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PROCESS OF MANUFACTURING CARBON ELECTRODES FOR ELECTRIC FURNACES

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The invention relates to a process of manufacturing carbon electrodes for electric furnaces.

Furnace electrodes are manufactured by working carbon obtained by coking mineral coal or other suitable substances with a liquid binding agent, such as tar, into a plastic mass, pressing it in moulds, and then heating it to a temperature of 1000 to 1500°. Small quantities of non-coked pit coal have also been added to this plastic mass. It was, however, known that such additions adversely affect the quality of the carbon, particularly if they exceed a certain amount, and it was therefore the rule to avoid these additions to the plastic mass either entirely or to limit them to a few per cent.

According to the invention mineral coal just capable of caking or baking is filled into a container or receptable and in the crushed (pulverized, granulated) state baked or roasted in this container.

It is a surprising discovery that it is possible to produce useful electrodes from such crushed (granular, pulverized) mineral coal just capable of caking without further additions, by simply introducing this coal into a container or receptacle and heating it until the coking is finished. Under mineral coal just capable of caking or baking is to be understood a coal which is not at all coked (not brought to red heat) or imperfectly coked, that is a mineral coal which in any case still contains a larger quantity of hydrocarbons than perfectly or completely coked coal.

An advantage of the improved process is that it is no longer necessary to produce electrode masses at all and that thus the difficulties arising in the preparation of such masses are eliminated altogether.

Preferably a coal will be chosen which has only a low mineral content. Coal with a high mineral content may easily be freed from the main portion of the admixed minerals by any of the processes known in the art. A well caking coal will furthermore be chosen. The quality of the finished electrode depends to a high degree upon the condition of the coal. It is, however, possible to modify the new process within wide limits to obtain good results with any kind of pit coal. It may thus happen that a coal develops large quantities of gas on being heated and that finally a porous and brittle product is obtained. This may be counteracted by subjecting the coal to be heated during the coking process, more particularly while in the plastic state, to pressure. This pressure may be exerted in various ways. The heating may take place in a press mould in which, while the coal is still in the plastic state, a pressure is exerted upon the heated mass. The necessary pressure may also be applied by placing a weight upon the coal contained in the receptacle. Under certain circumstances the pressure of the column of coal will be sufficient. It might then happen that the coal differs in density, because the upper layers are not under the same pressure as the lower ones. Sometimes, a very low pressure of 0,05 kg. per sq. cm. suffices. It is necessary to determine the pressure in each individual case according to the quality of the coal employed, the height of the column of the pulverized coal and the demands made upon the final product. Pressures of many pounds per sq. inch may, however, be employed.

The quality of the pulverized or powdered coal may also be influenced by admixing with it a pulverized or granular mass of a substance which softens on heating and then serves as binding agent, such as asphalt, resin, pitch, bitumen and so on. The pulverized or powdered coal may also be moistened with a small quantity of tar or any other suitable liquid. Part of the special advantages of the process is, however, lost thereby. As a rule care will therefore be taken not to interfere too much with its pouring capacity by moistening the powder. Small quantities of baked coal in fine distribution or larger pieces of such baked or unbaked coal may be added. The coarse pieces mix intimately with the pulverized (granular) coal forming the basic mass. Other additions, such as pieces of metal, usual in carbon electrodes, may be made to the powdered coal for the same ob-

ject as in the electrodes constructed in the usual way.

To obtain as high and as uniform a density in the piled up granular or pulverized mass of coal, it is advisable to vibrate the container during or after the pouring in of the material by rapping, shaking or the like. Comparatively light vibrations suffice to bring about a uniform and intimate intermingling of the particles.

The process is particularly suitable for the manufacture of so-called self-baking electrodes which are produced and fed into the furnace in a continuous operation.

I claim as my invention:

1. A process for the manufacture of carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal into a container and baking it in said container.

2. A process for the manufacture of carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal into a container and baking it in said container, and subjecting the mass in said container to a pressure while still in the plastic state.

3. A process for the manufacture of carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal into a container and baking it in said container, and subjecting the mass in said container to a pressure while still in the plastic state by applying a weight to the column of coal in said container.

4. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal admixed with dry coarser pieces of carbonaceous material, into a container, and in baking the mixture in said container.

5. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal admixed with dry coarser pieces of pit coal, into a container, and in baking the mixture in said container.

6. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal admixed with dry coarser pieces of burnt coal, into a container, and in baking the mixture in said container.

7. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal admixed with dry graphitic carbon, into a container, and in baking the mixture in said container.

8. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal into a container, vibrating said container to uniformly densify the dry coal, and baking it in said container.

9. A process of manufacturing carbon electrodes for electric thermal processes, consisting in filling unglowed, crushed, dry mineral coal into a container, vibrating said container to uniformly densify the dry coal, putting the dry densified mass under pressure, and baking it in said container into a perfectly coked condition.

In testimony whereof I affix my signature.

OTTO DIETSCHE.