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PROCESS OF FORMING A FUEL

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This invention relates to fuel, and with regard to certain more specific features, to fuel of a briquette or carbonized nature.

Among the several objects of the invention may be noted the provision of a fuel having low ash-content distillable bituminous or carbonaceous material, for example, lignite, as a base; a fuel of hard, strong, weather-proof characteristics; a fuel of the class described which burns substantially without producing smoke; and a fuel of the class described which is easily and economically manufactured. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combination of elements, steps and sequence of steps and features of synthesis which will be exemplified in the description hereinafter and the scope of the application of which will be indicated in the following claims.

It has been found that fuels such as bituminous coals and the like when ground to a fineness of 150 and 200 mesh have their ash-forming constituents mechanically detached in the form of a fine powder. Subsequent treatment with certain plasticizing agents forms these pulverized ash-forming constituents into a binder for the remainder of the pulverized mass, so that it can be effectively molded and then carbonized or distilled to constitute a fuel of finest qualities.

Certain types of carbonaceous materials, such as lignite, cannel coal, Virginia bituminous coal, and the like, occur naturally with a content of ash-forming constituents too low or of improper composition to form an effective binder material. This invention relates primarily to such carbonaceous materials.

In order to make up the deficiency of said ash-forming constituents, I add inorganic or earthy materials, such as clay, bentonite, or the like, having a high hydrated aluminum silicate content, to the comminuted carbonaceous material in sufficient quantities to bring the total plasticizable ash-forming constituents up to the order of eight to thirty per cent of the total weight. The mixture is then suitably homogenized by grinding, and a plasticizing agent, such as water, acid or alkaline or chloride solutions or the like, is added to combine with the clay to form a binder material. This binder material is cementitious in nature, and apparently forms a jacket or shell about each carbon particle, thereby holding the particles separate and yet binding them in a coherent, plastic mass.

Water alone suffices to plasticize most clays, or ash-forming constituents, and especially those having a high hydrated aluminum silicate content. Acids, particularly hydrochloric acid, and chlorides are desirable when the alkaline earth metal content is high; alkaline solutions are similarly desirable if the silica content be high. It is to be understood, however, that the plasticizing agents are entirely interchangeable with beneficial results.

After the mass of clay and carbonaceous material is plastic or moldable, it is formed into briquettes or like shaped objects, or left in naturally-formed lumps, according to the desired shape of the finished product. These lumps or shapes or briquettes are then preferably dried until excess mechanically held water is removed, and then subjected to a low or high-temperature carbonization or distillation. The evolved hydrocarbon vapors are collected and condensed. The briquettes, after reaching a maximum temperature of the order of 750° C., are removed and cooled. The resulting product is a hard, black, homogeneous smokeless coke, in which is found a structural or skeletal binder of partially or entirely vitrified clay and ash-forming constituents.

The following example will suffice to illustrate broadly the principles of my invention:

Lignite, containing 5% plasticizable ash-forming constituents, is ground to a fineness of 150 to 200 mesh, thereby mechanically detaching said ash-forming constituents. Clay, preferably ground to a similar fineness, is added in sufficient amount to bring the total plasticizable ash-forming constituents to 25% of the total weight. Water is next added, and the mixture ground in a pug mill or wet pan, until the entire mass becomes plastic or doughy or moldable. The plastic

mass is then molded into briquettes, which are dried for 48 hours in a humidity dryer, and then subjected to destructive distillation at a temperature gradually increasing to 600° C. Valuable hydrocarbon vapors and the like are evolved and condensed. The product is a homogeneous, black, firm, abrasion-proof coke, which is readily ignitable because of its porosity, and which burns with a substantially smokeless flame.

In view of the foregoing, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above objects without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The process of forming a fuel from carbonaceous materials having a naturally low content of plasticizable ash-forming constituents, which comprises comminuting said carbonaceous material, mixing therewith a plasticizable earthy material such as clay, bentonite, or the like, particularly those having a high hydrated aluminum silicate content, homogenizing and plasticizing the mixture with water, and subjecting the plastic mixture to carbonization.

2. The process of forming a fuel from carbonaceous materials having a naturally low content of plasticizable ash-forming constituents, which comprises comminuting said carbonaceous material, mixing therewith a plasticizable earthy material such as clay, bentonite, or the like, particularly those having a high alkaline earth metal content, homogenizing and plasticizing the mixture with a chloride, and subjecting the plastic mixture to carbonization.

3. The process of forming a fuel from carbonaceous materials having a naturally low content of plasticizable ash-forming constituents, which comprises comminuting said carbonaceous material, mixing therewith a plasticizable earthy material such as clay, bentonite, or the like, particularly those having a high alkaline earth metal content, homogenizing and plasticizing the mixture with an acid, and subjecting the plastic mixture to carbonization.

4. The process of forming a fuel from carbonaceous materials having a naturally low content of plasticizable ash-forming constituents, which comprises comminuting said carbonaceous material to an extent sufficient to mechanically detach said ash-forming constituents, mixing therewith comminuted plasticizable earthy material sufficient to bring the total content of plasticizable material to the order of eight to thirty per cent by weight of the total mass, plasticizing said combined ash-forming constituents and earthy material to form a binder for said carbonaceous material, thereby to plasticize said carbonaceous material, forming the plastic mass into briquettes, and subjecting said briquettes to a destructive distillation.

In testimony whereof, I have signed my name to this specification this 13th day of June, 1930.

FREDERICK E. KERN.