

Description

TECHNICAL FIELD

[0001] The present invention relates to a passenger conveyor such as an escalator, an electrically operated road and the like, and more particularly to a passenger conveyor which is preferably placed in a narrow place.

BACKGROUND ART

[0002] In conventional, in order to make a width of a passenger conveyor narrow, there have been already proposed a structure in which an electric motor is placed around a drive shaft for driving stairs and the drive shaft is directly driven (for example, JP-A-56-108683), a structure in which a stairs driving chain is directly driven during an outward route of the stairs (for example, JP-A-55-40185), and the like.

[0003] On the other hand, in order to prevent a baggage of the passenger from hitting a balustrade panel, there has been proposed a technique in which a width of a passenger conveyor is enlarged by appearance by making an interval between right and left balustrade panels wider than an interval between right and left moving handrails, for example, in JP-A-2001-139273 and the like.

[0004] The former of the prior arts mentioned above has an advantage that the width can be made narrower at a degree by which extra drive chain and drive sprocket for power transmission can be omitted by directly driving the stairs and the stairs chain by the electric motor.

[0005] Further, the latter of the prior arts can make the passenger to get on the passenger conveyor on the safe side in a point that it is possible to reduce a change that the baggage of the passenger hits the balustrade panel.

[0006] However, since the former of the prior arts mentioned above does not take into consideration a structure achieving a requirement of further width reduction, it is actually impossible to reduce the width more.

[0007] Further, in the latter of the prior arts, since a sharp step is formed at a degree of difference between the balustrade panel interval and the moving handrail interval which becomes narrower than the balustrade panel interval which is expanded in an entrance portion of the passenger conveyor, the baggage hits the step portion such as a back side of a member guiding the moving handrail or the like, and there is a problem that an overturning trouble of the passenger is brought about.

DISCLOSURE OF THE INVENTION

[0008] An object of the present invention is to provide a passenger conveyor which can sufficiently reduce a width.

[0009] Another object of the present invention is to provide a passenger conveyor on which a passenger

can get with slowing down even in the case that a width is reduced, and a baggage or the like can be prevented from hitting a back side of a member for guiding a moving handrail at a time of getting off.

[0010] In order to achieve the objects mentioned above, in accordance with the present invention, a teeth portion of a drive sprocket which is coaxially provided in a main sprocket winding a stairs chain for connecting a plurality of step boards, and right and left side frames constituting a main frame are overlapped in a vertical projection.

[0011] Further, an interval between opposing inner surfaces of balustrades provided in a rising manner in both sides of the stairs in a moving direction is formed wider than an interval between the moving handrails, and the expanded inner surface interval is formed so as to get close to the moving handrail interval step by step in a terminal end portion of the balustrade in a longitudinal direction.

[0012] In other words, since the teeth portion of the drive sprocket and the side frames of the main frame are arranged so as to be overlapped in the vertical projection, it is possible to do away with a gap existing between the teeth portion of the drive sprocket and the side frames, and it is possible to get the side frames close to the drive sprocket at that degree, so that it is possible to reduce a width of the main frame.

[0013] Further, since the baggage or the like of the passenger is not in contact with the balustrade by making the interval between the right and left balustrade inner surfaces wider than the interval between the moving handrails, the passenger can get on the conveyor with slowing down. Further, since the expanded inner surface interval is formed so as to get close to the moving handrail interval step by step in the terminal end portion of the balustrade in the longitudinal direction, the baggage or the like does not hit the back side or the like of the member guiding the moving handrail at a time when the passenger get off.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a perspective view showing an installation state of an escalator corresponding to one embodiment of a passenger conveyor in accordance with the present invention;

Fig. 2 is a schematic side elevational view of the escalator shown in Fig. 1;

Fig. 3 is an enlarged vertical cross sectional view along a line III-III in Fig. 2;

Fig. 4 is a schematic plan view showing an upper floor side of a main frame of the escalator shown in Fig. 2;

Fig. 5 is an enlarged view showing a right balustrade in Fig. 3;

Fig. 6 is an enlarged horizontal cross sectional view

along a line VI-VI line in Fig. 1; and
Fig. 7 is a view showing another embodiment of the passenger conveyor in accordance with the present invention, in correspondence to Fig. 5.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] A description will be given below of a passenger conveyor corresponding to an embodiment in accordance with the present invention on the basis of an escalator shown in Figs. 1 to 6. In general, an escalator 1 is structured on the basis of a main frame 4 placed between an upper floor 2 and a lower floor 3 in an architectural structure. The main frame 4 is constituted, as shown in Fig. 3, by a pair of left and right side frames 5A and 5B, a bottom plate 6 and cross beams 7 which connect the left and right side frames 5A and 5B. Further, the side frames 5A and 5B are constituted by a top cord member 8A and a lower cord member 8B which extend in a longitudinal direction of the escalator, and a vertical member 9 which connects the top cord member 8A and the bottom cord member 8B.

[0016] An upper horizontal portion 10 constituting an upper machine room is formed in a side of the upper floor 2 of the main frame 4 in the structure mentioned above, a lower horizontal portion 11 constituting a lower machine room is formed in a side of the lower floor 3, and a slope portion 12 is connected between the upper horizontal portion 10 and the lower horizontal portion 11. In general, an upper portion of the upper horizontal portion 10 and an upper portion of the lower horizontal portion 11 are closed by entrance floors 10F and 11F by which a passenger gets on and off.

[0017] A pair of main sprockets 13 and a pair of driven sprockets 14 are pivotally supported below the entrance floors 10F and 11F of the upper horizontal portion 10 and the lower horizontal portion 11 of the main frame 4 structured in the manner mentioned above, respectively. A pair of main sprockets 13 are fixed to a drive shaft 15, and both end portions of the drive shaft 15 are rotatably supported by a bearing 16. The bearing 16 is fixed to vertical members 9 of the side frames 5A and 5B, and a vertical projection of the bearing exists within a width h of side frames 5A and 5B.

[0018] An endless stair chain 17 is wound around the main sprocket 13 and the driven sprocket 14, and a stair 18 is connected to the stair chain 17. The stair 18 has a front wheel 19A and a rear wheel 19B which travel on a guide rail placed within the main frame 4. Further, the front wheel 19A is rotatably supported to a front wheel shaft protruding in a width direction of the stair 17, and a lot of stairs 18 can be connected to the stair chain 17 by connecting the front wheel shaft to the stair chain 17.

[0019] Further, a balustrade 20 is provided in a rising manner in each of the side frames 5A and 5B, and a moving handrail 21 is guided to a peripheral edge of the balustrade 20. The balustrade 20 is provided with a support column 22 which is provided in a rising manner in

the top chord member 8A of the side frames 5A and 5B, a handrail frame 23 which is supported to an upper end of the support column 22, a balustrade panel 24 which has an upper end supported to an upper end of the support column 22 within the handrail frame 23 and a lower end supported to a lower end portion of the support column 22, and is positioned in a side of the stair 18 of the support column 22, an inner deck cover 26 which covers a lower portion of the balustrade panel 24, a skirt guard 27 which sections between the inner deck cover 26 and the stair 18, and an outer deck cover 25 which is provided in an outer side of the handrail frame 23.

[0020] In this case, as shown in Figs. 1 and 3, in the case that the escalator 1 is arranged close to a wall W of the architectural structure and stairs S are placed in an opposite side to the wall W, a decorative outward packing board 28 is provided in an outer side of the balustrade 20 in a side of the stairs S vertically from the outer deck cover 25, the handrail 23 of the balustrade 20 in the side of the wall W is close to the wall W, a gap therebetween is closed by the outer deck cover 25, whereby an execution of the outward packing board 28 is omitted.

[0021] The balustrade panel 24 of the balustrade 20 structured in the manner mentioned above has a peripheral edge portion 29 in which an end portion is faced into the handrail frame 23, a base portion in which an end portion is faced into the inner deck cover 26, an inner surface portion 31 which is positioned in an opposite stair side with respect to the peripheral edge portion 29 and the base portion 30 and has a height H corresponding to most of a vertical height, and slope portions 32A and 32B which are formed at an angle θ_1 equal to or more than 90 degree with respect to the inner surface portion 31 between the inner surface portion 31 and the peripheral edge portion 29, and the base portion 30. A recess portion open to the stair 18 is entirely formed by the inner surface portion 31, the peripheral edge portion 29 and the base portion 30. The recess portion having the inner surface portion 31 with the height H is formed approximately all along the length of the balustrade 20, guides a baggage of the passenger to the stair side as shown in arrows B and C in Fig. 5, and is formed such as to be connected to the peripheral edge portion 29 via the slope portion 32A in a terminal end portion in a longitudinal direction of the balustrade 20. Further, the recess portion is expanded only at a width W_a in one side from a center A of the moving handrail 21, and the width W_a contributes to expansion in an upper side of the passenger's foot. In this case, the recess portion is a linear recess portion which is formed by the peripheral edge portion 29, the base portion 30 and the inner surface portion 31, however, may be formed as an entirely curved surface.

[0022] It is desirable that the slope portion 32A between the peripheral edge portion 29 and the inner surface portion 31 in the balustrade panel 24 has a slope angle which does not cross the handrail frame 23 on a

slope extension. Further, the slope portion 32B between the base portion 30 and the inner surface portion 31 has a slope angle which does not cross the inner deck cover 26 on a slope extension. Further, a slope angle 02 (Fig. 6) of the slope portion 32A in the terminal end portion of the balustrade 20 in the longitudinal direction is formed larger than the angle 01 mentioned above, whereby it is possible to smoothly guide the baggage of the passenger getting off the escalator positioned within the recess portion of the balustrade panel 24 as shown by an arrow E. In this case, the structure in which the slope extension of the slope portion 32A does not cross the handrail frame 23 is not essential, and there is no problem that the slope extension of the slope portion 32A may cross the handrail frame 23 as far as a large step is not generated with respect to the handrail frame 23.

[0023] In addition, an operation switch 50 such as a start switch and a stop switch of the escalator 1 are provided in the slope portion 32A in Fig. 6 which forms the terminal end slope surface of the terminal end portion in the longitudinal direction of the balustrade panel 24, and a switch box 51 is mounted to a back side thereof. As mentioned above, since an operating position is higher than the conventional case, by arranging the operation switch 50 in the terminal end slope surface of the terminal end portion in the longitudinal direction of the balustrade panel, there is provided a function improving effect of an operability, that is, an easily remarkable function and an easily operable function.

[0024] In this case, the inner surface portion 31 is a surface which is apart from the moving handrail of the balustrade described in claim 1, and the slope portion 32A forms a surface which moves close to the moving handrail. Further, the recess portion provided in the balustrade in the portion surrounded by the moving handrail described in claim 2 is a recess portion formed by the inner surface portion 31, the peripheral edge portion 29 and the base portion 30. Further, the interval of the balustrade panel described in claim 3 is an interval between the right and left balustrade panels 24, the expanded balustrade panel interval is an interval W1 between the right and left inner surface portions 31, and the interval of the moving handrail is an interval W2 between the right and left moving handrails 21.

[0025] On the other hand, in the drive shaft 15 fixing a pair of main sprockets 13, a drive sprocket 33 is fixed to an opposite stair side of one main sprocket 13. The drive sprocket 33 is formed in a dish shape expanding toward the bearing 16, and a teeth portion formed in an outer periphery is formed such that the teeth portion of the drive sprocket 33 and the side frame 5A overlap seen from a flat face while facing into the width h of the side frame 5A in the main frame 4, in other words, the teeth portion of the drive sprocket 33 and the side frame 5A are arranged such that vertical projections thereof lap over each other. Accordingly, three elements comprising the teeth portion of the drive sprocket 33, the bearing 16 and the side frame 5A of the main frame 4

are positioned within the width h of the side frame 5A such that the vertical projections thereof overlap each other.

[0026] A power transmission chain 34 is wound around the teeth portion of the drive sprocket 33, and the power transmission chain 34 is wound around a sprocket 36 of a driving machine apparatus 35 placed within the upper horizontal portion 10 of the main frame 4 corresponding to an outer side of a reciprocating passage of the stairs 18. The driving machine apparatus 35 is constituted by an electric motor 37, a reduction gear 38, a brake 39 and the like, however, the reduction gear 39 is not necessarily required.

[0027] A handrail drive sprocket 40 is fixed to an opposite side to the stair in each of a pair of main sprockets 13, and a handrail drive chain 41 is wound around the handrail drive sprocket 40 as shown in Fig. 4. The handrail drive chain 41 is structured such as to drive a handrail drive apparatus 43 (Fig. 2) via a turning roller 42. The handrail drive apparatus 43 is structured such as to drive a return side of the moving handrail 21 in an inner side of the balustrade 20 by a well-known means.

[0028] Since the structure is made such as mentioned above, it is possible to omit the space which is required because the teeth portion of the drive sprocket 33 has been actually positioned between the bearing 16 and the handrail drive sprocket 40, and the similar space which is required between the main sprocket 13 in the side having no drive sprocket 33 and the bearing 16 taking into consideration the installation balance of the main frame 4 and the balustrade 20, so that it is possible to reduce the total width of the main frame 4, and it is possible to make an installation width W₀ of the escalator 1 narrow.

[0029] Further, since the drive mechanism apparatus 35 is placed in an outer side in the longitudinal direction from a moving locus in a turning portion of the stairs 18, a maintenance and inspection space is not blocked by the stairs in comparison with the structure in which the driving machine apparatus is attached to a periphery of the drive shaft 15, and it is possible to easily maintain and inspect the driving machine apparatus 35.

[0030] In the case of placing the narrow escalator 1 having the structure mentioned above in a narrow place of an architectural structure, for example, the existing stairs of a station house or the like, the escalator 1 is normally placed close to one wall W in a width direction of the stairs S, as shown in Fig. 1, and the balustrade 20 in an opposite side of the escalator 1 to the wall W is formed as a partition wall between the stairs S and the escalator 1. In the case of placing the escalator 1 having the installation width W₀ in the stairs S as mentioned above, the width of the stairs S utilized by the passenger becomes narrow, however, since the installation width W₀ of the escalator 1 is narrow as mentioned above, it is possible to reduce the used width of the stairs S to the minimum.

[0031] Further, since the recess portion is actually

formed by denting the balustrade panel 24 arranged vertically at the positions of the peripheral edge portion 29 and the base portion 30 to the outer direction of the escalator 1, an occasion that the baggage is in contact with the balustrade panel 24 is reduced even if the passenger gets on the escalator while directing the baggage to the balustrade panel 24, so that the passenger can get on the escalator with slowing down.

[0032] In addition, in the terminal end portion in the longitudinal direction of the balustrade panel 24, since the slope portion 32A is formed in the balustrade panel 24 formed in the recess portion, and is inclined at the slope angle by which the slope extension of the slope portion 32A does not cross the handrail frame 23, the passenger reaches the getting-off port in a state in which the passenger makes the baggage to face to the recess portion of the balustrade panel 24. Accordingly, even if the passenger is going to get off the escalator in this state, the baggage is guided to the stairs side along the slope portion 32A, so that the baggage does not come into collision with the back side of the handrail 23 corresponding to the member for guiding the moving handrail 21, and it is possible to prevent the overturning trouble due to the baggage collision.

[0033] Fig. 7 shows the other embodiment in accordance with the present invention. This embodiment is largely different from the embodiment mentioned above in the structure of the balustrade, and has the same structures as those of the embodiment mentioned above in the structure of the main frame, the stairs and the drive mechanism of the moving handrail.

[0034] In this case, a balustrade 60 in this embodiment is constituted by a balustrade panel 61 which is vertically fixed to the side frame 5A via a fixing device 62, a handrail frame 23 which is fixed to a peripheral edge of the balustrade panel 61 via a fixing device 63 and guides the moving handrail 21, a covering body 64 which is fixed to the fixing device 63 in the peripheral edge of the balustrade panel 61 and covers a lower portion of the fixing device 63, an inner deck cover 65 which covers a base portion of the balustrade panel 61 and an upper portion in a side of the fixing device 62, the skirt guard 27 which sections between the inner deck cover 65 and the stairs 18, and the outer deck cover 25 which is placed between the handrail frame 23 and the peripheral edge of the balustrade panel 61.

[0035] The balustrade panel 61 is formed, for example, by a reinforced glass plate, a reinforced synthetic resin plate or the like, and has the same function serving as a design product as that of the outward packing product in the embodiment mentioned above. Further, the covering body 64 is placed at a slant with respect to the balustrade panel 61, and the slope is set more gentle that the slope of the covering body 64 placed so as to oppose to the stairs moving section, such that a direction of the baggage of the passenger is not rapidly changed in the terminal end portion in the longitudinal direction of the balustrade.

[0036] In accordance with the balustrade 60 having the structure mentioned above, since the support column 22, the balustrade panel 24 and the outward packing plate 28 in the embodiment mentioned above are structured by one balustrade panel 61, it is possible to further expand an interval W3 between a pair of opposing balustrade panels 61 in comparison with the interval W1 between the balustrade panels 24 in accordance with the embodiment mentioned above.

[0037] In addition, it is possible to have a balustrade lighting equipment built-in by utilizing a space 66 which is formed between an upper end (a peripheral edge) of the balustrade panel 61 and the handrail 23 by the covering body 64, whereby it is possible to provide the balustrade 60 with light. Further, an operation switch may be provided in a terminal end portion in a balustrade longitudinal direction of the covering body 64, in the same manner as that of the embodiment.

[0038] In accordance with the embodiment having the structure mentioned above, it is possible to further expand the balustrade panel 61, and it is possible to achieve the same operations and effects as those of the embodiment mentioned above.

[0039] In this case, the embodiment mentioned above is described on the basis of the escalator which is exemplified as the passenger conveyor. However, it goes without saying that the present invention can be applied to an electrically operated road in which no step is generated between the step plates. In this case, the structure of the embodiments mentioned above and claims can be applied by replacing the stairs described in the embodiments mentioned above and claims by the step plate.

[0040] As mentioned above, in accordance with the present invention, it is possible to obtain the passenger conveyor which can sufficiently reduce the width, and it is possible to obtain the passenger conveyor which the passenger can get on even in the case that the width is reduced, and the baggage does not come into collision with the member for guiding the moving handrail at a time when the passenger gets off.

Claims

1. A passenger conveyor in which balustrades are provided in a rising manner in both sides of a stairs row connected in an endless manner and moving in a circulating manner, and a moving handrail moving in synchronization with said stairs row is guided to a peripheral edge of the balustrades,

wherein an inner surface of said balustrade which is apart from said moving handrail is protruded to an opposite stair side from an inner surface of said balustrade which is close to said moving handrail, and an inner surface of said balustrade which is close to said moving handrail is formed as a slope surface connected to the inner surface protruded to

said opposite stair side.

2. A passenger conveyor comprising:

an endless stair chain connecting and driving a plurality of step plates;
 a main sprocket and a driven sprocket winding the stair chain near a portion under an entrance floor in both entrance ports;
 a drive sprocket provided in a drive shaft to which the main sprocket is fixed;
 a driving machine apparatus transmitting a rotation force to the drive sprocket;
 a balustrade provided in a rising manner in both sides of said stair in a moving direction;
 a moving handrail guided by a peripheral edge of the balustrade and moving in synchronization with said stair; and
 a main frame supporting these elements and having a pair of right and left side frames,

wherein a recess portion protruding to an opposite stair side is provided in a portion of said balustrade which is surrounded by said moving handrail, a slope surface inclined to the stair side is provided around the recess portion, and a teeth portion of said drive sprocket and said side frames are arranged such that vertical projections thereof lap over each other.

3. A passenger conveyor in which balustrades are provided in a rising manner in both sides of a stairs row connected in an endless manner and moving in a circulating manner, and a moving handrail moving in synchronization with said stairs row is guided to a peripheral edge of the balustrades,

wherein said balustrades in both sides have opposing balustrade panels, an interval of the balustrade panels is formed wider than an interval of said moving handrails, and the interval of said expanded balustrade panels is formed so as to be close to the interval of said moving handrail step by step in a terminal end portion in a longitudinal direction of said balustrade.

4. A passenger conveyor comprising:

an endless stair chain connecting and driving a plurality of step plates;
 a main sprocket and a driven sprocket winding the stair chain near a portion under an entrance floor in both entrance ports;
 a drive sprocket provided in a drive shaft to which the main sprocket is fixed;
 a driving machine apparatus transmitting a rotation force to the drive sprocket;
 a balustrade provided in a rising manner in both sides of said stair in a moving direction;

a moving handrail guided by a peripheral edge of the balustrade and moving in synchronization with said stair; and
 a main frame supporting these elements and having a pair of right and left side frames,

wherein said both side balustrades have opposing balustrade panels, an interval of the balustrade panels is formed wider than an interval of said moving handrails, the interval of said expanded balustrade panels is formed so as to be close to the interval of said moving handrail step by step in a terminal end portion in a longitudinal direction of said balustrade, and a teeth portion of said drive sprocket and said side frames are arranged such that vertical projections thereof lap over each other.

5. A passenger conveyor comprising:

an endless stair chain connecting and driving a plurality of step plates;
 a main sprocket and a driven sprocket winding the stair chain near a portion under an entrance floor in both entrance ports;
 a drive sprocket provided in a drive shaft to which the main sprocket is fixed;
 a driving machine apparatus transmitting a rotation force to the drive sprocket and placed in an outer side in a longitudinal direction from a moving locus of said stair;
 a balustrade provided in a rising manner in both sides of said stair in a moving direction;
 a moving handrail guided by a peripheral edge of the balustrade and moving in synchronization with said stair; and
 a main frame supporting these elements and having a pair of right and left side frames,

wherein said both side balustrades have opposing balustrade panels, an interval of the balustrade panels is formed wider than an interval of said moving handrails, the interval of said expanded balustrade panels is formed so as to be close to the interval of said moving handrail step by step in a terminal end portion in a longitudinal direction of said balustrade, and a bearing supporting said drive shaft, a teeth portion of said drive sprocket and said side frames are overlapped in a vertical projection.

6. A passenger conveyor comprising:

a balustrade provided in a rising manner along both sides of a stair row moving between both entrance floors, and extended between a stair moving portion and the entrance floor portion;
 a moving handrail guided by a peripheral edge of the balustrade; and
 a balustrade panel constituting said balustrade,

wherein said balustrade panel is provided with a surface in which an opposing interval is wider in said stair moving portion, and a terminal end slope surface in which an opposing interval is narrower step by step than the stair moving portion in said entrance floor portion. 5

7. A passenger conveyor as claimed in claim 6, wherein at least one of an upper end side and a lower end side of said balustrade panel is provided with a side portion slope surface which is formed so as to be open toward said stair side rather than an inner surface of said balustrade panel. 10

8. A passenger conveyor as claimed in claim 6, wherein an operation switch is provided in said terminal end slope surface. 15

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FIG. 1

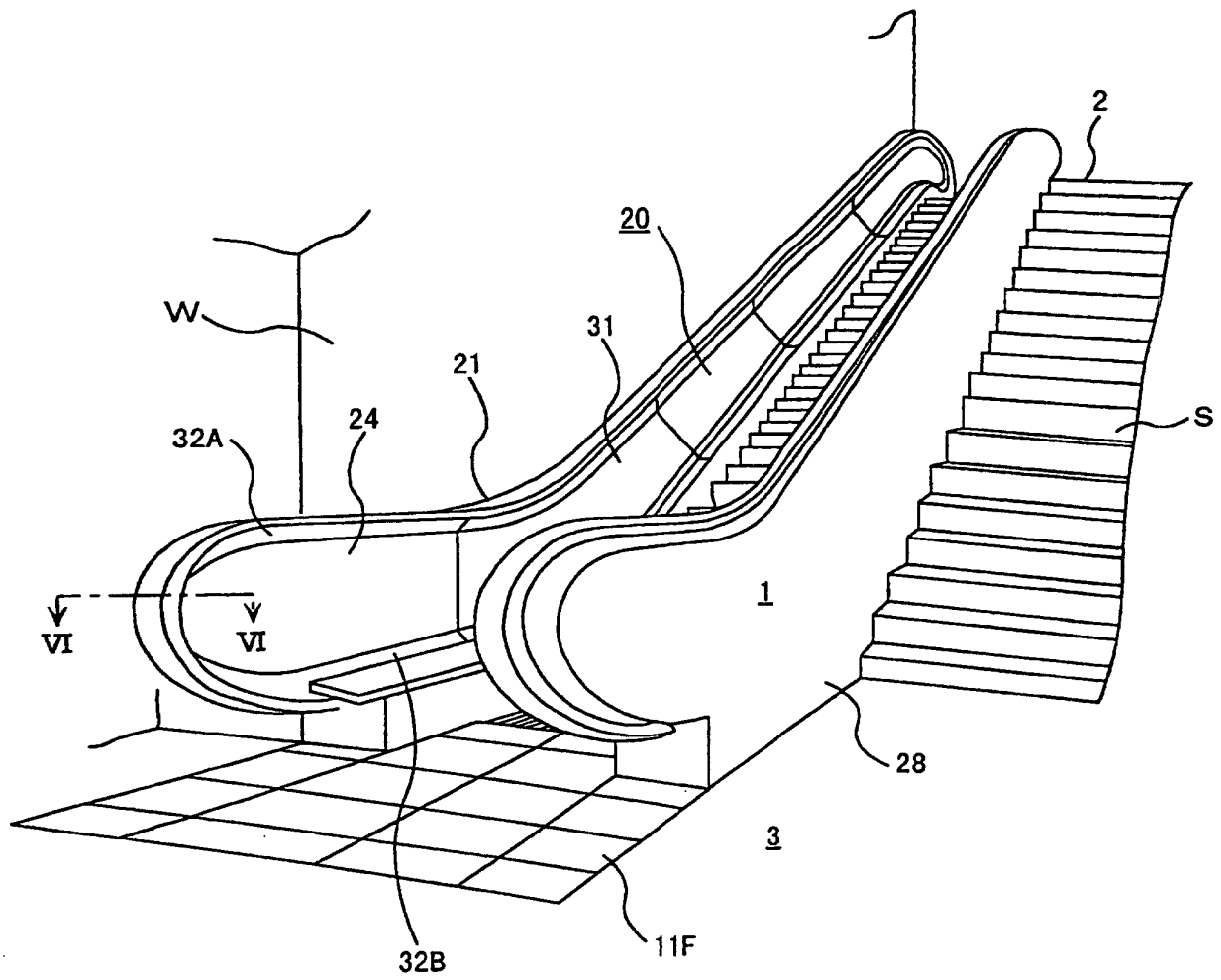


FIG. 2

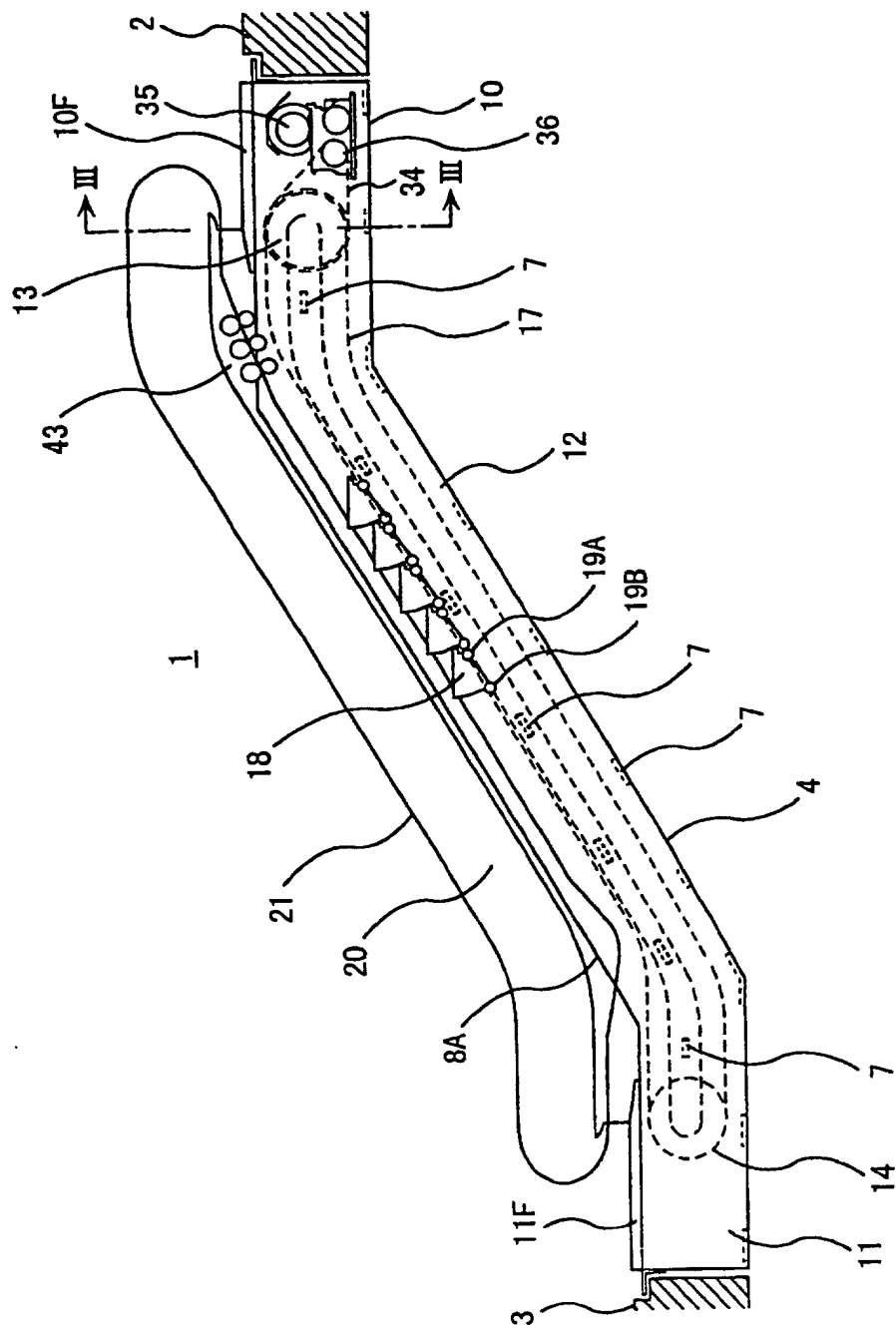


FIG. 3

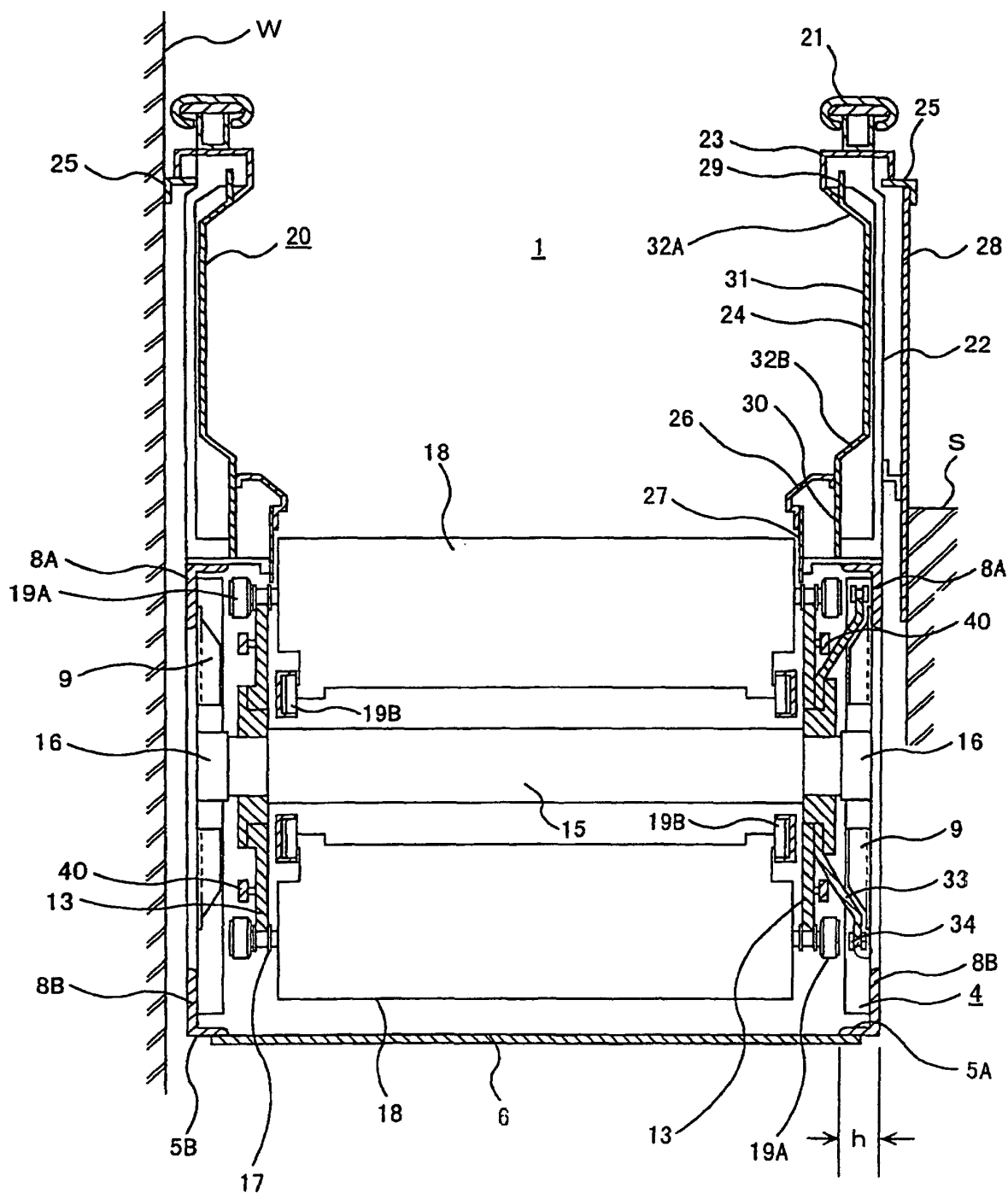


FIG. 4

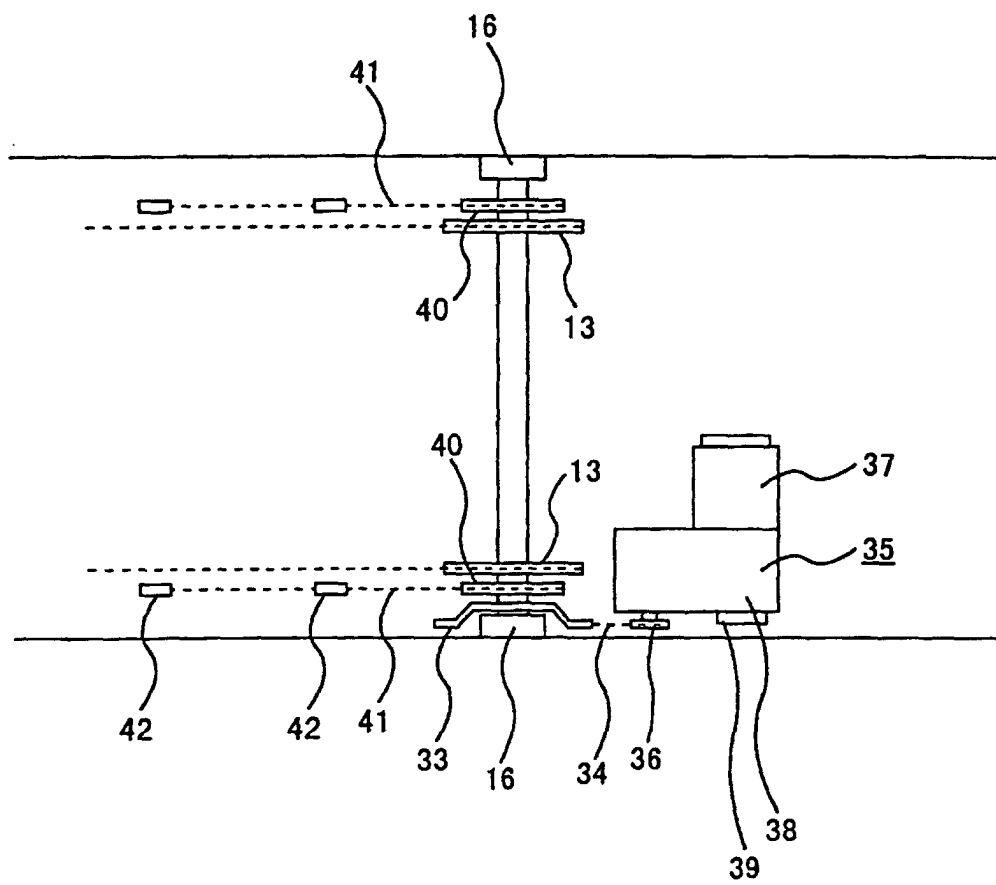


FIG. 5

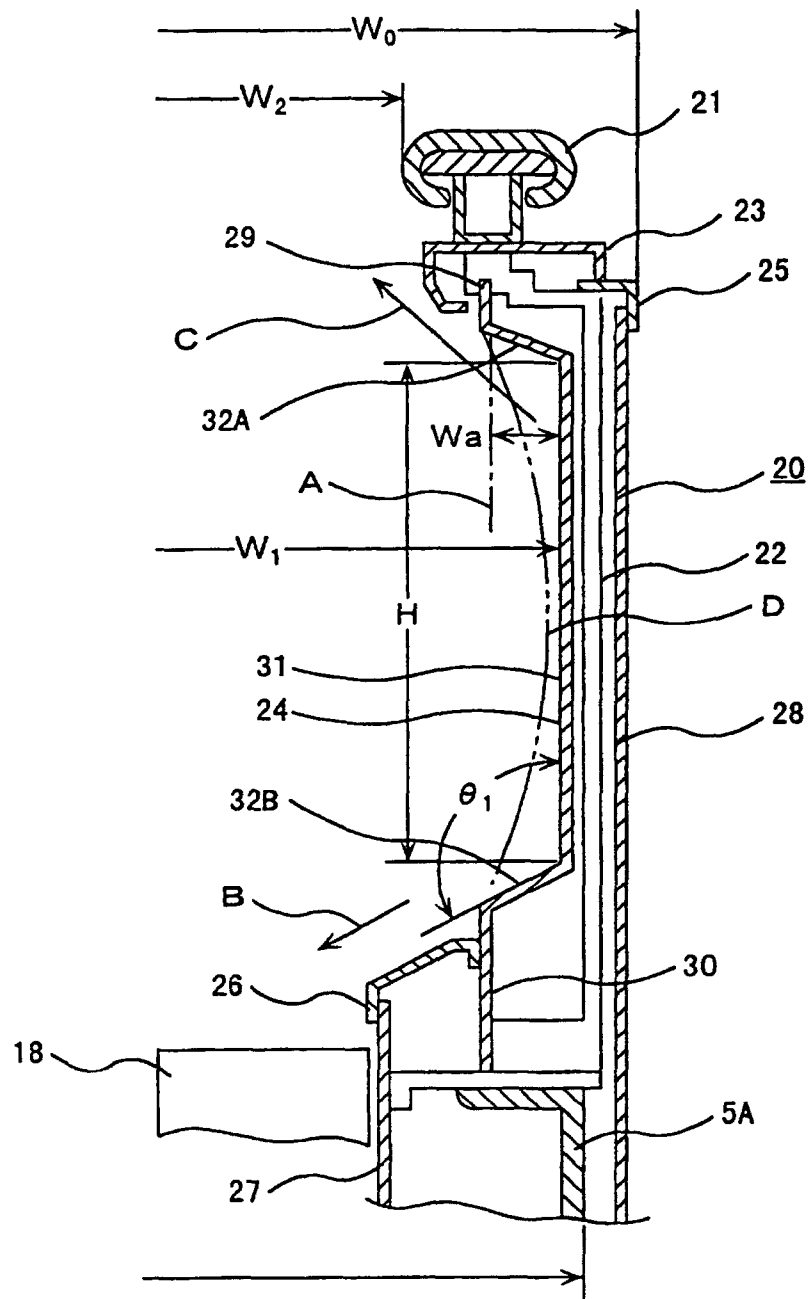


FIG. 6

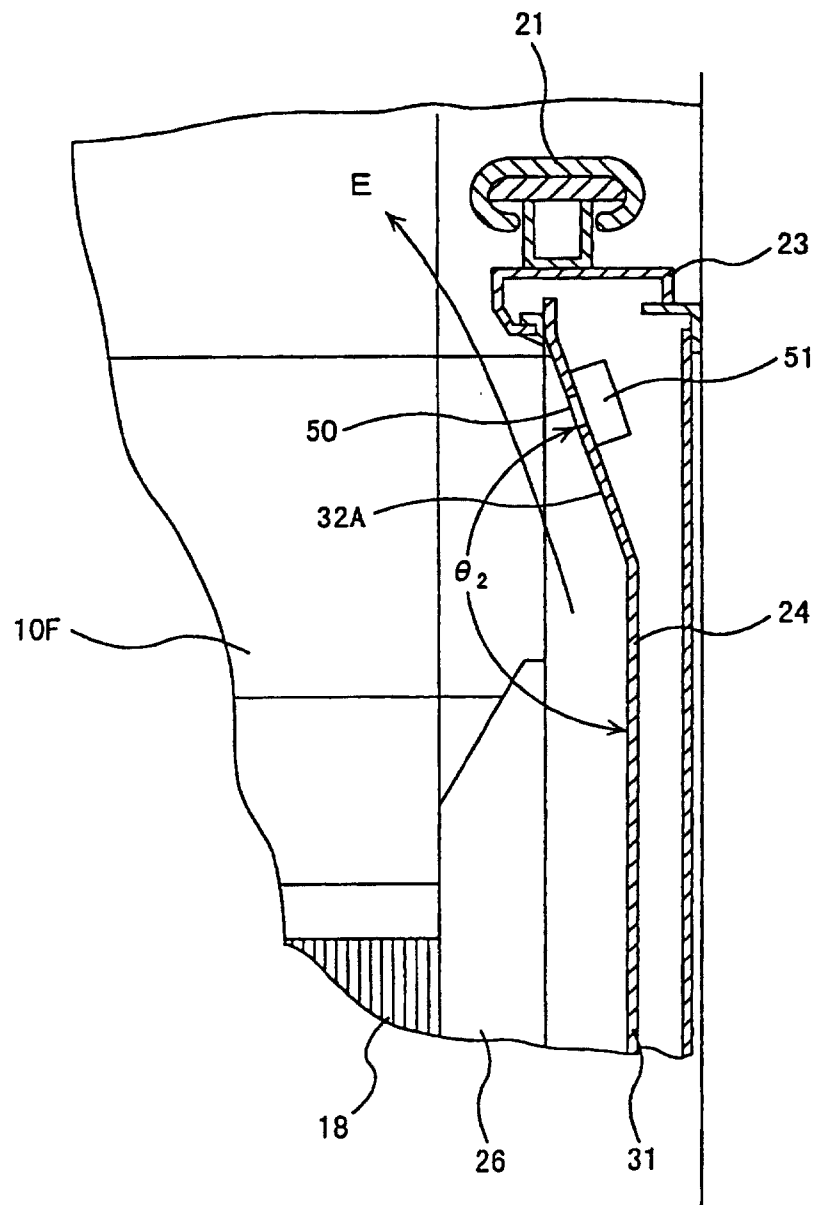
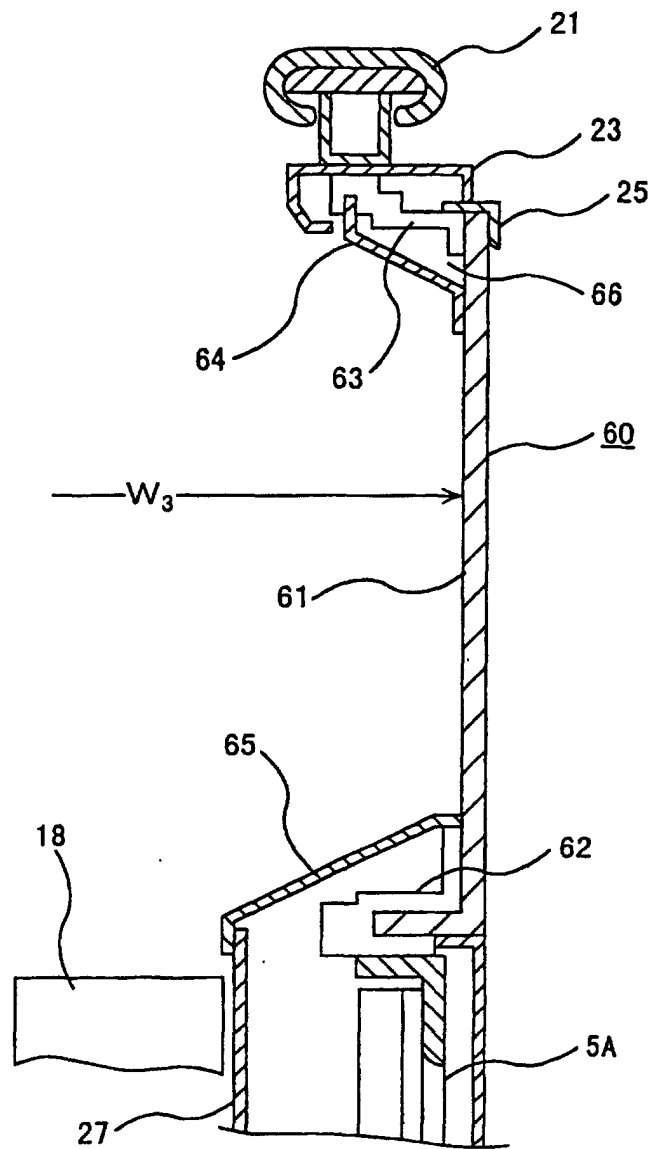


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP01/10730

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ B66B23/22		
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 B66B23/00-B66B23/26		
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 1996-2002 Kokai Jitsuyo Shinan Koho 1971-2002 Toroku Jitsuyo Shinan Koho 1994-2002		
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.
X A	JP 49-35399 B1 (Hitachi, Ltd.), 21 September, 1974 (21.09.74), (Family: none)	1 2-8
X A	JP 49-34309 Y1 (Tokyo Shibaura Electric Co., Ltd.), 17 September, 1974 (17.09.74), (Family: none)	1 2-8
X A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 40635/1971 (Laid-open No. 1389/1973) (Hitachi, Ltd.), 09 January, 1973 (09.01.73), (Family: none)	2 1,3-8
☒ Further documents are listed in the continuation of Box C. ☐ 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 "E" earlier document but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"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 "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 "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 "&" document member of the same patent family	
Date of the actual completion of the international search 29 August, 2002 (29.08.02)		Date of mailing of the international search report 17 September, 2002 (17.09.02)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/10730

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 123312/1986 (Laid-open No. 31075/1988) (Hitachi, Ltd.), 29 February, 1988 (29.02.88), (Family: none)	2 1,3-8
X A	JP 2001-139273 A (Hitachi, Ltd.), 22 May, 2001 (22.05.01), & EP 1101724 A2 & CN 1295968 A	3 1-2,4-8
A	JP 56-117978 A (Hitachi, Ltd.), 16 September, 1981 (16.09.81), (Family: none)	4-5
A	JP 2000-302364 A (Toshiba Elevator and Building Systems Corp.), 31 October, 2000 (31.10.00), (Family: none)	4-5
E,A	JP 2002-68650 A (Toshiba Elevator Products Kabushiki Kaisha), 08 March, 2002 (08.03.02), (Family: none)	4-5
A	JP 43-29707 Y1 (Hitachi, Ltd.), 05 December, 1968 (05.12.68), (Family: none)	6-8
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 6507/1985 (Laid-open No. 122278/1986) (Mitsubishi Electric Corp.), 01 August, 1986 (01.08.86), (Family: none)	6-8
A	JP 61-169490 A (Mitsubishi Electric Corp.), 31 July, 1986 (31.07.86), (Family: none)	1-8

Form PCT/ISA/210 (continuation of second sheet) (July 1998)