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(12) # EUROPEAN PATENT APPLICATION

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(54) **Process for improving the recovery of clean coal from flotation circuits.**

(57) Adding an effective amount of a water soluble, partially hydrolyzed polyacrylamide to the coal being processed to decrease the amount of the clay being floated and removed from the cells with the fine coal.

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PROCESS FOR IMPROVING THE RECOVERY OF CLEAN COAL FROM FLOTATION CIRCUITS.

Background of the Invention

Flotation processes have been used for some time in the coal industry to recover coal fines from previously discarded aqueous streams generated by processing raw coal. Generally, the flotation feed consists of fine coal and clay which results from prior coarse separation steps such as baths, jigs, dewatering screens, sieve bends and cyclones. The feed is normally 28 x 0 mesh and contains 4 to 12 percent solids.

The flotation circuit consists of four to eight cells in a single bank with the number of banks proportional to the total tonnage to be processed. The concentrate produced in the flotation cells goes to a vacuum filter where it is concentrated to approximately 75 to 80 percent solids. The tailings from the flotation process are discharged to a waste pond or a refuse vacuum filter. During the flotation process, the very fine clay that is in the circuit often becomes entrapped in and/or adsorbed on the coal being floated and increases the amount of ash

in the final product.

Accordingly, it is an object of this invention to improve the operation of the coal flotation circuit by improving the overall yield of coal.

It is another object of this invention to improve the operation of the coal flotation circuit by improving the overall yield of coal.

It is another object of this invention to improve the operation of the coal flotation circuit by decreasing the ash content of the coal.

These and other objects of this invention are accomplished by the addition of the partially hydrolyzed polyacrylamides to coal flotation circuits.

Detailed Description of the Invention

The polymer may be added to the feed to the flotation circuit or to the individual cells by conventional feeding means and it is believed that it functions by flocculating the fine coal fraction. The polymer may be used in dosages of between 0.025 and 1 pound per ton, preferably at least 0.05 pounds per ton, based on the weight of the dry flotation feed.

Suitable polymers which may be used in accordance with the teachings of this invention are water soluble, partially hydrolyzed polyacrylamides having a degree of hydrolysis of from 1 percent to 50 percent and a

molecular weight of at least 50,000, and preferably at least 1,000,000.

The following examples will illustrate this invention.

Example 1

A series of flotation tests were conducted. The objectives of the tests were to reduce the ash in the clean coal, increase the percent recovery of the coal and reduce the amount of fuel oil being used in the flotation circuit. The results of these tests are set forth in Table I.

Table I

Flotation Conditions	
Cell Speed	1800 RPM
Condition Time	30 seconds
Float Time	30 seconds
Ash	33.3%
Feed Solids	5.1%
Screen Analysis	100%-60 mesh

Treatment	Dosage MIBC	Dosage Polymer	% Coal Recovery	% Ash In Float
Control	0.125	---	89	10.54
Kerosene	0.125	10 drops	92	11.78
A	0.125	.5 lb./ton	82	9.31
	0.125	1.0 lb./ton	88	9.48
B	0.125	2 lb./ton	90	9.88
	0.125	4 lb./ton	91	11.11
C	0.125	2 lb./ton	91	10.84
	0.125	4 lb./ton	86	13.04

Treatment	Dosage MIBC	Dosage Polymer	% Coal Recovery	% Ash In Float
D	0.125	1 lb./ton	91	10.56
	0.125	2 lb./ton	88	10.13
E	0.125	.5 lb./ton	88	9.88
	0.125	1 lb./ton	87	9.99
	0.125	2 lb./ton	91	10.45
F	0.125	1 lb./ton	88	11.18
	0.125	2 lb./ton	84	10.41
G/Kerosene	0.125	10 ppm/ 10 drops	93	13.21

Treatment Identification

Treatment	% Active	Chemical Composition
A	25%	Sodium Poly Acrylate Emulsion
B	5%	35% Hydrolyzed Polyacrylamide Liquid
C	5%	15% Hydrolyzed Polyacrylamide Liquid
D	30%	Poly Acrylic Acid
E	30%	Sodium Poly Acrylate
F	8%	Acrylamide/2-Acrylamido Methylpropane Sulfonic Acid
G	20%	Poly(Dimethyldiallylammonium Chloride)
Control	1 drop	Methyl Isobutylcarbonal

Example 2

A similar series of flotation tests were conducted and the results of these tests are set forth in Table II.

Table II

Flotation Conditions	
Cell Speed	1800 RPM
Condition Time	30 seconds
Float Time	30 seconds
Ash	33.3%
Feed Solids	5.1%
Screen Analysis	100%-60 mesh

Table II (continued)

Sample No.	Alcohol lb/ton	Diesel lb/ton	A lb/ton	B lb/ton	C lb/ton	G ppm	Dry Wt.	% Ash
1	.125	.5	-	-	-	-	172.09	12.82
2	.125	.5	-	-	-	10	244.00	10.00
4	.125	-	-	-	1.0	-	339.50	11.50
7	.125	-	.5	-	-	-	210.5	12.18
11	.125	-	-	1.0	-	-	350.3	10.60

WE CLAIM:

1. A process for improving the recovery of clean coal from flotation circuits which comprises adding an effective amount of a water soluble, partially hydrolyzed polyacrylamide to the coal being processed to decrease the amount of the clay being floated and removed from the cells with the fine coal.

European Patent Office

EUROPEAN SEARCH REPORT

Application number
0020275
EP 80 40 0775

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
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CLASSIFICATION OF THE APPLICATION (Int. Cl.)

B 03 D 1/02
C 10 L 9/00

TECHNICAL FIELDS SEARCHED (Int.Cl.)

B 03 D

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	05-09-1980	VERMEESCH

EPO Form 1503.1 06.78

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	SU - A - 362 568 (MISHIN, E.N.) * Derwent abstract * --	1	
A	US - A - 3 717 574 (WERNEKE) * Column 1, lines 35-65 * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl. 3)