

(19)



(11)

EP 2 778 579 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.09.2014 Bulletin 2014/38

(51) Int Cl.:
F25D 23/04 (2006.01)

(21) Application number: **13159020.0**

(22) Date of filing: **13.03.2013**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(54) **Improved assembly for a closable compartment**

(57) A closable dairy compartment assembly with an improved control of the position of the cover implemented

with an additional plastic component.

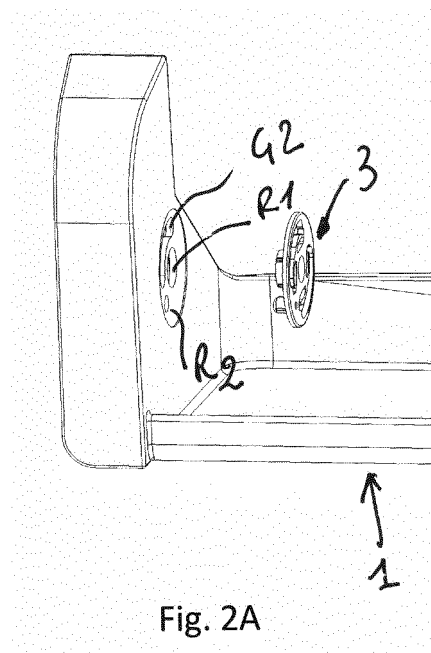


Fig. 2A

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Description

[0001] The present invention relates to an assembly for a closable compartment, particularly a plastic closable compartment, for being used in a domestic refrigerator or in a domestic freezer.

[0002] Nowadays, closable compartments for storing items to be cooled in a domestic refrigerator or in a freezer, in particular food items, are widely available in the marketplace.

[0003] These compartments normally comprise at least one fixed part aimed to contain the items to be cooled, and a movable part which is typically a cover protecting the contained items. Typically, the cover is pivotally hinged to the container in order to open or close the compartment.

[0004] These kinds of compartments are normally made of plastic material, which is a cheap and cleanable material, suitable to support temperature changes without any major wearing. Typical materials used for this purposes are ABS, PS and GPPS.

[0005] However, when manufacturing those compartments, if wide tolerances for allowing to the user an easy connection and disconnection of the two parts are used, the coupling of the two parts becomes loose and the closure movement of the cover becomes difficult to be controlled. In fact, the cover drops under its weight and hits the container resulting in an unpleasant noise. This is the case when the user is allowed to clean the two parts of the assembly separately. An example of these compartments is shown in Fig. 1A.

[0006] In the other cases, when it is preferred the control of the full movement of the cover by the user, manufacturing tolerances are kept small in order to obtain a certain degree of interference. In this manner, a friction created between the movable part and the fixed part allows a better control of the closing/opening movements of the cover, but requires the user to operate using two hands. This tight coupling also results in an audible and unpleasant scratching noise during rotation. An example of these compartments is shown in Fig. 1B.

[0007] In the art there are also known compartments with an improved movement control made with a single hand, but which make use of expensive gear systems.

[0008] Aim of the present invention is therefore to provide a cheap closable compartment with an improved control of the opening and closure operations and which overcomes the drawbacks of the known solutions.

[0009] These results are achieved by the present invention with the provisions of annexed claim 1. Further features and advantages of the method, according to the invention, will become apparent from the following description of preferred embodiments, taken in conjunction with the drawings, in which:

- Figure 1A represents a solution known in the art with loose parts coupling;
- Figure 1B represents a solution known in the art with

interference coupling between the parts;

- Figure 2A, 2B, 2C and 2D show exploded views of the assembly according to the invention;
- Figure 3 is a detail of the assembled construction of Fig. 2A-2D;
- Figure 4A and 4B represent a front and a rear view of an example of a bumper element;
- Figure 5 shows examples of other possible embodiments for the bumper element;
- Figure 6 shows the bumper element in the open and closed position of the movable part; and
- Fig. 7 shows a possible implementation of the holding means according to the present invention.

[0010] Referring to the cited figures, a compartment assembly, preferably a dairy compartment is described. The assembly comprises a fixed part 1, for instance in the form of a balcony, and a movable part 2, such as a cover rotatably hinged thereto.

[0011] The fixed part 1 is preferably shaped as a container, for containing items to be cooled in a refrigerator or in a freezer, made of plastic material such as GPPS. However, the fixed part could also include portions of other materials, including metal, depending on the specific purpose of the container. The fixed part 1 can be a plastic counter door compartment integral with the door or hanged to a wall of the refrigerator/freezer.

[0012] Preferably, the fixed part 1 is provided with opposed recesses R1, typically bores, in which opposed first pins P1 of the movable part 2 are rotatably housed, so as to define with them a hinge system. In a preferred embodiment the fixed part 1 is also provided with an additional recess R2 for housing a raised portion P3 of a bumper element 3, further described. This would allow keeping the bumper element solid with the fixed part during the relative movement of the two parts.

[0013] The movable part 2 can be shaped as a flap which can be rotatably hinged to the fixed part 1, through the first pins P1, which define a pivot axis X. The first pins P1 can be integral with a movable part 2, the cover, or can be separate object. The movable part 2 is connected and can rotate about first pins P1, when the latter are housed in the opposed recesses R1 of the fixed part 1. In an advantageous manner, pivot axis X should pass through the center of mass of cover, to reduce arm length which gives lower impact force. Preferably there should be a gap of more than 3 mm. between the cover and the balcony front wall. The cover is preferably also entirely made of plastic, for instance of GPPS, transparent or not, and can be pivotally coupled with the fixed part, in a hinge system, through its first pins P1. According to a preferable embodiment of the present invention the movable part also presents a second pin P2. The second pin is preferably integral with the movable part. For obtaining an improved control of the relative movements of the two parts, the hinge system could further include an additional guide G2 in the fixed part, through which the second pin P2 is movable. A complementary configuration of the

hinge system in respect to the described embodiment is however compatible with the present invention. Also a complementary configuration of the second pin (placed in the fixed part), is compatible with the present invention.

[0014] According to the present invention, between the fixed part 1 and the movable part 2 a bumper element 3 is interposed which is preferably made of plastic or rubber.

[0015] The bumper element 3 is preferably shaped as a disk provided with a central bore B through which one of the first pins P1 fits. A central protrusion PB can be also present to facilitate the coupling with the fixed part 1. The bumper element 3 can be provided with a protruding portion P3 suitable to be housed in an additional recess R2 of the fixed part 1 in order to keep the bumper element 3 solid with the fixed part 1 during the relative movement of the movable part 2, for obtaining the functionality described as follows. A complementary design (not shown) in which the bumper element 3 is provided with an additional recess and the fixed part is provided with a protruding portion suitable to be housed in the additional recess, is also compatible with the present invention.

[0016] In an alternative design of the assembly (not shown) the bumper element is fixed to the fixed part 1 by means of traditional fixing means like screw, rivets or the like, and the fixed part presents equivalent counter fixing means.

[0017] The bumper element 3 is further provided with at least one slot G1 whose shape depends on the movement trajectory of the movable part 2. In the described embodiment, the slot has substantially a semi-circular shape for a rotational movement. When the fixed part 1 and the movable part 2 are assembled with the bumper element 3, the second pin P2 runs within the slot G1 in a free movement, subjected to a friction or to a stop as a function of the position of the second pin P2 within the slot G1. The movement of the second pin P2 is stopped when the second pin abuts one of the end portions E1 or E2 of the slot G1. The movement is free when the position of the second pin corresponds to the central position C of the slot G1. When the second pin P2 moves from the central position C of the slot to the end position E1 or E2 its free movement is restrained by friction means F obtained in such positions of the bumper element 3. The width of the slot G1 reduces towards the ends thereof so that friction means F exert an elastic friction action against the second pin P2. The friction means F are shaped as to preferably modulate the friction action in the vicinity of the end portion E1 and/or E2 in order to slow down the movement of the second pin P2 (and of the connected movable part 2). Such friction means F are preferable elastic means which can have a flexible open shape, such as the section of "the head of a mushroom" (see Fig. 4A or 4B), or a flexible closed shape, a "flexible track" (see in Fig. 5), entirely connected with other portions of the bumper element 3. In one preferred embodiment the bumper element is provided with two

slots G1 because it allows to be applied on both the sides of the closable compartment, without the need of having an additional "ad hoc element".

[0018] More conveniently (Fig. 6), in operation the position of the second pin P2 in the first end position E1 corresponds to an open position of the movable part 2 in respect to the fixed part 1, while the position of the second pin P2 in the second end position E2, corresponds to a closed position of the movable part 2 in respect to the fixed part 1.

[0019] The shape of the slot G1 is preferably symmetric with respect to a centreline and optionally presents means H for holding the second pin P2 in at least one of the end position E1, E2, so that the user has to exert an initial force in order to move the second P2 pin from the first E1 and/or the second end E2 position thus resulting in a stable position of the movable part 2 in its closed and/or open position.

[0020] The shape of the holding means H can be such that the force required to open the flap 2 is lower than the force required to close the same compartment. In this manner the control of the opening/closure movement is further improved, allowing the user to operate this movement using only one hand. Moreover the sudden noisy impact of the movable part hitting the fixed part when closing is prevented, as well as any possible related damage.

[0021] The bumper element 3 is preferably provided with a symmetrical geometry so that the mounting of the component is facilitated for the operator.

[0022] In an alternative embodiment intermediate stable positions for the movable part can be created by shaping the bumper element with intermediate sites likewise the end portions (not illustrated).

[0023] In some embodiments two bumper elements 3 on the right and left positions of the cover are required for each assembly.

[0024] The bumper element 3 is preferably made of polymeric material containing PTFE in the percentage comprised between 10% and 30% in weight of its composition. PTFE composition is preferably in the percentage around 20%. PE material has a Young Module which is too low, and it is therefore not fully efficient for this purpose.

[0025] Polymeric materials may additionally include self lubricant material such as Nylon based or Polypropylene polymers or Polyoxymethylene based polymers (POM), for reducing the friction. The percentage of these additional components is dependent from the degree of friction that it would be achieved among the fixed and the movable part. The use of this material further improves to control the movement of the movable part and avoid any noise caused by the friction of plastic parts.

Claims

1. Assembly for a domestic refrigerator or a domestic

- freezer comprising a fixed part (1) and a movable part (2) hinged to the fixed part (1), particularly a plastic counter door compartment having a plastic cover hinged thereto, **characterized in that** between the fixed part (1) and the movable part (2) a bumper element (3) is interposed.
2. Assembly according to claim 1, 2 or 3 wherein the bumper element (3) is provided with a central bore (B) through which a first pin (P1), coupling the two parts, is rotatably mounted.
 3. Assembly according to any of the preceding claims wherein the bumper element (3) is provided with at least one slot (G1) whose shape depends on the movement trajectory of the movable part (2), through which a second pin (P2) is movable.
 4. Assembly according to claim 3, in which the second pin (P2) is integral with the movable part (2).
 5. Assembly according to any of the preceding claims wherein the fixed part (3) further includes an additional guide (G2).
 6. Assembly according to any of the preceding claims wherein the bumper element (3) further comprises a protruding portion (P3, PB) housed in an additional recess (R1, R2) of the fixed part (1) in order to keep the bumper element (3) solid with the fixed part (1) during the relative movement with the movable part (2).
 7. Assembly according to any of the preceding claims wherein the bumper element (3) further comprises a slot (G1) provided with friction means (F) to modulate the movement of the second pin (P2).
 8. Assembly according to claim 9 wherein the friction means (F) are elastic means.
 9. Assembly according to any of the preceding claims wherein in operation the position of the second pin (P2) in a first end position (E1) corresponds to an open position of the movable part (2) in respect to the fixed part (1), while the position of the second pin (P2) in the second end position (E2), corresponds to a closed position of the movable part (2) in respect to the fixed part (1).
 10. Assembly according to claim 10 wherein the bumper element (3) further comprises means (H) for holding the second pin (P2) in at least one of the end position (E1, E2).
 11. Assembly according to claim 11 wherein the bumper element (3) further comprises means (H) for holding the second pin (P2) in intermediate stable positions.
 12. Assembly according to any of the preceding claims wherein the bumper element (3) provided with a symmetrical geometry.
 13. Assembly according to any of the preceding claims, wherein the bumper element (3) is made of a polymeric material containing at least PTFE in a weight percentage comprised between 10% and 30%.
 14. Assembly according to claim 12 in which the content of PTFE in the polymeric material is around 20% of weight.
 15. Domestic appliance comprising an assembly according to any of the preceding claims.

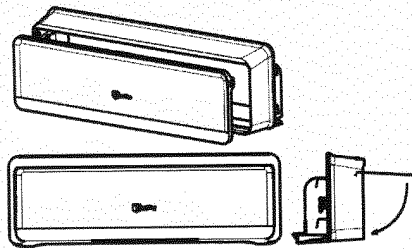


Fig. 1A
(PRIOR ART)

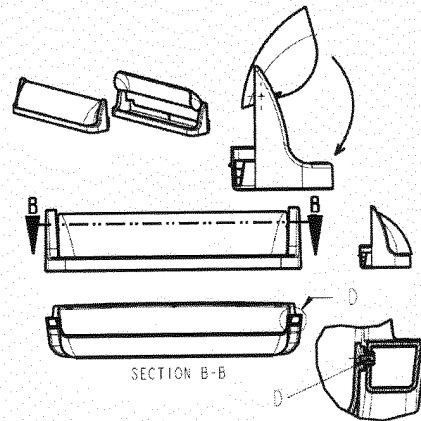


Fig. 1B
(PRIOR ART)

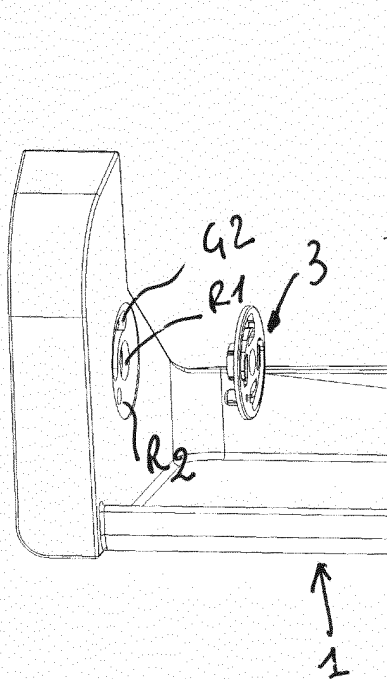


Fig. 2A

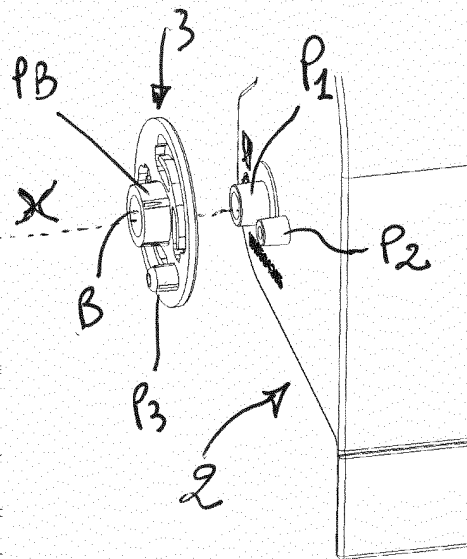


Fig. 2B

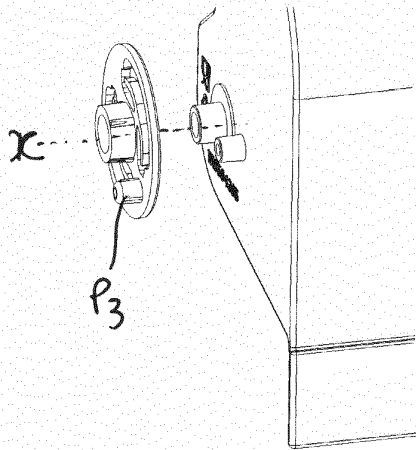


Fig. 2C

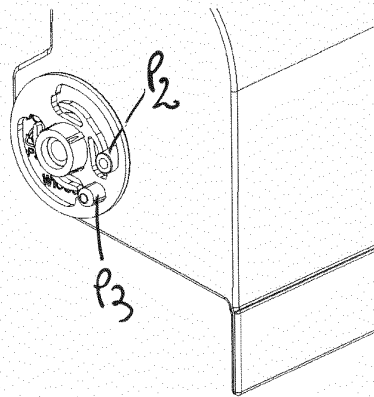


Fig. 2D

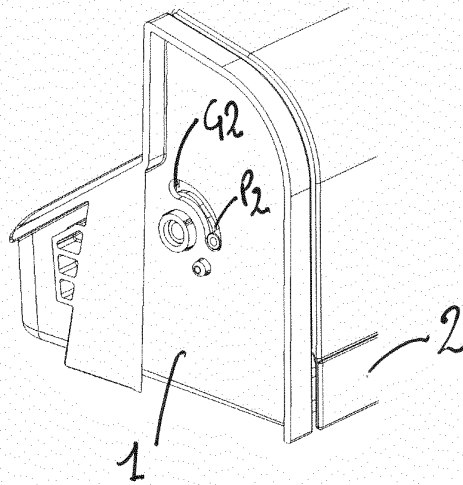


Fig. 3

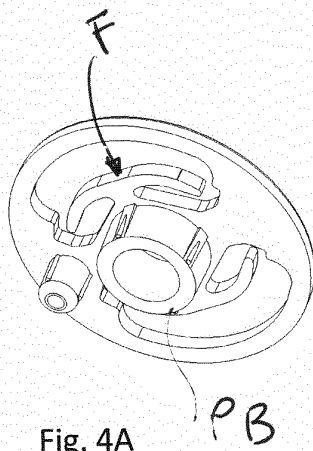


Fig. 4A

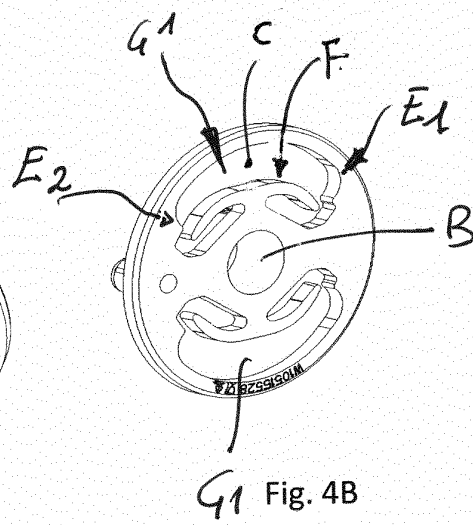


Fig. 4B

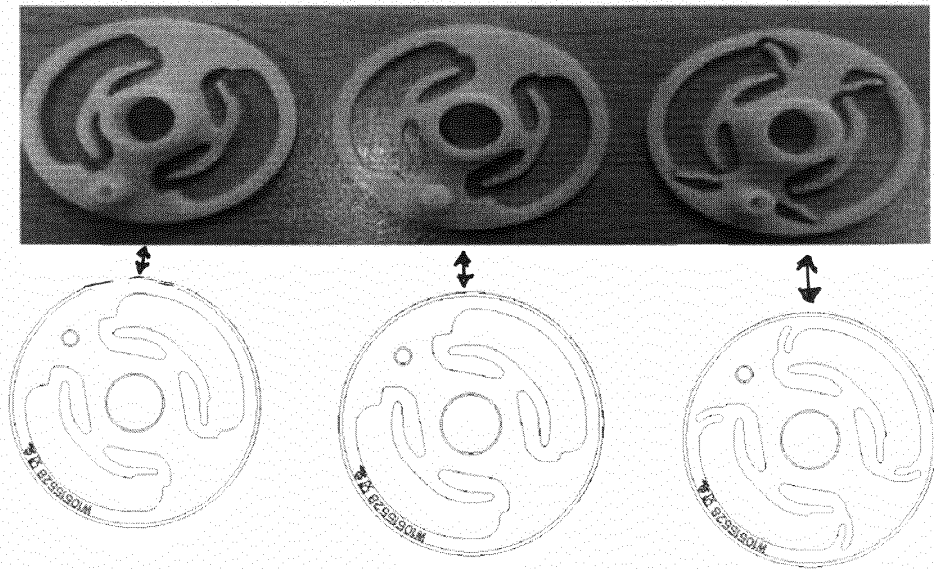


Fig. 5

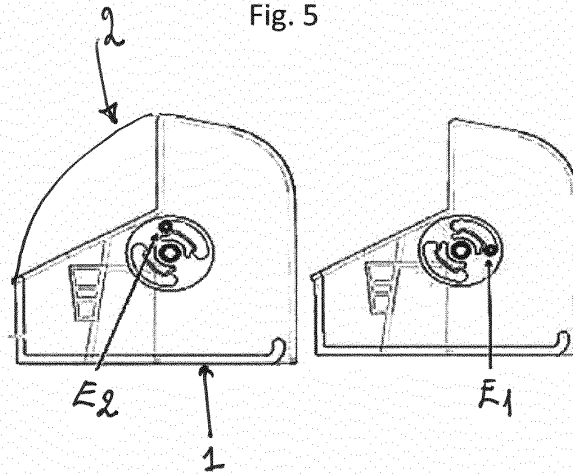


Fig. 6

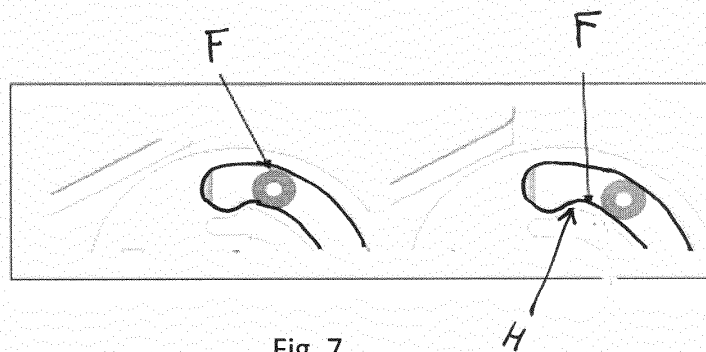


Fig. 7



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