W. E. SAWYER.

ELECTRO-MAGNETIC ENGINE-COMMUTATORS.

No. 195,174. Patented Sept. 11, 1877.

Fig. 1.

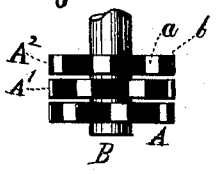
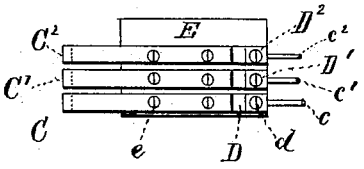


Fig. 2.



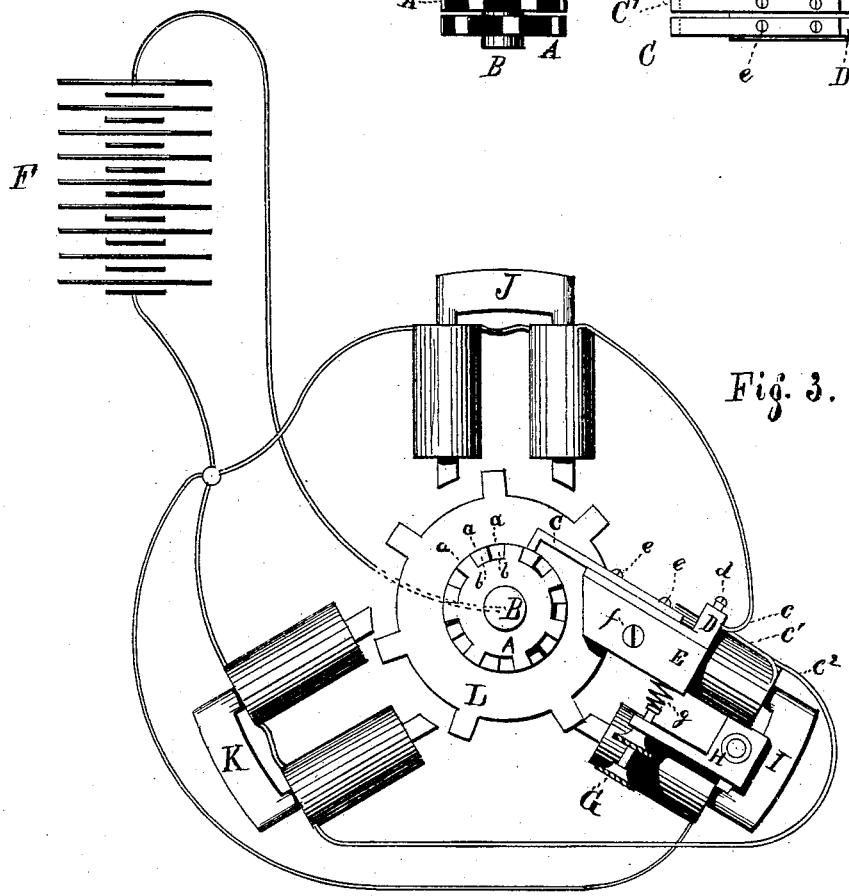


Fig. 3.

Witnesses:-
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WILLIAM E. SAWYER, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRO-MAGNETIC-ENGINE COMMUTATORS.

Specification forming part of Letters Patent No. **195,174**, dated September 11, 1877; application filed July 16, 1877.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnetic-Engine Commutators, of which the following is a full, clear, and exact description:

One of the greatest objections to the employment of electric engines has heretofore resided in the commutator or circuit-changer whereby the battery-current is let into and cut off from the magnets. The spark generated upon breaking the connection to a magnet has burned, and thereby impaired the conductivity of the contact-surfaces. The commutators of electric engines of any complexity have invariably been either too complicated for the comprehension of, and adjustment by, persons unskilled in their management, or have been too costly for the frequent renewal that has been found necessary in order to secure their continued successful operation.

My invention is designed to overcome these objections.

In the commutator of my invention, I prefer not to fill the open spaces between contact-surfaces with an insulating material. To obviate the imperfect connection resulting from the burning of the contact-surfaces, I provide for their constant attrition, so that the dirt occasioned by the burning is worn away as fast as produced. In order that the contact-points may be lasting, I provide for their being fed to a bearing as fast as they wear away; and in order that, while wearing away, the relative periods of make and break of circuit may be constant, I so taper the contact projections of my rotating disk that, while the disk is constantly reducing in diameter, the contact-surfaces bear the same proportion to the open spaces when the disk is worn nearly away that they bore at the outset, when the disk had a much greater diameter.

In the drawings accompanying and forming a part of this specification, Figure 1 is a top view of the toothed disks; Fig. 2, a top view of the contact-pieces; and Fig. 3, a side view of the commutator, showing its relation to the magnets and the battery-connections.

Although I have shown the disk as revolving and the contact-points stationary, it is clear that I may reverse this order of things with equally good results.

I, J, and K are the magnets. L is a revolving barrel of armatures, such as described in Letters Patent No. 191,781, dated June 12, 1877, granted to me. B, the shaft of the same, upon which the toothed disks A, A^1, and A^2 are fixed. The white spaces *a*, Fig. 1, are the surfaces of the teeth, and the dark parts *b* representing the open spaces between the teeth. The teeth *a*, Fig. 3, are tapering, growing narrower as they approach the center of the disk, thus as they wear away at the surface preserving their comparative width in respect of the open spaces. E is an insulating-piece, pivoted at *f*, upon which are fixed three metallic pieces, D D^1 D^2, one end of each of which is provided with an offset and set-screw, *d*, for holding the end of the magnet-wire *c*. Attachable and detachable from these pieces D D^1 D^2, by screws *e e*, are bent arms C C^1 C^2, which make connection with the disks A A^1 A^2. The piece E is caused to hold the contacts C C^1 C^2 to a bearing upon the surfaces of the teeth *a a a* by spiral spring *g*, whose tension is adjusted by set-screw G in piece H.

It will be understood from the foregoing that when the point C is bearing upon a tooth of disk A the points C^1 C^2 are over the open spaces of disks A^1 A^2, so that a perfect contact is made between point C and disk A; that as the shaft further rotates point C^1 bears upon a tooth of disk A^1, and points C and C^2 are over the open spaces of disks A and A^2, and so on. The result of this construction and arrangement is that the contact of a point, C, does not deteriorate as the point or a disk-tooth wears away, but the point has a bearing upon the disk-tooth so long as any part of it is left. Further, that, all the points being subjected to the same pressure, they wear away evenly, and that instead of the operation of making contact being clattering and jarring, the action of each point, notwithstanding it passes from a tooth to an open space and from an open space to a tooth, is as though it were bearing upon a perfectly smooth or plane surface.

The connections to the battery F in Fig. 3 are from one pole to the disks, and from the other pole to one side of each of the three

magnets. The other side of magnet J goes to contact-piece C; of magnet I, to contact C^1; and of magnet K to contact C^2; c, c^1, and c^2 representing the wires running to the magnets. The principles upon which electric engines operate are so well understood that I need only say that the three magnets I J K act upon the armature-barrel L in succession as the contact-points C C^1 C^2 successively put the battery to them.

I do not confine myself to the employment of the commutator of my invention in electro-magnetic engines solely; nor do I confine myself to any particular number of disks or contact-points. The disks may be insulated from each other and the magnet-wires connected to them, a single point, C, broad enough to cover all the disks, being used.

In an engine operated by a single magnet I would provide two disks—one insulated, and one merely serving to guide the contact-point for the other.

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

1. In an electro-magnetic-engine commutator, the combination, with the spring-holder E, of the contact-piece C attachable thereto, and removable therefrom when so worn as to be of no further use.

2. In an electro-magnetic-engine commutator, two or more contact-points connected to different magnets and caused to bear upon a rotating disk with equal pressure, by means of a spring or springs common to both or to all of such contact-points, substantially as shown and described.

3. In an electro-magnetic-engine commutator, the combination, with two or more parallel-toothed surfaces, of two or more contact-points therefor, insulated from each other and held to a bearing thereon by a spring common to both or to all of such contact-points, as and for the purposes specified.

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