(No Model.) 2 Sheets—Sheet 1.

G. RENNERFELT.

DYNAMO ELECTRIC MACHINE.

No. 523,998. Patented Aug. 7, 1894.

Fig. 1

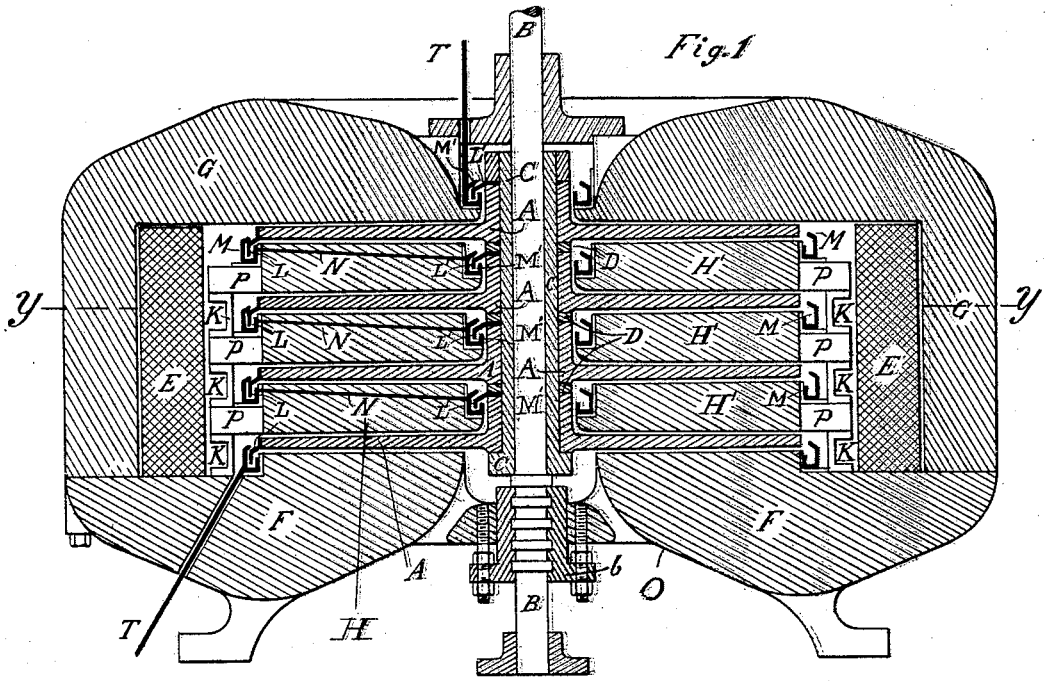
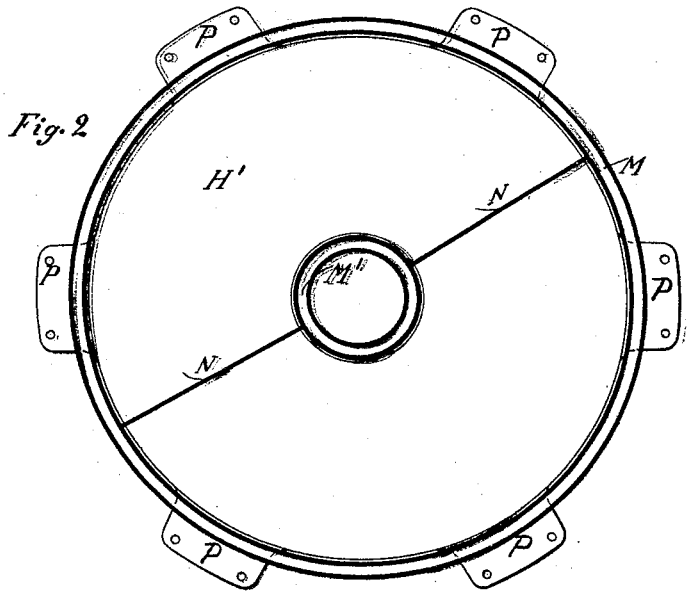


Fig. 2



Witnesses

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Louis P. Jackson

Inventor

Gus. Rennerfelt

(No Model.) 2 Sheets—Sheet 2.

G. RENNERFELT.

DYNAMO ELECTRIC MACHINE.

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Fig. 3

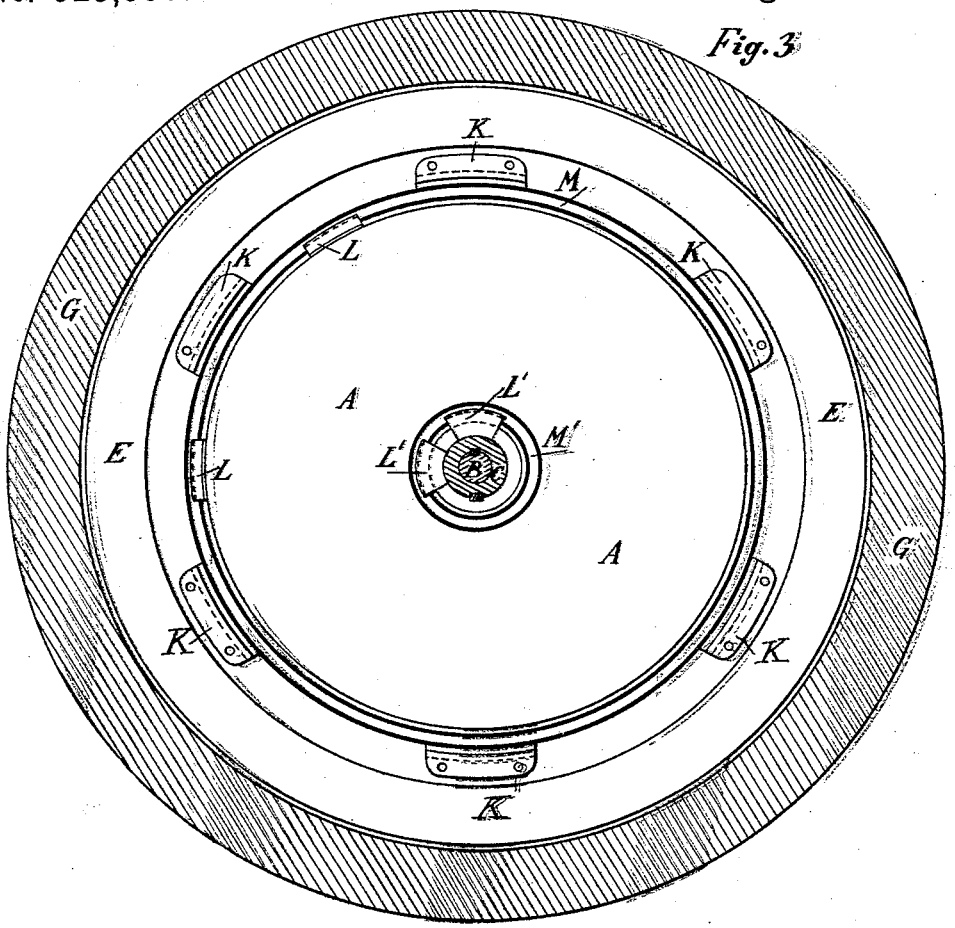
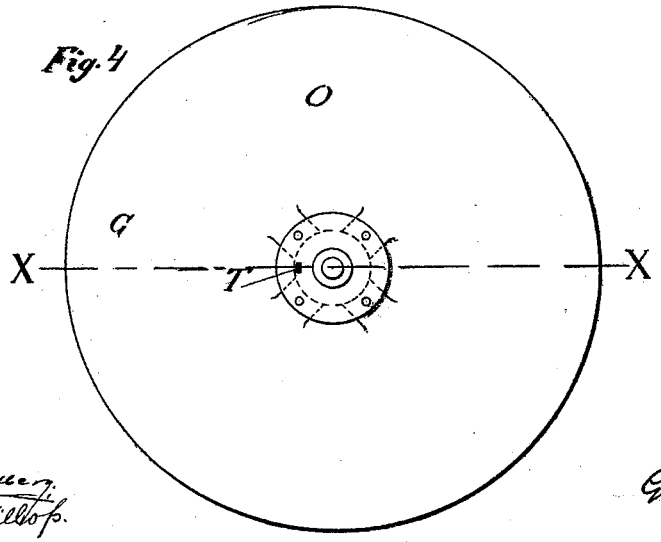


Fig. 4



Witnesses
Victor J. Evans
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UNITED STATES PATENT OFFICE.

GUSTAF RENNERFELT, OF LYNN, MASSACHUSETTS.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 523,998, dated August 7, 1894.

Application filed March 6, 1894. Serial No. 502,517. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF RENNERFELT, a subject of the King of Sweden and Norway, and a resident of Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to that class of the above named machines commonly known in the art as "uni-polar" or "non-polar" machines, and consists of a magnet with divided core, rotary conductors interposed between the parts thereof and means for electrically connecting the conductors in series, and further of the devices and combination of devices hereinafter more specifically set forth and claimed.

The object of my invention is, primarily, to increase the potential of the current generated by the above class of machines, and secondarily, to render such machines more durable in construction.

My invention is illustrated by the drawings herewith submitted, in which—

Figure 1, is a vertical section of a machine embodying my invention taken on line X X, Fig. 4. Fig. 2, is a plan view of a part of divided magnet core. Fig. 3, is a horizontal section on line Y, Y, Fig. 1. Fig. 4, is a top view (reduced scale) of a machine embodying my invention.

Similar letters of reference refer to similar parts throughout the several views.

In the drawings, O represents the frame in which the working parts of the machine are mounted. In the form of my invention shown in the drawings, the frame O is constructed of iron, steel, or other suitable magnetic material, and forms a part of the field magnet. The frame O, is preferably circular in form, and may be conveniently constructed in parts, F and G, bolted, or otherwise rigidly secured together. The frame O, is provided with an annular chamber, in which is wound the field coil E.

Inside the coil E is placed the core H of the field magnet, which is divided into the parts H′, H′, H′, &c., separated by intervening spaces.

I find the following to be a convenient form and arrangement for the parts H′, H′, H′, &c.: Each of the parts H′ consists of a circular or annular (the center being cut away for purposes hereinafter set forth) plate of iron or steel and is provided with a series of lugs P, P, P, &c., extending beyond its periphery, and resting upon the brackets K, K, K, &c. The lower series of brackets K, K, K, &c., rest upon the frame O, each of the lugs P, P, P, &c., is bolted or otherwise rigidly secured to the bracket K, above and below it and the lower series of brackets K, K, K, &c., are bolted to frame O, by this arrangement the plates H′, H′, H′, and the frame O are united in a rigid structure.

The brackets K, K, K, &c., are made of brass or other suitable non-magnetic material.

Interposed between the parts of the core H are the rotating conductors A, A, A, &c., which may be made of any good conducting material, wrought iron or steel, however giving the best result.

The following is a description of a convenient form and arrangement of the conductors A, A, A, &c: As shown in the drawings, the conductors A, A, A, &c., consist of disks of suitable conducting material, preferably wrought iron, of suitable thickness, mounted upon, and arranged to rotate with the shaft B, which extends through the annular plates H′, H′, H′, &c., and is mounted on suitable bearings in frame O. The plates A, A, &c., are insulated from the shaft B by an insulated bushing C, and from each other by insulated washers D, D, &c. Power may be applied to shaft B, by any suitable device.

In accordance with well known principles of the magnetic circuit it is desirable that the clearance between the disks A, A, A, &c., and the parts H′, H′, H′, &c., should be as small as practicable and the form and arrangement of the above designated parts are such that the smallest practical spaces exist between them. It being further desirable that the clearance between the disks A, A, A, &c., and plates H′, H′, H′, &c., should be, as far as practical, constant during the operation of the machine, the shaft B is provided with a suitable device *b* for taking up end thrust, which, in the form shown in the drawings, consists of a ring bearing of common form, for which however any other suitable device may be substituted.

For collecting the current I find it preferable to use a series of liquid collectors the form and arrangement of which are described as follows: Around the external periphery of each of the annular plates H′, H′, H′, is secured an annular gutter M and around the internal periphery adjacent to the hub of disk A a similar gutter M′. The gutters M and M′ are electrically insulated from the plate H′ and electrically connected with each other by a suitable conductor N extending through a chamber or groove in plate H′ and suitably insulated therefrom. The gutters M and M′ are partially filled with mercury or other suitable liquid of sufficient conducting power. The armature disks A, A, A, &c., are electrically connected with the liquid collectors by means of the contact pieces L, L, L, &c., and L′, L′, L′, &c. Such contact pieces may be conveniently in form of strips of copper or other suitable conducting material electrically connected with disks A, A, &c. The piece L is secured at the periphery of disk A and dips into the mercury in gutter M, so as to make a good electrical contact therewith without coming into physical contact with the sides of the gutter. The contact piece L′ is carried at the hub of disk A and is similarly arranged with reference to gutter M′. The arrangement is such that as the disks A, A, &c., rotate the contact pieces L, L, &c., and L′, L′, &c., pass through the mercury in the gutters M and M′ and keep disks A, A, &c., in continuous electrical connection with same. The rotation of the disks A, A, &c., the contact piece L, L, &c., and L′, L′, &c., dipping into the mercury in gutters M and M′, causes a flow of the mercury around the gutters and a tendency of same to overflow at outer edge, to prevent this I find it preferable to incline the outer side of the gutter inward making it if necessary somewhat higher than the inner side.

By the foregoing arrangement of the collectors and their connections the disks A, A, &c., are electrically connected in series, and the current to pass through the machine must flow through each of the disks A, A, A, &c., successively.

The terminals T, T are connected respectively with the first peripheral collector and the last hub collector.

The magnetic field may be excited by any of several of the well known systems, for example by either the "shunt" or "separate" system.

The operation of my invention is as follows: When a current is passed through the field coil E a magnetic field practically closed on itself is formed and the rotation of the disks A, A, &c., effects a continuous cutting of the lines of force, each disk generating a current the electro-motive force or potential of which depends upon the strength of the field and rapidity of rotation. The flow of such current is by a well known principle directed radially to the disks. The currents so generated will flow into the liquid collectors and by means of the several connections heretofore described the electro-motive force of the current generated upon any disk will before flowing out of the terminal T be increased by the electro-motive force of the current generated upon each of the other disks so that by using a sufficiently strong field an electro-motive force of any desired voltage may be obtained even with a moderate rate of rotation.

By using mercury collectors I do away with metallic contacts which became heated and were rapidly worn out constituting a serious defect in previous designs of machines of this class.

I do not consider my invention limited to the details of construction as hereinbefore described, but

I claim as novel, and desire to secure by Letters Patent, in a dynamo-electric machine—

1. The combination of a magnet with a divided core, a series of rotating conductors interposed between the parts thereof, and means for electrically connecting said conductors in series, substantially as described.

2. The combination of a magnet with divided core, a series of rotating conductors interposed between the parts thereof, and means for electrically connecting said conductors in series, consisting of a series of suitably connected liquid collectors, substantially as described.

3. The combination of a magnet with divided core, a rotating conductor interposed between the parts thereof and annular vessels containing mercury suitably arranged for collecting the current generated on said conductor substantially as described.

In witness whereof I have hereunto set my hand, in the presence of two witnesses, this 27th day of February, 1894.

GUSTAF RENNERFELT.

Witnesses:
G. S. MACFARLANE,
BENJAMIN PHILLIPS.