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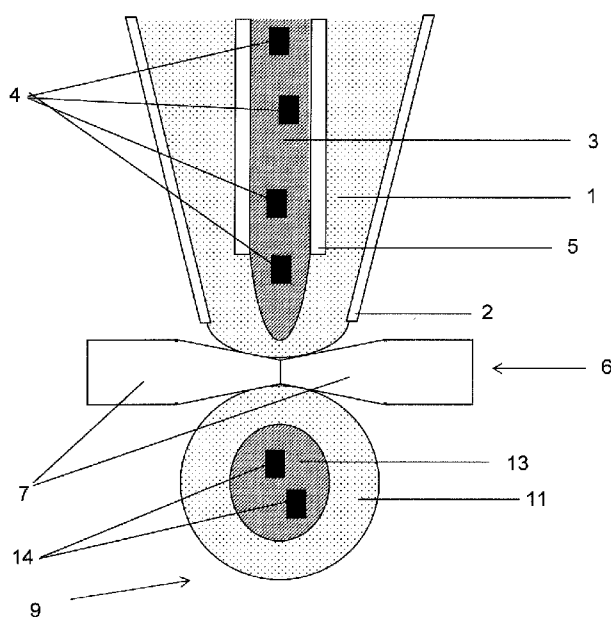
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(54) Title: PROCESS FOR PREPARING FROZEN CONFECTIONERY PRODUCTS

Figure 1



(57) Abstract: A process for producing frozen confectionery products is provided, the process comprising: supplying a first frozen confection (1) to a nozzle (2); dispensing a filling comprising sauce (3) and/or inclusions (4) into the first frozen confection (1) inside the nozzle (2); co-extruding the first frozen confection (1) and filling (3, 4) from the nozzle (2); cutting the co-extruded first frozen confection (1) and filling (3, 4) with an iris cutter (6) to form a portion (9) of the first frozen confection (11) in which the filling (13, 14) is encapsulated; dispensing a small amount of a second frozen confection (21) into an edible receptacle (20); and then dispensing the portion (9) into the edible receptacle (20) on top of the second frozen confection (21).



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- with international search report (*Art. 21(3)*)
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Description**Process for Preparing Frozen Confectionery Products****Technical Field of the Invention**

[0001] The present invention relates to a process for producing frozen confectionery products, more particularly a process for incorporating fillings into cone products.

Background to the Invention

[0002] Ice cream cone products, such as Cornetto™ are popular and well-known. These products typically consist of a wafer cone filled with ice cream on top of which sauces or pieces of biscuit, nut or fruit are dispensed to provide an attractive appearance. Consumers are continually looking for new eating experiences, and conventional cone products may be perceived as somewhat old-fashioned and uninteresting. For example, they contain relatively small amounts of sauce, which is normally on top of the ice cream. There is a need to design ice cream products that give the consumer a more indulgent and interesting eating experience, for example having sauces and/or inclusions incorporated into the ice cream. However, it is difficult to incorporate significant amounts of materials with very different rheological properties into ice cream (e.g. sauces, cookie dough or inclusions) using current methods.

[0003] Cone products containing inclusions can be produced by a process wherein ice cream is dispensed into the cone from a nozzle; then the inclusions are added from a separate feeder, and then a further layer of ice cream is dispensed from the nozzle to cover the inclusions. However this process does not distribute the inclusions throughout the product. WO 88 / 02990 discloses a method of making a frozen confection in which ice cream is co-extruded with sauce into a cone thereby forming central column of the sauce which extends throughout the height of the product. However, only a narrow column (less than about 10 mm in diameter) can be produced in this way. Moreover, liquid fillings that have a high yield stress and viscosity or that contain large amounts of solid inclusions cannot be dosed in this way. Thus there remains a need for an improved method for producing frozen confection products which contain large amounts of sauce and / or inclusions.

Brief Description of the Invention

[0004] We have now developed a process which overcomes these problems.

Accordingly, in a first aspect, the present invention provides a process for producing frozen confectionery products, the process comprising:

1. supplying a first frozen confection to a nozzle;
2. dispensing a filling into the first frozen confection inside the nozzle;
3. co-extruding the first frozen confection and filling from the nozzle;
4. cutting the co-extruded first frozen confection and filling with an iris cutter to form a portion of the first frozen confection in which the filling is encapsulated;
5. dispensing a small amount of a second frozen confection into an edible receptacle; and then
6. dispensing the portion into the edible receptacle on top of the second frozen confection.

[0005] This process allows the production of frozen confection products which contain a filling such as a viscous, dense sauce which contains solid inclusions. The filling is encapsulated wholly within the frozen confection and placed into the receptacle in a single dosing step. Dispensing a small amount of a second frozen confection into the bottom of the cone ensures that the cone is completely filled.

[0006] Preferably the edible receptacle is a cone.

[0007] Preferably the first frozen confection has an overrun of from 20 to 200%.

[0008] Preferably the first frozen confection is ice cream.

[0009] Preferably, the second frozen confection is the same as the first frozen confection.

[0010] Preferably the first frozen confection has inclusions mixed into it before it is supplied to the nozzle.

[0011] Preferably the filling constitutes from 20 to 70% of the total weight of frozen confection and filling.

[0012] Preferably the filling comprises a liquid filling and / or solid inclusions, which are more preferably from 1 to 20mm in size.

[0013] In one embodiment the filling comprises a third frozen confection.

Detailed Description of the Invention

[0014] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art (e.g. in frozen confectionery manufacture). Definitions and descriptions of various terms and techniques used in frozen confectionery manufacture are found in Ice Cream, 6th Edition, R. T. Marshall, H. D. Goff and R. W. Hartel (2003), Kluwer Academic/Plenum Publishers. All percentages, unless otherwise stated, refer to the percentage by weight, with the exception of percentages cited in relation to the overrun.

[0015] The term “ frozen confection” means a sweet-tasting fabricated foodstuff in the frozen state (i.e. under conditions wherein the temperature of the foodstuff is less than 0°C, and preferably under conditions wherein the foodstuff comprises significant amounts of ice). Frozen confections include ice cream, water ice, sorbet, sherbet, frozen yoghurt and the like. Frozen confections may be aerated or unaerated. By unaerated is meant an overrun of less than 20%, preferably less than 10%. An unaerated frozen confection is not subjected to deliberate steps such as whipping to increase the gas content. Nonetheless, it will be appreciated that during the preparation of unaerated frozen confections, low levels of gas, such as air, may be incorporated in the product. Aerated frozen confections have an overrun of more than 20%, preferably more than 50%, more preferably more than 75%. Preferably the frozen confection has an overrun of less than 200%, more preferably less than 150%, most preferably less than 120%. Overrun is defined by the equation below and is measured at atmospheric pressure

$$\text{overrun \%} = \frac{\text{density of mix} - \text{density of frozen confection}}{\text{density of frozen confection}} \times 100$$

[0016] Frozen confections may be manufactured by any suitable process, typically by preparing a mix of ingredients; then pasteurising and optionally homogenising the mix; and then freezing and optionally aerating the mix to produce the frozen confection.

[0017] The filling may be any filling typically used in frozen confections. The filling may comprise a liquid or liquid-like filling and / or inclusions (i.e. solid

pieces of edible material) or a mixture of both. For example, the filling may be a sauce having solid inclusions suspended within it.

[0018] The edible receptacle is preferably a cone, such as a wafer cone or a chocolate cone. Most preferably the receptacle is a wafer cone which has a fat-based coating (such as chocolate or couverture) on its inside surface which forms a moisture barrier which stops migration of water from the frozen confection into the wafer, thereby preventing the wafer from becoming soggy on storage. Cones normally have a circular cross-section, but the receptacle could also be a cone-like receptacle having a polygonal cross-section, e.g. square, rectangular or triangular. Alternatively, the receptacle could be cup-like, or any other shape suitable for containing a frozen confection.

[0019] The present invention will now be further described with reference to the figures wherein:

Figure 1 is a cross-sectional view of a nozzle and cutter demonstrating the process of the invention.

Figure 2 is a top view of an iris cutter.

[0020] Figure 3 is shows a preferred process wherein a small amount of a frozen confection is first dispensed into the bottom of a cone

Figure 4 shows a cross-section through a finished product.

[0021] As shown in Figure 1, the first frozen confection 1 is supplied to the nozzle 2. The first frozen confection is preferably at a temperature of around -6 or -7°C when it is supplied to the nozzle. We have found that the first frozen confection needs to be sufficiently firm and elastic so that it can encapsulate the filling, but not so firm that it does not conform to the shape of the receptacle into which it is dispensed. The filling is dispensed into the first frozen confection 1 from a dispensing device 5 located inside nozzle 2. In the embodiment shown in Figure 1, the filling consists of a sauce 3 containing inclusions 4. The first frozen confection 1 and filling are co-extruded from the nozzle 2.

[0022] The dispensing device 5 may be a second nozzle supplied with a sauce by a pump. Preferably the sauce is dispensed into the frozen confection close to the nozzle outlet. This prevents the sauce from going to the edge of flow

(where the shear is highest) before the point at which it is extruded from the nozzle. This could otherwise occur since the sauce is normally significantly less viscous than the frozen confection. Solid inclusions can be dispensed by an auger, a pneumatically-driven piston, a differential inclusion feeder, a fruit feeder or simply a hopper which feeds the inclusions by gravity. A piston is preferred when the filling is one or a few large inclusions, since it is possible to synchronise the piston with the cutter, so that the number of inclusions dispensed into the each product can be controlled. When the filling is a large number of small inclusions, an auger or hopper is preferred. Typically a cavity is formed in the frozen confection immediately downstream of the dispensing device inside the nozzle. The flow rate of the frozen confection is set so that the volume of the cavity matches the volume of the inclusions which are dosed into it, thereby avoiding the presence of air gaps inside the product. A fruit feeder is preferred when the filling comprises a third frozen confection. This allows the inclusions to be combined with the third frozen confection which makes up part of the filling. Subsequently, the combined filling can be extruded along with the first frozen confection which forms the outer layer.

[0023] The extrudate is cut into portions by means of an iris cutter 6 positioned above the edible receptacle. Such iris cutters are described in US 4 251 201 and have been used when encapsulating fillings in various food products, such as dough, as described for example in US 4 734 024. Iris cutters have also been used for forming round items of frozen confectionery in US 2005 / 0233033. As shown in Figure 2, iris cutters have a number of moveable blades 7 which form an aperture 8 of variable size. The aperture can be opened and closed by sliding the blades. At least three blades are typically used to form the aperture (in the cross-sectional view of Figure 1 only 2 blades are visible). The greater the number of blades, the more closely circular is the aperture, so that preferably at least six blades are used. In profile the blades are typically tapered as shown in Figure 1. As the aperture closes the blades apply a force radially inwards. The blades also apply a tangential force because of their sliding movement and an axial force because of their tapered profile.

These forces help to separate the stream of filling before the first frozen confection is cut, to form a portion 9 in which the filling (i.e. sauce 13 and inclusions 14) is encapsulated within the first frozen confection 11. The frozen confection and filling are preferably extruded continuously, so that multiple portions are formed by repeatedly cutting the extruded stream with the iris cutter. The cutter preferably moves downwards at the same velocity as the extruded frozen confection during the cutting step in order to prevent the frozen confection from piling up on top of the cutter and therefore becoming misshapen. Once cutting has been completed, the iris cutter is opened and then moved back up to its original position, ready to cut the next piece of frozen confection.

[0024] As shown in Figure 3, a small amount of a second frozen confection 21 is dispensed into the bottom of the edible cone before the portion 9 is dispensed into it. This may take place before, simultaneously with or after the co-extruded first frozen confection and filling is cut by the iris cutter. In a preferred process, the second frozen confection is dispensed into the cone at one station in a production line, and then moved to the next station where the portion 9 is dispensed. The second frozen confection 21 is preferably the same (in terms of composition and overrun) as the first frozen confection 11, but it may also be a different frozen confection (e.g. a different flavour). Dispensing a small amount of a second frozen confection into the bottom of the cone ensures that the cone is completely filled, whereas otherwise the taper of the cone could prevent the portion 9 from reaching the bottom, thereby leaving an air gap. The portion 9 is approximately spherical after it has been cut, but because it is not completely solid, it relaxes to some extent and fills the cone above the frozen confection 21 in the bottom of the cone. Figure 4 shows a cross-section through a finished product, which has some further sauce and inclusions on top of the frozen confection 11 and also a small plug of chocolate at the very bottom of the cone, resulting from coating the inside of the cone 20 with chocolate to form a moisture barrier.

[0025] The relative amounts of frozen confection and filling are controlled by adjusting the flow rate of the first frozen confection and the flow rate of

liquid fillings and / or the dose rate of solid fillings. Preferably the filling constitutes at least 20%, more preferably at least 30% or 40%, most preferably at least 50% of the total weight of frozen confection and filling. Preferably the filling constitutes at most 70%, more preferably at most 60% of the total weight of frozen confection and filling.

- [0026] Suitable liquid fillings include fat-based compositions such as chocolate or couverture (i.e. a chocolate analogue containing a fat other than cocoa butter), fruit purees / sauces, creams, liquid-like cookie dough, biscuit pastes, honey, syrups, caramel, toffee, nougat or fudge sauces and the like. The filling may be in the form of a fondant or a paste. The filling may be aerated, for example a fruit or chocolate mousse. The invention allows highly viscous liquid fillings to be dosed. Moreover, the higher the viscosity of the filling, the larger the amount of filling which can be encapsulated. Preferably liquid fillings have a viscosity of at least 100 mPas, more preferably at least 500mPas, most preferably at least 1000 mPas (measured using a TA Instruments, AR 2000 rheometer with a concentric cylinder system at room temperature and a shear rate of 10 s^{-1}).
- [0027] In one embodiment, the filling comprises a third frozen confection, such as ice cream. The third frozen confection may be the same as the first frozen confection, or it may differ in some way (such as in formulation, texture, flavour or colouring) from the first frozen confection. The third frozen confection may be used in addition to another liquid and / or solid filling. For example, the filling may consist of 30% sauce, 30% inclusions and 40% ice cream. Having a third frozen confection as part of the filling, especially where the filling constitutes a large part of the whole product, has the advantage that the inclusions and / or sauce can be embedded in the third frozen confection, as opposed to being concentrated in a central core. In one embodiment, the third frozen confection is the same as the first frozen confection, which allows other fillings, especially liquid fillings to be mixed into the frozen confection in a large part of the product, whilst still being fully encapsulated.
- [0028] Solid fillings are discrete pieces of an edible material (" inclusions"), such as chocolate, fruit (which may be e.g. fresh, dried, frozen or sugar-

infused), nut, biscuit, cake, cookie, toffee, fudge, nougat, marshmallow and the like. Preferably several small inclusions are dispensed into each product. A mixture of different types of inclusions may be used. Typically the inclusions are from 1 to 20mm in size, preferably 2 to 10mm, more preferably about 5 to 8mm. In one embodiment, a single large inclusion (e.g. having a diameter of at least 5mm, more preferably at least 10mm, most preferably at least 20mm) is dispensed into each product.

[0029] In a preferred embodiment, the filling comprises a liquid filling in which solid inclusions are suspended.

[0030] The first frozen confection itself may also contain inclusions mixed into it (i.e. in addition to inclusions that are in the filling). Where this is the case, the inclusions in the first frozen confection are preferably from 1mm to 5mm in size, more preferably from 3 to 4mm. The amount of inclusions is preferably at least 2% by weight of the combined amount of these inclusions and the first frozen confection, more preferably at least 5 wt%. Preferably the amount of inclusions is less than 20 wt%, more preferably less than 10 wt%. The first frozen confection may also comprise additional frozen confections or sauces etc.. For example, the first frozen confection may be given a striped appearance by introducing another frozen confection or sauce of a different colour into it upstream of the nozzle 2. Adding inclusions or stripes into the first frozen confection provides further interest for the consumer.

[0031] In one embodiment, the nozzle contains more than one dispensing device, so that two (or more) separate fillings can be encapsulated within the first frozen confection.

[0032] The frozen confectionery products that are produced by the process of the invention are typically single serving products e.g. 50-500mL, preferably 70-200mL in size.

[0033] The various features of the embodiments of the present invention referred to in individual sections above apply, as appropriate, to other sections *mutatis mutandis*. Consequently features specified in one section may be combined with features specified in other sections as appropriate.

Claims

1. A process for producing frozen confectionery products, the process comprising:
 - a) supplying a first frozen confection to a nozzle;
 - b) dispensing a filling comprising into the first frozen confection inside the nozzle;
 - c) co-extruding the first frozen confection and filling from the nozzle;
 - d) cutting the co-extruded first frozen confection and filling with an iris cutter to form a portion of the first frozen confection in which the filling is encapsulated; and
 - e) dispensing a small amount of a second frozen confection into an edible receptacle; and then
 - f) dispensing the portion into the edible receptacle on top of the second frozen confection.
2. A process according to claim 1 wherein the receptacle is a cone.
3. A process according to any of claim 1 or claim 2 wherein the first frozen confection has an overrun of from 20 to 200%.
4. A process according to any of claims 1 to 3 wherein the first frozen confection is ice cream.
5. A process according to any of claims 1 to 4 wherein the second frozen confection is the same as the first frozen confection.
6. A process according to any of claims 1 to 5 wherein the first frozen confection has inclusions mixed into it before it is supplied to the nozzle.
7. A process according to any of claims 1 to 6 wherein the filling constitutes from 20 to 70% of the total weight of frozen confection and filling.
8. A process according to any of claims 1 to 7 wherein the filling comprises a liquid filling and / or solid inclusions.
9. A process according to claim 8 wherein the filling comprises inclusions which are from 1 to 20mm in size.
10. A process according to any of claims 1 to 9 wherein the filling comprises a third frozen confection.

Figure 1

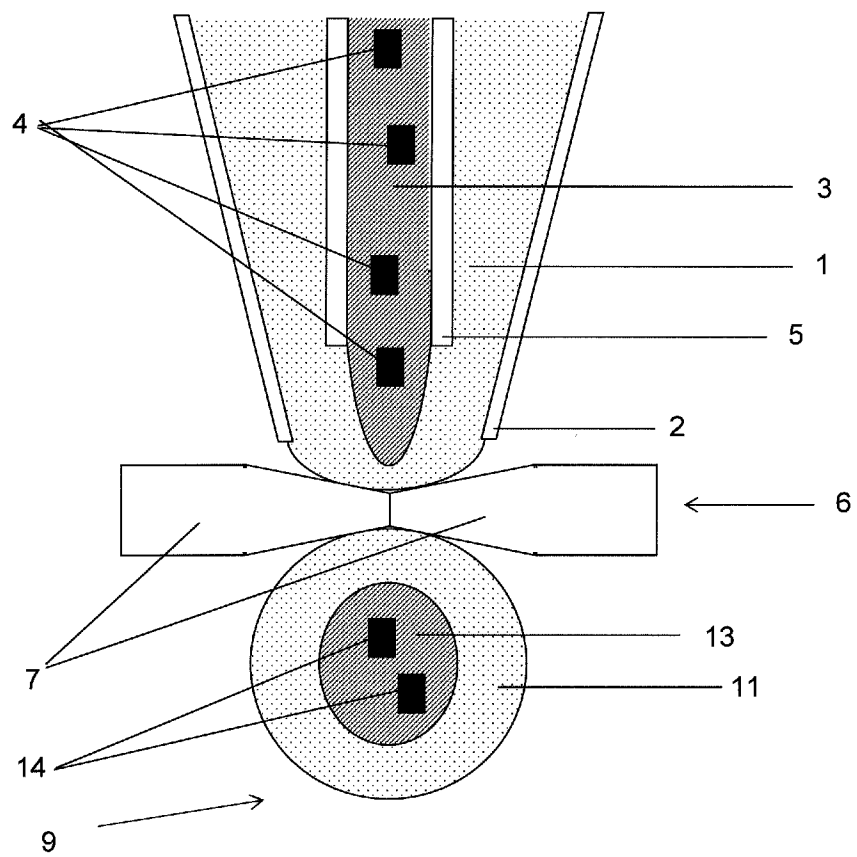
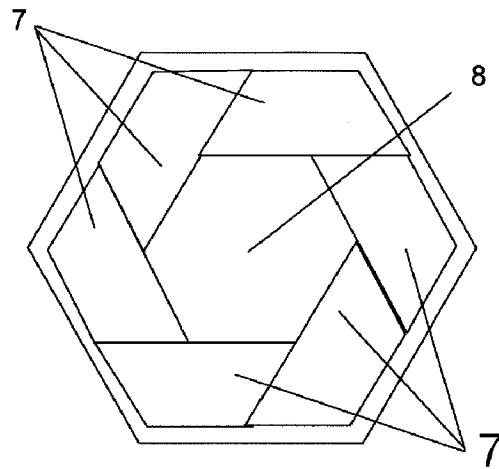


Figure 2



5 Figure 3

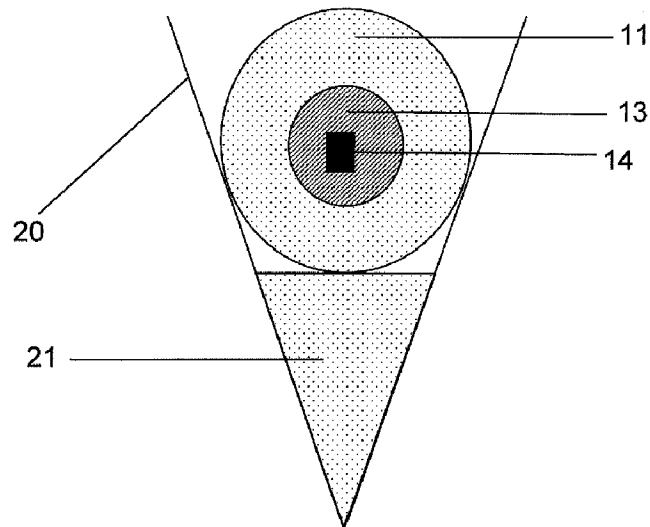
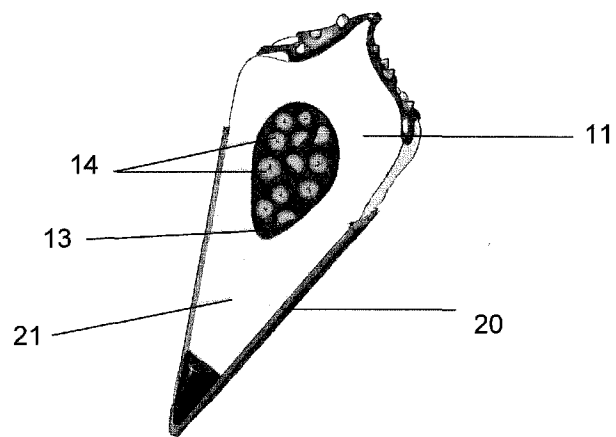


Figure 4



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. A23G9/48 A23G9/24 A23G9/28
ADD.

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)
A23G

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)

EP0-Internal, WPI Data, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 0 277 408 A2 (APV GLACIER INC [US]) 10 August 1988 (1988-08-10) columns 2,3; claims; figures 1-7 ----- -/--	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

5 April 2012

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/072660

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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