(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 377 995 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **89313406.4**

(51) Int. Cl.5: **C10L 5/10**

(22) Date of filing: **21.12.89**

(30) Priority: **12.01.89 GB 8900631**

(43) Date of publication of application:
18.07.90 Bulletin 90/29

(84) Designated Contracting States:
BE DE FR

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(54) **Briquetting process.**

(57) Fine coal is briquetted using a binder incorporating phosphoric acid e.g. molasses/phosphoric acid and up to 2% by weight of the mix of magnesium oxide. The briquettes show good initial green shatter resistance, improved hot crushing strength and/or water resistance.

EP 0 377 995 A2

BRIQUETTING PROCESS

The present invention concerns a briquetting process. More especially it concerns such a process which gives improved cure rate and green strength in "cold" briquetting, that is briquetting at temperatures of up to 100° C.

Our U.K. Patent Number 2,187,754B discusses a variety of cold coal briquetting processes and discloses a useful process utilising a combination of molasses and inorganic hardening agent as binder. Our co-pending U.K. Published Patent application Number 2 209 763A discloses a variation of the process of GB 2,187,754B in its use of concentrated sugar solutions. The disclosures of both these applications are incorporated herein by reference.

A great many cold briquetting processes, in which a water-containing binder is used, while apparently producing satisfactory briquettes of adequate final strength and combustion characteristics, result in green briquettes of inadequate initial strength and water resistance. That is to say, the briquette, when emerging from the briquette forming step are easily broken. In practice on the industrial scale, further handling of the green briquettes and hot curing thereof can result in undesirably high breakages and loss of complete briquettes, requiring recycle of broken briquette pieces or the acceptance of less desirable and less valuable product.

It has now been discovered that the incorporation of minor quantities of magnesium oxide into a water-containing mixture of coal and binder, especially under the normal operating temperatures of industrial processing, yields worthwhile improvements in green shatter resistance, final curing strength and water resistance of the cured briquette combined with undiminished or only slightly diminished green crushing strength. Additionally, magnesium oxide accelerates the rate of cure. Magnesium oxide has been found, in particular, to impart a significant improvement to the green shatter resistance of molasses/phosphoric acid bound briquettes.

The present invention provides a process for the cold briquetting of fine coal, comprising mixing fine coal with a binder utilising phosphoric acid to produce a water-containing briquetting mix, and characterised by the presence in the briquetting mix, preferably in an amount of up to 2% by weight of the mix of magnesium oxide, and briquetting the mix, whereby the green shatter strength, the hot crushing strength of the resulting briquettes during curing and/or the water resistance of the cured briquettes are improved.

Desirably, the binder is a combination of molasses and optionally an organic hardening agent, or a sugar solution, together with phosphoric acid and we refer to our prior applications mentioned above for examples of such binders. Molasses/phosphoric acid binder is particularly preferred.

Preferred coals are high rank non-caking coals, especially those having low smoke emissions such as anthracite. Desirably the coal is of a particular size mainly below 3mm, and anthracite duff is especially suitable. The invention is also applicable to coals for power stations or steam raising and to coal blends containing coking coal components and/or treated coals, e.g. by mild oxidation or pyrolysis. The coal may be crushed or be the direct product of coal cutting.

The briquetting step of the present invention includes all methods of forming agglomerates from fine coal, and these agglomerates may be of any size or shape according to market requirements. There may be mentioned forming agglomerates by extrusion, ringroll or roll-pressing, die-pressing, rotary table pressing and pelletising, e.g. on a disc pelletiser.

The hardening (curing) stage in the briquetting process, to give the required strength and water resistance of the product, is preferably carried out at temperature of the order of 200°C to 300°C for up to an hour. Hot curing may be conveniently carried out by passing the briquettes on a conveyor through an oven, in an atmosphere which may contain nitrogen, carbon dioxide, water vapour and/or oxygen.

The present invention will now be described by way of example only.

Example 1

Anthracite duff (88 parts, - 1.7mm particle size) was mixed with iron ore (1 part) and binder (11 parts) by weight. The binder was a mixture providing molasses (10 parts) and phosphoric acid (1 part). The mixture was briquetted in a pilot plant roll press, and the briquettes produced were tested for green crushing strength, green shatter resistance, hot crushing strength (at 250oC) and water resistance. The properties of the control mix were compared with those of a similar mix containing 1% w/w of magnesium oxide additive. The results shown in the attached table indicate a significant increase in the green shatter

resistance and hot crushing strength of the briquettes and in their water resistance. Similar results were obtained whether the magnesium oxide additive was added before or after the binder.

TABLE

Influence of Magnesium Oxide on the Green Strength and Cure Rate of Molasses/Phosphoric Acid Bound Briquettes		
ADDITIVE	CONTROL	1% MAGNESIUM OXIDE
10lb Green Shatter		
+ 1 1/4	35	71
+ 7/8	42	78
Green Crushing Strength (Kg)	3.7	3.5
Hot Crushing Strength (Kg) (Curing Time - mins)		
5	2.5	4.1
10	7.8	9.1
15	21.1	47.3
20	71.9	89.4
25	92.2	129.2
30	105.7	125.2
24 hour Water Resistance (Kg) (Curing Time - mins)		
5	D	D
10	3.2	10.2
15	27.0	68.6
20	93.5	126.9
25	109.0	141.9
30	101.4	149.7

Claims

1. A process for the cold briquetting of fine coal comprising mixing fine coal with a binder to produce a briguetting mix and briquetting the mix, characterised by the presence in the briquetting mix of magnesium oxide in an amount such that the green shatter strength, hot crushing strength and/or the water resistance of the resulting briquettes are improved.

2. A process according to claim 1 characterised in that the binder comprises molasses, a sugar solution and an inorganic hardening agent.

3. A process according to any claim 1 or 2 characterised in that the binder comprises molasses in an amount of from 5-15% by weight of the mix together with an acid and optionally, a hardening agent selected from iron oxide (or iron ore), calcium carbonate (or limestone), calcium phosphate (or phosphate rock) and aluminium oxide (or bauxile). 4. A process according to any preceding claim, characterised in that the magnesium oxide is mixed with dry coal before addition of the binder.

5. A process according to any of claims 1 to 3 characterised in that the magnesium oxide is mixed with the coal simultaneously with or after addition of the binder.

6. A process according to any preceding claim characterised in that the magnesium oxide is present in an amount of up to 2% by weight of the mix.

7. A process according to any preceding claim, characterised in that the coal is a high rank non-caking coal.