

(No Model.)

O. P. LOOMIS.  
COMMUTATOR BRUSH.

No. 554,369.

Patented Feb. 11, 1896.

Fig. 1.

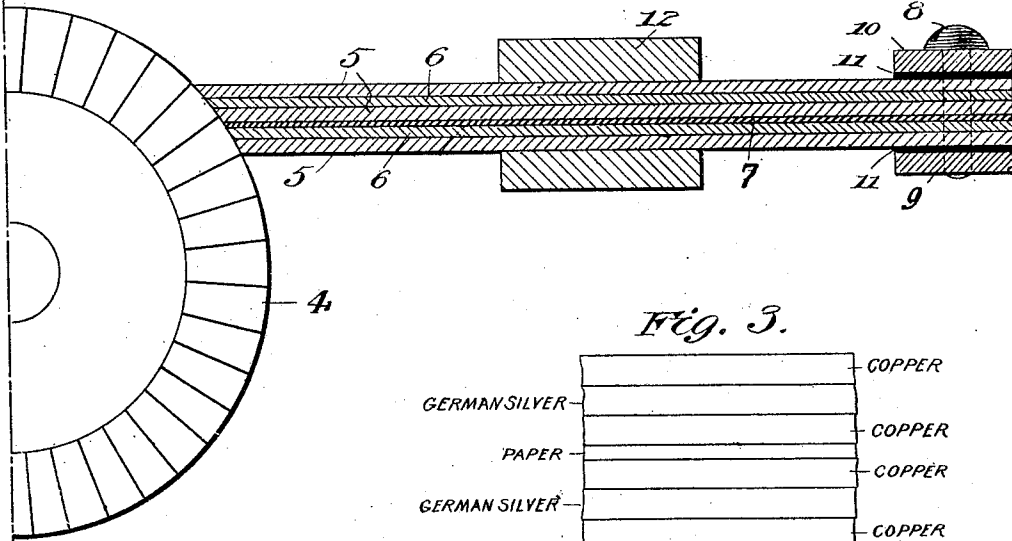


Fig. 3.

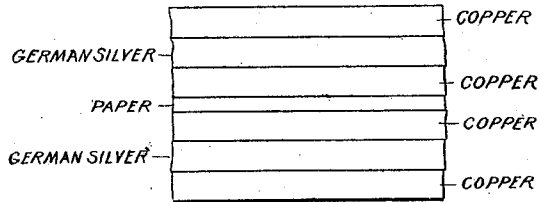
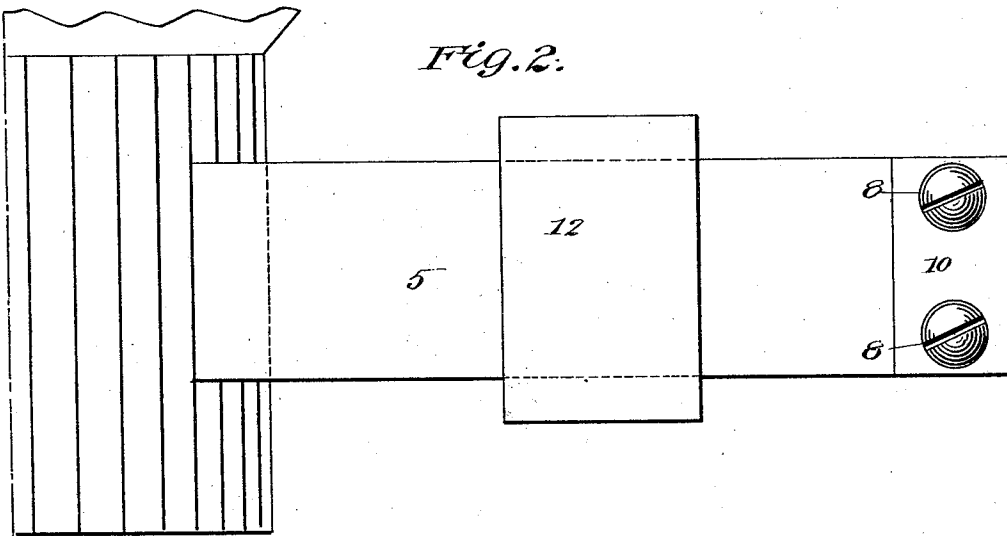


Fig. 2.



WITNESSES:

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OSBORN P. LOOMIS, OF BOUND BROOK, NEW JERSEY.

## COMMUTATOR-BRUSH.

SPECIFICATION forming part of Letters Patent No. 554,369, dated February 11, 1896.

Application filed February 13, 1895. Renewed October 17, 1895. Serial No. 566,001. (No model.)

*To all whom it may concern:*

Be it known that I, OSBORN P. LOOMIS, a citizen of the United States, residing at Bound Brook, Somerset county, State of New Jersey, have invented certain new and useful Improvements in Commutator-Brushes, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to prevent sparking of the brushes of dynamo-electric machines or motors. As generally understood the sparking is supposed to be due to an electric potential of small electromotive force being established between two adjacent segments, thereby creating currents of greater or less magnitude which circulate locally through the brush. It is, therefore, evident that if we make the specific resistance of the brush high these eddy-currents will accordingly be suppressed. In fact this is the reason why carbon brushes are used with such success. However, in low-potential systems, carbon offers too high a specific resistance to be used with satisfaction since increased commutator-surface is necessary to secure freedom from heating and excessive loss.

By my invention I am able to secure in all cases the superior results obtained in many instances by the use of the ordinary copper-leaf brush, the leaves of which when soldered together at one end afford a low-resistance medium for the circulatory currents which flow from one segment to the other. In this ordinary copper brush the main current generated by the machine passes out through the brush-clamp and numerous eddy-currents flow through the brush at various points, depending on the cleanness of the copper surfaces, and there is always a chance for the current to flow finally through the soldered junction of the leaves, and, as explained in various text-books, these currents when broken by the brush leaving the segments of the commutator produce sparking. In my invention I break up these circulatory currents in a manner somewhat analogous to that used in armature-cores by suitable lamination. First I divide the brush into an upper and a

lower half and insulate the halves from each other by a suitable piece of insulating material—such as strong paper, for instance—so that the two halves of current may pass up the respective halves of the brush and thence out each clamping-surface to the clamp.

It may be thought that as the two clamping-surfaces are part of one piece of metal forming the clamp it would destroy the insulating effect referred to, but in practice I find that the contact resistance of these two surfaces, while not having the slightest effect on the main current, are great enough to destroy the current that would be otherwise set up by the exceedingly-small electromotive force between adjacent segments of the commutator-cylinder.

Another important feature of my brush is the employment of alternate layers of metal of high conductivity and metal of high resistance.

In the accompanying drawings I have illustrated a type of my invention.

Figure 1 is a view of my improved brush in section on a vertical plane with one end of the brush bearing upon a commutator-cylinder, which is shown in part. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged side view of a modified form of my invention shown in portion.

Referring to the drawings, in which like numbers of reference indicate like parts throughout, 4 is an ordinary commutator-cylinder, having upon its exterior the segments with which the brush is kept in constant contact. The brush is made up of alternate layers of metal of high conductivity, such as copper, and which are indicated by the numeral 5, and of metal of high resistance, such as German silver, as indicated by numeral 6. These alternately-arranged layers or strips of metal are divided substantially into upper and lower halves on a plane parallel with the strips by the interposition of a layer of suitable insulating material 7—such, for example, as paper. The outer end of these several strips of material composing the brush are fastened securely together by means of plates 9 and 10, which are insulated from the exterior strips by insulation 11 11, and screws 8 8 are passed through the upper plate, 10, the set of strips and into the lower plate, 9, in which

are formed screw-threaded openings for the ends of the screws to take into. These screws are of course insulated from the strips composing the brush, and by tightening them the strips may be bound tightly together. The brush is carried by an ordinary clamp or holder 12, from which the current is taken.

In the form shown in Fig. 1 five strips of metal are used—first a layer of copper, then a comparatively thin layer of German silver, then copper, then a strip of German silver, and finally a strip of copper upon the lower side of the brush, thus bringing the copper surfaces in contact with the brush-holder 12. The layer of paper 7 for insulating the metallic strips, so as to divide the brush into two distinct parts, is placed between a layer of the copper and German silver, so as to bring it as near the center line of the brush as possible when an odd number of layers of metal is used, as is the case in Fig. 1.

In the form shown in Fig. 3 an even number of layers is used, so that the paper can be interposed exactly in the center of the brush between the two metal layers of copper. In all forms of the brush the German silver, which is made comparatively thin, is oxidized so as to increase its resistance, which is small when compared with the potential due only to two adjacent segments of the commutator. In this manner I place together alternately sheets of copper and sheets of German silver, with the interposed central layer of insulating material for dividing the brush, until I have a brush of suitable thickness for the capacity that it is intended and one that will run sparklessly owing to its ability to break up the circulatory currents.

While it is obvious that my improved brush may be varied in detail, I consider that the important features of the invention are the alternately-arranged layers of metal of high resistance and high conductivity and the insulating of the brush into upper and lower halves. Any number of layers may be used.

In practice I find it a good plan to dip the ends of the strips that are fastened together

in shellac and afterward bake so as to cement the whole together.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a commutator-brush, the combination of alternately - arranged layers or strips of metal of high conductivity and metal of high resistance, and a fastening device for securing the outer ends of said strips together, said device being insulated from said strips, substantially as and for the purpose set forth.

2. In a commutator-brush, the combination of alternately - arranged layers or strips of metal of high conductivity and metal of high resistance divided by insulating material into upper and lower halves on a plane parallel with the layers, substantially as and for the purpose set forth.

3. In a commutator-brush, the combination of a set of layers or strips composing the brush, and a fastening device for securing the outer ends of said strips together, said device being insulated from said strips.

4. In a commutator-brush, the combination of a set of layers or strips composing the brush, a pair of plates between which the outer ends of said strips are placed, said plates being insulated from said strips and provided with fasteners for clamping the plates against the strips to hold the ends together, substantially as and for the purpose set forth.

5. In a commutator-brush, the combination of alternately - arranged layers or strips of copper and oxidized German silver, and an interposed layer of paper or insulating material dividing said metal layers substantially in two halves, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand, this 12th day of February, 1895, in the presence of the two subscribing witnesses.

OSBORN P. LOOMIS.

Witnesses:

WILLIS FOWLER,  
G. R. BALDWIN.