



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
18.01.2006 Bulletin 2006/03

(51) Int Cl.:
B66B 5/02 (1968.09)

(21) Application number: **04721634.6**

(86) International application number:
PCT/JP2004/003632

(22) Date of filing: **18.03.2004**

(87) International publication number:
WO 2004/089801 (21.10.2004 Gazette 2004/43)

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

(72) Inventors:
• **MURAKAMI, Shin**
Hachioji-shi, Tokyo 1930943 (JP)
• **ISHII, Takashi**
2710092 (JP)
• **URATA, Naoki**
Fuchu-shi, Tokyo 1830043 (JP)

(30) Priority: **09.04.2003 JP 2003105363**

(71) Applicant: **Toshiba Elevator Kabushiki Kaisha**
Shinagawa-ku,
Tokyo 141-0001 (JP)

(74) Representative: **Kramer - Barske - Schmidtchen**
European Patent Attorneys
Patenta
Radeckestrasse 43
81245 München (DE)

(54) **BRAKE-RELEASING DEVICE FOR ELEVATOR HOIST AND METHOD OF OPERATING THE SAME**

(57) A brake release apparatus includes an outer tube 11 extending between a brake 102a of a hoist 102 and a storage box 20 disposed near an elevator hall 108, and an inner wire 12. An operation lever 40 connected to the inner wire 12 is rotatably disposed on a frame 30 in the storing box 20. The outer tube 11 is connected to the frame 30 through an outer tube securing shaft 35. The inner wire 12 has one end 12a connected to the operation lever 40 through an inner wire connecting shaft 46.

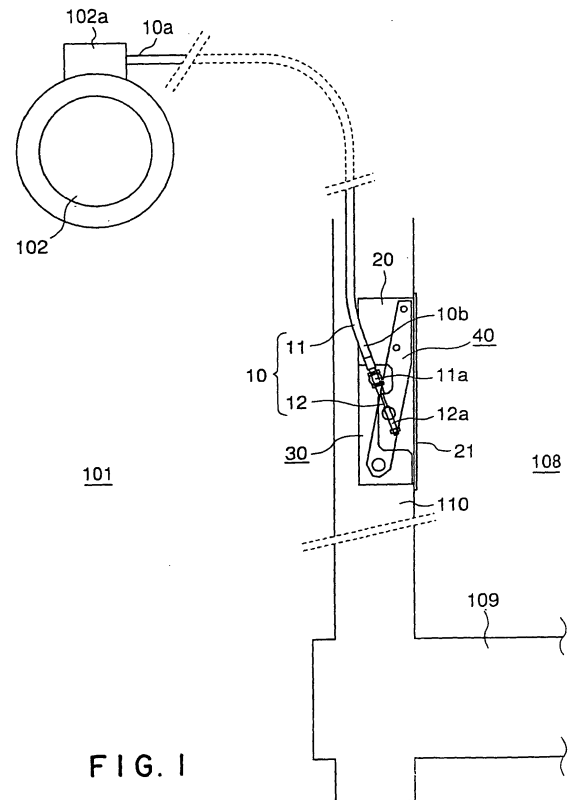


FIG. 1

DescriptionBACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a brake release apparatus of an elevator hoist, which is used for releasing a brake of an elevator hoist when the elevator hoist cannot be driven.

Background Art

[0002] During the operation of an elevator, it is possible that the operation of an elevator hoist (hereinafter also referred to as "hoist") becomes impossible because of an earthquake, a power failure, a breakdown of the elevator or the like. In this situation, a car stops between floors and a rescue operation is carried out by manually releasing a brake of the hoist so as to vertically move the car to an elevator hall.

[0003] Various apparatus for manually releasing a brake of a hoist have been proposed. For example, a rescue operation mechanism (see, for example, Japanese Patent Laid-Open Publication No. 2001-233563) is known, in which a brake wire is pulled during a rescue operation to release a brake by drawing an end of the brake wire to an elevator hall floor, and pushing down a foot lever temporarily installed on the elevator hall floor.

[0004] Another apparatus (see, for example, Japanese Patent Laid-Open Publication No. 2001-122547) includes a brake release wire disposed between a hoist and a manual operation part of an elevator, a pinion fixed on a rotary shaft of the hoist, a rack meshed with the pinion, a meshing wire for displacing the rack to a meshing position, and a manual driving wire for longitudinally reciprocating the rack. A brake release lever, a manual driving lever, and a meshing lever, which are for operating these wires, are secured to an indicator box located in an elevator hall.

[0005] A braking force setting apparatus of a hoist (see, for example, Japanese Patent Laid-Open Publication No. 2001-294386) is known, which is installed during a rescue operation on an elevator hall floor near a lower part of an elevator shaft, and includes a lever mechanism for independently pulling two pairs of brake wires disposed on a hoist.

[0006] In all the above-described inventions, an outer tube of a brake wire of a hoist is secured to a structure such as a frame, and an end of an inner wire is connected to a lever so that the inner wire is pulled relative to the outer tube by a rotation of the lever. A male screw is formed outside an end part of the outer tube so as to secure the outer tube to the structure by a nut.

[0007] In the above-described prior art, in installing a brake release apparatus near an elevator hall floor, if a car is located near the elevator hall, there may be a case in which a terminal of a brake wire disposed in an elevator

shaft cannot be drawn to the elevator hall. If the drawing of the terminal of the brake wire out of the elevator shaft is somewhat troublesome or time-consuming, the rescue may be delayed.

5 **[0008]** The brake wire must be loosened in the elevator shaft in order to draw the terminal of the brake wire to the elevator hall floor. However, the loosened wire might become entangled with the car. In addition, by drawing the brake wire to the elevator hall, a part of the brake
10 wire might bulge toward a car, or the brake wire may move because a tension is applied thereto. Then, the brake wire might become entangled with the car being guided.

15 **[0009]** In general, a relatively large operation lever is needed to release a brake of a hoist, because a force in a range of from several hundred N to 1 kN or above must be applied to an operation wire over a stroke of several tens of millimeters.

20 **[0010]** Thus, when storing such an operation lever in a box of an indicator in an elevator hall, the box must also be large, which results in a deterioration of the design.

25 **[0011]** A lever for pulling an inner wire of a brake wire is rotated about its supporting axis. Thus, with the pulling action, a direction to which the inner wire is pulled and a direction to which the outer tube is fixed might be misaligned. Then, it is likely that a friction force between the inner wire and the outer tube is increased, and thus, a smooth operation cannot be achieved, or further, the inner wire is damaged so that the safety of the rescue operation deteriorates.

30 **[0012]** In order to decrease a friction force between the inner wire and the outer tube, a misalignment of an angle must be reduced. That is, an operation angle of the lever must be reduced.

35 **[0013]** In order to obtain a force and a stroke required for a pulling action, one of the effective solutions is to extend a distance between a position where the inner wire is pulled and a rotational center of the lever. However, this solution causes the lever to be elongated as a whole. Thus, the brake release apparatus becomes larger, which produces such disadvantages that a larger storing space is needed, and that the design thereof deteriorates.

40 **[0014]** The other effective solution is to constitute the brake such that the brake can be released with a shorter stroke, which causes a pulling force to be increased. Here, there are the disadvantages that a thicker wire is needed, and the constitution of the brake is enlarged.
45 With a shorter stroke and an increased pulling force, a fine adjustment of the pulling force becomes difficult, and it might be difficult to execute a rescue operation in a stable manner.

55 SUMMARY OF THE INVENTION

[0015] The present invention is made in view of the above disadvantages. It is an object of the present in-

vention to provide a brake release apparatus of an elevator hoist and a method of operating the same in which a brake wire is not needed to be loosened in an elevator shaft, the brake wire does not bulge in the elevator shaft during a rescue operation, and a large lever is not needed.

[0016] A brake release apparatus of an elevator hoist according to the present invention for releasing a brake of an elevator hoist disposed in an elevator shaft from an elevator hall having an elevator hall door so as to guide a car, comprises: a housing disposed near the elevator hall, and incorporating therein a frame; an outer tube extending between the brake of an elevator hoist and the housing; an inner wire extending in the outer tube; and an operation lever rotatably disposed on the frame in the housing, and connected to the inner wire; wherein the outer tube is connected to the frame via an outer tube rotation supporting means, and the inner wire has one end connected to the operation lever via an inner wire rotation supporting means.

[0017] According to the present invention, the outer tube rotation supporting means includes a first shaft-shaped member through which the outer tube passes in a direction perpendicular to a shaft axis of the first shaft-shaped member, and the inner wire rotation supporting means includes a second shaft-shaped member through which the inner wire passes in a direction perpendicular to a shaft axis of the second shaft-shaped member.

[0018] According to the present invention, when the inner wire is pulled by rotating the operation lever, the outer tube rotation supporting means is rotated and the outer tube is constantly oriented to a direction where the inner wire is pulled. Thus, a friction force cannot be applied between an inner surface of the end part of the outer tube and the inner wire, and therefore a smooth operation can be achieved and an operation reliability is increased. In addition, an operation angle of the operation lever can be increased, and therefore an operation stroke of the operation lever can be increased even if the length of the operation lever is small. As a result, the apparatus itself can be more compact.

[0019] According to the present invention, an additional lever for extension is connected to the operation lever.

[0020] According to the present invention, the additional lever which is detached from the operation lever is stored in the housing.

[0021] According to the present invention, the operation lever can be further extended by attaching the additional lever to the operation lever. Thus, it is not necessary to provide a longer single lever, or a larger housing containing the longer single lever.

[0022] According to the present invention, when the operation lever is in the housing, the one end of the inner wire is separated from the operation lever, and when the operation lever is out of the housing, the one end of the inner wire is connected to the operation lever.

[0023] According to the present invention, the inner

wire is prevented from being mistakenly pulled. As a result, a favorable security and operability can be achieved.

[0024] According to the present invention, the housing is disposed on a position of the elevator hall where an operator can open the elevator hall door and operate the operation lever while watching the car in the elevator shaft.

[0025] A method of operating a brake release apparatus of an elevator hoist according to the present invention for releasing a brake of an elevator hoist disposed in an elevator shaft from an elevator hall having an elevator hall door so as to guide a car, the brake release apparatus comprising a housing disposed near the elevator hall and incorporating therein a frame, an outer tube extending between the brake of an elevator hoist and the housing, an inner wire extending in the outer tube, and an operation lever rotatably disposed on the frame in the housing and connected to the inner wire, wherein the outer tube is connected to the frame via an outer tube rotation supporting means, and the inner wire has one end connected to the operation lever via an inner wire rotation supporting means, comprising the steps of: opening the elevator hall door of the elevator hall; and operating the operation lever from the elevator hall to release the brake so as to guide the car while watching the car in the elevator shaft through the elevator hall door.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026]

Fig. 1 is a diagrammatic view showing an embodiment of a brake release apparatus of an elevator hoist according to the present invention;

Fig. 2 is an outline view of the brake release apparatus according to the present invention when viewed from an elevator hall;

Figs. 3(a) to 3(d) are illustrational views showing in detail a structure of the brake release apparatus according to the present invention;

Figs. 4(a) to 4(c) are illustrational views showing how a lever is connected to the brake release apparatus according to the present invention;

Figs. 5(a) to 5(c) are illustrational views showing an operation of a lever of the brake release apparatus according to the present invention; and

Fig. 6 is a diagrammatic view showing an example of a structure of an elevator.

DETAILED DESCRIPTION OF THE INVENTION

[0027] An embodiment of a brake release apparatus according to the present invention is described below with reference to the drawings.

[0028] A general elevator is described with reference to Fig. 6. Fig. 6 is a diagrammatic view showing an example of an elevator.

[0029] An elevator 100 includes a car 104 disposed in a vertically movable manner in an elevator shaft 101 of a building, and an elevator hoist (also referred to as "hoist") 102 disposed in an upper part of the elevator shaft 101. A rope 103 pending from the hoist 102 is passed round driven sheaves 105 disposed under the car 104, and one end of the rope 103 is supported near an upper end of the elevator shaft 101.

[0030] The rope 103 pending from the hoist 102 is passed round a sheave 107 built on an upper part of a counterweight 106, and the other end of the rope 103 is supported near an upper end of the elevator shaft 101.

[0031] An elevator hall 108 of each floor includes a floor 109, a wall 110, and an elevator hall door 111.

[0032] A brake release apparatus of an elevator hoist is described with reference to Fig. 1. In Fig. 1, the elevator shaft 101 is shown on the left, and the elevator hall 108 is shown on the right.

[0033] As shown in Fig. 1, the hoist 102 includes an emergency brake 102a. A brake release apparatus of an elevator hoist according to the present invention releases the brake 102a of the hoist 102 from a side of the elevator hall 108.

[0034] That is, the brake release apparatus includes: a storage box (housing) 20 disposed on the wall 110 near the elevator hall 108, and incorporating therein a frame 30; a flexible outer tube 11 extending between the brake 102a of the hoist 102 and the storage box 20; a flexible inner wire 12 extending in the outer tube 11; and an operation lever 40 rotatably disposed on the frame 30 in the storage box 20, and connected to the inner wire 12.

[0035] The outer tube 11 and the inner wire 12 constitute a brake wire 10. One end 10a of the brake wire 10 is connected to the brake 102a, while the other end 10b of the brake wire 10 is guided to the frame 30 of the storage box 20.

[0036] By pulling the inner wire 12 of the brake wire 10 with the operation lever 40, the brake 102a of the hoist 102 is adapted to be released. The storage box 20 is disposed on a position of the elevator hall 108 where an operator can open the elevator hall door 111 and operate the operation lever 40, while watching the car 104 in the elevator shaft 101.

[0037] An inner structure of the storage box (housing) 20 is described. The frame 30 is secured in the storage box 20. The operation lever 40 is rotatably disposed relative to the frame 30. The outer tube 11 has an end fitting 11a which is rotatably supported on the frame 30 through an outer tube securing shaft (first shaft-shaped member) 35. The inner wire 12 has an end fitting 12a which is supported on a middle part of the lever 40 through an inner wire connecting shaft (second shaft-shaped member) 46. The storage box 20 is provided with a cover 21, and thus an inside of the storage box 20 is invisible from the elevator hall 108.

[0038] Fig. 2 is an outline view of the storage box 20 when viewed from an elevator hall. An indicator panel 112 having not shown call buttons is disposed on the wall

110 of the elevator hall 108. The storage box 20 with the cover 21 is disposed near the indicator panel 112. A key 22 is disposed on the cover 21.

[0039] The inner structure of the storage box 20 is described further in detail with reference to Figs. 3(a) to 3(d). Figs. 3(a) to 3(d) respectively show the inner structure of the storage box 20. Fig. 3(a) is a side view showing the inner structure of the storage box 20. Fig. 3(b) is a front view thereof. Fig. 3(c) is an enlarged view of Fig. 3(b). Fig. 3(d) shows an outer tube securing shaft.

[0040] The frame 30 includes a pair of frame plates 31 of the same shape, a frame block 32 sandwiched between the pair of frame plates 31, and bolts 33 for securing the pair of frame plates 31 to each other. The frame block 32 is secured on a stationary board 113 disposed in the wall 110 by four bolts 34.

[0041] The operation lever 40 is supported inside the pair of frame plates 31 in a swingable manner about a lever rotation shaft 41 attached to the respective frame plates 31. The operation lever 40 includes a pair of lever plates 42 of the same shape, a spacer 43 sandwiched between the pair of lever plates 42, and a bolt 44 for securing the pair of lever plates 42 to each other. Each of the lever plates 42 has a hole 42a at its end. A supplemental pipe (additional lever) 45 can be connected to the operation lever 40 through the holes 42a. The supplemental pipe 45 is stored in the storage box 20.

[0042] A screw 13 is formed outside the end fitting 11a of the outer tube 11. The outer tube securing shaft 35 has a hole which is perpendicular to a shaft axis of the outer tube securing shaft 35. With the end fitting 11a being inserted in the hole, two nuts 14 are screwed to be engaged with the screw 13, so that the end fitting 11a is secured to the outer tube securing shaft 35. The outer tube securing shaft 35 is rotatably supported relative to the frame plates 31. The outer tube securing shaft 35 has two planar machining surfaces 35a with which the nuts 14 are in contact. Lock rings 35b are attached on both ends of the outer tube securing shaft 35.

[0043] A screw 15 is formed at an end of the end fitting 12a of the inner wire 12. The end fitting 12a passes through a hole perpendicular to a shaft axis of the inner wire connecting shaft 46. A nut 16 is attached on an end of the screw 15. The inner wire connecting shaft 46 is rotatably supported relative to the two lever plates 42. A planar machining surface 46a of the inner wire connecting shaft 46 is provided, with which the nut 16 is to be in contact. Lock rings 46b are attached on both ends of the inner wire connecting shaft 46. In Figs 3(a) to 3(d), the machining surface 46a of the inner wire connecting shaft 46 and the nut 16 are not in contact with each other, with a slight allowance therebetween.

[0044] An operation of the brake release apparatus thus constituted is described below with reference to Figs. 4(a) to 4(c) and Figs. 5(a) to 5(c).

[0045] When a hoist of an elevator cannot be driven because of errors or damages, the car 104 stops between the floors with the brake 102 of the hoist 102 being op-

erated, and a rescue operation of passengers in the car 104 is carried out by the following steps.

[0046] First, an operator slightly opens the door 111 of the elevator hall 108 on the floor near the hoist 102, so that an inside of the elevator shaft 101 is visible.

[0047] Following steps are described with reference to Figs. 4(a) to 4(c). Figs. 4(a) to 4(c) are side views showing an inside of the storage box 20 in a perspective manner. Fig. 4(a) shows the storage box 20 covered with the cover 21. The reference symbol G indicates a length of an allowance between the machining surface 46a of the inner wire connecting shaft 46 and the nut 16.

[0048] In Fig. 4(a), the key 22 of the storage box 20 is unlocked to open the cover 21, and the operation lever 40 is inclined toward the operator. Then, an end of the operation lever 40 is projected out of the storage box 20 to bring the machining surface 46a and the nut 16 in contact with each other (Fig. 4(b)). At this time, the allowance (G) becomes zero, but no tension is applied to the inner wire 12.

[0049] Then, by using the holes 42a at the end of the projected operation lever 40, the supplemental pipe 45 is connected to the operation lever 40 by bolts 47 (Fig. 4(c)).

[0050] An operation for pulling the inner wire 12 is described with reference to Figs. 5(a) to 5(c). Figs. 5(a) to 5(c) are schematic views showing operations of the operation lever 40 to which the supplemental pipe 45 is connected.

[0051] While watching the inside of the elevator shaft 101 from a gap of the elevator hall door 111, the operator grasps an end part of the supplemental pipe 45 to pull down the same. Then, a relative distance between the outer tube securing shaft 35 and the inner wire connecting shaft 46 is increased, and thus the inner wire 12 is pulled relative to the outer tube 11. That is, a state shown in Fig. 5(a) is changed into that shown in Fig. 5(b). Fig. 5(c) shows a state in which the operation lever 40 is further pulled down.

[0052] In accordance with an inclination of the operation lever 40, an end of the inner wire 12 is moved in an arcuate manner. Since the outer tube securing shaft 35 is rotatable relative to the frame 30, the end fitting 11 a of the outer tube 11 is constantly oriented to a direction where the inner wire is pulled. Since the inner wire connecting shaft 46 is also rotatably supported relative to the operation lever 40, no bending load is applied to the inner wire 12, when the operation lever 40 is rotated.

[0053] When the inner wire 12 is pulled, the brake 102a of the hoist 102 is released. Thus, a heavier one of the car 104 and the counterweight 106 is lowered. If weights of the car 104 and the counterweight 106 are counterbalanced, in order that their weights are not counterbalanced, a weight of the counterweight 106 is made heavier or lighter to apply a load to either one of the car 104 or the counterweight 106 by means of a method which is not described in detail.

[0054] In this way, the operator continually pulls down

the operation lever 40, while watching the car 104 in the elevator shaft 101. Through this operation, a speed of the car 104 is suitably adjusted as the brake 102a is released, so as to guide the car 104 to a front surface of the elevator hall 108. Thereafter, the elevator hall door 111 and the door of the car 104 are opened, and the passengers are rescued.

[0055] As described above, the following effects are obtained according to the embodiment of the present invention.

[0056] The brake 102a of the brake 102 can be released only by connecting the supplemental pipe 45 to the operation lever 40 in the storage box 20 disposed on the wall 111 of the elevator hall 108, and pulling down the supplemental pipe 45. Thus, there is no need to draw the brake wire to a floor of the elevator hall. Even when the car is located near the elevator hall floor, an operation can be securely carried out without problem. Further, since there is no need for the brake wire to be loosened in the elevator shaft, and the brake wire would not bulge in the elevator shaft during a rescue operation, a security can be improved.

[0057] In accordance with a rotation of the operation lever 40, the outer tube securing shaft 35 is rotated relative to the frame 30 so as to be constantly oriented to a direction where the inner wire 12 is pulled. Thus, between an inner surface of the end part of the outer tube 11 and the inner wire 12, a friction force can not be applied, so that a smooth operation can be achieved. As a result, a damage of the inner wire 12 is prevented, and a sufficient reliability can be obtained.

[0058] Since an operation angle of the operation lever 40 can be increased, a pulling action with a larger stroke can be realized without using an elongated lever. Consequently, the apparatus can be made more compact and smaller. Since a fine adjustment of a pulling force is permitted, an excellent operability is provided.

[0059] The inner wire connecting shaft 46 is rotated relative to the frame 30. Thus, when an operation angle of the operation lever 40 is increased, no excessive bending load is applied to an end of the inner wire 12, and thus a smooth operation can be achieved.

[0060] By providing an allowance with the inner wire 12, a play is given to an angle of the operation lever 40 when stored in the storage box 40, and an angle of the operation lever 40 when the supplemental pipe 45 is connected to the operation lever 40. Thus, in connecting the supplemental pipe 45 to the operation lever 40, the inner wire 12 is prevented from mistakenly pulled. As a result, a favorable security and operability can be obtained. In addition, since the operation lever 40 and the supplemental pipe 45 can be stored in the storage box 20 by fully using a space thereof, the small storage space in the storage box 20 can be effectively utilized, and the storage box 20 can be made smaller.

[0061] The above embodiment exemplifies one supplemental pipe 45 to be connected to the operation lever 40. However, not limited thereto, two or more supple-

mental pipes 45 may be connected to the operation lever 40 so as to suitably reduce a force required for operating the operation lever 40. The operation lever may be extended by using a foldable link mechanism or a stretchable lever. Alternatively, the operator can carry a lever for extension with him or her.

[0062] In the above embodiment, the outer tube securing shaft 35 and the inner wire connecting shaft 46 are supported by the frame plates 31 and the lever plate 42 to be directly contacted with each other. However, by using a lubricant or a bearing to further reduce a frictional force, a more smooth operation can be realized.

[0063] The above embodiment exemplifies a case in which the hoist 102 is disposed in an upper part of the elevator shaft 101 with reference to Fig. 6. However, the same effects can be obtained, if the hoist 102 is disposed on a pit of the elevator shaft 101, on other parts of the elevator shaft 101, or in a machineroom.

[0064] As described above, according to the present invention, since there is no need to draw a brake wire to an elevator hall, a rescue operation can be carried out in a quick and safe manner. Even when a car is located near the elevator hall, a rescue operation can be carried out without problem. Further, since there is no need for the brake wire to be loosened in an elevator shaft, and the brake wire would not bulge in the elevator shaft during a rescue operation, a brake release apparatus of an elevator hoist with a high security can be provided. In addition, since an operation angle of an operation lever can be increased, a pulling action with a sufficient stroke can be achieved without elongating the operation lever, and thus an operability can be improved. Since a housing for storing the operation lever can be made small, a deterioration of design is prevented.

Claims

1. A brake release apparatus of an elevator hoist for releasing a brake of an elevator hoist disposed in an elevator shaft from an elevator hall having an elevator hall door so as to guide a car, comprising:

a housing disposed near the elevator hall, and incorporating therein a frame;

an outer tube extending between the brake of an elevator hoist and the housing;

an inner wire extending in the outer tube; and an operation lever rotatably disposed on the frame in the housing, and connected to the inner wire; wherein

the outer tube is connected to the frame via an outer tube rotation supporting means, and the inner wire has one end connected to the operation lever via an inner wire rotation supporting means.

2. The brake release apparatus of an elevator hoist ac-

ording to claim 1, wherein

the outer tube rotation supporting means includes a first shaft-shaped member through which the outer tube passes in a direction perpendicular to a shaft axis of the first shaft-shaped member, and the inner wire rotation supporting means includes a second shaft-shaped member through which the inner wire passes in a direction perpendicular to a shaft axis of the second shaft-shaped member.

3. The brake release apparatus of an elevator hoist according to claim 1, wherein an additional lever for extension is connected to the operation lever.

4. The brake release apparatus of an elevator hoist according to claim 3, wherein the additional lever which is detached from the operation lever is stored in the housing.

5. The brake release apparatus of an elevator hoist according to claim 1, wherein when the operation lever is in the housing, the one end of the inner wire is separated from the operation lever, and when the operation lever is out of the housing, the one end of the inner wire is connected to the operation lever.

6. The brake release apparatus for an elevator hoist according to claim 1, wherein the housing is disposed on a position of the elevator hall where an operator can open the elevator hall door and operate the operation lever while watching the car in the elevator shaft.

7. A method of operating a brake release apparatus of an elevator hoist for releasing a brake of an elevator hoist disposed in an elevator shaft from an elevator hall having an elevator hall door so as to guide a car, the brake release apparatus comprising a housing disposed near the elevator hall and incorporating therein a frame, an outer tube extending between the brake of an elevator hoist and the housing, an inner wire extending in the outer tube, and an operation lever rotatably disposed on the frame in the housing and connected to the inner wire, wherein the outer tube is connected to the frame via an outer tube rotation supporting means, and the inner wire has one end connected to the operation lever via an inner wire rotation supporting means, comprising the steps of:

opening the elevator hall door of the elevator hall; and

operating the operation lever from the elevator hall to release the brake so as to guide the car, while watching the car in the elevator shaft through the elevator hall door.

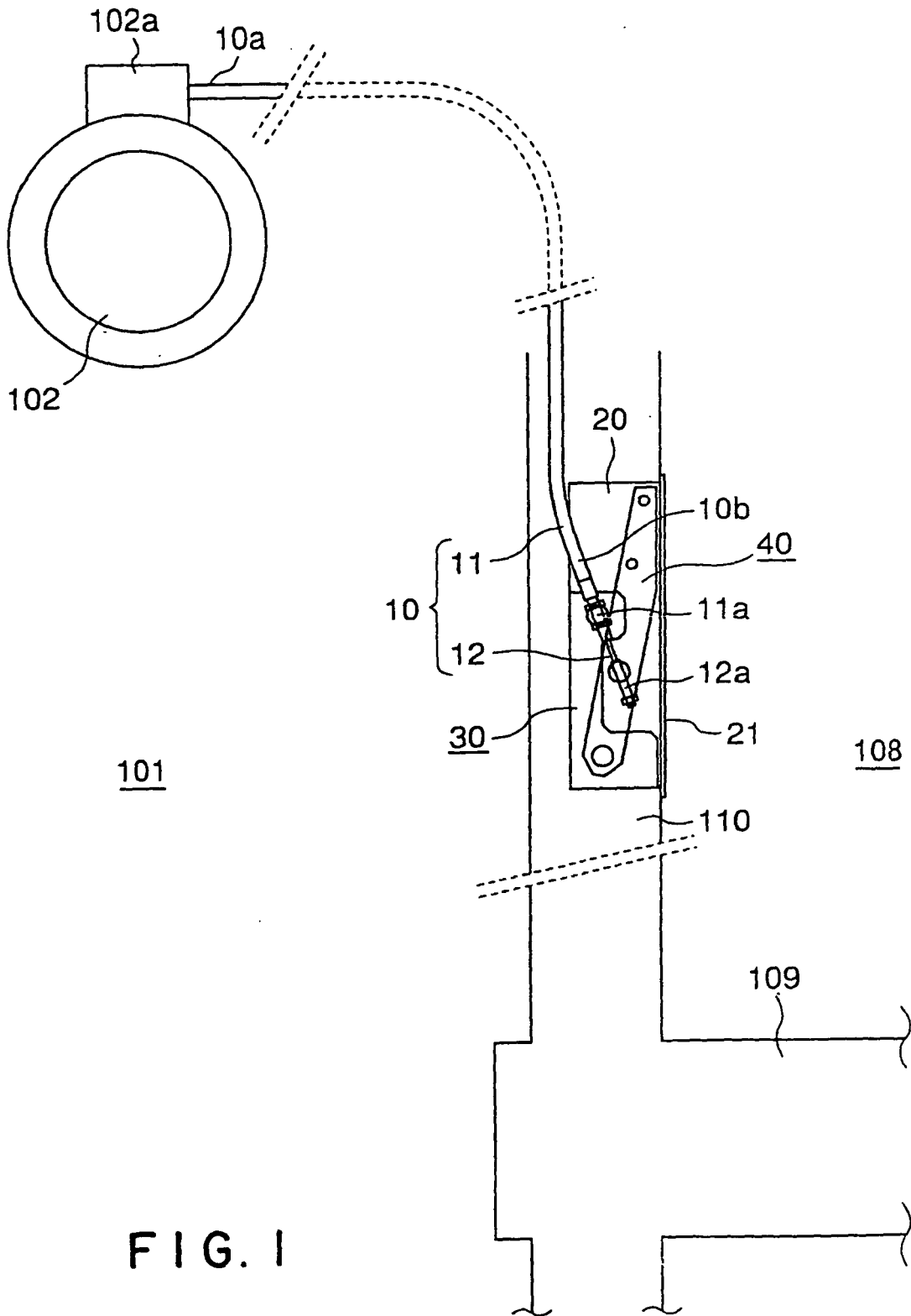


FIG. 1

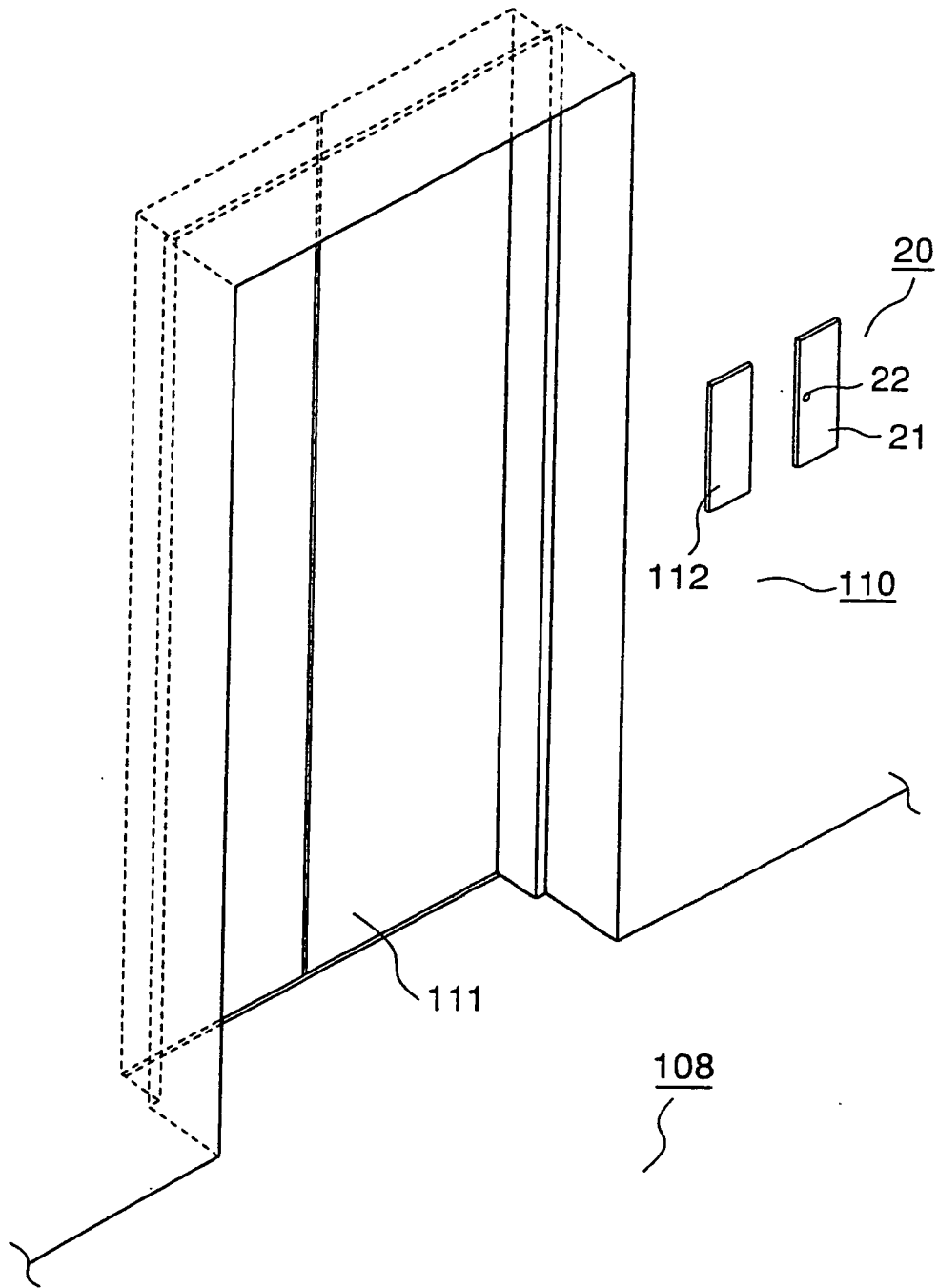


FIG. 2

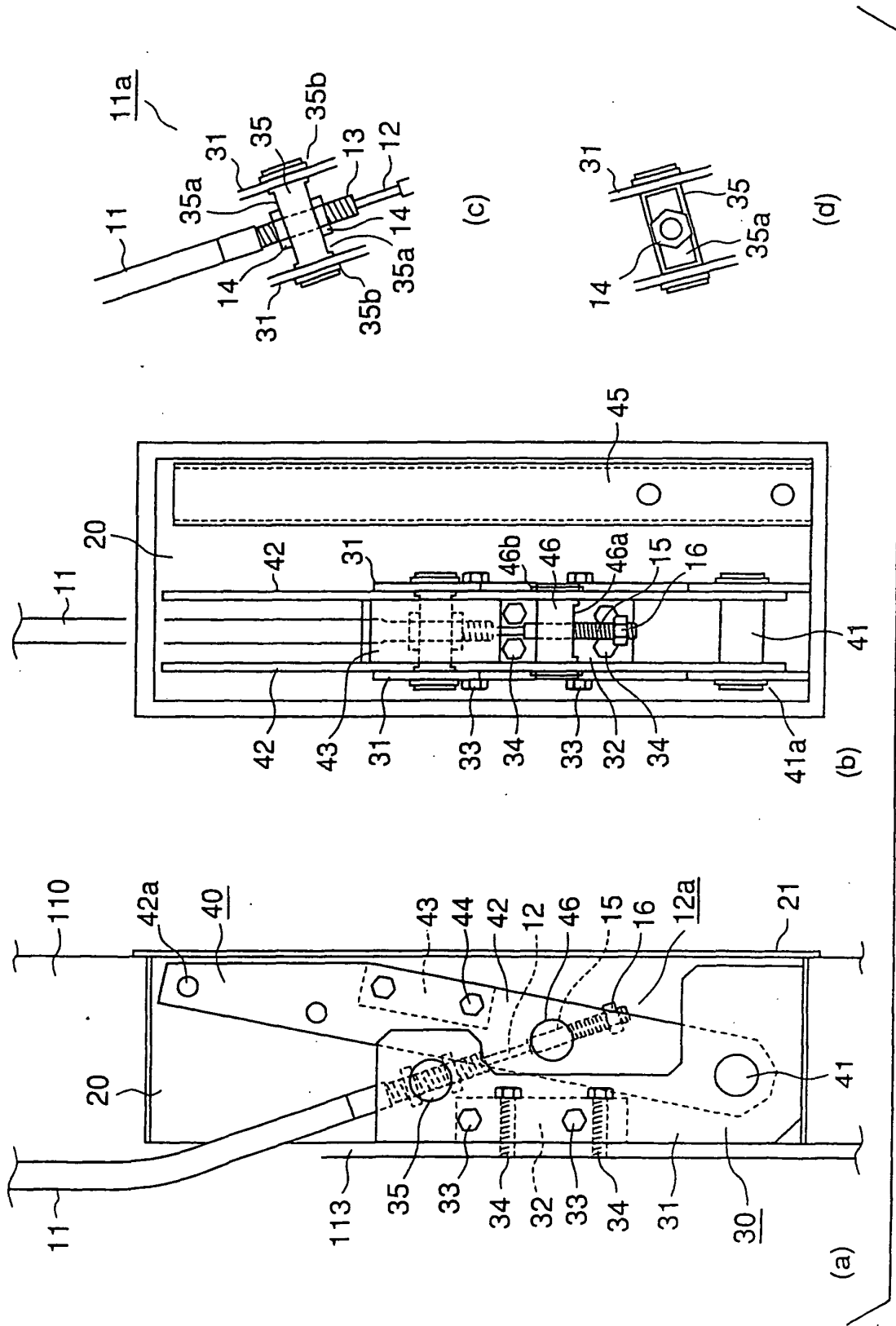


FIG. 3

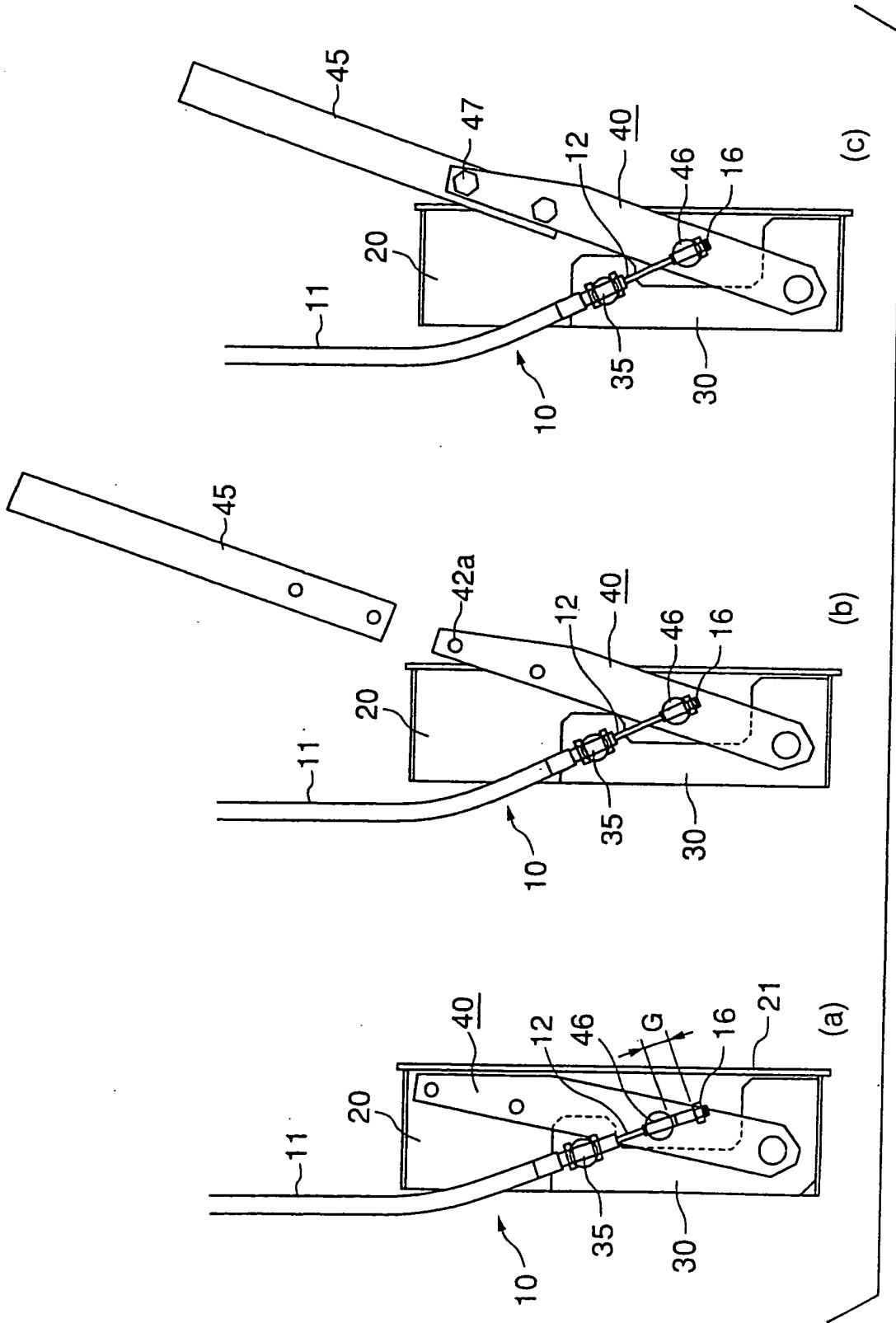


FIG. 4

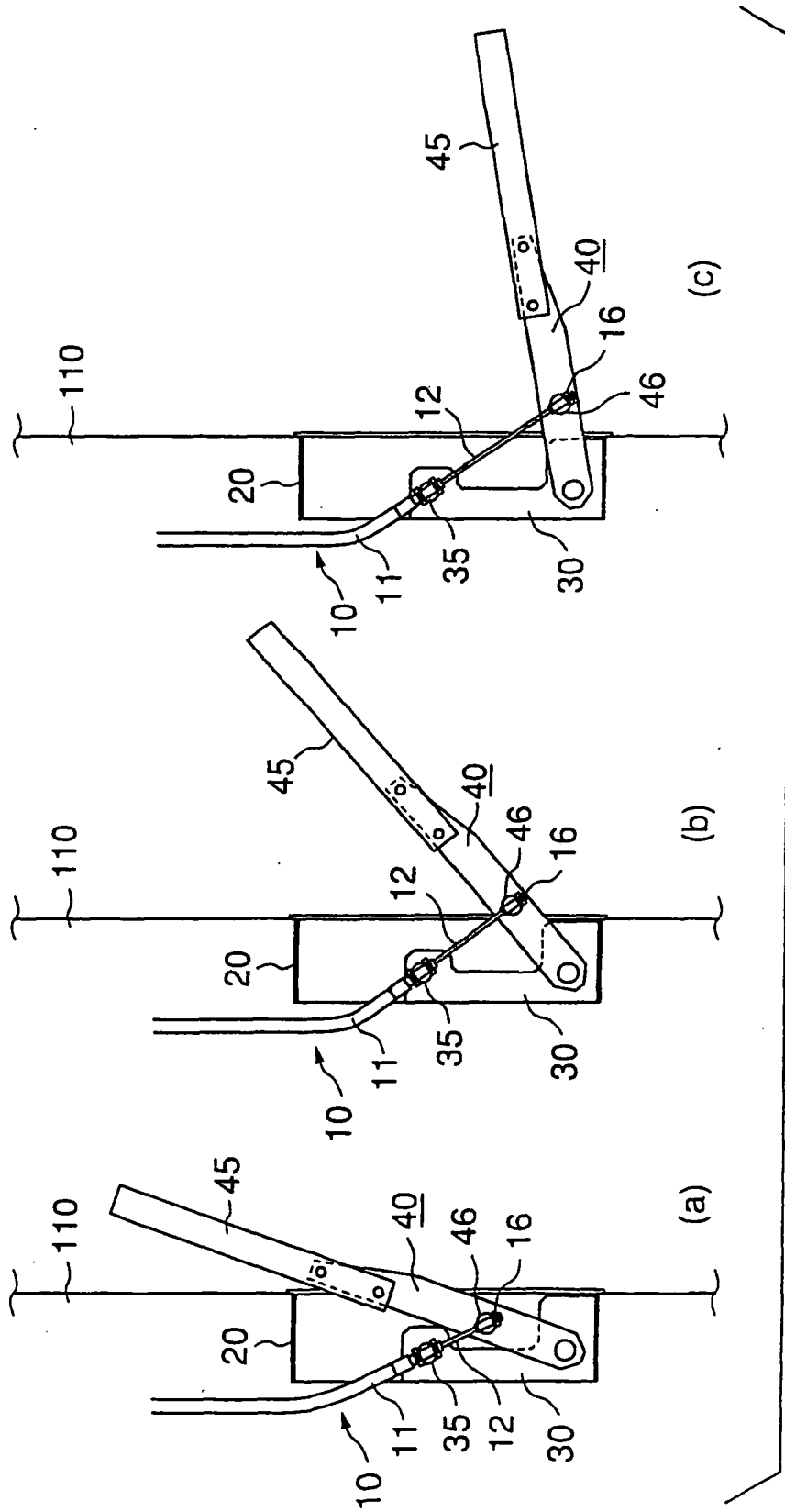


FIG. 5

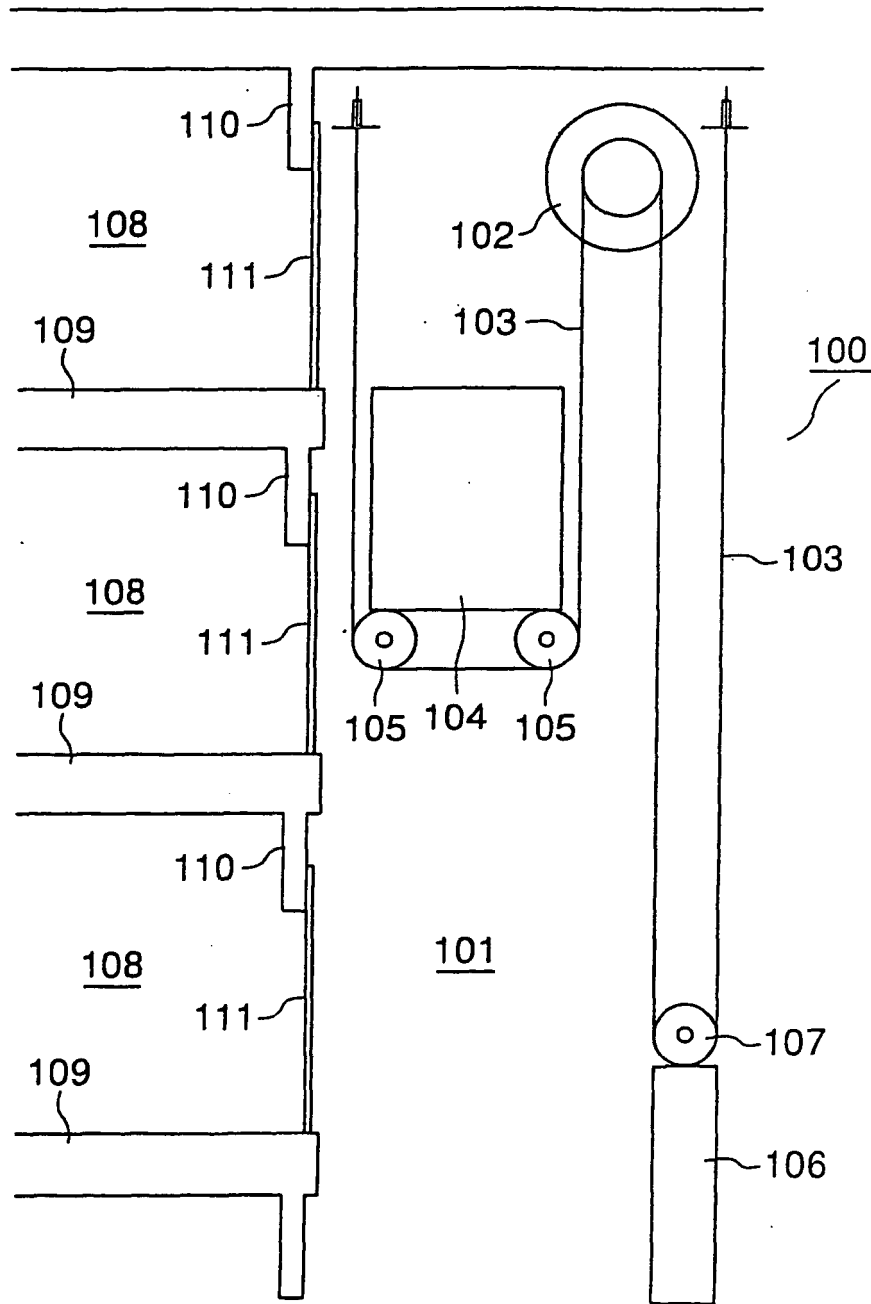


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/003632

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ B66B5/02		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. ⁷ B66B5/00-B66B13/30		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2004 Kokai Jitsuyo Shinan Koho 1971-2004 Toroku Jitsuyo Shinan Koho 1994-2004		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-233563 A (Mitsubishi Electric Corp.), 28 August, 2001 (28.08.01), (Family: none)	1-7
A	JP 2001-122547 A (Mitsubishi Electric Corp.), 08 May, 2001 (08.05.01), (Family: none)	1-7
A	JP 2001-294386 A (Mitsubishi Electric Corp.), 23 October, 2001 (23.10.01), (Family: none)	1-7
A	JP 2000-318943 A (Toshiba Elevator and Building Systems Corp.), 21 November, 2000 (21.11.00), (Family: none)	1-7
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.
* Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 23 June, 2004 (23.06.04)	Date of mailing of the international search report 13 July, 2004 (13.07.04)	
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer	
Facsimile No.	Telephone No.	