Patented Oct. 12, 1937

2,095,800

UNITED STATES PATENT OFFICE

2,095,800

ELECTROGRAPHITIC BRUSH PROCESSING

Howard M. Elsey, Oakmont, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

No Drawing. Application January 30, 1937, Serial No. 123,253

6 Claims. (Cl. 171—325)

This invention relates to a process for treating electro-graphitic contact brushes.

In the electrical industry electro-graphitic brushes compounded under heat and pressure are often employed as contact brushes for use with commutators. It is found, however, that in service where the electro-graphitic contact brushes are employed in intimate contact with copper, such as in commutator service, a black copper sulphide film is formed on the copper surface.

An object of this invention is to provide for treating electro-graphitic contact brushes to remove impurities therefrom.

A more specific object of this invention is to provide a process for treating electro-graphitic contact brushes containing sulphur to reduce the sulphur content and produce a brush that will not tarnish or corrode contacting surfaces with which it is adapted to be employed.

Other objects of this invention will be apparent from the following description when taken in conjunction with the appended claims.

Electro-graphitic brushes are generally compounded by mixing different solid forms of carbon with a liquid binder and subjecting the mixture to heat and pressure. In compounding the brushes, different solid carbons such as lamp black, petroleum coke, pitch coke, natural or artificial graphite or the like may be employed in conjunction with a liquid binder such as coal tar pitch, tar or the like. An examination of the materials employed in the contact brush reveals that they contain sulphur as an impurity. Some of the materials contain only a minor portion of the impurity. This minor portion is, however, sufficient when taken in conjunction with the sulphur content of the other materials of the brush to react in the presence of moisture when the brush is in intimate contact with a copper surface to form an undesirable black sulphide film on the contacting copper surface.

Through experiments it is found that while compounding the brush from the solid form of carbon and the liquid binder, the baking and graphitizing of the elements converts the sulphur content of the brush to the sulphide state of oxidation.

In order to remove the sulphur impurities from the compounded electro-graphitic brush, the brush may be subjected to an acid wash suitable for reacting with the sulphur to form a gas. The acid wash may be any suitable strong inorganic acid such as hydrochloric acid, sulphuric acid or phosphoric acid for reacting with the sulphur to form hydrogen sulphide.

After the sulphur in the brush material is decomposed, the hydrogen sulphide formed and the residual acid in the brush may be removed therefrom by washing the acid treated brush in a hot aqueous medium such as by immersing the brush in boiling water, or by flushing the brush with steam.

In a particular embodiment of this invention, a brush compounded from lamp black and pitch may be refluxed with a 11% solution of hydrochloric acid for a period of time of about three hours. During this treatment, the acid hydrolyzes the sulphur compounds in the brush forming hydrogen sulphide. In order to remove the hydrogen sulphide and the excess acid from the brush, the brush is then boiled with water for five hours, the water being changed several times during the boiling of the brush.

A modification of the washing of the excess acid and the hydrogen sulphide impurities from the brush is to flush the acid treated electro-graphitic brush with steam at a temperature of about 200° C. for a period of time of about five hours.

After the impurities are removed from the compounded brush in the manner hereinbefore described, the brush may be placed in a closed container and subjected to a vacuum to remove any remaining moisture.

Since it is desirable to provide a binder for the brush to prevent the admission of moisture thereto during service, a suitable binder such as a suitable wax or resin, natural or synthetic, may be admitted to the closed container while the brush is under a vacuum and in a dry condition. When the binder is admitted to the closed container, the vacuum is removed and pressure is applied to aid in the impregnation of the brush. After exposure to the impregnating agent under pressure for a predetermined time suitable for accomplishing the impregnation of the brush, the impregnated brush may be removed from the closed container and baked in a temperature suitable for curing the impregnating material.

Upon analysis of the electro-graphitic brushes treated by this process, it is found that the sulphur is effectively removed or reduced to such small quantities, of the order of about .02%, or less, that the brushes may be employed in intimate contact with copper in a moist atmosphere without any tarnishing effect thereon. The slight traces of sulphur remaining in the brush

after it is subjected to the treatment of this process are found to be in a state of oxidation other than sulphide and to have no tarnishing effect on copper.

I claim as my invention:

1. A process of treating electro-graphitic contact brushes in which sulphur is usually present comprising, subjecting the brush to an acid wash to decompose the sulphides, and washing the brush in a hot aqueous medium to remove the decomposed sulphides and residual acid from the brush.

2. A process of treating electro-graphitic contact brushes in which sulphur is usually present, comprising, subjecting the brush to an inorganic acid wash to decompose the sulphides, and washing the brush in a hot aqueous medium to remove the decomposed sulphides and residual acid from the brush.

3. A process of treating electro-graphitic contact brushes in which sulphur is usually present comprising, subjecting the brush to an acid wash to decompose the sulphides, washing the brush in boiling water to remove the decomposed sulphides and residual acid from the brush, drying the washed brush, and impregnating it with a binder.

4. A process of treating electro-graphitic contact brushes in which sulphur is usually present, comprising, subjecting the brush to an inorganic acid wash to decompose the sulphides, the inorganic acid being selected from the group consisting of hydrochloric acid, sulphuric acid and phosphoric acid, washing the brush in boiling water to remove the decomposed sulphides and residual acid, drying the washed brush, and impregnating it with a binder.

5. A process of treating an electro-graphitic contact brush in which sulphur is usually present, comprising, refluxing the brush with hydrochloric acid for a period of time sufficient to hydrolyze the sulphur in the brush and form hydrogen sulphide, and washing the brush in boiling water or steam to remove the hydrogen sulphide and residual acid from the brush.

6. A process of treating an electro-graphitic contact brush in which sulphur is usually present, comprising, refluxing the brush with a 11% solution of hydrochloric acid for a period of time sufficient to hydrolyze the sulphur in the brush and form hydrogen sulphide, washing the brush in boiling water or steam to remove the hydrogen sulphide and residual acid, drying the washed brush, and impregnating it with a binder.

HOWARD M. ELSEY.