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(54) **A REFRIGERATOR THE DOOR HEIGHT OF WHICH IS ADJUSTED**

KÜHLSCHRANK MIT EINSTELLBARER TÜRHÖHE

RÉFRIGÉRATEUR DONT LA HAUTEUR DE PORTE EST AJUSTÉE

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Description

[0001] The present invention relates to a refrigerator comprising a door, the height adjustment of which can be made.

[0002] When the doors of the refrigerators are not closed properly, refrigeration efficiency of the refrigerator decreases. One of the most important factors for refrigerators is to provide the door thereof to be kept closed properly. Insulation is provided by disposing gaskets on the edges of the door. However, the edges of the door should overlap with the edges of the body so that the gasket can provide insulation between the body and the door. For this, the position of the door should be adjusted properly. The door adjustments can degenerate during transportation after assembly until reaching the user or depending on conditions of utilization. Generally, adjustment is made through the hinge providing the door to be connected with the body, however, since the hinge supports the door at the same time, it is quite difficult for the user to perform the door adjustment.

[0003] In the state of the art Great Britain Patent Document No. GB184251, a refrigerator is explained wherein the door adjustment is provided by hinges and a lever.

[0004] In the state of the art United States Patent Document No. US20070113377 a refrigerator is explained wherein the door adjustment is provided by two hinges.

[0005] US 2 618 010 discloses a door hinge for heavy doors, e.g. for refrigerators, that provides a simple, durable and adjustable waterproof set of hinges. The height of the refrigerator door can be adjusted. The door weight is loaded on an antifriction ball that requires an oil supply for proper functioning.

[0006] US 5 568 673 relates to a height adjustment mechanism used in folding doors, e.g. of closet, cupboard or cabinet doors. A spring arranged in a carrier provided on the bottom of the closet, cupboard or cabinet provides a force opposing the weight of the door, thereby facilitating the height adjustment of the door.

[0007] Some of the state of the art door height adjustment mechanisms are integrated into the hinge. Since these mechanisms also support the weight of the door, the door height can only be adjusted by the producer or the service personnel and the user cannot make the door height adjustment. The height adjustment mechanisms separate from the hinge set bring an additional cost.

[0008] The aim of the present invention is the realization of a refrigerator wherein the height adjustment of the door thereof can be made easily.

[0009] The refrigerator realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body wherein the foodstuffs to be cooled are placed, a door providing insulation of the body from the exterior environment and at least one hinge set that provides the door to be mounted to the body so as to rotate around a rotational axis.

[0010] The hinge set of the present invention comprises a carrier mounted to a hinge bearing that extends towards under the door and an adjustment mechanism disposed in a connection member extending between the body and the upper portions of the door. The door is supported on the body by means of the force exerted by the carrier opposite to the weight of the door. The adjustment mechanism, when its position is changed, changes the pressure exerted by the door on the carrier and provides the door to move. The adjustment mechanism can be moved easily since the weight of the door is not imposed thereon.

[0011] In an embodiment of the present invention, the carrier pushing the door upwards is provided with a carrier spring. When a lot of objects are placed on the door, the force exerted on the carrier by the door is also too much and the carrier spring is compressed. The door remains at the same level with the body with the effect of its weight. When less number of objects are placed on the door, the force exerted on the spring decreases and the spring pushes the door upwards. The force exerted on the spring by the door is increased by changing the position of the adjustment mechanism so that the door remains at the same level with the body.

[0012] The carrier of the present invention is furthermore mounted onto the hinge bearing secured on the kick plate that extends outwards from the body. A bush is disposed in the hinge bearing which provides the door to be supported. The carrier spring disposed between the bush and the hinge bearing provides the bush to push the door. A sliding pin is situated in the bush that is seated into the housing disposed as an inward recess on the door. The sliding pin slides inside the housing towards into the bush by means of the sliding pin spring situated between the sliding pin and the bush, almost without being affected by the weight of the door. Thus, abrasion does not occur on the surface of the door rubbing against the sliding pin.

[0013] In the adjustment mechanism of the present invention, furthermore the portion of the connection member contacting the body is secured to the body. An shaft suitable to be placed into a shaft bearing disposed on the door is provided in the portion of the connection member contacting the door. An adjustment nut is disposed on the shaft, that can provide pressure to be exerted on the shaft bearing when moved. The pressure the door exerts on the carrier can be adjusted by moving the adjustment nut. Thus, the door can be provided to be moved upwards or downwards.

[0014] In an embodiment of the present invention, the shaft is screw shaped. Thus, the adjustment nut can move on the shaft by being guided.

[0015] A refrigerator realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the sideways cross sectional view of a refrigerator.

Figure 2 - is the view of detail A in Figure 1.

Figure 3 - is the view of detail B in Figure 1.

Figure 4 - is the exploded view of a carrier in an embodiment of the present invention.

[0016] The elements illustrated in the figures are numbered as follows:

1. Refrigerator
2. Body
3. Door
4. Hinge set
5. Carrier
6. Adjustment mechanism
7. Carrier spring
8. Kick plate
9. Hinge bearing
10. Housing
11. Bush
12. Sliding pin
13. Pin spring
14. Connection member
15. Shaft bearing
16. Shaft
17. Adjustment nut

[0017] The refrigerator (1) of the present invention comprises a body (2), at least one door (3) disposed on the body (2), providing access into the body (2) and at least one hinge set (4) that provides the door (3) to be fastened to the body (2) (Figure 1).

[0018] Insulation is provided between the cooled air inside the body (2) and the exterior environment by the door (3) entirely overlapping with the body (2). During production, the height adjustment of the door (3) is provided by the producer by means of the hinge set (4) so that the door (3) overlaps with the body (2) entirely.

[0019] The hinge set (4) comprises;

- a hinge bearing (9) secured to the body (2), extending towards under the door (3),
- a carrier (5) secured to the hinge bearing (9), on the upper portion of which the door (3) is seated, providing the door (3) to be mounted to the body (2) from its lower portion, supporting the door (3) and that can stretch in the vertical direction,
- a connection member (14) one end of which is secured to the upper side of the door (3) and the other end to the upper side of the body (2) and
- an adjustment mechanism (6) placed in the connection member (14), moving the door (3) by stretching the carrier (5) by its position being changed and providing the position of the door (3) to be adjusted in the vertical direction

[0020] (Figure 2 and Figure 3).

[0021] A kick plate (8) is disposed on the lower side of the body (2) that extends along the front edge of the body (2) towards under the door (3). The hinge bearing (9) is mounted to the end of the kick plate (8) which is the rotational axis of the door (3). The carrier (5) is mounted inside the hinge bearing (9) and the door (3) is placed on the carrier (5). The carrier (5) provides the door (3) to be supported in a flexible manner by pushing the door (3) upwards. By changing the position of the adjustment mechanism (6), the door (3) can be moved upwards and downwards. The door (3) changes the position by being pressured between the carrier (5) and the adjustment mechanism (6). If there is a change in the height of the door (3) during transportation or relating to utilization, the user can easily perform the height adjustment of the door (3) by moving the door (3) upwards or downwards on the flexible carrier (5) by means of the adjustment mechanism (6). Thus, the door (3) is provided to be aligned at the same level with the body (2).

[0022] In an embodiment of the present invention, the carrier (5) comprises a carrier spring (7) that provides the door (3), seated on the hinge bearing (9), to be pushed upwards (Figure 3). The door (3) is positioned on the carrier (5) so as to apply pressure to the carrier spring (7). The adjustment mechanism (6) is provided to push the door (3) downwards when moved in the downward direction and the carrier spring (7) enables the door (3) to move in the downward direction by stretching in the downward direction. When the adjustment mechanism (6) is moved upwards, the pressure on the carrier spring (7) is released and the carrier spring (7) is provided to push the door (3) upwards. Thus, when the door (3) is required to move in the upward or downward direction, the door (3) is provided to be changed to the most suitable position by changing the position of the adjustment mechanism (6).

[0023] In an embodiment of the present invention, the carrier spring (7) is of cylindrical helical type. The pushing force of the carrier spring (7) is selected so as to support the weight of the door (3). When the adjustment mechanism (6) is moved downwards, the pressure it applies on the door (3) joins with the weight of the door (3), overcomes the force of the carrier spring (7) and the carrier spring (7) stretches downwards. When the adjustment mechanism (6) is moved upwards, the pressure it applies on the door (3) is released, the force of the carrier spring (7) overcomes the weight of the door (3) and pushes the door (3) upwards.

[0024] The carrier (5), furthermore, comprises;

- at least one housing (10) situated on the door (3), extending towards into the door (3),
- a bush (11) placed inside the hinge bearing (9), mounted to the carrier spring (7),
- a sliding pin (12) disposed into the bush (11) so as to rotate around its axis and
- a sliding pin spring (13) situated between the bush (11) and the sliding pin (12), providing the sliding pin (12) to move flexibly inside the bush (11)

[0025] (Figure 3 and Figure 4).

[0026] The carrier spring (7) is disposed in the hinge bearing (9) and the bush (11) is situated thereon. Inside the bush (11), the sliding pin spring (13) is placed and the sliding pin (12) is disposed into the sliding pin spring (13) respectively. The sliding pin (12) and the pin spring (13) facilitate the opening/closing motion of the door (3). While the door (3) moves in the hinge bearing (9), the housing (10) exerts pressure on the bush (11), the sliding pin (12) and the pin spring (13). The bush (11) transfers the weight of the door (3) to the carrier spring (7). The pin spring (13) prevents the contacting surfaces of the bush (11) and the sliding pin (12) from abrading each other and provides the life of the carrier (5) to be prolonged.

[0027] The adjustment mechanism (6) comprises;

- a shaft bearing (15) situated on the door (3),
- an shaft (16), disposed on the end of the connection member (14) that is mounted to the door (3), with screw shaped outer surface, forming the rotational axis (E) of the door (3) by entering into the shaft bearing (15) and providing the door (3) to be mounted to the body (2) so as to open/close and
- an adjustment nut (17), mounted on the shaft (16), the pressure it exerts on the door (3) changing when moved

[0028] (Figure 2).

[0029] The adjustment nut (17) disposed on the shaft (16) is wider than the shaft bearing (15) and does not enter into the shaft bearing (15). The adjustment nut (17) forms an opposite force against the pushing force of the carrier (5) when rotated in one direction by exerting pressure to the door (3) through the shaft bearing (15). Accordingly, the door (3) moves in the downward direction. When the adjustment nut (17) is rotated in the opposite direction, the pressure exerted to the shaft bearing (15) and hence to the door (3) decreases. Thus, the carrier (5) enables the upward directional motion of the door (3) by pushing the door (3) upwards.

[0030] In the refrigerator (1) of the present invention, the height adjustment of door (3) is made easily by means of the hinge set (4). The hinge set (4) has the carrier (5) supporting the weight of the door (3) and pushing the door (3) upwards and an adjustment mechanism (6) providing the pressure exerted to the door (3) to be changed when its position is changed and thus enabling the door (3) to move upwards or downwards. The height adjustment of the door (3) can be performed by exerting a very small amount of force since almost no load is imposed on the adjustment mechanism (6). Consequently, the door (3) is provided to be closed on the body (2) properly, the height adjustment of door (3) impaired during transportation or by load placed on the door (3) can be readjusted easily.

[0031] It is to be understood that the present invention is not limited to the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A refrigerator (1) comprising a body (2), at least one door (3) disposed on the body (2), providing access into the body (2) and at least one hinge set (4) that provides the door (3) to be fastened to the body (2), the hinge set (4) having

- a hinge bearing (9) secured to the body (2), extending towards under the door (3),
- a carrier (5) seated on the hinge bearing (9), providing the door (3) to be mounted to the body (2) from its lower portion, supporting the door (3) by stretching in the vertical direction, the carrier (5) having a carrier spring (7) that provides the door (3) to be pushed upwards,
- a connection member (14) one end of which is secured to the upper side of the door (3) and the other end to the body (2) and
- an adjustment mechanism (6) placed in the connection member (14), moving the door (3) by stretching the carrier (5) by its position being changed and providing the position of the door (3) to be adjusted in the vertical direction,

characterized by the carrier (5) comprising

- at least one housing (10) situated on the door (3), extending towards into the door (3),
- a bush (11) placed inside the hinge bearing (9), mounted to the carrier spring (7),
- the carrier spring (7) disposed between the hinge bearing (9) and the bush (11), enabling the door (3) to move upwards/downwards with the effect of its weight, by pushing the bush (11) upwards,
- a sliding pin (12) disposed in the bush (11) so as to rotate around its axis and a sliding pin spring (13) situated between the bush (11) and the sliding pin (12), providing the sliding pin (12) to move flexibly inside the bush (11).

2. A refrigerator (1) as in Claim 2, **characterized by** the carrier spring (7) which is of cylindrical helical type.

3. A refrigerator (1) as in Claim 1 , 2 or 3, **characterized by** the adjustment mechanism (6) comprising

- a shaft bearing (15) situated on the door (3),
- an shaft (16), disposed on the end of the connection member (14) that is mounted to the door

(3), with screw shaped outer surface, forming the rotational axis (E) of the door (3) by entering into the shaft bearing (15) and providing the door (3) to be mounted to the body (2) so as to open/close and

- an adjustment nut (17), situated on the shaft (16), the pressure it exerts on the door (3) changing when moved.

Patentansprüche

1. Kühlschrank (1), umfassend einen Gehäusekörper (2), wenigstens eine Tür (3), die an dem Gehäusekörper (2) angeordnet ist und Zugang zum Inneren des Gehäusekörpers (2) bietet, und wenigstens einen Scharniersatz (4), der es ermöglicht, die Tür (3) am Gehäusekörper (2) zu befestigen, wobei der Scharniersatz (4) Folgendes aufweist:

   - ein Scharnierlager (9), das am Gehäusekörper (2) gesichert ist und sich unter der Tür (3) her erstreckt,
   - einen Halter (5) am Scharnierlager (9), der es ermöglicht, die Tür (3) von seinem unteren Abschnitt aus am Gehäusekörper (2) anzubringen, und die Tür (3) durch Erstrecken in vertikaler Richtung trägt, wobei der Halter (5) eine Halterfeder (7) aufweist, die dafür sorgt, dass die Tür (3) nach oben gedrückt wird,
   - ein Verbindungselement (14), dessen eines Ende an der Oberseite der Tür (3) und dessen anderes Ende am Gehäusekörper (2) gesichert ist, und
   - einen Einstellmechanismus (6), der im Verbindungselement (14) angeordnet ist und die Tür (3) bewegt, indem er den Halter (5) streckt, indem seine Position geändert wird. und der dafür sorgt, dass die Position der Tür (3) in der vertikalen Richtung eingestellt wird,

   dadurch gekennzeichnet, dass der Halter (5) Folgendes umfasst:

   - mindestens eine Öffnung (10), die an der Seitenfläche des Körpers (3) angeordnet ist,
   - ein Hülse (11) am Scharnierlager (9) angeordnet ist und der am Halterfeder (7) angebracht ist,
   - die Halterfeder (7), die zwischen dem Scharnierlager (9) und der Hülse (11) angeordnet ist und es der Tür (3) ermöglicht, sich durch Wirkung ihres Gewichts aufwärts/abwärts zu bewegen, indem die Hülse (11) nach oben gedrückt wird,
   - einen Gleitzapfen (12), der in der Hülse (11) angeordnet ist, derart, dass er sich um seine Achse dreht, und eine Gleitzapfenfeder (13), die zwischen der Hülse (11) und dem Gleitzapfen (12) angeordnet ist und es ermöglicht, dass sich der Gleitzapfen (12) flexibel in der Hülse (11) bewegt.

2. Kühlschrank (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die Halterfeder (7) vom zylindrischen spiralförmigen Typ ist.

3. Kühlschrank (1) nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** der Einstellmechanismus (6) Folgendes umfasst:

   - ein Wellenlager (15), das an der Tür (3) angeordnet ist,
   - eine Welle (16), die an dem Ende des Verbindungselements (14) angeordnet ist, das an der Tür angebracht ist, mit einer schraubenförmigen Außenfläche, und die Drehachse (E) der Tür (3) bildet, indem sie in das Wellenlager (15) tritt und es ermöglicht, dass die Tür (3) öffnend/schließend am Gehäusekörper (2) angebracht ist, und
   - eine Einstellmutter (17), die an der Welle (16) angeordnet ist, und deren auf die Tür (3) ausgeübter Druck sich bei Bewegung ändert.

Revendications

1. Un réfrigérateur (1) comprenant un corps (2), au moins une porte (3) qui est disposée sur le corps (2) et qui permet l'accès dans le corps (2) et au moins un jeu de charnière (4) qui permet la fixation de la porte (3) au corps (2), le jeu de charnière (4) présentant

   - un palier de charnière (9) qui est fixé au corps (2) et qui s'étend vers sous la porte (3),
   - un support (5) qui est placé sur la palier de charnière (9), qui permet à la porte (3) d'être montée au corps (2) à partir de sa partie inférieure, qui supporte la porte (3) en s'étirant dans la direction verticale, le support (5) présentant un ressort de support (7) qui permet à la porte (3) d'être poussé vers le haut,
   - un élément de raccordement (14) dont une extrémité est fixée au côté supérieur de la porte (3) et dont l'autre extrémité est fixée au corps (2) et
   - un mécanisme de réglage (6) qui est placé dans l'élément de raccordement (14), qui déplace la porte (3) en étirant le support (5) par le changement de sa position et qui permet le réglage de la position de la porte (3) dans la direction verticale,

   caractérisé par le support (5) comprenant

   - au moins un logement (10) qui est situé sur la

porte (3) et qui s'étend vers l'intérieur de la porte (3),
- un palier à douille (11) qui est placé dans le palier de charnière (9) et qui est monté au ressort de support (7),
- le ressort de support (7) qui est disposé entre le palier de charnière (9) et la palier à douille (11) et qui permet à la porte (3) de se déplacer vers le haut/le bas par l'effet de son poids en poussant le palier à douille (11) vers le haut,
- une goupille coulissante (12) qui est disposée dans le palier à douille (11) de manière à tourner autour de son axe et un ressort de goupille coulissante (13) qui est situé entre le palier à douille (11) et la goupille coulissante (12), permettant à la goupille coulissante (12) de se déplacer de manière flexible dans le palier à douille (11).

2. Un réfrigérateur (1) selon la Revendication 2, **caractérisé par** le ressort de support (7) qui est de type hélicoïdal cylindrique.

3. Un réfrigérateur (1) selon la Revendication 1, 2 ou 3, **caractérisé par** le mécanisme de réglage (6) comprenant

- un palier d'arbre (15) situé sur la porte (3),
- un arbre (16) avec une surface externe en forme de vis qui est disposé sur l'extrémité de l'élément de raccordement (14) qui est monté à la porte (3), qui forme l'axe de rotation (E) de la porte (3) en entrant dans le palier d'arbre (15) et permet à la porte (3) d'être montée au corps (2) de manière à s'ouvre/se fermer et
- un écrou de réglage (17) qui est situé sur l'arbre (16), la pression qu'il exerce sur la porte (3) changeant lorsqu'il se déplace.

Figure 1

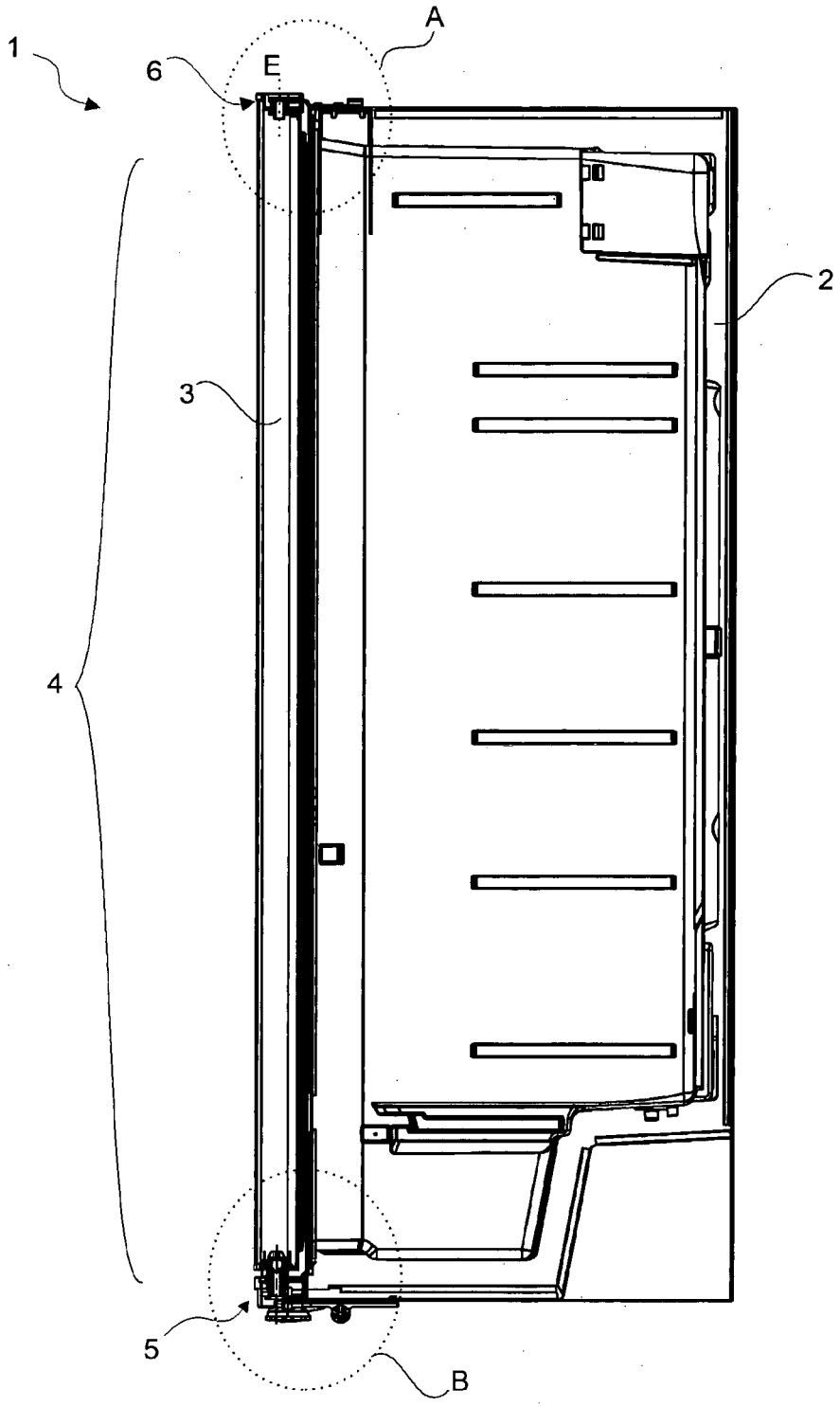
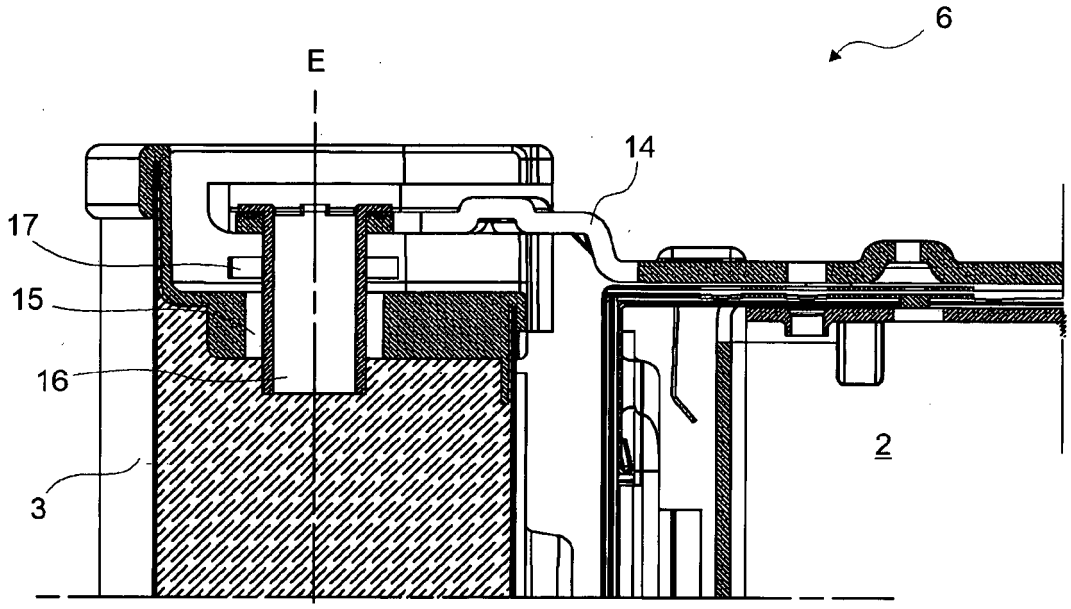


Figure 2

DETAIL A



DETAIL B

Figure 3

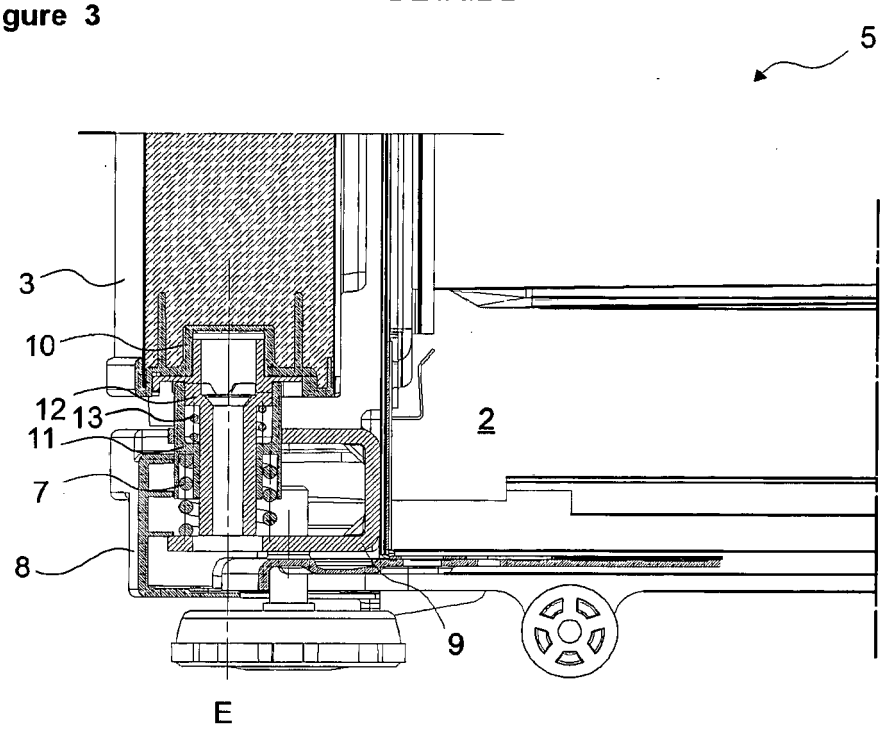
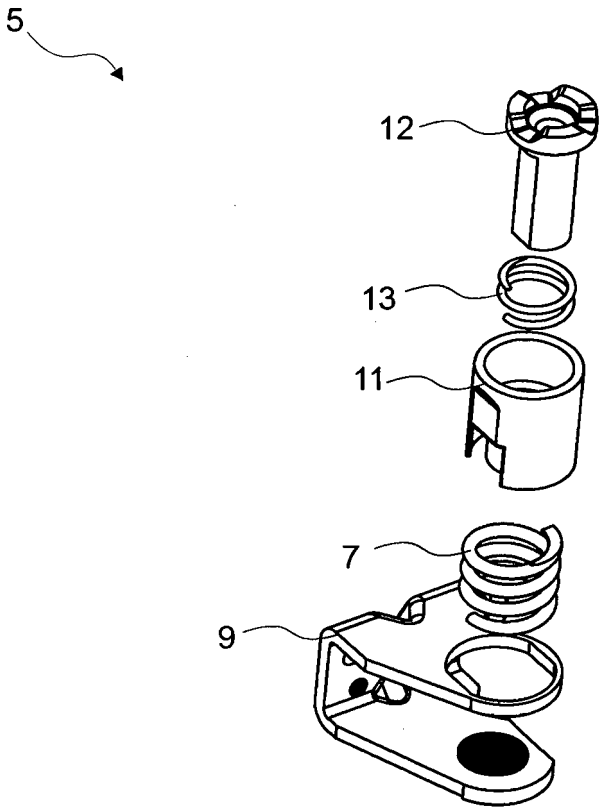


Figure 4



REFERENCES CITED IN THE DESCRIPTION

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- US 20070113377 A **[0004]**
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- US 5568673 A **[0006]**