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Datasheet for the decision of 10 April 2018

Case Number: T 1303/14 - 3.3.09

Application Number: 04791414.8

Publication Number: 1679975

IPC: A23J1/20, A23J3/08, A23J3/16

Language of the proceedings: EN

Title of invention:
Method for strengthening a protein-containing product and a protein-containing product

Applicant:
Uniq Bioresearch Oy

Headword:

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
Novelty and inventive step - (yes, after amendments)
Amendments - allowable (yes)

Decisions cited:

Catchword:

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Case Number: T 1303/14 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 10 April 2018

Appellant: (Applicant)	Uniq Bioresearch Oy Kuurinniityntie 26 02750 Espoo (FI)
Representative:	Seppo Laine Oy Itämerenkatu 3 B 00180 Helsinki (FI)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 3 January 2014 refusing European patent application No. 04791414.8 pursuant to Article 97(2) EPC**

Composition of the Board:

Chairman	W. Sieber
Members:	J. Jardón Álvarez
	E. Kossonakou

Summary of Facts and Submissions

I. This appeal lies from the decision of the examining division refusing European patent application No. 04 791 414.8, published as WO 2005/036976 A1.

II. The decision was based on a set of twenty claims filed with a letter dated 20 July 2012. Independent claims 1, 8, 11 and 18 read as follows:

"1. A method for strengthening the structure of a protein-containing food product during a pasteurization heat treatment of said product by forming disulfide bonds between the proteins to form a protein space network, **characterized** in that the method comprises adding modified protein to said product before said heat treatment, which protein is modified by cleaving at least one disulfide bond originally present in said protein to obtain free sulfhydryl groups, and heating said product for 15 minutes or less to cause an interchange reaction by said free sulfhydryl groups to form said structure strengthening disulfide bridges between proteins."

"8. A method for preparing a protein-containing food product having protective functional properties, **characterized** in that the method comprises adding modified protein to said product, which protein is modified by cleaving at least one disulfide bond originally present in said protein to obtain free sulfhydryl groups, and heating said product for 15 minutes or less to cause an interchange reaction by said free sulfhydryl groups to further cleave other disulfide bridges between proteins to obtain free sulfhydryl groups providing said functional properties."

"11. A protein-containing food product comprising a protein space network strengthening the structure of said product, which network is formed in a pasteurization heat treatment by disulfide bonds between proteins, **characterized** in that the food product contains modified protein in which free sulfhydryl groups are based cleaving at least one disulfide bond originally present in said protein and forming said structure strengthening disulfide bonds in an interchange reaction during the heat treatment of 15 minutes of less."

"18. A protein-containing food product having protective functional properties, **characterized** in that said product comprises modified protein added to the product before pasteurization heat treatment, which protein is modified by cleaving at least one disulfide bond originally present in said protein, to obtain free sulfhydryl groups to further cleave other disulfide bonds between proteins during a heating of 15 minutes or less to obtain free sulfhydryl groups providing said functional properties."

III. The examining division refused the application on the grounds that:

- the subject-matter of claims 1, 2, 4 and 6 to 9 lacked novelty over D1 (US 3 876 805 A);

- the subject-matter of at least claims 1, 8, 11 and 18 was not inventive over D1; and

- claim 15 was not clear.

In an *obiter dictum* it noted that the subject-matter of claims 11 and 18 did not meet the requirements of Article 84 EPC.

IV. On 27 February 2014 the applicant (in the following: the appellant) filed notice of appeal. The statement setting out the grounds of appeal was filed on 29 April 2014 and included an amended set of claims which replaced the claims before the examining division. The appellant requested that the decision under appeal be set aside and that examination of the application be continued.

V. In a communication dated 15 March 2017 the board raised several objections against claims 8 to 10 and 18 to 20 under Articles 84 and 123(2) EPC and suggested deleting those claims. It further noted that claim 1 was drafted in rather broad terms, such that it was doubtful whether the problem underlying the application was credibly solved over the whole scope claimed.

VI. With a letter dated 29 June 2017 the appellant submitted an amended set of claims.

VII. In a telephone conversation on 11 September 2017 the appellant was informed that the subject-matter of the amended claims extended beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

VIII. With a letter dated 9 November 2017 the appellant filed a new set of claims, in which the observations of the board had been addressed, and a description adapted to the new claims.

IX. Following a second telephone conversation on 13 December 2017, the appellant on 5 February 2018 again filed a new set of 12 claims addressing the board's clarity objections.

X. Independent claims 1 and 7 of the appellant's request filed on 5 February 2018 read as follows:

"1. A method for strengthening the structure of a protein-containing food product during a pasteurization heat treatment of said product by forming disulfide bonds between the proteins to form a protein space network, **characterized** in that the method comprises

- adding modified whey protein to said product before said pasteurization heat treatment, which protein is modified by cleaving at least one disulfide bond originally present in said protein, forming free sulfhydryl groups, the amount of free sulfhydryl groups in the added modified whey protein being in the range of 0.5 to 60 µmol/g calculated from the total protein of the product, and
- heating said product at a temperature of 70-85 °C for 15 minutes or less to cause an interchange reaction by said free sulfhydryl groups to form said structure strengthening disulfide bonds between the proteins."

"7. A protein-containing food product comprising a protein space network strengthening the structure of said product, which network is formed in a pasteurization heat treatment by disulfide bonds between proteins, **characterized** in that said protein space network has been created by

- adding modified whey protein to the product before said pasteurizing heat treatment, which protein is

modified by cleaving at least one disulfide bond originally present in said protein, forming free sulfhydryl groups, the amount of free sulfhydryl groups in the added modified whey protein being in the range of 0.5 to 60 µmol/g calculated from the total protein of the product
- heating said product at a temperature of 70-85 °C for 15 minutes or less to cause an interchange reaction by said free sulfhydryl groups to form said structure strengthening disulfide bonds between the proteins."

Claims 2 to 6 and 8 to 12 are dependent claims.

XI. The relevant arguments of the appellant may be summarised as follows:

- The claimed subject-matter was further limited to a pasteurization heat treatment and to the use of modified whey protein in accordance with the preferred embodiments of claims 2 and 7 as filed. Additionally, the amount of free sulfhydryl groups introduced via the added, modified protein was defined as disclosed on page 11, lines 8 to 10, of the application as filed.

- The novelty and inventive step objections raised by the examining division had been overcome by limiting the claims in particular to a pasteurization heat treatment carried out at a temperature of 70-85°C. The temperatures used in the present invention substantially differed from the baking temperatures used in D1.

- The patent aimed to provide a method for strengthening the structure of food products avoiding unnecessary long heating of the product or

the addition of extra thickening agents. This problem was solved by the claimed method using a modified whey protein having sulfhydryl groups. The claimed process used gentle conditions and avoided deterioration of the taste or appearance of the product. The products obtained had stronger structure and no metallic aftertaste. D1 used higher temperatures and gave no hint towards the process now claimed.

XII. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 12 as filed with the letter dated 5 February 2018.

Reasons for the Decision

1. Amendments

1.1 Claim 1 is based on claim 1 as filed, further specifying that:

- the heat treatment is a pasteurization heat treatment (see page 5 of the description, line 31);

- the heating temperature ranges from 70 to 85°C (claim 2 as filed);

- the modified protein is whey protein (claim 7 as filed); and

- the amount of free sulfhydryl groups in the whey protein is in the range from 0.5 to 60 µmol/g calculated from the total protein of the product (claim 5 as filed).

1.2 Similarly, independent claim 7 results from the combination of claims 11, 12, 15 and 17 as filed and the disclosure of page 5, line 31, for the pasteurization heat treatment.

1.3 The dependent claims are also supported by the application as filed as follows:

- claims 2 and 11 by the preferred amount of added sulfhydryl groups disclosed on page 11, line 10;
- claims 3 and 8 by page 5, lines 36/37;
- claims 4 and 9 by page 6, lines 1/2;
- claim 5 by claims 3 and 4 as filed;
- claim 6 by claims 9 and 10 as filed;
- claim 10 by claims 13 and 14 as filed; and
- claim 12 by claims 19 and 20 as filed.

1.4 Consequently, the claims fulfil the requirements of Article 123(2) EPC.

2. Novelty

2.1 Claim 1 is now directed to a method for strengthening the structure of a protein-containing food product by forming disulfide bonds using modified whey protein having free sulfhydryl groups and treating it by pasteurization at a temperature of 70-85°C for 15 minutes or less to cause an interchange reaction. During the interchange reaction a sulfhydryl group of the whey protein induces the cleavage of disulfide bonds in the protein-containing food product and, with the second sulfhydryl group thereby freed, forms a new disulfide bridge between the two proteins. This reaction results in a protein structure with a certain degree of strength.

2.2 The examining division denied novelty for the subject-matter of the then pending claim 1 in view of the disclosure in D1 of a dough conditioner for use in dough products to be baked.

2.3 The appellant has limited the subject-matter of the independent claims by specifying that the heat treatment to form disulfide bonds through the interchange reaction is a pasteurization heat treatment carried out a temperature of 70-85°C for 15 minutes or less. This amendment excludes the higher baking temperatures used in D1.

2.4 A product prepared by the claimed method can be distinguished from a product prepared with traditional heating methods on the basis of the physical properties of the products. In particular, the average amount of sulfhydryl groups per protein molecule is higher than in traditional products (see page 11, lines 22 to 35, of the application as filed).

2.5 For these reasons, the subject-matter of the claims is novel.

3. *Inventive step*

3.1 The invention relates to a method for strengthening the structure of protein-containing products by using modified protein or fractions made of modified protein, and to the products obtained by said method (see page 1, lines 6 to 9).

3.2 Prior art

3.2.1 As acknowledged in the "BACKGROUND OF THE INVENTION" section of the application as filed, food products having a high protein content need a support material in order to achieve a composition acceptable to the consumer. Such a structure is usually achieved by increasing the protein content in the product to a level high enough and by heating it at a temperature high enough and long enough, or by adding thickening or stabilising agents to strengthen the product.

3.2.2 According to the specification, such prior-art methods present some drawbacks, such as the formation of undesired side products as a consequence of long heating at high temperature and the presence of additives without substantial nutritional value (see page 3, lines 12 to 22).

3.3 Problem to be solved and its solution

3.3.1 In view of these drawbacks of the prior-art processes, the problem underlying the invention can be seen in the provision of "a new method for strengthening the structure of food products avoiding the unnecessary long heating of the product at high temperature or adding extra thickening or stabilizing agents" (see page 3, lines 24 to 26).

3.3.2 As is apparent from the application as filed, this problem is indeed solved by the method of claim 1, wherein a protein-containing food product is treated with a modified whey protein having free sulfhydryl groups and heated to cause an interchange reaction. This interchange reaction yields a protein with an improved structure (see figure 2 of the patent

application). The method results in products with a strong structure using gentle heat treatment.

3.4 Obviousness

3.4.1 There is no hint towards the claimed method in D1, the only document cited in the appealed decision. In this document a dough is formed and baked at temperatures well above those used in claim 1. D1 therefore gives no hint towards the claimed method.

3.4.2 Moreover, the claimed method is said to result in products containing fewer undesired side products, such as Amadori compound and lysinolalanine, than prior-art products prepared with the traditional heating method (page 11, lines 30 to 32). They are therefore also a non-obvious alternative to known products.

3.5 For these reasons the subject-matter of independent claims 1 and 7, as well as that of dependent claims 2 to 6 and 8 to 12, involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with the order to grant a patent on the basis of the following documents:

   - claims 1 to 12 as filed with the letter dated 5 February 2018;

   - description pages 1 to 26 as filed with the letter dated 9 November 2017; and

   - figure pages 1/2 and 2/2 as filed with the letter dated 29 June 2017.

The Registrar: The Chairman:

M. Cañueto Carbajo W. Sieber

Decision electronically authenticated