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(54) **PASSENGER CONVEYOR COMPRISING A SKIRT PANEL AND SKIRT COVER PANEL FOR A PASSENGER CONVEYOR**

(57) The present disclosure relates to a passenger conveyor (30) comprising a frame (33) receiving a moving staircase or receiving a moving walk, wherein a skirt (1.2) extending above steps (32) or pallets is formed on or connected to the frame (33) on at least one side of the staircase or moving walk, wherein the skirt (1.2) comprises at least one recess (14.1) having an opening on an inner side (13) of the skirt (1.2), and wherein the opening of the recess (14.1) is covered by a skirt cover panel (16). The invention is characterized in that the skirt cover panel (16) is formed from at least a first material (16.1) and a second material (16.2), wherein the first material (16.1) and the second material (16.2) are integrally connected to each other and are forming a continuous panel with each other.

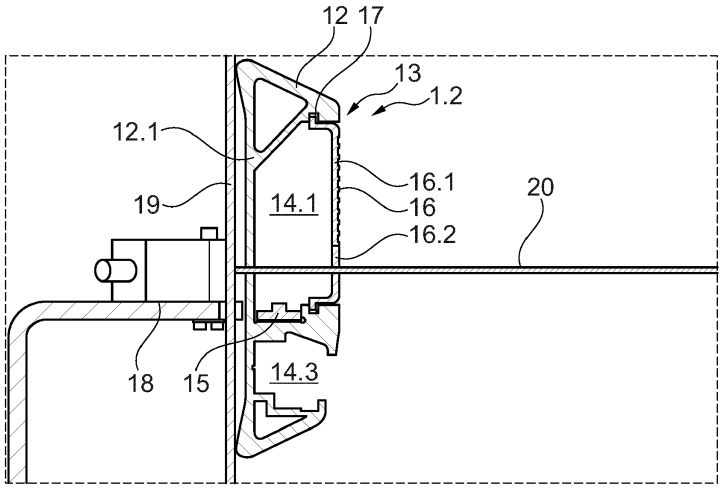

Fig. 2

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Description

Field of the invention

[0001] The present disclosure generally relates to a passenger conveyor for transporting passengers and/or goods comprising a frame receiving a moving staircase comprising a number of steps or receiving a moving walk comprising a number of pallets, wherein a skirt extending above the steps or pallets is formed on or connected to the frame on at least one side of the staircase or moving walk, wherein the skirt comprises at least one recess having an opening on an inner side of the skirt, and wherein the opening of the recess is covered by a skirt cover panel. The present disclosure further relates to a skirt cover panel for such a passenger conveyor and a method to manufacture the same.

Background of the invention

[0002] Such passenger conveyors, which are moving staircases or walks for carrying people and/or goods e.g. between floors or along a floor of a building or structure, are well known from the state of the art and typically comprise transition areas at their ends and a transportation area in between the transition areas. Steps or pallets of the passenger conveyor are running through those areas, forming stairs or a walk on an upper side of the transportation area and are turned around in the transition areas. The steps or pallets are typically guided on rails by a chain and/or rollers. Usually, all components of the conveyor are mounted in or on a frame.

[0003] It is also known, that on sides of the staircase or walk, a skirt extend upwards above the steps or pallets limiting the passenger area in side direction and on top of the skirt, balustrades extend to avoid the passengers from falling of the conveyor. These skirts may house lighting means, e.g. for design reasons and/or to provide lighting of the staircase or walk, and may also house sensor elements, e.g. for detecting a person or good entering or leaving the staircase or walk. Disadvantageously, skirts are of complicated construction when housing several components like lighting and sensor elements at the same time. In particular, the different components require separate housing with separate covers at an inner side of the skirt, wherein each cover is designs for the specific optical needs of the component.

Description of the invention

[0004] Based on the state of art described above, it is an object of the invention to provide a passenger conveyor having a continuous skirt which is simple and inexpensive, while allowing different components to be housed in/at the skirt.

[0005] This object is solved by the features of the independent claims. Advantageous embodiments are indicated in the dependent claims. Where technically possible, the features of the dependent claims may be combined as desired with the features of the independent claims and/or other dependent claims.

[0006] In particular, the object is solved by a passenger conveyor for transporting passengers and/or goods comprising a frame receiving a moving staircase comprising a number of steps or receiving a moving walk comprising a number of pallets, wherein a skirt extending above the steps or pallets is formed on or connected to the frame on at least one side of the staircase or moving walk, wherein the skirt comprises at least one recess having an opening on an inner side of the skirt, wherein the opening of the recess is covered by a skirt cover panel, wherein the skirt cover panel is formed from at least a first material and a second material;, and wherein the first material and the second material are integrally connected to each other and are forming a continuous panel with each other.

[0007] As far as elements are designated with the aid of numbering, for example "first element", "second element" and "third element", this numbering is provided purely for differentiation in the designation and does not represent any dependence of the elements on one another or any mandatory sequence of the elements. In particular, this means that, for example, a device or method need not have a "first element" in order to have a "second element". Also, the device or method may have a "first element", as well as a "third element", but without necessarily having a "second element". There may also be multiple units of an element of a single numbering, for example multiple "first elements".

[0008] A passenger conveyor generally refers to a device for transporting people or goods from one area to another area of a building, structure, or public area or vice versa. In particular, a passenger conveyor is an escalator having steps forming the staircase, wherein the areas are on different height levels or the passenger conveyor is a moving walk having pallets forming the walk, wherein the areas are on different or the same height levels. Such passenger conveyors are used e.g. in highly frequented buildings like office buildings, administration buildings or in public transport, e.g. at a subway station. For transportation of people or goods, a passenger conveyor has a first transition area at a first end, a second transition area at a second end and a transportation area in between the first transition area and the second transition area. The steps or pallets of the passenger conveyor are running through those areas, form a staircase or walk on an upper side of the transportation area, in case of an escalator are transformed into a flat arrangement with each other in the transition areas and are turned around in the transition areas.

[0009] A frame, which is the basic load-bearing element of the passenger conveyor, is preferably formed by opposing side units and cross members (also referred to as transverse beams) connecting them, a respective side unit being formed by at least one side wall and, in particular, by an upper beam and/or a lower beam. The frame can also include a floor unit connected to the side units,

wherein such a floor unit does not necessarily have to fulfill a load-bearing function, but is designed, for example, with regard to the function of collecting and, if necessary, draining off oil from a drive, or is optimized with regard to covering and/or accessing the passenger conveyors structure and/or components thereof.

[0010] A skirt is understood to extend upwards from the side unit, in particular from the beam and may cover a part of the frame structure or structure elements of a balustrade to an inner side of the conveyor in an area above the steps or pallets. An inner side of the skirt is understood to be a side facing the steps or pallets. Such a skirt also serves to protect the frame or any other components against the intrusion of objects and/or persons. Since the skirt is arranged in a fixed position directly next to the steps or pallets, is as close as possible to the steps/pallets and is also in the immediate vicinity of a person standing on the guideway device, the skirt is required not to have any potential danger points such as unevenness, open recesses, edges, ridges or the like. Therefore, the skirt cover panel preferably forms an even surface with the skirt respectively forms an even surface of the skirt.

[0011] Preferably, the skirt cover panel is received in a receptacle at the recess, e.g. a groove extending along an edge of the recess or is clamped or otherwise form fitted in the recess. The recess is most preferably U-shaped, V-shaped, or otherwise shaped with an opening only on one side of the geometry, wherein the opening is formed exclusively on the inner side of the skirt. The inner side, however, may be curved, convex/concave or of any other continuous form, wherein the skirt cover panel preferably continuously fits in the shape of the inner side. Further, the skirt may comprise brushes for keeping a passenger at a certain distance from the skirt or receptacles for such brushes.

[0012] With the passenger conveyor described before, different components may be housed in the single recess formed at the skirt, while the recess is simple to cover by the single skirt cover panel, e.g. by inserting the skirt cover panel into a respective receptacle at the recess or clamping the skirt cover panel into the recess. As the skirt cover panel is formed in one piece due to the integral connection of the two materials with each other, the skirt cover panel forms a continuous and safe surface with the skirt at least on the side of the skirt facing the steps or pallets. At the same time, due to the skirt cover panel comprising the first material and the second material, the first material may provide optical features needed for first components received in the recess, e.g. lighting means, wherein the respective first components are located in the recess such that the optical features of the first material are utilized and the second material may provide optical features needed for second components received in the recess, e.g. an optical sensor element, wherein the respective second components are located in the recess such that the optical features of the second material are utilized. The invention thus allows to house different components in a single recess having a single skirt cover panel and therefore being of a simple an inexpensive design, while different needs of the components regrading features of the skirt cover panel can be provided.

[0013] The skirt cover panel is preferably formed from a first flat panel of the first material and a second flat panel of the second material, wherein the flat panels are integrally connected to each other with abutting edges, such that the first flat panel and the second flat panel for a single, continuous panel together. Insofar the materials are forming a continuous panel with each other, the transition from the fist material to the second material aligns at least on the surface of the skirt, which faces the steps or pallets. The transition on the side of the skirt cover panel facing the recess preferably also aligns; however, it lies within the scope of the invention, if the first material and the second material form an edge, groove, or any other kind of discontinuity on the side of the skirt cover panel facing the recess, e.g. when connection means of the materials require so.

[0014] In one embodiment of the passenger conveyor, the first material is lucent, in particular translucent, for visible light. Thus, lighting means received in the recess can utilize the first material for emitting visible light through it and onto the steps or pallet. By the first material being translucent, the light is scattered over the area to be illuminated and diffused. Accordingly, in a preferred embodiment, light means emitting visible light are received in the recess, preferably utilizing the lucent first material. E.g., the lighting means comprise at least one LED, preferably a multi-color LED, for emitting light at low energy consumption.

[0015] In a further preferred embodiment, the second material is opaque for visible light. This is the second material provides cover for a component and/or structure located behind it in the recess such that the component is not visible for a passenger. Advantageously, this allows for a clean design, wherein a passenger only sees the surface of the skirt and of the skirt cover panel. The component or structure located behind the second material may e.g. be a sensor element or a part of a profile forming the skirt. In a further preferred embodiment, the second material is lucent for infrared light. Thus, it allows for being utilized by a sensor element utilizing an infrared signal.

[0016] In a further embodiment, which is in accordance with the feature described just before, at least one optical sensor element is received in or at the recess, preferably utilizing the second material. The sensor element may e.g. be clamped, screwed, or otherwise fixed to a wall of the recess. Most preferred, the optical sensor element is located in or at the recess so that an optical signal associated with the optical sensor element passes through the second material. Such a signal may be an infrared signal or may be of any other kind that can penetrate an according second material, such as an ultrasonic signal.

[0017] In one embodiment, the sensor element is a photocell, which is activated when an according (infrared) light signal falls on a cell surface. A photocell may interact

with a sensor element for emitting such a light signal, which may be located on a opposite skirt of the passenger conveyor. The photocell and the light emitting element may both be received in a respective recess at opposite skirts of the passenger conveyor, wherein both recesses may be formed and covered according to the invention. The passenger passing the sensor elements, e.g. by entering or leaving the passenger conveyor, is then detected due to interrupting the light signal.

[0018] In another embodiment, the recess is formed as a channel extending parallel to the movement direction of the steps or pallets, in particular the recess is formed by a profile. The skirt may then itself be formed as profile, wherein the recess most preferred is integrated in the skirt profile. With the recess being a channel, lighting means may extend along the channel and provide continuous and uniform lighting of the steps or pallets. For example, the lighting means may be a LED tape, preferably sticked or otherwise fixed to any inner wall of the recess. Further, sensor elements may be located at a number of positions along the channel, e.g. at ends of the passenger conveyor for detecting passengers entering or leaving the conveyor, or at one or more intermediate positions along the channel. In one embodiment, the first material and the second material are formed beside each other in a continuous manner along the channel. In an alternative embodiment, the first material may extend all along the channel while areas made from the second material are integrated into the first material at specific positions of sensor elements.

[0019] In a preferred embodiment, the skirt cover panel is manufactured by co-extrusion. Co-extrusion means the conveying of two materials through the same extrusion die. By using main and co-extruders, different materials can be combined in this process. Thus, materials with different features can be combined in a profile, resulting e.g. in profiles with different optical features, multicolored profiles, hard/soft compounds, and/or profiles with different surface finishes. Co-extrusion allows to produce a continuous panel with the two different materials being integrally connected to each other, while being inexpensive. Thus, the skirt cover panel can be produced at low costs, having different material features in different areas of the panel, and forming a single integral panel form.

[0020] In an alternative embodiment, the skirt cover panel is manufactured by connecting the first material to the second material by gluing, welding, soldering, or by a form fit. Thus, the two materials may be connected in a rigid manner, wherein a continuous panel is provided. A welding seam may be provided at a back side of the skirt cover panel, which faces away from the steps or pallets and into the recess.

[0021] In a further preferred embodiment, the first material and the second material are both plastic materials. With such plastic materials, a wide range of optical features can be chosen for the first and second material, while connection can be provided by inexpensive means, such as by gluing, welding, soldering, or the like. In particular, plastic materials may be extruded, most preferred co-extruded to form the skirt cover panel or a part thereof.

[0022] The object is further solved by a skirt cover panel for an predescribed passenger conveyor, wherein the skirt cover panel is formed from at least a first material and a second material, wherein the first material and the second material are integrally connected to each other and are forming a continuous panel with each other, wherein the first material is lucent, in particular translucent, for visible light, and wherein the second material is opaque for visible light and lucent for infrared light. In regards of the skirt cover panel, terms used for definition are to be understood in the same scope as defined regarding the passenger conveyor. With the skirt cover panel, basically the same advantageous can be archived that are predescribed regarding the passenger conveyor. In particular, with the skirt cover panel, a recess in a skirt, which comprises different components to utilize features of the first material on the one hand and features of the second material on the other hand can be covered simple and by a single cover panel. For example, lighting means received in the recess may utilize the lucent feature for visible light of the first material, wherein the light in particular is diffused, and an infrared sensor element may utilize the lucent feature for infrared light of the second material, while being not visible behind the second material due to the opaque feature of the second material.

[0023] The object is even further solved by a method to manufacture a predescribed skirt cover panel, wherein the skirt cover panel is manufactured by co-extrusion. Due to the co-extrusion, the skirt cover panel may be of a continuous form while providing the two materials next to each other firmly connected to each other. Thus, with the method, a skirt cover panel is manufactured, with which the advantageous described regarding the skirt cover panel are archived, respectively.

Brief description of the figures

[0024] In the following, the invention is explained in more detail with reference to the accompanying figures using preferred examples of embodiments. The formulation figure is abbreviated in the drawings as Fig.

- Fig. 1 is a cross section view of a skirt for a passenger conveyor according to the state of the art;
- Fig. 2 is a cross section view of a skirt for a passenger conveyor according to the invention; and
- Fig. 3 is a schematic side view of a passenger conveyor

Detailed description of the embodiments

[0025] The described embodiments are merely examples that can be modified and/or supplemented in a variety of ways within the scope of the claims. Any feature described for a particular embodiment example may be

used independently or in combination with other features in any other embodiment example. Any feature described for an embodiment example of a particular claim category may also be used in a corresponding manner in an embodiment example of another claim category.

[0026] Referring to Figure 1, a skirt 1.1 for a passenger conveyor according to the state of the art comprises a number of profile elements 2.1, 2.2, 2.3, which are connected to each other and form an inner surface 3 facing steps or pallets of a passenger conveyor. Namely, profile elements 2.1, 2.2 are structure elements of the skirt 1.1, while profile element 2.3 forms a first recess 4.1 and a second recess 4.2. The skirt 1.1 may further comprise a further recess (not shown), e.g. in the profile element 2.2, to receive brushes.

[0027] The first recess 4.1 houses lighting means 5 and is covered by a first skirt cover panel 6.1, which is received in a groove 7 at the first recess 4.1 and continuously blends in the surface 3. The first skirt cover panel 6.1 e.g. has translucent properties regarding visible light and therefore diffuses the light emitted by the lighting means 5 to illuminate the steps or pallets of the passenger conveyor.

[0028] At the second recess 4.2, an infrared sensor element 8 is provided, which interacts with a counterpart (not shown) on the other side of the steps or pallets, wherein between the infrared sensor element 8 an its counterpart a beam of infrared light may be formed. The infrared sensor element 8 is provided behind a wall 10 of the profile element 2.3, wherein the wall 10 comprises a hole (not shown) for the beam of infrared light to pass through. The second recess 4.2 is covered by a second skirt cover panel 6.2, which is received in a groove 9 at the second recess 4.2 and continuously blends in the surface 3. The second skirt cover panel 6.2 e.g. has lucent properties regarding infrared light to allow the infrared light beam to penetrate through and may further have opaque properties regarding visible light for inside of the second recess 4.2 to not be visible for passengers.

[0029] Referring to Figure 2, a skirt 1.2 according to the invention is formed as a single profile 12 forming an inner surface 13 facing steps or pallets of a passenger conveyor. The skirt 1.2 forms a first recess 14.1, in which lighting means 15 are provided and at which an infrared sensor element 18, namely a photocell, is attached behind a wall 12.1 of the profile 12 and a wall 19 of the passenger conveyor's structure. The infrared sensor element 18 interacts with a counterpart (not shown) on the other side of the steps or pallets, wherein between the infrared sensor element 18 an its counterpart a beam 20 of infrared light is be formed. The walls 12.1, 19 comprise holes (not shown) for the beam 20 of infrared light to pass through. The skirt 1.2, respectively the profile 12, further comprises a third recess 14.3 to receive brushes.

[0030] The first recess 14.1 is covered by a single skirt cover panel 16, which is received in a groove 17 formed at the first recess 14.1, wherein the skirt cover panel 16 blends into the inner surface 13 forming a continuous inner surface 13. The skirt cover panel 16 is formed from a first material 16.1 and a second material 16.2, wherein the first material 16.1 is translucent for visible light and therefore allows the light emitted by the lighting means 15 to pass through in order to illuminate the steps or pallets while being diffused. The second material 16.2 is opaque for visible light and therefore covers the lower part of the first recess 14.1, in which the infrared sensor element 18 and the lighting means 15 are placed, from the view of passengers. The second material 16.2 is further lucent for infrared light and therefore allows the beam 20 of infrared light to pass through to/from the infrared sensor element 18. The arrangement of the first material 16.1 and the second material 16.2 relative to each other may be changed, e.g. the second material 16.2 may be placed above the first material 16.1, while the infrared sensor element 18 and the lighting means 15 are arranged accordingly then. The lighting means 15 may be placed anywhere in the first recess 14.1, except blocking the infrared sensor element 18, and are e.g. sticked or screwed to an inner wall of the first recess 14.1.

[0031] The first material 16.1 and the second material 16.2 are formed as an integral unit with each other and form a continuous skirt cover panel 16. Most preferred, the first material 16.1 and the second material 16.2 are plastic materials and the skirt cover panel 16 is formed by co-extruding the first material 16.1 with the second material 16.2.

[0032] Referring to Figure 3, a passenger conveyor 30 is an escalator and has a lower transition area 31.1, an upper transition area 31.2 and a transportation area 31.3 in between, wherein steps 32 form a staircase in the transportation area 31.3 and are in a flat arrangement with each other ion the transition areas 31.1, 31.2. The passenger conveyor 30 has a frame 33 forming a basic structural element of the passenger conveyor 30, wherein the steps 32 are guided on guiding means (not shown) in the frame 33 by rollers 34 and are pulled by a chain 35 via chain rollers 36. The passenger conveyor 30 further has a skirt 1.2 according to Fig. 2 with a first recess 14.1 / a first skirt cover panel 16 and a balustrade 37 with a handrail 38.

Reference list

[0033]

1.1	skirt (according to the state of the art)
1.2	skirt (according to the invention)
2.1	profile element
2.2	profile element
2.3	profile element
3	inner surface
4.1	first recess
4.2	second recess
5	lighting means
6.1	first skirt cover panel
6.2	second skirt cover panel

7	groove
8	infrared sensor element
9	groove
10	wall
12	profile element
12.1	wall of the profile element
13	inner surface
14.1	first recess
14.3	third recess
15	lighting element
16	skirt cover panel
16.1	first material
16.2	second material
17	groove
18	infrared sensor element
19	wall
20	beam of infrared light
30	passenger conveyor
31.1	lower transition area
31.2	upper transition area
31.3	transportation area
32	steps
33	frame
34	roller
35	chain
36	chain roller
37	balustrade
38	handrail

Claims

1. Passenger conveyor (30) for transporting passengers and/or goods comprising

a frame (33) receiving a moving staircase comprising a number of steps (32) or receiving a moving walk comprising a number of pallets;
wherein a skirt (1.2) extending above the steps (32) or pallets is formed on or connected to the frame (33) on at least one side of the staircase or moving walk;
wherein the skirt (1.2) comprises at least one recess (14.1) having an opening on an inner side (13) of the skirt (1.2); and
wherein the opening of the recess (14.1) is covered by a skirt cover panel (16);
characterized in that
the skirt cover panel (16) is formed from at least a first material (16.1) and a second material (16.2);
wherein the first material (16.1) and the second material (16.2) are integrally connected to each other and are forming a continuous panel with each other.

2. Passenger conveyor (30) according to claim 1, wherein the first material (16.1) is lucent, in particular translucent, for visible light.

3. Passenger conveyor (30) according to claim 1 or 2, wherein the second material (16.2) is opaque for visible light.

4. Passenger conveyor (30) according to claim 3, wherein the second material (16.2) is lucent for infrared light.

5. Passenger conveyor (30), wherein the recess (14.1) is formed as a channel extending parallel to the movement direction of the steps (32) or pallets, in particular the recess (14.1) is formed by a profile (12).

6. Passenger conveyor (30) according to any of the preceding claims, wherein lighting means (15) emitting visible light are received in the recess (14.1).

7. Passenger conveyor (30) according to claim 5, wherein the lighting means (15) comprise at least one LED, in particular is a LED tape.

8. Passenger conveyor (30) according to any of the preceding claims, wherein at least one optical sensor element (18) is received in or at the recess (14.1).

9. Passenger conveyor (30) according to claim 8, wherein the optical sensor element (18) is located in or at the recess (14.1) so that an optical signal associated with the optical sensor element (18) passes through the second material (16.2).

10. Passenger conveyor (30) according to claim 8 or 9, wherein the optical sensor element (18) is an infrared sensor element (18), in particular a photocell.

11. Passenger conveyor (30) according to any of the preceding claims, wherein the skirt cover panel (16) is manufactured by co-extrusion.

12. Passenger conveyor (30) according to any of claims 1 to 11, wherein the skirt cover panel (16) is manufactured by connecting the first material (16.1) to the second material (16.2) by gluing, welding, soldering, or by a form fit.

13. Passenger conveyor (30) according to any of the preceding claims, wherein the first material (16.1) and the second material (16.2) are both plastic materials.

14. Skirt cover panel (16) for a passenger conveyor (30) according to any of the preceding claims,
characterized in that

the skirt cover panel (16) is formed from at least a first material (16.1) and a second material (16.2);

wherein the first material (16.1) and the second material (16.2) are integrally connected to each other and are forming a continuous panel with each other;
wherein the first material (16.1) is lucent, in particular translucent, for visible light; and
wherein the second material (16.2) is opaque for visible light and lucent for infrared light.

15. Method to manufacture a skirt cover panel (16) according to claim 14,
characterized in that
the skirt cover panel (16) is manufactured by co-extrusion.

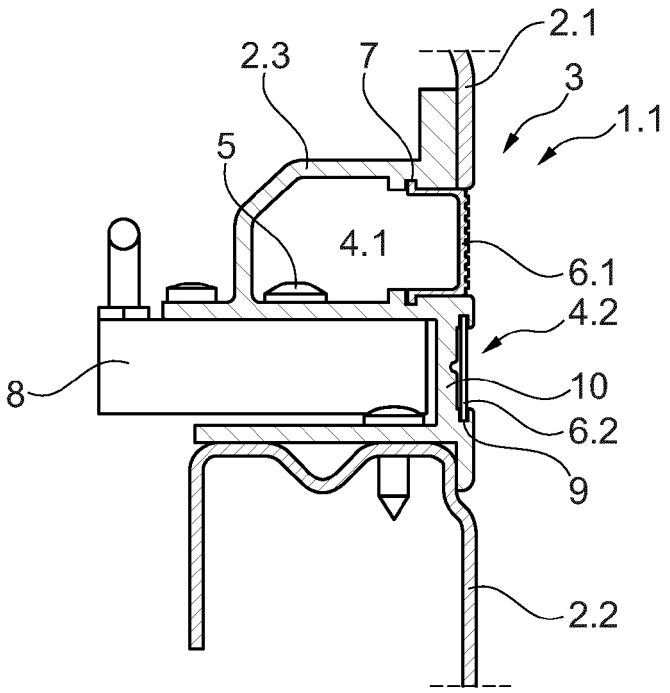

Fig. 1
(state of the art)

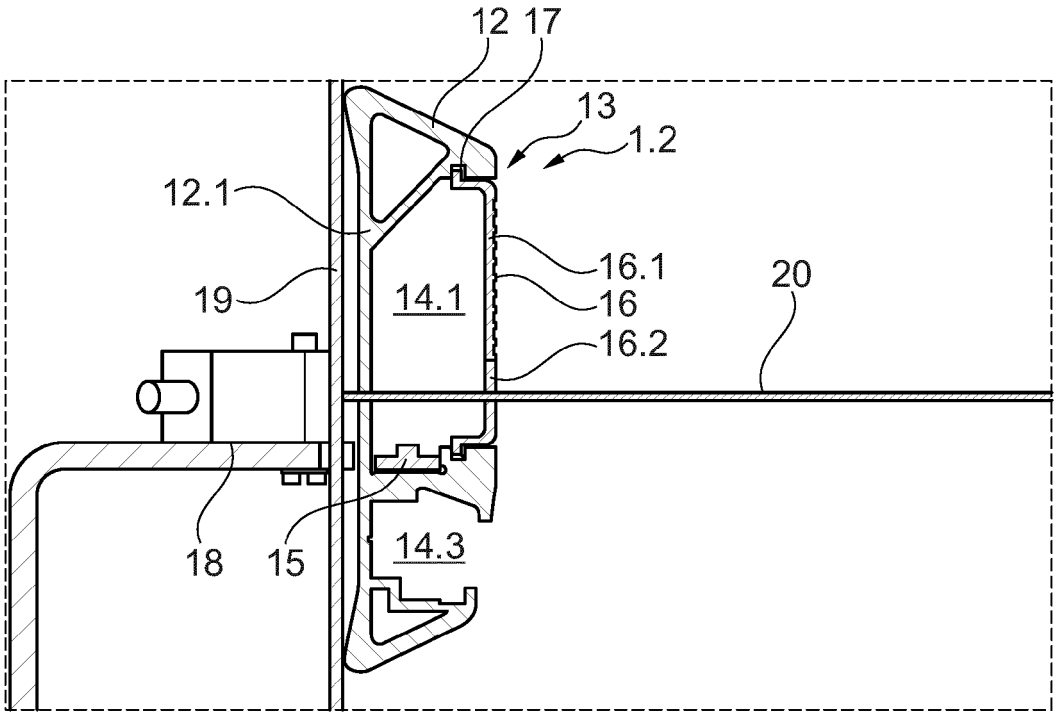

Fig. 2

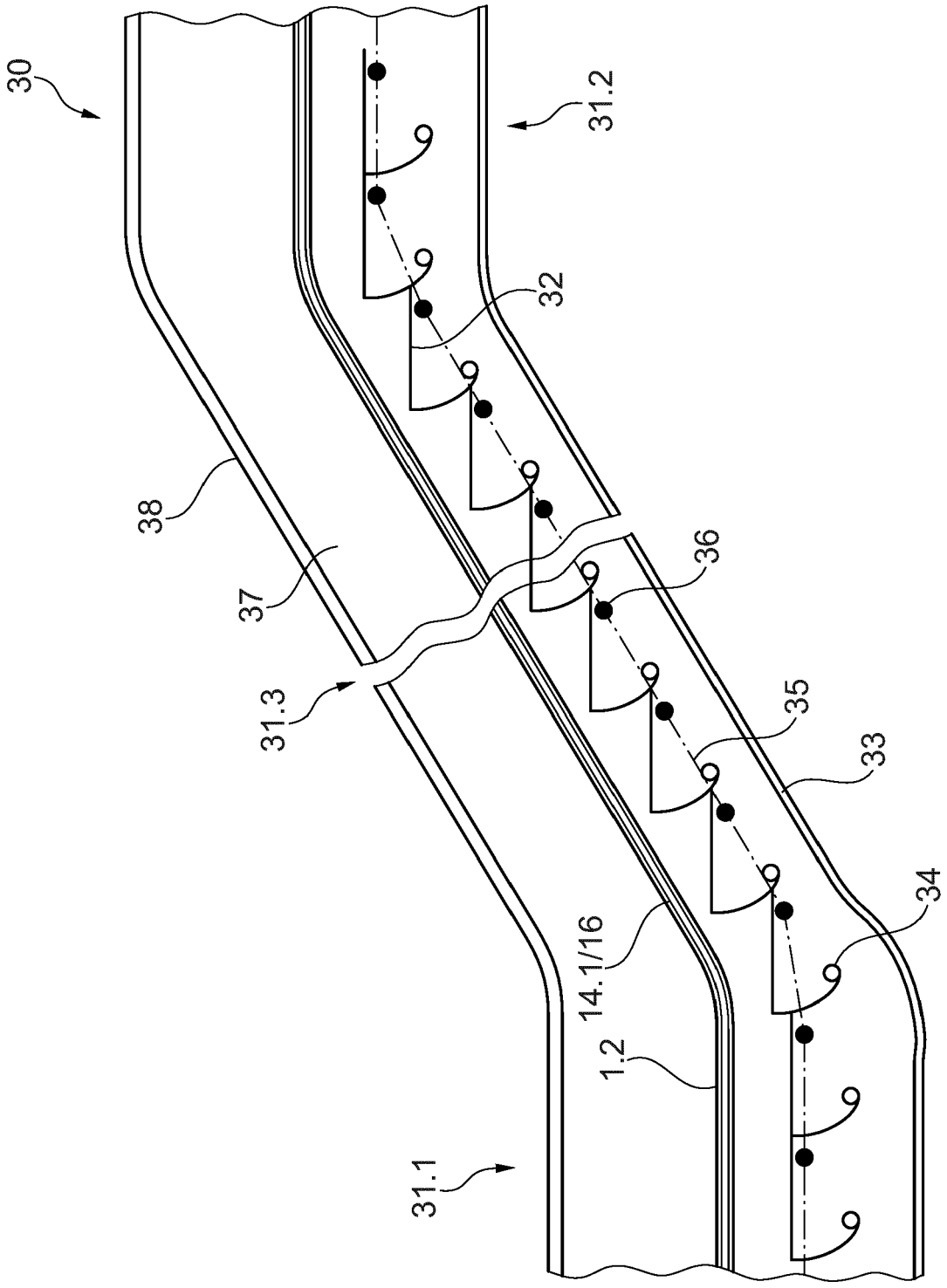

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 22 38 3274

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2011 020802 A (TOSHIBA ELEVATOR CO LTD) 3 February 2011 (2011-02-03) * paragraphs [0022], [0023]; figures 1,2,5 *	1-5,8-15	INV. B66B23/22
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TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 May 2023	Miklos, Zoltan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 38 3274

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
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20-05-2023

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