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(54) **A METHOD FOR THE ASSEMBLY OF A STAIRLIFT GUIDE RAIL, AND A KIT**

(57) A method for the assembly of a stairlift guide rail (100) using a plurality of segments of guide rail, each segment comprising a first face (211) and a second face (212), wherein the first face (211) of a first segment is aligned with and fixed to the second face (212) of a second segment. To improve the versatility so as to be able to install a variety of stairlift guide rails, tapered segments (210) are used for a curved section (401), a tapered segment (210) having the first face (211) and the second face (212) at an angle a of at most 16°.

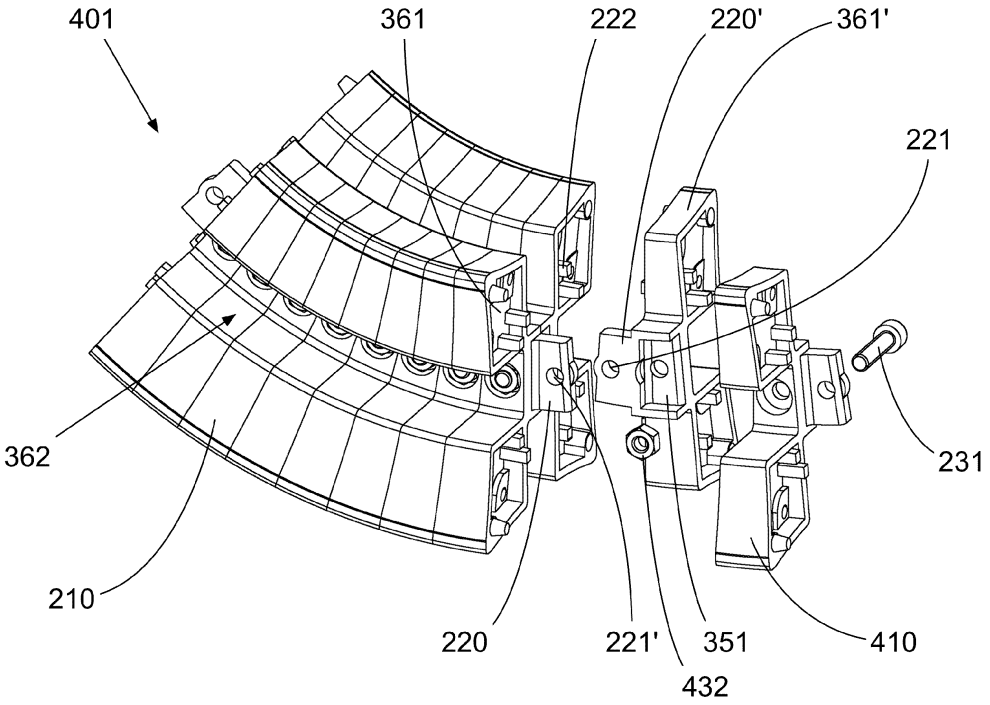

Fig. 4A

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Description

[0001] The present invention relates to a method for the assembly of a stairlift guide rail, the method involving the use of a kit comprising a plurality of segments of guide rail, each segment of the plurality of segments comprising a first face and a second face, said plurality comprising a segment for a curved section of the stairlift guide rail, wherein the method comprises the step of aligning the first face of a first segment with the second face of a second segment and fixing said first segment relative to said second segment.

[0002] Stairlifts are devices for transporting a person between two floors of a building, for example along a flight of stairs of a building lacking an elevator such as a home.

[0003] A problem with retrofitting a building such as a house with a stairlift guide rail is that it is quite expensive, because of two reasons:

- the location where the stairlift guide rail is to be installed has to be carefully measured in particular if the flight of stairs comprises a turn, and
- the guide rail segments are expensive to manufacture, requiring bending equipment.

[0004] A method according to the preamble is disclosed in US2012/0279826, which makes use of standardised segments to assemble the stairlift guide rail.

[0005] The versatility of such a kit of standardised segments leaves to be desired.

[0006] It is the object of the present invention to reduce the above problems.

[0007] To this end, a method according to the preamble is characterized in that the curved section of the stairlift guide rail comprises tapered segments, a tapered segment having the first face and the second face at an angle α of at most 16°;
wherein the angle α defines a first taper, and the first face and the second face of a tapered segment defining a second taper in a second direction, said second direction being a direction transverse to direction of the first taper, the second taper having an angle β of at most 16°.

[0008] With the method according to the present invention, it is possible that only two types of segments have to be produced for a wide variety of stairlift guide rails. The tapered segments can be mass-produced, for example using an automated CNC-machine, and kept in stock as pre-fab elements, allowing for significantly quicker delivery and installation than currently possible. They may also be kept in stock at supplier level, instead of at factory level, which further increases the speed of delivery and installation. Thus a versatile method suitable for creating a variety of stairlift rail guides is provided, and logistical problems are reduced. A curve section of a desired angle can be produced by combining the appropriate number of tapered segments.

[0009] This increases the versatility of the method and the types of stairlift guide rails that can be installed. To join single and double-tapered segments, there will be an intermediate straight segment, in general of short length. For a double-tapered segment, all the variations discussed above for a single-tapered segment are possible as well, and for the second taper the angle β (and β') will have the same value or in the same value range as α (and α'), albeit independently chosen. Repetition is abstained from for the sake of brevity only.

[0010] The stairlift guide rail will have at least one groove along the path thereof for a stairlift chair to be able to move along the stairlift rail guide.

[0011] According to a favourable embodiment, the segments have at least one groove extending from the first face and a second face for a stairlift chair to be able to move along the stairlift rail guide.

[0012] According to a favourable embodiment, the tapered segments used for the curved section are tapered segments produced using a moulding technique, preferably by injection moulding.

[0013] Thus the method is a more cost-effective method.

[0014] According to a favourable embodiment, a tapered segment for the curved section comprises

- a primary side chosen from the first face and the second face, and
- a secondary side, said secondary side being the other face of the first face and the second face;

wherein

- at the primary side the segment comprises a plurality of blocking protrusions, and
- the tapered segment comprises wall sections capable of receiving said plurality of blocking protrusions of an adjacent tapered segment, wherein the primary side of a first tapered segment is aligned with the secondary side of a second tapered segment, positioning the blocking protrusions of the plurality of blocking protrusions immediately adjacent to the wall sections.

[0015] Thus stiffness and in particular protection against torsion is provided. Preferably both the primary side and the secondary side are provided with a plurality of blocking protrusions, so blocking protrusions will be available for blocking rotation with any straight segment at either end of the curved section.

[0016] According to a favourable embodiment, the primary side of a first tapered segment comprises a tapered protrusion extending beyond the blocking protrusions and the secondary side of a second tapered segment comprises at its secondary side holes for receiving said tapered protrusion, wherein the first side and second side are aligned by the tapered protrusion and the hole receiving said tapered protrusion before the blocking protrusions are adjacent to the wall sections.

[0017] Thus assembly is facilitated.

[0018] According to a favourable embodiment, a segment for the curved section comprises

- a web,
- a primary side chosen from the first face and the second face, and
- a secondary side, said secondary side being the other face of the first face and the second face;

wherein

- at the primary side the segment comprises a lip comprising a first through-hole, and
- the web defines at the secondary side a receiving recess for receiving the lip of a second segment for the curved section, and the web comprising a second through-hole,

wherein in a state where
the primary side of a first segment for the curved section faces the secondary side of a second segment for the curved section and the lip of the first segment of the curved section is received by the receiving recess of the second segment for the curved section, the first through-hole and the second through-hole are aligned and used for bolting the first segment and second segment together.

[0019] Thus a desired number of segments can be joined easily. The lip will be in a plane that is transverse to the line of intersection defined by the intersection of the first face and the second face. It is preferred that the lip and the recess are in line. The through-holes will in general be formed by a finishing operation after injection molding, e.g. by drilling.

[0020] According to a favourable embodiment, a segment for the curved section comprises two segment halves, each comprising a lip and a receiving recess, and joining a segment with a bolt comprises joining two webs and two lips, the two webs and the two lips comprising four aligned through-holes.

[0021] Such segment halves are relatively easy to manufacture. The segment halves are preferably be identical, which makes manufacturing easier.

[0022] According to a favourable embodiment, the plurality of segments of the kit comprises a straight segment, said straight segment being formed using extrusion.

[0023] Such a straight segment is cheap to produce and can be cut to the required length, optionally machined, and then fixed relative to a tapered segment for a curve section. This can be done at the supplier level, with concomitant advantages.

[0024] According to a favourable embodiment, the straight segment comprises

- at least one cavity capable of receiving at least one of i) a tapered protrusion protruding from at least one of the first face and the second face of a tapered segment for a curved portion, ii) a blocking projection, and iii) a lip transverse to a primary face of a tapered segment for the curved section;
  and
- wall sections capable cooperating with a plurality of blocking protrusions of an adjacent tapered segment, said blocking protrusion acting as a stop for the straight segment to prevent movement of the straight segment relative to the adjacent tapered segment.

[0025] In general, the lip received by a straight section will not cooperate with the straight segment, as a result of which it will not help against torsion forces. The protrusions, e.g. stubs, from the tapered segment will take care of that. The cavity, such as a central cavity, will preferably be capable of receiving the lip of a tapered segment in a first orientation of the face facing the face of the straight segment and at a second orientation of said face facing the face of the straight segment, the later orientation being rotated over at least one of 90° and 180°, and preferably over 90°, 180° and 270°, in a plane parallel to the face of the straight segment. Thus the method according to this embodiment is very versatile when it comes to forming a stairlift guide rail.

[0026] According to a favourable embodiment, at least two segments of the plurality of segments comprise a slot for mounting the stairlift guide rail to a wall or the stairs.

[0027] The slot will extend in a direction of the stairlift guide rail formed and facilitates positioning and mounting of the stairlift guide rail.

[0028] According to a favourable embodiment, the tapered segments for the curved section comprises tapered segments with the angle α in a range chosen from i) 4.3-4.7°, ii) 4.8-5.2°, iii) 8.7-9.3° and iv) 11-11.5°.

[0029] Thus curved stairlift rail sections with variety of angles including about 45° and about 90° can be formed. Preferably the tapered segments are chosen from at least two of said ranges, allowing a larger variety of curve section angles.

[0030] According to a favourable embodiment, the segments for the curved section of the stairlift guide rail comprises

- segments with angle α of 5°, and
- segments with an angle a' chosen from at least one of 7° and 9°.

[0031] The amount of work for assembly of the stairlift guide rail can be reduced with 7° and/or 9° segments compared to the use of 5° segments alone. For a 90° angle using a combination of segments with 5° and 7° angles, 14 segments suffice, instead of 18 for 5° only. In addition, it is possible to create a greater range of angles. In particular it is possible to follow a staircase more closely, because in a building walls are rarely really perpendicular or at the required geometrical angle. By way of

example, for angles around 45°, the following range can be created using 5° and 7° segments: 40° (8*5°); 41° (4*5° + 3*7°); 42° (6*7°, or 5*5°+7°); 43° (3*5° + 4*7°); 44° (6.5° + 2*7°); 45° (2*5° + 5*7°); 46° (5*5° + 3*7°); 48° (4*5° + 4*7°); 49° (7*7°); and 50° (3*5° + 5*7°). For 5° and 9° segments the all these values can be covered in a similar manner. While the taper angle α of the segment doesn't need to be exactly 5° (e.g. 4.5° would work as well), the difference in angle between the segments having different angles will be close to a multiple of 2° for the best spread of angles within a range (such as from 40° to 50°), that is a multiple of a value in the range of 1.8 to 2.2° and preferably in the range of 1.9-2.1°). The multiple will be 1 or 2.

[0032] Finally, the present invention relates to kit for assembling a stairlift guide rail, wherein the kit comprises a plurality of tapered segments having a first face and a second face at an angle α of at most 16° and said angle α defines a first taper;
wherein the first face and the second face of a tapered segment of the plurality defines a second taper in a second direction, said second direction being a direction transverse to direction of the first taper, the second taper having an angle β of at most 16°.

[0033] The invention also relates to any embodiment of such a kit (or set) discussed in the subclaims of the above method in any combination, repetition only being avoided for the sake of brevity.

[0034] According to a favourable embodiment, the segments have at least one groove extending from the first face and a second face for a stairlift chair to be able to move along the stairlift rail guide.

[0035] The present invention will now be illustrated with reference to the drawing where

Fig. 1 shows a stair well with a stairlift guide rail;
Fig. 2 shows a section of the stairlift guide rail of Fig. 1 as side view;
Fig. 3 shows a front view of a tapered segment of the composite section of Fig. 2;
Fig. 4A and Fig. 4B show a curved section of the stairlift guide rail of Fig. 1 as a perspective view and a side view respectively; and
Fig. 5 shows a perspective view of a straight segment of the composite section of Fig. 2.

[0036] Fig. 1 shows a perspective view of a stairwell 190 comprising a flight of stairs 191, with steps 192, comprising a front face 193 and a top face 194.

[0037] The stairwell 190 is provided with a stairlift guide rail 100 according to the invention.

[0038] Fig. 2 shows a composite section 201 of the stairlift guide rail 100 of Fig. 1 as a side view. The composite section 201 shown comprises a tapered segment 210 (i.e. a wedge-shaped segment) and a straight segment 250. Each segment comprises a first face 211 and a second face 212, which in Fig. 2 have been indicated for tapered segment 210. These faces define, in the embodiment shown, a taper of 5°. For a straight segment 250, the faces run parallel.

[0039] The segments of the stairlift guide rail 100 are connected using a bolt 231 and a nut. To this end, the segments comprise lips. Fig. 2 shows a lip 220 of the tapered segment 210, comprising a through-hole 221 for a bolt 231.

[0040] The segments may be provided at a face with stubs 222 that engage an adjacent segment to prevent rotation and may contain tapered nobs 223 which will protrude beyond the stubs 222 and facilitate joining two segments together.

[0041] Fig. 3 shows a front view of a tapered segment 210 of the composite section 201 of Fig. 2. In the embodiment shown, the tapered segment 210 is a single-piece object that comprises a web 360 provided with lobes 361 defining grooves 362. These grooves 362 serve as a guide for a carriage comprising a chair. The grooves 362 may be curved, in particular for tapered segments having large taper angles a.

[0042] The tapered segment 210 comprise tapered recesses for receiving a tapered nob 223 to as to facilitate the aligning and joining of two tapered segments 210. Once aligned, the stubs 222 will be immediately adjacent to the wall of a lobe 361. Thus adjacent segments cannot rotate with respect to each other.

[0043] The tapered segments 210 comprise lips receiving recesses 351 for receiving a lip 220 of an adjacent tapered segment. To this end the lips 220 will not completely fill the lip receiving recesses 351, so as to be able to be received in at choice the lip receiving recess of an adjacent tapered segment 210.

[0044] To provide an end cap, the tapered segments may comprise holes 364 for a self-tapping bolt or threaded holes for a regular bolt. The holes will also be used for connecting a straight segment.

[0045] Fig. 4A and Fig. 4B show a curved section 401 of the stairlift guide rail 100 of Fig. 1 as a perspective view and a side view respectively.

[0046] The curved section 401 comprises a plurality of tapered segments 210.

[0047] In the embodiment discussed here, each tapered segment 210 comprises two identical segment halves 410. The production of segment halves facilitates production thereof using moulding such as injection moulding at reduced cost.

[0048] The segment halves 410 are connected to the curved section 201 using bolt 231 and nut 432. The web 360 also comprises a through-hole 364, and to add a tapered segment 210, a first segment halve 410 receives a lip 220 protruding from the curved section 401, and lip 220' is received in a lip receiving recess 351 of the curved section 401. To join adjacent segments, the web 360 of each segment half comprises a through-hole 221'. A single bolt 231 will pass through two through-holes 221' of two webs and two through-holes 221 of two flanges.

[0049] The straight segment 250 comprises a base 560 comprising a slot 561, here two, with which it may be

attached to a wall of the stairwell 190, or to the top face 194 of a step of the flight of stairs 191. To this end, a mounting bracket, preferably adjustable in length, will be used, as is known in the art. The mounting bracket may have a slot running in the transverse direction for optimum positioning. The mounting bracket may be screwed or bolted to the step or wall, and the segment may be bolted to the mounting bracket.

[0050] In general, the straight segment 250 will be of the desired length, produced by extrusion and cut to a desired length. To join the straight segment 250 to a tapered segment 210, the lip of said tapered segment 210 will be received in a central cavity 565 of the straight segment 250, but is not connected to it. The stubs 222 of the tapered segment 210 will be received in the cavities 565' of the lobes 361' of the straight segment 250 and be immediately adjacent to the wall 566 of the lobes 361', thus preventing rotation of the straight segment 250 with respect to the tapered segment 210. The two parts are connected using a bolt, such as a self-tapping bolt, which will be introduced into the holes 364'.

Claims

1. A method for the assembly of a stairlift guide rail (100), the method involving the use of a kit comprising a plurality of segments of guide rail, each segment of the plurality of segments comprising a first face (211) and a second face (212),
said plurality comprising a segment for a curved section (401) of the stairlift guide rail (100),
wherein the method comprises the step of aligning the first face (211) of a first segment with the second face (212) of a second segment and fixing said first segment relative to said second segment,
characterized in that the curved section (401) of the stairlift guide rail (100) comprises tapered segments (210), a tapered segment (210) having the first face (211) and the second face (212) at an angle α of at most 16°;
wherein the angle α defines a first taper, and the first face (211) and the second face (212) of a tapered segment (210) defining a second taper in a second direction, said second direction being a direction transverse to direction of the first taper, the second taper having an angle β of at most 16°.

2. The method according to claim 1, wherein the segments have at least one groove (362) extending from the first face (211) and a second face (212) for a stairlift chair to be able to move along the stairlift rail guide.

3. The method according to claim 1 or 2, wherein the tapered segments (210) used for the curved section are tapered segments (210) produced using a moulding technique, preferably by injection moulding.

4. The method according to any of the preceding claims, wherein a tapered segment for the curved section (401) comprises

    - a primary side chosen from the first face (211) and the second face (212), and
    - a secondary side, said secondary side being the other face of the first face (211) and the second face (212);

    wherein

    - at the primary side the segment comprises a plurality of blocking protrusions (222), and
    - the tapered segment (210) comprises wall sections (566) capable of receiving said plurality of blocking protrusions (222) of an adjacent tapered segment (210),
    wherein the primary side of a first tapered segment is aligned with the secondary side of a second tapered segment, positioning the blocking protrusions (222) of the plurality of blocking protrusions (222) immediately adjacent to the wall sections.

5. The method according to claim 4, wherein the primary side of a first tapered segment (210) comprises a tapered protrusion (223) extending beyond the blocking protrusions (222) and the secondary side of a second tapered segment comprises at its secondary side holes for receiving said tapered protrusion (223), wherein the first side and second side are aligned by the tapered protrusion (222) and the hole receiving said tapered protrusion (222) before the blocking protrusions (222) are adjacent to the wall sections.

6. The method according to any of the preceding claims, wherein a segment for the curved section (401) comprises

    - a web (360),
    - a primary side chosen from the first face (211) and the second face (212), and
    - a secondary side, said secondary side being the other face of the first face (211) and the second face (212);

    wherein

    - at the primary side the segment comprises a lip comprising a first through-hole, and
    - the web (360) defines at the secondary side a receiving recess (351) for receiving the lip of a second segment for the curved section (401), and the web (360) comprising a second through-

hole,

wherein in a state where
the primary side of a first segment for the curved section (401) faces the secondary side of a second segment for the curved section (401) and
the lip of the first segment of the curved section (401) is received by the receiving recess (351) of the second segment for the curved section (401), the first through-hole and the second through-hole are aligned and used for bolting the first segment and second segment together.

7. The method according to any of the preceding claims, wherein a segment for the curved section (401) comprises two segment halves (410), each comprising a lip and a receiving recess (351), and joining a segment with a bolt (231) comprises joining two webs and two lips (220), the two webs and the two lips (220) comprising four aligned through-holes (364').

8. The method according to any of the preceding claims, wherein the plurality of segments of the kit comprises a straight segment (250), said straight segment (250) being formed using extrusion.

9. The method according to claim 8, wherein the straight segment (250) comprises

- at least one cavity (565) capable of receiving at least one of i) a tapered protrusion protruding from at least one of the first face (211) and the second face (212) of a tapered segment (210) for a curved portion, ii) a blocking projection (222), and iii) a lip transverse to a primary face of a tapered segment (210) for the curved section (401);
and
- wall sections (566) capable cooperating with a plurality of blocking protrusions (222) of an adjacent tapered segment (210), said blocking protrusion (222) acting as a stop for the straight segment (250) to prevent movement of the straight segment (250) relative to the adjacent tapered segment (210).

10. The method according to any of the preceding claims, wherein at least two segments of the plurality of segments comprise a slot (561) for mounting the stairlift guide rail (100) to a wall (566) or the stairs (191).

11. The method according to any of the preceding claims, wherein the tapered segments (210) for the curved section (401) comprises tapered segments (210) with the angle α in a range chosen from i) 4.3-4.7°, ii) 4.8-5.2°, iii) 8.7-9.3° and iv) 11-11.5°.

12. The method according to any of the preceding claims, wherein the segments for the curved section (401) of the stairlift guide rail (100) comprises

- segments with angle α of 5°, and
- segments with an angle a' chosen from at least one of 7° and 9°.

13. Kit for assembling a stairlift guide rail (100), wherein the kit comprises a plurality of tapered segments (210) having a first face (211) and a second face (212) at an angle α of at most 16° and said angle α defines a first taper;
wherein the first face (211) and the second face (212) of a tapered segment (210) of the plurality defines a second taper in a second direction, said second direction being a direction transverse to direction of the first taper, the second taper having an angle β of at most 16°.

14. Kit according to claim 13, wherein the segments have at least one groove (362) extending from the first face (211) and a second face (212) for a stairlift chair to be able to move along the stairlift rail guide.

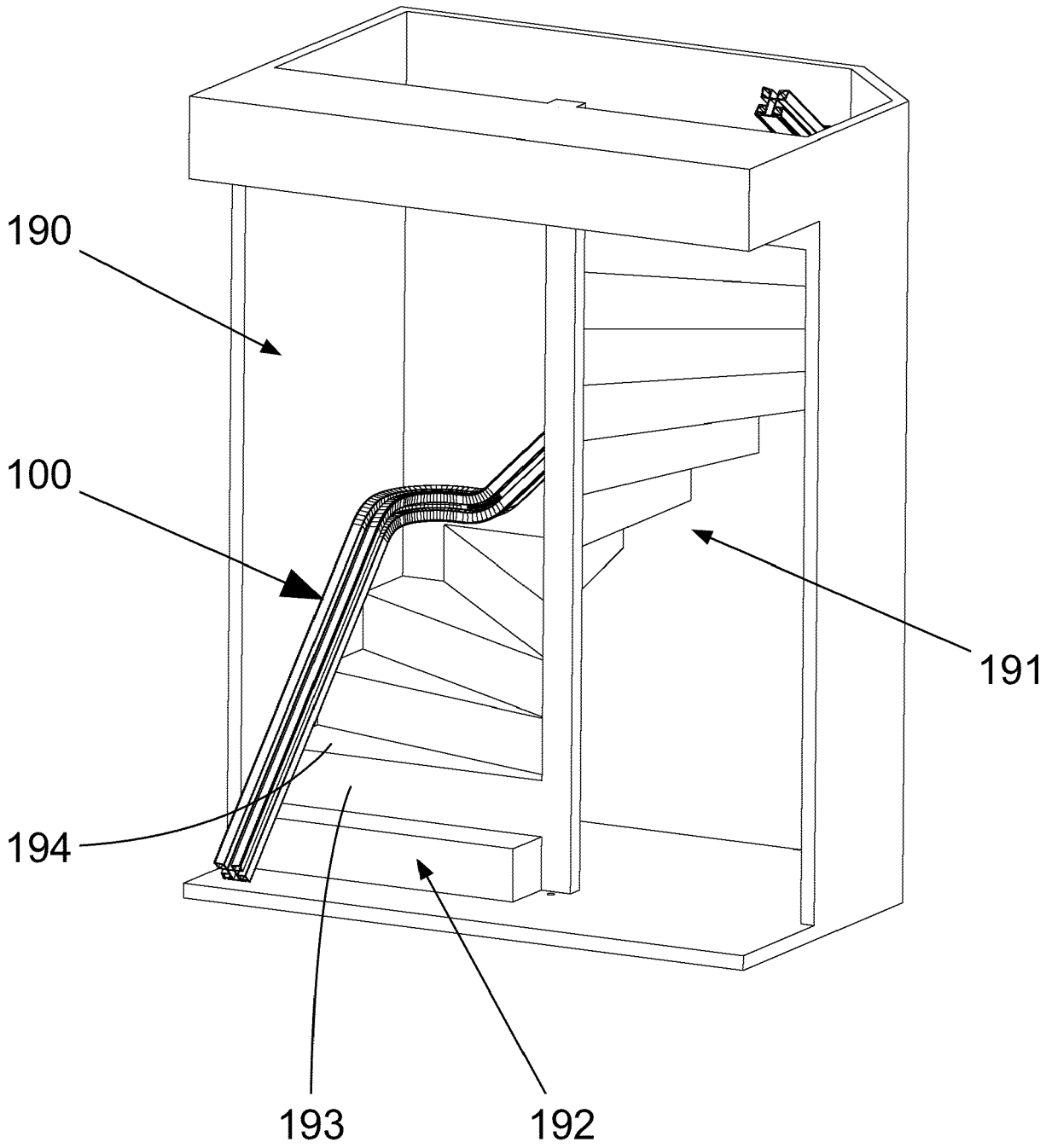

Fig. 1

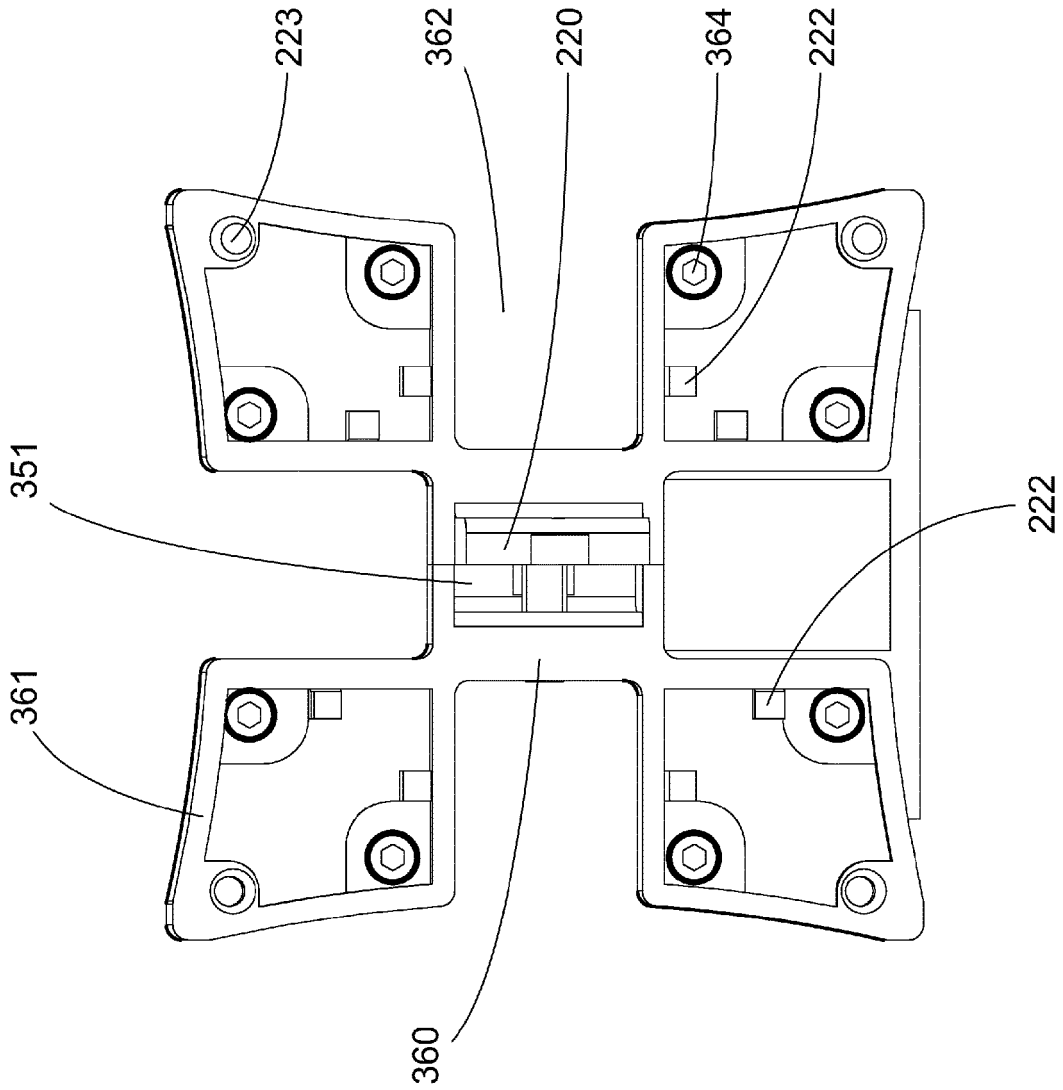
223
362
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Fig. 3

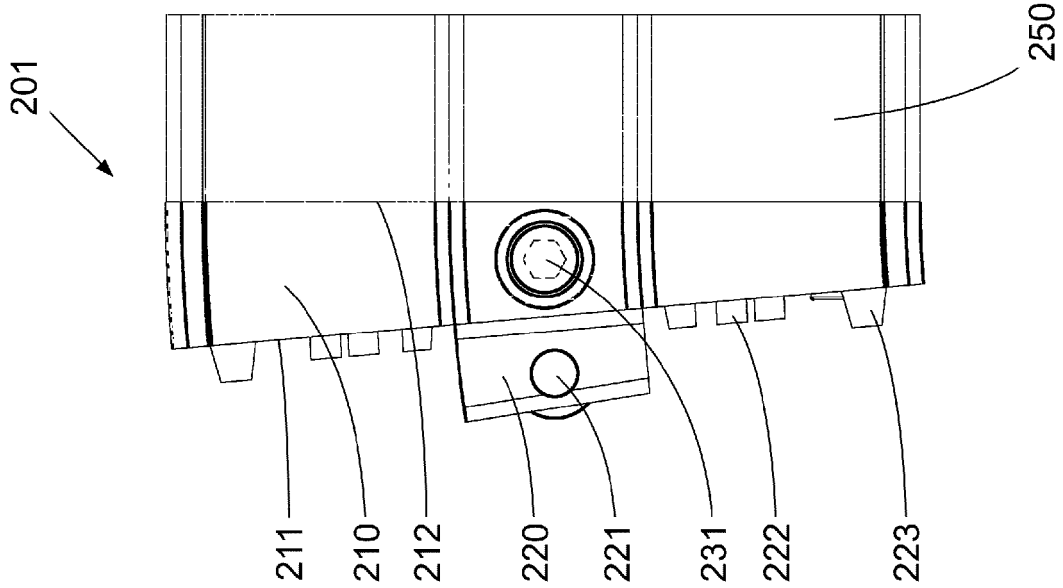
201
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Fig. 2

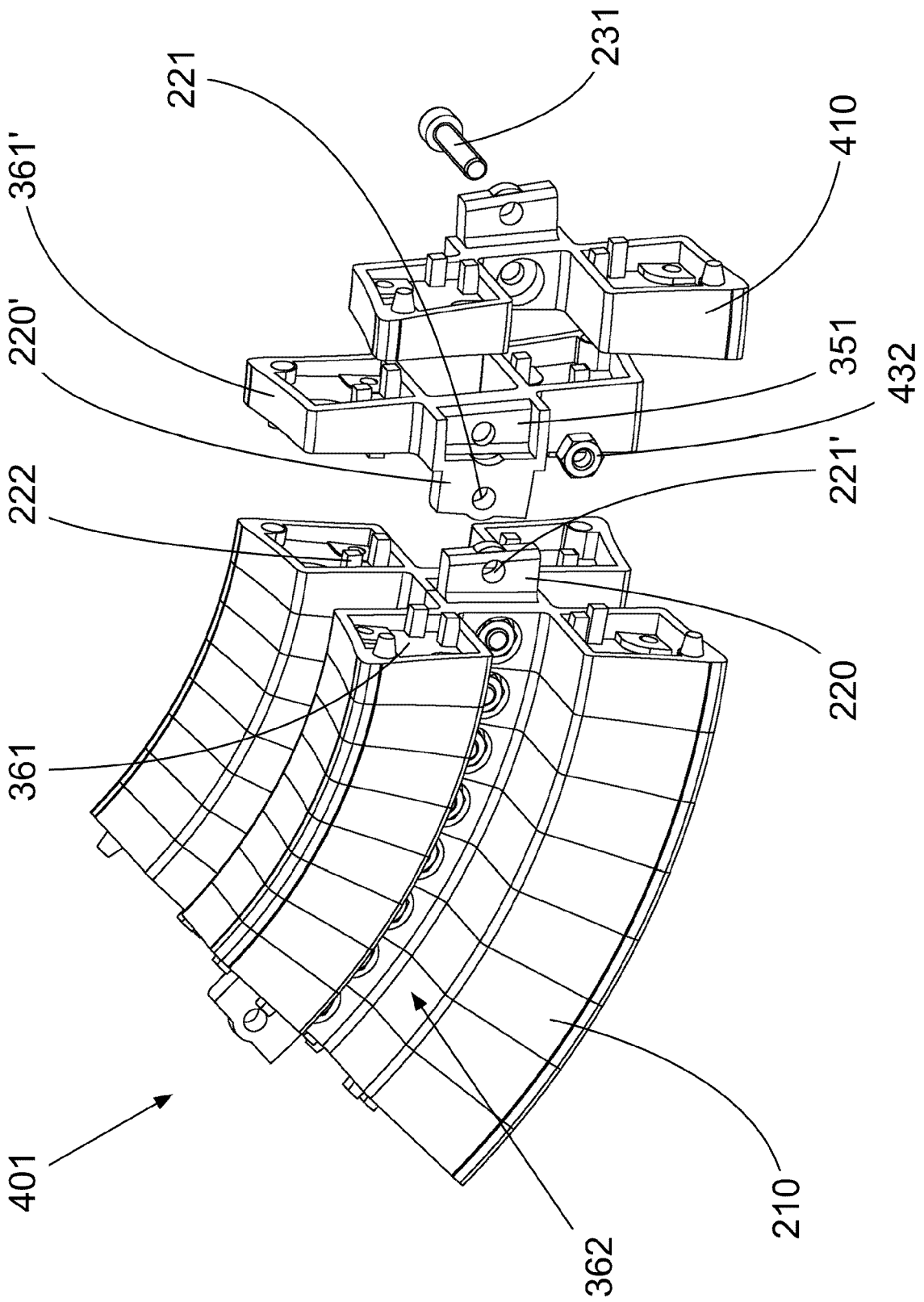

Fig. 4A

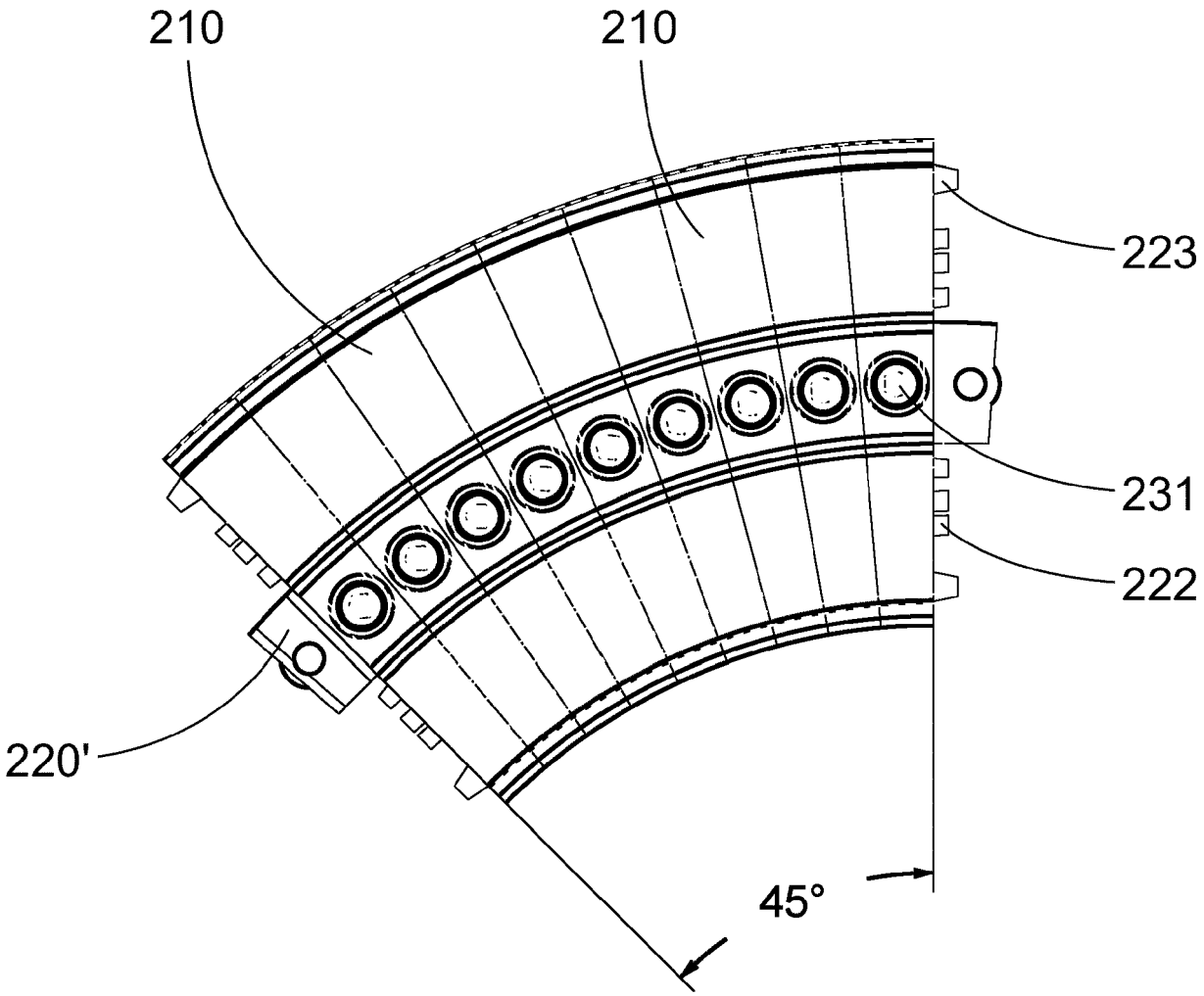

Fig. 4B

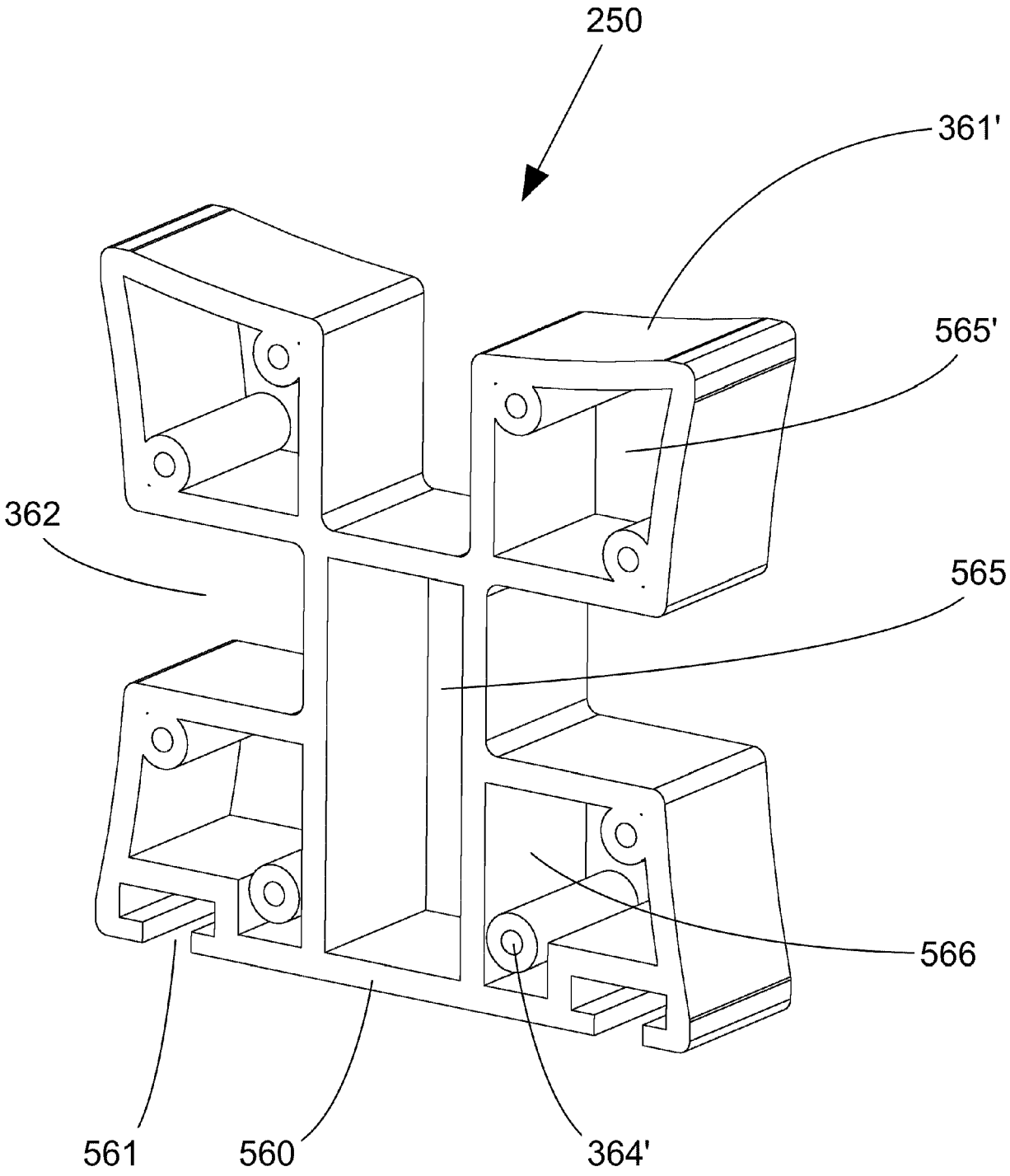

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 20 15 7891

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 2012/279826 A1 (JAKES JOHN STEWART [MC]) 8 November 2012 (2012-11-08) * abstract; figures 1-5 * * paragraphs [0029] - [0032] *	1-14	INV. B66B9/08
A	US 2015/059965 A1 (GEURTS PETER JOHANNES LODEWIJK [NL]) 5 March 2015 (2015-03-05) * abstract; figures 4-8 *	1-14	
A	NL 2 011 497 C2 (GTE B V) 30 March 2015 (2015-03-30) * figures 5-7 * * page 12 *	1-14	
			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	28 May 2020	Bleys, Philip

CATEGORY OF CITED DOCUMENTS

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

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28-05-2020

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

REFERENCES CITED IN THE DESCRIPTION

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