UNITED STATES PATENT OFFICE.

SAMUEL TROOD, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

PROCESS OF MAKING MOLDED CONDUCTORS.

1,281,716. Specification of Letters Patent. **Patented Oct. 15, 1918.**

No Drawing. Application filed October 3, 1913. Serial No. 793,116.

To all whom it may concern:

Be it known that I, SAMUEL TROOD, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Processes of Making Molded Conductors, of which the following is a specification.

My invention relates to molded conductors and it has special reference to current-carrying conductors such as may be employed as current collectors for dynamo-electric machines.

My invention has for one of its objects to provide a conductor which possesses the lubricating qualities of a graphite brush but which is more durable and is a better conductor.

Another object of my invention is to provide a process by means of which a conductor having the properties above noted may be easily and economically constructed.

As is well known, carbon brushes are employed as current collectors of dynamo-electric machines to avoid the sparking and wear of the commutator which occur when metallic brushes are used. When a heavy load is placed upon the machine, a layer of carbon is deposited upon the commutator which interferes with the efficient operation of the machine.

According to the present invention, a conductor is provided in which is combined the conducting properties of a metallic brush and the lubricating qualities of a carbon brush. I have provided a process for constructing a brush consisting of metal and graphite, soapstone, or other lubricating material, which avoids the use of a coked adhesive. When an adhesive is employed, the body of the brush is usually not homogeneous and the resistance of the brush is increased.

In carrying out my invention, a quantity of finely divided metal, such as copper or a suitable alloy, which is a good conductor, is amalgamated in any suitable, well known manner. If copper be used, the plastic copper amalgam is thoroughly mixed, at ordinary temperatures, with finely divided graphite, or other suitable lubricating material of a refractory nature, to form a homogeneous mass in which the minute particles are incased by a film of amalgam. Such a quantity of graphite is chosen that the resultant mixture is slightly plastic. The relative amounts of amalgam and graphite may be varied within certain limits to control the resistance of the finished product. For example, if a low-resistance brush is desired, approximately five parts of graphite are added to one hundred parts of amalgam, while, for a high-resistance brush approximately twenty-five parts of graphite are added to one hundred parts of amalgam. It is to be understood that these proportions may be varied between and beyond the limits stated, in order to obtain a brush of any desired resistance. The homogeneous mixture above described is then placed in a suitable mold and a heavy pressure is applied. The compression of the mixture removes a large percentage of the mercury, the amount varying with the pressure. Substantially all of the remainder of the mercury is then expelled by heating the molded brush, while under pressure, to a degree sufficient to vaporize the mercury. The mercury vapor may be collected in any suitable manner, if desired, for further use.

The removal of mercury may be accomplished by distillation alone, but the product is left in a porous or spongy condition which reduces its conducting properties. In some cases, it may be desirable to produce a slightly porous structure and this may be accomplished by adjusting the amount of pressure employed and thereby controlling the proportion of mercury to be removed by distillation. It has been found that approximately 90% of the mercury may be removed by pressure of a convenient degree.

The resultant product is a hard, compact and homogeneous mass having a conductivity much higher than carbon and possessing the good qualities of a carbon conductor. When metal and graphite are combined in the manner above described, the mass is coherent to a very high degree, thus insuring a long life for the conductor.

The carbon particles of the brush are coated with very thin layers of copper which constitute a substantially continuous conductor, thus providing a material having a uniform degree of conductivity throughout its mass.

I claim as my invention:

1. The process which consists in combining mercury and metal to form an amalgam,

mixing lubricating material with said amalgam and then removing substantially all of the mercury from the mixture.

2. The process which consists in combining mercury with copper to form an amalgam, mixing finely divided lubricating material with said amalgam to form a homogeneous mass, and then expelling substantially all of the mercury from said mixture.

3. The process which consists in combining mercury with finely divided metal to form an amalgam, mixing finely divided carbon with said amalgam, and then removing substantially all of the mercury from the mixture by applying heat and pressure.

4. The process which consists in combining mercury and finely divided copper to form an amalgam, mixing finely divided carbon with said amalgam to form a homogeneous mixture, and then removing substantially all of the mercury from said mixture by applying pressure and heat.

5. The process which consists in combining mercury with metal to form an amalgam, mixing carbon with said amalgam at ordinary temperatures, and then removing substantially all of the mercury from the mixture.

6. The process which consists in surrounding particles of lubricating material with a film of copper amalgam and then removing substantially all of the mercury from said amalgam.

7. The process which consists in surrounding particles of carbon with a film of copper amalgam and then removing substantially all of the mercury from said amalgam.

8. The process which consists in surrounding particles of carbon with a film of copper amalgam and then removing substantially all of the mercury from said amalgam by applying heat and pressure.

In testimony whereof, I have hereunto subscribed my name this 22nd day of Sept. 1913.

SAMUEL TROOD.

Witnesses:
B. B. HINES,
M. C. MERZ.