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(54) **Arrangement system for an automatic floor door assembly with reduced sill overall dimensions**

(57) The present invention relates to an arrangement system for shutters of an automatic floor door assembly within a lift plant such that the overall dimensions of the door sill can be reduced to the minimum. The shutter moving is realized by carriages, each of them fixed to each shutter of said door assembly, with a geometric

configuration such that it is possible to displace on a single vertical plane sliding guides for said carriages and the moving members in a space limited by said vertical plane. The sill overall dimensions save allows for installing such automatic lift doors in lift shaft with clearance insufficient for conventional automatic doors.

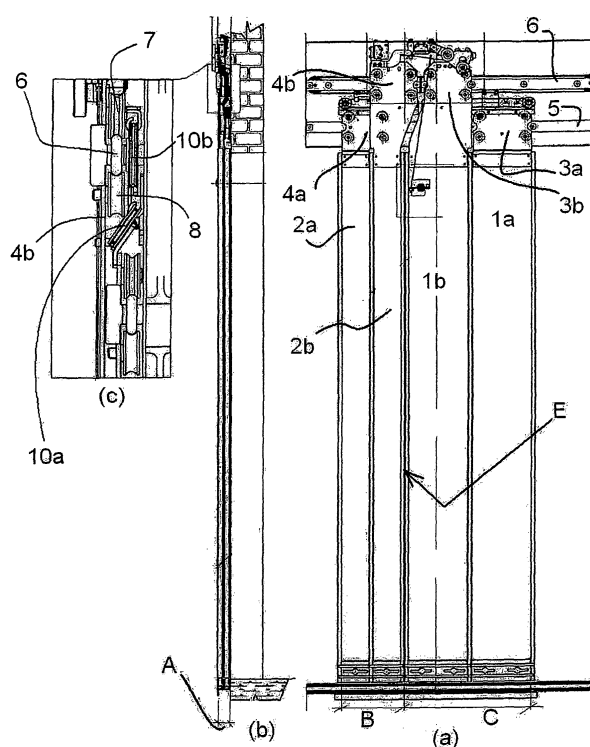


FIG. 3

Description

[0001] The present invention relates to an adjustment system for an automatic floor door assembly of a lift suitable to allow the installation of said automatic floor door even in the case in which the size of the lift shaft and enclosure do not allow for using automatic floor doors of standard size.

[0002] The opportunity to use the solution provided by the present invention is particularly felt when the building, wherein the lift plant has to be installed, has been designed without considering the possible presence of the aforesaid plant with either manual override doors or automatic doors. The latter leads to greater overall dimensions, with regard to the one with manual override doors, due to the need of housing the opening mechanisms.

[0003] The modernization of the old plants very often brings the problem of the door sill, which regards the available space for housing either the landing sill either the lift enclosure sill, and the problem of the side spaces sideways enclosure door opening, as well. Such spaces prove themselves to be very reduced for an old lift shaft, designed for a plant provided either with hinged door enclosure (or even without door) either with manual override hinged floor doors.

[0004] Therefore, in order to reduce the overall lateral dimensions of shutters in the open position, the number of the shutters needs to be increased, as well as their hanging guides that are displaced on a single plane thus obtaining a sill with greater overall dimensions.

[0005] Object of the present invention, therefore, is to provide an arrangement system for automatic floor door set such that the overall dimensions of the supporting and moving members of each shutter can be reduced and the installation of the automatic floor door can be allowed.

[0006] A further object of the present invention is to provide an arrangement system for automatic floor door set such that, besides the reduction of the sill overall dimensions, it makes said automatic door suitable even in the case of a lift shaft with different horizontal dimensions of the walls adjacent to the door. The arrangement system provides, in such a case, automatic floor doors not symmetrically shutting, better disclosed beyond.

[0007] These objects are realized by said arrangement system, whose features are defined in the claims and are illustrated in the appended drawings that show an illustrative, but not limiting, embodiment of the present invention and wherein:

fig. 1 is a perspective view of an automatic floor door according to an embodiment of the present invention,

fig. 2 is a front view of the moving members of the automatic floor door shutters,

fig. 3(a) is a front view of the automatic floor door set,

fig. 3(b) is a side view of the automatic floor door set,

fig. 3(c) is a side view of the coupling of an automatic

floor door shutter carriage with the corresponding sliding guide.

[0008] Referring now to figs. 1 and 2, the present invention, according to a possible embodiment thereof, is constituted by four shutters 1a, 1b, 2a and 2b, four carriages 3a, 3b, 4a and 4b, two sliding guides 5 and 6, a pulley system 10a, 10b, 11a and 11b and a transmission rope 12, sill guides 9a and 9b and a lock unit 13.

[0009] The shutters, below sliding on grooves formed in the guide 9b for shutters 1b and 2b and 9a for shutters 1a and 2a, are hung over the sliding guides 5 and 6 by the carriages: particularly, the shutter 1a is fixed on the carriage 3a, the shutter 1b on the carriage 3b, the shutter 2a on the carriage 4a and the shutter 2b on the carriage 4b.

[0010] The carriages 3a and 4a are formed by a slab, for each carriage, which, next to a side lying on a given vertical plane, has holes for fastening by bolts respectively the shutters 1a and 2a, and, next to the opposite side, lying on a plane parallel to the above plane, as better disclosed below, it has holes for fastening by bolts, respectively, a supporting slab 17 of the pulley 11a and a supporting slab 18 of the pulley 10a. Both of the slabs, for said carriages 3a and 4a, are shaped such that they have two vertical lying planes parallel to each other and spaced from each other by a quantity equal to the distance between the lying plane of the sliding guide 5 and the lying plane of the shutters 1a and 2a. Said supporting slabs 17 and 18 for the pulleys 11a and 10a are inclined in respect of the lying position of the carriage slabs at an angle such that they allow the transmission rope 12 for overcoming the drop being on said carriage slabs. Each carriage slab has further holes for connecting rollers for the sliding guide 5.

[0011] Carriages 3b and 4b, instead, can be easily manufactured since the correspondence between the lying plane of the shutters 1b and 2b and the lying position of the sliding guide 6 allows for realizing said carriages 3b and 4b by flat slabs provided with holes for fastening, even by bolts, at the shutters 1b and 2b, respectively, and with holes for connecting rollers for the sliding guide 6.

[0012] This embodiment provides, as it can be seen in fig. 3(a), not symmetrically closing shutters, with shutters 1a and 1b, on the whole, having width C greater than the whole width B of the shutters 2a and 2b. Such a choice, if, on one hand, constrains to have a shutter stop E not symmetrical in respect of the automatic door width, on the other hand, allows the adjustment of said automatic door to lift shaft with the walls, adjacent to the automatic door, having different widths D and F (see fig. 2) but, certainly, not smaller than B/2 and C/2 (see fig. 3(a)), respectively. It is to be envisioned the fact that, if it needs to choose a B/2 value much lower than the shutter height, due to the ratio between the automatic door width and the width of the adjacent walls, the shutter stiffness will be assured by ribs (not shown) formed on the same shut-

ter. Therefore, the use of carriages provided with double upper rollers 7 (see fig. 3(c)) for the sliding guide and with double lower rollers 8 gives the system the necessary stiffness and motion stability, as well.

[0013] Fig. 3(b), which is a side view of an embodiment of the present invention, clearly shows that the arrangement of the sliding guides 5 and 6 placed either on the same vertical plane or almost on the same vertical plane, as above disclosed with reference to figs. 1 and 2, leads to have floor door sill thickness A much more smaller than the thickness of conventional automatic door, whose hanging and sliding guides of the carriages lying beside each other on the same horizontal plane.

[0014] Fig. 3(c), finally, shows a special part of fig. 3 (b): the sliding guide 6 corresponding to the carriages 4b and 3b sliding by the action of the upper rollers 7 and the lower rollers 8 and the sliding guide 5 corresponding to the carriages 3a and 4a sliding by the action of the upper rollers 7 and the lower rollers 8. Therein it also can be seen how the transmission rope 12 due to the slope of the pulley 10a can pass, through the pulley 10b, from the carriage 4b to the carriage 4a, thus synchronizing the motion in the opening and closing steps.

[0015] The lock unit 13 (fig. 2), during the opening and closing steps of the floor door, is actuated by an electric motor fixed on the enclosure and, by means of suitable mechanisms for connecting to said lock unit 13, actuates the carriages 3b and 4b and the corresponding shutters, and by means of transmission and connection ropes 12 and 16 and the system of pulleys 10a, 10b, 11 a and 11 b actuates the carriages 3a and 4a and the corresponding shutters. In the case of malfunction of said lock unit 13 the unlocking function of the shutters can be realized by an emergency mechanism formed by an emergency lock 15 and a connecting rod 14 to the lock unit 13.

[0016] Those skilled in the art know that different embodiments can follow from the above disclosure which, therefore, does not be considered limited to the preferred embodiment just shown. Moreover it is to be envisioned the possibility to realize the present invention by different technologies and materials based on the features of the particular application the automatic lift door has been provided for.

Claims

1. An adjustment system for an lift automatic floor door comprising:

- (i) at least one couple of shutters (1a, 1b),
- (ii) at least one floor sill with double guide (9a, 9b) for lower sliding of said couple of shutters (1a, 1b),
- (iii) at least one couple of carriages (3a, 4a) fixed to said shutters (1a, 1b) sliding apart from each other, supported by coupling members, on at least one couple of sliding guides (5, 6)

characterized by the fact that said carriages have a geometric shape such that it allows for displacing said at least one couple of guides (5, 6) either on a same vertical plane, or on two different vertical planes, anyway laid upon, and the housing of the moving mechanic members of said at least one couple of shutters (1a, 1b) inside the space portion defined by said vertical plane.

2. The adjustment system for an lift automatic floor door according to claim 1, **characterized by the fact that** said carriages are slabs with different but parallel lying positions.
3. The adjustment system for an lift automatic floor door according to claim 1, **characterized by the fact that** said at least one couple of carriages (3a, 4a) is operatively connected to supporting means (17, 18) for counter members (10a, 11 a) for motion transmission elements (12) of said at least one couple of carriages (3a, 4a).
4. The adjustment system for an lift automatic floor door according to claims 2 and 3, **characterized by the fact that** said supporting means are inclined slabs such that they allow said transmission means (12) to go from one lying position to the other of said carriage slabs.
5. The adjustment system for an lift automatic floor door according to claim 2, **characterized by the fact that** said counter members (10a, 11 a) are pulleys.
6. The adjustment system for an lift automatic floor door according to claim 2, **characterized by the fact that** said transmission elements (12) are ropes.
7. The adjustment system for an lift automatic floor door according to claim 2, **characterized by the fact that** said transmission elements (12) are belts.

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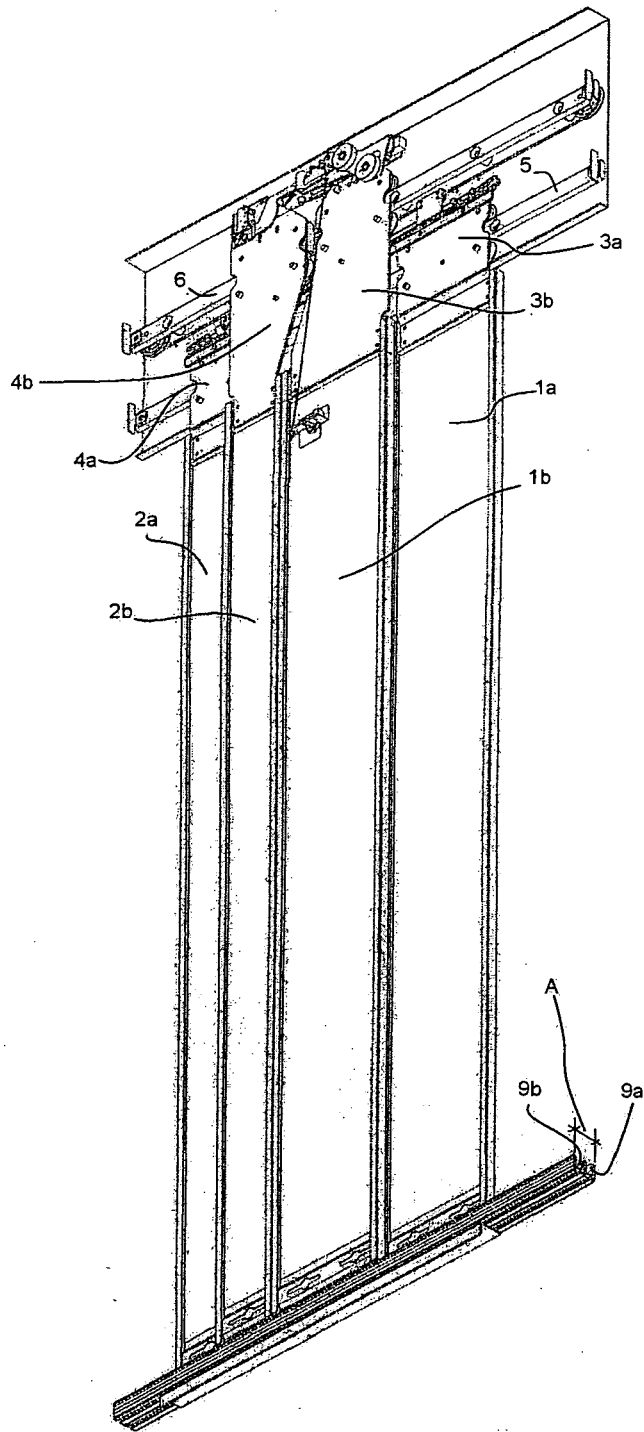


FIG. 1

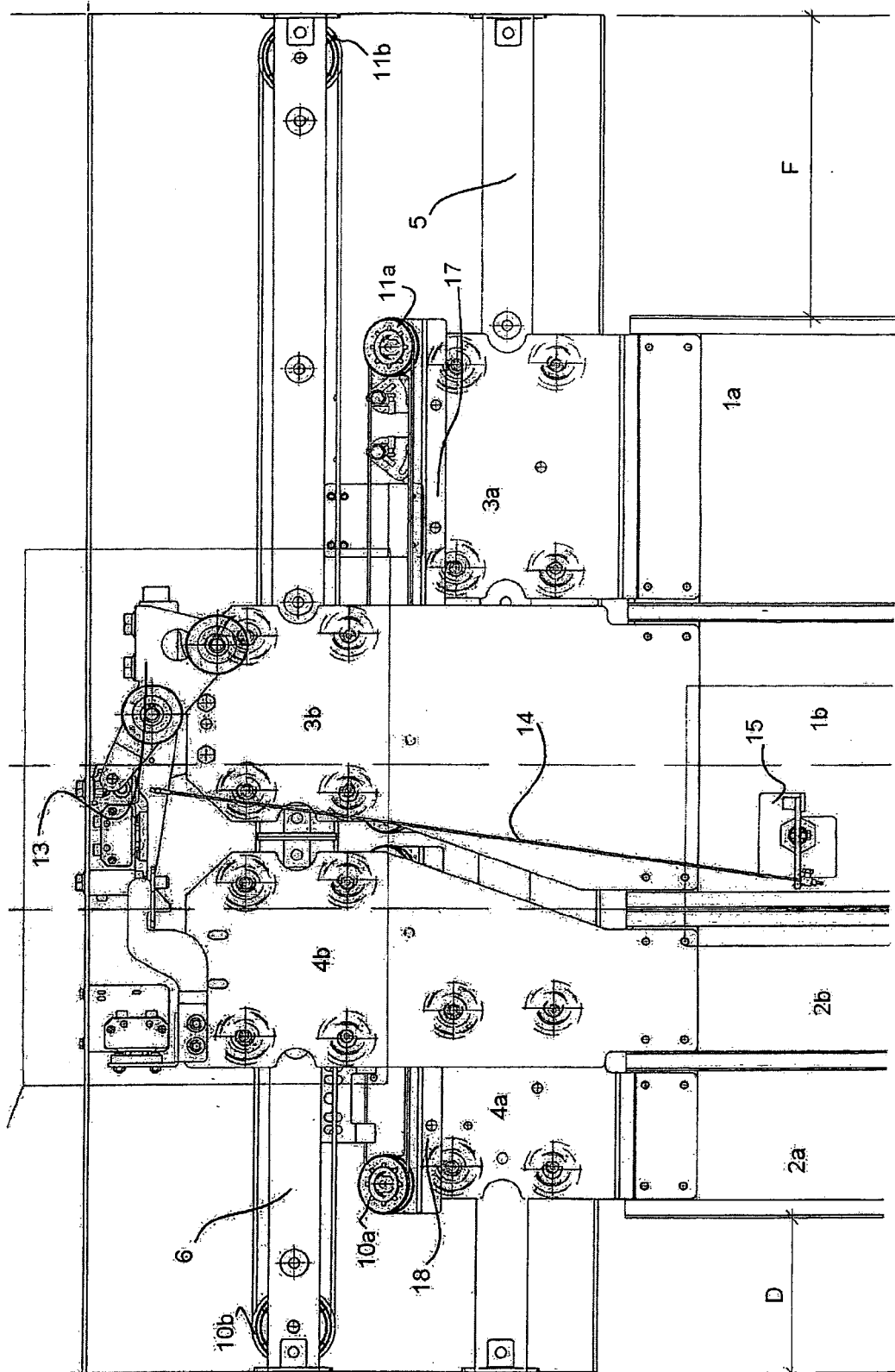


FIG. 2

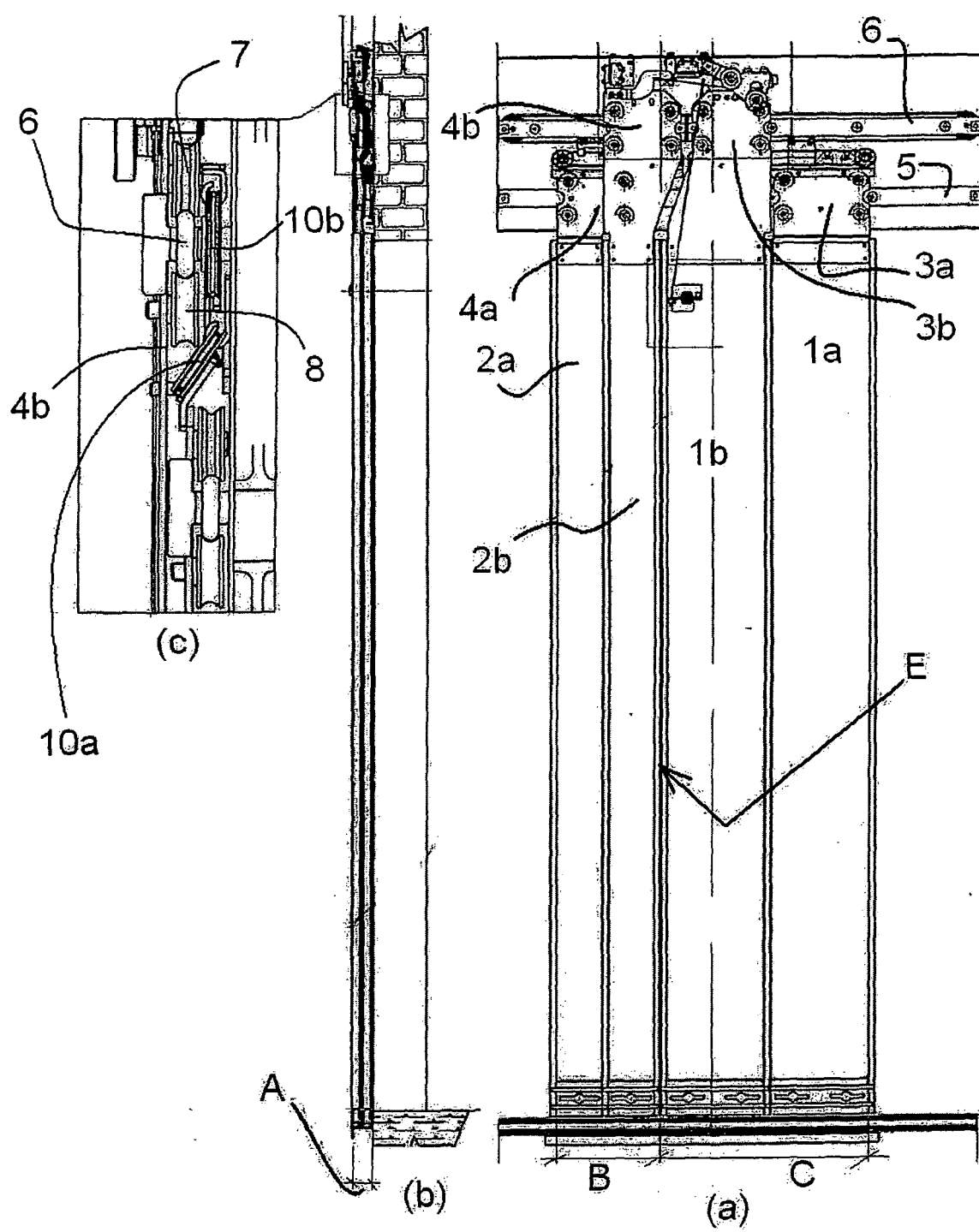


FIG. 3