UNITED STATES PATENT OFFICE.

ARTHUR T. HINCKLEY, OF NIAGARA FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NATIONAL CARBON COMPANY, INC., A CORPORATION OF NEW YORK.

BAKED CARBON ARTICLE.

1,307,738. Specification of Letters Patent. Patented June 24, 1919.

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To all whom it may concern:

Be it known that I, ARTHUR T. HINCKLEY, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented a certain new and useful Improvement in Baked Carbon Articles, of which the following is a full, clear, and exact description.

This invention relates to carbon articles and a process of making the same.

Carbon articles such as electrodes, brushes, electrolytic anodes, etc., consist of granules or particles of carbon held together by a binder of coke produced from the pitch or tar constituent of the mix when the article is baked.

When carbon articles are baked the pitch or tar is decomposed by the heat, part passing off as volatile hydrocarbons and part remaining behind as coke. Since the article is made from granular material it is impossible to produce an absolutely dense product, the particles being more or less spaced from each other by irregular interstitial spaces. Also the coking of the pitch or tar binder in the process of baking, produces voids or spaces due to the volatilization of a portion of the binder.

For certain uses it is desirable to produce carbon articles as dense as possible, for instance in electrolytic anodes the porosity should be reduced to a minimum because the electrolyte and oxidizing agents disintegrate the anode if they are permitted to permeate it. Also, the less free carbon there is in the binder, the more destructive is the action.

The aim of my invention is therefore to decrease the interstitial spaces in the article and to increase the amount of free carbon in the binder employed.

I accomplish this result by adding excessively fine or colloidal carbon to the tar or pitch binder when it is in a liquid condition through the application of heat or otherwise.

The excessively fine or colloidal carbon could be prepared by other processes, but by way of example I have prepared it by adding fine powdered sugar gradually, to concentrated sulfuric acid, the acid being stirred constantly while the sugar is being added. The mixture is allowed to stand quietly at room temperature for about twenty-four hours and then poured into 80 cc. of water. This resulting solution is then filtered and dialyzed through parchment until no trace of sulfuric acid is left, leaving a clear, black solution of colloidal carbon in water.

The colloidal solution is then mixed with tar and the water evaporated out by heating. In this way the residue insoluble in benzol, or the free carbon, can be materially increased without appreciably affecting the viscosity of the binder or its binding power.

When an electrode is made with a binder treated in this way, the increased surface resulting from the added colloidal material produces increased decomposition of the volatile hydrocarbons, which results not only in a saving of carbon, but augments the apparent density of the baked article, increases its strength and lengthens the life of the article in service.

It of course is not essential that the excessively fine or colloidal carbon be suspended in water solution. Other mediums can be used without departing from the spirit of the invention. It would not be practical to add the water suspension directly to molten hard pitch, as the boiling point of water is too low to permit a good mixture being obtained. However, the water can first be added to tar and after the colloidal particles are thoroughly disseminated therein, the tar can be added to molten hard pitch.

While I have described the invention in regard to articles formed from carbon, it must not be understood that I refer exclusively to amorphous carbon. The invention is applicable to articles produced from carbon generally, such as amorphous carbon, graphite, etc.

Having described my invention, what I claim is:

1. The process of making a carbon article which consists in forming a colloidal sus-

pension of carbon, adding it to a carbonaceous binder, mixing said binder containing the colloidal suspension of carbon with powdered or granulated carbon and baking to decompose and set the binder.

2. The process of forming a carbon article which consists in suspending colloidal carbon in water, adding the water suspension to a liquid carbonaceous binder, heating to drive off the water, mixing said binder containing the colloidal suspension of carbon with powdered or granular carbon and baking to decompose and set the binder.

In testimony whereof, I hereunto affix my signature.

ARTHUR T. HINCKLEY.