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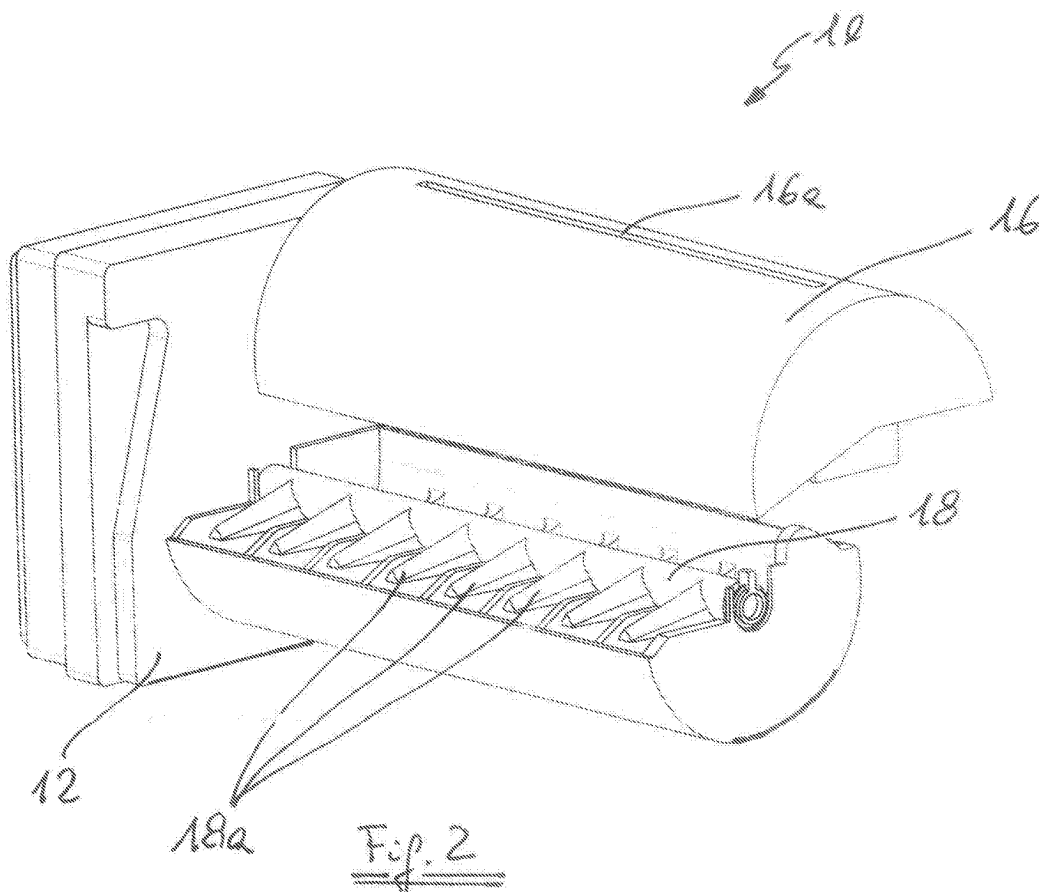
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(54) **Ice maker**

(57) An ice maker adapted to be mounted a refrigeration appliance comprises an ice-making container (14) and an ice-releasing system (18) for separating the

formed ice from the ice-making container. The ice-making container is provided with a substantially water-tight cover (16) for preventing a water spill when ice is not already formed in the ice-making container.



Description

[0001] The present invention relates to an ice maker for a refrigeration appliance. More particularly, it relates to an ice maker comprising a frame adapted to be mounted in the refrigeration appliance, an ice-making container supported by the frame, and an ice-releasing system for separating the formed ice from the ice-making container.

[0002] Ice makers are well known in the technical field of domestic refrigeration appliances. They are usually installed on a wall of a freezing chamber of the refrigerator (freezer) and therefore they are not subject to movement which could cause spill of water when ice is not already formed in the ice-making container or ice tray. This traditional construction has the drawback of requiring means for conveying ice cubes from the ice maker in the freezing chamber into a storage container in the door of the refrigerator where the user can collect ice from the outside through an ice dispenser. Moreover the traditional location of ice makers requires an automatic water supply device which increases the overall cost of the appliance. Moreover it is clear that the installation in the cavity of the freezer of the ice maker reduces the space for storing frozen food. No appliance producer has up to now proposed a mounting of the ice maker in a door of the freezer, mainly because the movement of the door during opening and closing thereof could cause water spill from the ice maker when the ice is not already formed.

[0003] An object of the invention is to provide an ice maker of the type mentioned at the beginning of the description which can be installed within the door of the appliance without any water spill problems. Another object is to provide an ice maker having a low cost since it does not need automatic and costly water supply devices. A further object of the present invention is to provide an ice maker which can easily work either with an automatic or manual drive system for removing ice from the ice-making container.

[0004] The above objects are reached thanks to the features listed in the appended claims.

[0005] The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments of the invention, given in conjunction with the accompanying drawings, in which:

- figure 1 is a perspective view of an ice maker according to a first embodiment of the invention;
- figure 2 is a partially exploded view of the ice maker of figure 1;
- figure 3 is a perspective view similar to figure 2 and shows a variant of the ice maker of figures 1-2;
- figure 4 is a perspective view of an ice maker according to a second embodiment of the invention;
- figure 5 is a partially exploded view of the ice maker of figure 5;
- figure 6 is a perspective view similar to figure 4 and

shows a variant of the ice maker of figure 4-5;

- figure 7 is a cross sectional view along line VII-VII of figure 4; and
- figure 8 is a cross sectional view similar to figure 7 and shows the ice maker in a configuration in which the ice is discharged from the ice maker.

[0006] With reference to figure 1, with 10 is indicated an ice maker having a base 12, an ice-making container 14 and a cover 16. According to the embodiment shown in figures 1 and 2, the base 12 contains a drive unit and can be mounted in a cantilevered way to a wall of a door of the freezer compartment of the refrigerator (not shown). The ice-making container 14, which is fixed to the base 12, has an a semi-circular or half moon cross section and is formed of metal or polymeric material. The cover 16 has a semi-circular cross section corresponding to the cross section of the ice-making container 14, and it is rotatably mounted on the ice-making container so that it can assume a first configuration (shown in figure 1) where it covers in a water-tight manner the ice-making container 14, and, by rotation along the arrow R in figure 1, a second configuration below the ice-making container 14, so that ice cubes can be removed from the ice-making container 14. The rotation of the cover 16 can be done either manually by the user or it can be driven by the drive unit in the base 12.

[0007] Coaxially with the semi-cylindrical ice-making container 14, it is rotatably mounted an ice releasing lever 18 for releasing ice from the ice-making container 14. The ice-releasing lever 18 has one end connected with the drive unit and the other hand supported by the ice-making container 14; it is formed with a plurality of ice releasing arms 18a spaced apart at a predetermined interval from one another. The cover 16 is fixed to the lever or auger 18 so that they rotate simultaneously.

[0008] The cover 16 is also provided with a longitudinal slot 16a which is useful for loading water in the ice-making container 14 and for allowing circulation of cold air under the cover 16 for slowing a quicker formation of the ice cubes having a cross section in the form of a half moon.

[0009] Once the ice-making container 14 has been filled with water, any movement of the ice maker 10 caused by the movement of the door where it is preferably installed does not cause any spill of water since the internal surface of the tile-shaped cover 16 is in contact with the edges of the tile-shaped container 14. Once the ice is formed, the cover 16 is rotated along arrow R, under the ice-making container, and the lever 18 is rotated as well in order to remove ice cubes from the container 14. Of course the movement of the lever 18 and of the cover 16 can be made independent one from the other as well. The cover 16 is intended to house ice tray and provides a seal so that if non-iced water is present when the ice-maker is moved, no water spill occurs.

[0010] The shape of the cover 16 ensures that when it rotates, any ice formation due to water sprinkled by movement is removed from the housing. The ice maker

cover 16 is designed so that ice maker can be placed in areas where it can be subject to movement (for example in the door).

[0011] In figure 3 is shown a modification of the ice maker of figures 1-2, in which the movement of the ice-releasing lever 18 is driven manually by a knob 20.

[0012] The cylindrical shape of the ice maker according to the embodiment shown in figures 1-3 is particularly useful for a mounting in a reduced space as in a counter-door of a freezer compartment.

[0013] In figures 4 and 5 it is shown a second embodiment of the ice maker according to the invention. Similar components of such embodiment are indicated with the same reference numerals of the first embodiment incremented by 100. According to figures 4 and 5, the base 112 is integral with the cover 116 and contains a drive unit 115. The ice-making container 114 is rotatably mounted below the cover 116 and presents a plurality of half moon shaped cavities 117 for forming ice cubes. The ice-making container 114 is made of flexible material so that it can be warped in order to cause the detachment of ice cubes. In figure 7 it is shown a configuration of the ice maker 110 in which the edges of the ice-making container 114, indicated with reference numerals 114a, are in a water-tight contact with a cylindrical internal surface 116b of the cover 116. In this configuration, which allows a water loading through the longitudinal slot 116a, any movement of the ice maker 110 does not cause any water spill. The cover 116 is intended to serve as support for ice maker components and to provide a seal so that if non iced water is present when the icemaker is moved, the water will not come out of the ice-making container. The shape of the cover 116 ensures that when the ice tray rotates, any ice formation due to water sprinkled by movement is removed from the housing. In figure 8 it is shown a second configuration of the ice maker 110 in which the drive unit 115 has caused a predetermined rotation of the ice-making container 114. In this configuration an end of the container 114 opposite to the drive unit abuts a corresponding end portions of the cover 116 so that any further rotation of the drive unit 115 causes a warp or twist of the ice-making container as shown in dotted lines in figure 8. This warping of the container causes the fall of ice cubes from the ice-making container 114.

[0014] Instead of having a drive unit, the ice maker 110 according to the second embodiment of the invention can also have a knob 120 (figure 6) for rotating the ice-making container and warping it in order to discharge ice cubes.

[0015] The realization of the ice maker according to the invention is flexible enough to provide fixation points to be placed anywhere inside a refrigerated compartment or to be part of a sub-assembly in order to facilitate fixation.

Claims

1. Ice maker adapted to be mounted a refrigeration appliance, comprising an ice-making container (14, 114) and an ice-releasing system (18, 18a, 20, 115, 120) for separating the formed ice from the ice-making container (14, 114), **characterised in that** the ice-making container (14, 114) is provided with a substantially water-tight cover (16, 116) for preventing a water spill when ice is not already formed in the ice-making container (14, 114).
2. Ice maker according to claim 1, **characterised in that** the ice-making container (14) and the cover (16) have semicircular cross sections and **in that** the cover (16) is adapted to assume by rotation a closed configuration in which the ice-making container (14) and the cover (16) form a cylindrical assembly and an open configuration in which the cover (16) is substantially under the ice-making container (14).
3. Ice maker according to claim 2, **characterised in that** the ice-releasing system comprises an ice release lever (18, 18a) adapted to rotate together with the cover (16).
4. Ice maker according to claim 3, **characterised in that** the ice maker comprises a drive unit (12) for providing power for driving the ice release lever (18, 18a) and/or for driving the rotating cover (16).
5. Ice maker according to claim 3, **characterised in that** the ice release lever (18, 18a) comprises a knob-shaped end (20) for manually rotating the lever (18, 18a).
6. Ice maker according to claim 1, **characterised in that** the ice releasing system comprises a movable and deformable ice-making container (114).
7. Ice maker according to claim 6, **characterised in that** it comprises a drive unit (115) for providing power for driving of the ice-making container (114).
8. Ice maker according to claim 6, **characterised in that** the movable and deformable ice-making container (114) is adapted to be rotated manually.
9. Ice maker according to any of claims 6-8, **characterised in that** the ice-making container (114) can be rotated between a first horizontal position and a second position in which one end of the container (114) abuts a corresponding portion of a supporting frame (112) and the other end is driven by a predetermined torque so that the ice-making container (114) undergoes a predetermined degree of warping.

10. Ice maker according to any of the preceding claims 2, **characterised in that** the cover (16, 116) presents an aperture (16a, 116a) for loading water in the ice-making container (14, 114) also in a close configuration of the ice maker (10, 110).

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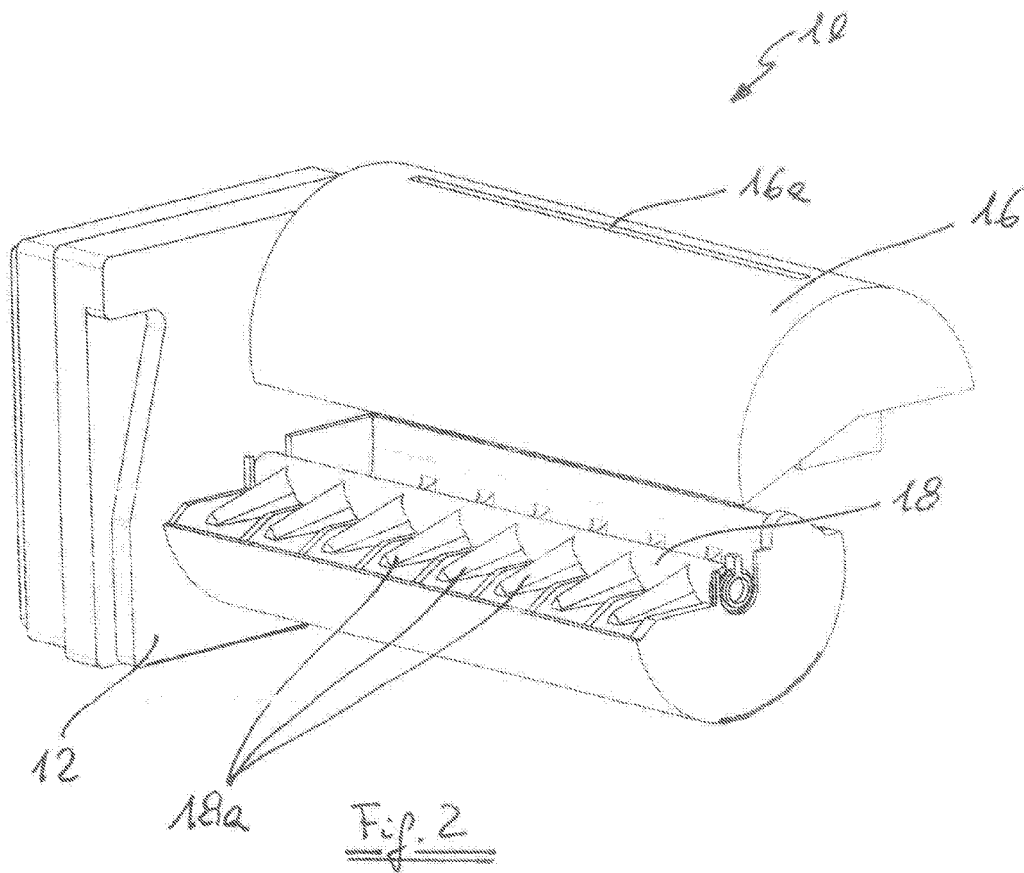
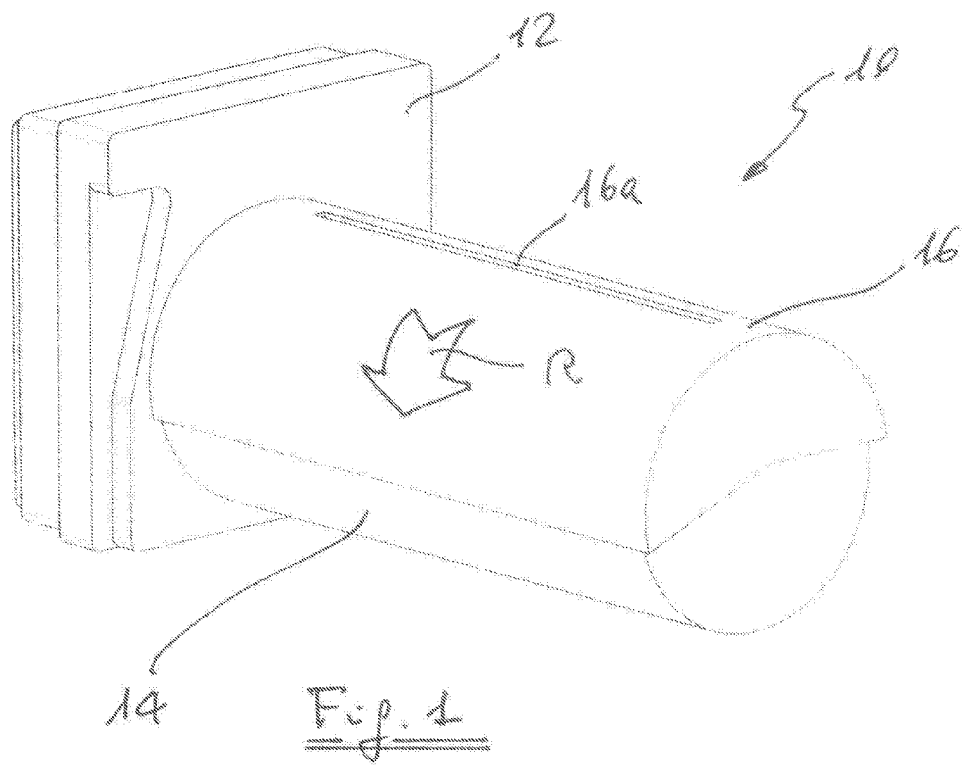
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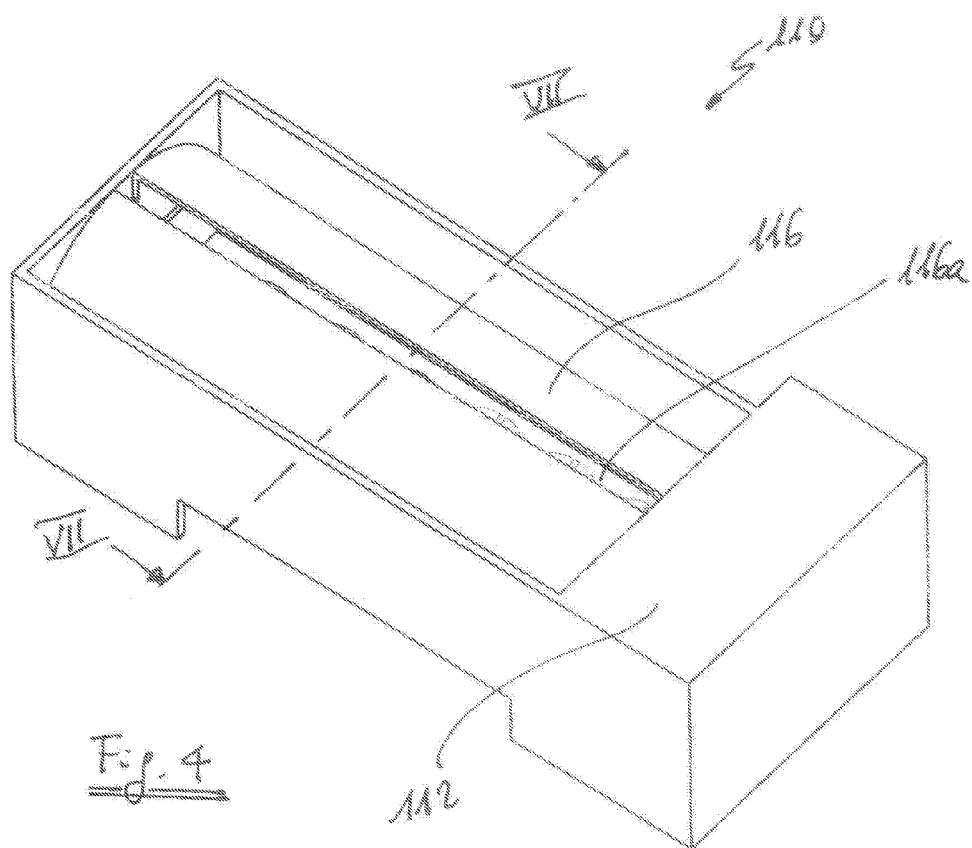
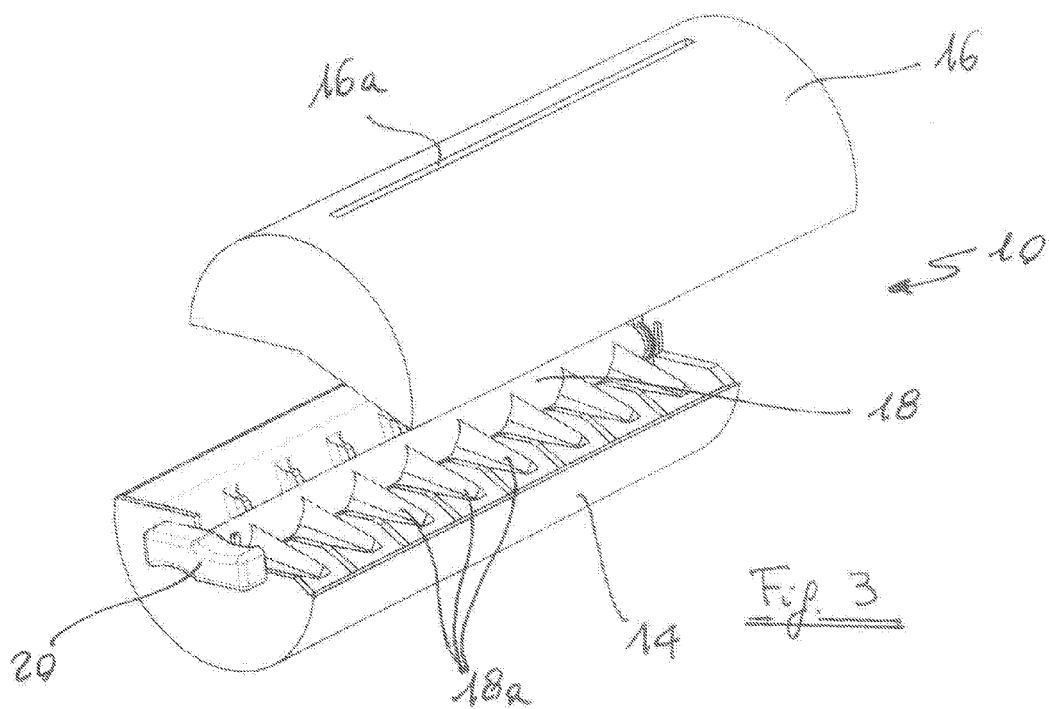
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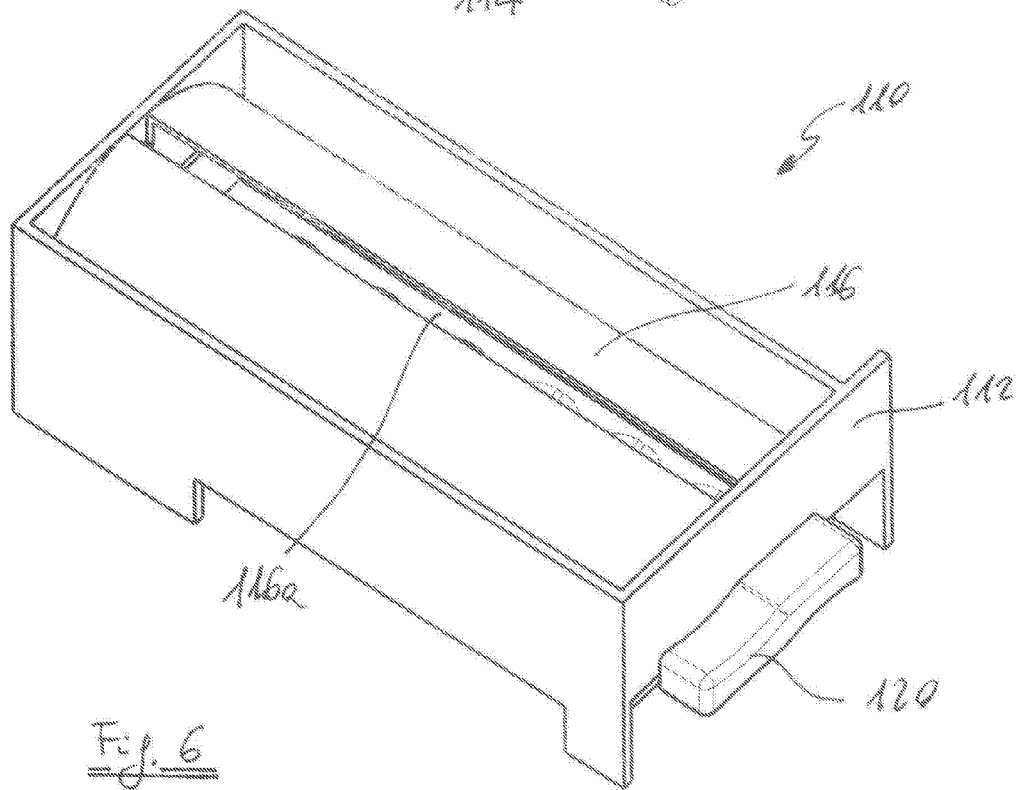
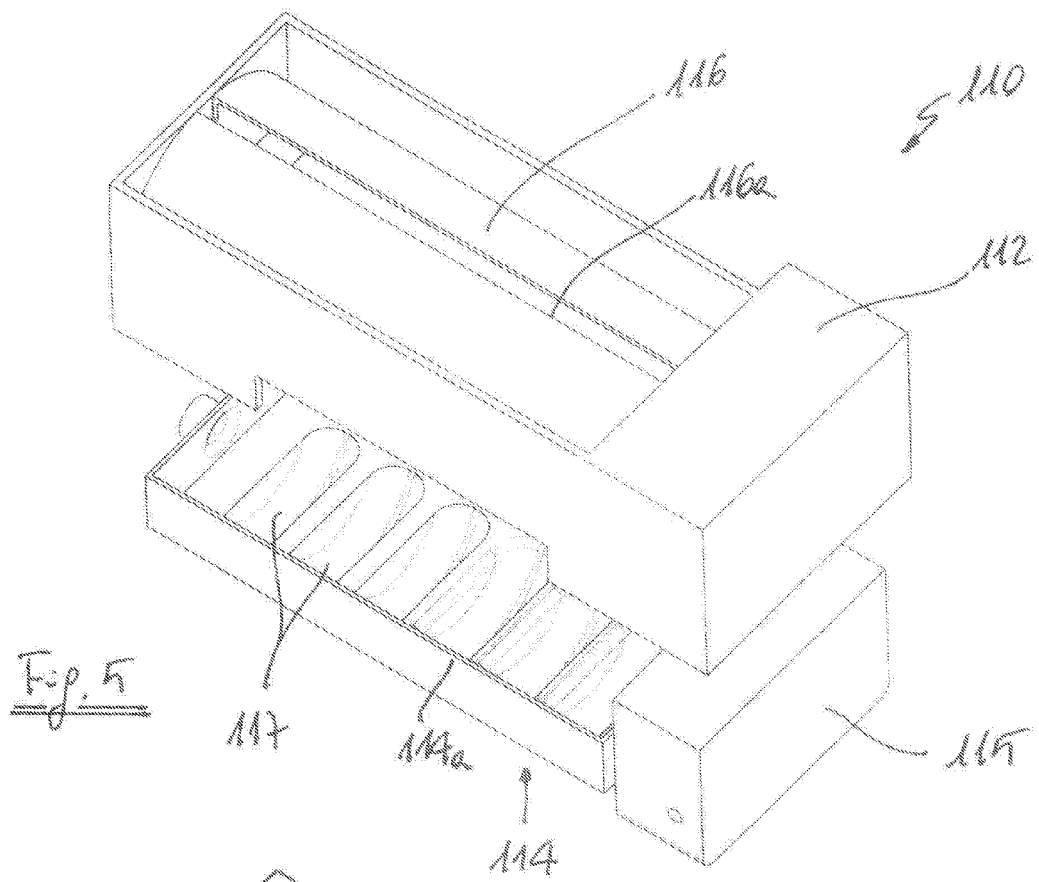
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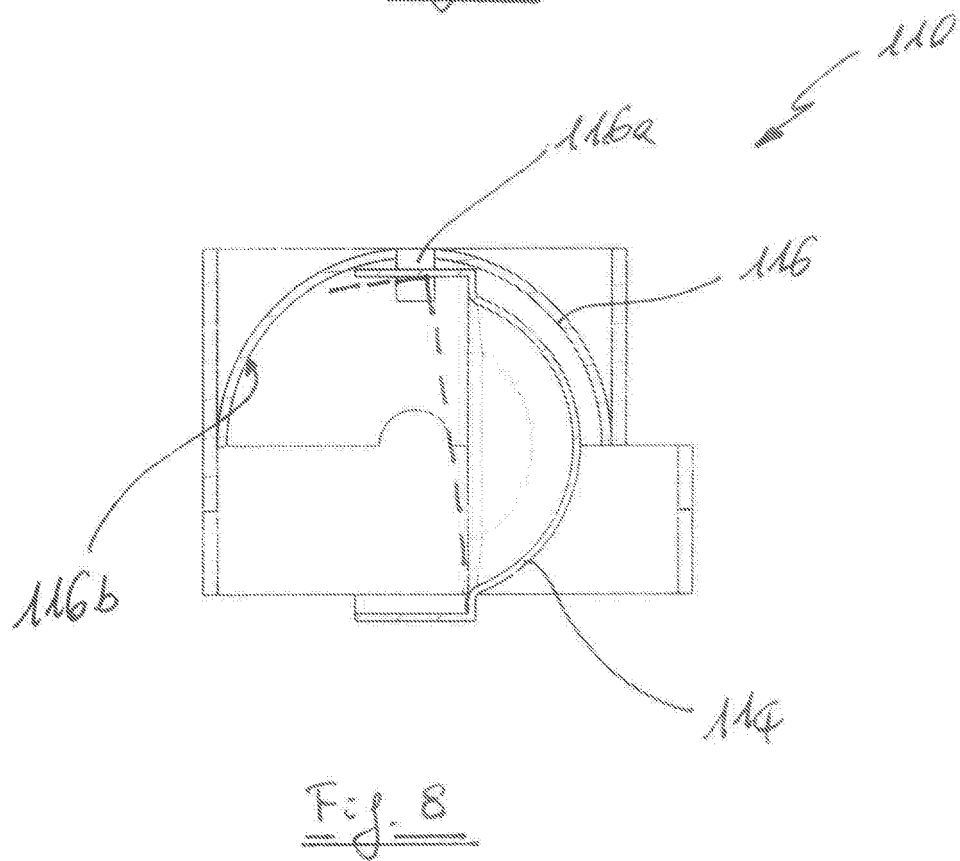
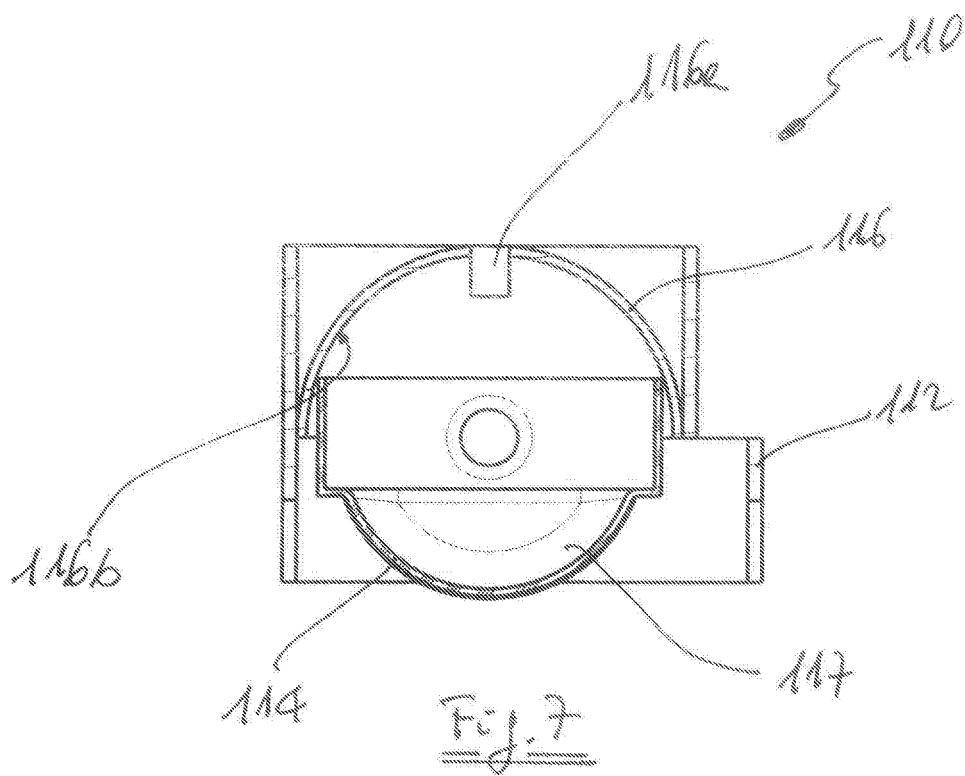
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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 5099

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	EP 1 482 261 A2 (LG ELECTRONICS INC [KR]) 1 December 2004 (2004-12-01)	1	INV. F25C1/04
A	* abstract; figures 11-14 * * paragraphs [0096], [0101] * -----	2	ADD. F25D23/02
X	US 2006/086135 A1 (WU GUOLIAN [US] ET AL) 27 April 2006 (2006-04-27) * abstract; figures 3-6,8 * -----	1-5,10	
			TECHNICAL FIELDS SEARCHED (IPC)
			F25D F25C
~~The present search report has been drawn up for all claims~~			
Place of search		Date of completion of the search	Examiner
The Hague		7 November 2006	Yousufi, Stefanie
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPC FORM 1503 03.82 (P04C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-5, 10



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LACK OF UNITY OF INVENTION
SHEET B

Application Number

EP 06 11 5099

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5, 10

Cover of ice-maker with semicircular cross section.

2. claims: 1, 6-9

Movable and deformable ice-making container

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 11 5099

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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07-11-2006

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 1482261	A2	01-12-2004	CN	1573270 A		02-02-2005
			US	2006117786 A1		08-06-2006
			US	2004237563 A1		02-12-2004

US 2006086135	A1	27-04-2006	AU	2005225153 A1		11-05-2006
			CN	1769822 A		10-05-2006
			EP	1653178 A2		03-05-2006
			MX	PA05011510 A		02-05-2006
			US	2006207282 A1		21-09-2006
