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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 March 2014 (13.03.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/037293 A1

(51) International Patent Classification:
A23G 9/28 (2006.01) *A23G 1/20* (2006.01)

(21) International Application Number:
PCT/EP2013/068050

(22) International Filing Date:
2 September 2013 (02.09.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12183541.7 7 September 2012 (07.09.2012) 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, BN, BR, BW, BY, BZ, CA, CH, CL, 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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, 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))*

— *of inventorship (Rule 4.17(iv))*

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(54) Title: DEVICE AND METHOD FOR SPLITTING AN INLET STREAM INTO A PLURALITY OF SUBSTREAMS

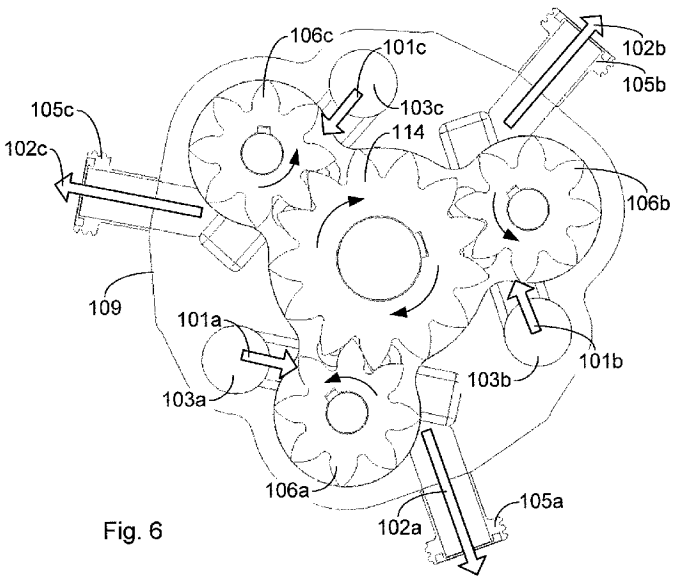

Fig. 6

(57) Abstract: The dosing device has a housing (9, 109) where the housing has an inlet chamber (3, 103) with an inlet (4, 104) for receiving an inlet stream (1, 101) of an aerated confectionery product within the inlet chamber, a plurality of outlets (5), each having a pair of meshing rotatable gears (6) associated therewith, where rotation of the gears is proportional to a portion of the product moving between the inlet chamber (3) and the associated outlet (5). The gears (6) of the plurality of outlets (5) are locked to rotate in synchronism which ensures a very low standard deviation between substreams (2). A motor (11, 111) controls the rotation of the gears to maintain the pressure within predetermined limits.

WO 2014/037293 A1

Published:

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

DEVICE AND METHOD FOR SPLITTING AN INLET STREAM INTO A PLURALITY OF SUBSTREAMS

FIELD OF THE INVENTION

The invention relates to devices for receiving an inlet stream of an aerated confectionery product or other edible product, and splitting the inlet stream into a plurality of substreams. The device is particular useful for use in dosing systems where each of a plurality of receptacles is to be filled with a predetermined amount of the product. An inlet stream of the product is fed to a splitting device which splits the inlet stream into a plurality of substreams which are fed to respective receptacles.

BACKGROUND OF THE INVENTION

Currently ice cream dosing systems for dosing ice cream into a plurality of receptacles before freezing are often imprecise in the sense that the standard deviation between the actual amounts filled into the receptacles can be as high as 10-12 % around the mean value. This is very unsatisfactory as it is often a demand, that a minimum amount of ice cream is present in each receptacle resulting in that many receptacles are overfilled.

Furthermore, currently used ice cream dosing system can handle only limited ranges of recipes and ingredients, leading to complex and lengthy change-over time which strongly affects a filling line's efficiency.

In addition, currently used ice cream dosing systems transfer a substantial amount of mechanical energy to the ice cream or dosed product which influences the texture and other properties of the ice cream. Ice cream is shear sensitive and sensitive to pressure variations such as pressure pulsations which should be avoided.

Hence, an improved device and method for dosing aerated confectionery products, in particular ice cream, would be advantageous.

OBJECT OF THE INVENTION

It is an object of the present invention to provide an alternative to the prior art.

In particular, it may be seen as an object of the present invention to provide a device and method that solves the above mentioned problems of the prior art with respect to influence on the properties of the product and/or producing a more precise dosing of aerated confectionery products. Examples of aerated confectionery products are frozen confectionery products such as ice cream, sherbet etc. or any other confectionery product such as chilled mousses etc. "Aerated" means having an overrun as is typical for such products.

SUMMARY OF THE INVENTION

In the present context the term "dosing" is preferably used in manner being ordinary to a skilled person to describe the process of providing a pre-selected amount of a product. The term "dosing" preferably includes the process of filling the pre-selected amount into a receptacle.

The device according to claim 1 inherently results in a substantially reduced standard deviation between the sub streams of the aerated confectionery product and reduces pressure variations that might have negative effects on the dosed product. The device of the invention makes use of the technology known from gear pumps where a pair of meshing rotatable gears in a housing provides a pump where a volume is pumped which is proportional to the rotation of the gears. The dosing device of the invention has a housing where the housing defines an inlet chamber with an inlet for receiving the inlet stream of the product within the inlet chamber, a plurality of outlets, each outlet for outputting one of the plurality of sub streams, wherein each outlet has a pair of meshing rotatable gears associated therewith, where rotation of the gears is proportional to a portion of the product moving between the inlet chamber and the associated outlet and interact with a pair of gears. The gears of the plurality of outlets are locked to rotate in synchronism which ensures a very low standard deviation between substreams. Furthermore, a motor is controllable to control the rotation of the gears so as to maintain the pressure in the product within predefined

pressure limits. This ensures that pressure variations are kept within acceptable limits. The gears will provide a pulsation-free operation, which is particularly advantageous when the product is ice cream.

Outlets can have identical pairs of gears whereby their respective dosings become identical, or outlets can have different pairs of gears e.g. with different diameters or axial lengths whereby their dosings become correspondingly different.

The controllable motor can be connected to the common shaft and be controllable to control rotation of the common shaft to cause the product to move between the inlet chamber and the outlets, or each pair of gears can be individually controlled e.g. by individually controlled stepping motors, whereby identical or different dosings can be achieved.

Preferably, one gear of each pair of gears is rotationally locked to a common shaft, whereby a relatively simple construction is achieved. In an embodiment the motor can be controlled to let the common shaft rotate independent on the motor. This allows the inlet stream of the product to cause rotation of the gears.

Advantageously, the motor can drive, via a gearbox, a plurality of shafts which drive each gear of all pairs of gears directly. For hygienic reasons the gearbox, which is a mechanical device serving mainly mechanical function, and the dosing device, which handles edible or confectionery products, can thereby be separated. Further, the mechanical interaction with exchange of torque and forces between gears can be restricted to the gears of the gearbox which can be optimised for that function, and the gears handling the confectionery product can be optimised for that function and driven without transmitting any, or very small, torques and forces, which is advantageous to shear sensitive products.

Aerated confectionery products are sensitive to pressure and pressure variations, which can be caused by several factors. Pressure changes may cause the product to lose its overrun and should therefore be avoided or reduced to a minimum. In general, this is obtained by operating the motor so that the pressure in the product is kept within acceptable limits, or the drop across the device is kept at a minimum.

Solid inclusions in the product being "caught" between teeth of a pair of meshing gears may cause the rotation of the gears to stop or reduce the speed temporarily which may cause an undesired pressure increase in the product upstream of the meshing gears. When the product is a confectionery product like ice cream with solid inclusions such as chocolate chips, nuts, candy and the like, such inclusions may enter the space between a pair of gears instead of leaving the device through an outlet, which might prevent the gears from rotating and cause an undesirable increase in pressure in the confectionery product.

Advantageously, a rotation sensor can therefore be arranged, e.g. integrated in the motor, to sense rotation of the gears whereby proper functioning of the device can be monitored, and upon sensing a disturbance of the rotation of the gears due to e.g. solid inclusions in the product, a controller can be arranged to control the motor to drive the gears in rotation. When the rotation sensor senses a disturbance of the rotation such as an undesired reduction in the rotation speed of the gears, or possibly an interruption, the motor will be controlled to assist and maintain the desired rotation of the gears as long as necessary, whereby solid inclusions causing the situation will be crushed between the pair of gears.

Preferably, a pressure sensor is arranged in the device for sensing a pressure in the product, and the motor can be controlled in a feedback loop to rotate the gears so that the pressure in the product is maintained within acceptable pressure limits.

The electric current consumed by the motor is an indicator of the torque it produces and thereby of the force transmitted by the teeth of the gears and/or of the pressure change (increase or decrease) it causes. The motor current can therefore be used in a feedback loop for controlling the motor to keep the pressure in the product within predetermined acceptable limits and also to keep shear forces between gear teeth low.

It is known that changes in cross section of the flow path of a flowing fluid will cause pressure changes. The cross sections of the inlet and of the outlets and the dimensions of the gears should therefore be dimensioned to maintain a constant pressure in the product throughout the device.

Preferably, the outlets are sealed against fluid communication between outlets. This ensures that there will be no flow of the product between outlets.

The dosing device can have a plurality of housings or housing modules with at least one rotatable shaft interconnecting corresponding gears in the housings, and at least one pipe establishing fluid connection for the product between the housings. Such modularity gives flexibility.

For cleaning purposes is advantageous that each housing has a flange in sealing contact with the housing and one or more of the rotatable shafts so as to confine the product within the housing, where the flange is movable away from the housing so as to leave a space between the housing and the flange allowing cleaning of the interior of the housing. Advantageously, a flange locking device is arranged on the at least one rotatable shaft and has a pair of inclined surfaces cooperating with corresponding structures on the flanges, wherein the flange locking device is rotatable about the at least one rotatable shaft between a locking position where the inclined surfaces lock the flanges in the sealing contact with the housing, and an unlocking position where the inclined surfaces allow the flanges to move away from the housings.

In an advantageous embodiment the shafts are tubular shafts with an opening to the outside of the housing and have one or more radially through going holes at positions where the gears are provided on the shafts. In case of a leak the leaked product will flow through the radially through going holes into the interior of the associated shaft and out through the opening to the outside of the housing where the leaked product will be visible and proper action can be taken.

If desired, the device can have several exchangeable sections each with a pair of gears, an outlet and an inlet chamber, and when the several sections are stacked and assembled their individual inlet chambers together form the inlet chamber of the assembled device.

The invention also provides a method for dosing a product to a plurality of receptacles, the method using a dosing device according to the invention. The method comprises

- conveying a plurality of receptacles to respective positions for receiving dosed product from outlets of the dosing device,
- feeding the product to the inlet chamber of the dosing device,
- maintaining a pressure in the product within predefined pressure limits,
- monitoring the amount of product being dosed into the receptacles from the outlets by monitoring the rotation of the pairs of gears, and
- interrupting the inlet stream of the product to the inlet chamber when the amounts dosed into the receptacles reach a predefined amount.

The method according may further comprise operating a motor to rotate the pairs of gears in case a deviation in rotation of the gears relative to desired rotation is observed while the product is moving from the inlet chamber to the outlets.

BRIEF DESCRIPTION OF THE FIGURES

The present invention and in particular preferred embodiments thereof will now be described in more detail with regard to the accompanying figures. The figures show ways of implementing the present invention and are not to be construed as being limiting to other possible embodiments falling within the scope of the attached claim set.

Figure 1 is an isometric view of a device for splitting an inlet stream into a plurality of substreams according to an embodiment of the invention,

Figure 2 is a cross sectional view of the device shown in figure 1 along line A-A of figure 1,

Figure 3 is a cross sectional view of the device shown in figure 1 along line D-D of figure 1,

Figure 4 is a cross sectional view of the device shown in figure 1 along line B-B of figure 1,

Figure 5 is an isometric view of a device for splitting an inlet stream into a plurality of substreams according to another embodiment of the invention,

Figure 6 is a cross sectional view of the device shown in figure 5,

Figures 7 and 8 illustrate the principle of a mechanism useful for cleaning the device in figures 5-6.

DETAILED DESCRIPTION OF EMBODIMENTS

Although the present invention has been described in connection with the specified embodiments, it should not be construed as being in any way limited to the presented examples. The scope of the invention is set out by the accompanying claim set. In the context of the claims, the terms "comprising" or "comprises" do not exclude other possible elements or steps. Also, the mentioning of references in the singular form such as "a" or "an" etc. should not be construed as excluding a plurality. The use of reference signs in the claims with respect to elements indicated in the figures shall also not be construed as limiting the scope of the invention. Furthermore, individual features mentioned in different claims, may possibly be advantageously combined, and the mentioning of these features in different claims does not exclude that a combination of features is not possible and advantageous.

In the figures is shown a dosing device for receiving an inlet stream 1 of a product, such as ice cream or other edible or confectionery product, and splitting the inlet stream 1 into a plurality of substreams 2. The device has a housing 9 with a plurality of, here four, neighbouring housing sections 9a, 9b, 9c, 9d each accommodating a pair of gears 6.The housing 9 has an inlet 4 for receiving the inlet stream 1 within an inlet chamber 3 common to all housing sections. Each of the housing sections 9a, 9b, 9c and 9d has an outlet 5, where each outlet 5 is for outputting one of the plurality of substreams 2.

One gear 6 of each pair of gears 6 is mounted on a first common shaft 7 so as to be rotationally locked to the first common shaft 7, whereby all gears on the common shaft will rotate in synchronism. The other gear 6 of each pair of gears 6 is mounted on a second common shaft 8, and they may be rotationally locked to the second common shaft 8, or the second shaft may be fixed to the housing 9

and the gears will then be free to rotate on the second shaft 8. Partition walls 12 are sealed with gaskets against the housing 9, and the gears are sealed e.g. with O-rings against the partition walls 12 and/or to the respective first and second common shafts 7, 8, whereby the outlets 5 are sealed against fluid communication between outlets.

A motor 11 such as a stepping motor has a motor shaft connected to the first common shaft 7. The motor can be controlled to rotate the first common shaft 7 at a desired speed of rotation, or to block the rotation of the first common shaft 7, or to allow free rotation of the first common shaft 7. A rotation sensor 13 senses the rotation of the first common shaft 7. The rotation sensor 13 can be attached to or included in the motor 11. A controller coupled to the motor and to the rotation sensor can control the motor e.g. in dependence on rotation of the first common shaft 7 sensed by the rotation sensor 13. In case a deviation in rotation relative to expected or desired rotation is observed due e.g. to a solid inclusion in the ice cream, the motor can be controlled to restore and maintain the desired rotation for a period whereby the inclusion causing the deviation will be crushed between meshing teeth of the corresponding pair of gears. The tips of the teeth of the gears are preferably relatively sharp which will assist in cutting or crushing possible solid inclusions.

In use the device will receive an inlet stream 1 of a product, such as ice cream or other edible or confectionery product, through an inlet 4 in the housing 9, and the product will be received in the inlet chamber 3. When the product is e.g. ice cream the motor 11 can be controlled to allow the first common shaft 7 to rotate freely, whereby no or unsubstantial pressure is applied to the ice cream. The motor may also be controlled to gently assist the rotation of the gears to overcome possible friction and pressure drop in the device, whereby the product is protected from pressure variations.

Preferably, a pressure sensor P is arranged e.g. in connection with the inlet chamber 3 to sense the pressure in the product in the inlet chamber. The sensed pressure is fed to a controller, e.g. in connection with the motor 11 in a feedback loop to control the motor 11 to keep the sensed pressure within predetermined

acceptable limits. The pressure in the product can be sensed at other locations in the device than in the inlet chamber.

From the inlet chamber 3 the product will move to each of the outlets 5 in interaction with the pairs of gears 6 and cause the gears to rotate. Since one of each pair of gears is rotationally locked to the first common shaft 7 all pairs of gears will rotate in synchronism. In the shown embodiment all gears are identical, and the substreams 2 will therefore be at least substantially identical with very low standard deviation.

In figure 4 is shown that the first and second common shafts 7 and 8 are hollow. Both hollow shafts have through going holes 10 in their walls. If the sealing of the gears 6 against the partition walls 12 or the tubular shafts fails then the ice cream will leak through the holes 10 and escape from an open end of the tube as indicated by an arrow where the leaking ice cream can be readily observed and proper measures can be taken. Preferably both the first and second common shafts 7 and 8 are hollow and have such through going holes for this purpose.

If different substreams of the product are desirable the size and in particular the diameter and/or the axial length of the gears can be correspondingly varied.

If desired, the same device may also be used for receiving a plurality of inlet streams in the "outlets" 5, 105 and joining and mixing the inlet streams in predefined proportions into a single stream leaving the device through the "inlet" 4, 104. The mixed product will have a well-defined composition of the input streams.

In figures 5 and 6 is shown another embodiment with an inlet 104 for receiving an inlet stream 101 of a product. A plurality of housings 109, in the illustrated embodiment two housings 109 are shown, each has a central gear 114 meshing with a plurality of peripheral gears, here three peripheral gears 106a, 106b and 106c are shown. The inlet stream 101 of the product enters and fills an inlet chamber 103 which branches into a plurality of sub inlet chambers 103a, 103b and 103c where inlet sub streams 101a, 101b and 101c are fed to respective pairs of meshing gears, where the central gear 114 meshes with each of the three

peripheral gears 106a, 106b and 106c. Thus, three pairs of meshing gears are formed where each pair includes the central gear 114.

In figure 5 two housings 109 are shown, but the device can have any suitable number of such housings. Three pipes 115 (only one is visible in the drawing) interconnect the sub inlet chambers 103a, 103b and 103c of the housings for leading the corresponding inlet sub streams 101a, 101b and 101c to each of the housings.

A gearbox 111 includes a controller and a motor and may also have a rotation sensor 113. The gearbox 111 houses a set of gears with a structure corresponding to the structure shown in figure 6, and common shafts corresponding in number to the number of gears in each housing, in figure 5 two common shafts 107 and 108 are visible, carry respective ones of the gears in the housings. Here, too, a pressure sensor P is arranged e.g. in connection with the inlet chamber 103 to sense the pressure in the product in the inlet chamber. The sensed pressure is fed to a controller, e.g. in connection with the motor 111 in a feedback loop to control the motor to keep the sensed pressure within predetermined acceptable limits.

The function of the device in figures 5 and 6 is much like the function of the device in figures 1 to 4. The inlet stream 101 of the product enters the inlet chamber 103 and branches into the sub inlet chambers 103a, 103b and 103c.

The inlet sub stream 101a is fed to the pair of gears 106a, 114 where it is branched and follows the teeth of both gears and reaches the two outlets 102a and 102c. Corresponding applies to the inlet sub streams 101b and 101c. Thus, each inlet sub stream is branched, and each outlet 105a, 105b and 105c outputs an outlet sub stream 102a, 102b, 102c originating from two inlet sub streams.

Some products have properties that allow them to have a pressure high enough to drive the pairs of gears and arrive at the outlets 105, but with pressure sensitive products such as ice cream and other confectionery products it is advantageous to have the motor 113 drive the gearbox and the gears in the housings 109 in synchronism in dependence on the sensed pressure in the product whereby

unwanted pressure changes are avoided. A gearbox may also be used in the embodiment in figures 1-4 to drive both common shafts 7 and 8.

When the product is ice cream or other shear sensitive product is advantageous to operate the motor to drive all the gears in the housings 9, 109 in synchronism and at a proper speed and in dependence on the sensed pressure in the product. Hereby the forces acting on the teeth of the gears in the housings are reduced to a minimum and the shear forces acting on the product are reduced correspondingly.

In figures 7 and 8 is illustrated the principle of a mechanism useful for cleaning the device in figures 5-6. These figures show two neighbouring housings 109 with the common shaft 107 extending through both housings, and two pipes 115 for leading the product from one housing to the other. In figure 7 a pair of flanges 116 are held against the opposing end faces of the housings 109. A cylindrical locking device 118 is rotatable on the shaft 107 and has a pair of protruding inclined ridges 119 cooperating with corresponding structures 117 on the flanges 116.

I figure 7 the cylindrical locking device 118 is in a locking position where the inclined surfaces 119 lock the flanges 116 in the sealing contact with the housing, and in figure 8 the cylindrical locking device 118 is rotated into an unlocking position where the inclined surfaces 119 allow the flanges to move away from the housings for cleaning the interior of the housings 109.

Claims

1. A dosing device for receiving an inlet stream (1, 101) of an aerated confectionery product and splitting the inlet stream (1, 101) into a plurality of outlet sub streams (2, 102), the device comprising a housing (9, 109), the housing having

- an inlet chamber (3, 103) with an inlet (4, 104) for receiving the inlet stream (1, 101) of the product within the inlet chamber (3, 103),
- a plurality of outlets (5, 105), each outlet (5, 105) for outputting one of the plurality of outlet sub streams (2, 102), each outlet (5, 105) having associated therewith a pair of meshing rotatable gears (6, 106, 114), where rotation of the gears (6) is proportional to a portion of the product moving between the inlet chamber (3, 103) and the associated outlet (5, 105), the gears (6, 106, 114) of the plurality of outlets (5, 105) being locked to rotate in synchronism, and
- a motor (11, 111) controllable to control the rotation of the gears (6, 106, 114) so as to maintain the pressure in the product within predefined pressure limits.

2. A dosing device according to claim 1 wherein a rotation sensor (13) is arranged to sense rotation of the gears (6, 106, 114), and the motor (11, 111) is controllable to control the rotation of the gears (6, 106, 114) in dependence of the sensed rotation of the gears so as to maintain the rotation of the gears (6, 106, 114) within predefined limits.

3. A dosing device according to claim 1 wherein a pressure sensor (P) is arranged to sense a pressure in the product, and the motor (11, 111) is controllable in dependence on the sensed pressure.

4. A dosing device according to any one of the preceding claims wherein each pair of meshing rotatable gears includes a common central gear (114) meshing with one of a plurality of peripheral gears (106).

5. A dosing device according to any one of the preceding claims wherein the motor (11, 111) drives all the gears (6, 106, 114) in synchronism.

6. A dosing device according to any one of the preceding claims wherein the motor drives, via a gearbox, a plurality of shafts which drive each gear of all pairs of gears directly.

7. A dosing device according to any one of the preceding claims wherein the cross sections of the inlet and of the outlets and the gears are dimensioned to maintain a constant pressure in the product throughout the device.

8. A dosing device according to any one of the preceding claims comprising a plurality of housings (109) with at least one rotatable shaft (107, 108) interconnecting corresponding gears in the housings, and at least one pipe (115) establishing fluid connection for the product between the housings (109).

9. A dosing device according to claim 8, wherein each housing (109) has a flange (116) in sealing contact with the housing and the at least one rotatable shaft (107, 108) so as to confine the product within the housing, where the flange is movable away from the housing so as to leave a space between the housing and the flange allowing cleaning of the interior of the housing.

10. A dosing device according to claim 9 having two or more housings (109) and at least one rotatable shaft (107, 108) interconnecting corresponding gears in the housings (109), wherein a flange locking device (118) is arranged on the at least one rotatable shaft (107, 108), the flange locking device (118) having a pair of inclined surfaces (119) cooperating with corresponding structures (117) on the flanges (116), the flange locking device (118) being rotatable about the at least one rotatable shaft (107, 108) between a locking position where the inclined surfaces (119) lock the flanges (116) in the sealing contact with the housing, and an unlocking position where the inclined surfaces (119) allow the flanges to move away from the housings.

11. A dosing device according to claim 9 wherein the shafts (7, 8) are tubular shafts having openings to the outside of the housing (9, 109) and one or more radially through going holes (10) at positions where the gears are provided on the shafts (7, 8).

12. A dosing installation for dosing a stream of an aerated confectionery product into a plurality of receptacles, the dosing installation comprising one or more dosing devices according to any of the preceding claims.

13. A method for dosing an aerated confectionery product to a plurality of receptacles, the method using a dosing device according to any of the preceding claims 1-11, the method comprising

- conveying a plurality of receptacles to respective positions for receiving dosed product from outlets (5, 105) of the dosing device,
- feeding the product to the inlet chamber (3, 103),
- maintaining a pressure in the product within predefined pressure limits,
- monitoring the amount of product being dosed into the receptacles from the outlets (5, 105) by monitoring the rotation of the pairs of gears (6), and
- interrupting the inlet stream of the product to the inlet chamber (3, 103) when the amounts dosed into the receptacles reach a predefined amount.

14. A method according to claim 13, wherein the method further comprises operating a motor (11) to rotate the pairs of gears (6) in case a deviation in rotation of the gears (6) relative to desired rotation is observed while the product is moving from the inlet chamber (3, 103) to the outlets (5, 105).

15. Use of a device according to any one of claims 1-11, a dosing installation according to claim 12 or a method according to claim 13 or 14 for dosing an aerated edible or confectionery product.

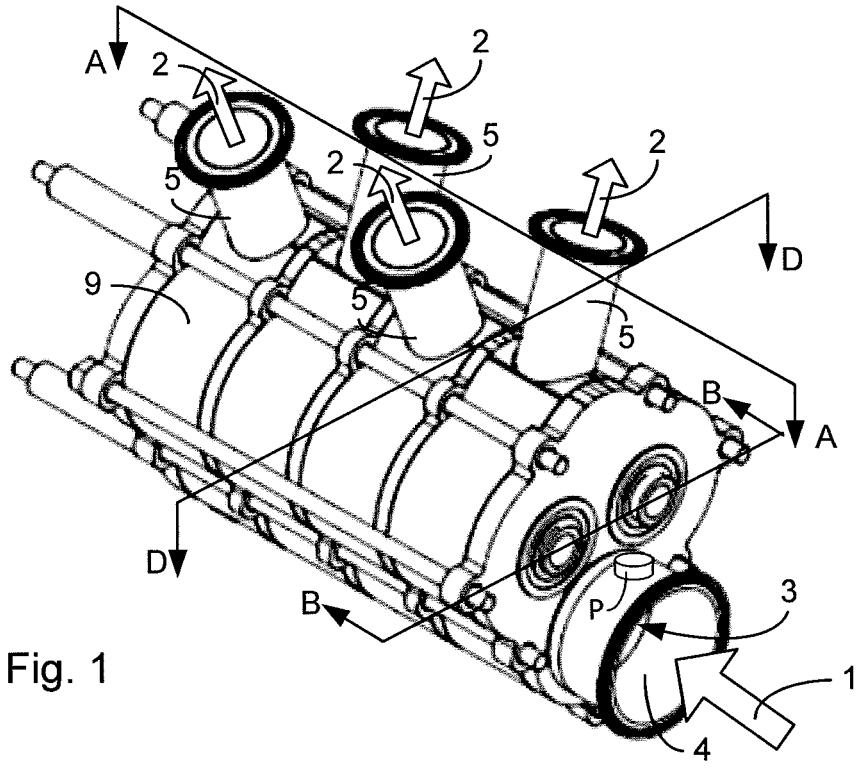

Fig. 1

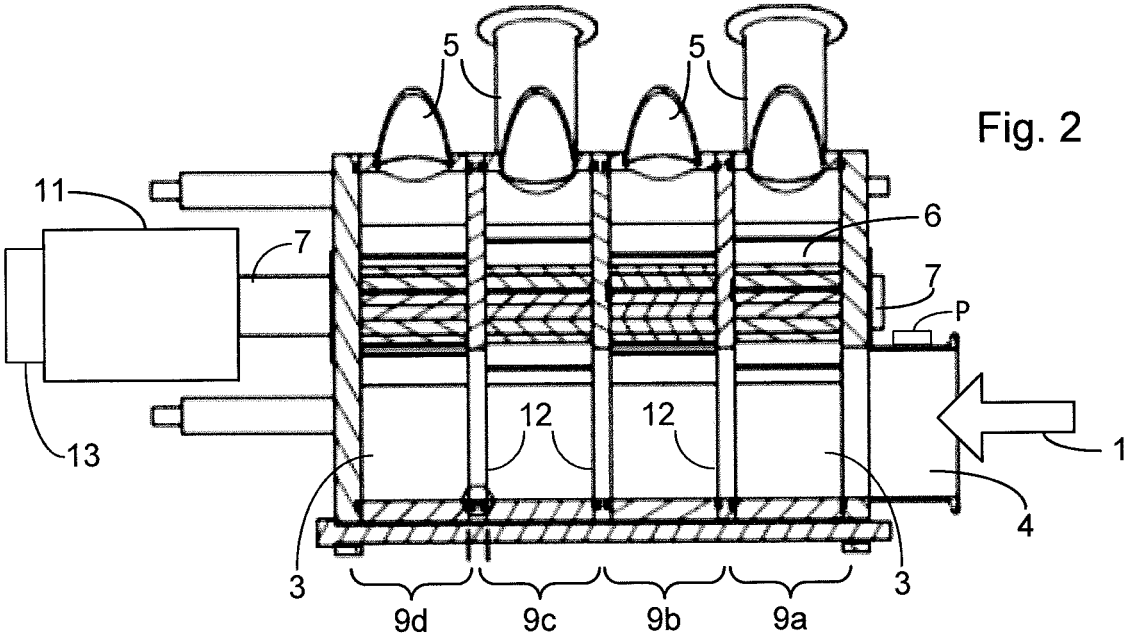

Fig. 2

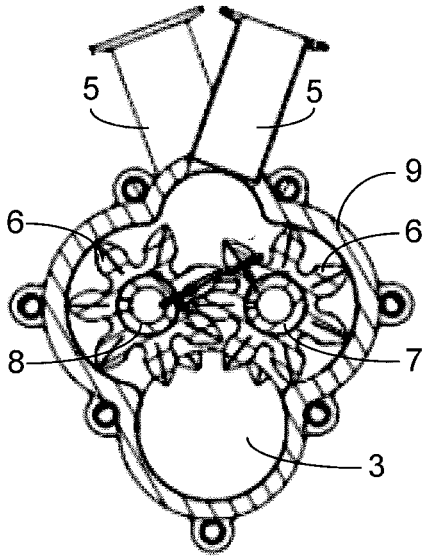

Fig. 3

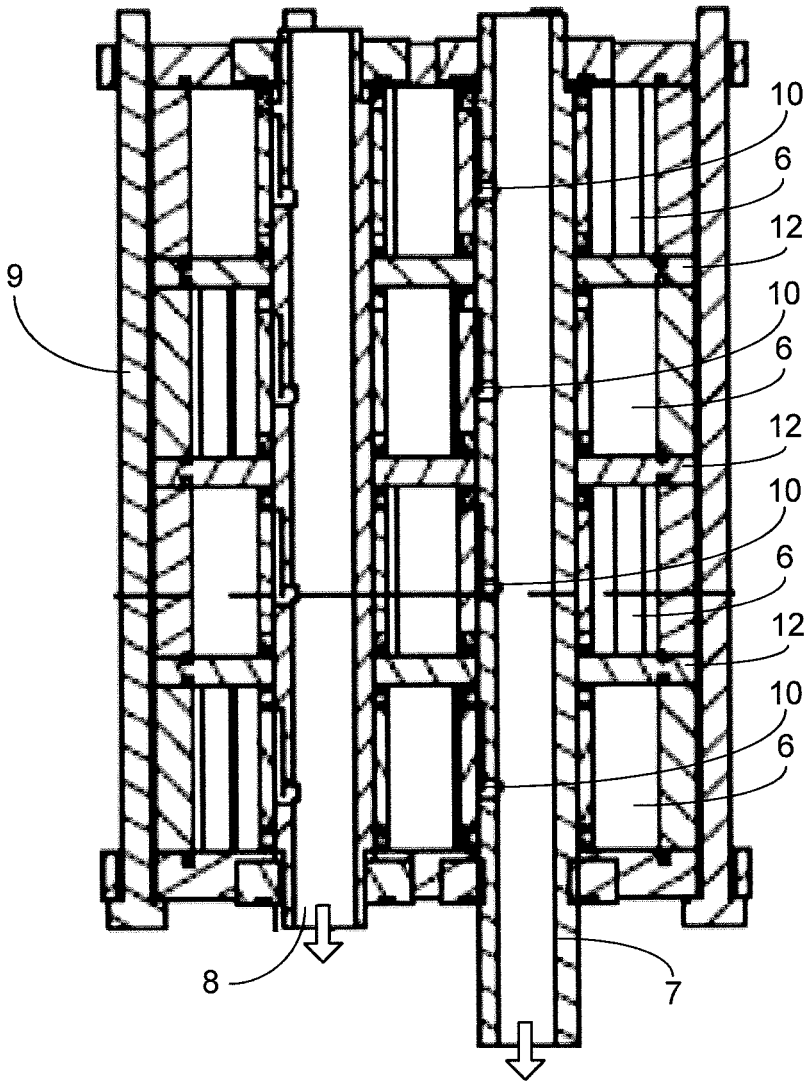

Fig. 4

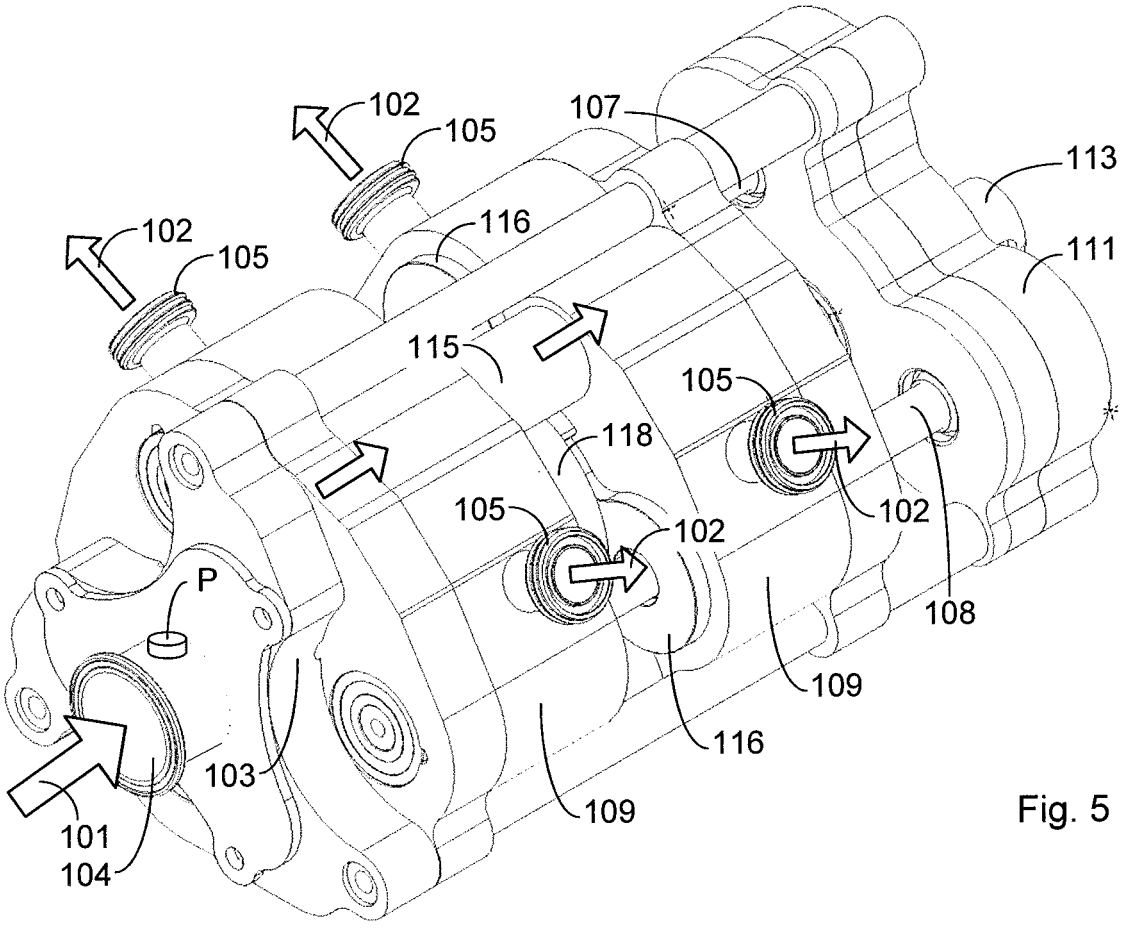
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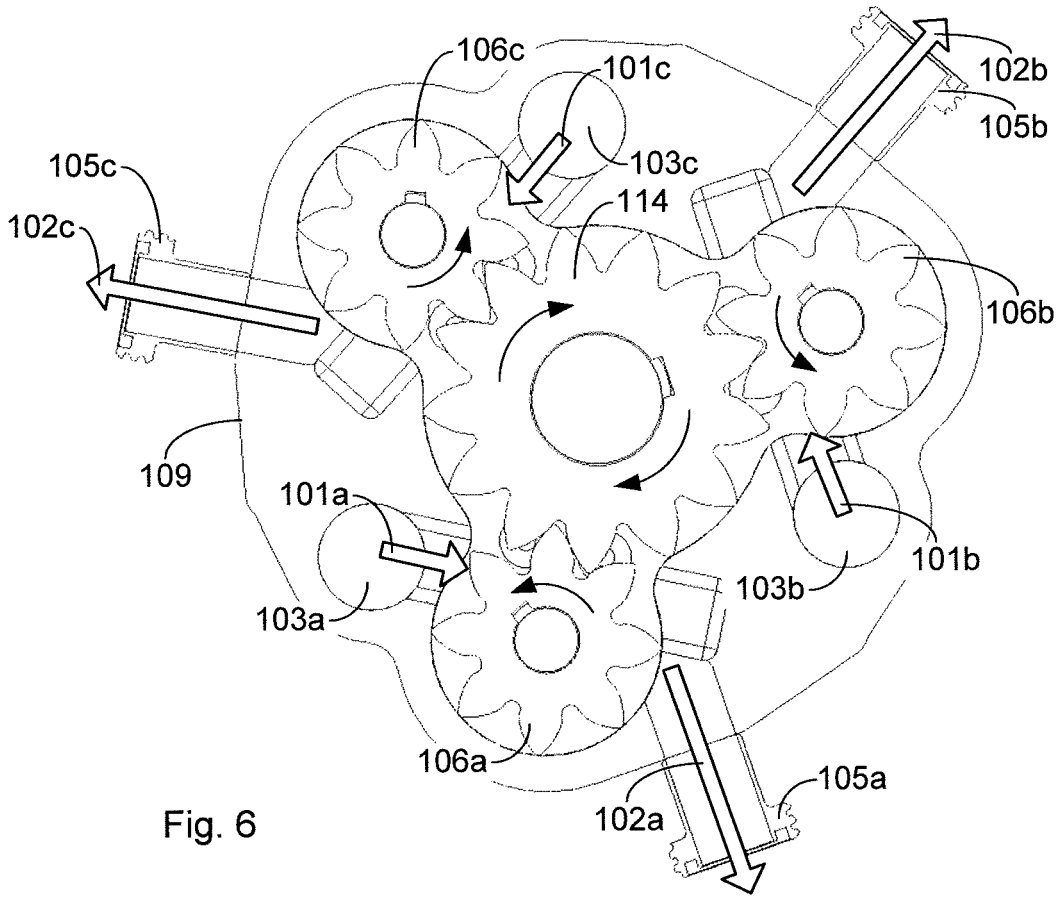
Fig. 5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105b
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102a

Fig. 6

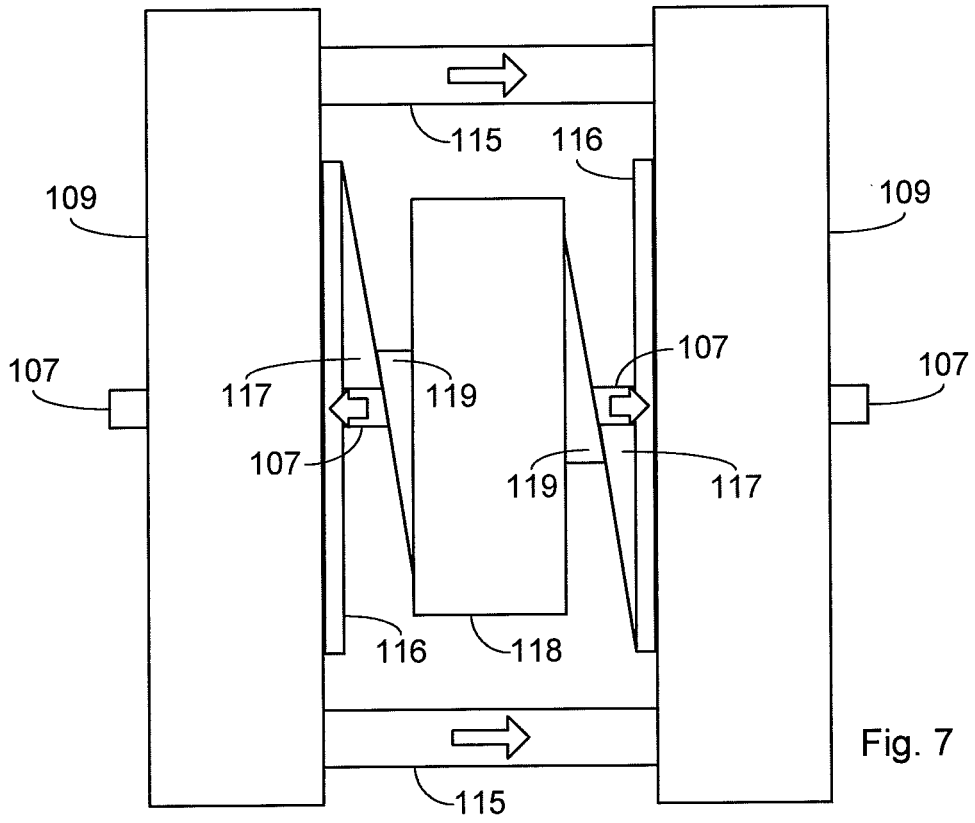
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Fig. 7

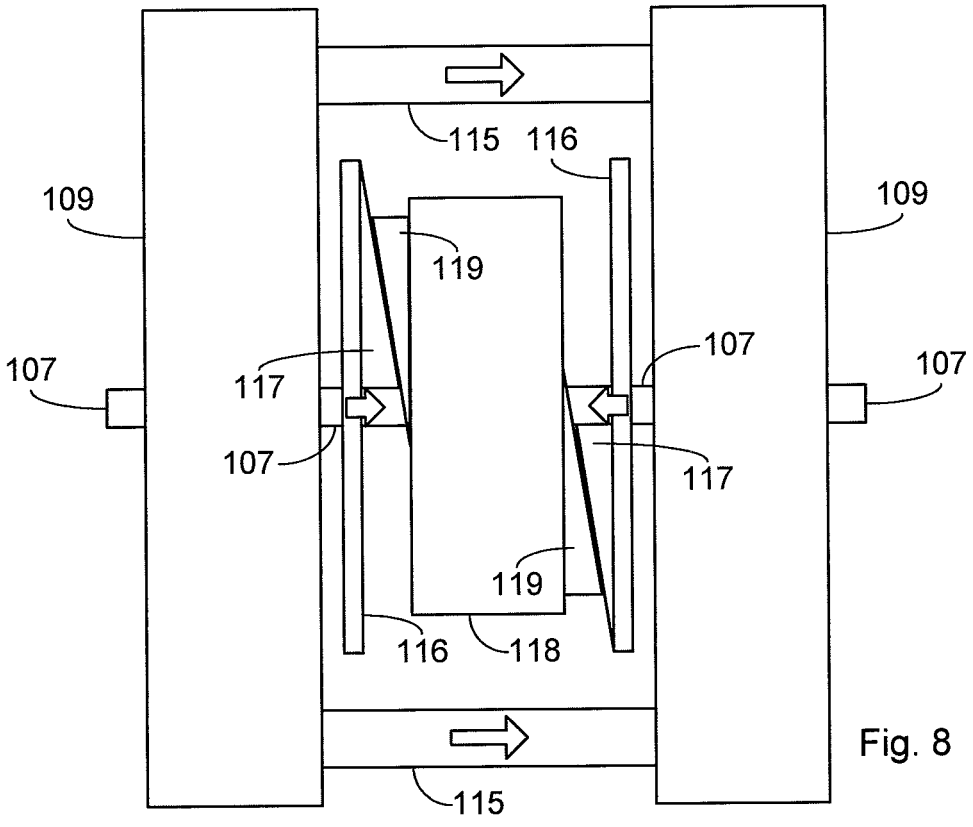
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Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/068050

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23G9/28 A23G1/20
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 practicable, search terms used)
EPO-Internal, WPI Data, COMPENDEX, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	EP 0 820 817 A2 (NORDSON CORP [US]) 28 January 1998 (1998-01-28) column 3, line 43 - column 4, line 58 figures 1-3	1-9, 12-15 10,11
A	US 2 291 578 A (JOHNSON JAMES P) 28 July 1942 (1942-07-28) figures 1-3 page 1, left-hand column, lines 1-6 page 1, left-hand column, line 7 - page 2, right-hand column, line 10	1-15
Y A	EP 1 034 912 A1 (MURATA MANUFACTURING CO [JP]) 13 September 2000 (2000-09-13) figure 5 paragraph [0038]	1-9, 12-15 10,11

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 October 2013	24/10/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Götz, Michael

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/068050

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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