

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 12 July 1994

Case Number: T 0732/92 - 3.2.3

Application Number: 85304911.2

Publication Number: 0208033

IPC: B02C 15/00

Language of the proceedings: EN

Title of invention:

Roller mill

Patentee:

Kawasaki Jukogyo Kabushiki Kaisha

Opponent:

Krupp Polysius AG

Headword:

-

Relevant legal norms:

EPC Art. 56

Keyword:

"Inventive step; main request: no"

"Inventive step; auxiliary request: yes"

Decisions cited:

T 0176/84

Catchword:

Technical field to be considered, obvious combination of documents.

Case Number: T 0732/92 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 12 July 1994

Appellant: Kawasaki Jukogyo Kabushiki Kaisha
(Proprietor of the patent)1-1 Higashikawasaki-cho 3-chome
Chuo-ku Kobe-shi
Hyogo-ken (JP)

Representative: Rackham, Anthony Charles
Lloyd Wise, Tregear & Co.
Norman House
105-109 Strand
London WC2R 0AE (GB)

Respondent: Krupp Polysuis AG
(Opponent) Graf-Galen-Strasse 17
D-4720 Beckum (DE)

Representative: Tetzner, Volkmar, Dr.-Ing. Dr. jur.
Van-Gogh-Strasse 3
D-81479 München (DE)

Decision under appeal: Decision of the Opposition Division of the European Patent Office dated 25 October 1991 posted on 15 January 1992, revoking European patent No. 0 208 033 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: F. Brösamle
Members: H. Andrä
W. Moser

Summary of Facts and Submissions

I. European patent No. 0 208 033 was granted with eight claims on 15 March 1989 on the basis of European application No. 85 304 911.2.

II. Claim 1 thereof reads as follows:

"1. A roller mill for crushing material, comprising a table (2a-2d) adapted to be rotatably driven about a substantially vertical axis (10), the table being adapted to receive the material in a central area adjacent said axis, said table having a substantially horizontal upper surface and an annular groove (4a-4d) formed in said upper surface radially outwardly from said central area, said groove having a concavely curved bottom surface, at least one roller (6a-6c) having an axis of rotation (20) which is above said upper surface and which substantially intersects said vertical axis, said roller running in said groove and having an outer peripheral surface (18, 18b, 18c) which is convexly curved in cross-section, said mill when in use having said table and said roller rotated and the material being crushed flowing into a clearance space (16; 36, 38; 36c, 38c) formed between said roller peripheral surface and said groove bottom surface, characterised in that said table has on said upper surface adjacent the outer periphery of said groove an upstanding dam (24, 24b, 24d) that extends radially inward at its upper portion (26, 26b, 26c) so that it overhangs the radially outer portion (39) of said groove thereby to obstruct the passage outward from said clearance space of the material being crushed".

III. Following an opposition lodged by the Respondent (Opponent) the Opposition Division revoked the European patent in suit on the basis of the following documents:

- (D1): JP-A-60-12151
- (D2): US-A-2 909 330
- (D3): DE-C-134 000

for reasons of lack of inventive step of the subject-matter of granted Claim 1, see minutes of 25 October 1991 and decision of 15 January 1992.

IV. With letter of 16 March 1992 received on the same day the Appellant (Proprietor) lodged an appeal against the above decision of the Opposition Division paying the appeal fee on the same day and filing the Statement of Grounds of Appeal on 25 May 1992.

V. Following the Communication pursuant to Article 11(2) RPBA of the Board oral proceedings took place on 12 July 1994 in which the Appellant requested to set aside the impugned decision and to maintain the patent in suit as granted (main request) or on the basis of documents submitted during the oral proceedings in amended form, namely on the basis of Claims 1 to 5, description and Figures 1 to 4 submitted in the oral proceedings (auxiliary request).

VI. Claim 1 of the auxiliary request reads as follows:

"1. A roller mill for crushing material, comprising a table (2a) adapted to be rotatably driven about a substantially vertical axis (10), the table

being adapted to receive the material in a central area adjacent said axis, said table having a substantially horizontal upper surface and an annular groove (4a) formed in said upper surface radially outwardly from said central area, said groove having a concavely curved bottom surface, at least one roller (6a) having an axis of rotation (20) which is above said upper surface and which substantially intersects said vertical axis, said roller running in said groove and having an outer peripheral surface (18) which is convexly curved in cross-section, said mill when in use having said table and said roller rotated and the material being crushed flowing into a clearance space (16, 36, 38, 36c, 38c) formed between said roller peripheral surface and said groove bottom surface, characterised in that said table has on said upper surface adjacent the outer periphery of said groove an upstanding dam (24) that extends radially inward at its upper portion (26) so that it overhangs the radially outer portion (39) of said groove thereby to obstruct the passage outward from said clearance space of the material being crushed, and wherein on the side of the clearance space (16) which is radially inward of the table (2a) from a plane (22) that extends radially of the roller (6a) and is located axially centrally of the roller (6a) the clearance space gradually narrows toward the outward direction, and on the radially outward side from the plane (22), the width of the clearance space (16) is substantially constant".

VII. The Respondent requests to dismiss the appeal since none of the existing requests is allowable. Concerning

particularly the auxiliary request the attention is drawn to the following documents:

- (D6): US-A-2 684 813
- (D7): WO-A-85/00 302 and
- (D8): FR-A-89 375 (first addition to patent No. 1 444 809).

VIII. Appellant's arguments concerning the question of inventive step can be summarised essentially as follows:

(a) *Main request*

- nearest prior art document is document (D2);
- the attempts of the prior art to solve the problem of enhancing the residence time of the material in the mill point away from the claimed solution;
- document (D3) if at all considered is based on a different type of mill and only by hindsight the skilled person can derive information for finding the claimed solution of the problem how to enhance the residence time of the material in the mill;
- history proves that a skilled person did not find a solution of the problem underlying the present invention as claimed;
- documents (D2) and (D3) do not disclose a dam and an overhang of it so that they cannot render obvious the claimed roller mill;
- while document (D3) is based on centrifugal forces for creating the pressure with which the

grinding tools are pressed against the material to be crushed, document (D2) teaches hydraulic means for achieving this pressure; the attempt to combine the teachings of documents (D2/D3) must therefore fail and cannot render the claimed mill obvious.

(b) *Auxiliary request*

- Claim 1 of this request is restricted to a narrowing clearance space on the one side and to a clearance space of constant width of the rollers and the roller table on the other side, which teaching cannot be found in documents (D6) to (D8);
- the two-part clearance space as claimed allows the use of slip between the rollers and the roller table and to enhance the grinding effect systematically;
- the interaction of a two-part clearance space as claimed with an overhanging dam can nowhere be seen in the prior art documents so that the claimed roller mill is nonobvious.

IX. Respondent's essential arguments can be summarised as follows:

(a) *Main request:*

- nearest prior art document is (D1) since document (D2) does not fulfil the precharacterising clause of Claim 1;

- from document (D3) the same problem as disclosed in the patent specification No. 0 208 033 is disclosed, namely the attempt to increase the residence time of the material to be crushed in the mill by blocking the possibility of ground material to escape from the mill;
- document (D3) does not only address the problem of the attacked patent but also its claimed solution, i.e. the provision of a dam which is inclined radially inwardly and which thus retains the material to be ground within the mill;
- the technical field of document (D3) is closely related to the technical field of roller mills since a skilled person is aware that the grinding tools can be rollers (as claimed) or balls (as in document (D3)) if material has to be crushed;
- since Claim 1 is not restricted to the way in which the grinding tools are pressure-loaded, no argument may be based on this fact;
- a skilled person could and would envisage a combination of documents (D1) and (D3) so that the claimed roller mill is deprived of an inventive step since the effect to be achieved by this combination of documents was clearly foreseeable and not at all surprising.

(b) *Auxiliary request:*

- The two-part clearance space as claimed solves two problems, namely firstly to allow the material to freely enter the grinding zone and

secondly to achieve a final fine grinding of the material;

- both effects are known from the prior art since Figure 5 of document (D1) discloses a narrowing clearance space and a sort of uniform clearance space and since a skilled person knows that the length of a path is the means to influence the residence time of the material to be crushed in the roller mill;
- documents (D7) and (D8) are examples for a clearance space of constant width in which fine grinding is carried out;
- a combinatory effect between an overhanging dam and a two-part clearance space as claimed is denied so that Claim 1 does not define an inventive roller mill.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
 - 2.1 Nearest prior art document is document (D1) and not document (D2) since in the latter document the roller table is flat and does not contain an annular groove and since the rollers are not convexly shaped. Appellant's argument that Claim 1 is delimited over document (D2) is therefore not supported by the facts.
 - 2.2 Claim 1 is completely delimited over document (D1) so that the roller mill claimed is novel, Article 54 EPC.

2.3 Starting from document (D1) the claimed invention seeks to improve the capability to retain material in the mill for a relatively long time, see EP-B1-0 208 033, Column 1, lines 23 to 27.

2.4 This problem is solved by the provision of an upstanding dam that extends radially inward at its upper position. The effect of this overhanging dam can be seen in the fact that the outward passage is obstructed so that the material to be crushed is kept within the clearance space for a long time.

2.5 The assessment of the question of inventive step leads to the following result:

2.5.1 From document (D3) which discloses a ball mill it is known that for reasons of good fine milling the material to be crushed has to be retained for a sufficient period of time within the mill. To achieve this a dam or a bulge, see reference "h" in Figure 1 thereof, is provided which has a height "h" and which is oriented radially inwardly, namely in a direction **against** the centrifugal forces acting on the particles to be ground. Background of this teaching of document (D3) is the attempt to obstruct the passage outwardly, see Figures 1, 2 and 4 as well as Claim 2 and page 2, paragraph 4 ("Damit nun ... nicht sofort verlassen kann ... der das Mahlgut zurückstaut...") of document (D3).

2.5.2 Following the principles developed in the decision T 176/84, published in OJ EPO 1986, 50, a technical field to be considered when assessing the issue of inventive step is a technical field in which identical

or similar problems exist in respect of the problem underlying the claimed inventive.

- 2.5.3 As set out in paragraph 2.5.1 above document (D3) literally discloses the technical problem to be solved by the present patent specification so that document (D3) originates from a related technical field which has to be considered by a skilled person confronted with the problem of how in a roller mill the material can be retained for a relatively long time so that sufficient crushing of the material can take place.
- 2.5.4 Due to the fact that document(D3) addresses the problem of the patent in suit **and also a solution in the meaning of Claim 1** the combination of documents (D1) as starting point of the invention and document (D3) would be envisaged by a skilled person.
- 2.5.5 In document (D3) a dam or bulge is taught which is of the height "h" and which acts as a means for obstructing the outward path of the mill. The centrifugal forces acting in a direction radially outwardly the known dam, see Figure 1, 2 and 4 of document (D3), also extends "radially inwardly" as claimed in the characterising clause of Claim 1 and thereby overhangs "to obstruct the passage outward from said clearance space of the material being crushed".
- 2.5.6 The above teaching can be derived from document (D3) without knowing the claimed invention so that the reproach of an ex post facto analysis (hindsight) expressed by Appellant's representative is not justified.

- 2.5.7 Since Claim 1 is not restricted to specific means for pressure loading the milling tools a convincing argument cannot be based in this difference between the subject-matter of Claim 1 and the teachings of documents (D3) and (D2).
- 2.5.8 The Board is therefore of the opinion that in contrast to the chain of arguments raised by the Appellant a skilled person **could and would** combine the teachings of documents (D1) and (D3) to immediately arrive at the subject-matter of Claim 1, since the effect of this combination was to be foreseen, namely an increase of the residence time of the material to be crushed in the mill.
- 2.5.9 Under these circumstances the subject-matter of Claim 1 cannot be seen as inventive so that granted Claim 1 is not valid, Article 56 EPC, and cannot justify maintaining the European patent No. 0 208 033 as granted. The main request consequently had to be rejected in the oral proceedings before the Board.
- 2.5.10 Appellant's argument that the claimed solution of the problem underlying the invention cannot be found in the prior art before the filing day of EP-B1-0 208 033 (history argument) and that the claimed roller mill is therefore nonobvious cannot be accepted since it is a **novelty** argument. Novelty is, however, not disputed.

Further arguments of the Appellant are also contradictory to the principles of T 176/84 and not convincing, namely the arguments of hindsight, non-compatibility of teachings of documents (D1) and (D3),

unforeseeable technical effect, prior solutions of the problem of the claimed invention pointing away from the subject-matter of Claim 1, the age of document (D3), difference of crushing tools concerning Claim 1 and document (D3) as well as any differences in operation essentially when starting and stopping the crushing mill according to Claim 1 and document (D3) and the paths along which the crushed material finally leaves the mill. Not convincing to the Board was also Appellant's argument that an overhang in document (D3) would give rise to a conflict with the crushing tools (balls) since Figure 1, 2 and 4 thereof clearly demonstrate that the outward path of the crushed material is obstructed **without any conflict** with the balls as the crushing means.

3. *Auxiliary request:*

3.1 Claim 1 thereof is based on granted Claim 1 and on features defining in detail the clearance space between the rollers and the roller table, namely as a portion which is narrowing in an outward direction and as a portion of constant width.

3.2 Novelty was not under discussion in this respect so that the crucial question whether or not Claim 1 is patentable is that of inventive step.

3.3 The Board has come to the conclusion that the subject-matter of Claim 1 is based on an inventive step within the meaning of Article 56 EPC.

- 3.3.1 Claim 1 solves the problem of how to improve the possibility of retaining the material to be crushed sufficiently long in the roller mill.
- 3.3.2 Apart from a dam upstanding on the outer periphery of the groove provided in the table of the mill Claim 1 defines the clearance space as a two-part-stage, namely conically in an outward direction and of constant width thereafter.
- 3.3.3 It is obvious that the upstanding dam **and** the clearance space of constant width serve one and the same purpose, namely to enhance the residence time of the material to be crushed in the mill. The two-part clearance space in addition offers the possibility to choose the areas of coarse and of fine milling since the former is carried out in the narrowing clearance space and since the latter is carried out in the space of constant width. The dam in combination with the claimed clearance space thus contribute to the milling effect and make the mill versatile for a multitude of materials to be crushed.
- 3.3.4 In contrast to Respondent's findings the teaching of Claim 1 of the auxiliary request is more than the exercise of the knowledge of a skilled person.
- 3.3.5 There is no prior art document available which discloses an overhanging dam in a roller mill as claimed and there is also no prior art document available which in addition discloses the clearance space as claimed.

- 3.3.6 Document (D1) does **not** offer a narrowing clearance space **and** a clearance space of constant width since the radii indicated in Figure 5 thereof clearly demonstrate that **no** constant width is realised. Only by inadmissible hindsight does document (D1) teach a two-part clearance space as claimed.
- 3.3.7 Document (D2) is completely irrelevant in this context since not all features of the preamble of Claim 1 are realised there, see **flat** roller table and rollers for instance.
- 3.3.8 Document (D3) is a relevant document in combination with Claim 1 of the main request but not in combination with Claim 1 of the auxiliary request since in this context the milling tool of Claim 1, namely a roller, is of importance. The gap between these rollers and the roller table is specifically designed in two stages, one for the coarse milling and the other for the final fine milling, see EP-B1- 0 208 033 column 2 lines 37 to 50, and from document (D3) no information can be derived in this context let alone a combinatory effect achieved by a two-part clearance space as claimed and an overhanging dam.
- 3.3.9 Document (D6), see Figure 1 and 4, is very similar to document (D2) and therefore also irrelevant since the roller table and the rollers are not provided with an annular groove or a convex outer periphery.
- 3.3.10 Document (D7), see Figure 12 and 14(2), does at least not disclose a clearance space of constant width so that its contribution to the solution of the problem of

how to enhance the residence time of the material to be crushed in the mill is not to be seen.

3.3.11 Document (D8) on the other hand also teaches away from the subject-matter of Claim 1 since its page 1, last two lines and single figure make it clear that no entry clearance space is foreseen but only a clearance space of uniform width. It is hindsight when the Respondent argues that the existence of a constant width clearance space leads to the claimed invention according to Claim 1.

3.3.12 Summarising the above arguments the Board is convinced that the teaching of Claim 1 is not rendered obvious by documents (D1) to (D3) and (D6) to (D8) even if the normal knowledge of a skilled person is duly considered.

3.3.13 Respondent's argument that the narrowing clearance space has only to safeguard the free entrance of the material to be crushed is not backed up by the facts since in this part of the clearance space coarse milling is already carried out.

Providing therefore a two-stage clearance space as claimed enables a skilled person to choose a balance between coarse and final fine milling depending on circumstances whereby the existence of a positive or negative slip between the rollers and the roller table can be clearly used to achieve an optimum milling result in both parts of the clearance space and this in combination with an overhanging dam which in itself is a means for influencing the milling result, see above

remarks in combination with Claim 1 of the main request.

4. Claim 1 of the auxiliary request is as a consequence of the foregoing observations valid so that the patent can be maintained in amended form as submitted in oral proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The main request is rejected.
3. The case is referred back to the first instance with the order to maintain the patent based on the following documents:
 - Claims 1 to 5 submitted during oral proceedings
 - Description and drawings submitted during oral proceedings.

The Registrar:

The Chairman:

J. Ruckerl

F. Brösamle