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D E C I S I O N
of 13 April 2000

Case Number: T 0897/97 - 3.3.5

Application Number: 92116248.3

Publication Number: 0534385

IPC: C04B 20/10

Language of the proceedings: EN

Title of invention:
Hydraulic substance

Applicant:
TAKENAKA CORPORATION, et al

Opponent:
-

Headword:
Hydraulic substance/TAKENAKA

Relevant legal provisions:
EPC Art. 54(1), 83, 123(2)

Keyword:
"Main request - novelty questionable - product parameters not clearly distinguishing"
"First auxiliary request - inadmissible generalisation"
"Main and second auxiliary request - insufficient disclosure - invention cannot be performed over the whole scope of the claim"

Decisions cited:
-

Catchword:
-



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Boards of Appeal

Chambres de recours

Case Number: T 0897/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 13 April 2000

Appellant:

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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 17 April 1997
refusing European patent application
No. 92 116 248.3 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
M. B. Günzel

Summary of Facts and Submissions

I. European patent application No. 92 116 248.3, published under No. 0 534 385, was refused by a decision of the Examining Division. The decision was taken on the basis of claims 1 and 2, filed on 31 July 1996.

II. The Examining Division held that the subject-matter of claim 1 lacked an inventive step over

D1: WO-A-80/00959 and

D2: EP-A-0 437 324.

In its decision, the Examining Division considered *inter alia* that the subject matter of claim 1 was novel over D2 only because D2 did not specifically disclose the silica content of the silica fume used for coating the rounded cement particles.

III. The Appellant lodged an appeal against this decision. With the statement of grounds of appeal the appellant filed a new amended main claim. It was argued that the present invention solved the problem of improving the fluidity of the hydraulic mixture without the costly treatment of the cement particles as disclosed in D2.

IV. In a communication under Article 110(2) EPC, the Board expressed the preliminary opinion that the amended main claim lacked novelty over D1. Further reference was made to

D3: Kirk-Othmer's Encyclopedia of Chemical Technology, third edition, volume 20 (1982), page 852.

This document revealed that silica fume contained about 90% silica. It was also indicated that if claim 1 were redrafted in conformity with claim 1 forming the basis of the decision under appeal objections under Article 83 EPC would arise.

V. With a letter dated 15 February 2000 the appellant filed a new set of claims 1 to 6. During oral proceedings, which were held on 13 April 2000, three new sets of claims 1 to 3 were submitted. Claim 1 of the main request reads as follows:

"Hydraulic mixture comprising

- solid particles A, the average diameter of which is 5 to 50 μm ,
- solid particles B, the average diameter of which is less than 1/5 of the average diameter of the solid particles A, and
- water the quantity of which is selected such that the quantity is less than 60 % of the total weight of the solid particles A and the solid particles B,
- wherein the solid particles B comprise more than about 70 weight % of SiO_2 and have the characteristic of adhering to the surfaces of the solid particles A in water due to different electric charges on the surfaces of particles A and B,

- wherein the quantity of the particles B is equal to the quantity that can make a single coating layer over the whole surfaces of particle A, so that direct contact between the solid particles A is restrained and the fluidity of the hydraulic mixture prior to hydration is improved by a bearing effect and an electrical repulsive effect of the solid particles B,

- wherein the solid particles A consist of Portland cement and mixed cement comprising Portland cement, whereas particles B consist of silica fume comprising 60-wgt% or more of amorphous silica, and

- wherein the specific surface of particles B consisting of silica fume is 50.000 to 1.000.000 cm²/g."

(underlining by the Board)

Claim 1 of the first auxiliary request differs therefrom in that the first half-sentence of the underlined feature of claim 1 of the main request reads:

"wherein the quantity of the particles B is about 3 to 3,5 % of volume of particles A such that particles B can make a single coating layer over the whole surfaces of particles A",...

Claim 1 of the second auxiliary request differs from claim 1 of the main request by the additional requirement that "particles A are excluded, which are treated to be spherical".

The appellant argued that said claims differed from the cited prior art documents essentially by the underlined

feature. D1 was mainly directed to hydraulic mixtures wherein the void between the particles A was completely filled with particles B. Although incomplete filling was also disclosed, there was no teaching to use exactly the quantity of particles B required to make a single coating layer. The picture in D2 showing a single layer was only a schematic design. D2 contained no teaching to coat the particles such that only a single layer of particles B on particles A was obtained. Thus the subject-matter of all the requests was novel, and, in view of the improved fluidity, also involved an inventive step.

- VI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 3 of the main request filed during the oral proceedings. As first and second auxiliary request the appellant requested that a patent be granted on the basis of claim 1 of the 1st and 2nd auxiliary requests respectively, also filed during the oral proceedings, each with claims 2 and 3 as in the main request.

Reasons for the Decision

1. The appeal is admissible
2. *Main request*
 - 2.1 D2 discloses spherical cement particles having a diameter of from 3.9 to 30 μm which can be coated with a layer of silica fume particles (see column 3, lines 51 to 56 and column 4, lines 17 to 29). According to D3 silica fume is the white smoke emanating from electric-furnace production of silicon or silicon alloys composed of particles containing about 90% amorphous silica (see the last paragraph of the cited

page). From D1 it is known that silica dust produced as a by-product in the production of silicon in electrical furnaces comprises particles in a particle size range of from about 0.005 to 0.5 μm having a specific surface of about 50,000 to 2,000,000 cm^2/g (page 9, lines 1 to 8). According to the application in suit the particles B comprise 60 weight % or more of amorphous silica, which is silica fume, the specific surface thereof being 50,000 to 1,000,000 cm^2/g and the silica fume is produced by evaporation and quick refrigeration of silica in the production of silicon metal or ferrosilicon and having a primary particle size of about 0.1 to 0.5 μm (page 4, lines 45 to 47 and page 6, lines 50 to 53 of the printed application). Since the Board is not aware of any evidence that the expression "silica fume" is used for a product which does not correspond to the definitions in D1 and D3 it is highly likely that for a skilled person the expression "silica fume" in D2 has the same meaning as in D1 and D3. If the silica fume mentioned in D2 fulfils the requirements of particles B in present claim 1 it should also have the same electric surface charge. D2 further discloses a sectional view of a spherical cement particle having silica fume particles attached to its surface; see column 7, lines 45 to 47 and Figure 3. This figure shows that the silica fume is present as one single coating layer over the whole surface of the cement particle in agreement with the underlined feature of present claim 1. The Board agrees that said Figure 3 is only a schematic view but holds that it gives the clear teaching that a coating over the whole surface is desirable and that one single layer is sufficient. In this respect the Board further observes that in the present application the single layer concept is also based on theoretical considerations and is illustrated with schematic pictures. There is no direct experimental evidence that in practice cement and silica fume particles are shaped

and arranged as indicated in Figures 1 to 3 of the present application. From the above it follows that in the Boards view it is at least doubtful whether the subject-matter of claim 1 is novel over D2. This question, however, is not decisive in the present appeal proceedings because the invention as defined by claim 1 does not fulfil the requirement of Article 83 EPC for the following reasons.

2.2 According to the underlined feature of claim 1 the quantity of silica fume must be such that a single coating layer over the whole surface of the cement particles is obtained. In the description it is only specified that in the case of uniform spherical particles A with a diameter of 20 μm and uniform spherical particles B with a diameter of 0.2 μm the amount of particles B required to coat a layer over the particles A is about 3-3.5 % of volume of particles A (page 5, lines 32 to 38 of the published application). Claim 1 is, however, not limited to such particles but comprises non-spherical particles A of various sizes and particles B of various sizes. According to the appellant's letter dated 15 February 2000 the amount can be calculated if one knows the average diameter of the particles A and B. Apart from the fact that this is not disclosed in the application as originally filed it is unlikely that the amount to form a single layer can be determined in this way. In the case of non-uniform particles B a more dense packing of the particles B around the particles A is expected. Moreover it is not clear what the average diameter of the particles is, especially not in the case of non-spherical particles. It may be assumed that silica fume consists of spherical particles. However, in the case of a silica particle distribution as shown in Figure 6 of the application, revealing two maxima, it is not even clear what the average diameter of the silica fume is. With respect to the particles A the situation is even more

ambiguous since they generally have an angular shape, as for instance shown in Figures 1 to 3 of the application in suit, so that the meaning of the particle "diameter" is not clear (page 9, lines 11 to 17 of the printed application). Also the examples do not provide any guidance for the underlined feature since they do not disclose any structural features. In fact it was admitted during oral proceedings that none of the examples seemed to fulfil the single layer requirement of present claim 1. Therefore, even if one were to assume in the appellant's favour that the skilled person would be able to calculate the suitable amounts of spherical particles A and B, the description still does not enable a skilled person to obtain hydraulic mixtures according to claim 1 in the usual cases where the particles A are not spherical. Consequently, the invention as defined by claim 1 of the main request is not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

3. *First auxiliary request*

Claim 1 of the first auxiliary request requires that the quantity of the particles B is about 3 to 3.5% of volume of particles A and can make a single coating over the whole surface of particles A. According to the appellant, this requirement is based on page 5, lines 32 to 38 of the printed application. From this passage, however, it is clear that these conditions are only fulfilled if spherical particles A and B of a specific size are taken (spherical particles A with a diameter of 20 μm and spherical particles B with a diameter of 0.2 μm). If the relative particle diameters of A and B change, the quantity of the particles B which can make a single coating over particles A must also change. The claimed quantity of particles B may therefore not be generalized to particles A having an

average diameter from 5 to 50 μm as claimed. Moreover, particles A are generally of angular shape which makes an original feature, based on the assumption of spherical particles A, unsuitable for characterizing the amount of particles B that can make a single coating layer on solid particles A having angular shape and variable diameter. The claimed combination of features in present claim 1 is therefore not disclosed in the application as originally filed. Thus, claim 1 contains subject matter which extends beyond the content of the application as originally filed and does not fulfil the requirements of Article 123(2) EPC.

4. *Second auxiliary request*

Claim 1 of the second auxiliary request differs from claim 1 of the main request by the additional requirement that particles A are excluded which are treated to be spherical. By this amendment novelty is no longer doubtful in respect of D2. As indicated above with respect to claim 1 of the main request, especially in the case of non-spherical particles the disclosure of the application in suit is insufficient. Therefore, the second auxiliary request must also fail, because the invention as defined by claim 1 of this request likewise does not fulfil the requirements of Article 83 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:



S. Hue

The Chairman:



R. Spangenberg