

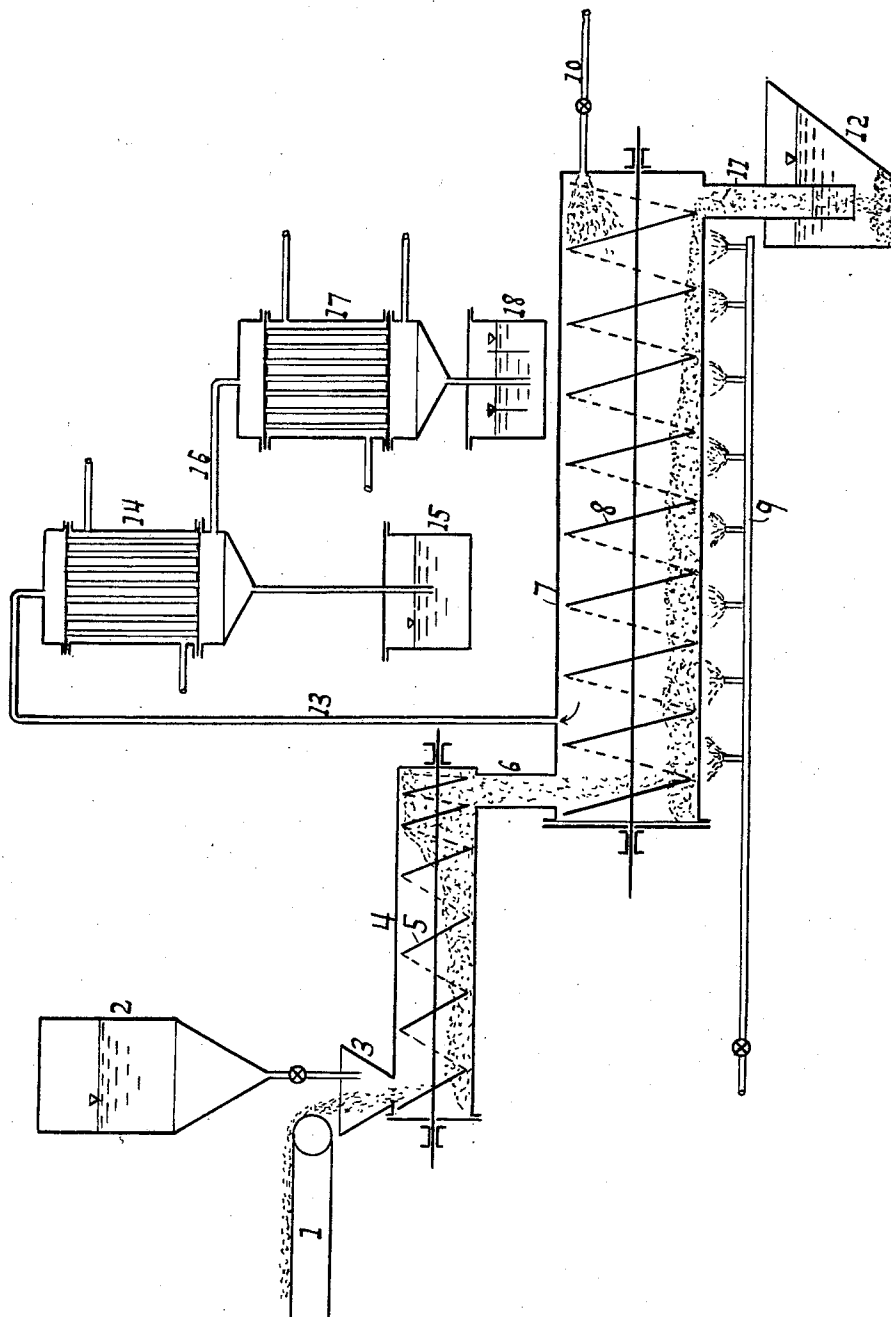
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LOW TEMPERATURE CARBONIZATION OF CARBONACEOUS MATERIAL

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LOW-TEMPERATURE CARBONIZATION OF
CARBONACEOUS MATERIAL

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2 Claims. (Cl. 202—15)

This invention relates to an improved process for the low-temperature carbonization of carbonaceous material.

The recovery of oils from oil bearing residues of the destructive hydrogenation of distillable carbonaceous materials, such as coal in all its varieties, tars, mineral oils and the like, which process is carried out at a pressure above 20 atmospheres and at a temperature between 300° C. and 700° C. as shown in Australian Patent No. 1217 of 1928, or from the residues obtained by the treatment by extraction of substances of the nature of coal and the like under an elevated pressure, the said processes being hereinafter referred to collectively as the "heat treatment of distillable carbonaceous materials under pressure." By the term "residues" is meant, wherever this expression is employed in the present application, the products remaining after the substances of low-boiling point have been distilled off.

It is known that considerable difficulties are encountered in practice when working up the oil-bearing residues containing solid materials obtained by the destructive hydrogenation of carbonaceous materials such as substances of the nature of coal, tars, mineral oils and the like, or when working up the residues obtained by the treatment by extraction with solvents of substances of the nature of coal under an elevated pressure, for example by means of benzene at an elevated temperature, since the said residues are often obtained in a semi-liquid form which is very unsuitable for their further treatment. The extraction of oils from the said residues as completely as possible is, however, a matter of great practical importance.

We have found that the recovery of oils from the said oil-bearing residues can be carried out with particular advantage if these initial materials be mixed with finely divided, dusty or fine grained carbonizable materials, in particular bituminous substances, such as coal dust, finely ground oil shale, fine or coarse sawdust, and the like. The mixture of materials under treatment may be made up into a paste with liquid hydrocarbons, or with mixtures or derivatives thereof. This practice of subjecting the carbonizable substances to low temperature carbonization and driving out the oils from the residues of destructive hydrogenation and the like has the advantage that the oils are obtained from the finely divided and fine grained carbonizable materials, simultaneously with the oils expelled from said residues, which oils are, in many cases, par-

ticularly suitable for certain applications, such as for employment as a pasting medium for solid starting materials for the destructive hydrogenation or for the present low-temperature carbonization process. The process has the further advantage that the state in which the materials are treated is particularly advantageous for the said purpose.

In the process according to the present invention solid substances promoting the formation of hydrocarbons of low boiling point from those of higher boiling point namely the solid residues of the heat treatment of solid fuels, such as coke, semi-coke, ashes or clinkers from producers and the like, which substances may act by loosening up the starting material or which may also exert a catalytic action may be advantageously added. Substances with an injurious action, especially such as give rise to the deposition of coke and formation of methane, such as free iron in a finely divided reactive form, nickel and the like, are preferably excluded.

The invention will be further illustrated with reference to the accompanying drawing, which shows an apparatus in vertical section, but it should be understood, that the invention is not limited to operating with the apparatus illustrated. 1 is an endless band for the introduction of solid fuel into the hopper 3. 2 is a container for residues which are also introduced into the hopper 3. 4 is a mixing vessel provided with a worm conveyor 5. 7 is a carbonizing vessel provided with the worm conveyor 8 and heated by the burners 9. 10 is a pipe for the introduction of scavenging gases into said vessel. 13 is a pipe for the removal of gaseous and vaporous carbonization products, and 14 and 17 are condensers. 16 is a pipe connecting said condensers. 15 and 18 are containers for condensates. 11 is a pipe for the removal of solid residues, and 12 is a vessel for collecting and quenching said residues.

The following example further illustrates the nature of this invention with reference to the accompanying drawing, but the invention is not restricted thereto.

Example

Lignite dust introduced by means of the endless band 1 is made into a paste in the mixing vessel 4 containing the worm 5 and provided with the hopper 3 for the introduction of the materials therein with oily residues from the destructive hydrogenation of coal introduced from the storage vessel 2. The mixture is passed through a low-temperature carbonization retort 7 by means

of a worm conveyor 8, and is met by a counterflow of scavenging gas such as superheated steam from the pipe 10, which carries off the vapors of the oils and distillation products. The retort is heated by means of the burner 9. The current of steam issuing from the retort by way of the pipe 13 is practically free from solid constituents and is passed through a cooling and condensing plant 14, in which the heavy oil condenses and collects in the vessel 15. The lighter hydrocarbons and water pass off by way of the pipe 16 to the condenser 17 where they are cooled to room temperature, the water and the lighter hydrocarbons condensing and being collected in the vessel 18. The residue, which consists of spent coal and destructive hydrogenation residues freed from oil, and which no longer contains any more oil is removed by way of the pipe 11 and is collected in the vessel 12. The yield of low temperature tar from the brown-coal employed

is over 100 per cent more than that furnished by a test determination in an aluminium low-temperature carbonization apparatus.

What we claim is:

1. A process for separating from semi-liquid oil-bearing residues obtained by the destructive hydrogenation of distillable carbonaceous materials the oils contained therein, as such and substantially free from solid particles, which comprises making up said oil bearing residues into a paste together with finely divided solid carbonizable material and carbonizing the mixture at a low temperature in the presence of a counterflow of hot inert scavenging gas, thereby distilling off the oils and recovering them.

2. A process as defined in the preceding claim in which the scavenging gas is superheated steam.

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