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ELTOFT WRAY WILKINSON, OF QUEENS VILLAGE, NEW YORK, ASSIGNOR TO MINERALS SEPARATION NORTH AMERICAN CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF MARYLAND.

TREATMENT OF FINE COAL.

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This invention relates to the treatment of fine coal and is particularly advantageous in the preparation of the coal for briquetting and is herein illustrated as applied to the production of coal for briquettes containing relatively little ash although the raw material is high-ash coal or domestic ashes containing unconsumed coal.

Such material varies widely in character and often carries large amounts of highly absorbent gangue with the result that the gangue interferes with the froth-flotation concentration of the coal by tending to float with it. Other difficulties encountered in the production of coal briquettes arise from the inability to obtain good agglomerates from some coal, and from the problem of sufficiently dewatering agglomerates so that they can be formed into briquettes in commercial briquetting machines.

According to the present invention, these and other difficulties are overcome by the addition of an organic sulphur compound such as a xanthate to the water suspension of the coal undergoing treatment. Not only does the sulphur-containing material tend to diminish the water carried by the coal agglomerates, but also it often causes a complete retention of the fine coal so that the run-off of water is clear instead of being cloudy with fine coal which has escaped agglomeration. The agglomerates thus obtained often may be squeezed in the hand to expel so much of the water that they feel dry to the touch, the water which runs off being clean and clear.

The material which coats the coal is usually described as an oil or as oily material, even though the term is thus made to cover coal tar and asphalt or asphaltic material.

Other features and advantages will hereinafter appear in connection with the examples.

Example 1.—Domestic ashes from a city dump near Brooklyn, New York, were concentrated in an eight-cell Minerals Separation subaeration flotation machine with the aid of soluble and insoluble flotation agents and mineral-frothing agents. The raw material contained large amounts of fine ash and miscellaneous refuse which seriously contaminated the froth concentrate. Upon the addition of about 0.5 pounds of potassium xanthate per estimated ton of combustible carbon present, the character of the froth was changed, and it was evident that a much cleaner coal concentrate was floated and overflowed. Moreover, fairly satisfactory coal agglomerates were obtained, whereas in the absence of a xanthate the coal obtained by the concentration of ashes did not produce satisfactory agglomerates.

Example 2.—A pulp of suitably ground high-ash coal sludge from Lehigh Coal and Navigation Company containing 22.6% ash, was agitated in a subaeration testing machine with 0.55 pounds of cresol, 1.40 pounds of solvent naphtha, and 0.05 pounds of potassium xanthate, all per ton of raw coal. Air was admitted for three minutes and the resulting froth concentrate collected. The weight of concentrate was 75.3% of the weight of the raw coal and it contained 10.0% ash and carried 87.6% of the combustible carbon present in the raw coal.

A parallel test in the absence of xanthate yielded a concentrate equal to 80.5% of the weight of the raw coal and containing 11.75% ash and carrying 88.2% of the combustible carbon present in the raw coal. Noticeably more of the bone coal was floated in the absence of the xanthate.

Example 3.—Coal concentrates obtained by froth-flotation treatment of domestic ashes from a city dump near Brooklyn, New York, containing 10.25% ash had failed to agglomerate. A pulp of the concentrates was agitated with about 180 pounds of Mexican fuel oil and about 0.25 pounds of potassium xanthate per ton of coal. Excellent agglomerates were obtained, with the ash content further reduced to 8.75%. It was also found that the agglomerates very largely dewatered themselves in overflowing them from the surface of the pulp on which they floated.

Example 4.—A pulp of froth-flotation concentrates produced from Philadelphia and Reading Coal and Iron Company high-ash coal sludge and containing 15% ash, was flowed through two standard Minerals Separation froth-flotation agitating cells where it was agitated with 206 pounds of Mexican fuel oil and 3 pounds of potassium xanthate, both per ton of concentrates. The pulp then passed to a similar single agitating cell

provided with a spitzkasten from which the floating agglomerates were overflowed, carrying noticeably less water than the same agglomerates made in the absence of xanthate.

Another lot of concentrates similar to the last were similarly agglomerated with 175 pounds of coke-oven coal tar and 0.25 pounds of potassium xanthate, and like improved results were obtained.

Small scale tests with potassium ethyl mercaptide indicated that mercaptides could be used in place of xanthates in the procedures described above, with satisfactory results.

Having thus described certain embodiments of the invention, what is claimed is:

1. The process of treating fine coal which consists in agitating the fine coal in an aqueous pulp with the addition of a fraction of one per cent of an agglomeration improving sulphur-containing organic compound under such conditions that there is obtained an oil-coated floating coal, and separating the coal from excess water.

2. The process of treating fine coal which consists in agitating the impure fine coal in an aqueous pulp with an oily coating material under such conditions that relatively pure coal tends to float, further agitating the oil-coated coal in aqueous pulp to form agglomerates, at least part of said pulp carrying a xanthate, and separating the oil-coated coal from the major portion of the pulp water.

3. The process of producing coal agglomerates which consists in agitating the coal in an aqueous pulp with the addition of a fraction of one per cent of an agglomeration improving sulphur-containing organic compound under such conditions that there is obtained an oil-coated floating coal, and separating the floating coal from the major portion of the pulp water.

4. The process of producing coal agglomerates which consists in agitating an oil-coated coal in an aqueous pulp with further oily material and with the addition of a fraction of one per cent of an agglomeration improving sulphur-containing organic compound under such conditions that coal agglomerates are formed, and separating the agglomerates from the major portion of the pulp water.

5. The process of producing coal agglomerates which consists in agitating coal in an aqueous pulp with a small proportion of an oily material, further agitating the pulp with further oily material and with the addition of a fraction of one per cent of an agglomeration improving sulphur-containing organic compound under such conditions that coal agglomerates are formed, and separating the agglomerates from the major portion of the pulp water.

6. The process of producing coal agglomerates which consists in agitating an oil-coated coal in an aqueous pulp with further oily material and with a xanthate under such conditions that coal agglomerates are formed, and separating the agglomerates from the major portion of the pulp water.

7. The process of producing coal agglomerates which consists in agitating coal in an aqueous pulp with a small proportion of an oily material, further agitating the pulp with further oily material and a xanthate under such conditions that coal agglomerates are formed, and separating the agglomerates from the major portion of the pulp water.

In testimony whereof, I have affixed my signature to this specification.

ELTOFT WRAY WILKINSON.