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Bezeichnung der Erfindung: Carbonaceous solids cleaning process
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B03B 9/00 // C10L 9/00

ENTSCHEIDUNG / DECISION
vom / of / du 9 May 1988

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Exxon Research and Engineering Co.

Einsprechender / Opponent / Opposant : Klöckner-Humboldt-Deutz AG.

Stichwort / Headword / Référence : Coal cleaning/Exxon

EPÜ / EPC / CBE Article 56 EPC

Kennwort / Keyword / Mot clé : Inventive step (No)

Leitsatz / Headnote / Sommaire

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Case Number : T 146/86 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal
of 9 May 1988

Appellant : (Opponent)
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Representative :

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Decision under appeal :
Decision of the Opposition Division of the European Patent Office dated 7 February 1986 rejecting the opposition filed against European patent No. 0 022 659 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : P.E.M. Delbecque
Members : C.T. Wilson
G.D. Paterson

Summary of Facts and Submissions

I. European patent No. 0 022 659 was granted on 21 September 1983 with seven claims on the basis of European patent application No. 80 302 329.0. The independent Claims 1, 4 and 5 read as follows:

1. A process for cleaning carbonaceous solids of varying densities which contain inorganic, ash-forming constituents comprising:

(a) removing from said carbonaceous solids substantially all particles having a specific gravity greater than a predetermined value in the range of between 1.3 and 1.9 thereby producing a fraction of solids comprising particles having a specific gravity less than said predetermined value characterised by;

(b) reducing the size of substantially all of said particles having a specific gravity less than said predetermined value to produce smaller particles;

(c) separating said smaller particles into a high density fraction and a low density fraction; and

(d) recovering said low density fraction produced in step (c) as clean carbonaceous solids.

4. A process for cleaning carbonaceous solids of varying densities which contain inorganic, ash-forming constituents comprising:

(a) subjecting said carbonaceous solids to a gravimetric separation at a predetermined specific gravity in the range of between 1.5 and 1.9 to divide said solids into

a high density fraction and a lighter fraction characterised by;

(b) subjecting substantially all of said lighter fraction to a gravimetric separation at a specific gravity less than said predetermined specific gravity to divide said lighter fraction into a low density fraction and a middle density fraction;

(c) reducing the size of the particles comprising said middle density fraction to produce smaller particles;

(d) subjecting said smaller particles to a gravimetric separation at a specific gravity higher than said specific gravity used in step (b), thereby providing a high density fraction and a low density fraction; and

(e) recovering said low density fraction produced in step (d) as clean carbonaceous solids.

5. A process for cleaning carbonaceous solids of varying densities which contain inorganic, ash-forming constituents comprising:

(a) subjecting said carbonaceous solids to a gravimetric separation at a predetermined specific gravity in the range of between 1.3 and 1.5 to divide said solids into a low density fraction and a heavier fraction characterised by;

(b) subjecting said heavier fraction to a gravimetric separation at a specific gravity higher than said predetermined specific gravity to divide said heavier fraction into a high density fraction and a middle density fraction;

(c) reducing the size of the particles comprising said middle density fraction to produce smaller particles;

(d) subjecting said smaller particles to a gravimetric separation at a specific gravity higher than said predetermined specific gravity used in step (a), thereby producing a high density fraction and a low density fraction; and

(e) recovering said low density fraction produced in step (d) as clean carbonaceous solids.

II. The patent was opposed in due time and form on 18 June 1984. The Opponent requested revocation of the patent because its subject-matter allegedly fails to meet the requirements of Articles 52 to 57 EPC. The following document was cited in support of the opposition:

Aufbereitung der Steinkohle, 2. Teil, Verlag Glückauf GmbH, Essen 1966 / Der deutsche Steinkohlenbergbau, Band 5, pages 482 to 488.

The following documents also relied upon by the Opponent, were filed outside the nine months period provided by Article 99 EPC:

H. Meyer - Rohstoffliche, technische und wirtschaftliche Überlegungen zur mechanischen Stückkohlenaufbereitung, Glückauf 43/44 (1950) 964/75

K.-H. Kubitza, D. Leiniger, F.P. Monostory, T. Schieder: Forschung und Entwicklung für die Aufbereitung von Steinkohlen in der B.R.D., Glückauf 110 (1974) 90/96.

III. The Patentee in his communication dated 12 December 1984 contested the arguments of the Opponent and requested maintenance of the patent unamended. As a subsidiary request, however, he filed a new set of Claims 1 to 6, in which the carbonaceous solids to be cleaned are defined as ranging in size between 1/4" and 3" (6 and 76 mm) in Claims 1, 4 and 5, and Claim 7 is accordingly deleted.

IV. The Opposition Division rejected the opposition in a decision dated 7 February 1986.

According to the decision, the disclosure in document "Aufbereitung der Steinkohle" is totally silent about removal of inorganic impurities from coal, being no more than a very general discussion on raw coal preparation. Thus there is no hint or lead in this document which would urge the skilled man to combine the teaching in this document either with the conventional method described in the specification or with the prior art cited in the European Search Report and thereby to abandon the conventional practice of preclassifying and crushing the coal before gravimetric separation on a size fraction thereof and thus arrive in an obvious way at the subject-matter of the patent in suit and solve the problem posed therein on page 2 of the specification in connection with the deficiencies in prior art washing processes.

Moreover, the documents filed after expiry of the time limit defined in Article 99(1) EPC, were examined by the Opposition Division of its own motion (Article 114(1) EPC): on examination these documents were found to contain no material which would lead to a revocation of the present patent. For this reason the Opposition Division decided to disregard these documents (Article 114(2) EPC).

V. The Opponent appealed against this decision on 19 March 1986, at the same time paying the appropriate fee. In his Statement of Grounds, filed on 5 June 1986, and in a further letter filed on 2 May 1987, the Appellant (Opponent) argues for revocation of the patent in its entirety on grounds of lack of novelty and/or of inventive step, relying on the same three documents filed during the opposition proceedings.

VI. The Respondent (Patentee) alleges in his communication filed on 8 December 1986 that the appeal is inadmissible since the Opponents have failed to specify their nationality and the State in which their residence or principal place of business is located, (Rules 64(a) and 26(2)(c) EPC).

Further, in his observations filed 8 December 1986, 26 June 1987 and 15 April 1988, the Respondent denies the arguments of the Appellant and requests maintenance of the patent unamended. As a first auxiliary request he requests maintenance of the patent with Claims 1 to 6 filed with his communication dated 12 December 1984, and as a second auxiliary request with Claims 1 to 6 filed with his observations on 8 December 1986. The independent Claims 1, 4 and 5 of the secondary auxiliary request differ from those of the first auxiliary request in that they recite further that the separation steps before and after the size-reduction step are effected gravimetrically and specify the specific gravity cut-point of the fractions which are separated in the gravimetric separation steps.

VII. The Appellant claims that Rule 64 EPC is fully complied with and maintains his request for revocation of the patent.

Reasons for the Decision

A. Admissibility

On the proper interpretation of Rules 64(a) and 26(2)(c) EPC, it is not required that a notice of appeal should contain a statement either of the nationality of the Appellant, or of the State in which his residence or principal place of business is located. Rule 64(a) EPC simply requires that a notice of appeal shall contain "the name and address of the appellant". As to this requirement, it must be carried out "in accordance with the provisions of Rule 26(2)(c) EPC". Thus, as to the name, see the second and third sentences of Rule 26(2)(c) EPC. As to the address, see the fourth and fifth sentences.

It follows that the Appellant has fulfilled the requirements of Rule 64(a) EPC in the present case.

The appeal is admissible.

(B) Allowability

1. The invention relates to a process for cleaning coal and similar carbonaceous solids having components of differing densities including impurities in the form of pyritic sulfur and other ash-forming, inorganic constituents. It is more especially concerned with upgrading raw coal by physically removing a substantial portion of these inorganic constituents.

2. As set out in the patent specification, the conventional method for physically treating coal for the purpose of removing inorganic sulfur and other inorganic ash-forming constituents normally involves a preliminary step of classifying crushed raw coal into several size

fractions: a large size fraction, an intermediate size fraction and a small size fraction. The three different size fractions are then separately treated in equipment specifically designed to handle the particular size fraction. The large and intermediate size fractions are physically cleaned by subjecting the particles to a gravimetric separation which is normally carried out at a specific gravity in the range between about 1.3 and about 1.9 in order to divide the particles into a low density, clean fraction containing a relatively small amount of inorganic constituents and a high density, dirty fraction containing a relatively large amount of inorganic constituents. However, in these conventional coal cleaning processes, the coal fraction to be cleaned is normally crushed prior to washing in order to liberate pyritic sulfur and other inorganic ash-forming constituents from the original coal particles. While crushing to create particles of finer size will normally result in obtaining a cleaner coal product after washing, there are limitations on the amount of inorganic constituents that can be removed in this manner. The finer the coal is ground, the more difficult it is to separate the resultant particles and at some degree of fineness such a separation will become impractical from both an economic and physical point of view.

3. The problem to be solved by the present invention is therefore to provide an improved physical coal cleaning process which makes it possible to obtain coal with lesser amounts of pyritic sulfur and other inorganic ash-forming constituents than was heretofore possible. As a result it is possible to utilize more coal directly as a fuel without the necessity of employing expensive scrubbing technology to remove sulfur dioxide from the combustion gases.

4. The solution to this problem, as set out in granted Claim 1, 4 and 5 is based on the fact that it has now been found that a cleaner coal product can be produced without crushing the coal to such a fine size by first subjecting the coal to a gravimetric separation to remove the dirtier, higher density particles and then selectively crushing the cleaner, lower density particles. The low density fraction particles obtained by washing the crushed solids will be cleaner than a similar fraction obtained from a conventional process which does not utilize such a separation prior to crushing.

5. The process of the invention is stated (in column 3, line 44) to be based at least in part upon the discovery that when a coal fraction comprised of particles having specific gravities higher than a predetermined value are crushed and subjected to a gravimetric separation, the resulting low density fraction will be dirtier or contain a greater amount of inorganic constituents than a similar low density fraction produced by subjecting a coal fraction comprised of cleaner particles having specific gravities lower than the predetermined value to the same gravimetric separation. Thus, in a conventional coal cleaning process where the coal feed is crushed, the resultant particles are subjected to a gravimetric separation and the low density fraction is recovered as product, this low density fraction will contain more inorganic constituents than would be the case if the dirtier particles of high specific gravity in the original coal feed were removed prior to the crushing step. The process of the invention produces a cleaner product because the dirtier particles of high specific gravity are removed from the carbonaceous feed solids prior to the crushing step, which then operates on a lower density, cleaner fraction of coal. The

carbonaceous feed solids will preferably be raw coal particles ranging in size between about 76 mm (3 inches) and about 6 mm (1/4 inch) on the US Sieve Series Scale produced by crushing and screening run-of-mine coal.

6. It is therefore clear that the process of the invention is intended to be carried out on the coal after it has been crushed and screened in the preliminary classifying step of the conventional methods, even though Claims 1, 4 and 5 of the main request do not make this clear.

7. In the Board's opinion, the closest state of the art to be found in the cited documents is the process disclosed in the citation "Rohstoffliche, technische, etc." After a careful examination of this document, filed outside the nine month period provided by Article 99 EPC, the Board finds it relevant in the sense of leading the Board to a different decision and has, therefore, making use of the power conferred on it by Article 114(2) EPC, decided to admit it into the proceedings.

8. Considering therefore the treatment of the middlings from this intermediate (50-13 mm) fraction, they result firstly from a gravimetric separation at 1.55, are then subjected to crushing (Aufschließung), and are then again subjected to a separation (Feinkornaufbereitung) to produce the final coal.

9. The only way in which this process differs from that in Claim 1 of the main request is in step (b) of that claim. In this step substantially all of the particles having a specific gravity less than said predetermined value are reduced in size to produce smaller particles, whereas in the prior art process it is only the middlings which are reduced in size after separation

from the 'clean" coal. This difference cannot however be seen to involve an inventive step. By first separating the clean coal, one increases the cost of separating whilst decreasing the cost of crushing. In the claimed method the reverse is true. Such a choice between two such possibilities would not involve any inventive thought for the person skilled in the art.

Therefore, the subject-matter of Claim 1 of the main request is lacking in inventive step.

Claims 4 and 5 differ from Claim 1 merely by the inclusion of an additional separation step prior to crushing. Since such a step is included in the citation, the subject-matter of these claims also is lacking in inventive step.

10. 1st Auxiliary Request

The independent claims of this request differ from the independent claims of the main request only in that the solids to be cleaned are defined as ranging in size between 6 and 76 mm. However, this restriction compares closely with the range .13 to 50 mm of the citation, and cannot be seen to add anything inventive thereto. This request is also therefore unallowable.

11. 2nd Auxiliary Request

These independent claims differ further in the following respects:

(i) the separation steps are effected gravimetrically, and

(ii) the specific gravity cut-points in the separation steps are specified.

With respect to (i), it is admitted in the patent that gravimetric separations and froth flotation are the conventional methods of washing coal to physically clean it, (column 2, lines 5-9). It is also stated that froth floatation is used when the particles are so small that they take too long to separate by gravity means. It cannot therefore be seen as inventive to use a conventional gravimetric separation for larger particles.

Similarly, the actual values selected for cut-points will depend on the raw coal to be cleaned. The values given, generally between 1,3 and 1,9 are stated again in column 1, lines 52-62 to be the normal values in the prior art. Again, nothing inventive can be seen in selecting values within this normal range.

The second auxiliary request must also therefore be refused.

Order

For these reasons, it is decided that:

1. The decision of the Opposition Division is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

S. Fabiani P.E.M. Delbecque