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[56]

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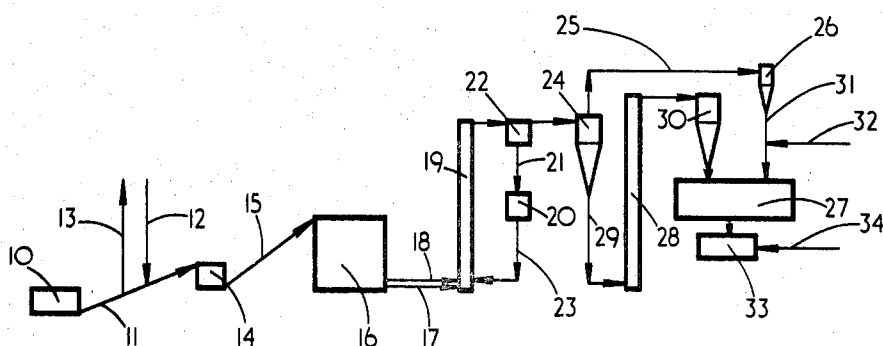
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[54] **PROCESS FOR THE TREATMENT OF COAL TO
 RENDER IT SUITABLE FOR USE IN COKE OVEN**
4 Claims, 1 Drawing Fig.

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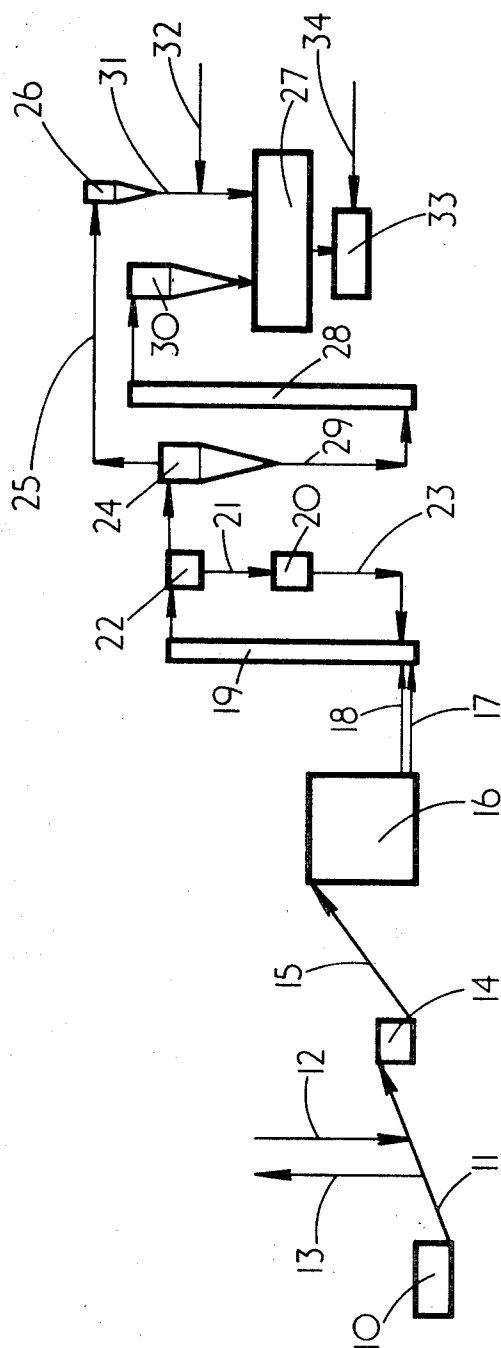
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ABSTRACT: The treatment of coal which is of a size, or which is crushed to a size not greater than 1 inch by drying and heating the coal and separating the relatively fine coal dust therefrom before delivering the coal and the coal dust mixed with oil to a surge bin.



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PROCESS FOR THE TREATMENT OF COAL TO RENDER IT SUITABLE FOR USE IN COKE OVEN

This invention relates to a process for the treatment of coal to render it suitable for use in coke ovens.

It has been previously proposed to feed coal into a series of blending bunkers from which it is conveyed to crushers which reduce the size of the coal to approx. 80—90 percent of $\frac{1}{8}$ -inch material. The crushed coal is then conveyed to large elevated storage hoppers situated above the oven battery, and capable of storing about 48 hours supply of coal for the ovens, in order to preserve continuity of feed to the ovens should there be a breakdown in the conveying means. The coal is then gravity fed into charging cars running on rails on the oven battery top, these cars charging coal into the ovens as required.

Such a process has disadvantages when applied to the conveying, storing and charging of dry or preheated coal in that the crushing means produce a larger amount of fine coal dust than is desirable thus creating dust nuisances at transfer points and explosive risks during storage. In addition the fine coal dust, when introduced into the ovens, causes a significant amount of carryover into the gas-collecting main of the ovens.

An object of the present invention is to obviate or mitigate the aforesaid disadvantages.

According to the present invention, there is provided a process for the treatment of coal to render it suitable for use in coke ovens, comprising the steps of thermally drying and heating coal of a size not greater than 1 inch, separating coal which is larger than required from the remainder of the dried and heated coal, crushing the coal which is larger than required and recycling the crushed coal to the drying and heating stage, removing relatively fine coal dust from the coal from which the larger-than-required coal has been separated, passing the relatively fine coal dust to a surge bin, and passing the coal from which the relatively fine coal dust has been separated to the surge bin.

Preferably, the fine coal dust is mixed with oil prior to being fed into the surge bin.

Preferably also, the preheating means is of the flash type.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawing which is a flow diagram of the coal-treating process in accordance with the present invention.

The apparatus for use in the process for treating coal in accordance with the present invention consists of a number of components, each of which is of known and/or conventional construction, and no claim is made to the individual apparatus components per se.

The coal-treating apparatus comprises a tippler 10 for delivering uncrushed coal containing, for example, 5 to 10 percent water onto a conveyor 11. Uncrushed coal may be delivered to this conveyor 11 from a stockpile (not shown) or removed from the conveyor 11 to the stockpile by conveyors 12 and 13 respectively.

The conveyor 11 delivers the water-containing uncrushed coal to a crusher 14 and crushed coal size 1 inch and/or less, preferably $\frac{3}{8}$ —0 inch is passed by a conveyor 15 to a series of blending/storage bunkers 16 capable of storing about 48 hours supply of coal for the coke oven battery.

The crusher 14 may be omitted if it is not necessary, i.e. if the coal is already of the requisite size, and, in this instance the conveyors 11 and 15 are one and the same.

The coal is fed from the blending/storage bunkers 16 onto one of a pair of parallel endless belt conveyors 17, 18 which carries the coal to the first stage 19 of a multistage preheating plant of the flash type.

The preheating plant may be two or three stage consisting of two or three thermal drying and heating tubes connected in series depending upon the degree of preheat required.

In the present embodiment, the preheating plant is two stage.

A coal crusher 20 is connected to an elutriator 22 of the preheating plant by a chute 21 and takes elutriated coal of a size approximately $\frac{1}{8}$ inch from the elutriator 22 at the top of the first stage drying tube 19 and feeds the crushed coal back into the bottom of the same tube via a chute 23. The preheated coal on passing from the first stage drying and heating tube 19 is passed to a first stage primary cyclone 24. This cyclone 24 is designed to separate the coal of size greater than about 100BS mesh from the residual coal of size less than 100BS mesh. The smaller sized residual coal passes from the top of cyclone 24 via a tube 25 to secondary cyclones 26 for removal from waste gases and which cyclones are located above a surge bin 27. The larger sized coal is passed from the bottom of the cyclone 24 to the second stage heating tube 28 via a chute 29. This coal is then delivered at a temperature of, for example, between 150° to 300° C. to a main preheater cyclone 30 located above the surge bin 27.

The coal from the preheater cyclone 30 and the fine coal dust from the secondary cyclone 26 are then passed into the surge bin 27, the fine coal dust from the cyclone 26 passing via a mixer conveyor 31 whereat it is mixed with oil 32 before it enters the surge bin 27.

The surge bin 27 is provided with level controllers which control the coal feed from the blending/storage bunkers 16 onto the conveying system 17, 18 and is purged with inert gas. Preheated coal is gravity fed from the surge bin 27 into the hoppers of a charging car 33 whereby the coal is charged into coking ovens (not shown). The coal, on passing from the surge bin 27 to the charging car 33, is introduced through telescopic sleeves incorporating filters, which are the subject of British Pat. application No. 12402/68 filed Mar. 14, 1968, and a film of oil as generally indicated at 34 is sprayed over the surface of the coal in each hopper to prevent coal dust being discharged into the atmosphere when the charging car 33 travels to the ovens. The charging car 33 is of the "clean air" type and is provided with a gas washer and gas ignition equipment in known manner.

The twin conveyors 17, 18 are provided in order to offset the possibility of breakdown in one conveyor between the main coal storage bunkers 16 and the preheating plant.

Whilst the above embodiment refers to preheating of the flash type, other types of preheating apparatus can also be employed, for example, fluidized bed driers or others which involve thermal drying of the coal.

It will be apparent that the process described above provides an arrangement whereby coal can be treated in such a way that undue emission of fine material is reduced to a very low level, due to avoidance of overcrushing of inherent fine material and treatment of this material within the process. This factor minimizes dust nuisance at transfer points, considerably reduces explosion risks and keeps carry over of fine material into the collecting main of the coke oven battery to a minimum.

A further advantage of the present invention is that a large storage hopper containing a large amount of preheated coal is dispensed with.

If the preheating plant comprises more than two thermal heating and drying stages then appropriate recirculation of the coal will be effected.

What I claim is:

1. A process for the treatment of coal to render it suitable for use in coke ovens, comprising the steps of thermally drying and heating the coal of a size not greater than 1 inch, separating coal which is larger than required from the remainder of the dried and heated coal, crushing the coal which is larger than required and recycling the crushed coal to the drying and heating stage, removing relatively fine coal dust from the coal from which the larger-than-required coal has been separated, passing the relatively fine coal dust to a surge bin, and passing the coal from which the relatively fine coal dust has been separated to the surge bin.

2. A process as claimed in claim 1 including the step of mixing oil with the relatively fine coal dust prior to passing the latter to the surge bin.

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3. A process as claimed in claim 1, including the step of crushing the coal to produce the coal of a size not greater than 1 inch.

further heating the coal from which the relatively fine coal dust has been removed prior to passing the said coal to the surge bin.

4. A process as claimed in claim 1, including the step of

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