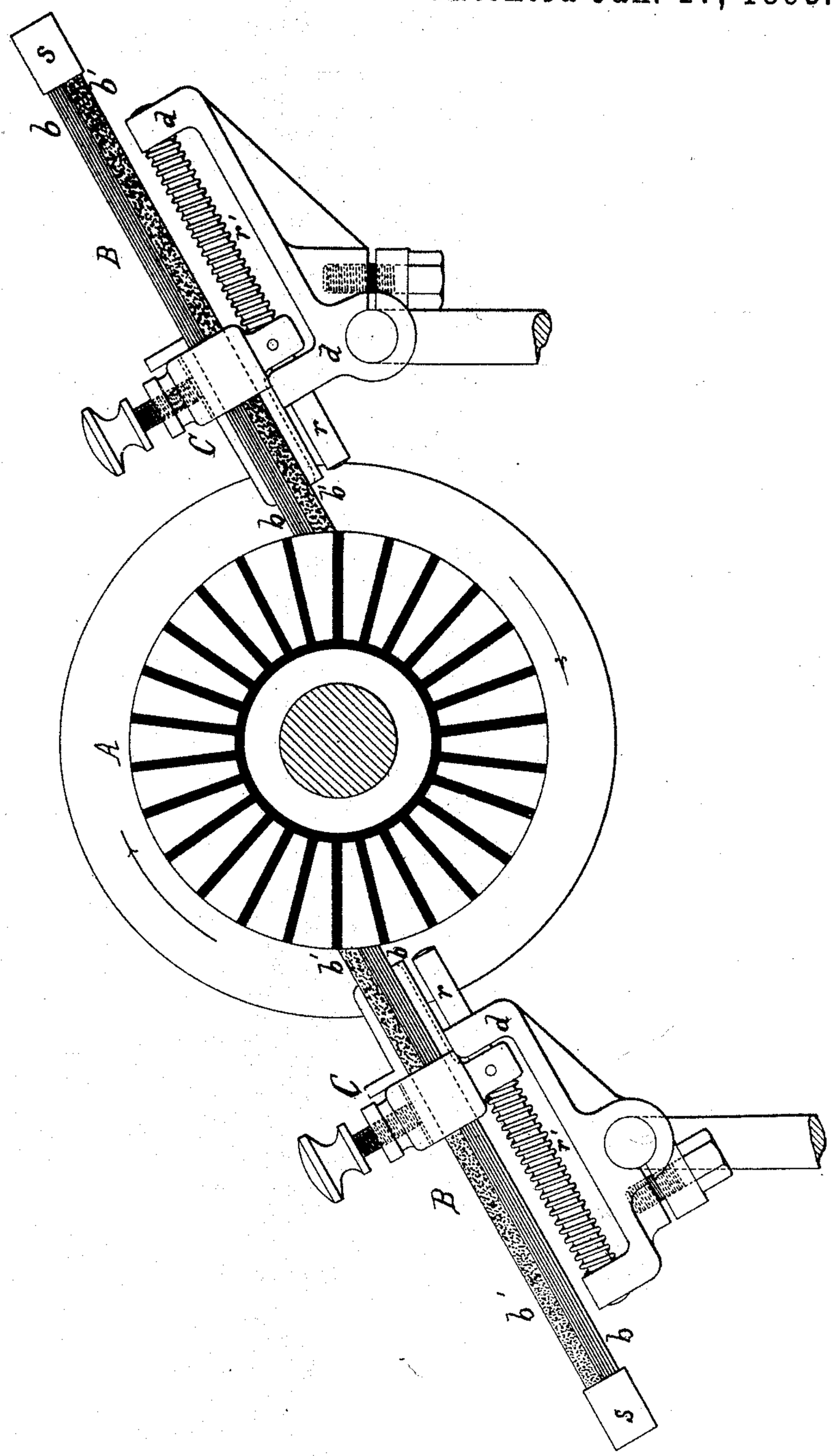
(No Model.)

# C. O. C. BILLBERG.

## COMMUTATOR BRUSH.

No. 490,183. Patented Jan. 17, 1893.

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# UNITED STATES PATENT OFFICE.

CARL O. C. BILLBERG, OF PHILADELPHIA, PENNSYLVANIA.

## COMMUTATOR-BRUSH.

SPECIFICATION forming part of Letters Patent No. 490,183, dated January 17, 1893.

Application filed September 20, 1890. Serial No. 365,579. (No model.)

*To all whom it may concern:*

Be it known that I, CARL O. C. BILLBERG, a subject of the King of Sweden and Norway, and a resident of Philadelphia, Pennsylvania, have invented an Improved Electrical Commutating Brush or Contact, of which the following is a specification.

The object of my invention is to construct an electrical contact or collector more particularly a commutator brush for dynamo electric machines or electric motors so as to prevent injurious sparking and consequent wear of the commutator so far as possible, and at the same time to secure and maintain efficient electrical contact between the relatively moving parts and good conductivity of the contact or commutator brush. Up to a comparatively recent period, electrical conductors or contacts, and particularly commutator brushes, have been made of copper or equivalent metal on account of its good conductive properties, but the use of copper brushes is attended with injurious cutting and scoring of the commutator. This is caused in part by sparks on the leaving side of the brush tearing off fine particles of copper from the commutator and producing a rough surface which acts as a kind of coarse grindstone on the brushes. This destruction of the commutator is however more largely due to the fact that the sparks themselves oxidize the melted or separated copper molecules, leaving a row of small copper globules covered with copper oxide, and this copper oxide being considerably harder than the copper itself, acts like emery in cutting down the commutator. The first sparks may be hardly noticeable but they produce these little balls of melted copper which commence cutting the commutator surface and tend to cause the brush to vibrate, thus increasing the sparks and repeating the process to an increased extent. In order to overcome these difficulties I make the contact or brush of copper or equivalent metal (such as copper bronze alloys) on the front or entering side or edge with carbon, plumbago or equivalent material applied to the back or the leaving side or leaving edge of the brush, so that the contact or brush may be generally described as of copper with a backing of carbon. Since this carbon is on the leaving edge of the brush I will no longer have to deal with melted copper but I will have as a product of these sparks oxide or di-oxide of carbon, which being a gas will be simply driven off, leaving the brush without the destructive molecules, so that the commutator is kept smooth and there is smooth contact with the brush with hardly noticeable wear.

The figure in the accompanying drawing is a side view, partly in section, illustrating the application of my invention to the commutator brushes of a dynamo-electric machine or electric motor, in which the commutator revolves while the brushes are stationary. It should be understood, however, that my invention may be applied to other constructions of such apparatus and to contact makers in general, in which there is a relative motion between the contact surfaces.

In the figure, A represents the commutator with its insulated segments, and B B, represent the two commutator brushes which bear at their ends against the periphery of the rotating commutator. Each brush consists of strips or wires *b* of copper or equivalent metal with a backing of carbon or similar material *b'*. This carbon is preferably in the form of a slab of suitable thickness, and the copper and carbon may be held together at their outer ends by being fitted into a socket *s*, and held in the commutator by a clamp C carried by a rod *r* adapted to have a sliding movement in a bracket *d* under the action of a spring *r'* which tends to keep the commutator brushes up to contact with the commutator. The brackets *d* are carried by any suitable part of the framework of the machine.

It will be understood that instead of having the commutator revolving and the brushes stationary, the latter may be arranged to revolve while the commutator is stationary, and as I have said, my construction of contact or collector or commutator brush may in general be applied in various ways and to various constructions of electrical apparatus in which electrical contact is desired between two relatively moving surfaces. For the sake of brevity, however, I will simply term the device a commutator or contact brush.

I am aware that it has been proposed to make commutator brushes of carbon, either wholly of carbon, or mainly of that substance with a copper backing on the leaving side of

the brush. Where the brush is made wholly of carbon or similar material, the conductivity is not sufficiently good, and on the other hand, where the carbon brush has a backing of copper on the leaving side, the destructive action of the sparking, above alluded to, is present just as if the whole brush were made of copper.

I claim as my invention:

The herein described electrical commutator brush or contact consisting of copper or equivalent metal, on the entering edge with a backing of carbon or similar material on the leaving edge, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL O. C. BILLBERG.

Witnesses:

HUBERT HOWSON,

HARRY SMITH.