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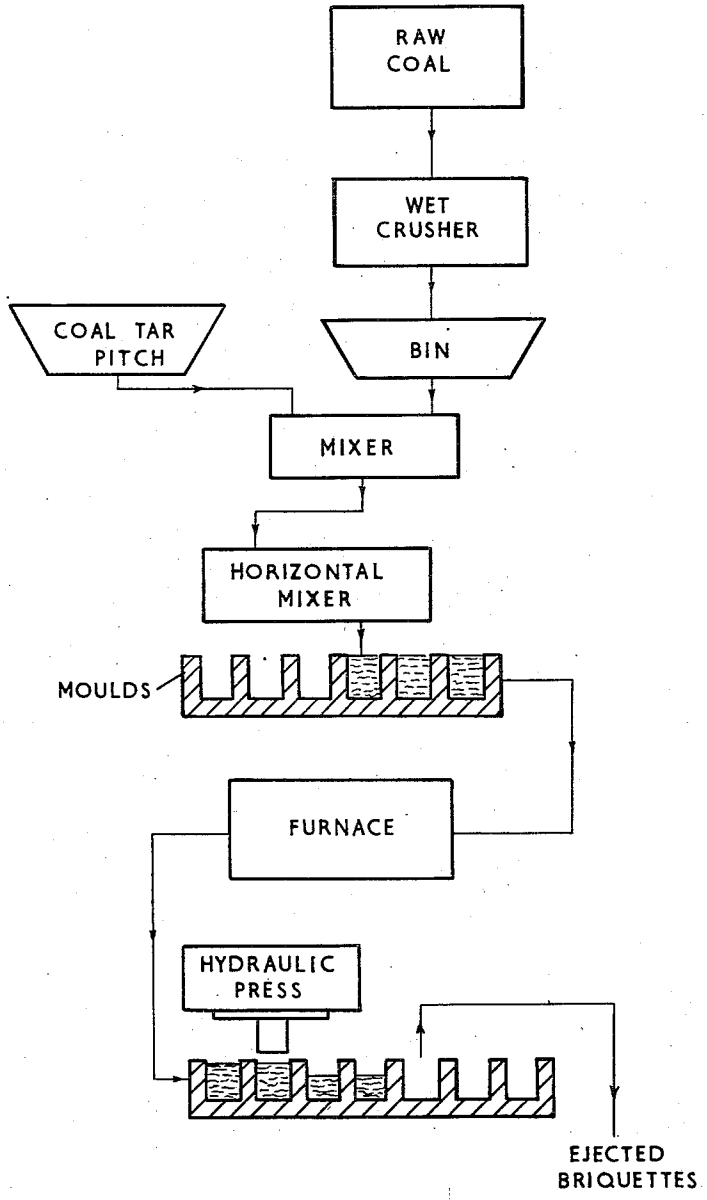

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BRIQUETTING OF COAL

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This invention relates to the briquetting of coal without the use of an added binder.

In the manufacture of carbonised briquettes it is sometimes necessary according to the type of coal used, to pre-treat the coal before briquetting in order to prevent clustering and distortion of the briquettes during the subsequent carbonization treatment. One well known pre-treatment process is oxidation in which the coal is heated in an atmosphere containing oxygen at a temperature of approximately 300–350° C. It is advantageous to briquette this oxidised coal at or near the oxidation temperature, that is at 300–350° C., and then to carbonise the briquettes. The conventional process of briquetting with a binder would necessitate the cooling of the oxidised coal to temperatures of, for example 80° C., which, if the briquettes are subsequently carbonised, would mean reheating the briquettes through the temperature range of cooling of the coal.

Three main processes have previously been proposed for the briquetting of coal without the use of an added binder and these are based on combinations of different temperatures and pressures which combinations may be classified as follows:

(1) The use of high pressures at atmospheric temperatures.

(2) The use of moderate pressures at moderately elevated temperatures.

(3) The use of low pressures at high temperatures.

In the first process, the pressures used for black coal are of the order of 8 to 30 tons per square inch. Essentially this process is a development of the processes used for briquetting brown coal, although with the latter coal much lower pressures are permissible.

The second class of process is one in which use is made of the incipient surface fusion of certain coals, especially those of the coking type, to cause agglomeration of the non-fusible coal to be briquetted. The pressures required in this class of process are of an order much less than those required in the above-mentioned first class of process.

In the third class of process, in which high temperatures are used in conjunction with low pressures, use is made of the property of the coal to fuse at or near its decomposition temperature. It is an object of the invention to so treat coal that the fusion temperature is reduced and at the same time the range of temperatures is enlarged thereby overcoming an obstacle to the successful operation of known processes. Although a few coals may fuse before decomposition occurs, many others fuse within the temperature range in which the volatile constituents are given off. In this third class of known process it is necessary to control carefully the briquetting temperatures in order to prevent undue loss of volatile matter.

The present invention relates to the third class of process with one of its objects to provide a process by which coal can be briquetted at a temperature substantially below that at which decomposition takes place and in which the temperature is not unduly critical.

According to the invention, in a coal briquetting process the coal to be briquetted is heated to its fusing temperature after admixture with a small quantity (i. e. less than 8%, but preferably 5% by weight on dry basis) of a fluxing agent selected from the group consisting of coal tar, coal tar by-product pitch, bitumen, a by-product of the distillation of petroleum, and tar or oils recovered from the distillation of wood, and the hot fused mixture is briquetted by the application of pressure whilst the mixture is fused and is at a temperature of from 250° C. to a temperature below the decomposition temperature of the coal used.

The term "fluxing agent" is here understood to denote a substance which when added to coal causes it when heated to fuse at a temperature below that at which it would normally fuse, and which enlarges the fusing range of temperatures.

By the addition of such a fluxing agent with consequent lowering of the fusion temperature, a wider range of briquetting temperatures becomes permissible and also fusion will now take place at a temperature below that at which decomposition commences. The fluxing agent is added in a proportion sufficient only to produce the desired fluxing effect and this is normally a small proportion.

In carrying out the process of the invention, coal of suitable size is pre-heated with the fluxing agent, preferably but not essentially in an inert or neutral atmosphere such as flue gases or steam. Where tar or other liquid is used as a fluxing agent this may be sprayed on to the coal. In all cases the coal and the fluxing agent are thoroughly mixed and the mixture briquetted under pressure in any convenient type of apparatus, such as a double roll or an impact type of press. Briquetting is effected at a temperature within the range 250° C. to 450° C., the temperature being maintained at a value above the fusion point but below the decomposition temperature. The briquetted fuel may then be carbonised at a high temperature if required.

In one example of the process according to the invention illustrated in the accompanying drawing, a low rank coal having a low degree of natural fluidity and decomposing at its normal fusion temperature of 420° C. was crushed in the wet state to below 1/16 inch grain size and mixed at room temperature with 5% by weight on dry basis of coal tar pitch. The coal and tar were then mixed in the conventional horizontal mixer at atmospheric temperature. After thorough mixing the mixture was transferred to moulds of appropriate size and heated in the furnace without the application of pressure until the temperature of the mixture reached 380° C. Escape of the water in the mixture provided the steam atmosphere necessary to prevent oxidation of this coal which has a low degree of natural fluidity. On reaching the briquetting temperature of 380° C. the mixture was pressed at 2 tons/sq. in. in an hydraulic press for one second, and the briquettes so formed immediately ejected from the moulds.

In a further example of the process according to the invention a coal of high natural fluidity was crushed to below 30 B. S. S. (i. e. 30 mesh British standard specification) in size and pre-treated by oxidation at temperatures between 300 and 350° C. Without cooling the coal it was transferred at a uniform rate to a mixing vessel, where a flux of solid pitch crushed to below 30 B. S. S. was added at a known uniform rate. The mixer was of the vertical pug mill type, the only modification from the conventional mill being that increased clearances between the rotating blades and the wall of the mixer were necessitated in order to allow for the comparatively high temperature of

operation. The pitch content of the mixture was 5% by weight.

After mixing the coal and flux the mixture was conveyed to a double roll press without loss of heat and briquetted therein at a temperature of 300° C. Except for increased roll and bearing clearances to allow for the temperature of operation, the double roll press was as used in conventional briquetting practice with pitch as a binder. The briquettes manufactured possessed sufficient strength at temperatures immediately below 300° C. to permit mechanical handling during transport to the carbonising unit.

We claim:

1. A coal briquetting process in which coal to be briquetted is heated to its fusing temperature after admixture with less than 8% of a fluxing agent selected from the group consisting of coal tar, coal tar by-products, pitch, bitumen, by-products of the distillation of petroleum, and tars and oils recovered from the distillation of wood, and the hot fused mixture is briquetted by the application of pressure whilst the mixture is fused and is at a temperature exceeding 250° C. and below the decomposition temperature of the coal used.

2. A coal briquetting process comprising the steps of crushing coal to granular form, mixing said coal with 5% of fluxing agent selected from the group consisting of coal tar and coal tar by-products and pitch and bitumen and tars and oils and by-products from the distillation of petroleum and wood, heating said coal mixed with said fluxing agent to its fusing temperature to form a hot fused mixture, then briquetting said hot fused mixture by the application of pressure whilst the mixture is fused and is at a temperature exceeding 250° C. and below the decomposition temperature of said coal.

3. A coal briquetting process as claimed in claim 2, wherein said coal is heated in an atmosphere of steam.

4. A coal briquetting process as claimed in claim 2, wherein said coal is heated in an atmosphere of flue gases.

5. A coal briquetting process as claimed in claim 8, wherein said fluxing agent is preheated before mixing with said coal.

6. A coal briquetting process as claimed in claim 5 wherein five percent by weight of fluxing agent is added to the coal.

7. A coal briquetting process as claimed in claim 2, wherein the coal and fluxing agent mixture is briquetted at 380° C. and under a pressure of two tons per square inch for a period of one second.

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