E. B. JEWETT.

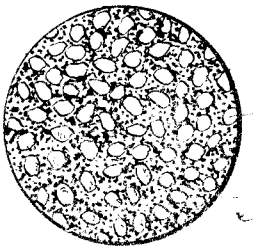
ELECTRODE FOR USE IN ELECTROTHERMAL PROCESSES.

APPLICATION FILED FEB. 14, 1912.

1,067,031.

Patented July 8, 1913.

Fig. 1.



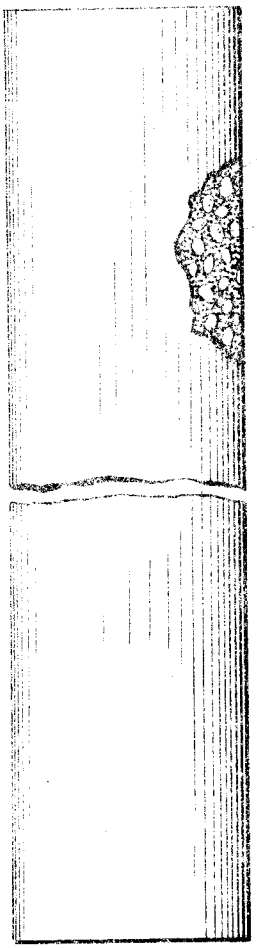


Fig. 2.

Witnesses

H. B. Sullivan

Inventor

Elmer B. Jewett

by Thurston & Lewis

Attorneys

UNITED STATES PATENT OFFICE.

ELMER B. JEWETT, OF CLARKSBURG, WEST VIRGINIA, ASSIGNOR TO NATIONAL CARBON COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF NEW JERSEY.

ELECTRODE FOR USE IN ELECTROTHERMAL PROCESSES.

1,067,031. Specification of Letters Patent. Patented July 8, 1913.

Application filed February 14, 1912. Serial No. 677,537.

To all whom it may concern:

Be it known that I, ELMER B. JEWETT, a citizen of the United States, residing at Clarksburg, in the county of Harrison and State of West Virginia, have invented a certain new and useful Improvement in Electrodes for Use in Electrothermal Processes, of which the following is a full, clear, and exact description.

The object of this invention is to construct carbon electrodes for use in electric furnaces so as to prevent, or at least very greatly minimize, the breaking and cracking which has heretofore attended such uses of ordinary carbon electrodes.

In electrothermal processes it is frequently necessary to place a cold electrode in a hot furnace, or to withdraw a hot electrode. Either of these operations causes disruptive stresses in the electrode owing to the more rapid expansion or contraction of the surface than of the center. This stress is a function of the furnace temperature, the heat conductivity of the material, the coefficient of expansion of the material, and the diameter of the electrode. It varies directly as the furnace temperature and the diameter of the electrode, and as the coefficient of expansion of the material. With small electrodes or larger ones of high heat conductivity, breakage due to such stresses is inappreciable, but with large electrodes of fine grain and low heat conductivity the stress is often sufficient to cause cracks which deepen with alternate heating and cooling of the electrode until breakage occurs.

This invention is an electrode which differs from the ordinary carbon electrodes previously used in that it has, distributed through it as evenly as possible, lumps or relatively large particles of carbon or carbonaceous material, such, for example, as electrode scrap, anthracite coal or coke, said included lumps or particles being of such size and strength as are necessary to prevent the formation or spreading of cracks, such as are commonly caused by the before mentioned stresses. It is impossible to state with exactness the relative size or volume of such included lumps. But these facts must be taken into account. If they are too large in diameter, or if their volume be relatively too large, the electrode will lose in strength. If they are too small or too few, the purpose for which they are employed will not be fully subserved. Also, the larger the electrodes are in diameter, the larger these included lumps should be. Also, the higher the heat of the furnace in which they are to be used, the larger should be the included lumps. A series of experiments have been conducted with a view to determining as nearly as possible what should be the diameter and what should be the relative volume of these included lumps to get the best results, all things considered. As a result of those experiments, it is my present belief that about 25 per cent. of the electrode should be made of these included lumps or particles, the remainder being composed, as is common, of carbon flour and a suitable binder, such as pitch. I believe also that the diameters of the lumps to be employed with electrodes of different diameters should be such as is represented by the abscissæ of a parabola whose ordinates are the diameters of the electrodes, and whose focus is 266 inches from its directrix. This formula is the result of plotting the results obtained in the experiments referred to which were conducted with a furnace whose temperature was substantially 1500° centigrade. It is not, however, my intention to limit the size of the included particles or lumps to the sizes which this formula will indicate. I simply state the formula as the best which I now know for determining the smallest diameters of lumps which, when used in electrodes of various diameters, will in a practical and efficient degree prevent the cracking and breaking of the electrodes by the stresses specified. Obviously, however, these included lumps may be larger in diameter up to any size which will not unduly weaken the electrodes. If they are smaller, they will, although in a less degree, prevent breaking and cracking. Also, if the electrodes are to be used in electric furnaces wherein the temperature is to be higher than 1500° centigrade, the size of these included lumps should be increased. If they are to be used in furnaces having a temperature materially less than 1500° centigrade, the size of these included particles may be decreased.

In the drawing, Figure 1 is a transverse sectional view of an electrode embodying the invention. Fig. 2 is a side elevation thereof partly broken away.

Referring to the parts by letters, A rep-

resents a mixture of carbon flour agglomerated by carbonaceous coke, and B represents the particles of carbonaceous material which are distributed throughout the electrode.

Having thus described my invention, I claim:

An electrode for use in electrothermal processes consisting of carbon flour agglomerated by a carbonaceous coke, and having distributed throughout its mass relatively large particles of carbonaceous material substantially as and for the purpose specified.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

ELMER B. JEWETT.

Witnesses:
CHARLES LONG,
JOHN C. LONG.