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COAL HANDLING

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Coal is customarily transported or handled in dry form, requiring shoveling or conveying mechanism applicable for short distances only. In contrast to such limitations of mechanical nature, oil on the other hand has the capability of being easily and cheaply pumped for enormous distances. In accordance with the present invention, it now becomes possible to handle coal as simply as oil, and with particularly advantageous capabilities of changing the forms and uses.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

The coal, bituminous or anthracite, etc., is, in accordance with the invention, finely divided or ground. This can be done at a convenient location, for instance at or near the mine. The disintegrated coal is mixed with a carrier liquid, and with suitable conditions therefor, as more particularly hereinafter detailed, is then handled as a liquid, as by being pumped through a pipe line, or transported in tanks, etc. By employing a combustible liquid as carrier, such for instance as a petroleum liquid, more conveniently a cheap fraction thereof, the entire material may be directly amenable to combustion usage as such. Thus, for instance gas oil, fluent residuums, etc., may be so applied. Preferably however, I employ an aqueous liquid as carrier, this making possible certain features not applicable otherwise.

While, in some situations, the agitation of the finely divided coal in the carrier medium is such in the pumping and handling operations as to prevent serious separation or settling, a means for maintaining the suspension safely under all conditions is preferable, and for this I incorporate a small amount of a stabilizing agent, such as a soap of a base of sodium, potassium, ammonium, ethanolamine, etc., with an acid radical, as for instance oleic, palmitic, stearic, lauric, or acids obtained from the oxidation of petroleum or paraffin, etc. The amount of stabilizing agent in general may be quite small, as for instance 0.005 to 0.5 per cent or more, amounts above 1 per cent being in general unnecessary or waste. With the finely divided coal in amount such as to form slurries of pumpable limits, as for instance 5 to 50 per cent, and the stabilizing agent thus in suspension form, such liquid is capable of indefinite handling and transportation, as indicated, and may be transported from point of preparation, as for instance the mine, through long distance pipe lines to point of usage, as desired. If desired, air may be mixed with the coal and water before transportation, and pine oil or cresylic acid or the like, and additionally if preferred xanthates or thiocarbanilide or the like, in amounts from 0.003 per cent upward. Such may be availed of in addition to or instead of the other stabilizers, as a buoyant effect is had from minute air bubbles engaging the coal particles. Where employing a combustible liquid as carrier, the product may of course be directly fed to a furnace in suitable atomizing burners, or may be applied for utilization of the carbonaceous material otherwise as desired. Where the carrier liquid is aqueous, it is then more feasible to effect a separation for usage. For this, the stable suspension may be broken, as by admixture of an electrolyte to neutralize ionic adsorption charges on the coal particles, or where the stabilizer is a water-soluble soap, the coagulating agent may be such as to precipitate an insoluble form of soap therefrom. Thus, convenient coagulating agents may be aluminum sulphate, alum, lime, etc. The amount of coagulating agent is in general such as to neutralize or precipitate as required, and may be for instance 0.00001 mol. per cent to any economic high concentration. For coagulating agent also, in some instances preferable to the foregoing, I may employ a small amount of oil, this being admixed with the suspension where an aqueous liquid is used, and the oil will then selectively wet the coal and displace its surface-action relative to the water, and cause separation from the water. Ash in the coal is not wetted and sinks. Amounts of oil suitable for this are small, as for instance 0.005 per cent to quantities sufficient to form a second layer of oil containing powdered coal. The oil for such purpose may advantageously be a cheap form of petroleum, as for instance gas oil, residuum, etc. When larger amounts of oil are employed mixtures of directly combustible character may be so obtained.

With the stable suspension broken, as at the point of usage, and the coal separated, as by settling or skimming or flotation, by bubble flotation using traces of cresylic acid, pine oil, or like agents, the solid coal may be separated or filtered conveniently, and the water having been eliminated, by suitable means the coal may be em-

ployed directly for firing, or it may be formed into compressed blocks as better suited for some furnace usages.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A process of transporting coal, which comprises changing its state to a pumpable fluid by grinding the coal and mixing the disintegrated coal with water and a small amount of a water-soluble soap, pumping a stream of such suspension to point of use, admixing lime and collecting the coal separated.

2. A process of transporting coal, which comprises changing its state to a pumpable fluid by grinding the coal and mixing the disintegrated coal with water and a small amount of an easily precipitated suspending agent, pumping a stream of such suspension to point of use, and coagulating the suspending agent to recover the coal.

3. A process of transporting coal, which comprises changing its state to a pumpable fluid by grinding the coal and mixing the disintegrated coal with water and a small amount of a water-soluble soap, pumping a stream of such suspension to point of use, and precipitating the soap to collect the coal.

4. A process of transporting coal, which comprises changing its state to a pumpable fluid by grinding the coal and suspending the disintegrated coal in an aqueous carrier liquid with a small amount of a water-soluble soap, admixing air and pumping a stream of such suspension to point of use, and coagulating the soap to separate the coal.

5. A process of transporting coal which comprises changing its state to a pumpable fluid by grinding the coal and mixing the disintegrated coal with water and a small amount of a water-soluble dispersing agent having the precipitable characteristics of soap, pumping a stream of such suspension to point of use, and precipitating the dispersing agent and separating the coal from the carrier water.

6. The process set forth in claim 5 in which air is used additionally as a stabilizing agent.

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