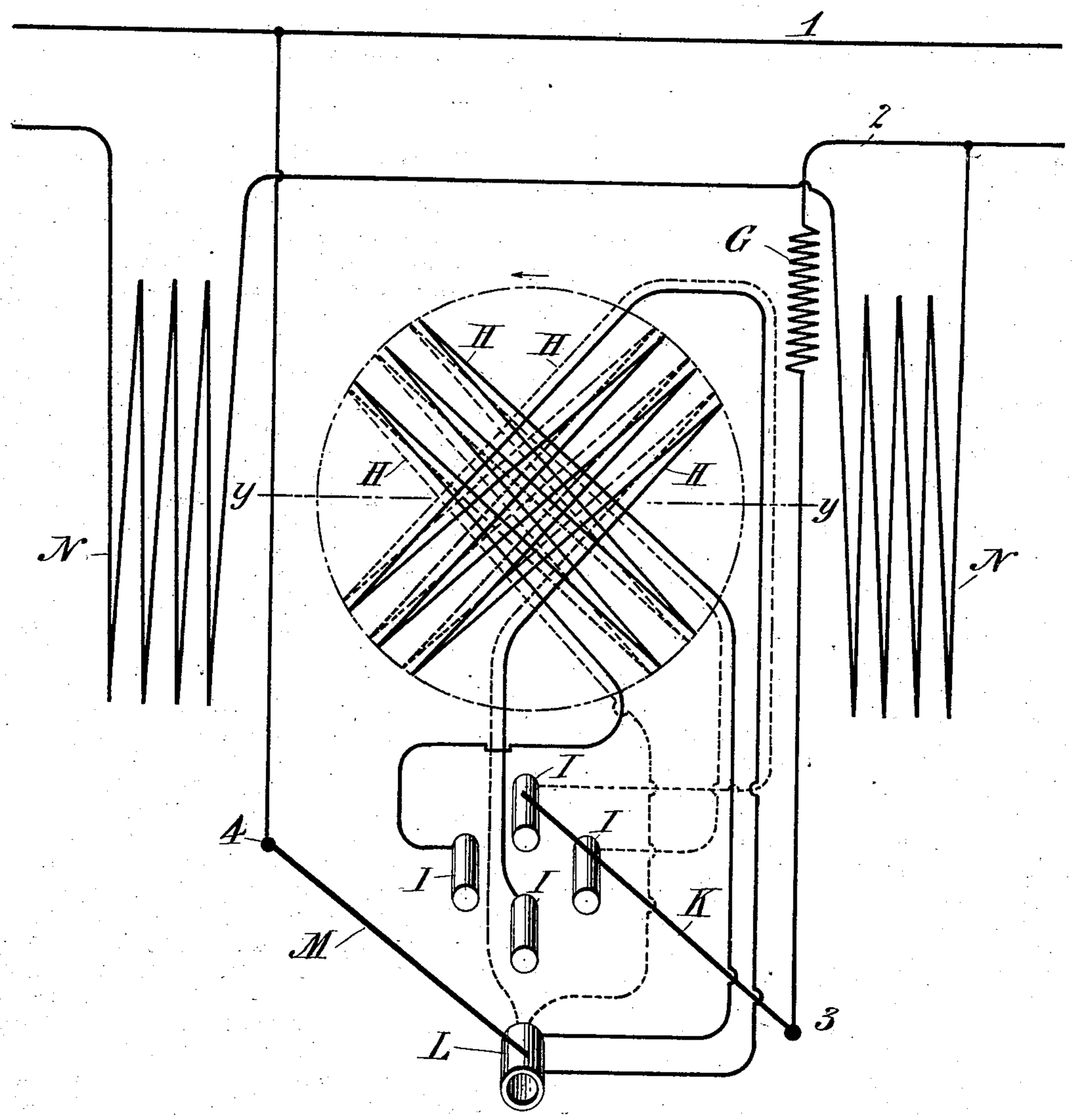
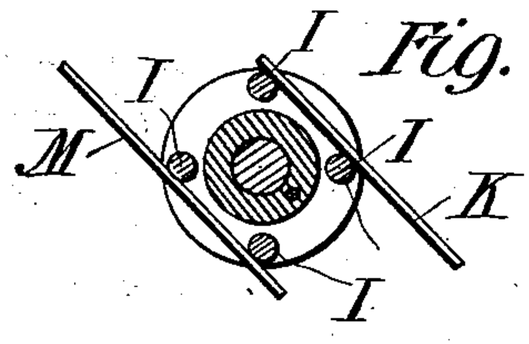


Fig. 7.



Witnesses
Frank S. Ober
Robt. S. Allen

Inventor
John F. Kelly.
By his Attorney R. Cruikshank.

UNITED STATES PATENT OFFICE.

JOHN F. KELLY, OF PITTSFIELD, MASSACHUSETTS.

COMMUTATOR-METER.

SPECIFICATION forming part of Letters Patent No. 720,152, dated February 10, 1903.

Application filed October 19, 1901. Serial No. 79,227. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. KELLY, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Commutator-Meters, of which the following is a full, clear, and exact description.

My invention relates to electric meters; and has for its object to produce a commutator-meter which shall be practically devoid of sparking or burning at the commutator and in which the commutator-segments are kept clean and bright, thus doing away with the most troublesome difficulties of such meters.

The following is a description of a meter embodying my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the working parts of the same. Fig. 2 is a plan view of the same with certain parts removed. Fig. 3 is a diagram of the circuits. Fig. 4 is a view of a detail. Figs. 5 and 6 are views on the line X X of the commutator and brush in two positions, and Fig. 7 is a similar view of a modification.

Referring more particularly to the drawings, A is the base from which rises the framework B, in which is journaled the shaft C, carrying the revolving armature D and the conducting portion E, which, with the surrounding magnets F, constitute a magnetic retarding device. The armature D is in a shunt-circuit across the mains 1 2 and is in series with a resistance G. The armature, as shown, has four coils H H H H, which are connected at one end to the posts I I I I of the polygonal commutator J, on which bears the brush K. The other ends of said coils are connected to the collecting-ring L, on which bears the brush M. The brushes K and M are insulated from each other at S and are respectively connected to the terminals 3 4.

N N are two coils in series with the work-circuit and serving to produce a field varying with the energy consumed in the translating devices, the armature and field coils being without iron cores.

The four coils H H H H constitute two pairs displaced at ninety degrees, those of each pair covering the same portion of the armature and being so arranged that a rotation of one hundred and eighty degrees brings one into the place of the other. The brush K, bearing upon the commutator-posts I, makes electric contact with at least one coil at all times. As the armature rotates the coils of each pair are alternately brought into service, or, in other words, a rotation of one hundred and eighty degrees will bring in the opposite member of a pair and in the same direction as the first member was when in circuit. A rotation of ninety degrees will bring in one of the members of the other pair. In passing from one coil to another the brush K will for an instant rest on two of the commutator-posts, thus throwing in circuit one coil of each pair. This, though it reduces the resistance of the armature, does not materially effect the current-flow therein, since the very large resistance G absorbs the greater part of the electromotive force impressed on the armature-circuit. It follows that since there is a closed circuit through both coils the opening of the circuit through one by the movement of the commutator produces very little sparking. Furthermore, the outgoing coil is arranged to have more counter electromotive force than the incoming coil, which fact causes the bulk of the current to take the new path and substantially shuts out the current from the outgoing coil before the break occurs. This is accomplished by adjusting the brush K so that the outgoing coil is in a stronger field than the incoming coil at the time of open-circuiting. In practice I arrange the brush so that the outgoing coil is open-circuited when it is a trifle less than forty-five degrees away from the line joining the centers of the field-coils, such position being that shown in Fig. 3. This, together with the paralleling of the incoming and outgoing coils, does away with substantially all sparking at the commutator. The commutator is, however, in addition kept dry and clean and free from oxid by the wiping action of the brush K over the rounded surface of the posts I I I I. The use of posts for commutator-segments gives the commutator a polygonal shape, which results in a more thorough wiping and cleansing of the parts. There will

therefore be practically no change in friction, nor will other disturbing causes arise at the commutator.

In the modification shown in Fig. 7 both brushes K and M bear upon the commutator and act in the same way as above described to parallel the circuits, so as to render the outgoing coil practically devoid of current at the time of breaking, while doubly cleaning the commutator-posts by wiping action.

While I have shown four coils, my invention is not limited to such number, as I may have more or fewer coils and posts and still preserve the advantages of paralleling two coils before breaking one and obtaining the wiping action of the brushes.

What I claim is—

1. In a meter, the combination of a field-energizing coil in series with the mains carrying the current to be measured, an armature having a plurality of armature-coils with separate terminals and located in a shunt to said mains, a commutator having less than six segments, the segments being at the angles of a polygon and having their contact-surfaces separated from each other by spaces several times as great as the width of each segment, each segment being connected to but one armature-coil terminal and a brush wiping over the angles formed by said segments.

2. In a meter, a commutator having its exterior in the shape of a polygon, the segments being at the angles thereof and the separations between the segments on the sides of said polygon, rotating conductors each having one terminal connected to one of said segments, their other terminals being connected in a common joint and to one of the mains, a brush wiping over the angles formed by the segments and connected to the other main forming a shunt-circuit, and a field-coil in series with the translating devices to which the current is supplied.

3. In a meter, a commutator having its exterior in the shape of a polygon, the segments being at the angles thereof and the separations between the segments on the sides of said polygon, rotating conductors each having one terminal connected to one of said segments, their other terminals being connected in a common joint and to one of the mains, a brush wiping over the angles formed by the segments and connected to the other main forming a shunt-circuit, a resistance in said shunt-circuit, and a field-coil in series with the translating devices to which the current is supplied.

4. In a meter the combination of series field-coils, and a shunt-armature, said armature having a plurality of rotating coils, means for successively open-circuiting said coils and for connecting an incoming coil in parallel with the outgoing coil prior to open-circuiting the same, said outgoing coil having a higher counter electromotive force than the incoming coil.

5. In a meter the combination of series field-coils, and a shunt-armature, said armature having a plurality of rotating coils, means for successively open-circuiting said coils and for connecting an incoming coil in parallel with the outgoing coil prior to open-circuiting the same, said outgoing coil having a higher counter electromotive force than the incoming coil, and a high resistance in series with said armature.

JOHN F. KELLY.

Witnesses:
L. VREELAND,
H. B. BROWNELL.