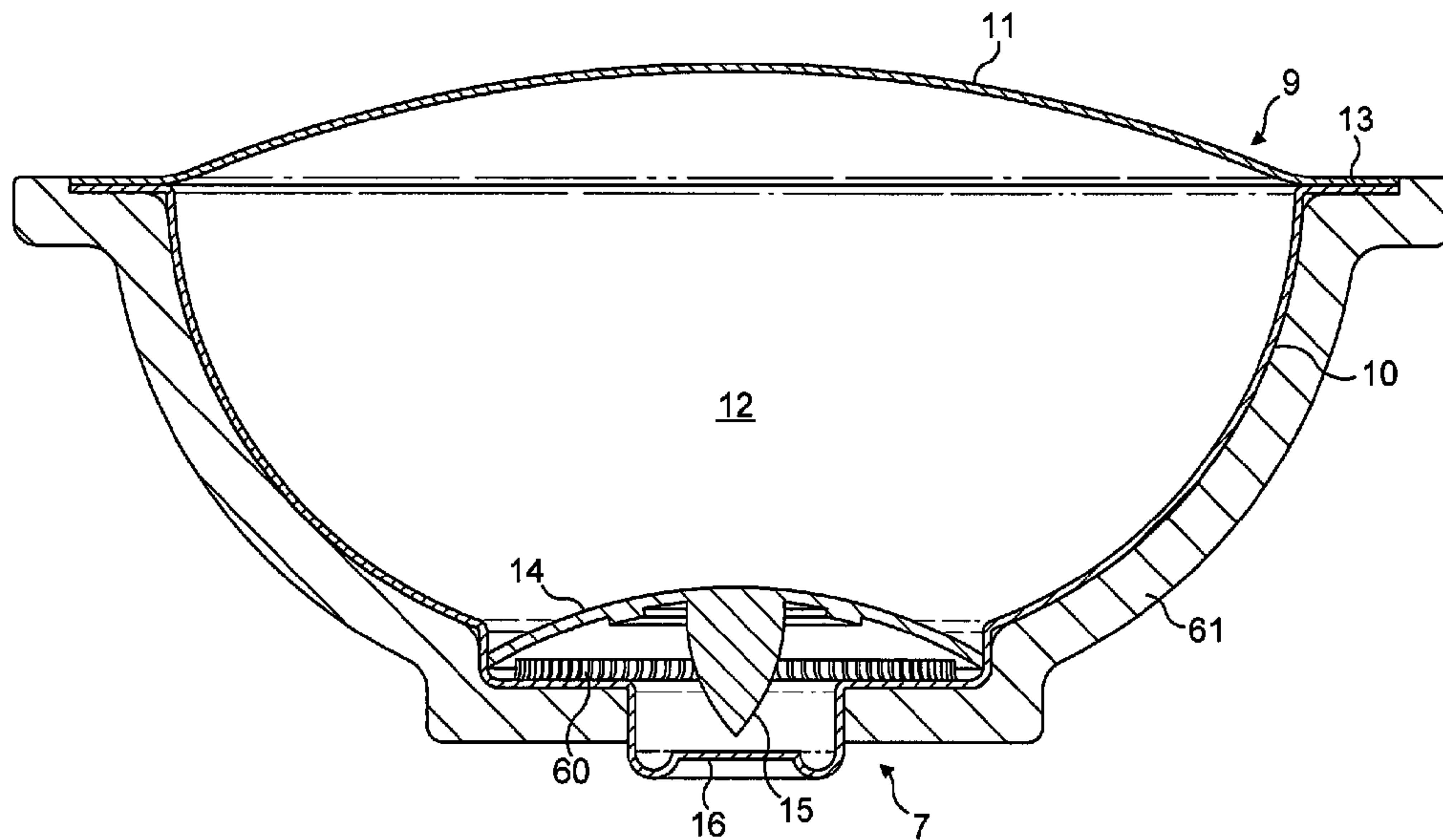




(86) **Date de dépôt PCT/PCT Filing Date:** 2009/01/26
 (87) **Date publication PCT/PCT Publication Date:** 2009/08/27
 (45) **Date de délivrance/Issue Date:** 2016/07/12
 (85) **Entrée phase nationale/National Entry:** 2010/07/08
 (86) **N° demande PCT/PCT Application No.:** EP 2009/050840
 (87) **N° publication PCT/PCT Publication No.:** 2009/103592
 (30) **Priorité/Priority:** 2008/02/19 (EP08151623.9)

(51) **Cl.Int./Int.Cl. A23C 9/00** (2006.01),
A23G 1/56 (2006.01), **A23L 2/39** (2006.01),
B65D 85/816 (2006.01)
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 (54) **Title: CULINARY CAPSULE**



(57) **Abrégé/Abstract:**

Described is a capsule comprising a plurality of compacted food articles comprising a dehydrated food powder mixed in a fat-based binding system. A method for the production of the capsule is further described.



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
27 August 2009 (27.08.2009)(10) International Publication Number
WO 2009/103592 A1

(51) International Patent Classification:

A23C 9/00 (2006.01) A23L 2/39 (2006.01)
 A23L 1/00 (2006.01) B65D 85/816 (2006.01)
 A23L 1/2165 (2006.01) A23G 1/56 (2006.01)
 A23L 1/40 (2006.01)

(21) International Application Number:

PCT/EP2009/050840

(22) International Filing Date:

26 January 2009 (26.01.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

08151623.9 19 February 2008 (19.02.2008) EP

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

(54) Title: CULINARY CAPSULE

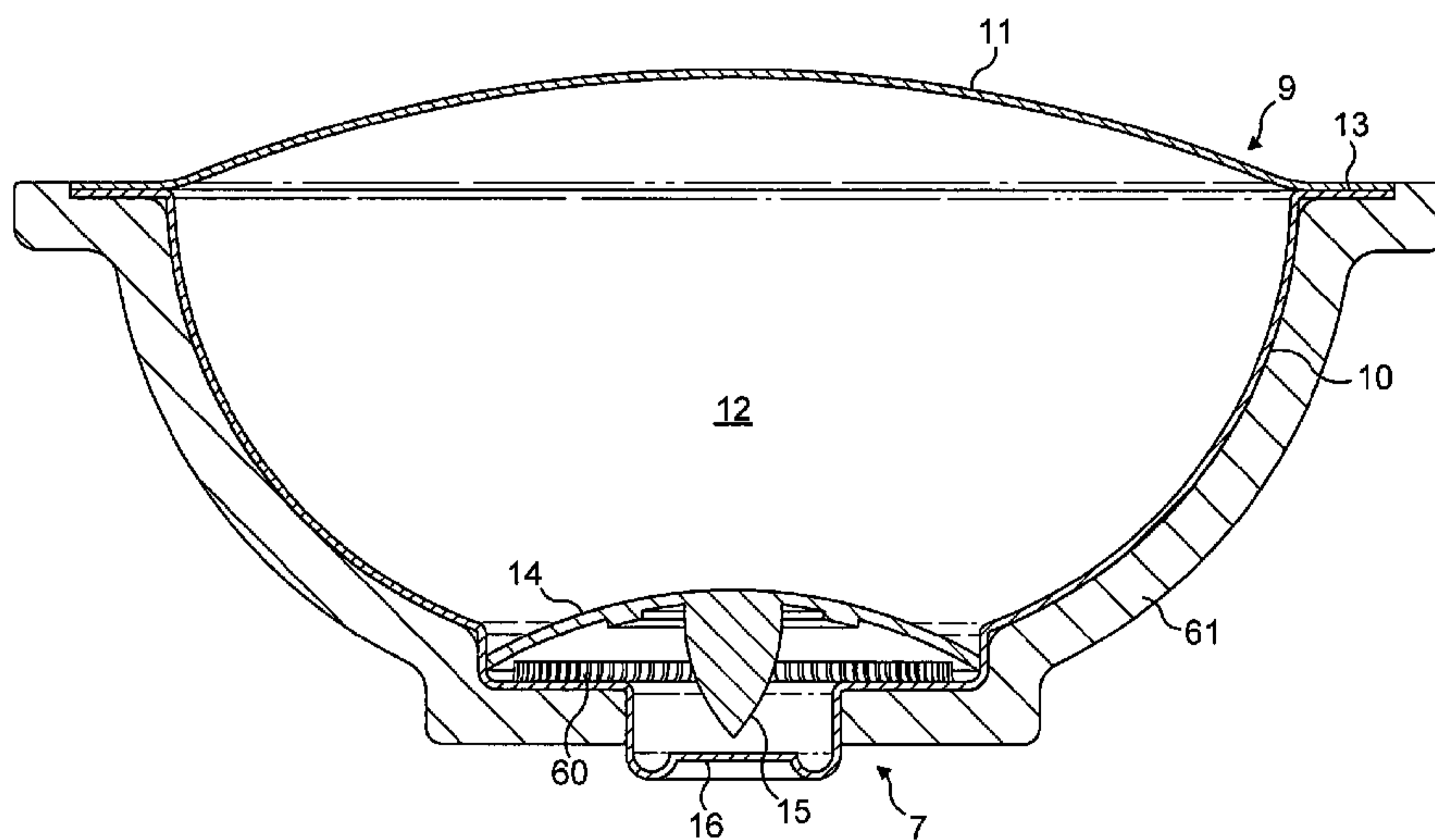


FIG. 3

(57) Abstract: Described is a capsule comprising a plurality of compacted food articles comprising a dehydrated food powder mixed in a fat-based binding system. A method for the production of the capsule is further described.

WO 2009/103592 A1 

Published:

— *with international search report (Art. 21(3))*

— *with information concerning incorporation by reference of missing parts and/or elements (Rule 20.6)*

Culinary Capsule

Field of the invention

The present invention relates to capsules comprising food
5 ingredients which upon reconstitution with hot liquid
using a dispensing system can provide food products such
as hot soups, sauces, mashed potatoes, etc. The present
invention also relates to the use of said capsules, to a
system for the production of an instant food product and
10 to food pellets which may be used in the present capsules.

Background of the invention

Capsules for dispensing hot and/or cold beverages using a
dispensing system are well known in the art. These
15 capsules are known for instance from EP 1 472 156.
Dispensing machines and the capsules usable therein are
commonly found on the market. The beverages which may be
produced by such machines and capsules are generally
coffee products, hot chocolates or teas.

20 The ingredients present in the commercially available
cartridges are usually in the form of a powder which
either dissolves with the injected liquid (usually hot
water), for example, in the case of the preparation of hot
25 chocolate, milk, etc. Alternatively, the powder inside the
capsule is extracted with the injected liquid, in the case
of coffee. The result is a beverage which has low
viscosity.

30 Savoury beverages which can be prepared using a capsule
and a dispensing machine are however less common. A clear
Consommé from Knorr which can be dispensed on a Lavazza
Blue machine has been made available on the market of
culinary products. This is however not a thick, creamy
35 food product.

Instant creamy soup formulations are described in GB
1464429. The agglomerated ingredients include pre-
gelatinised binding agents coated with fat and other

ingredients. However, the patent does not address the use of a cartridge-based system to prepare the soup, nor the modifications needed to the powder if said soup is to be prepared from a cartridge-based beverage system.

5

Object of the present invention

The present object is thus to provide a way in which beverages or food products with a thicker consistency than traditional beverages may be prepared using a capsule and beverage dispensing machine.

10

Summary of the present invention

The present object is solved by means of the independent claims. The dependent claims further develop the central idea of the invention.

15

Thus, in a first aspect, the present invention provides a capsule comprising a plurality of compacted food pellets comprising a dehydrated food powder mixed in a fat-based binding system.

20

In a further aspect of the invention, the present invention relates to the use of a capsule according to any of claims 1 to 28 in the preparation of an instant food product.

25

A method for the production of a capsule according to any of claims 1 to 28, comprising the step of

30

a. preparing food pellets by mixing dehydrated ingredients with a fat-based binding system and pressing or extruding the mixture to obtain said pellets and

b. Filling a capsule with a plurality of said pellets,

35

also forms part of the present invention.

Furthermore, a system for the production of an instant food product, comprising a machine and a capsule according to any of claims 1 to 28, wherein the machine comprises

means to extract said capsule placed in said machine by injecting hot liquid in said capsule, and wherein the capsule comprises means for being extracted by said hot liquid and means for allowing an instant food product to
5 flow out of said capsule, is also provided by the present invention.

Finally, the present invention also relates to a compacted food pellet comprising a dehydrated food powder mixed in a
10 fat-based binding system, wherein the fat-based binding system comprises a mixture of fat, flour, starch and gum. Said article can be in the shape of a pellet, lentil, briquette, pebble, dragee, pillow, egg or ball.

15 **Figures**

The present invention is further described hereinafter by reference to the accompanying figures, wherein:

- fig. 1 is a graph comparing dissolution of powders (comprised in traditional capsules) and pellets
20 (contained in the capsules according to the present invention),
- fig. 2 is a schematic diagram of the mass flow over time of a powder compared to a fat-based pellet as
25 used in the capsules of the invention, and
- fig. 3 is a schematic sectioned view of an example of a capsule.

30

Detailed description of the invention

The present invention relates to capsules comprising a plurality of compacted food pellets. The pellets comprise
35 a dehydrated food powder mixed in a fat-based binding system.

The capsules may be of any type which can be used in a beverage dispensing machine. Typical capsules which may be

used in the present invention are those described for instance in EP 1 472 156 B1. The capsules therein described are designed to be extracted by injection of a fluid under pressure in an extraction device. Each capsule
5 comprises its own opening means activated by the rise of pressure of the fluid introduced into the capsule at the time of its extraction. Further, the capsule has its own outflow passage with its own ducting means making it possible to avoid or at the very least considerably reduce
10 contact with the elements of the system of the extraction device.

Figure 3 shows an example of a capsule which can be used to incorporate the food ingredients. This capsule
15 comprises a cup (10) and a membrane (11) welded at a peripheral welding edge (13) forming the periphery of the said cup. The capsule contains food ingredients (12). The system for opening the capsule consists of a disc (14) arranged in the bottom of the cup (10) and comprising a
20 puncturing point (15) and a filter (60). The puncturing point is therefore enclosed in the chamber formed by the cup (10) and the membrane (11). The disc is thus arranged at the bottom of the cup and thus forms a wider area over which the internal pressure may be spread during
25 extraction. At the time of extraction, the capsule is introduced into the extraction device, water is introduced via a needle which punctures the membrane (11), and under the effect of the rise in pressure in the capsule, the disc (14) experiences a downward thrust towards the
30 retaining part (16) so that the point (15) punctures the retaining part (16) of the cup, thus allowing the food product to flow out. The capsule is held firmly in place by virtue of the support (61) and the filter (60) prevents remainders from passing into the mug (not depicted)
35 situated under the said capsule.

The capsule of the present invention is preferably a sealed capsule. It is typically designed to be extracted by injection of fluid under pressure in an extraction

device. Preferably, the capsule comprises a closed chamber containing the pellets and a means allowing said capsule to be opened at the time of its use and for allowing a beverage or food product to flow out.

5

The food pellets which are present in the capsule are compacted. Thus, they have a higher density than powders which are normally used in capsules. Typically, the density of the food pellet is between 1.0 to 1.5 g/cm³.

10

The food article comprises a dehydrated food powder mixed in a fat-based binding system. By "food" is meant any consumable ingredient. Thus, the dehydrated food powder may be any dried ingredient such as those used in soup
15 powders, sauce powders, mashed potato powders, chocolate powder, creamer, milk powder and soluble beverage powders.

The fat-based binding system to which the dehydrated food powder is mixed preferably comprises a mixture of fat,
20 flour, starch and gum. Typically, the binding system comprises 30-40wt% fat, 40-50wt% flour, 10-15wt% starch and 5-10wt% gum.

In a preferred embodiment, the binding system is a mixture
25 of palm fat, wheat flour, potato starch and guar gum. In the case of chocolate based beverage, it is conceivable that the binding system would comprise at least some cocoa butter as the fat component.

30 Binding systems are normally used to obtain thick creamy soups. They usually comprise modified or non-modified starches, flours or gums.

In the case of capsules however, where space is limited,
35 traditional binding systems do not work efficiently. It was found that the present fat-based binding system overcomes the space limitation by providing enhanced binding properties. The fat-based binding system was particularly advantageous when incorporated in a compacted

article comprising the dried ingredients. Indeed, the binding system allows the capsule contents to be homogeneously released from the capsule, while thickening the resulting product when reconstituted with water, without causing blockage during dispensing. Furthermore, using the fat-based binding system as in the present invention allows the dispensing of larger amounts of product from one capsule than when traditional binding systems are used.

10

Preferably, the dehydrated food ingredients are embedded in the fat-based binding system. Indeed it was found that the incorporation of the powder into the fat-based binding system and a compaction of the mixture to a food article were particularly advantageous as it provided a homogeneous release of the soup, when using a beverage dispensing machine.

15

To produce the food articles, the dehydrated food ingredients are mixed with the fat-based binding system and subsequently agglomerated.

20

Preferably, the dehydrated ingredients are mixed with the fat-based binding system in a dehydrated ingredients : binding system ratio of 50:50 to 90:10.

25

The compaction can then be achieved by pressing or extruding the mixture. Pressing is typically carried out with any of flat die pelleting presses, gear-shaped press rollers, punch and die presses, roller presses. Extrusion can typically be carried out with any of screen and basket extruders, radial, axial and dome extruders, flat and ring die extruders, axial screw extruders, hollow perforated cylinders.

30

35

The preferred technology used is a flat die pelleting press as it allows controlling the density of the food articles within a wider range compared to the other technologies.

Typically, the food articles are in the form of a pellet, lentil, briquette, pebble, dragee, pillow, egg or ball. Preferably, the food articles have a height dimension of
5 between 1 to 10mm, more preferably 5mm.

It has been found that the surface to volume ratio of the food articles is preferably between 0.9 to 3.5mm^{-1} . More preferably, it is between 0.95 - 3.33mm^{-1} , even more
10 preferably $1.3 - 2.1 \text{mm}^{-1}$.

Such surface ratio contributes in obtaining a homogeneous concentration of the soup in a capsule-based system.

15 Indeed, as soon as a hot liquid, typically water with a temperature of about 85°C is injected into the capsule, the fat starts melting and thus releasing the food product mass, e.g. soup.

20 If the surface to volume ratio is too high, e.g. higher than 3.5mm^{-1} , the release of the food product mass will be too quick, leading to a non-homogeneous distribution of the product during dispensing. In this case, for instance, the food articles present in the capsule would be
25 dissolved in the first 50mL of liquid flowing out of the capsule. Thus, the surface to volume ratio is preferably below 3.5mm^{-1} .

If, however, the surface to volume ratio is too low, e.g.
30 lower than 0.9mm^{-1} , the melting rate of the fat in the food articles will be too slow and as a consequence product will remain in the capsule after dispensing.

The food articles of the invention preferably comprise fat
35 in an amount of 5-65 wt%, starch in an amount of 1-10 wt%, gum in an amount of 1-5 wt%, flour in an amount of 10-30 wt%. Furthermore, the food articles may comprise any of salt, sugar, flavours, emulsifiers, maltodextrin, whey

protein powder, creamer, wheat gluten hydrolysate, or any combinations thereof.

5 The capsule of the invention typically contains 5 to 15g of food articles. This amount provides a good consistency to a product upon extraction with 100 to 250mL of hot liquid, e.g. hot water.

10 Thus, the use of the present capsules in the preparation of an instant food product forms part of the present invention.

15 Typically, the use comprises placing the capsule in a beverage system and allowing the contents of said capsule to be extracted. Preferably, the contents of the capsule are extracted with hot water, more preferably about 100-200mL of hot water.

20 The instant food product obtained by the use of the present capsules may be a soup, a sauce, mashed potatoes, a hot beverage, e.g. hot chocolate.

25 The instant food product is characterised by a creamy consistency which varies in thickness depending on the intended product. In any case, the product obtained is creamier and thicker than traditional products obtained using traditional capsules in a dispensing system. Furthermore, no problems of blockage due to the viscosity of the end product are observed. Thus, it is possible with
30 the present invention to provide a broader range of products, which extends beyond the usual beverages such as coffee, tea, hot chocolate to instant food products such as mashed potatoes, sauces for instance.

35 The present invention also offers the advantage that no further stirring is required since the food product is dispensed in a very homogeneous manner. Furthermore, the single-portioned beverage or food product is convenient for the consumer.

The present method for the production of a capsule according to any of claims 1 to 28, comprises the first step of preparing food articles by mixing dehydrated
 5 ingredients with a fat-based binding system and pressing or extruding the mixture to obtain said food articles. The preparation of the food articles may be carried out as described above. In a second step, the capsule is filled with a plurality of said food articles.

10

A system for the production of an instant food product also falls within the present invention. The system comprises a machine and a capsule as described above. The machine comprises means to extract a capsule placed in
 15 said machine by injecting hot liquid in said capsule. The capsule comprises means for being extracted by said hot liquid and means for allowing an instant food product to flow out of said capsule.

20 In a further aspect of the invention, a compacted food article comprising a dehydrated food powder mixed in a fat-based binding system, wherein the fat-based binding system comprises a mixture of fat, flour, starch and gum is provided. Preferably, the food article has a surface to
 25 volume ratio of 0.9mm^{-1} to 3.5mm^{-1} .

The present invention is further illustrated hereinafter with the following non-limiting examples.

30

Examples

Example 1

35 Recipe of a food pellet contained in a capsule for the preparation of an instant soup.

Ingredient	Amount (wt%)
Fat-based binding system	40-50%

Creamer	15-20%
Maltodextrin	5-15%
Salt	0.1-10%
Whey protein powder	0.1-5%
Sugar	0.1-2%
Wheat gluten hydrolysate	0.5-5%
flavours	10-20%

5

Fat-based binding system composition

Ingredients	Amount (wt%)
Wheat flour	40-50%
Potato starch	10-15%
Palm fat	30-40%
Guar gum	5-10%

10 Example 2

In order to measure the quantity of solubilised product after 10s, pellets of the invention and non-compacted powder were poured into a recipient comprising hot water (80°C).

15

The measuring equipment was a conductivity meter CDM 22

CLAIMS:

1. A capsule usable in a beverage dispensing machine, the capsule comprising a plurality of compacted food articles comprising a dehydrated food powder mixed in a fat-based binding system, wherein a ratio of the dehydrated food powder:fat-based binding system is between 50:50 to 90:10.
2. The capsule according to claim 1, wherein the food articles have a surface to volume ratio of 0.9 to 3.5mm^{-1} .
3. The capsule according to claim 1 or 2, wherein the surface to volume ratio of the food articles is between 0.9 - 3.35mm^{-1} .
4. The capsule according to claim 1 or 2, wherein the surface to volume ratio of the food articles is between 0.95 - 3.33mm^{-1} .
5. The capsule according to claim 1 or 2, wherein the surface to volume ratio of the food articles is between 1.3 - 2.1mm^{-1} .
6. The capsule according to any one of claims 1 to 5, wherein the binding system comprises a mixture of fat, flour, starch and gum.
7. The capsule according to any of claims 1 to 6, wherein the binding system comprises 30-40wt% fat, 40-50wt% flour, 10-15wt% starch and 5-10wt% gum.
8. The capsule according to any of claims 1 to 7, wherein the binding system comprises a mixture of palm fat, wheat flour, potato starch and guar gum.
9. The capsule according to any one of claims 1 to 8, wherein the food articles are in the form of a pellet, lentil, briquette, pebble, dragee, pillow, egg or ball.

10. The capsule according to claim 8, wherein the food articles have a height dimension of between 1 and 10mm.
11. The capsule according to claim 8, wherein the food articles have a height dimension of 5mm.
12. The capsule according to any one of claims 1 to 11, wherein the dehydrated food powder is selected from soup powders, sauce powders, mashed potato powders, chocolate powder, soluble beverage powders or milk powder.
13. The capsule according to any one of claims 1 to 12, wherein the food articles comprise fat in an amount of 5-65 wt%, starch in an amount of 1-10 wt%, gum in an amount of 1-5 wt%, flour in an amount of 10-30 wt%.
14. The capsule according to any one of claims 1 to 13, wherein the food articles comprise any of salt, sugar, flavours, emulsifiers, maltodextrin, whey protein powder, creamer, wheat gluten hydrolysate, or any combinations thereof.
15. The capsule according to any one of claims 1 to 14, wherein each of the food articles comprises a pellet having a density of 1.0 - 1.5 g/cm³.
16. The capsule according to any one of claims 1 to 15, which comprises 5-15g of food pellets.
17. The capsule according to any one of claims 1 to 16, which is a sealed capsule.
18. The capsule according to any one of claims 1 to 17, designed to be extracted by injection of fluid under pressure in an extraction device.

19. The capsule according to any one of claims 1 to 18, comprising a closed chamber containing said food articles and a means allowing said capsule to be opened at the time of its use and for allowing a beverage to flow out.
20. A use of a capsule according to any one of claims 1 to 19 in the preparation of an instant food product.
21. The use according to claim 20, which comprises placing the capsule in a beverage system and allowing the contents of said capsule to be extracted.
22. The use according to claim 21, wherein the contents of the capsule are extracted with hot water.
23. The use according to claim 22, wherein the contents of the capsule are extracted with 100-200mL of hot water.
24. The use according to any one of claims 20 to 23, wherein the food product is a soup, a sauce, mashed potatoes, beverage or savoury drink.
25. A method for the production of a capsule usable in a beverage dispensing machine according to any one of claims 1 to 19, comprising:
 - a. preparing food pellets by mixing dehydrated ingredients with a fat-based binding system wherein a ratio of the dehydrated ingredients:fat-based binding system is between 50:50 to 90:10 and pressing or extruding the mixture to obtain said food articles; and
 - b. filling the capsule usable in the beverage dispensing machine with a plurality of said food articles.
26. The method according to claim 25, wherein the pressing is carried out with any of flat die pelleting presses, gear-shaped press rollers, punch and die presses, roller presses.

27. The method according to any one of claims 25 or 26, wherein the extruding is carried out with any of screen and basket extruders, radial, axial and dome extruders, flat and ring die extruders, axial screw extruders, hollow perforated cylinders.
28. A system for the production of an instant food product, comprising a machine and a capsule according to any of claims 1 to 19, wherein the machine comprises means to extract a capsule placed in said machine by injecting hot liquid in said capsule, and wherein the capsule comprises means for being extracted by said hot liquid and means for allowing an instant food product to flow out of said capsule.
29. A compacted food pellet comprising a dehydrated food powder mixed in a fat-based binding system wherein a ratio of the dehydrated food powder:fat-based binding system is between 50:50 to 90:10, and wherein the fat-based binding system comprises a mixture of fat, flour, starch and gum.
30. The food pellet according to claim 29, wherein the pellet has a surface to volume ratio of 0.9mm^{-1} to 3.5mm^{-1} .

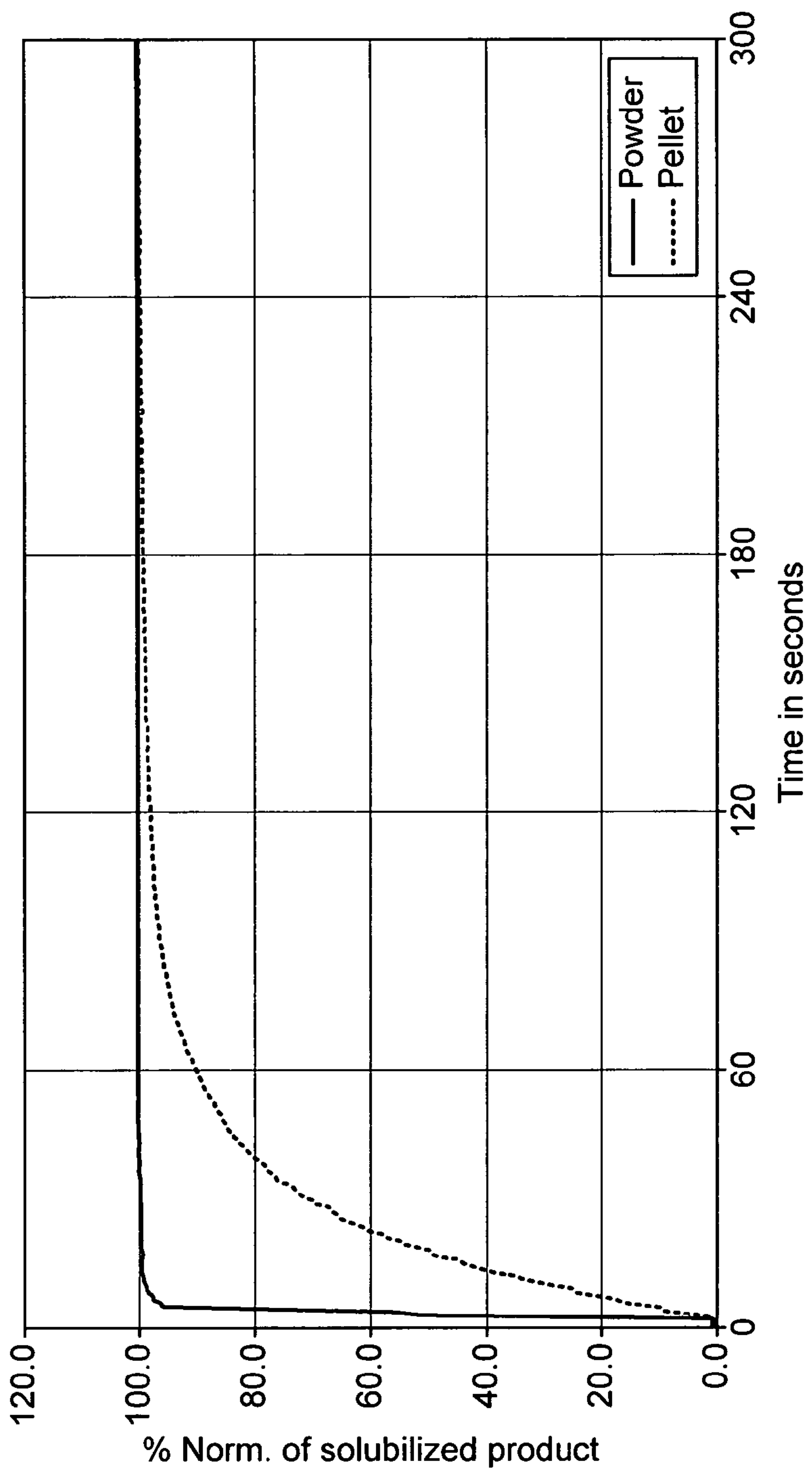


FIG. 1

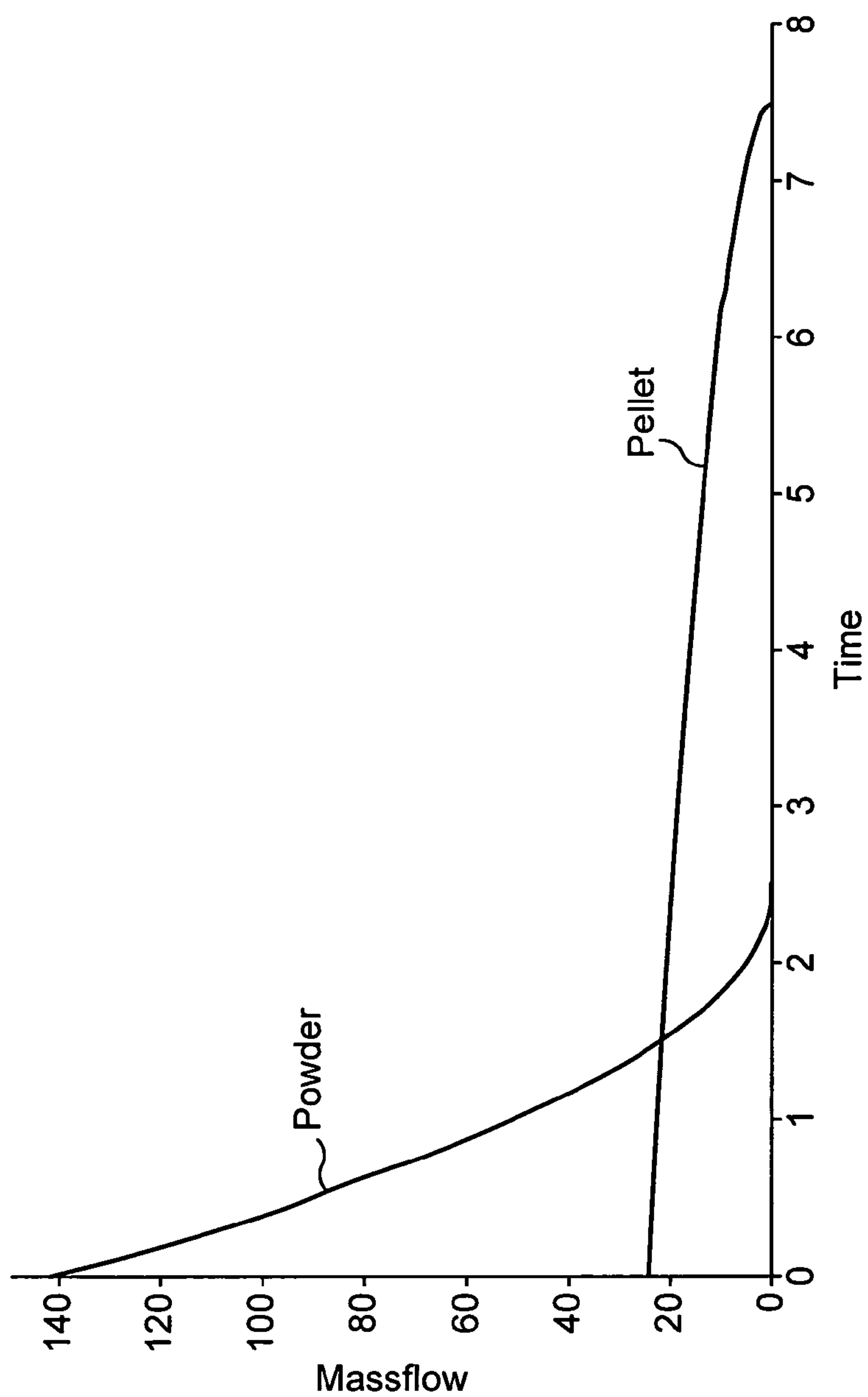


FIG. 2

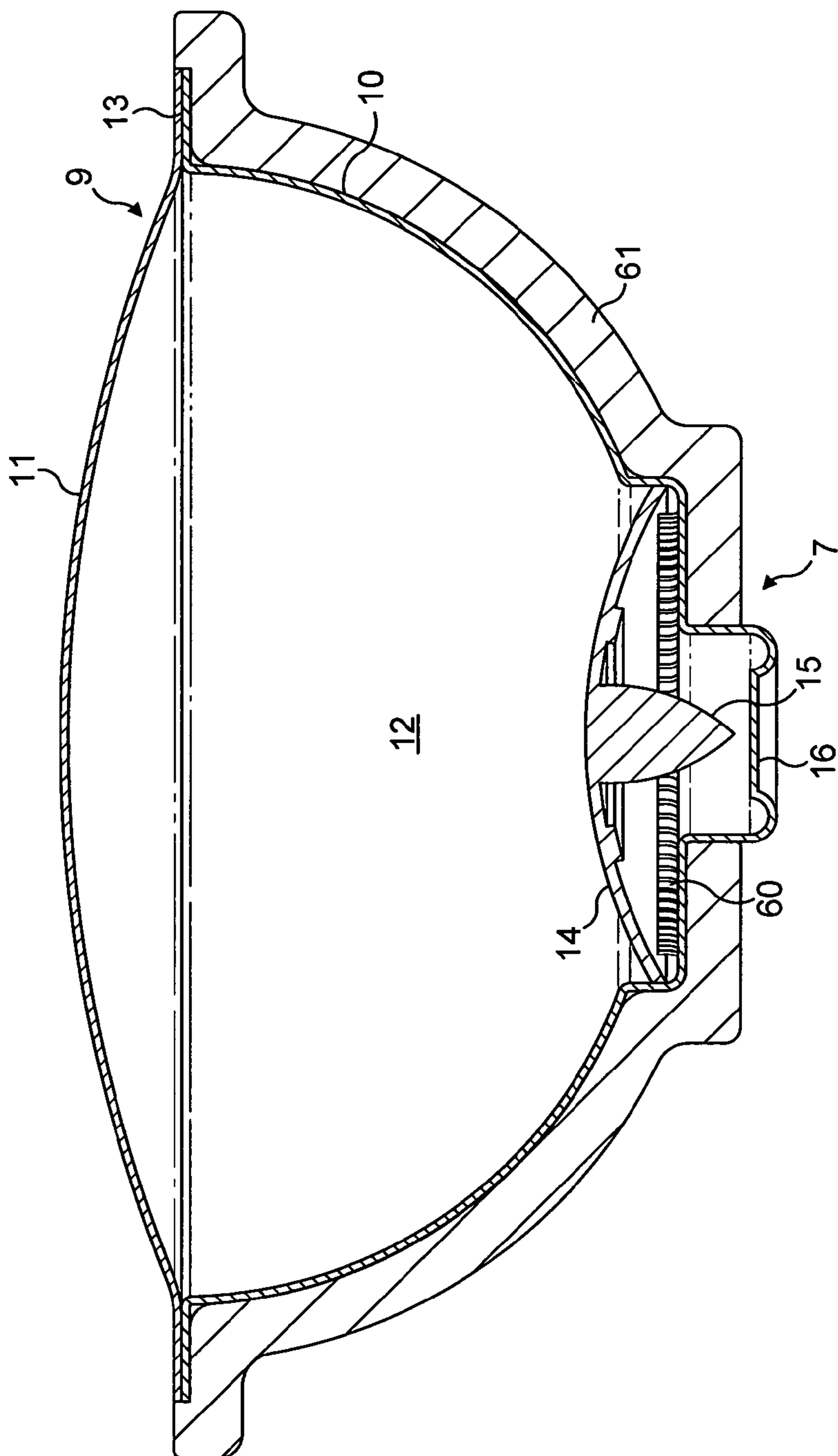


FIG. 3

