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D E C I S I O N
of 11 June 2002

Case Number: T 0466/99 - 3.2.3
Application Number: 92108096.6
Publication Number: 0513770
IPC: B02C 21/00, B02C 25/00,
B02C 15/00

Language of the proceedings: EN

Title of invention:
Crushing apparatus und crushing method

Patentee:
Kawasaki Jukogyo Kabushiki Kaisha

Opponent:
Krupp Polysius AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes) ex post facto analysis"

Decisions cited:
-

Catchword:
-



Case Number: T 0466/99 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 11 June 2002

Appellant:
(Opponent)

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office dated 26 February
1999, posted on 23 March 1999, concerning
maintenance of European patent No. 0 513 770 in
amended form.

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
J.-P. Seitz

Summary of Facts and Submissions

I. With decision of 23 March 1999 the opposition division maintained European patent No. 0 513 770 in amended form.

II. The independent claims according to the above decision read as follows:

"1. A crushing apparatus comprising:

crusher means (21) into which materials to be crushed are fed, substantially the whole amount of the crushed materials being taken out from the crusher means (21),

a distributing device (26) operatively connected to the crusher means (21) for distributing at least a portion of the crushed materials conveyed from the crusher means (21) and returning the portion of the crushed materials to the crusher means (21); and

a tube mill (29) installed downstream the crusher means (21) for carrying out a secondary crushing operation, **characterized in that**

- said crusher means is a vertical roller mill (21) including an outer housing (37), a table (34) horizontally arranged in the housing and rollers (38) disposed above the table (34); a rotating device (35,36) for the table (34); and a pressing device (39) for pressing the rollers (38) against the table (34) to crush the

materials between the table (34) and the rollers (38) and

- said distributing device (26) installed downstream the vertical roller mill (21) comprises a distributing vane (46) disposed therein and of which inclination is changed to adjust the returning amount of the crushed materials from the distributing device (26) towards the vertical roller mill (21), a distributing vane driving device (47), a control device controlling the distributing vane driving device (47) and a detector operatively connected to the control device for detecting a power consumption of the motor (35) for driving the table of the vertical roller mill, wherein the inclination of the distributing vane (46) is controlled in accordance with an amount of the consuming power of the motor (35)."

"5. A method of crushing materials by utilizing a crushing apparatus including a crusher means (21), a distributing device (26) for distributing materials crushed by the crusher means (21) and a tube mill (39) installed downstream the crusher means (21), the method comprising the steps of:

feeding materials to be crushed into the crusher means (21);

crushing the materials by a pressing force of the crusher means (21);

taking out substantially all amount of the crushed materials from the crusher means (21)

and conveying the same to the distributing device (26);

returning a portion of the crushed materials once conveyed to the distributing device (26) to the crusher means (21);

crushing again the materials including new materials and the returned materials by the crusher means (21); and

feeding the crushed materials to the tube mill (29) for carrying out a secondary crushing operation,

wherein said crusher means is a vertical roller mill (21) provided with rotatable table (34) and roller means (38),

characterized in that,

- the crushed materials once conveyed to the distributing device (26) are returned to the vertical roller mill (21) by an amount of 20% or more in weight ratio with respect to material which is to be newly fed into the vertical roller mill (21); and
- the returning amount of the crushed material from the distributing device (26) is controlled in accordance with the power consumption of the rotatable table (34) of the vertical roller mill (21)."

III. In its decision the opposition division came to the

result that the subject-matter of claims 1 and 5 recited in remark II is based on an inventive step in the light of

(D1) DE-A-3 518 543

(D2) DD-A-226 278

(D3) DE-A-3 644 341 and

(D7) "Zement-Kalk-Gips" - No. 7/1987, pages 345 and 348-350.

IV. Against the above interlocutory decision of the opposition division the opponent - appellant in the following - lodged an appeal on 28 April 1999 paying the fee on the same day and filing the statement of grounds of appeal on 26 July 1999. Based on (D1) to (D3) and on

(D9) DE-B-2 708 053

the appellant came to the result that the subject-matter of claims 1 and 5 lacked inventive step.

V. Following the board's Communication pursuant to Article 11(2) RPBA oral proceedings before the board were held on 11 June 2002 in which the parties essentially argued as follows:

(a) appellant

- the patent in suit related to a crushing apparatus and a crushing method based on a first and a second crusher means (mill) and a

distributing device well known from (D1) and (D3) which is responsible for the amount of crushed material recirculated to the first mill;

- starting from (D1) the subject-matter of claim 1 differs from the known crusher by the type of first mill, namely a **vertical** roller mill, and by the optimization thereof;
- the substitution of a known **horizontal** roller mill has to be seen as obvious, see (D9) in which both types - horizontal and vertical - crushers are dealt with in detail, since with both types of mill it is possible to exert **high** pressures to carry out crushing ("Gutbettzerkleinerung", see (D3) and its claim 1, feature (a));
- since the first mill effects the main crushing of the material it is obvious to optimize the first mill, namely by recycling material not finely enough crushed to it by using a distributing device as detailed in (D1), so that a combination of (D1) and (D3) rendered obvious the subject-matter of claim 1 since (D3) moreover teaches a skilled person to use a distributing vane which is adjusted in its inclination angle dependent from the amount of the consuming power of the motor(s) of the first mill as in claim 1, second characterizing feature, so that this feature could readily be transferred to the crusher according to (D1) without necessitating inventive adaptation steps;

- even if one started from (D3) as the nearest prior art to be considered a skilled person by incorporating the teaching of (D1) would achieve the subject-matter of claim 1 without an inventive endeavour since the objectively remaining problem to be solved in this case had to be seen in creating a crusher which is optimized with respect to its power consumption;
- since it is well known in the art that a crusher using **high pressure** ("Gutbettzerkleinerung") is optimum with respect to the power necessary for effective crushing a skilled person would utilise this principle of crushing in the first mill carrying out the main amount of crushing within the complete system;
- the subject-matter of claim 5 differs from claim 1 by the rate of recirculation, namely at least 20 % by weight which feature more or less is known in the art, in particular from (D7) so that again the claimed subject-matter was not based on an inventive step in the light of (D1) and (D3).

(b) respondent

- according to the problem-solution-approach to be applied when assessing the issue of inventive step (D1) has to be seen as the nearest prior art; claim 1 differs from (D1) by three features, namely a vertical roller mill as the first mill, a distributing vane as the distribution means and by controlling the angle of inclination of the distributing vane in

accordance with the power consumption of the first mill's motor;

- the objectively remaining problem to be solved by the invention when starting from (D1) was to achieve a fundamentally different crusher means and to provide optimum working conditions of such alternative crusher means;
- with respect to the subject-matter of claim 1 (D9) does not teach that a horizontal roller mill could directly be replaced by a vertical roller mill since the pressure to be applied in both cases was completely different;
- the vane of claim 1 is not derivable from (D1) which discloses a distributing device, however, no vane;
- according to (D1) the control of the first crusher means is based on the quantity of material present in the second mill as opposed to the teaching of claim 1, namely to control the recirculation of material as a function of the amount of the consuming power of the (single) motor of the first mill;
- (D3) discloses a vane as the means for distributing material flows, however, in a context completely different from the subject-matter of claim 1 in that recirculation of material to the first mill only takes place after the **second** mill **and** after carrying out a classifying action before the remaining coarse material is fed to the distribution means; (D3)

moreover is based on two control steps, see its claim 1, features (d) and (e), not being carried out in claim 1;

- summarizing, a skilled person would not combine the teachings of (D1) and (D3) since the principle taught in (D3) would have necessitated fundamental changes;
- with respect to claim 5 it was observed that (D1) to (D3) cannot render obvious the rate of recirculation claimed; it was, however, admitted that from (D7) recirculation rates of 30% were known whereas claim 5 claims rates of 20% or more by weight.

VI. The appellant requests to set aside the decision under appeal and to revoke European patent No. 0 513 770.

The respondent requests to dismiss the appeal.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*
 - 2.1 Claims 1 to 4 are upheld as granted.
 - 2.2 Amended claim 5 is based on all features of granted claim 5 plus the features of granted claim 7 so that neither the requirements of Article 123(2) nor Article 123(3) EPC are contravened.

2.3 Claims 6 and 7 correspond to granted claims 6 and 8 and are also not open to objections under Article 123 EPC.

3. *Novelty*

Novelty of the subject-matter of claims 1 and 5 was not disputed by the appellant and the board so that it is not necessary to deal with this issue in detail.

4. *Inventive step*

Claim 1

4.1 Nearest prior art document is (D1) disclosing a crushing apparatus with a first and a second crusher means and inbetween a distribution device which recirculates a set **quantity** of crushed material to the first crusher means which quantity can be mixed with fresh material. (D1) is based on a pair of horizontal rollers which are pressed against one another by a relatively high pressure, see page 4, second paragraph, to allow "Gutbettzerkleinerung" of the material in the first crusher means. The distribution device according to (D1) is controlled by the **material's degree of filling** in the second mill. This leads to an optimized operation of the **second** crusher.

4.2 Since the main crushing action should be carried out in the **first** and not in the second crusher means - which is **not based** on "Gutbettzerkleinerung" - the device disclosed in (D1) is to be improved.

4.3 Starting from (D1) the objectively remaining technical problem to be solved by the invention is to achieve a

fundamentally different crusher means and to provide optimum working conditions of such alternative crusher means.

- 4.4 The solution of the above problem according to claim 1 is based primarily on a vertical roller mill as the first mill to which is fed from a distributing vane as the distribution means a **conglomerate** of crushed material not necessarily desagglomerated. The distributing vane is controlled in accordance with a parameter of the **first** mill, namely its amount of the consuming power of its (single) motor.
- 4.5 It is thereby achieved that the recirculated flow of already crushed material to the first mill is varied in that the first mill - which is optimised with respect to energy consumption and crushing efficiency - can work constantly under its best conditions.
- 4.6 When assessing the contribution of the characterising features of claim 1 to the prior art the feature that the known horizontal roller mill of (D1) is replaced by a vertical roller mill has first to be discussed.

The appellant argued that this feature is obvious and relied on (D9). A closer study of (D9) and its Figures 2 (horizontal mill) and 3 (vertical mill) reveals that (D9) reflecting general technical knowledge clearly separates these two types of mills, see column 6, lines 3 to 20, by pointing to **horizontal rollers** being most favourable with respect to "Gutbettzerkleinerung" ("lassen am besten ... entsprechend dem erfindungsgemäßen Verfahren zu."). Not knowing the claimed invention a skilled person therefore is not led to a **vertical** roller mill as in

claim 1 but rather is encouraged to maintain the type of first mill disclosed in (D1).

4.7 The distributing vane as the means for recirculation of crushed material although not rendered obvious by (D1) is clearly per se known in the art, not, however, its **position** between two crushers and its control within the combination of features according to claim 1.

4.8 The appellant, based on the teaching of (D3), came to the result that a combination thereof with (D1) rendered obvious the subject-matter of claim. The board could not follow these findings for the following reasons:

4.8.1 The concept of (D3) comprises two mills and a distribution vane "6" following the **second** mill "2" - in contrast to claim 1 - and feeding material back after carrying out a classification step in "3". What is recirculated to the first mill "1" is a **double** crushed, **fine** material in contrast to claim 1 where a **conglomerate** leaving the **first** mill is recirculated.

4.8.2 Not knowing the claimed invention to the board's conviction (D3) leads away from the **position** of the distributing vane and from the **type of material** of claim 1 - fine, double crushed particles according to (D3) and a conglomerate according to claim 1 - which is recirculated to the first mill being a **horizontal** and not a vertical mill as in claim 1.

4.8.3 Even if (D3) makes use of the amount of the consuming power of the motor(s) of the first mill to control the inclination of the distributing vane "6" a skilled

person being confronted with the problem to be solved by the invention according to above remark 4.3 for the above reasons would not consider (D3) and would not combine (D3) with the teaching of (D1) since a complete reconstruction of the crushing apparatus would be necessary in this case. Appellant's contrary findings are the result of an ex post facto analysis not allowable when assessing the issue of inventive step.

4.9 Appellant's so called second, obvious way to arrive at the subject-matter of claim 1 is again the result of observations **knowing the claimed invention**. In detail (D3) cannot be seen as the starting point of the invention since the distributing vane is arranged after the **second** mill and after an **additional classifier**. Under these circumstances the material to be recirculated to the first mill is completely different from the conglomerate of claim 1 and (D3) is less relevant than (D1) being based on the recirculation of a conglomerate.

Summarizing, appellant's second way for achieving the subject-matter of claim 1 is not to be followed by the board.

4.10 As a result of the above considerations the subject-matter of claim 1 is novel and inventive so that claim 1 is valid, Articles 54, 56 and 100 (a) EPC.

This is also true for granted claims 2 to 4 which relate to further embodiments of the invention.

Claim 5

4.11 Claim 5 contains the features of claim 1 plus an

indication of the recirculation rate being 20% or more by weight. This feature is not directly derivable from the prior art since (D7) discloses a recirculation rate of 30% by weight.

The combination of features laid down in claim 5, namely the features of claim 1 plus the restriction to the recirculation rate of 20% or more by weight for the detailed reasons set out above in combination with claim 1 is not rendered obvious by the prior art i.e. the contribution of claim 5 to the nearest prior art document (D2) relevant for its two-part form is non-obvious either in the light of (D1) to (D3), Articles 56 and 100(a) EPC since (D2) is only relevant with respect to the crusher means being a vertical roller mill "2, 3", but not with respect to the separator "15" which separates material on the basis of **particle size**. Under these circumstances the above considerations in combination with the subject-matter of claim 1 are also applicable to the subject-matter of claim 5.

4.12 Claim 5 is therefore valid as are claims 6 and 7 relating to embodiments thereof.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Counillon

C. T. Wilson