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(54) **CONNECTOR PAD**

(57) The invention teaches a technology to connect attachments with building structures using a connector pad. The connector pad invented for this purpose allows the compensation of construction tolerances and strengthening of the building structure at the connection point.

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Description**BRIEF DESCRIPTION OF THE DRAWINGS****BACKGROUND OF THE INVENTION**

[0001] Connectors are used to fasten attachments to concrete buildings. Typically, either cast-in anchor plates, i.e. steel plates with welded anchors, or post-installed anchors are used, which typically do not allow compensation of construction tolerances. While the former requires troublesome welding on site causing quality issues, the latter requires tedious drilling causing health issues. For these reasons, a solution allowing a connection with bolts or screws without welding and drilling is preferable, in particular if this solution allows the compensation of construction tolerances and strengthening of the building structure at the connection point, particularly close to edges. The bolts or screws are then used to fix attachments, for example structural beams and columns or mechanical and electrical components.

BRIEF DESCRIPTION OF THE INVENTION

[0002] The invention provides for a technology to connect attachments to concrete building structures with bolts or screws without welding and drilling and allows the compensation of construction tolerances and strengthening of the building structure at the connection point, particularly close to edges.

[0003] In particular, the invention provides a technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate with a slot and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof, wherein in said connector pad, or below said connector pad and in the concrete of said concrete building structure, a void is present, created or maintained for accommodating slot bolt heads or self-drilling screw shafts.

[0004] The invention furthermore provides a method for connecting attachments to concrete building structures, thereby allowing the compensation of construction tolerances and/or strengthening of the building structure, by embedding a connector pad of the invention in said concrete building structure, or attaching said connector pad to the said concrete building structure, by inserting a slot bolt head into a void in or under said connector pad, and by fixing said attachment to the shaft of the slot bolt such that construction tolerances are reduced or eliminated, wherein the slot bolt may be replaced by a self-drilling screw.

[0005] The invention finally provides a building, set up with said method and having reduced or eliminated construction tolerances and/or being strengthened in its building structure.

[0006]

Fig. 1 shows a connector pad with a slotted hole to accommodate slot bolts allowing the compensation of building tolerances.

Fig. 2 shows a hollow connector pad with caps and a slotted hole to accommodate slot bolts allowing the compensation of building tolerances.

Fig. 3 shows a connector pad with a filler to accommodate self-drilling screws allowing the compensation of building tolerances.

Fig. 4 shows a connector pad with a slotted rail with or without studs to accommodate slot bolts allowing the compensation of building tolerances.

Fig. 5 shows a connector pad with an integrated slotted rail with or without studs to accommodate slot bolts allowing the compensation of building tolerances.

Fig. 6 shows a connector pad with a confining bend at the corner, optional reinforcement and a slotted hole to accommodate slot bolts allowing the compensation of building tolerances and strengthening of the building structure at the connection point.

Fig. 7 shows a connector pad with a confining bend at the corner and back-anchoring bend in various shapes and a slotted hole to accommodate slot bolts allowing the compensation of building tolerances and strengthening of the building structure at the connection point.

Fig. 8 shows a connector pad with inclined studs and with a slotted rail with inclined studs to accommodate slot bolts allowing the compensation of building tolerances.

[0007] The reference signs used in the figures are as following:

- | | | |
|----|------|---|
| 40 | (1) | Connecting pad |
| | (2) | Plate |
| | (3) | Stud |
| | (4) | Slot bolt with washer and nut |
| | (5) | Slot |
| 45 | (6) | Attachment |
| | (7) | Void |
| | (8) | Concrete |
| | (9) | Slotted rail with or without studs |
| | (10) | Combined plate and slotted rail |
| 50 | (11) | Extended connecting pad |
| | (12) | Confining and back-anchoring connecting pad |
| | (13) | Confining bend |
| | (14) | Back-anchoring bend |
| | (15) | Recess |
| 55 | (16) | Welded bend |
| | (17) | Welded sheet |
| | (18) | Welded wire |
| | (19) | Bolt post-installed or cast-in |

- (20) Hollow section
- (21) Self-drilling screw
- (22) Reinforcing bar
- (23) Caps
- (24) Filler
- (25) Encasement

DETAILED DESCRIPTION OF THE INVENTION

[0008] The invention will now be described with reference to the figures, which in the embodiment relate to connector pads capable to connect attachments to the building structure without welding and drilling as well as to compensate building tolerances and to strengthen the building structure at the connection point.

[0009] It is understood that the invention may be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Rather these embodiments are provided so that this disclosure will be thorough and complete and will fully convey the invention to those skilled in the art. Indeed, the invention is intended to cover alternatives, modifications and equivalents of these embodiments, which are included within the scope and spirit of the invention as defined in the appended claims. Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be clear to those of ordinary skill in the art that the invention may be practiced without such specific details.

[0010] Referring now for example to Fig. 1 there is shown in the cross sections and top view the connector pad (1), consisting of a plate (2) with a slot (5) and one or more studs (3) cast in the concrete (8) of the building structure. A void (7) is generated using an encasement below the plate (25). One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slot (5), allowing the compensation of building tolerances. Also Fig. 2 shows in the cross sections and top view the connector pad (1), consisting of a hollow section (20) with a slotted hole (5) and one or more studs (3) cast in the concrete (8) of the building structure. A void is generated (7) by closing the open ends of the hollow section (20) using caps (23). One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slot (5), allowing the compensation of building tolerances.

[0011] Also Fig. 3 shows in the cross sections and top view the connector pad (1), consisting of a hollow section (20) and one or more studs (3) cast in the concrete (8) of the building structure. A void is generated (7) by a soft filler (24) embedded in the hollow section (20). One or more self-drilling screws (21) are installed in the connector pad to fix any attachment (6) anywhere in the plate (2), allowing the compensation of building tolerances.

[0012] Also Fig. 4 shows in the cross sections and top

view the connector pad (1), consisting of a plate (2), one or more studs (3) and an embedded slotted rail with or without studs (9) cast in the concrete (8) of the building structure. Note that a taping, filler and/or caps prevents concrete from flowing into the slotted rail during casting. The filler and/or taping is removed after the concrete is set. One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slotted rail with or without studs (9), allowing the compensation of building tolerances.

[0013] Also Fig. 5 shows in the cross sections and top view the connector pad (1), consisting of a combined plate and slotted rail (10) and one or more studs (3) cast in the concrete (8) of the building structure. Note that a taping, filler and/or caps prevents concrete from flowing into the slotted rail during casting. The filler and/or taping is removed after the concrete is set. One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slotted rail with or without studs (9), allowing the compensation of building tolerances.

[0014] Also Fig. 6 shows in the cross sections and top view the connector pad (1), consisting of a plate (2) with a slot (5) and one or more studs (3) cast in the concrete (8) of the building structure. A void (7) is generated using an encasement below the plate (25). One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slot (5), allowing the compensation of building tolerances. The plate is extended to a close edge and fitted with a confining bend (13) which increases the breakout capacity of the edge and thus the overall capacity if the connector pad is loaded in shear. The capacity of the connector pad may be further increased using reinforcement (22).

[0015] Also Fig. 7 shows in the cross sections and top view the connector pad (1), consisting of a plate (2) with a slot (5) and one or more studs (3) cast in the concrete (8) of the building structure. A void (7) is generated using an encasement below the plate (25). One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slot (5), allowing the compensation of building tolerances. The plate is extended to a close edge and fitted with a confining bend (13) and back-anchoring bend (14), both of which increase the breakout capacity of the edge and thus the overall capacity if the connector pad is loaded in shear. The bends may be uniform or designed with recesses (15). The bends may be replaced by welded bends (16), welded sheets (17), welded wires (18), or bolts either post-installed or cast-in.

[0016] Also Fig. 8 shows in the cross sections and top view the connector pad (1), consisting of a plate (2), one or more inclined studs (3) and an embedded slotted rail with inclined studs (9) cast in the concrete (8) of the building structure. Connector pad and slotted rail may be placed at the edge (with zero distance to the front face surface). The connector pad may follow the corner and be reduced

to a simple angle profile. The slotted rail may have various cross-sections not necessarily symmetrically. Connector pad and slotted rail may have the same length as the connector pad. Note that a taping, filler and/or caps prevents concrete from flowing into the slotted rail during casting. The filler and/or taping is removed after the concrete is set. One or more slot bolts (4) with washers and nuts are installed in the connector pad to fix any attachment (6) anywhere in the slotted rail with or without studs (9), allowing the compensation of building tolerances.

Claims

1. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate with a slot and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof.
2. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a hollow section with a slotted hole and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof.
3. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a hollow section with a slotted hole and one or more studs, as well as self-drilling screws, or consisting thereof.
4. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate, one or more studs and an embedded slotted rail with or without studs of whatever kind and direction, as well as slot bolts, or consisting thereof.
5. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening
- of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a combined plate and slotted rail and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof.
6. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and strengthening of the building structure at the connection point by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate with a slot and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof, wherein the plate is extended to a close edge and fitted with a confining bend which increases the breakout capacity of the edge and thus the overall capacity if the connector pad is loaded in shear, and wherein the distance between slot and edge may be reduced to zero.
7. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and strengthening of the building structure at the connection point by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate with a slot and one or more studs of whatever kind and direction, as well as slot bolts, or consisting thereof, wherein the plate is extended to a close edge and fitted with a confining bend and back-anchoring bend, both of which increase the breakout capacity of the edge and thus the overall capacity if the connector pad is loaded in shear, and wherein the distance between slot and edge may be reduced to zero.
8. A technology according to the claims 6 or 7 whereby the capacity of the connector pad is further increased using reinforcement of whatever kind and direction.
9. A technology according to the claims 6 or 7 whereby the bends are designed with recesses or replaced by welded bends, welded sheets, welded wires, or bolts either post-installed or cast-in of whatever kind and direction.
10. A technology for the connection of attachments to concrete building structures allowing the compensation of construction tolerances and/or strengthening of the building structure by means of a connector pad, said connector pad being attached to or embedded in said concrete building structure, said connector pad comprising a plate with a slot and one or more studs of whatever kind and direction, as well

as slot bolts, or consisting thereof, wherein in said connector pad, or below said connector pad and in the concrete of said concrete building structure, a void is present, created or maintained for accommodating slot bolt heads or self-drilling screw shafts. 5

11. A method for connecting attachments to concrete building structures, thereby allowing the compensation of construction tolerances and/or strengthening of the building structure, by embedding a connector pad of one of the claims 1 to 10 in said concrete building structure, or attaching said connector pad to the said concrete building structure, by inserting a slot bolt head into a void in or under said connector pad, and by fixing said attachment to the shaft of the slot bolt such that construction tolerances are reduced or eliminated. 10 15
12. The method of claim 11, wherein the slot bolt is replaced by a self-drilling screw. 20
13. A building set up with the method of claim 11 or claim 12 and having reduced or eliminated construction tolerances and/or strengthened building structure. 25
14. Use of the technology according to one the claims 1 to 10 for setting up a building with reduced or eliminated construction tolerances and/or strengthened building structure. 30
15. A set of components comprising the structural elements of one of the claims 1 to 10, adapted for executing a method of claim 11 or claim 12. 35

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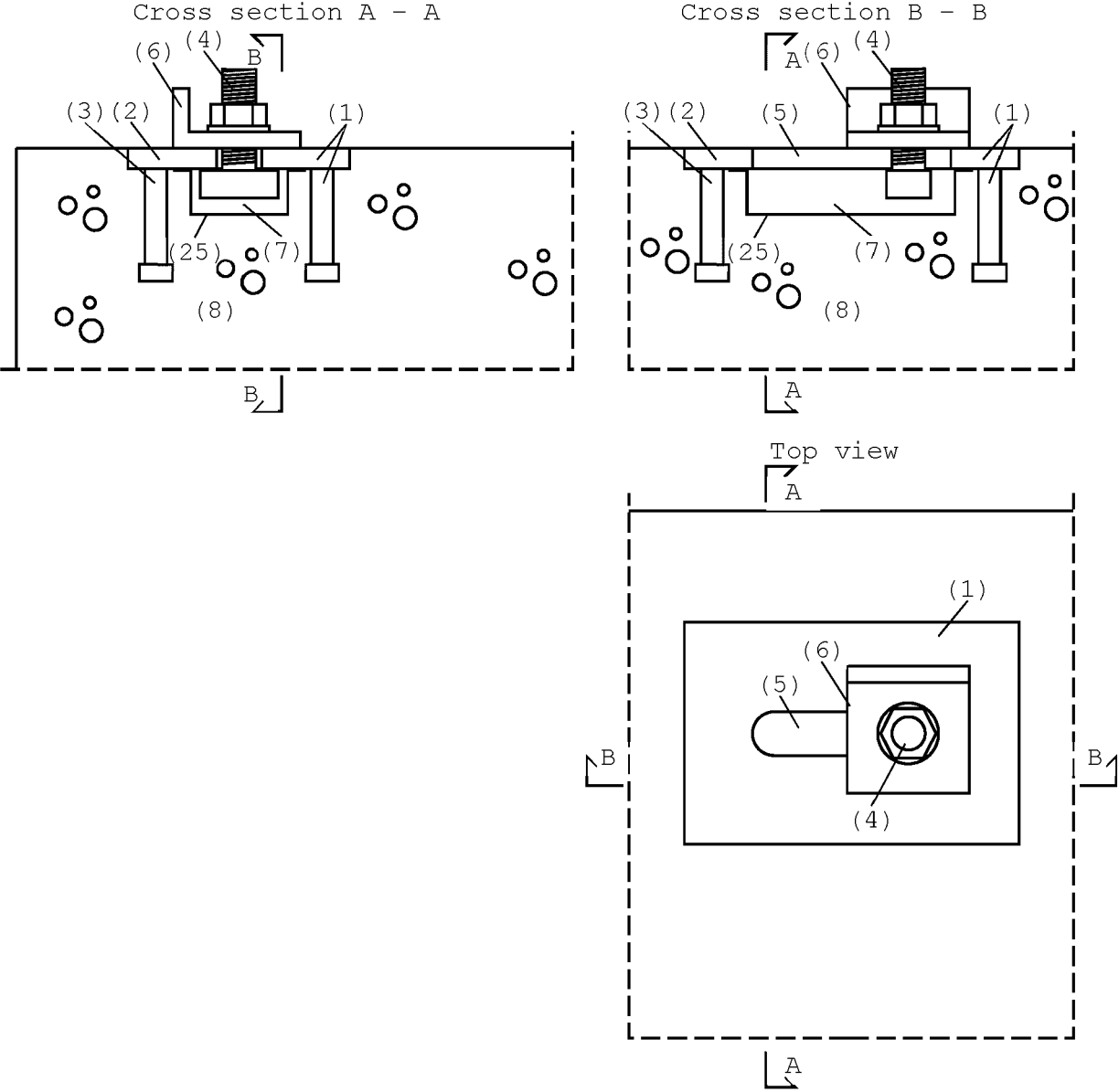


Fig. 1

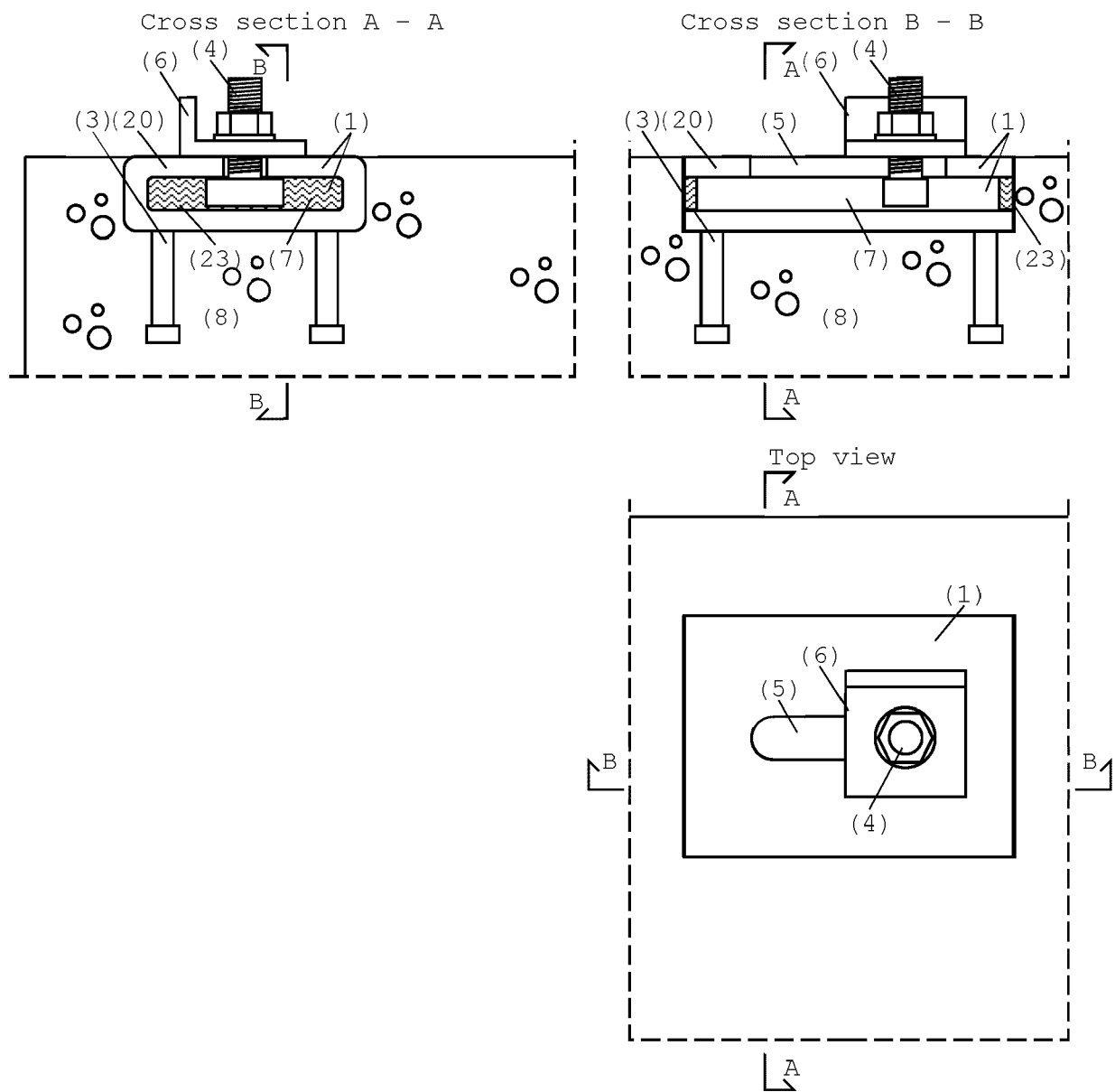


Fig. 2

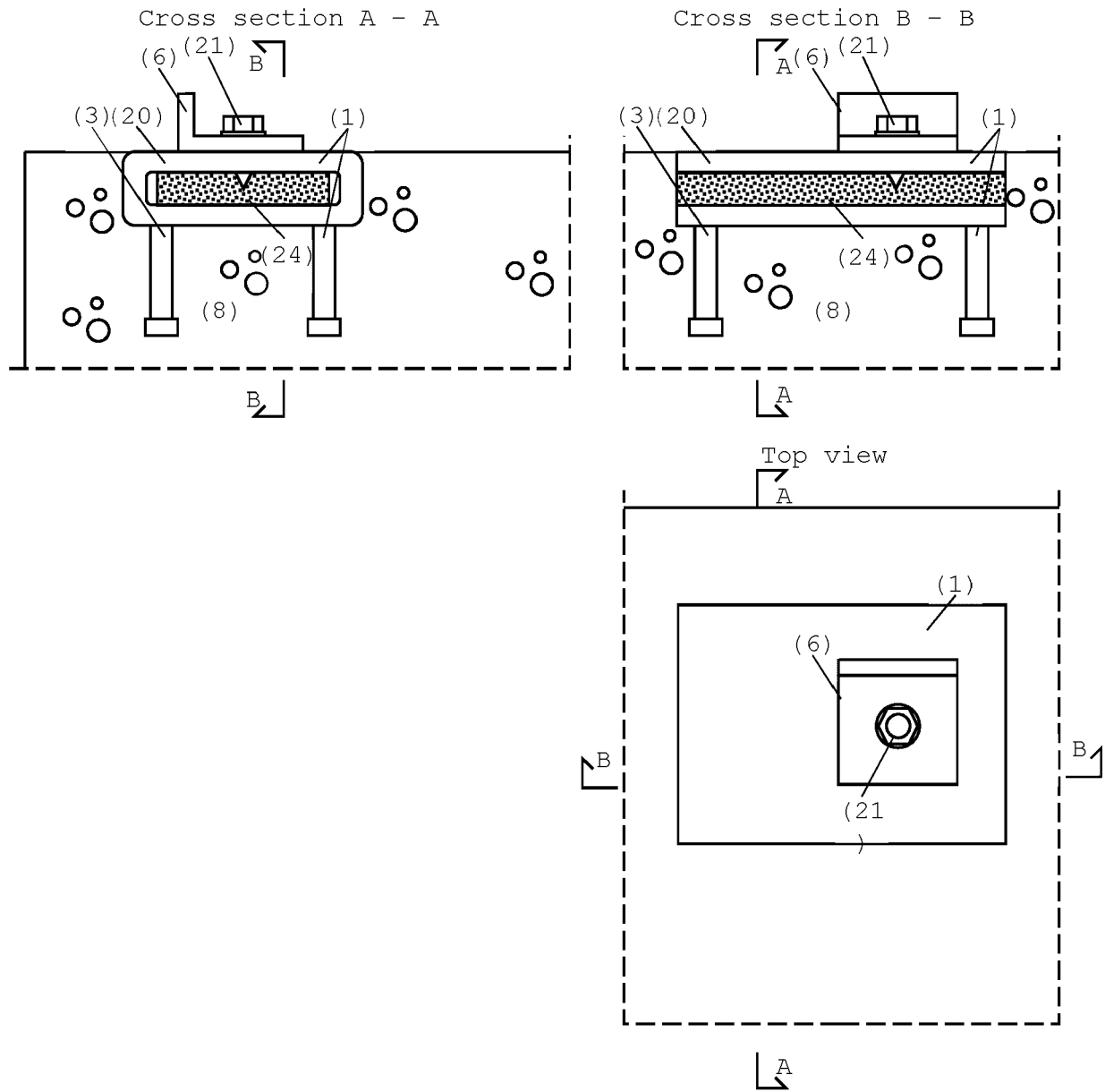


Fig. 3

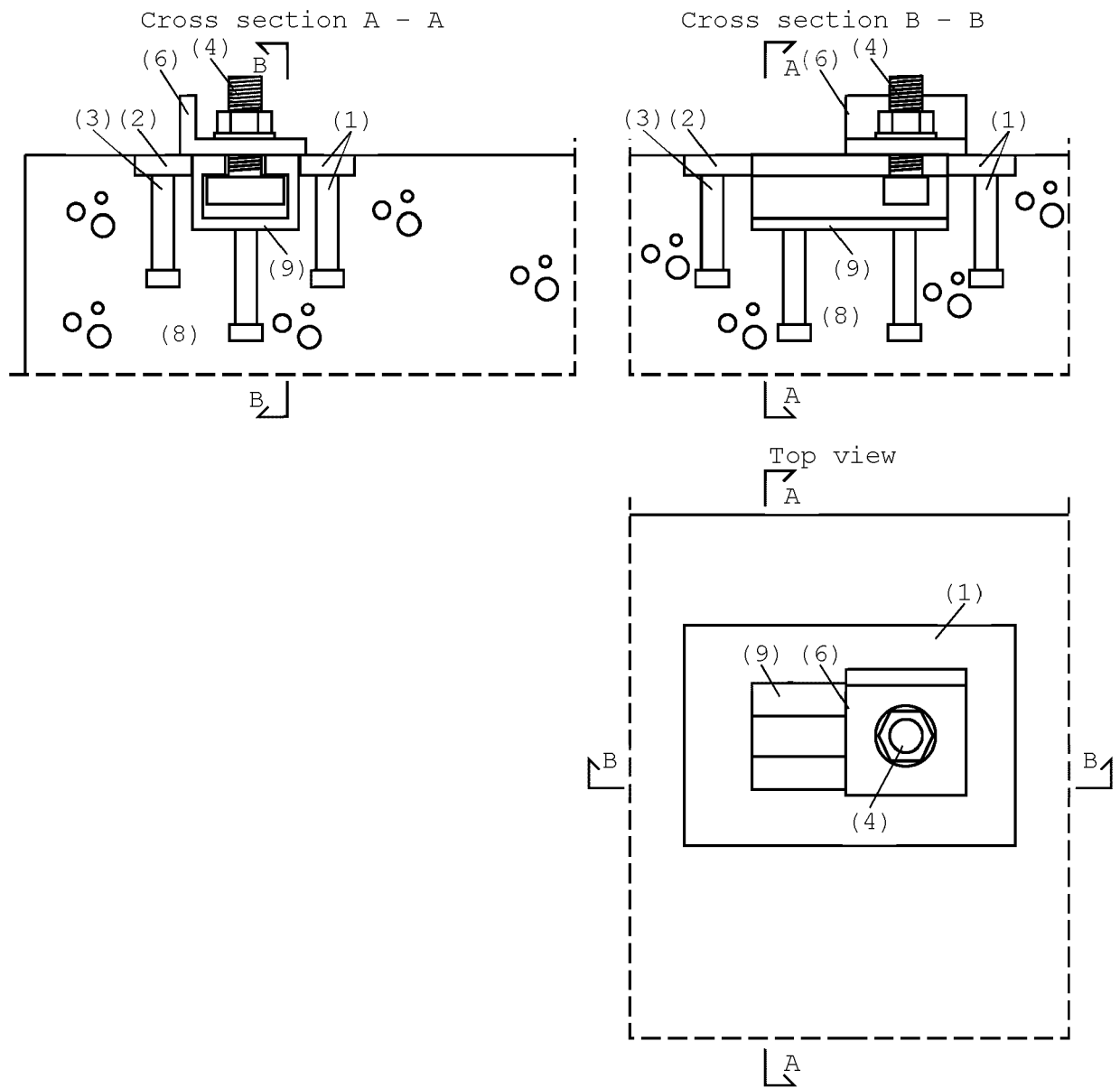


Fig. 4

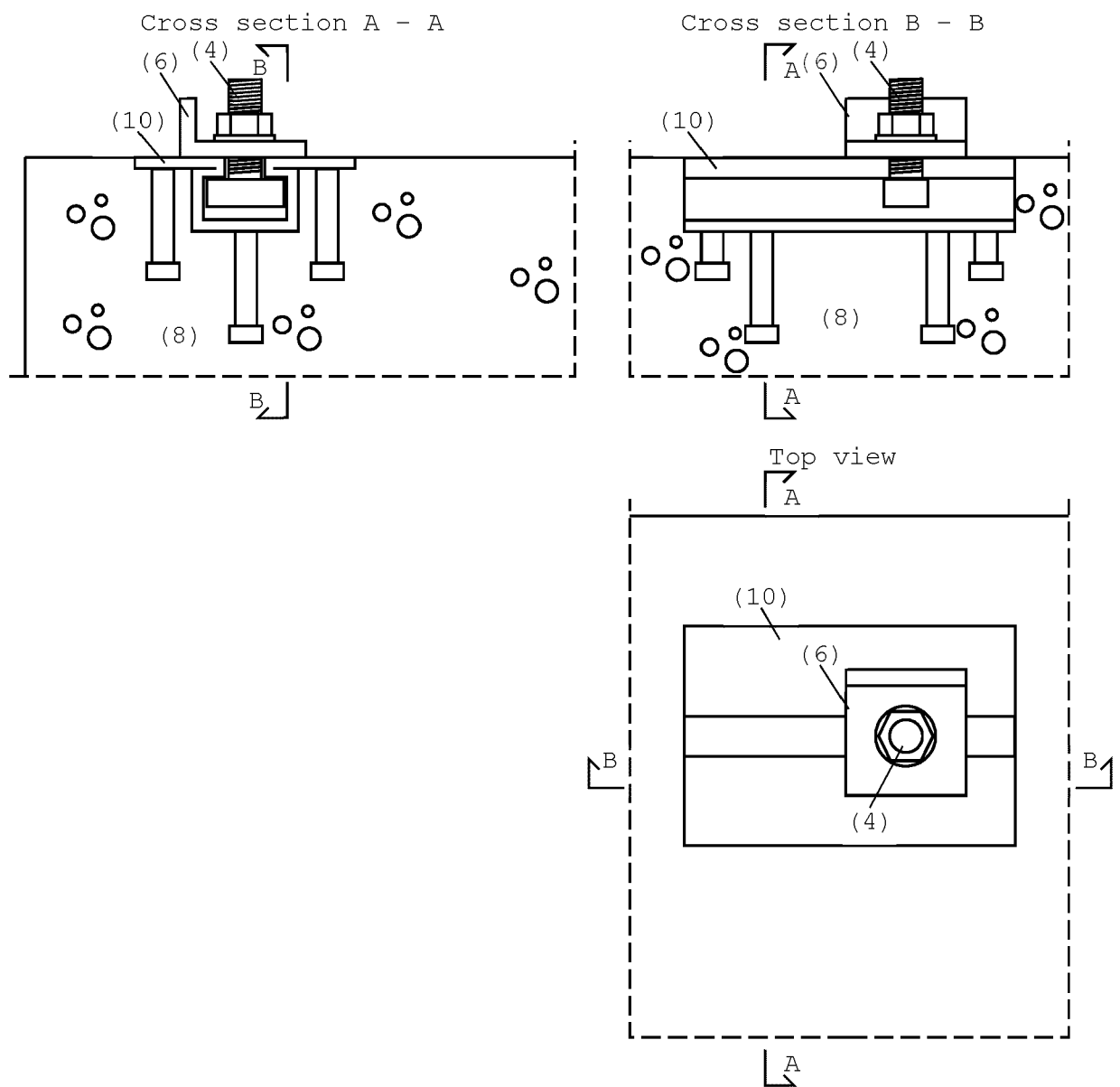


Fig. 5

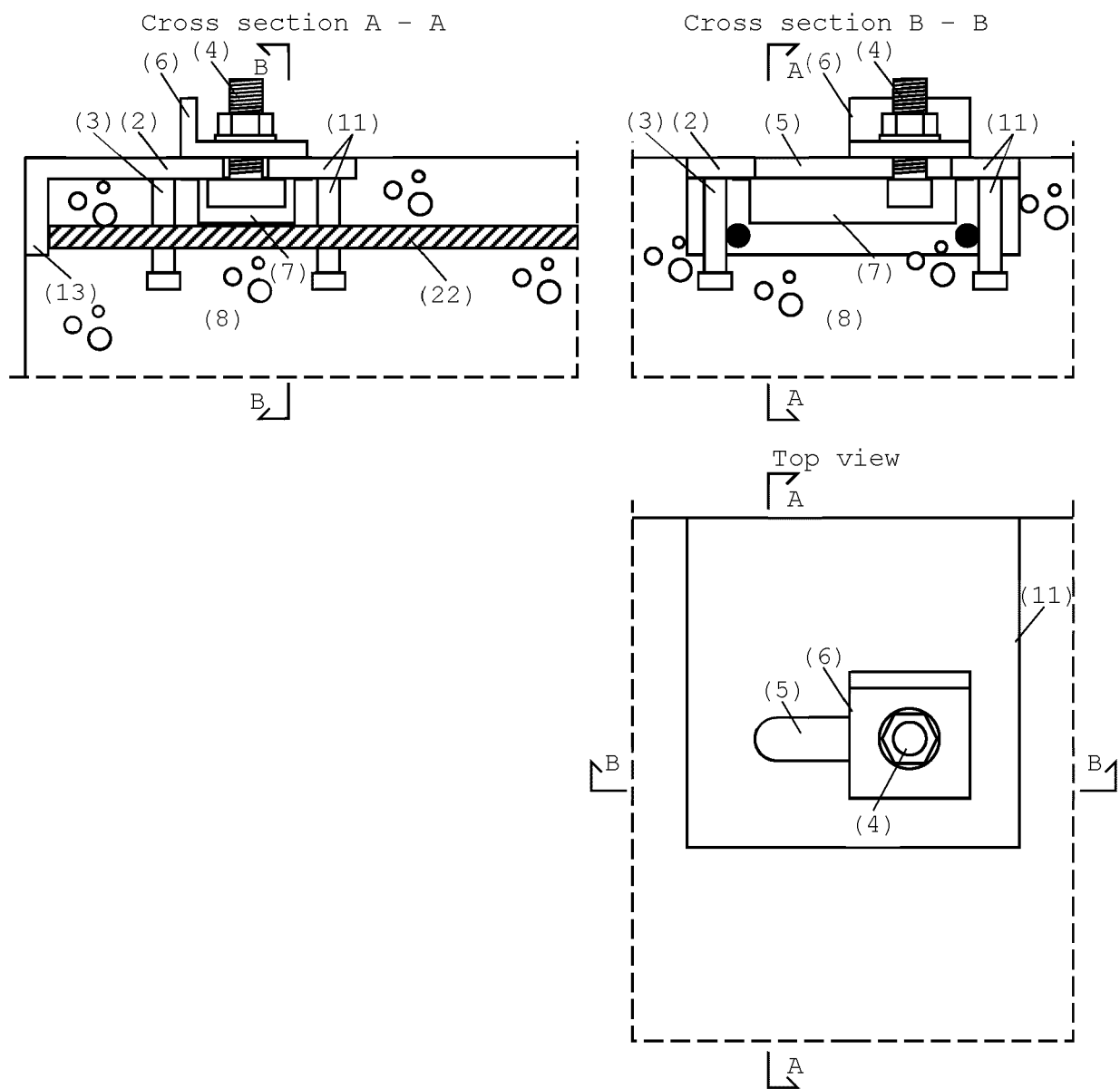


Fig. 6

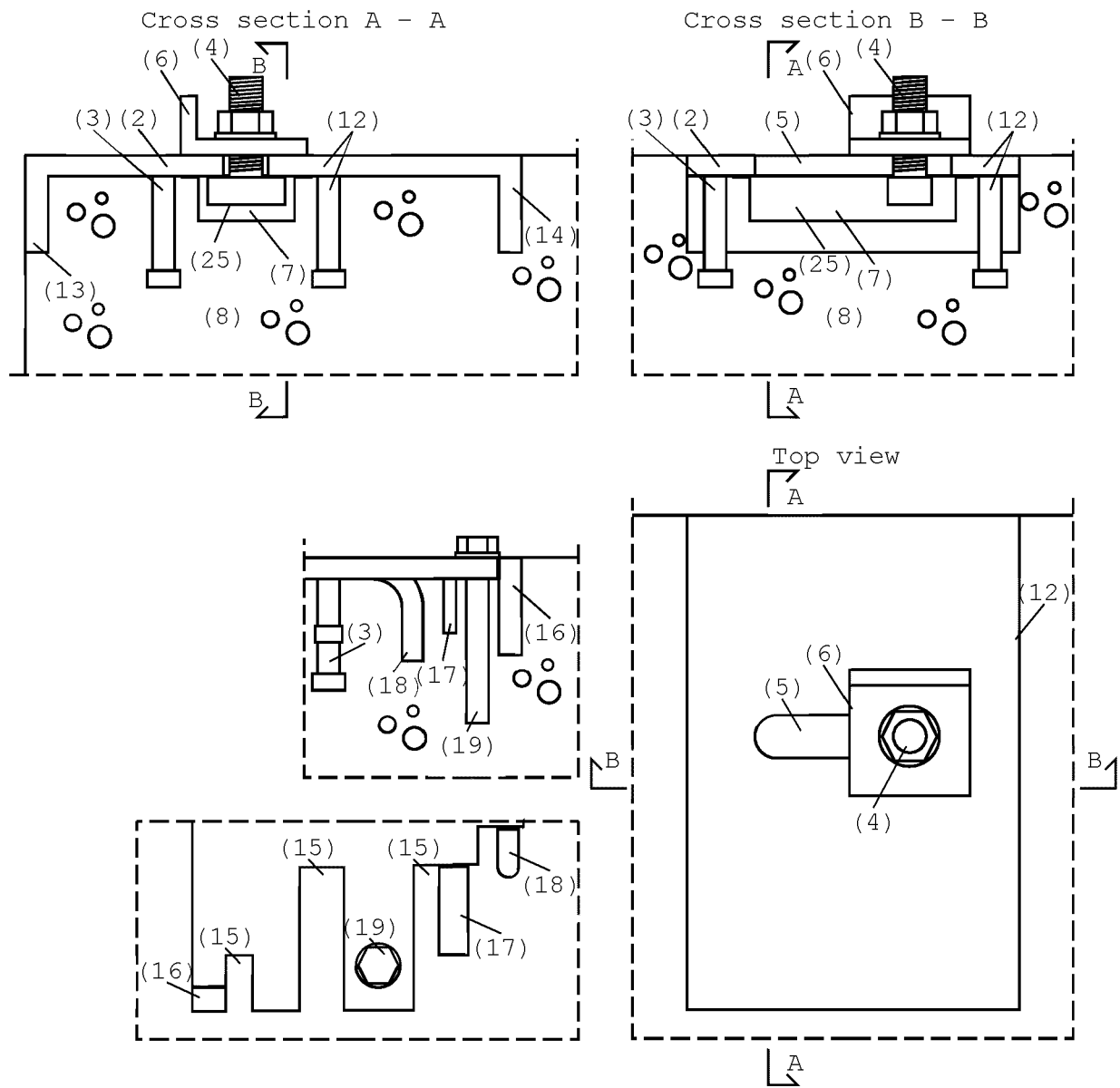


Fig. 7

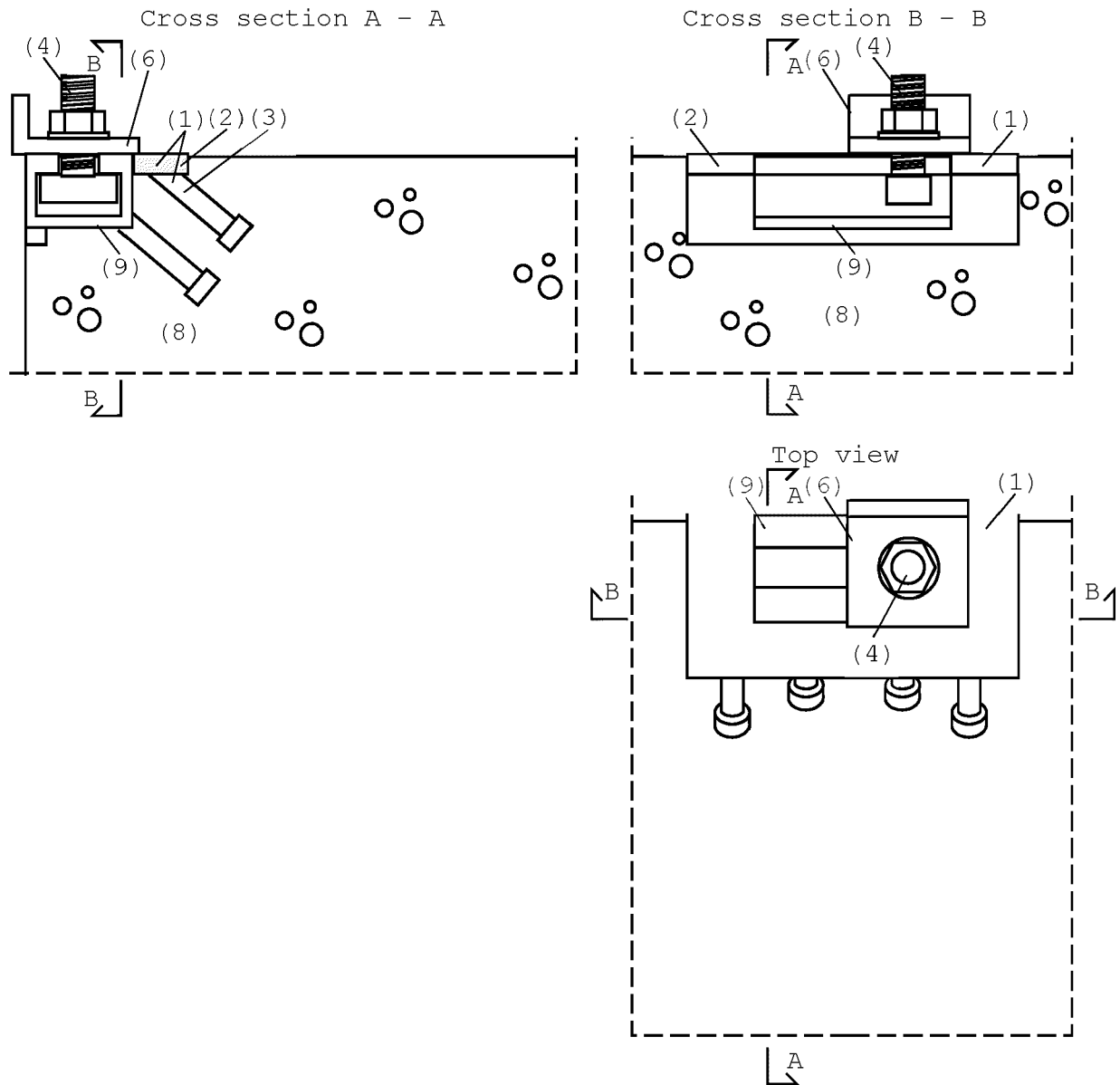


Fig. 8



EUROPEAN SEARCH REPORT

Application Number

EP 24 17 9251

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EPO FORM 1503 03.82 (P04C01)

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	US 5 548 939 A (CARMICAL CLIFTON [US]) 27 August 1996 (1996-08-27) * column 2, line 45 - column 4, line 16; figures 1, 2, 5, 6, 17, 18 * -----	1-15	INV. E04B1/41
X	DE 196 23 273 A1 (KAHNEISEN GES MBH DEUTSCHE [DE]) 4 December 1997 (1997-12-04) * column 2, line 4 - column 3, line 4; figure 2 * -----	3,10-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 October 2024	Examiner Galanti, Flavio
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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5 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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10 - 10 - 2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5548939 A	27-08-1996	NONE	
DE 19623273 A1	04-12-1997	NONE	

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