(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 108 635 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.06.2001 Bulletin 2001/25

(51) Int Cl.[7]: **B62B 1/02**

(21) Application number: **00107394.9**

(22) Date of filing: **05.04.2000**

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

(30) Priority: **16.12.1999 JP 35807499**

(71) Applicants:
- **Hitachi, Ltd.**
  Chiyoda-ku, Tokyo 101-8010 (JP)
- **Hitachi Building Systems Co., Ltd.**
  Chiyoda-ku, Tokyo 101-0054 (JP)

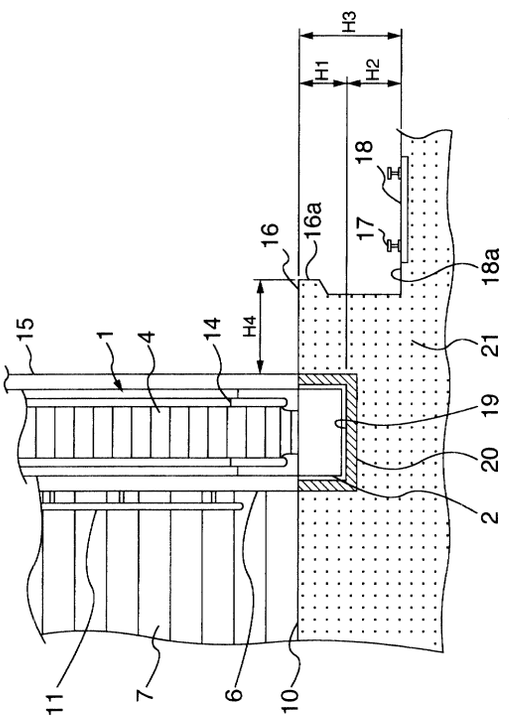
(72) Inventors:
- **Matsumoto, Tatsuya, c/o Hitachi, Ltd.**
  Tokyo 100-8220 (JP)
- **Saito Chuichi, c/o Hitachi, Ltd.**
  Tokyo 100-8220 (JP)
- **Ojima, Kazuhira, c/o Hitachi, Ltd.**
  Tokyo 100-8220 (JP)

(74) Representative: **Strehl Schübel-Hopf & Partner**
Maximilianstrasse 54
80538 München (DE)

(54) Platform arrangement

(57) In a passage facility having a platform (16) adjoining the ground (18) of a railroad (17) and having on a top face a pedestrian passage formed in a higher position than the ground of this railroad (17), and an escalator (1) of which at least a portion is accommodated in an excavated section (19) formed by drilling a prescribed part of the platform (16), further provided with a reinforcing section (21) formed underneath and aroung the excavated section (19) and restraining any adverse impact of the drilling on the ground (18), such as loosening or collapsing, the configuration having a dimensional relationship of H3 = H1 + H2, in which H1 is the drilled depth of the excavated section (19), H2 is the height of the reinforcing section (21), and H3 is the height from the surface of the prescribed ground (18) to the top face of the platform (16).

FIG. 3



EP 1 108 635 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a passage facility having a passenger conveyor and suitable for installation in a platform of a railway station or the like.

[0002] Heretofore, known techniques for installing an escalator in parallel with a stairway in a railway station or elsewhere are disclosed in JP-A-7-179282, JP-A-7-179283 and JP-A-7-179284.

[0003] As indicated in these known techniques, in the case where a passenger conveyor is to be installed in parallel with a stairway or in similar cases, it is considered to install a passenger conveyor on an architectural structure which adjoins a prescribed low ground and has on its top face a pedestrian passage formed in a position higher than the prescribed low ground. It is a usual practice, for instance, to install an escalator in an architectural structure adjacent to a ground over which rails to form a railway track are set up and having a pedestrian passage formed in a higher position than this ground, i. e. a platform in a railway station, and to install a passage facility to carry passengers at the platform by the escalator to an upper floor.

[0004] In case of installing such a passage facility, a conventional practice is to install the escalator by drilling a portion of the platform to form an excavated section which is to accommodate the lower flat part of the escalator.

[0005] According to the conventional art, in case of installing the lower flat part or the like of the escalator on the platform as mentioned above, with respect to the drilling depth of the excavated section, only a sufficient depth to accommodate the lower flat part of the escalator was considered. As a result, in the case where, for example, the minimum distance between an edge of the platform toward the side of ground on which the railroad is to be installed and the passenger conveyor is relatively short, enough to let one pedestrian pass through the top face of the platform, if the drilling depth is too great, there was such a trouble that the ground of the railroad adjoining the platform might become loose and even collapse. If such a drilling operation adversely affects the ground of the railroad to invite loosening or collapse of the ground, the ground will have to be repaired, and it would require extra time and cost, and may even cause trouble to railway passengers as well.

Summary of the Invention

[0006] The present invention has been achieved in view of the above described problems involved in the prior art, and an object of the invention is to provide a passage facility allowing a passenger conveyor to be installed without affecting any prescribed ground adjoining the architectural structure in which the passenger conveyor is to be installed.

[0007] In order to attain the above-stated object, according to the invention, there is provided a passage facility equipped with an architectural structure adjoining a prescribed ground and having on its top face a pedestrian passage formed in a position higher than the prescribed low ground, and a passenger conveyor of which at least a portion is accommodated in an excavated section formed by drilling the architectural structure, further equipped with a reinforcing section formed underneath and around the excavated section and restraining any adverse impact of the drilling on the prescribed ground, the configuration having a dimensional relationship of:

$$H3 = H1 + H2$$

wherein H1 is the drilled depth of the excavated section, H2 is the height of the reinforcing section, and H3 is the height from the surface of the prescribed ground to the top face of the architectural structure.

[0008] This configuration, which includes the reinforcing section underneath and around the excavated section, serves to restrain the adverse impact, when the excavated section is drilled into the architectural structure, of the drilling on the prescribed ground adjoining the architectural structure and to keep the prescribed ground in a stable state.

Brief Description of the Drawings

[0009]

Fig. 1 is a perspective view illustrating an external configuration of a passage facility which is one embodiment of the present invention;
Fig. 2 is an enlarged view of the portion marked with an arrow A-A in Fig. 1;
Fig. 3 is a cross section B-B of the configuration of Fig. 1; and
Fig. 4 is a cross section showing the configuration of the section near a top inverting part of an escalator with which the embodiment shown in Fig. 1 is to be provided.

Description of Preferred Embodiment

[0010] A passage facility which is a preferred embodiment of the present invention will be described below with reference to Figs. 1 through 4.

[0011] This embodiment is provided with, for instance, an escalator 1 as a passenger conveyor. This escalator 1 may be, for example, a thin-type escalator, whose frame forming a main body is configured with a less height than those of conventional escalators.

[0012] This escalator 1 comprises a frame 2 forming the main body as illustrated in Figs. 3 and 4, balustrades 3 erected over the frame 2 as shown in Fig. 1 and elsewhere, steps 4 for carrying passengers, and handrails

5 moving in synchronism with the steps 4. The escalator 1 is further provided with an upper flat part 12, an inclined part 13 and a lower flat part 14 to make up its overall shape.

[0013] The escalator 1 is arranged in, for instance an architectural structure of a railway station, such as a platform 16. The frame 2 forming the lower flat part 14 of the escalator 1, as illustrated in Fig. 3, is accommodated in an excavated section 19 formed in an architectural structure having a pedestrian passage on its top face, such as the platform 16. As illustrated in this drawing, a pit structure 20 built of concrete or the like is formed in this excavated section 19.

[0014] The platform 16 is so disposed that its top face constituting a pedestrian passage be in a higher position than a railroad 17 laid over a prescribed ground 18 adjoining the platform 16.

[0015] As shown in Fig. 1 and elsewhere, an external wall 6 is provided along one side of the escalator 1, and adjoining this external wall 6 is installed a stairway 7 to form a walkway for passengers. On the way of this stairway 7, there is for instance a landing 9. Near the external wall 6 is provided a stairway handrail 11 for use by passengers walking up or down the stairway 7.

[0016] The top face of the aforementioned platform 16 and the floor near the bottom of the stairway 7, i.e. a lower floor 10, are formed on, for instance, a common plane. Further, the floor near the top of the stairway 7 constitutes an upper floor 8 to form a pedestrian passage leading to the gate or the like. A threshold la at the lower end of the escalator 1 is provided on the lower floor 10, i.e. on the top face of the platform 16.

[0017] Particularly in this embodiment, as illustrated in Fig. 3, underneath and around the excavated section 19 to accommodate the frame 2 to form the lower flat part 14 of the escalator 1, there is provided a reinforcing section 21 to restrain the adverse effect of the drilling of the excavated section 19 on the ground 18 over which the railroad 17 is to be laid, the configuration being designed to have a dimensional relationship of:

$$H3 = H1 + H2$$

wherein H1 is the drilled depth of the excavated section 19, H2 is the height of the reinforcing section 21, and H3 is the height from the surface 18a of the prescribed ground 18 to the top face of the platform 16.

[0018] According to the findings of research and testing by the present inventors, the height H3 of the top face of the platform 16 is usually 1000 to 1300 mm, and the minimum distance H4 from an edge 16a, located toward the ground 18 as shown in Fig. 3, of the platform 16 toward the escalator 1, is not more than 2000 mm, and where there is an area passable by passengers on the top face of the platform 16, located between the edge 16a of the platform 16 and the escalator 1, it has been confirmed that the adverse effect of the drilling of the excavated section 19 on the ground 18 of the railroad 17 can be restrained by setting the excavating depth H1 between 500 and 800 mm and the height H2 of the reinforcing section 21 to no less than 200 mm.

[0019] To add, the escalator 1 is provided, as shown in Fig. 4, with a drive sprocket 23 having, for instance, 18 teeth and smaller in diameter than in a usual escalator, in the inverting part 22 of the steps 4 provided in the upper flat part 12 of the frame 2. Front wheels 24 of the steps 4 are guided by front wheel guide rails 25, and rear wheels 26 of the steps 4 are guided by rear wheel guide rails 27. The track of the front wheel guide rails 25 is positioned outside the rear wheel guide rails 27 in the widthwise direction of the frame 2, i.e. in the direction orthogonal to the face of Fig. 4. Chains 28, whose chain pitch is six for instance, are provided to link the front wheel shafts of the steps 4, and these chains 28 and the front wheel shafts are linked by triangularly shaped specific links 29. Each of these specific links 29 is provided with a long hole 30 to make possible displacement of the front wheel shaft. This long hole 30 is extended in a direction substantially orthogonal to the extensive direction of the chain 28.

[0020] To explain the actions of this constituent section, when a step 4 on its upward travel approaches the inverting part 22 but is not yet very close to the inverting part 22, the tread face of the step 4 is held upward and horizontal, and its front wheel shafts are at the slower end of the long holes 30 of the specific links 29. When the step 4 proceeds from this state and begins turning around, until the front wheels 24 reach a position in approximately the middle of the height of the drive sprocket 23, the front wheel shafts travel along the extending direction of the long holes 30 of the specific links 29 and, when the front wheels 24 reach about the middle of the height of the drive sprocket 23, their shafts reach the upper ends of the long holes 30, i.e. the rightmost end of Fig. 4. Then, as the step 4 turns around and, with its tread face held downward and horizontal, runs back its return path, the front wheel shafts are again positioned at the lower ends of the long holes 30 of the specific links 29.

[0021] These actions cause the track 31 of the chains 28 and the track 32 of the front wheel shafts of the steps 4 to substantially coincide with each other on the upward path until the inverting part 22 is reached and on the downward path after passing the inverting part 22, but in the inverting part 22 the track 32 of the front wheel shafts of the steps 4 is positioned outside the track 31 of the chains 28. Thus the track of the chains 28 resembles that of the chains driven by a sprocket installed on a usual, not particularly thin, escalator, and a step 4 about to turn around and the immediately adjoining steps 4 do not interfere with each other, and these steps 4 are enabled to turn around smoothly.

[0022] And since the drive sprockets 23, as mentioned above, are smaller in diameter than those of a usual escalator, it is possible to set the height H of the

frame 2 of this embodiment shown in Fig. 4 lower than that of the frame in a usual escalator by, for example, 20 to 30%, resulting a thin escalator 1 whose overall height is less than that of a usual escalator. Accordingly, it is made possible to set the height of the reinforcing section 21, shown in Fig. 3, to no less than 200 mm.

[0023] In the embodiment configured in this manner, since the reinforcing section 21 is provided underneath and around the excavated section 19 to accommodate the frame 2 of the lower flat part 14 of the escalator 1 as described above, in the drilling work to provide the aforementioned excavated section 19 in the platform 16, the adverse impact of the drilling on the ground 18 of the railroad 17 adjoining the platform 16 can be restrained, making it possible to keep the ground 18 of the railroad 17 in a stable condition, free from loosening, much less collapsing.

[0024] Accordingly, there is no need for repair work on the ground 18 of the railroad 17 after drilling the excavated section 19, and accordingly the escalator 1 can be installed without any fear of spending extra time and money on such repair work. Nor would railway passengers be troubled by such repair work on the ground 18 of the railroad 17 when the escalator 1 is installed.

[0025] Incidentally, although the above-described embodiment is an example of installing a thin-type escalator 1, where the platform 16 has a sufficient height and a greater than prescribed height can be secured for the reinforcing section 21, a usual escalator having a greater overall height than this thin escalator 1 can be installed as well.

[0026] Further, although the foregoing embodiment is supposed to use an escalator 1 as an example of passenger conveyor, the present invention is not limited to this but may as well be applied to a moving pedestrian passage or the like.

[0027] Also, though this embodiment is a passage facility in which the platform 16 of a railway station is equipped with an escalator 1, the invention is not confined to this, but can be applied to any passage facility comprising an architectural structure having a pedestrian passage on its top face adjoining a prescribed ground and formed in a higher position than the prescribed ground and a passenger conveyor at least a portion of which is accommodated in an excavated section formed by drilling a prescribed portion of this architectural structure.

[0028] As described above, the present invention makes it possible to install a passenger conveyor in an architectural structure without adversely affecting any prescribed ground adjoining the architectural structure, and accordingly to install the passenger conveyor without requiring any repair work on the prescribed ground, which would be otherwise needed after drilling an excavated section in which at least a portion of the passenger conveyor is to be accommodated, and without requiring any extra time and money on such repair work.

Claims

1. A passage facility equipped with an architectural structure (16) adjoining a prescribed ground (18) and having on a top face a pedestrian passage formed in a position higher than the prescribed ground (18), and a passenger conveyor (1) of which at least a portion is accommodated in an excavated section (19) formed by drilling the architectural structure (16), wherein there is provided a reinforcing section (21) formed underneath and around said excavated section (19) and restraining any adverse impact of the drilling on said prescribed ground (18) and, the configuration has a dimensional relationship of:

$$H3 = H1 + H2$$

in which H1 is the drilled depth of said excavated section (19), H2 is the height of said reinforcing section (21), and H3 is the height from the surface (18a) of said prescribed ground (18) to the top face of said architectural structure (16).

2. The passage facility as set forth in claim 1, wherein said prescribed ground is a ground (18) over which a railroad (17) is to be laid, and said architectural structure is a platform (16) of a railway station.

3. The passage facility as set forth in claim 1 or 2, wherein said passenger conveyor is an escalator (1) whose lower flat part (14) is disposed on said architectural structure (16).

4. The passage facility as set forth in any one of claims 1 through 3, wherein the minimum distance from the end of said architectural structure (16) located toward said prescribed ground to said passenger conveyor (1) is not more than 2000 mm, and the top face of said architectural structure (16) positioned between said end of said architectural structure (16) and said passenger conveyor (1) constitutes said pedestrian passage.

5. The passage facility as set forth in any one of claims 1 through 4, wherein the height H2 of said reinforcing section (21) is not less than 200 mm.

6. A passage facility formed by installing an escalator (1) along a stairway (7) leading to the platform (17) of a railway station, said escalator (1) being positioned on the railroad (17) side of the platform (16), wherein a pit structure (20) is formed in an excavated section (19) formed by drilling said platform (16), and the lower flat part (14) of said escalator (1) is accommodated in this pit structure (20), and the bottom of said pit structure (20) is positioned higher

than the ground (18) over which the railroad (17) is to be laid.

FIG. 1

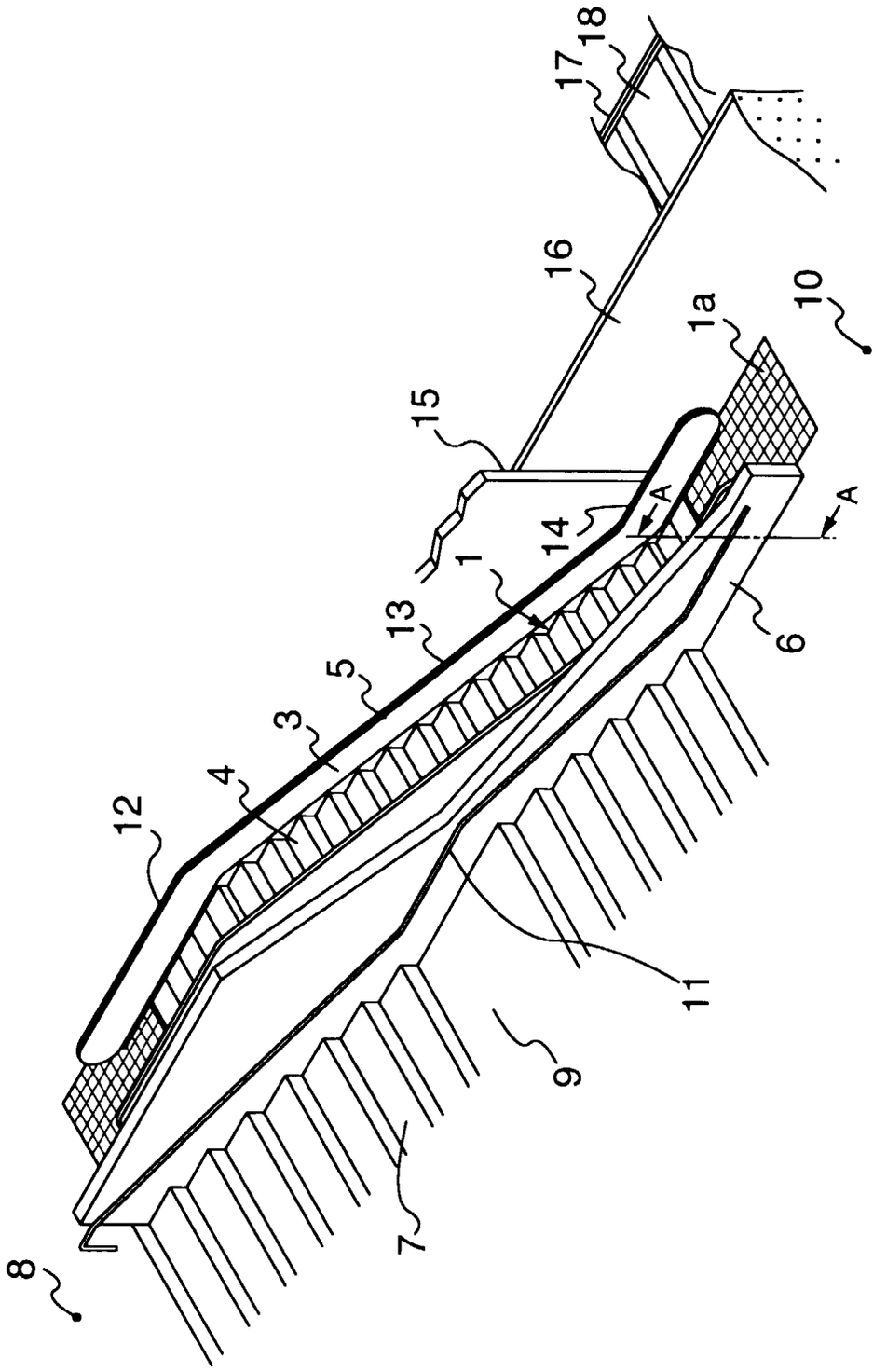


FIG. 2

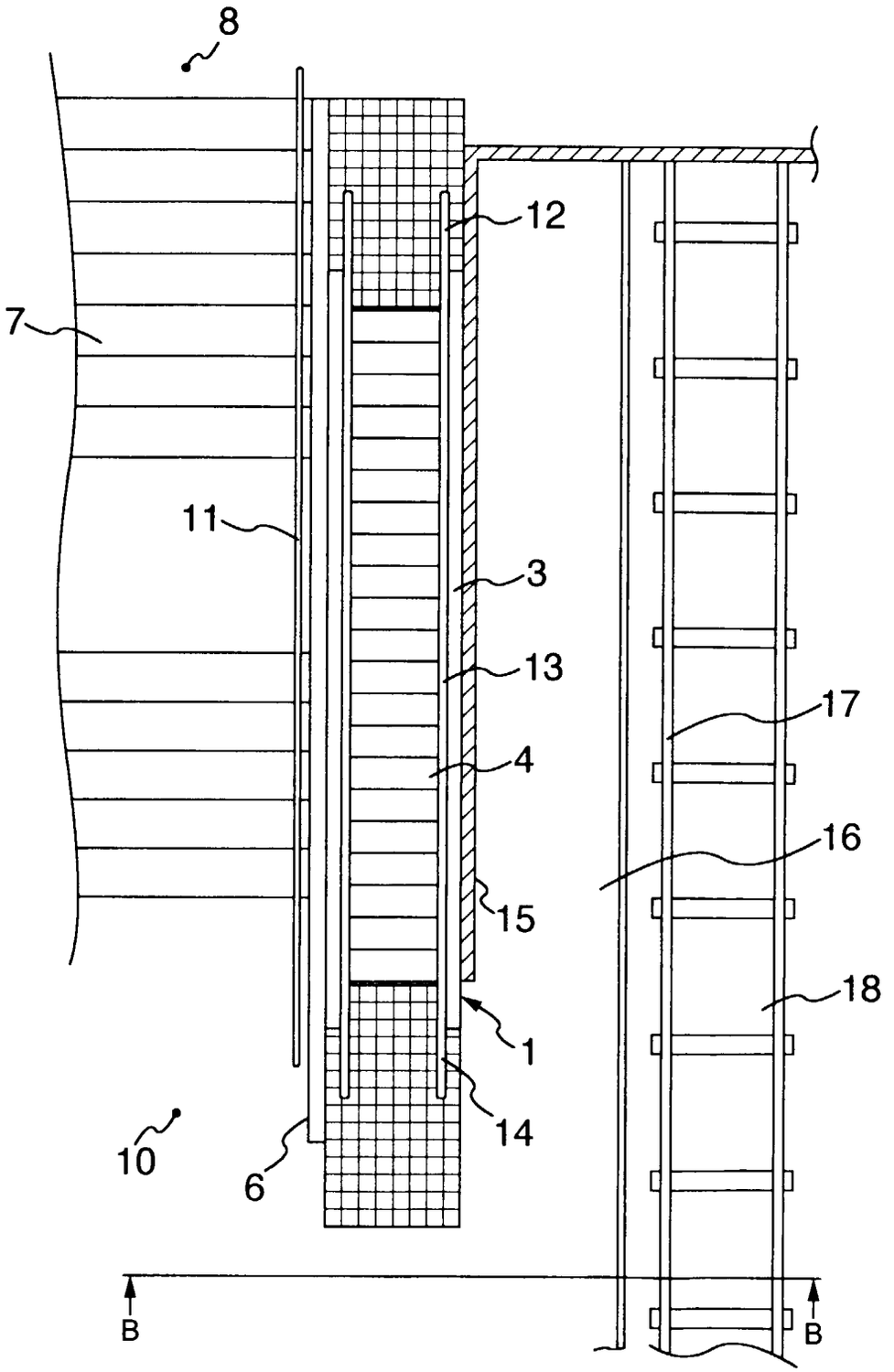


FIG. 3

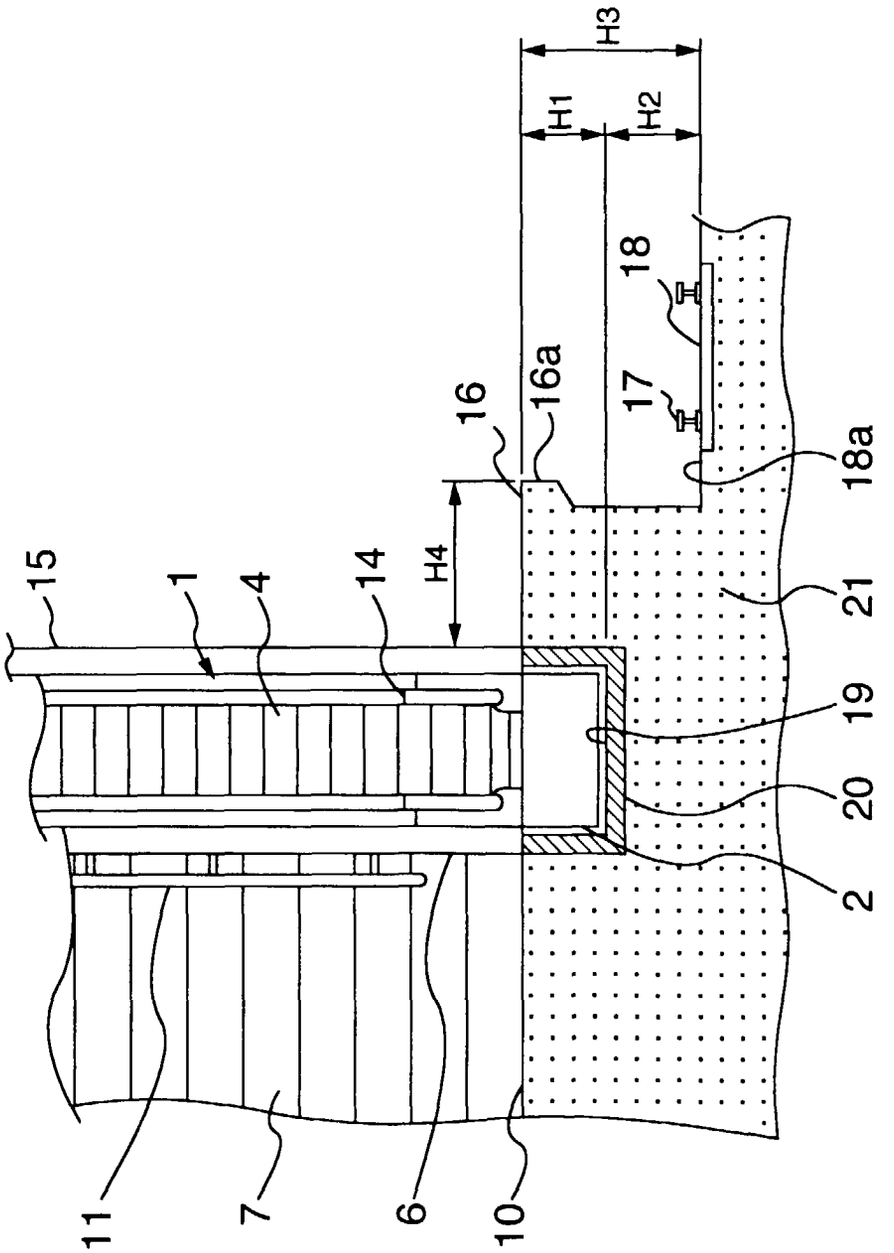
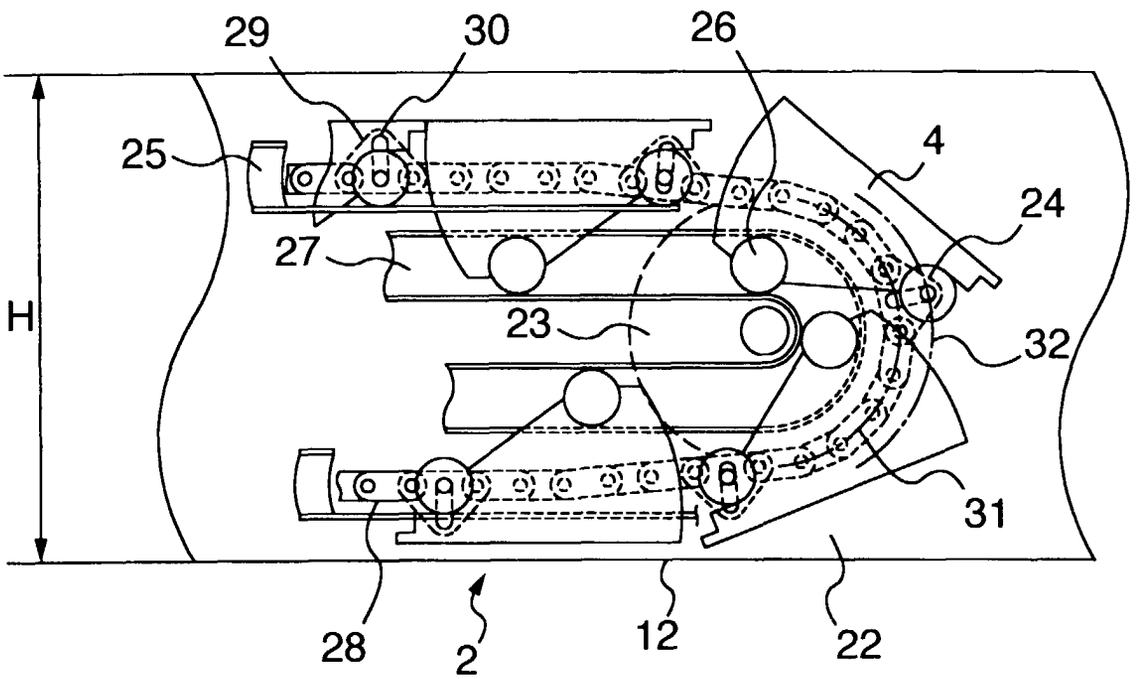


FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 7394

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,Y	JP 07 179284 A (EAST JAPAN RAILWAY CO.) 18 July 1995 (1995-07-18)	6	B62B1/02
A	* figure 4 *	1	
Y	DE 43 19 239 A (BAUER SPEZIALTIFBAU GMBH) 15 December 1994 (1994-12-15) * column 9, line 56 - column 10, line 57; figures 1,4 *	6	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E02D
B62B
E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 November 2000	Kergueno, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 10 7394

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-11-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 07179284 A	18-07-1995	NONE	
DE 4319239 A	15-12-1994	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82