My invention relates to a process of treating solid fuel materials, as coal and coke having a weatherbeaten or discolored appearance, to improve the lustre and color, and incidentally also to alay dust, make clean, prevent freezing, and for other purposes, and said process having also sundry advantages.

One of the main objects of my invention is to restore lost lustre and color to coal, and coke, and to enhance the color of weatherbeaten coal, or coal of poor color.

Another object of my process is to improve the appearance of coal and coke in general and especially where the normal, lustrous appearance has been dulled through exposure or degradation, by a treatment to restore the desired degree of lustre.

A further object of my process is to allay coal and coke dust while improving the lustre and color of the fuel treated.

A further object of my process is to cause the coal and coke to become clean and dustless while improving the lustre and color of the fuel treated.

A still further object of my invention is to prevent the mass freezing of coal and coke in transit, and in stack piles, in cold weather when treated by my above improved process.

Another object of my improved process is not to increase the corrosion of heating surfaces of boilers and hot air furnaces or other metal parts of heating or cooking apparatus and utensils by the combustion of coal treated by my above process.

Another object of my improved process is to prevent the corrosion of metal parts of apparatus, coal conveyors, storage tanks, spraying equipment, coal cars and truck bodies which may come in contact with coal treated by my above process.

A further object of my process is to improve the efficiency of combustion of coal treated by my above process.

As is well known, there are at various places, such as at the coal mines, yards, and like storage places large quantities of coal in piles, which have been exposed to the weather, unsheltered, for long periods of time, and while having all the desired fuel values, are mainly unsalable on account of poor color due to exposure; or coal freshly mined, while of useful heating value, may have such a poor color or lack lustre, as to render it unsalable, at regular prices.

Thus, while the blackness of the coal may be satisfactory, it lacks desired lustre. Or it may be weatherbeaten to an off-color, thus not only lacking lustre, but being also of an undesirable color tone. My present treatment, process and formulæ may be varied to suit the condition and color of the coal and coke, which it is desired to render salable, and commercially available, thus preventing wastage and creating a valuable asset of low value coals, at a minimum of treating costs.

These and other advantages may be attained by the process which is hereinafter described or by any equivalent thereof.

I attain these objects by having defectively appearing coal treated by a solution, which is hereinafter described, either by spraying said solution thereunto or by immersing the coal into the said solution.

For lack-lustre coal, which is defective mainly in lustre but has retained most of its color, and for making coal clean and dustless I have found that ligno-sulphonic acid, also known as lignin liquor, will restore its lustre and make it also clean and dustless, but I have also found that ligno-sulphonic acid and water also create the desired results; and to this end I propose to prepare a base solution of ligno-sulphonic acid which will contain approximately fifty percent (50%) of water for sale to users in bulk. Said solution may be further diluted by the addition of about 300% of water by the user, after which this solution is ready for use.

Where the color and lustre of the coal are very defective and where it is desirable for the treatment not to dry so thoroughly I propose to emulify the above solution by the addition thereto of oil in the proportion of one part by volume of oil to ten parts by volume of said solution. I find that excellent results can be obtained with Standard 18 Plus Fuel Oil.

Natural or aniline dyes, asphaltum and similar black coloring substances may also
be added to the above noted solutions in order to add coloring matter, where coal is off color, and it is desirable to color the coal with a deep lustrous black.

5. The above solution alone may be used for heightening the color and improving the lustre of coal also, incidentally, for allaying dust and improving combustibility without generating corroding gases.

10. In the proportions of ligno-sulphonic acid and water, or ligno-sulphonic acid, water and oil, and color, these solutions have a low freezing point, so that when coal is treated therewith it will not freeze when in mass, during freezing weather, and in transit, or stored, in exposed condition.

I have found that the above solution, when applied to coal by spraying the solution onto the coal or fuel by immersing the coal thereinto, has the effects as hereinbefore described in the statement of the objects of my process or invention.

This lignin liquor (which is also known as lignin pitch, when in the dry concentrated form with the moisture removed), as utilized herein is the gummy, resinous, sticky, intercellar by-product or waste liquor resulting from the use of cellulose or vegetable fibre from various woods or woody materials, principally spruce, hemlock and poplar, in the manufacture of paper pulp by various chemical processes. The three principal processes are generally known in the paper industry as the soda or alkaline process, the sulphite or acid process and the sulphate process. It is this resinous, glutinous material which is utilized herein and which gives the results desired independently of the chemical process from which it is obtained.

Variations are possible, and some of the above noted ingredients may be used without the other ingredients, and variations may also be made in the water and oil content without obviating the advantages herein noted.

I claim as my invention and desire to secure by Letters Patent:

1. In a process of treating coal or solid fuel the part process, consisting in applying to said coal a solution in the proper proportion of ligno-sulphonic acid, thereby improving the lustre and color of the fuel and making it clean and dustless.

2. In a process of treating coal or solid fuel the part process, consisting in applying to said coal a solution of dry ligno-sulphonic acid substantially in the proportion of one part of dry acid and approximately seven parts of water, thereby improving the lustre and color of the fuel and making it clean and dustless.

3. In a process of treating coal or solid fuel the part process, consisting in applying to said coal a solution of ligno-sulphonic acid substantially in the proportion of one part of said acid and three parts of water, said solution being emulsified by the addition in the proper proportion of oil, thereby improving the color and lustre of the coal and making it dustless.

4. In a process of treating coal or solid fuel the part process, consisting in applying to said coal a solution of ligno-sulphonic acid substantially in the proportion of one part of said acid and three parts of water, said solution being emulsified by the addition thereto of oil in the proportion of one part of oil and ten parts of said solution, thereby improving the color and lustre of the fuel and making it dustless.

5. In a process of treating coal or solid fuel the part process, consisting in spraying said coal with a solution in proper proportions of ligno-sulphonic acid, thereby improving the lustre and color of the fuel and making it clean and dustless.

6. In a process of treating coal or solid fuel the part process, consisting in applying to said coal a solution of ligno-sulphonic acid substantially in the proportion of one part of said acid and three parts of water, said solution being emulsified by the addition thereto of oil in the proportion of one part of oil and ten parts of said solution, and said solution being also enriched by the addition thereof of suitable coloring matter for restoring the color to badly discolored fuel.

7. In a process of treating solid fuel the part process, consisting in applying to said fuel a solution of ligno-sulphonic acid substantially in the proportion of one part of said acid and three parts of water, said solution being enriched by the addition thereto of suitable coloring matter for restoring the color to badly discolored fuel.

8. In a process of treating solid fuel for allaying dust, the part process of coating said fuel with ligno-sulphonic acid, said acid being liquid for applying the same to the fuel and for preventing removal of particles of said fuel.

9. In a process of treating solid fuel, the part process of applying to said fuel an emulsified coating to improve the combustible efficiency of said fuel, said coating consisting of a liquid ligno-sulphonic solution, and one part of oil to ten parts of said solution.

10. In a process of treating solid fuel, the part process of applying to said fuel an emulsified coating to retain the inner constituent elements of said fuel, said coating consisting of a liquid ligno-sulphonic solution, and one part of oil to ten parts of said solution.

11. A process for treating carbonaceous fuel for rendering the fuel clean and dustless, said process comprising coating said fuel with a water solution of lignin liquor; and causing said solution to dry and leave the material covered with a dry dustless coating which is clean and does not soil the hands.
12. A process for treating coal, coke and similar fuel for rendering the fuel clean and dustless, said process comprising coating said fuel with a water solution of ligno-sulfonic acid; and causing said solution to dry, leaving the material covered with a dry coating which is dustless and clean and does not soil the hands.

13. A fuel comprising lumps of carbonaceous fuel covered with a dry coating of lig-no-sulfonic acid, rendering said fuel dry, dustless and so clean that it will not soil the hands.


Signed at New York, in the county of New York and State of New York this 10th day of December A.D. 1929.

GEORGE P. SPENCER.