

UNITED STATES PATENT OFFICE

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LIQUID FUEL

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4 Claims. (Cl. 44-8)

The present invention relates to improvements in the manufacture of composite fuel from coal, and oil, of the type in which coal or the like carbonaceous fuel, such as coke, or again carbonaceous residuum, in a fine state of division, is maintained in suspension in an oil medium.

According to the present invention, coal or the like in a fine state of division is suspended in oil derived by destructive distillation with or without hydrogenation, from coal, shale or the like material, thereby having a greater affinity for the coal, which will reduce the danger of the coal settling out from the oil, permitting of a more perfect mixture or emulsion so that a lesser degree of grinding is necessary.

The oil so obtained from coal or the like material is ground together with the coal or the like to the desired fineness, preferably so that it will pass at least a 300-1000 mesh sieve.

The coal may be ground to colloidal fineness, where however, it is ground to lesser fineness, to promote dispersion, small proportions of dry starch may be added, or again, small proportions of caustic soda mixed with a little starch; or other emulsifying agent may be used.

In certain cases, it may be desirable to add to the fuel, accelerators, such as a potassium compound, or boric acid, the proportion of potassium compound being in the range of one-quarter of one per cent.

By way of example, a satisfactory fuel has been made from a coal containing on analysis 13% of volatile constituents, the coal being mixed with oil in the proportion of 40% by weight of coal to 60% by weight of oil, the oil being derived from coal by distillation or other process, one-quarter of 1% starch fibre and one-quarter of 1% sodium chloride so made up with soft water to dissolve the starch, the whole material then being ground in a grinder, such as a bar mill, and ground for five hours.

An alternative fuel found to be fully satisfactory has been made where one-eighth of 1% of boric acid has been substituted in the above for one-quarter of 1% of sodium chloride. A satisfactory fuel has also however, been made containing both one-quarter of 1% of sodium chloride and one-eighth of 1% boric acid.

Moreover, it has been found that a water content can be added 5% to 10%, the fuel still remaining permanently stable and providing a thoroughly satisfactory combustion.

The time of grinding of the fuel is a factor of the hardness of the coal, the viscosity of the fuel

required and the number of revolutions of the mill.

The above proportions of added ingredients of emulsifying agents, such as starch, and of accelerator such as sodium chloride, with, or alternatively to boric acid, have been found equally satisfactory with for instance, Kent coal, possessing volatile matter on analysis of 22%, and again with Spanish coal having volatile matter of 28%.

It is obvious that other accelerators, such as potassium compounds may be added to the fuel with, or alternatively, to the boric acid, and again combustion catalysts, such as ferric oxide, Fe_2O_3 , aluminium chloride or the like may be added.

In certain cases, instead of grinding all the oil with the coal, only a proportion of the ultimate oil content of the fuel may be ground up with the fuel, the rest being added subsequent to grinding.

Further, oxidizing agents may be added to the composite fuel, such as potassium nitrate.

Ozone may be added with the air during combustion of the fuel.

I declare that what I claim is:—

1. A liquid fuel comprising a combustible oil, particles of coal suspended in the oil, and substantially one-fourth of one percent of dry starch material distributed as a stabilizer in the oil in the substantial absence of water.

2. A liquid fuel comprising an emulsion of a combustible oil with an aqueous solution of starch and boric acid, and particles of coal held in stable suspension in the emulsion by said starch, the quantity of starch being substantially one-fourth of one percent of the weight of coal and oil.

3. A liquid fuel comprising a combustible oil having emulsified therewith an aqueous solution containing boric acid and starch, together with particles of a powdered carbonaceous fuel suspended in the emulsion and stabilized in its suspension by the starch, the quantity of boric acid being substantially $\frac{1}{8}\%$ and of starch being substantially $\frac{1}{4}\%$ of the combined weight of oil and fuel particles.

4. A liquid fuel comprising a combustible oil having emulsified therewith an aqueous solution containing boric acid, sodium chloride, and starch, together with particles of a powdered carbonaceous fuel suspended in the emulsion and stabilized in its suspension by the starch, the quantity of boric acid being substantially $\frac{1}{8}\%$ and of sodium chloride and starch being each substantially $\frac{1}{4}\%$ of the combined weight of oil and fuel particles.

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