UNITED STATES PATENT OFFICE.

MAX NIRDLINGER, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE FUEL PATENTS COMPANY.

ARTIFICIAL FUEL.

SPECIFICATION forming part of Letters Patent No. 500,934, dated July 4, 1893.

Application filed March 1, 1893. Serial No. 464,286. (No specimens.)

To all whom it may concern:

Be it known that I, MAX NIRDLINGER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Artificial Fuel, of which the following is a specification.

This invention relates to an improved composition of materials for a fuel, the object being to provide a fuel of coal-dust, slack, or culm, which shall be of little cost, shall insure a perfect and complete combustion without the production of noxious or unpleasant gases or smoke, and shall be capable of compression into blocks or cakes that will maintain their form and desired consistency under all ordinary conditions.

Heretofore much difficulty has been experienced in producing a fuel containing the slack or culm of coal which will meet all of the requirements of a marketable article. In some cases the fuels after they have been manufactured into the form of blocks or cakes disintegrate rapidly either because of the absorption of moisture or from the contraction and expansion due to variations in temperature. With others it is found that as soon as the fuel is introduced into the fire a disintegration there immediately results from the heating or evaparating of the binding ingredients. This rapid disintegration of the blocks interferes with a perfect combustion, as the mass upon the grate tends to fall down as a mass more or less pulverulent, throughout.

I have found that a superior fuel can be provided by combining in suitable proportions the culms of the two distinct species of coal known as the bituminous and the anthracite, and also that a very efficient binding material can be produced by using one of the pitches, (mineral or vegetable) and together with a small amount of the tar or oily material obtained from that pitch during the process of distillation. But the addition of the bituminous coal and the addition of the more or less viscid materials, as pitch and tar, increase the tendency of the fuel to pass off unconsumed in the form of smoke and gases; and this I obviate by adding certain ingredients which do not materially increase the cost of the fuel, but which supply combustion-supporting gases in large quantities.

The ingredients in proportions substantially such as are indicated, are compounded as follows: I take about one hundred pounds of the culm, slack or screenings of bituminous coal, and thoroughly mix therewith the proper amounts of silicate of soda and somewhat diluted sulphuric acid, preferably about three pounds of the former to the above named amount of the bituminous coal, and a sufficient amount of the sulphuric acid to effect the releasing of the soda at the proper time, as will be described below. Then about eighteen hundred pounds of the culm, slack or screenings of anthracite coal are placed in a mixing machine, and thoroughly mingled with the above one hundred pounds of the culm, slack or screenings of bituminous coal. Either after or before they have been intimately commingled, they are heated to a comparatively high temperature (preferably to about 100° Fahrenheit) and are thoroughly freed from moisture. Then the binding material is provided as follows: About ninety pounds of hard coal tar pitch is heated and to it is added about ten pounds of coal tar. The tar or oil product is obtained in the same process of distillation or manufacture which produces the aforesaid hard pitch. It is practically impossible to stop the process of distillation or manufacture at the point where there is a material suitable for my purposes. Hence I find it necessary to take the pitch after its manufacture and again add thereto a small amount of the tar previously taken therefrom in order to produce a compound which shall be capable of being made sufficiently fluid to be mixed with the other ingredients and yet shall after the fuel is manufactured, be sufficiently hard at all ordinary temperatures to meet the requirements. Under some circumstances I employ one or the other of equivalent compounds. I take asphaltum as found in nature, and which may be regarded as an equivalent of the hard mineral pitch obtained from coal tar, and this asphaltum I heat and to it add coal tar in about the above proportions of ninety pounds of one to ten pounds of the other. Another equivalent of this is a compound produced by using vegetable pitch, that is to say, the pitch obtained in the process of distillation of the products of the pine tree, and I combine with it

some of the heaviest tar or oil also obtained from the said pine product. The oil of the pine product cannot be used with the mineral pitch or coal tar pitch, and, vice versa, the coal-tar mentioned cannot be used with the vegetable pitch. After the pitch and its companion, tar, have been thoroughly commingled as described, I add to them the following materials, namely: the black oxide of manganese and chlorate of potash in the proportions of three pounds of the former to five pounds of the latter. Although the pitch and tar have been heated sufficiently high to render them comparatively liquid so that a thorough mechanical mixture of them with the culm will be attainable, they are not heated so highly as to effect a decomposition of the manganese and chlorate of potash. After the two species of the coal, culm or slack have been thoroughly commingled, heated and dried, and after the above-described hydro-carbons and other ingredients have been properly mixed, they are placed together (in the proportions of about nineteen hundred pounds of the mixed culm to one hundred pounds of the hydro-carbons) in a mixing machine where they are thoroughly agitated and mixed together and are heated to the temperature of about 175° Fahrenheit. In this way a homogeneous mass is produced which contains the above ingredients uniformly distributed throughout. After the mixing is thoroughly effected the material is passed to a machine whereby it is compressed into hard blocks or cakes, which upon becoming cool and dry are ready for the market.

I have found that the mixture of the anthracite and bituminous coal in about the proportions named is a matter of great advantage. The particles of the anthracite coal are so hard and have faces and edges which are so smooth and sharp that it is difficult to bind them together by any of the ordinary compounds to such an extent that they will permanently maintain the forms into which they may be compressed. Especially is it true that as soon as the high heat of a fire is applied disintegration occurs, and it is impossible to get the desired "coking" effect. But the bituminous coal is charged with hydro-carbon elements to such an extent that as soon as heat is applied the fusion of the particles of the coal acts to assist in binding together the particles of the anthracite coal. In short the bituminous coal may be regarded as a material intermediate between the pitch and the anthracite and adapted to assist not only in binding the particles of the fuel together but also to assist, under a high heat, in securing a "coking" effect. But as under some circumstances I find there is a tendency for the hydro-carbon binder to soften and fall short of its desired work of holding the material in permanent blocks or cakes, I employ the alkali and acid above described which present a supplemental binding material of another character not likely to be affected by changes in temperature such as will ordinarily affect one constituted of hydro-carbon. The oxygen-furnishing materials, namely, the oxide of manganese and the chlorate of potash, being thoroughly commingled, mechanically, with the heated carbon binding material, act to effect a perfect combustion and prevent the escape from the parts which are richer in carbonaceous material of unconsumed carbon in the form of smoke and carbon gases, inasmuch as they, the instant that they are heated by the fires, throw off large quantities of oxygen which immediately combines with the carbon. The chlorate of potash is particularly efficacious in this combustion when the oxide of manganese is present with it, as I have found.

Of course I am aware that many fuel compositions have heretofore been patented, and that it has been proposed to use in various ways the ingredients which I have above set forth. But I am familiar with all of the fuels that have been patented and also with many that it has been attempted to manufacture, and I do not believe the composition which is above described and produced in the way set forth has ever been provided for.

I have herein given the proportions which I at present use in compounding the fuel, but of course there can be more or less variation in that respect so long as the desired results are successfully reached.

I do not herein claim a composition for fuel such as is described in my application, Serial No. 426,147, filed March 23, 1892, which latter lacks some of the ingredients mentioned herein, as silicate of soda, chlorate of potash, &c.

What I claim is—

The herein described composition for fuel, it comprising one hundred pounds of the slack of bituminous coal, together with three pounds of silicate of soda and diluted sulphuric acid, together with eighteen hundred pounds of the slack of anthracite coal, together with ninety pounds of hard coal tar pitch and ten pounds of coal tar obtained in the manufacture of said pitch, and of a consistency slightly lighter than the pitch, mingled with three pounds of black oxide of manganese and five pounds of chlorate of potash, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MAX NIRDLINGER.

Witnesses:
A. B. MAY,
LOUISE JORDAN.