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WALTER EDWIN TRENT, OF NEW YORK, N. Y., ASSIGNOR TO TRENT PROCESS CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

PROCESS FOR PRODUCING A FUEL FROM PULVERIZED COAL.

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The invention relates to improvements in a process for producing a fuel from pulverized coal having the characteristics of vaporized liquid hydrocarbon and the product resulting from such process.

It is an object of this invention to provide a process by which finely pulverized coal is treated so that the fuel particles will be entrained and carried by vapors and gases generated from the coal particles.

I have discovered that if coal containing a desired volatile content is reduced to an extreme degree of fineness and then heated to a temperature preferably in excess of 200° C., that vapors and gases are generated in sufficient quantity to freely carry the fine carbon particles in suspension therein so that the fuel while produced entirely from coal has the desirable characteristics of a liquid hydrocarbon and can be used in fields where heretofore it has been practically universally the custom to employ liquid oils. The heat treatment of this excessively fine coal apparently has the effect of rendering the coal particles themselves so mobile that the generated gases entertain no difficulty in carrying such particles in suspension therein to a point of storage or consumption.

The fuel product produced by this process consists essentially of gases generated from finely pulverized coal with the said partially carbonized coal particles thoroughly distributed and entrained in such gases forming a free flowing fuel that may be mixed with the desired quantities of air to provide an explosive combustible mixture for use in internal combustion engines and elsewhere.

In carrying out my process I find that it is essential to reduce the coal to an exceedingly fine state of subdivision. The coal should be preferably reduced to a fineness in excess of 300 meshes or in such an impalpable state that a substantial part of it is capable of being measured in microns. The coal selected should have a high volatile content. Any of the high volatile coals can be used, but as an illustration I may use a bituminous coal having a volatile content in excess of 25 per cent.

As the product produced by this process is highly desirable for use in an internal combustion engine, I preferably remove from the coal its non-carbonaceous matter such as silica, etc. To effect the separation of the carbon from the non-carbonaceous content of the coal the same is preferably subjected to the purifying treatment described in my Patents 1,429,163 and 1,429,164, although it will be apparent that if the coal selected is substantially free of ash no purifying treatment need be resorted to.

The very fine coal with or without purification is then introduced to a vessel or treating zone of any suitable character. When in such zone the coal is heated to a temperature of 200° C., or over by a heating flame which will cause the coal to rapidly attain this temperature. I have discovered that when rapidly heated to or above this temperature the coal particles assume a condition resembling that reaction which occurs during the boiling of water. Multitudes of gaseous bubbles are evolved, which carry away in suspension the very fine partially carbonized carbon particles. In fact, the material might be characterized a flowing one, inasmuch as the gases and the entrained or contained fuel particles are very mobile and can with ease be conducted to a carburetor, a burner or a source of storage.

As an example, a bituminous coal having a volatile content in excess of 25% is reduced to a fineness such that all particles thereof will pass a screen having 300 meshes per linear inch. The thus reduced coal, with or without a purification treatment for the removal of ash and non-carbonaceous constituents according to the processes described in my Patents No. 1,429,163 and No. 1,429,164 above mentioned, is then rapidly heated to a temperature of at least 200° C. Preferably the coal is continuously fed to the heated zone and the evolved vapors and the carbonaceous particles entrained therein are led from the zone substantially as fast as formed. It is also desirable to substantially exclude air from the heating zone and also to prevent the intermingling of air with the gaseous fuel thus produced during the period while such fuel is being transported to the point where it is to be consumed.

Upon observation it appears that during this heat treatment the evolved gases often take a darkened appearance which clearly indicates that the partially carbonized particles are entrained therein and are being carried along by the energy of the gases.

It will be understood that to produce this fuel product the coal must be excessively fine in its state of sub-division, and that it must contain a substantial volatile content. While

coal of a sub-division of 300 meshes per linear inch can be used, I find it desirable to even use a finer coal because the finer the coal the more mobile the resulting product becomes. This product is useful in fields where hydrocarbon oils are now employed. It may be carburetted to provide combustible mixtures for use in explosive engines or it may be used for any other purpose where an explosive charge is needed or where a gaseous fuel for combustion is desired.

The finely pulverized coal may furthermore, if desired, be amalgamated or placed in suspension with a liquid hydrocarbon oil so that when the oil is vaporized the necessary gases will be supplied to carry the fine particles in suspension. Such an operation would be resorted to particularly at times when a coal is being used which is low in volatile content.

Having thus described my invention, what I claim is:

1. A process for producing a fuel, consisting in pulverizing coal containing a substantial volatile content to a fine state of division, and in heating such material to remove volatiles therefrom in sufficient quantity to entrain and carry in suspension therein the fine carbonaceous particles.

2. A process for producing a flowing fuel consisting in pulverizing coal containing a volatile content not substantially lower than 25 per cent to a fineness of at least substantially 300 meshes per linear inch, in heating such coal to a temperature of at least 200° C., to remove volatiles in sufficient quantities to entrain and carry in suspension the contained finely divided carbonaceous particles.

3. A process for producing a fuel consisting in finely pulverizing coal containing a substantial volatile content, in heating such coal to remove volatiles in sufficient quantities to entrain and carry in suspension therein the finely divided carbonaceous particles.

4. A process for producing a fuel consisting in finely pulverized coal containing a substantial volatile content, in heating such coal to remove volatiles in sufficient quantities to entrain and carry in suspension therein the finely divided carbonaceous particles, said particles being sufficiently fine and the volatile content removed from the coal being sufficiently great to cause such volatile content to freely carry the distributed carbonaceous particles.

5. A process for producing a fuel consisting in finely pulverizing coal containing a substantial volatile content, in removing carbonaceous from non-carbonaceous matter contained in said coal, and in thereafter heating the finely divided carbonaceous material to a temperature sufficient to remove volatiles therefrom in a quantity capable of entraining and carrying in suspension the finely divided carbonaceous fuel particles.

6. A process for manufacturing a fuel consisting in reducing coal containing a substantial volatile content to a degree of fineness in excess of 300 meshes per linear inch, in thereafter heating said finely reduced particles to a temperature to remove volatiles therefrom in a quantity sufficient to entrain and carry in suspension therein the finely reduced carbonaceous particles.

7. A flowing fuel composed of gases evolved from finely pulverized coal, with the carbonaceous particles of said coal distributed throughout and carried in suspension in said gases.

8. A fuel composed of gases evolved from finely pulverized coal with the partially carbonized particles distributed within and suspended in said gases to flow therewith.

9. A flowing fuel composed of volatile gases and finely pulverized carbonaceous particles distributed in and suspended by said gases.

10. A fuel composed of gases evolved from finely divided bituminous coal having suspended and entrained therein the partially carbonized coal particles.

In testimony whereof I affix my signature.

WALTER EDWIN TRENT.