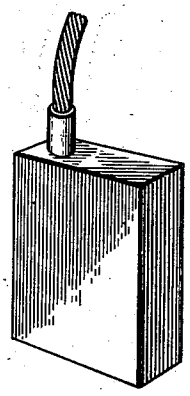
E. G. GILSON.

BRUSH FOR DYNAMO ELECTRIC MACHINES.

APPLICATION FILED JAN. 29, 1913.

1,093,614. Patented Apr. 21, 1914.



Contains Copper and Iron.

Witnesses:

Benjamin B. Hull

Helen O. Gould

Inventor:

Emery G. Gilson,

by Albert G. Davis

His Attorney

UNITED STATES PATENT OFFICE.

EMERY G. GILSON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

BRUSH FOR DYNAMO-ELECTRIC MACHINES.

1,093,614. Specification of Letters Patent. Patented Apr. 21, 1914.

Application filed January 29, 1913. Serial No. 745,021.

To all whom it may concern:

Be it known that I, EMERY G. GILSON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Brushes for Dynamo-Electric Machines, of which the following is a specification.

The present invention relates to bearing metals, suited particularly for brushes, or other rubbing parts of dynamo-electric machines, and is an improvement on the material described in my Patent No. 1,071,044, of August 26, 1913.

The bearing composition therein described, consisting of copper, graphite and a soft alloying metal, while entirely satisfactory for brushes used on collector rings of alternating current machines, is not so well suited for commutating machines in which the circuit is continuously shifted from one commutator segment to another. Under such conditions of operation there occurs a roughening of the commutator, which is apparently due to a deposition of metal from the brush to the commutator segments, and also to inequality of wear of the bars and the mica spacers. This roughening causes sparking which in turn makes the deposition of metal more pronounced, so that great care is required to keep the commutator in satisfactory condition. I have found that when a small amount of a metal less easily vaporized by the spark than copper, such as iron, nickel, chromium, manganese, tungsten or the like, is added to the brush mixture that uniformly good commutation can be secured.

The accompanying drawing illustrates a metal brush of a type to which my invention is applicable.

In carrying out my invention, I prefer to begin with a mixture of copper oxid, and an excess of graphite to which there is added usually also some reducible compound of a soft alloying metal, for example, lead or tin oxid. This mixture is heated to a reducing temperature until all but a small amount of the compounds have been reduced to the metallic state. The iron or equivalent metal is then added, preferably as the oxid. The mixture is finally pressed and fired as will be more fully explained.

Although I do not wish to be limited by any specific proportions or other details, I will describe a brush mixture which may be considered as typical of my invention. A mixture is prepared of 1000 parts of red copper oxid, Cu_2O, 95 parts of graphite, 127 parts of tin oxid and 81 parts of lead oxid or other soft metal which will readily alloy with the copper. If some other oxids are used the graphite content should be varied in accordance with the oxygen content of the oxid, so as to leave substantially the same amount of graphite in the finished brush. These materials should be in a finely divided condition and may be thoroughly mixed by pulverizing them in a ball mill or similar device. The mixture is placed in a suitable retort, for example a copper retort and is heated about 5 to 8 hours to a temperature of about 650° C. At the end of this time a large part of the metallic compounds will have been reduced to the metallic state but the reduction should be stopped before complete reduction has taken place. The amount of unreduced oxid may vary somewhat with the character of the mixture and the other details of the process but usually the mixture should contain somewhere between 1.5 to 3.5% of unreduced oxid, or other compound. In some cases the oxid percentage may be somewhat higher. The length of time necessary to effect the desired reduction will vary in accordance with the character of the mixture. Upon cooling preferably about one to four parts of iron oxid Fe_2O_3, in a finely powdered state are added for every 100 parts of the above described reduced mixture, but the iron oxid admixture may be high enough to leave 5% of iron in the finished brush. The iron oxid is thoroughly distributed in any convenient manner. The mixture is put through a 100 mesh sieve and is then compressed into desired form. The compressed articles are fired under the exclusion of air to a temperature of 650 to 700° C. until the reduction of the oxids is substantially complete and consolidation and alloyage has taken place between the metal particles comprising the mixture. Preferably the shaped articles are packed in charcoal and heated slowly so that the temperature of 650 to 700° C. is reached in about 18 hours, the heating being then continued about 120 hours. It is likely that the iron is present

in the finished brush in the form of a carbid although it may also alloy itself at least to some extent with the copper. In whatever state it may be present, I find that it has the effect of reducing the migration of metal with the current when the material is used as a current collector on a commutating machine. A brush made in accordance with my invention is also harder and thus acts to cause the mica to wear evenly with the copper, thereby maintaining the surface of the commutator smooth.

Although I have described a specific mixture of metals, I wish it to be understood that various substitutions may be made, for example, silver may be substituted for copper and the alloying metals may be replaced by others or even left out entirely. Compounds of iron other than the specific oxid mentioned may be used, in fact, as already indicated metals other than iron may be used as an addition to the composition to produce the above described result, although I prefer iron, or some other metal of the same group. Whereas the appended claims call specifically for a mixture containing iron, as an elementary constituent I mean to cover thereby the described equivalents of iron.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A brush for dynamo-electric machines consisting of copper, an alloying metal softer than copper, a lubricating substance, and a few per cent. of iron.

2. A current collector consisting of copper, a soft alloying metal, graphite and about 2 to 5 per cent. of iron.

3. A brush for dynamo electric machines comprising a molded mass of metal particles consolidated by heating and containing copper, a soft alloying metal and a substantial amount of iron as elementary constituents.

4. A brush for dynamo electric machines, comprising copper, graphite, tin and more than a trace of iron as elementary constituents.

In witness whereof, I have hereunto set my hand this 27th day of January, 1913.

EMERY G. GILSON.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.