



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.01.2007 Bulletin 2007/01

(51) Int Cl.:
B65B 3/12 (2006.01) **B65B 3/32** (2006.01)
B65B 25/00 (2006.01)

(21) Application number: **06013215.6**

(22) Date of filing: **27.06.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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(30) Priority: **27.06.2005 DK 200500947**

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(54) **Filling machine, method and use hereof**

(57) The invention relates to a filling machine (1) for the filling of an amount of edible ice into a container (2). The machine comprises: space for containing said edible ice, filling unit (6), which contains a piston (4) and a volume (13) with at least one inlet (11) and at least one outlet (14), where these create connections respectively to said space and container for the filling unit, and at least one valve. The said least one valve is an integrated part of said filling unit (6).

The invention also relates to a method for the filling of an amount of edible ice into a container (2) with a filling machine (1), and the use hereof.

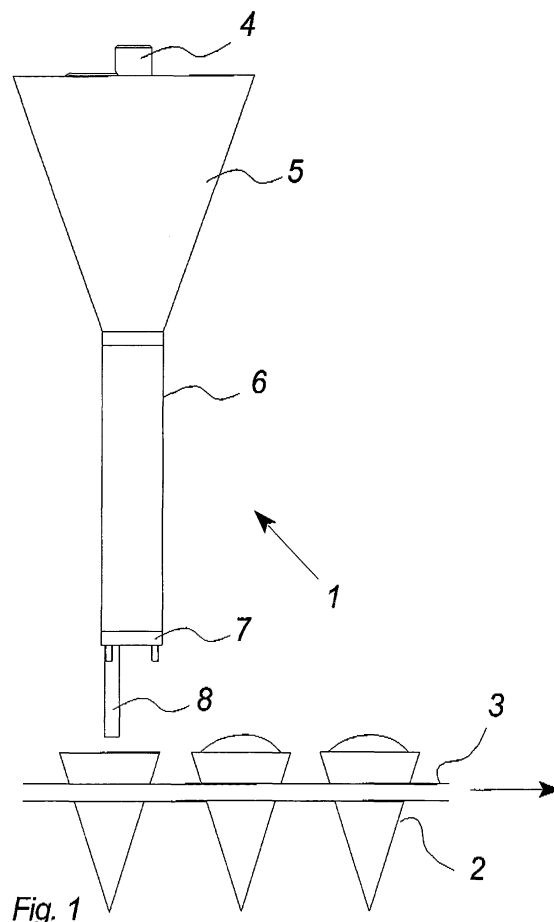


Fig. 1

Description

The scope of the invention

[0001] The present invention relates to a filling machine for the filling of an amount of edible ice or an amount of a mixture which contains edible ice into a container in accordance with the preamble of claim 1, a method and use hereof.

Prior art

[0002] It is known to measure out a predetermined amount of edible ice in connection with transfer to a cup, ice boats, cone, freezing pockets or other similar containers.

[0003] Existing techniques for the measuring out and distribution of edible ice contains e.g. a piston and a cylinder for driving the mass forwards, and subsequent valves for opening and closing in the transfer of the edible ice, where the opening time and frequency of the valve determine respectively the volume of the edible ice which is distributed and containers which can be filled.

[0004] The independent functions make it complicated to get the individual components to work together, which makes this a troublesome and expensive process to establish. Moreover, several independent movable parts give rise to a greater uncertainty in the amount of edible ice which is measured and distributed in each case, which is undesirable when the demand is for many portions of sizes corresponding to one another. Also, a frequent cleaning of the components is necessary in order to ensure operational reliability, which is troublesome and delays the process.

[0005] The object of the invention is to create a filling machine for edible ice which does not involve the problems for the above-mentioned known technique. It is especially an object of the invention to create a filling machine with a simple and efficient construction. It is also an object of the invention to create an operationally reliable filling machine which doses the edible ice quickly and precisely into cups, ice boats, cone, freezing pockets and other similar containers.

Brief description of the invention

[0006] The invention comprises a filling machine where at least one valve is an integrated part of the filling unit.

[0007] The present invention solves the above-mentioned problems with the known technique by providing a filling machine for edible ice which has integrated filling/pumping and valve mechanism in one unit. It is hereby possible to create a filling machine with a simple and efficient construction.

[0008] With one embodiment, the piston is connected to drive means which can drive the piston to describe both linear and rotational movements, where the move-

ments are simultaneous or one after the other, and each from a first position to a second position and vice versa. With the rotational movement of the piston, an advantageous possibility is achieved of being able to integrate a further functionality in the filling machine in addition to the pumping of the edible ice forwards to a container.

[0009] With one embodiment, at least a part of the piston has a circular cross-section and at least one longitudinal narrowing-down in the shape of the piston such as a notch or a groove in relation to the circular cross-section. Hereby opens possibility of defining a passage between the volume and the inlet or outlet when the piston moves in the volume, and herewith creating an advantageous, integrated filling/pumping and valve mechanism.

[0010] It shall be noted that the piston can be provided with other mechanisms than a narrowing-down for creating a valve mechanism in connection with the filling unit.

[0011] With one embodiment, the narrowing-down (12) in the shape of the piston can be up to 90 % of the cross-sectional area of the piston, such as up to half and e.g. between 20 and 40 % of the cross-sectional area of the piston. Hereby advantageous relations are achieved between the following conditions: distance that the piston has to rotate, necessary precision of the rotational movement and complete closing of the inlet or outlet and production of the piston. In particular there is also achieved a sufficiently large passage so that plugs of edible ice are avoided.

[0012] With one embodiment, the piston is provided with mixing means such as one or more projections placed on that part of the piston which is moved in said space. It is hereby possible to utilise the piston movement also for stirring the edible ice and for the stirring of other ingredients such as pieces of fruit, chocolate, nuts or other firm or fluid ingredients into the edible ice.

[0013] With one embodiment, the openings for said at least one inlet and at least one outlet in said volume are placed at the same or substantially the same level.

[0014] With one embodiment, the maximum amount of said volume corresponds to the amount of edible ice which is desired to be transferred to the container.

[0015] With one embodiment, said narrowing-down has a length which at least corresponds to the distance from the bottom of said volume to the openings for said least one inlet and/or least one outlet.

[0016] With one embodiment, said space, apart from said inlet, is e.g. a space closed with a cover where pressure can be applied to this closed space with pressure-creating means. There can hereby be created an overpressure in the space which presses edible ice or ice cream with higher viscosity more efficiently through the filling machine when this is allowed by the position of the piston.

[0017] The invention also comprises a method for use in connection with the filling machine.

[0018] With one execution of method, a rotation of a piston in the filling machine respectively opens and closes for a passage selected between inlet and outlet for

edible ice to or from the filling machine's volume, while a linear movement of the piston presses edible ice for the volume through the passage for outlet.

[0019] With a second execution of method, a narrowing-down in the piston establishes said passage for inlet or outlet after the rotation of the piston from a first position to a second position.

[0020] With a further execution of method, a linear movement for pressing ice mass out of said volume is followed by a shorter linear movement in the opposite direction before a rotation of the piston. It is hereby possible to suck a possible remainder of edible ice out of the outlet so that this does not drip out of the filling machine.

The drawings

[0021] In the following, the invention is explained in more detail with reference to the drawings, where

fig. 1 shows a side view of an embodiment of a filling machine for edible ice according to the invention,

fig. 2 shows the filling machine from fig. 1 as seen from above, and in particular the filling machine's funnel containing a space for edible ice,

fig. 3 shows a cross-section of an embodiment of a filling machine for edible ice with a piston in a first end position,

fig. 4 shows a cross-section of the filling machine from fig. 3 with the piston in the second end position,

fig. 5a and 5b show the cross-section of primarily the filling unit and the piston in a first and second embodiment,

fig. 6a and 6b show the cross-section of primarily the filling unit and the piston in different positions during use and the course of the edible ice in same,

fig. 7 shows a part of the filling machine according to the invention with mixing means for the stirring of the edible ice by the piston movements,

fig. 8 shows the funnel with a cover for creating a closed space for the edible ice,

fig. 9a to 9c show an embodiment of the piston for use in the filling machine according to the invention,

fig. 9d to 9f show further embodiments of the piston for use in the filling machine according to the invention, and

fig. 10a and 10b show the mode of operation for an alternative embodiment of the filling machine according to the invention.

Detailed description of the invention

[0022] Fig. 1 shows a filling machine 1 for measuring-out and transfer of predetermined amounts of edible ice to containers 2 which pass under an outlet pipe 8 for the machine. In the figure, the containers are shown as cones which are fed successively under said outlet pipe by a conveyor belt 3. In addition to cones, the containers can also be other forms of containers for edible ice such as ice boats, ice cups or freezing pockets and paper or plastic packaging for edible ice.

[0023] A freezing pocket forms part of a mould unit for ice mass. The mould unit is hollow, where a coolant runs in the inside while a part of the surface consists of a number of moulds called freezing pockets. The freezing pockets are filled with edible ice, after which the coolant transfers cold through the material in which the freezing pockets are formed and herewith ensures a quick freezing-down of the edible ice. After the freezing-down, each edible ice items can be removed from their freezing pockets.

[0024] The filling machine 1 further consists of a funnel 5 secured on top of a filling unit 6, which at the bottom terminates with a bottom-plate 7 and the earlier-mentioned outlet pipe 8. In the figure it is also shown that the end of a piston 4 protrudes out from the funnel 5.

[0025] Fig. 2 shows the filling machine 1 seen from above. At the top the funnel is shown with a quadratic shape and at the bottom with a rectangular shape, whereby a space is formed for the edible ice. In the lowermost surface in the funnel there is an opening 9 for an inlet to the filling unit 6. In the figure it is also shown that the uppermost part of the piston 4 is provided with an arm which works as an engagement 10 for a driving means for the piston, which will be explained in more detail in the following.

[0026] The funnel 5 can be formed with a side length of at least 150 mm in the uppermost cross-section, such as 200 mm, with side lengths respectively at least 40 mm and at least 50 mm in the lowermost cross-section, such as 50 respectively 60 mm.

[0027] The piston 4 mainly has a circular cross-section with a diameter of at least 20 mm and a length of at least 350 mm, such as 30 respectively 450 mm.

[0028] Figs. 3 and 4 show cross-sections of an embodiment of the filling machine 1. It is shown that the piston 4 is placed in the centre of the filling machine 1, and with a linear movement can be moved forwards and backwards in the longitudinal direction between two end positions, The two end positions for the piston are both placed in the filling unit 6 which is also shown with a volume 13 which varies in size with the movement and position of the piston. The filling unit is provided with an inlet 11 which has the opening 9 in the bottom of the space of the funnel, and an outlet 14 which has an opening 15 in the end of the outlet pipe 8 over a container.

[0029] Moreover, the inlet and the outlet have openings 21, 22 which can be in contact with the volume 13

through a narrowing-down 12 in a lowermost part of the side of the piston.

[0030] In the first end position shown in fig. 3, the piston 4 has been moved down to a position immediately above the bottom plate 7, so that the volume 13 is as small as possible. At the same time, the narrowing-down 12 is positioned so that there is a passage from the space with the edible ice through the inlet 11 and the narrowing-down 12 to the volume 13. The volume will thus be filled up with edible ice when the piston 4 moves upwards. It is also shown in the figure that the opening 22 for the outlet 14 is closed by the normal shape of the piston, and thus that there is no passage for edible ice from the volume to the outlet.

[0031] In the second end position of the piston 4 as shown in fig. 4, the piston is rotated a half a turn after it has been raised linearly to the end position. The opening 21 for the inlet is hereby now closed and the supply of edible ice is stopped. At the same time, a passage is created from the volume 13 to the outlet through the narrowing-down 12 and thus further to the container when the piston is moved linearly downwards.

[0032] The end positions from figs. 3 and 4 are naturally defined by the bottom plate 7 and by the placing of the openings 21, 22 for inlet and outlet 11, 14. The piston 4 will not be raised over the openings, since there would otherwise be passage between inlet and outlet and thus no valve mechanism.

[0033] In figs. 3 and 4 the openings 21, 22 for inlet and outlet 11, 14 are shown as placed opposite each other, i.e. at the same level and displaced horizontally 180 degrees in the wall of the circular inside of the filling unit 6 in which the piston 4 is moved. However, it must be noted that alternative embodiments of the invention can comprise other angles and different levels for inlet and outlet.

[0034] In fig. 4 it is also illustrated how driving means 16a, 16b are connected to the piston 4, including to the arm 10 (as shown in fig. 2), so that the piston can describe linear and rotational movements. The drive means can, among other things, be electric, pneumatic or hydraulic actuators, where the piston's movements e.g. are controlled with end stops.

[0035] Figs. 5a to 5b show cross-sections primarily of the filling unit and the piston in a first and a second embodiment.

[0036] Fig. 5a corresponds to an enlarged section of the filling unit shown in fig. 3, where in fig. 5a it is particularly shown that the piston is to be moved linearly upwards.

[0037] The inlet in the filling unit is shown as a closed passage down to an opening for inlet to the circular inside of the filling unit. The inlet can, e.g., be a vertical passage which is drilled down into the filling unit with said opening in the side.

[0038] Fig. 5b shows an alternative embodiment for fig. 5a, where the inlet is shown as a slit which is open in towards the circular space in the filling unit. The inlet can, e.g., be a vertical milling in the filling unit's inner side

in towards the piston.

[0039] Figs. 6a and 6b show cross-sections of the embodiment from fig. 5a during different positions of the piston 4. The figures also illustrate the course of the edible ice primarily in the filling unit during use of the filling machine.

[0040] Fig. 6a shows the linear movement of the piston 4 upwards after a passage has been created through the inlet 11 and the narrowing-down 12 to the volume 13 for the edible ice 17 in the space 5. By the movement of the piston, there thus occurs a filling of the volume 13 with the edible ice 17 from the space 5, where the path of the edible ice is shown with thick arrows and black colour in the volume. At the same time, it is shown that the opening 22 for the outlet 14 is closed by the piston 4, so that the edible ice can not come further from the volume 13 during this upwards movement.

[0041] Fig. 6b shows the linear movement of the piston 4 downwards after the movement in fig. 6a has reached its end the end position and the piston is rotated a half turn. By the rotation, passage was created from the volume 13 through the narrowing-down 12 to the outlet 14, and thus finally to the container. At the same time, the opening 21 for the inlet 11 has been closed, so that no further flow of edible ice from the space 5 to the volume 13 can take place during this downwards movement. By the movement downwards, the piston 4 will little by little press the edible ice out of the volume 13 through the narrowing-down 12 in the piston and the outlet 14.

[0042] Since the volume 13 becomes completely filled with edible ice by the upwards movement, the downwards movement of the piston will result in a transfer of a defined or measured amount of edible ice to the container under the outlet pipe 8.

[0043] Fig. 7 shows a cross-section of the funnel and the space 5 containing edible ice 17 or a mixture of edible ice and additional firm or liquid ingredients such as pieces of fruit, chocolate, nuts or the like. The part of the piston 4 in the space has fastened mixing means 18a, 18b for creating movement in the edible ice when the piston is in movement.

[0044] The figure shows the means as two displaced plates which are secured at right-angles to the piston, where especially the linear movement of the piston will create movement in the edible ice, and thus stir the edible ice and mix possible further ingredients into the edible ice before it continues down into the filling unit. This movement and stirring are illustrated in the figure with the two thick arrows.

[0045] The mixing means can also consist of plates, blades, rods or the like attached to the piston 4, where these are angled in relation to the horizontal plane. It is hereby also possible to take advantage of the rotating/linear movements of the piston to create movement in the edible ice.

[0046] Fig. 8 shows the funnel 5 provided with a cover 19. Since the funnel can be tightly sealed, apart for the opening 9 for the inlet, it is possible with pressure-creat-

ing means 20 to create an overpressure in the space. The edible ice can hereby be pressed through the inlet to the volume for the filling unit and sucked, due to the pressure difference, and thus not only be directed forwards by the force of gravity. The use of overpressure in the space will particularly be useful and expedient with edible ice of a more viscous kind.

[0047] Figs. 9a to 9c show an embodiment for the piston 4 where particularly the narrowing-down 12 in the lowermost part is shown and defined in more detail.

[0048] Fig. 9a shows the piston 4 seen from the side and in its full length. Also shown in the lowermost part of the piston is the narrowing-down 12, where this is defined with a length 1 and a thickness x in relation to the piston's cross-sectional diameter d.

[0049] Fig. 9b shows the cross-section of the piston at the cut-through line A - A and seen in the direction towards the uppermost end of the piston.

[0050] Fig. 9c shows the cross-section of the piston at the cut-through line A — A and seen in the direction towards the lowermost end of the piston. In this figure it is particularly clearly shown how a section is removed from the piston's circular cross-section. However, other forms of narrowing-down in the piston can be envisaged, including hollowing-out of the piston as exemplified in figs. 9d to 9f.

[0051] The thickness x will most often be between 20 and 40 % of the piston's area in order to create a suitable passage for the edible ice, but in special embodiments can be right up to 80-90 %. The diameter d of the piston can, e.g., be 30 mm at a length of 450 mm for the piston as a whole.

[0052] Fig. 9d shows a further embodiment of the piston for use in the filling machine according to the invention, where the piston's narrowing-down 12 ends in a protruding bottom part with a hole in it.

[0053] Figs. 9e and 9f show other embodiments of the piston with narrowing-down seen in the direction towards the uppermost end of the piston. In the upper figure, the narrowing-down is shown with a relatively open hollowing-out, and while the lower figure shows a much closed hollowing-out. With the shown embodiments, the narrowing-down will take up a large part of the piston's circular cross-section.

[0054] Figs. 10a and 10b show an alternative embodiment of the filling machine 1, where the filling unit 6 containing the piston 4 is placed at right-angle to the funnel 5 and inlet and outlet 11, 14.

[0055] The functionality of this alternative embodiment is fundamentally the same as mentioned above in connection with figs. 3 to 6b. For example, fig. 10a shows the piston in an end position corresponding to that shown in fig. 3, while fig. 10b shows the piston in an end position corresponding to that shown in fig. 4.

[0056] It shall be noted that the filling machine will most often be one among several filling machines placed side by side for simultaneous feeding of a number of containers which are conveyed successively by means of a con-

veyor belt or the like.

List

5 [0057]

1. Filling machine
2. Container such as an ice cone or boat for edible ice
3. Conveyor belt for containers
- 10 4. Piston
5. Funnel with space for edible ice
6. Filling unit
7. Bottom piece in filling unit
8. External outlet pipe
- 15 9. Opening for inlet in the space
10. Arm or engagement for driving means for rotational movement
11. Inlet
12. Narrowing-down in the piston
- 20 13. Volume in the filling unit
14. Outlet
15. Opening for outlet towards container
- 16a/16b Means for driving the piston in its linear and rotational movement
- 25 17. Mixture of edible ice
- 18a/18b Mixing means for edible ice in the funnel
19. Cover for the funnel and the space for edible ice
20. Means for creating pressure
- 30 21. Opening for inlet towards the volume
22. Opening for outlet towards the volume
- d. Diameter of the piston
1. Length of the narrowing-down in the piston
- x. Thickness of the piston at the narrowing-down

Claims

1. Filling machine (1) for filling of an amount of edible ice or an amount of mixture containing edible ice into a container (2) such as an ice cone or a freezing pocket, where said machine comprises:

space (5) for containing said edible ice, filling unit (6) which contains a piston (4) and an associated volume (13) with at least one inlet (11) and at least one outlet (14), where these respectively form connections to said space and container in the filling unit

characterised in that

the piston (4) is connected to drive means (16a, 16b) which can drive the piston (4) to describe both linear and rotational movements hereby integrating a valve functionality in the filling machine (1) by opening and closing passages between the volume and the inlet and the outlet, respectively.

2. Filling machine (1) according to claim 1, wherein the

linear and rotational movements of the piston (4) are simultaneous, and each from a first position to a second position and vice versa.

3. Filling machine (1) according to claim 1, wherein the linear and rotational movements of the piston (4) are one after the other, and each from a first position to a second position and vice versa. 5
4. Filling machine (1) according to one or more of the claims 1 to 3, characterised in that at least a part of the piston (4) has a circular cross-section and at least one longitudinal narrowing-down (12) in the shape of the piston, such as a notch or an undercut in relation to the circular cross-section. 10
5. Filling machine (1) according to claim 4, **characterised in that** the narrowing-down (12) in the shape of the piston can be up to 90% of the cross-sectional area of the piston, such as up to half and e.g. between 20 and 40 % of the cross-sectional area of the piston. 15
6. Filling machine (1) according to one or more of the claims 1 to 5, characterised in that the piston (4) is provided with mixing means such as one or more projections (18a, 18b) placed on that part of the piston which is moved in said space (5). 20
7. Filling machine (1) according to one or more of the claims 1 to 6, characterised in that the openings (21, 22) for said least one inlet and at least one outlet (11, 14) in said volume (13) are placed at the same or substantially the same level. 25
8. Filling machine (1) according to one or more of the claims 1 to 7, characterised in that the maximum size of said volume (13) corresponds to the amount of edible ice which is desired to be transferred to the container (2). 30
9. Filling machine (1) according one or more of the claims 4 to 8, **characterised in that** said narrowing-down (12) has a length which at least corresponds to the distance from the bottom of said volume to the openings (21, 22) for said least one inlet and/or said least one outlet (11, 14). 35
10. Filling machine (1) according to one or more of the claims 1 to 9, characterised in that apart from said inlet (11), said space (5) is a space closed with e.g. a cover (19) where pressure can be applied to this closed space with pressure-creating means (20). 40
11. Method for the filling of an amount of edible ice or a mixture containing edible ice into a container with a filling machine according to one or more of the claims 1 to 10. 45

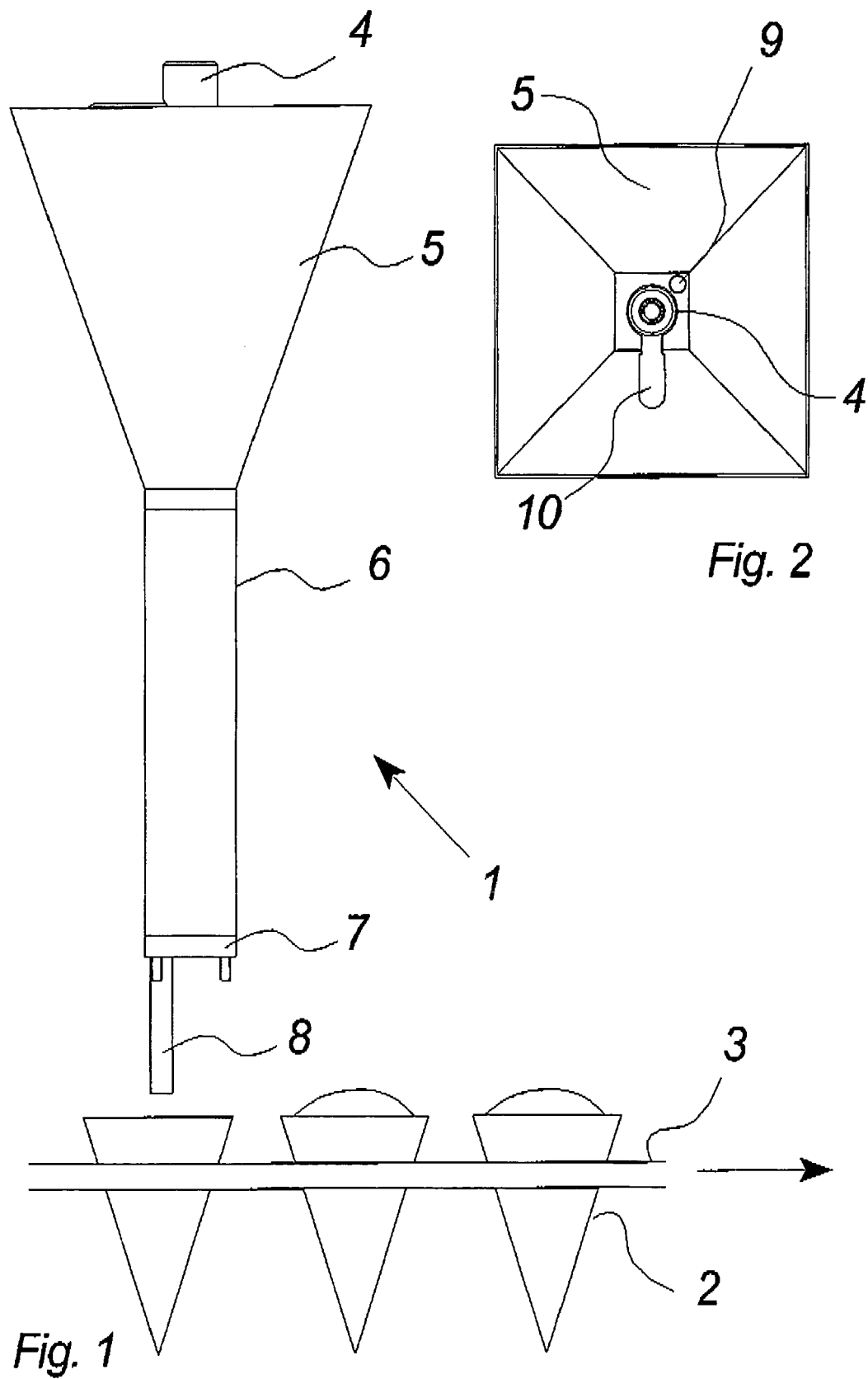
12. Method according to claim 11, where a rotation of a piston in the filling machine respectively opens and closes for one passage selected between inlet and outlet for edible ice to or from the filling machine's volume, while a linear movement of the piston presses edible ice for the volume through the passage for outlet.

13. Method according to claim 12, where a narrowing-down in the piston establishes said passage for inlet or outlet after the rotation of the piston from a first position to a second position.

14. Method according to one or more of the claim 11 to 13, where a linear movement for pressing edible ice out of said volume is followed by a shorter linear movement in the opposite direction before a rotation of the piston.

15. Use of filling machine according to one or more of the claims 1 to 10 and/or method according to one or more of the claims 11 to 14 for mixing and/or dosing of edible ice in the containers.

16. Use according to claim 15, where several filling machines are placed side by side for simultaneous feeding of a number of containers which are conveyed successively.



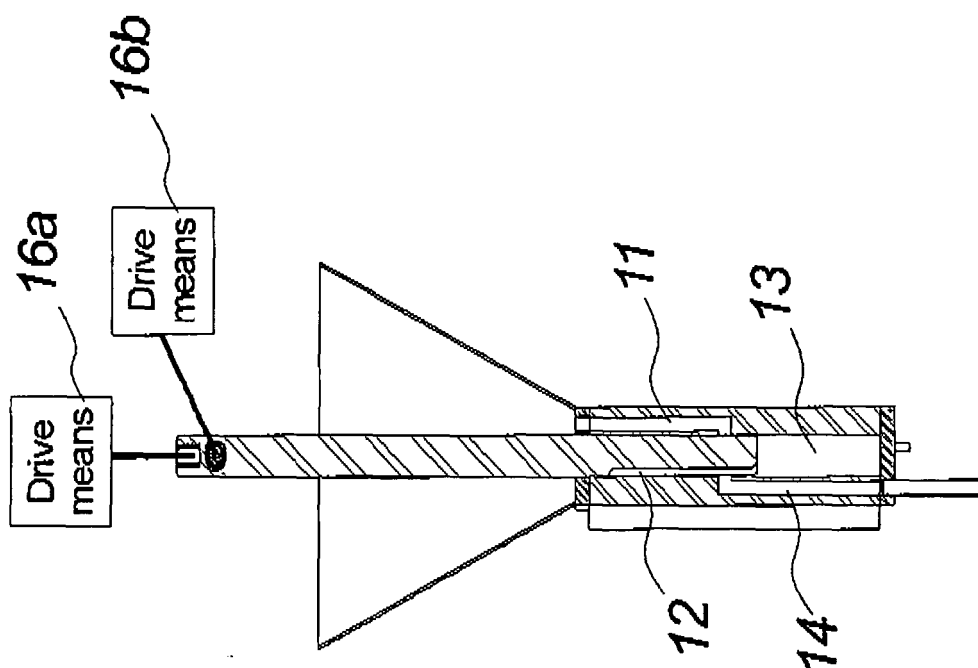


Fig. 4

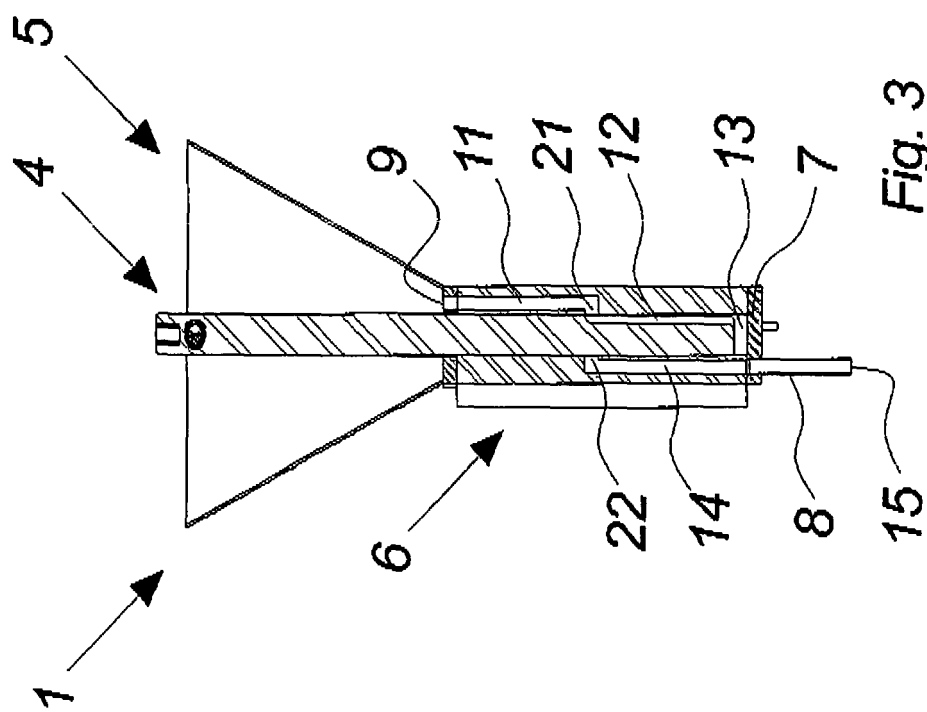
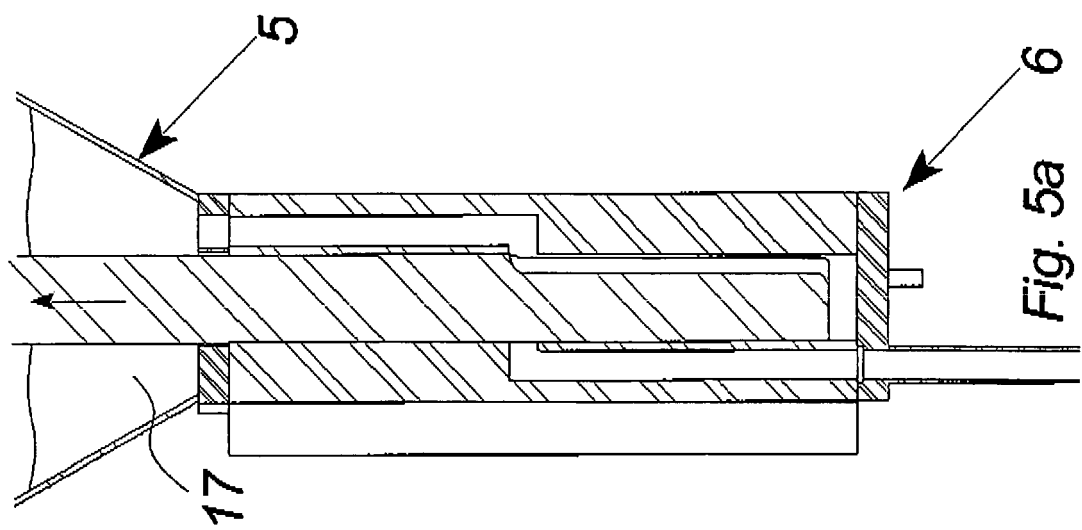
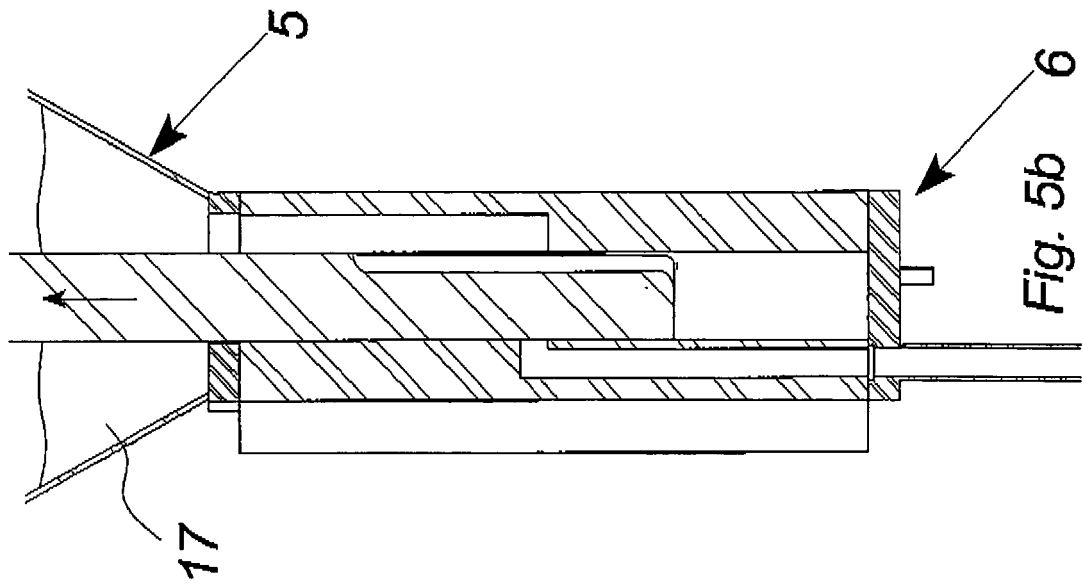
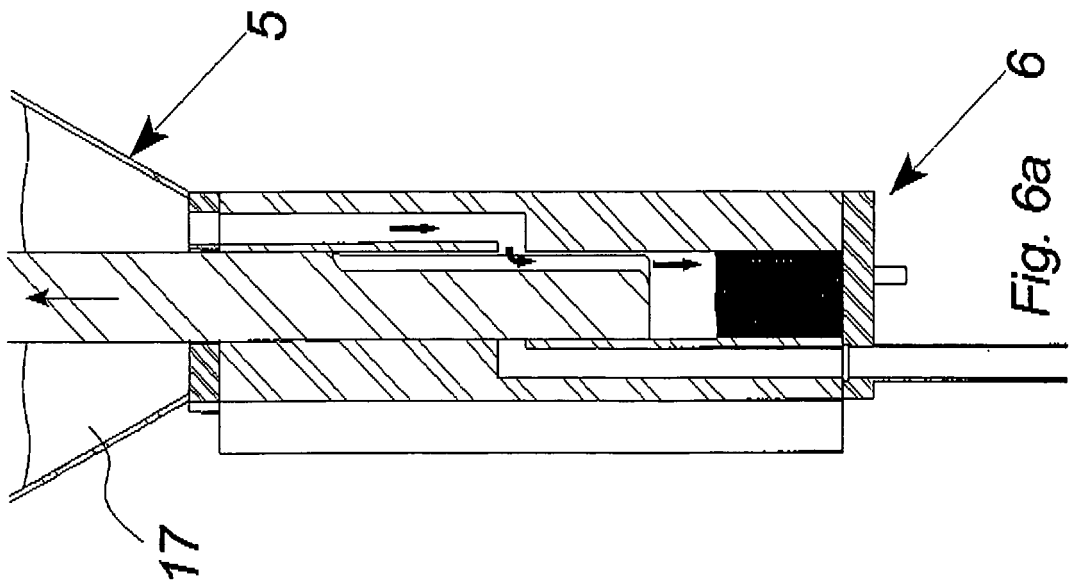
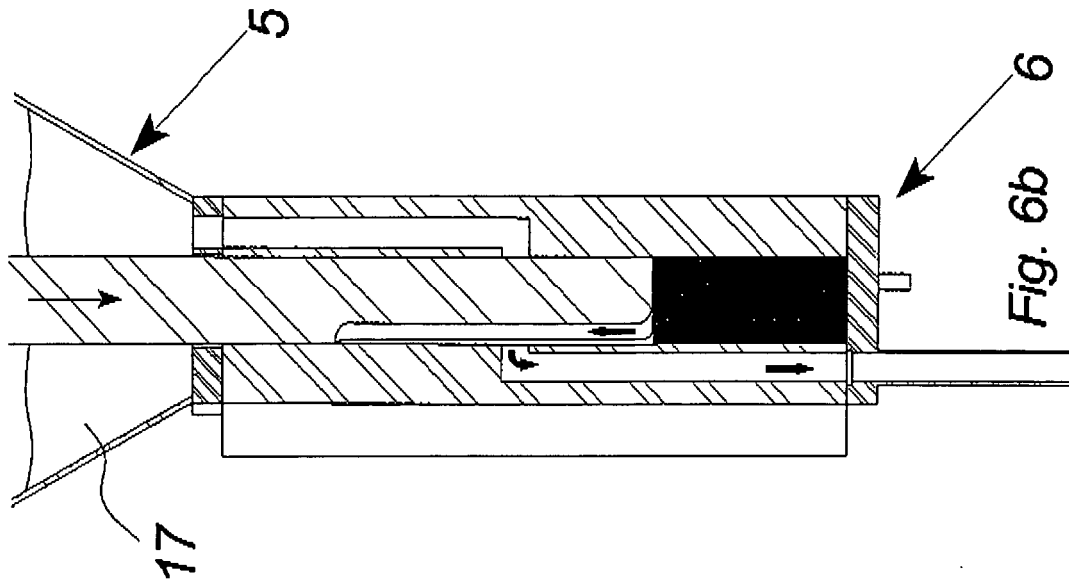


Fig. 3





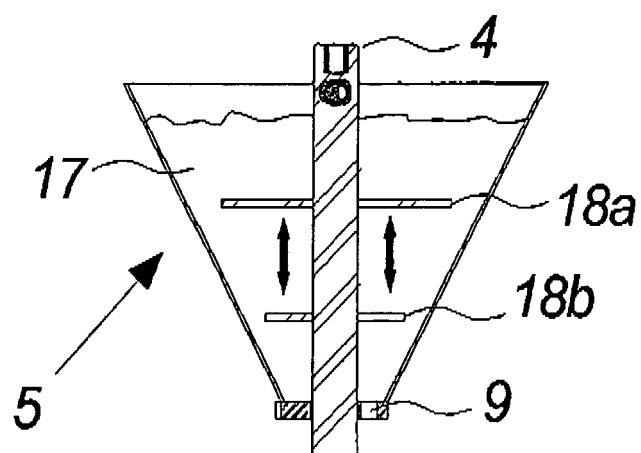


Fig. 7

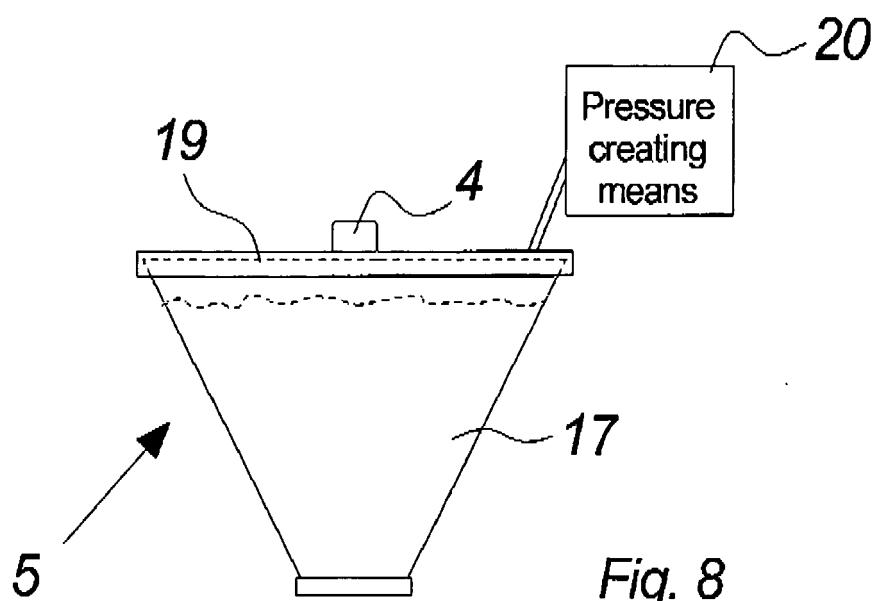
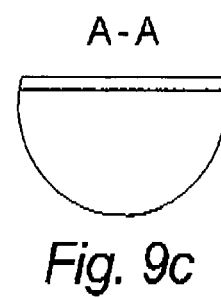
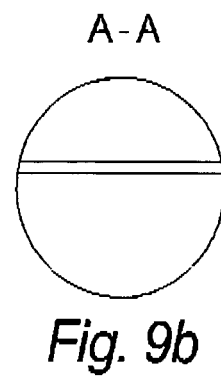
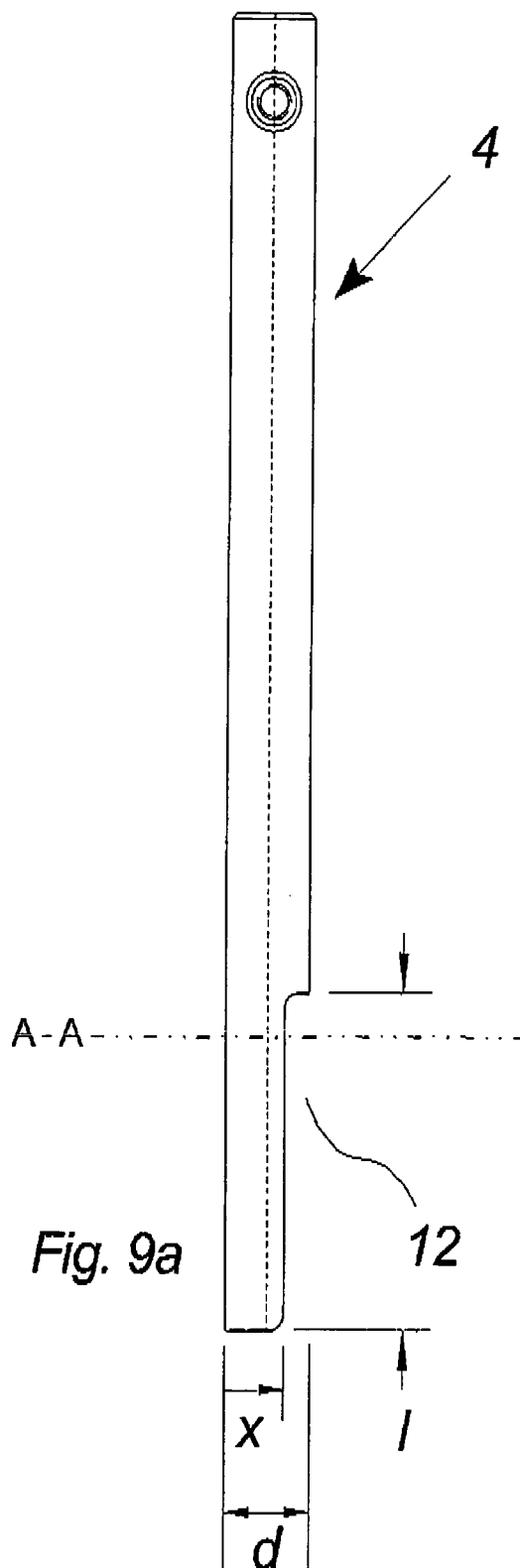
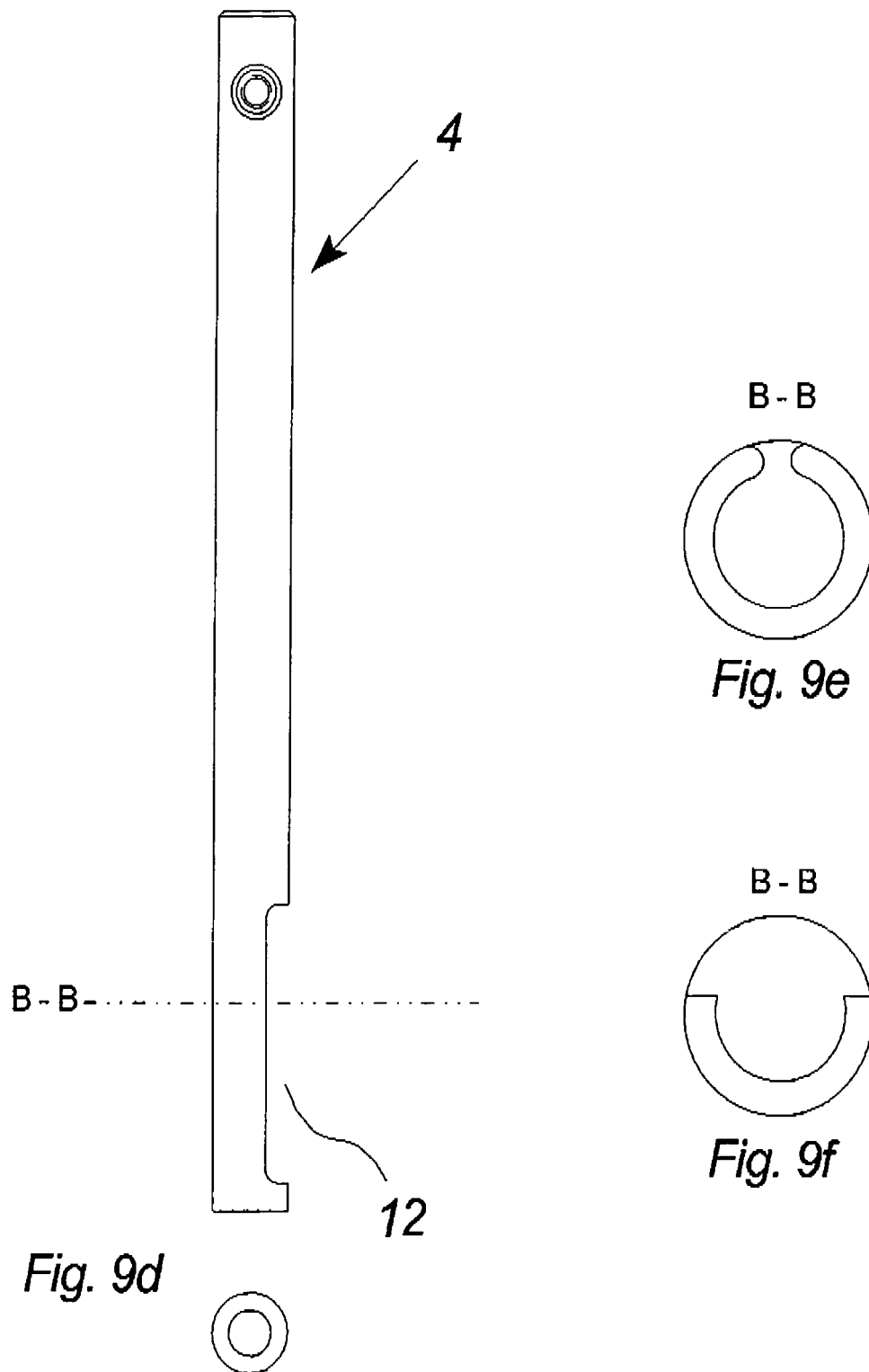


Fig. 8





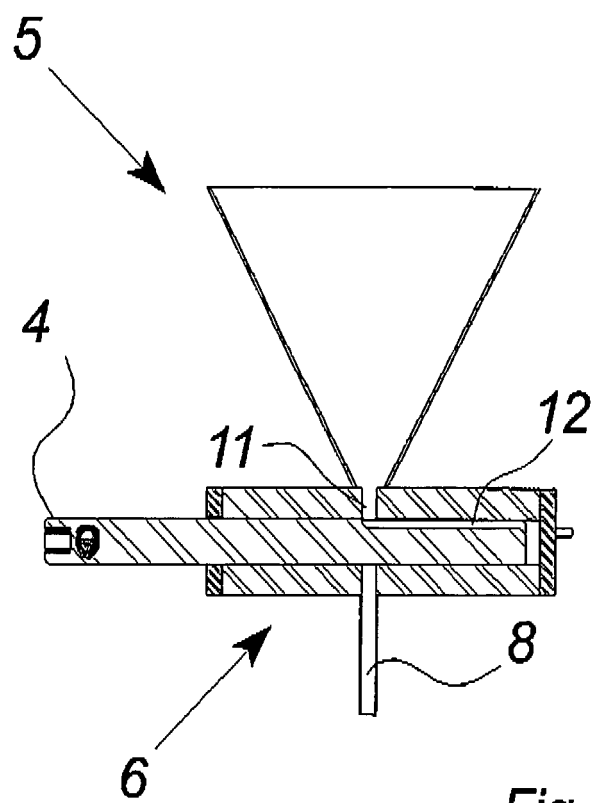


Fig. 10a

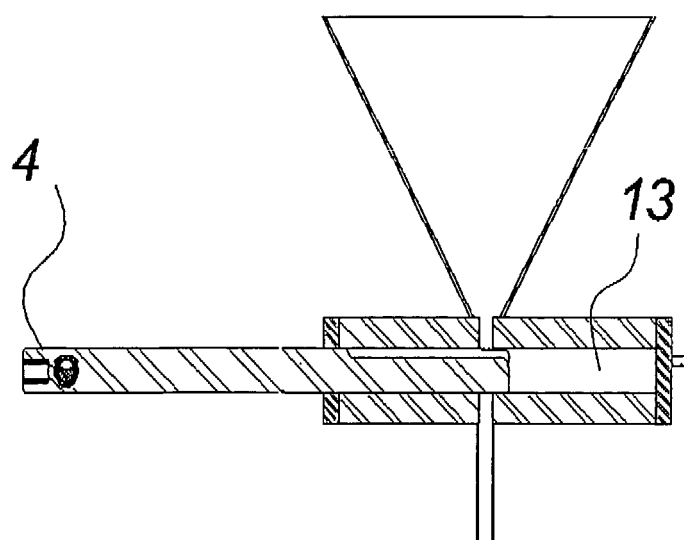


Fig. 10b



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 01 3215

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 43 12 015 A1 (BENZ & HILGERS GMBH, 40470 DUESSELDORF, DE) 20 October 1994 (1994-10-20)	1-5, 8-13,15, 16	INV. B65B3/12 B65B3/32 B65B25/00
Y	* abstract * * column 2, line 58 - column 3, line 46 * * column 3, line 32 - line 44 * * column 4, lines 25-34; figures *	7	
Y	US 2004/251279 A1 (HEITLINGER MARTIN HEINRICH) 16 December 2004 (2004-12-16) * paragraphs [0031] - [0033]; figure 1 *	7	
A	US 2004/129338 A1 (ROHRET RICHARD D ET AL) 8 July 2004 (2004-07-08) * the whole document *	1-16	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 September 2006	Examiner Vigilante, Marco
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 01 3215

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12-09-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 4312015	A1	20-10-1994	NONE	

US 2004251279	A1	16-12-2004	AT 287825 T	15-02-2005
			AU 2002320836 A1	23-12-2002
			CA 2450537 A1	19-12-2002
			DE 10128669 A1	19-12-2002
			DK 1395490 T3	23-05-2005
			WO 02100719 A2	19-12-2002
			EP 1395490 A2	10-03-2004
			ES 2235069 T3	01-07-2005
			JP 2005521598 T	21-07-2005

US 2004129338	A1	08-07-2004	AU 2003301159 A1	10-08-2004
			WO 2004063605 A2	29-07-2004
