(No Model.)

R. HIRSCH & H. MEMINGER.

COMMUTATOR BRUSH.

No. 551,033. Patented Dec. 10, 1895.

Fig. 3.

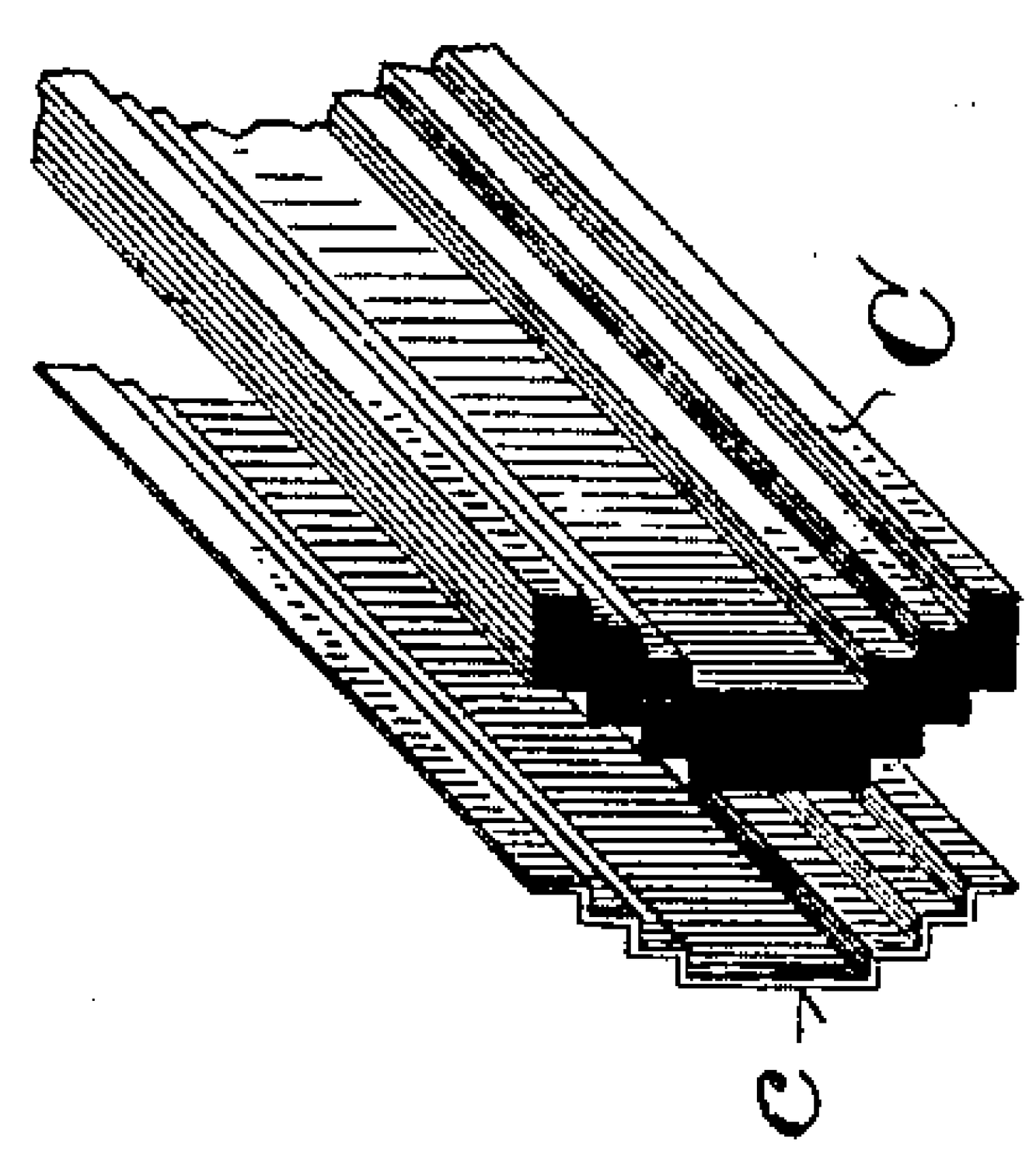


Fig. 2.

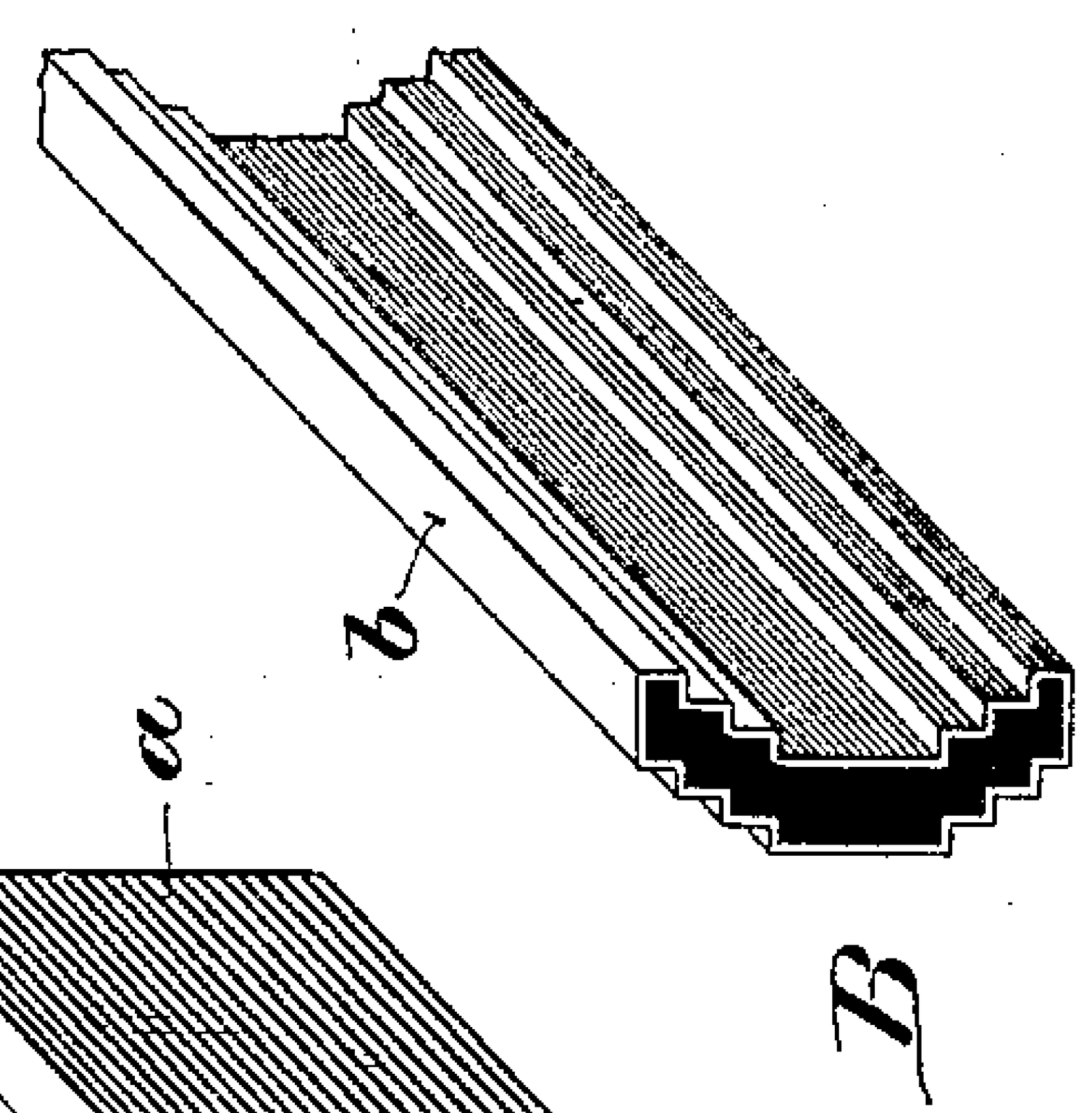


Fig. 1.

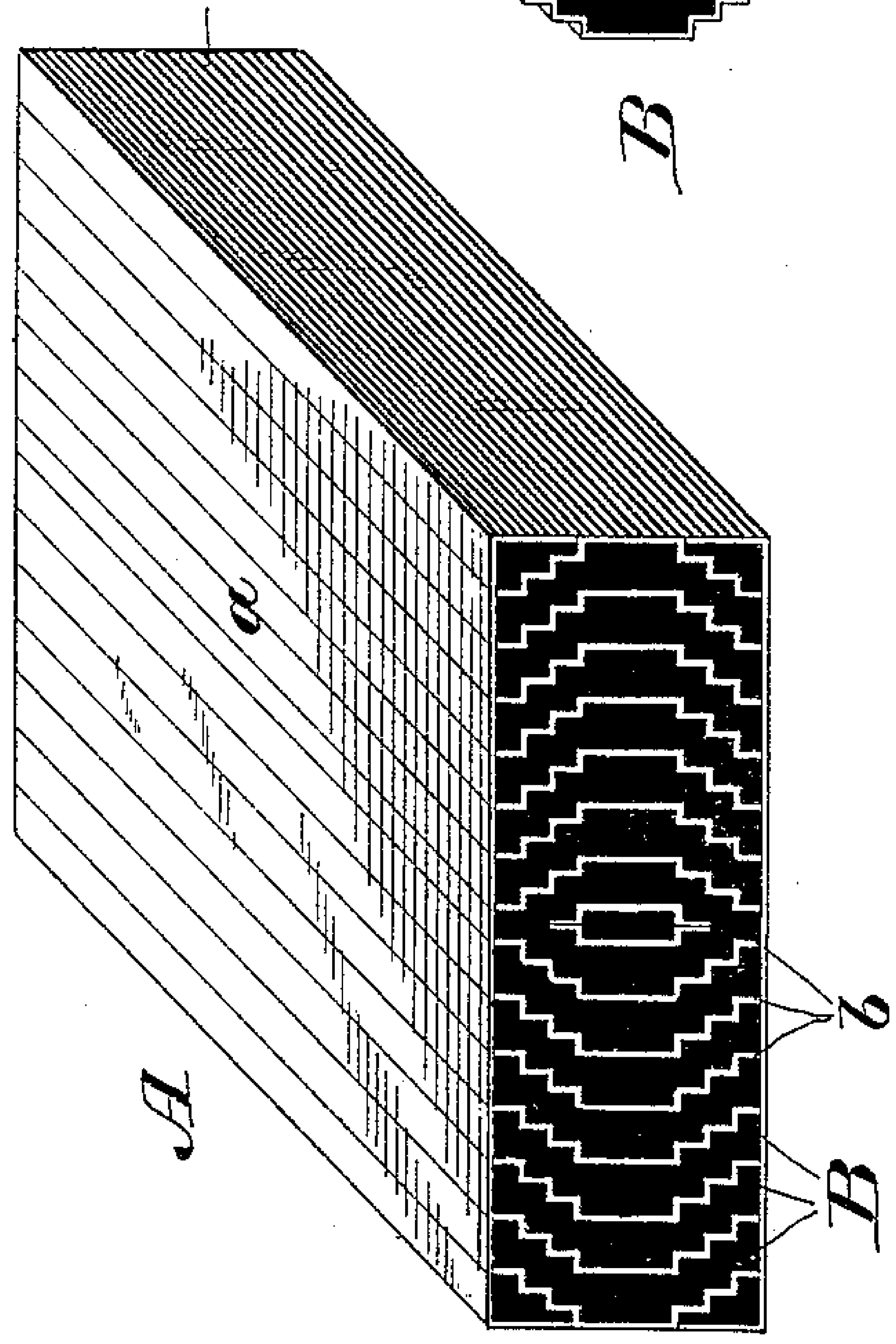


Fig. 5.

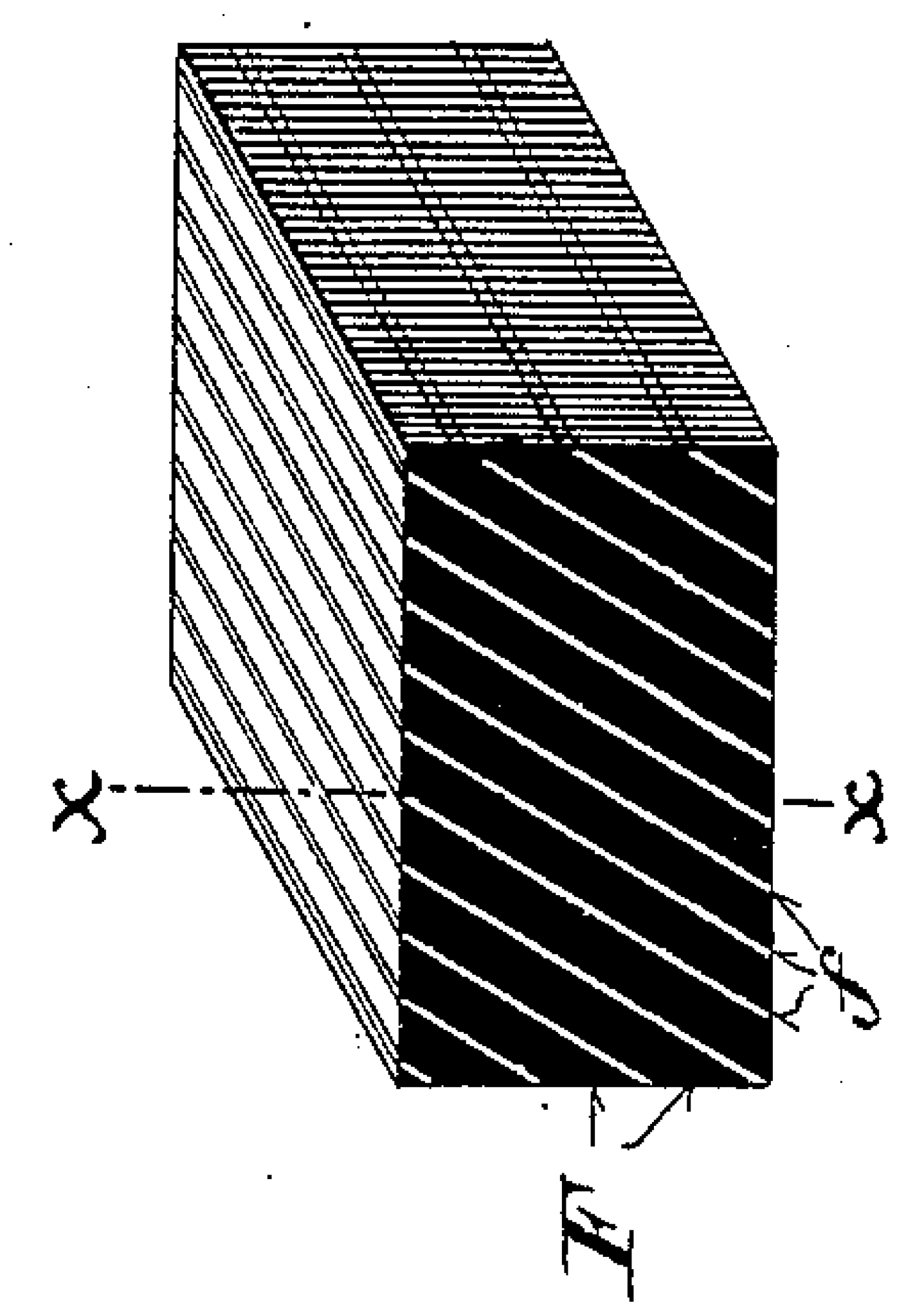
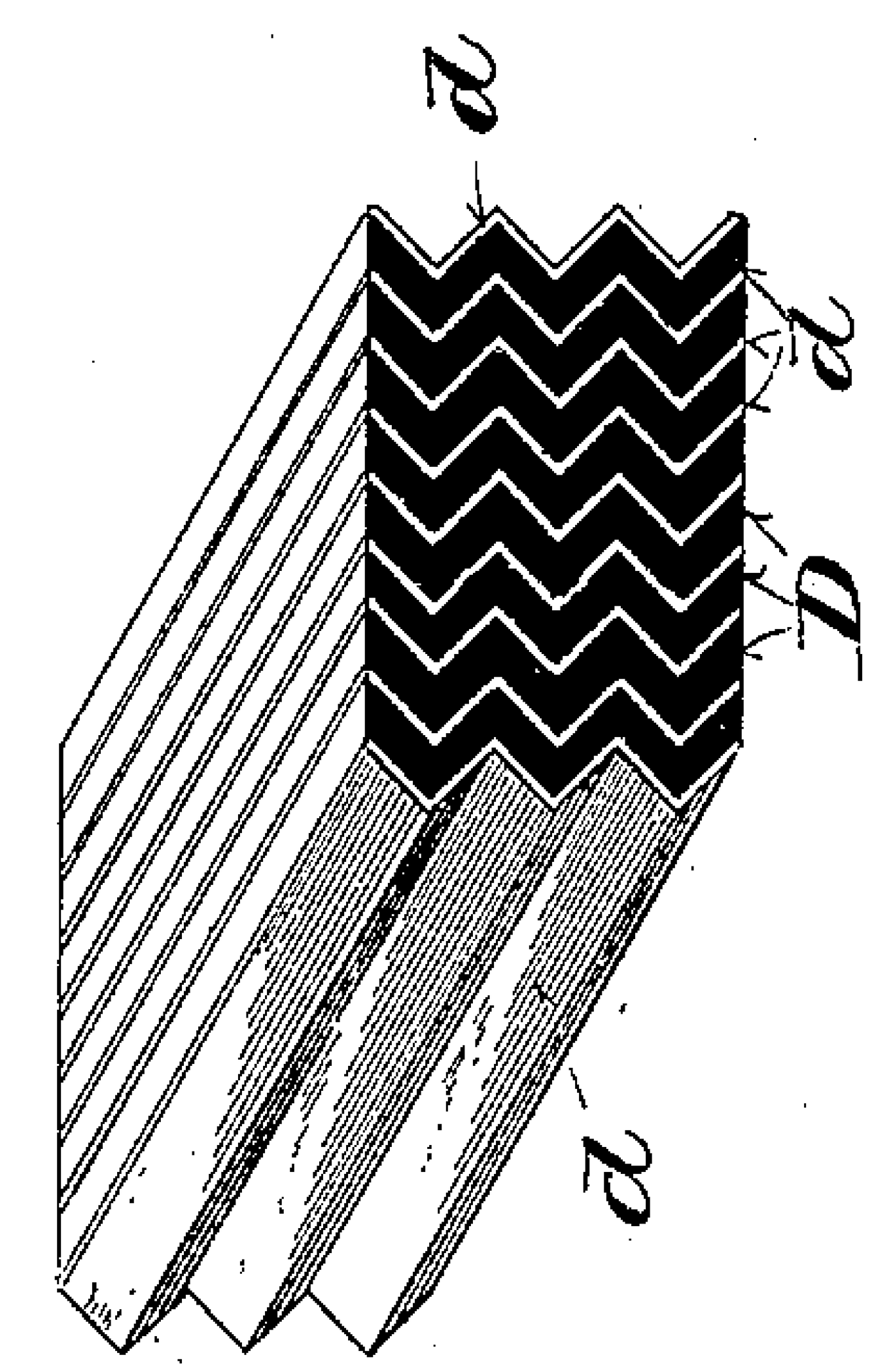


Fig. 4.



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ROBERT HIRSCH AND HERMAN MEMINGER, OF MILWAUKEE, WISCONSIN.

COMMUTATOR-BRUSH.

SPECIFICATION forming part of Letters Patent No. 551,033, dated December 10, 1895.

Application filed January 28, 1893. Serial No. 459,936. (No model.)

To all whom it may concern:

Be it known that we, ROBERT HIRSCH and HERMAN MEMINGER, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Commutator-Brushes; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of our invention is to provide commutator-brushes composed mainly or in part of carbon or of some similar material or composition with a metallic contact-surface disposed or arranged to present an approximately uniform area to the commutator transversely to its plane of rotation, and thereby to increase the conductivity and efficiency of the brush to insure perfect contact with the commutator and to avoid wearing the commutator unevenly.

It consists, essentially, of a commutator-brush composed of alternating layers, strips, or sections of carbon or some similar material or composition and layers, strips, or sections of metal, the metallic strips being so arranged as to present an approximately uniform area to the commutator transversely to the plane of its revolution.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a perspective view of a commutator-brush embodying our improvements. Fig. 2 is a similar view of one of the component sections. Fig. 3 illustrates a modification of the mode of forming and assembling the metallic and carbon sections, and Figs. 4 and 5 show still further modifications in the form of the sections.

Referring to Figs. 1 and 2, A represents a brush composed of a number of alternating sections, layers, or strips B B of graphite or other similar conducting and lubricating material and of correspondingly-shaped sections, layers, or strips *b b* of metal, such as copper. These sections are longitudinally fluted, crimped, or corrugated, so as to be nested together and more readily held in place when assembled in the brush and to distribute the metal more evenly in a direction transverse to the plane of rotation of the commutator. By means of this construction and arrangement of the component parts of the brush a metallic contact-surface of approximately uniform area is presented to the commutator throughout the width of the brush and at whatever angle it may be presented to the commutator.

The metallic portions of the brush serve, primarily, to conduct the current, thus increasing the conductivity of the brush, and, secondarily, to bind the graphite or other lubricating material or composition together, and thus prevent its disintegration.

In the construction of the brush we prefer to apply the metal to the sections of graphite or lubricating composition formed to the desired shape by electrodeposition. These sections may then be assembled and permanently bound together by a coating *a* of electrically-deposited metal, as shown in Fig. 1, or they may be separately assembled and held together by any suitable box, casing, or brush-holder.

For the lubricating material we prefer to employ a composition of graphite containing as an ingredient some suitable scouring material—such as tripoli, pumice-stone, or the like—which will prevent oxidation of the commutator-surface and keep the same constantly smooth and bright without attention. In Fig. 4 the sections have a zigzag form in cross-section, D D representing the graphite or composition strips and *d d* the metallic strips. In Fig. 5 the sections are formed with plane surfaces and are arranged obliquely to the plane of rotation of the commutator, (indicated by the dotted line *x x*,) so as to present a greater lateral extent of metal to the commutator, F F representing the sections of graphite or composition and *f f* the sections of metal. In either case the metal may be plated by electrodeposition upon the strips of graphite or composition, or the metal may be formed in separate strips corresponding in shape with the strips of graphite or composition between which they are interposed.

In brushes of this class as heretofore constructed the intermediate strips or layers of metal have been arranged in vertical planes

or planes parallel to the plane of rotation of the commutator, thus producing in a direction transverse to the plane of rotation of the commutator an interrupted metallic contact, which has tended to produce grooves in or wear the commutator unevenly, besides affording imperfect electrical contact, it being the main function of the carbon in such brushes to conduct the current and the main function of the metallic covering or sections to bind and hold the carbon in place.

The desired lateral distribution of the metal to produce a continuous uniform metallic contact with the commutator in the direction of the width of the brush is produced in our brush by arranging the sections at an inclination to a vertical plane or to the plane of rotation of the commutator or by offsetting, fluting, or corrugating the sections, so that they will each be cut by such a plane at two or more points.

It is obvious from the foregoing explanation, in connection with the drawings, that this result may be accomplished by various formations of the sections.

We claim—

1. A commutator brush composed of alternating strips or sections of carbon or a carboniferous composition, and strips or sections of metal offset or inclined to the plane of rotation of the commutator so as to present thereto a continuous and approximately uniform area of metallic contact, substantially as and for the purposes set forth.

2. A commutator brush composed of alternating strips or sections of carbon or a carboniferous composition, and metal, correspondingly corrugated or fluted lengthwise to fit into each other and to present an approximately uniform metallic contact surface to the commutator transversely to its plane of rotation, substantially as and for the purposes set forth.

3. A commutator brush composed of alternating sections or strips of a lubricating and scouring composition and of metal inclined or offset to the plane of rotation of the commutator so as to produce a continuous and approximately uniform area of metallic contact to the commutator in the direction of the width of the brush, substantially as and for the purposes set forth.

4. A commutator brush composed of alternating sections of a graphite composition containing a scouring ingredient and of metal, the component sections of the brush being corrugated or fluted lengthwise so as to present an approximately uniform area of metallic contact to the commutator transversely to the plane of rotation, substantially as and for the purposes set forth.

5. A commutator brush composed of alternating sections of a composition of graphite and scouring material and sections of metal, the component sections of the brush being offset or inclined to the plane of rotation of the commutator so as to present a continuous and approximately uniform area of metallic contact to the commutator, transverse to its plane of rotation, substantially as and for the purposes set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

ROBERT HIRSCH.
HERMAN MEMINGER.

Witnesses:
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