(19) DANMARK

(10) **DK/EP 3768089 T3**

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: ***A 21 C 3/02 (2006.01)*** ***A 21 C 1/00 (2006.01)*** ***A 21 C 9/08 (2006.01)*** ***A 21 C 11/10 (2006.01)*** ***A 21 C 13/00 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2023-05-08**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2023-03-08**

(86) Europæisk ansøgning nr.: **19717229.9**

(86) Europæisk indleveringsdag: **2019-03-19**

(87) Den europæiske ansøgnings publiceringsdag: **2021-01-27**

(86) International ansøgning nr.: **EP2019056821**

(87) Internationalt publikationsnr.: **WO2019180009**

(30) Prioritet: **2018-03-20 DE 102018204243**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **Kuchenmeister GmbH, Coesterweg 31, 59494 Soest, Tyskland**

(72) Opfinder: **MOHNKE, Thorsten, Berggarten 24, 44534 Lünen, Tyskland**
JANK, Rüdiger, Hermannstraße 8, 16548 Glienicke, Tyskland

(74) Fuldmægtig i Danmark: **CHAS. HUDE A/S, Langebrogade 3B, 1411 København K, Danmark**

(54) Benævnelse: **Fremgangsmåde til kontinuerlig fremstilling af bagværk, navnlig bagværk af hvededej, og apparat dertil**

(56) Fremdragne publikationer:
US-A- 5 356 652
US-A1- 2005 249 845
US-A1- 2017 202 226
Anonymous: "Exzenterschneckenpumpe - Wikipedia", , 16. Februar 2018 (2018-02-16), XP055603906, Gefunden im Internet: URL:https://de.wikipedia.org/w/index.php?t itle=Exzenterschneckenpumpe&oldid=17407786 4 [gefunden am 2019-07-09]
RONDO Burgdorf AG: "RONDO at iba 2009 - Seeded Bread Rolls on Starline", Youtube, 26. März 2010 (2010-03-26), Seite 1 pp., XP054979511, Gefunden im Internet: URL:https://www.youtube.com/watch?v=DOHL3F QFGDQ [gefunden am 2019-07-09]
baktec: "Fritsch lamination & pastry line / Fritsch Laminieranlage/Tourieranlage & Euroline Feigebäcklinie", Youtube, 26. März 2014 (2014-03-26), Seite 1 pp., XP054979513, Gefunden im Internet: URL:https://www.youtube.com/watch?v=t8NUbd 7hFJE [gefunden am 2019-07-09]

Method for the continuous production of bakery products, in particular bakery products from wheat dough, and apparatus therefor

The present invention relates to a multivariable process for the continuous production of bakery products, in particular bakery products from wheat dough, and to an apparatus for carrying out this process.

Description

Hamburger buns are the baked basis of savory snacks filled with fried ground meat, sausage, vegetables and various spicy sauces. The shape of the baked goods is either round (bun) or oblong (hot dog). The typical quality characteristics of the buns are a soft crust and a fine-pored crumb. The country of origin of this type of pastry is the USA. The name "hamburger" is based on a typical roll shape that was popular as a low-cost food among dockworkers in the port of Hamburg in the 19th century.

As a basis for snacks, the recipe has been modified and the production industrialized in recent decades. For this purpose, a technological process was developed in which the dough is produced in a batch kneader or continuous kneader, then pumped to a portioning machine and mechanically divided into portions of dough.

The dough is subject to high mechanical stress during processing. To compensate for this stress, wheat flours with a high proportion of the protein fractions gliadin and glutenin and baking agents consisting of emulsifiers and enzymes are used. The product made with these agents exactly meets the specific quality requirements for a bun.

The structure and texture of buns and hot dog buns are atypical of bakery products made from yeast doughs such as croissants, brioches, rolls, ciabatta, etc. For this reason, the production lines for buns and hot dogs are mono-lines. Flexible application of this technology for different baked goods with differentiated quality characteristics is not possible with the known manufacturing process.

For the industrial production of wheat doughs, line systems have been developed in recent decades that gently form wheat doughs into dough strips, laminate them, reduce the dough thickness, add filling components, and portion the dough portions to the desired portion size by cutting devices. These lines are used to produce a wide range of sweet and unsweetened

wheat dough products. These include brioches, snails, ciabatta, sliced rolls, doughnuts, croissants, brioches and toast. Gentle dough processing and reduced shear forces produce artisan quality yeast dough products.

The production of buns and hot dogs is not possible with this technology. Buns produced with this technology have different pore size and bubbles on the surface of the pastry. However, technological separation of different types of pastry is inconvenient and uneconomical. Instead, it is desirable to use one production line for a variety of pastry types.

Accordingly, one object of the present invention has been to provide a method that allows the production of wheat pastries with different textures and in different formats and sizes substantially in one production line, with only minor adjustments.

US 2017/202226 A 1 discloses a process for the continuous production of bakery products and a plant for carrying out this process according to the prior art.

This object is solved according to the invention with a method having the features of claim 1.

Accordingly, there is provided a method for the continuous production of bakery products, in particular bakery products from wheat doughs, comprising the following steps:

a) producing at least one dough in at least one kneading device;

b) feeding the at least one dough from the kneading device into at least one depolymerizer comprising at least one conveying screw and at least one eccentric screw pump for depolymerization and degassing of the dough; wherein the use of enzymes, in particular a glucose oxidase, results in regeneration of the gluten network after depolymerization during further processing, and wherein the shear forces are adapted to the flour grade through different shearing in the depolymerizer;

c) feeding the depolymerized dough into at least one dough strip former, to form a dough strip (with simultaneous reconstruction of the dough structure);

d) folding of the dough strip (lamination);

e) introducing the folded (laminated) dough strip into at least one rolling device to reduce the thickness of the dough, in particular by a combination of rollers;

f) cutting the dough strip into a number of dough portions using at least one cutting device;

g) optional flat rolling of the dough portions;

h) placing the dough portions on baking trays or in baking pans;

i) fermentation of the dough portions; and

j) baking the dough portions.

The present method allows the use of a production line, which can be adjusted only slightly, for the production of wheat pastries with different structures and sizes. The invention is essentially based on an extension of the technology by an additional process step. According to the invention, the doughs are fed to a depolymerizer consisting of a separate conveying screw connected to an eccentric screw pump.

Due to the untypical stressing of the doughs, a depolymerization of the gluten structure and an additional degassing of already existing air pockets takes place. The existing gas nuclei are not completely eliminated, but reduced in size. The plastic properties of the doughs are enhanced and thus the flow behavior improved. The use of enzymes such as glucose oxidase leads to regeneration of the gluten network after depolymerization during processing on the laminating line. By varying shear in the depolymerizer, the shear forces are adapted to the flour quality.

The laminating line for dough processing is also equipped with additional units such as effect channels, product stoppers, pressure rollers and positioning belts. Thus, with the process extension, it is possible to produce baked goods from yeast-flaked wheat doughs of different pastry structures with one production line.

As mentioned above, the raw materials are first fed to a kneading device in a first step. For this purpose, dough-forming raw materials are introduced into the kneading device to form the

dough or the dough phase in the kneading device. The kneading device used can be a continuous kneader or a batch kneader.

Dough-forming raw materials introduced into the kneading device include, in particular, water, yeast, and dry matter such as flour, emulsifiers, and possibly small amounts of sugar. Furthermore, dough-loading raw materials can be introduced into the dough phase. In the present context, dough-loading raw materials are understood to mean in particular fats, oils, flavorings, sugar, glycerol and the like. The amount of enzymes added is between 5 and 150 ppm, preferably between 10 and 100 ppm.

The dough temperature in the kneading device is in particular in a temperature range between 20 and 35 °C, preferably between 22 and 30 °C, very preferably 24 to 29 °C, in each case depending on the dough to be produced. The throughput of the kneading device is determined by the speed setting. Different kneading intensities result in different pastry structures.

As indicated above, the kneaded dough is transferred to a depolymerizer, which consists of at least one conveying screw and at least one eccentric screw pump. It may be a twin or triple screw, with a screw length between 500 to 1500 mm, preferably 600 to 1000mm, and with a pitch between 50 to 300 mm, preferably 80 to 200 mm. The rotational speed is from 5 to 50 rpm, preferably from 7 to 30 rpm. The residence time of the kneaded dough in the depolymerization device is between 1 to 10 min, preferably 2 to 5 min.

After depolymerization and degassing of the dough in the depolymerizer, the dough is conveyed to the dough strip former by an eccentric screw pump, e.g. via a pipeline. The dough strip former is designed in the form of a hopper device and has at least one pair of rollers, preferably two or three pairs of rollers, at or below the hopper opening. The dough mass is deposited through the hopper and the at least one pair of rollers vertically or vertically as a homogeneously formed dough strip onto a second, horizontally running conveyor belt.

Alternatively, the dough can be portioned and the portioned dough pieces are conveyed vertically and placed on a conveyor belt overlapping.

In one embodiment, at least one (first) rolling device can be provided on this second conveyor belt. The rolling device preferably comprises a rolling mill with motor-driven rolls at the top and bottom. It is also possible to use a rolling mill with several rolls running on a circular or elliptical path.

In this at least one (first) rolling device, the dough strip can preferably be rolled to a thickness of 2 to 30 mm, preferably 3 to 20 mm, in particular 5 to 10 mm. The thickness of the dough strip after leaving the rolling device is determined in particular by the desired end product.

The dough strip is then transferred from the second conveyor belt to a third conveyor belt for folding in step d). In one embodiment, the dough strip is placed on a further third conveyor belt arranged vertically or at right angles to the second conveyor belt transporting the dough strip in the direction of travel of the third conveyor belt for the purpose of folding. In this case, when the dough strip passes from the second conveyor belt to the third conveyor belt, the dough strip can be folded transversely to the direction of travel of the third conveyor belt. This can be done, for example, by laying down the dough strip at right angles in multiple layers. The dough strip is superimposed or laminated with a very low drop height in order to simulate manual processing and thereby increase the stability of the dough structure. The dough strip is laminated in three to six layers.

In a further embodiment of the present process, the folded dough strip is rolled in at least one (second) rolling device in step e) to a final dough thickness or dough strip thickness of 2 to 20 mm, preferably 2 to 10 mm. Here, the dough thickness to be set in the (second) rolling device is again dependent on the type of baking form desired. For example, the final dough thickness can be 2-4 mm for a bun and 8-10 mm for a hot dog bun.

This (second) rolling device is designed in particular in the form of a rolling mill with e.g. 8-12 rolls or sizing units running in an elliptical path (calibrating head with roll drum), whereby several e.g. three sizing units can be arranged one behind the other. The use of a multi-roll system is also possible.

After the second rolling operation, the dough strips typically have a width of between 200 and 900, preferably between 300 and 600 mm.

After the dough strip has been rolled again, it is cut into a number of dough portions in the longitudinal and transverse directions using a cutting device in step f). Preferably, the dough strip is cut using a cutting roller and guillotine.

During the cutting process, the dough strips are first cut in the longitudinal direction, and then, if necessary, in the transverse direction (as in the case of hot dog buns).

In a preferred embodiment, in particular for the production of buns, the step f) of cutting the dough strip comprises the following substeps:

f1) longitudinal cutting of the dough strip into a number of narrow dough strips, i.e. the dough strip is cut here in the transport direction;

f2) rolling up the dough strip (i.e. the narrow dough strips); and

f3) cross cutting of rolled dough strips into a number of dough portions.

The dough strips can be rolled up, for example, by using conical rollers. After rolling up, the rolls are preferably compacted using a pressure belt.

Separation of the cut dough portions is preferably effected by different belt speeds of the conveyor belts used, whereby the different final pastry sizes are determined by the separation of the cut dough belts into the individual portions of different sizes.

After the step of cutting and separating the dough strips into a number of dough portions, the cut dough portions can be transferred to a further conveyor belt in a further optional step f4), wherein effect channels are formed on the conveyor belt at an angle to the direction of travel of the conveyor belt, wherein round shaping of the dough portions is effected in the effect channels.

The effect channels provided on the conveyor belt are open at the sides in the form of channels. Each effect channel is formed and delimited by two metal rails. The angle ($\alpha 1$; $\alpha 2$) of the effect channels to the running direction of the conveyor belt is preferably between 20 and 60°, preferably 40 and 50°, in particular preferably 45 and 48°. Each effect channel is divided into at least two sections along the conveyor belt: The first section of the knitted channel runs along the conveyor belt at an angle $\alpha 1$ oblique to the direction of travel of the conveyor belt. After a predetermined distance, the first section of the effect channel bends at an angle β and merges into the second section of the effect channel; that is, the first and second sections of each effect channel are arranged in a V-shape relative to one another, with the first and second sections of the effect channel meeting at an angle β. The second section runs on the conveyor belt at an angle $\alpha 2$ oblique to the running direction of the conveyor belt, where $\alpha 1$ is equal to $\alpha 2$.

The effect channels counteract the transport movement of the conveyor belt and thus the linear movement of the dough portions deposited on the conveyor belt with a slight vertical

movement. Linear and vertical movement are superimposed, resulting in a round-effected dough piece. Due to the V-shaped arrangement of the first and second sections of the effect channels, there is initially a vertical movement in the first section in a first direction and in the second section in a second (opposite) direction, so that different thrust forces act on the dough piece or dough portion. Due to the linear forward movement of the conveyor belt and the angular arrangement of the effect channels on the conveyor belt, the dough piece is moved forward along the walls of the effect channels, while at the same time a vertical movement is exerted on the dough portions due to the angular arrangement of the effect channel walls. This causes the dough portions to roll along the walls of the effect channels, which in turn results in round shaping of the dough portions. The V-shaped arrangement of the effect channels with the same angular setting also restores the starting position of the dough portions on the line.

The modules used in the step of rolling in the dough portions and shaping them, such as guide rails (effect channels) and rolling-in devices, are interchangeable, making it easy to adapt the production process to the desired baked product.

In a further embodiment of the process, after leaving the effective channels, the thickness of the round-shaped dough portions is reduced by flat rolling (step h). The round-shaped dough portions used for the production of buns have their thickness reduced to a final thickness of between 2 and 5 mm.

The dough portions used for the production of hot dog buns are obtained by longitudinal cutting of the dough strip according to step f1), cross cutting according to step f3), and subsequent flat rolling of the deposited dough portions according to step g) to a final thickness between 8 - 10 mm. In the case of hot dog bun production, this eliminates the need to roll up the dough strips in accordance with step f2) and transfer the cut dough portions to kneading channels in accordance with step f4).

In the further course of the process, the formed dough portions are placed on baking molds or baking trays in step h). The baking trays to be used preferably have a square surface so that simple control of the transport is possible. It is particularly preferred to use a baking tray with a surface area of at least one square meter to enable a smooth process with low cycle rates. In addition, a square area of the baking tray enables process-dependent rotation of the baking tray molds or the baking tray using standardized, interchangeable transport paths. The baking molds to be used preferably have a constant ratio of the side surfaces to each other, i.e. the baking molds are predetermined with a given modular dimension. The constant ratio of the

side surfaces and the predetermined module dimension enable the baking molds to be transported, loaded and unloaded using the same systems.

The subsequent fermentation of the round-shaped dough portions in step i) is carried out in one variant at fermentation temperatures between 30 and 35°C, preferably between 32 and 34°C, the fermentation time being between 30 and 120 min, preferably 45 and 115 min, more preferably between 50 and 100 min.

The relative humidity during fermentation in the open baking mold can be between 75 and 95%, preferably between 80 and 90%, more preferably between 85 and 88%.

Fermentation temperature, fermentation time and relative humidity during the fermentation process depend in particular on the dough composition; for example, a dough for buns requires a fermentation temperature of 32 °C, a fermentation time of 70 min and a relative humidity of 85%.

After the proofing process, the dough portions can be sprinkled with seeds and/or sprayed with protein mixtures in an optional step i1).

Baking of the dough portions in step j) can be carried out at temperatures between 150 and 250 °C, preferably between 180 and 240 °C, in particular preferably between 200 and 220 °C. Preferably, the oven to be used has an oven temperature that gradually decreases as the dough portions pass through the oven. Thus, the oven temperature at the beginning (i.e., entry of the unbaked dough portions into the oven) may be between 200 and 240 °C and at the end of the baking zone (i.e., exit of the baked dough portions from the oven) may be between 180 and 200 °C.

In one embodiment of step j), the baking time is between 5 and 35 min, preferably between 6 and 30 min, more preferably between 7 and 15 min, most preferably between 8 and 12 min depending on the dough and/or dough weight to be baked.

Also, in one embodiment of the present method, convection is used in the oven depending on the product to be baked. Thus, for certain baked products, vertical convection from the bottom of the oven and/or horizontal or even vertical convection onto the surface of the dough portions to be baked may not be desirable at all, may be desirable only at the beginning of the baking time, or may be desirable during the entire baking time. It is also possible to use a limited

convection of, for example, 20 to 80%, preferably 40 to 60%. In particular, it is preferred to use a convection of 30 to 60 % at the beginning of the baking time.

In total, four possibilities of heat transfer are available in the present process in the baking process: Conduction, convection, radiation and/or condensation. The baking oven preferably has several different baking zones, for example up to twelve different baking zones. The direction of flow of the heat air in the baking zones is preferably designed in such a way that the vertical direction of flow prevents the entry of false air.

Depending on the type of pastry, the baking process can take place under 100% utilization of the baking surface or under less than up to 50% below the capacity of the oven, i.e. the oven can be operated at different utilization levels. In order to enable a uniform transfer of energy, an appropriate control of heat transfer is used. Preferably, thermal oil is used as the energy carrier, which enables more precise gap reduction. By optionally adding vertical and horizontal turbulence, the energy input can be precisely controlled in a poduct-specific manner by means of the convection already mentioned. A major advantage of the present process is that the normally necessary use of two different ovens when using different bakery doughs is eliminated.

The present method is characterized in particular by its variability and flexibility. The present variable system can be used to manufacture different products with variable process stages and varying technological components (modules).

Also, the present system and method allows coupling of the modules of the baking system with a second parallel (sister) system, creating a redundant factory system.

It is also an object of the present invention to provide a device for the continuous production of baked goods from wheat dough in a method described above.

Accordingly, the present device comprises

- at least one kneading device for the production of a dough;
- at least one depolymerizer comprising at least one conveying screw and at least one eccentric screw pump for depolymerizing the dough;
- at least one dough strip former for forming a dough strip;

- at least one conveyor belt for transferring the dough strip to a further conveyor belt, the dough strip being folded (laminated) during the transfer from the one conveyor belt to the further conveyor belt;
- at least one rolling device for reducing the thickness of the folded dough strip;
- at least one cutting device for cutting the dough strip into a number of dough portions;
- optionally at least one further conveyor belt with effect channels provided on the conveyor belt;
- at least one device for loading baking trays and/or baking molds with the shaped (round-shaped or elongated) dough portions;
- optionally at least one pressure roller to reduce the thickness of the dough;
- at least one fermentation device; and
- at least one oven to bake the dough.

With regard to the details of the singular device components, reference is made to the corresponding description of the process steps.

The present invention is explained in more detail below with reference to the figures, using an example of an embodiment. It shows:

Figure 1 a schematic representation of the process steps of an embodiment of the process according to the invention; and

Figure 2 a schematic representation of an embodiment of effect channels.

Figure 1 shows a schematic overview of an embodiment of the present method, wherein a dough phase is produced in a kneader (1), e.g. a batch kneader, from dough-forming raw materials such as wheat flour, water and/or yeast.

After a predetermined time and energy input of the kneading, which may vary depending on the desired baked product, the dough phase is transferred from the kneader (1) to a depolymerizer (2). The depolymerizer (2) comprises a separate conveying screw connected to an eccentric screw pump. Due to the untypical stressing of the doughs in this step, depolymerization of the gluten structure and additional degassing of already existing air pockets takes place. The existing gas nuclei are not completely eliminated, but reduced in size. The plastic properties of the doughs are enhanced and thus the flow behavior is changed. The use of enzymes such as glucose oxidase leads to regeneration of the gluten network after depolymerization during processing on the laminating line. By varying shear in the depolymerizer, the shear forces are adapted to the flour quality.

The dough phase leaving the depolymerizer (2) is fed via a pipeline into a dough strip former (3) with hopper device and pairs of rollers. The dough strip former (3) causes the formation of a homogeneous dough strip, which is deposited on a conveyor belt.

This conveyor belt is part of a dough rolling line, which is provided with a linearly arranged roller as (first) rolling device. Before the rolling device, the thickness of the dough strip deposited on the conveyor belt is e.g. 40 mm. The first rolling device can consist, for example, of a rolling mill or multi-roll system equipped with top and bottom motor-driven rolls, and enables the dough strip to be rolled to a dough thickness or dough thickness of 30 mm and less depending on the desired baked product. Thus, the dough thickness of the dough strip after leaving the rolling device is between 2 and 8 mm in the case of the production of buns and hot dog buns.

After the dough strip leaves the rolling device on a further conveyor belt, a folding process of the dough strip takes place, which can also be described as dough strip lamination (4), where the dough strip is folded vertically to the running direction of the conveyor belt. The rolled dough strip is applied to a further, next conveyor belt arranged vertically to the conveyor belt and, at the transition from the one conveyor belt to the next conveyor belt, is laid down or laminated in several layers at right angles. This increases the stability of the dough structure. The dough thickness is increased by a factor of 10 to 30.

The folded, laminated dough strip is subjected to a further shearing or rolling process (5) in a further (second) rolling device consisting of a multi-roll system and sizing unit. In this rolling device, the folded dough strip is sheared or rolled to a dough thickness of 2 mm and above,

again depending on the desired baked product. Thus, the dough thickness after leaving the (second) rolling device is 2 mm for a bun and 5 mm for a hot dog bun.

After reduction of the dough thickness in the (second) rolling device (5) and depositing of the rolled dough strip on a further conveyor belt, cutting of the dough strip in longitudinal and transverse direction is performed using at least two cutting devices.

Here, the dough strip is first cut in the longitudinal direction (i.e. in the running direction of the dough strip) into parallel running dough strips (6a) and then the parallel running dough strips (in the production of buns) are rolled up (6b). Then the rolled dough strips are cut in the transverse direction (6c). In the case of hot dog buns, the cut dough strips are not rolled up according to (6b) but cut in the longitudinal and transverse directions according to (6a) and (6c).

After the step of cutting (6a-6c) and separating the dough strips, the cut dough portions are transferred to another conveyor belt, with effective channels being formed on the conveyor belt at an angle to the direction of travel of the conveyor belt, whereby in the case of bun production, round shaping of the dough portions is effected in the effective channels (7).

The channels provided on the conveyor belt are open at the sides in the form of grooves.

As indicated in Figure 2, each effect channel is formed and delimited by two rails. The angle ($\alpha 1$; $\alpha 2$) of the effect channels to the running direction of the conveyor belt is 45°. Each effect channel is divided into at least two sections A, B along the conveyor belt: The first section A of the effect channel runs along the conveyor belt at an angle $\alpha 1$ oblique to the running direction of the conveyor belt. After a predetermined distance, the first section of the effect channel bends at an angle β and merges into the second section B of the effect channel; that is, the first and second sections of each effect channel are arranged in a V-shape relative to one another, with the first and second sections of the effect channel meeting at an angle β. The second section runs on the conveyor belt at an angle $\alpha 2$ oblique to the running direction of the conveyor belt, where $\alpha 1$ is equal to $\alpha 2$. Due to the linear forward movement of the conveyor belt and the angular arrangement of the effect channels on the conveyor belt, the dough piece is moved forward along the walls of the effect channels, while at the same time a vertical, rotating movement is exerted on the dough portions due to the oblique arrangement of the effect channel walls. This causes the dough portions to roll along the walls of the effect channels, which in turn results in round shaping of the dough portions.

After positioning and depositing the round-shaped dough portions in the corresponding baking molds or on baking trays (9), the fermentation process (10) takes place at varying fermentation temperatures, which are selected depending on the desired baked product.

After the fermentation process, the dough portions can be sprinkled with seeds (e.g., sesame seeds) or sprayed with protein mixtures (11).

The dough portions are fed to the oven and baked for a predetermined period of time, which depends on the desired baked product (12).

The baked goods are cooled and then packaged.

The following table summarizes the parameters for processes for the production of buns and hot dog buns obtained by this method.

Parameter	**Buns**	**Hot dog bun**
Dough temperature kneader	28°C	28°C
Kneader power	50Hz	50Hz
Gap width sizing unit 1	5mm	8mm
Gap width sizing unit 2	2mm	5mm
Fermentation temperature	32°C	32°C
Fermentation time	70min	60 min
Relative humidity (fermentation)	85%	85%
Baking time	9min	9min
Oven temperature	210°C	210°C
Vertical convection from below	60% of the baking time	50% of the baking time
Horizontal convection on the surface of the pastry	At the beginning of the baking time	At the beginning of the baking time

PATENTKRAV

1. Fremgangsmåde til kontinuerlig fremstilling af bagværk, navnlig bagværk af hvededej, omfattende trinnene:

a) fremstilling af mindst en dej i et ælteapparat (1);

b) indsætning af den mindst ene dej fra ælteapparatet (1) i mindst en depolymerisator (2), omfattende mindst en transportsnegl og mindst en excentersnekkepumpe til depolymerisering og afgasning af dejen; hvorved der ved anvendelse af enzymer, navnlig en glukoseoxidase, sker en regenerering af glutennetværket efter depolymeriseringen under den yderligere forarbejdning, og hvorved, ved forskellig skæring i depolymerisatoren, skæringskræfterne tilpasses til melkvaliteten;

c) indsætning af den depolymeriserede dej i mindst en dejstrimmeldanner (3) under dannelse af en dejstrimmel;

d) foldning af dejstrimlen (4);

e) indføring af den foldede dejstrimmel i mindst en valseindretning (5);

f) skæring af dejstrimlen (6) under anvendelse af mindst en skæreindretning til et antal dejportioner;

g) eventuel fladvalsning af dejportionerne;

h) aflægning af de dannede dejportioner på bageplader eller i bageforme (9);

i) gæring af dejportionerne (10);

j) bagning af dejportionerne (12).

2. Fremgangsmåde ifølge krav 1, **kendetegnet ved, at,** i trin c), dejen, der forlader den mindst ene depolymerisator (2), i den mindst ene delstrimmel-danner (3) via en rørledning transporteres ind i dejstrimmel-dannerens tragt, og den dannede dejstrimmel anbringes på et transportbånd.

3. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** dejstrimlen med henblik på foldning i trin d) bliver tvær-foldet på et yderligere

transportbånd, som er arrangeret vinkelret på transportbåndet, der transporterer dejstrimlen, i dette yderligere transportbånds løberetning.

4. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** den foldede dejstrimmel valses i den mindst ene valseretning (5) til en endelig dejtykkelse på 2 til 20 mm, fortrinsvis 2 til 10 mm.

5. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** trinnet f) med skæring af dejstrimlen med henblik på fremstilling af boller omfatter følgende undertrin:

f1) skæring af dejstrimlen på langs i et antal smalle dejstrimler, (6a);
f2) oprulning af dejstrimlen, navnlig de smalle dejstrimler (6b); og
f3) tværskæring af de oprullede dejstrimler i et antal dejportioner (6c).

6. Fremgangsmåde ifølge krav 5, **kendetegnet ved, at** de afskårne dejportioner i et yderligere trin f4) overføres til et yderligere transportbånd, hvorved der på transportbåndet i en vinkel i forhold til transportbåndets løberetning er dannet virkekanaler, hvorved der i virkekanalerne bevirkes en runddannelse af dejportionerne.

7. Fremgangsmåde ifølge krav 6, **kendetegnet ved, at** virkekanalerne er virkekanaler (7), som er dannet på et transportbånd under en vinkel i forhold til transportbåndets løberetning.

8. Fremgangsmåde ifølge et af kravene 6 til 7, **kendetegnet ved, at** tykkelsen af de afrundede dele, som forlader virkekanalerne, reduceres (trin h1).

9. Fremgangsmåde ifølge et af kravene 1-4, **kendetegnet ved, at** fremstillingen af hot-dog-brød i trin f) af skæringen af dejstrimlen omfatter følgende undertrin:

f1) længdeskæring af dejstrimlen i et antal smalle strimler, (6a); og
f3) tværskæring af dejstrimlerne i et antal dejportioner (6c).

10. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** gærtemperaturen i trin I) er mellem 30 og 35°C, fortrinsvis mellem 32 og 34°C, og gæringstiden er mellem 30 og 120 min., fortrinsvis mellem 45 og 115 min, navnlig med fordel mellem 50 og 100 min.

11. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** dejportionerne efter gæringen bestrøes med frø og/eller sprinkles med proteinblandinger (trin 12).

12. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** dejportionerne bages ved temperaturer mellem 150°C og 250°C, fortrinsvis mellem 180°C og 240°C, navnlig fortrinsvis mellem 200°C og 220°C.

13. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** bagetiden er mellem 5 og 35 min., fortrinsvis mellem 6 og 30 min, navnlig mellem 7 og 15 min., især med fordel mellem 8 og 12 min., afhængigt af dejen til bagning og/eller vægten af dejen.

14. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved, at** bageovnen, der anvendes til bagning, råder over en flerhed af bagezoner, med mindst fire varmeoverføringsvarianter, navnlig ledning, konvektion, stråling og kondensering, og kan drives med forskellige grader af kapacitetsudnyttelse.

15. System til implementering af en fremgangsmåde ifølge et af de foregående krav, omfattende

- mindst en ælteindretning (1) til fremstilling af en dej,
- mindst en depolymerisator (2), omfattende mindst en transportsnegl og mindst en excentersnekkepumpe til depolymerisering af dejen;
- mindst en dejstrimmeldanner (3) til dannelse af en dejstrimmel;
- mindst et transportbånd til overføring af dejstrimlen til et efterfølgende transportbånd, hvorved dejstrimlen foldes;

- mindst en valseindretning (5) til reduktion af den foldede dejstrimmels dejtykkelse;
- mindst en skæreindretning (6) til skæring af dejstrimlen i et antal dejportioner,
- eventuelt mindst et yderligere transportbånd, der er udstyret med virkekanaler (7) på transportbåndet;
- mindst en indretning til bestykning af bageplader og/eller bageforme med de formede dejportioner (9),
- mindst en gæringsindretning, og
- mindst en bageovn (12) til bagning af dejportionerne.

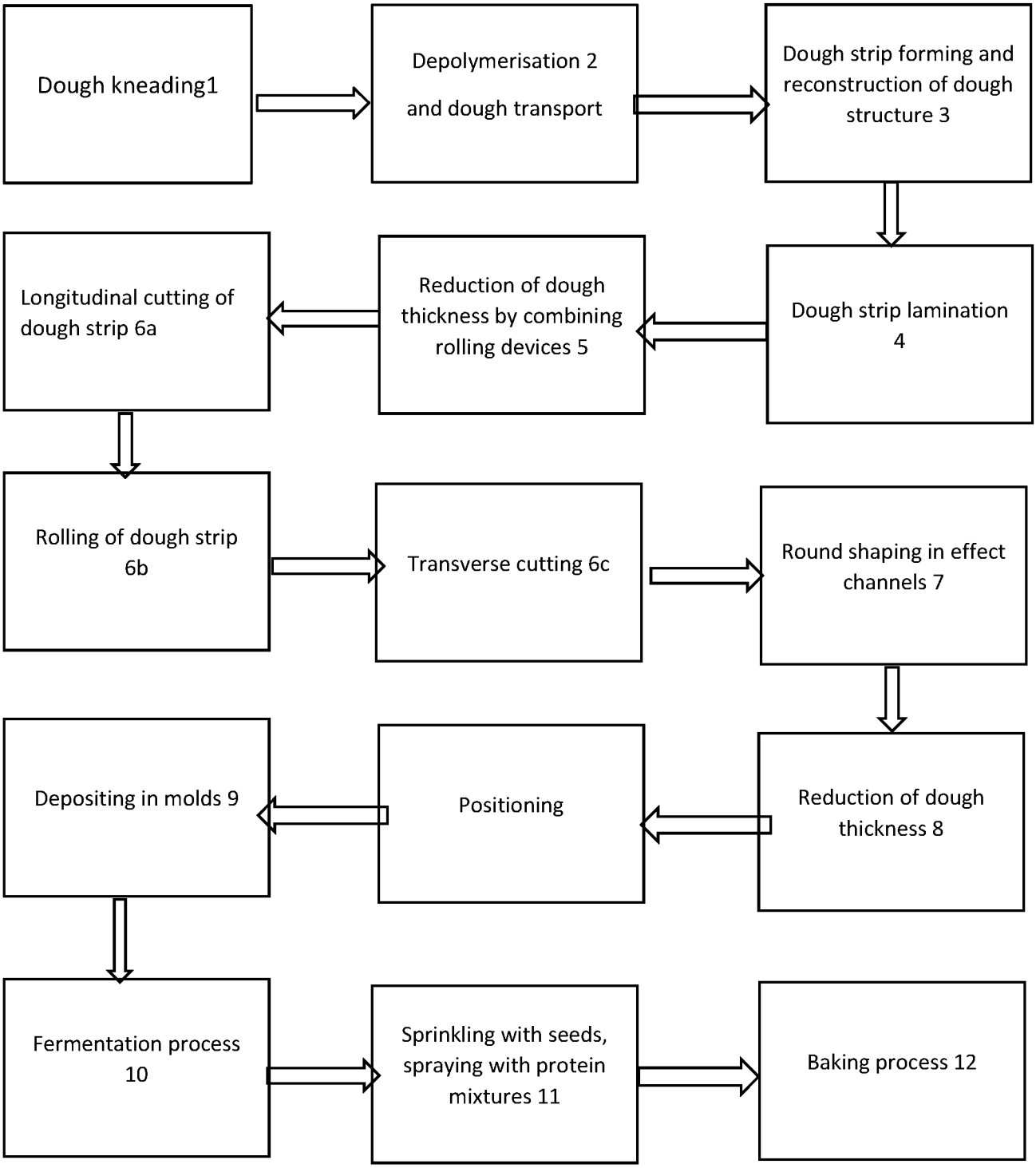

Dough kneading1
Depolymerisation 2
and dough transport
Dough strip forming and reconstruction of dough structure 3
Dough strip lamination 4
Reduction of dough thickness by combining rolling devices 5
Longitudinal cutting of dough strip 6a
Rolling of dough strip 6b
Transverse cutting 6c
Round shaping in effect channels 7
Reduction of dough thickness 8
Positioning
Depositing in molds 9
Fermentation process 10
Sprinkling with seeds, spraying with protein mixtures 11
Baking process 12

FIG 1

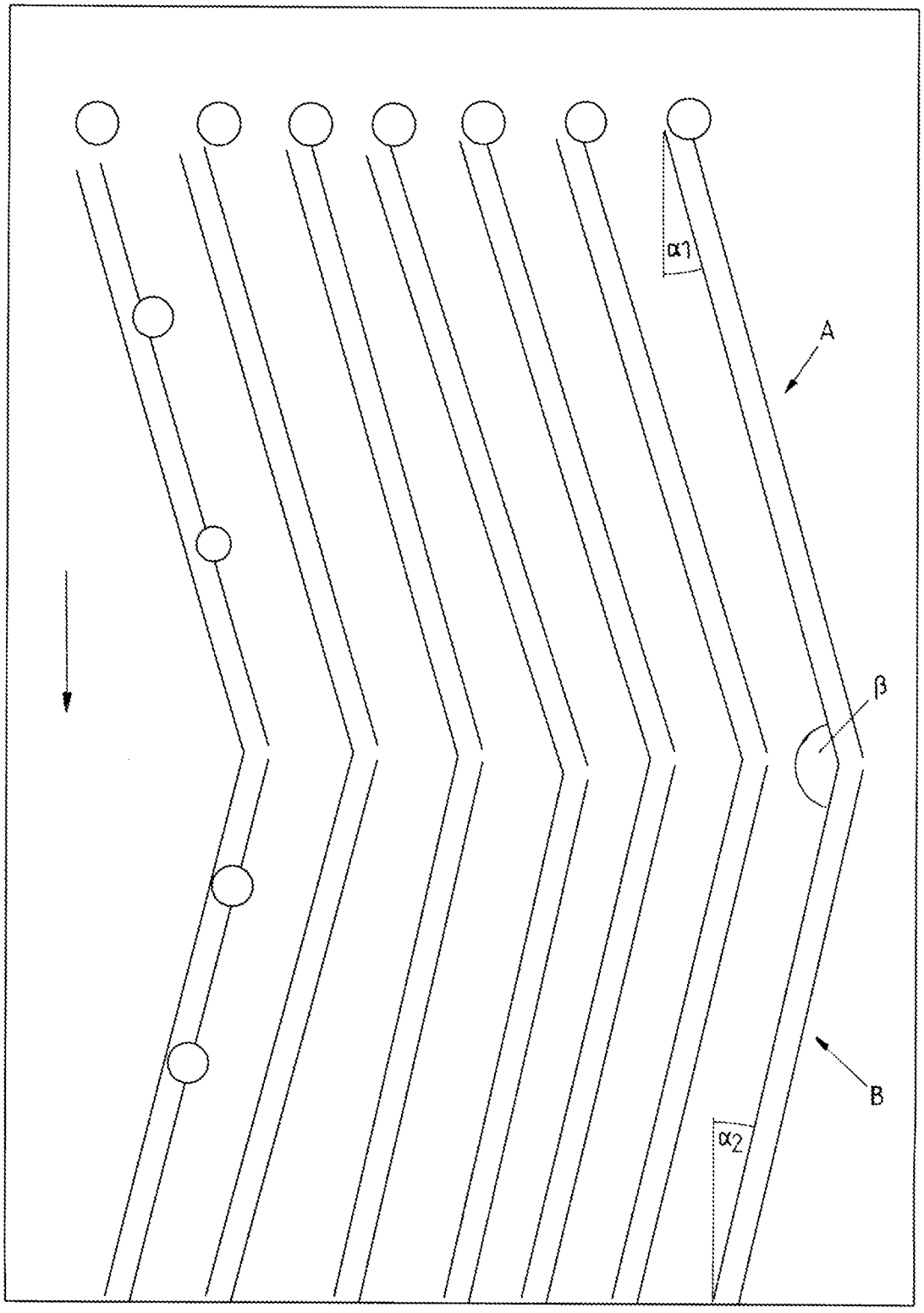


FIG 2