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(72) Inventors:
• **Cappelletti, Domenico**
62023, Matelica (MC) (IT)
• **Makio, Hasuike**
20136, Milano (IT)

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(74) Representative: **Dini, Roberto**
Metroconsult S.r.l.
Via Sestriere 100
I-10060 None (Torino) (IT)

(71) Applicant: **Indesit Company S.p.A.**
60044 Fabriano (AN) (IT)

(54) **Drawer for a refrigerating apparatus, and related refrigerating apparatus**

(57) The present invention relates to a drawer (1) for refrigerating apparatuses, of the type adapted to be placed inside a refrigerating compartment closed by a door, comprising a bottom (2), a pair of side walls (4,5) extending from the bottom (2), a rear wall (6), and a front

wall (3), wherein the front wall (3) can be turned about an axis which is substantially parallel to the bottom (2) in order to allow the drawer (1) to be opened frontally, thus making it easier for the user to access the drawer.

The present invention also relates to a refrigerating apparatus equipped with such a drawer.

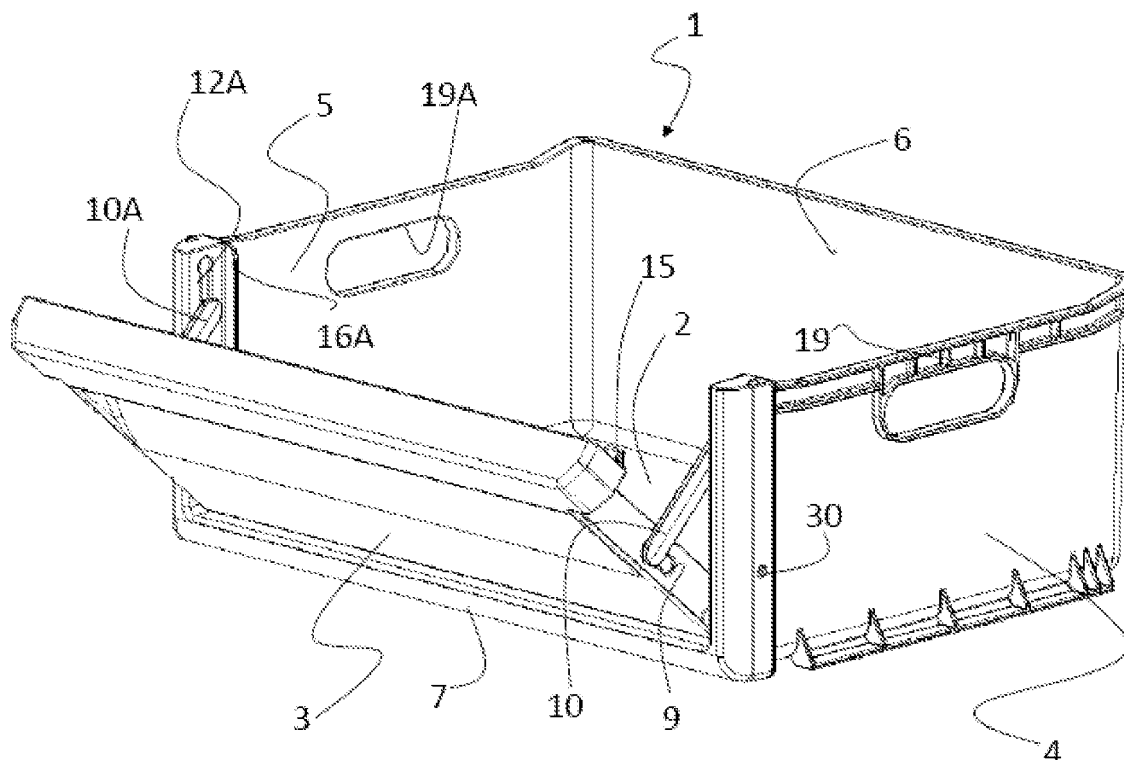


Fig. 2

Description

[0001] The present invention relates to a drawer for a refrigerating apparatus according to the preamble of claim 1, as well as to a refrigerating apparatus comprising such a drawer.

[0002] Drawers used for storing foodstuffs in refrigerating apparatuses, in particular drawers of freezer compartments of upright freezers or refrigerator-freezers known as "no-frost", typically are not very deep and cannot therefore be easily explored by a user when searching and removing foodstuffs stored in the drawer or placing foodstuffs into the drawer.

[0003] Moreover, due to the poor accessibility of the drawer, the door of the refrigerating apparatus often stays open for a rather long time, thereby causing the temperature in the refrigerating apparatus to rise and the energy consumption of the apparatus to increase in order to bring the temperature back to proper preservation levels.

[0004] This problem is especially felt in combined no-frost refrigerator-freezers, wherein a freezer compartment is arranged below a refrigerator compartment and each compartment has a dedicated access door. In order to improve the insulation of the refrigerator compartment, the current trend is to use increasingly thicker refrigerator compartment doors. However, a thicker refrigerator door makes it even more difficult to access the drawers of the freezer compartment, in particular the uppermost drawer among those housed in the freezer compartment.

[0005] A solution proposed by the prior art for the purpose of providing easier access to the drawer is contained in patent application US2007/0182295 by LG ELECTRONICS INC., which describes a drawer for a refrigerating apparatus to which a pivoted door is applied for closing the refrigerated compartment; the door is essentially an insulated panel for closing the compartment of the refrigerating apparatus that contains the drawer, and therefore it protrudes from the drawer profile at the sides, top and bottom thereof.

[0006] The drawer has four side walls and a bottom; when extracted, the interior is simplified thanks to the door pivoting outwards.

[0007] Although it makes it easier to gain access to the drawer, this solution suffers from several drawbacks: firstly, the advantages it provides are drastically reduced when several drawers are mounted one on top of another; in fact, in this case the space available for accessing the drawer from above is reduced.

[0008] Secondly, this solution teaches to mount the door's insulated panel directly to the drawer, thus binding the extraction of the former to the extraction of the latter. A drawer thus manufactured is therefore difficult to extract, because it is quite heavy.

[0009] The production cost of such a drawer is relatively high too: the insulated door fitted to the drawer is equipped with sealing gaskets running along the door edge, so that when two drawers are installed it is necessary to provide two distinct gaskets around each door.

[0010] Furthermore, mounting such a drawer to an existing refrigerating apparatus would involve undesirable structural modifications, so that this drawer can only be fitted to refrigerating apparatuses specifically designed for it.

[0011] The present invention aims at overcoming these and other drawbacks by providing a drawer for refrigerating apparatuses as set out in claim 1.

[0012] The present invention is based on the idea of providing a drawer of the type adapted to be placed inside a refrigerating compartment closed by a door, wherein the front wall of the drawer can be turned about an axis which is parallel to the drawer bottom, thus allowing the drawer to be opened frontally.

[0013] As explained below, in addition to providing easy access to the drawer's interior, such a drawer can also be manufactured easily and economically, and can be mounted as a substitute for the typical drawers installed in conventional refrigerating apparatuses.

[0014] Further advantageous features are set out in the appended claims.

[0015] It is another object of the present invention to provide a refrigerating apparatus equipped with such a drawer.

[0016] Further features and advantages of the invention will become apparent from the following description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig.1 is a perspective view of the drawer according to the present invention, with the front wall perpendicular to the bottom wall;

Fig.2 is a perspective view of the drawer of Fig. 1, with the front wall turned over;

Fig.3 is a transparency view of the drawer of Fig. 2; **Fig.4** is a perspective transparency view of the drawer of Fig.1.

[0017] With reference to Figs. 1 and 2, the drawer 1 comprises a bottom 2 and four side walls: a pivoted front wall 3, two side walls 4 and 5, and a rear wall 6.

[0018] The drawer 1 is adapted to be housed in a refrigerated compartment of the refrigerating apparatus; therefore, unlike the drawer described in patent application US2007/0182295, the maximum dimension of the pivoted front wall 3 is equal to the distance between the opposite side walls 4 and 5, so that the drawer 1 can exploit the whole internal volume of the compartment in which the drawer 1 is housed; this is made possible by the fact that the drawer 1, being housed in a compartment closed by a door, lacks the insulated panel which constitutes the door of the compartment itself.

[0019] In addition, as will be further explained below and as is clearly shown in Fig.4, wherein the front wall 3 is perpendicular to the bottom wall 2, in the drawer 1 the dimensions of the hinges that allow the front wall to be turned over are contained in the profile of the drawer 1 itself, i.e. within the inner space of the side walls 4 and

5, so that they do not take up any useful foodstuff storage room, while at the same time not being in the way when the user extracts the drawer from the compartment that contains it.

[0020] In the example shown, a frame 7 surrounding the front wall 3 is integral with the side walls 4 and 5 and the bottom 2.

[0021] As can be seen, the front wall 3 can be turned about a horizontal axis in the direction opposite to the rear wall 6; for this reason, it is equipped with a hinge, which in the illustrated example consists of pins 8 and 8A cooperating with corresponding seats 9 and 9A provided in the frame 7, as clearly shown in Fig.3. It must be pointed out that the items designated by a number followed by letter A (such as, for example, pin 8A and seat 9A), though not shown in the drawings, are located in a symmetrically opposite position with respect to the items designated by the same number (not followed by letter A) and shown in the drawings (said plane of symmetry consisting of the vertical plane orthogonal to the front wall 3 and passing through the geometrical centre of gravity of the front wall 3).

[0022] For the purpose of limiting the angle of rotation of the front wall 3, a stopping means is provided, which in the illustrated example consists of two swing arms 10 and 10A located between the front wall 3 and the frame 7, at the two opposite ends of which there are two constraints that, by way of non-limiting example, may be a rotoidal couple between the end of the swing arm 10 and 10A and the front wall 3, and a rototranslational constraint at the opposite end. Other configurations of the devices used for moving the front wall 3 relative to the frame 7 are possible as well, since a rotoidal couple or a rototranslational constraint may be arranged at the points of constraint between the frame 7 and the front wall 3 and/or between the front wall 3 and the swing arms 10 and 10A and/or between the swing arms 10 and 10A and the frame 7.

[0023] In this example, the rotoidal couple comprises an engagement pin 13 and 13A on the swing arm 10 and 10A, which cooperates with a corresponding engagement seat 14 and 14A provided on the outer side edge of the front wall 3, whereas the rototranslational constraint is obtained through sliding pins 11 and 11A moving (rotating and translating) within corresponding vertical guides 12 and 12A provided on the inner side edges of the frame 7.

[0024] For securing the front wall 3 when this is perpendicular to the bottom 2, there is a hooking means which in Figs. 2 and 3 consists of two hooking teeth 15 and 15A that cooperate with corresponding hooking edges 16 and 16A located on the inner sides of the frame 7 in order to hold the front wall 3 stably hooked in the closed position shown in Fig.1: in fact, when it is in the closed position, the hooking teeth 15 and 15A engage with the hooking edges 16 and 16A by interference, thus preventing the front wall 3 from turning.

[0025] The front wall 3 can be released by translating

it perpendicularly to and away from the bottom 2, thus disengaging the hooking teeth 15 and 15A from the hooking edge 16 and 16A.

[0026] In order to allow the front wall 3 to translate, both the seats 9 and 9A and the engagement seats 14 and 14A have an elongated shape, and the vertical guides 12,12A extend beyond the maximum height reached by the sliding pin 11,11A when the front wall is perpendicular to the bottom 2.

[0027] When the front wall 3 is perpendicular to the bottom 2 (and the hooking teeth 15 and 15A are engaged with the hooking edges 16 and 16A), the pins 8 and 8A (which are integral with the front wall 3) are positioned at the lower end of the respective seats 9 and 9A (should the pins 8 and 8A be integral with the frame 7, they will be positioned at the upper end of the respective seats 9 and 9A when the front wall 3 is perpendicular to the bottom 2), and the engagement pins 13 and 13A (which are integral with the swing arms 10 and 10A) are positioned at the lower end of the engagement seats 14 and 14A (should the pins 13 and 13A be integral with the swing arms 10 and 10A, they will be positioned at the upper end of the respective seats 14 and 14A when the front wall 3 is perpendicular to the bottom 2); in this manner, the front wall 3 can be translated perpendicularly to and slightly away from the bottom 2 so as to disengage the hooking teeth 15 and 15A from the hooking edges 16 and 16A, thus allowing the front wall 3 to rotate.

[0028] The operation of the drawer 1 is apparent from the above description and from the annexed drawings: after the refrigerator door has been opened, the drawer placed in a refrigerating compartment can be extracted like any traditional drawer; by exerting an upward parallel force onto the front wall, the front wall 3 of the drawer 1 is turned over, thus widening the access area of the drawer 1 and simplifying the exploration thereof, while at the same time improving the possibility of removing or loading relatively bulky foodstuffs or foodstuffs having relatively complex shapes from/into the drawer 1.

[0029] As the wall 3 is being turned over forwards, the sliding pins 11 and 11A move, by rotating and translating into the slide guides 12 and 12A, towards the bottom 2 of the drawer 1, and allow to stop the front wall 3 at an opening angle which can be preset by adjusting the length of the swing arms 10 and 10A; according to a preferred solution, the front wall 3 is turned by about 90°, so that it becomes aligned with the bottom 2, thus maximizing the ease of access to the drawer while allowing other drawers located immediately above or under the drawer 1 in the refrigerating apparatus to be opened simultaneously without any hindrance. In order to obtain a front wall rotation by about 90°, telescopic swing arms may be used. With a simplified structure (like the one illustrated in the drawings annexed to the present description), it is nonetheless possible to provide (by appropriately sizing the length of the swing arms 10 and 10A as well as the respective points of constraint to the frame 7 and front wall 3) a rather wide opening angle

(between approx. 30° and approx. 60°, e.g. approx. 45°) such that the obtained area of access to the drawer 1 (when the front wall 3 is turned over) provides comfortable access for an adult man's hand.

[0030] According to a further advantageous feature, the drawer 1 can be manufactured at a very low cost, with the walls 4, 5 and 6 made of plastic material, e.g. polypropylene, and reinforced by upper reinforcement ribs 17, 17A and 20 and lower reinforcement ribs 18 and 18A, wherein the lower ribs 18 and 18A may also be used as a slide guide for the drawer, since they are provided with flat resting surfaces which may be laid onto a support fitted to the inner walls of the refrigerating apparatus (not shown).

[0031] According to an advantageous feature, the upper reinforcement ribs 17, 17A and 17B are provided in one piece with the walls themselves, thus making the production of the drawer extremely economical.

[0032] The drawer 1 also comprises two handles 19 and 19A for facilitating the transportation of the drawer when it is removed from the refrigerating apparatus, which handles may be provided in one piece with the side walls, in particular near the upper side ribs 17 and 17A, so as to ensure sufficient strength of the entire assembly.

[0033] The lower reinforcement ribs 18, provided in one piece with the walls, include flat resting surfaces for supporting the drawer and guiding the sliding motion thereof on a support provided inside a refrigerated compartment.

[0034] The frame 7 has a boxed structure with the front edges of the side walls 4 and 5 reinforced in the proximity of the front wall 3, so as to support any load that may be placed onto the wall 3 as the user is loading/unloading or exploring the drawer 1.

[0035] The boxed structure of the frame 7 also ensures that the slide guides 12 and 12A and the seats 9 and 9A are strong enough to support the front wall 3 during its overturning motion without undergoing any deformation.

[0036] The frame 7 may be provided in one piece with the side walls and/or with the bottom wall, or else it may be applied thereto during a subsequent stage of the production process, in particular through fastening means (e.g. comprising screws, among which the screws 30 and 30A) which may also be used when the material of the frame 7 is different from the material of the structure of the drawer 1, e.g. a different plastic material.

[0037] A cavity 31, preferably provided in one piece with the front wall 3, which forms a lift/extraction handle in the front wall 3, makes it easier to extract the drawer 1 from the refrigerating compartment and facilitates the short upward movement of the front wall 3.

[0038] As shown in Figs. 3 and 4, the cavity may be provided through a suitable surface inclined relative to the front wall 3 and featuring a grip aperture 35 at the top that aids in gripping the drawer.

[0039] The upper edge 32 also features a boxed structure that improves the strength of the front wall 3, which

by the way may be made of a transparent or translucent material, so as to advantageously allow a user to look into the drawer without having to open it.

[0040] Advantageously, the front wall 3 may comprise an interspace extending for at least a portion of the wall and filled with a eutectic mixture (e.g. sodium chloride or calcium chloride) for the purpose of improving the thermal insulation of the drawer 1: the drawers 1, in fact, offer the best advantages when they are arranged one on top of another in a freezer equipped with a traditional door, i.e. with lateral hinges, which, when opened, provides simultaneous access to all drawers; in this case, in fact, when the door is opened the front walls of the various drawers will come in contact with the outside environment, and the interspace filled with a eutectic mixture will avoid excessive thermal dissipation. It should be pointed out that the application of an element made of eutectic material to the front wall of a drawer for a refrigerating apparatus (said application being either removable or non-removable) is per se an inventive feature, regardless of the shape of the drawer (e.g. even for a drawer for a refrigerating apparatus having a fixed front wall).

[0041] It is barely worth mentioning that the positions of the pins and seats in the hinges may be exchanged, and that the stopping means used for preventing the front wall from turning uncontrollably may be replaced with equivalent results by a simple projection provided at the base of the front wall, which abuts against the bottom or the frame, for example, so as to determine a point at which the front wall will stop rotating. As an alternative to the projection on the front wall, projections may be provided on the frame, the bottom or the side walls for stopping the front wall at a predetermined angle of rotation.

[0042] Likewise, the man skilled in the art may also replace the front wall fastening system comprising hooking teeth with an equivalent alternative, e.g. a simple hooking tooth which can be disengaged by the user, or more in general any suitable latch mechanism.

[0043] Likewise, although to the detriment of robustness, it is also possible to use a single swing arm cooperating with a single vertical guide provided on the frame, and/or a single hooking tooth.

[0044] Furthermore, the frame may even only consist of the edges (whether specially profiled or not) of the side and bottom walls facing the front wall.

Claims

1. Drawer (1) for refrigerating apparatuses, of the type adapted to be placed inside a refrigerating compartment closed by a door, comprising a bottom (2), a pair of side walls (4,5) extending from the bottom (2), a rear wall (6), and a front wall (3), **characterized in that** the front wall (3) can be turned about an axis which is substantially parallel to the bottom (2) in order to allow the drawer (1) to be opened frontally.

2. Drawer (1) according to claim 1, wherein the horizontal axis about which the front wall (3) can be turned is located substantially at the bottom (6).
3. Drawer (1) according to claim 1 or 2, wherein the front wall (3) extends between the opposite side walls (4,5). 5
4. Drawer (1) according to any of the preceding claims, comprising a hinge (8,8A,9,9A) for turning over the front wall (3). 10
5. Drawer (1) according to any of the preceding claims, comprising a stopping means adapted to stop the rotation of the front wall (3) at a predetermined angle of rotation. 15
6. Drawer (1) according to any of the preceding claims, comprising a hooking means adapted to hold the front wall (3) in a position perpendicular to the bottom (2). 20
7. Drawer (1) according to any of the preceding claims, wherein the hinge, the stopping means and the hooking means are housed in the space between the opposite side walls (4,5) and over the bottom (2) of the drawer (1). 25
8. Drawer (1) according to any of the preceding claims, comprising a reinforcement frame (7) prearranged on the side walls (4,5) and on the bottom (6) where said walls (4,5,6) face the front wall (3). 30
9. Drawer (1) according to claim 8, wherein the hinge consists of pins (8,8A) arranged on the flanks of the front wall (3) and of corresponding seats (9,9A) located on the frame (7), thus allowing the front wall (3) to rotate. 35
10. Drawer (1) according to claim 8, wherein the stopping means comprises at least one vertical guide (12,12A) arranged on the inner side edges of the frame (7), and at least one engagement seat (14,14A) located on the outer side edge of the front wall (3), wherein the vertical guides (12,12A) and the engagement seats (14,14A) are adapted to house at least one sliding pin (11,11A) and at least one engagement pin (13,13A), respectively, provided on the opposite ends of at least one swing arm (10,10A). 40
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11. Drawer (1) according to claim 8, wherein the hooking means releases the front wall (3), thus allowing it to rotate, through a translational movement of the latter away from the bottom (2). 55
12. Drawer (1) according to claim 11, wherein the hooking means consists of at least one hooking tooth (15,15A) on the front wall (3) and one corresponding hooking edge (16,16A) on the inner side of the frame (7), thus allowing the front wall (3) to be hooked in a position substantially perpendicular to the bottom (2).
13. Drawer (1) according to any of claims 6 to 11, wherein the seats (9,9A) provided on the frame (7) and the engagement seats (14,14A) provided on the front wall (3) have an elongated shape, and wherein the vertical guide (12,12A) extends upwards beyond the height corresponding to the height reached by the sliding pin (11,11A) when the front wall (3) is perpendicular to the bottom (2), thus allowing the front wall (3) to translate away from the bottom (2) in order to disengage the hooking tooth (15,15A) from the corresponding hooking edge (16,16A).
14. Drawer (1) according to any of the preceding claims, wherein the front wall (3) comprises an interspace filled with a eutectic mixture for improving the thermal insulation of the drawer (1).
15. Refrigerating apparatus comprising at least one refrigerated compartment closed by a door, **characterized in that** the refrigerated compartment houses at least one drawer according to any of claims 1 to 14.

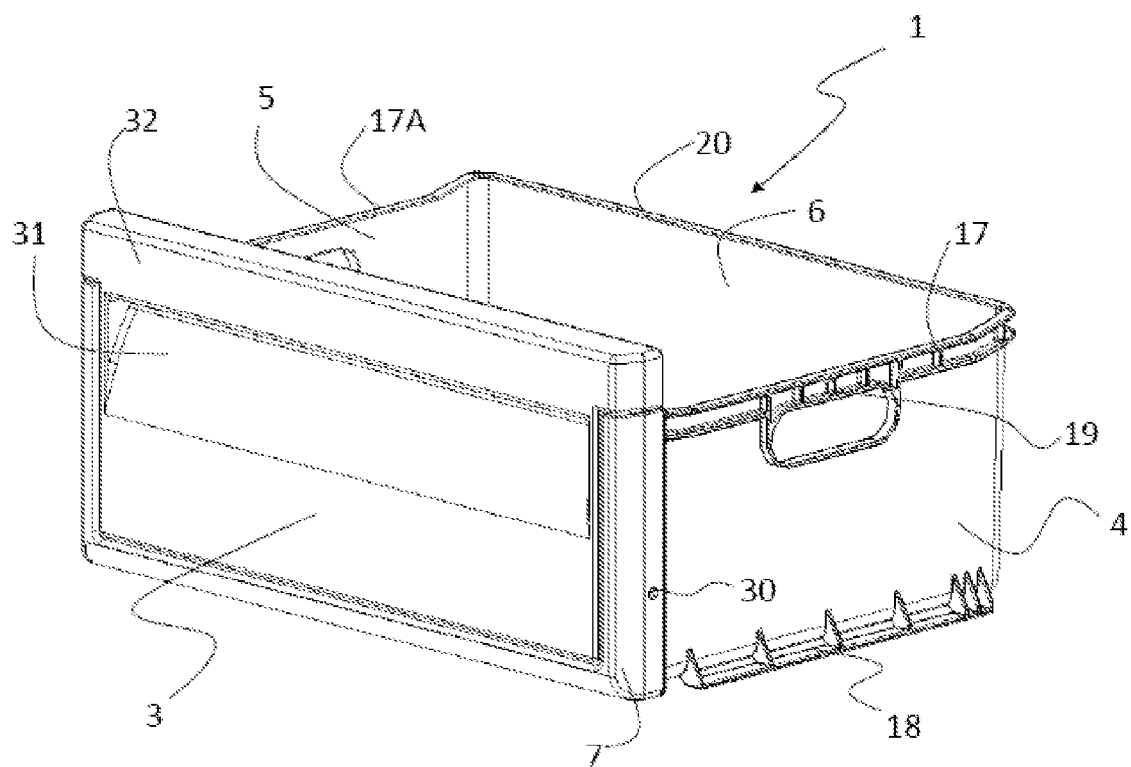


Fig.1

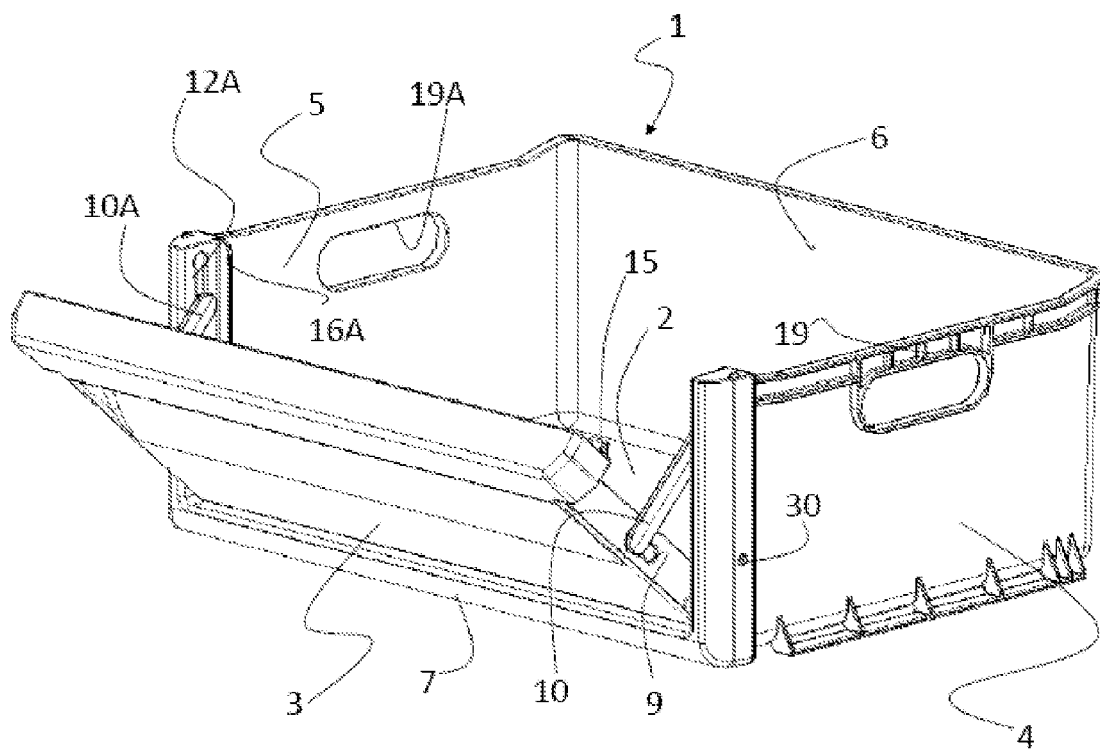


Fig.2

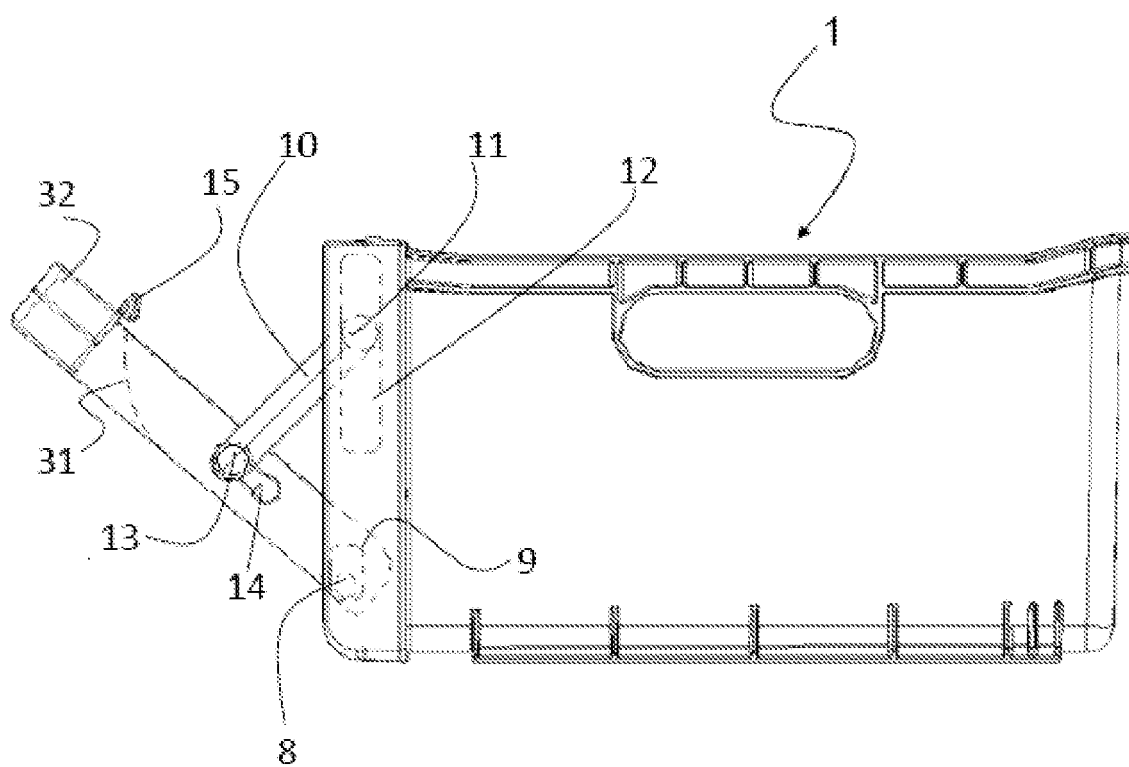
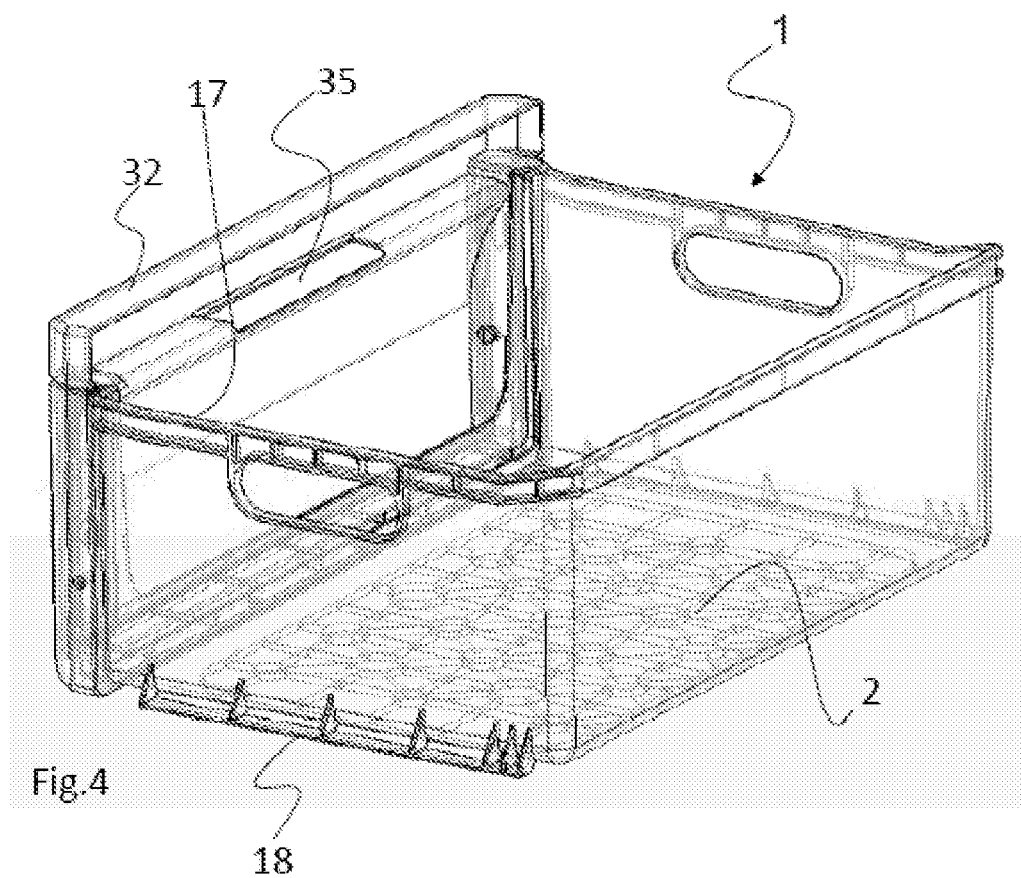


Fig.3



REFERENCES CITED IN THE DESCRIPTION

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