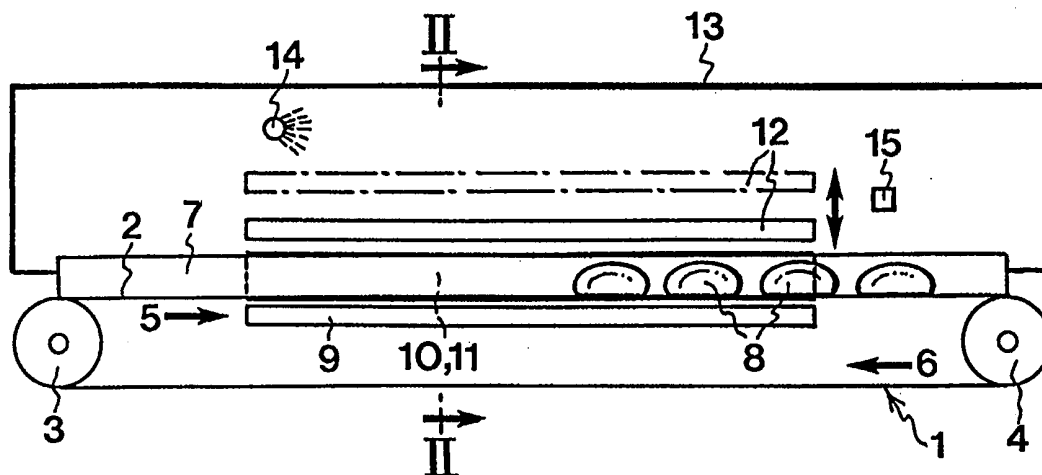




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<p>(21) International Application Number: PCT/SE99/00545 (22) International Filing Date: 1 April 1999 (01.04.99) (30) Priority Data: 09/054,546 3 April 1998 (03.04.98) US (71) Applicant: FRIGOSCANDIA EQUIPMENT AB [SE/SE]; P.O. Box 913, S-251 09 Helsingborg (SE). (72) Inventors: HYLLSTAM, Mari; Andreas Rydelius väg 7, S-224 66 Lund (SE). JARA, Bruce, C.; 927 North Main Street, Amherst, OH 44001 (US). PÅHLSSON, Sten; Frostgatan 222, S-260 35 Ödåkra (SE). VOZELLA, Joseph, A., III; 16 Raymond Lane, Hampton, NH 03842 (US). (74) Agent: AWAPATENT AB; P.O. Box 5117, S-200 71 Malmö (SE).</p>		<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: METHOD AND APPARATUS FOR PREPARING FOOD PRODUCTS FOR FURTHER PROCESSING



(57) Abstract

In a method of preparing soft or sticky food products for further processing, the food products are heated from below for setting a surface layer of the food products which forms a crust holding and supporting the food products during further processing. An apparatus for performing this method comprises a belt conveyor having a conveyor belt for conveying the soft or sticky food products along a path upstream of the further processing, and heating element positioned below and on both sides of the conveyor belt in the path upstream of the further processing. The heating elements heat the soft or sticky food products on the conveyor belt from below and laterally for forming a crust which is able to hold and support the food products during the further processing.

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METHOD AND APPARATUS FOR PREPARING FOOD PRODUCTS FOR
FURTHER PROCESSING

This invention generally is related to the processing of soft or sticky food products and, more precisely, is related to a preparatory treatment of such food products performed before and simplifying the
5 processing thereof, especially the processing of the food products by air on a foraminous conveyor belt.

Many food products being processed in the food industry are soft or sticky in the initial state of the processing. Dough for making bread, batter for batter
10 cakes and marinated chicken parts are examples of such soft or sticky food products. Therefore, it often is necessary to use carriers, e.g. pans, plates and trays, which are designed to support the food products during the processing.

15 These carriers prolong the processing time. Further, when the processing is performed at several separate processing stations, the transferring of the food products between the stations is complicated as a result of the carriers. Also, the carriers prevent processing of
20 food products produced in continuous lengths. Finally, if the carriers are recycled after the completion of the processing of the food products, they often need to be cleaned as they do not always prevent loss of food product.

25 Therefore, a main object of the invention is to eliminate the disadvantages of the carriers referred to above.

A more specific object of the invention is to enable processing of initially soft or sticky food products in

continuous lengths on a foraminous conveyor belt and also enable processing without substantial loss of the food products.

These and other objects are achieved in that the present invention provides a method of preparing soft or sticky food products for processing on a foraminous conveyor belt, wherein the food products are positioned on an endless, substantially fluid impermeable conveyor belt and are heated from below for setting a surface layer on the bottom side of the food products which forms a crust holding and supporting the food products during a subsequent processing.

Such a crust may be formed which is able to support the food product without any carrier, i.e. also on a foraminous conveyor belt having an upper rough supporting surface, without any substantial impressions being formed on the food product. It also enables the forming of the food products as continuous lengths, e.g. strings or sheets, on the endless conveyor belt, although the food products may take other forms.

The heating is preferably such as to produce a flexible surface layer, like a skin, and thereby enabling flexing of the food products when transferred to the foraminous conveyor belt for the subsequent processing. Thus, the set surface layer should be thin, e.g. having a thickness of less than 2 mm, when the food products consist of dough, but having a thickness of more than 1 mm and preferably less than 10 mm, when the food products consist of batter. The set surface layer should be so tough that it without any risk of breaking holds the rest, i.e. the major part of the food product to be treated in the subsequent processing.

The heating may be extended to the lateral sides and also to the top of the food products such that a crust fully enclosing the rest of the food product is formed.

The conveyor belt may follow an upper forward run
5 from a first roller to a second roller and a lower return run from the second roller back to the first roller. A heating element is provided between the upper run and the lower run of the conveyor belt so as to heat the conveyor belt in its upper run and also the bottom side of the
10 food products carried by the conveyor belt. Two further heating elements are provided laterally on either side of the conveyor belt in its upper run so as to heat the lateral sides of the food products carried by the conveyor belt.

15 The necessary increase of the temperature of the bottom and lateral surfaces of the food products for forming a crust is decisive for selecting the heating capacity of the heating elements and the speed of the conveyor belt. Of course, this temperature increase also
20 is dependent upon the specific food product.

The invention is advantageously used for preparatory treatment of dough pieces. Thus, in a method for producing baked articles from dough pieces by first proofing the dough pieces and then baking the proofed
25 dough pieces, the dough pieces are heated from below prior to proofing for setting the bottom side of the dough pieces and forming a crust which holds and supports the dough pieces during the proofing and baking steps.

The subsequent processing may be performed directly
30 after the preparatory treatment of the food products or may be delayed and performed at a later time. Thus, the subsequent processing may be freezing of the food products. When the food products contain yeast, the

subsequent processing could be freezing, proofing and freezing, proofing and baking or proofing, baking and freezing of the food products.

FIG. 1 is a cross-sectional view of a belt conveyor
5 embodying the present invention along the lines I-I in FIG. 2.

FIG. 2 is a cross-sectional view along the lines II-II in FIG. 1.

Referring to FIG. 1, a belt conveyor 1 comprises a
10 conveyor belt 2 and two rollers 3 and 4. The conveyor belt 2 follows an upper straight run 5 from the roller 3 to the roller 4, and follows a lower return run 6 from the roller 4 back to the roller 3.

The conveyor belt 2 consists of a heat resistant
15 material. Side walls 7 may be provided on the conveyor belt 2 so as to stop liquid or semi-liquid food products from flowing off the conveyor belt 2. These side walls 7 may extend along a part of or the whole length of the conveyor belt 2 or they may have the shape of a plurality
20 of frames. Preferably, the side walls 7 are not fixed to the conveyor belt 2.

The conveyor belt 2 may have a surface coating on its upper surface in the upper run 5 that reduces the adherence of food products 8 to the conveyor belt.

25 A heating element 9 which may be an electric element or of a type using heated oil, is provided directly below the upper run 5. Further, a second heating element 10 and a third heating element 11 are provided on either side of the conveyor belt 2 in its upper run 5. Finally, a fourth
30 heating element 12 may be provided above the upper run 5 of the conveyor belt 2 at such height as to allow the food products 8 to pass freely or almost freely thereunder. Preferably, the height of the fourth heating

element 12 above the conveyor belt 2 is adjustable, as illustrated by the dotted lines above the heating element 12. By using the fourth heating element 12, it is possible to obtain a substantially flat upper surface on the food products 8 which is advantageous inter alia when producing croutons, since the cutting of the bread lengths or loafs into cubes is facilitated.

The heat effect of the heating element 9 may be dimensioned on the basis of the heat conductivity of the conveyor belt 2 and the heat required to form a crust on the bottom surface of the food products 8. Preferably, the heat generated by the heating element 9 is controlled by a circuit controlling the power that is supplied thereto. The heating elements 10-12 may be controlled correspondingly.

Also, the speed of the conveyor belt 2 may be varied in order to control the temperature increase at the bottom, the lateral and the top sides of the food products 8 carried by the conveyor belt 2 along the upper run 5.

Further, in order to control the relative humidity (RH) affecting the dry out of the surface of the food products 8, the apparatus may be arranged under a hood 13 within which a steam injector 14 is positioned near the inlet end of the belt conveyor 1 and controlled by a RH-sensor 15 positioned near the outlet end of the belt conveyor 1.

Of course, other means for humidity control, and also other forms of environmental control may be used, including equivalents to the hood 13, the steam injector 14 and the RH-sensor 15.

The operation of the above apparatus is as follows:

A motor (not shown) driving the belt conveyor 1 is started and power is supplied to the heating element 9 and possibly also to the heating elements 10-12. Food products 8 are placed on the conveyor belt 2 at the roller 3 and are carried by the conveyor belt 2 past the heating elements 9-12 at such a rate that the desired crust is formed on the food products. The steam injector 14 may be activated and operative under control of the RH-sensor 15 during the forming of the crust such that the top surface of the food products is prevented from drying out and the food products are well conditioned for a further processing.

Then, the food products 8 are transferred to another processing station where they do not need any separate carrier since the crust formed is able to support the food products 8 irrespective of the shape of any means carrying the food products to, through and from the further processing stations where the actual processing is carried out.

Preferably, the further processing should include a heating step. However, one of several further processing steps may be a freezing step such that the following processing steps may be delayed a time period of an almost arbitrary length and even performed at a different location.

Preferably, the crust is made so thin that the products remain flexible, i.e. the crust is a flexible layer having a thickness of less than about 10 mm, preferably less than about 2 mm, when the food products consist of dough, and having a thickness of more than about 1 mm, when the products consist of batter.

The inventive method is advantageously used as a preparatory treatment of dough before the proofing

thereof when producing bread products, but it may also be used for such products as batter cakes and marinated chicken parts.

When preparing dough pieces the temperature of the heating elements 8-10 may be about 150-250 °C and the speed of the conveyor belt may be such that the dough lengths or pieces are heated for less than about 1 minute. When preparing batter cakes the heating time will be longer and may well amount to about 10 minutes.

The expert realizes that several modifications of the above-described embodiment of a method and an apparatus for preparing soft or sticky food products for further processing are conceivable within the scope of the invention as defined in the appended claims.

CLAIMS

1. A method of preparing soft or sticky food products for processing on a foraminous conveyor belt, wherein the food products are positioned on an endless, substantially fluid impermeable conveyor belt and are heated from below for setting a surface layer on the bottom side of the food products which forms a crust holding and supporting the food products during a subsequent processing.
2. A method as claimed in claim 1, wherein the food products are formed as a continuous length on the endless conveyor belt.
3. A method as claimed in claim 1, wherein the conveyor belt is moved in a path above a heating element.
4. A method as claimed in claim 1, 2 or 3, wherein the crust is formed as a flexible layer.
5. A method as claimed in claim 4, wherein the flexible layer has a thickness of less than 2 mm, when the food products consist of dough, and a thickness of more than 1 mm, when the products consist of batter.
6. A method as claimed in claim 1, 2 or 3, wherein the food products also are heated laterally for setting a surface layer on the lateral sides of the food products.
7. A method as claimed in claim 1, 2 or 3, wherein the food products also are heated from above so as to form a top crust.
8. A method as claimed in claim 2, wherein the lengths are formed as strings or sheets.
9. A method as claimed in claim 1, 2 or 3, wherein the subsequent processing is selected from the group consisting of freezing, proofing and freezing, proofing and baking, and proofing, baking and freezing.

10. A method as claimed in claim 1, wherein the relative humidity above the substantially impermeable conveyor belt is controlled during the heating of the food products.

5 11. An apparatus for preparing soft or sticky food products for further processing, comprising a belt conveyor having an endless, fluid impermeable conveyor belt for conveying the soft or sticky food products along a path upstream of said further processing, and heating
10 elements positioned below and laterally on both sides of the conveyor belt in said path upstream of said further processing, for heating the soft or sticky food products on the conveyor belt from below and laterally for setting the bottom and the lateral sides of the food products and
15 forming a crust supporting the food products during said further processing.

 12. An apparatus as claimed in claim 11, comprising a further heating element positioned above the conveyor belt in said path upstream of said further processing,
20 for heating the soft or sticky food products on the conveyor belt from above for setting the top of the food products.

 13. An apparatus as claimed in claim 12, wherein the height of the further heating element above the conveyor
25 belt is adjustable.

 14. An apparatus as claimed in claim 11, further comprising a hood and a steam injector positioned therein, the belt conveyor also being positioned under hood.

FIG. I

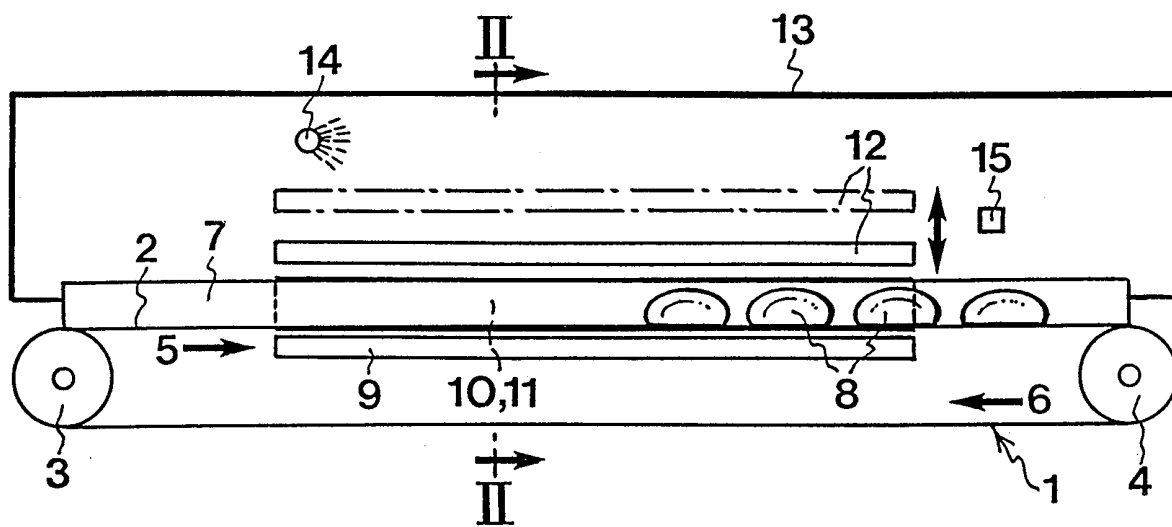
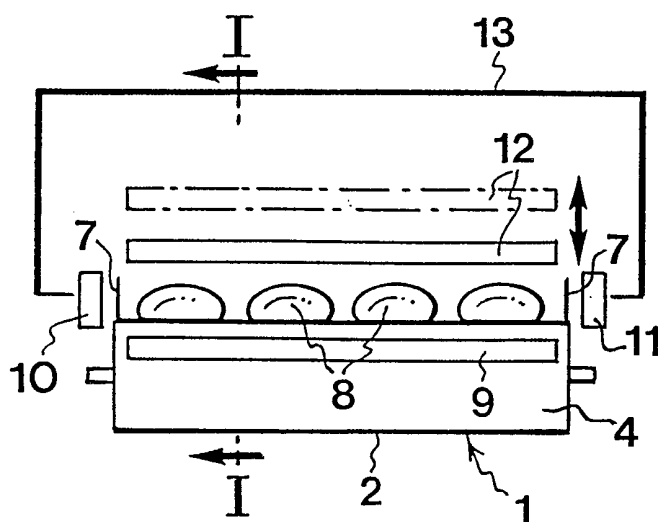


FIG. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00545

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A23L 1/01, A21B 1/48
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A21B, A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	GB 1247999 A (ATLAS EQUIPMENT (LONDON) LIMITED), 29 Sept 1971 (29.09.71) -- -----	1-14

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