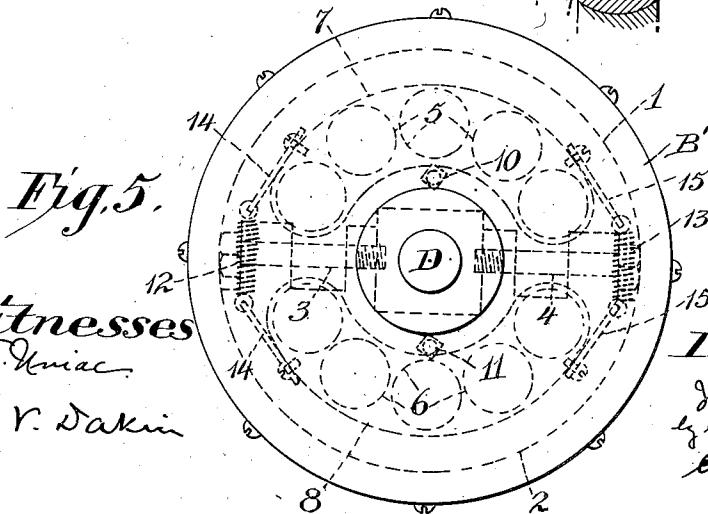
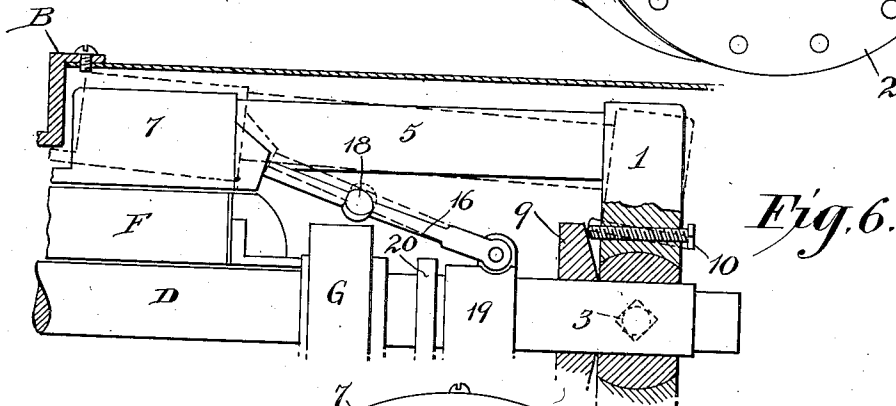
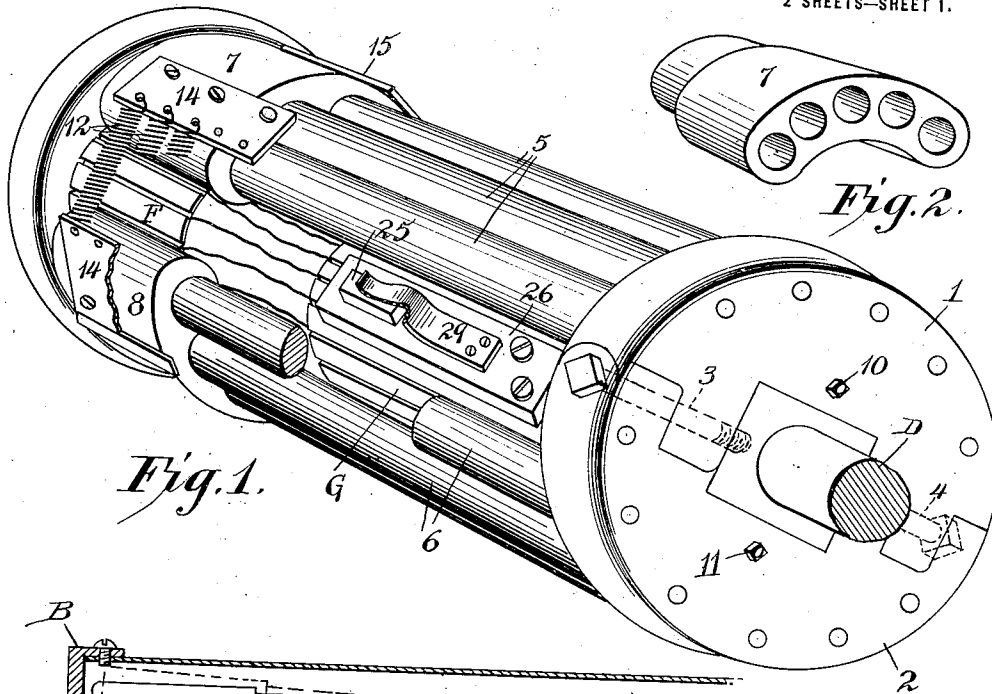


J. O. HEINZE, JR.
DYNAMO ELECTRIC GENERATOR.
APPLICATION FILED DEC. 20, 1911.

1,153,076.

Patented Sept. 7, 1915.
2 SHEETS—SHEET 1.



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Fig. 3.

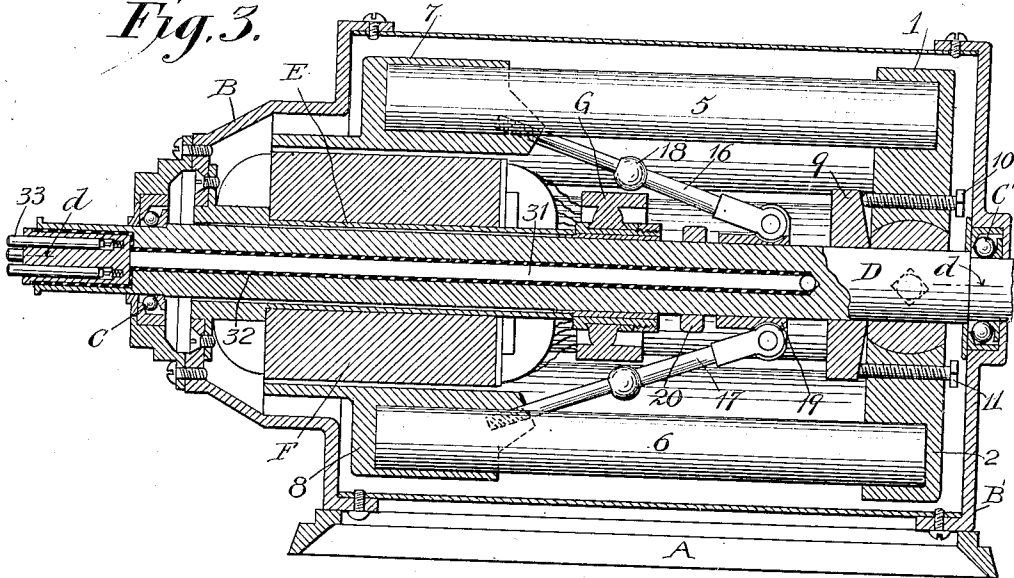
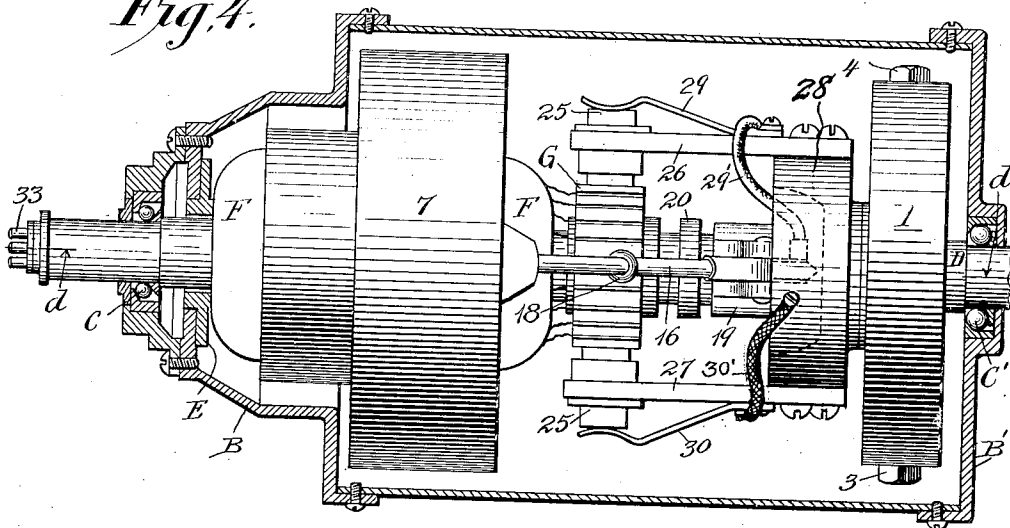


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN O. HEINZE, JR., OF LOWELL, MASSACHUSETTS.

DYNAMO-ELECTRIC GENERATOR.

1,153,076.

Specification of Letters Patent.

Patented Sept. 7, 1915.

Application filed December 20, 1911. Serial No. 666,890.

To all whom it may concern:

Be it known that I, JOHN O. HEINZE, JR., a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Dynamo-Electric Generator, of which the following is a specification, reference being had therein to the accompanying drawings.

10 While my invention relates generally to dynamo-electric generators using either permanent or electromagnets to create the field, it relates particularly to those generators that can be driven at varying speeds and yet
15 can produce electrical currents of substantially constant potential.

The object of my invention may be said to be an elimination of the delicate devices, embodied in prior structures required to
20 keep a constant potential, regardless of the speed of the generator; and I attain this object by providing a rotatable magnet having its pole pieces adapted to be moved centripetally and centrifugally toward and
25 away from a stationary armature in parallel planes, one of which passes through the longitudinal axis of the armature; all being designed to increase or decrease the air space between the pole pieces and the armature,
30 upon an increase or decrease in speed of the generator, and thus to diminish or increase the intensity of the magnetic field, so that less or more the lines of force of the rotating field may at such increased or decreased
35 speeds be cut by the windings of the armature; the result being that the electrical current generated is of constant potential.

In the drawings illustrating the principle of my invention and the best mode now
40 known to me of embodying the same, Figure 1 is a perspective view, partly broken away, showing the pivoted cores and pole pieces of a magnet embracing a stationary armature, and a commutator engaged by suitable
45 brushes; Fig. 2 is a perspective view of one of the pole pieces; Fig. 3 is a longitudinal vertical view, partly in section, while Fig. 4 is a plan, partly in section, the cores of the magnet having been removed to expose one
50 of the pole pieces, brushes, and other details of construction. Fig. 5 is an end elevation; Fig. 6 is a detail view and illustrates in an exaggerated manner the movement of one of the pole pieces toward or away from the armature.

This variable speed constant potential

generator has a base A, Fig. 3, provided with two end supports B, B', in which are mounted in suitable ball-bearings C, C', a shaft D, designed to be operatively connected
60 with, say, the driving shaft, of an internal combustion engine. Inclosing one end portion of the shaft and secured to one of the end supports B is a cylindrical shell E upon which is fixedly mounted an armature F of
65 any well known type, for example, that known as the Siemens wound armature. To the opposite end portion of this shaft are secured two semi-circular hinged members 1, 2, the axis of the pivots 3, 4, of the
70 hinge passing, at right angles, through the longitudinal axis *d*, Fig. 5, of the shaft; while arranged in suitable holes formed in the inside faces of these hinged members are inserted series of cylindrical
75 soft iron cores 5, 6, so arranged that the longitudinal axes of these cores are, when the cores are in normal position, substantially parallel with the longitudinal axis of the shaft; these cores being arranged in
80 the arc of a circle struck from the axis of the driving shaft as a center. On the opposite end portions of these two series of cores are mounted two metal pole pieces 7, 8, Figs. 1, 2, 3, 5, arranged on opposite sides of the
85 armature F, and substantially embracing but not contacting the same, because of an abutting plate 9 made fast to the shaft, inside of the hinged plates, and adapted to be engaged by limiting screws 10, 11, passing
90 through the said hinged plates 1, 2.

To elastically and centripetally control the outward movement of the pole pieces 7, 8, while rotating about the armature, there are two sets of coil springs 12, 13, Figs. 1 and
95 5, which are secured in plates 14, 15, made fast to the outside adjacent end portions of the pole pieces 7, 8; but in order positively to stop the outward movements of the pole pieces due to the centrifugal force, and to
100 insure uniform equal and opposite movements of the pole pieces toward and away from the armature, there are a pair of restraining arms 16, 17, having universal joints 18, and being pivotally secured diametrically opposite each other in a collar 19
105 free to slide on said shaft, one side of the collar being adapted to come into abutment with an abutting ring 20, fixed in a suitable position on the shaft, when the pole pieces
110 have reached the desired limit of outward movement.

It will be obvious that a rotation of the shaft will cause the cores 5, 6, and the pole pieces 7, 8, Figs. 1, 3, 5 and 6, to fly outwardly, by reason of centrifugal force, about the pivot pins 3, 4, of the hinged members, and assume the position indicated in dotted lines, Fig. 6; that the outward movement is limited by the abutment of the restraining arm collar 19 and the abutting ring 20, while the inward movement, as already explained, is limited by the screws 10, 11, in the hinged plates 1, 2, contacting the abutting plate 9 secured to the driving shaft; that the pole pieces will tend to move to a greater or less distance away from the armature, upon a greater or less speed of the driving shaft; that the intensity of the magnetic field between the pole pieces will necessarily increase or decrease as the pole pieces approach or recede from each other, and, consequently, that while the electrical current generated in the armature will increase or decrease in proportion to the intensity of the magnetic field, it will proportionately decrease or increase in proportion to the speed of the armature, so that the result secured, viz., an electrical current of uniform potential, is the same regardless of whether the speed of the driving shaft is variable or constant.

Having explained the principle and general structure of the means whereby an electrical generator may produce a current of constant potential, at varying speeds of the generator, the only problem remaining is one which all those skilled in the manufacture of electrical generators can readily solve, that is, the problem of so designing the hinged magnet and pole pieces and their connecting springs, and so winding the armature, that between certain limits in variations in the speed of rotation of the shaft, and hence the magnet, there will be such a correlation of the intensity of the magnetic field, and the speed with which the coils of the armature cut the magnetic lines of force, that the above mentioned current of uniform potential will result.

The current generated in the armature may be delivered in any well known way, as by a commutator G fixedly secured to the cylindrical shell E upon which the stationary armature F is mounted. Carbon brushes 25, Figs. 1 and 4, rubbing opposite sides of this commutator are mounted in legs 26, 27, of a U-shaped holder the base 28 of which is metal and is fixed to the driving shaft; these legs 26, 27, being of fiber; and the brushes being held in contact with the commutator by means of contact springs 29, 30, fixed upon the outside portions of the legs. One of these springs, as 30, is in electrical connection with, and grounded on the base of the generator, through an insulated wire 30'; while the other, as 29, is electrically

connected by means of an insulated wire 29', with a metal rod 31, Fig. 3, mounted in a long hole therefor in the longitudinal axis of the driving shaft D; said rod being insulated from the side of the hole by a fiber tube 32. Mounted in the outer end portion of this metal rod there may be, if thought desirable, a number of metal spring fingers 33 which protrude therefrom and serve to make suitable electrical contact with electrical connections for the delivery of the electricity generated by the generator and drawn off from the armature through the commutator.

While this generator is designed to be used for ignition purposes as well as for electric lighting, I have not considered it necessary to show or to describe any of the well known methods of distributing the resulting current, for the reason that my invention resides simply in a centrifugally controlled magnet whose pole pieces are adapted to move toward and away from the armature in a plane passing through the longitudinal axis of the armature.

Having disclosed the principle of my invention and the general features of construction, those skilled in the art may make many variations in details to suit a great variety of environments, without departing from the positive law of action inherent in all structures embodying my invention.

Desiring to protect my invention in the broadest manner legally possible, what I claim is:—

1. In a generator having driving means and a stationary armature; a rotatable magnet having pole pieces and legs hinged to the driving means; said legs and pole pieces having one of their planes of movement pass through the longitudinal axis of the armature; the rotation of said magnet causing the pole pieces to move in said plane away from the armature.

2. In a generator having a driving shaft and a stationary armature; a rotatable magnet, having two legs provided with pole pieces to rotate about, and to form the magnetic field for, said armature, and pivoted to the driving shaft; said legs and pole pieces having a common plane of inward and of outward movement passing through the longitudinal axis of the armature.

3. In a generator having a driving shaft and a stationary armature; a rotatable magnet, having two legs provided with pole pieces to rotate about, and to form the magnetic field for, said armature, and pivoted to the driving shaft; said legs and pole pieces having a common plane of inward and of outward movement passing through the longitudinal axis of the armature; and suitable spring connections whereby the pole pieces tend to approach the armature, upon a decrease in the speed of rotation, and hence in

the centrifugal force in the rotating legs and pole pieces of the magnet.

4. In a generator having a driving shaft and a stationary armature; a rotatable magnet, having two legs provided with pole pieces to rotate about, and to form the magnetic field for, said armature, and pivoted to the driving shaft; said legs and pole pieces having a common plane of inward and of outward movement passing through the longitudinal axis of the armature; suitable spring connections whereby the pole pieces tend to approach the armature, upon a decrease in the speed of rotation, and hence in the centrifugal force inherent in the rotating legs and pole pieces of the magnet; and limiting arms sliding on the shaft and connected to the pole pieces whereby each pole piece moves equally toward or away from the armature.

5. In a generator having a driving shaft and a stationary armature; a rotatable magnet, having two legs provided with pole

pieces to rotate about, and to form the magnetic field for, said armature, and pivoted to the driving shaft; said legs and pole pieces having a common plane of inward and of outward movement passing through the longitudinal axis of the armature; suitable spring connections whereby the pole pieces tend to approach the armature, upon a decrease in the speed of rotation, and hence in the centrifugal force inherent in the rotating legs and pole pieces of the magnet; limiting arms sliding on the shaft and connected to the pole pieces whereby each pole piece moves equally toward or away from the armature; and means for limiting the inward and the outward movements of the pole pieces.

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

JOHN O. HEINZE, JR.

Witnesses:

GEO. S. LUNGER,
OSCAR M. SPRINGER.