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(54) Titre : PROCÉDE DE FABRICATION D'UN PRODUIT DE BOULANGERIE  
(54) Title: METHOD FOR MAKING A BAKING PRODUCT

(57) **Abrégé/Abstract:**

The present invention is related to the manufacture of a bakery product so that the baking step is carried out with the bakery product being enclosed in a wrapper material having at least a portion its surface area made permeable to moisture in a limited manner.

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<b>(21) International Application Number:</b> PCT/FI97/00739 <b>(22) International Filing Date:</b> 1 December 1997 (01.12.97) <b>(30) Priority Data:</b> 964850 4 December 1996 (04.12.96) FI <b>(71) Applicant (for all designated States except US):</b> RAISIO YHTYMÄ OYJ [FI/FI]; Raisionkaari 55, FIN-21200 Raisio (FI). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> PAUKKUNEN, Veli-Matti [FI/FI]; Vanha Tampereentie 286, FIN-39500 Ikaalinen (FI). <b>(74) Agent:</b> OY JALO ANT-WUORINEN AB; Iso Roobertinkatu 4-6 A, FIN-00120 Helsinki (FI).		<b>(81) Designated States:</b> AU, BR, CA, CN, CZ, EE, FI, HU, IS, JP, KR, LT, LV, MX, NO, NZ, PL, RO, RU, SI, SK, TR, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Finnish).</i>
<b>(54) Title:</b> METHOD FOR MAKING A BAKING PRODUCT		
<b>(57) Abstract</b>  <p>The present invention is related to the manufacture of a bakery product so that the baking step is carried out with the bakery product being enclosed in a wrapper material having at least a portion its surface area made permeable to moisture in a limited manner.</p>		

## Method for making a baking product

The present invention relates primarily to a method of baking a bakery product, and additionally, the scope of the invention relates to the manufacture of a bakery product. In the present context, the term bakery product refers to a foodstuff product whose method of manufacture is chiefly dictated by the properties of the product's grain portion used, as the flour dough, for instance.

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Conventionally, bakery products are baked using either so-called open-hearth baking or pan-baking. In open-hearth baking, the bakery product is made from a dough piece having a sufficient coherency for keeping the piece essentially in its intended shape until passed to the baking step. In contrast, pan-baking can be carried out using dough of essentially higher elasticity or otherwise lower coherency, because this baking technique is not so sensitive to the shape retention of the dough. As known, pan-baking can be carried out using either an open pan or a pan covered with a lid.

When baking in an open-hearth oven or open pan, an essential portion of the products surface is in immediate contact with the atmosphere of the oven. This imposes a significant moisture loss effect on the product during baking. Baking in a covered pan in turn makes the pan very tight, which almost completely prevents evaporation of moisture. Also known in the art are baking methods in which a covered pan is provided with a vent mechanism suitable for controlling the release of evaporated moisture. Such a method is described in, e.g., US Pat. No. 4,590,078.

In order to prevent excessive moisture loss of the product being baked, particularly during baking in an open-hearth oven, the baking process is generally accelerated by increasing the baking temperature. The higher baking

temperature obviously also speeds the release of moisture, but nevertheless gives a finished product of higher water content than that achievable using a lower baking temperature and respectively a longer baking time. A co-  
5 factor related to this behaviour is the product crumb which forms faster at an elevated temperature, thus causing delayed removal of moisture from the product. A similar phenomenon may also occur during baking in open pans, however, in a lesser degree due to the smaller open sur-  
10 face of the product being baked. An alternative method for delaying the moisture loss of the product during baking is to elevate the moisture content of the baking atmosphere surrounding the product. However, this method affects the crumb formation, thereby causing a less attractive look of the product; and the baking result may  
15 also exhibit impaired quality in tasting tests. Crumb formation is even more incomplete in baking processes carried out in covered pans, which makes this baking technique suitable only for certain special applications, wherein the product form is the primary criterium and the  
20 products are intended for an end use involving a post-treatment such as roasting.

It is an object of the present invention to provide a  
25 baking method for bakery products suitable for improved control of moisture removal from the product during the baking process so that the end product properties are managed in a superior fashion over the prior art. Furthermore, the method permits control of the baking  
30 step so that the desired properties of the end product can be attained in a repeatable manner. The repeatability of the baking outcome makes the method suited for industrial applications involving large-volume manufacture of baked products.

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It is a further object of the invention to provide a baking method also offering management of such dough

varieties which are based on raw materials not inherently rendering the baking properties that are required in conventional open-hearth baking. Dough gluten, which is a vital property affecting the bakeability of dough, is  
5 determined by the cereal gluten, particularly its amount and quality. For instance, the use of oat and barley in bakery products is limited due to their inferior gluten properties. This is a significant drawback, because these grain varieties contain a plurality of constituents with  
10 good nutritional properties. On the other hand, gluten is the main culprit of the celiac disease.

Controlled management of moisture release during baking is crucial in the baking of, e.g., bread inasmuch bread  
15 is commonly known to gain improved taste qualities if the bread can be baked at a lower temperature and using a longer baking time than those permitted by prior-art baking methods, particularly those used in commercial production. Pastry products, such as rolls, in turn are sen-  
20 sitive to excessive moisture loss of the product under baking conditions that otherwise in terms of baking temperature and time are known to give a good baking result.

The desirable goal of a controlled baking technique is  
25 attained by virtue of a method according to the invention characterized in that the baking step is carried out having the bakery product sealed in a wrapper material in which at least a portion of the wrapper offers controlled permeability to moisture. Additionally, the scope of the  
30 invention covers the manufacture of a bakery product starting from a dough piece so that each dough piece is placed in an individual wrapper having at least a portion its surface area made in a limited manner permeable to moisture, that the dough piece is allowed to rise, when  
35 required, in said wrapper and that the dough piece is baked in said wrapper.

By virtue of the baking method according to the invention, benefits are gained already with conventional dough compositions therein that the moisture loss from the bakery product during baking occurs at a slower rate than in open-hearth baking or pan-baking. Resultingly, the baking temperature can be lowered and respectively the baking time extended, thereby rendering the desirable improvement in product taste. Moreover, additional advantages are available in conjunction with products conventionally made using open-hearth baking. In these products, a higher amount of liquid than was possible in the prior art can be used in the dough, because the dough piece will be handled enclosed in the wrapper, whereby such factors as the shape retention of the dough piece becomes irrelevant. The application contemplated herein is, e.g., baking of bread from a dough of particularly low paste viscosity, or alternatively, from a dough made using a low-gluten grain variety.

In the context of the present invention, the term "wrapper material" is used in general reference to a sheet or web of a thin paper- or film-type product offering the desirable properties. The wrapper material shall be of a kind qualified compatible with foodstuff use regulations, it must endure the temperatures applied in the baking processes of bakery products and it must offer a correct rate of moisture permeability for the baking process. Such a moisture permeability can be attained by an inherently porous structure of the wrapper material, or alternatively, the permeability properties may be made puncturing the wrapper material using spark-discharge techniques, for instance.

A suitable wrapper material has been found to be the casing material used in the curing of sausages. This casing is made from fibrous web, in practice, from a paper grade processed to fulfill the given quality criteria. The

desirable special properties of the web are obtained by impregnating viscose cellulose into the base web and then regenerating the cellulose. A variety of casing material suitable for use in the application of the invention is manufactured by Visko Oy, Hanko, Finland, under trade marks Visko Standard, Visko EP and Visko X.

The wrapper material used in making a bakery product can be made exclusively from a wrapper product possessing the above-described properties, or alternatively, the invention may be implemented so that each piece of bakery product is prior to its handling enclosed in a wrapper having only a portion of its surface area made permeable to moisture in a manner described above. Then, the other portion of the wrapper can be of essentially similar material, however, being essentially nonpermeable. Such a modification may be advantageous in the manufacture of products with a high fat content, whereby the pan conventionally used to prevent the release of fat from the product may be omitted.

The baking method according to the invention has even wider applications in manufacturing and handling processes of bakery products. As discussed above, the handling properties of the bakery product dough piece can be made independent from its shape retention by enclosing each dough piece after its metering in an individual wrapper. Then, the product can travel also through a possible raising step enclosed in said wrapper into the actual baking step.

Now, the raising and/or baking steps may be substantially outdistanced both temporally and spatially from the reduction of dough into a formed piece. The product can be transported packaged in the wrapper, e.g., in a deep-frozen state to a retail store or directly to the consumer, whereby the raising and/or baking steps required

to prepare the finished product can be performed at either site.

On the other hand, if the product is processed closer to its final qualities in an integrated system, essential benefits over the prior art are obtained in the process after the baking step. For instance, baked the product may be delivered in its wrapper, that is, as a ready-packaged product almost immediately after baking to a retail store or directly to the location of the end user. Herein, among other benefits, the cooling steps required in conventional processes prior to packaging may be omitted. Furthermore, the postfermentation of the product in the wrapper continues in an advantageous manner, and still further, the shelf-life, that is, the good-until date of the product may be extended. When desired, the postbaking behaviour of the product may be affected by a separate posttreatment step, wherein the properties of the wrapper are modified into a more advantageous direction in terms of postfermentation and/or storage. For instance, the goal of such a posttreatment may be to reduce the moisture permeability of the wrapper from the value of optimal moisture permeability rate required during baking.

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When applied to breadmaking, for instance, the invention may be carried out by metering the dough piece into its protective wrapper using extrusion techniques. While the wrapper itself may have any shape suited for the specific application, a tubular casing is an advantageous form in concurrent manufacturing processes. In order to take into account the expansion of the product during the raising and baking steps, a suitably large volume of space must be reserved for the dough piece in the wrapper. As a guideline, about 1/4 of the wrapper overall volume is filled by the dough piece in breadmaking. After the partial filling, the tubular casing can be transferred to the

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subsequent steps either cut to constant lengths, or alternatively, as a continuous coil of tubular casing if the transport is to be performed over a greater distance.

5 The scope of the invention also covers the manufacture of pan-baked products, wherein the product is sealed as such in the wrapper, and this combination is placed in a pan and baked therein. Such a baking technique is applicable to, e.g., baking of fat-containing products or when the  
10 product is desired to have a given finished form. After baking, the product is removed from the pan and submitted to delivery and sales without being removed from its wrapper.

15 As mentioned above, the present invention makes it possible to perform baking at a temperature lower than that of conventional baking techniques. Generally, the baking temperature can be lowered by about 5 - 15 °C. Such a lower baking temperature allows about 10 % longer baking  
20 time.

## Claims:

1. A method of making a bakery product, said method comprising the steps of (a) providing an individual protective dough wrapper having a surface, at least a part of that surface having controlled permeability to moisture; (b) metering a dough piece into the protective wrapper; and (c) using the individual protective dough wrapper for shape retention of the dough piece during baking.
2. The method of claim 1, and including the step of filling about 1/4 of the overall wrapper volume with the dough piece.
3. The method of any one of claims 1 and 2, including the step of heating to a baking temperature that is lowered by about 5 - 15 °C from a conventional baking temperature, and the step of using a baking time that is about 10% longer than of a conventional open-hearth baking time.
4. The method of any one of claims 1 to 3, including the step of using a wrapper material whose entire surface area has limited permeability to moisture.
5. The method of claim 4, including the step of using a fibrous web material as the wrapper.
6. The method of claim 5, including the step of treating the fibrous web material with an agent affecting the moisture permeability properties of the fibrous web material.
7. The method of claim 6, including the step of using a fibrous web material containing regenerated viscose cellulose in making the wrapper.
8. The method of any one of the claims 1 to 7, said method including the step of allowing the dough piece to rise in the wrapper before baking.

9. The method of any one of claims 1 to 8 wherein said method includes the step of transporting the dough piece in the wrapper.

10. The method of any one of claims 1 to 9 wherein said method includes delivering the dough piece, as baked, in the wrapper.

11. A method of preparing a bakery product, comprising the steps of (a) providing a wrapper made of a material suitable for baking in an oven, the wrapper having at least a portion that is at least partially impermeable to moisture; (b) placing a dough piece in the wrapper; and (c) using said wrapper as a shape retainer for the dough piece.

12. The method of claim 11, wherein the wrapper has a volume, and the method includes the step of filling about 1/4 of the wrapper volume with the dough piece.

13. The method of any one of claims 11 and 12, wherein the method includes at least one of the steps chosen from the set of steps consisting of:

- (a) baking the dough piece in the wrapper at a temperature that is lower by about 5 - 15 °C than the customary baking temperature of similar dough pieces baked other than in said wrapper; and
- (b) baking the dough piece in the wrapper for a baking time that is about 10% longer than the customary open-hearth baking time of similar dough pieces baked other than in said wrapper.

14. The method of any one of claims 11 to 13, including the step of making the entirety of said wrapper of a wrapper material is has limited permeability to moisture.

15. The method of claim 14, wherein the step of making includes the step of using a fibrous web material to make the wrapper.

16. The method of any one of claims 11 to 15, including the step of treating the fibrous web material of which the wrapper is made with an agent affecting the moisture permeability properties of the material.

17. A method as defined in any one of claims 11 to 16, including the step of making the wrapper of a fibrous web material that includes regenerated viscose cellulose.

18. A method according to any one of claims 11 to 17, including the step of allowing the dough piece to rise in the wrapper before baking.

19. The method of any one of claims 11 to 18 wherein said method includes the step of transporting the dough piece in the wrapper.

20. The method of any one of claims 11 to 19 wherein said method includes delivering the dough piece, as baked, in the wrapper.

21. A method of preparing a bakery product comprising the steps of (a) providing a dough wrapper, the dough wrapper having a surface, at least a part of that surface having limited permeability to moisture; (b) placing a dough piece into the wrapper; and (c) baking the dough piece in the wrapper.

22. The combination of a dough piece and a dough wrapper for use in the method of any of claims 1 - 21.

23. The combination of claim 22 wherein the dough piece has been baked.

24. The combination of claim 22 wherein the dough wrapper has a form for retaining the shape of the dough piece.

25. The combination of claim 22 wherein the wrapper has a cylindrical shape.