(54) Title: SHELL-TYPE CONFECTIONERY PRODUCT

(57) Abstract: The invention relates to a novel confectionery-based product comprising a moulded shell and a substantially planar closure base portion securely sealed onto the edges of the shell; the sealed assembly formed by the shell and the closure base portion delimiting an inner cavity, wherein the inner cavity is partially occupied with a mass formed of solid edible discrete pieces and the inner cavity comprising a free gas volume left within the cavity including at least interstitial spaces formed within the mass of the pieces. The invention also encompasses the method of manufacturing such novel confectionery product.
SHELL-TYPE CONFECTIONERY PRODUCT

This invention relates to confectionery products, and especially concerns a novel confectionery product of the shell type and a method of manufacturing a shell type confectionery product.

In the confectionery and chocolate industry, it is well known to propose products having solidified edible confectionery shells and fillings or centres of varied edible liquid, pasty or foamy materials therein. Shell-type chocolate products are usually manufactured on shell moulding lines. It is usually meant by shell, a relatively thin open concave fat-based layer that is formed by deposition in a mould that further receives a deposit of confectionery centre followed by backing with more liquid fat based material. As a result, the shell-type confectionery comprises a shell structure with a relatively flat bottom that enables to conveniently display the confectionery product in a box or similar.

Many shell moulded confectionery products contain a centre, which contrasts with the chocolate in term of taste or texture, e.g., caramel, fondant or praline. The organoleptic effect, the resistance to chewing, or taste of the confectionery product can be modified in a wide range of combinations by changing the nature and characteristics or either the shell or filling or both.

For traditional chocolate or chocolate-like fat containing sweets, a relatively rigid shell provided with liquid fillings such as paste, juice, liquors or syrups are well known. Other various sweets are frequently proposed such as chocolate shells and centres of fudge, caramel, white egg-based foam, syrup glaze, etc. In general, the centre is entirely filled so when biting in the sweet, the teeth go from the fat containing shell directly into a somewhat different texture of the centre which can be, for example, either soft for praline or hard for nuts. The combination is relatively compact so the shell and filling immediately mix in the mouth and melt together and specific features of the filling may be lost or hidden in mouth.

Confectionery may contain a powder or granules which react with the saliva in the mouth to produce an intense flavour or a reaction such as fizzing or popping. When this is surrounded by another material such as fat, which is required to fill the
shell, this coating material has a tendency to hide or mute the reactivity of these components. The centre may thus be less reactive in mouth and specific sensations coming from the centre may be lost or delayed in mouth.

WO 97/19604 relates to a food product comprising an edible and freely movable article in a hollow basic body that has a through-passage and/or is made to be partially transparent. The food product is not a shell-type confectionery. The basic body is extruded as a tubular structure and closed to retain the edible articles therein.

GB 2229 347 relates to a confection filled with gasified caramel that are made of two halves of caramel mass joined together and into which chips of gasified caramel or of gasified caramel mixture with chewing gum, are deposited.

JP 62-236445 relates to a crispy, hollow snack obtained by containing edible granular materials; e.g., sesame freely floating in a hollow part if a snack body.

Therefore, it would be desirable to propose a novel, lighter and more reactive confectionery product of shell-type with a unique texture.

The present invention aims to solve the above-identified problems. More particularly, one object of the present invention is to propose a method to produce a novel shell-type confectionery product having a less dense structure, unique mouthfeel properties and a high capability to preserve the organoleptic effects and intrinsic reactivity of the materials in the centre.

The present invention also relates to a new method of manufacturing of shell-type confectionery products and more particularly, even if non-exclusively, adapted to produce the aforementioned shell-type confectionery product of the invention.

In the normal way of manufacturing traditional shell type confectionery products, the shell is first produced by using the well-known techniques of either the "cold plunger" or the traditional "wet shell". After the shell is moulded by one of these two techniques, the filling is deposited to fill the shell while leaving a small edge protruding upwardly from the shell. Then, a flowable mass is deposited in the small cavity demarcated by the surface of the filling and the shell's edge to form the lid of the shell. Then, the confectionery product is allowed to cool and is demoulded. A major inconvenient of the methods of the prior art comes from the properties of flowability of the deposited confectionery product. In the case the filling has an homogeneous supporting structure for bearing the flowable material of the lid before
it solidifies such as for liquid or viscous deposited fillings, the cavity must be filled sufficiently with the filling to permit the lid to be supported by the filling before the material of the lid solidifies and creates an appropriate seals of the shell. However, it is very difficult to properly control accurately the thickness of the lid in these conditions. Very often the lids are uneven which leads to weight control's problems. For instance, in the case of caramel-like fillings, a strand of relatively hard caramel may stick up. The liquid confectionery deposited for the lid has a tendency to get into the crevices while leaving the strands sticking therethrough. As a result, the sweet is caused to deteriorate very rapidly. Generally for more liquid fillings such as liquors or syrups, the filled shell must be cooled to lower the viscosity of the liquid to such an extent that the filling creates a sufficient support for the lid to be poured thereon. Such a process necessitates specific cooling systems which occupy additional space floor and complicate the production line. Another possibility consists in using a relatively thick material which is later on thinned down by the addition of enzymes, in particular invertase as described in "Sugar Confectionery and Chocolate Manufacture" by R Lees and E B Jackson Leonard Hill 1973 page 217.

In the case the filling has a non-homogeneous structure during deposition within the cavity such as a filling formed from free-flowing solid or semi-solid pieces, as proposed in the present invention, the flowable confectionery material of the lid, when it is deposited, has a natural tendency to fill the free volume of the cavity formed between the free-flowing pieces before the shell can be fully closed. Therefore, the absence of free volume left inside of the confectionery due to the tendency of the deposited confectionery mass to flow by gravity inside the cavity to fill the gaps prevents the product to remain partially empty or totally empty and therefore causes the final product to become denser. It results in a relatively dense final filled shell type product which promotes a relatively fatty and thick mouthfeel.

Similarly, it would also not be possible to back off the confectionery shell with a relatively thin lid in case there is no filling at all poured within the cavity. As a consequence, it is also not possible to produce an empty shell-type confectionery product according to the known methods of the prior art.

Therefore, therefore it would be desirable to propose a practical and industrial method today which would permit to make a shell type confectionery product
partially filled but with a relatively thin and even lid by a simple and economical solution.

There are numerous patent documents among them are WO 95/35037; EP 566 927; WO 98/26668; EP 0 299 943, that teach how to mould a chocolate hollow product by filling a closable mould with a flowable melted mass of chocolate, then, applying a rotational motion to the mould around at least two distinct axis of rotation so that the melted chocolate is completely spread over the mould surface. However, these methods are not appropriate to produce confectionery products with a shell and a partly hollow centre. The spinning methods for forming hollow goods such as Eastern Eggs and rabbits or Santa Clauses and the like would not permit to keep edible solid pieces in a free flowing state after the rotational operations have been carried out. In particular, the filling would be mixed to the melted confectionery during the rotational motion of the moulds which would consequently lead to an undesirable result with inclusions embedded within the walls of the confectionery after setting of the confectionery.

Therefore the present invention primarily relates to a new method for producing shell type confectionery products including an edible free flowing mass therein, which comprises forming a plurality of open shells from a moulded confectionery material into a plurality of individual cavities; optionally depositing a metered amount of edible material into the shells; independently, forming a layer of confectionery material, applying said confectionery layer adjacent said plurality of filled cavities and in contact with the edges of the plurality of open shells and pressing sufficiently and further cooling to obtain the sealing onto the edges of the open shells and to form a plurality of lids for closing the plurality of cavities.

In a more preferable aspect of the method of the invention, the confectionery layer is formed by layering a substantially constant thickness of confectionery material onto a conveyor means having a receiving surface for the layer, cooling the layer until it reaches a sufficient degree of rigidity while constantly moving the conveyor means and placing the confectionery layer in a position parallel and adjacent the plurality of open shells and pressing onto the conveyor means by pressure means located opposite the receiving surface, cooling until the sealing has sufficiently solidified while maintaining the conveyor means adjacent the plurality of cavities; moving the conveyor means away from the plurality of cavities so as to obtain the
solidified confectionery layer stripped off from the receiving surface and securely sealed onto the plurality of shells.

In a first embodiment corresponding to the production of the shell-type confectionery of the invention, the depositing of the filling material into the open shells is made to partially fill the shell while leaving a certain free volume of gas therein after the lids have been formed thereon.

In one embodiment, the plurality of shells is formed according to the "cold plunger" technique. For that, the plurality of open shells are formed by charging each cavity with a predetermined amount of flowable confectionery mass, applying a cooling plunger to the confectionery mass in each cavity to cause it to flow and fill the space between the plunger and the cavity, allowing the confectionery mass to assume a temperature such that it forms a substantially self-supporting shell and withdrawing the plunger therefrom. The cooling plunger may be at a cooling temperature in the range of −25 to 10°C, and may be kept into contact of the confectionery mass from 1 to 20 seconds.

Yet another embodiment, the plurality of shells may be formed according to the "wet shell" technique. For that, the plurality of open shells are formed by charging each cavity with a predetermined amount of flowable confectionery mass, cooling to partially set the mass, turning over the cavities, shaking to leave the cavity with the open shells while eliminating by gravity the excess of confectionery, and then cooling to set the open shells. The wet shell technique is explained in more details in "Industrial Chocolate Manufacture And Use", Third Edition, Pages 276-277 edited by Steve Beckett, the disclosure of which is included by reference herein.

Preference is given to confectionery materials that contain fat, especially chocolate or chocolate-like materials. It is preferred that any chocolate mass charged to the cavities should be tempered to ensure that the cocoa butter constituent is seeded and that the chocolate sets in a stable condition with a good permanent colour and gloss. In some circumstances, non-tempering chocolate flavoured compounds may also be used.

The invention also relates to a novel confectionery-based product, more specifically obtained by the aforementioned method, comprising a moulded shell and a substantially planar closure base portion securely sealed onto the edges of the shell;
the sealed assembly formed by the shell and the closure base portion delimiting an inner cavity, wherein the inner cavity is partially occupied with a mass formed of edible discrete pieces and the inner cavity comprising a free gas volume left within the cavity including at least interstitial spaces formed within the mass of the pieces. 

Preferably, the ratio free volume to occupied volume within the cavity is comprised between 95:5 to 5:95, even preferably, 70:30 to 30:70.

Indeed, it has been surprisingly found that when biting in the sweet, the teeth more suddenly break through the shell which then collapses because of the presence of the free gas volume inside of the inner cavity. Then, the teeth meet the very different texture of the centre material, which because it is in the form of discrete particles or pieces, can easily and freely move around within the mouth. The pieces of the centre are capable to provide more rapidly and more actively their intrinsic properties within the mouth compared to traditional sweets in which the centre material is embedded in a fat and/or sugar matrix.

Preferably, the product is relatively small to provide this unique and reactive texture in mouth where both the shell and the centre material must be present, at least in sufficient proportion. For that, it is preferred that the product is substantially of one or a maximum of two bite-size. Therefore, the length of the confectionery product is preferably in a range of 5 to 150 mm, and more preferably in a range of 10 to 40 mm.

The advantages of such a novel confectionery product are multiple. It is possible to obtain a very unique effect when biting on the product compared to traditional filled shell-based confectionery products. A gain in volume impression and an improved attractiveness of the confectionery product are consequently obtained. The confectionery product appears also much lighter which advantageously enhances a unique effect in mouth. The solid or semi-solid pieces can be of various natures so conferring very different organoleptic combinations which is not possible to obtain with the traditional filled shell-type confectionery products.

In a more preferred aspect of the invention, the solid or semi-solid edible pieces are present in the cavity in a free flowing state. The pieces are those which are solid or semi-solid at room temperature. As "free flowing" state, it is meant that the pieces are in number and dimensions with respect to the cavity size such as to remain capable to flow or move within the sealed cavity. The presence of free-flowing pieces inside the
cavity participates to the lightness of the confectionery structure and it also confers a more attractive and surprising biting comparatively to confectionery structures with non-flowing filling. A playing purpose may also be obtained such as in relation to the possibility to produce sounds by shaking the confectionery product to obtain, for example, a sort of confectionery rattle.

Preferably, the edible pieces are selected from the group consisting of nut fragments, cereals, seeds, dehydrated fruits, popping candies, caramelised cocoa nibs, and small solid fat-based pieces and a combination thereof. It is thus possible to have a wide variety of edible crunchy solid or semi-solid materials which are not found in free-flowing state in conventional filled confectionery but which are generally mixed in a fat-based, sugar-based or ice-cream-based matrix. It has been surprisingly found that when there are in a free flowing state within a shell structure, their intrinsic features, such as crispiness, flavour, bitterness, fizzy effect and/or acidity, are much more enhanced as compared to when they are embedded in a fat and/or sugar confectionery matrix. The shell structure has also a protective role to preserve intact their intrinsic features until consumption. In particular, the shell may protect the edible pieces from rancidity or from moisturising.

The invention is particularly advantageous with fillings which require to be kept in a relatively dry atmosphere and which would loose at least partly their intrinsic properties if in too much contact or embedded in a wetting matrix. That is typically the case with popping candies for the filling. When popping candies are used for the free flowing pieces, the advantages are due to the preservation in a drier atmosphere which results in a more reactive effect of the candies at the time the confectionery is consumed and wetted by the saliva. Popping candies are known as discrete carbonated sugar pieces comprising sugar and a high gas content therein. The gas is capable to release when the sugar dissolves in the mouth giving a surprising popping sensation in the head. The size of the gas bubbles generally gives the "pop" ratings of the candies. Large bubbles generally break with more or greater force and emit a louder sound. Gasified candy is often sold as a product 'per se' and in recent years this product has become particularly popular with the younger members of the public.

For producing these candies, a sugar melt is gasified at superatmospheric pressure and the gasified sugar melt is cooled below its fusion temperature under superatmospheric pressure to form a gasified candy. The gas is preferably carbon

Other edible solid pieces can serve as filling such as caramelised cocoa nibs which are known to be fragments of cocoa beans coated with sugar and caramelised according to the process described in EP-A-0795 273 which content is included herewith by reference. In the closed and partly free gas environment of the invention, the caramelised cocoa nibs preserve their crispy texture intact for a longer time. The combination of a chocolate or chocolate-like shell and caramelised cocoa nibs in a free flowing state inside the shell contributes to a global texture of confectionery that has never been met before and that is very unique. When biting on the product, the consumer first has the clear sensation of chocolate breaking and collapsing then, he can feel the immediate and direct contact with the caramelised cocoa nibs in the mouth.

A wide variety of slightly different textures but all surprising and novel 'per se' may be obtained depending upon the choice of the edible solid or semi-solid pieces.

It should be mentioned that when we refer herein to edible free flowing pieces, we mean edible discrete pieces of solid food material of small size; i.e., at least lower than the cavity size of the confectionery shell, which have the ability to be deposited or to flow off, preferably in a solid state, into the cavity while leaving free interstitial spaces within the mass and between the mass and the cavity walls. In a preferred mode, the pieces occupy between 10 to 90% of the cavity volume, preferably in the range of 20 to 85, even more preferably in the range of 30 to 70%; the rest being free gas of the cavity such as air or an inert gas. In order to enhance the lightness and the brittle effect with the sensation of discrete pieces inside when biting in the product, it is important the shell is a relatively thin. In particular, it is preferred that the thickness of the shell does not exceed 3 mm. Preferably, the shell thickness should be in the range of 0.7 to 2.5 mm.

In a preferred aspect of the invention, the confectionery material for the shell is a mouldable fat-based confectionery material, especially chocolate. Chocolate is preferred as it is perfectly suitable for making thin shells and it gives a good resistance to biting with a good snap which has been widely accepted by the public. Chocolate also creates a natural moisture barrier that helps to preserve the free flowing materials
in dry conditions. "Chocolate" is meant to be not only pure chocolate, made from cocoa, but also chocolate-like products and chocolate substitutes. Chocolate is essentially non-fat solids, including cocoa solids, suspended in fat. Chocolate can be milk chocolate such as buttermilk chocolate or skim milk chocolate, or white chocolate, or dark chocolate. Chocolate-like products can be non-standardised chocolates which have a composition which fall outside the specified ranges of commonly standardised chocolates. Chocolates are classified as "non-standardised" chocolates when a specified ingredient is replaced, either partially or completely, such as when the cocoa butter is replaced with vegetable oils or fats. Substitutes to cocoa butter are known as cocoa butter equivalents (CBEs) or lauric or non-lauric cocoa butter replacers (CBRs).

In an alternative, the method of the invention may also provides significant advantages for producing traditional shell-type confectionery products in which the filling material during the filling stage into the open shell is made approximately up the top of the open shells so as to entirely fill the confectionery product after the lids have been formed thereon. As already aforementioned, a better weight control of the confectionery product is advantageously obtained as the thickness of the lid is more accurately controlled. In the case of caramel-like filling or similar, the problem of sticking-up strand is resolved because of the pressure applied down on the filling during the application of the confectionery layer when backing off which consequently flattens the strands which no longer can stand through the lid. Consequently, the quality and shelf life of the traditional fully filled shell-type confectionery products of any size are dramatically improved thanks to this novel process.

The method of the invention might also be very useful as an alternative to the book moulding of empty confectionery products which would be very slow and costly when small-size hollow confectionery products are concerned. As small size confectionery product, it is meant confectionery of one or two bites. Therefore, in a possible alternative, the open shells are left entirely free before applying the layer of confectionery material so as to finally form an empty confectionery-based product with an even moulded lid thereon.

The shell formed during the different moulding stages may encompass a wide range of thicknesses depending upon the biting effect desired.
The invention also encompasses varied possibilities of decorating the confectionery product. For instance, the receiving surface of the conveyor means may advantageously comprise graphic patterns, letters and/or characters embossed thereon to form by moulding a corresponding imprint onto the outer surface of the confectionery layer, after the layer has been stripped off.

In a similar manner, the receiving surface of the conveyor means may be charged before the confectionery layer is layered with a decorative and/or coloured transfer such as a decalcomania or a cocoa butter transfer. In that case, the confectionery product is decorated by the heat produced during the layering of the confectionery material onto the receiving surface of the conveyor means.

The novel method as proposed herein also promotes a better weight control of the confectionery material of the shell. In particular, the thickness of the confectionery lid when applied onto the open shell can be more accurately controlled compared to the well-known depositing technique. It also can provide with a large variety of decorations and holes throughout the lid of the confectionery.

The invention is explained in more detail hereinbelow with reference to exemplary embodiments represented in the enclosed drawings, in which:

Fig. 1 shows a schematic representation in perspective of novel confectionery product of the invention;

Fig. 2 shows a perspective cross section view of the confectionery product of Fig. 1;

Fig. 3 to 7 show an embodiment for the method of manufacturing the confectionery product of the invention;

Fig. 8 illustrates a detail of the layering operation according to a particular embodiment of the invention;

Fig. 9 shows a perspective view of a confectionery product produced to the variant of Fig. 8.

Fig. 1 and 2 show a confectionery product 1 of the invention having a shell portion 10 and a planar portion forming a lid 11 which is securely sealed to the edges of the shell portion 10. The sealing arrangement of the shell and planar portion of lid demarcates an inner cavity 2. The cavity is partially occupied by a mass of edible
discrete solid or semi-solid pieces 3 randomly placed within the cavity. A free gas volume is left inside the cavity which corresponds to the total volume of the cavity minus the volume occupied by the mass 3. The lid 11 may from the upper part of the confectionery product as it is shown or it may form the bottom of the product in case the confectionery product needs to be presented in an upside down position for commercial or any other suitable reasons. The lid can receive a coloured or embossed decoration 12 apparent on its top surface. The method for decorating the lid will be described later in the present description.

In the context of the preferred embodiment of a shell-type chocolate, the product size is preferably of a bite size which has a length in the range of 5 to 40 mm. The product may have a circular, a lentil, a square or a rectangular projected surface. In case of a circular projected surface, the length is considered as the diameter of the projected surface. If a lentil surface, the length is measured across the major axis of the centre. In case of a rectangular surface, the length represents the longer side of the shape.

The wall thickness may vary from 0.5 to 5.0 mm, preferably between 0.7 to 2.5 mm. The ratio free volume: occupied volume is preferably comprised between 95:5 to 5:95, more preferably between 80:20 and 20:80. A sufficient free gas volume is appropriate to enhance the lightness of the confectionery but also to increase the unique perception conferred by the free flowing pieces inside.

The free flowing material contained within the cavity may be chosen among a wide variety of edible materials and within a large range of crispiness, acidity, bitterness and/or flavour. The free flowing material may be selected among the group consisting of nuts, cereals, seeds, dehydrated fruits, candies, caramelised cocoa nibs, and small solid fat-based pieces and a combination thereof. Dehydrated fruits may be, for example, small pieces of fruits such as cinnamon flavoured apple or orange chips, raspberry pieces or sherbet. Seeds can be sunflower seeds or other edible seeds. Candies may be popping candies. Small solid pieces may also be chocolate chips or nuggets. In general, a good biting perception is obtain when the size of the edible pieces may vary from 30 micrometer to 10 mm, more preferably 0.5 to 3 mm.

The shell and lid of the confectionery material is preferably formed of a moulded chocolate or chocolate-like material such as a tempered or non-tempered
dark, white or milk chocolate or compound coating. The composition of the lid may be different from the one of the shell. For instance, the lid may be a white chocolate while the shell is milk chocolate.

Referring to fig. 3 to 5, there is provided for practising the method of manufacturing the novel confectionery products of the invention, a series of multi-cavity moulds 4 which are mounted along a horizontal conveyor chain (not shown). A plurality of cavities are provided in each mould which may have the shape of hemispherical recesses or any other suitable concave ornamental shape. Each cavity is then charged with a metered amount of tempered chocolate mass 50 in a melted state (fig. 4). The temperature of the chocolate is deposited by depositing means 41 known in the art, at a temperature of about 30-35 °C. Then a series of cooled moulding plungers 60 is inserted in the cavities to mould the chocolate mass into a shell 10. Each plunger 60 is so shaped and dimensioned that it causes the chocolate mass 50 to rise in the cavity to the top of the cavity, the chocolate mass thus filling the space between the outside surface of the plunger 60 and the inside surface of the cavity 40. The plunger may be a supercooled plunger, for example of the type described in EP-A-589820, and should remain in contact with the chocolate mass for a time sufficient to cool the chocolate mass to a temperature at which it is self-supporting. Thus, for example, the formed chocolate shell 10 may be cooled to a temperature of the order of 10 °C to 20 °C, by contact with the plunger (at a temperature of less than or equal to 10°C) for from 1 to 15 seconds. The moulding plunger is then lifted clear of the chocolate shell 10 and the multi-cavity mould continues its horizontal motion along the moulding line. Additional details of the "cold plunger" moulding is given in "Industrial Chocolate Manufacture And Use", Chapter 22 of 3rd Edition from S. Beckett, Pages 423-425, the content of which is herein included by reference.

On the next stage illustrated in Fig. 6, the open chocolate shells are partially filled by gravity deposition with metered amounts of edible solid or substantially solid pieces. The deposition can be carried out in a vibrating hopper or any similar depositing means. Depositing is preferably done while the internal surfaces of the shell have sufficiently solidified to prevent a significant amount of pieces from being embedded or mixed to the chocolate mass. The pieces may partially fill the cavity to the top with interstitial spaces, or alternatively, the pieces may only fill the cavity at a level below the top of the cavity so as to leave more free space for the pieces to freely
flow within the cavity in the final product. Due to the non-homogeneous structure of the edible pieces which forms a sort of mass or independent discrete pieces within the cavity, as opposed to an homogeneous liquid or viscous mass, even if the cavity is filled to the top, the pieces may not provide with an upper surface effective to support a liquid confectionery mass which would be poured onto these pieces. Depending on the average granulometry of the pieces, the liquid confectionery mass would generally pass through the interstitial spaces between each adjacent pieces and/or between pieces and the wall of the cavity which would finally result in a partial or complete filling of the cavity of pieces embedded in confectionery matrix. Therefore, there is a need to propose a new way of closing the shell on a continuous and efficient manner in the production line which allows maintaining a certain gas volume within the cavity. It must be noted that although the method of the invention is particularly suited for locking in discrete pieces of edible materials, it could also be applied to liquids or viscous materials as well in the case, a certain amount of gas needs to be reserved in the cavity. Therefore, the method of the invention might find a broader application to produce shell-type confectionery products partly filled with a filling of various nature including liquids, pastes, solids, etc., even with no filling at all so as to form empty shell-type confectionery items.

Fig. 7 shows the production line after the shells have been produced and partially filled according to the aforementioned method. Whereas the prior moulding operations require intermittent motion of the multi-cavity mould, at this stage, the multi-cavity moulds are conveyed in a continuous motion in the horizontal direction of the arrow A, for example, by means of a chain assembly. According to an important aspect of the invention, the closure of the open shells is operated by passing over the shells while pressing a continuous substantially self-supporting chocolate layer.

For that, a conveyor band 7 is provided which is fed uniformly and, preferably continuously, with a chocolate or chocolate-like fat containing confectionery layer 8 which is brought in a melted state at the time it is spreaded onto the conveyor band. There may be various ways for evenly spreading a chocolate layer on a moving band. The one illustrated in Fig. 7 uses a chocolate layering box in which the chocolate is brought to its melting temperature and which comprises a thickness gauge at its outlet to uniformly feed the band in the desired thickness. Another possible way consists in
having a chocolate mass deposited by a chocolate curtain which is then evenly flattened to the right thickness through gauge means such as a rolling drum or any suitable equivalent.

Following the layering of the chocolate layer, the layer is allowed to cool sufficiently in order to rigidify and it becomes self-supporting for the next stage. Specific cooling means may be added to the line in case the line needs to fit with a limited spacing floor. When the layer has reached a sufficiently solidified stage, the band may continue to be driven in an inverted direction so the layer is turned in downward direction of the open shells. For that, the band passes a rolling means which makes the band to turn upside down so that it receiving surfaces substantially project downwardly. It is important to note that the visco-plasticity of the chocolate layer must be controlled very precisely so that the layer can withstand the deformation during the change of direction along the roller 70 while gaining sufficient rigidity to keep its own shape when the band is run in the inverted direction at the end of the roller. Further guiding means such as a roller 71 can be provided along the line to properly position the band supporting the layer 8 above the multi-cavity moulds 4. The sealing of the open shells is carried out by approaching the self-supporting chocolate layer to a position adjacent the edges of the shells and by pressing the layer sufficiently by a pressing means such as another larger pressure gauged roller 72. The velocity of the conveyor band should be equal to the velocity at which the moulds are continuously driven so as to prevent the confectionery layer from stretching. For instance, the mould can be transported at an average rate of 20-30 moulds per minutes. If necessary, the edges of the shells will be previously heat treated to promote the sealing with the upper layer. For instance, infra red lights can be disposed above the multi-cavity moulds before the moulds are passed along the sealing station so as to soften the edges sufficiently. In an alternative, the layer itself can also be heat treated in surface.

The sealing of the edges of the shells results in the formation of a plurality of lids 11 circumferentially closing each individual shell. As shown in fig. 3, each cavity mould 4 is preferably provided with special cutting edges 43 around the rim of the impression so as to promote the release of each individual filled product with no significant chocolate burr after removal from the mould. Holding grooves 44 located around the edges 43 are also provided to receive the excess of chocolate. After the
sealing, the conveyor band is maintained parallel along the moulds to keep the lid in contact therewith until the closure joints have completely set. The setting of the confectionery and its closure joints can be advantageously expedited by passing the moulds and the conveyor band under a cooling tunnel 9, which directs a cooling gas or brine toward the moulds such as nitrogen, or any other suitable cooling means. Then, the conveyor band is moved away from the moulds in an upward direction A by means of an another roller 73 which causes the band to change from direction and consequently the lids to release from the band. A scraper 74 may be positioned further up in close contact with the band to remove the chocolate cuttings which would have stucked onto the band's receiving surface 75. The cuttings may be received in a recycling container 79. In order to favour the release of the chocolate from the receiving surface of the band, the surface may preferably be made of a material having non-stick and heat resistant properties such as silicon or Teflon. A release agent may also be sprayed on the receiving surface before layering of the chocolate.

Further cooling means can be installed, if necessary, after the moulds have left the line to complete the setting of the confectionery products. Then, the confectionery products are removed from the moulds.

It will be appreciated that many modifications are possible within the general scope of the invention. In particular, the lid of the confectionery product can be decorated by colouring patterns or by embossing its surface by moulding transfer. For that, the conveyor means may comprise graphic patterns, letters and/or characters embossed thereon to form by moulding a corresponding imprint onto the outer surface of the confectionery layer after it has been stripped off. The receiving surface of the conveyor means may also be charged before the confectionery layer is layered with a heat sensitive decorative and/or dye transfer such as a decal or a cocoa butter transfer.

Fig. 8 shows a detail of the layering station with the conveyor band having a plurality of small protruding portions or embossing 76. The band structured as such passes under the layering box to receive a confectionery layer according to a predetermined thickness which may be slightly less than the height of the embossing so as to leave the upper surfaces of the embossing apparent after layering. The further production stages are the same as previously described. Fig. 9 shows the results on the structure of the lid with the formation of holes 13 through the lids of the confectionery product.
Importantly, it may be noted that in a possible alternative, the layer of confectionery layered onto the conveyor band may also be formed of discontinuous portions so that the portions may be deposited in spaced apart relationship corresponding to the lost distance between each cavities of the mould. Therefore, the discontinuity of the layer can be envisaged in the conveying direction and/or in a direction normal to the conveying direction.

In an alternative not illustrated, the confectionery shells may be produced according to the traditionally "wet shell" technique. For that, the plurality of open shells is formed by charging each cavity of the moulds with an amount of chocolate mass which preferably overflows in the cavity. The moulds are then turned over to remove the excess of chocolate. Oscillating and vibrating may be carried out till it leaves the cavity with a thin layer of chocolate. Cooling is conducted to complete the setting of the chocolate shells. Further details of the "wet shell" technique can be found in "Chocolate, Cocoa, and Confectionery – Minifie – Chapman & Hall published by Avi Publishing Co."; pages 201 to 202.

The present invention thus provides a novel shell type chocolate or chocolate-like fat containing confectionery product, which is lighter than the usual confectionery product of the same category and at the same time confers a very unique texture in mouth. The confectionery product also enhances the natural and intrinsic features of its centre. It may also be specially designed to be considered as real toys for the children to make funny sounds similar to a rattle. The invention permits to envisage the production of new confectionery assortments in wide range of size and shapes. The invention also provides a process for producing such novel product which is reliable, cheap, fast and hygienic and utilises relatively simple machinery.
Claims:

1. A method for producing confectionery moulded products which comprises:
   forming a plurality of open shells from a moulded confectionery material into a
   plurality of individual cavities; independently forming a layer of confectionery
   material; applying said confectionery layer adjacent said plurality of filled cavities
   and in contact with the edges of the plurality of open shells and pressing
   sufficiently and cooling to obtain the sealing onto the edges of the open shells and
   to form a plurality of lids for closing the plurality of cavities.

2. A method according to claim 1, wherein said the continuous confectionery layer
   is formed by layering a substantially constant thickness of confectionery material
   onto a conveyor means having a receiving surface for the layer, cooling the layer
   until it reaches a sufficient degree of rigidity while constantly moving the
   conveyor means and placing the confectionery layer in a position parallel and
   adjacent the plurality of open shells and pressing onto the conveyor means by
   pressure means located opposite the receiving surface, cooling until the sealing
   has sufficiently solidified while maintaining the conveyor means adjacent the
   plurality of cavities; moving the conveyor means away from the plurality of
   cavities so as to obtain the solidified confectionery layer stripped off from the
   receiving surface and securely sealed onto the plurality of shells.

3. A method according to claim 1 or 2, wherein after forming the moulded open shell
   and before applying the confectionery layer to form the lids of the confectionery
   products, it further comprises depositing a metered amount of edible material into
   the open shells.

4. A method according to claim 3, wherein the depositing of the filling material into
   the open shells is made partially while leaving a free volume of gas therein after
   the lids have been formed thereon; wherein the ratio free volume to occupied

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volume within the cavity is comprised between 95:5 to 5:95, preferably 70:30 to 30:70.

5. A method according to claim 1 or 4, wherein said continuous confectionery layer is applied adjacent said plurality of filled cavities while the layer is in a non-entirely solidifiable state effective and/or the edges of the plurality of open shells are in a non-entirely solidified state to promote adhesion at the interface between the confectionery layer and the edges of the plurality of open shells.

6. A method according to any of claims 1 to 5, wherein before the layer is applied onto the plurality of open shells, the edges of the open shells are reheated by heating means such as infra red heating means.

7. A method according to any of claims 1 to 6, wherein the plurality of open shells is formed by charging each cavity with a predetermined amount of flowable confectionery mass, applying a cooling plunger to the confectionery mass in each cavity to cause it to flow and fill the space between the plunger and the cavity, allowing the confectionery mass to assume a temperature such that it forms a substantially self-supporting shell and withdrawing the plunger therefrom.

8. A method according to any of claims 1 to 5, wherein the plurality of open shells is formed by charging each cavity with a predetermined amount of flowable confectionery mass, cooling to partially set the mass, turning over the cavities, shaking so as to leave the open shells onto the surface of the cavity while eliminating by gravity the excess of confectionery, and cooling to set the open shells.

9. A method according to any of claims 1 to 8, wherein the receiving surface of the conveyor means comprises graphic patterns, letters and/or characters embossed thereon to form by moulding a corresponding imprint onto the outer surface of the confectionery layer after layer has been stripped off.
10. A method according to any of claims 1 to 9 wherein the receiving surface of the conveyor means is charged before the confectionery layer is layered with a decorative and/or coloured transfer such as a decal or a cocoa butter transfer.

11. A method according to any of claims 1 to 10, wherein the confectionery material is a fat-based material, especially chocolate.

12. A method according to any of claims 3 or 11, wherein said edible material is selected from the group consisting of solid or semi-solid pieces, liquids, pastes and a combination thereof.

13. A method according to claim 12, wherein said edible material is selected from the group consisting of nut fragments, cereals, seeds, dehydrated fruits, popping candies, caramelised cocoa nibs, and small solid fat-based pieces and a combination thereof.

14. A method according to any of claims 1 to 13, wherein the shell have a length in the range of 4 to 150 mm.

15. A method according to claim 3, wherein the depositing of the filling material into the open shell is made approximately up the top of the open shells so as to entirely fill the confectionery product after the lids have been formed thereon.

16. A method according to any of claims 1 or 2, wherein the open shells are left entirely free before applying the layer of confectionery material so as to finally form an empty confectionery-based product.

17. A confectionery-based product comprising a moulded fat-based shell and a substantially planar fat-based closure base portion securely sealed onto the edges of the shell; the sealed assembly formed by the shell and the closure base portion delimiting an inner cavity, characterised in that the inner cavity is partially occupied with a mass formed of solid edible discrete pieces present in the cavity in a free flowing state and the inner cavity comprising a free gas volume left
within the cavity including at least interstitial spaces formed within the mass of the pieces; wherein ratio free volume/occupied volume within the cavity is preferably comprised between 95:5 and 5:95.

18. A confectionery-based product according to claim 17, wherein the ratio free volume to occupied volume is comprised between 70:30 to 30:70.

19. A confectionery-based product according to claim 17 or 18, wherein the length of the product is in a range of 5 to 150 mm, more preferably less than 40 mm.

20. A confectionery-based product according to claim 17 or 18, wherein the free flowing material is selected from the group consisting of nuts, cereals, seeds, dehydrated fruits, popping candies, caramelised cocoa nibs, and small solid fat-based pieces and a combination thereof.

21. A confectionery-based product according to any of claims 17 to 20, wherein the wall thickness of the confectionery shell is comprised between 0.5 and 5 mm.

22. A confectionery-based product according to any of claims 17 to 21, wherein the wall thickness of the confectionery shell is comprised between 0.7 and 2.5 mm.

23. A confectionery-based product according to any of claims 17 to 22, wherein the size of the discrete pieces is comprised in the range of 30 microns to 10 mm.
## INTERNATIONAL SEARCH REPORT

### A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols):

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

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

EPO-Internal, WPI Data, PAJ, FSTA

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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**Notes:**

- "A" document defining the general state of the art which is not considered to be of particular relevance.
- "E" earlier document but published on or after the international filing date.
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified).
- "O" document referring to an oral disclosure, use, exhibition or other means.
- "P" document published prior to the international filing date but later than the priority date claimed.
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention.
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone.
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "S" document member of the same patent family.

Date of the actual completion of the international search: 4 July 2001

Date of mailing of the international search report: 17/07/2001

Name and mailing address of the ISA:

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx: 31 651 epo nl, Fax: (+31-70) 340-3016

Authorized officer: Boddaert, P.
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