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EUROPEAN PATENT APPLICATION

21 Application number: 89307527.5

51 Int. Cl.⁵: B 66 B 13/12
 B 66 B 13/06

22 Date of filing: 25.07.89

30 Priority: 26.07.88 GB 8817746

43 Date of publication of application:
 31.01.90 Bulletin 90/05

84 Designated Contracting States: DE FR GB IT

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54 Electrically driven service lift.

57 A service lift has a door assembly which includes vertical guides (20, 21) on opposite sides of an access opening, and two doors (22, 23) which are vertically slidable in the guides (20, 21). A flexible cable (33) links the doors (22, 23) for simultaneous movement in opposite direction towards and away from a shut position. The cable (33) is secured to the doors (22, 23) adjacent zones (26) thereof which abut when the doors are shut. The door assembly may be in an access opening in a car of the lift or in a landing opening.

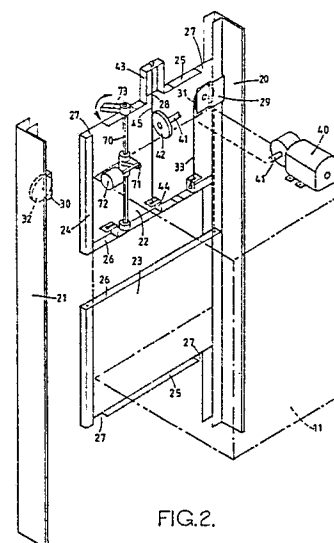


FIG. 2.

Description

ELECTRICALLY DRIVEN SERVICE LIFT

It is known to provide electrically driven service lifts for goods and documents. The shafts of such lifts generally have small cross sections, which precludes the lift doors from being operated horizontally. It is commonly required that the landing doors shall be vertically bi-parting. It is also desirable that the lift car shall have similar doors, to prevent articles in the car from overhanging. When large quantities of articles are to be transported by such a lift it is also desirable that both the car and landing doors shall open and close automatically, and substantially in unison. The operating mechanism for the doors should preferably extend for a minimum vertical distance outside the overall dimensions of the doors, in their shut conditions.

It is an object of the invention to provide a service lift in which the foregoing requirements are met.

It is a further object of the invention to provide a service lift which also includes means for positively locking the landing doors shut when the lift car is not stationary adjacent those landing doors.

Service lifts typically comprise a tower frame work which extends through the lift shaft. The varying floor-to-ceiling heights of buildings in which these lifts are installed usually means that precise measurements and pre-construction are necessary to ensure that the landing doors are located at the correct height above each floor. It is a further object of the invention to provide a service lift assembly in which a landing door may readily be located at any one of a plurality of positions over the length of the lift tower framework.

According to the invention a service lift includes a door assembly comprising vertical guides on opposite sides of an access opening, two doors slidably engaging said guides, and flexible coupling means for linking said doors for simultaneous sliding movement in opposite directions towards and away from mutual abutment, said coupling means being attached to said doors adjacent the zones of mutual abutment thereof.

According to another aspect of the invention a service lift includes a vertically extending tower framework one face of which is adapted to provide landing openings for access to a lift car within the framework, said one face including two spaced vertical members and transverse bracing elements securable to said vertical members at desired positions along the length thereof, said vertical members having a plurality of holes at substantially equal pitches along the lengths of said members, and two landing door frame elements secured to respective ones of said vertical members, said frame elements having holes spaced at whole number multiples of said pitches, whereby said frame elements may be secured to said frame work at desired locations, and said transverse bracing elements located clear of a landing door opening defined between said frame elements.

An embodiment of the invention will now be described by way of example only and with reference

to the accompanying drawings in which:-

Figure 1 is pictorial view of part of a service lift assembly,

Figure 2 is an exploded pictorial view of a door assembly for car of the lift and

Figure 3 is an exploded pictorial view of a landing door assembly.

As shown in Figure 1 a service lift includes a vertical tower framework 10 in which a lift car 11 is movable by a geared electric motor 12. A front face of the framework 10 includes parallel vertical members 13, 14 and a plurality of transverse bracing elements 15. Mounted between the members 13, 14 are vertically bi-parting landing doors 16, 17, later to be described in detail. Bi-parting doors, not shown in Figure 1, are also provided on the car 11.

The car 11 is shown in chain-dotted outline in Figure 2. Secured to respective opposite sides of the car 11 are guides 20, 21, the guide 21 being shown laterally displaced in the interest of clarity. The guides 20, 21 define channels whose inner surfaces are lined with a suitable anti-friction material. Car doors 22, 23 have turned back opposite edges 24 which are freely slidable in the guides 20, 21. The doors 22, 23 have identical basic constructions and include flanges 25, 26 on their horizontal edges. Portions of the flange 25 are removed on both doors, as indicated at 27. The door 22 corresponds to the door 23 in a reversed orientation, with an additional portion 28 of the flange 25 removed and with additional elements added, as described hereafter. The doors 22, 23 are movable between open positions in which access to the inside of the car 11 is unobstructed, and shut positions in which their flanges 26 are in mutual abutment.

Mounted on the respective guides 20, 21 by brackets 29, 30 are respective pulleys 31, 32. Thin wire cables 33, only one of which is shown, are led round the respective pulleys 31, 32 and secured to the doors 22, 23 adjacent their respective flanges 26. Since the flanges 26 abut when the doors 22, 23 are shut, and the doors move open through distances substantially equal to their respective heights, the pulleys 31, 32 may be located on the guides 20, 21 only just above the flange 25 of the door 22 in the shut position thereof. The removed portions 27 allow the flange 25 to move past the pulleys 31, 32 as the door 22 shuts. The run of the cable 33 between the pulleys 31, 32 and the door 23 lies within the turned back edges 24 of the door 22.

Mounted on top of the car 11 is a geared electric motor 40 whose output shaft 41 is secured to a further pulley 42. It will be appreciated that in the drawing the motor 40 is shown displaced from its correct position. Passing round the pulley 42 and extending between brackets 43, 44 on respective flanges 25, 26 is a fine wire cable 45. The bracket 43 and the removed portion 28 of the flange 25 provide clearance for the pulley 42. The bracket 44 may comprise a leaf-spring by means of which a suitable

tension in the cable 45 is maintained.

It will be apparent that rotation of the pulley 42 in respective opposite directions moves the door 22 to and from its open and shut positions, this movement being simultaneously applied through the cables 33 to the door 23.

The landing door assembly shown in Figure 3 comprises two vertical guides 50, 51 secured to respective ones of the vertical members 13, 14 of the tower framework. The members 13, 14 comprise angle sections in which each limb has a plurality of equispaced holes at short pitches, for example 2.5mm. The transverse bracing elements 15 are mounted on brackets 52, 53 which are secured by bolts to the sides of the vertical members 13, 14 so that the elements 15 are spaced forwardly of the members 13, 14, whereby flanges 54 of the guides 50, 51 can pass between the members 13, 14 and the bracing elements 15. The flanges 54 are provided with a plurality of holes which are spaced at whole multiples of the pitches of the holes in the members 13, 14, so that the guides 50, 51 may be located at any desired vertical position on the tower framework. The transverse elements 15 may also readily be located to clear the landing door opening.

Vertically slidable in the guides 50, 51 are doors 55, 56 whose basic construction is identical with that of the car doors 22, 23, corresponding parts being indicated by identical reference numerals. Pulleys 57 are mounted on the guide 54 in a manner similar to the mounting of pulleys 31, 32 of Figure 2, and cooperate with cables 49 which are connected to the doors 55, 56 adjacent the abutting flanges 26 thereof to provide movement in unison of the doors 55, 56. As indicated in Figure 3, a slot 48 is provided in each edge of both of the doors 55, 56, only one such edge being shown, for clarity. Two slots 49 are positioned in each of the guides 50, 51 so as to be aligned with the respective slots 48 when the doors 55, 56 are shut. A latch 59 is pivoted on the flange 54 of the guide 50, and has projections 63 which can pass through the slots 49 in the guide 50 and engage the slots 48 in adjacent edges of the doors 55, 56 when the latter are shut thereby preventing the doors 55, 56 from opening. Mounted on the latch 59 is a roller 60 which is engagable by a projection on the car 11 to pivot the latch 59 clear of the slots 48, 49 and release the doors when the car 11 is at the landing opening associated with the doors. A plunger switch 61 is operated by the latch 59 to give an indication whether the latter is, or is not, engaged. A further plunger switch 62 is mounted on the guide 51 to provide an indication as to whether the doors 55, 56 are open or shut. The bifurcated construction of the latch 59 allows the projections to pass clear of the cable 49 within the guide 50.

Referring back to Figure 2 the door 22 includes a mechanism for causing the landing doors 55, 56 to move in unison with the car doors 22, 23. This mechanism comprises a non-circular shaft 70 which is restrained against axial movement but is pivotally mounted between the flanges 25, 26 of the door 22. A crank-arm 71 is mounted on the cab 11 so as not to be movable vertical relative thereto and is pivotal by a solenoid 72, also mounted on the cab 11. The

crank arm 71 is slidable on the shaft 70 and has a non-circular bore so as to impart rotation to the shaft 70. A tongue 73 is secured to the shaft 70 and is movable by the solenoid 72 between a position in which it is aligned with the flange 25 and a position in which it extends forwardly of the door 22 to engage one or other of a plurality of recesses defined between brackets 74 on the door 55 (Figure 3).

When the car 11 is sensed by suitable means as being stationary at a selected landing door and the latch 59 (Figure 3) is sensed by the switch 61 as being disengaged, the solenoid 72 (Figure 2) is operated so that the tongue 73 engages the brackets 74. The motor 40 is then energised to open the doors 22, 23, the tongue 73 causing the doors 55, 56 to open at the same time. When the doors have been reshut the solenoid 72 disengages the tongue 73 from the door 55 and the doors 22, 23 are free to move vertically with the car 11.

Claims

1. A service lift including a door assembly comprising vertical guides (20, 21 or 50, 51) on opposite sides of an access opening, two doors (22, 23 or 55, 56) slidably engaging said guides (20, 21 or 50, 51), and a flexible coupling (33 or 58) for linking said doors (22, 23 or 55, 56) for simultaneous sliding movement in opposite directions towards and away from mutual abutment, said flexible coupling (33 or 58) being attached to said doors (22, 23 or 55, 56) adjacent zones (26) of mutual abutment thereof.

2. A lift as claimed in claim 1 in which said coupling comprises to coupling elements (33 or 58) which pass round respective pulleys (31, 32 or 57) which are fixedly located with respect to said guides (20, 21 or 50, 51), said pulleys (31, 32 or 57) lying wholly within the range of travelling movement of one of said doors (22 or 55).

3. A lift as claimed in claim 1 or claim 2 in which said door assembly is on a car (11) of the lift.

4. A lift as claimed in claim 3 which includes a further door assembly as above defined at each landing access opening, and a device (70-74), operable when the doors (22, 23) on said car (11) are substantially aligned with the doors (55, 56) at a landing access opening, for moving the car and landing doors in unison.

5. A lift as claimed in claim 4 in which said device for moving the car and landing doors in unison comprises a projection (73) mounted on one of said car doors (22), a structure (74) on one of said landing doors (55) for receiving said projection (73) and an actuator (72) for moving said projection (73) into engagement with said structure (74).

6. A lift as claimed in any preceding claim which includes a latch (59) engageable with at least one of the doors (55, 56) of said further door assembly for preventing the doors (55, 56)

of said further assembly from moving from their shut positions, said latch (59) being engagable by a car (11) of the lift to release the doors (55, 56) of the further assembly when said car (11) is aligned with the doors of said further assembly.

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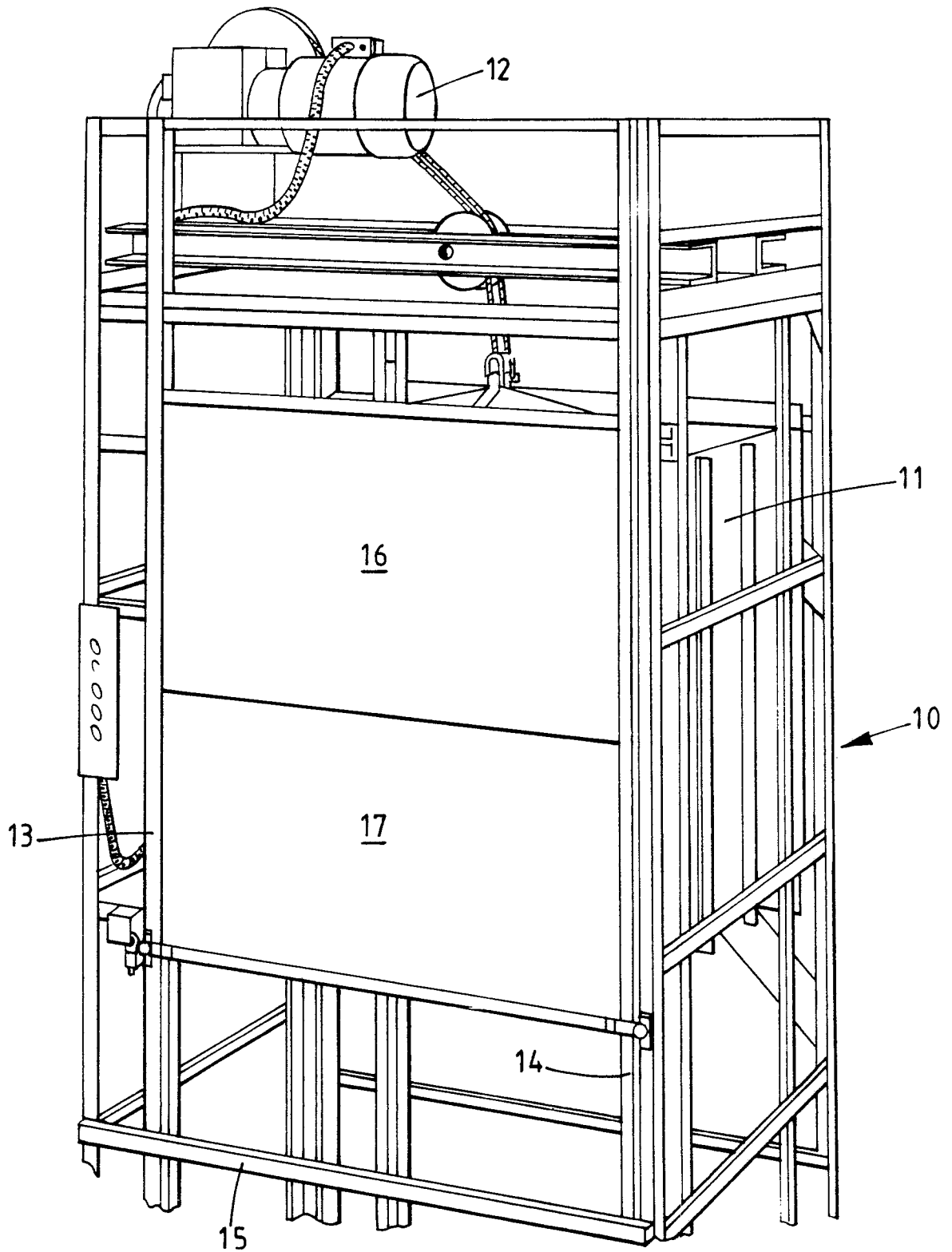
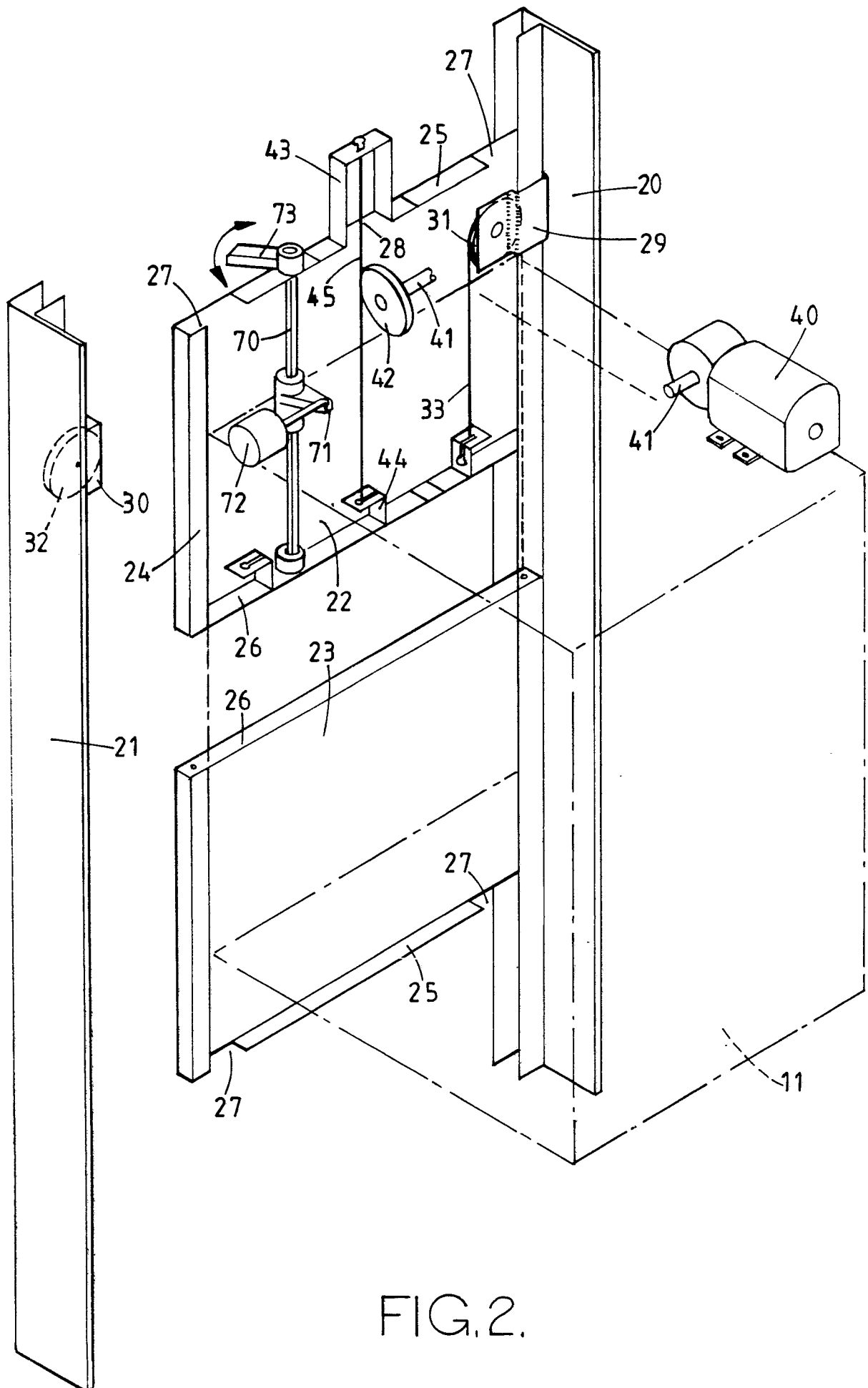


FIG. 1.



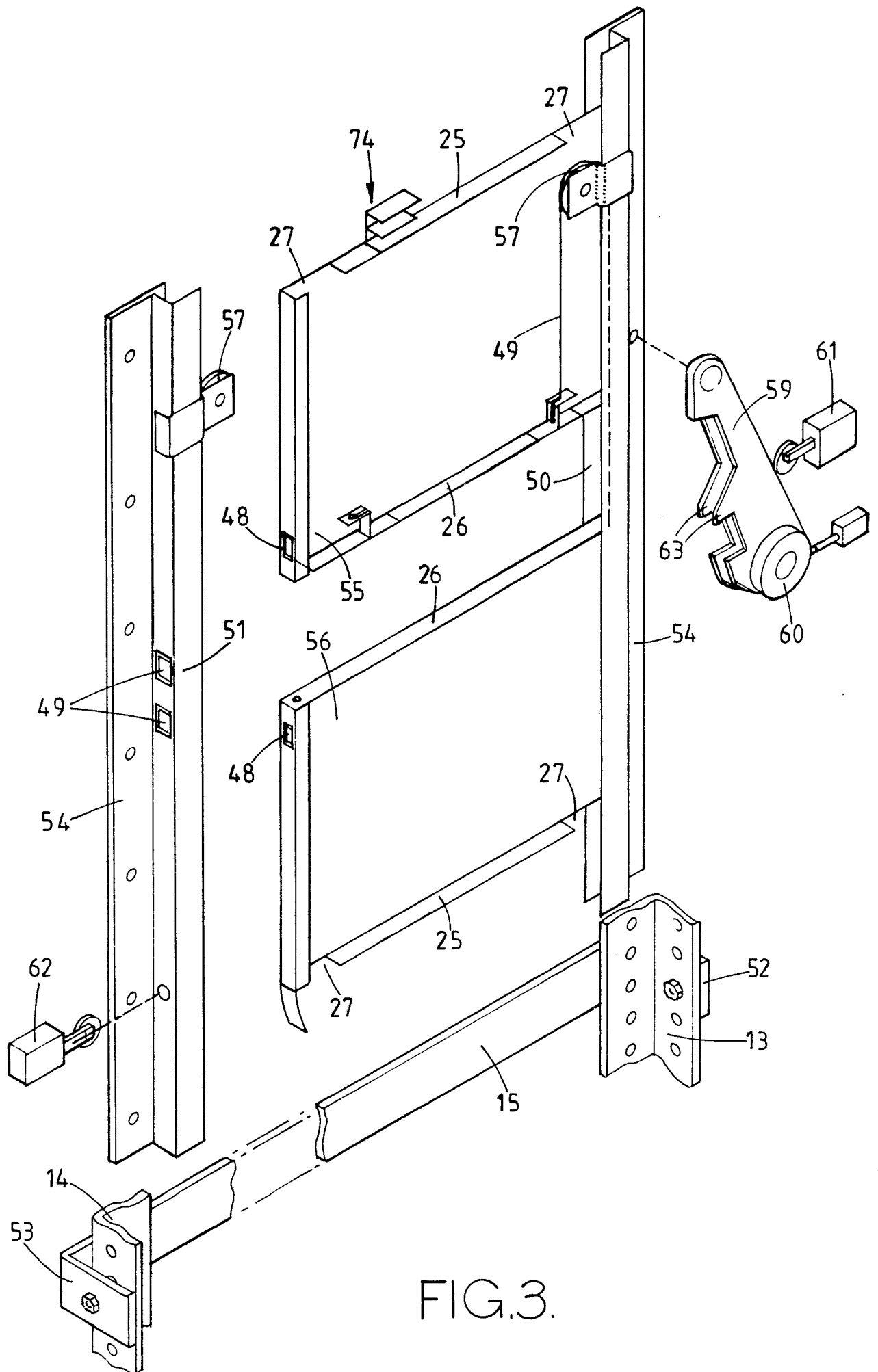


FIG.3.