

Z. T. GRAMME.

COMMUTATOR FOR MAGNETO OR DYNAMO ELECTRIC MACHINES.

No. 294,613.

Patented Mar. 4, 1884.

Fig. 1.

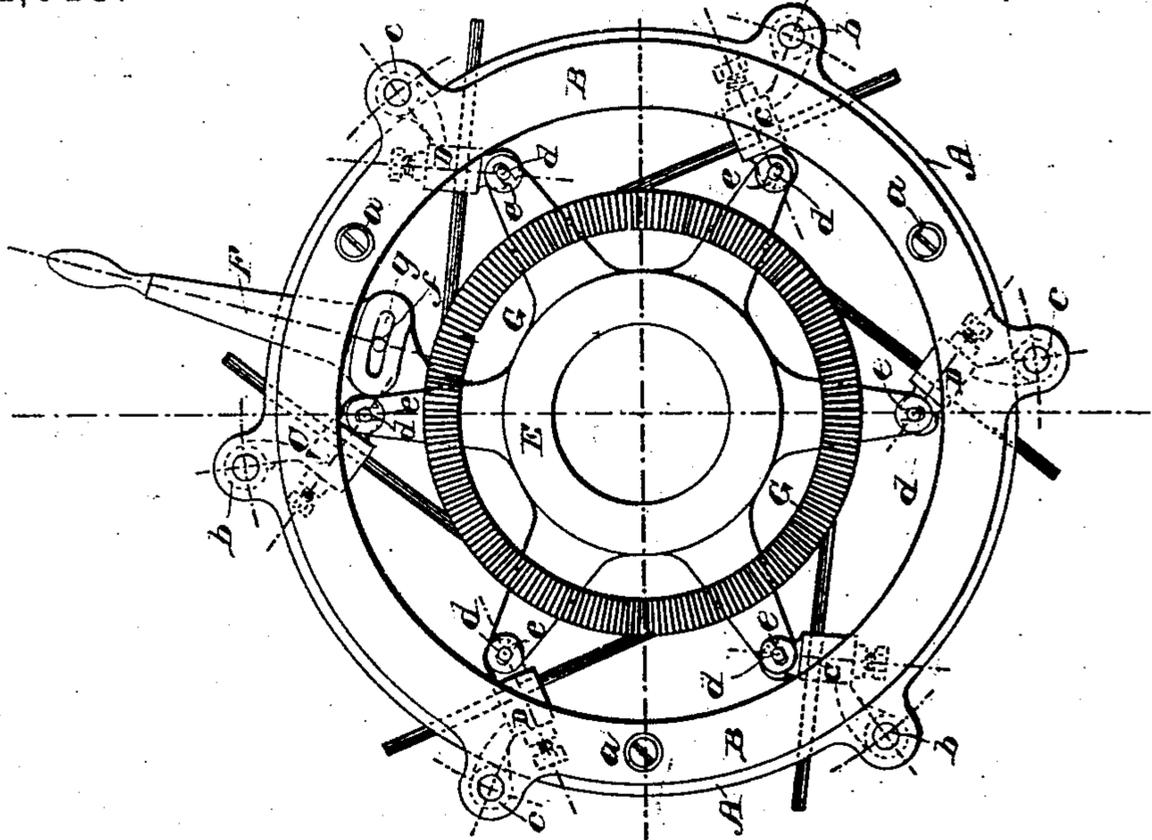
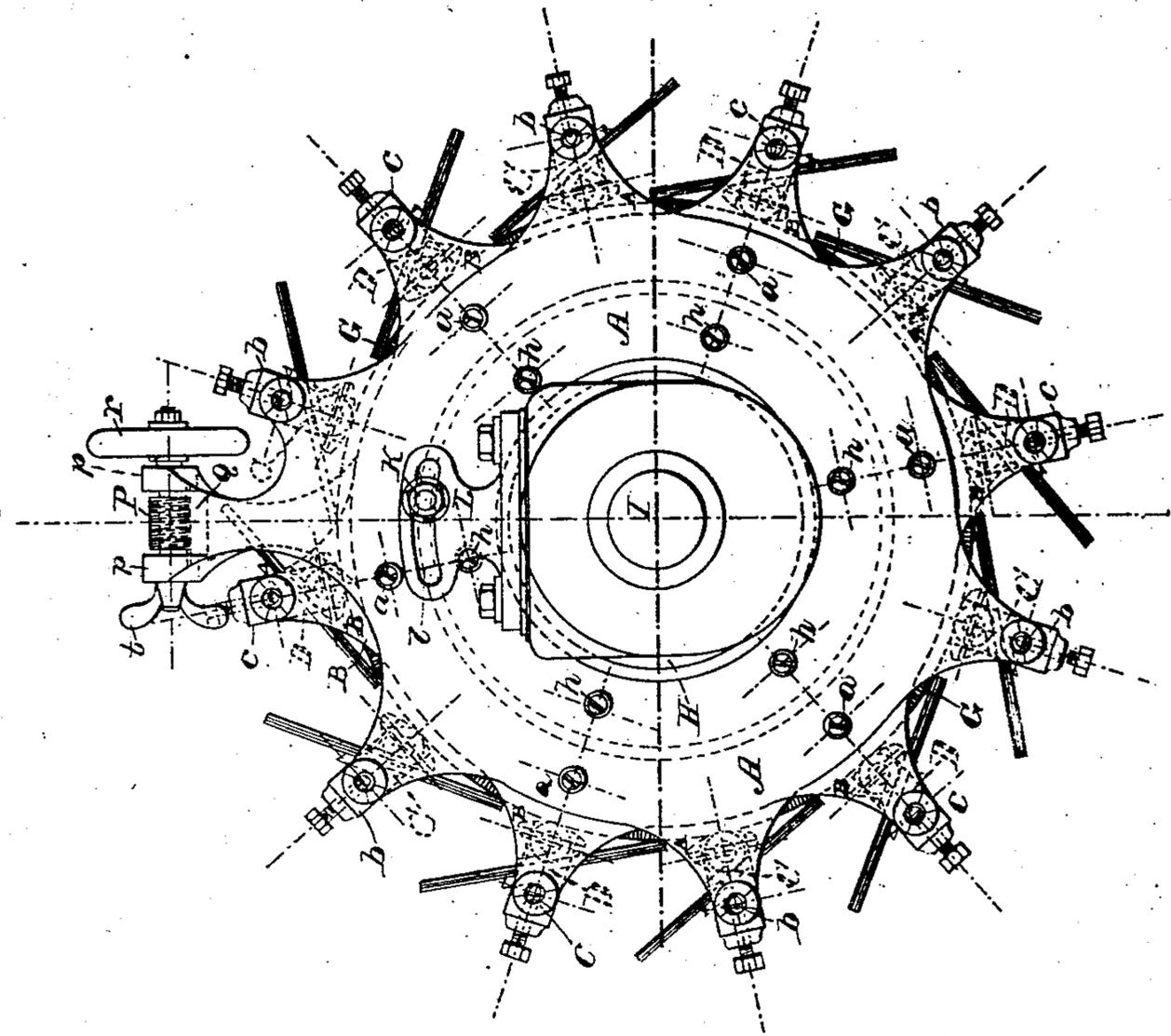


Fig. 2.



Witnesses

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(No Model.)

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Fig. 4.

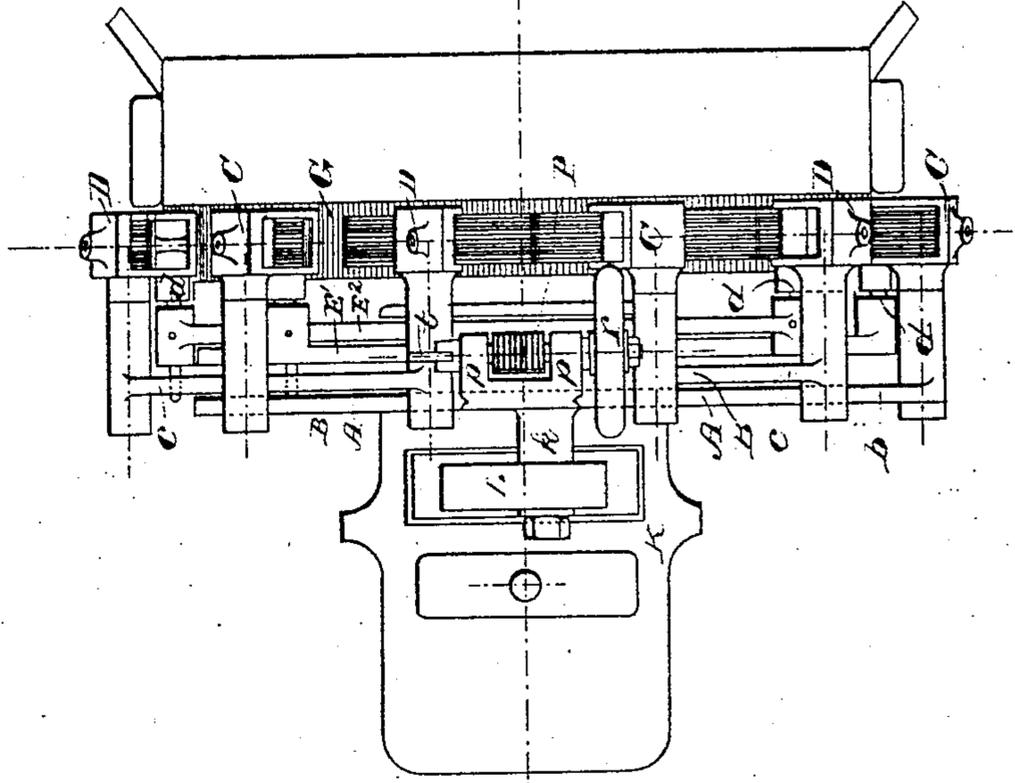
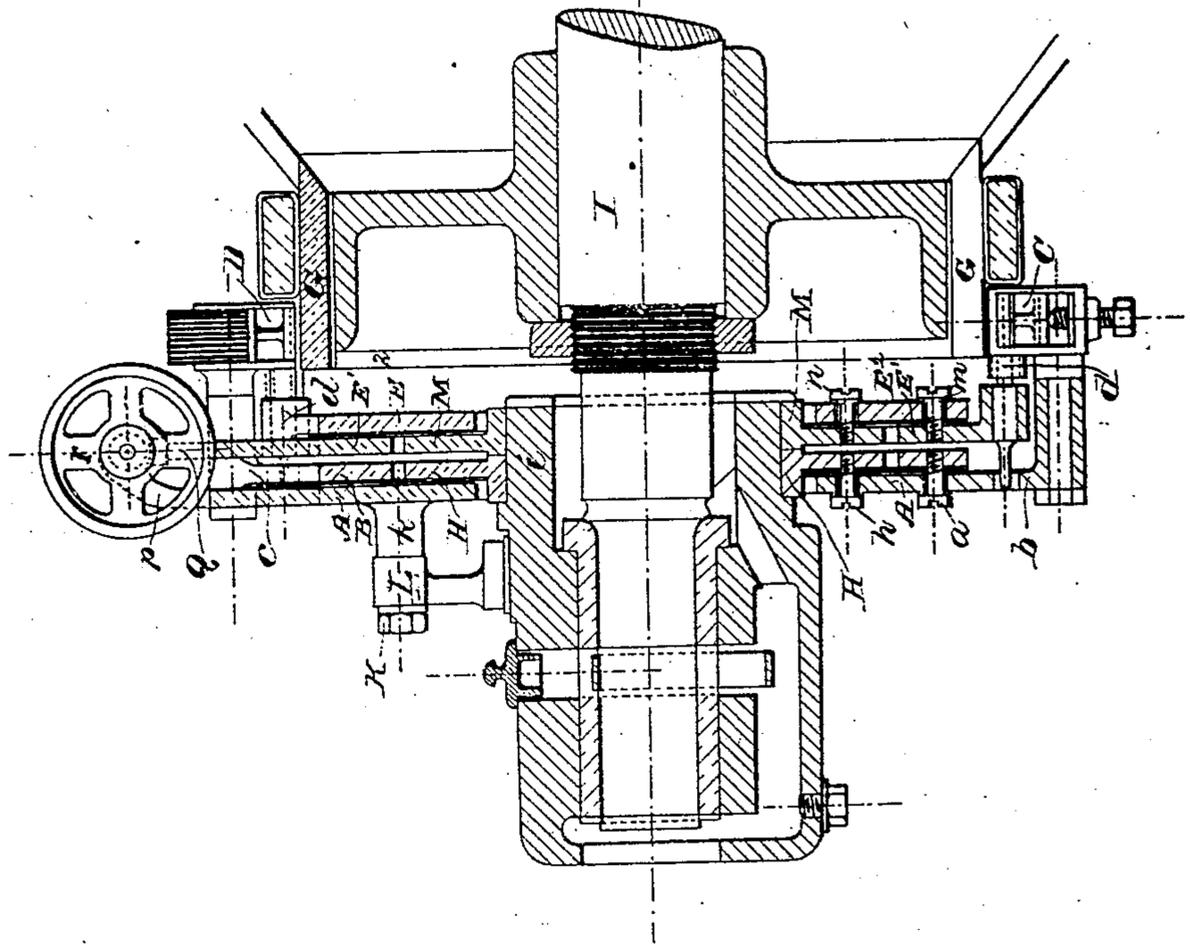


Fig. 3.



Witnesses

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## UNITED STATES PATENT OFFICE.

ZÉNOBE THÉOPHILE GRAMME, OF PARIS, FRANCE.

COMMUTATOR FOR MAGNETO OR DYNAMO ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 294,613, dated March 4, 1884.

Application filed December 18, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, ZÉNOBE THÉOPHILE GRAMME, a citizen of France, residing at Paris, in the Department of the Seine, have invented new and useful Improvements in Commutators of Magneto and Dynamo Electric Machines, of which the following is a specification.

This invention relates to mechanism for moving the commutator brushes or rubbers into and out of contact with the sections or bars of the commutator-disk, and generally for regulating the position of the brushes. It has more particular reference to machines of the Gramme type having several (two or more) pairs of poles and corresponding pairs of brushes; the mechanism being adapted to move all the brushes in and out simultaneously; but it may be applied to other machines.

It consists in the combination, with the sockets or carriers for the brushes, of a common support with which said sockets or carriers are movably connected, and operating devices also carried by a common support for simultaneously shifting said sockets or carriers. Preferably the sockets or carriers are pivoted or hinged so as to move in circular arcs; but other connection which permits to them movements adapted to bring the brushes into or withdraw them from contact with the commutator-disk may be used. The operating devices also may be of any suitable kind, preference being given, however, to pins working in slots. The common supports above referred to need not be in one piece, although they may be; but they or either of them may consist of two or more parts, provided the same are fastened together or suitably connected, so as to act substantially as one piece. In order to shift the position of the brushes, the supports are moved with respect one to the other, thereby operating upon all the sockets or carriers equally and simultaneously.

The invention also consists in the use of rings or disks for one or both the common supports above referred to; and it further comprises certain special constructions and combinations hereinafter set forth.

The accompanying drawings illustrate what is considered the best mode of applying the principle of the invention.

Figure 1 is a simplified elevation of a com-

mutator embodying the invention, or part thereof, and adapted to use in a six-pole machine. Figs. 2, 3, and 4 represent in end elevation, vertical longitudinal section, and plan the commutator of a twelve-pole machine, and illustrate more fully details of construction.

Referring to Fig. 1, A B are two metal rings insulated from each other, but fastened together by a screw, *a*. They are attached to the machine-frame, from which they are also insulated. They constitute the common support to the brush sockets or carriers CD. The sockets C are hinged or pivoted to the ears *b* of the ring A, and the sockets D to the ears *c* of the ring B. The sockets C carry the brushes of one sign (say the positive brushes) and the sockets D those of opposite sign, (or negative brushes.) The sockets or brush-carriers are each mechanically connected with an arm of a star-wheel, E, by means of a pin, *d*, on the arm, which engages a slot, *e*, on the carrier. The sockets or carriers are suitably insulated from the star-wheel. The latter is mounted on a boss, on which it can be turned by means of the handle F. The rings A B being stationary, when the star-wheel is turned in one direction to the right, as shown, it moves all the sockets or carriers CD simultaneously, so as to press the ends of the brushes against the commutator-disk G. When turned in the opposite direction, it moves them out of contact. A pin, *f*, in a slot, *g*, in the handle F limits the play of the latter.

Instead of using two rings, A B, it is evident that one could be used, provided the sockets or carriers be properly insulated therefrom; also, that the machine-frame itself could be used to support the sockets or carriers. It is further evident that by making the star-wheel or support for the operating devices *d* in two parts, insulated from each other, it would not be necessary to insulate the sockets or carriers from said wheel or support. This arrangement, which has some advantages, is shown in Figs. 2, 3, and 4, in which the parts are lettered to correspond as near as may be with those of Fig. 1. Thus the rings or annular plates A B are fastened together by the screws *a*, but are insulated from each other, and constitute the common support to the brush sockets or carriers CD, the sockets C

for the positive brushes being hinged to the ears *b* of plate A, and those D for the negative brushes to the ears *c* of plate B. The plate A projects inward beyond the plate B, and is fastened to the hub H by the screws *h*, but is insulated therefrom. The hub H surrounds and is adapted to turn upon a stationary boss, *i*, which forms a part of the journal-bearing of the armature-shaft I. The plate A is provided with a projection, *k*, into the end of which is tapped a bolt, K. This bolt passes through a curved slot, *l*, in the stationary arm L, which projects upward from and is attached to the journal-bearing. By this bolt the plates A B, with their hub H, can be held stationary whenever desired, while at the same time an adjustment not exceeding the length of the slot can be had by loosening the bolt. This adjustment is an improvement omitted, for the sake of simplicity, in Fig. 1. It enables the position of the brushes to be adjusted with respect to the neutral and maximum points of the commutator-disk. The construction further enables the brushes to be set uniformly in their sockets or carriers C D, for, by removing the bolt K the plates A B can be turned all the way round, so that, each socket or carrier coming successively into the same position, the brushes can be set so as to touch the commutator at the same point precisely.

The devices for simultaneously moving the brushes into and out of contact and the support therefor are turned with the plates A B and hub H. This support consists of two annular plates or rings, E' E<sup>2</sup>. These are fastened together by screws *m*, but are insulated from each other, and the inner plate or ring, E<sup>2</sup> is fastened to the hub M by screws *n*, but is insulated from it. The hub M is capable of turning on the boss *i*. The plates or rings E' E<sup>2</sup> being fastened directly or indirectly to the hub, the latter turns with it. The pins *d*, which act upon the brush sockets or carriers, are carried by projections of the two plates or rings, the pins for acting upon the sockets or carriers C by the plate or ring E', and those for acting upon the sockets or carriers D by the plate or ring E<sup>2</sup>.

The means for moving the support E' E<sup>2</sup> of the pins *d* or shifting devices with respect to the support A B of the brush sockets or carriers C D consist of a screw or worm, P, journaled in projections *p* of the plate or ring A, and adapted to be turned by a small hand-wheel, *r*, and a projection, Q, of the plate E', the said projection being threaded and the thread engaging or meshing with that of the screw or worm P. A thumb-nut, *t*, on the end of the shaft of screw P, can be tightened to prevent the accidental turning of said screw. On loosening the nut and turning the screw, the plates E' E<sup>2</sup> will be turned in one direction or the other, according to the direction in which the screw is turned, and the

effect will be to shift simultaneously all the brush sockets or carriers C D, so as to bring the brushes into or out of contact with the commutator-disk G, or to increase or decrease the pressure of the brushes against said commutator-disk. When the plates A B are adjusted or turned around the boss *i*, the plates E' E<sup>2</sup>, being connected with them through the screw or worm P, are of course adjusted or turned with them.

It is evident that modifications may be made in details without departing from the spirit of the invention, and that parts of the invention may be used separately.

Having now fully described my said invention and the manner of carrying the same into effect, what I claim is—

1. The combination, with the brush sockets or carriers and the common support therefor, of the devices for shifting the said sockets or carriers and the common support for said devices, substantially as described.

2. The combination, with two or more pairs of commutator-brushes, of mechanism, substantially as described, for simultaneously moving said brushes into and out of contact with the commutator-disk, as set forth.

3. The combination, with brush sockets or carriers, movable to bring the commutator-brushes into and out of contact with the commutator-disk, of a ring or plate movable around the axis of said disk, and connected with said sockets or carriers to shift the same, substantially as described.

4. In combination with the brush sockets or carriers, plates fastened together but insulated from each other, and connected, respectively, with sockets or carriers of unlike sign, substantially as described.

5. The combination, with the brush sockets or carriers, of the two supports connected with said sockets or carriers, said supports being movable with respect to each other to move the brushes toward and away from the commutator-disk, and movable together to adjust the position of the brushes with respect to the neutral and maximum points on the commutator-disk, substantially as described.

6. The combination, with the commutator disk and brushes of an electrical machine, of means, substantially as described, for simultaneously moving the said brushes toward and away from the commutator-disks, and for simultaneously adjusting the position of the brushes with respect to the neutral and maximum points on the commutator-disk, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ZENOBE THEOPHILE GRAMME.

Witnesses:

EMILE BARRAULT,  
AUG. VINCK.