

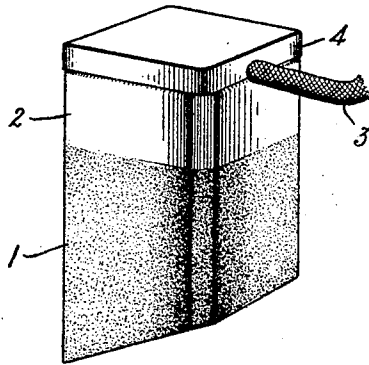


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TREATED CARBON AND THE METHOD OF PRODUCING IT.  
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# UNITED STATES PATENT OFFICE.

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TREATED CARBON AND THE METHOD OF PRODUCING IT.

949,988.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed December 2, 1904. Serial No. 235,160.

To all whom it may concern:

Be it known that I, PETER J. MULVEY, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Treated Carbon and the Methods of Producing It, of which the following is a specification.

My present invention consists in a treated carbon which is especially adapted for use as a material out of which to make brushes for dynamo electric machines, journal bearings, packing rings, and the like, and the method of producing it.

In carrying out my invention I first immerse in a liquid bath a carbon molded either into the form of the completed article to be produced, such as a brush for a dynamo electric machine, a shaft-bearing part, etc., or into a block from which the desired article can be made. The carbon which I use may be in the ordinary form of untreated carbon used for the purpose. The liquid bath which I prefer to employ is formed of melted petroleum jelly. Instead of petroleum jelly I may use ordinary paraffin in the melted state, or similar oily substances, or indeed I may use many other substances which may be either liquids or solids at ordinary temperatures. It is essential, however, that the substances which I employ in the liquid bath should possess lubricating qualities and should not possess the properties common to drying oils of hardening in the air by oxidation or the like. The bath is maintained at a temperature equal to or above the melting point of the lubricating material. With petroleum jelly and similar substances I prefer to heat the bath to a temperature about equal to that of boiling water. The carbon is immersed in the bath for a period sufficient to insure that all of the air normally found in the pores of the carbon brush is replaced with liquid. Blocks of carbon of the size usually employed as brushes for dynamo electric machines I ordinarily keep in the bath for a period of several hours. The desired temperature of the bath may be easily obtained by placing a suitable vat or pan containing it in an oven, or by the use of a steam coil in the bath. After the carbon is thoroughly impregnated in the manner described I ordinarily allow it to drain and dry in the air for a period

of several hours, though this is not essential in all cases. After the carbon is dried in air at ordinary temperatures, or without such drying, it is placed in an oven in an atmosphere of dry air and baked at a temperature which is preferably at least as high as the maximum temperature to which the carbon will be heated in operation. When the carbon is thus heated a portion of the petroleum jelly or other lubricating substance absorbed by the carbon while in the bath is driven or "fried" out. The baking operation is continued until no more lubricating material is given off at the temperature employed. I have obtained excellent results with carbon brushes for dynamo electric machines by baking them for about twelve hours at a temperature varying from 120 to 200 degrees C. depending on the character of service performed by the brushes. Carbon packing rings, such as are employed in steam turbines, I have advantageously baked for a number of hours at a temperature of 260 or 270 degrees C.

My present understanding is that the baking treatment at the temperatures mentioned above does not produce chemical changes in the carbon or lubricating material contained therein, but simply removes from the carbon a portion of the lubricating material leaving an amount which will not be expelled at temperatures to which the carbon block is subjected in operation. It will thus be seen that the pores of carbon blocks treated in accordance with my invention are impregnated with lubricating material below the point of saturation of the block at the temperature at which it is operated. By "impregnating the pores of a carbon block with lubricating material below the point of saturation of the block at the temperature at which it is operated", I mean impregnating the pores of a carbon block with such an amount of lubricating material that it will not be expelled from the block at temperatures at which it is operated. The contact surface of the carbon thus treated takes a high polish after being in engagement for a short time with the commutator, shaft, or the like.

The advantages possessed by brushes for dynamo electric machines made of carbon treated in the manner described above have been found highly important. The treated

brushes run smoothly and without chattering or crumbling and with the same service conditions the heating at the commutator with these brushes has been found to be  
 5 much less than with the ordinary carbon brushes heretofore employed. The life of carbon brushes is greatly increased by the described treatment.

Carbon treated in accordance with my invention has been found to be an excellent material out of which to make packing rings for steam turbines. These packing rings, which are subjected to the temperature of live steam, frequently superheated,  
 15 I have advantageously baked at a temperature of about 260 or 270 degrees C. The packing rings thus treated are found to be much more durable than are rings formed of untreated carbon. With packing rings  
 20 formed of carbon treated in accordance with my invention there appears to be less carbonization of the shafts with which they contact than is the case when ordinary carbon is employed as the material out of  
 25 which to make packing rings. The dense polished surface formed on the treated carbon rings by contact with the shafts which they surround insures an excellent joint between the ring and shaft.

I am aware that heretofore carbons have been immersed in baths of lubricating material, as stated above, for the purpose of impregnating them with a material which will lubricate the surface engaged by the  
 30 carbon. In the only methods of treatment of carbons with such substances heretofore employed, so far as I am aware, the carbons have contained an excess of lubricating material which oozes out of the carbons in  
 35 operation, particularly as they become heated, and is otherwise detrimental. The oozing out of the lubricating material from the pores of the carbon brushes of dynamo electric machines is particularly objectionable  
 40 as it gums up the commutator and interferes with the proper operation of the brush holders employed, especially when the brush holders are of the type in which spring-pressed brushes slide in guides or  
 45 boxes. When carbon is treated after being impregnated with lubricating material as I have described above, none of these difficulties is experienced, as the heating to which the carbons are subjected in operation will  
 50 not cause any more lubricating material to ooze out of the pores of the carbon. I am also aware that it has been proposed to bake the carbons which have been impregnated with air-hardening oils such as linseed oil or  
 55 the like. The lubricating qualities, if any, possessed by carbon thus treated are markedly inferior to those possessed by carbon treated in accordance with my invention.

In the accompanying drawing I have  
 65 shown in perspective a carbon brush for

dynamo electric machines, such as I have treated with success in the manner hereinbefore described.

In the drawing, 1 represents a block of carbon, the upper end of which may be coated with metal as indicated at 2. A flexible pig-tail conductor 3 is shown as secured  
 70 between the upper end of the brush and a metal plate 4, which may be soldered or otherwise secured to the carbon block 1. Ordinarily I coat the brush with metal and attach the flexible conductor before treating the brush with lubricating material.

While I have hereinbefore described the best manner in which my invention may be carried out now known to me, it will be obvious to those skilled in the art that changes in the manner described may be made without departing from the spirit of my invention.

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

1. A carbon block, the pores of which are impregnated with lubricating material below the point of saturation of the block at the temperature at which it is operated.

2. A carbon block, the pores of which are impregnated with petroleum jelly below the point of saturation of the block at the temperature at which it is operated.

3. The method which consists in saturating the pores of a carbon block with a lubricating material and then expelling a portion of the lubricating material from said block.

4. The method which consists in filling the pores of a carbon brush with a lubricating material and then expelling from said brush a portion of said lubricating material leaving only an amount which will not be expelled from the brush at temperatures at which it is operated.

5. The method which consists in immersing molded carbon blocks in a bath of melted petroleum jelly maintained at a temperature of boiling water for several hours, then drying the blocks of carbon at normal temperature, and then further maintaining the blocks of carbon at a temperature considerably in excess of that of boiling water until the carbon gives off no more jelly.

6. The method which consists in immersing carbon in a liquid bath of a non-air-hardening oil substance to thoroughly impregnate the carbon with said substance, and then heating the carbon in air at a temperature at or between 120° and 200° C. until no more of the substance is caused to flow out of said carbon by said baking treatment.

7. The method which consists in impregnating the pores of a carbon block with melted petroleum jelly and then heating the block to a temperature at or between 120° and 200° C. until no more of the petroleum jelly is driven out of the carbon by such heat.

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8. The method which consists in impregnating a carbon block with lubricating material, and then heating the block to drive off a portion of said lubricating material.

5 9. The method which consists in saturating a carbon block with melted petroleum jelly and then heating the brush at a temperature high enough to drive off a portion but not all of said jelly.

10 10. The method of treating carbon designed for frictional engagement with a relatively movable body, which consists in saturating the pores of the carbon with a lubricating material which does not harden

in air by oxidation, and then baking the 15 carbon at a temperature at least as high as the maximum temperature to which the carbon will be subjected in engagement with said relatively movable member until no more lubricating material is "fried" out of 20 the carbon at the temperature to which it is heated.

In witness whereof, I have hereunto set my hand this 30th day of November, 1904.

PETER J. MULVEY.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.