

# UNITED STATES PATENT OFFICE.

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## ARTIFICIAL FUEL.

SPECIFICATION forming part of Letters Patent No. 533,487, dated February 5, 1895.

Application filed March 23, 1892. Serial No. 426,148. (No specimens.)

*To all whom it may concern:*

Be it known that I, MAX NIRDLINGER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, 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 from which an artificial fuel can be manufactured; it relating more particularly to improvements in fuels which contain for their base or body one or another of the fibrous materials which are largely attainable, such as peat, saw-dust, straw, hemp, &c. As yet no successful artificial fuel has been produced of this sort, although many compositions have been proposed, and many attempts have been made. I have had long experience in experimenting in this line of manufacture, and have been led to perceive the numerous peculiar difficulties which are incident to the manufacture.

In the first place, it is necessary to form the fuel into blocks or cakes in order that it may be in a marketable shape, and adapted to be manipulated and transported; but as the materials ordinarily available are exceedingly elastic they resist compression or, at least immediately after being compressed, tend to expand to the volume occupied prior to compression and this has been a source of great difficulty.

Secondly, a successful fuel must have the particles of the component materials so bound together that the blocks or cakes shall permanently resist the disintegrating agencies constantly acting upon them, such as the moisture from the air and other sources, the variations of temperature, blows in handling, &c. To attain such a permanent binding together of the particles use must be made of a binding material, in quantities large enough to attain the purpose, and yet not in excess, and they must be of such nature that they shall not retard the combustion of the mass, but, if possible assist it.

The binding material generally consists of some hydro-carbon material, or compound of hydro-carbons; but as heretofore applied, the hydro-carbon binding material has been of such sort or has been introduced in such pro-

portions that the fuel was offensive by reason of the smoke and gases evolved, or such that at many ordinary temperatures the fuel would become gummy so that it was impossible to handle, store, or transport it to advantage in the form of blocks or cakes. One or more of these difficulties, incident to the manufacture or the storing, handling, transporting, or using of these artificial fuels consisting mainly of fibrous bases or bodies, have prevented them from being successfully introduced. The long experience above referred to which I have had has led me to adopt the composition and the manner of preparing it which is herein below set forth. The following materials, in substantially the proportions indicated, are treated as follows:

I take one thousand (1,000) pounds of peat, preferably that having the longer and clean fibers and thoroughly disintegrate it; and with the peat I thoroughly commingle in a suitable mixing machine six hundred and fifty (650) pounds of saw-dust. Prior, or subsequent, to the mixing, both the peat and the saw-dust are heated to a comparatively high point and are rendered absolutely dry, preferably by suitable exposure in an artificial desiccating apparatus. Heretofore the materials have not been sufficiently dried and have been treated in the state in which they are ordinarily found. The presence of moisture, or of any material amount of sap I have found to be one of the chief causes that have prevented the desired solidifying of the fuel and have induced disintegration shortly after compression. While the fibrous or porous base or body material is thus in a heated and desiccated condition I apply to it the following composition: I take one hundred and fifty (150) pounds of common resin and add thereto one hundred pounds of hard vegetable pitch and both are heated together in a suitable apparatus. With them there is combined a heavy residuum of petroleum in the proportion of about seventy-five (75) pounds to the amounts above indicated. These are heated to about 150° Fahrenheit and thoroughly mixed together until they form a perfectly homogeneous mass. Then the latter and the porous or fibrous base materials above described are brought together in a mixing apparatus, both being still in their

heated state, and while they are being mixed together heat is applied to prevent the lowering of the temperature and overcome any tendency of any of the parts of the mass to harden or solidify. Twenty-five (25) pounds of common carbonate of soda are added, and after the mixing is completed, the ton, or thereabouts, of composition is ready to be delivered to the devices which effect the molding and compressing of the blocks or cakes.

The particles of the base or body materials (the peat and the saw-dust) being as aforesaid, thoroughly desiccated, they readily and immediately absorb all of the lighter oily parts of the hydro-carbons, which oily parts have prior to that served another function, namely: that of softening and assisting in the liquefying of the hard resin and pitch. The latter, namely: the pitch and resin being originally kindred bodies, and obtained in the same process of manufacture readily unite and commingle to form a homogeneous mass so as to become thoroughly distributed in common throughout the whole body, and after the oily parts of the heavy residuum of petroleum have been absorbed as aforesaid by the base and after the temperature drops sufficiently the resin and the pitch act as a binding adhesive in minute films between the porous or fibrous particles, and are of such nature that they resist largely the action of the above described agencies which tend to produce disintegration.

I have found that proportions substantially such as are indicated are of great advantage, in that on the one hand they successfully effect the described binding together of the particles, and, on the other hand, the carbonaceous bodies are not so largely present as to produce a disagreeable amount of smoke or offensive odors, and while they assist in the combustion of the other ingredients do not cause a burning thereof so rapidly as to prevent the fuel from being available for all ordinary purposes.

I aim to effect the compression into blocks or cakes at such time, relative to the other steps in the manufacture, that the tempera-

ture of the compound shall be considerably lowered by the time the blocks or cakes leave the molds so that the resin and pitch shall have become sufficiently hard to assist in retaining the particles in the positions into which they are forced by the compressing devices.

While I prefer, when using resin, such as above mentioned to employ in conjunction therewith a vegetable pitch, in contradistinction from coal-tar pitch or any of the species of mineral pitch, because of the advantages above set forth arising from the combining of kindred materials, yet I may under some circumstances use the mineral pitch, or even natural asphaltum. Again while I have more particularly mentioned saw-dust as one of the components of the porous or fibrous base, yet I have used, in substantially the above composition, straw, cut into small particles, and hemp, and other similar materials.

No absolutely exact rule can be laid down in such arts as this concerning the proportions, that is to say, under some circumstances it may be found necessary to modify them somewhat as judgment indicates. Thus in treating one species of peat or saw-dust it will be found that more of the resin, or of the pitch, or of the petroleum is necessary than when treating another. Hence it will be understood that the above amounts must be left open to the exercise of discretion, but the amounts given indicate substantially the proportions which I find to provide a valuable fuel.

What I claim is—

The herein described fuel composed of peat and saw-dust, together with vegetable resin, hard vegetable pitch, the residuum of petroleum and carbonate of soda, in substantially the proportions specified, as set forth.

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

MAX NIRDLINGER.

Witnesses:

C. M. HOOPER,  
W. G. MARSON.