Nov. 15, 1932. D. W. BERLIN 1,887,671

METHOD FOR IMPROVING PEAT FUELS AND THE LIKE

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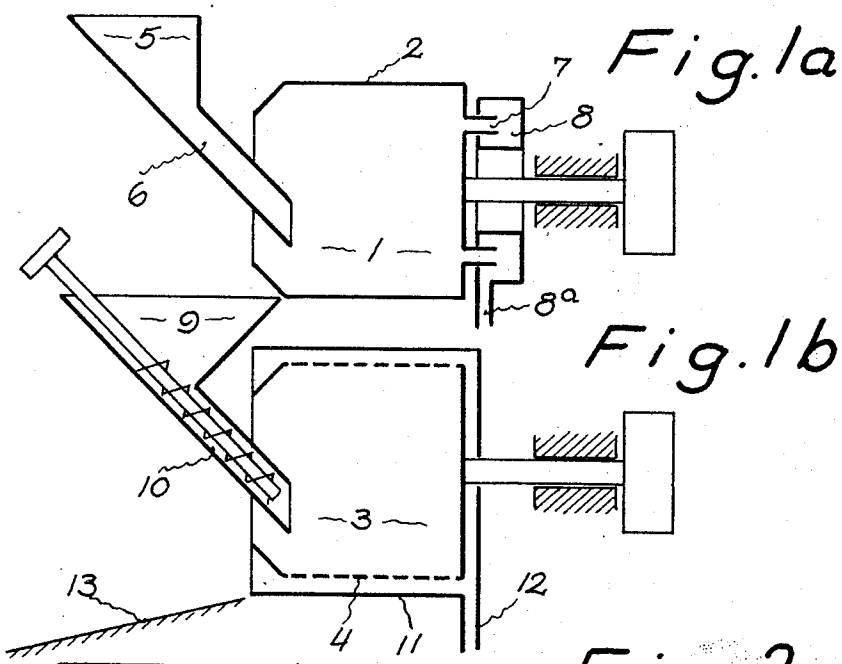


Fig. 1a

Fig. 1b

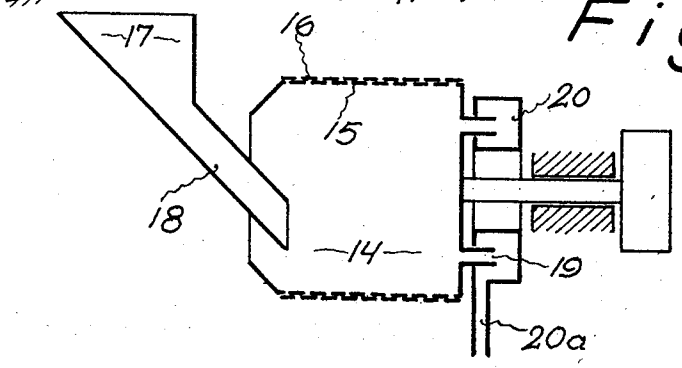


Fig. 2

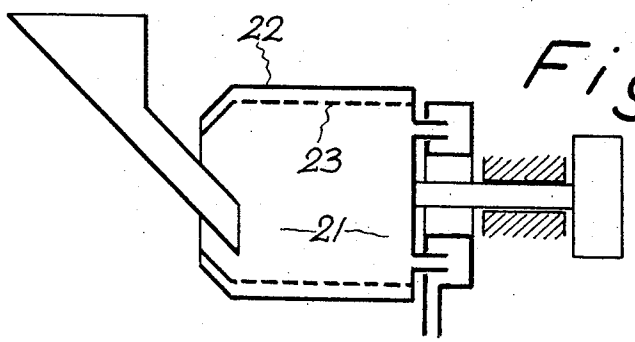


Fig. 3

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METHOD FOR IMPROVING PEAT FUELS AND THE LIKE

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My present invention refers to a method for improving or transforming peat or other inferior fuels into similar products of a superior quality by removal of moisture from such substances as wet-carbonized peat, or peat otherwise pre-treated, sawdust, wood splinters or waste wood in general, dried grasses and the like. At the separation of a liquid from a finely disintegrated material, the difficulty lies in the obtaining of a sufficient degree of dryness, as a finely disintegrated material possesses a greater capillary power acting for retention of the liquid than a material consisting of coarser grains.

In order to perform an efficient drying action by mechanical influence, it is required that the drying is performed according to principles making it possible to subject the liquid constituent to a maximum of separative power both when removing the main part thereof and when removing the final rests.

My present invention involves a solution to this problem and consists mainly therein that the substance to be dried or dewatered, which substance is pre-treated in a manner known per se, for instance by wet-carbonization, during a first stage of treatment, for removing the main amount of liquid, is thrown out from the liquid, whereafter the liquid, during a second stage of treatment for removing the small rest thereof, is thrown away from the solid substance.

In practice these principles are carried into effect in such a manner that a liquid containing substance, or a solid substance sludged in a liquid, by means of centrifugation is at first separated from the main amount of liquid by treatment in a centrifugal machine, the bowl or drum of which is provided with unpenetrable walls, so that the solid substance, due to the centrifugal action arising, is thrown through the liquid and settles against the unpenetrable walls of the drum, the liquid being forced towards the centre of the drum and removed therefrom, whereafter the product is again centrifugated when resting on perforated or generally liquid penetrable walls, so that the centrifugal action then arising forces the rest of the liquid through the solid product and further through the penetrable walls of the drum. In this manner the ideal condition is obtained that the power required for separation of the constituents is applied just at that point where it is able to act in the most favourable and effective manner, i. e. directly within the material.

In the first stage of treatment of the material in the centrifugal machine, it may be advantageous to sub-divide the product settled against the wall of the drum into different layers or strata, and such step can be performed either by means of insertion of perforated division walls or, at the discharge of the product from the machine, to cut out the same in different layers. The reason hereto is that when separating certain substances, the layer settled nearest to the wall of the drum may have such very low content of moisture that it need not be subjected to the second stage of treatment.

Although applicable to materials of different kinds, the invention is mainly intended for separation of wet-carbonized peat from water mixed therewith, and this object is obtained in such a way that the peat is at first separated from the main bulk of water by treatment in a centrifugal machine the drum of which has unpenetrable walls, so that the peat mass is collected on the inner face of the wall of the drum, the water being forced inwardly therein towards the centre, whereafter the peat is again subjected to centrifugation in another machine provided with perforated, porous or otherwise liquid penetrable walls, so that the water is thrown out therethrough.

In a specific embodiment of invention, adapted for making the process automatic in the greatest possible degree, the peat is at first separated from the main bulk of water in the manner described above, whereafter the unpenetrable walls are made liquid penetrable, by forming suitable openings therein, and the peat in the same machine is subjected to another centrifugation at which the rest of the water is thrown away through said openings.

In another embodiment of invention,

adapted for simplifying the process and for making it possible to use one single centrifugal machine throughout, the peat is at first separated from the main bulk of water in the manner described whereby certain portions of the dry substance is settled within cavities provided in the wall of the drum, whereafter the remaining water at a later stage of separation is forced out through the peat substance at hand in these cavities.

In order to increase the working capacity at the separation, it may be suitable in certain cases /depending on the condition of the materials to be separated/ to permit the finest sludgy particles at the first stage of separation to depart from the separator together with the liquid, so as either to be admixed again with the raw material fed in, or permitted to settle out from the liquid in order thereafter in a more concentrated condition to be introduced into the separator again.

The annexed diagrammatical drawing is intended to show some different embodiments of machines adapted for carrying the invention into effect, all of the figures in the drawing being intended to show the different machines seen in longitudinal section.—

In the drawing

Fig. 1*a* and Fig. 1*b* show a set of centrifugal separators adapted to be used in series in the same separation process, Fig. 1*a* showing the first machine and Fig. 1*b* the second one.

Fig. 2 shows a centrifugal separator adapted to be used as single machine for the complete process and provided with a double walled drum, both walls of which are perforated and mounted slidably in relation to each other in axial direction.

Fig. 3 shows another embodiment of a centrifugal separator provided with a double walled drum, the inner wall being liquid penetrable the outer being unpenetrable.

According to Figs. 1*a* and 1*b* the first separator or pre-centrifuge has the general reference 1, and it is provided with a drum having an unpenetrable side wall 2, the second separator or super-centrifuge having the general reference 3, and is provided with a drum having a liquid penetrable side wall 4. The penetrability of the last mentioned wall can be effected in many different ways, such as by strainer plates or filters of suitable kinds. A porous material may also be used for the said wall.

When used in practice, the set of machines described above functions in such a way that the liquid containing material is at first fed into the pre-centrifuge (Fig. 1*a*) by means of the charging hopper 5 and the chute 6, suitable proportions being introduced into the drum for each charge. The liquid constituent collecting towards the centre of the machine departs by means of the outlets 7 and the annular and stationary collector 8 provided with the outlet 8ª. The layer of comparatively dry substance settled against the unpenetrable drum jacket 2 is scraped off and down into the hopper 9 belonging to the super-centrifuge (Fig. 1*b*). From the last mentioned hopper the substance by means of the screw conveyor 10 is fed into the drum belonging to the super-centrifuge and formed by the liquid penetrable jacket 4. In this second machine the rest of water is removed and departs through the said jacket 4 into the non-rotating collector 11 surrounding the same, as thereafter to depart from the collector by means of the outlet 12.—The final dry product is scraped out from the super-centrifuge on the inclined surface 13, from where it can be removed by any suitable means for further treatment, i. e. for final drying by heat treatment within a suitable kiln.

The combined first and second stage machine diagrammatically shown in Fig. 2 comprises a separator drum having the general reference 14. This drum consists of double walls 15 and 16 which are both liquid penetrable, i. e. for instance perforated, such drum walls being constructed in such a manner that the outer one 16 may be displaced in axial direction in relation to the other. Hereby the combined drum may naturally be made liquid penetrable or non-penetrable according to will, and when the perforations in the walls 15 and 16 are in register the liquid may escape therethrough, but otherwise such escape is impossible.

According to this embodiment the liquid containing material is fed in by the intermediary of the hopper 17 and the chute 18, and in the first stage of treatment the drum walls 15 and 16 are slid into such a position in relation to each other that the drum wall is unpenetrable. Thereby the liquid collected towards the centre of the drum is discharged through the outlets 19 and the annular collector 20 provided with the outlet 20ª. During the second stage of treatment, the outer drum wall 16 is displaced in relation to the inner wall 15 so that the perforations are more or less in register. Then the rest of the liquid will be thrown out through the penetrable drum wall, and the liquid thus escaping may be collected and led off in any suitable manner, for instance as shown and described with reference to Fig. 1*b*.

According to Fig. 3 the centrifugal machine, having the general reference 21, is provided with a drum built up from an inner liquid penetrable wall 23 and an outer non-penetrable wall 22, both of such walls being positioned in a little distance from each other rigidly connected.—Otherwise this construction is substantially the same as shown in Fig. 2.

This machine is also intended to act as

single machine for a complete treatment, and during the first stage of separation the solid product collecting between the walls 22 and 23, when acted upon by the interior pressure, will slowly slide towards the open (left) end of the drum, which is somewhat restricted as shown in the drawing, and at this point the collected and compressed solid product, during the second stage of separation, will serve as a filter and liquid penetrable means for the rest of the liquid at hand in the substance remaining within the inner compartment of the drum.

The perforation of the inner drum jacket 23 may be performed by means of annular openings, and the outer drum may be subdivided into a number of annular sections between which the liquid can escape after having passed the layer of peat at hand between the drum jackets.

Another method for removal of the peat mass from the machines described is by mounting the drum proper in a disconnectable manner on a supporting disc, so that the drum, after finishing the treatment, may be disconnected and turned upside down for the purpose of emptying. The interlocking means between the drum and the disc may be carried out in any suitable way.

According to the drawing the machines in all embodiments are supposed to have horizontal axis of rotation, but naturally the function will be substantially the same even if the axis is vertical or positioned in any inclination. The means for imparting a rotation to the drum may be constructed in any suitable manner independent of the invention, and the belt pulleys shown in the drawing are to be considered as an example only.

What I claim and desire to secure by Letters Patent is:—

1. A method for improving peat or other inferior fuels, and for transforming them into similar products of superior quality comprising first subjecting the material to wet-carbonization by heat treatment, thereafter removing the main contents of water by centrifugation in a centrifugal machine having drum walls unpenetrable to water, then subjecting the mass pre-dried by the first centrifugation to a second centrifugation in a centrifugal machine having drum walls penetrable to water, and finally heating the mass resulting from the second stage of centrifugation for final drying.

2. A method for improving peat or other inferior fuels, and for transforming them into similar products of superior quality comprising first subjecting the material to wet-carbonization by heat treatment, thereafter dehydrating the wet-carbonized material by means of centrifugal separation in two stages succeeding each other, the first of such stages being a centrifugation of the mass against drum surfaces unpenetrable to water so that the solids are thrown out from the liquid, the second stage being a centrifugation of the pre-dried mass from the first stage against drum surfaces penetrable to water so that the liquid is thrown out from the solids, and finally heating the mass resulting from the second stage of centrifugation for final drying.

In testimony whereof I have signed my name to this specification.

DAVID WERNER BERLIN.