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(71) Applicant: **Gomis Rabassa, Juan Ramón**
Piatini - Santo Domingo (DO)

(72) Inventor: **Gomis Rabassa, Juan Ramón**
Piatini - Santo Domingo (DO)

(74) Representative: **Sugrañes Patentes y Marcas**
Calle Provenza 304
08008 Barcelona (ES)

(54) **A SYSTEM FOR TEMPORARILY COUPLING A LANDING DOOR TO A CAR DOOR IN AN ELEVATOR INSTALLATION WITH SLIDING DOORS**

(57) A system (100) for temporarily coupling a car door (1) to a landing door (30) of an elevator installation with sliding doors, the system (100) comprising a male device (101) attached to a leaf (2) of the car door (1) and having a male group (4) with a front vane (4a) and a rear vane (4b) and a female device (102) with a receiving group (24) that has a first and second support element (22, 23) and that can be fastened to a leaf (32) of the landing door (2), in which the male group (4) does not have the ability to expand between the first and second support elements (22, 23) of the female device (102), while the first and second support elements (22, 33) of the female device (102) can be moved, being able to adopt several relative positions, at least one being a standby position a), in which a suitable distance is determined therebetween so that the male group (4) moves or is arranged with a space between said first and second support elements (22, 23); and another position is an operating position b), in which, given the movement of said first and second support elements (22, 23) towards one another, a distance is determined therebetween which reduces the space with the male group (4) or which is enough to adjust or hold between them the said male group (4).

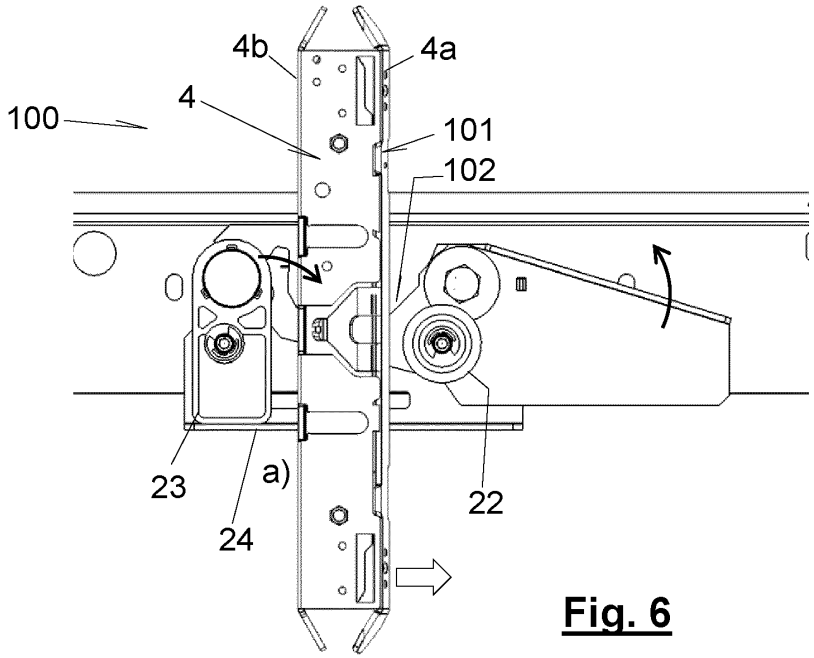

Fig. 6

EP 3 556 708 A1

Description

Technical field of the invention

[0001] The invention relates to a system for temporarily coupling a landing door to a car door in an elevator installation with sliding doors. The system is of the type that comprises a male device attached to a car door leaf and a female device attached to a landing door leaf, both prepared to be coupled together when the car stops at the level of the landing and the car doors are actuated in the opening or closing direction thereof. This coupling enables the movement of the car door to be transmitted to the landing door for the joint sliding thereof.

Background of the invention

[0002] The known systems for temporarily coupling a landing door to a car door in an elevator installation with sliding doors comprise two parts: a male part that travels with a leaf of the car door, and a female part that travels with a leaf of the landing door. These male and female parts are prepared to be mechanically coupled together when the car stops at the level of the landing and the car doors are actuated. This coupling enables both the car doors and the landing doors to move together during the opening and closing operations.

[0003] An elevator installation often comprises a car that travels through the well of the installation and several landings at different levels. The implementation of the aforementioned systems requires equipping the car with the male device and equipping each landing with its own female device. It is important that these devices should only be coupled when the car is conveniently stopped at the level of a landing and the car door is operated to be opened and closed. Therefore, during the transit of the car through the well of the elevator installation, there should not be any interference or mechanical coupling between the male device that travels with the car and the female devices attached to the doors of the landings of the installation through which the car can transit without stopping.

[0004] To reach this objective, many proposals are known based on providing the male device of a male group with two contact surfaces, conventionally formed on elongated, vertically orientated elements that are known in the art as vanes; and providing the female devices with a receiving group that assembles two stops that are separated from each other by a horizontal distance greater than that which separates the vanes. These male and female devices are arranged in the car and in the landings such that during the transit of the car through the landing, the set of vanes can pass between the stops unhindered; and such that when a car stops at the level of a landing, the vanes remain arranged between the aforementioned stops.

[0005] As such, under these circumstances, in other words, with the car stopped at the level of a landing, coupling with the male device occurs and the stops of the female device provide the male group with a mechanism that ensures the expansion thereof, by means of separating the vanes from each other, when the leaf of the car door leaves the position that the closed car door had. The expansion of the male group, due to separation of the vanes, causes the male group to remain locked or fitted by pressure between the stops of the female device, thereby producing coupling that will allow the car and landing doors to move together.

[0006] Proposals of this type are described, for example, in the patent documents EP 0839753; EP1497217; and EP1524233.

[0007] The mechanism that ensures the separation of the vanes, in the different known versions thereof, requires articulated levers, elastic means and other movable components subjected to many work cycles throughout the useful life of the installation. This results in misalignments and therefore requires relatively intensive maintenance of the installation, which leads to operating costs. Improper maintenance leads to installation failures in the long term that are caused by breakage, misalignments or wear of non-replaceable components over time.

[0008] An objective of the present invention is a system that resolves these drawbacks. Specifically, an objective of the invention is a system that is simpler in terms of construction and subject to less wear, which therefore leads to lower production and operating costs.

[0009] The known systems, in addition to carrying out the main function of coupling the car and landing doors, sometimes provide or complement other functions, especially safety functions, for example, preventing car or landing doors from opening when coupling of the male device and the female device does not occur.

[0010] This fact has caused the known entraining devices to be, if possible, more complex because in addition to having to be equipped with the mechanism that ensures the expansion of the male group, they must also incorporate other mechanisms that lock and unlock the movement of the doors. Similarly, this fact has also caused the coupling devices attached to the landing doors to be more mechanically complex.

[0011] Another objective of the invention is that the greater simplicity of the coupling system does not impede the integration thereof with other mechanisms of the installation, such as safety mechanisms that ensure the locking and unlocking of the movement of the doors when the proper safety conditions are provided.

[0012] It is also desirable that there are no gaps between the start of the movement of the leaf or leaves of the car door and of the leaf or leaves of the landing door during the opening operation. Sometimes the mechanism that ensures the expansion of the male group is activated when the leaf of the associated door starts to move in the opening direction of the door, which means that the true coupling between the male device and the female device occurs moments after the leaf of the car

door has begun to move.

Description of the invention

[0013] The system proposed by the present invention combines in a known manner a male device, which is located between a car door actuator and the leaf of the car door and has a male group with a forward vane and a rear vane, and a female device, which has a receiving group with a first and second support element and can be fastened to the leaf of the landing door, such that the male group of the male device can transit or remain arranged with space between the first support element and a second support element when the car passes through the landing without stopping or when the car stops at the level of the landing, respectively, the car and landing doors adopting the closed position thereof.

[0014] Advantageously, the system of the invention does not necessarily have to expand the male group in each door opening operation and it bases the coupling on moving the support elements of the female group in order to hold between them or adjust the aforementioned male group. The active part of the coupling is moved to the landing, the female devices of which are subject to a very low number of work cycles since they only operate when the car stops at the corresponding landing.

[0015] For this reason, while in the system according to the invention the male group does not have the ability to expand between the first and second support elements of the female device, the first and second support elements of said female device are movable, being able to adopt several relative positions, at least one being a standby position a), in which a suitable distance is determined therebetween so that the male group moves or is arranged with a space between said first and second support elements; and another position is an operating position b), in which, given the movement towards one another, a distance is determined therebetween which reduces the space with the male group or which is enough to hold or adjust them together to said male group for coupling between the male device and the female device.

[0016] Furthermore, the system is prepared so that the change between the standby position a) and the operating position b) occurs, the male group being arranged between the first and second support elements, when said male group is moved by the actuator in the opening direction of the car door and applies a pushing force against the first support element.

[0017] In one embodiment, the male group is assembled on a support joined to the actuator and coupled with a certain amount of play between a first and second end position A) and B) to a base fastened to the leaf of the car door, being able to adjust the assembly of the male device in the car in a way that the support adopts the first end position A) when the door is closed, such that when moving the actuator in the direction that ensures the opening of the car door in a first phase of said opening operation the support will move with respect to the base until the support adopts the second end position B) thereof, and in a second phase of the opening operation by stopping of the support against the base, the first will entrain the second with movement, thereby moving the leaf of the car door.

[0018] As described in greater detail below, a gap between the start of the movement of the leaves of the car and landing door is thus avoided, since these doors will not start to move until the male group is uncoupled between the first and second contact elements of the receiving group of the female device.

[0019] According to a constructive manner of interest, the support of the male group is assembled on the base in a movable way but guided by means of a set of pins and sliders, the respective first and second end positions A), B) of the support with respect to the base being determined by stops.

[0020] It is envisaged that the stops are formed by the ends of the sliders, but there are other possible solutions for determining the course of the support with respect to the base.

[0021] In a variant of interest, the male device is prepared to actuate interlocking means of the car door in a closed door position and enable the movement of the leaf of the car door only when the coupling between the male group and the support elements of the receiving group is satisfactory.

[0022] For this reason, in one embodiment the forward vane is movable with respect to the support and towards the rear vane; and the base is equipped with movable interlocking means configured to cooperate with a fixed element of the car to prevent the movement of said base, and therefore that of the leaf of the door, at the start of an opening operation of the door, these interlocking means being actuated by the movement of the forward vane in the direction towards the rear vane.

[0023] The interlocking means can comprise a hook articulated to the base having a cam surface configured to receive the support and push of a sensing element connected to the forward vane when the support is in the second end position B) thereof with respect to the base. In this position, the movement of the forward vane will be transmitted to the articulated hook.

[0024] Several options are possible so that the movement of the forward vane is controlled.

[0025] Thus, in one embodiment the forward vane is rotatable or foldable around a longitudinal axis but adopts a standby position by default which is essentially normal to the plane of the leaf and from which it can rotate towards the rear vane by loading an elastic means.

[0026] This elastic means tends to arrange the forward vane in the position thereof by default. The elastic means can be a component that connects a fixed part with the forward vane, such as a spring, to several of these, or a part of material with flexible properties.

[0027] As explained below, the movement of the forward vane will be ensured by the reaction force that the first support element of the receiving group of the female

device will exert on this forward vane when the male group pushes it to start the joint movement of the leaves of the car and landing door.

[0028] With regard to this female device, in one embodiment the first support element of the receiving group adopts the standby position a) by default, either due to the effect of gravity or by other means, while the second support element is turned by a force that tends to arrange it in the operating position b), having, nevertheless, a contact surface aimed to cooperate with a fixed component of the landing such that when the landing door is closed, this fixed component of the landing forces the second support element to adopt the standby position a).

[0029] The female device allows for an adjustment on the landing such that, when the first support element receives a push from a male group arranged between the first and second support elements in the direction that ensures the opening of the landing door, the first support element will move towards the operating position b) in a first phase of the opening operation, and the receiving group will move together with the associated leaf of the door in a second phase of the opening operation, separating the second support element from the fixed component that prevents the rotation thereof so that it will also adopt the operating position b) thereof to hold or adjust to the male group with the first support element.

[0030] Similar to the male device, the system is compatible with the provision of means for locking the opening of the landing door.

[0031] Thus, in accordance with an embodiment, the female device comprises locking means with a movable lock configured to cooperate with a fixed protrusion of the landing to prevent the movement of the receiving group, and therefore the leaf of the door, at the start of an opening operation of the landing door, the first support element being connected to said movable lock, this movable lock being actuated by the movement of the first support element between the standby position a) and operating position b).

[0032] Advantageously, the movement of the leaf of the landing door will only be enabled if the first support element effectively moves, in other words, if there is coupling with guarantees with the male group of the male device.

[0033] According to a possible constructive solution, the movable lock is configured as a lever that can rotate around a rotation axis, comprising an arm or power area where the first supporting element is joined to and an arm or resistance area generally configured as a hook.

[0034] In a variant of interest, the movable lock is configured such that the first supporting element is in the standby position a) due to gravity.

[0035] Other variants are possible, in which either the intervention of an elastic means, such as a spring, or the prior deformation of a component with elastic properties assist in arranging the first support element towards the standby position a).

[0036] According to a possible constructive solution, the second support element can rotate around an eccentric axis and has a counterweight that generates the force that tends to arrange it in the operating position b) thereof due to gravity.

[0037] Other variants are possible, in which either the intervention of an elastic means, such as a spring, or the prior deformation of a component with elastic properties assist in arranging the second support element towards the operating position b).

[0038] According to another characteristic, it is envisaged that an eventual push of the male group on the second support element during a closing operation of the landing door does not cause this second support element to rotate towards the original position thereof.

[0039] For this, the second support element can be configured such that in the operating position b) the point or contact area that would receive the eventual push of the rear vane of the male group is located on one side of the horizontal projection of the axis around which this second support element rotates, which is different from the side that this point or contact area occupies when the second support element is in the standby position a).

Brief description of the drawings

[0040]

Figs. 1 and 2 are front views of a male device of a system according to the invention, in positions that correspond to a closed car door position and a coupling position with the female device and start of movement of the car door, respectively;

Figs. 3a and 3b are detailed views of the male device in the positions of Figs. 1 a and 1 b, respectively, with some components having been removed from the male device in order to show the actuation of the interlocking means;

Fig. 3c, is a detailed perspective view of the male device to show the actuation of the interlocking means;

Figs. 4a and 4b show a female device of a system according to the invention and the assembly arrangement thereof on a landing, respectively, both in a closed landing door position;

Figs. 5a and 5b the female device and the assembly arrangement thereof on a landing, respectively, both in a partially open door position during an opening operation of the landing door; and

Figs. 6 and 7 are schematic compositions that show the male and female devices of a system according to the invention before and during the coupling thereof, respectively.

Detailed description of an embodiment

[0041] The system 100 that exemplifies the invention comprises two parts that cooperate together to achieve temporary coupling between a car door and a landing door of an elevator installation. Of these two parts, one is a male device 101 that is assembled in the car and the other is female device 102 that is assembled in a landing.

[0042] Figs. 1 a and 1 b are front views of the male device 101 and they show the different positions adopted by the basic components thereof during an operation for opening doors.

[0043] This male device 101 essentially comprises a support 5, joined to an actuator 3 of the car door, that is of a belt type in the example, in order to move together with this actuator 3 during the opening and closing operations of the door; and a support 10 that is fastened to a leaf 2 of the car door which therefore moves together with this door. To better understand the drawings, only one part of this leaf 2 has been symbolically represented in Figs. 1 a and 1 b. Likewise, only one part of the shaft of the car 1 has been symbolically and partially represented.

[0044] The support 5 and the base 10 are connected mechanically. In the example, the support 5 and the base 10 are coupled in a movable way but guided by means of a set of pins 8 and sliders 9, such that the support 5 can move with respect to the base 10 between a first and second end position A) and B), respectively shown in Figs. 1 a and 1 b.

[0045] In turn, the support 5 assembles a male group 4 that is intended to mechanically couple with a female device of a landing door. A characteristic of the male device 101 of the present invention is that the male group 4 does not expand to couple to the aforementioned female device, but rather, it will be held by the female device, which has an active role as compared to the passive role of the male group 4 with regard to coupling.

[0046] In the example, the base 10 is equipped with movable interlocking means 19 configured to cooperate with a fixed element 18 of the car to prevent the movement of said base 10, and therefore that of the leaf 2 of the door, at the start of an opening operation of the landing door. These interlocking means comprise a hook 15 articulated to the base 10 and the male device 101 is prepared to actuate the hook 15 in the direction that will enable the movement of the base 10 when the coupling between the male group 4 and the female device occurs.

[0047] For this, the male group 4 is provided with a forward vane 4a and a rear vane 4b, the first of which is able to move towards the second. In the embodiment shown, the forward vane 4a is rotational with respect to the support 5 and is turned by elastic means 7 that tend to arrange it in a standby position, the position that it adopts in Fig. 1, since it is able to rotate around a longitudinal axis and towards the rear vane 4b, overcoming the force that said elastic means 7 exert on the forward vane 4a. The elastic means 7 can be formed by a spring, a resilient component or a component with flexible properties by means of which the vane 4a is fastened to the support 5 or to a secured component thereof. In any case, the vane 4a has an arm that projects towards the hook 15 with a sensing element 16 that supports and pushes on a cam surface 15a provided for said purpose in the hook 15 when the forward vane 4a is rotated by an external force towards the rear vane 4b, the support 5 being in the second end position B) thereof with respect to the base 10. This external force will be the reaction force that the female device will exert on the forward vane 4a when the male group 4, driven by the actuator 3 of the car door, pushes said female device during an opening operation of the doors. The interaction between the sensing element 16 and the complementary cam surface 15a is shown in Figs. 3a, 3b and 3c, which will be mentioned again below.

[0048] A female device 102 especially suitable for holding the male group 4 is illustrated in Figs. 4a and 5a, shown in the operator of a landing door 30 in Figs. 4b and 5b.

[0049] Essentially, the female device 102 comprises a receiving group 24 that can be fastened to a leaf 32 (see Figs. 4b and 5b) of the landing door and will move together with this leaf, on which the aforementioned first and second movable support elements 22 and 23 are supported, which can adopt at least the relative positions of Figs. 4a and 5a, respectively, which we will refer to hereinafter as the standby position a) and operating position b).

[0050] In the present example, the first support element 22 of the receiving group 24 is supported on a type of lever that can be rotated around a rotation axis 22a that it has, if no other external force is applied to the first support element 22 in the standby position a) of Figs. 4a and 4b. This position can be forced by the effects of gravity, the effects of elastic means or by a combination of both.

[0051] The second support element 23 is turned by a force that tends to arrange it in the operating position b) that it adopts in Figs. 5a and 5b, however, the receiving group 24 is designed to be able to be adjusted in the assembly such that a contact surface 23c (see Fig. 5a) of said second support element 23 stops against a contact part of the fixed component 27 of the landing (see Fig. 5b) when the landing door is closed (see Fig. 4b), such that the fixed component 27 forces the second support element 23 to adopt the standby position a) of Figs. 4a and 4b.

[0052] In the example, the lever that supports the first support element 22 carries out the function of locking means 28 in the form of a movable lock 28a that cooperates with a fixed protrusion 29 (see Fig. 5b) of the landing to prevent the movement of the receiving group 24, and therefore the leaf 32 of the landing door, at the start of an opening operation of the landing door.

[0053] Specifically, the first support element 22 is joined to a power area of the movable lock 28a, the re-

sistance area of which is generally configured as a hook for the latching thereof to the fixed protrusion 29 of the landing, such that the movable lock 28a will be actuated to enable the movement of the leaf 22 of the landing door by the movement of the first support element 22 towards the operating position b) thereof.

[0054] The system 100 is thus prepared so that when the support elements 22 and 23 adopt the standby position a) the car 1 can stop at the height of the landing 30, the male group 4, remaining static, with a space between the first and second support elements 22 and 23. This situation is schematically represented in Fig. 6.

[0055] From this situation, the system 100 operates during the opening operation of the car and landing doors in the following way:

- In a first phase of the opening operation, the actuator 3 will move the support 5 of the male device 101 in the direction indicated by the arrows of Fig. 1 from the first end position A) to the second end position B), shown in Fig. 2. These end positions will be determined by the stopping of the pins 9 against the ends of the associated sliders 8.

[0056] In other embodiments, there may be removable stops, for example, in the sliders 8 in order to conveniently regulate the range of movement of the support 5 on the base 10.

[0057] This movement of the support 5 from the first end position A) thereof to the second end position B) thereof with respect to the base 10 will occur without, for the time being, moving the leaf 2 of the car door impeded by moving to the latching of the hook 15 on the fixed element 18.

- In a second phase of the opening operation, the support 5, by the stopping of the pins 9 against the ends of the sliders 8, will now be entrained in movement to the base 10, which in turn will move the leaf 2 of the car door.

[0058] The forward movement of the assembly formed by the support 5 and the base 10 produces the contact and pushing of the forward vane 4a of the male group 4 against the first contact element 22 of the receiving group 24 of the female device 102.

[0059] Two effects are thus produced. On one hand, the movable lock 28a on which said first support element 22 is fastened is required to rotate in the direction indicated by the arrow in Fig. 7, unlatching from the fixed protrusion 29 and enabling the movement of the receiving group 24 and with it, that of the leaf 32 of the landing door.

[0060] On the other hand, the reaction force exerted by the first support element 22 on the forward vane 4a of the male group 4 causes the folding of the forward vane 4a in the direction indicated by the arrow in Fig. 3a. With the support 5 in the second end position B), the sensing element 15, which has the forward vane 4a, supports and then pushes against the cam surface 15a of the hook 15, as shown in the details of Fig. 3c, pushing the hook 15 to make it rotate in the direction indicated in Fig. 3b. The rotation of the hook 15 then enables the movement of the base 10 and with that of the leaf 2 of the car door in the opening direction thereof.

[0061] Consequently, the leaves of the landing and car door 2 and 32 being enabled for movement, respectively, the male group 4, moved by the actuator 3, entrains the receiving group 24 in movement and with it now the leaf 32 of the associated car door, moving said leaves 2, 32 of the car and landing doors together, respectively.

[0062] It is worth noting that the movement of the receiving group 24 will separate the second support element 23 from the fixed component 27 which forced it to adopt the position illustrated in Figs. 4a and 4b, going on to automatically adopt the position illustrated in Figs. 5a and 5b, the set of support elements 22 and 23 remaining in the operating position b). The rotation of the second support element 23 is illustrated by an arrow in Fig. 4a.

[0063] In the example, the second support element 23 can rotate around an eccentric axis 23a and it has a counterweight 23b that, due to gravity, generates the force that tends to arrange it in this operating position b). Other means can be used as an alternative or to complement the effect of gravity to turn the second support element towards this position, including elastic means.

[0064] In the variant represented, the second support element 23 is essentially horizontal when the receiving group 24 adopts the operating position b). It is possible to provide the second support element 23 with an outer profile such that eventual supporting the male group 4 on this element during the closing operation of the doors does not cause the rotation thereof in the opposite direction, that is, towards the direction adopted in Figs. 4a, 4b and 6. For this reason, it is envisaged that the contact area of the male group 4 on the second support element 23 is located above the horizontal projection of the axis 23a around which the aforementioned second support element 23 rotates. This vertical gap in the support area will tend to rotate the second support element 23 in a direction opposite to that which it would have in the initial position thereof. In cooperation with a rotation stop, it is not only able to prevent the undesired return of the support element to the original position thereof, but it is also able to prevent excessive rotation in the opposite direction. Other solutions are possible, including providing the second support element 23 with a contact profile such that the breakdown of forces has a greater vertical component, ascending in this case, and which consequently tends to rotate this second contact element 23 in the direction opposite to that which will once again guide it to the original position thereof.

[0065] In general, the landing doors are equipped with an energy accumulating means, conventionally potential energy, that is charged during the opening of the landing doors, either, for example, by means of a spring or a counterweight, which tends to arrange the landing door

in the closed position thereof. By conventionally calibrating these means, during the closing operation of the doors the male element 4 acts as a brake, traveling at a speed slower than that of the accumulating means when it alone would press the landing door. As a result, during the closing operation, the forward vane 4a of the male group will continue to be folded, subject to the force that the first support element 22 will exert on it.

Claims

1. A system (100) for temporarily coupling a car door (1) to a landing door (30) of an elevator installation with sliding doors, the landing door comprising at least one leaf (32) and the car door further comprising at least one leaf (2) and the system (100) comprising:

   - a male device (101) that is located between a car door actuator (3) and the leaf (2) of the car door (1) and has a male group (4) with a forward vane (4a) and a rear vane (4b),
   - a female device (102) with a receiving group (24) that has a first and second support element (22, 23) and can be fastened to the leaf (32) of the landing door (2), such that the male group (4) of the male device (101) can transit or remain arranged with space between the first support element and the second support element (22, 23) when the car (1) passes through the landing (30) without stopping or when the car (1) stops at the level of the landing (30), respectively, the car and landing doors adopting the closed position thereof, the system being **characterized in that**
   - the male group (4) does not have the ability to expand between the first and second support elements (22, 23) of the female device (102), while
   - the first and second support elements (22, 33) of the female device (102) are movable, being able to adopt several relative positions, at least one being a standby position a), in which a suitable distance is determined therebetween so that the male group (4) moves or is arranged with a space between said first and second support elements (22, 23); and another position is an operating position b), in which, given the movement of said first and second support elements (22, 23) towards one another, a distance is determined therebetween which reduces the space with the male group (4) or which is enough to adjust or hold them together to said male group (4) for coupling between the male device (101) and the female device (102), the change between the standby position a) and the operating position b) being caused when, the male group (4) being arranged between the first and second support elements (22, 23), said male group (4) is moved by the actuator (3) in the opening direction of the car door and applies a pushing force against the first support element (22).

2. The system (100) according to the preceding claim, characterize in that the male group (4) is assembled on a support (5) joined to the actuator (3) and coupled with a certain amount of play between a first and second end position A) and B) to a base (10) fastened to the leaf (2) of the car door, the assembly of the male device (101) in the car being adjusted in a way that the support adopts the first end position A) when the door is closed, such that when moving the actuator (3) in the direction that ensures the opening of the car door in a first phase of said opening operation the support (5) will move with respect to the base (10) until the support (5) adopts the second end position B) thereof, and in a second phase of the opening operation by stopping of the support (5) against the base (10), the first will entrain the second with movement, thereby moving the leaf (2) of the car door.

3. The system (100) according to the preceding claim, **characterized in that** the support (5) of the male group (4) is assembled on the base (10) in a movable way but guided by means of a set of pins and sliders (9, 8), stops determining the respective first and second end positions A), B) of the support (5) with respect to the base.

4. The system (100) according to the preceding claim, **characterized in that** the stops are formed by the ends of the sliders (8).

5. The system (100) according to any one of the preceding claims, **characterized in that** the forward vane (4a) is movable with respect to the support (5) and towards the rear vane (4b); and **in that** the base (10) is equipped with movable interlocking means (19) configured to cooperate with a fixed element (18) of the car to prevent the movement of said base (10), and therefore that of the leaf (2) of the door, at the start of an opening operation of the door, these interlocking means (19) being actuated by the movement of the forward vane (4a) in the direction towards the rear vane (4b).

6. The system (100) according to the preceding claim, **characterized in that** the interlocking means comprise a hook (15) articulated to the base (10) having a cam surface (15a) configured to receive the support and push of a sensing element (16) connected to the forward vane (4a) when the support (5) is in the second end position B) thereof with respect to

the base (10).

7. The system (100) according to claims 5 or 6, **characterized in that** the forward vane (4a) is rotative or is foldable around a longitudinal axis but adopts a standby position by default which is essentially normal to the plane of the leaf (2) and from which it can rotate towards the rear vane (4b) by loading an elastic means (7).

8. The system (100) according to any one of the preceding claims, **characterized in that**

- the first support element (22) of the receiving group (24) adopts the standby position a) by default, while
- the second support element (23) is urged by a force that tends to arrange it in the operating position b), having, nevertheless, a contact surface (23c) aimed to cooperate with a fixed component (27) of the landing (30) such that when the landing door is closed, this fixed component (27) of the landing forces the second support element (23) to adopt the standby position a), and all this such that when the first support element (22) receives a push from a male group (4) arranged between the first and second support elements (22, 23) in the direction that ensures the opening of the landing door, the first support element (22) will move towards the operating position b) in a first phase of the opening operation, and the receiving group (24) will move together with the associated leaf (32) of the door in a second phase of the opening operation, separating the second support element (23) from the fixed component (27) that prevents the rotation thereof so that it will also adopt the operating position b) thereof to hold or adjust to the male group (4) with the first support element (22).

9. The system (100) according to claim 8, **characterized in that** the female device (102) comprises locking means (28) with a movable lock (28a) configured to cooperate with a fixed protrusion (29) of the landing to prevent the receiving group (24), and therefore the leaf (32) of the door, from moving at the start of an opening operation of the landing door, and **in that** the first support element (22) is connected to said movable lock (28a), this movable lock (28a) being actuated by the movement of the first support element (22) between the standby position a) and operating position b).

10. The system (100) according to the preceding claim, **characterized in that** the movable lock (28a) is configured as a lever that can rotate around a rotation axis (22a), comprising an arm or power area where the first supporting element (22) is joined to and an arm or resistance area generally configured as a hook.

11. The system (100) according to the preceding claim, **characterized in that** the movable lock (28a) is configured such that the first supporting element (22) is in the standby position a) due to gravity.

12. The system (100) according to any one of claims 8 to 10, **characterized in that** the second support element (23) can rotate around an eccentric axis (23a) and has a counterweight (23b) that generates the force that tends to arrange it in the operating position b) thereof due to gravity.

13. The system (100) according to the preceding claim, **characterized in that** the second support element (23) is configured such that in the operating position b) the point or contact area that would receive the eventual push of the rear vane (4b) of the male group (4) is located on the other side of the horizontal projection of the axis (23a) that it occupies when the second support element (23) is in the standby position a).

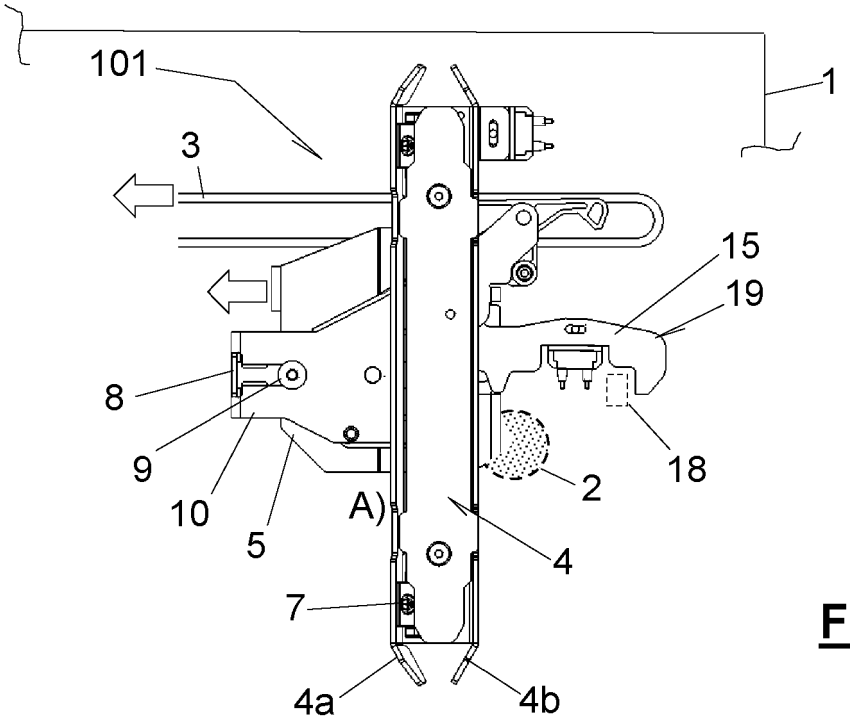

Fig. 1

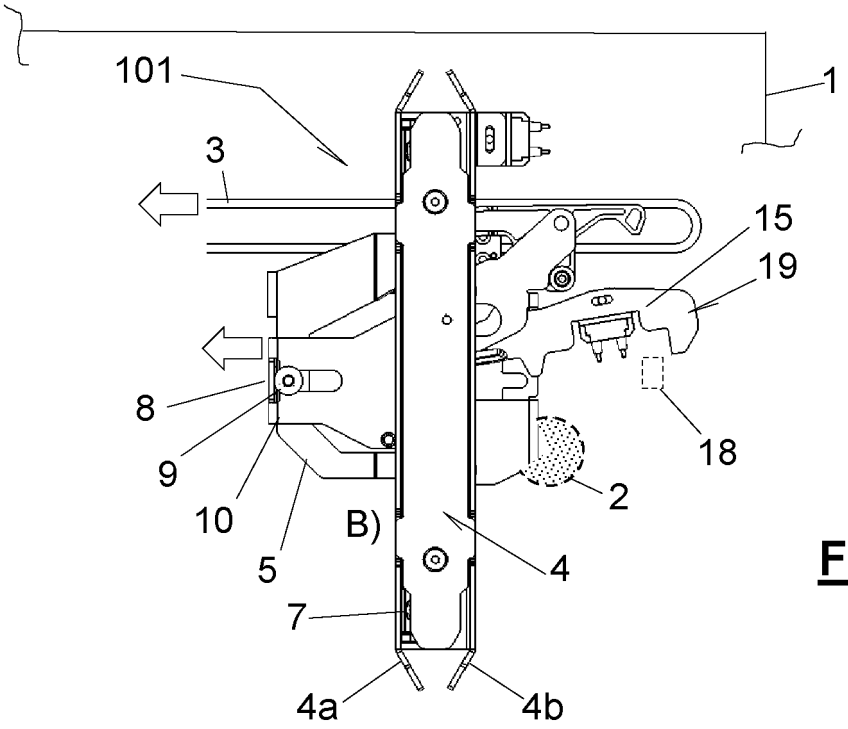

Fig. 2

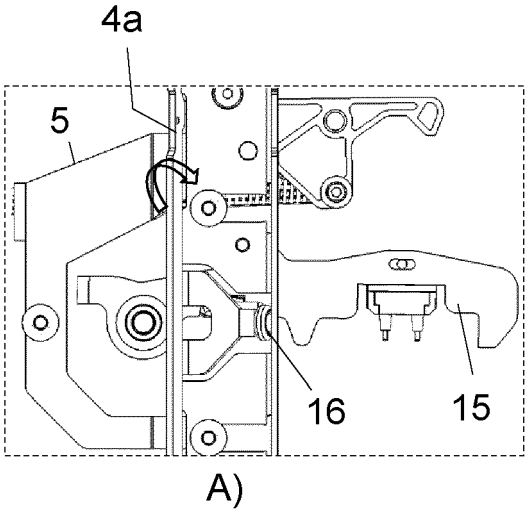

Fig. 3a

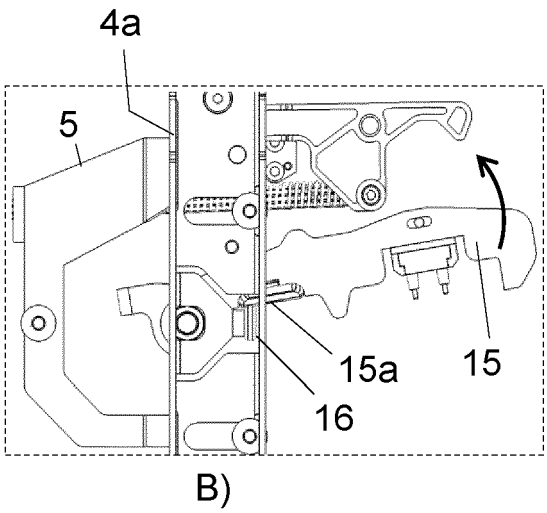

Fig. 3b

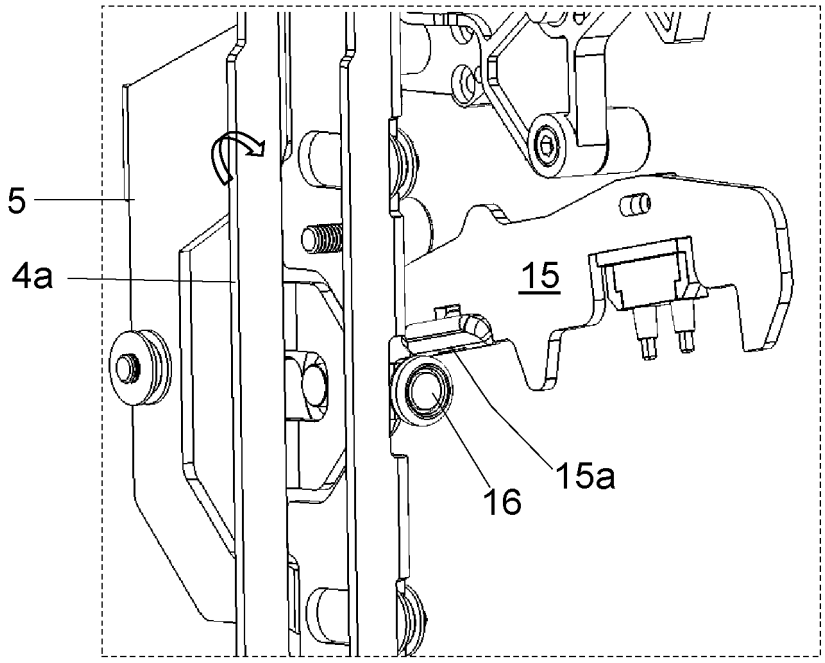

Fig. 3c

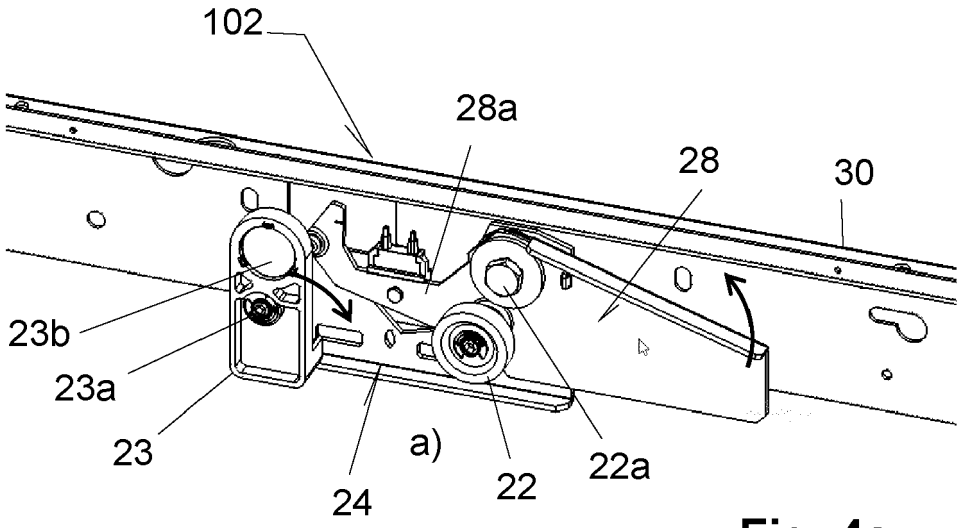

Fig. 4a

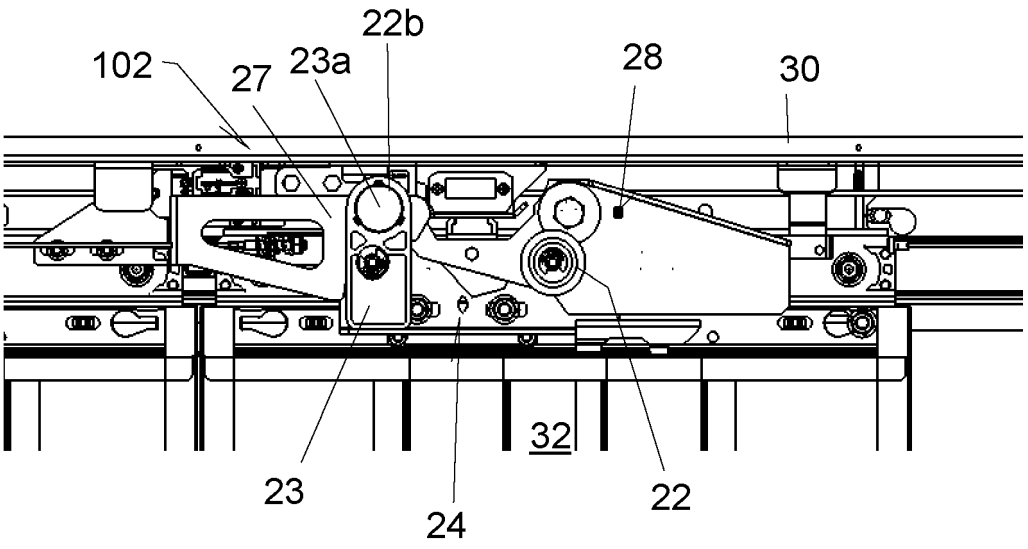

Fig. 4b

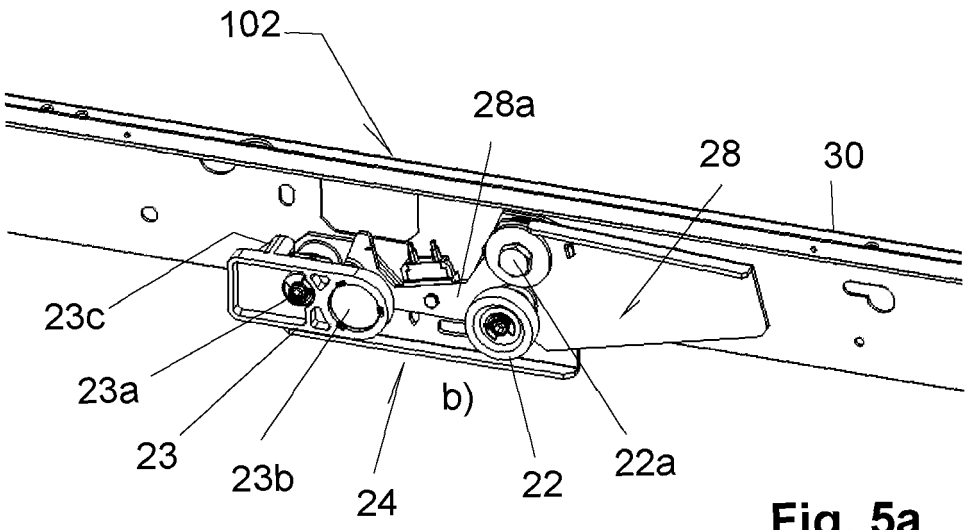

Fig. 5a

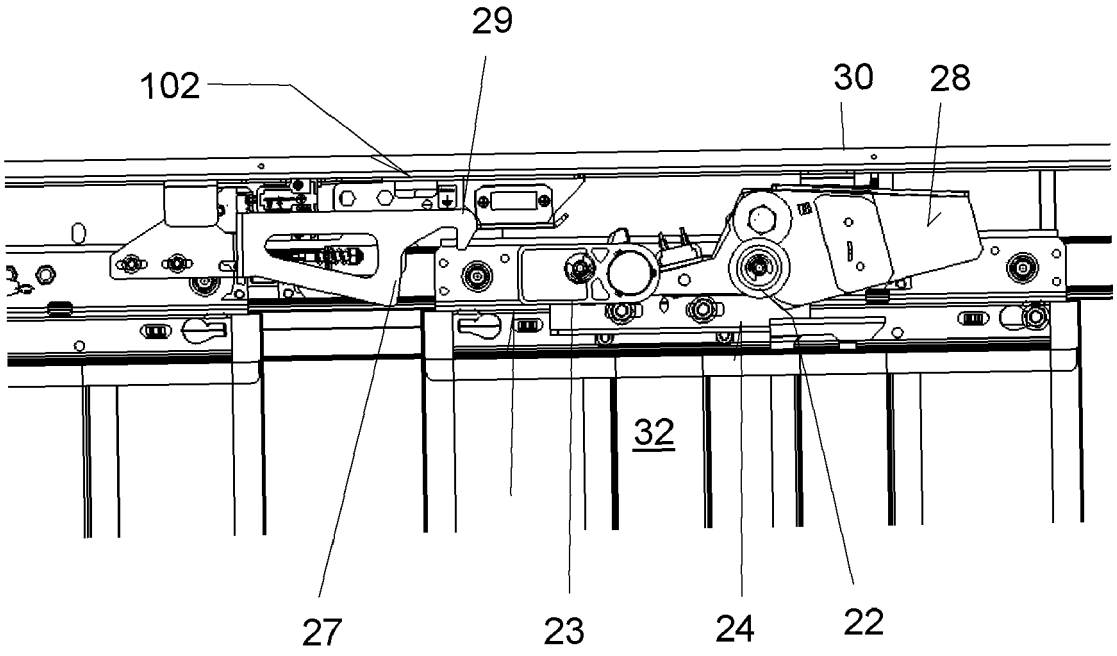

Fig. 5b

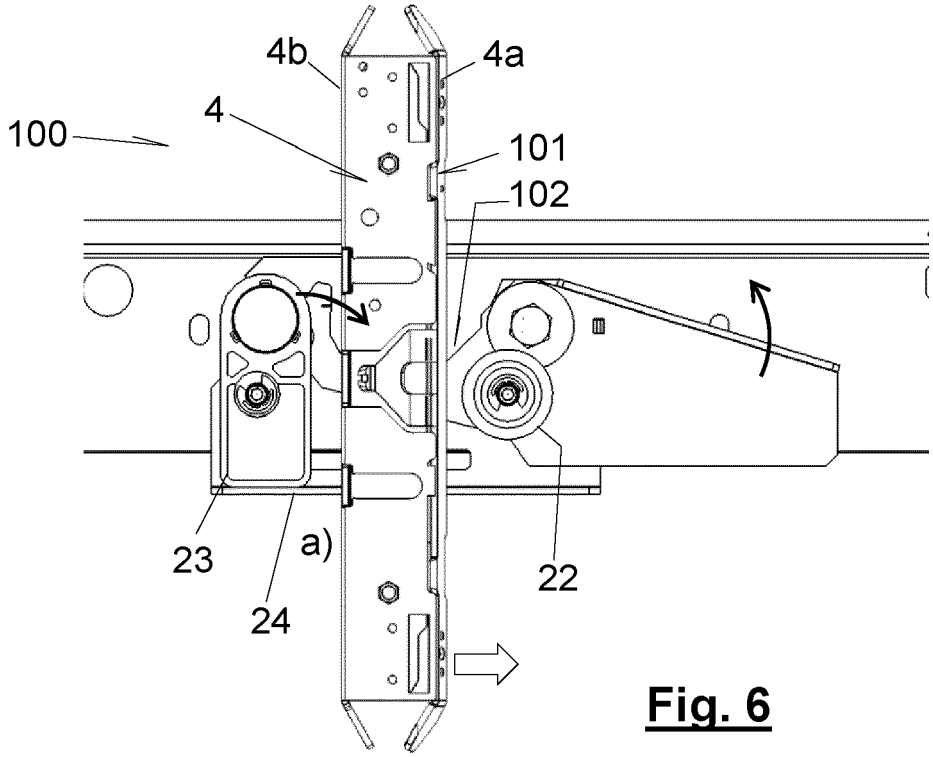

Fig. 6

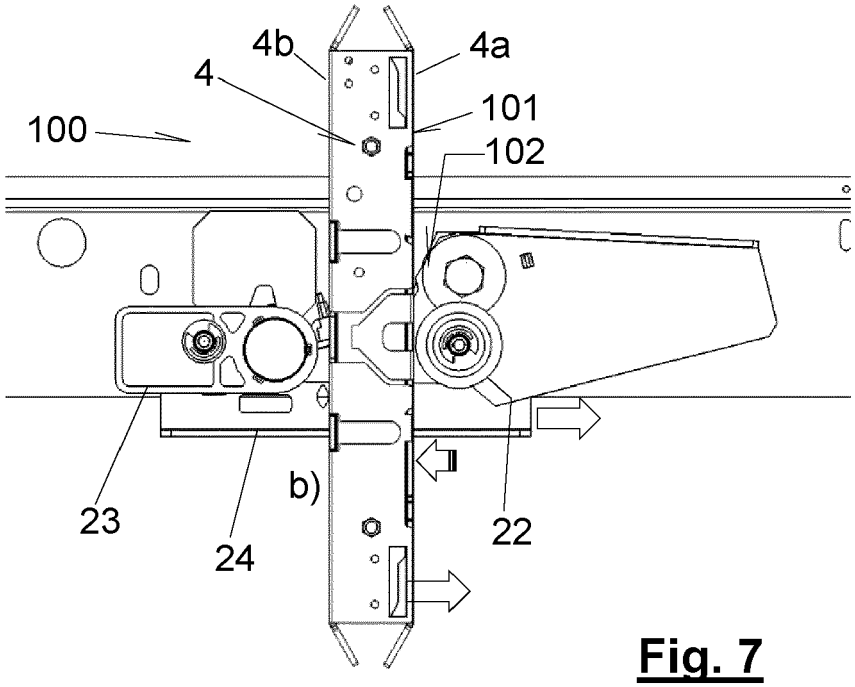

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 38 2264

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 638 762 A (JOHNS CALVIN EDWARD) 1 February 1972 (1972-02-01)	1,8-13	INV. B66B13/12
A	* abstract; figures 1-3 * * column 2, line 53 - column 4, line 35 * * column 7, lines 60-66 *	2-7	
X	JP S50 128852 U (-) 22 October 1975 (1975-10-22)	1,8-13	
A	* figures 2-4 *	2-7	

TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 December 2018	Bleys, Philip

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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11-12-2018

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 1497217 A **[0006]**
- EP 1524233 A **[0006]**