

# UNITED STATES PATENT OFFICE.

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## ARTIFICIAL FUEL.

No. 856,101.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, BENJAMIN H. REED, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Artificial Fuel; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in artificial fuel composed for the most part of pulverized coal, united by a suitable binder to retain the same in suitable molded form and containing ingredients for promoting the combustion of the fuel, other ingredients to render the same moisture proof and further ingredients to reduce the smoke, passing from the fuel, to a minimum.

The object of the invention is to provide an artificial fuel of this character which can be made at a low cost from low grade pulverized or slack coal, which will produce fuel having a high thermal efficiency and which will retain its molded form under all conditions of weather, and also retain its form until thoroughly consumed on the grate.

An artificial fuel made in accordance with my invention is composed for the most part of coal reduced to a pulverized condition to which is added kaolin in a substantial quantity, a suitable binder substance, as for instance, rye flour, which co-operates with certain properties of the kaolin to produce a binder for holding the fuel mass together. To this mass is added a suitable water-proofing material, such as crude petroleum. Sodium chlorid may be added which serves to reduce or neutralize the smoke arising from the combustion of the fuel. The ingredients and the proportions thereof which I have used in thus producing artificial fuel may be set forth substantially as follows: Pulverized coal 85- $\frac{1}{2}$ % kaolin 10% rye flour 2% crude petroleum oil  $\frac{1}{2}$ % sodium chlorid 2%.

The kaolin serves in the composition as a radiant during the combustion of the fuel, and this ingredient is of such nature as to become disintegrated under the heat of the combustion and produce a porosity of the molded fuel mass and permits the escape of gases from the burning mass, thereby facilitating combustion. The kaolin is of such nature,

however, that it thus disintegrates or separates from the coal mass to produce the porosity referred to only under high temperature and so that the molded fuel masses stand upon the grate until consumed and the fuel does not crumble away under the lower temperature as is true in the use of clays heretofore used in the manufacture of artificial fuels. I have also discovered that kaolin possesses peculiar properties, when combined with pulverized fuel, in addition to the foregoing, in that it co-operates with a binder substance to constitute a material factor of the binder which holds the fuel mass in molded form until entirely consumed. That is to say, the kaolin is of such close texture or fine grain that it more readily combines with the binder element of the fuel than the coarser clay heretofore employed so that it is possible to effect a very intimate union of the mixed kaolin and binder with the pulverized fuel. I find that by the use of kaolin for the purpose described I am enabled to materially reduce the other binder substances usually employed. By reason of the nature of the kaolin, and its capacity for intimate intermixture with the coal and other binder constituents I am enabled to produce a fuel with a comparatively small percentage of this factor, so that while utilizing to a maximum extent the properties derived from an ingredient of this general character often found in artificial fuel, its bulk, as compared with the coal, is such as not to impair the burning properties of the coal nor produce an undue amount of ash, or any clinkers. Moreover I have found that kaolin, when mixed with the fuel mass under the proper degree of plasticity, and is dried in molded form, produces blocks of fuel of such hardness and tenacity of structure that it can be handled during shipment and use without extreme care and without danger of being broken up or powdered. This feature of the fuel is due to the properties of the kaolin above referred to and is of great importance inasmuch as it makes it practicable to ship the fuel in the same manner as ordinary coal. The said binder substance, as flour, combines not only with the kaolin but with the crude oil to produce the proper consistency of the mixed ingredients to facilitate the molding of the same and to retain the same in molded form, but the crude oil itself promotes combustion

of the fuel. The sodium chlorid when employed reduces or neutralizes the smoke arising from the combustion of the fuel and also serves in a manner to protect the metal surfaces of the combustion chamber against the deleterious effects of the gases arising from the combustion. The crude oil also serves to render water-proof the molded forms and thereby tends to prevent disintegration of said forms by moisture, thus enabling the fuel to be transported and handled in all conditions of weather without danger of the same breaking down.

The fuel is produced by first mixing the kaolin with such binder constituents as cooperate therewith for the purpose described to the proper consistency and this mixture is thereafter mixed with the pulverized coal. The mass is thereafter given form in a suitable mold. The mixing of the pulverized coal with the other constituents of the fuel is preferably effected in a churning mill, whereby the particles of the coal are further crushed during the mixing of the constituents. In this manner the constituents are thoroughly combined in a homogeneous structure, so that the combustion of the fuel is uniform throughout the entire mass.

I claim as my invention:—

1. An artificial fuel comprising pulverized coal, kaolin and a binder substance combined in substantially the proportions set forth and molded to form.

2. An artificial fuel comprising pulverized coal, kaolin, a binder substance and crude petroleum combined in substantially the proportions herein set forth and molded to form.

3. An artificial fuel consisting of pulverized coal, kaolin, a binder substance, crude petroleum oil and sodium chlorid, combined in substantially the proportions herein set forth and molded to form.

4. An artificial fuel comprising the following ingredients mixed and molded to form, to wit,—pulverized coal 85½%, kaolin 10%, rye flour 2%, crude petroleum oil ½% and sodium chlorid 2%.

In testimony, that I claim the foregoing as my invention, I affix my signature in presence of two witnesses, this 2nd day of June A. D. 1906.

BENJAMIN H. REED.

Witnesses:

W. L. HALL,  
JOHN R. PHILP.