

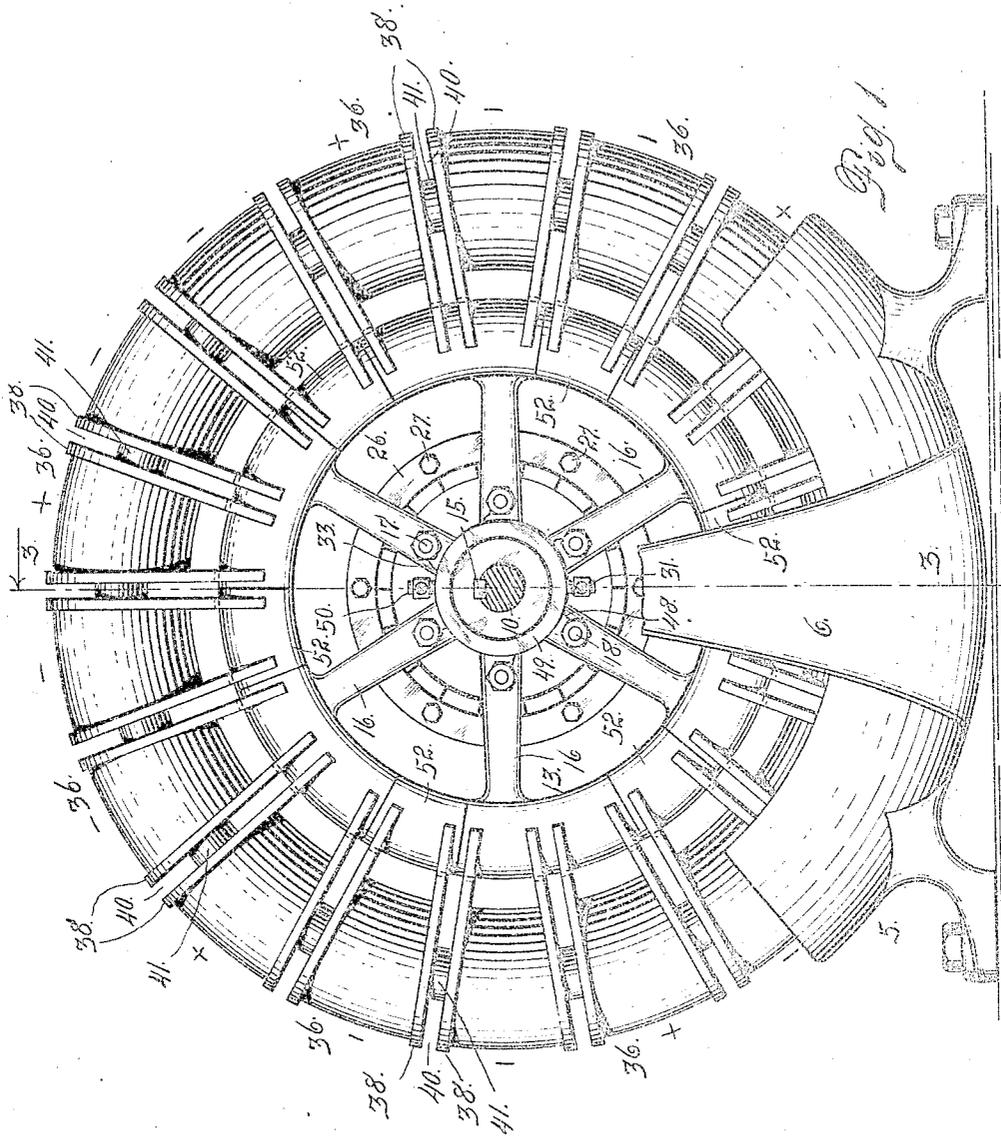
H. A. RHODES.
ELECTROMAGNETIC MOTOR.

APPLICATION FILED SEPT. 13, 1909. RENEWED DEC. 13, 1912.

1,069,291.

Patented Aug 5, 1913.

3 SHEETS—SHEET 1.



Witnesses

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J. W. Thornburgh

Inventor

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By *A. J. O'Brien*
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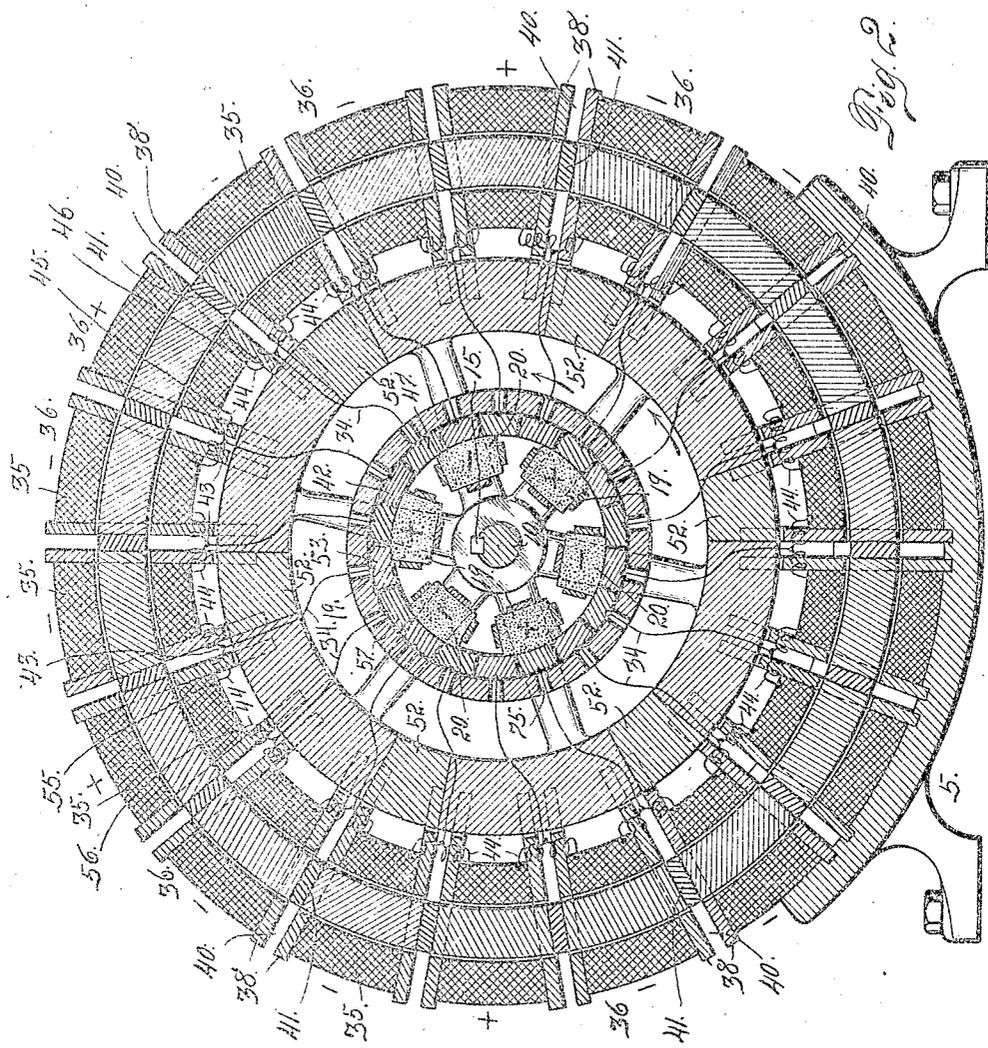
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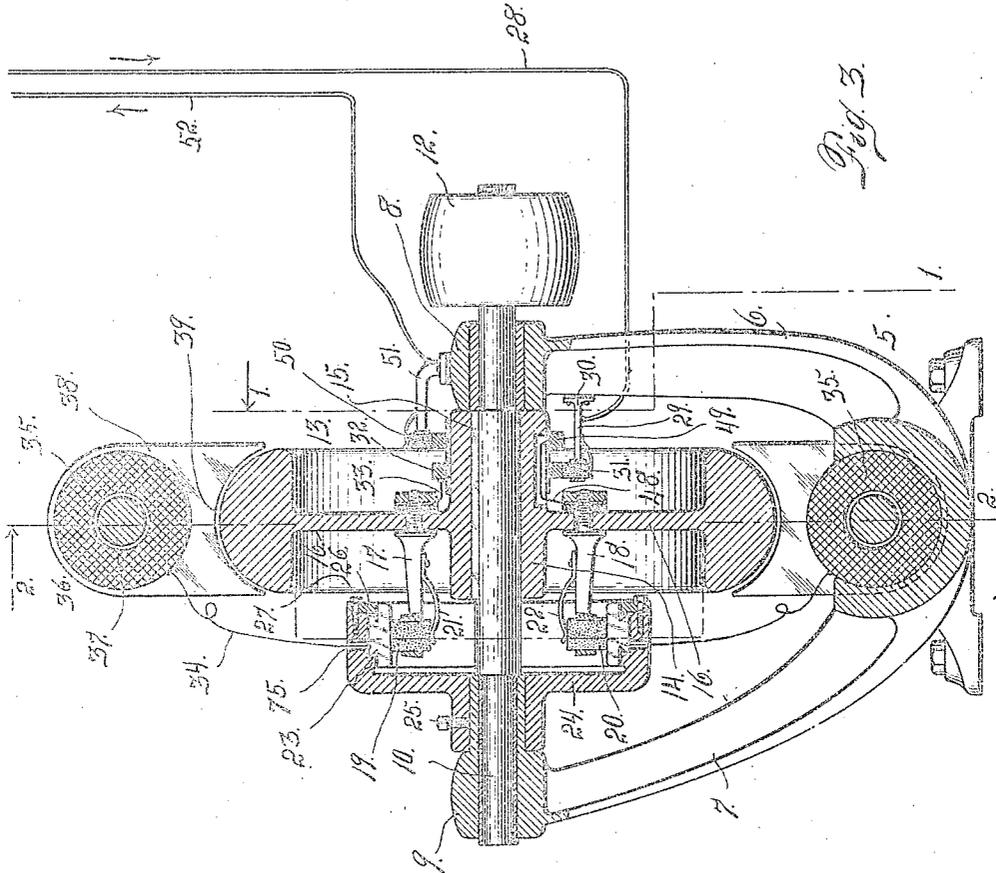
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UNITED STATES PATENT OFFICE.

HARRY A. RHODES, OF DENVER, COLORADO, ASSIGNOR TO THE UNIVERSAL MOTOR COMPANY, OF DENVER, COLORADO, A CORPORATION OF ARIZONA.

ELECTROMAGNETIC MOTOR.

1,069,291.

Specification of Letters Patent.

Patented Aug. 5, 1913.

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To all whom it may concern:

Be it known that I, HARRY A. RHODES, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Electromagnetic Motors; and I do 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 letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvement in electric motors. In this case I employ magnets composed of coils wound around iron cores, each magnet having two pole shoes or plates which act upon the armature or rotary element of the motor, the latter being composed of a number of iron segments separated by segments composed of non-magnetic material. The coils of the magnets receive current through the segments of a commutator from brushes arranged in such a manner as to short circuit some magnets and have the rest working, that is energized, and acting on the soft iron segments of the rotary armature, whereby the latter is actuated and transmits power to a shaft.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a side elevation, partly in section, of my improved motor. The section is taken on the line 1—1, Fig. 3, looking toward the left or in the direction of the arrow. Fig. 2 is a section taken on the line 2—2, Fig. 3, looking toward the right, or in the direction of the arrow adjacent said line. Fig. 3 is a section taken through the motor approximately on the line 3—3, Fig. 1.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a suitable frame having arms 6 and 7, projecting upwardly, their extremities being equipped with bearings 8 and 9, in which an operat-

ing shaft 10 is journaled, the said shaft having a pulley 12, at one extremity. The armature or rotary element 13, of the motor is provided with a hub 14, secured to the shaft by a key 15. Mounted on spokes 16, of the armature are posts 17 and 18, carrying positive and negative brushes 19 and 20 respectively, the said brushes being held in place by springs 21 and 22 respectively. These brushes engage a commutator 23, which is dovetailed into a housing member 24, secured to the bearing 9, of the shaft 10, by a set bolt 25. The commutator is held in place upon the housing 24, by a ring 26, held in place by screws or bolts 27.

The current is brought into the motor through a conductor 28, which leads to a post 29, mounted on the frame, but insulated therefrom, as shown at 30. This post carries a brush 31, engaging a collector ring 32, which is connected with the post 17, by a wire 33. From the segments of the commutator, wires 34, passing through openings 35 in the housing 24, lead to the coils of electro-magnets 36, the coils being wound around iron cores 37 and embraced on opposite ends by pole shoes or plates 38, which project inwardly and have their extremities curved, as shown at 39, to partly surround the peripheral segments of the rotating armature. Between the magnets 36 air spaces are left, in which are located non-magnetic plates 41, which separate adjacent extremities of the iron cores of the magnets.

As illustrated in the drawing, the commutator is stationary and the positive and negative brushes 19 and 20 respectively, rotate with the armature but in contact with the commutator.

In the operation of the device, the magnets are energized and deenergized in such a manner as to act upon the iron segments of the armature to rotate the latter certain of the magnets being short-circuited to prevent energization, while other magnets are advantageously energized and act upon the armature.

The operation may be described in detail as follows: Assuming that the parts are in the relative positions illustrated in Fig. 2. Starting with any positive brush 19, the

current may be said to pass first into a commutator segment 42, thence through a wire 34, to a point 43, where it joins two branch wires 44, leading to the coils of two adjacent magnets 33. In the drawing, the magnet farther away from the nearest negative brush 20, is designated minus (-); while the other magnet is designated plus (+). The minus (-) magnet will not be energized because the current will take the shortest course to one terminal 45, of the plus (+) magnet, and after passing through the coils thereof, will pass out of the magnet at the terminal 46, and thence through a branch wire 41, and a wire 34, to a commutator segment 47, in contact with a negative brush 20, and thence out of the motor, through a post or arm 18, a wire 43, a ring 49, a brush 50, an arm 51 and a conductor 52. The energization of the plus (+) magnet acts upon one of the iron segments 52, of the armature to move the latter into the space between and partly surrounded by the pole shoes or plates 36 of the plus (+) magnet, thus giving motion to the armature in the direction indicated by the arrow adjacent the periphery of the motor in Fig. 2. At the same time the current also passes from the same positive brush 19, through a commutator segment 53, a wire 34, to a point 43, from which lead two branch wires 44, to the coils of two adjacent magnets, one of which is marked plus (+) and the other minus (-). The minus (-) magnet is farther from the nearest negative brush than its companion magnet marked plus (+). Hence the current will pass to the terminal 55, of the coils of the last named magnet, thence through the said coils to the opposite terminal 56, of the magnet, thence through wires 44 and 34, and a commutator segment 57, to a negative brush 20, and thence out of the motor, completing the circuit. From this it will be understood that when the brushes are arranged as shown in the drawing, the current which excites the magnets, is passed simultaneously from each positive brush to two magnets of the motor and as there are three positive brushes, there are six magnets distributed at equal intervals around the magnet zone simultaneously pulling on the rotary armature in the same direction and exerting their conjoint strength to rotate the same; while all of the other magnets are short-circuited and therefore inactive or deenergized.

Having thus described my invention what I claim is:

1. An electric motor, composed of a series of electro-magnets arranged in circular form, the cores of the magnets being separated by non-magnetic members, each magnet having pole shoes or plates embracing its opposite ends and projecting beyond the

coils, an armature mounted to rotate adjacent the pole shoes of the various magnets, the armature being composed of magnetic members separated by non-magnetic members, and means for simultaneously energizing a number of magnets arranged at suitable intervals around the armature, the energized magnets being in advance of the magnetic members of the armature, whereby all of the magnets are successively energized and in turn deenergized as the armature rotates, the active magnets being kept in advance of the magnetic members of the armature and the inactive ones in the rear thereof.

2. An electric motor, composed of a series of electro-magnets arranged in circular form, each magnet having pole shoes embracing its opposite ends and projecting radially beyond the coils, a concentric armature mounted to rotate, composed of magnetic members spaced by non-magnetic members, and means whereby a number of magnets arranged at intervals around the magnetic zone, and located forwardly of and adjacent to the magnetic members of the armature, are simultaneously energized, while the other magnets are simultaneously deenergized, the various magnets successively assuming the energized and deenergized states as the armature rotates, substantially as described.

3. An electric motor, comprising a series of electro-magnets arranged in circular form, an armature mounted to rotate in proximity to the electro-magnets, the armature being composed of magnetic members separated by non-magnetic members, each magnet having pole shoes or plates embracing its ends and projecting beyond the coils into the zone of rotation of the armature, and means for energizing a number of magnets arranged at suitable intervals, the energized magnets being in advance of the magnetic members of the armature, whereby all of the magnets are successively energized and in turn deenergized as the armature rotates, the active magnets being kept in advance of the armature and the inactive ones in the rear thereof.

4. An electric motor, composed of a series of electro-magnets arranged in circular form, the cores of the magnets being separated by non-magnetic members, a concentric armature mounted to rotate, each magnet having pole shoes or plates embracing its opposite extremities and projecting beyond the coils into the zone of rotation of the armature, the projecting extremities of the pole shoes being curved, the armature being composed of magnetic members separated by non-magnetic members, and means for simultaneously energizing a number of magnets arranged at suitable intervals

around the armature, whereby all of the magnets are successively energized, and in turn deenergized as the armature rotates, the active magnets being kept in advance of the magnetic members of the armature and the inactive ones in the rear thereof, substantially as described.

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

HARRY A. RHODES.

Witnesses:

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M. F. MANEY.