

UNITED STATES PATENT OFFICE

2,339,742

GRANULATED ACTIVE CARBON FROM
BITUMINOUS COAL

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No Drawing. Application January 24, 1942;
Serial No. 428,088

1 Claim. (Cl. 252-289)

This invention relates to a new and improved method of producing active carbon from bituminous coal.

One of the objects of my invention is to oxidize powdered bituminous coal without appreciable loss in weight but with complete destruction of coking properties.

Another object of my invention is to compress oxidized coal into bodies of small size, and any desired shape.

Another object of my invention is to activate compressed bodies of oxidized coal, thus producing a high-grade active carbon in granules of uniform activity.

Other objects of my invention are set forth in the following description, it being understood that the above statement of the objects of my invention is intended to generally explain the same without limiting the same in any manner.

Likewise, I do not wish to be limited to the specific examples which are later given herein as illustrating the best embodiments of the invention, since numerous changes in procedure and in ingredients may be made, without departing from the spirit of the invention.

Up to the present time, active carbon prepared from bituminous coal was inferior to products obtained from other carbonaceous materials. However, high-grade active carbon may be produced from bituminous coal in good yield and uniform quality by due consideration of the following:

(a) Three steps of manufacture—oxidation, shaping, and activation—must be coordinated.

(b) Optimum conditions must be established experimentally for each bituminous coal.

Oxidation as a step in the manufacture of active carbon from bituminous coal has been considered by N. K. Chaney in U. S. Patent 1,499,908. He states that active carbon is only obtainable by the activation of a so-called "primary carbon," which is defined as "an active carbon base containing adsorbed hydrocarbons." Anthracite is regarded as native primary carbon. "Bituminous coals may be similarly regarded although the hydrocarbons are usually present in such coals in great excess of the adsorptive capacity of the active carbon base, and such excess may be readily removed by distillation under proper conditions."

The Chaney process calls for a primary carbon as starting material. In case of bituminous coal, the primary carbon is prepared by distillation of the coal at temperatures "not materially exceeding 500°-600° C., with proper precautions to eliminate all of the bituminous matter of hydrocarbons which can be volatilized at this temperature. If desired oxidizing conditions may

be maintained during the distillation, in order to minimize the proportion of adsorbed hydrocarbons in the residual active carbon base."

The oxidation step adopted in the present invention differs from the Chaney process in that it calls for a treatment of comminuted bituminous coal with air, preferably moist air at a temperature between 200 and 350° C. At this temperature no distillation of hydrocarbons and consequently no loss of carbon occur. This type of oxidation aims at complete destruction of coking properties by transformation of hydrocarbons into oxygen compounds such as acids, ketones, or the like. Apart from other advantages, the yield of active carbon is thus greatly increased.

The importance of activating a material of uniform particle size and density has been shown by various inventors (e. g., U. S. Patent 1,753,507). In case of bituminous coal, oxidized coal compressed into bodies of small size provides the desired uniform material for the final activation.

The application of the principles of this invention is illustrated by the following examples:

Example 1.—A Central Pennsylvania bituminous coal with 22.0% volatile matter was ground to pass a 10 mesh screen. The comminuted coal was sent through a rotary furnace kept at 250° C. at such a rate that the time of treatment did not exceed one hour. Oxidation was effected by sending a current of air saturated with water vapor at ordinary temperature through the furnace. The oxidized coal was mixed with 10 per cent water and compressed by means of a pellet press to pellets of $\frac{1}{8}$ inch thickness and $\frac{1}{8}$ inch diameter. The pellets were activated with steam between 800 and 900° C. The product is a high-grade granulated active carbon. If desired it may be reduced in size and used in a finely divided or powdered condition.

Example 2.—A Central Pennsylvania bituminous coal with 29.5% volatile matter was treated according to U. S. Patent 2,242,822. The ashfree oxidized product was compressed to pellets and activated as above. A high-grade ash-free granulated active carbon was obtained.

I claim:

A method of producing granulated active carbon from bituminous coal which consists in oxidizing comminuted bituminous coal at a temperature below 350° C. without substantial loss of carbon until complete destruction of coking properties is accomplished; mixing the oxidized product with approximately 10 per cent water; compressing the moist oxidized product into bodies of small size and any desired shape; and activating the compressed bodies.

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