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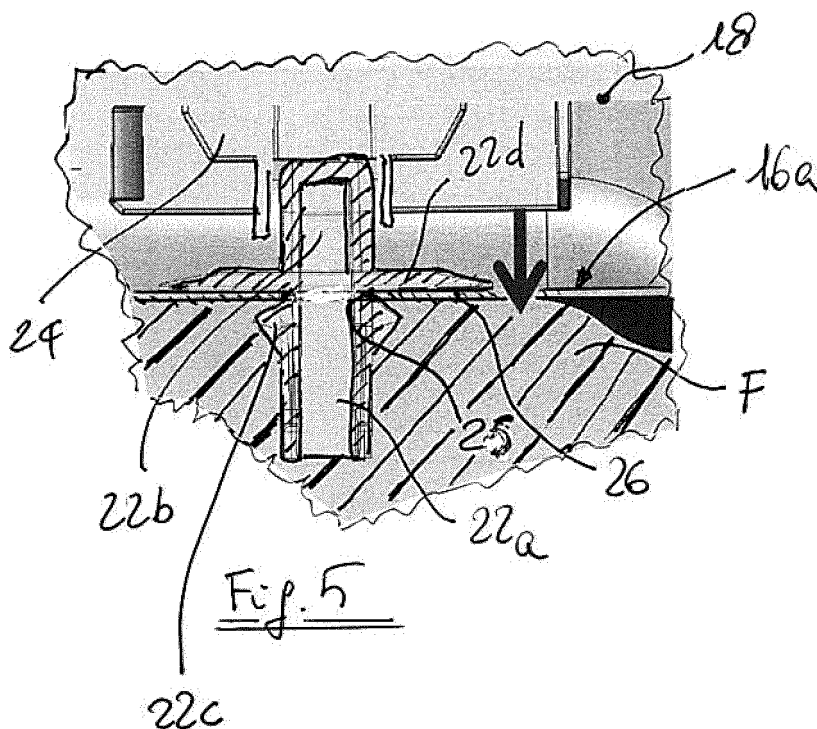
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(54) **Refrigerator with a crisp drawer**

(57) A refrigerator comprises a cabinet having defined therein a storage compartment and a crisp drawer supported on the bottom wall of the storage compartment, between said drawer and said bottom wall being interposed a sliding system comprising at least two par-

allel rails of polymeric material inserted and fastened in cut outs of the bottom wall and having a low coefficient of friction, such rails being configured to cooperate with corresponding shaped bottom portions of the crisp drawer in order to assure a smooth sliding movement thereof.



Description

[0001] The present invention relates to a refrigerator comprising a cabinet having defined therein a storage compartment and a crisp drawer supported on the bottom wall of the storage compartment, between such drawer and said bottom wall being interposed a sliding system.

[0002] With the term "refrigerator" we mean any kind of refrigerating appliance in which a cabinet with a crisp drawer is defined, including refrigerators having a freezer and fresh food compartment, as well as side by side refrigerators.

[0003] The first sliding system used in the above kind of refrigerators was simply a sliding cooperation between the bottom wall of the crisp drawer and the bottom wall of the storage compartment. This traditional system has the disadvantage of a side wobbling and annoying noise when the drawer is extracted and/or inserted in the storage compartment. The combined effect of wobbling and noise gives to the user an impression of low quality, leaving aside any possible problems of preventing the user from extracting the crisp drawer in an easy and smooth way.

[0004] In order to solve the above technical problem several solutions have been proposed. One solution is disclosed by US 2014/0265801 A1 in which the sliding system comprises several rollers for controlling the vertical and side-by-side movements of the crisp drawer. Another solution is disclosed by US 2014/0265807 A1 in which the sliding system comprises a base supported by the bottom wall of the storage compartment and having under bin rails configured to cooperate with guide members integral with the drawer.

[0005] Even if the above known solutions can guarantee a smooth sliding of the crisp drawer in and out of the storage compartment, nevertheless they are quite complex and expensive. Moreover they make the cleaning of the storage compartment and of the crisp drawer more difficult if compared to the old solution in which the crisp drawer is supported directly by the bottom wall of the storage compartment and can slide on it.

[0006] It is therefore an object of the present invention to provide a refrigerator of the type specified at the beginning of the description which does not present the above problems and which is easy to be assembled.

[0007] The above object is reached thanks to the features listed in the appended claims.

[0008] By using a pair of parallel rails of polymeric material having a low coefficient of friction and embedded in the bottom wall of the storage compartment it is possible to obtain a smooth extraction movement of the crisp drawer with a minimal side wobbling, with a minimal increase of overall cost if compared to the traditional systems where the crisp drawer slides directly on the bottom wall of the storage compartment. As a matter of fact the technical solution according to the invention does not need additional rollers or wheel or additional parts to be installed to the drawer.

[0009] According to a preferred embodiment of the invention, the rails are embedded in the bottom wall of the storage compartment by inserting them in slits provided in said bottom wall and by assuring that such rails have a root portion of sufficient dimensions in order to assure a proper fastening of the rails when insulating foam is injected in the space adjacent the liner of the cabinet. In other words, the rails are fastened to the liner when the insulating foam is injected.

[0010] According to another preferred feature of the invention, the crisp drawer presents raised shaped portions configured to cooperate with the rails, such shaped portions having preferably a lattice structure obtained by plastic injection molding.

[0011] Further advantages and features will be clear from the following detailed description, provided as a non limitative example, with reference to the attached drawings in which:

- Figure 1 is a perspective partial view of a crisp drawer mounted in a storage compartment of a refrigerator according to the invention;
- Figure 2 is a front view of the crisp drawer shown in figure 1;
- Figures 3 and 4 are enlarged details of figure 2;
- Figure 5 is a sectioned view of a detail of the refrigerator according to a first embodiment of the invention;
- Figure 6 is a view similar to figure 5 and showing a detail of the refrigerator according to a second embodiment of the invention; and
- Figure 7 is a perspective view of a detail of a shaped bottom portion of the crisp drawer used in the refrigerator according to the invention.

[0012] With reference to the drawings, a refrigerator 10 comprises a cabinet 12 with a door 14 and defining a fresh food storage compartment 16. Such compartment 16 has a bottom wall 16a on which a crisp drawer 18 (known also as "crisper") is supported. The crisp drawer 18 is covered by a shelf 20 supported by side walls of the compartment 16.

[0013] With reference to figures 2-4, on the bottom wall 16a of the compartment 16 there are mounted two parallel rails 22 of polymeric material having a low coefficient of friction, for instance polyoxymethylene (POM), i.e. an engineer polymer widely used in the automotive and consumer electronic industry. The rails 22 may be totally made of any low-friction material, or they may have a composite structure where only the top portion thereof is made of such material, while the base portion is made of less expensive polymer, for instance polypropylene (PP).

[0014] Figure 3 shows the left rail 22 and an overlapping crisper integrated ribbed structure 24 with side walls 24a defining a minimal side clearance (to hold the crisper 18 against wobbling). Figure 4 shows the right rail 22 with an increased side clearance to cover the width dimen-

sional and thermal variability.

[0015] The two hollow rails 22 may be fastened to the bottom wall 16a of the compartment 16 in several ways. According to the preferred solution shown in figure 5, each rail 22 presents a root portion 22a which has a height similar or even higher than the dimension of the upper portion 22b which protrudes from the bottom wall 16a (in the example shown in figure 5 the root portion 22a has dimension similar to the upper portion 22b). Moreover, each rail 22 has a fixing enlarged portion 22c which co- operates in a snap engagement way with a correspond- ing slit 25 provided in the liner 26 defining the bottom wall 16a. In order to define a proper positioning of the rail 22 after insertion in the slit 25 (insertion from the above as shown by the arrow in figure 5), each rail 22 presents a flanged portion 22d which, after said insertion, abuts the liner 26 (the edge of the slit 25 is sandwiched between the enlarged portion 22c and the flange portion 22d of the rail 22. When an insulating foam F is injected in the area below the liner 26, it fastens the root portion 22a of the rail 22. Moreover such solution has the advantage that the slit or cut out 25 is hidden by the flange portion 22d.

[0016] According to the embodiment shown in figure 5, each hollow rail 22 does not have a root portion, rather a bottom enlarged portion 22f which abuts the liner 26 from the lower surface of the liner 26 (insertion from the bottom as shown by the arrow in figure 6. The advantage of this solution is that each rail 22 doesn't project into the insulating foam F and in case of cell wrapped pipe there's no obstruction for the pipe (almost flat surface from the foam side).

[0017] With reference to figure 7, it is shown a detail of one of the integrated ribbed structures 24 provided on the bottom of the crisp drawer 18. Such structures have a lattice construction with a plurality of crossing ribs 30 obtained during the injection molding process for produc- ing the crisp drawer 18. Such lattice structure has the advantage of creating a more rigid surface configured to slide on the rails 22. Moreover such lattice structure does not create molding defects in the bottom of the crisp draw- er 18 which maintains a flat surface. With the sliding sys- tem according to the invention, when the user is extract- ing the drawer 18 the side movement thereof is minimized by the interference assured by vertical side walls 24a cooperating with the rails 22, so that the sensorial expe- rience and the perceived quality is very good (no strange noise and very low force requested for pulling out the drawer). Moreover, from a user perspective, the robust- ness and behavior of the sliding system is comparable to much more expensive and complex system.

Claims

1. Refrigerator (10) comprising a cabinet (12) having defined therein a storage compartment (16) and a crisp drawer (18) supported on the bottom wall (16a)

of the storage compartment (16), between said draw- er (18) and said bottom wall (16a) being interposed a sliding system, **characterized in that** said sliding system comprises at least two parallel rails (22) of polymeric material having a low coefficient of friction and fastened to said bottom wall (16a), such rails (22) being configured to cooperate with correspond- ing shaped bottom portions (24, 30) of the crisp draw- er (18) in order to assure a smooth sliding movement thereof.

2. Refrigerator according to claim 1, wherein the rails are inserted in cut outs (25) of the bottom wall (16a), each rail (22) having a portion (22a) inserted in the cut out (25) which has dimensions similar to the di- mensions of the portion (22b) protruding in the stor- age compartment (16).

3. Refrigerator according to claim 2, wherein each rail (22) is provided with a flange portion (22d) larger than the cut out (25) configured to prevent insulating foam material from going out from the cut out during foaming process of the refrigerator (10).

4. Refrigerator according to claim 3, wherein adjacent the flange portion (22d) each rail (22) present an enlarged portion (22c) configured to allow a snap- engagement of the rail (22) into the cut out (25).

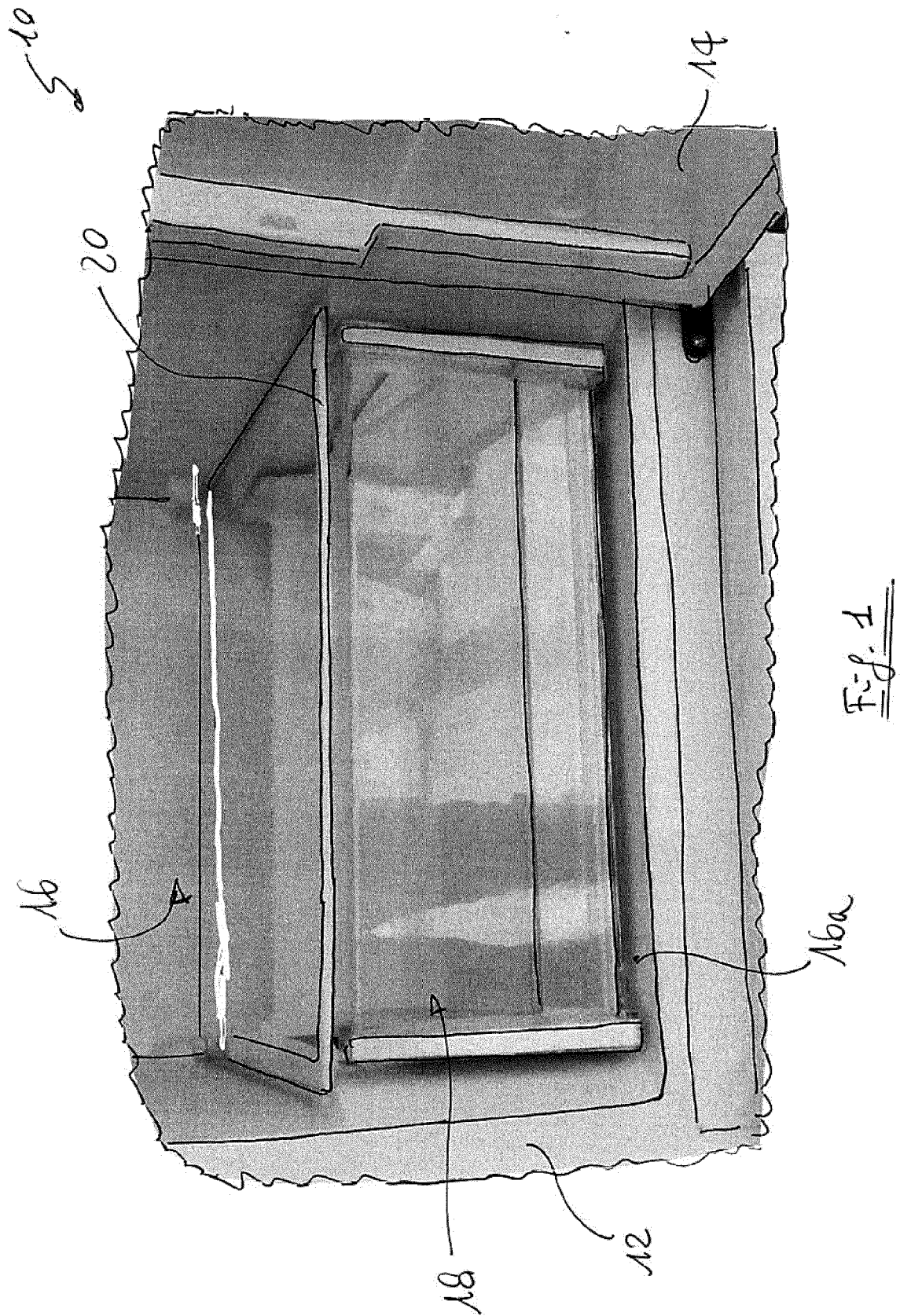
5. Refrigerator according to claim 1, wherein each rail (22) presents an enlarged base portion (22f) config- ured to assure a proper positioning in cut out (25) of the bottom wall (16a) and to be urged by insulating foam pressure against a lower surface of the bottom wall (16a) during the foaming process of the refrig- erator (10).

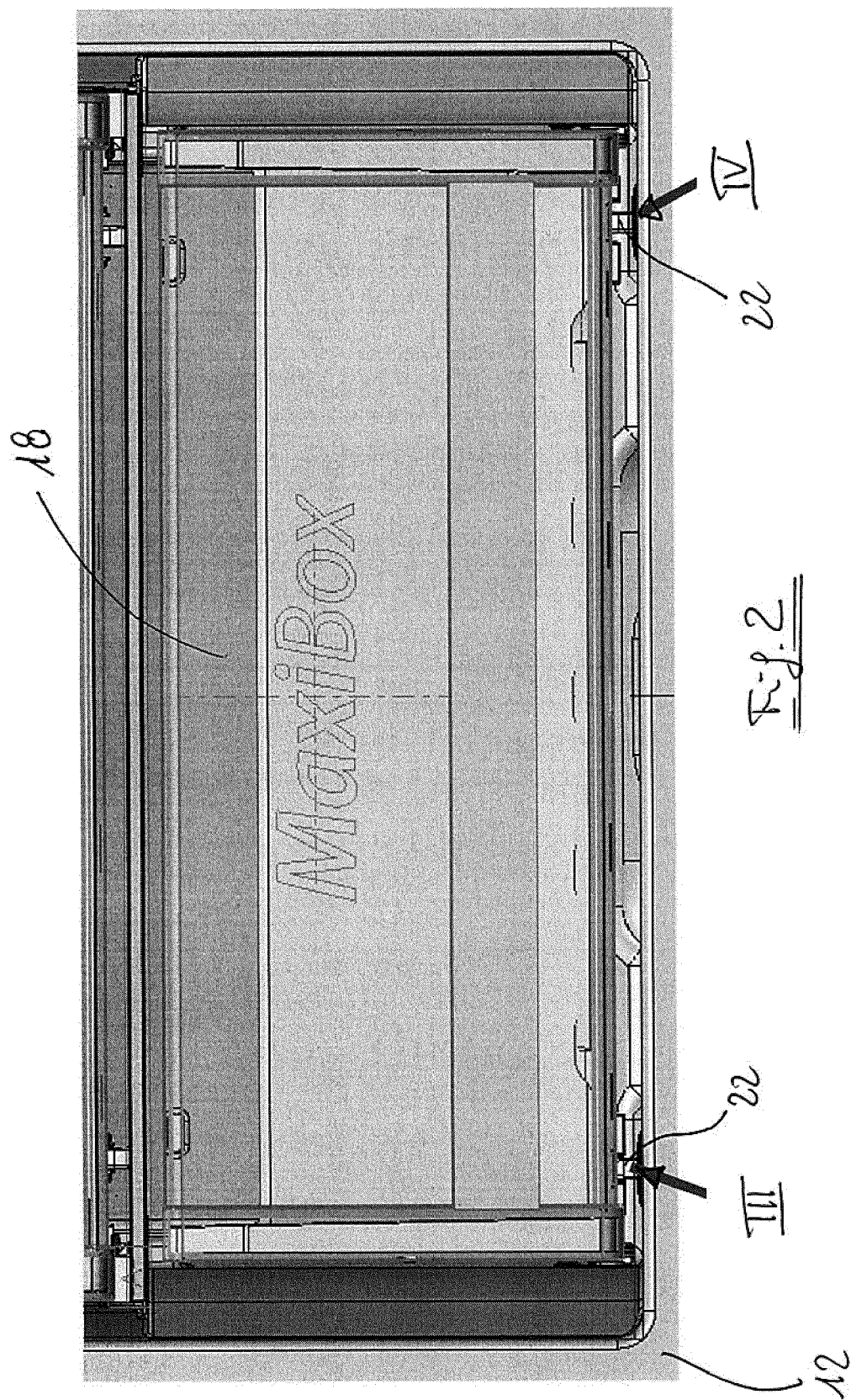
6. Refrigerator according to any of the preceding claims, wherein each shaped bottom portion (24) of the crisp drawer (18) has two side parallel walls (24a) which protrudes from the crisp drawer (18) and which are configured to guide the crisp drawer (18) on the corresponding rail (22).

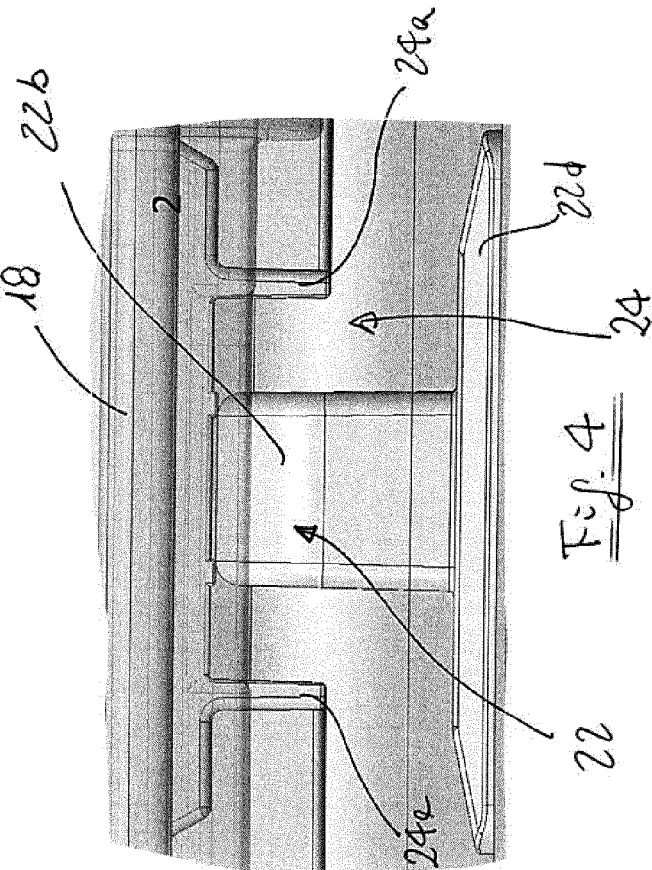
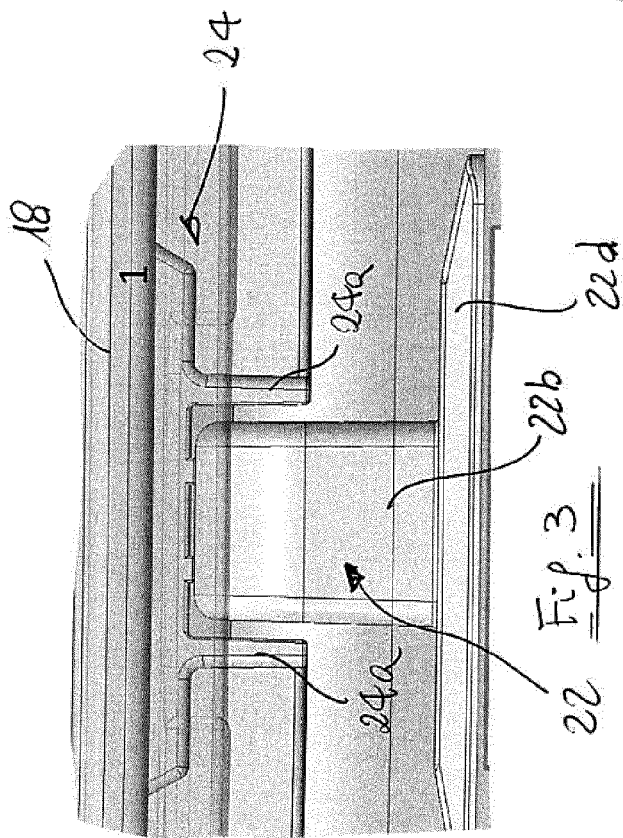
7. Refrigerator according to claim 6, wherein each shaped bottom portion (24) of the crisp drawer (18) has a lattice structure obtained by injection molding.

8. Refrigerator according to claim 6 or 7, wherein the width of a first channel defined by said side walls (24a) of a first shaped bottom portion (24) is larger than the width of a second channel defined by said side wall (24a) of a second shaped bottom portion (24) of the crisp drawer (18).

9. Refrigerator according to any of the preceding claims, wherein the polymeric material of the rails is a polyacetal, particularly a polyoxymethylene.







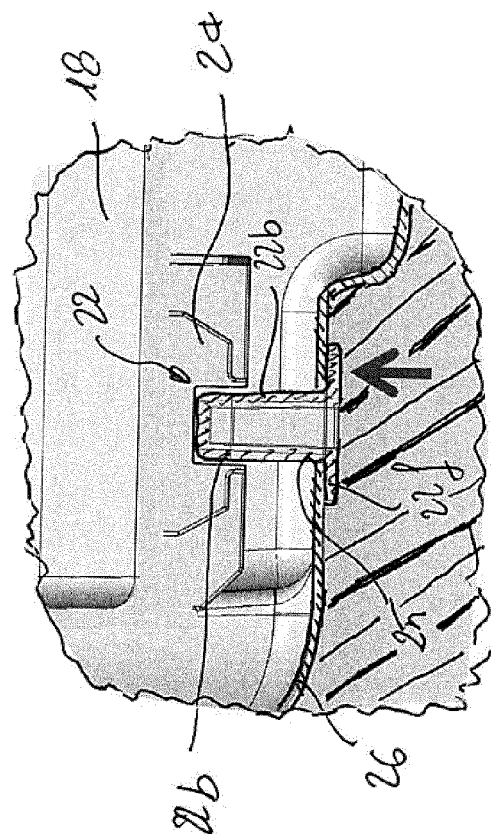


Fig. 6

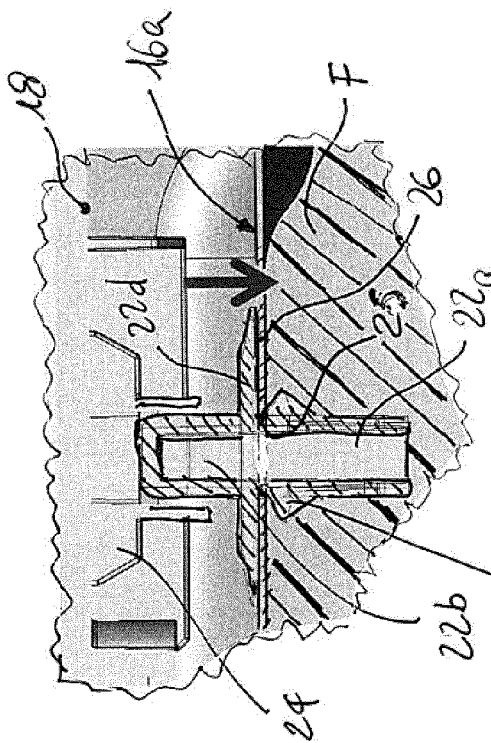


Fig. 5

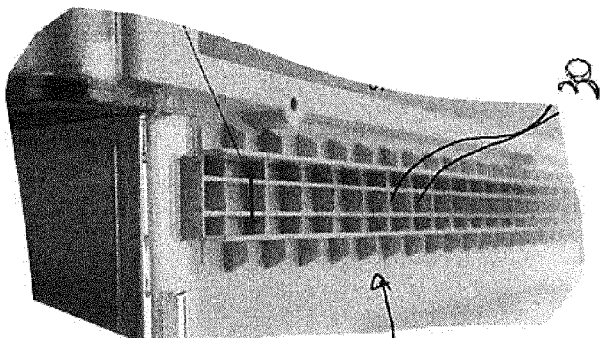


Fig. 7

18 ~
22c

24

30



EUROPEAN SEARCH REPORT

Application Number
EP 15 15 2491

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Y	----- JP H04 268185 A (TOSHIBA CORP) 24 September 1992 (1992-09-24) * figure 4 *	2-5	

			TECHNICAL FIELDS SEARCHED (IPC)
			F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 July 2015	Examiner Melo Sousa, Filipe
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			

EPO FORM 1503 03/02 (P04C01)

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

EP 15 15 2491

5 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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20-07-2015

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