G. MERKEL.

PROCESS OF DISTILLING AND EXSICCATING WATERY COMBUSTIBLES.

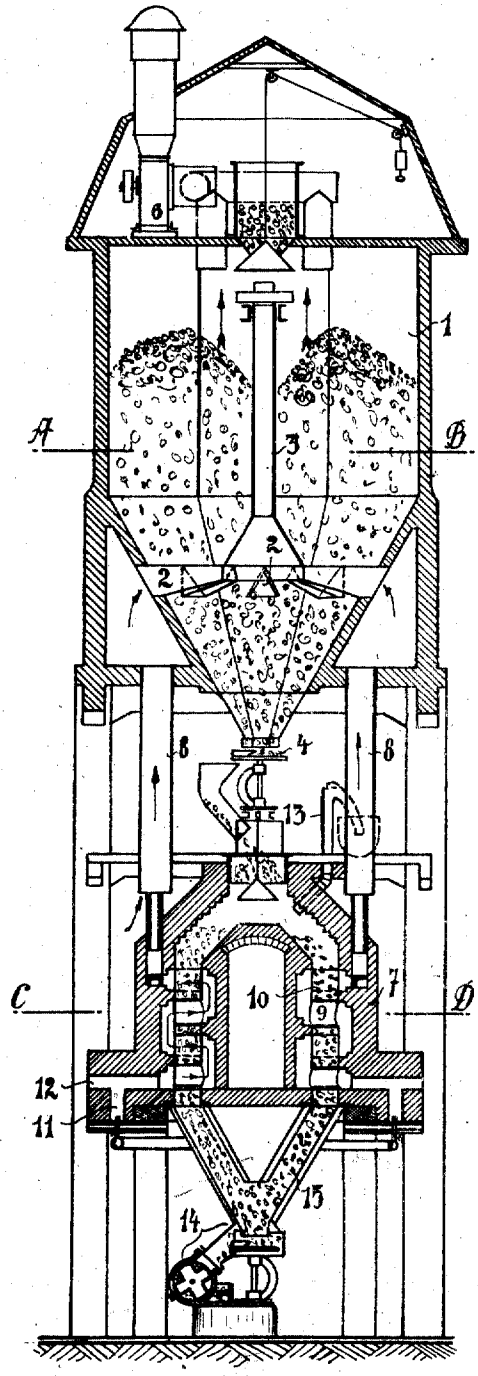
APPLICATION FILED APR. 13, 1917.

1,229,637.

Fig. 1.

Patented June 12, 1917.

2 SHEETS—SHEET 1.



Inventor
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2 SHEETS—SHEET 2.

Fig. 4.

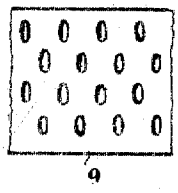


Fig. 5.

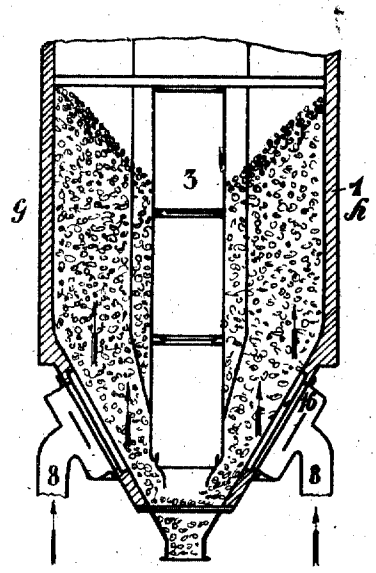


Fig. 2.

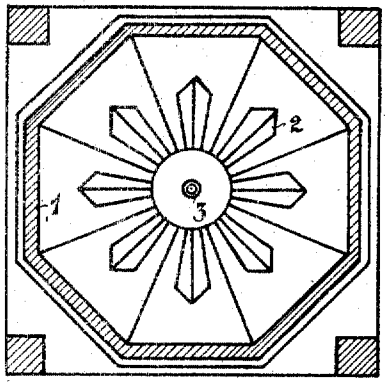


Fig. 3.

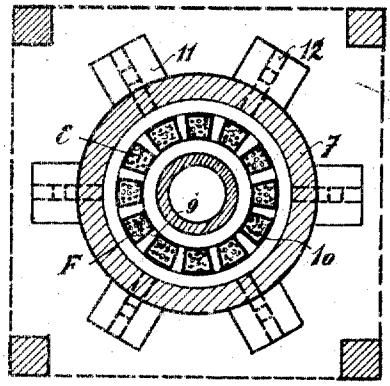
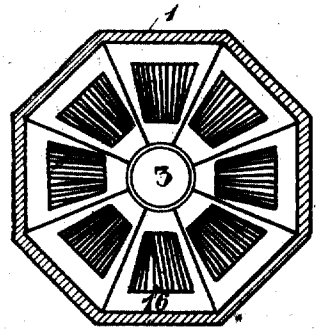


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORG MERKEL, OF MUNICH, GERMANY.

PROCESS OF DISTILLING AND EXSICCATING WATERY COMBUSTIBLES.

1,229,637. Specification of Letters Patent. Patented June 12, 1917.

Application filed April 13, 1917. Serial No. 161,898.

To all whom it may concern:

Be it known that I, GEORG MERKEL, citizen of Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in the Process of Distilling and Exsiccating Watery Combustibles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in the process of distilling and exsiccating watery combustibles and the objects of my invention are the removal of certain drawbacks and disadvantages in similar processes hitherto in vogue and referred to herein, to improve the product obtained by the said process, and to design a device particularly adapted for carrying out my improved methods.

In describing my invention I refer to the drawings herewith illustrating a furnace or kiln as used for the distillation of watery combustibles, but improved as hereinafter described and combined with a silo mounted thereon, the whole being designed for carrying out the purposes of my invention.

In distilling wet combustibles, such as brown-coal, lignite, peat and the like, as heretofore practised, the structure of the material was destroyed to such an extent through intensive evaporation within the distilling-furnace or kiln and sudden shrinkage that the residue was not obtained in solid form, but merely as coal dust. This disadvantage is not of great importance if the object of the distillation is to obtain the distillate only, but if the residue is intended for use, particularly if the same shall be employed as a fuel, it must be solid.

The only remedy by which the crumbling of the combustibles during distillation may be avoided has been found to be in removing the chief portion of the water therein contained by a preparatory drying in advance of the distilling process. In big works artificial exsiccation is resorted to only, because natural drying by the action of the open air would be much too costly and time consuming.

Now, thorough tests have shown that the temperature and degree of moisture of the drying means are of considerable influence on the physical condition of the ultimate product. The slower and milder the preparatory drying of the wet combustible goes on, the more solid and valuable will be the residue of distillation.

Accordingly, the present process comprises a preparatory exsiccation in a current of air of moderate dampness and of a lower temperature than the boiling point of water. The temperature of the drying means, *i. e.* the moderately damp and hot air-current, is preferably as low and its moisture content is as high as economy of drying may permit. Generally the most suitable temperature for the air entering the drying compartment has been found to be from fifty to eighty degrees Celsius, while a temperature of more than one hundred degrees Celsius should be avoided, lest the development of the vapors might cause the disadvantage above referred to.

The favorable effect of a moderately moist and warm air-current may, for instance, be observed in the air-shafts of lignite pits where the walls or sides, owing to the action of the escaping damp and warm air, show a strikingly solid and tough condition of the coal where they pass.

In case of distillation of very moist material, as peat, a natural drying in the open air should precede the artificial exsiccation referred to.

Crude peat contains in the average from eighty-five to ninety-two per cent. of water and therefore can never be made dry economically by means of artificial heat alone, because the heat content of crude peat is not sufficient to evaporate the water therein contained. In addition, the handling of so moist a peat is difficult owing to its pulpy condition.

In my process the crude peat will be first freed of its water to a certain extent for the purpose of rendering the subsequent artificial exsiccation economical and at the same time imparting a consistency to the peat sufficient to make it capable of resisting a certain degree of pressure.

The degree of moisture of the peat is also important from another point of view, it having appeared that at the beginning of the drying process water issues so rapidly from fresh peat that exposure to the action of the open air for two or three weeks will be sufficient to reduce its moisture to a proportion of fifty to fifty-five per cent., a result which may be attained even during cool weather. The production of dry peat which is used in most countries for heating purposes and possessing about twenty to twenty-five per cent. of moisture, requires to be stored in the open air for about eight to ten weeks.

It is clear from the foregoing that artificial exsiccation may be with advantage commenced as soon as the crude peat exposed to the action of the air has attained a degree of moisture of fifty to fifty-five per cent.

The further treatment of the peat the moisture content of which has been reduced proceeds in the way which is followed in the treatment of pit-moist lignite coal, the moisture content of which averages also about fifty per cent.

In carrying out my process I prefer to employ a device as illustrated in the drawings herewith in which Figure 1 is a vertical section through an entire plant; Fig. 2 is a horizontal section on the line A—B of Fig. 1; Fig. 3 is a horizontal section on the line C—D of Fig. 1; Fig. 4 is a segmental section on the line E—F of Fig. 3; Fig. 5 is a vertical section through a drying-silo hereinafter referred to and showing a modification of the silo forming a portion of the plant shown in Fig. 1, and Fig. 6 is a horizontal section on the line G—H in Fig. 5, the said modification comprising inclined grates (16) hereinafter mentioned, and embedded in the funnel-shaped bottom portion of the silo.

As drying means I employ the hot gases which issue from the distilling-furnace 7 and mix within the annular compartment 8 with the atmospheric air admitted thereto. The combustion water always present in the heating gases causes a moistening of the drying means to the desired degree. This method of generating warm air is of great advantage because almost the entire heat of the heating gases issuing from the furnace is thus utilized, going over into the drying means.

The material dried within the silo is then, by the aid of scraper device 4, fed into the distilling furnace 7. To prevent crumbling of the material during distillation it will in most cases be sufficient to dry the material down to ten to twenty per cent. of moisture.

The drying device comprises a silo 1 the lower portion of which is provided with radially disposed angular ducts 2 acting as passages for the admission of the hot air, being secured with their outer open ends in corresponding openings in the wall of the silo and with their inner ends in a central conical bottom portion which is attached to a tubular core 3.

The charge admitted into the top of the silo descends at the rate at which dried material is drawn off through the said discharger or scraper table 4.

The drying is effected by counter-current, the hot air traveling beneath the angular pieces 2 into the material, expanding and being drawn upwardly by the fan 6. The hot air being uniformly distributed over the whole section of the silo, the exsiccation of the material is also uniform.

The distilling-furnace 7, beneath the silo, comprises mainly concentric embedded iron or steel cylinders connected with each other by radial flues 9, preferably of oval cross section. The annular space 10 between the said two cylinders receives the material intended for distillation, which descends at the rate at which the residue from the same is taken out of the furnace.

The heating gases may be produced by the burning of generator gas in the fire-box 11, though any combustible gas may be employed. The required air may be supplied through openings 12. The heating gases flow spirally upwardly through the furnace, as indicated by arrows in the drawing, Fig. 1, and after they have left the furnace, they are made use of for exsiccation in the silo above, as hereinabove set forth.

To secure better distribution of the heat within the distilling furnace, the flues 9 may be arranged in staggered relation, as illustrated in Fig. 4.

The residue obtained by the distillation after being cooled in the cooler 15, may be continuously discharged by a special discharging device 14, constructed to prevent an admission of air into the distilling compartment.

The distilling gases escape through the tube 13 on top of the distiller.

I claim:

1. The herein described method of producing solid fuel from watery combustibles, which consists in first exposing the combustibles to the action of a current of moist air at a high temperature but lower than the boiling point of water, and then distilling the material while excluding atmospheric air therefrom.

2. The herein described method of producing solid fuel from watery combustibles, which consists in feeding such combustibles in one direction and passing therethrough in an opposite direction a moist current of air and gases at a high temperature but lower than the boiling point of water, and then distilling the material.

3. The herein described method of pro-

ducing solid fuel from watery combustibles, which consists in first exposing the material to the action of air until the moisture content of such material has been reduced to between fifty and fifty-five per cent., thereafter subjecting said material to the action of a current of moist air at a high temperature but lower than the boiling point of water, and finally distilling such material.

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

GEORG MERKEL.

Witnesses:
EDUARD PASAIG,
AUGUSTE FICHLER.