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(71) Applicant: **VANBOT BV**
8972 Poperinge (BE)

(72) Inventor: **VERDONCK, Frank**
8972 Poperinge (BE)

(74) Representative: **Brantsandpatents bv**
Pauline Van Pottelsberghelaan 24
9051 Ghent (BE)

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(54) **VERTICAL SLIDING DOOR ASSEMBLY**

(57) The invention relates to a vertical sliding-door assembly with primary and secondary door panels, wherein the primary door panel is hingedly coupled to a primary movable carriage and the secondary door panels are non-hingedly coupled to a secondary movable carriage. Both door panels are suspended from pull belts with attachment ends and upward pull ends for raising and lowering. Both carriages use the same guide track, whereby the volume taken up is limited. The guide track comprises an unbranched segment and a branched segment with two branches, so that the door panels can be stored face-to-face. The pull belts are optionally driven by motors and guided by belt guides near the branch point. The invention also comprises methods for opening and/or closing and manufacturing or installing the vertical sliding-door assembly.

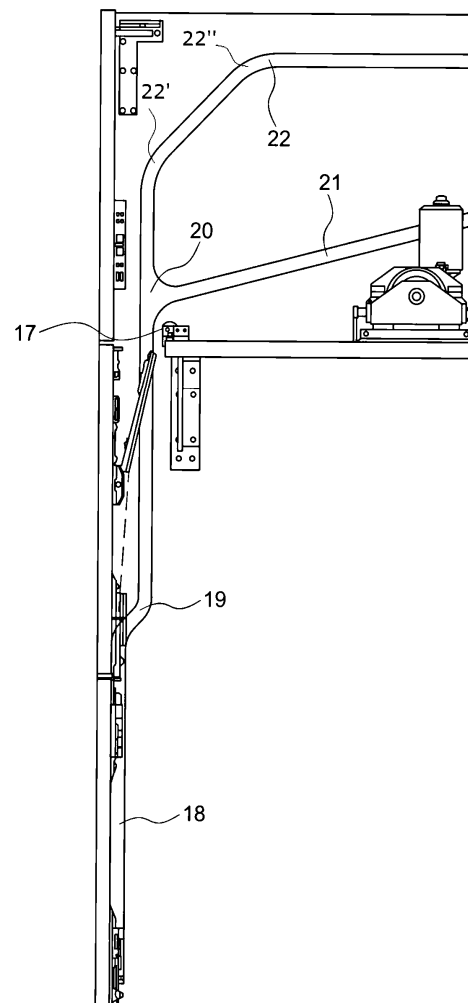


Fig. 3

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Description

TECHNICAL FIELD

[0001] The invention is directed to a vertical sliding-door assembly and methods for opening and/or closing, as well as manufacturing or installing the same.

BACKGROUND ART

[0002] Vertical sliding doors are known as such. Sliding doors with vertically slidable door panels are used in cabinets, for example.

[0003] US 2010/072868 describes an automated cabinet door system. The system provides several movable panels that overlap one another in a stepped fashion. The side edges of the panels run along vertical tracks. The panels are individually slidable in the vertical direction. In this way the cabinet can be opened (maximum overlap) and closed (minimum overlap). There is always a certain amount of overlap between the panels. The system therefore takes up quite a lot of space. It also does not look very refined.

[0004] Furthermore, WO 2005/054613 describes a vertical sliding door with two door panels. The panels are provided with wheels at their lateral edges, in guide rails. Opening and closing is done manually by sliding the door panels vertically. In the closed position, the panels form one front plane. During opening, the lower door panel is first hinged in front of the upper door panel by forward pivoting of the guide rails. However, the mechanics are quite complex. The system therefore requires highly skilled installation.

[0005] Finally, EP 2 821 576 discloses another automated cabinet with a system for moving the cabinet panels up and down. In the closed position, the panels together form one front plane. However, the closing mechanism requires that the bottom and top edge portions of the panels be chamfered. Such panels have a higher cost.

[0006] The present invention aims to provide an improved sliding-door assembly, and/or an improved suspension system for the sliding-door panels. The invention also aims to provide solutions to the above problems.

SUMMARY OF THE INVENTION

[0007] In a first aspect, the invention relates to a vertical sliding-door assembly according to claim 1, comprising a primary door panel and one or more secondary door panels, which primary and secondary door panel are configured for moving between a raised, open position and a lowered, closed position, wherein the primary door panel in the lowered, closed position is positioned above the secondary door panel in a front plane of the sliding-door assembly, wherein said primary door panel is hingedly coupled to a primary mo-

vable carriage with primary guide means, and wherein said one or more secondary door panels are non-hinged coupled to a secondary movable carriage with secondary guide means, which primary and secondary door panel are each suspended from respectively a primary and secondary pull belt, each with an attachment end and an upward pull end, which pull belts are configured for raising and lowering respectively the primary and secondary door panel, characterised in that said primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track. By guiding the primary and secondary door panel along the same guide track, the volume taken up by the vertical sliding-door assembly is limited such that, when the vertical sliding-door assembly is provided in a storage facility such as for example a cabinet, a larger usable volume is realised.

[0008] Preferred embodiments of the sliding-door assembly are set out in dependent claims 2-17.

[0009] In a second aspect, the invention relates to a method for opening and/or closing a vertical sliding-door assembly according to claim 18, comprising the steps of: activating a primary motor for raising a primary pull belt, whereby a primary door panel is raised; causing the primary door panel to move hingedly with respect to a first primary carriage part prior to the complete raising of the primary door panel; guiding an upper side of the primary door panel along a first branch of a branched segment of a guide track and a lower side of the primary door panel along a second branch of the branched segment; activating a secondary motor for raising a secondary pull belt, whereby a secondary door panel is raised; and guiding an upper side of the secondary door panel along the first branch and a lower side of the secondary door panel along the second branch, wherein the primary and secondary door panels are oriented face-to-face in a storage space.

[0010] In a third aspect, the invention relates to a method for manufacturing or installing a vertical sliding-door assembly according to claim 19, comprising the steps of: providing a guide track in a side wall of a cabinet, wherein the guide track comprises an unbranched segment and a branched segment, which branched segment comprises a first and a second branch that meet at a branch point; mounting a primary door panel by means of a primary movable carriage with primary guide means, wherein the primary door panel is hingedly coupled to the primary movable carriage; mounting a secondary door panel by means of a secondary movable carriage with secondary guide means, wherein the secondary door panel is non-hinged coupled to the secondary movable carriage; providing a primary and secondary motor in a storage space of the cabinet; connecting an upward pull end of a primary pull belt to the primary motor and an attachment end of the primary pull belt to the primary door

panel; and connecting an upward pull end of a secondary pull belt to the secondary motor and an attachment end of the secondary pull belt to the secondary door panel, wherein the primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track.

DESCRIPTION OF THE FIGURES

[0011] The figures are non-limiting examples that illustrate the invention and are neither intended nor to be interpreted as limiting the scope of the invention.

Fig. 1 illustrates a rear view of the vertical sliding-door assembly.

Fig. 2 illustrates a side view of the vertical sliding-door assembly in which the pull belts are shown.

Fig. 3 illustrates a side view of the vertical sliding-door assembly with different segments of the guide indicated.

Fig. 4 illustrates a side view of the vertical sliding-door assembly with an indication of the hinging movement of the primary door panel.

Fig. 5 to 7 illustrate a side view of the vertical sliding-door assembly in which the primary door panel is configured in various stages of raising, wherein the pull belts are not shown for clarity.

Fig. 8 illustrates a side view of the vertical sliding-door assembly with the primary door panel in the raised position, wherein the corresponding pull belt is shown.

Fig. 9 illustrates a side view of the vertical sliding-door assembly with the primary and the secondary door panel in the raised configuration, wherein both pull belts are shown.

DETAILED DESCRIPTION

[0012] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explicitly defined.

[0013] The terms "comprise", "comprising", "consist of", "consisting of", "provided with", "contain", "containing", "encompass", "encompassing", "include" and "including" are synonyms and are inclusive or open terms indicating the presence of what follows, and do not exclude or preclude the presence of other components,

features, elements, members or steps known from or described in the prior art.

[0014] In a first aspect, the invention relates to a vertical sliding-door assembly comprising a primary door panel and one or more secondary door panels, which primary and secondary door panel are configured for moving between a raised, open position and a lowered, closed position, wherein the primary door panel in the lowered, closed position is positioned above the secondary door panel in a front plane of the sliding-door assembly, wherein said primary door panel is hingedly coupled to a primary movable carriage with primary guide means, and wherein said one or more secondary door panels are non-hingedly coupled to a secondary movable carriage with secondary guide means, which primary and secondary door panel are each suspended from respectively a primary and secondary pull belt, each with an attachment end and an upward pull end, which pull belts are configured for raising and lowering respectively the primary and secondary door panel, and wherein said primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track. By guiding the primary and secondary door panel along the same guide track, the volume taken up by the vertical sliding-door assembly is limited such that, when the vertical sliding-door assembly is provided in a storage facility such as for example a cabinet, a larger usable volume is realised.

[0015] In a further or alternative embodiment, the vertical sliding-door assembly comprises a storage space, wherein the guide track comprises (i) an unbranched segment and (ii) a branched segment, which unbranched segment extends substantially vertically along the front side of the vertical sliding-door assembly, and which branched segment is coupled to the unbranched segment at the level of a branch point, wherein the branched segment comprises a first and a second branch, which first and second branch meet in said branch point, and wherein the branched segment is positioned in said storage space and is configured for storing the primary and secondary door panels face-to-face in said storage space.

[0016] By storing the primary and secondary door panel face-to-face via the branched segment, the required volume is limited to a minimum. This makes the system particularly suitable for use in a cabinet, where optimal use of the available storage volume is of essential importance. The raised door panels remain outside the useful cabinet volume, so that the opened portion remains freely accessible. Upper cabinet volumes are moreover generally more difficult to reach and are in this way functionally utilised as storage space. According to a possible embodiment, this storage space is located behind a fixed top panel in the cabinet.

[0017] In a further or alternative embodiment, the primary movable carriage comprises a first primary carriage part and a second primary carriage part, wherein

the first primary carriage part is a hinging carriage part, wherein the second primary carriage part is a non-hinging carriage part, and wherein the first primary carriage part is attached substantially at the top of the rear side of the primary door panel and the second primary carriage part is attached substantially at the bottom of the rear side of the primary door panel.

[0018] As a result, the upper side of the primary door panel is able to hinge away from, and back towards, the guide track from the front plane. The primary door panel can thereby be oriented both in the front plane and at an angle with respect to the front plane. Furthermore, the guide means are provided both at the upper side and at the lower side of the primary door panel, so that these sides can move independently of one another along different parts of the guide track. This makes it possible to change the orientation of the primary door panel during raising to the raised position.

[0019] In a further or alternative embodiment, the secondary movable carriage comprises a first secondary carriage part and a second secondary carriage part, wherein the first and the second secondary carriage part are non-hinging carriage parts, and wherein the first secondary carriage part is attached substantially at the top of the rear side of the secondary door panel and the second secondary carriage part is attached substantially at the bottom of the rear side of the secondary door panel.

[0020] As a result, the guide means are provided both at the upper side and at the lower side of the secondary door panel, whereby the respective sides of the door panel can be guided along different parts of the guide track. This makes it possible to change the orientation of the secondary door panel during raising to the raised position.

[0021] In a further or alternative embodiment, the guide means of the first primary and secondary carriage part are configured for guiding respectively the primary and secondary door panel along the first branch, and the guide means of the second primary and secondary carriage part are configured for guiding respectively the primary and secondary door panel along the second branch.

[0022] As a result, the primary and secondary door panel can, upon raising to the raised position, change orientation at the level of the storage space. This reorientation makes it possible to accommodate the door panels in the storage space with a minimum required volume, whereby the available space is used efficiently.

[0023] In a further or alternative embodiment, the respective attachment ends of the primary and secondary pull belt are configured for exerting a pulling force on the lower side of respectively the primary and secondary door panel.

[0024] The lower side is hereby defined as the bottom half of the door panel. In an alternative embodiment, this concerns the bottom 10%, and preferably the bottom 5% of the door panel. Said pulling force can

be exerted via an application point located at the lower side of the door panel concerned. Alternatively, the pulling force can be realised by means of a belt guide positioned at the lower side of the door panel or at the second carriage part.

[0025] By exerting a pulling force on the lower side, a slight tilting of both the primary and the secondary door panel occurs upon raising to the raised position. This tilting has the consequence that the guide means of the first primary and first secondary carriage part are guided into the first branch of the guide track, while the guide means of the second primary and second secondary carriage part are guided into the second branch as soon as the respective guide means pass the branch point.

[0026] In a further or alternative embodiment, the vertical sliding-door assembly comprises a primary and secondary belt guide, which belt guides are positioned at a height and depth in the sliding-door assembly deviating by at most 10 centimetres from the height and depth of the branch point in the sliding-door assembly, and which primary and secondary belt guide are configured for guiding respectively the primary and secondary pull belt.

[0027] By virtue of this positioning, the pull belts are oriented along the unbranched segment of the guide track and subsequently along the second branch of the branched segment. As a result, upon raising, the door panels are first moved efficiently along the unbranched segment, and subsequently, as soon as the second carriage part of the door panel concerned passes the branch point, guided efficiently along the second branch. The belt guides ensure that the direction of the exerted pulling force changes at the moment that the direction of movement of the second carriage part also changes at the level of the branch point.

[0028] Preferably, the belt guides are positioned at a height and depth in the sliding-door assembly deviating by at most 8 centimetres, more preferably at most 6 centimetres, even more preferably at most 5, 4, 3, 2 centimetres, or most preferably at most 1 centimetre, from the height and depth of the branch point in the sliding-door assembly.

[0029] In one embodiment, the belt guide is placed at the front of the cabinet, for example along the longitudinal direction of a shelf or shelving board fitted at the top.

[0030] According to a further or other embodiment, a separate belt guide is provided for each pull belt.

[0031] In a further or alternative embodiment, the first branch extends from the branch point towards the rear side of the vertical sliding-door assembly, from a substantially vertically oriented portion, over an obliquely oriented portion, to a substantially horizontally oriented portion, wherein the obliquely oriented portion of the first branch is preferably positioned at an angle between 35 and 55° relative to the substantially vertically oriented portion of the first branch. More preferably, the

obliquely oriented portion of the first branch is positioned at an angle between 40 and 50° relative to the substantially vertically oriented portion of the first branch. Even more preferably, the obliquely oriented portion of the first branch is positioned at an angle between 43 and 47° relative to the substantially vertically oriented portion of the first branch.

[0032] In a further or alternative embodiment, the second branch extends from the branch point towards the rear side of the vertical sliding-door assembly, over a substantially obliquely oriented portion, wherein the obliquely oriented portion of the second branch is preferably positioned at an angle between 50 and 80° relative to the substantially vertically oriented portion of the first branch. More preferably, the obliquely oriented portion of the second branch is positioned at an angle between 60 and 80° relative to the substantially vertically oriented portion of the first branch. Even more preferably, the obliquely oriented portion of the second branch is positioned at an angle between 70 and 80° relative to the substantially vertically oriented portion of the first branch.

[0033] In a further or alternative embodiment, the first branch extends above the second branch, and the substantially horizontally oriented portion of the first branch and the obliquely oriented portion of the second branch extend convergently from the front side to the rear side of the sliding-door assembly.

[0034] By virtue of this configuration of the branched segment, the door panels are translated away from the front plane and can be oriented face-to-face in the storage space.

[0035] In a further or alternative embodiment, the vertical sliding-door assembly comprises a primary and secondary motor, respectively configured for driving the primary and secondary pull belt, in particular the upward pull ends of the primary and secondary pull belt.

[0036] In a further or alternative embodiment, said primary and secondary motor are each provided with a wheel configured for rotationally raising and lowering the respective primary and secondary pull belts, wherein the primary and secondary motor are positioned such that the primary and secondary pull belts extend between the respective first and second belt guides and the primary and secondary motor at an angle between 75 and 90° relative to the substantially vertically oriented portion of the first branch. The wheel can possibly be dimensioned in such a way that relatively constant speeds of the pull belt are obtained under constant drive of the motor.

[0037] Furthermore, this positioning prevents the pull belts from being visible after the door panels have been fully raised. Moreover, this angle ensures that the pull belt of the secondary door panel does not impede the raising of the primary door panel when the latter is moved along the second branch. An additional advantage of this positioning is that, once the door panels have been raised beyond the branch point, the pull

belts no longer need to be guided along a belt guide, resulting in reduced friction and lower energy consumption.

[0038] In addition, the motors can, by virtue of their position in the upper space of a cabinet or other storage facility, be placed out of sight. These higher-positioned spaces, which are often difficult to access, are in this way efficiently used as storage space for the drive system.

[0039] In a further or alternative embodiment, the unbranched segment comprises a lower and an upper substantially vertical portion, wherein the lower portion is oriented more towards the front side of the sliding-door assembly than the upper portion, and wherein the upper and lower portion are connected by means of an S-shaped bend, wherein the S-shaped bend is positioned at a height located between the first primary carriage part and the second primary carriage part of the primary door panel in the lowered position.

[0040] In many cabinets, a fixed top panel is used as a shield for an overlying storage space. By virtue of the presence of the S-shaped bend, the door panels can be guided away from the front plane and raised behind this fixed panel into the storage space. The positioning of the S-shaped segment makes it possible for the guide means of the second primary carriage part to be located in the lower portion of the guide track, such that the lower side of the primary door panel is placed in the front plane. At the same time, the guide means of the first primary carriage part are located in the upper portion of the guide track, which runs further from the front plane. Since the first primary carriage part is of a hinging design, the upper side of the primary door panel can move inwardly into and out of the front plane.

[0041] In a further or alternative embodiment, the primary pull belt, in particular the attachment end of the primary pull belt, is bent at least between the primary door panel and the first primary carriage part, so as to pull the primary door panel from the pull end towards the first primary carriage part, in a hinging manner.

[0042] As a result, both the hinging of the primary door panel into and out of the front plane and the raising thereof can be driven by one and the same pulling force in the pull belt.

[0043] In a further or alternative embodiment, the primary pull belt extends at least from the first primary carriage part to the second primary carriage part.

[0044] In a further or alternative embodiment, the primary pull belt extends at least from the second primary carriage part to the primary belt guide.

[0045] When a pulling force is exerted on the pull belt, this will initially move the first primary carriage part towards the hinge piece. Once this movement is completed and the pull belt no longer has any slack, the pulling force is transmitted to the second belt guide. This pulling force then results in the raising of the primary door panel, wherein the second primary carriage part, upon reaching the branch point, is guided into the

second branch of the guide track.

[0046] In a further or alternative embodiment, the material of the guide track, preferably the material of the contact surface between the guide means and the guide track, has a minimum wear resistance. The wear resistance will possibly assume different parameters depending on the material. In the case of a plastic layer and/or coating in the profile, the wear resistance can be evaluated in accordance with ASTM G99. In a specific embodiment, the wear resistance of the plastic layer and/or coating was evaluated in accordance with ASTM G99 (CS-10 wheels, 1000 cycles, 1 kg load), wherein a mass loss of less than 10 mg was established. This minimum wear resistance guarantees a long service life of the guide track, even with frequent use of the vertical sliding-door assembly.

[0047] In a further or alternative embodiment, the first primary carriage part is provided with a spring mechanism that is preloaded to hinge the hinge piece of the first primary carriage part away. As an advantage, the door panel automatically assumes its closing position at rest. Optionally, this concerns a compression spring arranged between the first primary carriage part and the hinge piece. Optionally, the compression spring is located at a higher position than the hinge axis, suitably arranged to move the upper side of the door panel forwards and backwards. It is preferably a conical compression spring. When compressed, conical compression springs take up less space. The door panel can thus be stored more compactly. Alternatively, the spring mechanism comprises a torsion spring, a leaf spring or a tension spring.

[0048] The various embodiments as described herein allow the lowering of the door panels to be carried out without exerting a pushing force on the panels. The lowering of the door panels can occur solely under the influence of gravity.

[0049] According to some embodiments, the various door panels are each provided with only one pull belt. According to some other embodiments, the various door panels are each provided with two pull belts. Preferably, said two pull belts are positioned mirror-symmetrically with respect to two opposite longitudinal sides on the rear side of the panels.

[0050] In a further or alternative embodiment, the sliding-door assembly has a design wherein moving the primary door panel out of the front plane requires a first tensile force in the pull belt, and wherein raising the primary door panel requires a second tensile force in the pull belt, which second tensile force is greater than the first tensile force. In this way, the door panel is automatically moved out of the front plane first, and only subsequently raised.

[0051] In one embodiment, the guide track is provided directly in a side wall of a cabinet, preferably at the front side of the side wall. In this way, both the primary and the secondary door panel can effectively close off and open the storage volume. The guide track

can thereby be realised as a rail manufactured from metal, for example aluminium, or plastic, which is recessed in a cabinet frame. According to some embodiments, the guide track is provided at one or more of its edges with a separate lining material, which lining material satisfies the aforementioned minimum wear resistance. According to some embodiments, the material of the side walls themselves satisfies the aforementioned minimum wear resistance.

[0052] Preferably, the guide track concerns a guide groove with an almost constant width and depth over the entire length. In a specific embodiment, the guide track is milled in the side wall, so that the guide means can move in the milled groove.

[0053] Preferably, the vertical sliding door is fully automatically controlled. This embodiment comprises a motor that is responsible for raising and lowering the pull end of the pull belt, as well as a control unit for the motor. The motor is positioned such that after raising, the pull belts are not visible, whereby the aesthetic appearance of the cabinet is maintained.

[0054] One embodiment provides for the presence of multiple secondary door panels, which are arranged one below the other in the lowered, closed position. The number of secondary door panels depends on the dimensions of the cabinet and the door panels. For example, multiple smaller secondary door panels or a smaller number of larger panels can be deployed, whereby the system is flexibly applicable for a wide variety of applications.

[0055] In a second aspect, the invention concerns a method for installing a vertical sliding-door assembly in a cabinet, comprising the steps of: providing a guide track in a side wall of a cabinet, wherein the guide track comprises a first, substantially vertical, portion, and a second, branched, portion; providing a drive at the rear of a cabinet, at the level of the second portion of the guide track; guidably providing a door panel in the guide track by means of guide means; suspending a door panel from a first end of a pull belt, wherein the pull belt exerts a pulling force on a lower side of the door panel, and connecting a second end of the pull belt to the drive.

[0056] The various embodiments from the first aspect are, insofar as compatible, also embodiments of the second aspect.

[0057] By means of this method, a vertical sliding-door assembly can be provided in a wide variety of cabinets, taking up a minimum depth of the cabinet.

[0058] In a third aspect, the invention concerns a method for manufacturing or installing a vertical sliding-door assembly (claim 19) according to the first aspect, comprising the steps of: providing a guide track in a side wall of a cabinet, wherein the guide track comprises an unbranched segment and a branched segment, which branched segment comprises a first and a second branch that meet at a branch point; mounting a primary door panel by means of a primary movable

carriage with primary guide means, wherein the primary door panel is hingedly coupled to the primary movable carriage; mounting a secondary door panel by means of a secondary movable carriage with secondary guide means, wherein the secondary door panel is non-hingedly coupled to the secondary movable carriage; providing a primary and secondary motor in a storage space of the cabinet; connecting an upward pull end of a primary pull belt to the primary motor and an attachment end of the primary pull belt to the primary door panel; and connecting an upward pull end of a secondary pull belt to the secondary motor and an attachment end of the secondary pull belt to the secondary door panel, wherein the primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track.

[0059] The various embodiments from the first aspect are, insofar as compatible, also embodiments of the third aspect.

[0060] This method provides a systematic and reliable installation method that ensures correct assembly and operation of the vertical sliding-door assembly.

[0061] In what follows, the invention is described by means of non-limiting examples that illustrate the invention and are neither intended nor to be interpreted as limiting the scope of the invention.

EXAMPLES

[0062] Fig. 1 and Fig. 2 show, respectively, a schematic rear view and side view of a vertical sliding-door assembly, comprising a primary door panel (2) and a secondary door panel (1), each of which is movable between a lowered, closed position (see also Fig. 3) and a raised, open position. Above the door panels, a fixed upper door panel (3) is provided, behind which a storage space is located.

[0063] The primary door panel (2) is positioned in the lowered, closed position above the secondary door panel (1), wherein all panels are oriented in the same front plane. Both door panels are suspended from respectively a primary (6) and a secondary pull belt (5), each with an attachment end that engages at a pull point (7,8) on the lower side of the respective door panel, and an upward pull end that is connected to a motor (14,13). These primary and secondary motors are accommodated in the storage space behind the upper door panel (3) and are configured for raising and lowering the respective door panels.

[0064] The primary door panel (2) is hingedly coupled to a primary movable carriage (16), consisting of a first primary carriage part (16') and a second primary carriage part (16''). The first primary carriage part (16') is a hinging carriage part, attached substantially at the top of the rear side of the primary door panel, and provided with a primary guide means (12). The second primary carriage part (16'') is a non-hinging carriage

part, attached substantially at the bottom, and provided with a guide means (11).

[0065] The secondary door panel (1) is non-hingedly coupled to a secondary movable carriage (28), which consists of a first and second secondary carriage part (28', 28''), provided with guide means (9, 10) respectively, and attached to the upper side and lower side of the secondary door panel.

[0066] Said guide means (9, 10, 11, 12) are configured for guiding along a common guide track, consisting of a substantially vertical unbranched segment (18) and a branched segment, beginning at a branch point (20), which are provided in or on a side wall (4) of a cabinet. The guide track comprises a first branch (22) and a second branch (21), which extend rearwardly from the branch point into the storage space, and are configured for storing the door panels face-to-face.

[0067] The unbranched segment (18) of the guide track runs from the lower side of the side wall (4) to the level of the upper side of the primary door panel (2) and comprises an S-shaped bend (19), positioned between the guide means (11, 12) in the lowered position. As a result, the lower guide means (11) is situated in the front plane, while the upper guide means (12) can hinge away from and towards the front plane. Fig. 3 shows this arrangement schematically.

[0068] The branch point (20) is situated at the bottom of the storage space, slightly above the primary door panel (2). There, the guide track splits into a first branch (22), which runs rearwardly and horizontally via a lower (22') and upper deflection (22''), and a second branch (21), which runs obliquely rearwardly upwards. The first branch (22) is positioned above the second branch (21), and the portions converge from the front side to the rear side of the sliding-door assembly.

[0069] The first and second branch of the guide track are designed such that the respective upper and lower sides of the door panel are guided in separate portions of the guide track. By virtue of the configuration whereby the guide means of the first carriage part are guided in the first branch (22) and those of the second carriage part in the second branch (21), the door panels are reoriented upon raising into a face-to-face position in the storage space.

[0070] Belt guides (17) are provided near the branch point (20), at a comparable height and depth, and guide the pull belts (5, 6) at an angle from the vertical segment to the motors (13, 14). This angled guiding ensures that the pull belt exerts a pulling force at a slight angle relative to the vertical plane. This causes a tilting of the door panels whereby the upper side moves slightly forward, and the lower side moves rearward (see arrows 24, 25 in Fig. 5).

[0071] The motor (14) pulls the first primary carriage part (16') upwards via the pull belt (6), by means of which the primary door panel (2) can hinge in and out of the front plane, indicated in Fig. 3 by arrow (23). The hinging movement makes it possible to first raise the

panel vertically, and subsequently to store it behind the upper door panel (3) via the bend (19) and the branched segments (21, 22).

[0072] After raising the primary door panel (2), the secondary door panel (1) is raised in a comparable manner along the same path (see Fig. 6, 7, 8). Since the secondary door panel (1) is non-hingedly mounted, it follows the guide track in a fixed configuration. When both panels are situated in the storage space, they are stacked face-to-face (see Fig. 9).

[0073] The second branch (21) runs obliquely upwards in such a manner that the primary door panel (2), when fully pulled rearwards (see Fig. 8), is positioned above the pull belt (5) of the secondary door panel (1). As a result, this pull belt does not impede the raising.

List of reference numerals:

[0074]

- | | | |
|----------|---|----|
| (1) - | Secondary door panel | |
| (2) - | Primary door panel | |
| (3) - | Upper (fixed) door panel / cover of storage space | 25 |
| (4) - | Upright side wall / side wall of the cabinet | |
| (5) - | Secondary pull belt | |
| (6) - | Primary pull belt | |
| (7) - | Pull point of secondary door panel | |
| (8) - | Pull point of primary door panel | 30 |
| (9) - | Lower guide means of secondary door panel | |
| (10) - | Upper guide means of secondary door panel | |
| (11) - | Lower guide means of primary door panel | |
| (12) - | Upper guide means of primary door panel | |
| (13) - | Secondary motor | 35 |
| (14) - | Primary motor | |
| (16) - | Primary movable carriage | |
| (16') - | First primary carriage part (hinging) | |
| (16'') - | Second primary carriage part (non-hinging) | |
| (17) - | Belt guide(s) | 40 |
| (18) - | Unbranched segment of the guide track | |
| (19) - | S-shaped bend / S-segment | |
| (20) - | Branch point of the guide track | |
| (21) - | Second branch of the guide track | |
| (22) - | First branch of the guide track | 45 |
| (22') - | Lower deflection of the first branch | |
| (22'') - | Upper deflection of the first branch | |
| (23) - | Arrow indication for hinging movement of primary door panel | |
| (24) - | Arrow indication for forward force on upper side of door panel | 50 |
| (25) - | Arrow indication for rearward force on lower side of door panel | |
| (26) - | Arrow indication for further rearward movement of lower side | 55 |

Claims

1. A vertical sliding-door assembly comprising a primary door panel and one or more secondary door panels, which primary and secondary door panel are configured for moving between a raised, open position and a lowered, closed position, wherein the primary door panel in the lowered, closed position is positioned above the secondary door panel in a front plane of the sliding-door assembly,

wherein said primary door panel is hingedly coupled to a primary movable carriage with primary guide means,

and wherein said one or more secondary door panels are non-hingedly coupled to a secondary movable carriage with secondary guide means,

which primary and secondary door panel are each suspended from respectively a primary and secondary pull belt, each with an attachment end and an upward pull end, which pull belts are configured for raising and lowering respectively the primary and secondary door panel,

characterised in that said primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track.

2. The vertical sliding-door assembly according to claim 1, wherein the vertical sliding-door assembly comprises a storage space, and wherein the guide track comprises (i) an unbranched segment and (ii) a branched segment, which unbranched segment extends substantially vertically along the front side of the vertical sliding-door assembly, and which branched segment is coupled to the unbranched segment at the level of a branch point, wherein the branched segment comprises a first and a second branch, which first and second branch meet in said branch point, and wherein the branched segment is positioned in said storage space and is configured for storing the primary and secondary door panels face-to-face in said storage space.

3. The vertical sliding-door assembly according to claim 1 or 2, wherein the primary movable carriage comprises a first primary carriage part and a second primary carriage part, wherein the first primary carriage part is a hinging carriage part, wherein the second primary carriage part is a non-hinging carriage part, and wherein the first primary carriage part is attached substantially at the top of the rear side of the primary door panel and the second primary carriage part is attached substantially at the bottom of the rear side of the primary door panel.

4. The vertical sliding-door assembly according to any one of the preceding claims 1-3, wherein the secondary movable carriage comprises a first secondary carriage part and a second secondary carriage part, wherein the first and the second secondary carriage part are non-hinging carriage parts, and wherein the first secondary carriage part is attached substantially at the top of the rear side of the secondary door panel and the second secondary carriage part is attached substantially at the bottom of the rear side of the secondary door panel. 5
5. The vertical sliding-door assembly according to claim 3 or 4, wherein the guide means of the first primary and secondary carriage part are configured for guiding the primary and secondary door panel, respectively, along the first branch, and wherein the guide means of the second primary and secondary carriage part are configured for guiding the primary and secondary door panel, respectively, along the second branch. 10
6. The vertical sliding-door assembly according to any one of the preceding claims 1-5, wherein the respective attachment ends of the primary and secondary pull belt are configured for exerting a pulling force on the lower side of the primary and secondary door panel, respectively. 20
7. The vertical sliding-door assembly according to any one of the preceding claims 2-6, wherein the vertical sliding-door assembly comprises a primary and secondary belt guide, which belt guides are positioned at a height and depth in the sliding-door assembly that deviates by at most 10 centimetres from the height and depth of the branch point in the sliding-door assembly, and which primary and secondary belt guide are configured for guiding the primary and secondary pull belt, respectively. 25
8. The vertical sliding-door assembly according to any one of the preceding claims 2-7, wherein the first branch extends from the branch point towards the rear side of the vertical sliding-door assembly, from a substantially vertically oriented portion, over an obliquely oriented portion, to a substantially horizontally oriented portion, wherein the obliquely oriented portion of the first branch is preferably positioned at an angle between 35 and 55° relative to the substantially vertically oriented portion of the first branch. 30
9. The vertical sliding-door assembly according to any one of the preceding claims 2-8, wherein the second branch extends from the branch point towards the rear side of the vertical sliding-door assembly, over a substantially obliquely oriented portion, wherein the obliquely oriented portion of the second branch is preferably positioned at an angle between 50 and 80° relative to the substantially vertically oriented portion of the first branch. 35
10. The vertical sliding-door assembly according to claim 8 or 9, wherein the first branch extends above the second branch, and wherein the substantially horizontally oriented portion of the first branch and the obliquely oriented portion of the second branch extend convergingly from the front side to the rear side of the sliding-door assembly. 40
11. The vertical sliding-door assembly according to any one of the preceding claims 1-10, wherein the vertical sliding-door assembly comprises a primary and secondary motor, configured respectively for driving the primary and secondary pull belt, in particular the upward pull ends of the primary and secondary pull belt. 45
12. The vertical sliding-door assembly according to claim 11, wherein said primary and secondary motor are each provided with a wheel configured for rotationally raising and lowering the respective primary and secondary pull belts, wherein the primary and secondary motor are positioned such that the primary and secondary pull belts extend between the respective first and second belt guides and the primary and secondary motor at an angle between 75 and 90° relative to the substantially vertically oriented portion of the first branch. 50
13. The vertical sliding-door assembly according to any one of claims 2-12, wherein the unbranched segment comprises a lower and an upper substantially vertical portion, wherein the lower portion is oriented more towards the front side of the sliding-door assembly than the upper portion, and wherein the upper and lower portion are connected by means of an S-shaped bend, wherein the S-shaped bend is positioned at a height located between the first primary carriage part and the second primary carriage part of the primary door panel in the lowered position. 55
14. A method for opening and/or closing a vertical sliding-door assembly according to any one of the preceding claims 1-13, comprising the steps of:
 - activating a primary motor for raising a primary pull belt, whereby a primary door panel is raised;
 - causing the primary door panel to hinge relative to a first primary carriage part before fully raising the primary door panel;
 - guiding an upper side of the primary door panel along a first branch of a branched segment

of a guide track and a lower side of the primary door panel along a second branch of the branched segment;
 activating a secondary motor for raising a secondary pull belt, whereby a secondary door panel is raised; and
 guiding an upper side of the secondary door panel along the first branch and a lower side of the secondary door panel along the second branch,
 wherein the primary and secondary door panels are oriented face-to-face in a storage space.

15. A method for manufacturing or installing a vertical sliding-door assembly according to any one of the preceding claims 1-13, comprising the steps of:

providing a guide track in a side wall of a cabinet, wherein the guide track comprises an unbranched segment and a branched segment, which branched segment comprises a first and a second branch that meet at a branch point;
 mounting a primary door panel by means of a primary movable carriage with primary guide means, wherein the primary door panel is hingedly coupled to the primary movable carriage;
 mounting a secondary door panel by means of a secondary movable carriage with secondary guide means, wherein the secondary door panel is non-hingedly coupled to the secondary movable carriage;
 providing a primary and secondary motor in a storage space of the cabinet;
 connecting an upward pull end of a primary pull belt to the primary motor and an attachment end of the primary pull belt to the primary door panel; and
 connecting an upward pull end of a secondary pull belt to the secondary motor and an attachment end of the secondary pull belt to the secondary door panel,
 wherein the primary and secondary guide means are configured for guiding the respective primary and secondary door panels upwards and downwards along one and the same guide track.

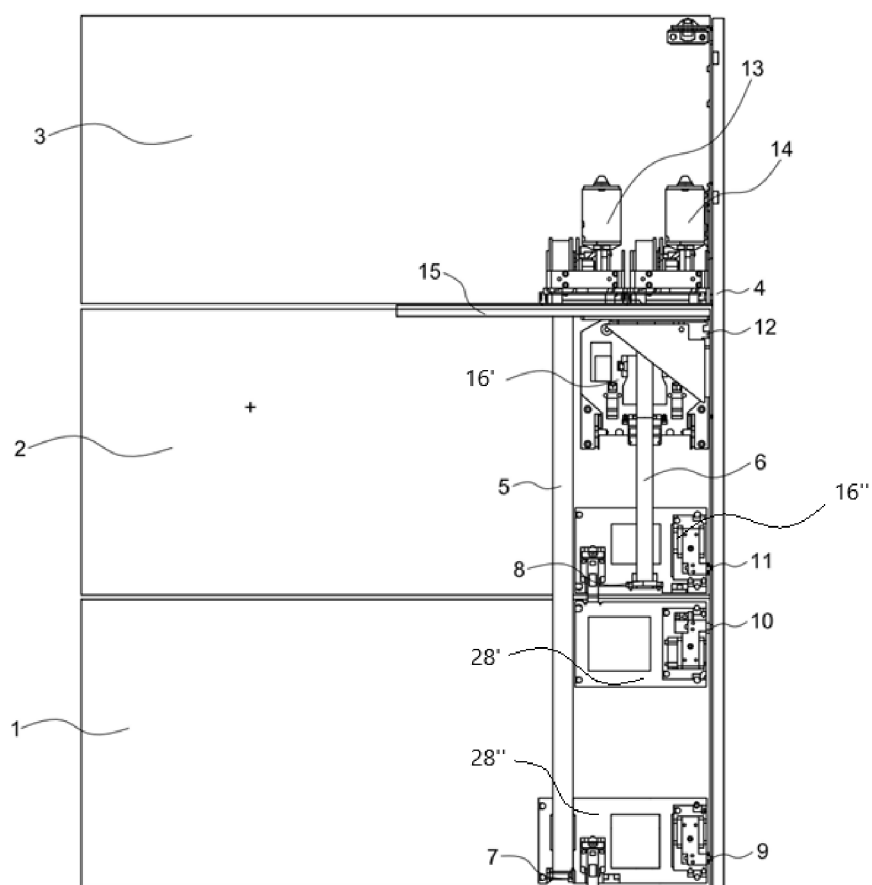


Fig. 1

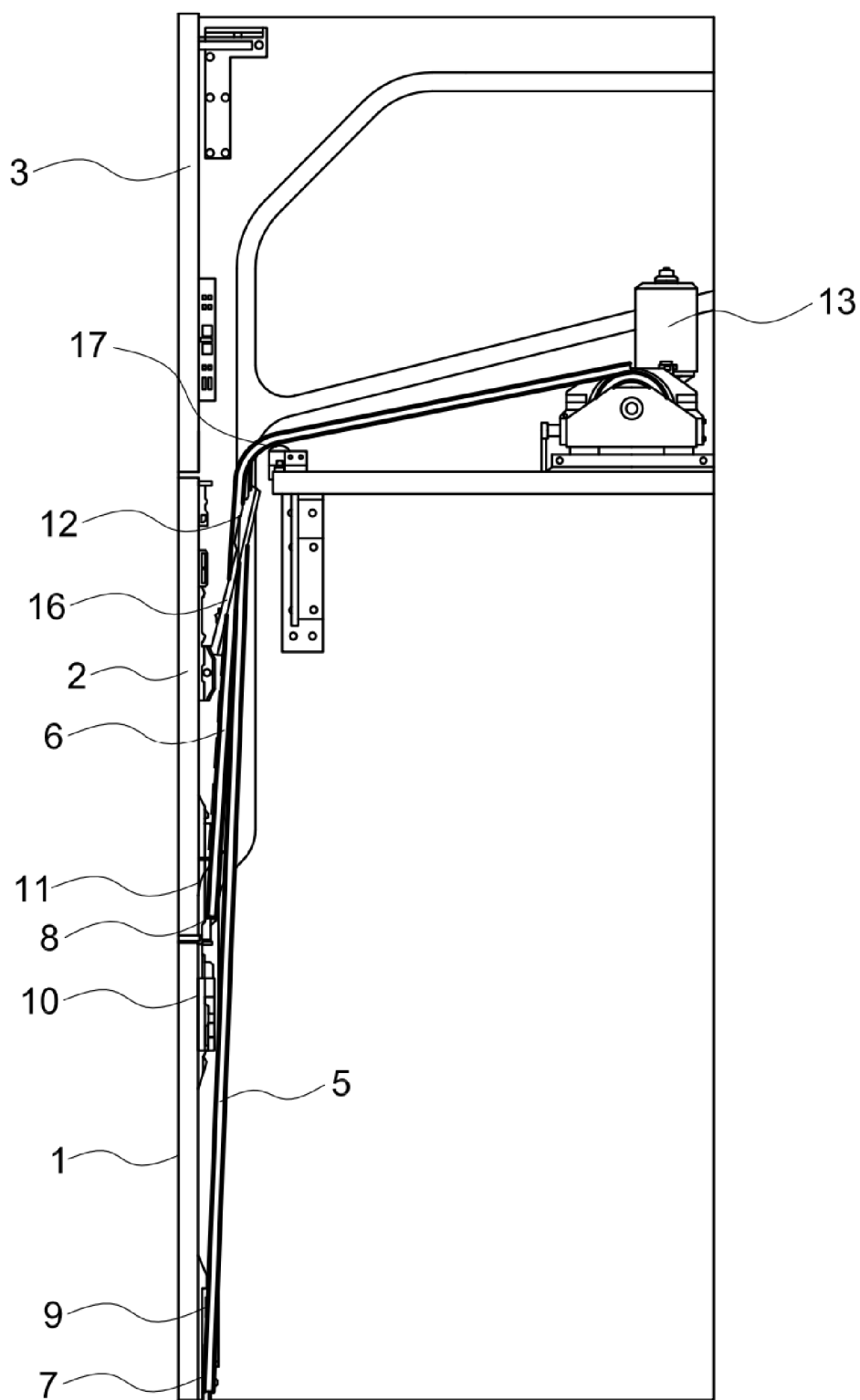


Fig. 2

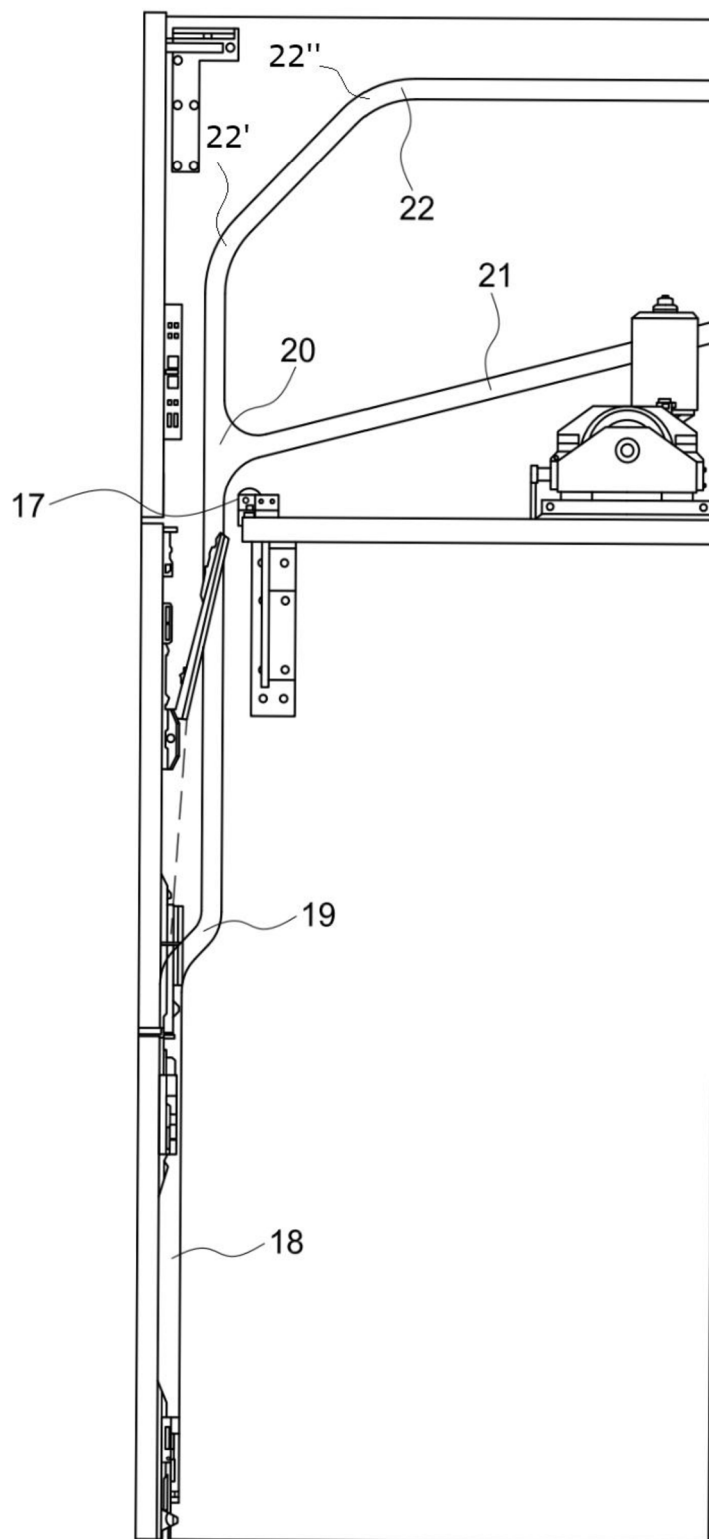


Fig. 3

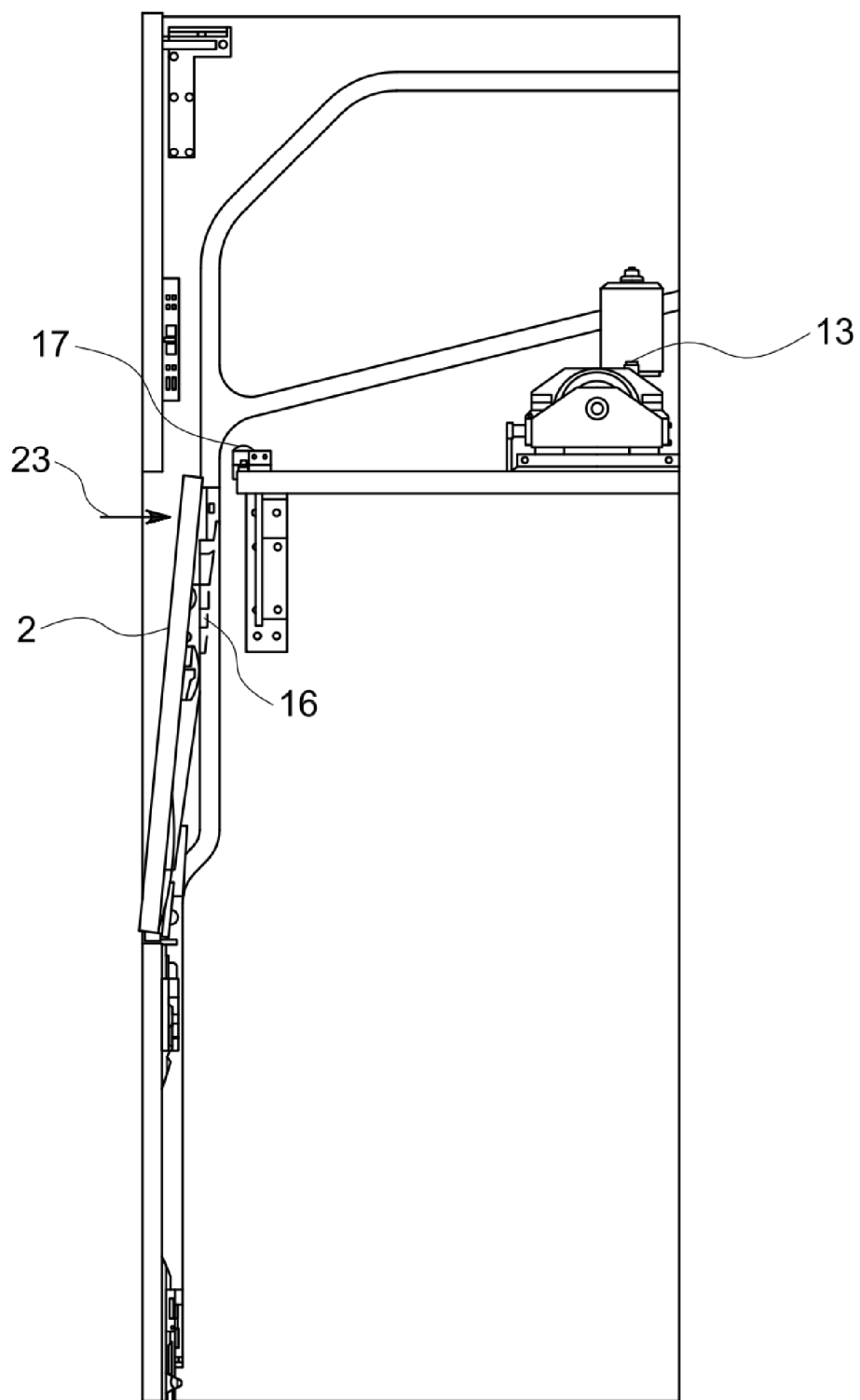


Fig. 4

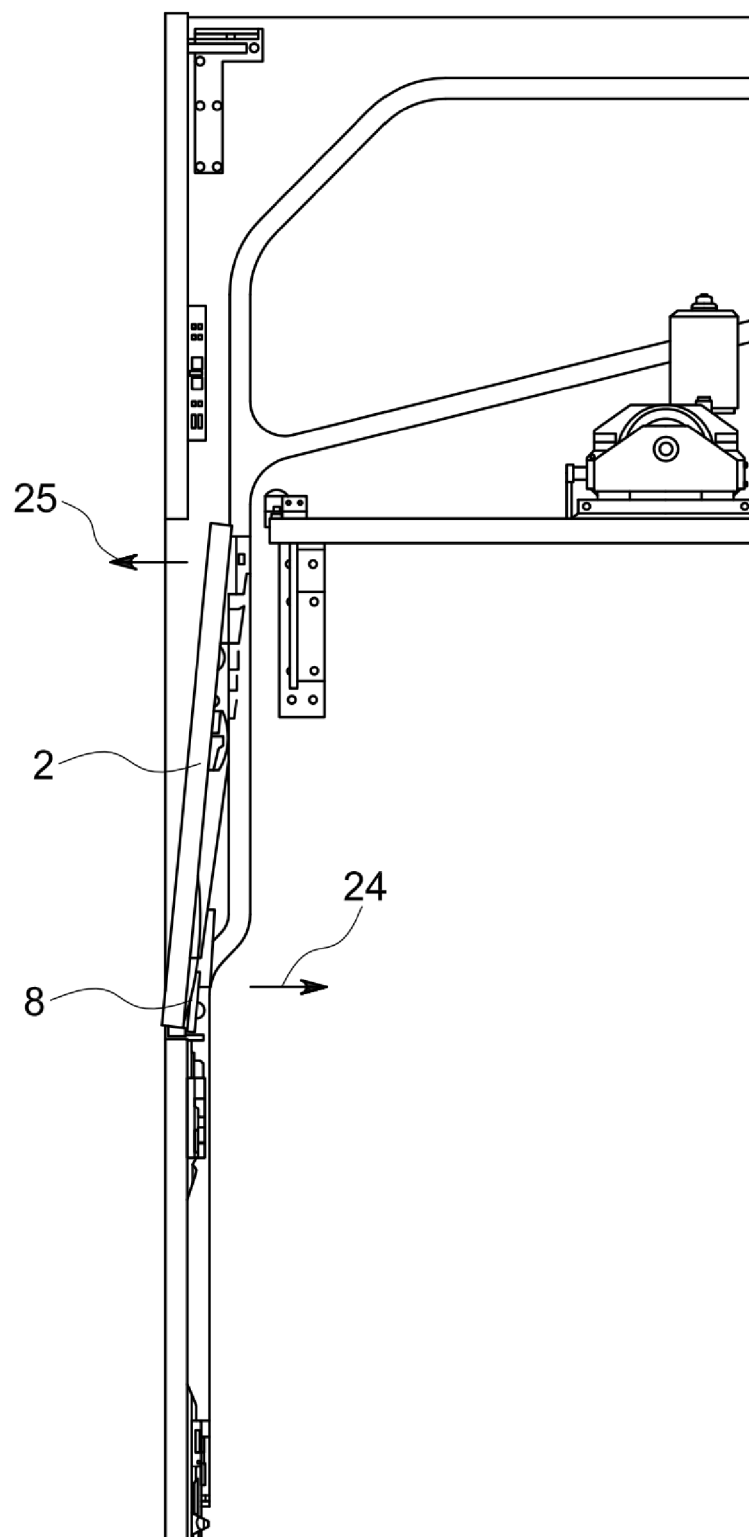


Fig. 5

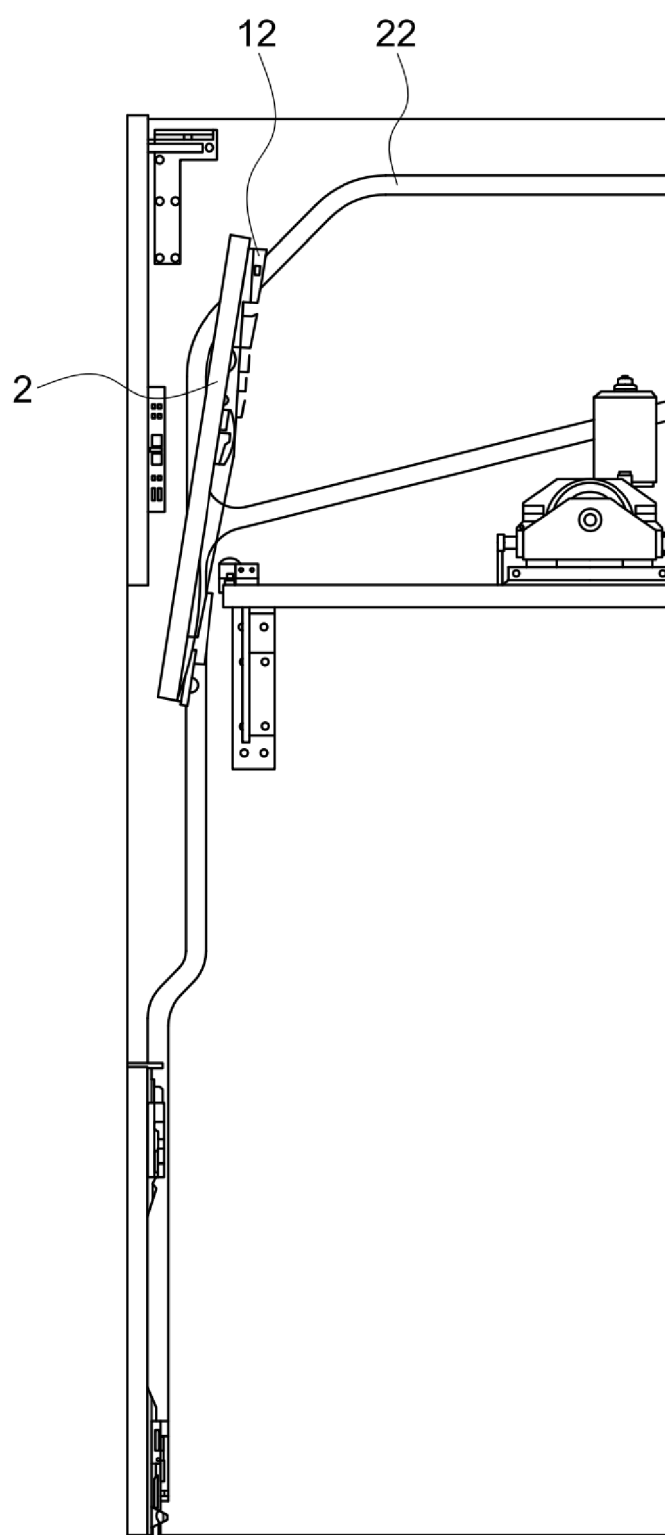


Fig. 6

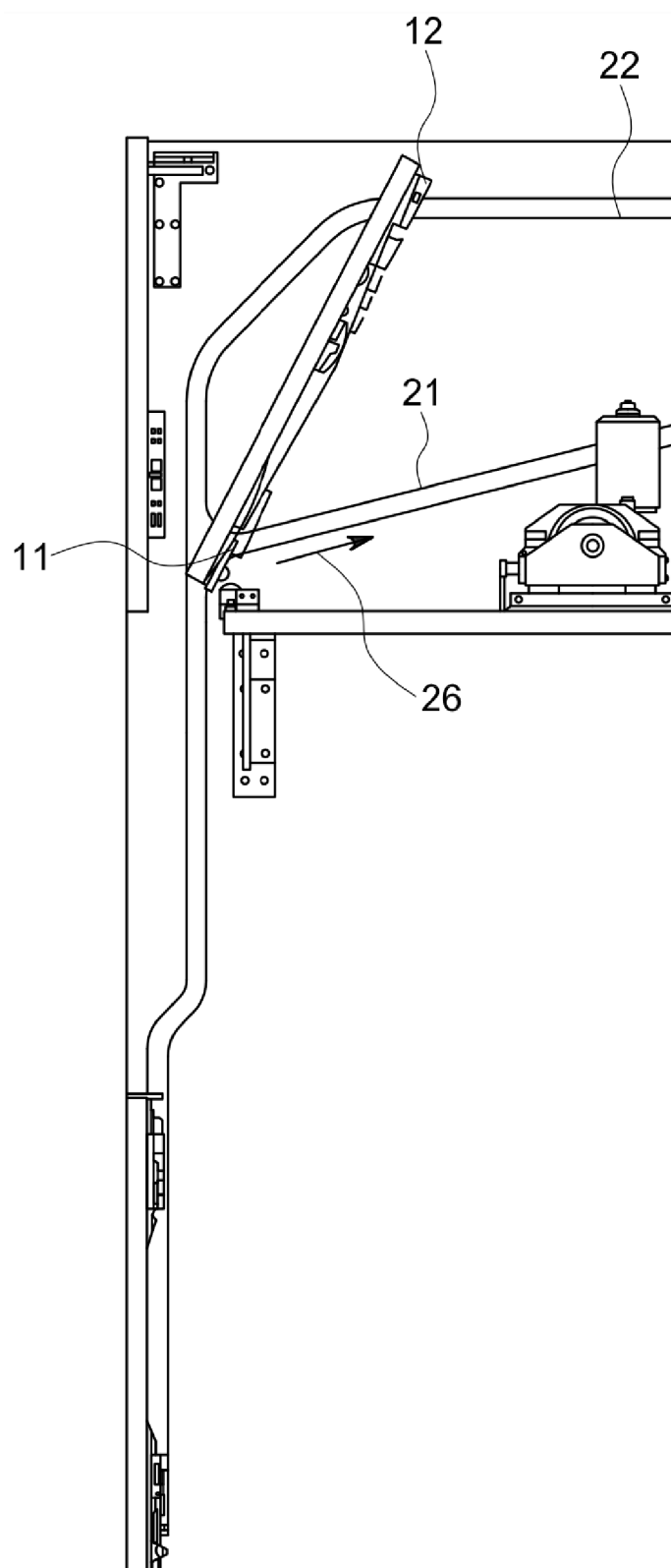


Fig. 7

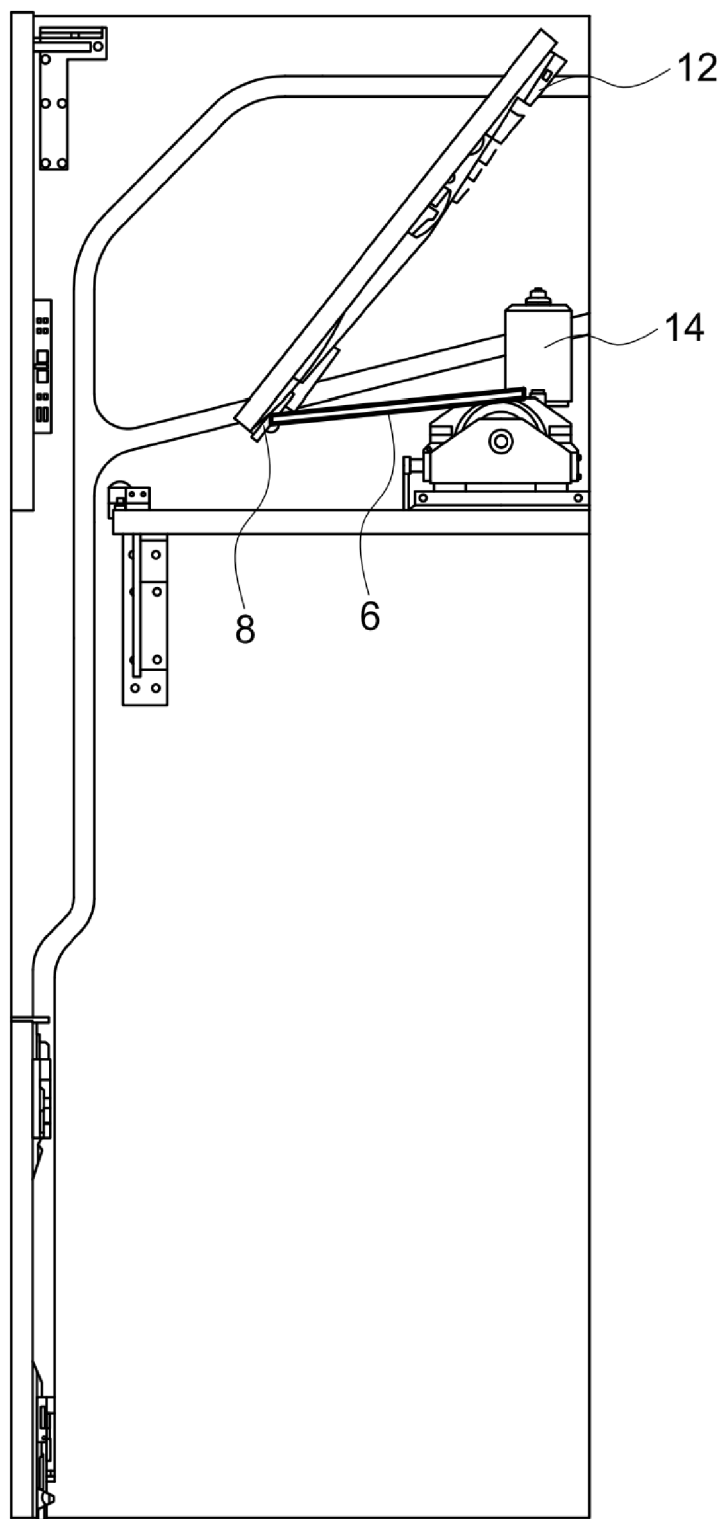


Fig. 8

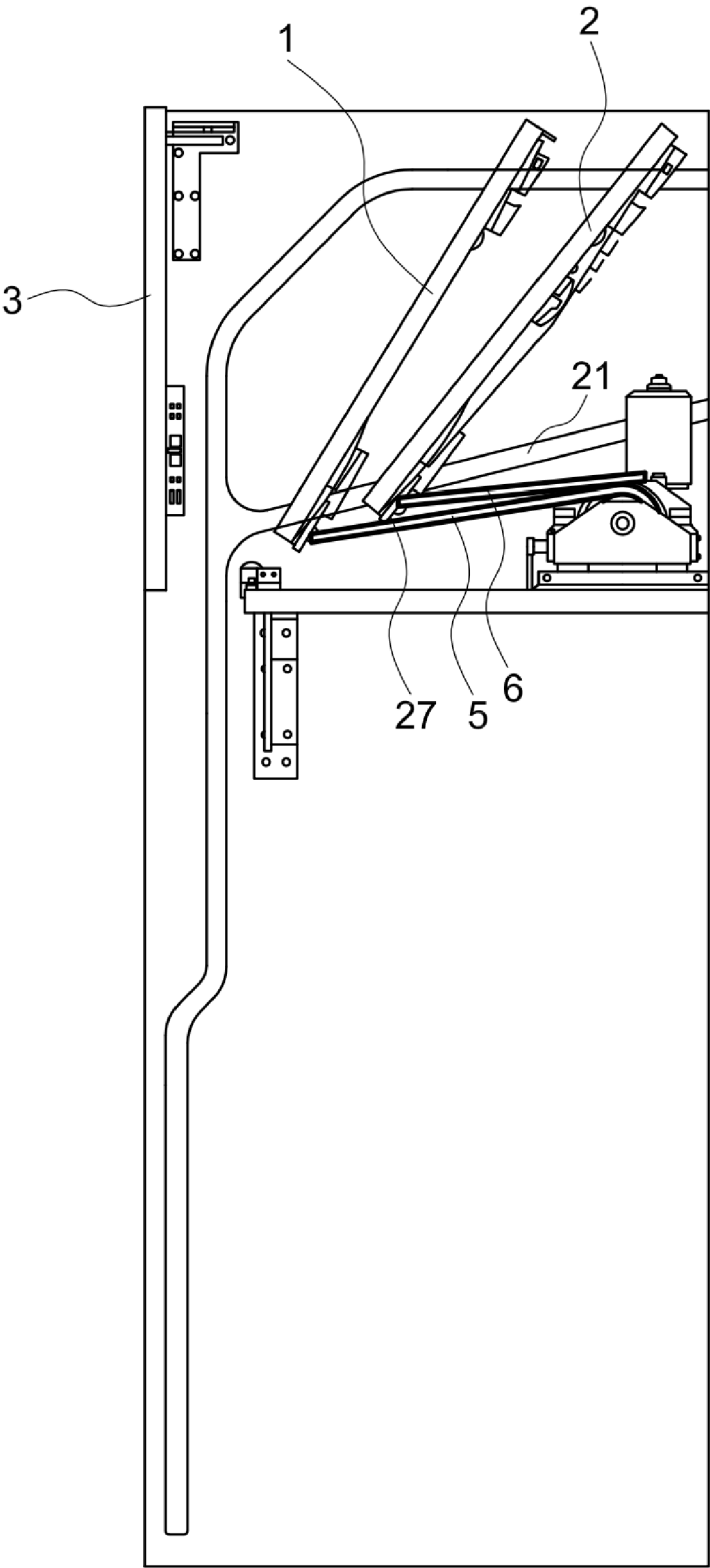


Fig. 9



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Application Number

EP 26 17 3002

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		10 August 2026	Berote, Marc
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