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(54) **Height adjustable shelf arrangement**

(57) The present invention relates to a shelf arrangement, which is developed to make the height adjustment of shelves (2), and particularly the refrigerator shelves (2), in an easy and practical manner, without having to

remove any previously-placed items on the shelf (2), and without having to dismount the shelf (2), said shelf arrangement comprising a sliding bearing (1), a roller set (3), and a spring mechanism (6).

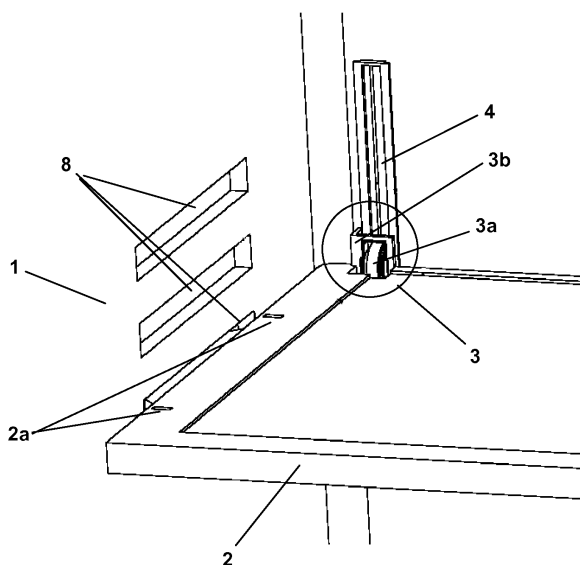


Figure - 1

Description

Field of Invention

[0001] The present invention relates to a shelf arrangement particularly for refrigerators, which is developed to provide for the adjustment of the shelf volume according to varying needs, by allowing vertically displacing such shelves, in a loaded or empty state, without dismounting the same.

Prior Art

[0002] One of the most important problems in relation to refrigerators is the inability of setting the shelf volumes according to current needs of a user and/or the difficulty encountered during the adjustment thereof. In other words, volumes remaining between standard refrigerator shelves do sometimes fail in meeting user needs, whereupon the users tend to change the heights left between the shelves. For instance, due to the fact that the size of pots or kettles of a two-member family will naturally differ from those of a more crowded family, the volumes of the shelves onto which these pots or kettles are to be placed shall differ accordingly. While changing the position of a shelf in the vertical direction, any previously-placed containers, jars, etc. on the shelf must be removed from the shelf, the shelf be brought to the desired height, and fixed thereafter. Any items removed from the shelf are then placed back. This puts an extra burden on the user and leads to time loss.

[0003] Various efforts have been put in the prior art for increasing and/or decreasing the shelf volume by means of varying the height of refrigerator shelves. One of these may be exemplified with the patent document US6065821A. The shelf of the mechanism disclosed in this patent document is displaced by means of a control sprocket, which is in connection with a driveshaft passing underneath the shelf. As the control sprocket is changed, the driveshaft is turned and resultantly the shelf is moved.

[0004] The patent document W02008062991 may be given as another example of the relevant prior art. Said patent document discloses a mechanism, which provides the vertical movement of a refrigerator shelf on a guided lever and roller system. In said mechanism, a roller bearing and a sliding guide are extended parallel to each other, but vertical to the shelf. It settles on fixing holes on the sliding guide with one end of a spring lever. When the spring lever is pulled, the shelf is brought into unsupported position and is moved vertically on a roller system. Then the lever is released, such that one end of the lever is introduced into the fixing hole and the shelf is made immovable.

[0005] Since the lever used for brining the shelf into unsupported position is in the inner lateral sides of the shelf in the mechanism of the aforesaid patent document, it shall be hardly accessible by the user. And since it shall be difficult to move the shelf, once the user turns the lever

and brings it into unsupported position, the items already present on the shelf must be removed while the height of the shelf is altered.

Brief Description of Invention

[0006] The shelf arrangement according to this invention is developed to provide the opportunity of easily making height adjustment of refrigerator shelves, together with the items placed thereon, i.e. without removing the items already placed thereon. This shelf arrangement basically comprises a shelf, sliding bearings disposed at mutual walls of the refrigerator's internal volume, roller bearings parallel to each other and disposed at the wall opposite to the refrigerator's door, a roller set movable on the roller bearing, and a spring mechanism assembled as an extra component on the shelf.

[0007] In the shelf arrangement developed according to this invention, a spring mechanism is attached to the shelf cavities and this mechanism is displaced forward and backward with the aid of a lever. When the lever is pulled the spring is compressed and the spring mechanism is introduced into the shelf cavity. Thus, the shelf is easily moved vertically in the refrigerator with the aid of said rollers. The shelf is brought to the sliding guide at the desired alignment and the lever is released. The lever released causes the spring to be free, so that the spring mechanism is pushed from the shelf cavity towards the sliding bearing.

Object of Invention

[0008] The object according to the present invention is to develop a mechanism, providing the opportunity of vertically moving a shelf, without removing any items already placed on that shelf.

[0009] Another object according to the present invention is to develop a spring mechanism, providing the opportunity of easily releasing the shelf from the sliding bearing and placing it on another bearing, as well as a lever, providing the displacement of said spring mechanism.

[0010] A further object according to the present invention is to produce an inexpensive and reliable shelf mechanism, of which the attachment/detachment operations can be performed practically.

Description of Figures

[0011] An illustrative embodiment of the subject refrigerator shelf with adjustable height is illustrated in annexed figures briefly described hereunder.

Figure 1 is a general illustration of the shelf arrangement in mounted form from above.

Figure 2 is a general illustration of the shelf arrangement in mounted form from below.

Figure 3 is an illustration of the shelf in dismounted

form from below.

Figure 4 is a perspective illustration of the spring mechanism.

Figure 5 is a cross-sectional illustration of the shelf and shelf arrangement.

Figure 6 is a general cross-sectional illustration of the shelf in free form.

Figure 7 is a general cross-sectional illustration of the shelf in mounted form.

Figure 8 is a general illustration of the roller set in dismounted form.

Figure 9 is a general illustration of the roller set in mounted form.

[0012] The parts in said figures are individually enumerated as following:

Sliding bearing (1)

Shelf (2)

Holder for fastening tab (2a)

Roller set (3)

Roller (3a)

Roller holder (3b)

Shelf holder (3c)

Fastening tab (3d)

Roller bearing (4)

Shelf cavity (5)

Spring protrusion (5a)

Spring mechanism (6)

Lever (6a)

Fastening tab (6b)

Spring protrusion (6c)

Spring (7)

Gap (8)

Gap (9)

Description of Invention

[0013] Figures 1 to 9 illustrate a shelf (2) with adjustable height and other components in relation to said shelf (2); wherein the shelf arrangement (2) according to the present invention is developed to easily make the height adjustment of refrigerator shelves, without having to remove any items placed on the shelf (2). As illustrated in figures 1 and 4, the shelf arrangement basically comprises a shelf (2), a sliding bearing (1), at least one roller set (3), and a spring mechanism (6).

[0014] Figure 1 provides a general illustration of said shelf arrangement in mounted form from above. As illustrated here, the shelf (2) is in connection with the sliding bearing (1) and the roller set (3) disposed in the refrigerator.

[0015] At least one shelf cavity (5) is formed on each of the mutual edges of the shelf (2), at least one spring protrusion (5a) is disposed in these shelf cavities (5), and at least one fastening tab holder (2a) is formed each on both sides of the shelf cavities (5). As an exemplary embodiment in Figure 3, two spring protrusions (5a) are pro-

vided in the shelf cavity (5), as well as one fastening tab holder (2a) is provided each at either side of the shelf cavity (5), as shown in the detail illustration of a dismounted form of one edge of the shelf (2) as well. A spring mechanism (6), as an additional component is attached to this cavity (5), so as to pass the shelf (2) between sliding bearings (1).

[0016] The spring mechanism (6) is a part that is applied to the shelf cavities (5) provided at mutual sides of the shelf (2), so that it is introduced into proper available gaps (8) on the sliding bearing (1), resultantly immobilizing the shelf (2). The spring mechanism (6) comprises at least one spring protrusion (6c), at least one fastening tab (6b), and at least one lever (6a). The spring mechanism (6) illustrated in Figure 4 is convenient for the shelf (2) illustrated in Figure 3. The spring mechanism (6) illustrated in Figure 4 comprises two spring protrusions (6c), corresponding to the spring protrusions (5a) provided on the shelf cavity (5), and similarly, two fastening tabs (6b) and one lever (6a), corresponding to the fastening tab holders (2a) on the shelf cavity (5).

[0017] Before the shelf (2) is placed into the refrigerator's body, said spring mechanism (6) is placed into the shelf cavity (5). While the spring mechanism (6) is placed into the shelf cavity (5), the spring protrusions (6c) provided on the spring mechanism (6) come face to face with the spring protrusions (5a) left in the shelf cavity (5), wherein one each spring (7) is provided between these spring protrusions (5a, 6c). One end of said spring (7) is attached to one spring protrusion (5a), whereas the other end is attached to the other spring protrusion (6c). The spring (7) disposed between the spring protrusions (5a, 6c) is in connection with the lever (6a) provided on the spring mechanism (6), and it relaxes and compresses as the lever is moved for- and backward, so as to provide for the horizontal displacement of the spring mechanism (6). In other words, when the lever (6a) is pulled, the spring (7) is compressed and the spring mechanism (6) is pulled towards the shelf cavity (5). When the lever (6a) is released, the spring (7) is relaxed, pushing the spring mechanism (6) from the shelf cavity (5) towards the proper gap (8) on the sliding bearing (1) (illustrated in Figure 1).

[0018] The sliding bearing (1) is positioned on the mutual walls in the refrigerator's internal volume, whereto the shelf (2) is to be attached. At least two sliding bearings (1) are provided on each wall so as to be parallel to each other on mutual walls. As illustrated in figures 6 and 7, the sliding bearings (1) provided on mutual walls comprises at least two gaps (8), into which the spring mechanisms (6) mounted on the shelf (2) can be introduced. The gaps (8) on the same wall are parallel to each other, and the gaps (8) provided on mutual walls are on the same alignment with each other. For instance, the first gap (8) at the right wall is aligned with the first gap (8) provided on the left wall, likewise, the second gap (8) at the right wall is in alignment with the second gap (8) at the left wall. Additionally, the first and second gaps (8)

provided on the same wall are positioned in parallel to each other.

[0019] While the spring mechanism (6) is in one of the gaps (8) on the sliding bearing (1), the shelf (2) is immovable and the lever (6a) is free. As illustrated in Figure 6, the lever (6a) is pulled in order to free the shelf (2), so that the spring (7) between the spring protrusions (5a, 6c) is compressed. When the spring (7) is compressed, the spring mechanism (6) is introduced up to the interior of the shelf cavity (5). Thus, the shelf (2) is also supported from the rollers (3a) in the refrigerator's volume (illustrated in figures 8 and 9) and displaced vertically.

[0020] At least one roller set (3) is disposed at the opposite wall of the refrigerator door, these being parallel to each other and displaceable up- and downward on the bearings (4) thereof, so as to facilitate the vertical movement of the shelf (2). As can be seen in the shelf arrangement given exemplarily in Figure 3, two roller sets (3) are disposed on the shelf (2). And as illustrated in figures 8 and 9, each roller set (3) comprises at least one roller (3a), a roller holder (3b) for each roller, and a shelf holder (3c). The roller set (3) is connected over the shelf (2) with the shelf holder (3c).

[0021] At the related wall of the refrigerator are provided roller bearings (4) as many as the roller sets (2) provided on the shelf (2). The roller set (3) is connected to the roller bearing (4) by means of the roller holder (3b) by which the roller (3a) is fixed.

[0022] A gap (9) is provided on the shelf holder (3c), which ensures to keep the shelf (2) in an immobilized manner by hindering its for- or backward movement during the vertical displacement thereof, this gap (9) receiving also the roller (3a) and the roller holder (3b). The shelf holder (4) is placed on the shelf (2). The roller set (3), in turn, is placed on the roller bearing (4). Then the roller holder (3b) is passed through the gap (9) provided on the shelf holder (3c) and is immobilized by means of fastening tabs (3d).

[0023] As illustrated in figures 6 and 7, once the lever (6a) is pulled and the spring mechanism (6) is introduced into the shelf cavity (5), it is easily moved vertically within the refrigerator, with the aid of the rollers (3) as well. The distance between the shelves (2) is adjusted according to user needs and the lever (6a) is released at the level of the corresponding gap (8) on the sliding bearing (1). When the lever (6a) is released, the spring (7) is relaxed so that it pushes the spring mechanism (6) towards the respective gap (8). When the spring mechanism (6) is settled into the gap (8), the shelf (2) is made immobilized. Then the fastening tabs (6b) on the spring mechanism (6) are engaged to the tab holders (2a) at the edge of the shelf cavity (5), such that the spring mechanism (6) is immobilized on the shelf (2).

[0024] Thanks to the shelf embodiment (2) with adjustable height according to the present invention, the distance between shelves (2) is easily adjusted without having to remove any items already present on the shelves (2).

Claims

1. A shelf arrangement developed to make the height adjustment of the shelf (2) without having to remove any previously-placed items from the shelf (2), and comprising a sliding bearing (1) provided with gaps (8) thereon, roller bearing (4), and a roller set (3), which is in connection with the shelf (2) that is positioned in this roller bearing (4) and can be displaced at the vertical direction, **characterized by** comprising
 - at least one spring mechanism (6),
 - at least one lever (6a) in connection with said spring mechanism (6), and
 - fastening tabs (6b), which prevent the spring mechanism (6) from becoming removed from the shelf cavity (5).
2. A shelf arrangement according to Claim 1, **characterized in that** said spring mechanism (6) is an additional part, which comprises at least one spring protrusion (6c), at least one fastening tab (6b), and at least one lever (6a).
3. A shelf arrangement according to claims 1 and 2, **characterized in that** said spring mechanism (6) is an additional part, which is attached to the shelf cavity (5) provided on the shelf (2).
4. A shelf arrangement according to claims 1 and 3, **characterized in that** at least one shelf cavity (5) is provided on each one of both mutual sides of said shelf (2).
5. A shelf arrangement according to claims 1, 3, and 4, **characterized in that** said shelf cavities (5) comprise at least one spring protrusion (5a) and at least one fastening tab holder (2a).
6. A shelf arrangement according to claims 1 and 2, **characterized in that** at least one spring (7) is provided between each spring protrusion (6c) disposed on the spring mechanism (6), and the spring protrusion (5a), which is disposed on the shelf cavity (5) so as to become face to face with the other spring protrusion (6c).
7. A shelf arrangement according to claims 1, 2, and 6, **characterized in that**, when said lever (6a) is pulled, said spring (7) is compressed.
8. A shelf arrangement according to claims 1, 2, and 6, **characterized in that**, when said lever (6a) is released, said spring (7) is relaxed.
9. A shelf arrangement according to claims 1, 2, 6, and 7, **characterized in that**, when said lever (6a) is

pulled, said spring (7) is compressed, and said spring mechanism (6) is settled into the shelf cavity (5).

10. A shelf arrangement according to claims 1, 2, 6, and 8, **characterized in that**, when said lever (6a) is released, said spring (7) is relaxed, so as to push said spring mechanism (6) from the shelf cavity (5) to the gaps (8) provided on the sliding bearing (1). 5
11. A shelf arrangement according to Claim 1, **characterized in that** said spring mechanism (6) is fastened over the shelf cavity (5) by means of fastening tabs (6b). 10
12. A shelf arrangement according to Claim 1, **characterized in that** said roller set (3) comprises at least one roller (3a), a roller holder (3b) for each roller, at least one shelf holder (3c), and at least one fastening tab (3d). 15
13. A shelf arrangement according to claims 1 and 12, **characterized in that** said roller set (3) is connected over the shelf (2) with the shelf holder (3c). 20
14. A shelf arrangement according to claims 1, 12, and 13, **characterized in that** said roller set (3) is connected to the roller bearing (4) by means of the roller holder (3b). 25
15. A shelf arrangement according to claims 1, 11, and 12, **characterized by** comprising a shelf holder (3c), which holds the shelf (2) immovable by avoiding it from moving for- and backward, while the shelf (2) is moved vertically. 30

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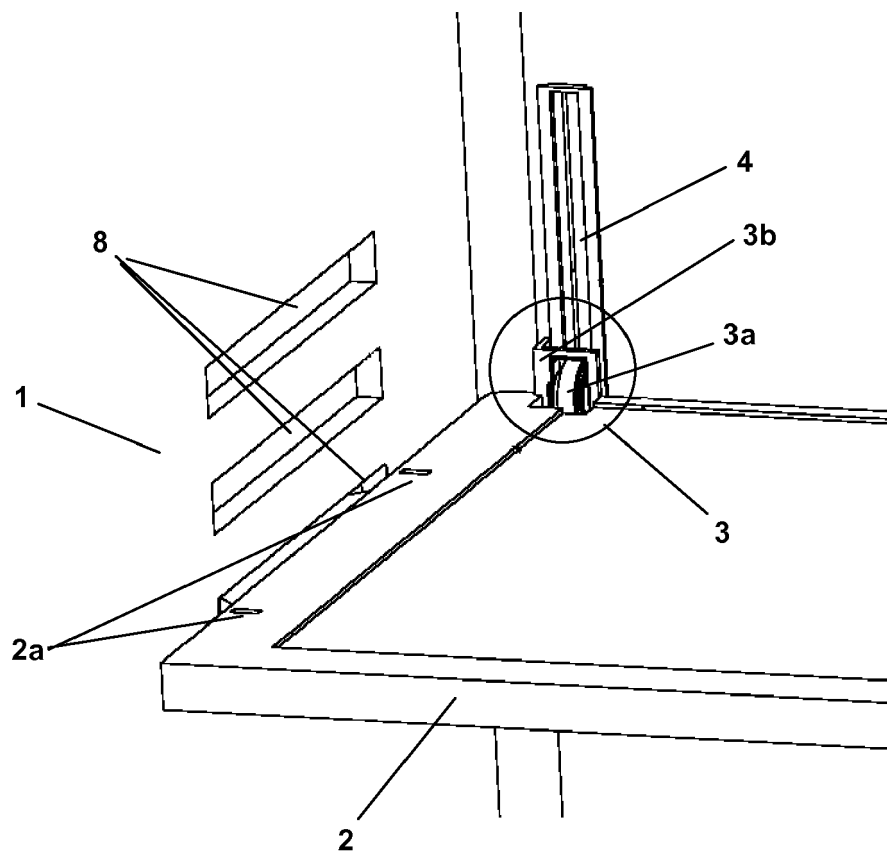


Figure - 1

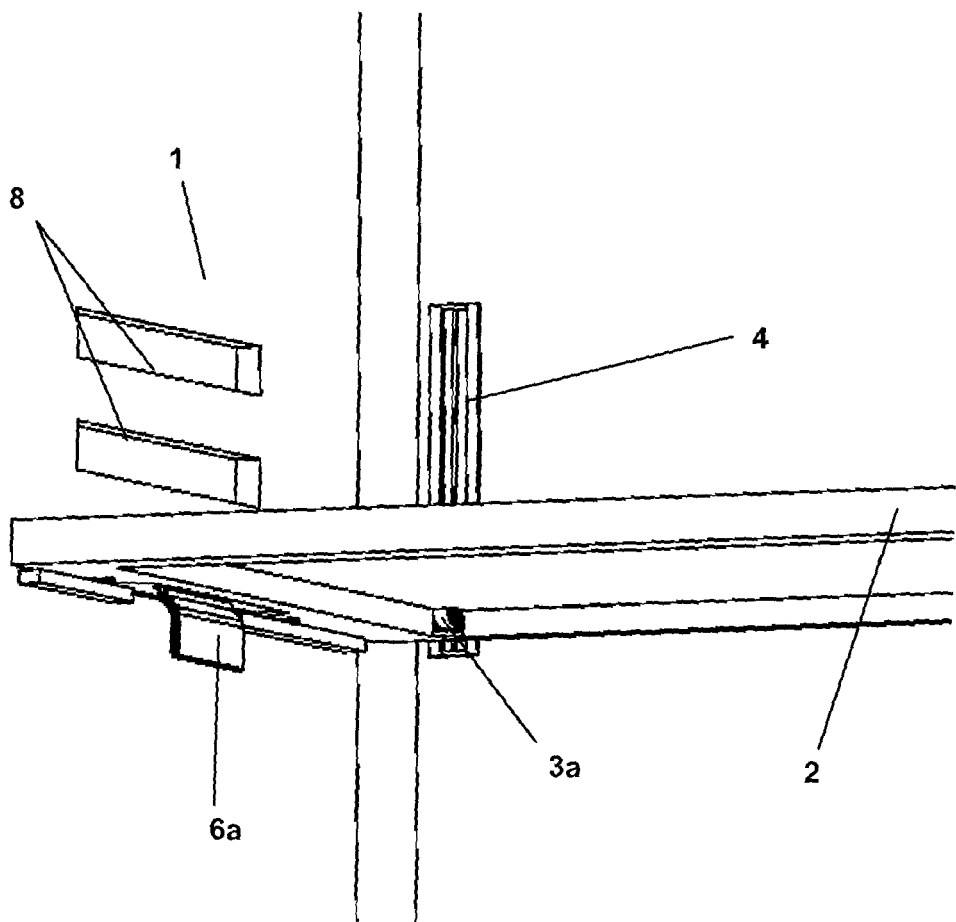


Figure – 2

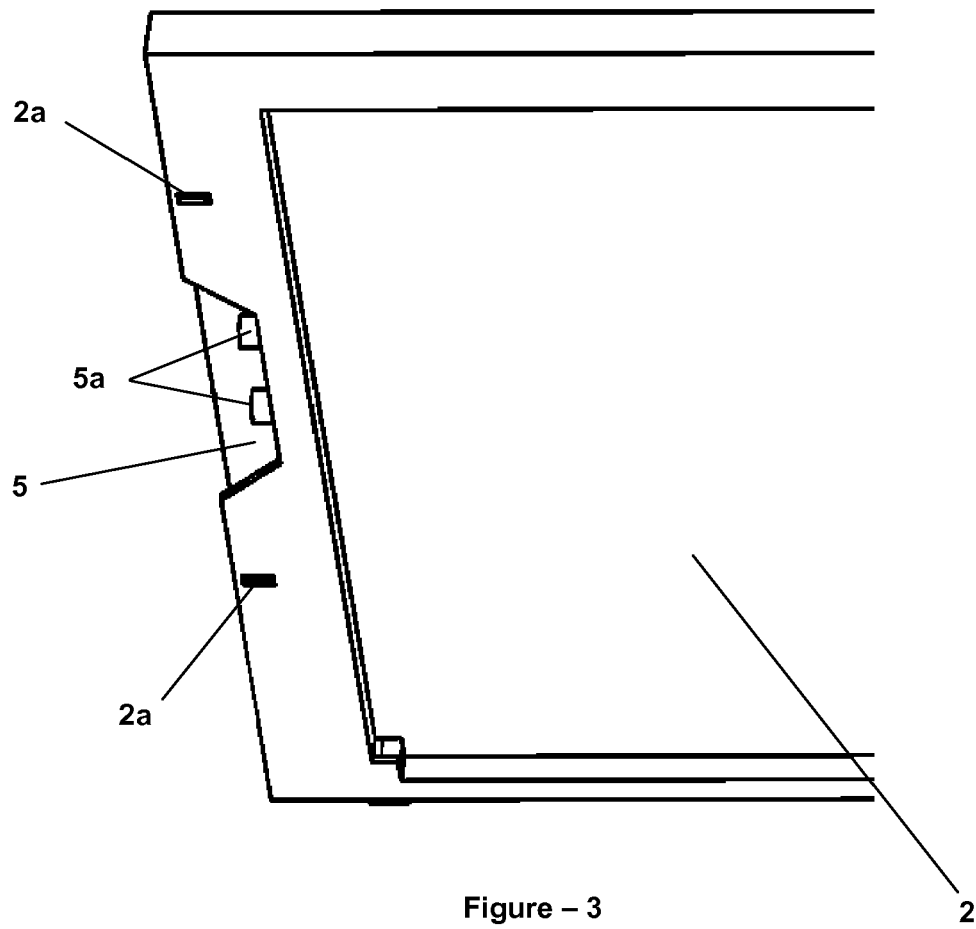


Figure - 3

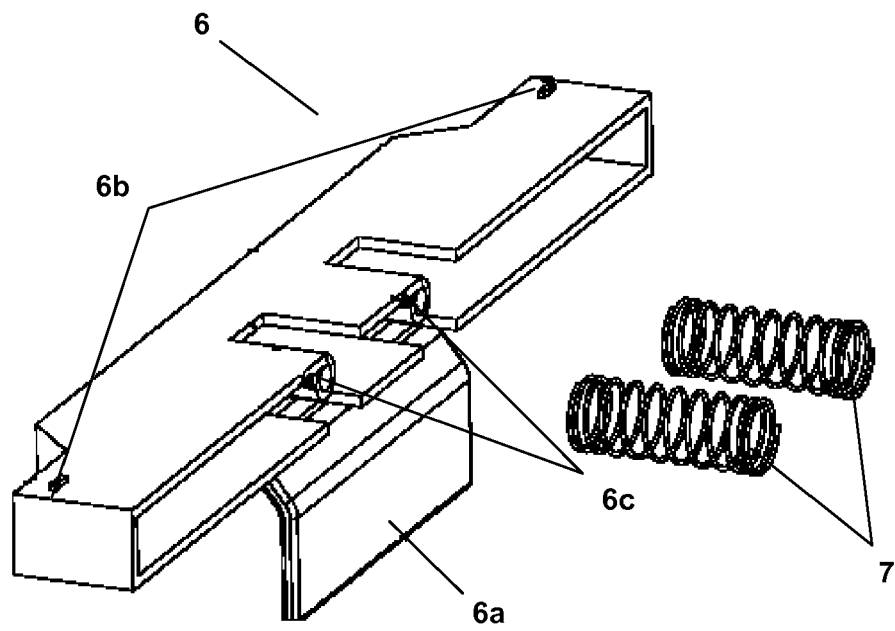


Figure - 4

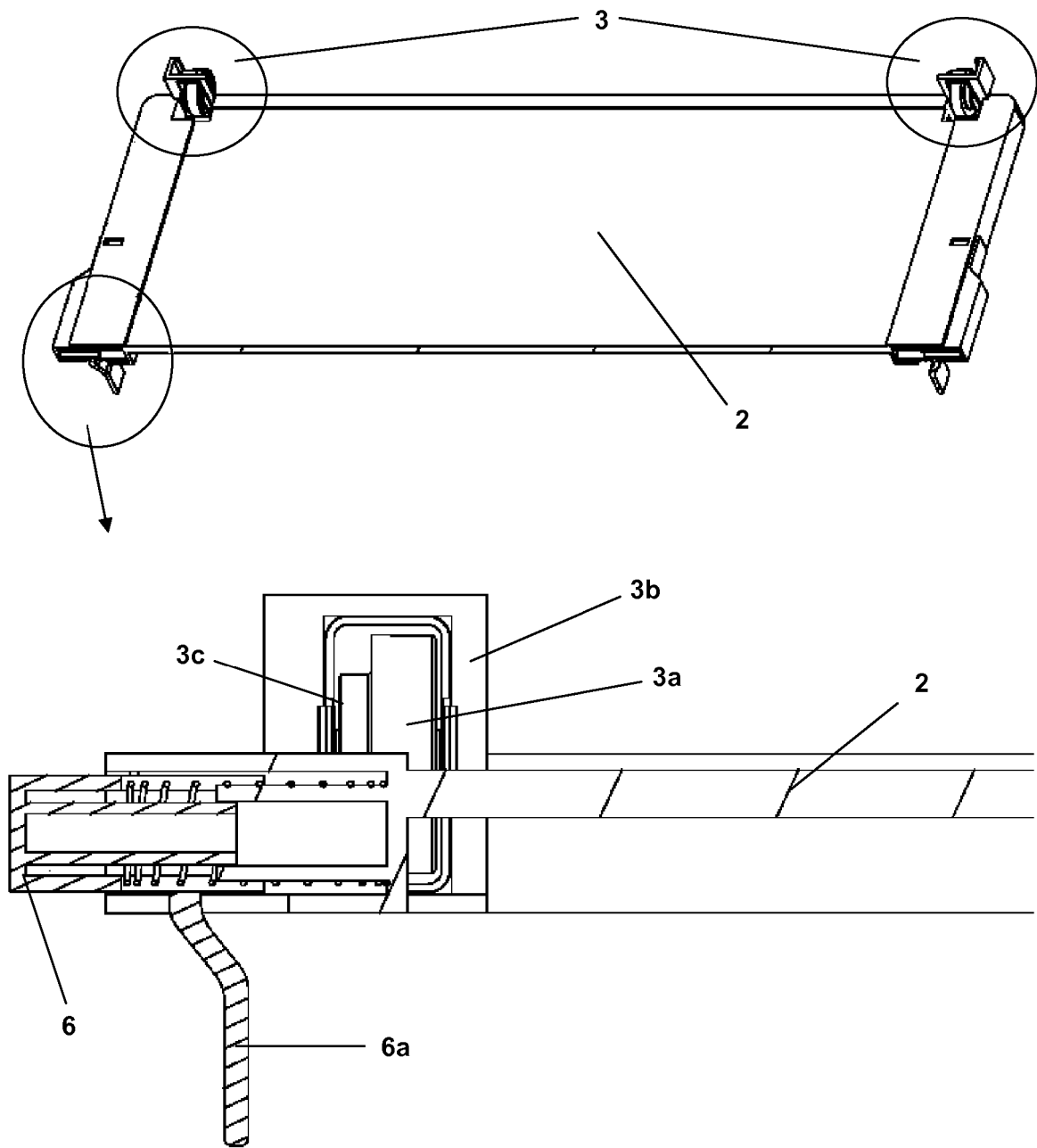


Figure – 5

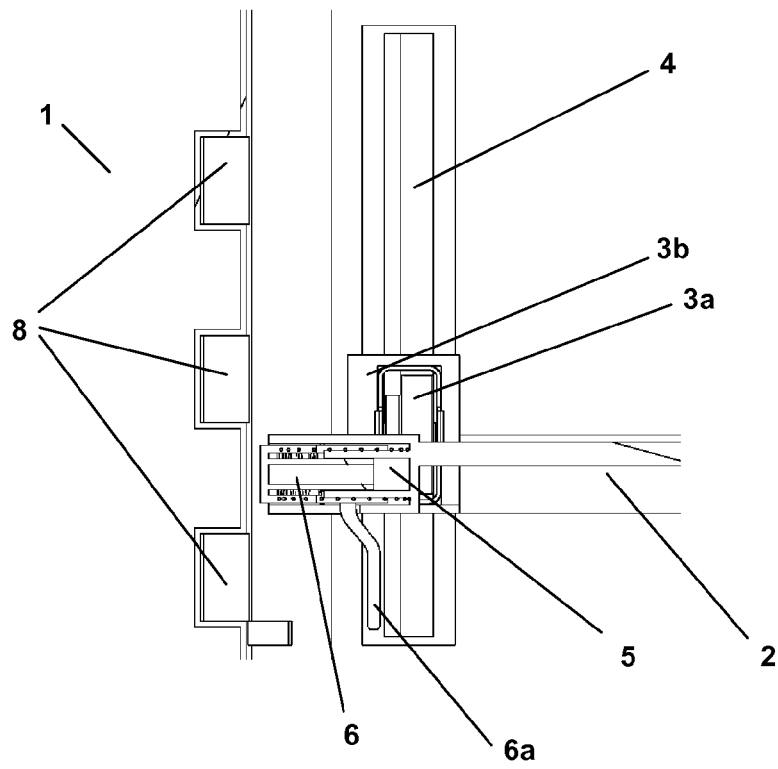


Figure - 6

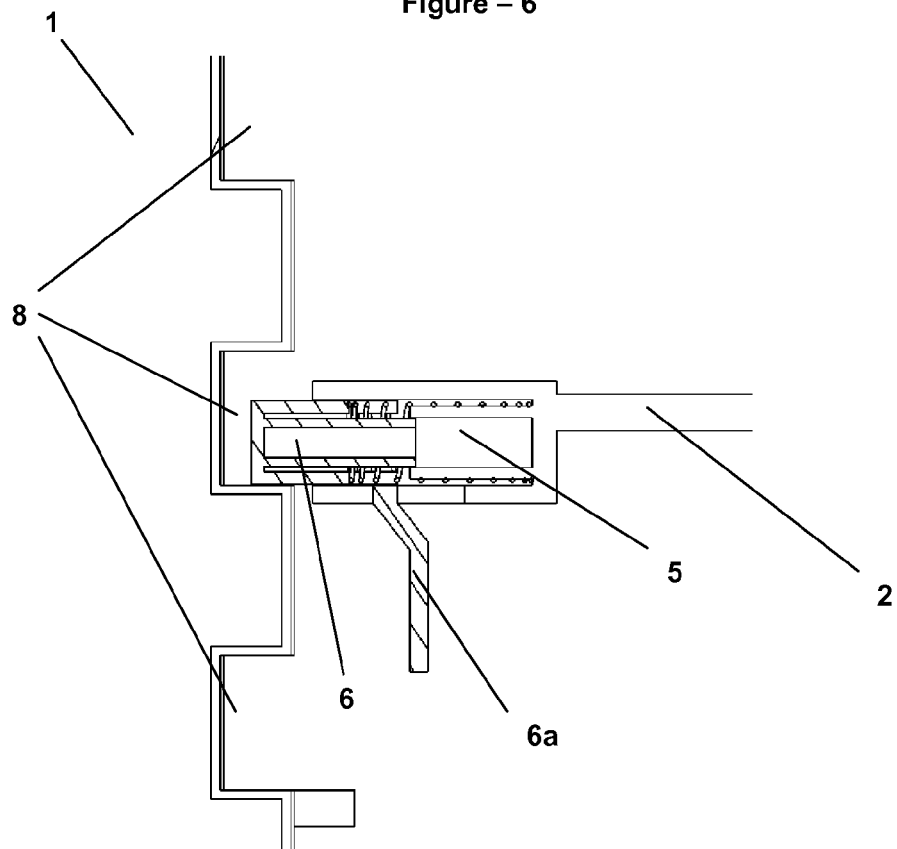


Figure - 7

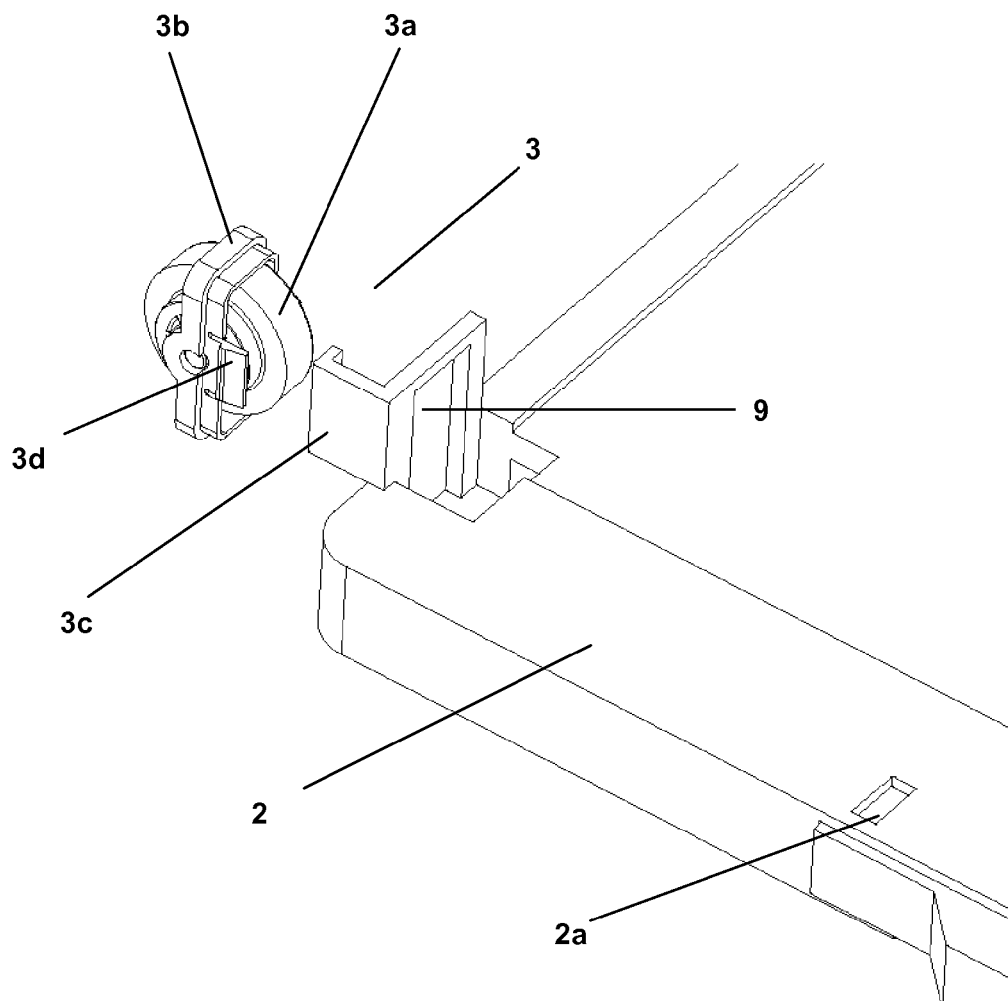


Figure - 8

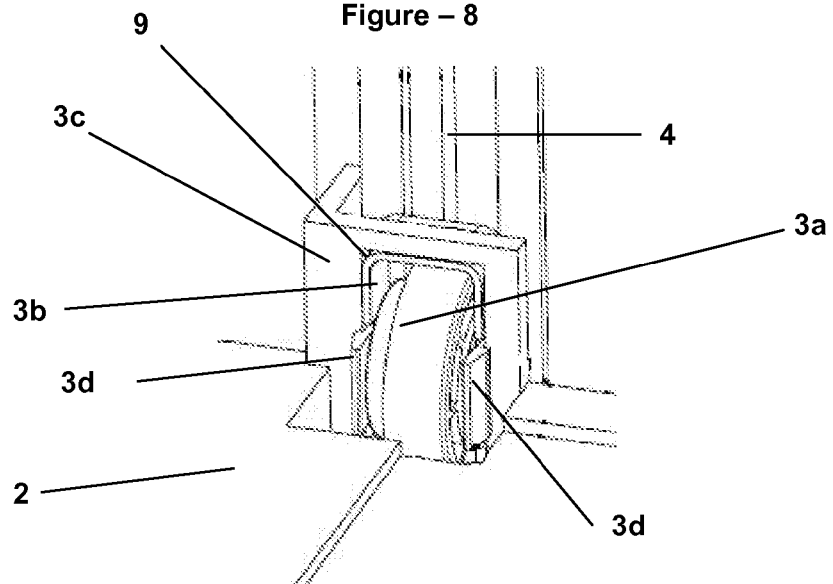


Figure - 9



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 0443

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	WO 2008/062965 A1 (LG ELECTRONICS; KANG; LEE; SHIN) 29 May 2008 (2008-05-29) * the whole document *	1-15	INV. A47B57/08 A47B57/10 F25D25/02 F25D25/04
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X	JP 3 170783 A (MATSUSHITA REFRIGERATION) 24 July 1991 (1991-07-24) * abstract; figures 1-5 *	1,3-5,7, 8,11	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 August 2010	Examiner Linden, Stefan
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ON EUROPEAN PATENT APPLICATION NO.**

EP 10 16 0443

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04-08-2010

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REFERENCES CITED IN THE DESCRIPTION

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