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COAL SPRAY OIL

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11 Claims. (Cl. 44—6)

This invention relates to coal spray oils and the like and to the treating of solid carbonaceous lump fuels to prevent the formation of dust and other degradation products.

Various oils and other materials have in the past been applied to solid carbonaceous lump fuels, particularly coal, lignite, etc. for the purpose of laying dust and more particularly for the purpose of preventing degradation known as slacking. This degradation is caused partly by the escape of moisture from the coal and partly by the oxidation of mineral material, particularly iron sulfide, contained in the cleavage veins of coal and similar fuels. Another important problem is that of dusting caused by mechanical abrasion. All of these phenomena are highly undesirable from the standpoint of the ultimate user and result as well in loss of valuable fuel.

It is an object of my invention to provide new and improved coal spray compositions which will prevent these degradation phenomena to a greater degree than has heretofore been the case. Another object of my invention is to provide coal spray materials which will prevent degradation and at the same time give a fuel which is free from undesirable staining characteristics. A further object of my invention is to provide coal spray compositions which will accomplish a given degree of dust proofing with a smaller amount of material than has heretofore been necessary. A still further object of my invention is to provide coal spray materials which will form uniform films on lump fuels even when not initially applied to the entire surface of such fuels. It is also an object of my invention to provide coal spray methods having the advantages enumerated. A further object of my invention is to provide improved treated lump fuels. Other and more detailed objects, advantages and uses of my invention will become apparent as the description thereof proceeds.

In brief my invention contemplates the use of solvent extracts and compositions containing solvent extracts for treating solid carbonaceous lump fuels. Many processes for the solvent extraction of petroleum oils are known. Selective solvents such as Chlorex (beta beta' dichlor diethyl ether), phenol, cresol, furfural, nitrobenzene, chloraniline, chlorphenol, sulfur dioxide and solvent mixtures containing one or more of these solvents are used to extract aromatic or polynuclear naphthenic compounds from petroleum materials, particularly lubricating oil stocks, leaving undissolved material of a mononuclear naphthenic or "relatively paraffinic" nature. In the case of lubricating oil extraction the undissolved fraction or raffinate is a greatly improved lubricant. The extracts are in general of practically no value as lubricants and have heretofore been considered to be undesirable by-products.

I have found, however, that such solvent extracts and particularly extracts obtained in the manufacture of relatively light lubricating oils such as S. A. E. 20 lubricating oils are of extremely great value in coal spray compositions, since they reduce dusting and similar degradation to a much greater extent than do compositions heretofore known. Moreover, they form a uniform film on the treated coal or similar material even when the coal is not initially entirely covered by the sprayed composition. Still further, these materials give a treated coal which does not stain floors and pavements as do some of the prior art compositions.

My coal spray compositions can contain from 15% to 100% of lubricating oil solvent extract and from 0 to 85% of blending oil. Preferably, however, they contain from about 25% to about 80% of the lubricating oil solvent extract, the remainder being blending oil. The blending oil used is preferably a petroleum product having a viscosity of from about 50 to about 150 seconds Saybolt at 100° F. although somewhat more viscous blending oils can be used when a viscose product is desired. This blending oil can be a light lubricating oil, preferably a wax distillate. However, other mineral oil fractions within the viscosity range specified can be used, for instance cracking still cycle stocks. If a wax distillate is used in large amount in a composition applied by a spraying apparatus which does not provide for operation at temperatures somewhat above atmospheric, it is necessary to incorporate a pour point depressor; for instance a portion of the blending oil can be replaced by an asphaltic residuum to the extent of from about 10% to about 25% of the total composition to reduce the pour point but the efficiency of the coal spray material decreases and the asphaltic residuum causes increased staining. It is therefore much better to avoid the use of asphaltic residuum by the use of elevated spraying temperatures.

The coal spray product as a whole should have a viscosity of at least about 150 seconds Saybolt at 100° F. and may have a viscosity up to about 1200 seconds Saybolt at 100° F. but it is obvious that if compositions are used having viscosities in the upper part of this range provision must be made for relatively high temperature spraying.

As previously indicated, the lubricating oil sol-

vent extract can suitably be that from the manufacture of S. A. E. 20 oil, particularly as manufactured from Mid-Continent crude although solvent extracts from other types of lubricating oil stocks can be used. The extract can suitably have a viscosity from about 500 to about 1000 seconds Saybolt at 100° F. but extracts of different viscosities can be used so long as the final product has a viscosity within the range mentioned in the preceding paragraph, for instance extract from the manufacture of S. A. E. 50 oil having a viscosity as high as 550 seconds Saybolt at 210° F. can be used.

The following are examples of coal spray compositions in accordance with my invention:

	Example				
	1	2	3	4	5
Composition:					
Solvent extract.....per cent..	31.5	37	52	75	100
Blending oil.....per cent..	68.5	63	48	25	0
Viscosity in seconds Saybolt at 100° F.....	180	180	350	600	800

In these examples the solvent extract can suitably be a Chlorex extract produced as a by-product from the manufacture of S. A. E. 20 lubricating oil from Mid-Continent crude and the blending oil can suitably be a wax distillate having a viscosity of 100 seconds Saybolt at 100 F., the two being blended to give a viscosity as indicated in the table. The reason for the different compositions of Examples 1 and 2 which have the same viscosity is that the solvent extract used in Example 1 had a slightly higher viscosity than that used in Example 2.

The superiority of these products can be demonstrated by dust chamber experiments of the type used by the Battelle Memorial Institute. By this method a dustiness index is obtained which is the number of grams of fine and intermediate dust obtained per ton of coal under standardized conditions. In this method a 50 pound sample of coal is supported at the top of a tall dust chamber, allowed to drop to the bottom and five seconds later slides are introduced at standardized levels to catch the dust suspended in the chamber. This dust is collected and weighed and the weight is multiplied by 40 to obtain the dustiness index in grams per ton.

Using a coal spray material in accordance with Example 2 in quantities of 2.38 gallons per ton of coal, the dustiness index was found to be 29. This compares with a dustiness index of 118 for a coal spray oil of approximately the same viscosity (165 seconds Saybolt at 100° F.) in nearly the same amount (2.25 gallons per ton). It also compares with a dustiness index of 285 for a mixture of 40% crude scale wax and 60% lubricating oil distillate, the blend having a viscosity of 85 to 100 seconds Saybolt at 100° F. used in a quantity of 2.18 gallons per ton. The material which was found to be next best to the Chlorex extract type of material was petrolatum tailings containing paraffin wax, petrolatum wax and oil, the viscosity being 150 seconds Saybolt at 100° F. and this material had a dustiness index of 63 as compared with an index of 29 for the material of Example 2.

While dust chamber experiments have not been made on materials of higher solvent extract content, the results of other work indicate conclusively that higher solvent extract contents give still better results.

Thus, for example, the materials of Examples 1 and 3 have both been sold and used commercially in large quantities (a total of about 100,000 tons of coal has already been treated). In commercial use it has been found with one particular type of Illinois egg coal when spraying with a Mid-Continent mineral oil having a viscosity of 165 seconds Saybolt at 100° F., there was formed in each car of coal during shipment from mine to coal yard a total amount of dust and screenings between 1500 and 3000 pounds per 40 to 50 ton car. This amount of degradation product was a complete loss and the shipper had to give the customer credit. When the material of Example 1 was substituted for the straight mineral oil type of coal spray material and used in similar amounts, the degradation products were reduced to a maximum of 500 pounds per car. By going to the material of Example 3 containing a larger amount of solvent extract, it was found that degradation could be substantially completely eliminated.

Not only are these compositions useful on coals which respond reasonably well to prior art coal spray materials but they can also be used very effectively on materials such as Iowa coal which is very high in both moisture and iron sulfide content and which has hitherto been an unsatisfactory fuel, even when sprayed, due to excessive degradation. Moreover, my compositions can be used much more effectively than straight mineral oils and wax-containing mineral oils for the treatment of stoker coal—an extremely difficult type of coal to treat effectively.

As previously indicated, I prefer to use the solvent extract alone or in a blend with mineral oil but it can likewise be used very effectively in aqueous emulsions. Thus the solvent extract can be emulsified in water by the use of soaps and other known emulsifying agents and this can be sprayed on the coal.

In either event the amount of oily material sprayed can suitably range from about ½ to about 5 gallons per ton of fuel and the temperature used in the spraying operation can be atmospheric temperature or a temperature slightly above that at which the particular composition used is difficult to handle. With compositions such as that of Examples 1 and 2 no heating is necessary under prevailing summer temperatures while with a material containing larger amounts of solvent extract somewhat elevated temperatures are necessary.

I am not fully aware of the correct explanation for the peculiar effectiveness of coal spray compositions containing lubricating oil solvent extracts but I believe this is due at least in part to the fact that the solvent extract leaves a viscous and highly tenacious film on the surface of the coal or other solid carbonaceous lump fuel which prevents moisture loss and oxidation. When a light lubricating oil is used along with the extract it penetrates into the fuel, leaving the extract on the surface. These extract materials apparently have a very high tendency to creep along the surface of the fuel, due no doubt to a surface tension phenomenon, and complete coverage is obtained even if the original coverage in the spraying operation is only from 50 to 75% of the total coverage of the fuel. The result of this is that a smaller amount of material can be used than has heretofore been thought necessary to achieve a given dust proofing effect.

Another use for the compositions of my invention is in spraying the interiors of cars used in

coal strip mining and similar operations. The coal is normally very wet and when thrown into cars in winter weather freezes to the cars so that they cannot be dumped effectively. My compositions are particularly advantageous in this connection since they adhere to the cars much better than does straight mineral oil but not so tenaciously as to render the cars slippery and more or less permanently hazardous. They make it possible to dump the coal or other lump carbonaceous fuel readily but are largely removed by the falling fuel so that the cars are not left in an unsafe condition as they would be if a mixture of oil and asphalt were used.

These compositions of matter are also effective for coating concrete forms prior to pouring the concrete and serve to prevent the concrete from sticking to the form.

While I have described my invention in connection with certain specific embodiments thereof, it is to be understood that these are by way of illustration and not by way of limitation and I do not mean to be bound thereby but only to the scope of the appended claims which should be construed as broadly as the prior art will permit.

I claim:

1. A spraying composition comprising from about 25% to about 80% of a lubricating oil solvent extract together with a blending oil having a viscosity of at least about 50 seconds Saybolt at 100° F., said composition having a viscosity of from about 150 to about 1200 seconds Saybolt at 100° F.

2. A spraying composition comprising at least about 25% of a lubricating oil solvent extract together with a substantial amount of a blending oil having a viscosity of from about 50 to about 150 seconds Saybolt at 100° F., said composition having a viscosity of from about 100 to about 1200 seconds Saybolt at 100° F.

3. A method of dust proofing a solid carbonaceous lump fuel which comprises applying thereto a composition containing at least about 25% of a lubricating oil solvent extract together with a blending oil having a viscosity of from about 50 to about 150 seconds Saybolt at 100° F., said composition having a viscosity of from about 150 to about 1200 seconds at 100° F.

4. A method of dust proofing a solid carbonaceous lump fuel which comprises applying thereto a composition having a viscosity of from about 150 to about 1200 seconds Saybolt at 100° F. containing from about 25% to about 85% of a lubricating oil solvent extract and from about 15% to about 75% of a blending oil having a viscosity of from about 50 to about 150 seconds Saybolt at 100° F.

5. A coal spray oil composition comprising at least 25% of a heavy solvent extract of a petroleum lubricating oil dissolved in a relatively less viscous solvent petroleum oil, said solvent oil being in quantity sufficient to lower the viscosity of the blend to sprayable consistency.

6. A coal spray oil composition consisting substantially of a major constituent, namely a heavy solvent extract of a petroleum lubricating oil, dissolved in a minor constituent, namely a relatively less viscous solvent petroleum oil, said solvent petroleum oil being in quantity sufficient to lower the viscosity of the blend to sprayable consistency.

7. A coal spraying composition consisting essentially of a lubricating oil solvent extract as the major constituent and a blending oil having a viscosity of at least about 50 seconds Saybolt at 100° F., said composition having a viscosity of from about 150 to about 1200 seconds Saybolt Universal at 100° F.

8. A method of dust proofing a solid carbonaceous lump fuel which comprises applying thereto a composition consisting essentially of a lubricating oil solvent extract as the major constituent and a blending oil having a viscosity of from about 50 to about 150 seconds Saybolt Universal at 100° F., said composition having a viscosity of from about 150 to about 1200 seconds Saybolt at 100° F.

9. A method of dust proofing a solid carbonaceous lump fuel which comprises applying thereto a composition having a viscosity of from about 150 to about 1200 seconds Saybolt at 100° F., consisting essentially of from about 25% to about 85% of a lubricating oil solvent extract and from about 15% to about 75% of a blending oil having a viscosity of from about 50 to 150 seconds Saybolt Universal at 100° F.

10. A spraying composition consisting essentially of at least about 25% of a lubricating oil solvent extract and a relatively less viscous solvent petroleum oil, said solvent petroleum oil being used in an amount sufficient to form a composition having a Saybolt Universal viscosity at 100° F., of from about 100 to 1200 seconds.

11. A coal spray oil composition consisting substantially of a major constituent, namely a heavy solvent extract of a petroleum lubricating oil dissolved in a minor constituent, namely a relatively less viscous solvent petroleum oil, said solvent petroleum oil being used in an amount sufficient to form a composition having a Saybolt Universal viscosity at 100° F. of from about 100 seconds to about 1200 seconds.

WORTH GRAY.

CERTIFICATE OF CORRECTION.

Patent No. 2,383,543 August 28, 1945.

WORTH GRAY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 49, claim 3, after the word "seconds" insert --Saybolt--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of December, A. D. 1945.

Leslie Frazer

(Seal) First Assistant Commissioner of Patents.