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PROCESS OF PRODUCING CARBONIZED PARTICLES FROM COKING COAL

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The invention relates to a process for producing finely carbonized fuel particles from coal of a coking nature.

Coals are now generally divided into two broad classes known as coking and non-coking coals. In this sense coking coals mean all classes of coals that coke or cake, or swell or agglomerate in any way, and not just those coals known as coking coals that are suitable to make blast furnace coke. With the coking coals whenever sufficient heat is applied the residue fuses forming coke masses. Because of the structure non-coking coals will not ordinarily coke when heated to a fluxing temperature. I have found that it is highly desirable to produce a fuel consisting of carbonized particles in a fine state of subdivision.

It is an object of this invention to produce such a fuel from pulverized coking coals which has heretofore been regarded as impractical because of the tendency of these coal particles to fuse when heated to a coking temperature.

The invention is based on the discovery that where coking coals in a finely divided state are mixed with finely divided oxide ores which may be in the form of flue dust, when the mass is heated the coal particles will draw oxygen from the oxide ores thereby preventing such particles from fusing or forming coke like masses. When so treated the coal particles remain in substantially their original subdivided form, providing carbonized fuel particles that produce a most efficient fuel.

The treated materials may then be subjected to well known processes of separation so that the fine carbonized particles may be used for the desired purposes.

In carrying out my process I mix finely pulverized coal particles made from a coking coal such as obtained from the Pittsburgh field, with finely crushed or otherwise finely divided oxide ores, such, for example, as an iron oxide ore of the Mesabi Range type. I preferably have the coal and ores in a state of subdivison ranging from 100 to 200 meshes per linear inch. In carrying out the process I use coal and ore in the proportions of approximately three parts coal by weight to two parts ore by weight. These proportions are, of course, only given for the purpose of illustration and may widely vary, depending upon the products desired and the materials being treated.

After thoroughly intermixing these materials I subject them to a heat treatment at a temperature ranging from 400° to 650° C. This carbonizing may take place in any well known form of carbonizing retort. I have found that during the heat treatment where temperatures are used sufficient to carbonize the coal that oxygen is extracted from the oxide ore, which may be an iron ore or any other oxide ore which will give up oxygen when mixed with carbon and heated within the carbonizing temperature range for the coal used, and that this oxygen even though coking temperatures are employed prevents the coal particles from substantially fusing and forming a coherent coke like mass. In other words, while the temperature is sufficient to coke the coal, this coking is prevented by reason of the oxygen contained in the oxide ore so that the fuel remains in the form of finely carbonized particles. The temperature should, however, not exceed that point that will cause the oxide ore or metallic constituents reduced therefrom, to fuse or agglomerate. If the temperatures as above specified are used, such an agglomerate will not occur when an iron oxide ore is used, and in fact the entire treated mass will remain in the form of finely divided particles. After treating the mass it is subjected to any well known form of separation by means of which the partially treated ore and the carbonized particles are separated from one another. When so separated the carbonized particles

may be used as a fuel, while the reduction of the partially treated ore may be completed by further treatment either with the carbonized fuel dust or other suitable reducing agent.

From the foregoing it will be apparent that by mixing the coal with the oxide ore a normally coking coal can be subjected to a coking temperature, yet fusion of the particles will not occur. This permits the production of a fuel in the form of finely pulverized particles which is highly desirable.

Having thus described my invention, what I claim is:

1. A method of producing carbonized particles from a coking coal, which comprises mixing a coking coal in a fine state of subdivision with a sufficient proportion of a finely divided iron oxide ore to prevent fusion of the coal, carbonizing such mixture by heating to a temperature sufficient to carbonize the coal particles without causing fusion thereof and thereafter separating the carbonized particles from the ore particles.

2. A method of producing finely divided carbonized particles from coal, which comprises mixing pulverized coal with a sufficient proportion of a finely divided oxide ore to prevent fusion of the coal, carbonizing such mixture by heating to a temperature sufficient to convert the coal into finely divided carbonized particles and thereafter separating the carbonized particles from the ore particles.

3. The method of producing carbonized coal particles which comprises mixing with pulverized coal finely divided oxide ore capable of preventing and in amount sufficient to prevent fusion of the pulverized coal when heated to a carbonizing temperature, and subjecting the coal in admixture with the oxide ore to carbonization.

4. The method of producing carbonized coal particles which comprises mixing with pulverized coal finely divided iron oxide ore in amount sufficient to prevent fusion of the pulverized coal when heated to a carbonizing temperature, and subjecting the coal in admixture with the oxide ore to carbonization.

5. The method of producing carbonized particles of coking coal which comprises mixing with particles of coking coal finely divided oxide ore capable of destroying and in amount sufficient to destroy the coking properties of the coal when heated to a carbonizing temperature, and carbonizing the coal in admixture with the oxide ore.

6. The method of producing carbonized particles of coking coal which comprises mixing with particles of coking coal finely divided iron oxide ore in amount sufficient to destroy the coking properties of the coal when heated to a carbonizing temperature, and carbonizing the coal in admixture with the oxide ore at a temperature of from 400° C. to 650° C.

7. The method of producing carbonized particles of coking coal which comprises carbonizing pulverized coking coal in admixture with finely divided oxide ore capable of preventing and in amount sufficient to prevent fusion of the coal during carbonization.

8. The method of producing carbonized particles of coking coal which comprises carbonizing pulverized coking coal in admixture with finely divided iron oxide ore in amount sufficient to prevent fusion of the coal during carbonization.

In testimony whereof I affix my signature.

WALTER EDWIN TRENT.