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(71) Applicant: **Inventio AG**
6052 Hergiswil NW (CH)

(72) Inventor: **Han, Lin**
200072 Shanghai (CN)

(54) Rope shielding for elevator roping arrangement

(57) The field of the invention relates generally to a mounting device (10) for shielding at least two ropes (80a, 80b, 80c, 80d, 80e) usable within an elevator roping arrangement, More particularly, the present invention relates to a mounting device (10) connectable with the first of the at least two ropes (80a, 80b, 80c, 80d, 80e) and the other rope of the at least two ropes (80a, 80b, 80c, 80d, 80e) is freely movable within the mounting device (10). The mounting device (10) comprises a fixing means (40, 40a, 40b) for attaching the mounting device to one of the ropes and at least one opening (50, 50a, 50b) for another rope, wherein the rope is freely movable within the opening.

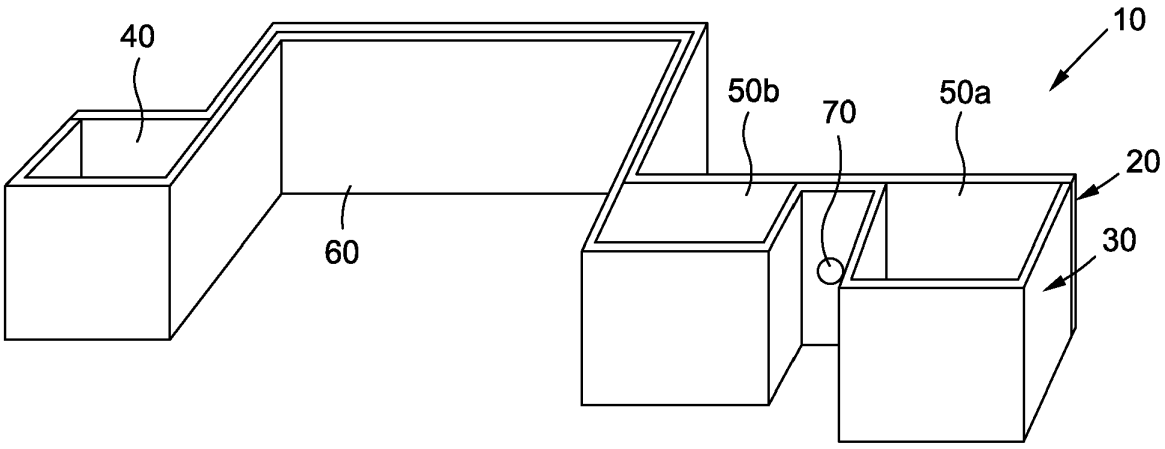

FIG. 4

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Description

Field of the Invention

[0001] The field of the disclosed technology relates generally to a mounting device for shielding at least two ropes within an elevator roping arrangement.

Background of the invention

[0002] Present elevator roping arrangements are very complex and one major safety issue of elevator roping arrangements is detecting the occurrence of a slack or a break in one of the parallel ropes and to compensate the possible malfunctioning or to shut down the elevator roping arrangement in case of a detected break of the rope. For this reason a slack detection device is installed in at least one position within the elevator roping arrangement.

[0003] The parallel ropes are attached within connection points of different parts of the elevator roping arrangement, such as the elevator car, the counterweight or dead end hitches of the elevator hoistway. According to known elevator roping arrangements, the connection points comprise regularly a shielding means, which ties the ropes together and therefore relative movements between the ropes are prevented. In addition, because of the prevention of relative movements of the tied ropes different twists of each rope during the movement, a break or getting loose of a rope due to the movement or due to the rotation of the rope within the connection points cause stresses in the ropes and therefore reduces the lifetime of the ropes. Consequently within known connection points relative movements of the ropes are prevented by known shielding means in elevator roping arrangements and the slack detection device cannot properly detect a possible slack or break of the rope within the connection points. Therefore possible safety issues of non-detected slacks or breaks within tied ropes could arise from these arrangements of the shielding means within connection points of known elevator roping arrangements.

[0004] WO 2011/045215 A1 discloses an elevator system having a suspension and a suspension for supporting and/or moving at least one elevator car in an elevator system, wherein the suspension can be guided and driven at least by means of a sheave, in particular a traction sheave of a drive machine of an elevator system, and the suspension comprises a body made of a polymer and at least one tie beam extending in the longitudinal direction of the suspension and embedded in the body and made of wires and is present as a cord or rope.

[0005] US 2012/0132487 A1 discloses an elevator system that has at least one elevator car and at least one counterweight connected by a suspension device, both of which can be counter-directionally displaced at at least one guide rail in an elevator shaft via a traction sheave of a drive. At least one pivotable suspension anchoring is adaptable to displacements of the suspension device according to a displacement angle wherein a rolling body moves on a holding plate.

[0006] US 7,086,217 B2 discloses a rope apparatus including two ropes of synthetic fiber strands arranged for taking up a force applied in a lengthwise direction. The ropes are arranged a predetermined distance apart and are fixed by a rope sheathing forming a fixed link running in the lengthwise direction between the two ropes. The rope apparatus also has at least one reinforcement element for the mechanical reinforcement of the rope sheathing.

[0007] US 2006/0016641 A1 discloses an elevator installation including an elevator car located in a hoistway and having a floor, and a rear wall extending upward from the floor. A counterweight is located in the hoistway adjacent to the rear wall of the elevator car. An underslung sheave assembly is located generally below the floor and preferably forms a V-shaped configuration that operatively engages the elevator car. A drive machine is mounted in the upper portion of the hoistway, and a drive sheave operatively engages the drive machine and is located above the counterweight, with the drive sheave having a front edge. A deflector sheave is also mounted in the upper part of the hoistway generally below the drive sheave and has a rear edge that vertically overlaps with the front edge of the drive sheave. A first rope and a second rope each have a first end attached to one of a first and a second dead end hitch in the upper portion of the hoistway, with the under-slung sheave assembly operatively engaging the first and second ropes to support the elevator car and the counterweight operatively engaging the first and second ropes as the first and second ropes extend from the drive sheave to the counterweight, and with the first and second ropes extending from the underslung sheave assembly around the rear edge of the deflector sheave and the front edge of the drive sheave such that the first and second ropes wrap around the drive sheave greater than 180 degrees.

[0008] It is an object of the present invention to enhance the detectability of slacks, breaks, or losses of ropes within connection points of elevator roping arrangements.

Summary of the invention

[0009] The present invention discloses a mounting device for shielding at least two ropes usable within an elevator roping arrangement, wherein the mounting device is connectable with the first of the at least two ropes and the other rope of the at least two ropes is freely movable within the mounting device. In particular a first component and at least another component are attachable with each other and form in combination a fixing means for the first rope and a shielding means for the at least one other rope. The fixing means can be attachable with one of the at least two parallel ropes, but also other fixations of the shielding means with the rope arrangements are possi-

ble.

[0010] Additionally, the shape of the first and of the at least further component define in combination the fixing means with a dimension close to the diameter of the first rope and an opening with a dimension greater than the diameter of the at least other rope. Other dimensions of the openings and different dimensions and/or shapes for different openings of the shielding means can be used. Additionally, the second component of the mounting device can be the shielding means. In a further embodiment at least one element of the mounting device is attachable to a ground wall of the elevator roping arrangement and also at least two other ropes are freely movable within the opening and the first rope is fixed within the fixing means. As an alternative each of the at least two other ropes are freely movable in separate openings and the first rope is fixed within the fixing means.

[0011] In a further embodiment the dimension of the opening is wider than the diameter of at least one rope, preferably the dimension of the opening is close to or twice the diameter of the designated rope. Further, the components and/or fixing means and/or openings are formed of a flexible material and are formable in regard to the diameter or shape of at least one rope. Also the components comprise at least two fixing means for at least two different ropes and the at least two openings of at least two different ropes. In a further embodiment the fixing means comprises frictional layers for fixing the first rope within the fixing means and the components are attachable to each other by screws and/or by click connections. Additionally, the mounting device is mountable onto a counterweight and/or an elevator car and/or a hoistway wall and/or a guide rail and/or a module supporting a drive unit. Also the opening comprises a protection layer and/or support elements for assisting the free movement of the rope within the opening; in particular the rope is formed of elastomeric coated steel. The mounting device can also comprise at least a first material for the fixing means in combined with at least a second material forming the opening and the mounting device is directly attachable by the fixing means with the first rope.

[0012] Further embodiments, features, and advantages of the present invention, as well as the structure and operation of various embodiments of the present invention, are described in detail below with reference to the accompanying drawings.

Description of the figures

[0013] The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate exemplary embodiments of the present invention and, together with the description, further serve to explain the principles of the present invention and to enable a person skilled in the pertinent art to make and use embodiments of the present invention.

Fig. 1 is a schematic diagram of an exemplary first component and the second component and is usable as a shielding means of the mounting device.

Fig. 2 shows the mounting device as a combination of the first and second components.

Fig. 3 is a schematic diagram of a second embodiment with the first and second components of the mounting device.

Fig. 4 shows the mounting device as a further embodiment as a combination of the first and second components.

Fig. 5 shows a top view of the mounting device according to another embodiment.

Fig. 6 shows a top view of the mounting device according to a further embodiment.

Fig. 7 shows a top view of a further aspect of the mounting device.

Fig. 8 shows a top view of a further embodiment of the mounting device.

Fig. 9 shows a side view of a further aspect of a mounting device with two shielding means according to one of the teachings disclosed herein.

Detailed description of the invention

[0014] The invention will now be described on the basis of the drawings. It will be understood that the embodiments and aspects of the invention described herein are only examples and do not limit the protective scope of the claims in any way. The invention is defined by the claims and their equivalents. It will be understood that features of one aspect or embodiment of the invention can be combined with a feature of a different aspect or aspects and/or embodiments of the invention.

[0015] Fig. 1 shows a schematic diagram of an exemplary first component 20 and second component 20 of the mounting device, whereas the second component 30 is being used as a shielding means 60 for ropes within an elevator roping arrangement (not shown in Fig. 1). Both components 20, 30 comprise connections 70a, 70b for fixing the components 20, 30 to each other. The connections 70a, 70b attach the at least two components 20, 30 to each other and are preferably a screw joint, click connections or other possible connectors of the components 20, 30. The backside of the first component 20 is also attachable via the connection 70a with a hoistway wall, a ground wall or other parts of the elevator roping arrangement. The connections 70a, 70b can be used for attaching the first component 20 to the backside and/or with the second component 30 used as a shielding means 60 of the mounting device 10. Additional connec-

tions 70a, 70b can be arranged at different positions on the mounting device 10 or on the components 20, 30. The components 20, 30 and/or the mounting device 10 can consist of one or a combination of different materials, preferably of metallic, plastic or elastic materials or a combination of these materials.

[0016] Fig. 2 shows the mounting device 10 as a combination of the first component 20 and the second component 30. The front side of the mounting device 10 defines the shielding means 60, which shields the ropes within the connection points of the elevator roping arrangement (not shown in Fig. 2). According to the embodiment disclosed in Fig. 2 the mounting device 10 comprises one fixing means 40 for fixing the mounting device 10 to the at least one rope and the opening 50 in which at least another rope is freely movable. In case the screw connection 70 of the mounting device 10 is removed, the mounting device 10 can easily be placed along the rope or be dismounted quickly from the rope. During the installation or maintenance work at the elevator roping arrangement the mounting device 10 can easily and quickly be placed, shifted or dismounted from the rope within the connections points.

[0017] According to another embodiment disclosed in Fig. 3 the forms of the first component 20 and of the second component 30 of the mounting device 10 (not shown in Fig. 3) are different compared to the shapes of the first and second components 20, 30 according to Fig. 1. The form of the first component 20 is adapted to the form of the ground wall (not shown in Fig. 3) being used for the attachment of the first component 20 to the elevator hoistway. The form of the second component 30 can be adjusted to provide the at least one fixing means 40 for one rope and the at least one opening 50 for another rope. According to Fig. 4 one fixing means 40 and two openings 50a, 50b of the mounting device 10 are shown. The dimensions of the openings 50a, 50b can be different and depend on the position s and relative distances of the different ropes within the connection points of the elevator roping arrangement, the materials of the ropes and/or the moving characteristics of the elevator roping arrangement. The first opening 50a shown in Fig. 4 defines dimension twice as large compared to the rope (not shown on Fig. 4), which is freely movable within this first opening 50a. The shape of the opening 50a, 50b does not necessarily need to correspond to the outer shape of the rope. For example, the rectangular shape of the opening 50a, 50b according to Fig. 4 can be used for shielding of round, rectangular or other shapes of the designated ropes free movable within the openings 50a, 50b.

[0018] Fig. 5 illustrates a top view of a cross section of the mounting device 10 attached to the straight ground 90 of the elevator roping arrangement. The first component 20 is attached to the ground 90 and the second component 30 comprises a number of different shapes defining one fixing means 40 attached to the first rope 80a, the first opening 50a with a dimension close to the diameter of the designated rope 80b and the second opening 50b with a dimension twice the diameter of the designated ropes 80c, 80d, 80e. It will be appreciated that the dimensions of the openings are predefined and determined based on the expected diameters of the designated rope or arrangement of ropes 80b to 80e that are freely movable within the openings 50a, 50b.

[0019] According to another preferred embodiment the fixing means 40, openings 50a, 50b and shielding means 60 consist of one first component 20 and three addition components 30a, 30b, 30c combined with each other and with the ground 90 by connections 70a, 70b, as shown in Fig. 6 and 7. It will be appreciated that the additional components 30a, 30b, 30c can be attachable to each other and can be built up as to the shielding means 60, preferably by the connections 70a, 70b. The shapes of the different openings 50a, 50b can be different and it will be appreciated that the shapes of the openings 50a, 50b are flexible and can be modelled based on the diameters of and distances between the designated ropes 80b to 80e. The dimension of the fixing means 40 for the designated rope 80a disclosed in Fig. 7 is much tighter compared to the dimension of the fixing means 40 illustrated in Fig. 6. According to this embodiment during the installation or the maintenance work of the rope arrangement, the fixing means 40 and/or openings 50a, 50b do not need to be predefined and can be formed during the installation/maintenance work because of the flexible material of the additional components 30a, 30b, 30c. The maintenance worker can easily form the shapes of the fixing means 40 and/or openings 50a, 50b during the installation/maintenance work.

[0020] Fig. 8 shows a top view of a cross section of another preferred embodiment of the mounting device 10. The first component 20 of the mounting device 10 is attached to the ground 90 and the second component 30 is fixed to the first component 20, whereas both components 20, 30 define the fixing means 40 with dimensions close to those of the at least first rope 80a. The opening 50 is basically defined by the bended shape of the second component 30 and is only attached on one side of the second component 30 of the mounting device 10. The designated ropes 80b to 80e can move freely within the opening 50. In addition, because this shape of the opening 50 is easy to install in view of the designated ropes 80b to 80e, the shielding means 60 can quickly be adapted to the rope arrangement 80b to 80e.

[0021] Another embodiment is shown in Fig. 9 as a side view of the connection points within the top of the elevator hoistway 100. The ropes 80a to 80e are connected and fixed with the top of the elevator hoistway 100 and being shielded by the mounting device 10 comprising two shielding means 60a, 60b. It is not mandatory that the shielding means 60a, 60b are defined by the additional components 20, 30 (not shown Fig. 9). In addition, the fixing means 40a, 40b are attached to different ropes 80a, 80c of the rope arrangement 80a to 80e and it will be appreciated that the distance between the shield-

ing means 40a, 40b can be determined based on the number, material and/or arrangement of the ropes 80a to 80e. The shape and size of the different shielding means 40a, 40b of the mounting device 10 can vary and may comprise different materials.

[0022] Having thus described the present invention in detail, it is to be understood that the foregoing detailed description of the invention is not intended to limit the scope of the invention. One of ordinary skill in the art would recognise other variants, modifications and alternatives in light of the foregoing discussion.

Reference numerals

[0023]

10	mounting device
20	first component
30	second component
40	fixing means
50	opening
60	shielding means
70	connection
80	rope
90	wall
100	top of the elevator hoistway

Claims

1. A mounting device (10) for shielding at least two ropes (80a, 80b, 80c, 80d, 80e) usable within an elevator roping arrangement, wherein the mounting device (10) is connectable with the first of the at least two ropes (80a, 80b, 80c, 80d, 80e) and the other rope of the at least two ropes (80a, 80b, 80c, 80d, 80e) is freely movable within the mounting device (10).

2. Mounting device (10) according to claim 1, wherein a first component (20) and at least another component (30, 30a, 30b, 30c) are attachable with each other and form in combination a fixing means (40, 40a, 40b) for the first rope (80a, 80b, 80c, 80d, 80e) and a shielding means (60, 60a, 60b) for the at least other rope (80a, 80b, 80c, 80d, 80e).

3. Mounting device (10) according to any of claims 1 or 2, wherein the shape of the first component (20) and of the at least further component (30, 30a, 30b, 30c) define in combination the fixing means (40, 40a, 40b) with a dimension close to the diameter of the first rope (80a) and an opening (50, 50a, 50b) with a dimension greater than the diameter of the at least other rope (80b, 80c, 80d, 80e) as part of the shielding means (60, 60a, 60b).

4. Mounting device (10) according to any of claims 1 to 3, wherein the second component (30, 30a, 30b, 30c) is the shielding means (60, 60a, 60b).

5. Mounting device (10) according to any of claims 1 to 4, wherein at least one element (20, 30, 30a, 30b, 30c, 40, 40a, 40b, 50, 50a, 50b) of the mounting device (10) is attachable to a hoistway wall (90) and/or a counterweight and/or an elevator car and/or a guide rail and/or a module supporting a drive unit.

6. Mounting device (10) as claimed in any preceding claim 1 to 5, wherein at least two other ropes (80a, 80b, 80c, 80d, 80e) are freely movable within the opening (50, 40a, 50b) and the first rope (80a, 80b, 80c, 80d, 80e) is fixed within the fixing means (40, 40a, 40b).

7. Mounting device (10) according to any of claims 1 to 5, wherein each of the at least two other ropes (80a, 80b, 80c, 80d, 80e) is freely movable within separate openings (50, 50a, 50b) and the first rope (80a, 80b, 80c, 80d, 80e) is fixed within the fixing means (40, 40a, 40b).

8. Mounting device (10) according any of claims 3 to 7, wherein the dimension of the opening (50, 50a, 50b) is wider than the diameter of at least one rope (80a, 80b, 80c, 80d, 80e).

9. Mounting device (10) according to any of claims 1 to 8, wherein the components (20, 30) and/or fixing means (40, 40a, 40b) and/or opening (50, 50a, 50b) and/or shielding means (60, 60a, 60b) comprise a flexible material and are formable regarding to the diameter or shape of the at least one rope (80a, 80b, 80c, 80d, 80e).

10. Mounting device (10) according to any of claims 1 to 9, wherein the components (20, 30, 30a, 30b) comprising at least two fixing means (40, 40a, 40b) for two different ropes (80a, 80b, 80c, 80d, 80e) and at least two openings (50, 50a, 50b) for the at least two different ropes (80a, 80b, 80c, 80d, 80e).

11. Mounting device (10) as claimed in any preceding claim 1 to 10, wherein the fixing means (40, 40a, 40b) comprises frictional layers for fixing the first rope (80a, 80b, 80c, 80d, 80e) within the fixing means (40, 40a, 40b).

12. Mounting device (10) according to any of claims 1 to 11, wherein the components (20, 30, 30a, 30b) are attachable to each other by screw joints and/or by click connections (70a, 70b).

13. Mounting device (10) as claimed in any preceding claim 1 to 12, wherein the opening (50, 50a, 50b) comprises a protection layer and/or support ele-

ments for the free movement of the at least one rope (80a, 80b, 80c, 80d, 80e) formed of elastomeric coated steel.

14. Mounting device (10) according to any of claims 1, 5 to 13, wherein the mounting device (10) comprises the at least a first material for the fixing means (40, 40a, 40b) combined with at least a second material forming the opening (50, 50a, 50b) and the mounting device (10) is directly attachable by the fixing means (40, 40a, 40b) to the first rope (80a, 80b, 80c, 80d, 80e).

15. Elevator with a roping arrangement and a mounting device (10) according to any of claims 1 to 14.

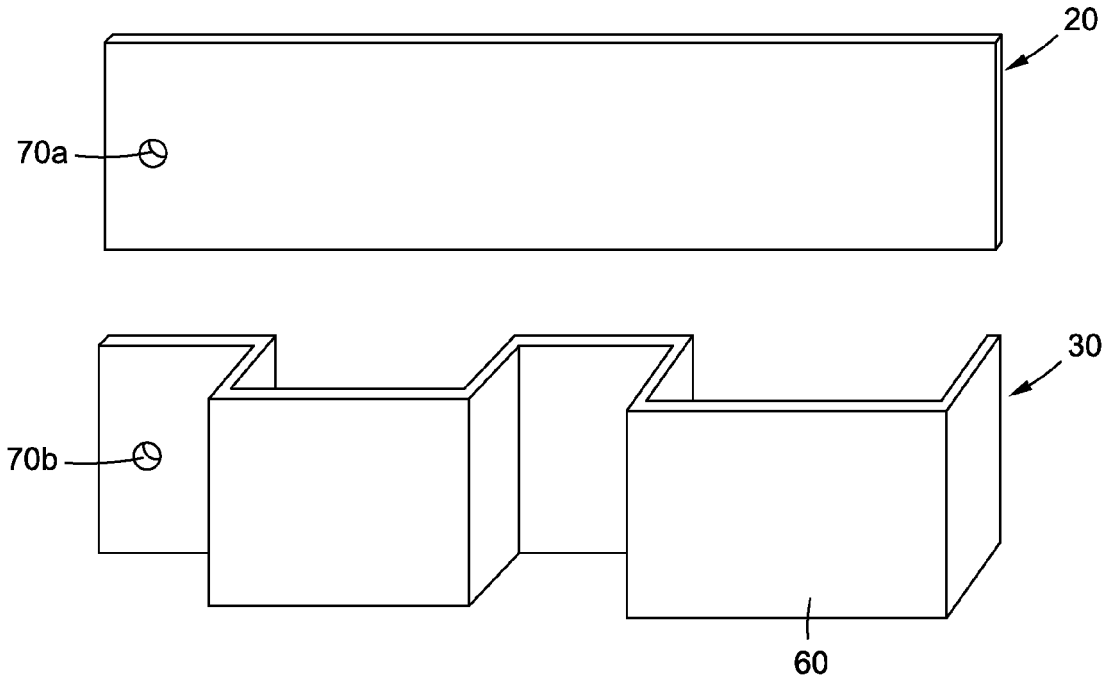


FIG. 1

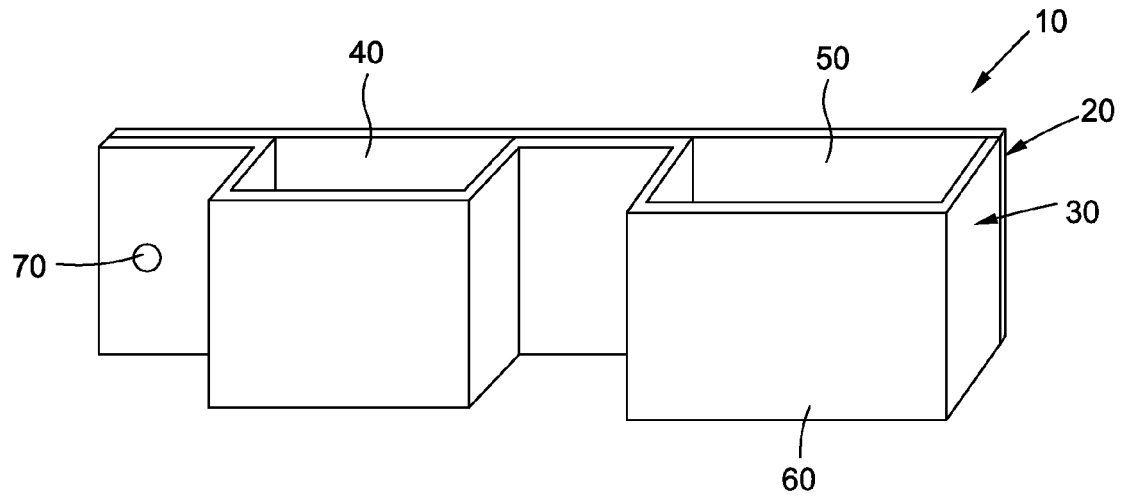


FIG. 2

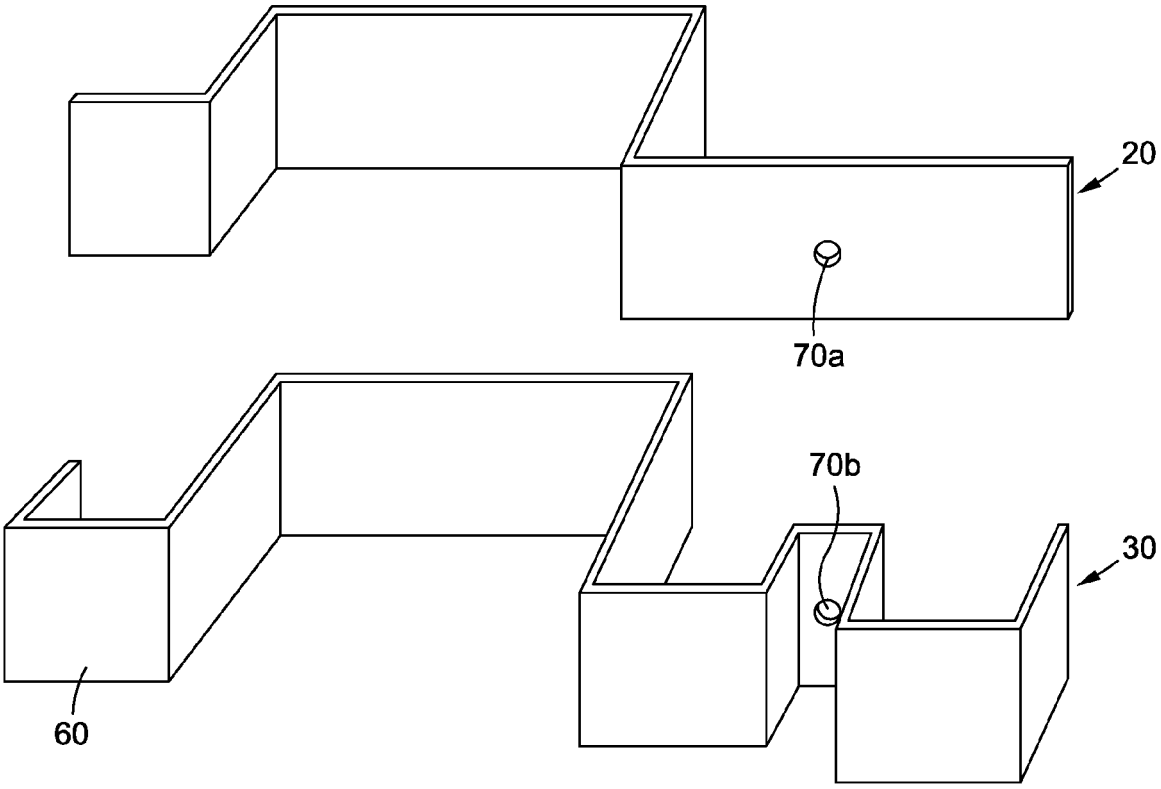


FIG. 3

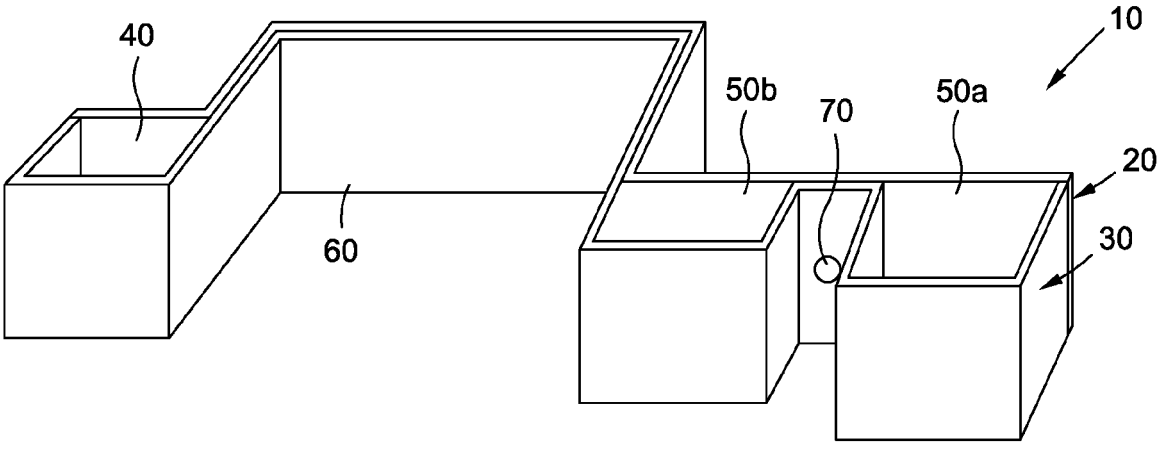
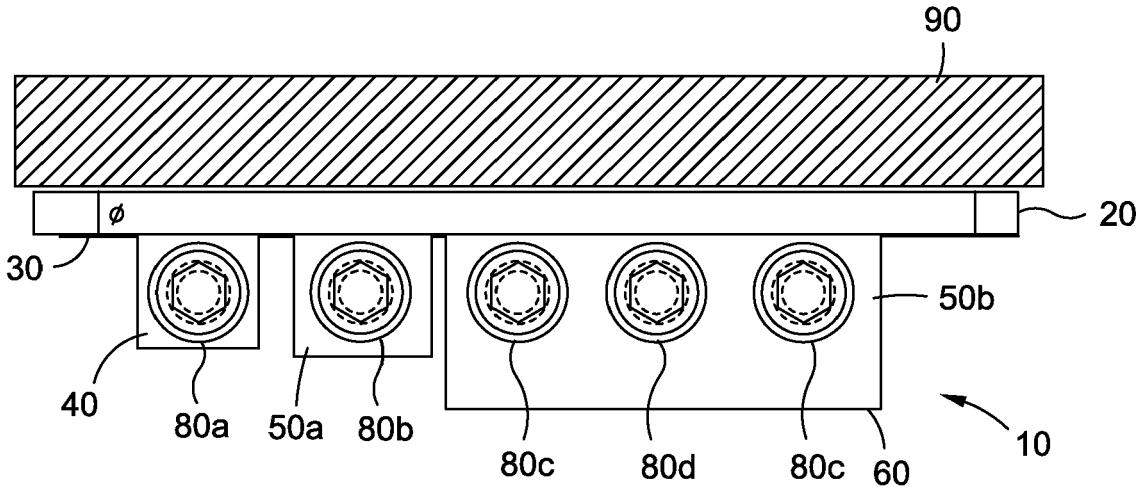


FIG. 4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20
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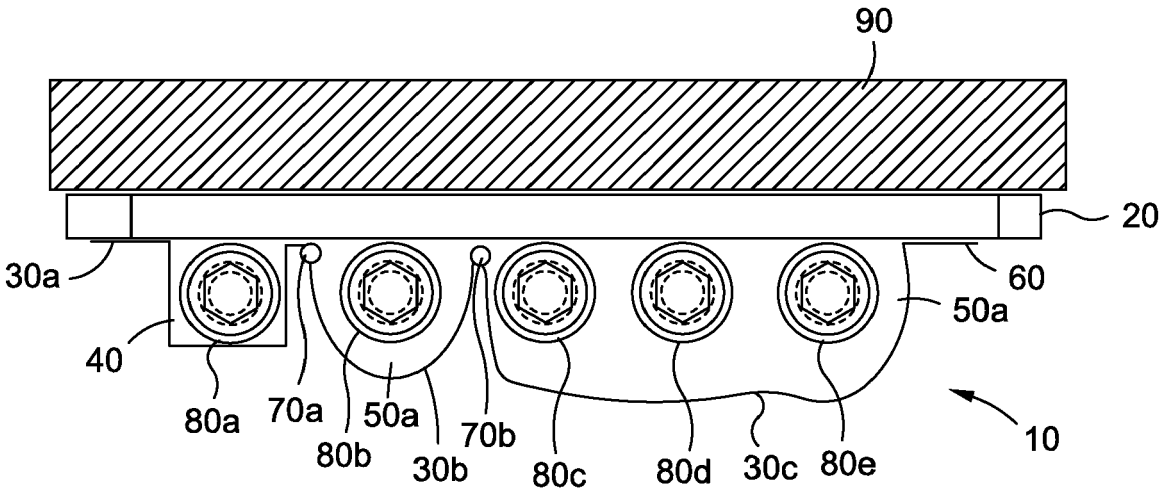
50b
40
80a
50a
80b
80c
80d
80c
60
10

FIG. 5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80e
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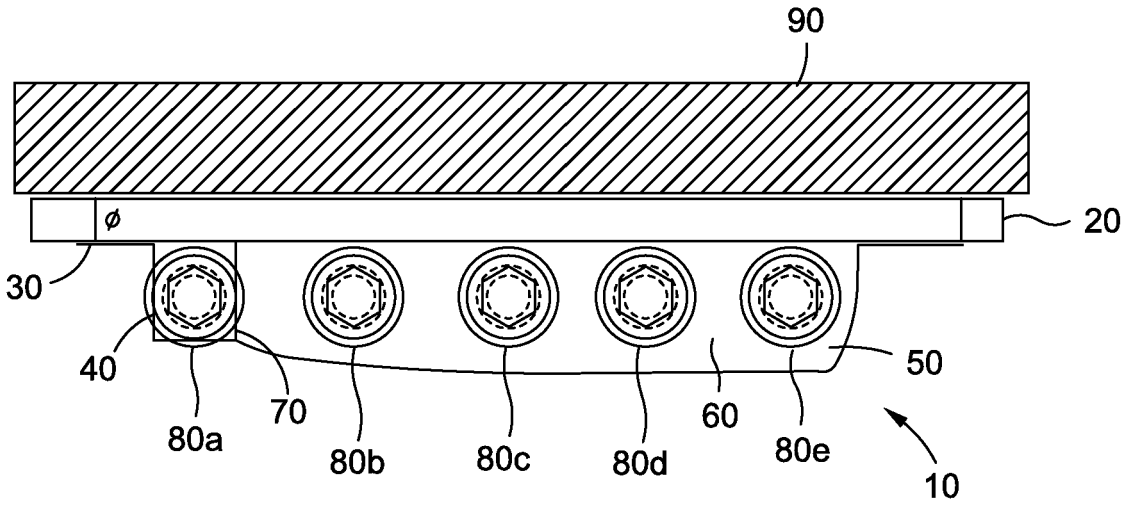
FIG. 6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80e
50
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FIG. 7

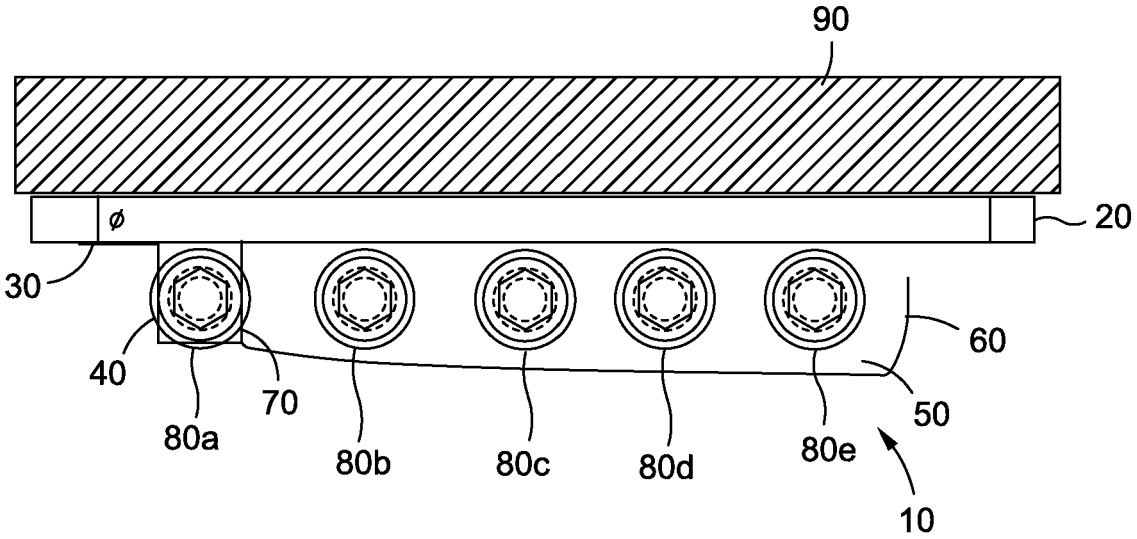
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FIG. 8

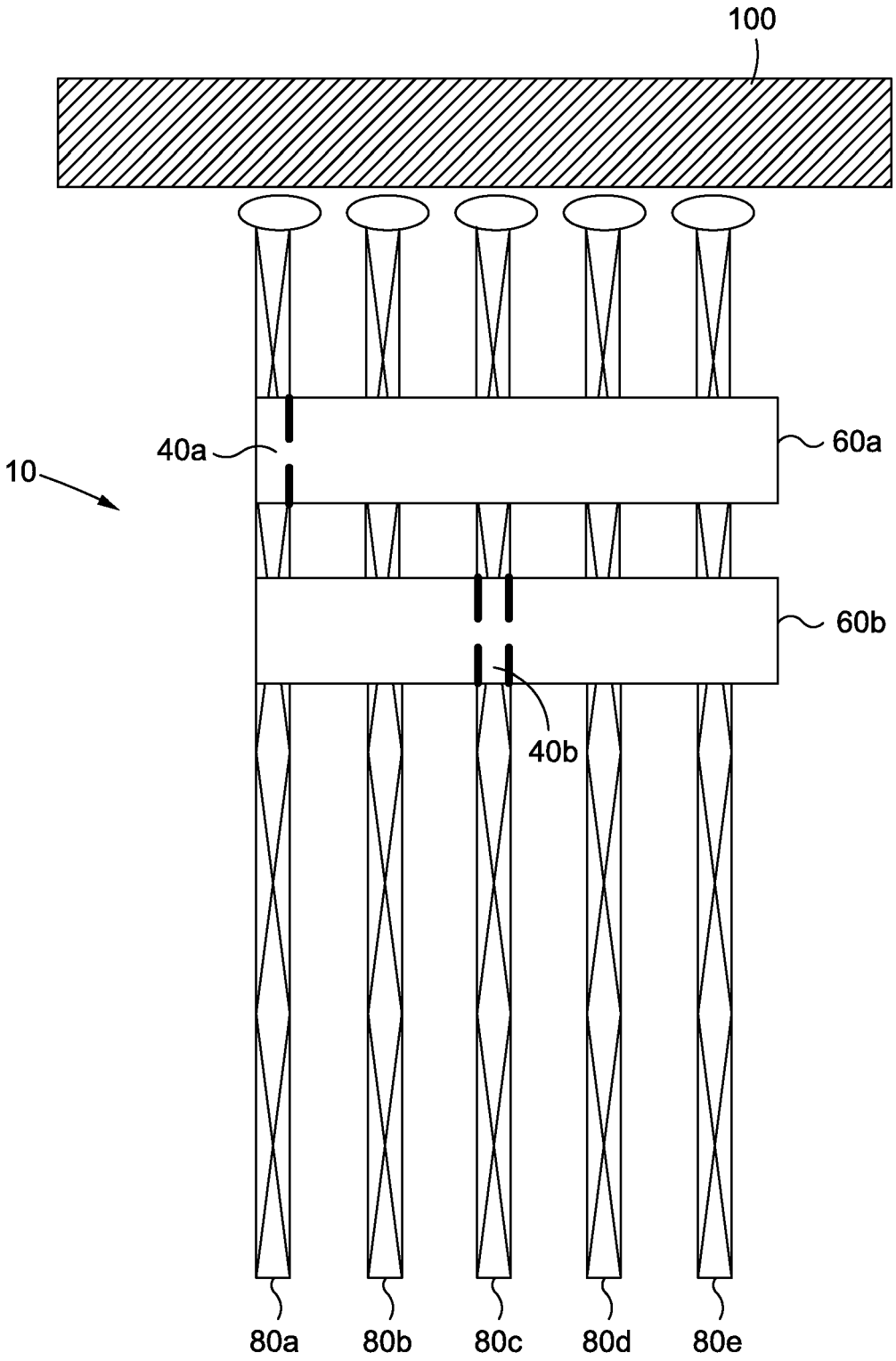

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 2064

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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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	26 June 2014	Bleys, Philip

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 14 15 2064

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

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