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(54) **GUIDE SYSTEM FOR ELEVATOR APPARATUS, ELEVATOR APPARATUS, AND ASSEMBLY
AND MANUFACTURING METHODS**

(57) Information on abstract not available

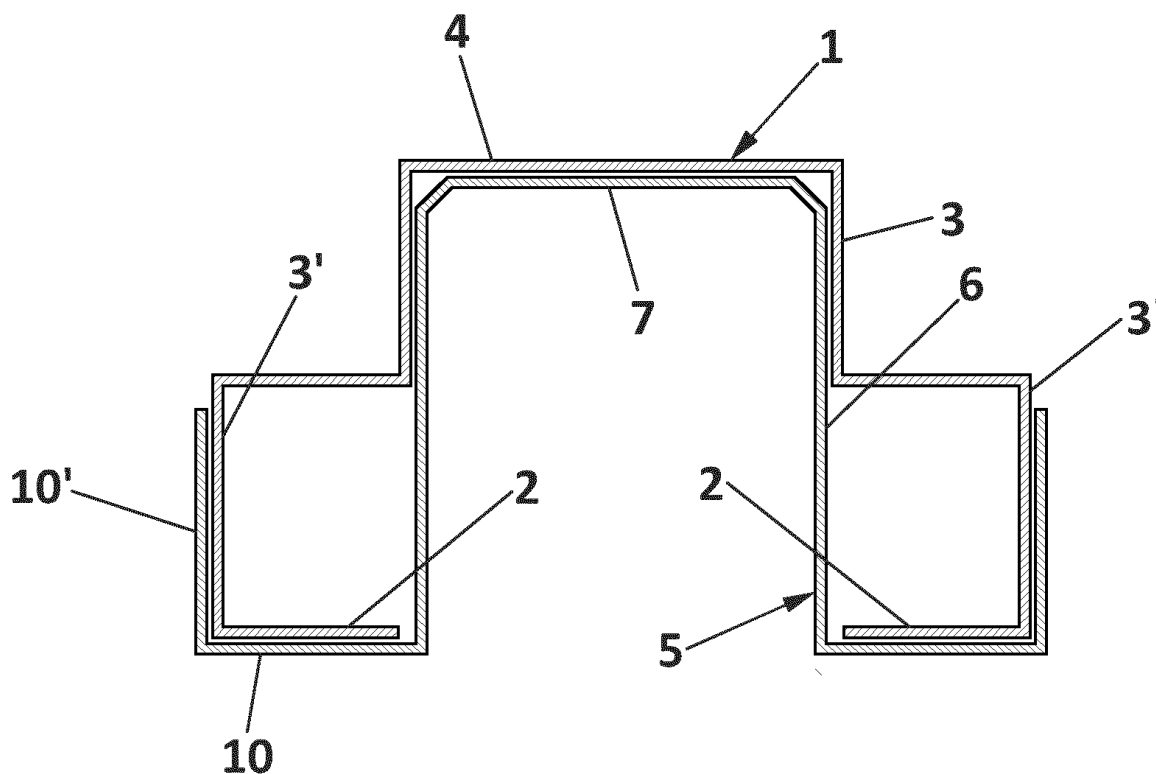


FIG. 1

Description

Technical Field of the Invention

[0001] The present invention relates to a guide system for elevator apparatus, as well as to elevator apparatus comprising said guide system, as well as to methods for assembling and manufacturing said guide system, applicable in the industry of elevator apparatus, and more specifically in elevator guide systems using guides made of sheet metal that are connected to one another with attachment elements, also referred to as connecting parts, that are likewise made as a single part from sheet metal, which allows preventing guide misalignment in the sliding/rolling area of the friction plates/roller guide shoes, assuring a sufficiently rigid connection of two contiguous guide segments, and reducing costs by means of reducing material and assembly time, facilitating both fastener accessibility and guide handling in the installation.

Background of the Invention

[0002] Attachment elements, commonly known as connectors, for attaching different guide segments manufactured in sheet metal are known today. Their main advantage lies in their cost.

[0003] Connectors made of sheet metal used today are determined by the type of guide element that is used.

[0004] In the case of solid T-type guides, connectors made of sheet metal with holes for screwing to the base of the guide through the flaps thereof are used. These connections have flank-like U-shaped ends to contain the base of the guide and particularly to increase its rigidity. Conventional connectors made of sheet metal used for conventional T-type guides are fastened on the base thereof by means of 8 screws. T-type guides are tongue and groove guides that do not have to be secured close to the sliding/rolling area.

[0005] Moreover, in the case of a guide made of sheet metal with a closed profile but a hollow head, like the one described in Chinese patent application no. CN-103264943-B, the connection allows fitting one guide to another without fasteners. To that end, the connection is formed by two L-shaped sheet metals which hold the guide in the inner portion thereof. These L-shaped sheet metals open against the walls of the guides when the screw is fastened from the base of the guide.

[0006] In those cases in which there is no space in the head of the guide, there are solutions in which the two fastened L-shaped plates are arranged, on the outer portion of the guide, by means of screws in the base and sides close to the attachment between both guides.

[0007] Likewise, very basic connections for open guides with a hollow head made of sheet metal can be found on the market. These connections consist of connecting plates that have holes with a similar or smaller geometry with respect to the geometry of the open guide

and are inserted through the open side of the guide. These connections have holes for fixing with the guide in the flaps of their base.

[0008] An example of the foregoing can be found in Chinese patent application no. CN-106586768-A which describes a connection which partially penetrates the hollow portion of the guide, without reaching the sliding/rolling area, and at the same time holds the guide from the outer portion in the area of the base. The connection is fastened to the guide in the area of the flaps. One drawback of connections of this type is that a sufficient rigidity in the sliding/rolling area of the guide cannot be assured and control over the tightening force is inexistent.

[0009] Another example is found in European patent application no. EP-0931752-A1 which describes a connection for a closed guide with a hollow head made of sheet metal, in which the connection is actually formed by two parts in which one of them reinforces the sliding area of the guide and the other holds the guide from the outside in the area of the base.

[0010] In any case, at present, the main problems of guide connections made of sheet metal are the alignment and rigidity required in the area corresponding to the actual attachment of two guide segments.

Description of the Invention

[0011] A first aspect of the present invention relates to a guide system for elevator apparatus as defined in claim 1, which allows preventing guide misalignment, assuring a sufficiently rigid connection of two contiguous guide segments, and reducing costs by means of reducing material and assembly time, facilitating both fastener accessibility and guide handling in the installation.

[0012] The invention is applicable, for example, to any elevator which uses guides made of sheet metal, both in the car and in the counterweight, in which the guide segments made of sheet metal are connected to one another with connecting parts also made of sheet metal, which can be obtained as a single part by means of a die, for example.

[0013] The system proposed by the invention comprises at least two guide elements, commonly known as hollow guide segments or simply guide, where according to a cross-section, each guide element comprises an open base, at least one side guiding surface, and a front guiding surface located opposite the base.

[0014] According to the invention, the system comprises at least one attachment, also referred to simply as connection, attaching two guide elements at their ends, where said attachment comprises at least one side attachment surface at least partially contacting the inner face of a side guiding surface.

[0015] The attachment system comprises at least one fixing which fixes each guide element with each attachment on the front guiding surface.

[0016] In turn, each attachment comprises a front attachment surface. The possibility of said front attachment

surface at least partially contacting the inner face of the front guiding surface is contemplated, although, as explained below in the different embodiments of the invention, said contact may not exist as it arises for purely geometric reasons.

[0017] In other words, on one hand, part of the attachment is introduced into the head of the guide made of sheet metal which is an open hollow profile, in the sliding/rolling area, and at the same time another part of the attachment holds the guide in the base thereof on the outer portion, whereby achieving the following advantages with respect to the state of the art.

[0018] By means of a single part, the guides are aligned and at the same time the rigidity of the guides in the attachment area is increased.

[0019] The connection or attachment between guides is made rigid as it holds the guiding profile on the outer portion, preventing said profile from opening by considerably increasing the guiding rigidity in said attachment area.

[0020] The invention allows attaching guides made of sheet metal only with front screws that are fastened in the direction of the space between guides, from the head towards the base of the guide; without side fasteners or fasteners from the base of the guide.

[0021] The assembly time is considerably reduced in comparison with the connection of a conventional guide system with solid T-type guides. The possible cost overrun of the part is compensated for by the reduction of assembly time with respect to the case of solid guides. Assembly is facilitated by allowing attachment between two segments of the guiding profile only by means of fasteners from the front face of the guide, in the direction of the space between guides, the most accessible face in an installation in the shaft of the elevator.

[0022] The invention allows hanging a series of guides by means of a hook for handling thereof in the installation. The handling of the guides in the installation is thereby facilitated: the attachment incorporates a supporting element to which a tool, such as a hoist, can be hooked for handling the connection and guiding profile assembly.

[0023] The possibility of each guide element comprising two side guiding surfaces and each attachment comprising two side attachment surfaces at least partially in contact with the inner face of the side guiding surfaces is contemplated. According to a preferred embodiment of the invention, the two side guiding surfaces are substantially parallel to one another, at least in a situation prior to the assembly of the attachment. Likewise, it is contemplated that the side guiding surfaces are likewise parallel to one another, also in a situation at least prior to the assembly of the attachment.

[0024] Likewise, each fixing between at least one guide element and an attachment may comprise fixing means which can be selected from screws, rivets, or welding spots, or combinations thereof.

[0025] It is contemplated that the front guiding surface of each guide element has at least one sinkage partially

housing the fixing means. It also is contemplated that the actual casing of the guide system comprises a sinkage in the slide plate or front friction plate provided for partially housing a protruding portion of the fixing means.

[0026] According to one embodiment, the attachment is a single part made of die-cut galvanized steel sheet metal having at least two deep drawings partially incorporating the fixing means as they are previously tapped to allow fastening the two segments or guide elements on the front portion thereof. The attachment is assembled with interference with the guide to force contact between the guide elements and the attachment once assembled.

[0027] Likewise it is contemplated that the front guiding surface has two sinkages located on the perimetral edges of said front guiding surface.

[0028] At least one attachment may comprise at least one lower flange which is in contact with the base of each guide element.

[0029] Each lower flange can be prolonged such that they completely contain the base of each guide element according to a cross-section, where each lower flange is prolonged into a side segment externally containing the guide element according to a cross-section.

[0030] The possibility of each guide element comprising two side surfaces located between the side guiding surfaces and the base is contemplated, where each side segment of the lower flanges of the attachment externally contacts each side surface of the guide element such that it causes deformation of the guide element such that the side surfaces are moved closer to one another, which contributes to contact between the inner faces of the side guiding surfaces of the guide element and the side attachment surfaces of the attachment. Contact between the attachment and the guide element by means of elastic deformation of the guide element is thereby assured, causing an inward compression or narrowing.

[0031] The possibility of the system comprising at least one reinforcement element at least partially contacting the inner face of the side guiding surfaces, and optionally also the front guiding surface, is contemplated. This reinforcement element is provided as an inner reinforcement for the actuation of safety gears, both for the car and for the counterweight. Contact by means of deformation between at least one side attachment surface of the attachment with the inner face of a side guiding surface of the guide element is therefore achieved with intermediation of said reinforcement element contacting the inner face of the side guiding surfaces.

[0032] Likewise, it is contemplated that the system comprises at least one side fastener fixing each guide element to a side segment of an attachment. Therefore, there would be two side fasteners on each side of the attachment, one for each guide element, said fasteners being able to consist of screws. Connection is thereby reinforced for the case of guides subjected to increased load.

[0033] A second aspect of the invention relates to a method for manufacturing a guide system like the one

described above, which method comprises obtaining the guide element and the attachment from sheet metal.

[0034] Alternatively, the method comprises obtaining the attachment by means of deep drawing such that it at least partially incorporates fixing means in the area corresponding to fixing with the guide element.

[0035] Another aspect of the invention relates to a method for assembling a guide system like the one described above, which method comprises placing the fixing means from the front guiding surface towards the base of each guide element.

Description of the Drawings

[0036] To complement the description being made and for the purpose of helping to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following is depicted in an illustrative and non-limiting manner:

Figure 1 shows a schematic view according to a cross-section of an embodiment of a guide element and an attachment, according to the invention, coupled to one another.

Figure 2 shows a schematic front perspective view of two guide segments, i.e., two guide elements attached by means of the attachment depicted in Figure 1, the fixing means fixing each guide element to the attachment also having been depicted.

Figure 3 shows a schematic view according to a cross-section of another embodiment of the invention, in which the front guiding surface of the guide element comprises a sinkage, with there being contact between said surface and the front attachment surface of the attachment itself.

Figure 4 shows a schematic view according to a cross-section of another embodiment of the invention which differs from that of Figure 3 in that there is no contact between the front guiding surface and the front attachment surface of the guide element and the attachment, respectively.

Figure 5 shows a schematic perspective view, like that of Figure 2, in which the guide elements correspond with those depicted in Figures 3 and 4.

Figure 6 shows a perspective view in the area corresponding to the base of an embodiment of the invention, in which the attachment incorporates a supporting element which allows holding and supporting the guide elements, said supporting element already being fixed to the attachment to proceed with the installation thereof.

Figures 7 to 10 show four views according to a cross-section of four variants of the invention, in which the system comprises a reinforcement element which provides different options in terms of the relative arrangement thereof with respect to the front guiding and attachment surfaces.

Figure 11 shows a schematic profile view of an embodiment of the invention comprising two side fasteners between the attachment and the guide elements.

Preferred Embodiment of the Invention

[0037] In view of the mentioned drawings, it can be observed how in one of the possible embodiments of the invention the guide system for elevator apparatus proposed by the invention comprises two hollow guide elements (1), where according to a cross-section, each guide element (1) comprises an open base (2), two side guiding surfaces (3), and a front guiding surface (4) located opposite the base (2).

[0038] According to the invention, the system comprises an attachment (5) attaching the two guide elements (1) at their ends (1'). As can be seen in the embodiment of the drawings, the attachment (5) comprises two side attachment surfaces (6), each of which at least partially contacts the inner face of one of the side guiding surfaces (3).

[0039] In turn, the attachment (5) comprises a front attachment surface (7) which, in the embodiment depicted in Figures 1 and 3, at least partially contacts the inner face of the front guiding surface (4), the system comprising at least one fixing which fixes each guide element (1) with the attachment (5) on the front guiding surface (4). In the embodiment depicted in Figure 4, said contact between the front guiding surface (4) and the front attachment surface (7) does not exist.

[0040] In other words, on one hand, part of the attachment (5) is introduced into the head of the guide made of sheet metal which is an open hollow profile, in the sliding/rolling area, and at the same time another part of the attachment (5) holds the guide (1) in the base (2) thereof on the outer portion.

[0041] As seen in the drawings, each guide element (1) comprises two parallel side guiding surfaces (3) and each attachment (5) comprises two likewise parallel side attachment surfaces (6) at least partially in contact with the inner face of the side guiding surfaces (3) as a result of deformation.

[0042] Each fixing between a guide element (1) and an attachment (5) comprises fixing means (8) which can be selected from screws, rivets, or welding spots, or combinations thereof.

[0043] As depicted in Figures 3 to 5 and 7 to 10, it is contemplated that the front guiding surface (4) of each guide element (1) has at least one sinkage (9) partially housing the fixing means (8), for example the head of a screw, such that it does not protrude at all or too much from the front guiding surface (4). It is also contemplated that the actual casing of the guide system comprises a sinkage in the slide plate or front friction plate provided for partially housing a protruding portion of the fixing means (8).

[0044] According to one embodiment, the attachment

(5) is a single part made of die-cut galvanized steel sheet metal having at least two deep drawings that incorporate fixing means (8) as they are previously tapped to allow fastening the two segments or guide elements (1) on the front portion thereof.

[0045] As seen in the drawings, the attachment (5) comprises two lower flanges (10) which are in contact with the base (2) of each guide element (1).

[0046] Likewise, each lower flange (10) is prolonged such that they completely contain the base (2) of each guide element (1) according to a cross-section, where each lower flange (10) is prolonged into a side segment (10') externally containing the guide element (1) according to a cross-section.

[0047] As can be seen in the drawings, each guide element (1) comprises two side surfaces (3') located between the side guiding surfaces (3) and the base (2). Each side segment (10') of the lower flanges (10) of the attachment (5) externally contacts each side surface (3') of the guide element (1) such that it causes deformation of the guide element (1) such that the side surfaces (3, 3') are moved closer to one another.

[0048] Figure 6 depicts an embodiment of the invention in which the attachment (5) incorporates a supporting element (13) which allows holding and supporting the guide elements (1), said supporting element (13) already being fixed to the attachment (5) to proceed with the installation thereof, facilitating said installation.

[0049] As schematically depicted in the embodiments of Figures 7 to 10, the system comprises a reinforcement element (11) contacting the inner face of the side guiding surfaces (3). Said four drawings correspond with four variants of the invention reflecting different options in terms of the arrangement of the reinforcement element (11) with respect to the front guiding surface (4) and front attachment surface (7). In the variant of Figure 7, there is contact between said surfaces with the reinforcement element (11) itself, whereas in Figure 8 there is no contact between any of the surfaces. In Figures 9 and 10, there is only contact with the front guiding surface (4) and with the front attachment surface (7), respectively.

[0050] Figure 11 depicts an embodiment in which the system comprises four side fasteners (12) fixing each guide element (1) with the side segment (10') of an attachment (5). Therefore, there would be two side fasteners (12) on each side of the attachment (5), one for each guide element (1), said fasteners being able to consist of screws.

Claims

1. Guide system for elevator apparatus, comprising at least two hollow guide elements (1), where according to a cross-section, each guide element (1) comprises an open base (2), at least one side guiding surface (3), and a front guiding surface (4) located opposite the base (2), **characterized in that** it comprises at

least one attachment (5) attaching two guide elements (1) at their ends (1'), where said attachment (5) comprises at least one side attachment surface (6) at least partially contacting the inner face of a side guiding surface (3), the system comprising at least one fixing which fixes each guide element (1) with each attachment (5) on the front guiding surface (4).

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2. System according to claim 1, wherein each guide element (1) comprises two side guiding surfaces (3) and each attachment (5) comprises two side attachment surfaces (6) at least partially in contact with the inner face of the side guiding surfaces (3).
3. System according to any of the preceding claims, wherein each fixing between at least one guide element (1) and an attachment (5) comprises fixing means (8) which can be selected from screws, rivets, or welding spots, or combinations thereof.
4. System according to claim 3, wherein the front guiding surface (4) of each guide element (1) has at least one sinkage (9) partially housing the fixing means (8).
5. System according to claim 4, wherein the front guiding surface (4) has two sinkages (9) located on the perimetral edges of said front guiding surface (4).
6. System according to any of the preceding claims, wherein at least one attachment (5) comprises at least one lower flange (10) which is in contact with the base (2) of each guide element (1).
7. System according to claim 6, wherein each lower flange (10) is prolonged such that they completely contain the base (2) of each guide element (1) according to a cross-section, where each lower flange (10) is prolonged into a side segment (10') externally containing the guide element (1) according to a cross-section.
8. System according to claim 7, wherein each guide element (1) comprises two side surfaces (3') located between the side guiding surfaces (3) and the base (2), where each side segment (10') of the lower flanges (10) of the attachment (5) externally contacts each side surface (3') of the guide element (1) such that it causes deformation of the guide element (1) such that the side surfaces (3, 3') are moved closer to one another, which contributes to contact between the inner faces of the side guiding surfaces (3) of the guide element (1) and the side attachment surfaces (6) of the attachment (5).
9. System according to any of the preceding claims, wherein the contact between at least one side at-

achment surface (6) of the attachment (5) with the inner face of a side guiding surface (3) of the guide element (1), is achieved with intermediation of at least one reinforcement element (11) which at least partially contacts the inner face of the side guiding surfaces (3). 5

10. System according to any of claims 7 to 9, comprising at least one side fastener (12) fixing each guide element (1) to a side segment (10') of an attachment (5). 10
11. Elevator apparatus comprising a guide system according to any of the preceding claims. 15
12. Method for manufacturing a guide system according to any of claims 1 to 10, **characterized in that** it comprises obtaining the guide element (1) and the attachment (5) from sheet metal. 20
13. Method for manufacturing a guide system according to claim 12, **characterized in that** it comprises obtaining the attachment (5) by means of deep drawing such that it at least partially incorporates fixing means (8) in the area corresponding to the fixing with the guide element (1). 25
14. Method for assembling a guide system according to any of claims 3 to 10, **characterized in that** it comprises placing the fixing means (8) from the front guiding surface (4) towards the base (2) of each guide element (1). 30

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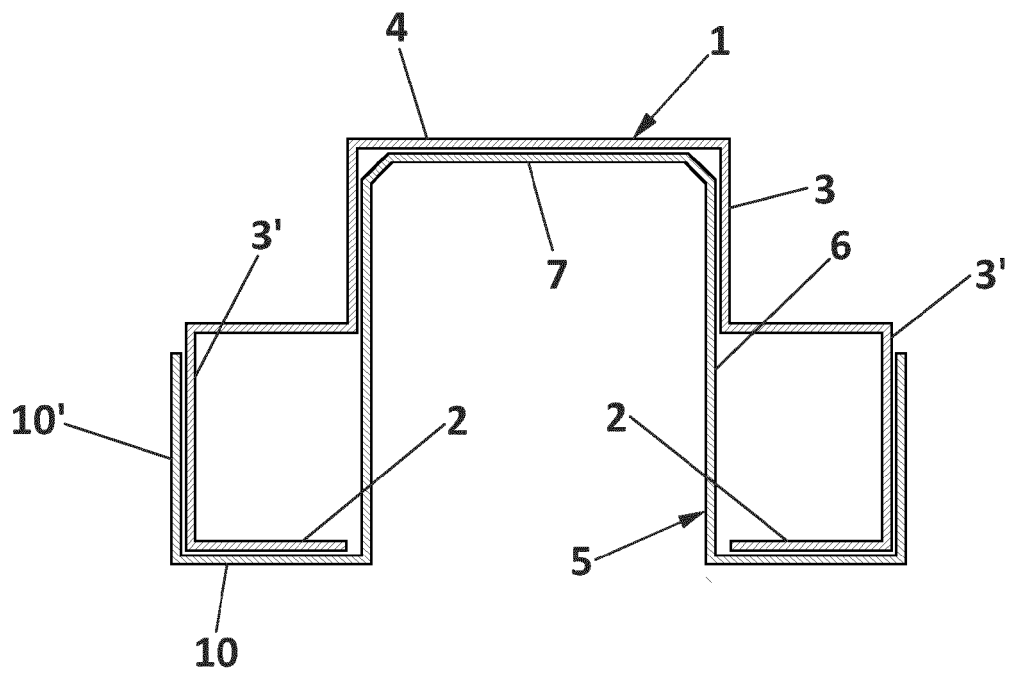


FIG. 1

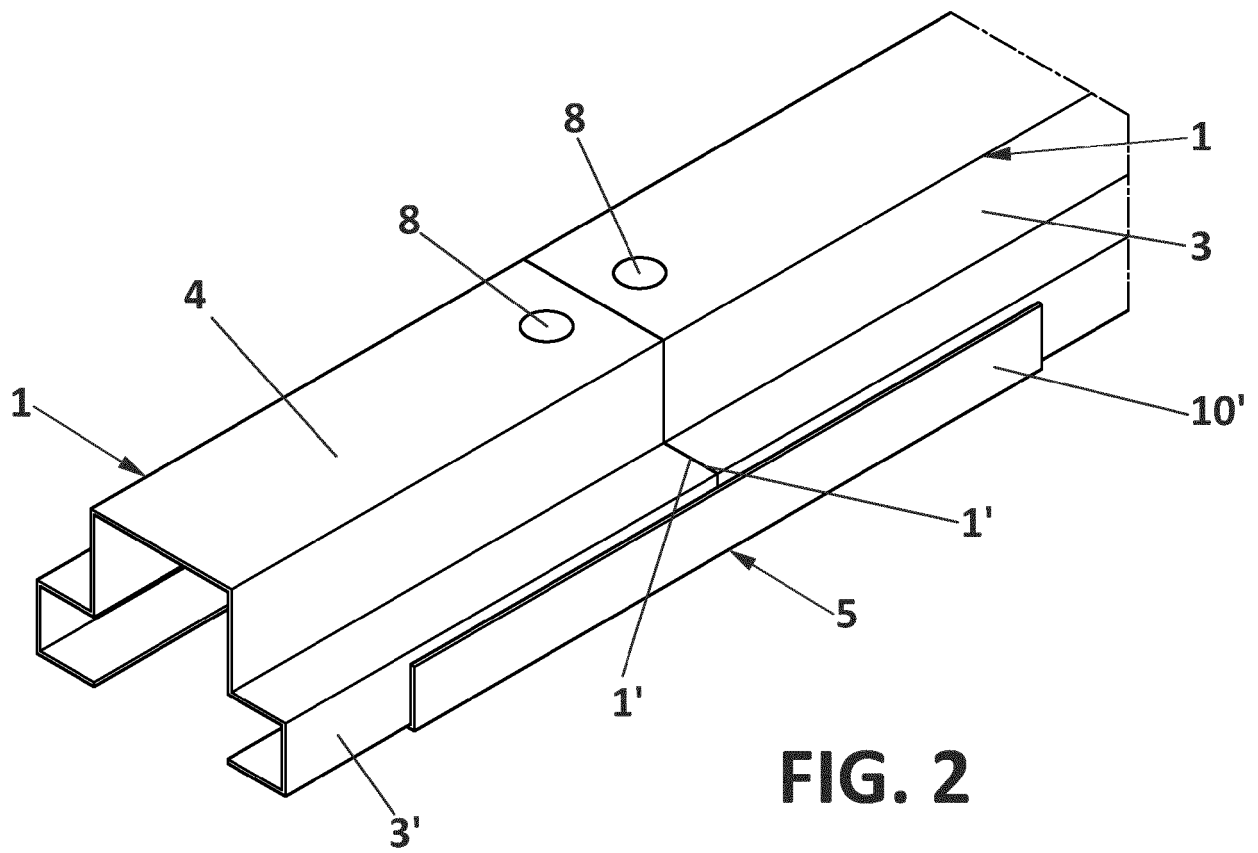


FIG. 2

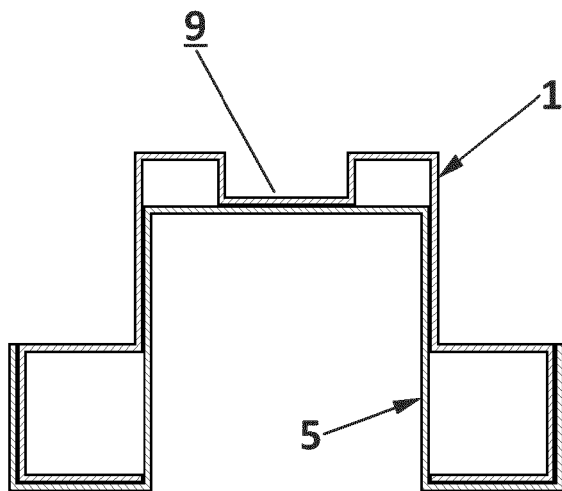


FIG. 3

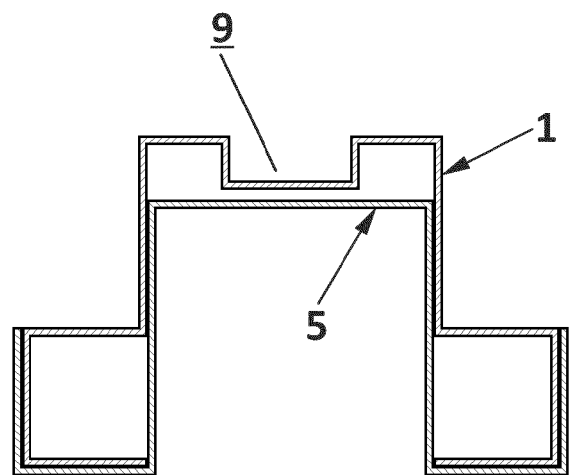


FIG. 4

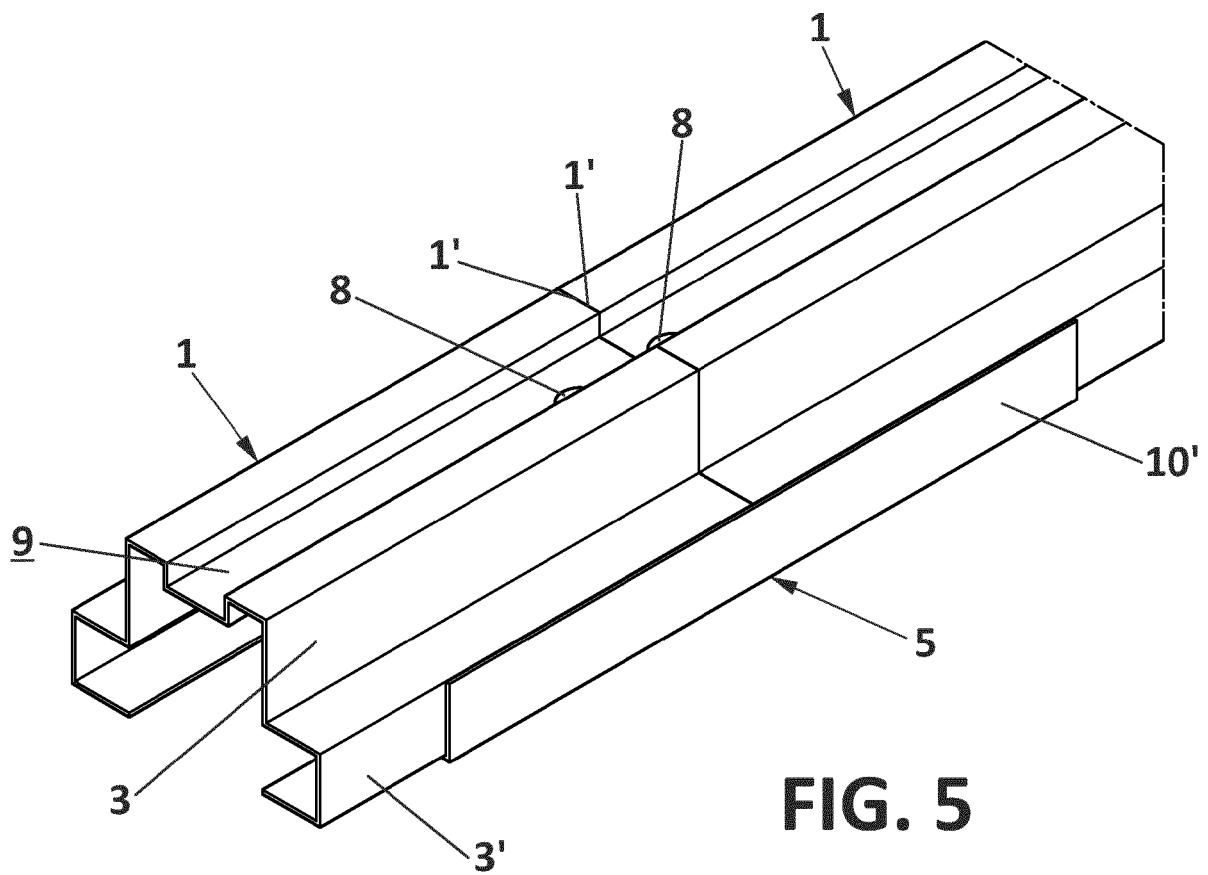


FIG. 5

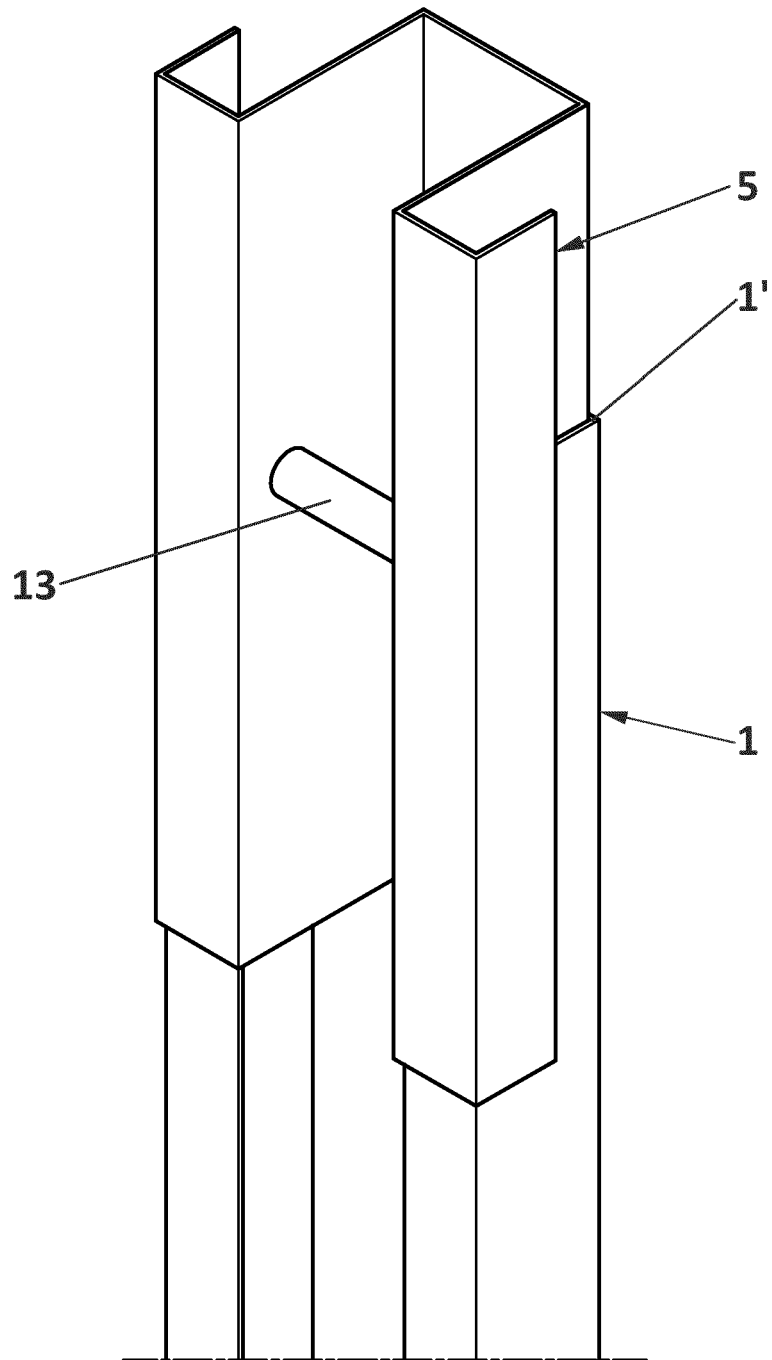


FIG. 6

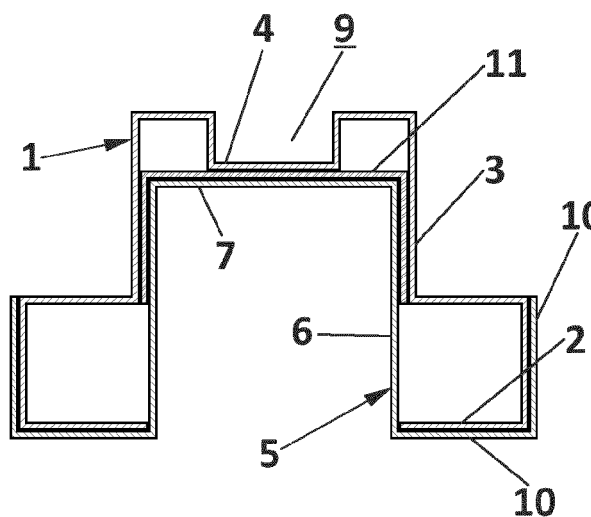


FIG. 7

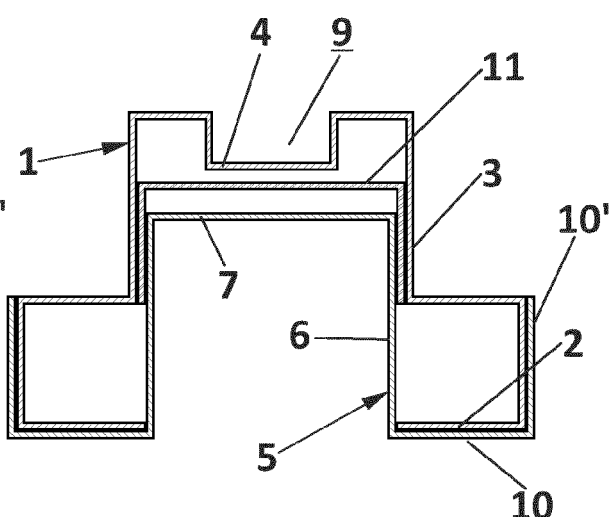


FIG. 8

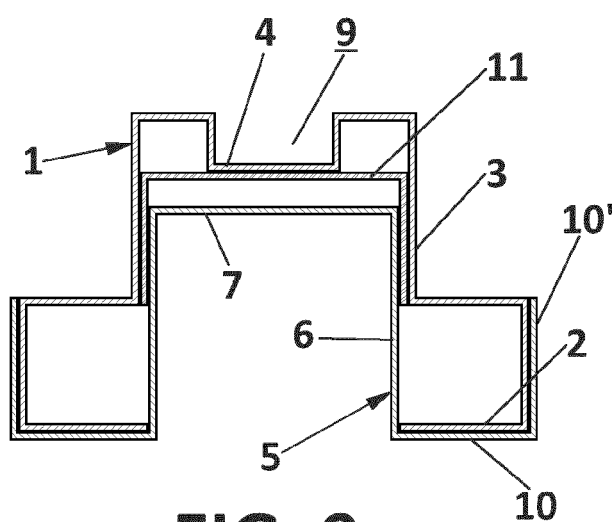


FIG. 9

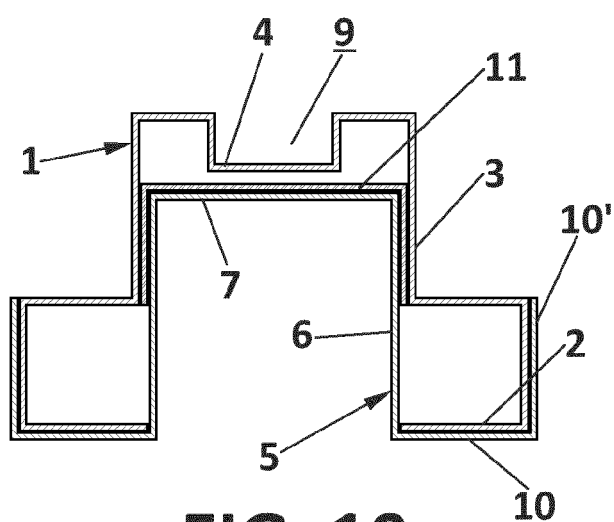


FIG. 10

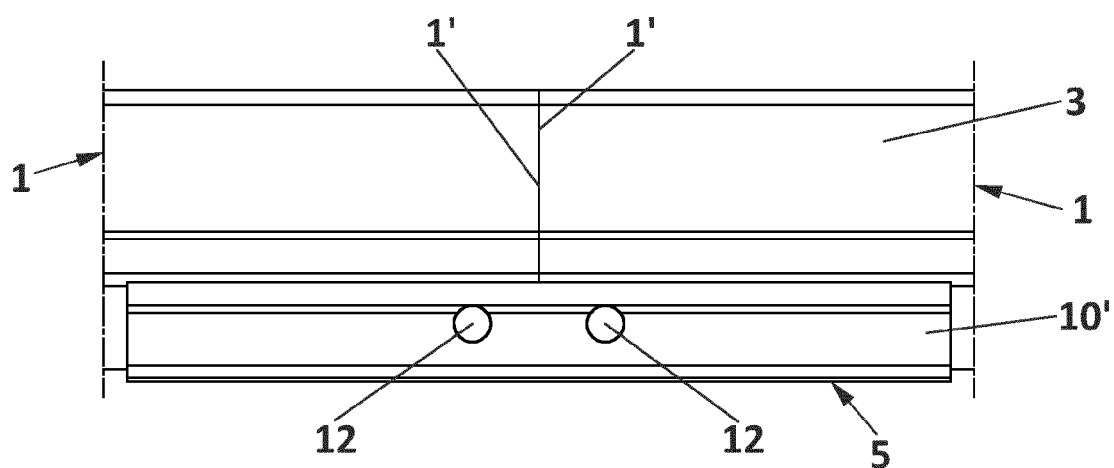


FIG. 11



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Application Number
EP 19 38 2939

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 March 2020	Examiner Szován, Levente
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ON EUROPEAN PATENT APPLICATION NO.**

EP 19 38 2939

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