

**"A FILLED FOOD PRODUCT, RELATED SEMI-PROCESSED PRODUCT,
AND METHODS AND PLANTS FOR PRODUCING SAME"**

DESCRIPTION

[0001]. The present invention relates to a filled food
5 product, the related semi-processed product without
filling, and the methods and plants for producing the
same.

[0002]. Food products comprising a dough base
supporting a filling by the name of pizza, open piadina
10 and the like are well appreciated and known. However,
such food products suffer from some drawbacks. The shape
and consistency of the dough base make it such that the
consumer may not consume them without a suitable
support, typically a plate, and is therefore obliged to
15 stop and, *de facto*, sit down at a table.

[0003]. It is also known that other food products may
be obtained from those above by closing the dough base
with the aim of easing consumption without the need for
support. By folding the pizza prior to cooking and
20 joining the adjacent edges together, a food product
called "calzone" is obtained. On the other hand, the
piadina is frequently rolled up so as to enclose the
filling therein and leave the dough on the outside.
Thus, consumption without any support becomes much
25 easier for the calzone and for the rolled piadina, than

for the pizza and the open piadina respectively. Even these closed food products, however, suffer from some drawbacks. Indeed, the problem related to the spillage of the filling remains. With the calzone, the limited
5 adherence of the edges gives rise to a weakly sealed joint which does not tolerate the mechanical stresses which occur during consumption without a support. Besides, with the rolled piadina, no type of joint is provided and the filling can freely spill out. The
10 spilling of the filling frequently causes unpleasant drawbacks; for example the risk of staining the consumers clothing or even of causing them burns, particularly if the cooking of the food product has only recently been completed and if the filling is very
15 watery.

[0004]. The demand for a food product, consisting of a base of dough and a filling, which can be eaten comfortably in the absence of any support without despite this, risking the spillage of the filling with
20 all the drawbacks that this brings, is therefore felt.

At the heart of the present invention, are the problems of studying and providing a semi-processed food product which allows the creation of a finished food product which has structural, functional and organoleptic
25 characteristics such as to satisfy the needs imposed by

the market and, at the same time, of overcoming the above drawbacks with reference to the known food products. Another problem at the heart of the present invention is that of defining the methods and the plants
5 for the manufacture of the semi-processed food product and the finished food product.

[0005]. Such problems are solved by a semi-processed food product in accordance with claim 1, a method and a plant for manufacturing such semi-processed food product
10 in accordance with claims 29 and 77 respectively.

[0006]. Such problems are solved by a finished food product in accordance with claim 21, a method and a plant for manufacturing such finished food product in accordance with claims 43 and 93 respectively.

15 [0007]. Further characteristics and advantages of the food product, of the method and the plant for the manufacture thereof according to the invention, will result from the description below of some preferred example embodiments thereof, which are given as a non-
20 limiting indication, with reference to the attached figures, wherein:

[0008]. Figure 1 represents a perspective view of one embodiment of the semi-processed food product;

[0009]. Figure 2 represents a cross sectional view of
25 one embodiment of the semi-processed food product;

[0010]. Figure 3 represents a perspective view of one embodiment of the finished food product;

[0011]. Figure 4 represents a cross sectional view of one embodiment of the finished food product;

5 [0012]. Figure 5 represents by a block diagram the manufacturing method for the semi-processed food product;

[0013]. Figure 6 represents by a block diagram the manufacturing method for the finished food product;

10 [0014]. Figures 7a and 7b represent two cross sectional views of the mould for manufacturing the semi-finished food product;

[0015]. Figure 8 represents an elevational side view of the moulding station of the semi-processed food
15 product with the moulds open;

[0016]. Figure 9 represents an elevational side view of the moulding station of the semi-processed food product with the moulds closed;

[0017]. Figure 10 represents a plan view of the
20 central section of the semi-processed food product production plant;

[0018]. Figure 11 represents a front view of the semi-processed food product production plant;

[0019]. Figure 12 represents a elevational side view
25 of the semi-processed food product production plant;

[0020]. Figure 13 represents by a block diagram the semi-processed food product production plant;

[0021]. Figure 14 represents a perspective view of the oven for manufacturing the finished food product;

5 [0022]. Figure 15 represents a perspective view of the finished product emerging from the oven of figure 14

[0023]. Figure 16 represents a plan cross sectional view of a detail of the oven of figure 14;

[0024]. Figure 17 represents a perspective view of the
10 counter for storing finished food products;

[0025]. [0026] Figure 18 represents a view of the bench of figure 17 in cross section taken along the line XVIII;

[0026]. Figure 19 represents by means of a block
15 diagram the plant for manufacturing the finished food product;

[0027]. Figures 20a and 20b are sectional views of two further moulds for manufacturing the semi-processed food product;

20 [0028]. Figures 21a to 21d are sectional views of four configurations of the mould from figure 20b for manufacturing the semi-processed food product;

[0029]. Figures 22a and 22b are sectional views of two further embodiments of the semi-processed food product.

25 [0030]. With reference to the attached figures 1 and

2, with 1 is indicated the semi-processed food product in its entirety.

[0031]. Such semi-processed product consists of a dough obtained by the partial cooking or pre-cooking of
5 a mixture comprising flour and water. In one preferred embodiment, the mixture also comprises organic yeast. In another embodiment, the mixture comprises a chemical rising agent in place of the organic yeast. In another preferred embodiment, the mixture also comprises cooking
10 salt (NaCl).

[0032]. With the expression 'partial cooking' has been meant and hereinafter means a thermal process which, while maintaining the colouration of the mixture more or less unaltered, induces the coagulation of the proteins
15 of the flour (defined below) and the cessation of the vital activity of the organic yeast, if present (defined below). In other words, in the semi-processed, partially cooked product the gluten and the starch of the flour are structured in such a manner that the mixture in its
20 entirety is able to maintain, under the effect of its own weight, the shape which has been conferred upon it. Furthermore, following the partial cooking procedure, the semi-processed product maintains a colour which differs only slightly from the colour of the raw
25 mixture. Finally, in the partially cooked semi-processed

product the organic yeast, if present, has ceased its vital activity.

[0033]. The partial cooking procedure occurs through the transmission of heat to the mixture and can be accomplished by one or more of the known systems for food preparation. Preferably, it will occur by the direct contact of the mixture with a heated surface. The partial cooking can also take place, in the case that specific requirements suggest it, by heating the mixture with hot air (for example in the form of convective or forced flows) or by irradiation (for example infrared or microwave rays).

[0034]. The effects of the partial cooking develop from the area of the mixture which first receives the transmission of heat and from there spread towards the remaining mass of the mixture.

[0035]. With the term 'flour' has been meant and hereinafter means, a milled product intended for human consumption, particularly of the type obtained from cereals, but also from tubers, from legumes or from other foodstuffs and/or by mixing these various types even in extremely different proportions. In accordance with a preferred embodiment of the invention, the most used type of flour comes from milled wheat.

[0036]. With the expression 'organic yeast' has been

meant and means hereinafter to identify one or more micro-organism species which are able to feed on the components (sugars) of the flour present in the mixture and to produce various compounds (ethyl alcohol for example) and gas (CO₂) which makes the volume of the mixture increase thus giving rise to the so-called 'rising' phenomenon. Such micro-organisms, known per se, can be for example of the *Saccharomycetes* family. In accordance with one preferred embodiment, the yeast used is in its most significant percentage of the type denominated as 'brewers yeast' (*Saccharomyces cerevisiae*).

[0037]. With the expression 'chemical rising agent' or 'mineral rising agent' has been meant and means hereinafter to indicate one or more chemical species which, during cooking, release carbon dioxide which swells the dough. In accordance with one preferred embodiment of the invention, the chemical rising agent comprises sodium carbonate, ammonium carbonate and potassium bitartrate.

[0038]. The semi-processed product, as can be clearly seen from figures 1 and 2, is shaped as a three dimensional goblet. It is manufactured in a single and whole piece of dough in which a base 2 and a side wall 3 can be identified. In other words the semi-processed

product 1 does not comprise any join between the adjacent edges of dough nor any overlapping of the edges of the dough but is a single and whole piece of dough. The mutual arrangement of the side walls 3 and the base 2 creates a cavity 4 endowed with an opening 5 placing it in communication with the outside. The opening 5 and its edge 15 unambiguously define a plane π whilst the goblet-like shape unambiguously defines an axis c-c.

[0039]. In accordance with one preferred embodiment, the three dimensional goblet-like shape is that of a cone, preferably of a more or less circular cross section. It has indeed been observed that this shape offers the consumer a particularly comfortable hold.

[0040]. In accordance with additional embodiments, the axis c-c is inclined and oblique with respect to the plane π of the opening 5 at the tip of the cone itself. The axis c-c forms with the perpendicular p to the plane π an angle α comprised of between 5° and 45° , preferably between 10° and 34° and still more preferably between 18° and 25° . It has been indeed observed that this inclination has shown itself to be particularly comfortable for the consumer.

[0041]. The side wall 3 of the semi-processed product has a more or less constant and relatively thin thickness with respect to the overall dimensions of the

semi-processed product 10 itself; in particular it is of a predetermined thickness. Two surfaces can be observed thereon, one inner 3' and one outer 3". The fact that the thickness is predetermined and that both surfaces 3' and 3" have come into contact with the heated surfaces, makes it such that the effects of the partial cooking are observable in a more or less homogeneous manner within the entire dough and can be obtained in predetermined times, useful for industrial production.

10 [0042]. In accordance with one preferred embodiment, the base 2 has instead a variable thickness the minimum of which is substantially equal to that of the side walls with which it is joined.

[0043]. In another preferred embodiment, the thickness of the side wall 3 is comprised of between 3.5 and 10 millimetres, preferably between 4 and 8 and still more preferably between 5 and 7.

In a further preferred embodiment, the maximum thickness of the base 2 is greater than that of the side walls 3 by a factor comprised of between 2 and 7, preferably between 4 and 5. Such proportions of the thickness have shown themselves to be particularly advantageous since allow to obtain a homogeneous partial cooking in times that are convenient for industrial production.

25 [0044]. With reference to the attached figures 3 and

4, with 7 is indicated the finished food product in its entirety. Such a finished product is achieved through the cooking of a semi-processed product 1 and a filling 8.

5 [0045]. With the term 'cooking' has been meant and hereinafter means a thermal procedure which, without sensibly changing the characteristics of the dough distributed over the inner thickness of the semi-processed product, gives a more intense and golden-brown
10 colouration on the outer surface thereof (caramelisation of the sugars) and a more crispy consistency. The cooking procedure, in addition, brings the filling to a temperature and a consistency which are considered optimal for consumption.

15 [0046]. The cooking procedure occurs through the transmission of heat to the dough and can be carried out through one or more of the known systems for the preparation of foodstuffs. Preferably, it will occur by supplying heat to the mixture simultaneously by hot air
20 and infrared irradiation. The cooking can also occur, in the event that specific needs suggest it, by supplying heat to the mixture through the direct contact of the dough with a heated surface or through microwave irradiation.

25 [0047]. In accordance with another preferred

embodiment, the filling comprises tomato and spun curd cheese, preferably of the type commonly indicated by the name mozzarella. The filling ingredients are present in the form of small cubes, julienne, thin strips or the like or even in the form of a cream, sauce or the like.

[0048]. In accordance with a further preferred embodiment, the tomato is present in the form of a layer of sieved tomato 6 which covers the inside of the side wall 3 in a more or less uniform manner.

10 [0049]. With reference to the attached figure 5, the method for the production of a semi-processed food product as described above in accordance with the present invention will be described in the following. In figure 5, the steps indicated by dotted lines are useful alternatives for carrying out the method in accordance with variant embodiments thereof.

[0050]. The method provides firstly the step of measuring out the ingredients for the mixture. Depending on the particular embodiment, the proportions between flour and water present in the mixture can range over a rather wide interval, without departing from the scope of the invention.

[0051]. For example it is possible, whilst maintaining the traditional proportions used for pizza dough, to opt for the attainment of a higher consistency mixture, by

mixing flour and water in the indicative proportions of 1 to 0.5 by weight (for example, for each 100 kg of flour, 50 kg of water are added).

[0052]. It is otherwise possible to opt to obtain a more fluid mixture, by mixing flour and water in the indicative proportions of 1 to 1 by weight (for example, for each 100 kg of flour, 100 kg of water are added).

[0053]. It is obviously possible to select any of the intermediate proportions and thus adapt the consistency of the mixture to any possible specific needs.

[0054]. It is then possible to add organic yeast, chemical rising agents, salt and/or other specific known ingredients to the mixture which may be believed suitable according to specific requirements.

[0055]. When all the ingredients have been measured out according to requirements, it is necessary to proceed to the mixing step in order to obtain the proper mixture in the form of a single and homogeneous mass.

[0056]. In accordance with one preferred embodiment, at this point the mixture needs to be maintained at a controlled temperature (comprised of between 20°C and 40°C, preferably between 25°C and 35°C) and to be left to rest so that the organic yeast may develop and perform its function.

[0057]. The single mass of the mixture must then be divided into individual amounts the weight of which, determined in the known manner, is believed to be suited to the requirements. In accordance with one preferred
5 embodiment, the individual amounts of mixture will have a weight comprised of between approx. 80 and approx. 100 grams.

[0058]. In one particular embodiment, the two steps of rising and dividing up or cutting may be reversed in
10 order, in such a manner as to make the mixture rise when it is already divided into individual amounts. Whilst the rising of the mixture in a single mass is preferable for the more fluid mixtures, rising in individual amounts is preferable for the higher consistency
15 mixtures.

[0059]. Each of the individual amounts of mixture must then be formed in such a manner that they assume a three dimensional goblet-like shape, in accordance with that previously described. This shaping step can be obtained
20 by moulding a block of mixture, by drawing a disk of mixture or through any other procedure which allows the attainment of semi-processed product 1 which does not have any join between the adjacent edges of dough nor any overlapping of the edges of dough, but which is a
25 single and whole piece of dough.

[0060]. The partial cooking step follows on from the moulding step. In accordance with one particular embodiment of the method, each individual semi-processed product is subjected to a temperature of approx. 210°C for approx. 3 minutes, in such a manner that the coagulation of the flour proteins and the cessation of the vital activity of the organic yeast is induced. It is possible, without despite this departing from the invention, to obtain analogous effects through different combinations of times and temperatures. In general, in order to obtain similar partial cooking effects, the application of slightly lower temperatures (for example approx. 180°C) should be extended for slightly longer periods of time (for example approx. 5 minutes) and, vice versa, the application of slightly higher temperatures (for example approx. 250°C) should be extended for slightly shorter periods of time (for example approx. 2 minutes).

[0061]. According to one preferred embodiment, the partial cooking can occur through the direct contact of heated surfaces with both the outer 3' and inner surfaces 3" of the semi-processed product. According to other embodiments, the partial cooking occurs through heating the mixture with hot air (for example in the form of convective or forced flows) or through

irradiation (for example infrared or microwave rays).

[0062]. In accordance with one preferred embodiment, a cooling step follows on from the partial cooking step of the semi-processed product. In this step , the
5 temperature of the semi-processed product is lowered from the approx. 210°C of the partial cooking step to room temperature.

[0063]. In accordance with another preferred embodiment, a deep freezing step follows on from the
10 cooling step of the semi-processed product, intended to make possible the preservation of its organoleptic characteristics over time. In this step the temperature of the semi-processed product is lowered from room temperature in a few minutes to a temperature of less
15 than -18°C, through the circulation of a gas at a temperature comprised of between approx. -30°C and approx. -40°C.

[0064]. Despite being conceptually distinct, the steps of cooling and deep freezing may be contiguous and
20 therefore, in practice, distinguished with difficulty.

[0065]. In accordance with other alternative embodiments, following on from the cooling step may be, rather than the deep freezing step, other steps known per se, which are intended to attain the preservation of
25 the organoleptic characteristics of the semi-processed

product over time. The cooling step may for example be followed by freezing, packaging under modified atmosphere or packaging under vacuum steps.

[0066]. Despite being conceptually distinct, the steps
5 of cooling and freezing or the modification of the packaging atmosphere may be contiguous and therefore, in practice, distinguished with difficulty.

[0067]. With reference to the attached figure 6, the method for the production of a finished food product as
10 described above, in accordance with the present invention is described in the following. In figure 6, the step indicated by dotted lines is one alternative, useful for carrying out the method in accordance with one variant embodiment thereof.

15 [0068]. The method certainly provides the filling step of the semi-processed product. In accordance with one embodiment, the filling comprises tomato and spun curd cheese, preferably of the type commonly indicated by the name of mozzarella. The filling ingredients are present
20 in the form of small cubes, julienne, small strips or the like or even in the form of a cream, sauce or the like.

[0069]. The cooking step follows on from the filling step. In accordance with one particular embodiment of
25 the method, each individual, filled, semi-processed

product is subjected to a temperature of approx. 320°C for approx. 3 minutes, in such a manner that, without sensibly changing the characteristics of the dough distributed over the inner thickness of the semi-processed product, a more intense and golden-brown colour and crispiness are conferred onto the outer surface thereof. In addition, the cooking procedure, brings the filling to a temperature and a consistency considered to be optimal for consumption. It is possible, without departing from the invention, to obtain analogous effects through different combinations of times and temperatures. In general, in order to obtain similar cooking effects, the application of slightly lower temperatures (for example approx. 280°C) should be extended for slightly longer periods of time (for example approx. 5 minutes) and, vice versa, the application of slightly higher temperatures (for example approx. 350°C) should be extended for slightly shorter periods of time (for example approx. 2 minutes).

[0070]. According to one preferred embodiment, the cooking takes place by simultaneously heating the dough and the filling through contact with hot air and through infrared ray irradiation. According to other embodiments, cooking occurs through direct contact with heated surfaces or through microwave irradiation.

[0071]. Following the cooking step is a brief cooling step to room temperature, sufficient to reduce the outside temperature of the finished product 7 to a value considered to be acceptable for manipulation by the operator and the consumer.

[0072]. In accordance with one embodiment of the method, following the cooking step, the step of maintaining the finished product 7 at a temperature considered to be ideal for consumption is provided. Such a temperature is preferably comprised of between approx. 60°C and approx. 80°C, still more preferably between approx. 65°C and approx. 75°C. Thus, in the case that it is not possible to consume the finished product 7 immediately following the cooking and cooling steps, the product itself is maintained under optimal conditions for consumption for the time waiting prior to consumption itself.

[0073]. With reference to the attached figure 7, with 10 is indicated the mould for producing the previously described semi-processed product. The mould 10 comprises a male half-mould 11 and a female half-mould 12. The female half-mould 12 consists of at least two pieces movable in relation to each other, in such a manner that it may be opened in order to assist the removal of the semi-processed product.

[0074]. The two half moulds are arranged in such a manner that, once joined, a hollow, interspace having a goblet-like shape, as previously described, remains between them.

5 [0075]. Both the male half-mould 11 and the female half-mould 12 comprise therein their own means suitable for locally heating the mould 10. In accordance with the particular embodiment represented in figure 7, the means for heating the mould 10 comprise channels 13 for the
10 circulation of a hot fluid near the interspace 14. Such hot fluid is preferably diathermic oil, but in other embodiments it may be superheated water under pressure, steam or other fluids which may better meet specific requirements.

15 [0076]. In accordance with other embodiments, the means for heating the mould comprise electrical elements wound near the interspace 14.

[0077]. As described above, the mould 10 comprises a goblet-like shaped interspace 14 in which a bottom space
20 15 and a side space 16 may be identified. Such a goblet-like shape defines an axis c-c.

[0078]. In accordance with one preferred embodiment, the three dimensional goblet-like shape of the interspace 14 is that of a cone, preferably with a more
25 or less circular cross section.

[0079]. In accordance with an additional embodiment, on the female half-mould 12 and on the male half mould 11 are positioned corners, 17 and 17' respectively, which constitute the fastening at the top of the interspace 14. The axis c-c is inclined and oblique with respect to the plane π which comprises the corners 17 and 17'. The axis c-c forms an angle α comprised of between 5° and 45° with the perpendicular p to the plane π , preferably between 10° and 34° and still more preferably between 18° and 25° .

[0080]. The side space 16 of the interspace 14 has more or less constant and relatively thin thickness with respect to the overall dimensions of the interspace itself.

[0081]. In accordance with one preferred embodiment, the bottom space 15 instead has a variable thickness, the minimum of which is substantially equal to that of the side space 16 with which it is joined.

[0082]. In another preferred embodiment, the thickness of the side space 16 is comprised of between 3.5 and 10 millimetres, preferably between 4 and 8 and still more preferably between 5 and 7.

[0083]. In an additional preferred embodiment, the maximum thickness of the bottom space 15 is greater than that of the side space 16 by a factor comprised of

between 2 and 7, preferably between 4 and 5.

[0084]. With reference to the attached figures 8 and 9, with 20 is indicated a station consisting of a plurality of moulds 10 for producing the semi-processed product 1.

[0085]. The mould station 20 comprises a first substation 21 which in turn comprises a plurality of male half-moulds 11 and a second substation 22 which in turn comprises a plurality of female half moulds 12. As described above, each of the female half-moulds 12 is made from at least two pieces, movable with respect to one another. The design of the entire substation 22 must be such that these pieces may be moved so as to obtain the opening of the female half-moulds and thus assist with the removal of the semi-processed product.

[0086]. In accordance with one embodiment, the substation 22 comprises two parallel rows A and B of female half-moulds 12 (clearly visible in plan in figure 10). Such female half-moulds 12 are obtained by positioning a central block 23 near to two appropriately shaped side blocks 24a and 24b. The movement of the side block 24a causes the opening of the female half-moulds of row A, whilst the movement of the side block 24b causes the opening of the female half-moulds of row B. The substation 22 further comprises means 25a and 25b

for moving the blocks which constitute the female half-moulds.

[0087]. According to one of the embodiments, the means for moving the blocks comprise dual action jacks 25a and 25b, respectively connected to the side blocks 24a and 24b. The dual action of the jacks allows the translation of the side blocks in such a manner as to bring them close to the central block 23 and, respectively, in such a manner as to move them away from it. When the side blocks 24 are near to the central block 23, the two rows of female half moulds 12 A and B are closed. When the side blocks 24 are moved away from the central block 23, the two rows of female half-moulds A and B are opened in order to ease the removal of the semi-processed product.

[0088]. The substation 21 comprises means for moving the plurality of male half-moulds 11. According to one of the embodiments, such means comprise at least one jack 26 which allows to couple each of the male half-moulds 11 with the respective female half-mould 12 and, respectively, to remove them from it.

[0089]. In accordance with one preferred embodiment, the jacks 25 and 26 are of the hydraulic or pneumatic type, connected to a plant which feeds them using a fluid under pressure.

[0090]. Both the substation 21 and the substation 22

comprise connections for feeding the means suitable for locally heating each of the moulds 10. Such means are present both in the male half-moulds 11 comprised within the substation 21 and in the female half-moulds 12 comprised within the substation 22. Such connections, not represented in the figure, are made in a known manner and such as to allow the free movement envisaged for each of the blocks 24 and for the substation 21.

[0091]. In accordance with one preferred embodiment wherein the means for heating the moulds 10 comprise channels 13 for the circulation of a hot fluid, such connections comprise flexible tubes. Such hot fluid is preferably diathermic oil, but in other embodiments it may be superheated water under pressure. In the latter case, the tubes will have to be both flexible and resistant to the high internal pressures.

[0092]. In accordance with other embodiments, wherein the means for heating the mould comprise electrical elements, the connections comprise electrical wires.

[0093]. With reference to the attached figures 10, 11, 12 and 13, with 30 is indicated for example a particular embodiment of the entire plant for producing the semi-processed product 1. In figure 13, the stations indicated by dotted lines are useful alternatives for designing the plant in accordance with variants thereof.

[0094]. The plant 30 comprises a plurality of hoppers 31 containing water, flour and, in accordance with other embodiments, organic yeast or chemical rising agents, cooking salt (NaCl) and other ingredients which are believed useful in the preparation of the mixture. The hoppers also comprise means 32 adjustable and adapted to measuring out the amounts of the ingredients according to the proportions described above. It is for example possible, by maintaining the proportions traditionally used for pizza dough, to regulate such means 32 in such a manner as to obtain a mixture of a high consistency, by mixing flour and water in the indicative proportions of 1 to 0.5 by weight (for example, for each 100 kg of flour, 50 kg of water are added). It is otherwise possible to regulate such means 32 in such a manner as to obtain a more fluid mixture, by mixing flour and water in the indicative ratio of 1 to 1 by weight (for example, for each 100 kg of flour, 100 kg of water are added). It is obviously possible to select any of the intermediate settings and thus adapt the consistency of the mixture to any possible specific requirements.

[0095]. After the hoppers 31 there is a mixer 33 of a known type, which is able to produce a homogeneous mixture from the above described ingredients.

[0096]. In accordance with one particular embodiment of the plant, after the mixer 33 there is a rising chamber 34 which is able to maintain the tub containing the mixture at a controlled temperature (comprised of
5 between 20°C and 40°C, preferably between 25°C and 35°C) in order that the organic yeast can develop and perform its function.

[0097]. After the rising chamber 34 there is a dropping or dosing machine 36'. Such a machine is able
10 to divide up the single mass of the mixture into the individual amounts of predetermined weight, which is believed suited to the requirements. In accordance with one preferred embodiment, the individual amount of mixture will have a weight comprised of between approx.
15 80 and approx. 100 grams.

[0098]. In accordance with one embodiment, the dropping or dosing machine 36' is provided with means which allow it to reach each of the stations 20 which will be hereinafter described.

20 [0099]. In accordance with another embodiment of the plant, after the mixer 33 there is instead immediately a cutting machine 36". After the cutting machine there is the rising chamber 34, in such a manner as to make the mixture rise once it is already divided into single
25 amounts. In this case, the plant will also comprise

means 37 for transporting the individual amounts of dough from the rising chamber 34 to the stations 20 which will be described in the following.

[00100]. Whilst the plant which carries out the rising
5 of the mixture in a single mass is preferable for treating the more fluid mixtures, the plant which brings about the rising in individual amounts is preferable for mixtures of a higher consistency.

[00101]. The plant 30, after the hereinabove described
10 machinery which has produced the mixture, has divided it into individual portions and possibly has made it rise, provides one or more moulds 10 or one or more stations 20, described above. Such stations 20 comprise a plurality of moulds 10, and are therefore able to
15 receive a plurality of amounts of mixture, to shape them into goblet-like shapes and to bring them to the completion of the pre-cooking or partially cooking procedure.

[00102]. In accordance with one particular embodiment
20 of the plant, each individual mould 10 is able to maintain an individual amount of mixture at a temperature of approx. 210°C for around 3 minutes, in such a manner that the coagulation of the flour proteins and the cessation of the vital activity of the organic
25 yeast is induced. It is possible, without departing from

the invention, to obtain similar effects through different combinations of times and temperatures. In general, in order to obtain similar partial cooking effects, the application of slightly lower temperatures (for example approx. 180°C) should be extended for slightly longer periods of time (for example approx. 5 minutes) and, vice versa, the application of slightly higher temperatures (for example approx. 250°C) should be extended for slightly shorter periods of time (for example approx. 2 minutes).

[00103]. The stations 20 are preferably arranged in series. Still more preferably they are fixed and arranged in such a manner that the self-propelled dosing out machine 36' or the means 37 use, in order to complete a filling cycle of all the moulds of all the stations, a time substantially equal to that which the stations 20 themselves use in order to complete the partial cooking of the semi-processed product 1. It is in this manner possible to establish a continuous production cycle without any dead time.

[00104]. The plant 30 comprises a plant for supplying thermal energy to the means for heating the moulds 10 of the stations 20. In accordance with one particular embodiment, the means for heating the moulds 10 comprise channels 13 for the circulation of a hot fluid. Such hot

fluid, preferably diathermic oil, is heated by a boiler of a known type and made to circulate inside the conduits which distribute it to the stations 20 and which allow the free movement provided for each of the
5 blocks 24 and the substation 21.

[00105]. In other embodiments, in place of the diathermic oil, the hot fluid may be superheated water under pressure or other fluids which may better satisfy the specific requirements. In these cases, the hot fluid
10 distribution plants will be made in a known manner conceptually similar to that described above.

[00106]. In accordance with other embodiments, the means for heating the moulds comprise electrical elements. In this case the supply plant of the means for
15 heating the moulds comprises known electrical cables and connectors.

[00107]. The plant 30 also comprises means for moving the male half-moulds and for moving the parts which constitute the female half-moulds. In accordance with
20 one embodiment, the plant 30 comprises a supplying plant for the means for moving the blocks 24 which constitute the substations 22 and for moving the substations 21.

[00108]. According to one of the embodiments, the means for moving the blocks comprise jacks 25 and 26. In
25 accordance with one preferred embodiment, the jacks 25

and 26 are of the hydraulic or pneumatic type, and the plant of a known type which they are connected thereto must be able to feed them with a fluid under pressure, typically oil or air.

5 [00109]. The stations 20 described above overhang a conveyor belt 38 in such a manner that, when the partial cooking procedure is completed and the female half-moulds 12 are opened, the semi-processed products 1 are removed under gravity from the male half-moulds 11 and
10 are collected by the conveyor belt 38.

[00110]. The conveyor belt 38 conveys the semi-processed product along a cooling path 39. In this passage the temperature of the semi-processed product is lowered from around the 210°C of the partial cooking
15 step to room temperature.

[00111]. In accordance with one preferred embodiment of the plant, following the cooling path 39 is a deep freezing tunnel 40 for the semi-processed product, wherein the temperature of the semi-processed product is
20 lowered in a few minutes from room temperature to a temperature of less than -18°C, through the circulation of gas at a temperature comprised of between approx. -30°C and approx. -40°C.

[00112]. Despite being conceptually distinct, the
25 cooling path 39 and the deep freezing tunnel 40 may be

contiguous and therefore, in practice, distinguished with difficulty.

[00113]. In accordance with other alternative embodiments, after the cooling path 39 there may be, rather than the deep freezing tunnel 40, other known machines, intended to treat the semi-processed product in such a manner as to enable the preservation of its organoleptic characteristics over time. After the cooling path there may be for example either a freezing tunnel, a machine for packaging in a modified atmosphere, or a machine for packaging under vacuum.

[00114]. Despite being conceptually distinct, the cooling path and the freezing tunnel or the machine for the modification of the packaging atmosphere, may be contiguous and therefore, in practice, distinguished with difficulty.

[00115]. With reference to the attached figures 14, 16 and 19, by 60 is indicated a particular embodiment of the plant for preparing the finished product 7. In figure 19, the station indicated by dotted lines is useful for designing the plant in accordance with one variant thereof.

[00116]. The plant 60 comprises a filling station, an oven 61 having an inlet aperture 68 and an outlet aperture 69, a cooling path and a drawing chain 62

which moves with a constant speed along a closed path which runs the length of the plant. On the drawing chain 62 may be located a plurality of baskets 63 adapted to hold the semi-finished product 1 and/or the finished product 7 in such a manner that the filling 8 does not spill out and from which the semi-finished product 1 and the filling 8 are not thermally isolated. The drawing chain leads the baskets 63 and the semi-finished products 1 supported by them, through the inlet aperture 68, to the interior of the oven 61 where means for producing heat are located.

[00117]. In accordance with one preferred embodiment, such known means for producing heat are able to heat the air contained inside the oven 61 and to directly irradiate the semi-finished product 1 and the filling 8. They comprise for example electrical elements and quartz lamps. In accordance with other embodiments, such means which heat the air and/or irradiate the product, comprise wood combustion chambers, gas burners, microwave generators, or other known means which better satisfy the specific requirements. In accordance with additional embodiments, such means are able to heat the semi-processed product by direct contact with hot surfaces and comprise for example plates heated by electrical elements.

[00118]. The means for producing heat must be able to bring the cooking of the semi-processed product and the relevant filling to completion within the time used by each basket 63 to cross the oven at the speed with which
5 it is drawn by the chain 62.

[00119]. In accordance with one particular embodiment of the plant 60, each individual basket 63 and the related filled, semi-processed product are subjected to a temperature of approx. 320°C for around 3 minutes, in
10 such a manner that, without significantly altering the characteristics of the dough distributed on the inner thickness of the semi-processed product, a more intense and golden-brown colouration and a more crispy consistency are conferred on the outer surface thereof.

15 The plant 60, furthermore, brings the filling 8 to a temperature and consistency considered to be optimal for consumption. It is possible, without departing from the invention, to obtain similar effects through different combinations of times and temperatures. In general, in
20 order to obtain similar cooking effects, the application of slightly lower temperatures (for example approx. 280°C) should be extended for slightly longer periods of time (for example approx. 5 minutes) and, vice versa, the application of slightly higher temperatures (for
25 example approx. 350°C) should be extended for slightly

shorter periods of time (for example approx. 2 minutes).
[00120]. In accordance with one preferred embodiment,
the baskets 63 define an axis s-s, which is firstly made
to coincide with the axis c-c of the semi-processed
5 product 1 and then with the finished product 7. The
plant 60, comprises means 64 adapted to make the baskets
63 rotate around the axis s-s, at least during their
passage inside the oven 61. Such means 64 comprise for
example a cogwheel 65 placed at the base of each basket
10 63 and adapted to interacting with a rack 66 which runs
alongside the chain 62 at least for the distance that
this runs inside the oven 61. In this manner, when each
basket 63, which is supported by the chain in such a
manner as to be free to rotate around its own axis s-s,
15 is drawn inside the oven, the cogwheel 65 engages the
rack 66 and is forced to rotate by this movement,
drawing the entire basket 63 and the filled semi-
processed product contained within it. In this manner,
the means for the production of heat, particularly those
20 which emit infrared radiation, can act in a more uniform
manner over the entire product.

[00121]. When the basket 63 emerges from the oven 61
through the outlet aperture 69, the product which it
supports has been transformed in every effect into the
25 previously described finished product 7. In other words,

its outer surface has acquired a golden-brown colouration and a crispy consistency which clearly distinguish it from the semi-processed product 1 and the filling contained within it has by now reached the temperature and the consistency considered to be optimal for consumption.

[00122]. In accordance with one preferred embodiment, the inlet 68 and outlet 69 apertures of the oven, are made in such a manner as to envisage being splayed. As may be observed in figure 16, the part of the aperture on the inner side of the oven is larger than that on the outer side. In this manner it is possible to, at least partially, counteract the air flows which can occur between the inside and outside of the oven due to the different conditions of temperature and pressure which are established during the operation of the means for the production of heat.

[00123]. In accordance with another preferred embodiment, the oven 61 comprises a transparent wall 70 which allows the consumers to follow the steps of cooking of the product.

[00124]. In accordance with one preferred embodiment, the cooling path comprises a thin plate 67 which runs along the drawing chain 62 overhanging the cogwheel 65 of the basket 63. In this manner the operator cannot

remove the basket as soon as this has emerged from the oven 61, i.e. at the time in which its temperature is maximal and potentially dangerous. The thin plate 67 impedes the removal of the basket 63 for a length such
5 that, at the speed with which the chain is moving, it is sufficient to reduce the outer temperature of the finished product 7 to a value considered to be acceptable for handling by the operators and consumers.

[00125]. When the finished product 7 is removed from
10 the basket 63, a new semi-processed product 1 previously filled with filling 8 may be inserted into the basket. It is thus possible to obtain a continuous production cycle, without any dead time.

[00126]. It is obvious that the optimal cooking times
15 may be predetermined by taking account of the length of the oven 61 and its internal temperature, and regulating the speed with which the chain 62 moves. It is likewise possible to predetermine the cooling times by taking account of the length of the thin plate 67 and the
20 temperature of the surroundings.

[00127]. In accordance with one embodiment and with reference to the attached figures 17 and 18, adjacent to the plant 60 a heated counter 70 is provided for maintaining the finished product 7 at a temperature
25 considered to be ideal for consumption. Such temperature

is preferably comprised between approx. 60°C and approx. 80°C, still more preferably between approx. 65°C and approx. 75°C. Thus, in the event that it is not possible to consume the finished product 7 immediately following the cooking and cooling steps, the product itself is maintained in the optimal conditions for consumption during the time whilst waiting prior to consumption itself. The heated counter 70 comprises cavities 71 which are complementary to the finished product 7. The finished products ready for consumption, are partially inserted into such cavities 71 and maintained in a position such that the filling 8 does not spill out and such that the finished products themselves may be easily held for as long as necessary and then removed from the respective cavity. To such an end, for example, the cavity 71 houses the lower part of the finished product 7 therein, leaving the upper part, which may be held by the operator for the removal of the product, sticking out.

[00128]. The heated counter 70 comprises means for maintaining the temperature comprised of between approx. 60°C and approx. 80°C, still more preferably between approx. 65°C and approx. 75°C. According to one preferred embodiment, such known means comprise electrical elements 72 which envelop the cavity 71. Such

electrical elements 72 are controlled, for example, by a thermostat 73 which is set by the operator. According to other embodiments, such known means comprise circuits for the circulation of heated fluids such as water, air or steam. The feeding of such circuits is controlled by means which are set by the operator, for example electrovalves connected to a temperature sensor.

[00129]. With reference to the annexed figures 20a to 21d, with 10 has been indicated a further embodiment of the mould for manufacturing the semi-processed product as described above. The mould 10 is represented in figures 21 in a two-member battery, but in accordance with various embodiments, it can either be single or belong to larger batteries, as required.

[00130]. The mould 10 comprises a male half-mould 11 and a female half-mould 12. The female half-mould 12 consists of one single piece. The male half-mould 11 consists of a collar 110 and a mandrel 111. The collar and the mandrel share the axis c-c and slide on each other along said axis.

[00131]. The collar 110 is rigidly connected to a collar-holding plate 112. The connection of the collar to the plate is preferably made in a removable manner such as to allow, if required, the removal and replacement of each of the collars. Figures 20a and 20b

show two moulds being identical to each other except for the two collars that have different sizes.

[00132]. The mandrel 111 is connected to a mandrel-holding plate 113 by means of a support 115 sliding in a bush 117 being arranged on the mandrel-holding plate 113. Between the plate 113 and the mandrel 111 there is placed an elastic element 119, for example a spring.

[00133]. The mandrel-holding plate 113 and the collar-holding plate 112 are integral to each other in the configurations represented in figures 21a, 21b and 21c. In accordance to an embodiment of the mould, the plates 113 and 112 can be spaced apart, if required, such as in the configuration shown in figure 21d.

[00134]. In accordance with the particular embodiment illustrated in figure 21, along the mandrel 111 there is provided a slot 114. The slot is preferably arranged transversal to the mould axis c-c. Still more preferably, the slot 114 is closed looped and circumpherentially arranged perpendicular to axis c-c.

[00135]. Both half-moulds 11 and 12 are shaped such that, after they have been coupled, an interspace having a goblet-like shape or a bell-shaped gap is left therebetween as described above.

[00136]. Both the male half-mould 11 and the female half-mould 12 comprise inner means suitable to locally

heat the mould 10. In accordance with the particular embodiment from figure 21, the mould-heating means 10 comprise electrical resistances 13'.

[00137]. During the partial cooking step, the dough
5 releases quite a considerable amount of gas (mainly CO₂)
thereby causing an increase in the pressure within the
gap 14. Since almost the whole gap 14 is filled with the
dough, the volume available for gas expansion is
minimum, and consequently, the pressure increase is
10 maximum. This pressure increase within the gap 14 is
very detrimental to good industrial production of the
semi-processed. In fact, the risk exists that, after the
partial cooking step has been completed, the violent
release of the pressurized gas may irreparably damage
15 the semi-processed product 1 upon opening the mould 10.

[00138]. The mould described above and represented in
figures 20 and 21 allows to bring a particular
embodiment of the partial cooking step of the semi-
processed product according to the invention to
20 completion.

[00139]. In accordance with a particular embodiment,
the pressure of the gas that has developed within the
mould 10, is compensated by the volume increase in the
gap 14. In fact, due to the effect of the pressure
25 inside the mould, the mandrel 111 will compress the

spring 119. Thereby, the small axial displacement of the mandrel 111 will increase the mould inner volume.

[00140]. It should be noted that the variation in the mould inner volume, though not entailing a considerable absolute variation in the thickness of the semi-processed side wall 3, is considerable relative to the inner volume not being occupied by the dough and hence available for gas expansion. Thereby, the thickness remaining well within the range described above as being optimum, a sensible pressure reduction will be obtained within the mould.

[00141]. It also should be noted that the inner volume of the mould 10 is substantially proportional to the gas pressure increase. As a consequence, the mould is substantially capable to be automatically adapted to any particular situation. This feature is particularly appreciated in the industrial preparation of food in view of the greatly varying conditions that may occur during the preparation step, even though controls on ingredients and environmental conditions are carried out.

[00142]. In this way, this particular embodiment of the method for preparing the semi-processed product resolves the problem of the gas developing within the mould thus providing an extra volume being substantially

proportionate to pressure.

[00143]. In accordance with another embodiment of the method, the partial cooking step provides controlled apertures in the mould while heat is being supplied to
5 the dough, in order to dramatically reduce the pressure within the mould.

[00144]. In other words, in the period of time when the female half-mould 12 and the male half-mould 11 are supplying heat to the dough, the male half-mould is
10 lifted from the female half-mould at preset time intervals.

[00145]. This can be a slight and short lifting, as far as it allows the gas originating from the dough to be released to the outside.

15 [00146]. Particularly, the lifting can be of a few centimeters and last a few seconds. The lifting can also be repeated over the partial cooking step of the semi-processed product.

[00147]. The duration, amount and repetition number of
20 the lifting of the male half-mould 11 substantially depend on the texture of the dough, mould temperature and other particular conditions.

[00148]. In this way, this particular embodiment of the method for manufacturing the semi-processed product
25 resolves the problem of the gas developing within the

mould as it is released to the outside at preset time intervals.

[00149]. Both solutions described above are not substitute to each other. On the contrary, in accordance
5 with a preferred embodiment of the method, the problem of the gas developing within the mould is first resolved by being released to the outside at preset intervals, and then by providing an extra volume substantially proportionate to the residual pressure.

10 [00150]. At the end of the partial cooking step, the mould is definitely opened by lifting the male half-mould 11 from the female half-mould 12 (this configuration is represented in figure 21c).

[00151]. The partially cooked semi-processed product
15 remains attached to the mandrel 111 due to the presence of the slot 114 which in the partial cooking step forms and engages a rib 114' within the semi-processed product.

[00152]. In accordance with an embodiment of the
20 method, the mandrel-holding plate 113 can be moved away from the collar-holding plate 112, such that each collar 110, by being pushed on the semi-processed upper edge, will cause the latter to be detached from the mandrel 111.

25 [00153]. In this way, after the semi-processed product

just manufactured has been removed, the mould 10 is ready to receive another dough portion and bring another partial cooking step to complexion.

[00154]. By employing the mould 10 comprising the
5 interchangeable collar 110, different semi-processed products can be manufactured and the semi-processed size can be thereby adapted to particular requirements. For example, the semi-processed product size can be adapted to the specific requirements of a particular
10 market.

[00155]. As can be seen in figures 20a and 20b, in fact, it is possible to obtain different sizes of collar 110. In figure 20a there is represented a mould 10 comprising a collar 110 of a greater size than collar
15 110 of mould 10 being represented in figure 20b. A greater size of the collar determines a smaller size of the gap 14, and vice versa, a smaller size of the collar determines a greater size of the gap 14. In the practice of the method for manufacturing the semi-processed
20 product, the amount of dough within the mould 10 requires to be dosed by considering the volume of the gap that will be formed with collar 110 being actually mounted thereon. Semi-processed products of different sizes can be thus manufactured. For example, in figures
25 22a and 22b there are represented two semi-processed

products of length l and L , respectively, where l is shorter than L .

[00156]. Particularly, the total length of the semi-processed product can be thereby changed, while
5 maintaining the other sizes considered as being optimum unchanged. In the case described above, and illustrated in figure 22, the semi-processed product has the shape of a cone and an aperture forming an angle a to the axis c-c, as described above. If the total length of the cone
10 are changed from l to L , the angle a , the cone angle, the thickness of the side walls and the bottom will maintain their optimum values unchanged.

[00157]. Thanks to the arrangement of the characteristics described in the attached claim 1, it is
15 easy to industrially obtain a semi-processed product which, once filled and cooked, will lead to a food product that is self-contained and easy to hold, i.e. capable of withstanding the mechanical stresses which intervene during consumption without support.
20 Additionally, the particular shape shows itself to be particularly convenient for the consumer.

[00158]. As may be therefore appreciated, the food product according to the present invention allows the satisfaction of the aforementioned needs of being
25 conveniently eaten in the absence of any support without

despite this risking the spilling of the filling with the drawbacks that this would bring.

[00159]. Finally, it is understood that the invention described solves the problems and the drawbacks of the
5 prior art.

[00160]. To the preferred embodiments of the invention described above, an expert in the art, with the aim of satisfying contingent and specific needs, may bring about numerous modifications, adjustments and
10 substitutions of elements with others that are functionally equivalent, without however departing from the scope of the claims below. For every aspect of the invention, some of such modifications are suggested within the description. It is understood that they may
15 be combined variously, so as to adapt the invention each time to the specific requirements.

CLAIMS

1. A semi-processed food product consisting of a single and whole piece of dough formed into a goblet-like shape and having an axis c-c and an opening defining a plane
5 π , said dough consisting of a partially cooked mixture comprising water and flour, wherein said axis c-c is inclined and oblique with respect to the plane π of the opening.
2. The semi-processed food product in accordance with
10 claim 1, wherein said mixture further comprises a rising agent.
3. The semi-processed food product in accordance with claim 2, wherein said rising agent is a chemical rising agent.
- 15 4. The semi-processed food product in accordance with claim 2, wherein said rising agent is organic yeast.
5. The semi-processed food product in accordance with claim 4, wherein said organic yeast is primarily brewers yeast (*Saccharomyces cerevisiae*).
- 20 6. The semi-processed food product in accordance with any of the preceding claims, wherein said mixture further comprises cooking salt (NaCl).
7. The semi-processed food product in accordance with any of the preceding claims, wherein said goblet-like
25 shape is in the shape of a cone.

8. The semi-processed food product in accordance with claim 7, wherein said cone is a cone with a substantially circular cross section.

9. The semi-processed food product in accordance with
5 any of the preceding claims, wherein said axis c-c forms a predefined angle α with the perpendicular p to the plane π .

10. The semi-processed food product in accordance with claim 9, wherein said angle α is comprised of between 5°
10 and 45°.

11. The semi-processed food product in accordance with claim 9, wherein said angle α is comprised of between 10° and 34°.

12. The semi-processed food product in accordance with
15 claim 9, wherein said angle α is comprised of between 16° and 25°.

13. The semi-processed food product in accordance with any of the preceding claims, wherein said goblet-like shape comprises a side wall of a constant predefined
20 thickness and is thin with respect to the overall dimensions of the semi-processed product itself.

14. The semi-processed food product in accordance with claim 13 wherein said thickness of said side wall is comprised of between 3.5mm and 10mm.

25 15. The semi-processed food product in accordance with

claim 13 wherein said thickness of said side wall is comprised of between 4mm and 8mm.

16. The semi-processed food product in accordance with claim 13 wherein said thickness of said side wall is
5 comprised of between 5mm and 7mm.

17. The semi-processed food product in accordance with any of the preceding claims, wherein said goblet-like shape comprises a base having a variable thickness.

18. The semi-processed food product in accordance with
10 claims 13 and 17, wherein the minimum value of said thickness of said base is equal to the value of said thickness of said side wall.

19. The semi-processed food product in accordance with claim 18, wherein the maximum value of said thickness of
15 said base is from 2 to 7 times the value of said thickness of said side wall.

20. The semi-processed food product in accordance with claim 18, wherein the maximum value of said thickness of said base is from 4 to 5 times the value of said
20 thickness of said side wall.

21. The food product comprising a semi-processed product in accordance with any of the claims 1 to 20 and a filling held within said semi-processed product, wherein said semi-processed product and said filling are cooked.

25 22. The food product in accordance with claim 21,

wherein said filling comprises tomato..

23. The food product in accordance with claim 22, wherein said tomato is present in the form of a layer of sieved tomato which covers the inside of said side wall.

5 24. The food product in accordance with any of the claims 21 to 23, wherein said filling comprises cheese.

25. The food product in accordance with claim 24, wherein said cheese is a spun curd cheese.

26. The food product in accordance with claim 25,
10 wherein said spun curd cheese is of the type commonly indicated by the name of mozzarella.

27. The food product in accordance with any of the claims 21 to 26, wherein said filling comprises a plurality of ingredients in the form of small cubes,
15 julienne or small strips.

28. The food product in accordance with any of the claims 21 to 27, wherein said filling comprises a plurality of ingredients in the form of a cream or a sauce.

20 29. A method for the production of a semi-processed food product in accordance with claim 1 comprising the steps of;

measuring out the ingredients comprising predefined amounts of water and flour;

25 mixing the measured ingredients so as to obtain a

- homogeneous mass of mixture;
measuring out the mass of mixture into individual
amounts;
shaping said amounts of mixture into goblet-like shapes,
5 said shape having an axis c-c and an opening defining a
plane π said axis c-c being inclined and oblique with
respect to plane π of the opening;
partial cooking the amounts of the semi-processed
mixture of dough;
10 cooling said semi-processed dough.
30. The method in accordance with claim 29, wherein in
the measuring out step the rising agent is also measured
out.
31. The method in accordance with claim 30, wherein said
15 rising agent is a chemical rising agent.
32. The method in accordance with claim 30, wherein said
rising agent is organic yeast.
33. The method in accordance with claim 32, wherein
said organic yeast is predominantly brewers yeast
20 (*Saccharomyces cerevisiae*).
34. The method in accordance with claim 32, further
comprising a rising step between the mixing and
measuring out steps.
35. The method in accordance with claim 32, further
25 comprising a rising step between the measuring out and

shaping steps.

36. The method in accordance with any of the claims 29 to 35, wherein the measuring out of the flour and water is of a weight ratio comprised of between 1:0.5 and 1:1.

5 37. The method in accordance with any of the claims 29 to 36, wherein the partial cooking occurs at a temperature comprised of between 180° C and 250° C for a time comprised of between 2 and 5 minutes.

38. The method in accordance with any of the claims 29
10 to 37, wherein the partial cooking occurs at a temperature of approx. 210° C for a time of approx. 3 minutes.

39. The method in accordance with claim 29 further comprising the deep freezing step of the semi-processed
15 product.

40. The method in accordance with claim 29 further comprising the freezing step of the semi-processed product.

41. The method in accordance with claim 29 further
20 comprising the packaging step, in a modified atmosphere, of the semi-processed product.

42. The method in accordance with claim 29 further comprising the packaging step, under vacuum, of the semi-processed product.

25 43. A method for producing a food product comprising the

steps of:

providing a semi-processed product according to any of the claims 1 to 20;

filling the semi-processed product;

5 cooking the semi-processed product and the filling;

cooling the finished product.

44. The method in accordance with claim 43, wherein the cooking occurs at a temperature comprised of between 280°C and 350°C for a time comprised of between 2 and 5
10 minutes.

45. The method in accordance with any of the claims 43 or 44, wherein the cooking occurs at a temperature of approx. 320°C for a time of approx. 3 minutes.

46. The method in accordance with any of the claims 43
15 to 45, further comprising the step of maintaining said food product at a temperature comprised of between 60°C and 80°C.

47. The method in accordance with any of the claims 43 to 46, further comprising the step of maintaining said
20 food product at a temperature comprised of between 65°C and 75°C.

48. A mould for producing a semi-processed product in accordance with claim 1 comprising a male half-mould and a female half-mould comprising at least two parts which
25 are movable with respect to one another; said male half-

moulds and female half-moulds comprise their own means adapted to locally heating the mould and being shaped in such a manner that, once coupled, an interspace remains between them having a goblet-like shape, said shape
5 having an axis c-c and an opening defining a plane π said axis c-c being inclined and oblique with respect to said plane π of the opening.

49. A mould in accordance with claim 48, wherein said axis c-c forms an angle α with the perpendicular p to
10 the plane π .

50. The mould in accordance with claim 49, wherein said angle α is comprised of between 5° and 45° .

51. The mould in accordance with claim 49, wherein said angle α is comprised of between 10° and 34° .

15 52. The mould in accordance with claim 49, wherein said angle α is comprised of between 18° and 25° .

53. The mould in accordance with any of the claims 48 to 52, wherein said interspace comprises a side space with a constant thickness and is thin with respect to the
20 overall dimensions of the semi-processed product itself.

54. The mould in accordance with claim 53 wherein said thickness of said side space is comprised of between 3.5mm and 10mm.

55. The mould in accordance with claim 53 wherein said
25 thickness of said side space is comprised of between 4mm

and 8mm.

56. The mould in accordance with claim 53 wherein said thickness of said side space is comprised of between 5mm and 7mm.

5 57. The mould in accordance with any of the claims 48 to 56, wherein said interspace comprises a bottom space having a variable thickness.

58. The mould in accordance with claims 53 and 57, wherein the minimum value of said thickness of said
10 bottom space is equal to the value of said thickness of said side space.

59. The mould in accordance with claim 58, wherein the maximum value of said thickness of said bottom space is equal to 2-7 times the value of said thickness of said
15 side space.

60. The mould in accordance with claim 58, wherein the maximum value of said thickness of said bottom space is equal to 4-5 times the value of said thickness of said side space.

20 61. The mould in accordance with any of the claims 48 to 60, wherein said goblet-like shape of said interspace is a cone shape.

62. The mould in accordance with claim 61 wherein said cone is a cone with a substantially circular cross
25 section.

63. The mould in accordance with any of the claims 48 to 62, wherein said own means suitable for locally heating the mould comprise channels for the circulation of a hot fluid.

5 64. The mould in accordance with any of the claims 48 a 63, wherein said own means suitable for heating the mould comprise channels for the circulation of hot diathermic oil.

65. The mould in accordance with any of the claims 48
10 to 64, wherein said own means suitable for heating the mould comprise channels for the circulation of superheated water under pressure.

66. The mould in accordance with any of the claims 48 to 65, wherein said own means suitable for heating the
15 mould comprise electrical elements.

67. A station for producing a semi-processed product in accordance with claim 1 comprising a plurality of moulds in accordance with claim 5; means for moving at least two parts which make up each female half-mould and for
20 moving each male half-mould; and connections for feeding their said means suited to locally heating each of the moulds.

68. The station in accordance with claim 67 wherein said plurality of moulds is arranged into two parallel lines.

25 69. The station in accordance with claim 68 wherein said

plurality of female half-moulds is made up by a central block and two side blocks.

70. The station in accordance with claim 68 wherein said means for moving the at least two parts which make up
5 each female half-mould comprise jacks.

71. The station in accordance with claim 68 wherein said means for moving each male half-mould comprise at least one jack.

72. The station in accordance with claims 70 or 71
10 wherein said jacks are hydraulic jacks.

73. The station in accordance with claims 70 or 71 wherein said jacks are pneumatic jacks.

74. The station in accordance with claim 68 wherein said connections for supplying said own means for locally
15 heating the moulds are adapted to making possible the movement of said male half-moulds and said parts of the female half-moulds.

75. The station in accordance with claim 74 wherein said connections comprise flexible tubes.

20 76. The station in accordance with claim 74 wherein said connections comprise electrical cables.

77. A plant for producing a semi-processed product in accordance with claim 1, comprising:

hoppers containing water and flour and comprising
25 measuring out devices;

a mixing machine;

a dosing machine;

at least one mould in accordance with any of the claims
48 to 66 or at least one station of moulds in accordance
5 with any of the claims 67 to 76;

a feeding plant for said means for moving said at least
two parts of said female half-moulds and said male half-
mould;

a supply plant for said own means suitable for locally
10 heating each of the moulds;

a cooling path.

78. The plant in accordance with claim 77, further
comprising a hopper containing rising agent and
comprising a measuring out device.

15 79. The plant in accordance with claim 78, wherein said
rising agent is a chemical rising agent.

80. The plant in accordance with claim 78, wherein said
rising agent is organic yeast.

81. The plant in accordance with claim 80, wherein said
20 organic yeast is predominantly brewers yeast
(*Saccharomyces cerevisiae*).

82. The plant in accordance with claim 80, further
comprising a rising chamber between the mixing machine
and the dosing machine.

25 83. The plant in accordance with claim 80, further

comprising a rising chamber between the dosing machine and the moulds station.

84. The plant in accordance with any of the claims 77 to 83, wherein said measuring out devices are adapted to
5 measuring out flour and water in a weight ratio comprised of between 1:0.5 and 1:1.

85. The plant in accordance with any of the claims 77 to 84, wherein said station of moulds is adapted to maintaining a temperature comprised of between 180°C and
10 250°C and to remain in a closed position for a time comprised of between 2 and 5 minutes.

86. The plant in accordance with any of the claims 77 to 85, wherein said station of moulds is adapted to maintaining a temperature of approx. 210°C and to
15 remaining in a closed position for a time of approx. 3 minutes.

87. The plant in accordance with any of the claims 77 to 86, further comprising a semi-processed product deep-freezing tunnel.

20 88. The plant in accordance with any of the claims 77 to 87, further comprising a semi-processed product freezing tunnel.

89. The plant in accordance with any of the claims 77 to 88, further comprising a machine for the packaging of
25 the semi-processed product in a modified atmosphere.

90. The plant in accordance with any of the claims 77 to 89, further comprising a machine for packaging the semi-finished product under a vacuum.

91. The plant in accordance with any of the claims 77
5 to 90, comprising a plurality of stations in accordance with claim 67.

92. The plant in accordance with claim 91 wherein said plurality of stations is arranged in series in such a manner that the dosing machine completes a cycle of
10 the filling of the moulds of all the stations in a time substantially equal to that which said stations use up for bringing the partial cooling of the semi-finished product to an end, thus establishing a continuous production cycle devoid of any dead time.

15 93. An apparatus for producing a food product in accordance with claim 21 according to the method in accordance with claim 43 comprising a filling station, a cooking station and a cooling path .

94. The apparatus in accordance with claim 93 wherein
20 said cooking station comprises an oven.

95. The apparatus in accordance with claim 94 wherein said oven comprises means for producing heat selected from the group comprising electrical elements, quartz lamps, wood combustion chambers, gas burners and
25 microwave generators.

96. The apparatus in accordance with any of the claims 93 to 95, wherein said cooking station comprises heated plates.

97. The apparatus in accordance with claim 94, further
5 comprising a drawing chain constituting a closed path, said path traversing said filling station, said cooking station and said cooling path .

98. The apparatus in accordance with claim 97, further comprising a plurality of baskets adapted to holding a
10 semi-finished product in accordance with claim 1 and/or a product in accordance with claim 21, said baskets defining an axis s-s and being adapted to being transported by said drawing chain along said closed path.

15 99. The apparatus in accordance with claim 98, comprising means adapted to making said baskets rotate around the axis s-s at least along the length inside said oven.

100. The apparatus in accordance with claim 99 wherein
20 said means adapted to make said baskets rotate comprise a cogwheel fixed to each basket and adapted to engaging a rack fixed to said apparatus.

101. The apparatus in accordance with any of the claims 93 to 100, wherein said cooling path comprises a thin
25 plate which sits beside said drawing chain partially

overhanging said baskets and impeding removal for a length immediately following said oven.

102. The apparatus in accordance with claim 94 wherein said oven comprises an inlet aperture and an outlet
5 aperture, each aperture comprising a splayed part, said splayed part being arranged in such a manner that the section of said apertures on the inner side is larger than the section of said apertures on the outer side.

103. The apparatus in accordance with any of the claims
10 93 to 102, further comprising a heated counter comprising at least one cavity complimentary to a food product in accordance with claim 21 and means for maintaining the ideal temperature for consumption.

104. The apparatus in accordance with claim 103 wherein
15 said temperature is comprised of between approx. 60°C and approx. 80°C.

105. The apparatus in accordance with claim 103 wherein said temperature is comprised of between approx. 65°C and approx. 75°C.

20 106. The apparatus in accordance with claim 103 wherein said means for maintaining the temperature comprise electrical elements.

107. The apparatus in accordance with claim 103 wherein said means for maintaining the temperature comprise
25 circuits for the circulation of heated fluids.

108. The mould for manufacturing a semi-processed product in accordance with claim 1 comprising a male half-mould and a female half-mould, said male half-mould comprising a collar and a mandrel moving relative
5 to each other; said male half-mould and female half-mould comprising means suitable to locally heat the mould and being shaped such that, after they have been coupled, a bell-shaped gap is left therebetween, said shape having an axis c-c and an aperture defining a
10 plane π said axis c-c being inclined and biased relative to said plane π of the aperture.

109. The mould in accordance with claim 108, wherein said mandrel moves along said axis c-c.

110. The mould in accordance with claim 108, wherein
15 said mandrel is slidably mounted on a mandrel-holding plate.

111. The mould in accordance with claim 110, wherein between said mandrel and said mandrel-holding plate there is interposed an elastic element.

20 112. The mould in accordance with claim 108, wherein said collar is releasably mounted on a collar-holding plate.

113. The mould in accordance with claim 48 or 108, wherein said male half-mould comprises a slot
25 transversal to said axis c-c.

equal to the value of said thickness of said side space.

123. The mould in accordance with claim 121, wherein the maximum value of said thickness of said bottom space is equal to 2÷7 folds the value of said thickness of said side space.

124. The mould in accordance with claim 121, wherein the maximum value of said thickness of said bottom space is equal to 4÷5 folds the value of said thickness of said side space.

10 125. The mould in accordance with any claim 108 to 124, wherein said bell-shape of said gap is a cone shape.

126. The mould in accordance with any claim 108 to 125, wherein said means suitable to locally heat the mould comprise electric resistances.

15 127. A station to manufacture a semi-processed product in accordance with claim 1 comprising a plurality of moulds in accordance with claim 108; moving means for the collar and mandrel of each male half-mould; and connections to supply said means suitable to locally
20 heat each one of the moulds.

128. The station in accordance with claim 68 wherein said moving means for the collar and mandrel of each male half-mould comprise at least one jack.

129. The station in accordance with claim 128 wherein
25 said at least one jack is pneumatic.

114. The mould in accordance with claim 108, wherein said axis c-c forms an angle α with the perpendicular p to plane π .

115. The mould in accordance with claim 109, wherein
5 said angle α is comprised of between 5° and 45° .

116. The mould in accordance with claim 109, wherein said angle α is comprised of between 10° and 34° .

117. The mould in accordance with any claim 108 to 116, wherein said gap comprises a side space having a thin
10 thickness relative to the overall size of the semi-processed.

118. The mould in accordance with claim 117 wherein said thickness of said side space is comprised of between 3,5mm and 10mm.

15 119. The mould in accordance with claim 117 wherein said thickness of said side space is comprised of between 4mm and 8mm.

120. The mould in accordance with claim 117 wherein said thickness of said side space is comprised of between 5mm
20 and 7mm.

121. The mould in accordance with any claim 108 to 120, wherein said gap comprises a bottom space having a varying thickness.

122. The mould in accordance with claim 121, wherein the
25 minimum value of said thickness of said bottom space is

130. A system for manufacturing a semi-processed product in accordance with claim 1, comprising:

- hoppers containing water and flour and
 comprising dosing devices;
- 5- a mixer;
- a cutter;
- at least one mould in accordance with any claim
 108 to 126 or at least one mould station in accordance
 with any claim 127 to 129;
- 10- a power supply system for said moving means for
 said collar and said mandrel of each one of said male
 half-moulds;
- a power supply system for said means suitable to
 locally heat each one of the moulds;
- 15- a cooling path.

131. The system in accordance with claim 130, further comprising a hopper containing yeast and comprising a dosing device.

132. The system in accordance with claim 131, wherein
20 said yeast is chemical yeast.

133. The system in accordance with claim 131, wherein
said yeast is organic yeast.

134. The system in accordance with claim 133, wherein
said organic yeast is mainly brewers yeast
25 (*saccharomyces cerevisiae*).

135. The system in accordance with claim 130, further comprising a rising chamber between the mixer and the cutting machine.

136. The system in accordance with claim 130, further
5 comprising a rising chamber between the cutting machine and the mould station.

137. The system in accordance with any claim 130 to 136, wherein said dosing devices are suitable to dose flour and water in a proportion ranging from 1:0,5 to 1:1 by
10 weight.

138. The system in accordance with any claim 130 to 136, wherein said mould station is suitable to maintain a temperature ranging from 180°C to 250°C and remain in the closed position for a time comprised of between 2
15 and 5 minutes.

139. The system in accordance with any claim 130 to 136, wherein said mould station is suitable to maintain a temperature of about 210°C and remain in the closed position for a time of approx. 3 minutes.

20 140. The system in accordance with claim 77 or 130, wherein said moving means for the collar and mandrel of each male half-mould are suitable to lift said male half-mould from said female half-mould at preset intervals of time.

25 141. The system in accordance with any claim 130 to 140,

further comprising a freezing tunnel for the semi-processed product.

142. The system in accordance with any claim 130 to 140, further comprising a deep-freezing tunnel for the semi-processed product.

143. The system in accordance with any claim 130 to 140, further comprising a machine for packaging the semi-processed product in a modified atmosphere.

144. The system in accordance with any claim 130 to 140, further comprising a machine for packaging the semi-finished product under a vacuum.

145. The system in accordance with any claim 130 to 140, comprising a plurality of stations in accordance with claim 127.

146. The system in accordance with claim 145 wherein said plurality of stations is arranged in series such that the dosing machine completes a filling cycle of the moulds in all stations in a time substantially equal to that which said stations use up for bringing the partial cooking of the semi-finished product to an end, thus establishing a continuous production cycle devoid of any dead time.

147. The method in accordance with 29 wherein said partial cooking step is carried out by means of a mould in accordance with claim 48 or 108.

148. The method in accordance with claim 147 wherein said partial cooking step comprises, in turn, at least one release step of the pressure within said mould.

149. The method in accordance with claim 148 wherein
5 said release step of the pressure comprises, in turn, lifting the male half-mould from the female half-mould .

150. The method in accordance with claim 149 wherein said lifting of the male half-mould from the female half-mould is carried out at a preset time interval
10 after the male half-mould has been closed onto the female half-mould.

151. The method in accordance with claim 29 wherein said partial cooking step is carried out by means of a mould in accordance with claim 108.

15 152. The method in accordance with claim 151 wherein said partial cooking step comprises, in turn, a step of increasing the inner volume of said mould, said volume increase being substantially proportional to the pressure increase within said mould.

20 153. The method according to claim 151 wherein said partial cooking step comprises, in turn, at least one release step of the pressure within said mould, and a step of increasing the inner volume within said mould, said volume increase being substantially proportional to
25 the pressure increase within said mould.

154. The method in accordance with claim 151, further comprising, prior to said forming step, the step of selecting said collar.

155. The method in accordance with claim 151, further
5 comprising, after said partial cooking step, the step of lifting said male half-mould from said female half-mould.

156. The method in accordance with claim 151, further comprising, after said step of lifting said male half-
10 mould from said female half-mould, the step of moving said mandrel relative to said collar of said male half-mould .