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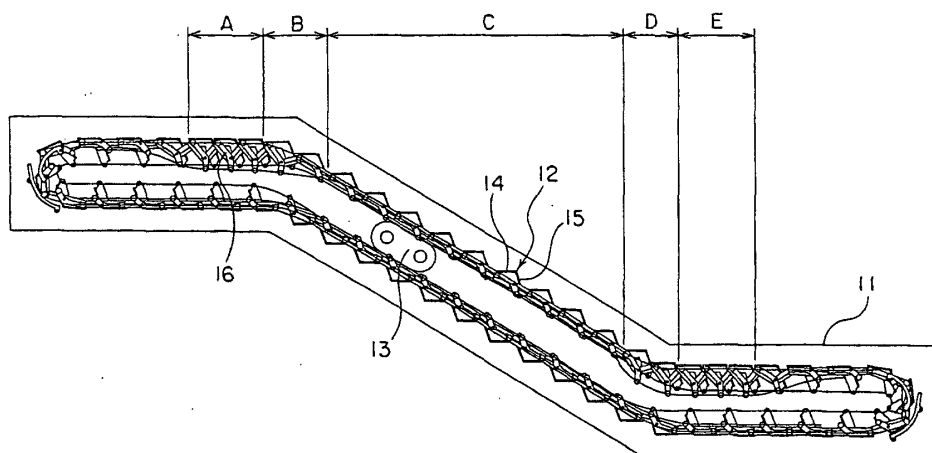
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(54) **SLOPED PART HIGH-SPEED ESCALATOR**

(57) In a high-speed inclined portion escalator, a traveling speed of steps in an intermediate inclined portion is set so as to be faster than a traveling speed of the steps in an upper landing portion and a lower landing portion. A riser protrudes outward toward an adjacent step on a downstairs side in the intermediate inclined

portion so as to form an obtuse angle relative to a tread of the adjacent step. A plurality of riser cleats are disposed on a surface of the riser. A plurality of protruding portions inserted into the riser cleats are disposed on an edge portion of the tread. An end surface of the protruding portions facing a bottom surface of the riser cleats forms an acute angle relative to the tread.

FIG. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to a high-speed inclined portion escalator in which a traveling speed of steps in an intermediate inclined portion is faster than a traveling speed of the steps in an upper landing portion and a lower landing portion.

BACKGROUND ART

[0002] Figure 6 is a schematic side elevation showing steps of a conventional normal escalator. In the figure, steps 1 have: a tread 2 for carrying passengers; and a riser 3 disposed on an edge on a downstairs side of the tread 2.

[0003] Figure 7 is a cross section showing a portion VII of Figure 6 enlarged. A plurality of tread cleats 2a extending in a direction of travel are disposed on a surface 2c of the tread 2. A plurality of riser cleats 3a are disposed on a surface of the riser 3. A plurality of pectinate protruding portions 2b are disposed on an edge portion (a demarcation comb) on an opposite side of the tread 2 from the riser 3 for insertion into the riser cleats 3a of an adjacent step. The protruding portions 2b are formed continuously on end portions of the tread cleats 2a.

[0004] By intermeshing the protruding portions 2b precisely with the riser cleats 3a, even if the toe of a passenger's shoe contacts the riser 3, the toe of the shoe is prevented from being pulled in between the riser 3 and the tread 2. Furthermore, consideration is also given to promoting caution so that passengers do not approach the edge portion of the tread 2 by applying a warning color such as yellow, etc., thereto.

[0005] On the other hand, in recent years, a large number of escalators having high lift ranges have been installed in subway stations, etc. In escalators of this kind, passengers must stand still on the steps for a long time, and many passengers feel uncomfortable. Because of this, escalators that operate at high speeds have been developed, but there is an upper limit to the operating speeds thereof for passengers to get on and off safely.

[0006] In answer to this, high-speed inclined portion escalators have been proposed in which it is possible for the amount of time spent riding the escalator to be shortened by operating at low speed in upper and lower landing portions where the passengers get on and off, operating to accelerate and decelerate in an upper curved portion and a lower curved portion, and operating at high speed in an intermediate inclined portion.

[0007] Figure 8 is a schematic side elevation showing steps of a conventional high-speed inclined portion escalator. In the figure, steps 4 have: a tread 5 for carrying passengers; and a riser 6 disposed on an edge on a downstairs side of the tread 5.

[0008] In a high-speed inclined portion escalator of this kind, since a traveling speed of the steps 4 is changed, a pitch between adjacent step 4, or more precisely, a pitch between step link roller shafts (not shown) mounted to the steps 4 to support step link rollers disposed to bear the steps 4 is changed. Specifically, the pitch between the steps 4 is reduced in the upper and lower landing portions, and the pitch between the steps 4 is increased in the intermediate inclined portion. Together with this, a surface of the riser 6 forms an obtuse angle θ relative to the tread of the step 4 adjacent on a lower side in the intermediate inclined portion. In other words, the riser 6 protrudes outward toward the step 4 adjacent on the downstairs side.

[0009] Figure 9 is a cross section showing a portion IX of Figure 8 enlarged. A plurality of tread cleats 5a extending in the direction of travel are disposed on a surface of the tread 5. A plurality of riser cleats 6a are disposed on a surface of the riser 6. A plurality of pectinate protruding portions 5b are disposed on an edge portion on an opposite side of the tread 5 from the riser 6 for insertion into the riser cleats 6a of an adjacent step.

[0010] However, in a conventional high-speed inclined portion escalator such as described above, since the surface of the riser 6 forms an obtuse angle θ relative to the tread of the step 4 adjacent on the lower side in the intermediate inclined portion, corner portions 5c of the protruding portions 5b are exposed from the riser cleats 6a. Furthermore, if a depth of the riser cleats 6a is increased in order to insert the protruding portions 5b completely inside the riser cleats 6a, a length of the protruding portions 5b must also be increased, making it easy for the protruding portions 5b to be damaged.

DISCLOSURE OF THE INVENTION

[0011] The present invention aims to solve the above problems and an object of the present invention is to provide a high-speed inclined portion escalator enabling protruding portions on an edge portion of a tread to intermesh sufficiently with riser cleats even if a riser protrudes outward toward a step adjacent on a downstairs side.

[0012] In order to achieve the above object, according to one aspect of the present invention, there is provided a high-speed inclined portion escalator including: a cyclic path including an upper landing portion, a lower landing portion, and an intermediate inclined portion positioned between the upper landing portion and the lower landing portion; and a plurality of steps linked endlessly and moved cyclically along the cyclic path, the steps having a tread for carrying passengers is disposed, and a riser disposed on an edge of the tread, wherein a traveling speed of the steps in the intermediate inclined portion is set so as to be faster than a traveling speed of the steps in the upper landing portion and the lower landing portion, the riser protrudes outward toward an adjacent step on a downstairs side in

the intermediate inclined portion so as to form an obtuse angle relative to the tread of the adjacent step, a plurality of riser cleats are disposed on a surface of the riser, a plurality of protruding portions inserted into the riser cleats are disposed on an edge portion of the tread, and an end surface of the protruding portions facing a bottom surface of the riser cleats forms an acute angle relative to the tread.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Figure 1 is a schematic side elevation showing a high-speed inclined portion escalator according to Embodiment 1 of the present invention;

Figure 2 is a cross section showing part of Figure 1 enlarged;

Figure 3 is a cross section showing part of a high-speed inclined portion escalator according to Embodiment 2 of the present invention;

Figure 4 is a cross section showing part of a high-speed inclined portion escalator according to Embodiment 3 of the present invention;

Figure 5 is a cross section showing part of a high-speed inclined portion escalator according to Embodiment 4 of the present invention;

Figure 6 is a schematic side elevation showing steps of a conventional normal escalator;

Figure 7 is a cross section showing a portion VII of Figure 6 enlarged;

Figure 8 is a schematic side elevation showing steps of a conventional high-speed inclined portion escalator; and

Figure 9 is a cross section showing a portion IX of Figure 8 enlarged.

BEST MODE FOR CARRYING OUT THE INVENTION

[0014] Preferred embodiments of the present invention will now be explained with reference to the drawings.

Embodiment 1

[0015] Figure 1 is a schematic side elevation showing a high-speed inclined portion escalator according to Embodiment 1 of the present invention. In the figure, a plurality of steps 12 linked endlessly are disposed on a main frame 11. The steps 12 are driven by a drive unit (a step driving means) 13, and are moved cyclically.

[0016] A cyclic path for the steps 12 has: a forward section, a return section, an upper inversion portion, and a lower inversion portion. The forward section of the cyclic path includes: an upper landing portion (an upper horizontal portion) A, an upper curved portion B, an intermediate inclined portion (a constant inclination portion) C, a lower curved portion D, and a lower landing

portion (a lower horizontal portion) E.

[0017] The steps 12 have: a tread 14 for carrying passengers; and a straight riser 15 formed on one edge in a depth direction of the tread 14. Adjacent steps 12 are linked to each other by linking mechanisms 16. A pitch between the adjacent step 12 is changed by changing the shape of the linking mechanisms 16.

[0018] A speed of the steps 12 is changed by changing a pitch between step link roller shafts (not shown) disposed on adjacent steps 12. Specifically, the pitch between the step link roller shafts is minimized in the upper landing portion A and the lower landing portion E where the passengers get on and off, and the steps 12 move at low speed. The pitch between the step link roller shafts is maximized in the intermediate inclined portion C, and the steps 12 move at high speed. In addition, the pitch between the step link roller shafts changes in the upper curved portion B and the lower curved portion D, and the steps 12 accelerate or decelerate.

[0019] Next, Figure 2 is a cross section showing part of Figure 1 enlarged. In the figure, a plurality of tread cleats 14b extending in a direction of travel are disposed on an upper surface the tread 2. A plurality of riser cleats 15a are disposed on a surface of the riser 15. A plurality of pectinate protruding portions 14c are disposed on an edge portion (a demarcation comb) on an opposite side of the tread 14 from the riser 15 for insertion into the riser cleats 15a of an adjacent step. The protruding portions 14c are formed continuously on end portions of the tread cleats 14b.

[0020] A surface of the riser 15 forms an obtuse angle θ relative to the tread 14a of the step 12 adjacent on the lower side in the intermediate inclined portion C. In other words, the riser 15 protrudes outward toward the step 12 adjacent on the downstairs side in the intermediate inclined portion C. End surfaces 14d of the protruding portions 14c (surfaces facing bottom surfaces 15b of the riser cleats 15a) form an acute angle α relative to the tread 14a. Thus, the end surfaces 14d are parallel to an angle of inclination of the riser 15 and the bottom surfaces 15b, and are inserted completely inside the riser cleats 15a.

[0021] In a high-speed inclined portion escalator of this kind, since the end surfaces 14d of the protruding portions 14c form an acute angle α relative to the tread 14a, even if a riser protrudes outward toward a step adjacent on a downstairs side, the protruding portions 14c of the tread 14 can intermesh with the riser cleats 15a sufficiently. Consequently, even if the toe of a passenger's shoe contacts the riser 15, the toe of the shoe is prevented from being pulled in between the riser 15 and the tread 14.

[0022] Furthermore, the intermeshing between the protruding portions 14c and the riser cleats 15a will not be dislodged even if subjected to influences such as manufacturing errors, installation errors, or deformation due to load, etc., in component parts driving and guiding the steps 12.

Embodiment 2

[0023] Moreover, in Embodiment 1, the entire end surface 14d is made to form an acute angle relative to the tread 14a, but as shown in Figure 3, for example, a portion 14e forming a right angle and a portion 14f forming an acute angle relative to the tread 14a may also be combined.

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Embodiment 3

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[0024] As shown in Figure 4, for example, rounding (a curved portion) may also be applied to a corner portion 14g between the tread 14a and the end surface 14d.

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Embodiment 4

[0025] In addition, as shown in Figure 5, for example, the entire end surface 14d may also be made into a gently curved surface.

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[0026] Furthermore, the protruding portions 14c may be disposed so as to be integrated with a main body of the tread 14, or they may also be constructed using a different material from the main body.

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Claims

1. A high-speed inclined portion escalator comprising:

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a cyclic path including an upper landing portion, a lower landing portion, and an intermediate inclined portion positioned between the upper landing portion and the lower landing portion; and

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a plurality of steps linked endlessly and moved cyclically along the cyclic path, the steps having a tread for carrying passengers is disposed, and a riser disposed on an edge of the tread,

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wherein a traveling speed of the steps in the intermediate inclined portion is set so as to be faster than a traveling speed of the steps in the upper landing portion and the lower landing portion;

the riser protrudes outward toward an adjacent step on a downstairs side in the intermediate inclined portion so as to form an obtuse angle relative to the tread of the adjacent step;

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a plurality of riser cleats are disposed on a surface of the riser;

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a plurality of protruding portions inserted into the riser cleats are disposed on an edge portion of the tread; and

an end surface of the protruding portions facing a bottom surface of the riser cleats forms an acute angle relative to the tread.

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2. The high-speed inclined portion escalator accord-

ing to Claim 1, wherein rounding is applied to a corner portion between the end surface and the tread.

FIG. 1

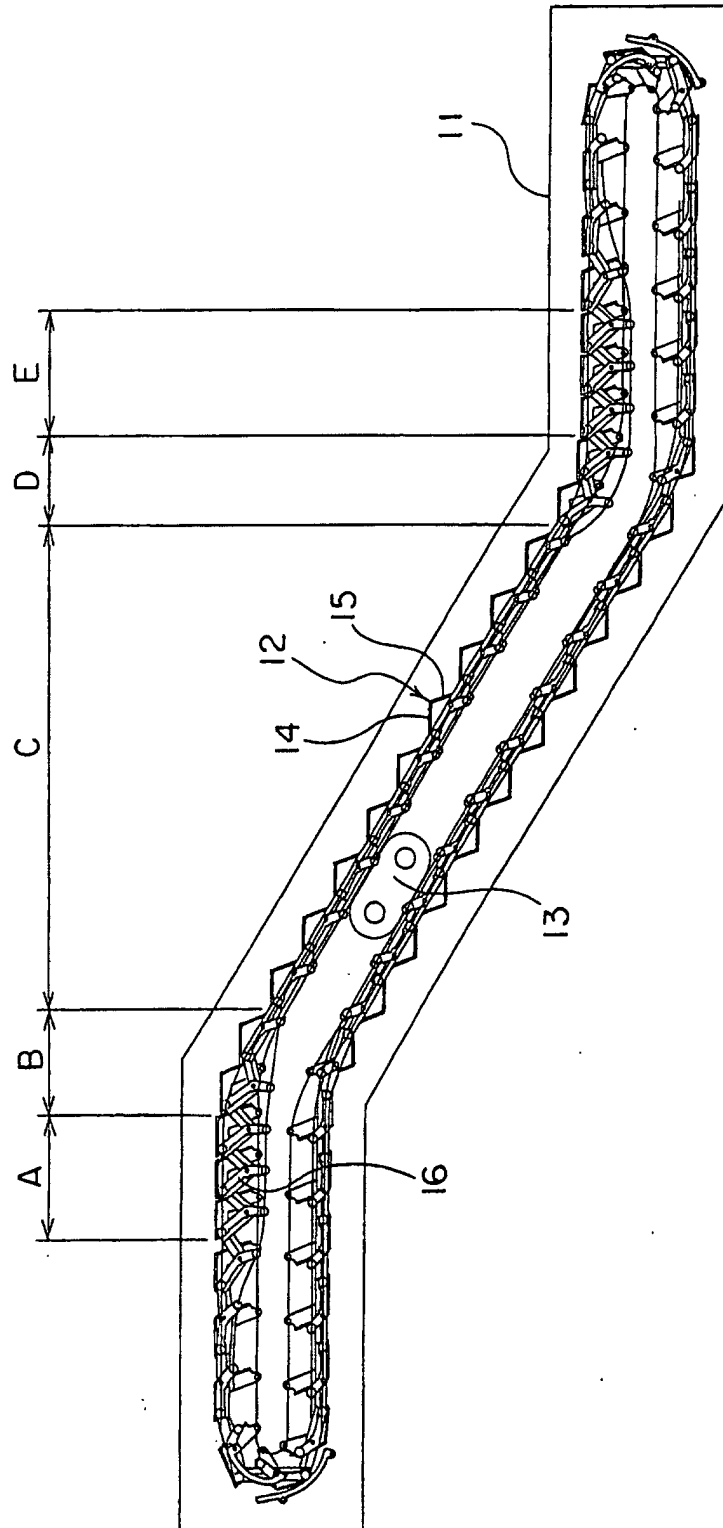


FIG. 2

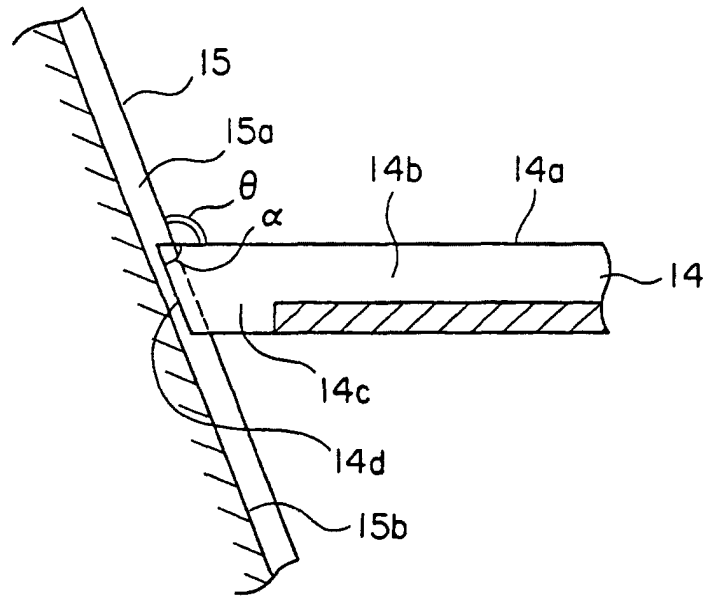


FIG. 3

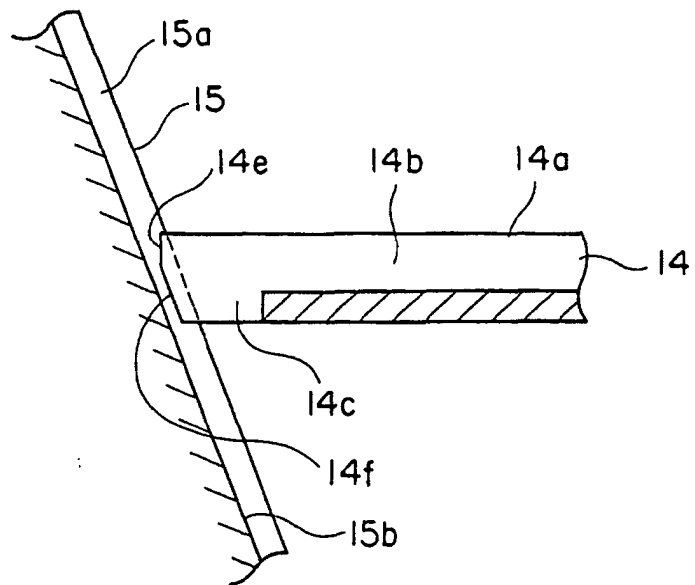


FIG. 4

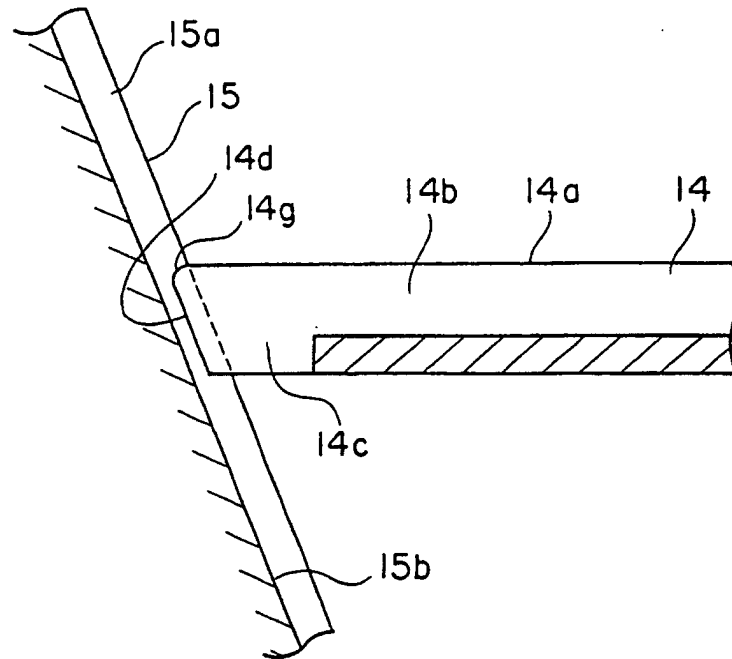


FIG. 5

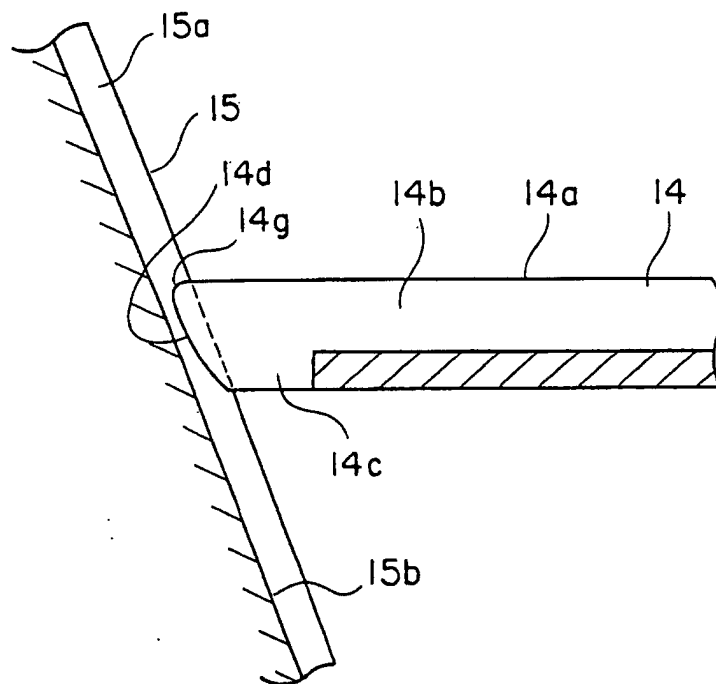


FIG. 6

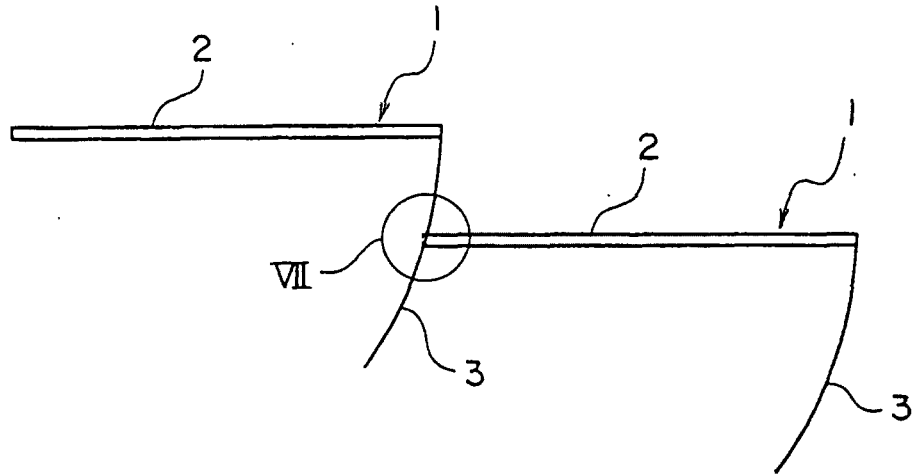


FIG. 7

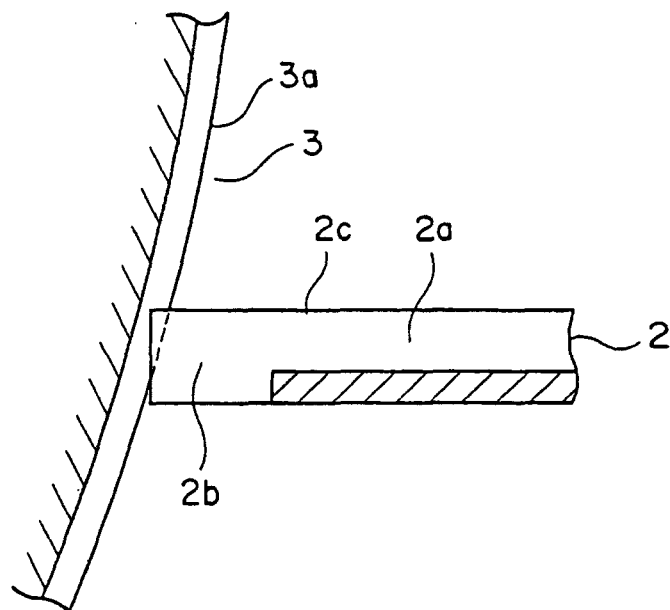


FIG. 8

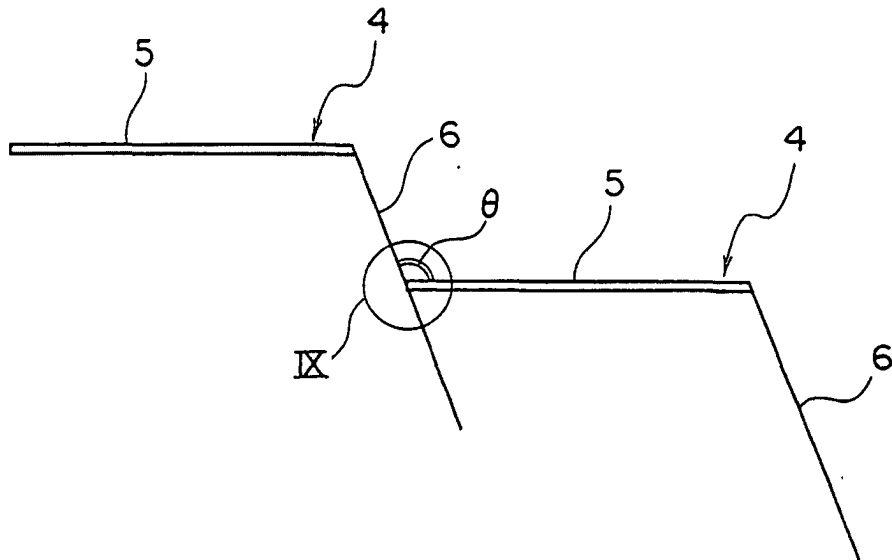
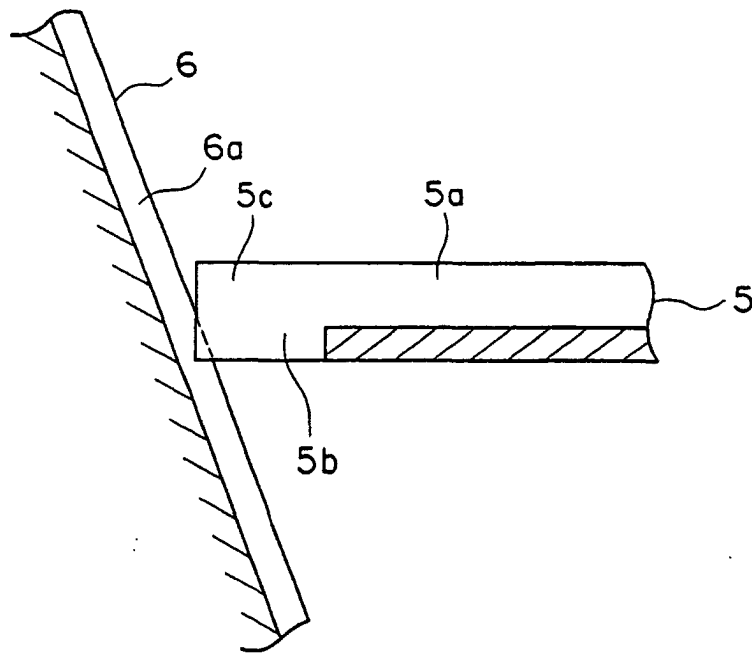


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/13129

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl ⁷ B66B21/02, B66B23/12		
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 B66B21/00-B66B31/02		
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 1996-2003 Kokai Jitsuyo Shinan Koho 1971-2003 Toroku Jitsuyo Shinan Koho 1994-2003		
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	JP 62-185692 A (Inventio AG), 14 August, 1987 (14.08.87), & EP 0243572 A1 & MX 160538 A	1-2
A	JP 51-116586 A (Hitachi, Ltd.), 14 October, 1976 (14.10.76), (Family: none)	1-2
☐ 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 01 April, 2003 (01.04.03)		Date of mailing of the international search report 15 April, 2003 (15.04.03)
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