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(54) **A DOOR OPENING/CLOSING MECHANISM SUITABLE FOR USE IN COOLING DEVICES**

ZUR VERWENDUNG IN KÜHLVORRICHTUNGEN GEEIGNETER TÜRÖFFNUNGS-/
SCHLISSMECHANISMUS

MÉCANISME D'OUVERTURE-FERMETURE DE PORTE UTILISÉ DANS DES DISPOSITIFS DE
REFROIDISSEMENT

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Description

[0001] This invention relates to a door opening/closing mechanism suitable for use in cooling devices.

[0002] In cooling devices, especially in the domestic refrigerators, unclosed doors affects the cooling efficiency of cooling devices negatively. Therefore, assuring the very firm closing of refrigerator door is an important factor in the cooling efficiency of cooling devices. Closing the refrigerator door for consumers, especially when they have their hands full, is quite a big problem. Since the consumer could close the door only by pushing it, the door might close with different speeds. When the said repulsive force is low or high, the door might not close completely. Therefore, although consumer assumes that the door is closed, it might be left ajar.

[0003] In the most preferred embodiment of the state of the art, magnets are placed into cooling device door gaskets.

[0004] In the state of the art Japanese Patent Application No JP2000027544, a mechanism allowing opening and closing the refrigerator door is explained.

[0005] In the state of the art the United States of America Patent Application No US5896619, a mechanism allowing closing the refrigerator door is explained.

[0006] In the state of the art British Patent Applications No GB1239912 and No GB993296, door opening/closing mechanisms are explained.

[0007] In all the state of the art patent documents cited above, the door always moves depending on the opening closing mechanism. When the door is assembled to the body articulately, the angular movement of the door relative to the body requires opening closing mechanisms have a complex nature.

[0008] The aim of the present invention is the realization of an opening/closing mechanism suitable for use in cooling devices.

[0009] The opening/closing mechanism realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, enables the door to be closed by grabbing the arm with grippers and pulling the door towards the body when the door is being closed and to be opened by pushing the arm and thus the door when the door is being opened.

[0010] Moving the door away from the body through pushing the arm on the door by means of the pusher is provided. When the door is being closed, the free end of the arm gets in between the grippers and is grabbed by grippers and the door is pulled towards the body by means of the arm and closed over the body.

[0011] By way of the present invention, since the door is pulled towards the body by means of the opening/closing mechanism, pressure is applied onto the body and the door is closed firmly.

[0012] Furthermore, by means of the present invention, even if the user intends to close the door very rapidly, the force applied to the arm attenuates the force applied by the user, preventing the door hitting the body rapidly

and moving away from body and leaving the door ajar. Also, when the door is pushed gently by the user, as the arm is grabbed by the grippers, the door is pulled towards the body and closed by means of the spring and the pusher.

[0013] The door opening/closing mechanism realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the top view of an opening/closing mechanism when the door is closed.

Figure 2 - is the top view of the opening/closing mechanism when the door is open.

Figure 3 - is the perspective view of the opening/closing mechanism when the door is closed.

Figure 4 - is the perspective view of the opening/closing mechanism when closed.

Figure 5 - is the top view of a cooling device when the door is open.

[0014] The elements shown in the figures are numbered as follows:

1. Opening/closing mechanism
2. Arm
3. Pusher
4. Gripper
5. Channel
6. Spring
7. Diverter spring
8. Pin

[0015] This invention relates to an opening/closing mechanism (1) of a door (D) of a cooling device (R) that comprises a door (D) providing access to the body (B) wherein objects to be cooled are placed and the opening/closing mechanism (1) comprises;

- an arm (2) with one end attached on to the door (D) and the other free,
- a pusher (3) allowing the door (D) to be opened at a certain speed by pushing the door (D) and moving the arm (2) away from the body (B) by applying force on the free end of the arm (2) when the door (D) is being opened and
- one or more grippers (4) allowing the door (D) to be closed onto the body (B) at a certain speed by grabbing the arm (2) and pulling the arm (2) when the door (D) is being closed (Figure 1, Figure 2, Figure 3 and Figure 5).

[0016] Even if the force applied by user is removed when the gripper (4) grabs the arm (2), the gripper (4) enables the door (D) to be closed completely onto the body (B) by pulling the door (D) towards the body (B).

[0017] Furthermore, the opening/closing mechanism comprises one or more pins (8) situated on every gripper (4) and at least two channels (5) arranged in mirror sym-

metry wherein pins (8) are seated with the purpose of diverting the movement of gripper (4). Channel (5) guides the pins (8) for opening and closing the grippers (4). In this embodiment, channels (5) are opened to the sides.

[0018] Opening / closing mechanism (1) comprises at least two springs (6) that extend parallel to each other with one end attached to the body (B). When the door is closed, as the compressed springs (6) pull, the grippers (4), where to the other ends of the springs (6) are attached, grab the free end of the arm (2) compressing the arm (2) from both directions and pull the arm (2) towards the body by means of the springs (6). When the door (D) is being open, as the springs (6) push and the arm (2) pulls, the moving and diverging grippers (4) inside the channel (5) open. As a result, the arm (2) is released and even if the force applied by the user is removed, the door (D) opens automatically.

[0019] The pusher (3) extends between the springs (6) parallel to gripper (4) with one end fastened on the body (B) and the other end attached to the grippers (4) from the connection point of grippers (4).

[0020] The arm (2) is attached to the door (D) pivotably. In this embodiment the opening/closing mechanism (1) comprises a diverter spring (7) for the purpose of diverting the arm (2) into the casing (6) with a certain angle.

[0021] When the door (D) is being opened, in addition to the force applied to the door (D) by the user the pusher also pushes the arm (2) and the arm (2) moves away from the body (B) together with the door (D). The arm (2) is shifted together with the grippers (4) grabbing it. Since the channels (5) are parallel to each other at the beginning, grippers (4) move forward inside the channels (5) grabbing the arm (2) as a result of the force that the arm (2) applies. But when the grippers (4) come close to the end of channels (5), the grippers (4) start to move away and open. If the movement continues, the arm (2) is released from the grippers and the door (D) is released from the body (B) and moves freely. In this case, grippers (4) stand in the end of the channels (5), springs (6) are in the tightest condition and the pusher (3) is in the longest position (Figure 2).

[0022] When the door (D) is intended to be closed, the user pushes the door (D). This force can be constant or as far as the door (D) is in a certain distance to the body (B), in other words, until the arm (2) enters between the grippers (4). As a result of this force, the arm (2) enters between the grippers (4) and bears on the connection point of the grippers (4) and the pusher (3). When the arm (2) bears on the connection point, grippers (4) move inside the channel (5) and since the pulling force of the springs (6) is stronger than the pulling force of the pusher (3) they come closer and by grabbing the arm (2) pull the door (D) in a certain speed towards the body (B). This pulling process continues till the grippers (4) bear on the other end of the channels (5). When grippers (4) bear on the end of the channel (5), the door (D) closes completely onto the body (B). Even if the force applied by the user is removed, as the arm (2) is grabbed by the grippers (4),

the movement continues with a certain acceleration depending on the force that the spring (6) and pusher (3) apply and the door (D) is closed onto the body (B). In this embodiment, even if the user pushes the door (D) with a strong force, the door (D) will not be able to move away by hitting the body (B). By means of the springs (6) and the pusher (3) the extra force applied by the user will be attenuated (Figure 1).

[0023] In another embodiment of the present invention, the ends of grippers (4) attached to each other and to the pusher (3) move inside of another channel (5).

[0024] In another embodiment of the present invention, grippers (4) have an inclined surface in a vertical plane. Thus, even if the grippers (4) are closed, shifting of the arm (2) continues by means of the said inclined surface and is seated entering between the grippers (4). In this embodiment of the present invention, the arm (2) can move both horizontally and vertically.

[0025] By means of the present invention, as the door (D) is always pulled towards the body (B) by opening/closing mechanism (1) it applies pressure on the body (B) and placement of a magnet inside the door (D) gasket is not required. Furthermore, by means of the present invention, even if the user intends to close the door (D) very rapidly, the force applied to the arm (2) by the pusher (3) and spring (6) attenuates the force applied by the user, preventing the door (D) from hitting the body (B) rapidly and moving away from body (B) thus, leaving the door (D) ajar. Again when the door (D) is pushed with a little force by the user, which should be to the maximum extent that the arm (2) enters between the grippers (4) and can apply force to the grippers (4), as the arm (2) is grabbed by the grippers (4) the door (D) is pulled towards the body (B) by means of the spring (6) and pusher (3) and provided to be closed onto the body (B). By means of the present invention, the possibility of leaving the door (D) ajar is removed.

Claims

1. An opening / closing mechanism (1) suitable for use in a cooling device (R), the cooling device having a body (B) wherein objects to be cooled are placed and a door (D) providing access to inside of the body (B), the opening / closing mechanism (1) comprising

- an arm (2) with one end attached on to the door (D) and one free end,
- at least two grippers (4) allowing the door (D) to be closed on to the body (B) by grabbing the free end of the arm (2) and pulling it when the door (D) is being closed,
- a pusher (3) with one end fastened on the body (B) and with the other end attached to the grippers (4), the pusher (3) allowing the door (D) to be opened by moving the arm (2) away from body (B) by applying force on the free end of the

arm (2) when the door (D) is being opened and by pushing the door (D) and

- at least two springs (6) that extend parallel to each other with one end attached to the body (B) and the other ends attached to the grippers (4),

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characterized by one or more pins (8) situated on every gripper (4) and at least two symmetrically placed channels (5) wherein the pins (8) are seated with the purpose of diverting the movement of the grippers (4).

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2. An opening / closing mechanism (1) as in claim 1, **characterized in that** the at least two grippers (4) grab the free end of the arm (2) by means of the compression of springs (6) as a result of force that the arm (2) applies when the door (D) is closed, move away by means of the push by springs (6) when the door is opening and release the arm (2) as they open.
3. An opening /closing mechanism (1) as in claim 1, **characterized in that** the pusher (3) extends parallel to springs (6) between the springs (6) with one end fastened on to the body (B) and the other end attached to the connection point of the grippers (4).
4. An opening / closing mechanism (1) as in claim 1, **characterized in that** a diverter spring (7) diverts the arm (2) to the area between the grippers (4) with a certain angle.

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Patentansprüche

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1. Öffnungs-/Schließmechanismus (1), geeignet zur Benutzung in einer Kühlvorrichtung (R), wobei die Kühlvorrichtung (R) einen Gehäusekörper (B) aufweist, in den zu kühlende Artikel gelegt werden, und eine Tür (D), die Zugriff auf das Innere des Gehäusekörpers (B) bietet, wobei der Öffnungs-/Schließmechanismus (1) Folgendes umfasst:

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- einen Arm (2) mit einem Ende, das an der Tür (D) angebracht ist, und einem freien Ende,
- wenigstens zwei Greifer (4), die es ermöglichen, dass die Tür (D) am Gehäusekörper (B) geschlossen wird, indem das freie Ende des Arms (2) ergriffen und daran gezogen wird, während die Tür (D) geschlossen wird,
- eine Schiebeeinrichtung (3) mit einem Ende, das am Gehäusekörper (B) befestigt ist, und dem anderen, das an den Greifern (4) angebracht ist, wobei die Schiebeeinrichtung (3) es ermöglicht, dass die Tür (D) durch Bewegen des Arms (2) fort vom Gehäusekörper (B) geöffnet wird, indem Kraft auf das freie Ende des Arms (2) ausgeübt wird, wenn die Tür (D) geöffnet

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wird, und indem die Tür (D) geschoben wird, und

- wenigstens zwei Federn (6), die sich parallel zueinander erstrecken, und deren eines Ende am Gehäusekörper (B) angebracht ist und deren andere Enden an den Greifern (4) angebracht sind,

gekennzeichnet durch einen oder mehrere Stifte (8), die an jedem Greifer (4) angeordnet sind, und wenigstens zwei symmetrisch angeordnete Kanäle (5), in denen die Stifte (8) sitzen, um die Bewegung der Greifer (4) abzulenken.

2. Öffnungs-/Schließmechanismus (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die wenigstens zwei Greifer (4) das freie Ende des Arms (2) mittels des Drucks von Federn (6) aufgrund der Kraft ergreifen, die der Arm (2) anlegt, wenn die Tür (D) geschlossen ist, sich mittels des Schiebens durch die Federn (6) weg bewegen, wenn sich die Tür (D) öffnet, und den Arm (2) freigeben, während sie sich öffnen.
3. Öffnungs-/Schließmechanismus (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Schiebeeinrichtung (3) parallel zu den Federn (6) zwischen den Federn (6) erstreckt, wobei ein Ende am Gehäusekörper (B) und das andere Ende am Verbindungspunkt der Greifer (4) befestigt ist.
4. Öffnungs-/Schließmechanismus (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Ablenkfeder (7) den Arm (2) mit einem bestimmten Winkel in den Bereich zwischen den Greifern (4) ablenkt.

Revendications

1. Un mécanisme d'ouverture et fermeture (1) adapté à être utilisé dans un dispositif de refroidissement (R), le dispositif de refroidissement (R) ayant un corps (B) où les objets à refroidir sont placés et une porte (D) permettant accès à l'intérieur du corps (B), le mécanisme d'ouverture et fermeture (1) comprenant

- un bras (2) dont l'une extrémité est fixée à la porte (D) et l'une extrémité est libre,
- au moins deux pinces (4) qui saisissent l'extrémité libre du bras (2) et la tirent lorsque la porte (D) est en cours de fermeture et donc permettent à la porte (D) d'être fermée sur le corps (B),
- un poussoir (3) dont l'une extrémité est fixée sur le corps (B) et l'autre extrémité est fixée aux pinces (4), le poussoir (3) mettant le bras (2) loin du corps (B) en appliquant une force sur l'extrémité libre du bras (2) lorsque la porte (D) est en

cours d'ouverture et poussant la porte (D), et donc permettant à la porte (D) d'être ouverte, et

- au moins deux ressorts (6) qui s'étendent parallèlement l'un à l'autre, dont l'une extrémité est fixée au corps (B) et l'autre extrémité est fixée aux pinces (4),

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caractérisé par une ou plusieurs goupilles (8) qui sont situées sur chaque pince (4) et au moins deux canaux (5) qui sont placés symétriquement, dans lesquels les goupilles (8) sont logés afin de dévier le mouvement des pinces (4).

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2. Un mécanisme d'ouverture et fermeture (1) selon la Revendication 1, **caractérisé en ce que** l'au moins deux pinces (4) saisissent l'extrémité libre du bras (2) au moyen de la compression des ressorts (6) en raison de la force appliquée par le bras (2) lorsque la porte (D) est fermée, s'éloignent au moyen de la poussée par les ressorts (6) lorsque la porte (D) s'ouvre et libèrent le bras (2) comme ils sont ouverts.
3. Un mécanisme d'ouverture et fermeture (1) selon la Revendication 1, **caractérisé en ce que** le poussoir (3) s'étend parallèlement aux ressorts (6) entre les ressorts (6) avec une extrémité étant fixée sur le corps (B) et l'autre extrémité étant fixée au point de connexion des pinces (4).
4. Un mécanisme d'ouverture et fermeture (1) selon la Revendication 1, **caractérisé en ce que** un ressort déviateur (7) dévie le bras (2) vers la région entre les pinces (4) à un certain angle.

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Figure 1

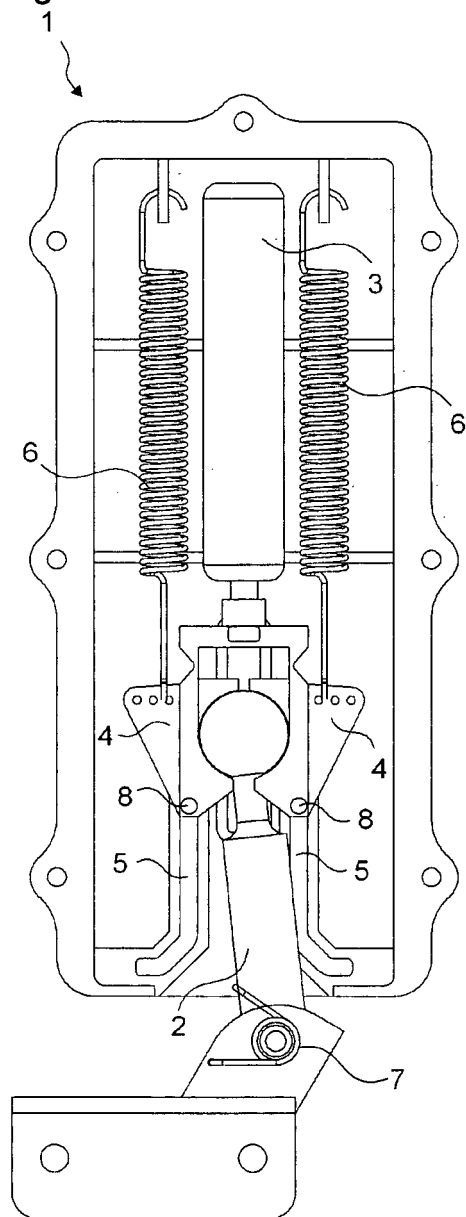


Figure 2

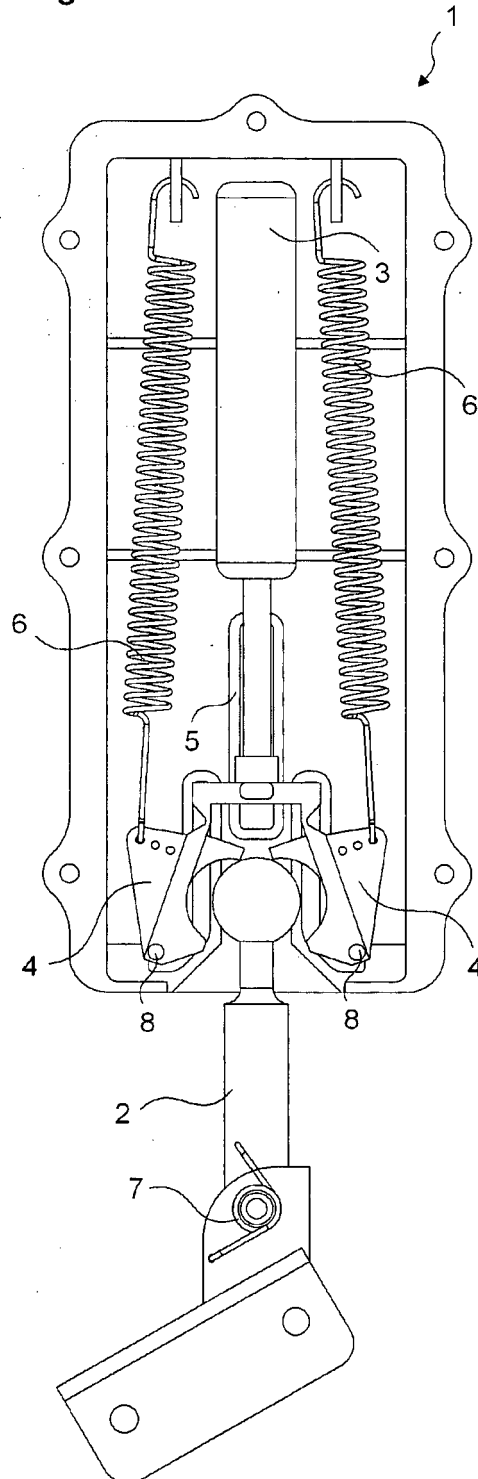


Figure 3

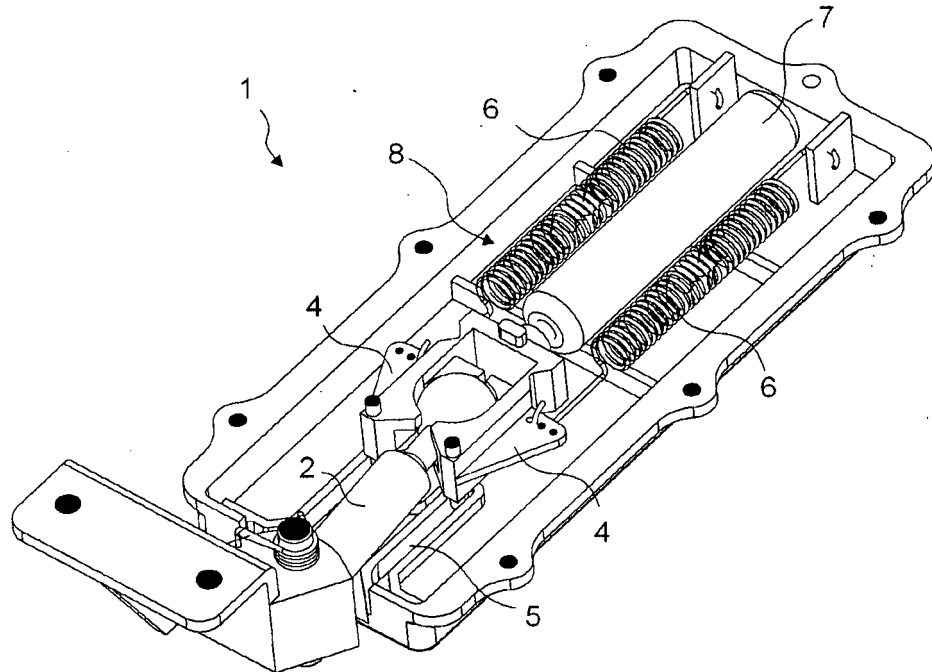


Figure 4

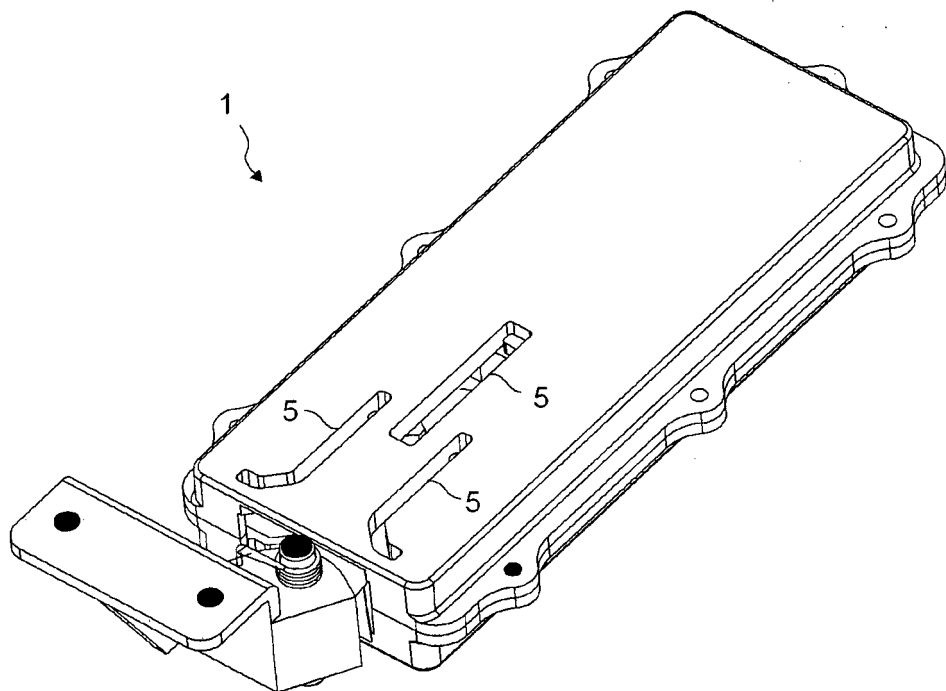
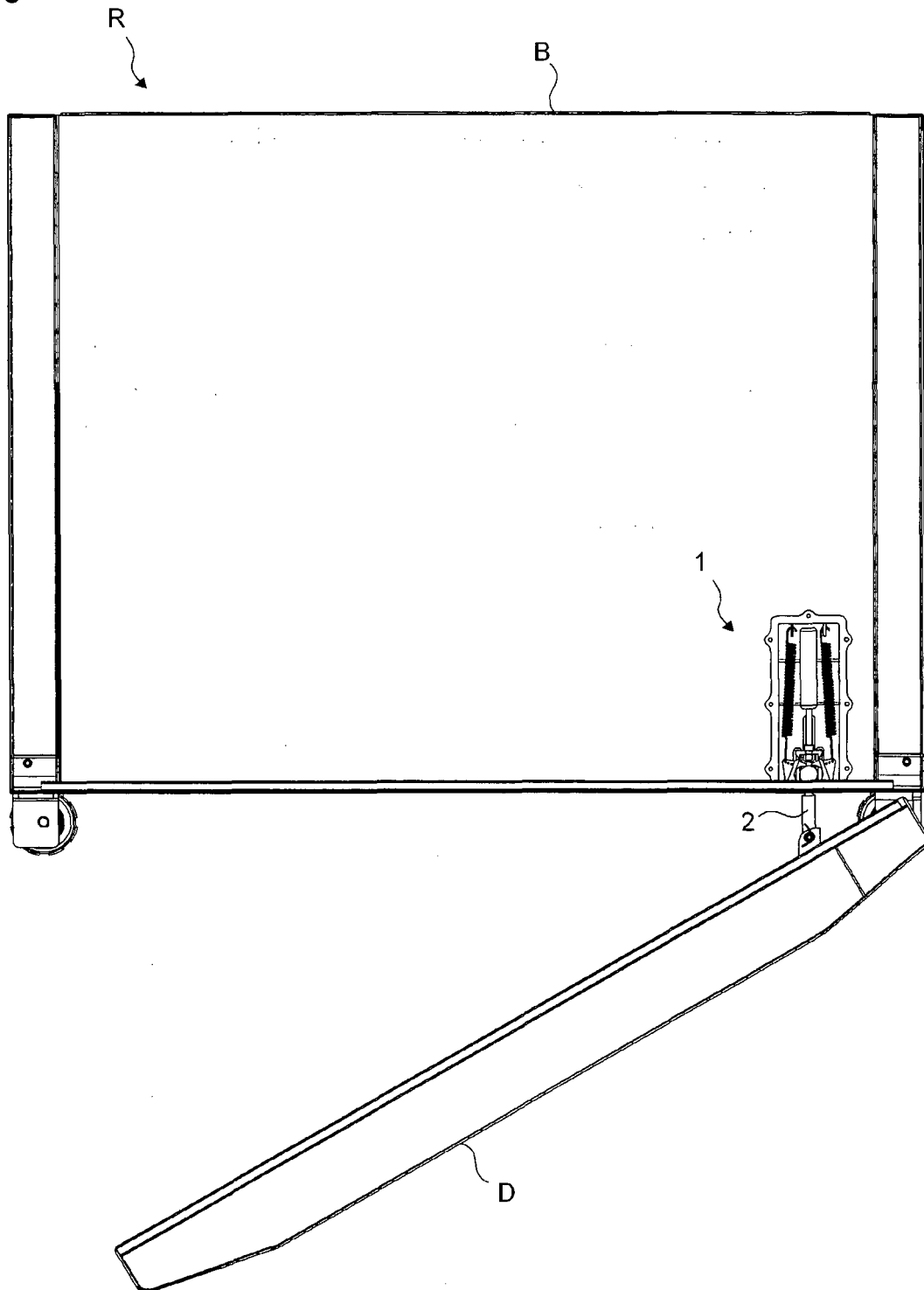


Figure 5



REFERENCES CITED IN THE DESCRIPTION

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