(No Model.)

C. A. LIEB.

COMMUTATOR AND PROCESS OF MAKING THE SAME.

No. 435,504. Patented Sept. 2, 1890.

Fig. 1.

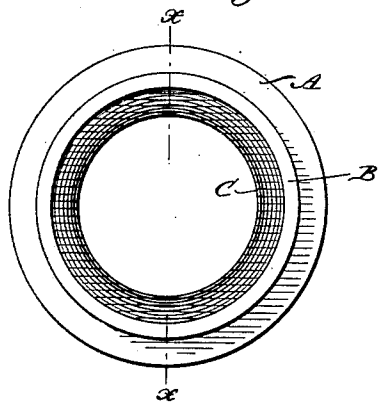


Fig. 2.

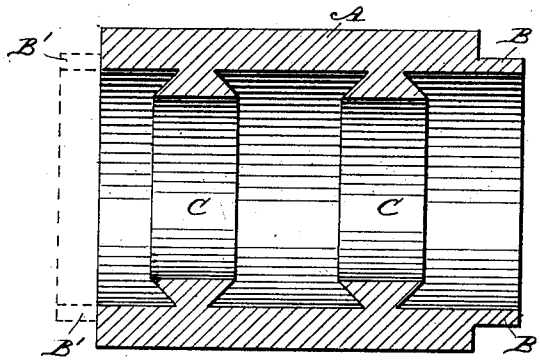


Fig. 3.

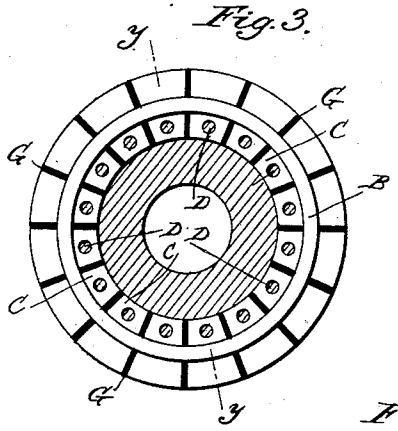


Fig. 4.

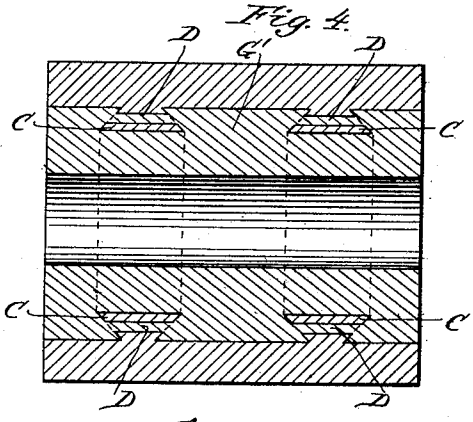


Fig. 5.

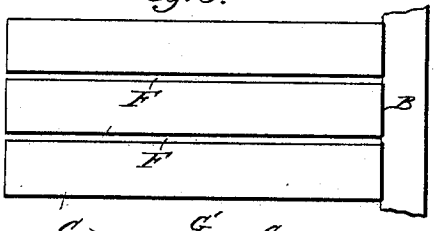


Fig. 7.

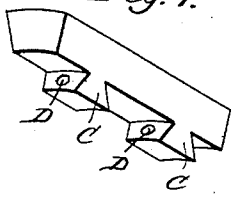


Fig. 8.

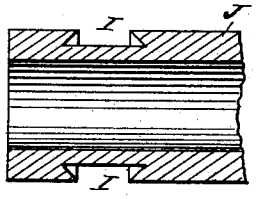
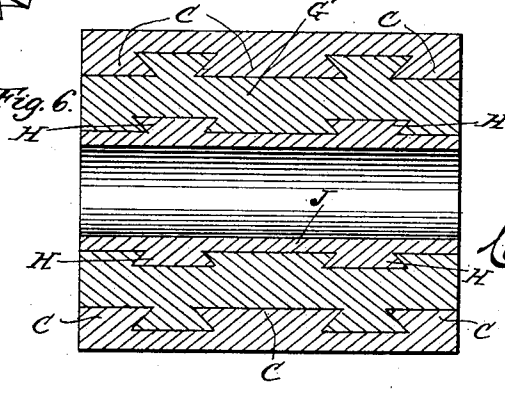


Fig. 6.



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UNITED STATES PATENT OFFICE.

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

COMMUTATOR AND PROCESS OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 435,504, dated September 2, 1890.

Application filed May 6, 1890. Serial No. 350,842. (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 city, in the county of New York and State of New York, have invented certain new and useful Improvements in Commutators and the Process of Making the Same, of which the following is a specification.

My invention relates to improvements in commutators for electrical apparatus; and it consists in peculiar constructions thereof whereby expense and labor of manufacture are reduced and the durability of the commutator is increased; and it also relates to the method employed for the manufacture of the commutator.

In the drawings the same reference-letters indicate the same parts in all the figures.

Figure 1 illustrates an end view of the commutator in process of manufacture and before it is slit and before the removal of the staying-flange. Fig. 2 illustrates a section of that which is shown in Fig. 1 on the line X X of that figure. Fig. 3 illustrates an end view of the commutator after it has been slit and the insulating material placed in the slits, but before the removal of the staying-flange. Fig. 4 illustrates a longitudinal section on the line Y Y of Fig. 3. Fig. 5 illustrates a plan view showing how the staying-flange stays the commutator-bars during the slitting operation. Fig. 6 illustrates a sectional view of a commutator under one form of my invention. Fig. 7 illustrates a detached commutator-bar. Fig. 8 illustrates a sectional view of a portion of the bushing, showing the dovetail on its exterior for the reception of the insulating material.

I first cast or otherwise form a ring A of any suitable metal, from which I make the commutator, as hereinafter set forth, and on one end thereof I cast integral with it a flange B, which I will call the "staying-flange," because its purpose is to support the ring A during the operation of slitting it up into the bars. This casting or form I will call a "blank." I also cast integral with the blank A inwardly-projecting undercut or dovetail annular parts C C. I then preferably, but not necessarily, bore holes through the parts C C, as seen at D D. I then slit the blank up by means of a saw or otherwise into separate bars, as shown, the saw-kerf F (see Fig. 5) running between the holes D D. I do not, however, extend the slits through the staying-flange B, but temporarily leave it intact to act as a support for the bars during the continuance of the slitting operation, and afterward, if desired, during the operation of putting in the insulating material, and, if preferred, there may be a staying-flange at each end of the blank, as shown in dotted lines at B', Fig. 2. After the blank A has been slit up into the desired number of bars, I place the mica or other insulating material or strips G between them in any suitable manner, and I then line the bore of the blank with any suitable interior insulating material G', which may be applied in fluid or plastic condition or otherwise, as preferred, and may be subjected to pressure to secure intimate contact with the inner surfaces of the bars and penetration into the holes D and about the undercut or dovetail projecting parts of the inwardly-projecting parts C, so that the interior insulating material will hold the bars in place or aid in so doing. At any suitable stage in the manufacture the staying-flange B is cut off or removed, leaving each bar insulated from the others, as usual. If desired, the commutator may be put upon a shaft without any interior bushing; but if one is used, I prefer to provide dovetail projections or other retaining surface thereon, as shown at H, Fig. 6, or made therein, as shown at I, Fig. 8, J being the bushing. The commutator is supplied with bar strips or wires and the other usual coactive parts, as is well known. My invention not extending to them, it is not necessary to show or explain them.

It will be obvious to those who are familiar with this art that changes may be made in the details of construction of my blank and also in the special methods set forth by me. I do not, therefore, limit myself to the details.

I claim—

1. The combination, in a commutator, of a series of bars having perforated dovetailed projecting parts on their inner sides and insulating material about the same and in the perforations, substantially as set forth.

2. The combination, in a commutator, of a

series of bars having dovetailed projecting parts on their inner sides, and a bushing having dovetailed projecting parts on its exterior and insulating material between, substantially as set forth.

3. The method described in the construction of commutators, consisting in forming a blank with a staying-flange, slitting the blank into bars, and removing the staying-flange, substantially as set forth.

4. The method described in the construction of commutators, consisting in forming the blank with a staying-flange with inwardly-projecting dovetailed parts, slitting the blank and the dovetailed projecting parts into bars, removing the flange, and applying insulating material about the dovetailed projecting parts and between the bars, substantially as set forth.

5. The method described in the manufacture of commutators, consisting in forming the bars with inwardly-projecting dovetailed parts and a bushing with outwardly-projecting dovetailed parts, placing the bushing within the bars, and applying insulating material between the inner surfaces of the bars and the outer surface of the bushing and about their respective dovetailed projecting parts, substantially as set forth.

6. The combination, in a commutator, of a series of bars having dovetailed projecting parts on their inner sides, a bushing, and a seamless mass of insulating material between them which holds the bars and the bushing in proper relative position, substantially as set forth.

7. A blank from which commutator-bars may be made, comprising, essentially, a cylindrical portion having an inwardly-projecting dovetailed part and a staying-flange at the end of the cylindrical part, substantially as set forth.

8. A blank from which commutator-bars may be made, comprising, essentially, a cylindrical part having an inwardly-projecting dovetailed or undercut part, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 26th day of April, A. D. 1890.

CHARLES A. LIEB.

Witnesses:

PHILLIPS ABBOTT,

FREDERICK SMITH.