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ETE DES PRODUITS NESTLÉ S.A. [CH/CH]; Case En ce qui concerne les codes à deux lettres et autres abrévia-
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WO 01/13737 A1 (54) Titre: ROUND ICE CONFECTIONERY PRODUCTS AND METHOD FOR MAKING SAME

(54) Titre: ARTICLES ARRONDIS DE CONFISERIE GLACEE ET PROCEDE DE FABRICATON

(57) Abstract: The invention concerns a round ice confectionery product having uniform roundness, with complete spherical shape, substantially having no peak, angle or traces of forming tool, in particularly ball-shaped with an appearance similar to a ball home-made with a spoon, produced by cold process extrusion-forming.

(57) Abrégé: Un article arrondi de confiserie glacée de rotondité régulière, de forme de révolution, essentiellement dépourvu de sommet, d'angle et de traces d'outil de formage, notamment en forme de boule d'aspect semblable à une boule confectionnée artisanalement à la cuillère, est fabriqué par extrusion-formage à froid.

Round item of frozen confectionery and process of manufacture

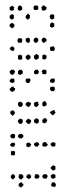
The invention relates to the field of simultaneous forming and proportioning of items consisting in forming and discharging in round-shaped portions a frozen confectionery having a pasty consistency.

5 Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

The problem which forms the basis of the invention is the large-scale mechanical manufacture of round, especially spherical, items of frozen confectionery, for example
10 ice-cream, ice-milk or sorbet, which do not contain a final coating, for example couverture chocolate coating. Thus, when there is no coating capable of masking slight defects in shape, the formed portions obtained should have an even roundness, a homogeneous general appearance and resemble, if possible, the shape and the appearance of balls produced manually with the aid of an ice-cream scoop, for example
15 a degree of roughness in a surface which otherwise has an even, so to speak "handmade", roundness.



Preformed balls are not currently commercially available because attempts at forming by moulding in a two-part mould, for example between two hemispherical cavities, have not been given the desired appearance, the balls being too smooth at the
20 surface and the mould joint being visible.



There is known, for example from US-A-5,031,567 an apparatus for the continuous manufacture of ice-cream portions, comprising the extrusion of a roll of pasty mass, the forming of the roll and its cutting into portions having a practically spherical shape by means of diaphragms, as well as the deposition of the portions on a
25 moving conveyor belt. After deposition, the portions pass successively into a hardening

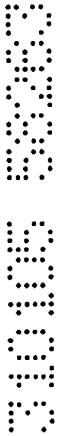
tunnel and into a coating machine where they are coated with a layer of chocolate. The balls obtained by this means are not perfectly spherical. The ice-cream is relatively soft on leaving the extrusion nozzles, even if the freezer is pushed to the maximum of its refrigeration capacity. As a result, the ball is deformed under the effect of its own weight during the extrusion and tends to collapse when it falls on the flat surface of the conveyor belt, resulting in a flat base before it has been sufficiently cooled by the hardening tunnel. Moreover, the mark by the diaphragm blades is clearly visible on its surface. Furthermore, there is a drop effect on the top by formation of a protuberance in the form of a tip when the ball is detached by the blades of the diaphragm. These marks are masked when the product is then coated. However, the deformation of the items and the marks which are apparent in its surface are perceived as major visual defects for "plain" items which are therefore without coating.

It is possible to improve the roundness of the products by accelerating the hardening phase by limiting the period during which the product can collapse on itself, for example by using a supercooled tunnel. Similarly, it is possible to cause the balls to fall into a liquid nitrogen bath in order to encrust the surface. Using such processes, it is effectively possible to improve the roundness of the products, but these processes are expensive and do not address the problem of the marks on their surface.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

In its first aspect the invention relates to a round item of frozen confectionery, having an even roundness, and its cohesion of greater than 95% but which substantially lacks rough edges and forming tool marks.

In its second aspect the invention relates to a packaged frozen confectionery product comprising a plurality of round frozen confectionery items according to the first



aspect positioned upon cells in strips of thermoformed plastic material enclosed by an external packaging.

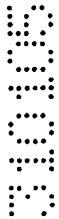
Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

The invention therefore relates to a round item of frozen confectionery, preferably one obtained by extrusion-forming, that has an even roundness, and can have any form of revolution. It essentially lacks an apex, rough edges and forming tool marks, and has a good cohesion, preferably of greater than 95%. The cohesion is expressed as the ratio, expressed as percentage, between the height of the item just before the hardening and that at the outlet of the extrusion nozzle. Thus, a cohesion greater than 95% according to the invention means that the deformation of the item does not exceed 5%.

In the context of the invention, a frozen confectionery designates an ice-cream, an ice-milk or a sorbet having a percentage overrun of 80 to 120%, excluding a water ice.

The frozen confectionery should have a good cohesion. This means that it should have a pasty and relatively hard consistency in order to be able to be formed continuously and at a high rate by extrusion-forming, and then deposited in a packaging moving below the forming device, this being without undergoing notable deformation of its volume or of its surface during the extrusion, during the deposition into the packaging and up to the hardening.

Depending on the composition of the mix, the temperature on leaving the extruder, the capacity of the extruder and the throughput of the frozen confectionery, the frozen confectionery is at a temperature \leq or $= -7^{\circ}\text{C}$ and preferably from -10°C to -12°C in the case of an ice-cream and preferably from -16°C to -20°C in the case of a ice-milk or a

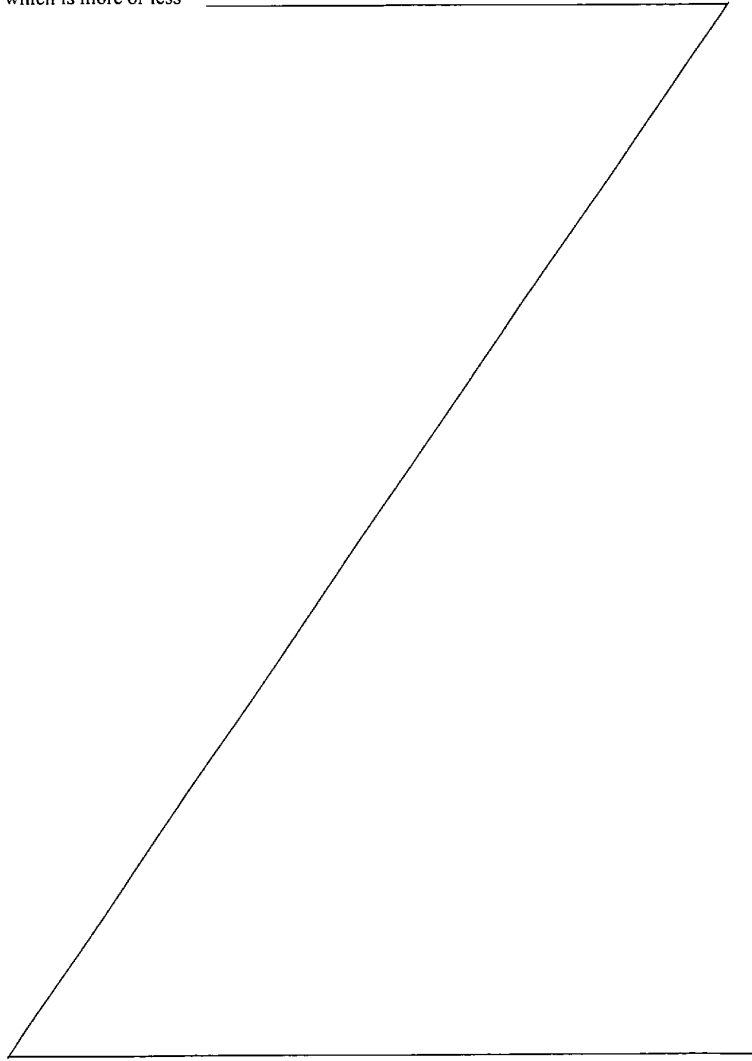


sorbet. Such a frozen confectionery may be prepared by means of a cooled screw extruder, preferably a twin screw extruder.

In the context of the invention, a round article can have any form of revolution, which is more or less

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complex, for example frustoconical having a circular base with a round top, cylindrical with a round top, the shape of a skittle, the shape of a fruit, for example pear, lemon or strawberry, and preferably the shape of a ball, a hollow sphere, or a hemisphere. A ball has a diameter of 30 to 70 mm and preferably a diameter of 30 mm to 40 mm, for
5 example 34 mm approximately, for a volume of 14 to 180 ml and preferably of 14 to 25 ml, for example 20 to 25 ml.

The invention also relates to a process for the manufacture of a preceding item, wherein a forming head with diaphragms is continuously fed with an extruded roll of frozen confectionery having a temperature $\leq -7^{\circ}\text{C}$ at a constant pressure, such that
10 the frozen confectionery is directed alternately to one or the other diaphragm, which avoids the creation of a counterpressure upstream of the said forming head, round individual portions are formed and cut from the said roll by opening and then closing the diaphragms, and
the portions thus formed are directly deposited in a packaging moving below the
15 forming head.

According to a preferred embodiment, the forming head consists of two diaphragms. The supply with frozen confectionery thus takes place alternately towards one or the other of the diaphragms. It is possible to allow for the diaphragms to be alternately supplied by a rotating cylindrical throttle chamber carrying out the
20 distribution and for the blades constituting the diaphragms to be driven in a synchronized manner so that there is no counterpressure upstream and therefore no notable variation in the supply rate by the fact that when one of the diaphragms is completely open, the other is completely closed. Such a system may be as described for
example in US-A-5, 031,567 (also EP-A-0,373,246), the system for setting the
25 cylindrical _____

throttle chamber and the diaphragms in motion being mechanical, for example by a common motor with a variable speed drive unit engaged with the cylindrical throttle chamber and the cams driving the diaphragms
5 synchronously.

The cylindrical throttle chamber and the diaphragms can be driven individually by servomotors, such that it is possible to continuously produce portions with forms of
10 revolution which are different from each other.

After forming and cutting, the portions are deposited directly into cells arranged in lines and rows in packaging trays below the forming head, for example
15 made of thermoformed plastic material. The trays are carried by an indexed endless chain moving continuously and slowing down at the time of the deposition or discontinuously step by step, under the forming head, such that each portion is deposited into a cell.
20 Preferably, each tray is closed with an additional cover covering the portions, for example locked onto the tray and preferably made of translucent thermoformed plastic material.

25 The formed portions are sufficiently hard at the time of forming for their deformation by the dynamic extrusion operation to be negligible. The deformation by the fall of the portions into the cells is low, generally of the order of 3% maximum for a distance
30 between the diaphragm and the cells of the order of about 10 cm.

One decisive advantage of the process according to the invention is its high flexibility, its high
35 productivity and its quality from the hygiene point of view, since the portions are deposited directly in their packaging without entering into contact with intermediate recovering surfaces.

The accompanying drawings illustrate one embodiment of the invention given by way of example.

In these drawings,

- 5 Figure 1 is a schematic general view of the manufacturing process,
Figure 2 is a schematic detailed view of the means of driving the forming head, and
Figure 3 is an exploded perspective view of a packaging
10 containing items.

In Figure 1, an ice-cream mix is formed into a structure cooled by means of the twin screw extruder 1 to the outlet temperature of -14°C . The cold ice-cream
15 has a percentage overrun of 90% by volume. An apparatus as described in US-A-5,345,781 is used as extruder. As a variant, it is possible to use an extruder as described in US-A-5,919,510 with an outlet temperature of -8°C . A cylindrical roll of hardened ice-cream is
20 delivered at the outlet.

The roll is formed into balls by means of the forming head 2 containing diaphragms with six to eight blades. The blades of the diaphragms are curved inwards in
25 order to obtain perfectly round balls 3. The balls 3 are deposited in the thermoformed cells 4 in the trays 5 made of plastic material, carried by the endless chain 6 moving according to the arrow f1, step by step, and indexed on the output of the forming
30 head 2. The trays 5 in fact consist of lines of strips 7 as represented in Figure 3 below. Only one line of strips 7 has been represented in Figure 1 for the sake of simplicity, but the forming head in reality delivers balls 3 in two lines. Once filled with balls,
35 one strip is covered with a thermoformed cover 8 made of translucent plastic material locked onto the said strip. The trays of strips are then directed to a hardening tunnel which is not represented.

The forming head is as represented in Figures 4 and 5 of US-A-5,031,567 (also EP-A-0,373,246) and the diagrams and the cylindrical throttle chamber are synchronously driven as described in this document in a first embodiment.

In a second embodiment, starting with a forming head of the same construction as above and driven in a different manner as shown in Figure 2, the cylindrical throttle chamber 9 is supplied with ice-cream according to f2 and its rotation according to f3 is directed by a servomotor 10 in order to distribute the ice-cream alternatively according to f4 and f5 towards the diaphragms 11 and 12. A servomotor 13 operates the diaphragm 11 independently and a servomotor 14 operates the diaphragm 12, also independently, and the various servomotors are controlled by a programmable automatic machine so as to provide a constant flow of ice-cream without the formation of a counterpressure. The fact that the diaphragms 11 and 12 can be driven independently of each other, it is possible to produce portions of different shapes from the same forming head, for example a ball 15 and a pear 16. It is thus possible to vary the shapes of the portions from one strip to another or in the same strip.

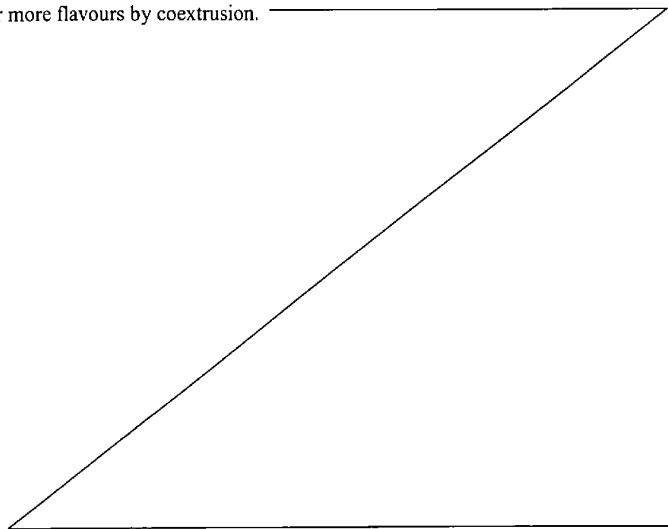
In Figure 3, the portions or balls 3 of ice-cream are arranged in the cells 4 in line in strips 7 made of thermoformed plastic material, each strip 7 containing e.g. six balls 3. These strips 7 are covered with the cover 8 thermoformed from a translucent plastic material. The cover 8 is locked onto the strip 7 in a known manner, for example by means of a member such as a resilient tongue 17 or a flap located inside each end face of the cover 8 which fits into a complementary recess 18 outside each corresponding end face of the strip 7. It is possible to have for example three strips 7 in parallel lines, respectively containing balls of chocolate-, vanilla- and praline-flavoured ice-cream or respectively vanilla-flavoured balls with red fruits and with lemon, placed in a cardboard outer packaging case or box 19. In this case, it is clear that for placing in boxes, it is



necessary to allow for the separation of the lines of strips, and then their convergence into three lines, which may be produced by mechanical devices in a known manner.

In the embodiment represented, the items represented are balls. It is possible to change the shape of the items by modifying the opening and closing rhythm of the diaphragms. It is also possible to act on the curvature and the cutting edge of the blades of the diaphragms in order to modify the roundness of the items. The blades may also be notched so as to produce decorative effects on the surface.

In the embodiment represented, the head comprises two diaphragms. Without departing from the scope of the invention, it is possible to increase the number of diaphragms. It is also possible to replace a single conduit for supplying the roll with a conduit comprising separating walls or with a coaxial conduit with a smaller diameter supplying several different frozen confectionery products, so as to produce items with two or more flavours by coextrusion.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A round item of frozen confectionery, having an even roundness, and cohesion of greater than 95% but which substantially lacks rough edges and forming tool marks.
2. The item according to claim 1, in which the frozen confectionery is an ice-cream,
5 an ice-milk or a sorbet each having a percentage overrun of 80 to 120%.
3. The item of claim 1 or claim 2, in which the frozen confectionery is obtained by extrusion-forming at a temperature of -7°C or less.
4. The item according to any one of the preceding claims having a frustoconical
10 top, the shape of a skittle, the shape of a fruit, or the shape of a ball, a hollow sphere, or a hemisphere.
5. The item according to claim 4, wherein the fruit shape is of a pear, lemon or strawberry.
6. The item according to any one of claims 1 to 5, in the form of a ball having a
15 diameter of 30 to 70 mm, and a volume of 14 to 180 ml.
7. The item according to claim 6, wherein the diameter of the ball is 30 to 40 mm.
8. The item according to claim 7, wherein said diameter is approximately 34 mm.
9. The item according to any one of claims 6 to 8 having a volume of 14 to 25 ml.
10. The item according to claim 9, wherein said volume is 20 to 25ml.
- 20 11. A packaged frozen confectionery product comprising a plurality of round frozen confectionery items according to claim 1 positioned upon cells in strips of thermoformed plastic material enclosed by an external packaging.
12. The product of claim 11 wherein the external packaging is a cardboard box.
13. The item of claim 1, wherein the item substantially lacks an apex.
- 25 14. The item of claim 3, wherein the item has a form of revolution.



15. The item of claim 14, wherein the item is substantially uncoated.

16. A packaged frozen confectionery product, comprising a plurality of round frozen confectionery items according to claim 4 positioned upon cells in strips of thermoformed plastic material enclosed by an external packaging.

5 17. The product of claim 16, wherein the external packaging is a cardboard box.

18. A packaged frozen confectionery product, comprising a plurality of round frozen confectionery items according to claim 15 positioned upon cells in strips of thermoformed plastic material enclosed by an external packaging.

19. The product of claim 18, wherein the external packaging is cardboard box.

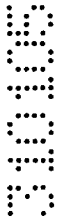
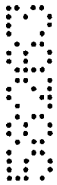
10 20. A round item of frozen confectionery substantially as herein described with reference to any one of the embodiments of the invention as illustrated in the accompanying drawings and/or examples but excluding comparative examples.

21. A packaged frozen confectionery product substantially as herein described with reference to any one of the embodiments of the invention as illustrated in the

15 accompanying drawings and/or examples but excluding comparative examples.

DATED this 31st day of JANUARY, 2005
SHELSTON IP
Attorneys for: SOCIETE DES PRODUITS NESTLE S.A.

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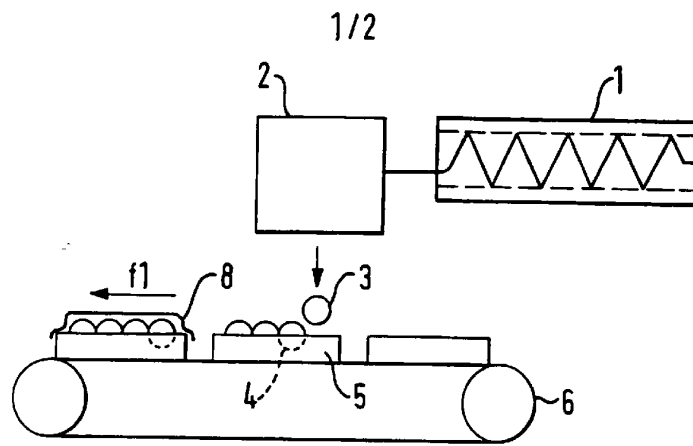


FIG. 1

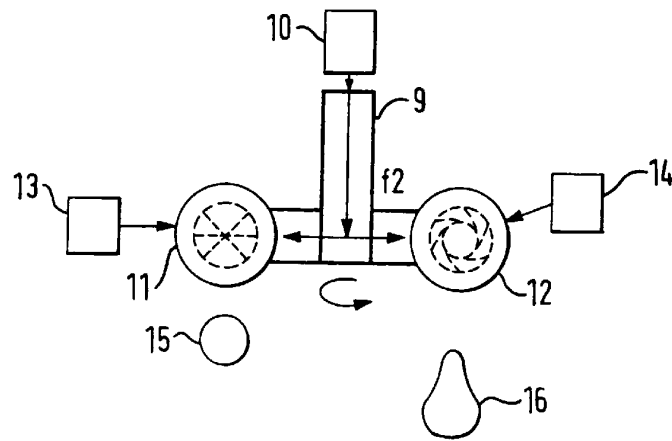


FIG. 2

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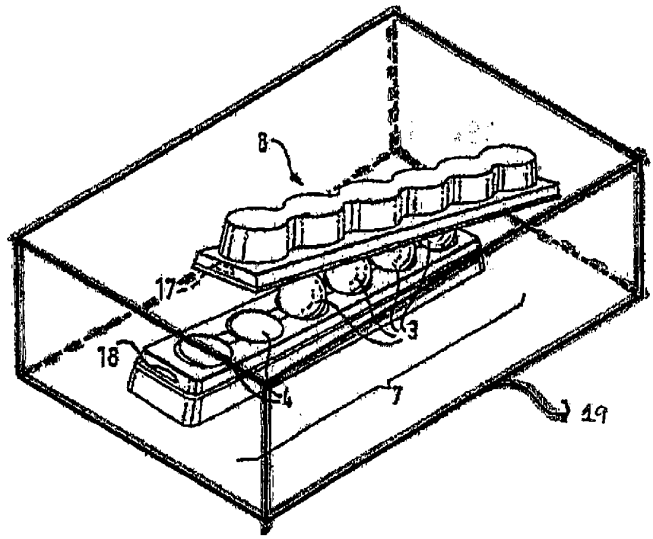


FIG. 3