(No Model.)

C. A. LIEB.

COMMUTATOR.

No. 435,503. Patented Sept. 2, 1890.

Fig. 1.

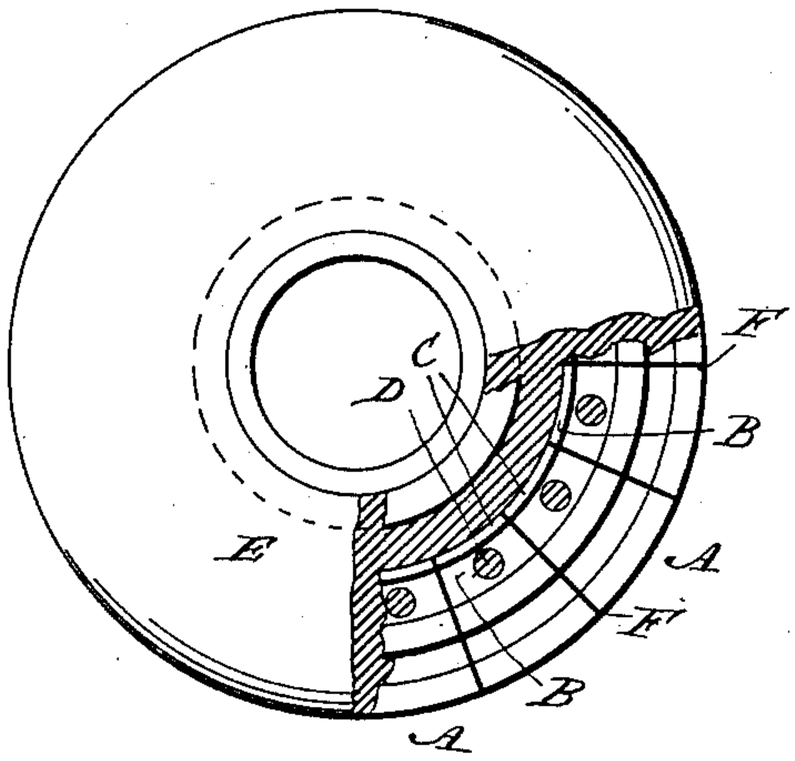


Fig. 2.

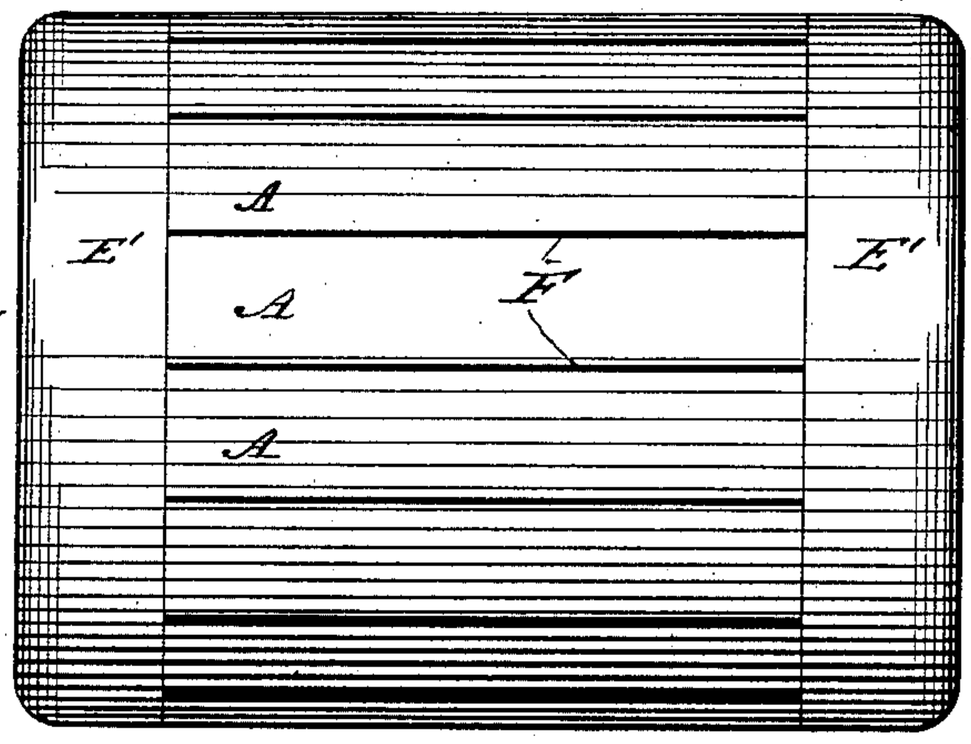


Fig. 3.

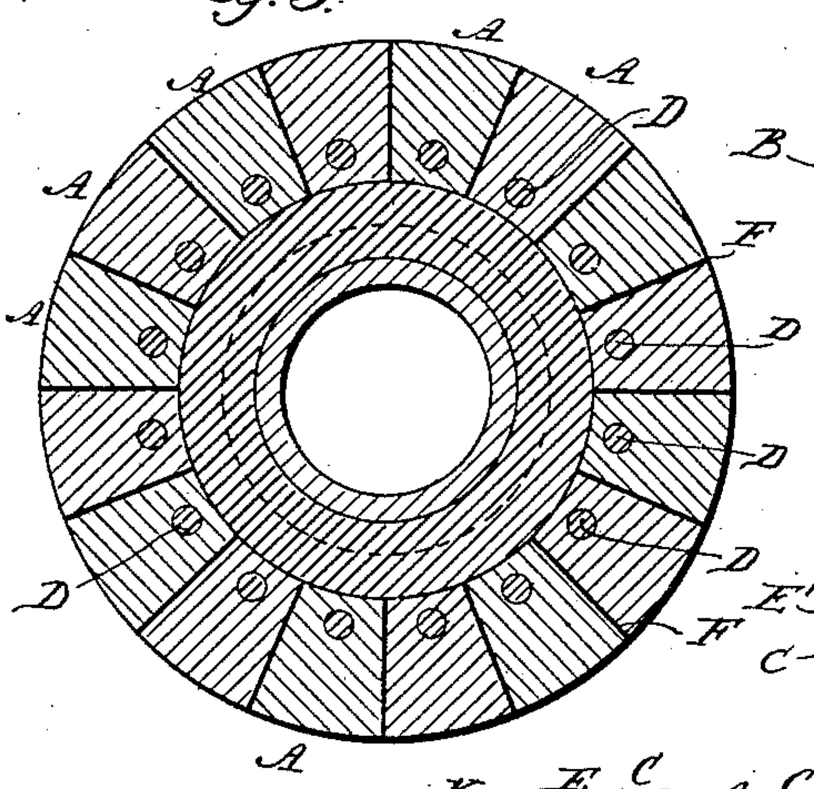


Fig. 4.

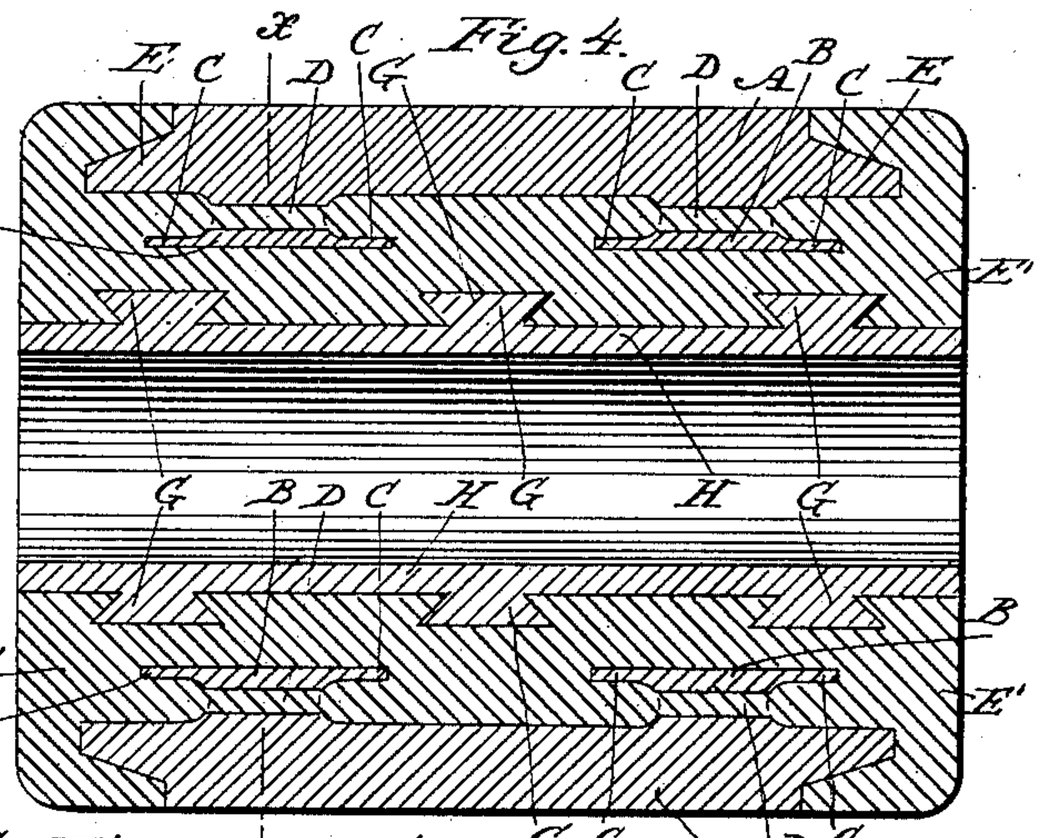


Fig. 5.

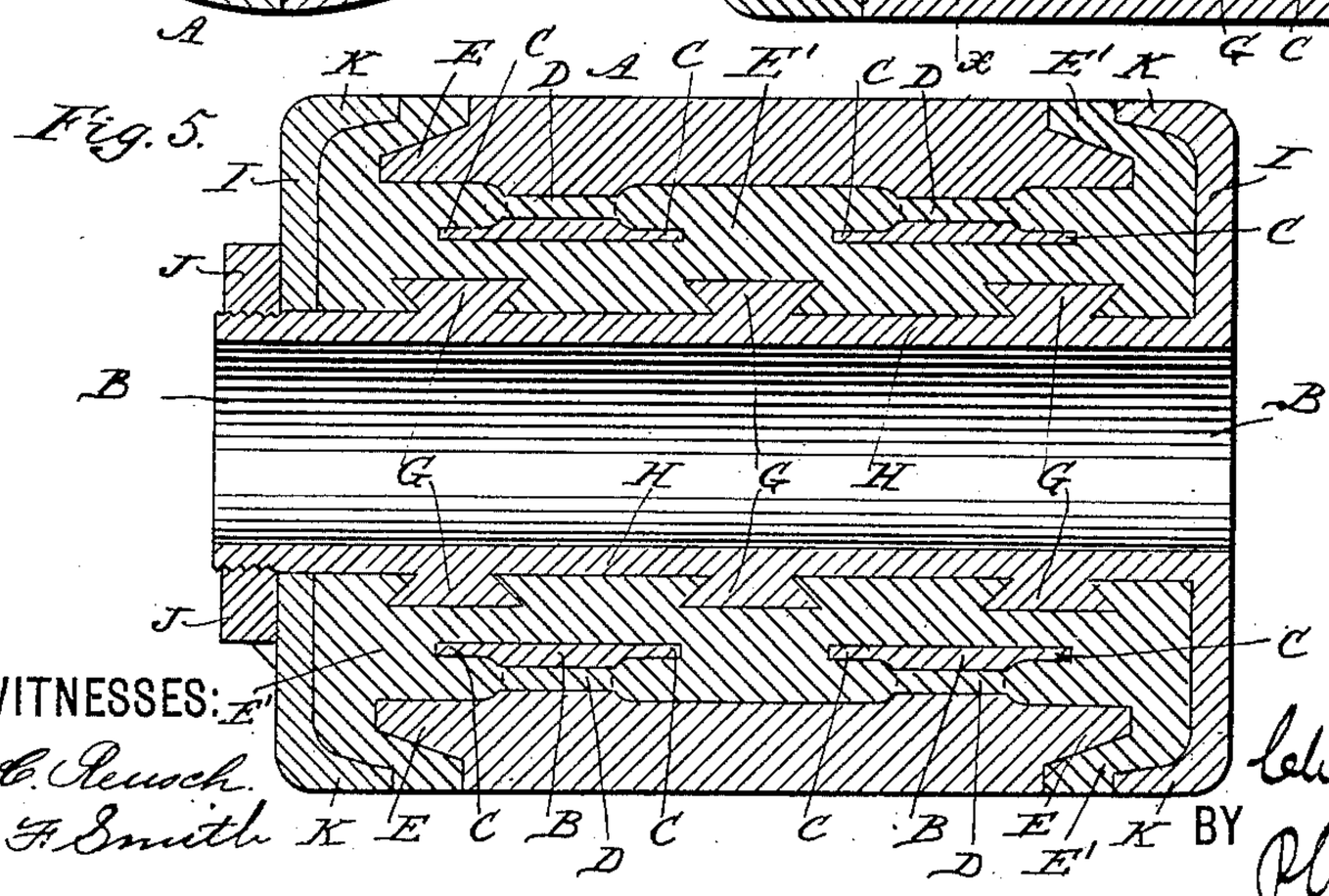
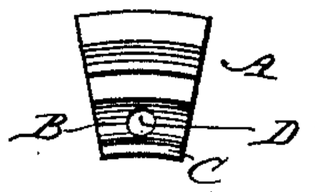


Fig. 6.



WITNESSES:
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UNITED STATES PATENT OFFICE.

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

COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 435,503, dated September 2, 1890.

Application filed April 30, 1890. Serial No. 350,000. (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 Commutators, of which the following is a specification.

My invention has reference to improvements in commutators; and it relates to the means whereby the commutator-bars are held in place and are prevented from movement relative to each other in any direction.

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

Figure 1 illustrates an end view in elevation of a commutator made under my invention, partly broken away to show a section thereof. Fig. 2 illustrates a side elevation of the commutator. Fig. 3 illustrates a transverse section on the line X X of Fig. 4. Fig. 4 illustrates a longitudinal section of the commutator shown in transverse section in Fig. 3. Fig. 5 illustrates a longitudinal section of an alternative construction of commutator, showing metallic heads or rings at the ends thereof for additionally sustaining the bars and the insulating material. Fig. 6 illustrates an end view of a bar detached.

A are the commutator-bars, and they are provided with inwardly-projecting undercut parts B, which have broad ledges C, and I prefer to perforate them, as at D. They are also preferably provided with flange-like projecting ledges E, extending from each end. My commutators may be made of these bars with insulating material put together as follows: The bars are first properly spaced and held in any suitable frame, so that they well maintain their proper position. The insulating material placed between the adjacent faces of the several bars (shown at F) may be mica or any other suitable material, and it may be put in in the form of plates or strips or as a fluid, a plastic, or a semi-plastic mass, pressure being employed, if need be, to secure intimate contact between the various surfaces of the bars and the insulating material, and the insulating material E′, which is used on the interior of the commutator, may itself be employed as that which shall separate adjacent bars, if desired. After the bars are spaced, as stated, and supported by a suitable frame, then the insulating material is allowed to flow in or is pressed in to the interior of the ring of bars in such manner that it fills all the space about the undercut parts B, overlaps the ledges C, and enters the holes D, if they be used. It also overlaps the endwise-projecting ledges E and thus makes a continuous firm binder for all the bars by reason of its overlapping the said several parts and entering the said holes, so that when it has hardened the several bars will be firmly held in their proper position by it alone, and no further support will in many instances be required. The hole in the center for the reception of the shaft is then suitably finished, if required, and the commutator is then completed and furnished with the usual attachments, as is well understood. I sometimes, however, prefer that the commutator should have a central bushing for the shaft, and in order that it may be firmly held in place I prefer to provide dovetail projections G on its exterior surface, as shown in Figs. 4 and 5, H being the bushing, and sometimes I prefer to additionally strengthen the commutator by re-enforcing the interior insulating material. This I accomplish by providing metallic, hard-rubber, or other heads I I—one at either end of the commutator (see Figs. 1 and 5)—and they may both be integral with the bushing H, as shown at the right in Fig. 5, or they may be both detached therefrom, as shown at the left in Fig. 5, and, if so, they may be held in position by a nut J, which screws on the bushing, as shown. Various other ways, however, of attaching these heads to the commutator will readily present themselves to those who are skilled in this art. The heads I are preferably each provided with a laterally-extending annular flange K, which overlaps the insulating material E′ at its outer end parts. If the bushing is used either with or without the heads, I prefer to place it centrally within the series of bars held in the frame, as before stated, prior to the application of the insulating material E′ thereto. It will then be allowed to flow, if fluid, slowly into all the spaces provided for it between the bars and the bushing, and thus acquire intimate contact with all

the shoulders, ledges, dovetails, &c., of these several parts. If the insulating material be plastic or semi-plastic, then it may be forced by pressure into intimate contact with these parts for the proper sustaining and holding of the bars, the bushing, and the flanged heads relative to each other.

It will be observed that my commutator differs from all others now in use, because they (the former ones) are all built up of a number of different parts screwed together, the desire heretofore being to make the commutators so that new parts could be substituted for worn or damaged parts. The result has been that it is inevitable that the device sooner or later becomes defective, because of the unequal expansion and contraction of the various parts, especially the bars thereof; also, owing to the excessive strains resulting from the different expansions and the strong vibrations and jars of the machine, the screws, bolts, and nuts very soon become loosened, thus loosening the bars, which results in defective contact of the brushes, thereby not only destroying the commutator, but also frequently the brushes, as well as the armature itself. Under my improved construction, when the insulating material is once hardened about the bars, they and the insulating material become an integral structure, and it is impossible to remove or move one of them at any time without destroying the commutator. This construction, although attended with certain disadvantageous incidents, results in a very superior commutator, which during its entire life will always give the desired results. The insulating material which I use is partially elastic and allows for expansions and contractions of the metal.

I do not limit myself to the details of construction shown, because they may be somewhat departed from and still the essentials of my invention be present.

I claim—

1. A commutator comprising, essentially, a series of bars having undercut parts or ledges on their inner surfaces and ledges on their ends and insulating material between the bars and about the said undercut parts and ledges, substantially as set forth.

2. The combination, in a commutator, of a series of bars having ledges on their ends and undercut parts on their inner surfaces, a bushing, and insulating material between the bars about the undercut surfaces over the ledges and between the bars and the bushing, substantially as set forth.

3. The combination, in a commutator, of a series of bars having insulating material between them and ledges on their ends, a bushing having dovetail surfaces on its exterior, insulating material between the bars and the bushing and under the dovetail surfaces of the bushing, and heads for the confinement for the insulating material, 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:
PHILLIP ABBOTT,
FREDERICK SMITH.