(No Model.)

C. A. LIEB.

COMMUTATOR FOR DYNAMOS OR MOTORS.

No. 454,488. Patented June 23, 1891.

FIG. 1.

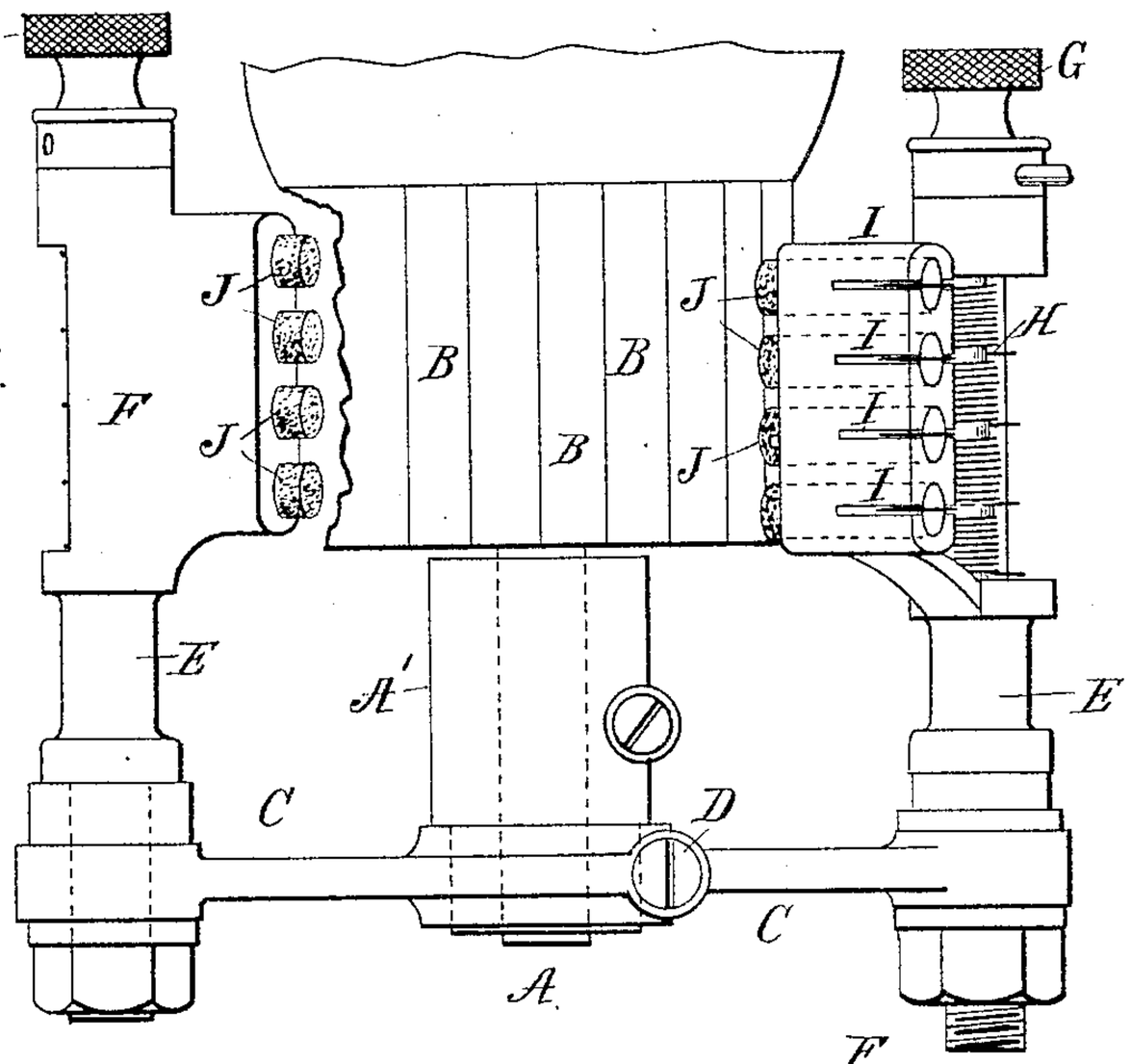


FIG. 2.

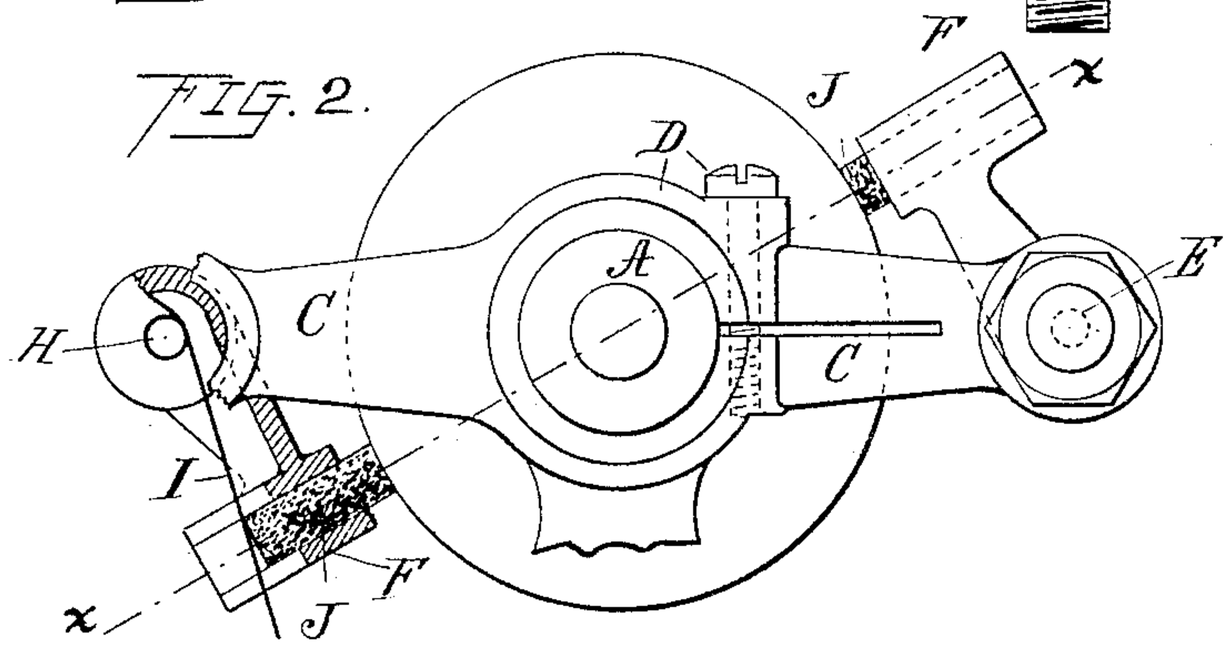
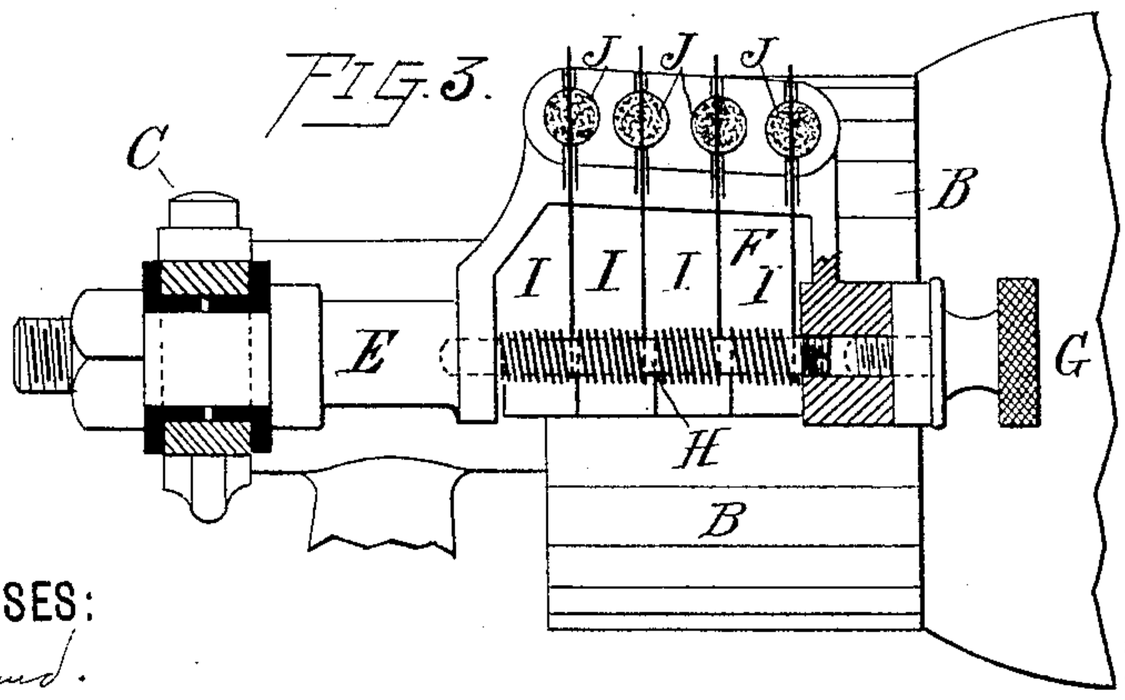


FIG. 3.



WITNESSES:

E. L. Copeland.

Frederick Smith

INVENTOR

Charles A Lieb

BY Phillips Abbott

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

COMMUTATOR FOR DYNAMOS OR MOTORS.

SPECIFICATION forming part of Letters Patent No. 454,488, dated June 23, 1891.

Application filed December 12, 1890. Serial No. 374,506. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Dynamos or Motors, of which the following is a specification.

My invention relates to improvements in dynamos or motors; and it consists in making the commutator-sections of aluminium or an alloy containing aluminium, and it also consists in certain improvements in the brushes, whereby economy, ease of repair, anti-sparking, and durability are obtained.

I have discovered certain properties of aluminium which, so far as I am aware, have never before been known, and which make commutator-sections produced from it or from an alloy in which it forms any considerable part peculiarly effective, durable, and permanent.

I have discovered that aluminium when first heated, say, to dull red after having been cast in the first instance, will expand to a certain extent, and will then upon cooling contract somewhat, but not to its original size, and that upon being successively heated and cooled it at each heating expands less and less and upon cooling contracts less and less, until finally there arrives a condition at which there is, as compared with other metals now used for making commutators, very little change in size between the metal warm or cold—that is, as its temperature is changed during use of the machine—and this is true whether the pure aluminium be used or an alloyed metal in which it forms part, depending in degree, of course, upon the proportion of the aluminium. It follows from the above fact that a commutator made from aluminium treated as I suggest will not alter in size materially whether heated or cooled, and consequently the bars or sections of the commutator will not become loosened by reason of expansion and contraction, which is one of the special defects or troubles in commutators. This method of treating the aluminium, whereby it is caused to assume a substantially or measurably fixed size whether heated or cold, I will in the claims hereof call "annealed," although I am aware it is not exactly an annealing process. I have also discovered that when the brushes are made of carbon or an equivalent substance or compound the surface of the aluminium seems to have a peculiar affinity for it in a manner which I cannot now fully explain, but which results in a superior contact-surface between the brush and the commutator, whereby the current is very freely delivered and passed from one to the other, and also that fine particles of the carbon or its equivalent become embedded, as it were, in or attached to the commutator, rendering its surface hard or tough, because of the small particles of this abrading material embedded or attached upon it. Thus the wear is almost entirely on the brushes, which are cheap and easily replaced; also, a clean contact is maintained, and I avoid particles of metal from the commutator getting between the bars and short-circuiting them. I have also found that because aluminium very readily radiates heat a commutator made from it will not spark, fuse, or burn so readily as those made from other materials.

It is obvious that the contact-surface of the bars, whether they be made of aluminium or other material, may be treated with carbon or other material during their manufacture, thus securing the advantages above stated without waiting for these conditions to result from use, and inasmuch as I believe myself to be the inventor of this part of the invention, irrespective of whether aluminium be the metal used or others be used, I do not limit myself to aluminium in this regard.

My invention also extends to certain improvements in the construction of the brushes, which will hereinafter be explained.

Figure 1 illustrates a plan of the invention. Fig. 2 illustrates an end view of that which is shown in Fig. 1. Fig. 3 illustrates a section on the line $x\,x$ of Fig. 2.

A is the shaft of the commutator. A′ is its journal-box.

B are the commutator-sections, made, as before stated, of aluminium or an alloy containing aluminium.

C is the brush-arm.

D is the clamp, which holds the brush-arm at such place or position on the journal-box A′ as desired.

E E are the spindles, upon which the brushes are held.

F is the brush-supporting frame held on

the spindles E by the thumb-screws or binding-posts G.

H H are spindles extending from side to side of the brush-frames F F.

I are light springs, which are coiled about the spindle H, and which, projecting forwardly, rest upon the ends of the carbon brushes J, which play easily through holes made so as to substantially fit them in the front portion of the brush-frame. The springs I normally hold the brushes J against the surface of the commutator-sections, as well understood.

It will be seen in Fig. 3 that the brush-frames F at the part where the carbons J pass through them are arranged at a slight angle relative to the plane of the commutator-sections, or that which would amount to the same thing. The holes which contain the carbons are arranged at such an angle.

It will be seen from the above description of the commutator-brushes that I am enabled to remove one of the carbons and insert another by simply lifting the spring I, which bears upon the defective one, and remove it and substitute a new or perfect one without stopping the machine; also, by reason of the angular arrangement of the carbons they do not leave the commutator-section all at the same time, but, on the contrary, some one or more of them are in contact at all times with two contiguous sections, whereby sparking is largely avoided, and also that the manufacture of the brushes is very easy and inexpensive. It is obvious that any form of brush made of any material may be used instead of the carbon brushes.

I do not limit myself to the details of construction, because it will be apparent to those who are familiar with this art that alterations may be made therein and still the essentials of my invention be employed.

The method or process of treating, or, as I have termed it, "annealing," the aluminium whereby it maintains more or less uniformity in size irrespective of temperature forms the subject-matter of another application for Letters Patent, filed by me April 20, 1891, it being Serial No. 389,576.

I claim—

1. A commutator-brush having a fixed frame, and a series of contact-points placed in holes therein diagonally across the commutator-bars and pressed against the commutator-bars by separate springs, which press upon but are independent of the contact-points, substantially as set forth.

2. A commutator-bar the contact-surface whereof has attached to or embedded in it abrading material, substantially as set forth.

3. A commutator the sections or bars whereof contain annealed aluminium, substantially as set forth.

4. The combination, in a dynamo-machine, of commutator bars or sections containing annealed aluminium, and a brush made of carbon, substantially as set forth.

5. A commutator the bars or sections whereof are composed, essentially, of annealed aluminium, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 28th day of November, A. D. 1890.

CHARLES A. LIEB.

Witnesses:

PHILLIPS ABBOTT,

FREDERICK SMITH.