

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. **AU 199736272 B2**
(10) Patent No. **732396**

(54) Title
Granulated sugar product

(51)⁶ International Patent Classification(s)
C13F 003/00

(21) Application No: **199736272** (22) Application Date: **1997 .07 .14**

(87) WIPO No: **WO98/02585**

(30) Priority Data

(31) Number (32) Date (33) Country
9614759 1996 .07 .13 GB

(43) Publication Date : **1998 .02 .09**

(43) Publication Journal Date : **1998 .04 .02**

(44) Accepted Journal Date : **2001 .04 .26**

(71) Applicant(s)
Parnova Enterprises Limited

(72) Inventor(s)
William Duffett

(74) Agent/Attorney
GRIFFITH HACK, GPO Box 3125, BRISBANE QLD 4001

(56) Related Art
GB 2026881
EP 335852
FR 2221179

OPI DATE 09/02/98 APPLN. ID 36272/97
AQJP DATE 02/04/98 PCT NUMBER PCT/GB97/01929



AU9736272

(PCT)

(51) International Patent Classification 6 : C13F 3/00		A1	(11) International Publication Number: WO 98/02585
			(43) International Publication Date: 22 January 1998 (22.01.98)
(21) International Application Number: PCT/GB97/01929		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 14 July 1997 (14.07.97)			
(30) Priority Data: 9614759.0 13 July 1996 (13.07.96) GB			
(71) Applicant (for all designated States except US): AGGLOMERATION TECHNOLOGY LIMITED (GB/GB), Unit 7, Monkswell Park, Manse Lane, Knaresborough HG5 8NQ (GB).		Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	
(72) Inventor; and (75) Inventor/Applicant (for US only): DUFFETT, William (GB/GB); 9 Calderdale Close, Knaresborough, North Yorkshire HG5 0DY (GB); <i>Calderdale</i>		(71) <i>PARNOVA ENTERPRISES LIMITED</i> <i>Centre Heights</i> <i>137 Finchley Road</i> <i>London NW3 6JG</i> <i>United Kingdom</i>	
(74) Agents: SHERRARD-SMITH, Hugh et al.; Appleyard Lees, 15 Clare Road, Halifax, West Yorkshire HX1 2HY (GB).			
(54) Title: GRANULATED SUGAR PRODUCT			
(57) Abstract A granulated sugar product comprises a core material substantially of a granulated first sugar and a surface material substantially of a second sugar, the second sugar material being less dense than the first sugar material. The product may include a sweetener.			

see
fol. 2, 3



GRANULATED SUGAR PRODUCT

The present invention relates to a granulated sugar product and a process for making such a product and, in particular, to a product intended to be used as
5 a substitute for granulated sugar.

Many and varied attempts have been made over a number of years to produce a granulated sugar product with similar appearance to sugar, the same sweetness and half the bulk density. The product should, when dispensed by
10 a variety of measures eg. spoons, deliver less, preferably, only half or less, of the weight for the same sweetness when compared with granulated sugar. The product should also exhibit the "crunch" and reflective appearance of granulated sugar.

15 The present invention has been made from a consideration of this problem and in order to provide a granulated sugar product having one or more of the above-mentioned characteristics.

According to one aspect of the invention there is provided a granulated sugar
20 product comprising a core material substantially of a granulated first sugar material and a surface material substantially of a second sugar material, wherein the second sugar material is less dense than the first sugar material and wherein the second sugar material is fluffy and light.

25



- 1a -

Advantageously the second sugar material is sufficiently fluffy to give it a significantly reduced bulk density. Preferably the second sugar material comprises a honeycomb effect and typically is a foam dried sugar.

- 5 The surface material may cover only some or all of the surface of the first sugar granule. The product may also incorporate a sweetener, preferably a high intensity sweetener.



In this manner, a granulated sugar product can be provided with an overall bulk density less than the bulk density of the granulated first sugar and, therefore, act as a lighter alternative to the first sugar product whilst maintaining the granulated form and "crunch". Furthermore, by the use of
5 appropriate quantities of sweeteners, a lighter product with the same sweetness as the first sugar may be obtained.

Preferably, the first sugar is sucrose but any granulated sugar product may be used. By granulated is meant such products as would include, for instance,
10 commercial table sugar and caster sugar but not icing sugar. Thus, typically granulated may imply having crystals of at least 0.1 mm or between about 0.1 mm and 1.0 mm, more preferably 0.2 mm and 0.8 mm and including specifically castor sugar having crystals in the range 0.27 to 0.34 mm and conventional granulated or table sugar having crystals in the range 0.60 to
15 0.67 mm. Preferably, the crystal sizes are in the range 0.27 mm to 0.67 mm.

The second sugar may be selected from any sugar product. Preferably, it may be selected from sucrose, glucose (dextrose, anhydrous & mono), fructose, lactose (anhydrous and hydrated), maltose, Ribose, galactose, dried glucose
20 syrups, grape sugar, arabinose, raffinose, mannose, rhamnose, iso-maltose, gentobiose, trehalose, cellobiose, neohesperidose, maltotriose, parose, neokestose, stachyose.

The sweetener may be any sweetener. Preferably, the sweetener is selected
25 from sorbitol (E420), mannitol (E421), isomalt (E953), maltitol (E965), lactitol (E966), xylitol (E967), acesulfame k (E950), aspartame (E951), cyclamic acid and sodium and calcium salts (E952), saccharin and its sodium.



AMENDED SHEET

potassium and calcium salts (E954), thaumatin (E957), neohesperidine DC (E959).

5 More preferably, the sweetener is aspartame and/or acesulfame K and/or other high intensity sweeteners. The high intensity of the sweetener is defined in terms of its sweetness compared with sugar on a weight basis. Preferably, the high intensity sweetener is at least 30 times, typically 200/300 times or at least 100 times, as sweet as sugar on a weight basis. Preferably, the product comprises two sweeteners, typically both aspartame and acesulfame K. In
10 general aspartame tastes good but tends not to be heat stable whereas acesulfame K is heat stable but does not taste as good. The product may include a liquid component such as water. The amount of added liquid typically determines the consistency of the mixture. Preferably, the surface material is in a powder form. More preferably, the surface material
15 comprises a foam dried material. Preferably, a surface material having a lower calorific density compared with sucrose is used. The lower calorific density may be due to the chemical or physical form of the surface material or both. Preferably, a low density maltodextrin is used. Preferably, the maltodextrin is in powder form and most preferably the maltodextrin
20 comprises foam dried maltodextrin. Foam drying is a known process comprising pumping gas under pressure into the feed to the spray drier prior to the sugar being spray dried. Foam dried sugar has a honeycomb effect which gives it a significantly reduced bulk density. Thus, preferably a sugar that is fluffy and light is used.

25 Preferably, the product comprises the first sugar in the range of 60-90% by weight, more preferably, 75-85% by weight. Preferably, the surface material is 10-40% by weight, more preferably, 15-25% by weight. Preferably, the



AMENDED SHEET

sweetener, typically aspartame and/or acesulfame K, is 0.1-1.0% by weight, more preferably, 0.1-0.5% by weight. Preferably, about 0.4% sweetener or about 0.2% each of aspartame and acesulfame K is used. Preferably about 0.18 to 0.22% each of aspartame and acesulfame K is used.

5

According to a second aspect of the invention there is provided a method of producing a granulated sugar product comprising mixing a core material of a granulated first sugar material and a surface material substantially of a second sugar material, wherein the second sugar material is less dense than
10 the first sugar material in such a manner as to result in agglomeration of the mixture and wherein the second sugar material is fluffy and light.



Preferably, the components of the mixture are as described above with respect to the first aspect of the invention. Preferably, the mixing is by means of a
15 low shear mixer or slow speed blender. Alternatively, a batch or continuous agglomerator may be used. Preferably, liquid, typically water, is added to the mixture during mixing. The liquid may be added by spraying atomised liquid onto the mixture. Advantageously, the liquid turns the mixture into a slurry, but, preferably, does not dissolve the majority of the granulated first sugar or,
20 preferably, the majority of the surface material although the liquid will, inevitably, dissolve some of the sugars. Advantageously dissolving a small amount of the sugars, the liquid, once dried, has the effect of encouraging the first sugar and the surface material to agglomerate thus producing larger granules with lower bulk density than the first sugar. Preferably, the liquid
25 is water but any liquid able to solubilise sugars may be used. Preferably, the liquid is non-toxic and is easily evaporated. Preferably, 0.05-5% of liquid by weight, typically, water, is used, more preferably, 1.0-2.0% by weight is used.



Preferably, the mixture is mixed in a low shear mixer and a small amount of liquid, typically water, is added. As a specific example, 50 ml to 3.0 litres water may be added to an approximately 60 kg mixture. This results in the even and permanent agglomeration of the mixture with all of or some of the
5 aforementioned characteristics. The low shear mixer may be of any suitable type such as drum types, tote blenders or slow speed blenders.

Alternatively, the mixture may be added to a batch or continuous agglomerator such as a fluidised bed agglomerator. Such an agglomerator may comprise
10 a vessel having an air distribution grate at a lower end thereof. One or more filters may be positioned at an upper end of the vessel to filter out entrained solids. Nozzles for spraying atomised liquids, typically water, may be positioned in, on or adjacent to the vessel, for example in the sides or top of the vessel. Preferably, a small amount of sugar is added to the liquid or
15 water in either embodiment before it enters the mixer or agglomerator as it has been found that this gives better results.

Preferably, the method comprises mixing using a mixing machine as described in GB 2026881, which document is incorporated herein by reference. Thus,
20 preferably the method comprises mixing by means of a mixing machine in which the components of the mixture are mixed by means of two counter-rotating shafts with blades, where some of the blades have different angles of incidence and different blade areas in order to obtain a good mixing of the components.

25 Preferably, the mixing machine comprises a mixing chamber in which two shafts are arranged in substantially the same horizontal plane, the shafts being provided with blades or paddles disposed at an angle to and parallel with the



shafts, the shafts rotating in opposite directions. Although the machine may be operated as described in GB 2026881 with reference to Figure 4 thereof, it is preferred that the machine is operated such that downward movements are on the side where the shafts turn toward one another.

5

Preferably, the mixing machine is operated such that the blades have a peripheral rotational velocity of at least 1.2 m/sec or between 1.2 and 1.8 m/sec.

- 10 Preferably, a plurality of opposing pairs of blades of certain area are mounted on each shaft, positioned 90° transverse of the centerline for the shafts and with the blade wings disposed at a 45° angle in relation to the shaft centreline. The supports for the blade wings of some opposing pairs of blades may be displaced 90° in relation to the supports for other pairs as specifically
- 15 described in GB 2026881. Other specific features of the machine, such as the disposition and form of the blades at the ends of the shafts, may be as described in GB 2026881. As previously mentioned it is preferred that the machine is operated conversely to the operation described in GB 2026881 in that the shafts are rotated in contra-rotation with downward movement of the
- 20 shafts being on the side where the shafts turn towards each other. This allows the mixing to take place towards the lower region of the chamber, that is below the level of the shafts. It has been found that such operation gives surprisingly better results.

- 25 According to a third aspect of the invention there is provided a method of producing a granulated sugar product comprising the steps of:-



AMENDED SHEET

- (i) adding a core material substantially of a granulated first sugar, and a surface material to a low shear mixer or slow speed blender having at least two driving shafts, the shafts being provided with blades arranged at an angle to and parallel with the shafts, wherein the surface material is less dense than the first sugar material and wherein the surface material comprises substantially a second sugar, dextrins, sorbitol, mannitol, starch, cellulose, inulin, glycogen, xylitol, levoglucason or maltol (and ethyl derivative); and
- 5
- (ii) operating the mixer or blender such that the shafts rotate in opposite directions.
- 10

Preferably, the shafts of the mixer or blender are disposed in substantially the same horizontal plane and preferably the mixer or blender is operated such that downward movement of the shafts is on the side where the shafts turn toward one another.

15

Preferably, the mix or blender is as described in GB 2202681 with reference to Figures 1 to 3 thereof and/or as described above.

20

The method may include adding sweetener, liquid or other method steps described herein. The surface material, sugars and sweeteners may be as aforescribed herein.

25 The invention further includes a method of producing a granulated sugar product of the invention and a product produced by means of a method of the invention.



AMENDED SHEET

According to a further aspect of the present invention there is provided a granulated sugar product comprising a mixture of granulated sugar, maltodextrin and high intensity sweetener. Preferably the product is crystalline. Preferably, the sweetener is as described above. Preferably, the product comprises two sweeteners, typically both aspartame and acesulfame K. The product may include a liquid component such as water. The amount of added liquid typically determines the consistency of the mixture. Preferably, a low density maltodextrin is used. Preferably, the maltodextrin is in powder form and most preferably, the maltodextrin comprises foam dried maltodextrin. Foam dried maltodextrin has a honeycomb effect which gives it a significantly reduced bulk density. Thus, preferably a maltodextrin that is fluffy and light is used.

Preferably, the product comprises granulated sugar in the range of 60-90% by weight, more preferably 75-85% by weight, maltodextrin 10-40% by weight more preferably 15-25% by weight and sweetener, typically aspartame and/or acesulfame K, 0.1-1.0% by weight more preferably 0.1-0.5% by weight. Preferably, about 0.4% sweetener or about 0.2% each of aspartame and acesulfame K is used. Preferably about 0.18 to 0.22% each of aspartame and acesulfame K is used.

According to a still further aspect of the present invention there is provided a method of producing a granulated sugar product comprising mixing granulated sugar, maltodextrin and high intensity sweetener in such a manner as to result in agglomeration of the mixture. Preferably, the components of the mixture are as described above. Preferably, the mixing is by means of a low shear mixer or slow speed blender. Alternatively, a batch or continuous agglomerator may be used. Preferably, liquid, typically water, is added to the



mixture during mixing. The liquid may be added by spraying atomised liquid onto the mixture.

5 Preferably, the mixture is mixed in a low shear mixer and a small amount of liquid, typically water, is added. As a specific example, 50 ml to 3.0 litres water may be added to an approximately 60 kg mixture. This results in the even and permanent agglomeration of the mixture with all of or some of the aforementioned characteristics. The low shear mixer may be of any suitable type such as drum types, tote blenders or slow speed blenders.

10

Alternatively, the mixture may be added to a batch or continuous agglomerator such as a fluidised bed agglomerator. Such an agglomerator may comprise a vessel having an air distribution grate at a lower end thereof. One or more filters may be positioned at an upper end of the vessel to filter out entrained solids. Nozzles for spraying atomised liquids, typically water, 15 may be positioned in, on or adjacent to the vessel, for example in the sides or top of the vessel. Preferably, a small amount of sugar is added to the liquid or water in either embodiment before it enters the mixer or agglomerator as it has been found that this gives better results.

20

Preferably, the mixer or blender is as described above and is operated as described above.

25 According to another aspect of the invention there is provided a method of producing a granulated sugar product comprising the steps of:-

- (i) adding granulated sugar, starch or hydrolysis products thereof and high intensity sweetener to a low shear mixer or slow speed blender having



AMENDED SHEET

at least two driving shafts, the shafts being provided with blades arranged at an angle to and parallel with the shafts; and

- 5 (ii) operating the mixer or blender such that the shafts rotate in opposite directions.

Preferably, the mixer or blender is as described above and is operated as described above.

- 10 Preferably, the starch or hydrolysis product thereof is a low bulk density material. Preferably, the hydrolysis product of starch is maltodextrin. The method may include adding liquid or other method steps described herein. The sugar, maltodextrin and sweetener may be as described herein.

- 15 The invention further includes a method of producing a granulated sugar product of the invention and a product produced by means of a method of the invention.

- 20 The invention will now be described further by way of example only, and with reference to the accompanying drawings and examples in which:-

Fig. 1 is a schematic view showing use of a low shear mixer in the method of the invention; and

- 25 Fig. 2 is a schematic view showing use of a fluidised bed agglomerator in the method of the invention.



AMENDED SHEET

Referring to Fig. 1 granulated sugar, maltodextrin and aspartame/acesulfame K. are added as shown schematically by arrow A, in powder form to a low shear mixer or slow speed blender 1 comprising an open topped vessel 2 having mixing blades or paddles 4 located therein. The blades are mounted on a driving shaft 6 which is rotated by motor means 8 so that the blades move slowly. It is preferable that on certain mixers the rotation is reversed to that of conventional operation. In normal operation on certain mixers such as that described in GB 22026881 the two shafts turn towards each other with upward movement on the side where the shafts turn toward each other so that the paddles take the product and mix them at the top of the vessel where these two sets of paddles meet. It is preferable for the invention that the two shafts turn toward each other with downward movement on the side where the shafts turn toward each other and that the mixing takes place at the bottom of the machine where the paddles meet. It will be appreciated that any suitable low shear mixer or slow speed blender may be used and for example, a ribbon or screw mixing means may be used instead of blades 4 and shaft 6. Although ribbon mixing means are normally run at high speed such means could be run slowly for the purpose of the present invention.

While or after the powders are added, liquid such as water is added typically while the blades are moving. This is illustrated by arrow B. As the mixture is mixed, the mixture agglomerates and the resultant product is output via a suitable outlet 10 on the vessel 2, as shown by arrow C.

Referring to Fig. 2, the mixture 12 is added to a fluidised bed agglomerator comprising an open topped vessel 14. Liquid is sprayed into the vessel via one or more nozzles 16 located in or on the vessel. Typically the nozzles 16 are designed to atomise the liquid. The base of the vessel 14 comprises a



AMENDED SHEET

mesh plate 18 and the vessel is connected to an air supply or fan 20 so that, in use, air passes up through the mesh plates, through the mixture and out through the filters 22 located at the top of the vessel 14.

- 5 It has been found that a product of the invention or produced using a method of the invention has one or more of the aforementioned desired characteristics and is cost effective to produce.

Method of Preparation

10

Load a mixing machine as described in GB 2026881 with reference to Figures 1 to 3 thereof with 28.30 kg (sucrose) sugar or ground oversize plus 0.079g each of Aspartame and Acesulfame K. Start the machine at full speed. Add a wet mix of sucrose sugar (2.70 kg) and water (0.75 kg) and mix for 45
15 seconds. Stop the machine. Add 5.000 kg sugar followed by 7.67 kg maltodextrin (foam dried). Mix for 10 seconds on full speed and discharge into bin. Transfer to Calmic container and gently mix. Sieve through 2 mm screen, keeping the load on the screen low. If the bulk density starts to increase, the amount of water in the wet mix may be increased by 50 ml. at
20 a time until the required bulk density is obtained. It is preferred that the mixing machine is operated such that the shafts rotate in opposite directions with downward movements on the side where the shafts turn toward one another so that the mixing zone lies below the level of the shafts in contrast to the mixing method described with reference to Figure 4 of GB 2026881.

25

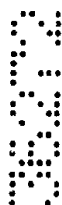
The above procedure produces a maximum bulk density of 0.38 g/cc.



AMENDED SHEET

It will be appreciated that the present invention is not intended to be restricted to the details of the above embodiments which are described by way of example only.

- 5 Throughout this specification and the claims, the words "comprise", "comprises" and "comprising" are used in a non-exclusive sense, except where the context requires otherwise.



CLAIMS

1. A granulated sugar product comprising a core material substantially of a granulated first sugar material and a surface material substantially of a second sugar material, wherein the second sugar material is less dense than the first sugar material and wherein the second sugar material is fluffy and light
2. A granulated sugar product according to claim 1, wherein the second sugar material is sufficiently fluffy to give it a significantly reduced bulk density.
3. A granulated sugar product according to claim 1 or 2, wherein the second sugar material comprises a honeycomb effect.
4. A granulated sugar product according to claim 1, 2 or 3, wherein the second sugar material comprises a foam dried sugar.
5. A granulated sugar product according to any preceding claim, wherein the surface material covers only some or all of the surface of the first sugar granule.
6. A granulated sugar product according to any preceding claim, wherein the product incorporates a sweetener.
7. A granulated sugar product according to any preceding claim, wherein the product comprises a high intensity sweetener.



8. A granulated sugar product according to any preceding claim, wherein the first sugar material is sucrose.

5 9. A granulated sugar product according to any preceding claim, wherein the second sugar material is selected from sucrose, glucose (dextrose, anhydrous & mono), fructose, lactose (anhydrous and hydrated), maltose, Ribose, galactose, dextrans, dried glucose syrups, sorbitol, mannitol, grape sugar, arabinose, raffinose, mannose, starch, cellulose, inulin, glycogen, xylitol, levoglucosan, rhamnose, maltol (and ethyl derivative), iso-maltose, 10 gentobiose, trehalose, cellobiose, neohesperidose, maltotriose, parose, neokestose, stachyose.

15 10. A granulated sugar product according to any of claims 7-9, wherein the sweetener is selected from sorbitol (E420), mannitol (E421), isomalt (E953), maltitol (E965), lactitol (E966), xylitol (E967), acesulfame k (E950), aspartame (E951), cyclamic acid and its sodium and calcium salts (E952), saccharin and its sodium, potassium and calcium salts (E954), thaumatin (E957), neohesperidine DC (E959).

20 11. A granulated sugar product according to any preceding claim, wherein the second sugar material comprises a low density maltodextrin.

12. A granulated sugar product according to any preceding claim, wherein the product comprises the first sugar material in the range of 60-90% by weight.

25



13. A granulated sugar product according to any preceding claim, wherein the product comprises the second sugar material in the range of 10-40% by weight.

5 14. A granulated sugar product according to any of claims 7-13, wherein the product comprises the sweetener in the range of 0.1-1.0% by weight-

10 15. A method of producing a granulated sugar product comprising mixing a core material of a granulated first sugar material and a surface material substantially of a second sugar material, wherein the second sugar material is less dense than the first sugar material in such a manner as to result in agglomeration of the mixture and wherein the second sugar material is fluffy and light.



15 16. A method of producing a granulated sugar product according to claim 15, wherein mixing is by means of a mixing machine comprising a mixing chamber in which two shafts are arranged in substantially the same horizontal plane, the shafts being provided with blades or paddles disposed at an angle to and parallel with the shafts, the shafts rotating in opposite directions.



20 17. A method of producing a granulated sugar product according to claim 16, wherein the machine is operated such that downward movements are on the side where the shafts turn toward one another.

25 18. A method of producing a granulated sugar product according to claim 16 or claim 17 wherein a plurality of opposing pairs of blades of certain area are mounted on each shaft, positioned 90° transverse of the centerline for the



shafts and with the blade wings disposed at a 45° angle in relation to the shaft centreline.

19. A method of producing a granulated sugar product according to any of claims
5 1-14 comprising the steps of:-

- 10 (i) adding a core material substantially of a granulated first sugar material, and a surface material substantially of a second sugar material, wherein the second sugar material is less dense than the first sugar material to a low shear mixer or slow speed blender having at least two driving shafts, the shafts being provided with blades arranged at an angle to and parallel with the shafts; and
(ii) operating the mixer or blender such that the shafts rotate in opposite directions.

15 20. A method according to claim 19, wherein the shafts of the mixer or blender are disposed in substantially the same horizontal plane and the mixer or blender is operated such that downward movement of the shafts is on the side where the shafts turn toward one another.

20 21. A product produced by means of a method as claimed in any of claims 15 to 20.

22. A product substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

25

23. A method substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.



- 1/1 -

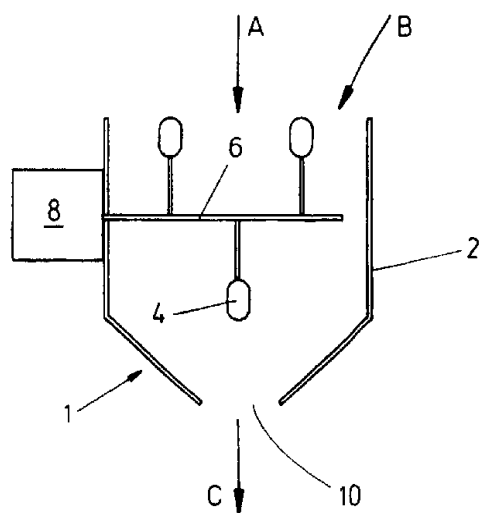


FIG. 1

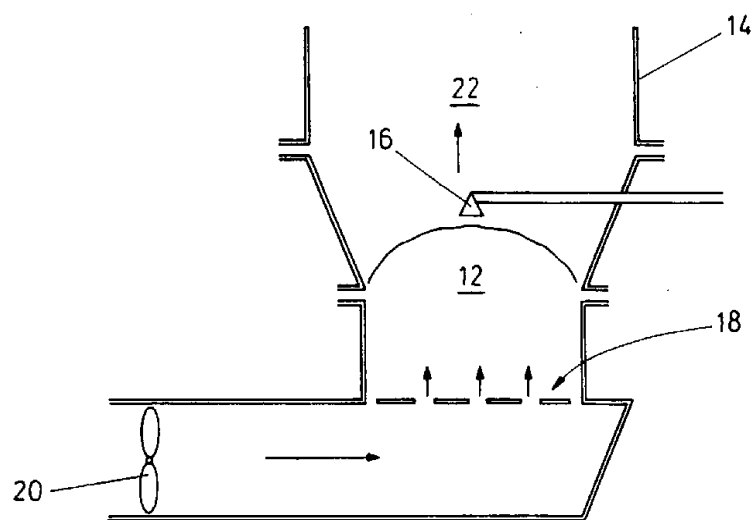


FIG. 2