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(54) **Low-pressure container and refrigerator comprising the same**

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a low-pressure container and a refrigerator comprising the low-pressure container. More particularly, the present invention relates to a low-pressure container, having an openable and closable door, for a refrigerator and a household or commercial refrigerator comprising such low-pressure container.

BACKGROUND

[0002] Chinese patent application CN101324394A discloses a refrigeration appliance having a low-pressure storage unit (also called as a "vacuum storage unit"). The low-pressure storage unit is provided with a locking mechanism for locking a door of the low-pressure storage with a main body of the low-pressure storage when the door is closed, as well as a handle which is provided in a manner of linkage with the locking mechanism. The handle is disposed at a front end of the door and comprises a rod body being located in front of the door and extending approximately across a width of the door, left and right supporting parts being connected to both ends of the rod body and extending backwardly as well as a handle operating part being connected at a central portion of the rod body. The locking mechanism comprises a first mating part located on an end of the supporting part and a corresponding second mating part located on an outer surface of a side wall of the main body. When the handle is rotated, the first mating part is also rotated and thus pushed into the second mating part so as to be locked with the latter. In this way, the door is locked in a closed position such that airtightness of the low-pressure storage unit is improved. When the rod body is rotated reversely, the first mating part can be unlocked from the second mating part.

[0003] For the technical solution disclosed by the above-mentioned Chinese patent application, when the handle is operated, the rod body must be separated from a front surface of the door by a distance such that the rod body is rotatable about a rotational axis, which rotational axis is defined by a fulcrum shaft connected to the supporting part and extends in the door interior. This increases the volume occupied by the low-pressure storage unit and thus reduces available space in the refrigeration appliance. Furthermore, it is unaesthetic that the rod body is exposed in front of the storage unit.

[0004] In order to solve the above problem, Chinese patent application CN102338539A discloses a storage unit. This storage unit is compact in structure such that a first mating part of the storage unit can be fitted with a second mating part of the storage unit without extending outside of a side wall of a main body of the storage unit. When the storage unit is installed for example in a storage compartment of a refrigeration appliance, a locking

mechanism is not necessarily held between the side wall of the main body and a corresponding inner wall of the storage compartment of the refrigeration appliance. This facilitates improving space utilization in the refrigeration appliance. In order to obtain a better sealing effect, the locking mechanism or its locking effect need be provided or implemented at a vertical middle position of a front opening of the main body of the storage unit. Because a portion of the locking mechanism of the storage unit is securely connected to a rod body which is also securely connected to a handle, the position of the locking mechanism is restricted and at the same time the position of the handle on the door is also restricted. That is, the handle has to be located at a middle position of the door such that it is difficult to design the door body with a pleasing appearance.

[0005] WO 2009/014365 A2 discloses an ice making device comprising; a case having an inside space and an opening; an ice making container in the case for having water supplied thereto and forming ice; an opening/closing member for opening/closing the opening in the case; at least one locking slot provided to one of one side of the case and one side of the opening/closing member; and an operation member provided to the other one of one side of the case and one side of the opening/closing member for locking at the locking slot or release from the locking at the locking slot.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a low-pressure container and a refrigerator having the low-pressure container so as to solve at least one problem cited in the BACKGROUND part of the description such that a handle of the low-pressure container can be freely positioned on a door of the low-pressure container.

[0007] In order to achieve the above object, the present invention presents a low-pressure container for a refrigerator according to claim 1.

[0008] The first mating part is driven by the handle via a transmission mechanism to rotate. Due to the transmission mechanism, the rotational axis of the handle is not coaxial with the rotational axis of the first mating part. That is, the two rotational axes are not the same rotational axis such that the problem in the prior art that the handle position is restricted by the locking mechanism position is solved. By providing the transmission mechanism, the handle can be disposed upwardly or downwardly relative to the middle position of the door where it was disposed as previous. That is, according to technology requirements, the handle can be provided in a relatively free manner on the door. Therefore, more designs can be adopted such that the door can be readily designed with an appealing appearance.

[0009] Other individual and/or combined technical features which are considered as the inventive features will be explained in the appending claims.

[0010] Optionally, the second rotational axis is parallel

to the first rotational axis such that the handle and the first mating part can be readily rotated at the same time.

[0011] Optionally, the transmission mechanism is a linkage transmission mechanism which is advantageous by simple structure and flexible operation.

[0012] Optionally, the linkage transmission mechanism comprises a first transmission part, a second transmission part and a third transmission part coupling the first transmission part with the second transmission part.

[0013] Optionally, both the first transmission part and the second transmission part are rotatable components, and the third transmission part is a translational component.

[0014] Optionally, the first transmission part is rotatable around the first rotational axis, and the second transmission part is rotatable around the second rotational axis.

[0015] Optionally, the third transmission part is able to translate in the door.

[0016] Optionally, the third transmission part is substantially plate-shaped so as to couple the first transmission part with the second transmission part more reliably.

[0017] Optionally, both the first rotational axis and the second rotational axis are located in a plane which is parallel to the third transmission part.

[0018] Optionally, the locking mechanism comprises four first mating parts located on the door and four second mating parts located on the main body and adapted to engage and lock with said four first mating parts. In this way, two sealing and locking points are added. Therefore, the number of the sealing and locking points becomes four than the previous case such that a reinforced sealing and locking effect is obtained.

[0019] By providing the second rod body, two rod bodies can be both driven by rotation of a single handle to rotate such that four first mating parts are driven to rotate.

[0020] Optionally, the transmission mechanism is a gear transmission mechanism which is more reliable than other transmission mechanisms such that a rotational consistency of the first mating part and the handle is ensured.

[0021] Optionally, the gear transmission mechanism is coupled to each first mating part, and the handle is used to drive the first mating part via the gear transmission mechanism to rotate. The rotational axis of the handle is separated from two first mating parts, and is disposed upwardly or downwardly relative to a central position on the door where the handle was disposed as usual. Therefore, the handle is no longer limited by the position of the locking mechanism.

[0022] Optionally, the gear transmission mechanism comprises a first gear transmission part, a second gear transmission part and a third gear transmission part.

[0023] Optionally, at least one of the first gear transmission part and the third gear transmission part is substantially a sector gear, the second gear transmission part is a wheel gear and meshed with both the first gear transmission part and the third gear transmission part.

[0024] Optionally, the third gear transmission part forms an integral structure with the first mating parts. Therefore, the number of the parts is reduced such that more reliable transmission can be obtained.

[0025] Optionally, a third rod body is provided between the handle and the gear transmission mechanism, and the third rod body has a central axis as the first rotational axis.

[0026] In order to achieve the above object, the present invention further provides a refrigerator having a low-pressure container as described above.

[0027] The construction, other inventive objects and benefits of the present invention will be well understood by description of preferred embodiments in combination of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] Drawings, which are as a part of the specification and are used to provide further understanding of the present invention, illustrate embodiments of the present invention as below and explain the principle of the present invention together with the description, in which:

Figure 1 is a schematic perspective view of a refrigerator according to a preferred embodiment of the present invention, wherein a door of the refrigerator is not shown;

Figure 2 is a schematic perspective and assembled view of a low-pressure container according to a first embodiment of the present invention which is used for the refrigerator;

Figure 3 is a schematic perspective view of a main body of the low-pressure container according to the first embodiment of the present invention;

Figure 4a and 4b are partially enlarged views of a locking device shown in the following figure 5;

Figure 5 is a schematic structural view of a stopping unit for a low-pressure container used for the refrigerator;

Figure 6 is a schematic exploded view of the low-pressure container according to the first embodiment of the present invention which is used for the refrigerator;

Figure 7 is a schematic structural view of a stopping unit, according to a first embodiment of the present invention, of the inventive low-pressure container used for the refrigerator;

Figures 8a is a schematic view of a transmission mechanism, wherein a door of the inventive low-pressure container for the refrigerator is unlocked

with the main body when the door is in a closed position;

Figure 8b is a schematic view of the transmission mechanism, wherein the door of the inventive low-pressure container for the refrigerator is locked with the main body when the door is in the closed position;

Figure 9 is a schematic perspective view of a main body of a low-pressure container;

Figure 10 is a schematic exploded view of the low-pressure container with a gear transmission mechanism;

Figure 11 is a schematic view of a transmission mechanism of the low-pressure container;

Figure 12a is a partial cross-sectional view showing that the door of the low-pressure container for the refrigerator is unlocked with the main body when the door is in the closed position;

Figure 12b is a partial cross-sectional view showing that the door of the low-pressure container for the refrigerator is locked with the main body when the door is in the closed position; and

Figure 13 is a schematic view showing how the transmission mechanism of the low-pressure container for the refrigerator is placed.

DETAILED DESCRIPTION OF THE INVENTION

[0029] Representative embodiments of the present invention will be explained in detail now, examples of which are illustrated in the drawings. The same reference numerals represent the same components in all drawings. The present invention will be explained with reference to the embodiments illustrated by the drawings as follows.

[0030] As shown in figure 1, a refrigerator 1 comprises a thermally insulated body 2. The body 2 comprises an outer shell 2a, an inner shell 2b and a heat-insulating layer (not shown) disposed therebetween. The body 2 delimits a plurality of thermally insulated storage compartments 3, 4 and 5 to store items such as foods or the like therein. In the present embodiment, these storage compartments refer to a cooling compartment 3 at the top of the body, a freezing compartment 5 at the bottom of the body and a (food) preserving compartment 4 therebetween. The interior of the preserving compartment can be maintained at a temperature slightly higher than 0°C. These storage compartments 3, 4, and 5 can be closed by respective compartment doors (not shown).

[0031] It should be understood that the present invention is not limited by above concrete arrangement of the storage compartments of the refrigerator. The present invention can also be applied for refrigerators of other

types, such as a refrigerator whose cooling and freezing compartments are arranged one above another, a side-by-side combination refrigerator whose storage compartments are arranged side by side and a refrigerator having a drawer-type door and/or a French door or the like.

[0032] The refrigerator 1 is provided with a low-pressure container 7 which can be maintained in a low-pressure state and an evacuating device (not shown) for drawing gas out of the low-pressure container 7. The evacuating device may comprise a vacuum pump and a pipeline (not shown) connected between the vacuum pump and the low-pressure container 7. In the present embodiment, the low-pressure container 7 is disposed in the preserving compartment 4.

[0033] It should be understood that, in an alternative embodiment, the low-pressure container 7 may be disposed in other compartments such as the cooling compartment 3 or a temperature-variable compartment whose interior temperature is switchable between cooling and freezing temperatures. The low-pressure container 7 is located at the bottom of the preserving compartment 4 and is supported on a bottom wall of the preserving compartment 4. Provided above the low-pressure container 7 is a preserving container 6 the interior humidity of which is relatively high and which is adapted to store foods such as vegetables or the like therein. The low-pressure container 7 may be manufactured independently of the body 2 and then is assembled in the body 2.

[0034] As shown in figure 2, in this embodiment, the low-pressure container 7 is of a substantially flat and rectangular shape, the width of which is slightly less than the width of the preserving compartment 4 such that the low-pressure container 7 is insertable into the preserving compartment 4 or pullable out of the preserving compartment 4. The low-pressure container 7 comprises a main body 8 secured in the preserving compartment 4 and a door 10 connected to the main body 8. The door can be pushed into or withdrawn from the preserving compartment 4.

[0035] As shown in figures 2, 3 and 9, the main body 8 is of a box shape, which delimits a flat storage compartment 15 having a food access opening 15a. The access opening 15a is preferably located at a front end of the main body 8 in such a way that it faces towards a user. In one preferred embodiment, the main body 8 comprises at least one first member made of metal of high strength (for example steel sheet) and at least one second member made of plastic, which first and second members form, respectively, walls enduring external pressure when the interior of the storage compartment 15 is in a low-pressure state. In this embodiment, the first member forms a top wall 20, a bottom wall 21 as well as left and right side walls 22 of the main body 8 such that a box body 11 having front and rear ports is formed. The second member comprises a rear cover 23 for closing the rear port of the box body 11. The rear cover 23 has an evacuating channel for being connected to the evac-

uating device and an evacuating valve 60 for opening or closing a fluid channel. The door 10 may be provided with an annular sealing element 16 (shown in figure 6) such that a hermetical engagement can be formed between the main body 8 and the door 10 when the door 10 is in a closed position. Gas is prevented from entering the storage compartment 15 at the engagement location between the main body 8 and the door 10. The sealing element 16 may also be provided at the front end of the main body 8. When the storage compartment 15 is closed by the door 10 and the evacuating device is activated, gas is drawn out of the storage compartment 15 and thus the storage compartment 15 is in the low-pressure state.

[0036] A handle 32 may be provided with an openable or closable air feeding channel 19 (shown in figure 6) at its rear side, which air feeding channel is provided on a body 26 of the door and used to release the storage compartment 15 from its low-pressure state. The air feeding channel 19 may be opened or closed by operating the handle 32.

[0037] The low-pressure container 7 comprises locking mechanisms for locking the door 10 at the closed position with the main body 8. As shown in figures 5 and 6, each locking mechanism comprises a first mating part 34 disposed on the door 10 and a second mating part 44 disposed on the main body 8. By engaging the first mating part 34 with the second mating part 44, the door 10 is locked in the closed position and the sealing element 16 between the door 10 and the main body 8 is squeezed and sufficiently deformed due to a locking force generated by the locking mechanism such that airtightness between the door 10 and the main body 8 is improved. The second mating part 44 is connected to a front surface 18 of the main body 8 such that the second mating part protrudes forwardly.

[0038] As shown in figures 4a and 4b, the second mating part 44 comprises a base portion 45 being connected to the front surface 18 and protruding forwardly as well as a cylindrical locking portion 46 located in front of the front surface 18. The locking portion 46 is separated from the front surface 18 by a predetermined distance. The locking portion has an axis extending transversely and parallel to the horizontal plane and the front surface 18. The locking portion 46 is disposed at the inner side of the base portion 45. The locking portion 46 comprises an inner pillar 46a secured on the base portion 45 and an outer wheel 46b fitted over the inner pillar 46a and adapted to rotate around the inner pillar 46a. The rotatable outer wheel 46b facilitates reducing friction between the locking portion 46 and the first mating part 44 as they are engaged with each other. In this way, they are enabled to easily enter their locking position. The inner pillar 46a may be integrated on the base portion 45. Alternatively, the inner pillar 46a may be manufactured independently of the base portion 45 and then is connected to the latter. In one simpler embodiment, the inner pillar 46a may be constituted by a screw secured on the base portion 45.

[0039] The door 10 comprises the door body 26, a stopping unit 27 secured on the body 26 and a decorative cover 29 connected to the door body 26 for masking corresponding parts of the stopping unit 27.

[0040] Figure 5 shows a stopping unit 27 which is not part of the invention. As shown in figure 5, the stopping unit 27 comprises: a handle 32 which is substantially -shaped and rotatable around a rotational axis X, a first rod body 33a under the rotational axis X of the handle 32 and a transmission mechanism 902 for coupling the handle 32 with the first rod body 33a. The transmission mechanism 902 results in the following two technical effects: first, the transmission mechanism is used to transmit rotation of the handle 32 to the first rod body 33a, that is, as the handle 32 is rotated around its rotational axis X, the first rod body 33a is also rotated around its own central axis Y so as to drive the first mating part 33 to rotate and to engage and lock with the second mating part 44; second, the first rod body 22a is separated vertically from the rotational axis X of the handle 32. Because the first mating part 34 is securely connected to either end of the first rod body 33a, the first mating part 34 is also separated vertically from the rotational axis X of the handle 32. In order to obtain a better sealing effect, the second mating part 44, which corresponds to the first mating part 34, is usually provided at a substantially middle position of the front surface 18 of the main body 8. However, the handle 32 is not restricted by the position of the first mating part 34 or the locking mechanism. That is, the handle 32 is possibly positioned upwardly or downwardly relative to the middle position of the door where it was positioned as previous.

[0041] The rotational axis X is not coaxial with the rotational axis Y. That is, the rotational axis X and the rotational axis Y are not the same axis such that the handle 32 is not restricted by the positions of the locking mechanism 34, 44 and can be designed to locate at any desirable position on the door 10. In the present embodiment, the rotational axis X is parallel to the rotational axis Y, and the position of the handle 32 is not restricted. That is, the handle 32 can be provided in a relatively free manner on the door 10 such that more designs can be adopted. In this way, the door 10 can be readily designed with an appealing appearance.

[0042] Figures 6 and 7 show a stopping unit 27 according to a first embodiment of the present invention. In this embodiment, the stopping unit 27 comprises: a handle 32 which is substantially plate-shaped and rotatable around a rotational axis, a first rod body 33a under the rotational axis of the handle 32, a transmission mechanism 902 for coupling the handle 32 with the first rod body 33a as well as a second rod body 33b directly and securely connected to the handle 32. A first mating part 34 is connected to either end of the second rod body 33b. Because the second rod body 33b is securely connected to the handle 32, the second rod body 33b can be rotated around its own central axis by rotating the handle 32 such that the first mating part 34 at either end of the second

rod body 33b is driven to engage and lock with a corresponding second mating part 44. Four second mating parts 44 shown in figure 3 are arranged in a substantially symmetrical manner adjacent four corners of the front surface 18 of the main body 32. Therefore, the first embodiment may result in a better locking effect. The position of the handle 32 on the door 10 is relevant to the first mating part 34 located at either end of the second rod body 33b but not restricted by it. That is, the handle 32 may still be provided in a relatively free manner on the door 10.

[0043] The transmission mechanism (901, 902) may be a gear transmission mechanism 901, a belt transmission mechanism or a linkage transmission mechanism 902 which is adopted in the present embodiment. The linkage transmission mechanism 902 is simple in configuration and efficient in transmission. As shown in figures 8a and 8b, the linkage transmission mechanism 902 comprises a first transmission part 912, a second transmission part 922 and a third transmission part 932, wherein the first transmission part 912 and the second transmission part 922 are both rotatable and the third transmission part 932 is translational. The first transmission part 912 is rotatable around the first rotational axis X. The second transmission part 922 is rotatable around the second rotational axis Y. The third transmission part 932 is translational in the door 10.

[0044] The first transmission part 912 is connected to the third transmission part 932 at one end and connected to the handle 32 at the other end. The second transmission part 922 is connected to the third transmission part 932 at one end and connected to the first rod body 33a at the other end. When the handle 32 is rotated, the handle 32 is not moved relative to the first transmission part 912 and one end of the first transmission part 912 is rotated along with the handle 32 so as to press the entire third transmission part 932 downwardly. In this case, the third transmission part 932 cannot be rotated but translated. Because the first rod body 33a is securely connected to the second transmission part 922, the first rod body 33a is rotated by the rotating second transmission part 922. In this process, although the first rod body 33a is rotated, the central axis of the first rod body 33a is stationary relative to the door body 26.

[0045] The third transmission part 932 can be configured as a single rod member; a member consisted of two parallel rods or a plate-shaped member. In the present embodiment, the third transmission part is substantially of a plate shape. During rotation of the handle 32, the third transmission part 932 is translated. That is, the third transmission part is translated both horizontally and vertically. In the translation, the plane where the third transmission part 932 is located is always parallel to the rotational axis X and the rotational axis Y. Both the first rotational axis X and the second rotational axis Y are located in a plane which is parallel to the third transmission part 932. In the present embodiment, the first transmission part 912 and the second transmission part 922 are

also substantially of a plate shape.

[0046] The first embodiment of the stopping unit 27 according to the present invention is explained above. A second embodiment of the stopping unit 27 making use of a gear transmission mechanism shown on figures 10 to 13 according to the present invention is explained below.

[0047] As shown in figures 9 and 10, which do not represent a low-pressure container according to be invention, a second mating part 44 is connected to the front surface 18 of the main body 8 and protrudes forwardly. The second mating part 44 comprises a base portion 45 being connected to the front surface 18 and protruding forwardly as well as a pillar-shaped locking portion 46 located in front of the front surface 18. The locking portion 46 is separated from the front surface 18 by a predetermined distance. The locking portion has an axis extending transversely and parallel to the horizontal plane and the front surface 18. The locking portion 46 is disposed at the inner side of the base portion 45.

[0048] The stopping unit 27 according to the second embodiment comprises a handle 32 of a substantial plate shape, a cylindrical rod body 33 secured on the handle 32, two first mating parts 34 and two transmission mechanisms 90 for coupling the first mating parts 34 to both ends of the rod body 33. The transmission mechanisms 90 are used to separate the two first mating parts 34 vertically from a central axis of the rod body 33. As the central axis of the rod body 33 coincides with a rotational axis X of the handle 32, the rotational axis X of the handle 32 is also separated vertically from the two first mating parts 34 such that the handle 32 is possibly positioned upwardly or downwardly relative to the middle position of the door where it was positioned as previous. The handle 32 is not restricted by the position of the transmission mechanism and can be provided in a relatively free manner on the door 10, such that more designs can be adopted and thus the door 10 can be readily designed with an appealing appearance.

[0049] The extent to which the handle 32 is positioned upwardly or downwardly on the door 10 is dependent on the configuration of the transmission mechanism 90. In this embodiment, the transmission mechanism 901 is embodied as a gear transmission mechanism 901 as shown in figure 11. That is, by means of gear train, rotation of the rod body 33 is transmitted to each first mating part 34. The gear transmission mechanism 901 comprises a first gear transmission part 911 secured to an end of the rod body 33, wherein the first gear transmission part 911 is substantially embodied as a sector gear which, by comparison with a wheel gear, is advantageous in that the number of teeth is reduced by half so as to save space in the door 10; a third gear transmission part 931 which forms an integral structure with the first mating part 34 and is also substantially embodied as a sector gear; as well as a second gear transmission part 921 which is embodied as a wheel gear and meshed with the first gear transmission part 911 and the third gear

transmission part 931.

[0050] One first gear transmission part 911 is secured to either end of the rod body 33. The first gear transmission part 911 is sleeved on a corresponding end of the rod body 33 and then fixed on the rod body 33 via a securing device for example a screw. Therefore, when the rod body 33 is installed on the door body 26 such that the rod body is rotated around its own central axis X, the first gear transmission part 911 is also rotated around the central axis X of the rod body 33. Because teeth of the first gear transmission part 911 are meshed with the gear of the second gear transmission part 921, the second gear transmission part 921 is driven to rotate. Similarly, the third gear transmission part 931 is driven by the second gear transmission part 921 to rotate. Because the first mating part 34 forms the integral structure with the third gear transmission part 931, the first mating part 34 under the rod body 34 is finally driven to rotate so as to engage and lock with the second mating part 44. As shown in figure 13, the gear transmission mechanism 901 is placed between a supporting plate of the side wall for the door 10 and a sealing strip at a corresponding side edge such that the sealing effect between the door and the main body is not influenced. The second gear transmission part 921 and the third gear transmission part 931 are secured on a supporting plate 98 of the door 10 such that they are rotatable around their own rotational centers respectively. A through slot, through which the transmission mechanism 90 and the first mating part 44 are allowed to pass, is formed between the side edge of the door 10 and the supporting plate 98.

[0051] After the handle 32 is installed on the door body 26, the handle is rotatably connected to the door 10. When the handle 32 is rotated, the rod body 33 in the door body 26 is also rotated around its own central axis X and, at the same time, the first gear transmission part 911 is driven by it to rotate. The second gear transmission part 921 is driven by the first gear transmission part 911 to rotate. The third gear transmission part 931 is driven by the second gear transmission part 921 to rotate. The first mating part 34 is driven by the third gear transmission part 931 to rotate. The rod body 33 defines a rotational shaft for the handle 32. In the above process, although the handle 32 is rotated, the central axis X, which is defined by the rotational shaft for the handle 32 is immovable relative to the door body 26. The handle 32 is rotatable around the central axis X of the rod body 33 between first and second positions. In the first position, an angle included between the handle 32 and a front face 26a of the door body 26 reaches its maximal value and a distance measured between a lower end of the handle and the front face 26a of the door body 26 reaches its maximal value. Therefore, the first position is also called as a stretching position. In the second position, the angle included between the handle 32 and the front face 26a of the door body 26 reaches its minimal value and the distance measured between the lower end of the handle and the front face 26a of the door body 26 reaches its

minimal value. Therefore, the second position is also called as a retracting position. Correspondingly, the first mating part linked with the handle 32 is also limited to rotate between first and second limiting positions. When the handle 32 is in the first position, the first mating part 34 is in the first limiting position (shown in figure 12a). When the handle is in the second position, the first mating part 34 is in the second limiting position (shown in figure 12b).

[0052] Figure 12a shows that the door 10 is in the closed position but not locked yet. Now, the handle 32 is in the first position. When the user presses the handle 32 downwardly and forwardly, the handle 32 is rotated inwardly around the central axis X of the rod body 33. Meanwhile, the rod body 33 is also rotated around its own central axis X so as to drive the first mating part 34 to rotate upwardly such that a cam surface 34a of the first mating part 34 is enabled to progressively approach the locking portion 46 of the second mating part 44. Figure 12b shows that the door 10 is locked with the main body 8. Now, the handle 32 is in the second position. As shown in figure 12b, when the handle 32 is rotated into the second position, the locking portion 46 is forced into the first mating part 34a and engaged tightly with it.

[0053] Both the first gear transmission part 911 and the third gear transmission part 931 are sector gears and meshed with each other. The first gear transmission part 911 is rotated following rotation of the rod body 33 and at the same time the third gear transmission part 931 is gear-driven to rotate. Since the first mating part 34 forms the integral structure with the third gear transmission part 931, the first mating part 34 and the second mating part 44 are enabled to engage and lock with each other. Although this embodiment may result in a technical effect that the first mating part 34 is located under the handle 32, it has two shortcomings than the previous embodiments: first, the extent to which the handle 32 is adjusted upwardly relative to the middle position of the door 10 where it was located as previous is reduced; second, because two adjacent gears are rotated reversely, it is necessary to re-design the mechanism between the handle 32 and the rod body 33, which is troublesome.

Claims

1. A low-pressure container (7) for a refrigerator, comprising:

- a main body (8), wherein the main body (8) defines a storage compartment (15) having an opening portion (15a) for loading or unloading items;
- a door (10) for selectively opening or closing the opening portion (15);
- a locking mechanism (34, 44) for locking the door (10) with the main body (8) when the door (10) is in a closed position, wherein the locking

mechanism (34, 44) comprises first mating parts (34) located on the door (10) and second mating parts (44) located on the main body (8) and adapted to engage and lock with the first mating parts (34); and

a handle (32) which is rotatable around a first rotational axis (X) so as to drive the first mating parts (34) to rotate;

wherein the low-pressure container further comprises a transmission mechanism (901, 902) by which the handle (32) drives first mating parts (34) to rotate around a second rotational axis (Y), and wherein the second rotational axis (Y) is not coaxial with the first rotational axis (X),

characterized in that

the low-pressure container (7) is an evacuable container (7),

the low-pressure container (7) further comprises a first rod body (33a) to which the handle (32) is coupled via the transmission mechanism (901, 902) and which rotates around the second rotational axis (4), and one of the first mating parts (34) is securely connected to either end of the first rod body (33a), and the low-pressure container (7) further comprises a second rod body (33b) which is securely connected to the handle (32), the second rod body (33b) has a central axis as the first rotational axis (X), and one of the first mating parts (34) is securely connected to either end of the second rod body (33b).

2. The low-pressure container as claimed in claim 1, wherein the second rotational axis (Y) is parallel to the first rotational axis (X).
3. The low-pressure container as claimed in any one of the preceding claims, wherein the transmission mechanism (902) is a linkage transmission mechanism.
4. The low-pressure container as claimed in claim 3, wherein the linkage transmission mechanism (902) comprises a first transmission part (912), a second transmission part (922) and a third transmission part (933) which couples the first transmission part (912) with the second transmission part (922).
5. The low-pressure container as claimed in claim 4, wherein the third transmission part (932) is able to translate in the door.
6. The low-pressure container as claimed in any of the claims 4 or 5, wherein the third transmission part (932) is substantially plate-shaped.
7. The low-pressure container as claimed in any one of the preceding claims, wherein the locking mechanism (34, 44) comprises four first mating parts (34)

located on the door (10) and four second mating parts (44) located on the main body (8) and adapted to engage and lock with said four first mating parts (34).

8. The low-pressure container as claimed in any one of the preceding claims, wherein the low-pressure container is connectable to an evacuating device for drawing gas out of the low-pressure container.
9. The low-pressure container as claimed in any one of the preceding claims, wherein the transmission mechanism (901) is a gear transmission mechanism.
10. The low-pressure container as claimed in claim 9, wherein the gear transmission mechanism (901) is coupled to each first mating part (34), and the handle (32) drives the first mating part (34) via the gear transmission mechanism (901) to rotate.
11. The low-pressure container as claimed in any of the claims 9 or 10, wherein the gear transmission mechanism (901) comprises a first gear transmission part (911), a second gear transmission part (921) and a third gear transmission part (931).
12. The low-pressure container as claimed in claim 11, wherein at least one of the first gear transmission part (911) and the third gear transmission part (931) is substantially a sector gear, the second gear transmission part (921) is a wheel gear and meshed with both the first gear transmission part (911) and the third gear transmission part (931).
13. The low-pressure container as claimed in any of the claims 9 to 12, wherein a third rod body (33) is provided between the handle (32) and the gear transmission mechanism (901), and the third rod body (33) has a central axis as the first rotational axis (X).
14. A refrigerator having a low-pressure container (7) as claimed in any one of the preceding claims and comprising an evacuating device an evacuating device for drawing gas out of the low-pressure container.

Patentansprüche

1. Niederdruckbehälter (7) für einen Kühlschrank mit:

einem Hauptteil (8), wobei der Hauptteil (8) ein Aufbewahrungsfach (15) mit einem Öffnungsabschnitt (15a) zum Hineinlegen oder Herausnehmen von Artikeln definiert,
einer Tür (10) zum gezielten Öffnen oder Schließen des Öffnungsabschnitts (15),
einem Verriegelungsmechanismus (34, 44)

- zum Verriegeln der Tür (10) mit dem Hauptteil (8), wenn sich die Tür (10) in einer geschlossenen Position befindet, wobei der Verriegelungsmechanismus (34, 44) erste Passteile (34) an der Tür (10) und zweite Passteile (44) am Hauptteil (8) umfasst, die so ausgelegt sind, dass sie die ersten Passteile (34) in Eingriff nehmen und sich damit verriegeln, und
- einem Griff (32), der um eine erste Drehachse (X) drehbar ist und so die ersten Passteile (34) zum Drehen bringt,
- wobei der Niederdruckbehälter ferner einen Getriebemechanismus (901, 902) umfasst, über den der Griff (32) erste Passteile (34) zum Drehen um eine zweite Drehachse (Y) bringt, und die zweite Drehachse (Y) nicht koaxial mit der ersten Drehachse (X) verläuft,
- dadurch gekennzeichnet, dass**
- es sich bei dem Niederdruckbehälter (7) um einen evakuierbaren Behälter (7) handelt,
- der Niederdruckbehälter (7) ferner einen ersten Stangenkörper (33a) umfasst, mit dem der Griff (32) über den Getriebemechanismus (901, 902) gekoppelt ist und der sich um die zweite Drehachse (Y) dreht, und eines der ersten Passteile (34) fest mit einem Ende des ersten Stangenkörpers (33a) verbunden ist und
- der Niederdruckbehälter (7) ferner einen zweiten Stangenkörper (33b) umfasst, der fest mit dem Griff (32) verbunden ist, wobei der zweite Stangenkörper (33b) eine Mittelachse als erste Drehachse (X) aufweist und eines der ersten Passteile (34) fest mit einem Ende des zweiten Stangenkörpers (33b) verbunden ist.
2. Niederdruckbehälter nach Anspruch 1, bei dem die zweite Drehachse (Y) parallel zur ersten Drehachse (X) verläuft.
 3. Niederdruckbehälter nach einem der vorhergehenden Ansprüche, bei dem es sich bei dem Getriebemechanismus (902) um einen Koppelgetriebemechanismus handelt.
 4. Niederdruckbehälter nach Anspruch 3, bei dem der Koppelgetriebemechanismus (902) ein erstes Getriebeteil (912), ein zweites Getriebeteil (922) sowie ein drittes Getriebeteil (933) umfasst, das das erste Getriebeteil (912) mit dem zweiten Getriebeteil (922) koppelt.
 5. Niederdruckbehälter nach Anspruch 4, bei dem das dritte Getriebeteil (932) in der Lage ist, sich in der Tür zu verschieben.
 6. Niederdruckbehälter nach einem der Ansprüche 4 und 5, bei dem das dritte Getriebeteil (932) im Wesentlichen plattenförmig ist.
 7. Niederdruckbehälter nach einem der vorhergehenden Ansprüche, bei dem der Verriegelungsmechanismus (34, 44) vier erste Passteile (34) an der Tür (10) und vier zweite Passteile (44) am Hauptteil (8) umfasst, die so ausgelegt sind, dass sie die vier ersten Passteile (34) in Eingriff nehmen und sich damit verriegeln.
 8. Niederdruckbehälter nach einem der vorhergehenden Ansprüche, wobei sich der Niederdruckbehälter mit einer Evakuierungsvorrichtung zum Abziehen von Gas aus dem Niederdruckbehälter verbinden lässt.
 9. Niederdruckbehälter nach einem der vorhergehenden Ansprüche, bei dem es sich bei dem Getriebemechanismus (901) um einen Zahnradgetriebemechanismus handelt.
 10. Niederdruckbehälter nach Anspruch 9, bei dem der Zahnradgetriebemechanismus (901) mit jedem ersten Passteil (34) gekoppelt ist und der Griff (32) das erste Passteil (34) über den Zahnradgetriebemechanismus (901) zum Drehen bringt.
 11. Niederdruckbehälter nach einem der Ansprüche 9 und 10, bei dem der Zahnradgetriebemechanismus (901) ein erstes Zahnradgetriebeteil (911), ein zweites Zahnradgetriebeteil (921) und ein drittes Zahnradgetriebeteil (931) umfasst.
 12. Niederdruckbehälter nach Anspruch 11, bei dem das erste Zahnradgetriebeteil (911) oder/ und das dritte Zahnradgetriebeteil (931) im Wesentlichen ein Zahnsegment und das zweite Zahnradgetriebeteil (921) ein Zahnrad ist, das sowohl in das erste Zahnradgetriebeteil (911) als auch in das dritte Zahnradgetriebeteil (931) eingreift.
 13. Niederdruckbehälter nach einem der Ansprüche 9 bis 12, bei dem sich zwischen dem Griff (32) und dem Zahnradgetriebemechanismus (901) ein dritter Stangenkörper (33) befindet und der dritte Stangenkörper (33) eine Mittelachse als erste Drehachse (X) aufweist.
 14. Kühlschrank mit einem Niederdruckbehälter (7) nach einem der vorhergehenden Ansprüche und einer Evakuierungsvorrichtung zum Abziehen von Gas aus dem Niederdruckbehälter.
- Revendications**
1. Récipient basse pression (7) pour un réfrigérateur, comprenant :

un corps principal (8), dans lequel le corps principal (8) définit un compartiment de stockage

- (15) ayant une pièce ouvrante (15a) permettant de charger ou de décharger des articles ;
 une porte (10) permettant d'ouvrir ou de fermer sélectivement la pièce ouvrante (15) ;
 un mécanisme de verrouillage (34, 44) permettant de verrouiller la porte (10) avec le corps principal (8) lorsque la porte (10) se trouve en position fermée, dans lequel le mécanisme de verrouillage (34, 44) comprend des premières pièces d'appariement (34) situées sur la porte (10) et des deuxièmes pièces d'appariement (44) situées sur le corps principal (8) et adaptées pour venir en prise et se verrouiller avec les premières pièces d'appariement (34) ; et
 une poignée (32) qui peut tourner autour d'un premier axe de rotation (X) de manière à entraîner en rotation les premières pièces d'appariement (34) ;
 dans lequel le récipient basse pression comprend en outre un mécanisme de transmission (901, 902) au moyen duquel la poignée (32) entraîne les premières pièces d'appariement (34) en rotation autour d'un deuxième axe de rotation (Y), et dans lequel le deuxième axe de rotation (Y) n'est pas coaxial avec le premier axe de rotation (X), **caractérisé en ce que**
 le récipient basse pression (7) est un récipient évacuable (7),
 le récipient basse pression (7) comprend en outre un premier corps en forme de tige (33a) auquel la poignée (32) est couplée via le mécanisme de transmission (901, 902) et qui tourne autour du deuxième axe de rotation (Y), et l'une des premières pièces d'appariement (34) est raccordée solidement à l'une ou l'autre extrémité du premier corps en forme de tige (33a), et le récipient basse pression (7) comprend en outre un deuxième corps en forme de tige (33b) qui est raccordé solidement à la poignée (32), le deuxième corps en forme de tige (33b) a un axe central en tant que premier axe de rotation (X) et l'une des premières pièces d'appariement (34) est raccordée solidement à l'une ou l'autre extrémité du deuxième corps en forme de tige (33b).
2. Récipient basse pression selon la revendication 1, dans lequel le deuxième axe de rotation (Y) est parallèle au premier axe de rotation (X).
 3. Récipient basse pression selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de transmission (902) est un mécanisme de transmission à articulation.
 4. Récipient basse pression selon la revendication 3, dans lequel le mécanisme de transmission à articulation (902) comprend une première pièce de transmission (912), une deuxième pièce de transmission (922) et une troisième pièce de transmission (933) qui couple la première pièce de transmission (912) à la deuxième pièce de transmission (922).
 5. Récipient basse pression selon la revendication 4, dans lequel la troisième pièce de transmission (932) est en mesure d'effectuer une translation dans la porte.
 6. Récipient basse pression selon l'une quelconque des revendications 4 ou 5, dans lequel la troisième pièce de transmission (932) est sensiblement en forme de plaque.
 7. Récipient basse pression selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de verrouillage (34, 44) comprend quatre premières pièces d'appariement (34) situées sur la porte (10) et quatre deuxièmes pièces d'appariement (44) situées sur le corps principal (8) et adaptées pour venir en prise et se verrouiller avec lesdites quatre premières pièces d'appariement (34).
 8. Récipient basse pression selon l'une quelconque des revendications précédentes, dans lequel le récipient basse pression peut être raccordé à un dispositif d'évacuation pour évacuer du gaz hors du récipient basse pression.
 9. Récipient basse pression selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de transmission (901) est un mécanisme de transmission à engrenage.
 10. Récipient basse pression selon la revendication 9, dans lequel le mécanisme de transmission à engrenage (901) est couplé à chaque première pièce d'appariement (34), et la poignée (32) entraîne en rotation la première pièce d'appariement (34) via le mécanisme de transmission à engrenage (901).
 11. Récipient basse pression selon l'une quelconque des revendications 9 ou 10, dans lequel le mécanisme de transmission à engrenage (901) comprend une première pièce de transmission à engrenage (911), une deuxième pièce de transmission à engrenage (921) et une troisième pièce de transmission à engrenage (931).
 12. Récipient basse pression selon la revendication 11, dans lequel au moins l'une parmi la première pièce de transmission à engrenage (911) et la troisième pièce de transmission à engrenage (931) est sensiblement un secteur denté, la deuxième pièce de transmission à engrenage (921) est un train d'engrenages et est engrenée avec à la fois la première pièce de transmission à engrenage (911) et la troi-

sième pièce de transmission à engrenage (931).

13. Récipient basse pression selon l'une quelconque des revendications 9 à 12, dans lequel un troisième corps en forme de tige (33) est prévu entre la poignée (32) et le mécanisme de transmission à engrenage (901), et le troisième corps en forme de tige (33) a un axe central en tant que premier axe de rotation (X).
14. Réfrigérateur ayant un récipient basse pression (7) selon l'une quelconque des revendications précédentes et comprenant un dispositif d'évacuation permettant d'évacuer du gaz hors du récipient basse pression.

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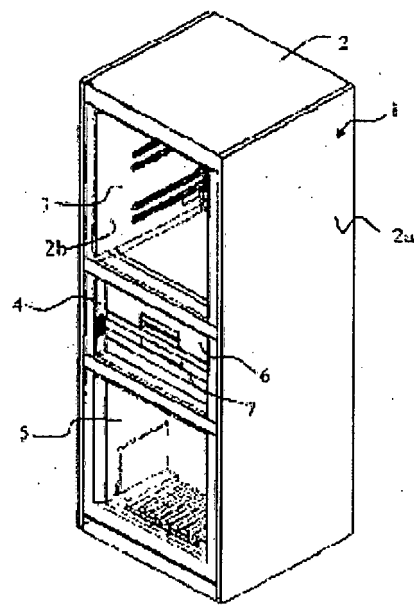


FIGURE 1

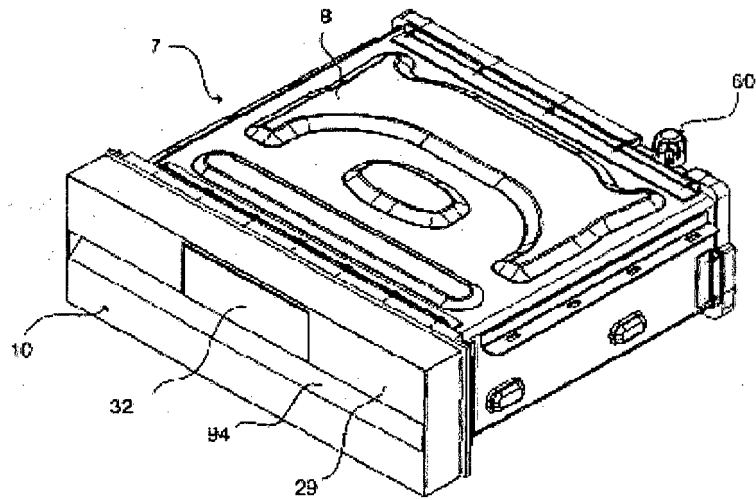


FIGURE 2

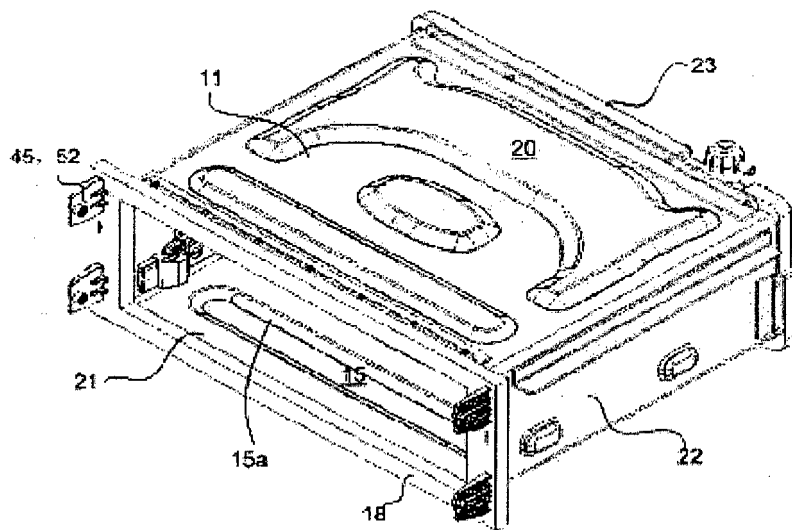


FIGURE 3

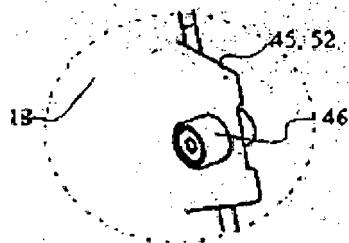


FIGURE 4a

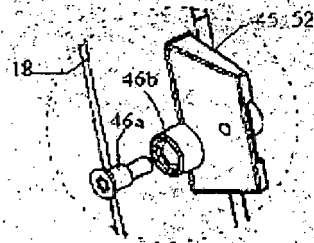


FIGURE 4b

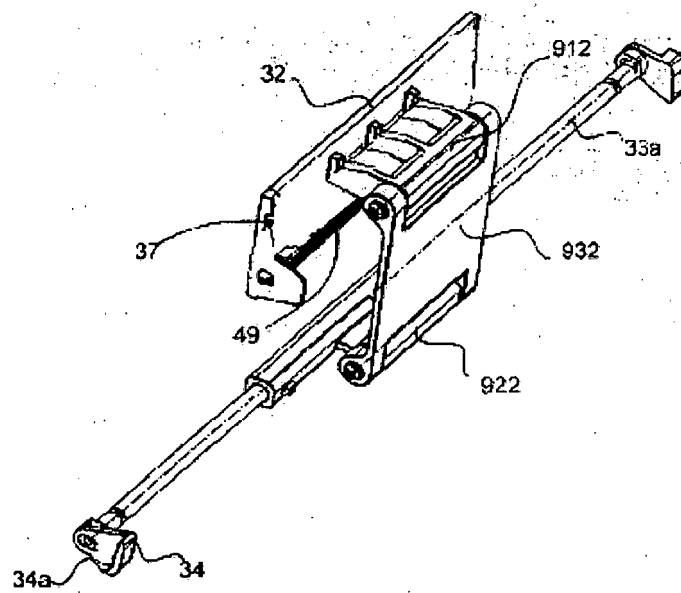


FIGURE 5

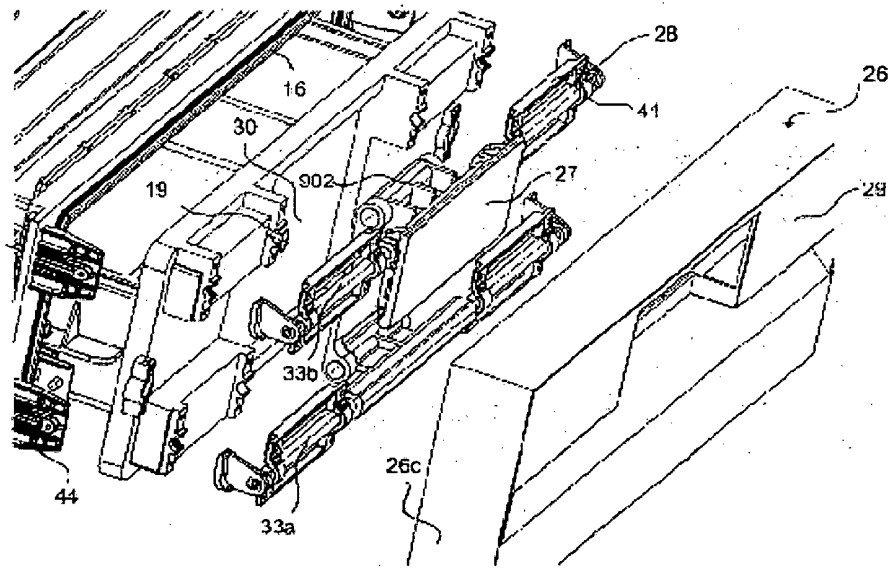


FIGURE 6

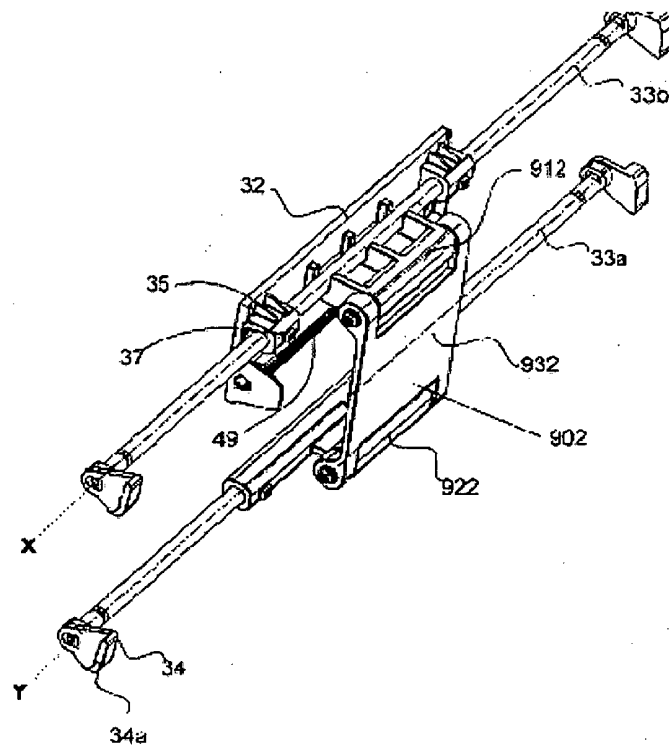


FIGURE 7

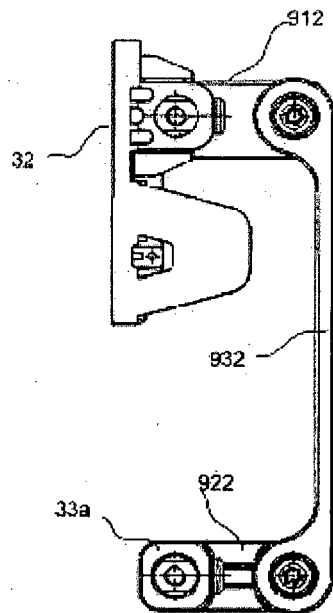


FIGURE 8a

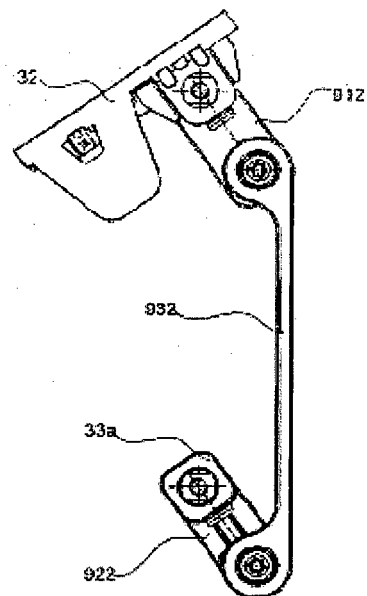


FIGURE 8b

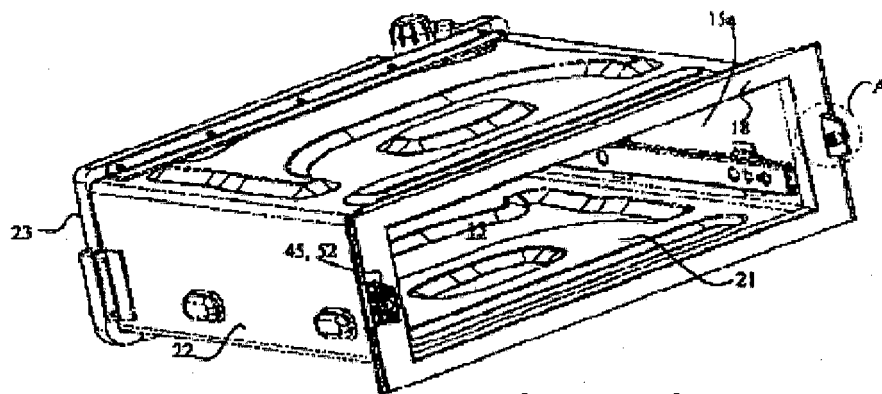


FIGURE 9

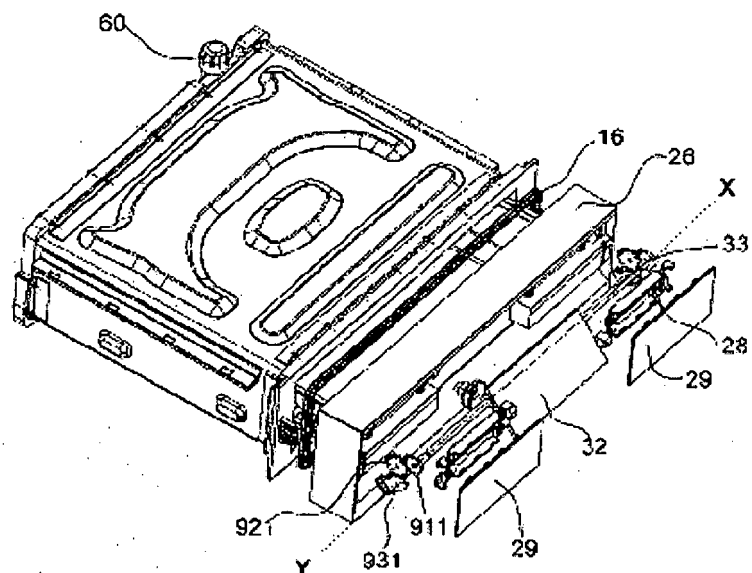


FIGURE 10

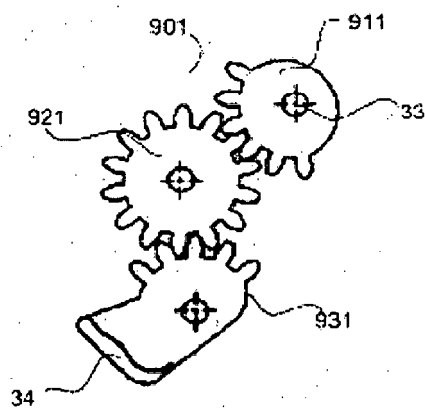


FIGURE 11

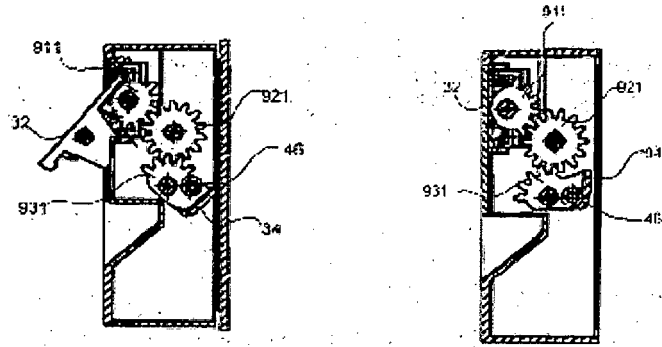


FIGURE 12a **FIGURE 12b**

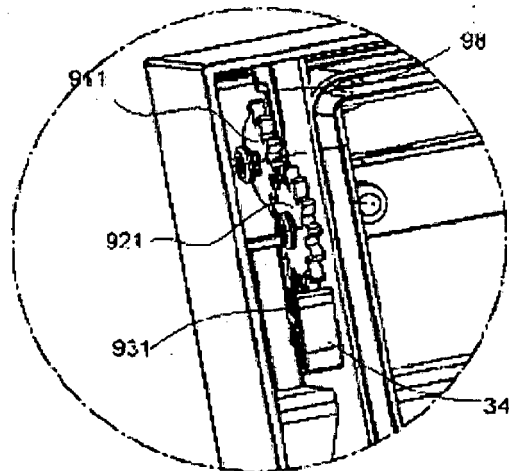


FIGURE 13

REFERENCES CITED IN THE DESCRIPTION

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