

Patented Sept. 9, 1924.

1,507,678

UNITED STATES PATENT OFFICE.

THEODORE NAGEL, OF BROOKLYN, NEW YORK.

BINDING-FUEL MATERIAL AND PROCESS OF PRODUCING THE SAME.

No Drawing.

Application filed December 8, 1923. Serial No. 679,305.

To all whom it may concern:

Be it known that I, THEODORE NAGEL, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and city and State of New York, have invented new and useful Improvements in Binding-Fuel Materials and Processes of Producing the Same, of which the following is a specification.

This invention relates to the production of a binding fuel material and its use in various agglomerating processes and particularly applicable to the manufacture of fuel briquets for the production of water-insoluble, smokeless fuels especially for domestic use.

The object of this invention is to provide a practical binding material for processing fines of fuels to produce a commercial commodity.

With these and other objects in view, this invention consists in the various steps and combination of steps constituting the process, all as will be more fully hereinafter disclosed and particularly pointed out in the claims.

The carrying out of my invention may be best illustrated by describing the manufacture of hard, water-insoluble, smokeless briquets in which my improved binding material is used. The smokeless fuels available for this process are fines of anthracite, coke, semi-carbonized bituminous coal and carbonized lignite.

As an example of my improved binding fuel material I mix approximately one part by weight of sulphuric acid of not over 50% strength with four parts by weight of a liquid possessing adhesive properties, such as sulphite pitch, the concentrated waste liquor produced in making wood pulp.

Comminuted smokeless fuel is wetted with my improved binding material, the mixture just referred to; then pressed to form briquets. To convert the binding material into a hard, water-insoluble, smokeless binder the briquets must be baked at a temperature above 400° F. and preferably below 800° F., for example at least 15 minutes depending of course upon the size and shape of the briquets.

That my invention may be more clearly understood, I refer by way of contrast to the manufacture of briquets in which pitch, tar and asphaltum oil residue are used as the

binding materials. These materials are softened to flowing by heating and are then mixed with heated comminuted fuels to prevent chilling the binding material. This mixture is pressed to form briquets which when cooled are hard and water-insoluble. These briquets on burning produce smoke, soften and disintegrate as the binder burns before the coal particles are consumed. All binders of this nature when burning are partly volatilized and give off carbon compounds which with insufficient oxygen produce finely divided carbon in the form of smoke. A method of overcoming this is to fix the volatile carbon compounds. This I have succeeded in doing.

Strong dehydrating agents, such as sulphuric acid, zinc chloride, etc., on heating abstract the water of combination from hydrocarbons and leave carbon.

When baking, to cure the binding material of the briquets made with sulphite pitch and sulphuric acid, the hydrocarbons are split up by the acid leaving a carbon which forms a bond between the solid particles. The acid decomposes the organic and inorganic materials contained in the binding material converting them into water-insoluble substances and renders the binder as well as the briquets water-insoluble, smokeless and hard.

I have thus discovered a method of binding together finely divided materials with a water-soluble binding material the chemical composition of which is so altered on heating that it is converted into a hard, water-insoluble, smokeless binder.

By water-insoluble I mean briquets which resist the disintegrating action of the water encountered by coal in the usual handling, shipping and outdoor storage.

By smokeless or nonvolatile binder I mean that upon burning the binder does not produce more smoke than anthracite coal for example.

It is obvious that those skilled in the art may vary the process without departing from the spirit of this invention. Therefore I do not wish to be limited to the above disclosure except as may be required by the claims.

What I claim is:

1. A method of making a hard, water-insoluble, nonvolatile binding fuel material which method consists in mixing sulphuric

acid or the like with a water-soluble organic adhesive material in such proportions that upon incorporating with comminuted materials, pressing into briquets and heating, the particles forming the briquets will be held together by a hard, water-insoluble, nonvolatile binder.

2. A method of making a hard, water-insoluble, nonvolatile binding fuel material which method consists in mixing sulphuric acid with sulphite pitch in such proportions that upon incorporating with comminuted materials, pressing into briquets and heating, the particles forming the briquets will be held together by a hard, water-insoluble, nonvolatile binder.

3. A method of making a hard, water-insoluble nonvolatile binding fuel material binder which method consists in mixing sulphuric acid and sulphite pitch in such proportions that upon incorporating with comminuted smokeless fuels, pressing into briquets and heating above 400° F., the binder becomes hard water-insoluble and nonvolatile.

4. A method of making a hard, water-insoluble, nonvolatile binding fuel material which method consists in mixing about one

part of 50% strength sulphuric acid with 4 parts of commercial sulphite pitch by weight so that after wetting comminuted smokeless fuel particles with this mixture and pressing to form briquets and upon heating above 400° F. for at least 15 minutes the binding material will be converted into a hard, water-insoluble, nonvolatile binder; substantially as described.

5. The herein described new composition of matter constituting a binding fuel material for briquetting which comprises a mixture of one part of sulphuric acid of approximately 50% strength and four parts of commercial sulphite pitch; substantially as described.

6. The herein described new composition of matter constituting a binding fuel material which comprises a mixture of an acid and a water-soluble adhesive material in such proportions that upon heating produces a water-insoluble, nonvolatile material cementing together the particles with which it is mixed; substantially as described.

This specification signed this 7th day of December, 1923.

THEODORE NAGEL.