



US 20100109498A1

(19) **United States**(12) **Patent Application Publication**
Ramm et al.(10) **Pub. No.: US 2010/0109498 A1**(43) **Pub. Date: May 6, 2010**(54) **SYSTEM FOR MOVING A SET OF SHELVES
OF A REFRIGERATION APPLIANCE AND
REFRIGERATION APPLIANCE**(76) Inventors: **Axel Julio Ramm**, Sao Paulo (BR);
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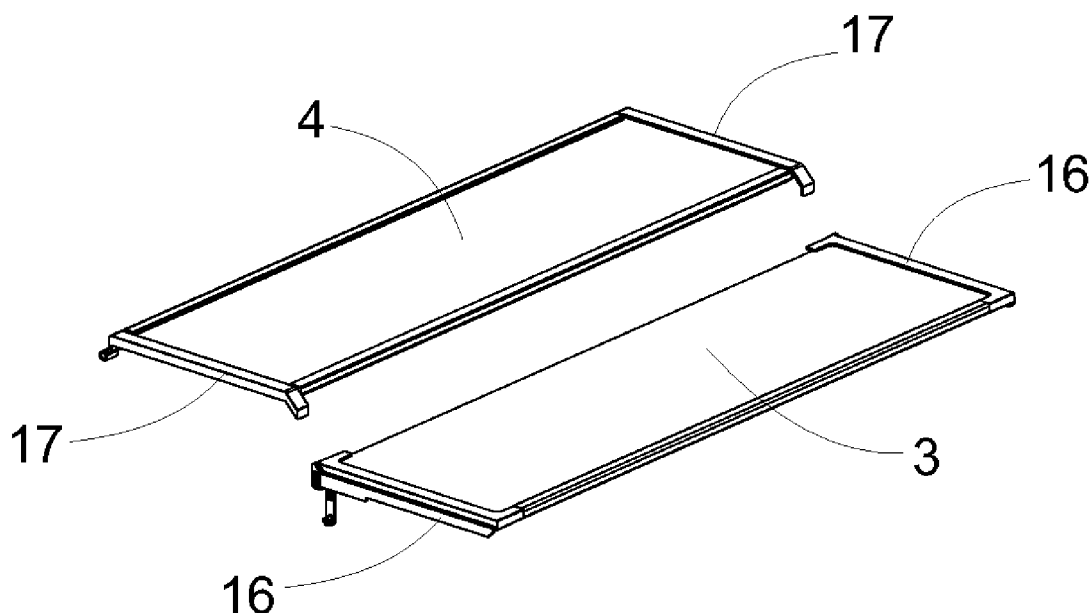
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CIRA CENTRE, 12TH FLOOR, 2929 ARCH
STREET
PHILADELPHIA, PA 19104-2891 (US)(21) Appl. No.: **12/498,200**(22) Filed: **Jul. 6, 2009**(30) **Foreign Application Priority Data**

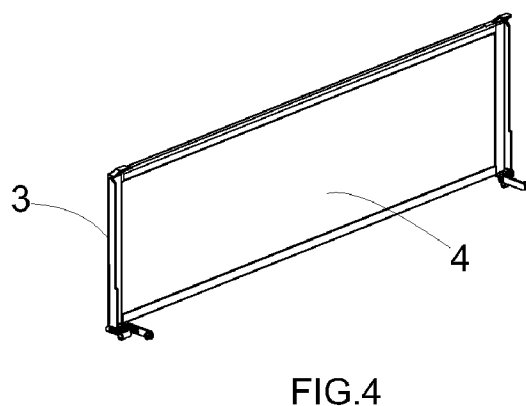
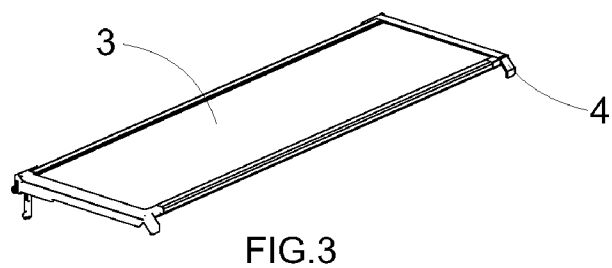
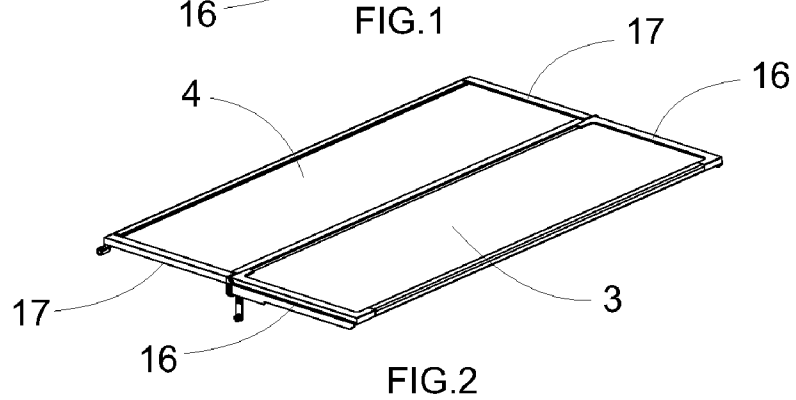
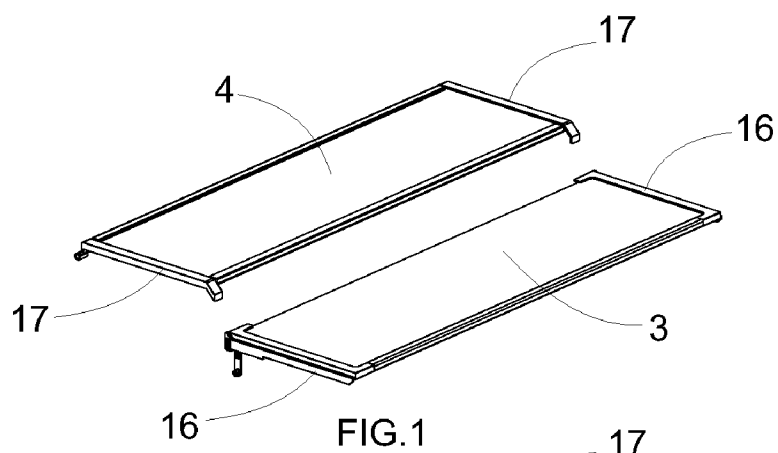
Jul. 7, 2008 (BR) PI0803841-4

Publication Classification(51) **Int. Cl.**
F25D 25/02 (2006.01)(52) **U.S. Cl. 312/408**(57) **ABSTRACT**

The present invention refers to a system that is able to provide movement over three stable stages of a set of shelves of a refrigeration appliance. The said refrigeration appliance comprises at least one refrigeratable cabinet. The said set of shelves comprises at least one front shelf and one rear shelf associable to each other. The said set of shelves is associated to the refrigeratable cabinet by means of at least one side bar provided with a first accommodating portion and a second accommodating portion that are substantially flat. The front shelf is supportable by the first accommodating portion and the rear shelf is supportable by the second accommodating portion. The first accommodating portion has a difference in height in relation to the second accommodating portion as to allow an horizontally aligned juxtaposition between the front shelf and the rear shelf. The front shelf is dissociable from the first accommodating portion and is able to be superimposed in relation to the rear shelf supportable by the second accommodating portion. The rear shelf has its first end provided with a pivoting element associated articulately to the second accommodating portion of the side bar. The pivoting element is able to allow the angular movement of the set of superimposed shelves from an initial horizontal position to a final substantially vertical position.

The present invention also refers to a refrigeration appliance provided with the abovementioned system.





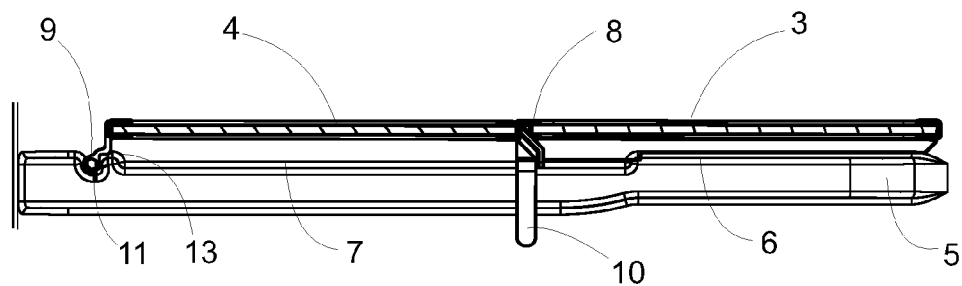


FIG. 5

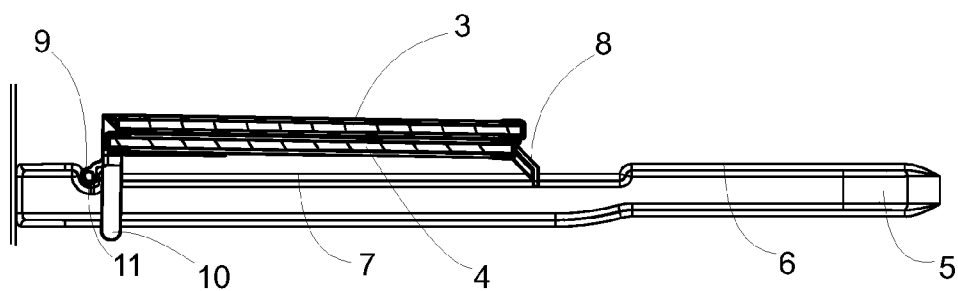


FIG. 6

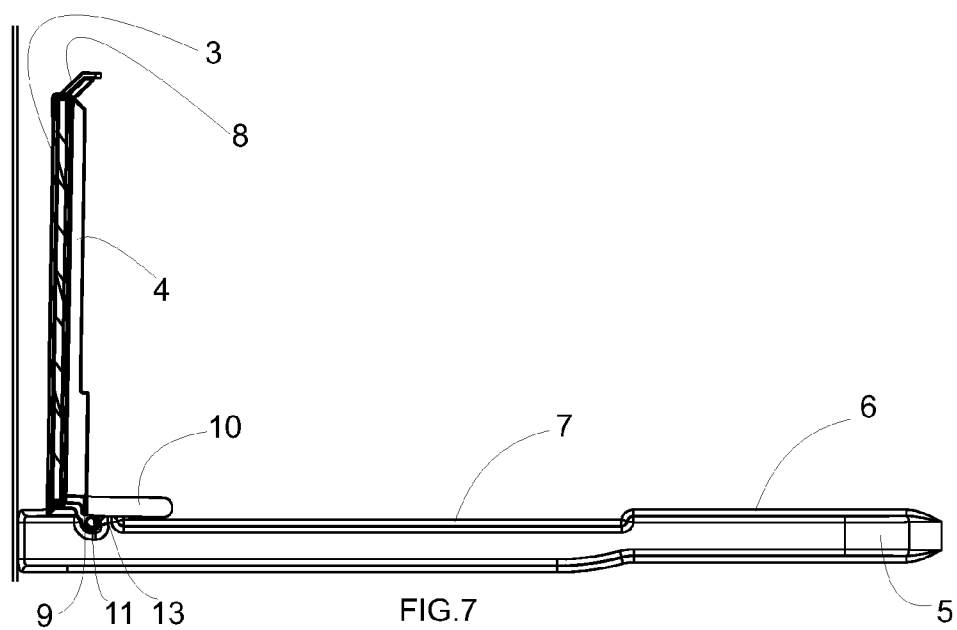


FIG. 7

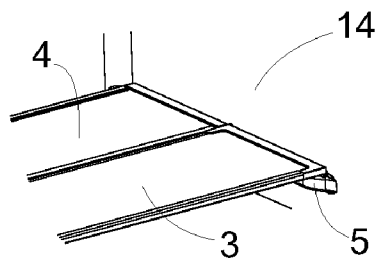


FIG. 8

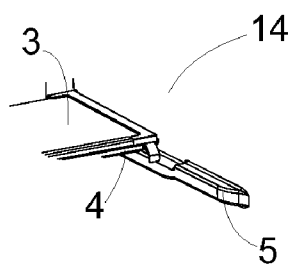


FIG. 9

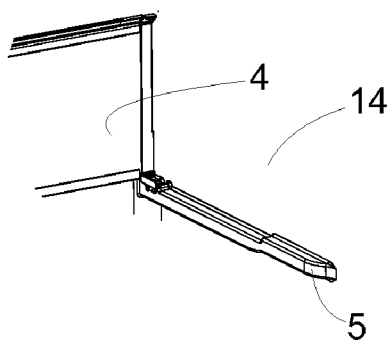


FIG. 10

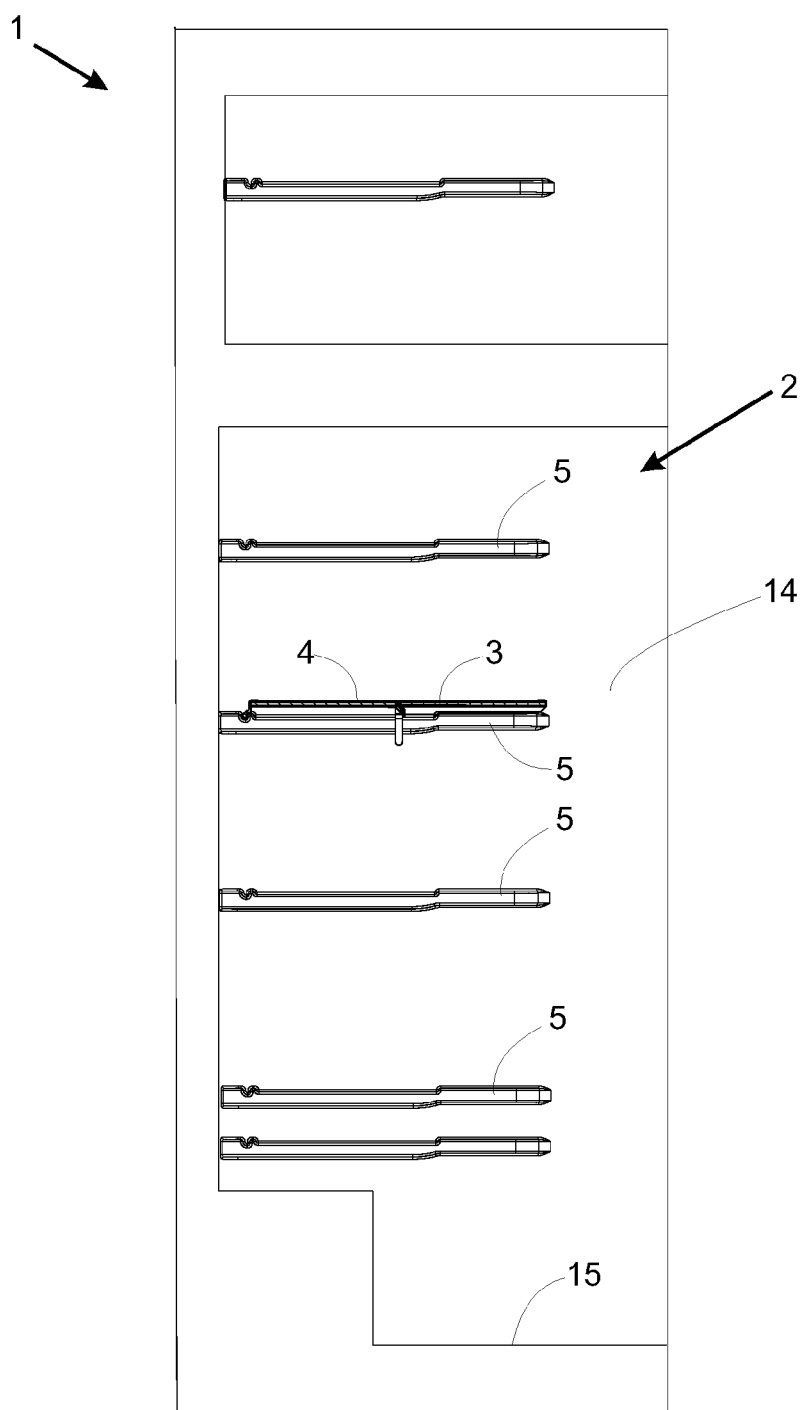
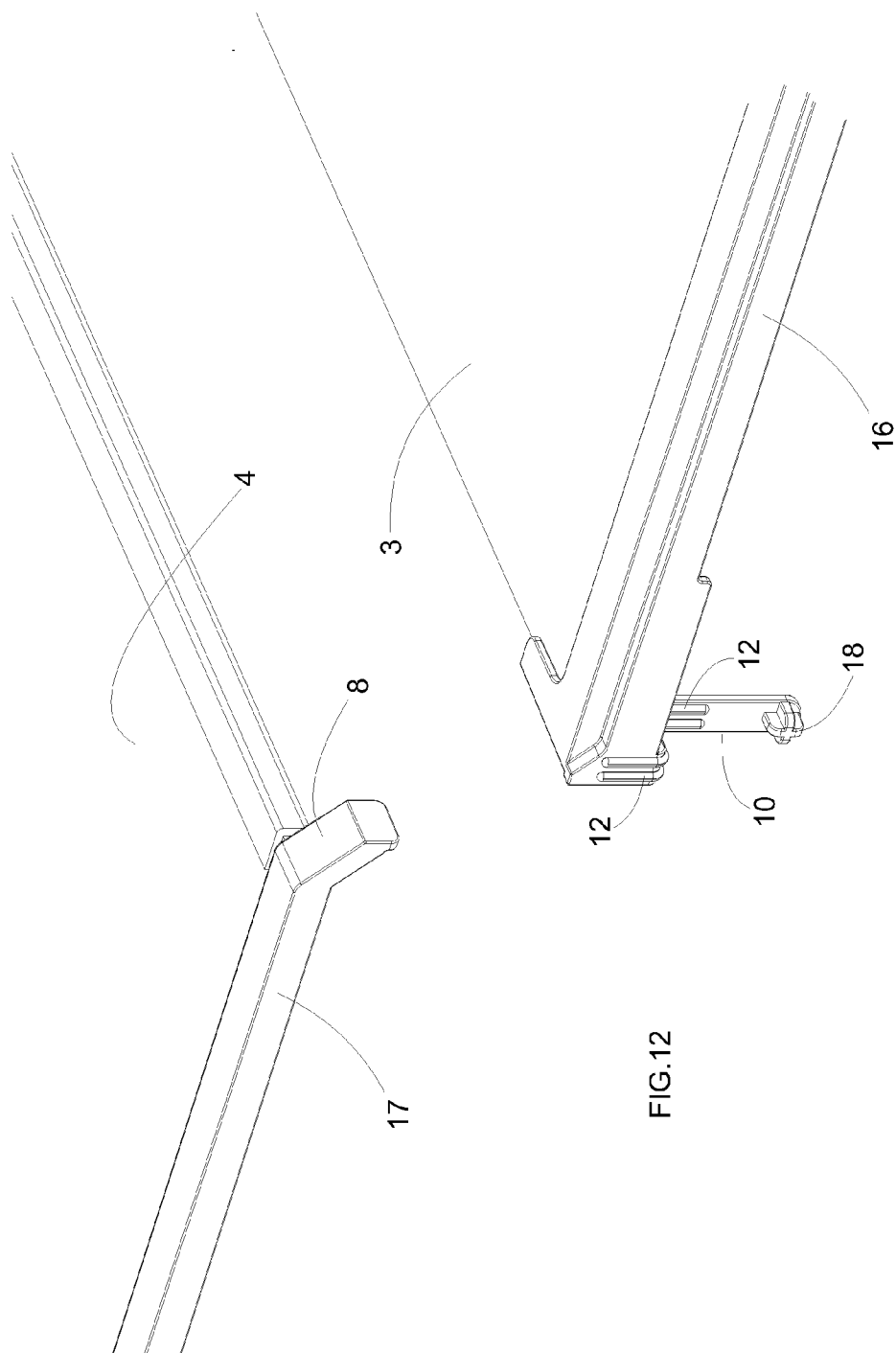
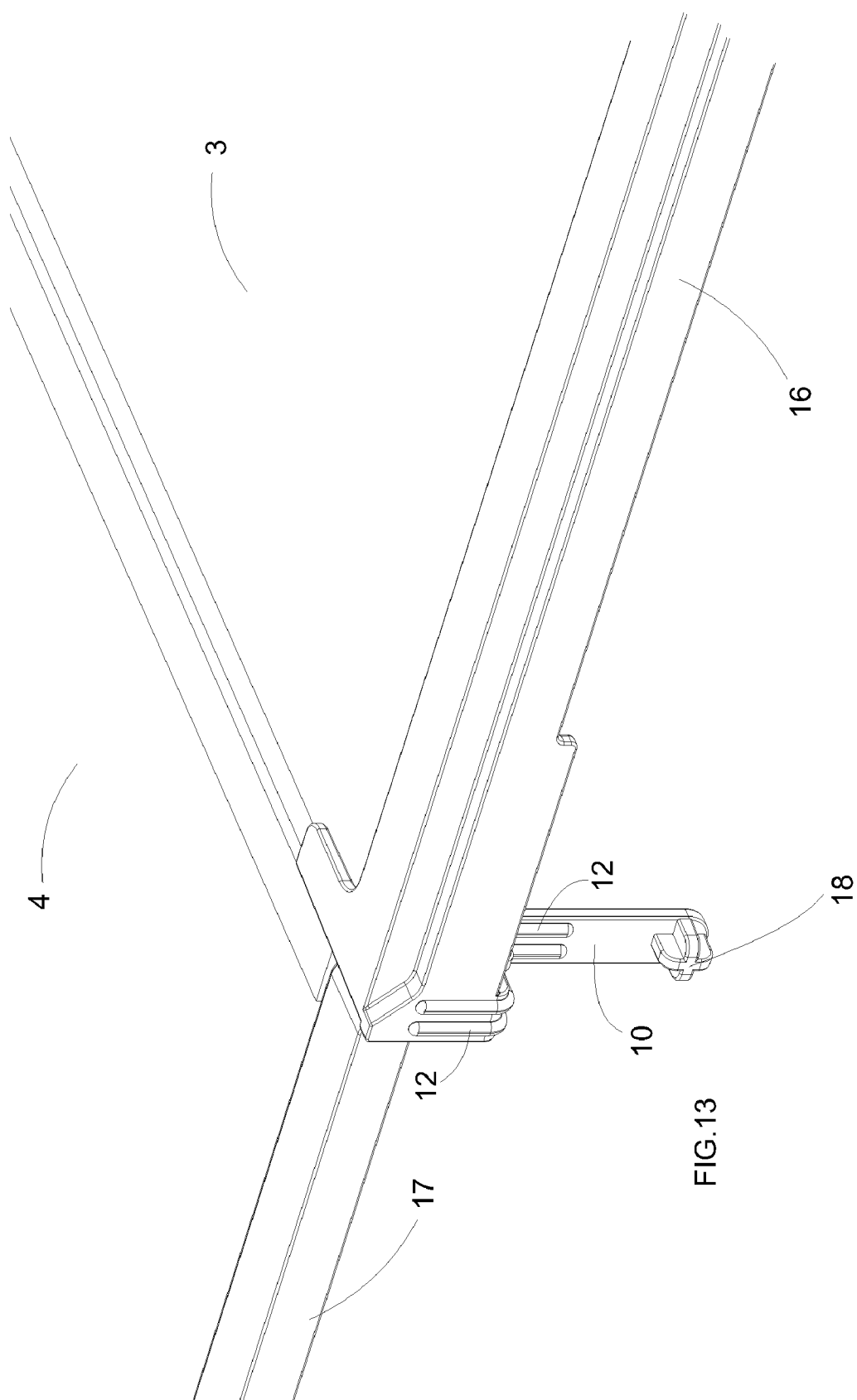
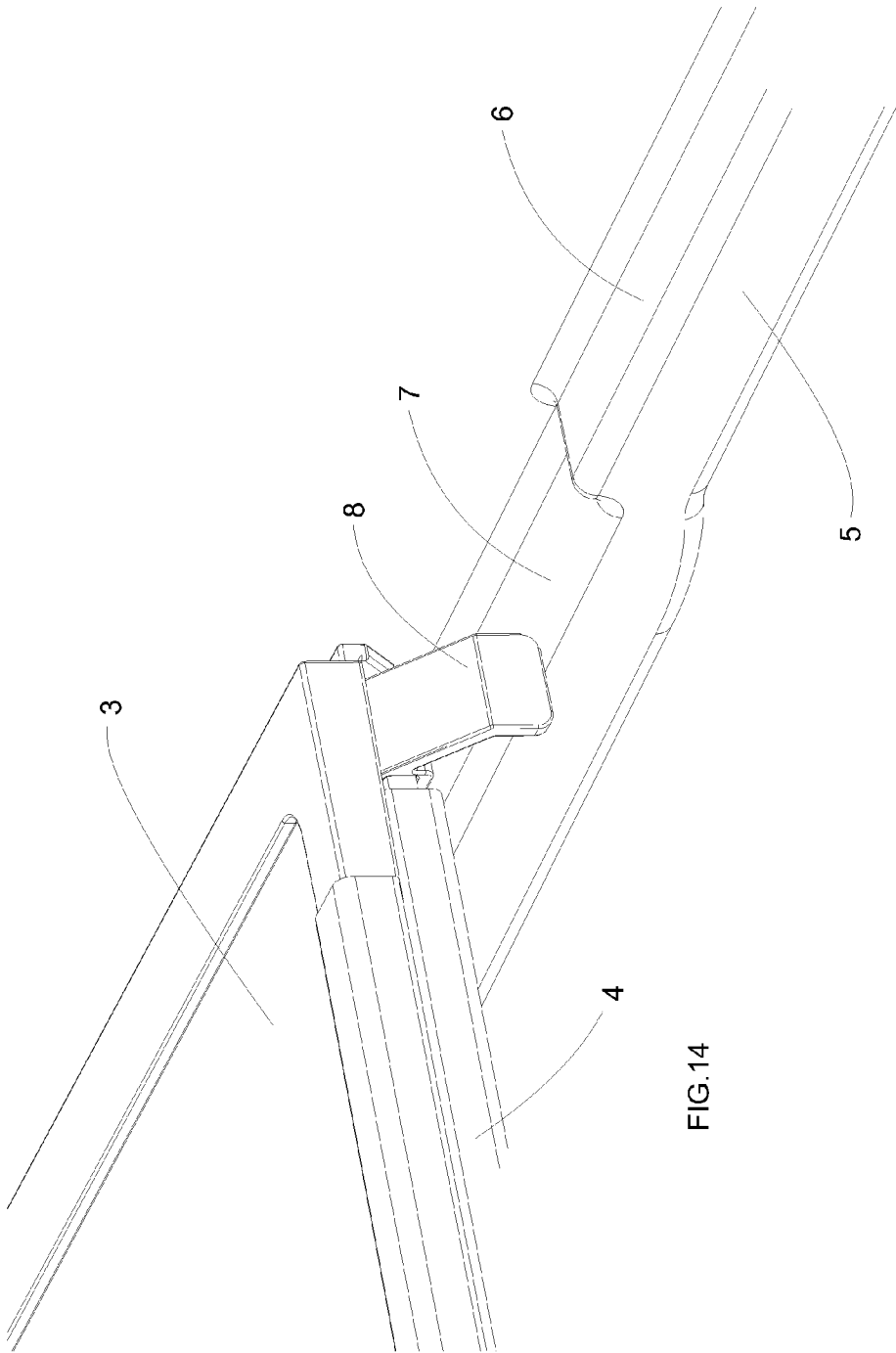
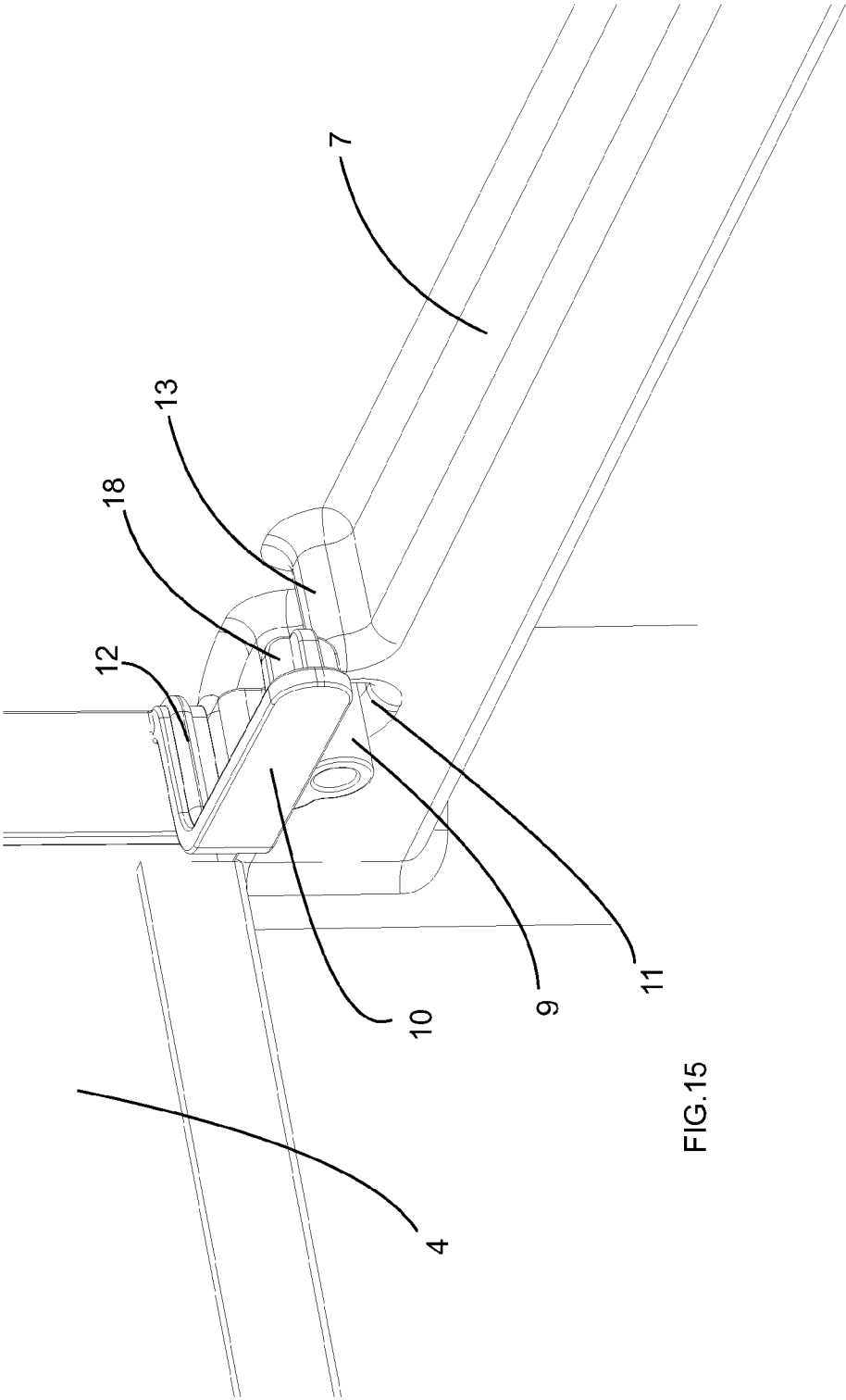


FIG.11









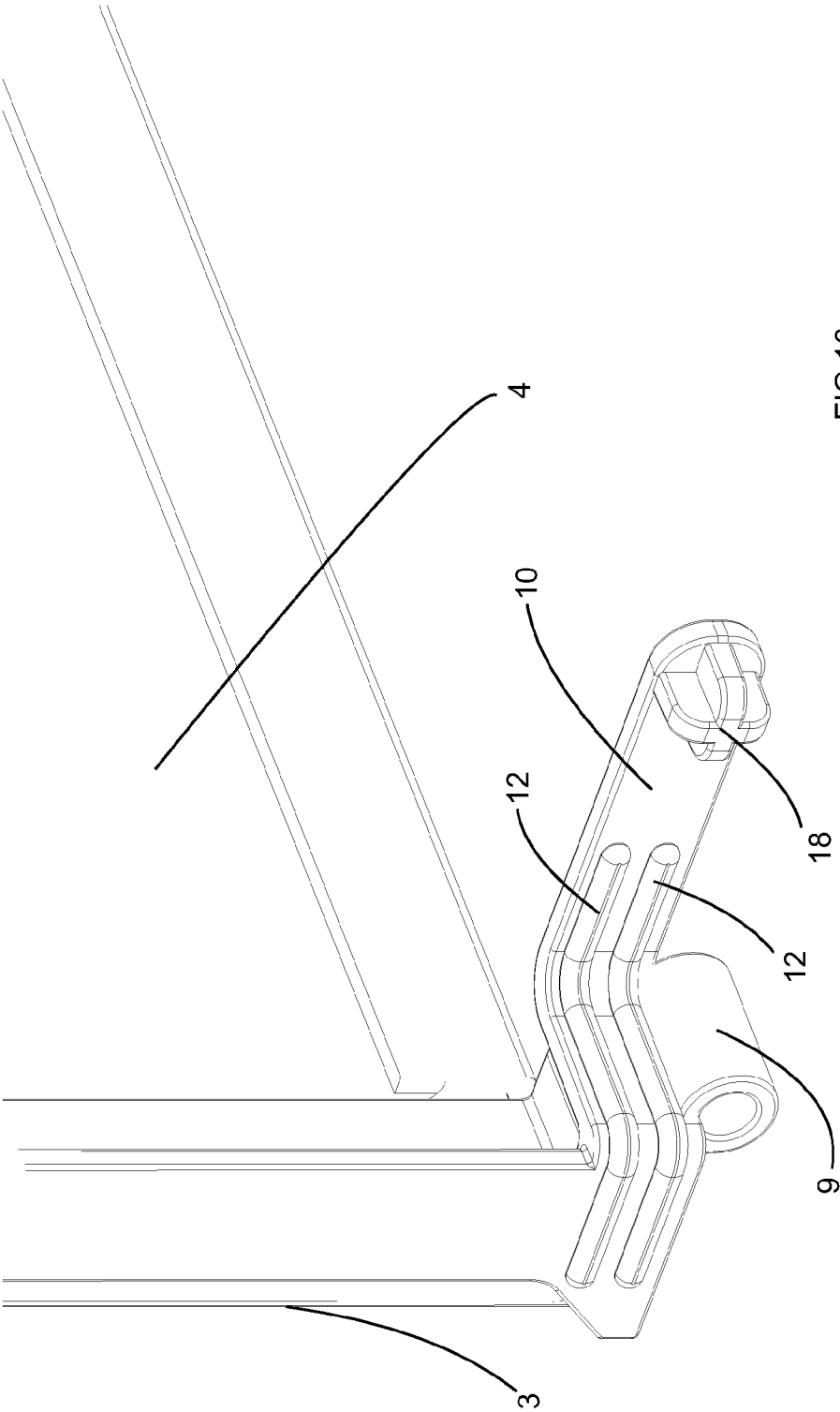


FIG.16

SYSTEM FOR MOVING A SET OF SHELVES OF A REFRIGERATION APPLIANCE AND REFRIGERATION APPLIANCE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Brazilian Application No. PI0803841-4, filed Jul. 7, 2008, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a system for moving a set of shelves of refrigeration appliance. More particularly, the present invention relates to a system able to provide a displacement over three stable stages of a set of shelves of a refrigeration appliance so as to allow better usage of the internal space of its cabinet in accordance to the user's needs.

[0003] The present invention also relates to a refrigeration appliance able to provide better usage of the internal space of its cabinet in accordance to the user's needs, by a system that allows the moving of a set of shelves within the said cabinet over three stages.

BACKGROUND

[0004] Usually, the arrangement of the shelves of a refrigeration appliance is predefined at the factory, that is, the usability of the refrigerator is limited by a previously established configuration by the manufacturer. In many domestic refrigerators and/or freezers, the removal of shelves is permitted in order to allow the placement of foods or items of larger dimensions.

[0005] The said limitation prevents the optimization of the internal space of the said cabinet, in such a manner that the user is prevented from placing a desired quantity of items inside the refrigerator or he/she is forced to put them in a disorganized manner, often stacking them randomly.

[0006] Keeping in view the abovementioned problems, various devices have been developed so as to allow the moving/placing of shelves inside the refrigerator's cabinet in such a manner as to provide greater flexibility and usability.

[0007] For example, the Korean document KR 100756887 relates to a set of two shelves, being that one of them is the main shelf (back) and the other one is an assistant shelf (front) which are associated to a "U" shaped frame. This frame is set up horizontally inside the refrigeration cabinet, and it comprises a flange that is able to hold (accommodate) the main shelf, which comprises an internal guide that, in association with a frame rail that is specially designed for this purpose, allows the sliding of the assistant shelf. In its first stage, the main shelf and the assistant shelf remain exposed to the user, allowing the placement of foods and other items. At a second stage, the assistant shelf remains positioned internally on the main shelf, being that the last mentioned one remains exposed to the user. At a third stage, the unit made up of the main shelf and the assistant shelf is positioned orthogonally in relation to the horizontal position, by the angular rotational movement of this unit, starting from an initial horizontal position to the final vertical position.

[0008] The Japanese document JP 8035765A discloses a set of two shelves (back and front) in refrigerators that may also be configured in three stages (stable positions). In its first stage, both shelves are accessible to accommodate foods and items to be refrigerated placed on them. In the second stage,

only the back shelf is accessible for accommodating items to be placed on it (the front shelf is slid into the back shelf by means of a specially designed and constructed side rail for this purpose). In the third stage, the unit with both shelves is stabilized in a vertical position by being rotated from its horizontal position (second stage).

[0009] In the abovementioned documents when both shelves are configured to simultaneously hold foods and items for refrigeration, they become out of alignment as the sliding mechanism is configured in such a manner so that the front shelf slides into the back shelf. This disarray may cause the foods and items for refrigeration that are on these shelves to become unbalanced, thus limiting the usage of the refrigerator as the user is prevented from placing items of larger dimensions on the shelves, due to the risk of falls or undesirable falling over.

[0010] Beside this, the solutions presented in these documents require specially designed side rails in order to allow the movement of the set of shelves between the three stable stages, thus, the said solutions do not present a modular capacity, that is, the side rails can only be used in this specific application.

[0011] Additionally, the need for the design and manufacturing of a specific rail for this application adds difficulty for it to be manufactured and implemented and consequently involves a higher final cost.

[0012] Therefore, there is no known satisfactory and efficient solution which allows the optimization of the interior space of a refrigeration appliance's cabinet by a moving/dislocating system of a set of shelves between three stable stages, which will combine low cost, usability and flexibility.

Objectives of the Invention

[0013] The first objective of the present invention consists of providing a low cost system that is able to allow movement/displacement of a set of shelves inside a refrigeration appliance's cabinet between three stable stages, by a solution that will allow the secure placement of foods and items of various dimensions, and which will still present usability and modularity.

[0014] The second objective of the present invention consists of providing a refrigeration appliance that is able to allow the better usage of the internal space of its cabinet according to the user's needs, by a system that provides movement/displacement of a set of shelves between three stable stages.

SUMMARY

[0015] The first objective of the present invention is achieved by providing a system to move a set of shelves in a refrigeration appliance. The said refrigeration appliance comprises at least one refrigeration cabinet. The said set of shelves has at least one front shelf and one back shelf associated to each other. The said set of shelves are associable to the refrigeration cabinet by means of at least one side bar provided with at least one first accommodating portion and one second accommodating portion that are substantially flat. The mentioned front shelf is supportable on the first accommodating portion and the rear shelf is supportable by the second accommodating portion. The said first accommodating portion has a height difference in relation to the height of the second accommodating portion so as to allow a horizontal juxtaposition aligned between the front shelf and the back

shelf. The mentioned front shelf is dissociable from the first accommodating portion and is able to superimpose (overlap) in relation to the rear shelf that is supportable by the second accommodating portion. The mentioned rear shelf has a end provided with a pivoting element associated in an articulated manner to the second accommodating portion of the side bar. The said pivoting element is able to allow the angular movement of the superimposed (overlapped) set of shelves from an initial horizontal position to a final substantially vertical position.

[0016] The second objective of the present invention is achieved by providing a refrigeration appliance that comprises at least one refrigeratable cabinet that provided with at least one set of shelves. The said set of shelves comprises at least one front shelf and one rear shelf associable to each other. The said set of shelves is associable to the refrigeratable cabinet by means of a side bar provided with a first accommodating portion as well as a second accommodating portion that are substantially flat. The said front shelf is supportable by the first accommodating portion and the rear shelf is supportable by the second accommodating portion. The first accommodating portion has a height difference in relation to the second accommodating portion as to allow a horizontally aligned juxtaposition between the front and rear shelf. The mentioned front shelf is dissociable from the first accommodating portion and is able to be superimposed (overlapped) in relation to the rear shelf supportable by the second accommodating portion. The mentioned rear shelf has a first end provided with a pivoting element associated articulately to the second accommodating portion of the side bar. The said pivoting element is able to allow the angular movement of the set of the superimposed (overlapped) shelves from an initial horizontal position to a final substantially vertical position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present invention will be described next in greater detail with reference to the attached drawings, in which:

[0018] FIG. 1 shows a perspective view of a set of shelves of a refrigeration appliance, under the condition in which the shelves are disassociated to each other;

[0019] FIG. 2 shows a perspective view of the set of shelves as shown in FIG. 1, under the condition in which the shelves are associated to each other, at a first stable stage;

[0020] FIG. 3 shows a perspective view of the set of shelves as shown in FIG. 1, under the condition in which the shelves are associated to each other, at a second stable stage;

[0021] FIG. 4 shows a perspective view of the set of shelves as shown in FIG. 1, under the condition in which the shelves are associated to each other, at a third stable stage;

[0022] FIG. 5 shows a side view of a movement system for a set of shelves, the object of the present invention, under the condition of a first stable stage of the set of shelves;

[0023] FIG. 6 shows a side view of the movement system of a set of shelves as shown in FIG. 5, under the condition of a second stable stage of the set of shelves;

[0024] FIG. 7 shows a side view of the movement system of a set of shelves as shown in FIG. 5, under the condition of a third stable stage of the set of shelves;

[0025] FIG. 8 shows a partial view in perspective of the movement system for the set of shelves under the condition as shown in FIG. 5;

[0026] FIG. 9 shows a partial view in perspective of the movement system for the set of shelves under the condition as shown in FIG. 6;

[0027] FIG. 10 shows a partial view in perspective of the movement system for the set of shelves under the condition as shown in FIG. 7;

[0028] FIG. 11 shows a side view of the interior of a refrigeration appliance, also the object of the present invention, which comprises the movement system of the set of shelves under the condition as shown in FIG. 5;

[0029] FIG. 12 shows a view of a detail of FIG. 1;

[0030] FIG. 13 shows a view of a detail of FIG. 2;

[0031] FIG. 14 shows a view of a detail of FIG. 9;

[0032] FIG. 15 shows a view of a detail of FIG. 10; and

[0033] FIG. 16 shows a view of a detail of FIG. 4.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0034] FIGS. 5 to 10 show the side views in perspective of a shelf movement system of a refrigeration appliance 1, according to a preferred embodiment of the present invention. The said refrigeration appliance 1, as shown in FIG. 11, preferably but not obligatorily, consists of a domestic/commercial refrigerator or freezer that comprises at least one refrigeratable cabinet 2, provided with at least two side walls 14 substantially parallel to each other and associated substantially perpendicularly to a base 15.

[0035] As shown by FIGS. 1 to 4, the set of shelves comprises at least one front shelf 3 and one rear shelf 4 associable to each other. Optionally, a larger number of shelves may be used, according to the desired application.

[0036] The set of shelves that is associated to the refrigeratable cabinet 2 by means of at least one side bar 5 preferably being oblong and substantially parallel to the base 15. Still in a preferential, but not mandatory manner, the side bar 5 is made from polystyrene plastic and is thermoformed, which affords lower costs in relation to injected parts.

[0037] The side bar 5 is provided with a first accommodating portion 6 that is substantially flat and is able to accommodate the front shelf 3. The side bar 5 is also provided with a second accommodating portion 7 that is substantially flat and is able to accommodate the rear shelf 4. In other words, the front shelf 3 is supportable by the first accommodating portion 6 and the rear shelf 4 is supportable by the second accommodating portion 7.

[0038] In the present invention, the first accommodating portion 6 has a height difference in relation to the height of the second accommodating portion 7 so as to allow the horizontal juxtaposition between the front shelf 3 and the rear shelf 4. Particularly, the first accommodating portion 6 has a greater height in relation to the second accommodating portion 7, which allows the top surfaces of the front shelves 3 and the rear shelves 4 to be on the same horizontal plane, substantially parallel to the base 15. This configuration defines the stable first stage of the set of shelves, as shown in FIGS. 2, 5, 8 and 13.

[0039] Thus, contrary to the documents of the state of the technique, the Korean KR 100756887 and the Japanese JP 8035765A, foods and items to be refrigerated with larger dimensions may be placed on the front 3 and rear 4 shelves simultaneously in a safe manner as they do not become misaligned. In this manner, the surface of the set of shelves is substantially continuous, without the presence of a step, providing better usability as to the first stage.

[0040] The front shelf 3 is dissociable from the first accommodating portion 6 to be superimposed in relation to the rear shelf 4. Under this condition, the rear shelf 4 remains supported by the second accommodating portion 7. This configuration defines a stable second stage of the set of shelves, in which the shelves are superimposed and substantially parallel to the base 15, as illustrated in FIGS. 3, 6, 9 and 14.

[0041] As shown by FIGS. 5 to 7, 15 to 16, the rear shelf 4 has its first end provided with a pivoting element 9 associated articulately (in a articulated manner) to the second accommodating portion 7 of the side bar 5. The pivoting element 9 is able to allow the angular movement of the set of shelves superimposed starting from an initial horizontal position to a final substantially vertical position. Particularly, the second accommodating portion 7 of the side bar 5 has at least one fitting cavity 11 that allows the fitting of the pivoting element 9 of the rear shelf 4. In this manner, the set of shelves rotates around the central axis of the pivoting element 9. This configuration defines a stable third stage of the set of shelves, in which the shelves are superimposed and positioned substantially perpendicular to the base 15, as shown in FIGS. 4, 7, 10 and 15. It is possible to completely remove the front shelf 4 from inside of the refrigeratable cabinet 2.

[0042] The rear shelf 4 also has a second end provided with an access ramp 8 that is supportable by the second accommodating portion 7, as shown in FIG. 14. On the other hand, the front shelf 3 has its first end associable to the second end of the rear shelf 4 and the second end is supportable by the first accommodating portion 6. The access ramp 8 is able to allow the sliding out of the first end of the front shelf 3 over the second end of the rear shelf 4 in a smooth manner, thus allowing the overlaying of the front shelf 3 in relation to the rear shelf 4. Optionally, the access ramp 8 could be comprised by the first end of the front shelf 3.

[0043] The front shelf 3 is provided with at least one auxiliary arm 10, associated to the side bar 5, able to allow the sliding of the front shelf 3 over the side bar 5 and is also able to provide stability to the set of shelves when it is substantially vertically positioned. Preferably, the auxiliary arm 10 is "L" shaped, which will allow the rectilinear sliding of the front shelf 3 over the side bar 5, thus preventing the bar from tilting both on the horizontal as well as the vertical, so as to guarantee greater stability and safety in its use.

[0044] The auxiliary arm 10 is provided with at least one protruding element 12 that extends over at least one portion of the said auxiliary arm 10. The protruding element 12 is able to slide over the side bar 5, providing smooth motion of the protruding arm 8 over the side bar 5. The protruding element 12 is also "L" shaped which follows the "L" shape of the auxiliary arm 10. Still in a preferential manner, the auxiliary arm 10 comprises a number of protruding elements 12.

[0045] The second accommodating portion 7 of the side bar 5 is also provided with at least one supporting projection 13 able to allow the support of at least one portion of the auxiliary arm 10 when in its third stage, which provides stability to the set of shelves.

[0046] The portion of the auxiliary arm 10 that is supported by the supporting projection 13 consists of a supporting element 18 which extends from the auxiliary arm 10 in the direction of the side bar 5, as seen in FIG. 15.

[0047] In a preferred embodiment, the side bar 5 is set into the refrigeratable cabinet 2 as a single piece. As shown in FIG. 11, the refrigeration appliance 1 comprises a plurality of side bars 5 which may be used to support other types of shelves

and/or structures and moving mechanisms for the shelves. Therefore, the side bar 5 is a multiuse type and, in this manner, it is not necessary to manufacture a specific bar for the system of the present invention, affording a reduction of costs, modularity and flexibility to the user.

[0048] Besides, the system of this invention also presents simplified implementation and maintenance/cleaning, as the associations between the auxiliary arms 10, the supporting bars 5 and the set of shelves may be carried out in a removable manner, by interference fittings, dispensing the use of special tools and specific technical knowledge.

[0049] Alternatively, the side bar 5 may be associated to the refrigeratable cabinet 2 by mechanical means, a suitable resin may be applied or even fitted in a removable manner.

[0050] Preferentially, the set of shelves is associated to the side bars 5 laid out on a geometric plane that is substantially parallel to the base 15, so as to guarantee the parallelism in relation to the base 15. Under this configuration each side bar 5 is associated to each side wall 14.

[0051] The front shelf 3 and/or rear shelf 4 comprises an encapsulated piece of glass that is associated to the two side supporting elements 16, 17. Specifically in relation to the front shelf 3, each side supporting element 16 is provided with an auxiliary arm 10 integrated into a single piece or part. Specifically in relation to the rear shelf 4, each side supporting element 17 is provided with a pivoting element 9 integrated into a single piece or part.

[0052] After describing an example of a preferred embodiment, it shall be understood that the scope of the present invention comprises other possible variations, being limited only by the contents of the attached claims, where the possible equivalents are included.

1-23. (canceled)

24. A system for moving a set of shelves of a refrigeration appliance, the refrigeration appliance comprising at least one refrigeratable cabinet, the set of shelves comprising at least one front shelf and one rear shelf associated with each other, the system comprising:

the set of shelves associated with the refrigeratable cabinet by means of at least one side bar comprising at least one first accommodating portion and one second accommodating portion that are substantially flat, the front shelf being supportable by the first accommodating portion and the rear shelf being supportable by the second accommodating portion, the first accommodating portion having a height difference in relation to the height of the second accommodating portion so as to allow a horizontally aligned juxtaposition between the front shelf and the rear shelf;

the front shelf dissociable from the first accommodating portion and capable of being superimposed in relation to the rear shelf supportable by the second accommodating portion; and

the rear shelf comprising a first end having a pivoting element associated articulately with the second accommodating portion of the side bar, the pivoting element allowing an angular movement of the superimposed set of shelves from an initial horizontal position to a final substantially vertical position.

25. The system according to claim 24, wherein the rear shelf has a second end comprising an access ramp supportable by the second accommodating portion, the front shelf having its first end associated with the second end of the rear shelf, the access ramp allowing the sliding of the first end of

the front shelf over the second end of the rear shelf so as to allow the superimposition of the front shelf in relation to the rear shelf.

26. The system according to claim **24**, wherein the front shelf comprises at least one auxiliary arm associated with the side bar, the auxiliary arm being able to:

- allow the sliding of the front shelf over the side bar; and
- provide stability to the set of shelves when it is positioned substantially vertically.

27. The system according to claim **26**, wherein the auxiliary arm is "L" shaped and is able to provide a rectilinear movement of the front shelf over the side bar.

28. The system according to claim **27**, wherein the auxiliary arm comprises at least one protruding element which extends over at least one portion of the extent of the auxiliary arm, the protruding element being able to slide over the side bar.

29. The system according to claim **28**, wherein the protruding element is "L" shaped.

30. The system according to claim **28**, wherein the auxiliary arm comprises a plurality of protruding elements.

31. The system according to claim **26**, wherein the second accommodating portion of the side bar comprises at least one supporting projection able to allow the support of at least one portion of the auxiliary arm.

32. The system according to claim **31**, wherein the portion of the auxiliary arm which is supported by the supporting projection comprises a supporting element which extends from the auxiliary arm in the direction of the side bar.

33. The system according to claim **24**, wherein the second accommodating portion of the side bar has at least one fitting cavity allowing an interference fitting of the pivoting element of the rear shelf.

34. The system according to claim **24**, wherein the set of shelves is associated with two side bars, the refrigeratable cabinet of the refrigeration appliance comprising at least one base and two side walls, the side walls being substantially parallel to each other and perpendicular to the base, and each side bar associated with each side wall, both side bars being laid out on a geometric plane that is substantially parallel to the base.

35. The system according to claim **24**, wherein the side bar is integrated as a single piece to the refrigeratable cabinet.

36. The system according to claim **24**, wherein each shelf in the set of shelves comprises an encapsulated piece of glass, which is associated with two side supporting elements.

37. The system according to claim **36**, wherein each side supporting element of the front shelf comprises an auxiliary arm integrated into a single piece.

38. The system according to claim **36**, wherein each side supporting element of the rear shelf comprises a pivoting element integrated into a single piece.

39. The system according to claim **24**, wherein the angular movement of the set of shelves is a rotational movement around a central axis of the pivoting element.

40. A refrigeration appliance comprising at least one refrigeratable cabinet comprising at least one set of shelves, the set of shelves comprising at least one front shelf and one rear shelf associated with each other, the refrigeration appliance comprising:

the set of shelves associated with the refrigeratable cabinet by means of at least one side bar comprising at least one first accommodating portion and one second accommodating portion that are substantially flat, the front shelf being supportable by the first accommodating portion and the rear shelf being supportable by the second accommodating portion, the first accommodating portion having a height difference in relation to the height of the second accommodating portion so as to allow a horizontally aligned juxtaposition between the front shelf and the rear shelf;

the front shelf dissociable from the first accommodating portion and capable of being superimposed in relation to the rear shelf supportable by the second accommodating portion; and

the rear shelf comprising a first end having a pivoting element associated articulately with the second accommodating portion of the side bar, the pivoting element being able to allow an angular movement of the superimposed set of shelves from an initial horizontal position to a final substantially vertical position.

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