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D E C I S I O N
of 11 March 1996

Case Number: T 0425/94 - 3.3.2

Application Number: 89908400.8

Publication Number: 0430967

IPC: B01F 7/00

Language of the proceedings: EN

Title of invention:
A method and an apparatus for mixing materials

Applicant:
SKAKO A/S

Opponent:
-

Headword:
Mixer/SKAKO

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0425/94 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 11 March 1996

Appellant: SKAKO A/S
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Representative: WITTRUP, Flemming
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 30 December 1993 refusing European patent application No. 89 908 400.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. A. M. Lançon
Members: G. J. Wassenaar
J. Van Moer

Summary of Facts and Submissions

I. European patent application No. 89 908 400.8 was refused by a decision of the Examining Division. The decision was taken on the basis of the set of amended claims 1 to 4 filed on 23 June 1993.

II. The Examining Division held that the subject-matter of the amended claims lacked an inventive step over US-A-4 453 831 (1).

The subject-matter of the amended claims was also considered to lack an inventive step with regard to the teaching of EP-A-265 587 (2).

In its decision, the Examining Division considered that the difference between the disclosure of (1) and claim 1 consisted merely in the requirement that the difference between the speed of rotation of at least one of the sets of blades and the others did not exceed 25%. No surprising effect could be derived from this difference and the skilled man, determining empirically the optimum operating parameters, would arrive at the claimed requirement without recourse to any inventive activity.

III. The Appellant lodged an appeal against this decision.

In the statement of the grounds of appeal, the appellant contested the arguments of the Examining Division and submitted a new set of claims 1 to 4.

IV. In a communication of the Board objections concerning allowability of amendments, clarity and inventive step were raised.

V. During oral proceedings, which were held on 11 March 1996, the Appellant submitted as a single request a set of amended claims 1 to 4 which forms the basis of this decision.

Claim 1 of this set of claims reads as follows:

"1. A method of mixing **granulate** materials **and liquids** in a container having two or more sets of rotating stirring means adapted for uniform working of the materials, in which at least one of the sets is caused to rotate with a speed of rotation differing from that of the other or the others, and where the spacing of adjacent axes of rotation at pairs of sets of stirring means is greater than the sum of radii of the outermost positions of the stirring means of said pair of sets, **characterized in**, that all sets of stirring means are adapted for shifting the materials in the mixer in a plane essentially perpendicular to the axis of rotation of the sets and that at least one of the sets is caused to rotate with a speed of rotation differing from that of the other or the others by a value not exceeding 25%".

VI. With respect to the inventive step of the subject-matter of the newly filed claims, the Appellant argued essentially that in a mixing process every mixing means has an optimum speed of rotation so that if similar means are applied the skilled man would choose the same speed. Only if clearly dissimilar stirring means are applied as disclosed in (1) one would apply different rotation speeds. In the case of a mixing arrangement with blades and a mixing screw as a second, functionally different, mixing means, as disclosed in (1), an appreciable greater speed of rotation would be chosen for the mixing screw compared with that of the mixing

arrangement with blades. Such a difference would be much greater than 25%. The prior art revealed no reason to apply a different speed of rotation for similar rotation means.

The claimed method of mixing granulate materials and liquids (e.g. concrete) would have the advantage over (1) of reduced wear because no high speed mixing screw was necessary to obtain a homogeneous mixture.

Document (2) was considered to be less relevant because it was directed to the mixing of fluids of different viscosity and not to the mixing of granulates with a fluid. Moreover (2) contained contradictory statements with respect to variations in rotation speed between rotary sections so that it cannot provide an unambiguous hint to the present process and apparatus.

VII. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims 1 to 4 as filed during the oral proceedings, amended page 1 of the description as filed at the oral proceedings, the rest of the description as filed on 21 March 1992 and drawings as originally filed.

Reasons for the Decision

1. The appeal is admissible.

2. *Allowability of amendments and clarity of the claims*

Present claim 1 is based on original claim 1 in combination with the first paragraph of page 1 of the original description. The different wording to describe the nature and the movement of the sets of rotating stirring means was chosen to overcome the clarity objection and is based on Figure 1 and its explanation on page 2 of the original description.

Present claim 2 is based on original claims 2 and 4 in combination with Figure 2 as originally filed.

Present claim 3 is based on original claim 7.

Present claim 4 is based on original claim 8 with the wording adapted to that of present claim 1.

The objection of lack of clarity raised earlier in the proceedings does not apply to the present set of claims and is no longer maintained.

Thus present claims 1 to 4 satisfy the requirements of Articles 84 and 123(2) EPC.

3. *Novelty*

None of the documents on file discloses all the features of independent claims 1 or 4 so that the subject-matter of these claims is novel. Novelty was in fact not disputed in the contested decision.

4. *Inventive step*

4.1 In agreement with the Examining Division and the Appellant, the closest prior art is considered to be (1), which discloses a method of mixing granulate materials and liquids, such as concrete, with a planetary mixer having a mixing arrangement equipped with blades. The only specific example in (1) discloses a planetary mixer in which a mixing arrangement equipped with blades is combined with a mixing screw with a speed of rotation which is appreciably greater than that of the mixing arrangement (column 4, lines 5 to 26 and Figure 1).

4.2 According to the description of the application, the invention provides a method for making the mixing of the materials more uniform and more efficient (cf. page 1, lines 22 to 24 and page 3, lines 20 to 24). This alleged advantage, however, has not been substantiated and was, in fact, not maintained vis-à-vis (1) during oral proceedings. In the oral proceedings the Appellant agreed that the method according to (1) would also produce high grade homogeneous mixtures.

The technical problem underlying the claimed invention is therefore regarded as providing an alternative process for mixing granulate materials and liquid.

According to claim 1, this problem is solved in that all sets of stirring means are adapted for shifting the materials in the mixer in a plane essentially perpendicular to the axis of rotation of the sets and that at least one of the sets is caused to rotate with a speed of rotation differing from that of the other or others by a value not exceeding 25%.

It is evident that the method as claimed and disclosed in the application is suitable to obtain a uniform mixture of granulate materials and liquids so that the Board is satisfied that the said problem is solved by the method of claim 1.

4.3 It remains therefore to be decided if, for solving the above stated problem, it would have been obvious to replace the high speed screw with stirring means of the blade-type, adapted for shifting the materials in the mixer in a plane essentially perpendicular to the axis of rotation of the sets, and to chose rotation differences between the stirring means not exceeding 25%.

4.3.1 The teaching of (1) is not limited to a combination of a mixing arrangement with blades and a high speed screw. It is specifically indicated that in the majority of cases one mixing arrangement of the blade-type is sufficient but that it could easily be envisaged to arrange several of such mixing arrangements in the drum of the mixer (column 2, lines 56 to 60). It is further indicated that apart from the mixing arrangements of the blade-type, **it may also be envisaged** to provide different, powered tools such as a mixing screw in the drum (column 4, lines 5 to 11). The use of a high speed screw as examplified in Figure 1, is thus according to (1) not compulsory and a mixer containing only two or more mixing arrangements equipped with blades is already envisaged by (1). However, it must be noted that only in relation with a mixing screw a different speed of rotation was choosen for the different mixing arrangements (see colomn 4, lines 19 to 25).

According to the Appellant, every type of stirring means has its own optimum speed of rotation so that if two sets of the same type of stirring means are used, one would generally operate them with the same speed of rotation, i.e. synchronously.

The Board does not dispute that the majority of the prior art mixers with at least two sets of equivalent stirring means works synchronously, but that does not take away the fact that in the prior art it has already been envisaged to operate such mixers asynchronously. In this respect reference is made to document (2), which discloses a planetary mixer with two sets of identical stirring means (Figures 9 to 12). In the embodiment illustrated by Figure 9, the two sets, having identical gear boxes, work synchronously, but according to the corresponding description variations in the diameters of the gears contained in the rotary sections are possible so that the two rotary sections rotate at a different speed (column 14, lines 39 to 45).

4.3.2 According to the Appellant, said passage suggesting asynchronic rotation does not apply to a mixer according to Figure 9, since the reference numbers 128A and 128B used therein to indicate the rotary sections, do not appear in Figure 9.

The Board agrees that said reference numbers do not appear in Figure 9. Number 128A appears only in Figure 3 to indicate an alternative position of rotary section 128 in a mixer with a single set of stirring means. Number 128B does not appear in any of the figures but the supplement "B" only makes sense in combination with two sets of stirring means. In Figures 3 to 12 numbers 128 and 180 are both used to indicate rotary sections, whereby 128 is used in Figures 3 to 8 for mixers with a single set of stirring means and 180 is used in

Figures 9 to 12 to indicate the rotary sections in mixers with two sets of stirring means. The skilled man would readily recognize that 128A and 128B in column 14 should read 180A and 180B, so that the concept of different rotation speed does apply to a mixer configuration like that of Figure 9.

4.3.3 Further, according to the Appellant, said passage in column 14 would not make sense, since it is contradictory to most of the document suggesting synchronous stirring.

This argument is not convincing to the Board since there are many other passages disclosing asynchronous speed of rotation (column 2, lines 26 to 32; column 3, lines 29 to 37). In fact, one of the advantages of the mixers according to (2) is said to be the capability of rotating a selected stirrer at a selected speed independent of the speed of the other stirrer (column 2, lines 29 to 32).

4.3.4 Appellant's argument that it was not evident that said passage in column 14 would apply to a mixer with the same kind of stirring means as illustrated in Figure 9, cannot convince either. The mixer of Figure 9 is a two-arm extension of the mixers illustrated in Figures 3 to 8, which all disclose identical stirring means. Although the use of different stirring means is not excluded by (2), the use of different gears in said passage has not been related to the use of different stirring means.

But even if one would accept that in the context of (2) a different gear would imply different stirring means, Appellant's argument would not be valid, since claim 1 of the present application does not require the use of identical stirring means, but allows different stirring means having the same function. For slightly different

stirring means, (2) clearly suggests to use an adapted, i.e. a slightly different, speed of rotation. This comes close to the requirement of present claim 1 that the difference in rotation speed should not exceed 25%.

4.3.5 The Appellant also argued that (2) is not relevant for present claim 1 and may not be combined with (1) since it is directed to the mixing of liquids with different viscosities and not to the mixing of granular materials and liquids having only one viscosity.

The Board finds this argument not convincing either since the mixing of liquids with different viscosity is only one example of possible mixing processes comprised by (2). Document (2) relates in general to mixers for liquids and solids in a tank (column 1, lines 4 to 6).

4.3.6 Thus (2) teaches the skilled man that it may be useful to use a difference in rotation speed also between two sets of stirring means having similar action. Since (2) relates to the same type of mixers as contemplated by (1), it was obvious to apply this teaching also to mixers according to (1). Therefore, although (1) discloses only one example with rotation speed differences, and that only in combination with the use of a mixing screw, it was obvious to allow differences in rotation speed also in the case that, in agreement with (1), only similar sets of stirring means were chosen.

The upper limit of 25% for the difference in rotation speed follows from the choice of only using stirring means equipped with blades. Because of their similar action great differences in rotation speed are then not possible and it is a matter of routine experimentation to determine the practical tolerable speed difference.

4.4 In the oral proceedings it was argued for the first time that with the method of the invention the wear of the apparatus would be reduced, due to the fact that no high speed mixing screw was necessary as required by (1) to obtain a homogeneous mixture.

The alleged advantage of reduced wear has no basis in the application as originally filed. On the contrary, the use of an additional high shear mixing screw is explicitely also contemplated in the present application (see page 3, lines 20 to 28).

Although introduced at a very late stage into the proceedings, the Board has considered this new advantage but found that it has no impact on the decision for the following reasons.

Taking it into consideration, the problem underlying the invention would have been to provide a method for obtaining a homogeneous mixture with reduced wear of the mixing apparatus.

The Board considers that the new problem is solved by the method of claim 1 because it is immediatly apparent to the skilled man that high wear is related to the use of a high speed screw and that removing the latter would solve the problem. Since according to (1) the use of a high speed screw is not compulsary and the replacement of the screw with lower speed rotating, blade-type, stirring means is also contemplated in (1), (see point 4.3.1 above), the method as now claimed is an obvious solution for the said new problem.

4.5 For these reasons, the method of claim 1 does not involve an inventive step. The dependent claims 2 and 3 fall with claim 1.

The same reasons apply to the apparatus of claim 4 so that the claimed apparatus does not involve an inventive step either.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana P. A. M. Lançon