

No. 731,857.

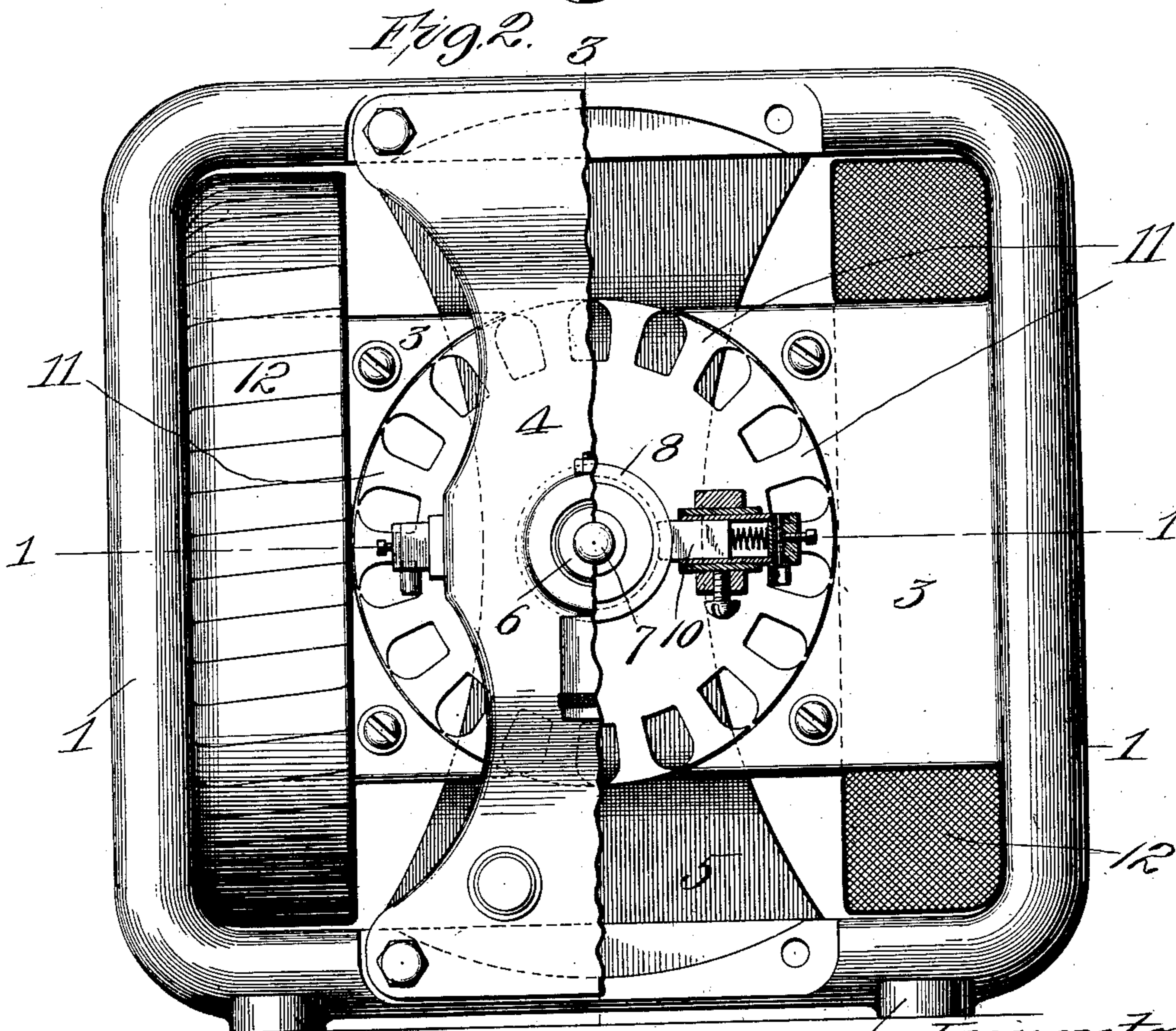
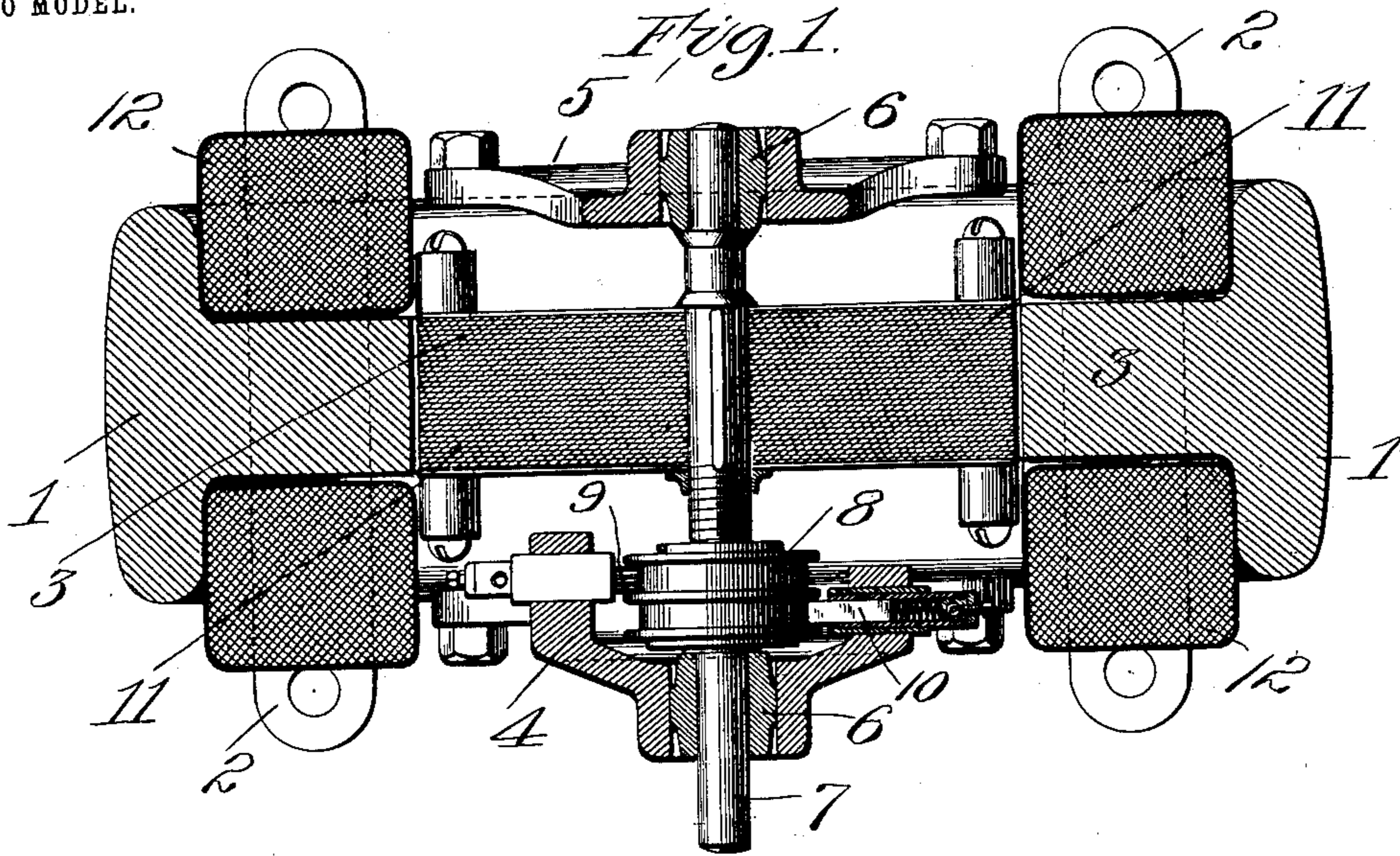
PATENTED JUNE 23, 1903.

P. E. CHAPMAN.  
ELECTRIC MOTOR.

APPLICATION FILED SEPT. 15, 1902.

3 SHEETS—SHEET 1.

NO MODEL.



Witnesses:  
*Wm. H. Scott*  
*Ralph Halick*

Inventor:  
*Penrose E. Chapman,*  
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*Attys.*

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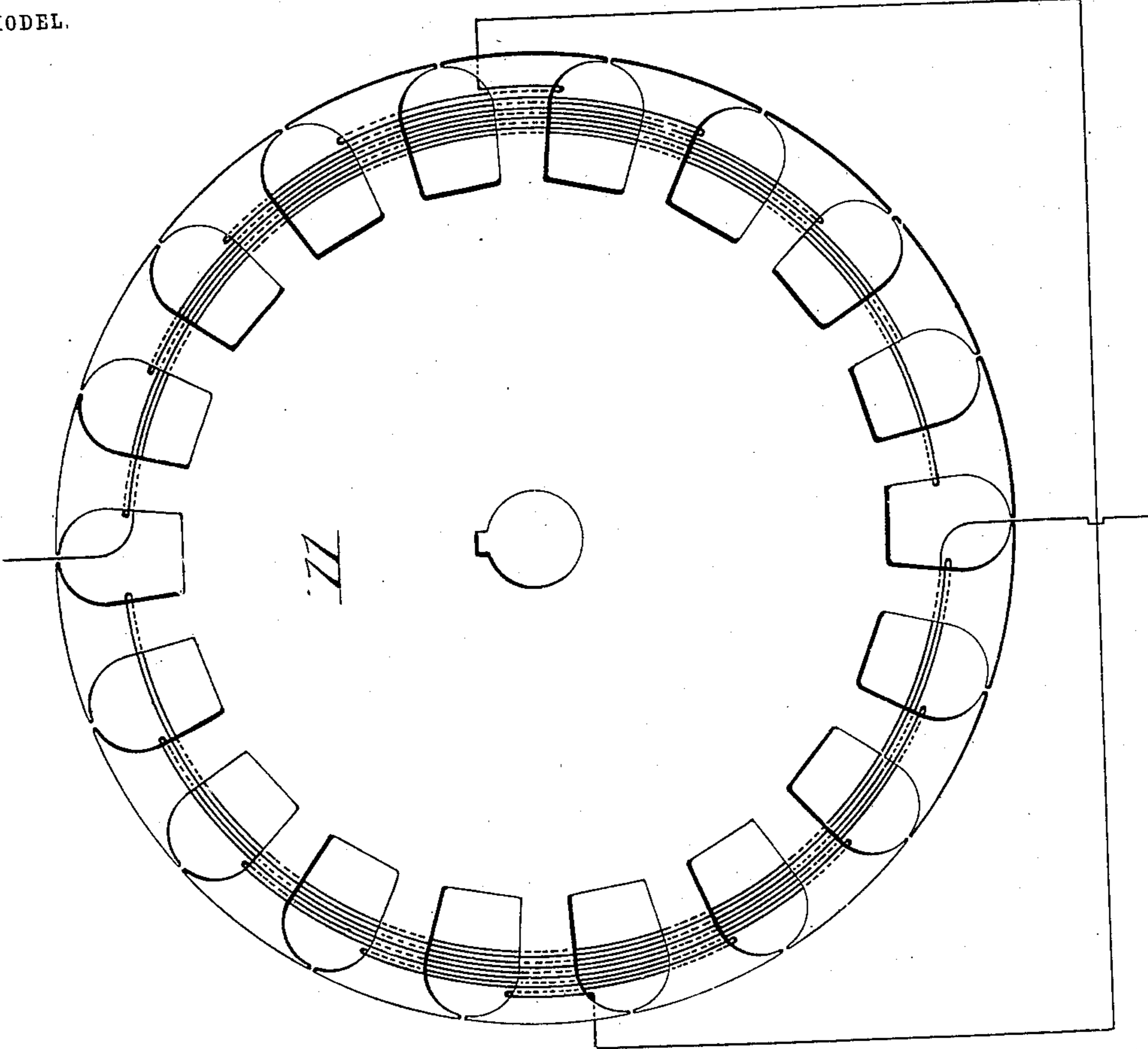
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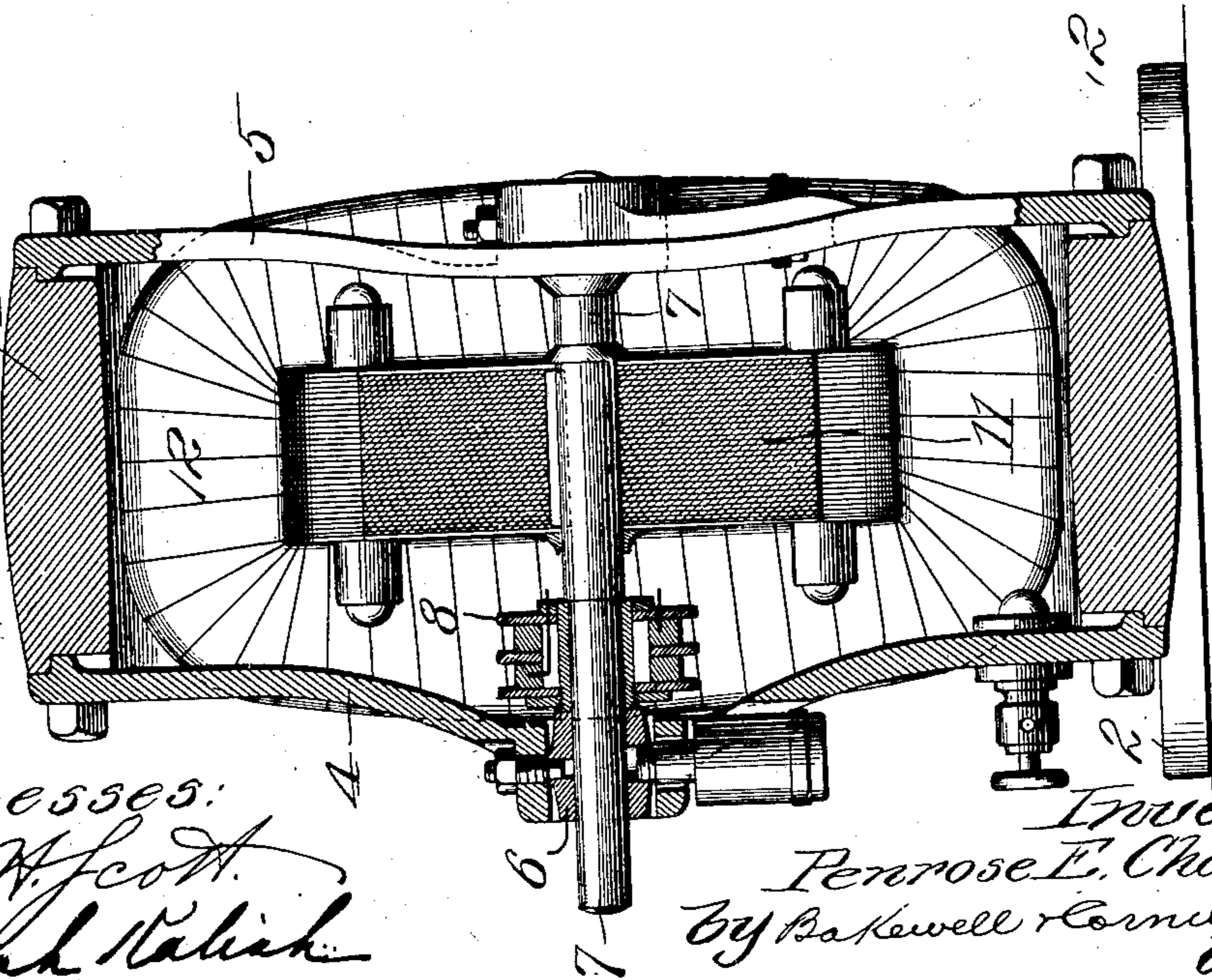
3 SHEETS—SHEET 2.

NO MODEL.

*Fig. 4.*



*Fig. 3.*



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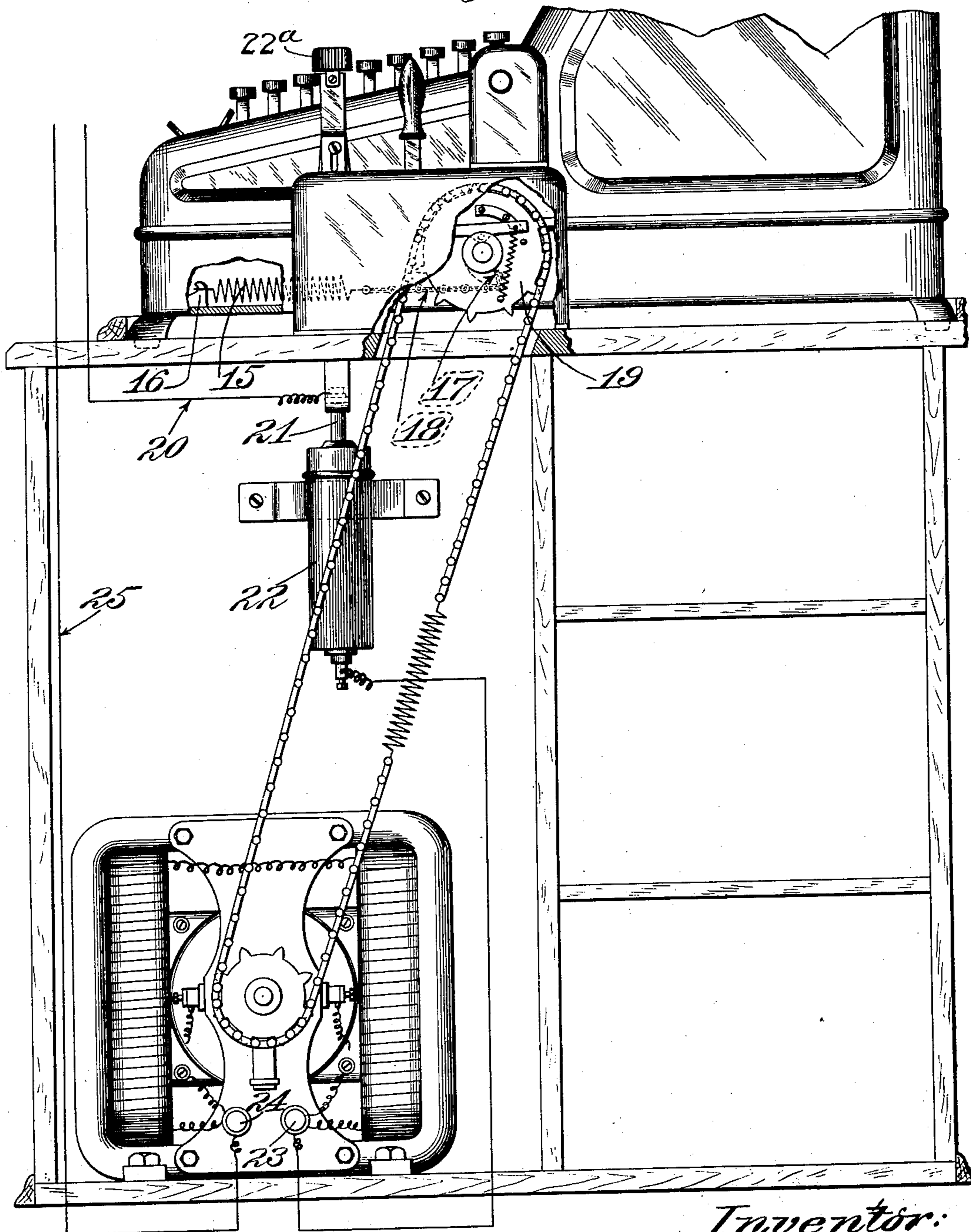
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3 SHEETS—SHEET 3.

NO MODEL.

*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

PENROSE E. CHAPMAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO UNIVERSAL ACCOUNTANT MACHINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

## ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 731,857, dated June 23, 1903.

Application filed September 15, 1902. Serial No. 123,450. (No model.)

*To all whom it may concern:*

Be it known that I, PENROSE E. CHAPMAN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Electric Motors, of which the following is a full, clear, and exact description, 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, forming part of this specification, in which—

Figure 1 is a horizontal sectional view on the line 1 1 of Fig. 2. Fig. 2 is a front elevational view, partly in section. Fig. 3 is a vertical sectional view on the line 3 3 of Fig. 2. Fig. 4 is a diagrammatic view of the armature and its windings, and Fig. 5 is a side elevational view of a cabinet-frame containing a motor connected to an adding-machine resting on said cabinet-frame.

This invention relates to a new and useful improvement in electric motors of that type where the armature is designed to make less than a complete revolution at each operation, means being provided for restoring the armature to home or starting position in readiness for another operation. The motor shown in the accompanying drawings is designed particularly for use in driving the main shaft of a calculating-machine—such, for instance, as shown in the United States patent granted to Frank C. Rinsche July 24, 1900, No. 654,181.

In Fig. 5 I have shown a calculating-machine partly broken away, which machine is placed on a cabinet and provided with a sprocket-wheel on the shaft which usually carries the operating-handle. My improved motor is arranged in the cabinet, and a sprocket-wheel is mounted on its armature-shaft, the two sprockets being connected by an appropriate chain, whereby when the motor is energized through the said connection the calculating-machine is driven forwardly. The restoring-springs in the machine are used to return the armature after actuation. It is obvious, however, that instead of gearing the motor to the calculating-machine the same can be coupled directly to the driving-shaft thereof, the motor-frame being bolted or ar-

ranged upon a suitable bracket extending from the frame.

While I have shown the motor as connected to a calculating-machine, such connection is shown merely as a convenience, because such machines have therein means which will restore the armature to its normal position after the current is interrupted, though it is obvious that the motor is equally applicable to any machine requiring the same movement and containing restoring means for the armature.

In the drawings, 1 indicates the frame of the motor, preferably in the form of steel casting and provided with lugs 2, forming supporting-feet, which lugs are preferably perforated for the passage of securing-screws. 3 indicates the poles extending from the frame.

4 and 5 are the front and back plates, which are bolted to the frame, said plates being provided with openings to receive bushings 6 of self-aligning bearings for the armature-shaft.

7 indicates the armature-shaft, upon which are arranged laminations forming the armature.

8 indicates the collector-rings, mounted upon the armature-shaft and coöperating with brushes 9 and 10, through which a current is led to and from the windings on the armature 11.

12 indicates the field-magnet winding.

The armature-winding, as shown in Fig. 4, is of that type known as "pyramidal" winding—that is, the laminations forming the armature-core are formed with teeth, and in winding the armature one of these teeth is first wound, after which the winding includes the next two teeth, then the next adjacent two teeth, and so on until one-half of said teeth are included in the winding to form one pole on the armature. By this method of winding, which is duplicated on the opposite side, the armature has two poles whose greatest magnetic intensity is located at diametrically opposite points on the periphery thereof, approximately opposite the teeth first wound. In the normal position of the armature with reference to the field-poles the cen-

ter of each armature-pole is preferably to one side of a vertical line through the armature-shaft perpendicular to the magnetic axis of the field-magnets. Thus when current is admitted to the field and armature windings the first magnetic action of the armature is repulsion, combined with attraction toward the opposite field-poles, followed by increasing attraction and decreasing repulsion up to the point where the armature-poles aline with the field-poles, imparting an available movement to the armature slightly in excess of one-quarter of a turn. In other words, there is a tendency to turn the armature similar to that in any direct-current motor; but in my invention, there being no commutator, the action is from zero to maximum and to zero again as the center of the armature passes the successive points.

There being no commutators, it is obvious that no sparking can occur in the motor, that when the centers of the armature-poles aline with a field-pole the armature will come to a position of rest, maintaining such position until current is cut off from the machine, and that when the motor is deenergized the armature is free to return to its original position in readiness for another operation. When the motor is connected with an adding-machine, as shown in Fig. 5, the return-spring 15, which is connected at one end thereof to a fixed member 16 of the machine and at its opposite end to the cam or lever 17 by means of the chain 18, will retract said cam-lever, which is secured to the sprocket 19 on the actuating-shaft of said machine, thereby restoring said machine, and through the sprockets and chain the motor is returned to its normal position of rest. The construction is extremely simple, the parts being easy of assemblage, and the brushes bearing upon collector-rings which do not spark will wear a long time without renewing.

In practice a direct-current is used for energizing my improved motor, and so far as I am aware I am the first to employ a pyramidally-wound armature which is energized by a direct current. By the use of my invention the winding may be secured with a minimum quantity of wire, and the resistance is consequently less and efficiency higher than

the ordinary direct-current winding, the winding used in my armature being one where the maximum efficiency can be obtained for this type of motor.

The circuit is as follows: through leader 20 into piston-rod 21 of dash-pot 22, wherein the circuit is broken upon elevation of piston-rod 21 and closed upon depression thereof through the key 22<sup>a</sup>. From the dash-pot the circuit continues to the post 23, where it is divided between the field and the armature and continues thence to post 24 and line 25 to its source.

I am aware that many minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric motor of the character described, the combination with field-magnets, and a pyramidally-wound armature which is incapable of making a complete revolution when the field-magnets are energized; substantially as described.

2. In a motor of the character described, the combination with a frame having field-poles, of a laminated armature, pyramidal windings on said armature, and means for simultaneously energizing the field and pyramidal windings of the armature; substantially as described.

3. In a motor of the character described, the combination with a frame having poles, of windings arranged on said poles, an armature having teeth, pyramidal windings on the teeth of said armature, collector-rings forming the terminals of said armature-windings, and brushes coöperating with said collector-rings; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 10th day of September, 1902.

PENROSE E. CHAPMAN.

Witnesses:

GEORGE BAKEWELL,  
G. A. PENNINGTON.