Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a double deck elevator car that has two elevator cars, one above the other, and may vary the gap between the elevator cars.

2. Description of the Related Art

[0002] In recent years, the need has intensified for elevator cars having two elevator cars provided in the vertical direction (double deck elevator cars) in order to increase transport capability in the vertical direction of ultra-high-rise buildings. Also, when it comes to ultra-high-rise buildings, the first floor height is often higher than that of normal floors because the first floor is an entrance hall or a lobby and the first floor is often used for ventilation, and so it is not possible to use a double deck elevator car in which the gap between the upper and lower elevator cars is fixed.

[0003] Therefore, there have been several proposals relating to double deck elevator cars that may vary the gap between the upper and lower elevator cars to respond to such a need. As an example, as shown in FIG. 1, outer frame 3, that incorporates upper and lower elevator cars 4 and 5, is raised and lowered by hoist 2 provided above hoistway 1. One or other of elevator cars 4 and 5 is raised or lowered in relation to outer frame 3 by a drive source for motors or the like provided in this outer frame 3 (Laid-Open Patent No. Showa 48-5384).

[0004] Also, as shown in FIG.2, a mechanism has been proposed (Laid-Open Patent No. Heisei 10-279231, EP-A-0870716) that varies the gap between upper and lower elevator cars 4 and 5 by pantograph mechanism 6 that has its fulcrum on central beam 3a of outer frame 3.

[0005] In the above-mentioned double deck elevator car shown in FIG.1, while adjustment for floor heights is possible, to raise or lower one elevator car 4 or 5 in relation to outer frame 3 requires a large capacity drive means (device). On the other hand, the variable double deck elevator car shown in FIG.2 achieves a balance between the upper and lower cars by pantograph mechanism 6, and the capacity required for the drive is kept smaller. However, there is a requirement to strengthen outer frame 3 and, even within it, central beam 3a that supports the fulcrum of pantograph mechanism 6 must be strongly-built to support the combined weight of upper and lower car compartments 4 and 5. Thus the overall outer frame becomes larger and space efficiency becomes poorer.


SUMMARY OF THE INVENTION

[0007] Accordingly, taking such points into consideration, one object of the present invention is to provide a novel double deck elevator car that, being a double deck elevator car having two elevator cars, may easily and simply vary the gap between the elevator cars.

[0008] To achieve the above object, the present invention provides an elevator car according to claim 1.

[0009] When using the present invention, since the loads of both elevator cars are supported by the carrier, the car itself as a whole may be lightened and made smaller by strengthening the carrier alone. Also, since the screw thread direction of the at least one screw shaft for supporting the weight of the first elevator car and the screw thread direction of the at least one second screw shaft for supporting the weight of the second elevator car are opposite, the first elevator car and the second elevator car play the roles of mutual counterweights.

Thus, the capacity of the driving mechanisms may be made smaller.

[0010] The present invention is a double deck elevator car that has the characteristic of, at least, the first elevator car engagement unit or the second elevator car engagement unit having:

at least a nut that engages with the first screw shaft or the second screw shaft;

and at least a coupler that restrains the rotational movement of the nut but permits horizontal movement of the nut.

[0011] When using the present invention, no excessive force will operate on the transmission members during movement of the first elevator car and the second elevator car in the vertical direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

FIG.1 is a drawing showing a prior art elevator car;
FIG.2 is a drawing showing a prior art elevator car;
FIG.3 is an overall block diagram showing a first embodiment of an elevator car according to the present invention.
FIG.4 is an illustration of the operation of the elevator;
FIG.5 is a detail drawing of the vicinity of the upper beam of the elevator car;
FIG.6 is a detail drawing showing a drive mechanism (device) of the elevator car;
FIG.7 is a detail drawing showing a nut and coupling...
of the elevator car;

FIG. 8 is a block diagram showing a second embodiment of an elevator car according to the present invention;

FIG. 9 is a drawing showing a modification of the second embodiment of an elevator car according to the present invention; and

FIG. 10 is a block diagram showing a third embodiment of an elevator car according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0013] Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, and more particularly to FIG. 3 thereof, one embodiment of the present invention will be described.

[0014] FIG. 3 to FIG. 7 are drawings showing a first embodiment of a double deck elevator car according to the present invention.

[0015] As shown in FIG. 3 to FIG. 5, the double deck elevator car possesses first elevator car 23a and second elevator car 23b that are consecutively arranged in the vertical direction inside hoistway 1. When first elevator car 23a in the upper position stops at upper floor 41, second elevator car 23b in the lower position stops at lower floor 42. Also, so that it may respond to cases where the distance between upper floor 41 and lower floor 42 varies, the double deck elevator car may vary the gap between first elevator car 23a and second elevator car 23b.

[0016] That is to say, with the double deck elevator car, outer frame (carrier or supporting member is sometimes used) 11 and balance weight 15 are suspended via suspension cables 16 that pass over traction sheave 13 of hoist 12 and deflector sheave 14, and are raised and lowered by the rotational drive of hoist 12. Of these, outer frame 11 and balance weight (counterweight) 15 are arranged inside hoistway 1, while hoist 12, having traction sheave 13, and deflector sheave 14 are positioned in machinery room 2 provided above hoistway 1.

[0017] Also, above-mentioned first elevator car 23a and second elevator car 23b are supported in the vertical direction, so that they are free to move, in outer frame 11.

[0018] Next, outer frame 11 and the support structures for first elevator car 23a and second elevator car 23b will be described. Outer frame 11 has upper beam 11a that is connected via pitch springs (not shown) to the ends of suspension cables 16, vertical beams 11b that are connected to upper beam 11a and extend perpendicularly downward, and lower beam 11c that connects the lower ends of vertical beams 11b. Furthermore, it has a pair of support beams 11d that are secured to upper beam 11a and protrude in mutually opposite directions. A drive motor (driving mechanism) 17 is supported on each of the pair of support beams 11d out of the above.

[0019] A transmission member 19, having first screw shaft 19a that is protected by housing 18 secured to support beam 11d and second screw shaft 19b connected to this first screw shaft 19a, is provided for each drive motor 17. First screw shaft 19a and second screw shaft 19b are connected via respective flanges 45a and 45b. Also, the lower end of second screw shaft 19b is supported, so that it is free to rotate, by support 20 secured to vertical beam 11b.

[0020] Also, first screw shafts 19a and second screw shafts 19b are formed by cutting their respective screw threads in opposite directions, and compose inverse helical relationships with each other. Moreover, nuts 25a of car frame 22a that supports first elevator car 23a engage with first screw shafts 19a, and nuts 25b of car frame 22b that supports second elevator car 23b engage with second screw shafts 19b. In this way, first elevator car 23a and second elevator car 23b are respectively supported via car frames 22a and 22b by first screw shafts 19a and second screw shafts 19b.

[0021] Also, guidance devices 10, having guide rollers that engage with a pair of main guide rails 50 provided in hoistway 1, are mounted at four places at the upper and lower left and right of outer frame 11. Guidance of outer frame 11 is performed by guidance devices 10 engaging with main guide rails 50. Moreover, guidance devices 21, that engage with each vertical beam 11b of outer frame 11, are mounted at four places at the upper and lower left and right of each of car frames 22a and 22b. Furthermore, counter-weight 15 also has guidance devices that engage with a pair of sub-guide rails (not illustrated).

[0022] Next, the drive mechanisms for first elevator car 23a and second elevator car 23b will be explained, using FIG. 6 and FIG. 7. In FIG. 6, output shaft 17a of drive motor 17, which is secured to support beam 11d, is connected to first screw shaft 19a via tie shaft 26. In this case, first screw shaft 19a is protected by housing 18 secured to support beam 11d, and is also supported in housing 18 via bearing 28, so that it is free to rotate. Moreover, flange 45b of second screw shaft 19b, on which the screw thread is cut in the reverse direction to that of first screw shaft 19a, is coupled to flange 45a on the lower end of screw shaft 19a. The lower end of screw shaft 19b is supported via bearing 48, so that it is free to rotate, in support 20 provided on vertical beam 11b.

[0023] Also, nuts 25a and 25b that engage with first screw shaft 19a and second screw shaft 19b are coupled to couplers 46 that have translation freedom. These couplers 46 are composed by rectangular blocks 29 in which nuts 25a and 25b are anchored; sliders 30 with rectangular external shapes and having rectangular holes that give sliding support to rectangular blocks 29 in one direction; mounting members 31 having rectangular holes that give sliding support to sliders 30 in the direction orthogonal to the sliding direction of rectangular blocks 29.
and covers 32 provided in the vertical direction of mounting members 31. Couplers 46 are provided on each of car frame 22a of first elevator car 23a and car frame 22b of second elevator car 23b. The design is that, should slight displacement occur in the horizontal direction between first elevator car 23a and second elevator car 23b and transmission members 19, that displacement may be absorbed by couplers 46. The engagement units of first elevator car 23a and second elevator car 23b are composed by couplers 46 and nuts 25a and 25b.

[0024] Next, the operation of an embodiment with this composition will be described. First, when hoist 12 is driven, outer frame 11 ascends or descends along guide rails 50 by means of suspensions cable 16 that pass over sheaves 13 and 14. At this time, for example, right-hand torques are applied to first screw shafts 19a via nuts 25a by the weight of first elevator car 23a and car frame 22a. At the same time, left-hand torques are applied to screw shafts 19b, which are directly coupled to first screw shafts 19a, via nuts 25b by the weight of second elevator car 23b and car frame 22b. At this time, when the weights of the two elevator cars 23a and 23b, the weights of the two car frames 22a and 22b and the screw pitches of the screw shafts 19a and 19b are respectively equal, then the torques on first screw shafts 19a and second screw shafts 19b cancel each other, and the positions of the two elevator cars 23a and 23b may be kept constant, even without outputting torques from drive motors 17. Furthermore, by arranging the positions of drive motors 17 and screw shafts 19a and 19b in point symmetry in relation to the centers of gravity of first elevator car 23a and second elevator car 23b, well-balanced drive becomes possible.

[0031] When using this embodiment, by driving first elevator car 23a and second elevator car 23b in relation to outer frame 11, which is guided by guide rails, using screw shafts 19a and 19b, which are directly coupled on the same axis but of which the respective threads are cut in different directions, it is possible easily and simply to adjust the gap between elevator cars 23a and 23b.

Second Embodiment

[0032] Next, a second embodiment of an elevator car according to the present invention will be described using FIG. 8 and FIG. 9.

[0033] The embodiment shown in FIG. 8 and FIG. 9 is one in which, in the first embodiment shown in FIG. 3 to FIG. 7, reduction gears 33 are provided between each drive motor 17 and screw shafts 19a and 19b (FIG. 8), or only a single drive motor 17 is provided and the motive power of this drive motor 17 is transmitted to the other drive mechanism 51 via toothed belt 34 (FIG. 9). In FIG. 8 and FIG. 9, parts that are identical to those of the first embodiment shown in FIG. 3 to FIG. 7 have been assigned identical reference numerals and their detailed descriptions have been omitted.

[0034] In FIG. 8, since the speed of revolution of screw shafts 19a and 19b may be kept low by providing reduction gears 33, it is easy to avoid the critical speed that becomes a problem when long screwed rods 19 are used.

[0035] Also, in FIG. 9, since there is only one drive motor 17, there is no need to consider controls such as guaranteeing the synchronization of two drive motors.

Third Embodiment

[0036] Next, a third embodiment of an elevator car ac-
According to the present invention will be described using FIG.10. This embodiment provides suspension beam 35 as the carrier in place of outer frame 11. In FIG.10, parts that are identical to those of the first embodiment shown in FIG.3 to FIG.7 have been assigned identical reference numerals and their detailed descriptions have been omitted.

In FIG.10, suspension beam 35 is provided at the end of suspension cables 16, and guidance devices 10 that guide it on guide rails 50 are provided at the upper and lower, left and right four corners of suspension beam 35. Also, supports 36 project in mirror-image directions to the left and right at the two ends of suspension beam 35, and each supports a drive motor 17. First screw shafts 19a are supported below the two supports 36 protected in housings 18. Second screw shafts 19b, with their threads cut in the opposite direction to those of first screw shafts 19a, are coupled to first screw shafts 19a by flanges 45a and 45b. Stoppers 37 are secured at the lower ends of second screw shafts 19b. Also, first car frame 22a supports first elevator car 23a and, at the same time, has nuts 25a that engage with first screw shafts 19a. Guidance devices 21 that guide it on main guide rails 50 are provided on the upper and lower four corners of car frame 22a. Moreover, second car frame 22b supports first elevator car 23b and, at the same time, has nuts 25b that engage with second screw shafts 19b. Guidance devices 21 that guide it on main guide rails 50 are provided on the upper and lower four corners of car frame 22b.

The drive mechanisms for elevator cars 23a and 23b are the same as in the first embodiment (see FIG.6), and output shafts (drive shafts) 17a of drive motors 17 are coupled, via tie shafts 26, to first screw shafts 19a, which are supported so that they are free to rotate by bearings 28 in housings 18. Moreover, second screw shafts 19b, of which the screw threads are cut in the opposite direction, are coupled to first screw shafts 19a via flanges 45a and 45b, and stoppers 37 are provided at the lower ends of second screw shafts 19b.

Also, nuts 25a and 25b that engage with screw shafts 19a and 19b are coupled by couplings 46 that have translation freedom and are composed by rectangular blocks 29 in which nuts 25a and 25b are anchored; sliders 30 with rectangular external shapes and having rectangular holes that give sliding support to rectangular blocks 29 in one direction; mounting members 31 having rectangular holes that give sliding support to sliders 30 in the direction orthogonal to the sliding direction of rectangular blocks 29 and covers 32 provided in the vertical direction of mounting members 31. Couplers 46 are coupled to car frame 22a of first elevator car 23a and car frame 22b of second elevator car 23b.

In FIG.10, suspension beam 35 is provided in place of outer frame 11 as the carrier. Therefore, outer frame 11 becomes unnecessary, and, in the case of the same size of hoistway, larger-sized elevator cars 23a and 23b may be provided.

When using the present invention as described above, by driving the first elevator car by means of first screw shafts that are driven in rotation and driving the second elevator car by means of second screw shafts that are co-axially coupled to, and of which the screw threads are cut in the opposite direction to, the first screw shafts, it becomes possible to adjust the gap between the upper and lower elevator cars with an energy-saving and space-saving construction.

Also, by using ball threads for the first screw shafts and the second screw shafts, it becomes possible very efficiently to drive the elevator cars.

Moreover, by driving the respective elevator cars with screw shafts of different pitches, in cases where the weights of the upper and lower elevator cars are not equal, or when it is not possible uniformly to move the upper and lower elevator cars due to hoistway shaft dimensions or the like, it is possible efficaciously to adjust the gap between the elevator cars.

Furthermore, by supporting the nuts that engage with the screw shafts with couplings that are restricted only in the direction of rotation but may move horizontally, no excessive force is applied to the transmission members.

Still further, by arranging the transmission members in positions that are in point symmetry with the centers of gravity of the first elevator car and the second elevator car, it is possible stably to drive the elevator cars.

Furthermore, by providing a single drive mechanism, it is possible to drive a pair of transmission members in synchronization, and it is possible stably to drive the elevator cars.

Again, by guiding the elevator cars along the outer frame, it is possible stably to drive the elevator cars.

Yet again, by providing a suspension beam in place of an outer frame, it is possible to provide larger-sized elevator cars.

Obviously, numerous additional modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the present invention may be practised otherwise than as specifically described herein.

Claims

1. A double deck elevator car having a first elevator car (23a) and a second elevator car (23b) that are arranged in the vertical direction, comprising:

   a carrier (11) that is suspended via suspension cables (16) that pass over a hoist;

   transmission members (19) that each comprise:

   at least a first screw shaft that is provided in said carrier so that said first screw shaft is free to move and that engages with at least one of:

   a second screw shaft (19b) of another elevator car;

   one or more devices (21) each that guide the respective elevator cars along the outer frame (35); and

   one or more guides (50) that guide the respective elevator cars along said outer frame (35).

5. A double deck elevator car having a first elevator car (23a) and a second elevator car (23b) that are arranged in the vertical direction, comprising:

   a carrier (11) that is suspended via suspension cables (16) that pass over a hoist;

   transmission members (19) that each comprise:

   at least a first screw shaft that is provided in said carrier so that said first screw shaft is free to move and that engages with at least one of:

   a second screw shaft (19b) of another elevator car;

   one or more devices (21) each that guide the respective elevator cars along the outer frame (35); and

   one or more guides (50) that guide the respective elevator cars along said outer frame (35).
least a first engagement unit (25a) on said first elevator car;
at least a second screw shaft (19b) that is coupled to said first screw shaft and engages with at least a second engagement unit (25b) on said second elevator car and, at the same time, of which a second screw thread is cut in the opposite direction to a first screw thread direction of said first screw shaft; and
at least a drive mechanism (17) that is secured to the carrier and that drive these transmission members in rotation, wherein at least, said first elevator car engagement unit or said second elevator car engagement unit further comprises:
at least a nut (25a,25b) that engages with said first screw shaft or said second screw shaft; characterized by
at least a coupler (46) that restricts rotational movement of said nut, but permits horizontal movement of said nut.

2. A double deck elevator car according to Claim 1, wherein:
said first engagement unit of said first screw shaft and said first elevator car is a ball thread construction; and
said second engagement unit of said second screw shaft and said second elevator car is a ball thread construction.

3. A double deck elevator car according to Claim 1, wherein:
pitches of said first screw shaft and said second screw shaft are different from each other.

4. A double deck elevator car according to Claim 1, wherein:
a pair of said transmission members are arranged in point symmetry with the center of gravity of said first elevator car and said second elevator car when seen in plan view.

5. A double deck elevator car according to Claim 4, wherein:
said pair of transmission members being driven by a single drive mechanism.

6. A double deck elevator car according to Claim 1, said carrier further comprising:
an outer frame that surrounds said first elevator car and said second elevator car, wherein said
first elevator car and said second elevator car are guided in the vertical direction along said outer frame.

7. A double deck elevator car according to Claim 1, said carrier further comprising:
a suspension beam that is positioned above said first elevator car and said second elevator car.

8. The double deck elevator car according to Claim 2, wherein said first engagement unit and said second engagement unit project to outside said cars from side faces of said first and second cars.

9. The double deck elevator car according to Claim 7, wherein said transmission members are mounted on said outer frame of said carrier and arranged so that an axial direction of a screw is in the vertical direction.

10. The double deck elevator car according to Claim 1, wherein said drive mechanism is at the ends of said first screw shaft and second screw shaft respectively.

Patentansprüche

1. Doppeldeck-Aufzugskabine, die eine erste Aufzugskabine (23a) und eine zweite Aufzugskabine (23b) aufweist, umfassend:
zumindest eine ersten Schraubenachse, die in dem Träger so vorgesehen ist, dass die erste Schraubenachse frei ist um sich zu bewegen, und die mit zumindest einer ersten Eingriffseinheit (25a) an der ersten Aufzugskabine eingeht;
zumindest eine zweite Schraubenachse (19b), die mit der ersten Schraubenachse gekoppelt ist und die mit zumindest einer zweiten Eingriffseinheit (25b) an der zweiten Aufzugskabine eingeht, und bei der gleichzeitig ein zweites Schraubengewinde in die entgegengesetzte Richtung zu einer Richtung eines ersten Schraubengewindes der ersten Schraubenachse geschnitten ist; und
zumindest einen Antriebsmechanismus (17) der an dem Träger befestigt ist und der diese Übertragungselemente in Rotation antreibt, bei der zumindest die erste Aufzugskabi-
Doppeldeck-Aufzugskabine nach Anspruch 1, bei der:

zumindest eine Mutter (25a, 25b) die mit der ersten Schraubenachse oder der zweiten Schraubenachse eingreift; gekennzeichnet durch

zumindest eine Koppel (46), die eine Rotationsbewegung der Mutter begrenzt, aber eine horizontale Bewegung der Mutter erlaubt.

2. Doppeldeck-Aufzugskabine nach Anspruch 1, bei der:

die erste Eingriffseinheit der ersten Schraubenachse und der ersten Aufzugskabine eine Kugelgewindekonstruktion ist; und

die zweite Eingriffseinheit der zweiten Schraubenachse und der zweiten Aufzugskabine eine Kugelgewindekonstruktion ist.

3. Doppeldeck-Aufzugskabine nach Anspruch 1, bei der:

die Neigung der ersten Schraubenachse und der zweiten Schraubenachse sich voneinander unterscheiden.

4. Doppeldeck-Aufzugskabine nach Anspruch 1, bei der:

zwei der Übertragungselemente in einer Draufsicht punktsymmetrisch zu dem Schwerpunkt der ersten Aufzugskabine und der zweiten Aufzugskabine angeordnet sind.

5. Doppeldeck-Aufzugskabine nach Anspruch 4, bei der:

die zwei Übertragungselemente durch einen einzelnen Antriebsmechanismus angetrieben werden.

6. Doppeldeck-Aufzugskabine nach Anspruch 1, wobei der Träger ferner umfasst:

einen äußeren Rahmen, der die erste Aufzugskabine und die zweite Aufzugskabine umgibt, wobei die erste Aufzugskabine und die zweite Aufzugskabine in vertikaler Richtung entlang des äußeren Rahmens geführt werden.

7. Doppeldeck-Aufzugskabine nach Anspruch 1, wobei der Träger ferner umfasst:

einen Einhängeträger, der über der ersten Aufzugskabine und der zweiten Aufzugskabine positioniert ist.


10. Doppeldeck-Aufzugskabine nach Anspruch 1, bei der der Antriebsmechanismus jeweils an den Enden der ersten Schraubenachse und zweiten Schraubenachse ist.

Revendications

1. Cabine d’ascenseur à deux étages comprenant une première cabine d’ascenseur (23a) et une seconde cabine d’ascenseur (23b) qui sont agencées dans la direction verticale, comprenant :

un support (11) qui est suspendu via des câbles de suspension (16) qui passent par-dessus un dispositif de levage ;

des éléments de transmission (19), comprenant chacun :

au moins un premier arbre fileté prévu dans ledit support, de telle sorte que ledit premier arbre fileté est libre de se déplacer et est en engagement avec au moins une première unité d’engagement (25a) sur ladite première cabine d’ascenseur ;

au moins un second arbre fileté (19b), qui est couplé audit premier arbre fileté et qui est en engagement avec au moins une seconde unité d’engagement (25b) sur ladite seconde cabine d’ascenseur et qui présente simultanément un second filetage taillé dans la direction opposée à la direction du premier filetage dudit premier arbre fileté ;

et

au moins un mécanisme d’entraînement (17) qui est fixé au support et qui entraîne ces éléments de transmission en rotation, dans laquelle au moins ladite première unité d’engagement sur la première cabine d’ascenseur ou ladite seconde unité d’engagement sur la seconde cabine d’ascenseur comprend en outre :
en engagement avec ledit premier arbre fileté ou avec ledit second arbre fileté ; caractérisée par au moins un coupleur (46) qui restreint un mouvement de rotation dudit écrou, mais qui permet un mouvement horizontal dudit écrou.

2. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle :

   ladite première unité d’engagement dudit premier arbre fileté et ladite première cabine d’ascenseur présentent une structure du type vis à recirculation de billes ; et

   ladite seconde unité d’engagement dudit second arbre fileté et ladite seconde cabine d’ascenseur présentent une structure du type vis à recirculation de billes.

3. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle :

   les pas dudit premier arbre fileté et dudit second arbre fileté sont différents l’un de l’autre.

4. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle :

   une paire dudit éléments de transmission sont agencés à symétrie ponctuelle par rapport au centre de gravité de ladite première cabine d’ascenseur et de ladite seconde cabine ascenseur, lorsqu’on les voit dans une vue en plan.

5. Cabine d’ascenseur à deux étages selon la revendication 4, dans laquelle :

   ladite paire d’éléments de transmission sont entraînés par un mécanisme d’entraînement unique.

6. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle ledit support comprend en outre :

   un cadre extérieur qui entoure ladite première cabine d’ascenseur et ladite seconde cabine d’ascenseur, ladite première cabine ascenseur et ladite seconde cabine ascenseur étant guidées dans la direction verticale le long dudit cadre extérieur.

7. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle ledit support comprend en outre :

   une poutre de suspension qui est positionnée au-dessus de ladite première cabine d’ascenseur et de ladite seconde cabine d’ascenseur.

8. Cabine d’ascenseur à deux étages selon la revendication 2, dans laquelle ladite première unité d’engagement et ladite seconde unité d’engagement se projettent à l’extérieur desdites cabines depuis des faces latérales de ladite première et de ladite seconde cabine.

9. Cabine d’ascenseur à deux étages selon la revendication 7, dans laquelle lesdits éléments de transmission sont montés sur ledit cadre extérieur dudit support et sont agencés de telle façon qu’une direction axiale d’un arbre fileté est dans la direction verticale.

10. Cabine d’ascenseur à deux étages selon la revendication 1, dans laquelle ledit mécanisme d’entraînement se trouve aux extrémités dudit premier arbre fileté et dudit second arbre fileté respectivement.
FIG. 2 (PRIOR ART)
FIG. 10
REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader’s convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

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