UNITED STATES PATENT OFFICE.

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MAKING WASTE WOOD OBTAINED IN FORESTRY INTO BRIQUETS.

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To all whom it may concern:

Be it known that I, FRIEDRICH von KALITSCH, subject of the German Emperor, residing at Baerentzoren, near Dobritz, Germany, have invented new and useful Improvements in Making Waste Wood Obtained in Forestry into Briquets, of which the following is a specification.

A primary object of my invention is to obviate the drawbacks which arise in forestry owing to waste wood of various kinds, such as root-stocks, tops of trunks, branches, twigs, dead wood, *e. g.* fagots, and the like, left lying in woods or forests because heretofore they could not be employed advantageously. Such waste material prevents the growth of young aftergrowth, forms a hiding place for vermin and is objectionable owing to its greatly increasing the danger of fire. Such waste material, particularly dead wood, has therefore been collected, frequently at considerable expense, and occasionally conveyed to open spaces, and uselessly burnt. Now I have found that this waste material can be very advantageously employed in a simple manner by making it, in the manner described hereinafter, into a high-grade, readily transportable fuel, which can be conveniently done by admixing only small quantities of other inexpensive constituents. As such constituents I employ porous materials which bind gases, such as disintegrated wood charcoal, peat charcoal, coke or the like. In practice wood charcoal comes primarily into consideration especially because it can be readily made as a secondary occupation in connection with forestry on the spot.

It is well known to make in the form of briquets for the purpose of employment as fuel, industrial—not forest—waste wood of all kinds, such as is met with in timber-yards, saw-mills, factories and the like, and also certain non-woody products of forestry and agriculture, such as fallen leaves, wood humus, spent bark and other materials of various kinds obtained from plants, with and without impregnating agents, such as crude oil, tar and the like. Further, it is well known to make such briquets from mixtures of waste coal and vegetable substances and so on, as well as to admix various kinds of mineral substances with fuels or mixtures thereof. Such mineral substances are very injurious and only increase the quantity of the resulting ash.

In contradistinction thereto, the object of my invention is to employ as fuel hitherto unused and indeed harmful waste materials of the forest of a woody nature by suitably disintegrating the same while they are in their healthy condition and not materially changed by decomposition, mixing them with one or more suitable porous substances which bind gas, preferably wood charcoal, and then making briquets therefrom.

The waste material which I make into briquets contains a relatively large quantity of carbon and volatile fuels, like all other vegetable residues. In dead wood of all kinds there are deposits of reserve materials rich in carbon, particularly in the form of starch-flour, albumins and rosins. In root-stocks, tops of trunks, branches of coniferous trees rich in rosin the percentage of rosin and turpentine is sometimes as much as 20% of the weight of the wood. In consequence of the large percentage of hydrogen in all these compounds, when the same are burnt they produce much greater heat than pure carbon and are therefore very valuable fuels. Accordingly, they very considerably increase the calorific value of the wood which contains large quantities thereof. It follows from this that particularly the waste materials used according to my invention are considerably more valuable than the industrial waste wood, such as sawdust, shavings, small pieces of wood and the like, made heretofore into briquets. In addition, such industrial waste materials employed heretofore are, according to their nature, particles of wood having destroyed cell-walls and veins of rosin, and having a relatively large superficial area. Owing to volatilization and oxidation in the air the same have for the most part lost their small quantity of volatile, particularly resinous substances. The briquets manufactured according to this process are held together in that the previously cited volatile combustible component parts of the forestry, resins in particular, emerge upon compression from the wood and subsequently cement the particles of wood with each other as well as cement the wood with the charcoal added to said wood into a compact whole. When it is considered that the adhesive power of resins is very great and that, as stated before, the waste of forestry contain something like 20 per cent of substance of this character, it follows that the briquets adhere together even

without the addition of other adhesive substances, such as pitch, tar, etc. As found by experience, air-dried wood able to be employed for industrial purposes has, on an average, not half the calorific value of pure carbon in the form of wood charcoal, and as a rule does not come into question as an industrial fuel on account of this. Particularly, it does not pay to transport such wood for burning purposes to long distances. Under these circumstances the last mentioned industrial waste wood materials come still less into consideration as a fuel for industrial purposes.

According to my invention I work up the mentioned forest waste woody materials possessing a high calorific value by suitably disintegrating them by means of suitable devices, to a degree sufficient to form briquets therefrom by compression and then forming them together with suitable porous and gas-binding admixtures into briquets. As such admixtures wood charcoal is the most important, it being very valuable owing to its property of binding gas and to its great porosity. I may however employ other porous substances which bind gas, such as peat charcoal, coke and the like. I employ about 5–15% of such admixtures. An admixture of a binder, such as pitch, tar oil or the like is not necessary. On the other hand, when the outdoor temperature is too low, *e. g.* during the cold season of the year, it is preferable to heat the mixture a little when forming it into briquets; such heating, may, however, be only so slight that it does not cause any volatilization or distillation of any constituents of the materials and may in no case be more than 100° C.

The briquets made from such waste materials cost about the same as coal but possess a greater calorific value. They are very clean and very little smoke is developed by them. They leave behind only little ash and the surfaces which they heat, particularly boiler plates, last longer when such briquets are used than when coal is burnt because their products of combustion contain no sulfurous acid.

Example: 850 kg. dead wood, root-stocks, tops of trunks and the like from *Douglasii* forests or woods are disintegrated by means of suitable devices into sufficiently small pieces which can be pressed. They are then well mixed with 150 kg. coarse powdered wood charcoal of any desired origin and pressed into briquets of the ordinary form.

It is to be understood that my invention is not limited to the mentioned constituents or proportions, but that the invention substantially consists in disintegrating woody waste material of all kinds met with in forestry, such as branches, twigs, tops of trunks, roots, dead wood and the like in a fresh or dry state and not decomposed by rot or devastation and mixing it with wood charcoal or with some other similar porous, readily carbonized and combustible material, and forming the mixture into briquets.

I expressly state that I consider the manufacture of industrial waste wood into briquets in the above mentioned manner, *i. e.* sawdust, shavings, waste obtained in working boards and the like, as outside the scope of my invention; likewise, I do not claim the employment of fallen leaves, rotten and decayed wood or roots, humus, spent bark or the like; also, I do not claim the manufacture of briquets of the kind described with an admixture of a binder such as pitch, tar, sulfite cellulose lye or the like, nor mixtures containing an admixture of mineral substances of any kind, such as sand, lime, metallic oxids or the like; but

I claim:—

1. A process of working up waste forest wood obtained in forestry, consisting in disintegrating the waste wood, in mixing it with wood charcoal, and in forming the mixture into briquets.

2. A briquet composed of disintegrated waste wood obtained in forestry mixed with wood charcoal.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRIEDRICH von KALITSCH.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.