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(54) Device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building

(57) A device (1) for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments (2a, 2b) of a building, comprising a plurality of modular elements (3) made of elastically deformable material, which can be mutually associated in series and are arranged so that their lateral surfaces (4a, 4b) face the constructive segments (2a, 2b), the modular elements (3) being closed in a vise-like configuration between at least two elements for interconnection and compression, which are arranged respectively adjacent to the upper surface (15) and the lower surface (17) of the modular elements (3).

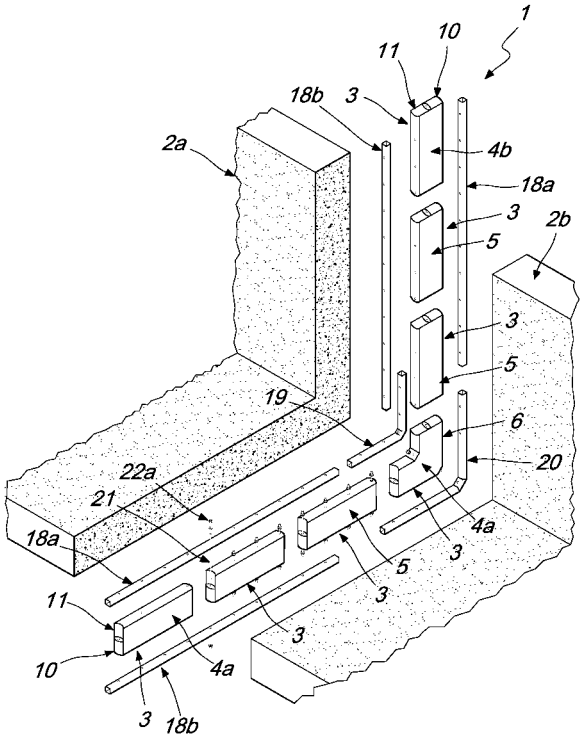

Fig. 1

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Description

[0001] The present invention relates to a device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building.

[0002] Currently it is known to construct buildings by arranging mutually side by side several construction segments, generally made of reinforced concrete, which can be prefabricated and installed after their production or can be obtained directly on site by means of concrete castings into appropriate formwork.

[0003] In order to stop infiltrations of water that tend to rise from the ground into the interspace or channel formed between each pair of contiguous segments, it is known to spread between such segments appropriate resins, which once hardened constitute a barrier to such water infiltrations.

[0004] However, these resins have a drawback; once they have hardened, they have limited mechanical strength and are therefore often subject to breakage due to the mutual movements that occur between the segments connected to them, which are caused for example by the different thermal expansions to which such segments are subjected, or to ground settling movements.

[0005] Further, since such resins can be used only if the two segments are very close to each other, they cannot be used to provide earthquake-resistant buildings; earthquake-proofing standards, in order to prevent, in case of earthquake, the phenomenon of hammering between two contiguous constructive segments, in fact set high values for the minimum allowed distance between them, which therefore do not allow the use of such known types of resin.

[0006] In the case of segments obtained directly on site, in order to limit water infiltrations it is also known to arrange, transversely to the interspace or channel formed between two contiguous segments, metal plates or strips made of PVC (Poly Vinyl Chloride) that have a generally approximately rectangular plan shape and are embedded, with their longitudinal ends, in the two segments when they are built, so as to connect them and thus constitute a barrier to water infiltrations.

[0007] These known types of plate and strip, however, have a drawback; particularly the metallic ones, but also the ones made of PVC, may in fact be deformed elastically only by a limited extent and therefore are not capable of following the large dimensional variations of the channel formed between the two segments and caused for example by the different thermal expansions thereof or by any movements of the ground; due to these dimensional variations, the plates and strips may therefore easily crack and/or break, thus allowing the passage of water.

[0008] As a partial solution to this drawback, strips made of plastic material are known whose central region has a tubular or bulb-like shape in order to facilitate the elastic deformations of such strip in the direction of the axis that connects the two segments; during the mutual movements of the two constructive segments connected by the strip, the central region of such strip can thus be deformed elastically even by a large extent, and can therefore follow, without the risk of breaking, the dimensional variations of the channel formed between such segments.

[0009] Both this second type of strip and the ones described earlier, however, have a drawback: fixing to the segments, which occurs on site during concrete casting, requires appropriately provided molds whose application is awkward and requires a long execution time.

[0010] Further, these known types of solution do not lend themselves to be used if the segments are prefabricated, since the strips cannot be fixed to them.

[0011] Moreover, in order to fully close the channel formed between two segments it is often necessary to mutually connect a plurality of strips that are longitudinally aligned to each other; connection between two contiguous strips occurs by mutually welding, for example by blowing air at high temperature or by means of an appropriately provided welding plate, two transverse ends of the two strips, and this is awkward and dangerous and requires a long time and a certain skill on the part of the installation technician. Moreover, this welding cannot be performed in the presence of water in the channel formed between the two constructive segments.

[0012] Further, depending on the distance of the segments to be connected, on the pressure of the water to which they are subjected and on the extent of the mutual movements provided for them, it may be necessary to use strips having different shapes and dimensions; it is therefore necessary to have available a wide range of strips of different shapes and dimensions, and this has a negative effect on costs for their production, storage and transport.

[0013] The aim of the present invention is to solve the above noted technical problems, eliminating the drawbacks of the cited background art, by providing a device that allows to prevent infiltrations of water in the interspace or channel formed between two contiguous constructive segments of a building.

[0014] Within this aim, an object of the invention is to ensure the seal between two contiguous constructive segments even in case of slight variations in their mutual distance.

[0015] Another object of the invention is to provide a device which can be applied both to prefabricated segments and to segments provided directly on site.

[0016] Another object of the invention is to provide a device which can be installed on site easily and quickly and without risks for the safety of the installation technician.

[0017] Another object of the invention is to provide a device which can be installed even in the presence of water in the interspace or channel formed between the two constructive segments.

[0018] Another object of the invention is to provide a device which can be used independently of the distance

of the segments to be connected, of the pressure of the water to which they are subjected, and of the extent of the mutual movements to which they will be subj ected.

[0019] Another object of the invention is to provide a device that is structurally simple and has low manufacturing costs.

[0020] This aim and these and other objects, which will become better apparent hereinafter, are achieved by a device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building, characterized in that it comprises a plurality of modular elements made of elastically deformable material, which can be mutually associated in series and are arranged so that their lateral surfaces face said constructive segments, said modular elements being closed in a vise-like configuration between at least two elements for interconnection and compression, which are arranged respectively adjacent to the upper surface and the lower surface of said modular elements.

[0021] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective exploded view of the device according to the invention before its application between two constructive segments of a building;

Figure 2 is a perspective view of one of the two constructive segments of Figure 1 with the device according to the invention applied thereto;

Figure 3 is a perspective view of a first embodiment of modular element of the device according to the invention;

Figure 4 is a perspective view of a second embodiment of the modular element;

Figure 5 is a perspective view of an angular modular element of the device according to the invention;

Figure 6 is a sectional view, taken along a longitudinal central sectional plane, of the device according to the invention before its assembly;

Figure 7 is an enlarged-scale view of a detail of Figure 6, illustrating two modular elements of the device according to the invention just prior to their connection;

Figure 8 is a view, similar to the preceding one, of two modular elements of the device according to the invention in the assembled configuration;

Figures 9, 10 and 11 are views, taken along a transverse plane, of three steps of the application of the device of Figure 1 between two prefabricated constructive segments of a building;

Figures 12, 13 and 14 are views, taken along a transverse plane, of three steps of the installation of the second embodiment of the device shown in Figure 4;

Figure 15 is a perspective view of another embodiment of two modular elements of the device according to the invention prior to their mutual connection.

[0022] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0023] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0024] With reference to the figures, the reference numeral 1 designates a device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments 2a, 2b of a building.

[0025] The device 1 comprises a plurality of modular elements 3 made of elastically deformable material, which can be mutually associated in series with respect to each other and are arranged so that their lateral surfaces 4a and 4b face the constructive segments 2a and 2b.

[0026] Advantageously, the modular elements 3 can be made of natural rubber or synthetic rubber, such as for example the material known by the acronym PVC (Poly Vinyl Chloride) or the material known by the acronym EPDM (Ethylene Propylene Diene Monomer), or polyurethane, molded or poured.

[0027] A first embodiment of modular element 3, illustrated for example in Figure 3, is constituted by a first block 5, which is substantially shaped like a parallelepiped and can be interposed between two constructive segments 2a and 2b in their straight portions.

[0028] An angular modular element 3, illustrated for example in Figure 5, is constituted by a second block 6, which in a side view is approximately L-shaped, preferably with an outer vertex 7a and an inner vertex 7b which are rounded, and can be interposed between two constructive segments 2a and 2b at the 90° bends of their perimetric edge.

[0029] The modular elements 3 can in any case have, in a side view, the desired shape, for example a curved shape, so as to adapt to the specific profile of the constructive segments 2a, 2b to be connected.

[0030] In a second embodiment, illustrated for example in Figures 4, 12, 13 and 14, which can be used if the two constructive segments 2a and 2b are provided directly on site by casting concrete, appropriately provided protrusions 8 protrude from the lateral surfaces 4a and 4b of the modular elements 3, preferably have an approximately T-shaped transverse cross-section and can be embedded in the constructive segments 2a and 2b during concrete casting in order to couple the modular elements 3 to the segments 2a and 2b and facilitate the installation of the device 1.

[0031] The protrusions 8 can be provided monolithically with the respective modular element 3, or can be associated with the latter by means of appropriately provided fixing means, such as for example appropriately provided adhesives, or by interlocking.

[0032] The modular elements 3 have, at a first end 9a

thereof, one or more first teeth 10 and/or one or more first seats 11, which can be associated respectively with a corresponding number of complementarily shaped second seats 12 and/or second teeth 13, provided at a second end 9b of one separate modular element 3.

[0033] In the embodiment shown in the accompanying figures, the modular elements 3 have, at and along part of the first end 9a, a first tooth 10, which is followed axially by a complementarily shaped first seat 11.

[0034] A first recess 14 is thus provided which forms the first seat 11, which has a preferably approximately elliptical plan shape and is obtained starting from an upper surface 15 of the modular element 3 and affects it along approximately half of its height.

[0035] Advantageously, as shown for example in Figure 15, the first recess 14, and therefore the first seat 11 and the first tooth 10 formed by them, can have a substantially rectangular or square plan shape.

[0036] At the second end 9b of the modular elements 3 there is instead a second recess 16, which is similar to the first recess 14 and forms a second seat 12, which is shaped complementarily to the first tooth 10, and a second tooth 13, which is shaped complementarily to the first seat 11.

[0037] As shown for example in Figures 2, 7 and 8, the various modular elements 3 can be connected axially in series to each other by arranging the first tooth 10 and the contiguous first seat 11 of one modular element 3 respectively in engagement with the second seat 12 and the adjacent second tooth 13 of one distinct and contiguous modular element 3.

[0038] The engagement of the first and second teeth 10 and 13 respectively in the first and second seats 11 and 12 increases the length and the tortuousness of the contact surface between two contiguous modular elements 3, making any infiltration of water in the interspace between the two constructive segments 2a and 2b, through such contact surface, more difficult.

[0039] Further, the mutual engagement of the first and second teeth 10 and 13 respectively in the first and second seats 11 and 12 allows to connect in series to each other two modular elements 3, arranging them so that their longitudinal axes are both mutually aligned, as shown for example in Figures 1 and 2, and mutually inclined, as shown for example in Figure 15, maintaining the continuity of the connection between the modular elements 3; in this manner it is thus possible to use the device 1 according to the invention to provide the interconnection and hydraulic seal between two constructive segments 2a and 2b, whose mutually facing perimetric edges have, in plan view, a desired profile.

[0040] Each pair of the mutually contiguous modular elements 3 is interposed between at least two interconnection and compression elements, which are arranged respectively adjacent to the upper surface 15 and a lower surface 17 of the modular elements 3.

[0041] In the embodiment shown in the accompanying figures, the interconnection and compression elements comprise two first profiles 18a, 18b, which are substantially mutually identical; the first profiles 18a and 18b are advantageously approximately rectilinear, have a preferably approximately square transverse cross-section and are narrower than the first blocks 5.

[0042] As an alternative, the first profiles 18a, 18b can have a desired shape in plan view, so as to be able to mutually connect in series the modular elements 3 according to a desired arrangement in plan view; for example, Figure 15 illustrates the case in which the first profiles 18a and 18b have a substantially L-shaped plan configuration, so as to be able to mutually connect two modular elements 3 that are arranged, in plan view, approximately at right angles to each other.

[0043] Advantageously, such interconnection and compression elements further comprise a second profile 19, which is approximately L-shaped in a side view, with a rounded wing connection region, and is at least partially shaped complementarily with respect to the upper surface 15 of the second blocks 6, so that it can be positioned adjacent to it during use.

[0044] Conveniently, the interconnection and compression elements further comprise a third profile 20, which is approximately L-shaped in a side view with a rounded wing connection region, and is at least partially shaped complementarily with respect to the lower surface 17 of the second blocks 6, so that during use it can be arranged adjacent thereto.

[0045] Advantageously, once they have been associated with the upper surface 15 and with the lower surface 17 of a second block 6, the second profile 19 and the third profile 20 protrude, with their free ends, approximately at right angles from the first end 9a and from the second end 9b of the second block 6, so that they can be arranged adjacent to the upper surface 15 or lower surface 17 of two additional first blocks 5, which are axially associated in series respectively with the first and second ends 9a and 9b of the second block 6.

[0046] Advantageously, the mutual distance of such interconnection and compression elements can be modified selectively by way of appropriately provided adjustment means, so as to reduce or increase elastically the height of the modular elements 3 and accordingly respectively increase or reduce elastically their width, so as to adjust the pressure of the lateral surfaces 4a and 4b thereof against the constructive segments 2a and 2b.

[0047] Advantageously, such adjustment means are constituted by tension elements 21, with appropriately threaded ends 21a, 21b of which it is possible to associate respectively two nuts 22a, 22b, with the optional interposition of appropriately provided washers 23a, 23b; the tension elements 21 can be inserted in appropriately provided first holes 24, which are formed transversely to the first, second and third profiles, and in facing second holes 25, which are provided axially with respect to the modular elements 3.

[0048] Advantageously, at least two second holes 25 are formed respectively axially with respect to the first

tooth 10 and the second tooth 13, in such a position that they face each other once two modular elements 3 are associated.

[0049] Advantageously, at least one second hole 25 is formed at the inner vertex 7b and at the outer vertex 7a of the second block 6.

[0050] Use of the invention is therefore as follows.

[0051] With reference to Figures 1, 2, 6, 7, 8, 9, 10 and 11, the device 1 can be used to mutually connect two prefabricated constructive segments 2a and 2b.

[0052] A plurality of modular elements 3 can be arranged in series to each other so as to follow the mutually facing perimetric edges of the two constructive segments 2a and 2b, and can thus be mutually connected by means of the interconnection and compression elements.

[0053] As shown in Figure 11, by screwing the nuts 22a and 22b associated with the tension elements 21 so as to make them advance toward each other, the interconnection and compression elements are moved mutually closer, compressing the modular elements 3, which thus reduce their height.

[0054] The compression of the modular elements 3 also causes their simultaneous widening in the direction of the axis that connects the two constructive segments 2a and 2b, so that the lateral surfaces 4a and 4b of the modular elements 3 abut against the mutually facing surfaces of the segments 2a and 2b, coupling by friction to them.

[0055] The compression of the modular elements 3 further causes their simultaneous elongation in a longitudinal direction, thus increasing the fastening between two contiguous modular elements 3.

[0056] By acting on the nuts 22a and 22b it is thus possible to widen the modular elements 3 by the chosen extent, so as to obtain the desired contact pressure and therefore the desired hydraulic seal between the lateral surfaces 4a and 4b thereof and the mutually facing surfaces of the constructive segments 2a and 2b.

[0057] In the case shown in Figures 12, 13 and 14, in which the two constructive segments 2a and 2b are provided directly on site by casting concrete into appropriately provided formwork, it is possible to use modular elements 3 provided with the protrusions 8, which are embedded in the two constructive segments 2a and 2b, during the production of the segments 2a and 2b.

[0058] Once the two constructive segments 2a and 2b have hardened, the modular elements 3, fixed to them by way of the protrusions 8, can be compressed, by means of the interconnection and compression elements, until the desired contact pressure is achieved between the lateral surfaces 4a and 4b thereof and the mutually facing surfaces of the constructive segments 2a and 2b.

[0059] In both of the cases described above, the contact pressure is adjusted so that the modular elements 3, after their installation, are compressed elastically in the direction of the line that connects the two constructive segments 2a and 2b, so that if the distance between the segments increases, for example due to thermal expansions or ground movements, the modular elements 3 expand laterally, remaining in contact with the constructive segments 2a and 2b and thus ensuring that the hydraulic seal is maintained.

[0060] It has thus been found that the invention has achieved the proposed aim and objects, a device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building, having been provided which is capable of preventing effectively water infiltrations into the interspace or channel formed between the constructive segments.

[0061] Further, by way of the possibility to adjust the width of the modular elements, and consequently the contact pressure between the lateral surfaces thereof and the constructive segments, it is possible to use effectively a same modular element for a wide range of different situations, characterized by different mutual distances of the constructive segments, different water pressures and different extent of the mutual movements to which the segments will be subjected; it is thus possible to reduce the types of modular element that are produced and therefore their storage and transport costs.

[0062] Moreover, the device according to the invention allows to calibrate even locally the pressure on the segments, so as to adjust the hydraulic seal as a function for example of the depth of use.

[0063] Moreover, the device according to the invention can be disassembled and/or adjusted even after its installation on site, thus allowing easy maintenance thereof and allowing the possibility to modify the contact pressure at a chosen time depending for example on any variations in the environmental conditions.

[0064] Further, the connection among the various modular elements can be provided easily and quickly by way of the interconnection and compression elements and therefore does not require the use of tools with hot parts, which therefore are potentially dangerous for the user, as instead occurs for strips of plastic material of the known type; this increases speed and convenience in installation, reduces the risk of injury to the installation technician, and further allows installation even in the presence of water in the interspace formed between the two constructive segments.

[0065] The installation of the device according to the invention in fact occurs without using complex or specific equipment, since ordinary box wrenches are sufficient to tighten the nuts associated with the tension elements.

[0066] The device according to the invention further allows to provide directly on site any form and length of the seal, both in a horizontal direction and in a vertical direction, without the need for external prefabrication and by using a limited variety of modular elements.

[0067] Further, by adjusting appropriately the compression of the modular elements, the hydraulic seal between them and the two constructive segments can be achieved independently of the material of which the segments are made; this allows to use the device according

to the invention also in combination with constructive segments made of materials other than reinforced concrete, such as for example steel.

[0068] Further, the modular components, by way of their limited dimensions, can be transported and installed easily even in tight spaces that are difficult to reach.

[0069] Further, the device according to the invention, being constituted by modular elements that can be mutually associated in the desired manner, adapts without problems to any mismatches between the design and the real building.

[0070] Further, the hydraulic seal is achieved independently of the length of the channel formed between the two constructive segments.

[0071] Further, the production costs of the device according to the invention remain modest, since the device is provided only by means of components that are easy to manufacture and/or assemble.

[0072] The invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0073] Thus, for example, in an embodiment not shown in the accompanying figures, the second profile 19 and the third profile 20 can be shorter respectively than the upper surface 15 and lower surface 17 of the second block 6, so that they can be associated with the latter only respectively at the inner vertex 7b and at the outer vertex 7a thereof, without protruding from the first or second end of the second block 6.

[0074] Further, the modular elements 3 and the interconnection and compression elements can have the desired plan shape, so as to allow to connect them in series according to the desired plan configuration.

[0075] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be more pertinent according to the specific requirements.

[0076] The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including ones that are not illustrated.

[0077] The characteristics indicated as advantageous, convenient or the like may also be omitted or be replaced with equivalents.

[0078] The disclosures in Italian Patent Application No. VE2008A000006 from which this application claims priority are incorporated herein by reference.

[0079] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building, **characterized in that** it comprises a plurality of modular elements made of elastically deformable material, which can be mutually associated in series and are arranged so that their lateral surfaces face said constructive segments, said modular elements being closed in a vise-like configuration between at least two elements for interconnection and compression, which are arranged respectively adjacent to the upper surface and the lower surface of said modular elements.

2. A device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building, **characterized in that** it comprises a plurality of modular elements made of elastically deformable material, which can be mutually associated in series and are arranged so that their lateral surfaces face said constructive segments, said modular elements being closed in a vise-like configuration between at least two elements for interconnection and compression, which are arranged respectively adjacent to the upper surface and the lower surface of said modular elements, said modular elements having, at a first end thereof, one or more first teeth and/or one or more first seats that can be associated respectively with a corresponding number of complementarily shaped second seats and/or second teeth provided at a second end of a distinct modular element.

3. A device for providing a hydraulic seal and interconnection, particularly for two contiguous constructive segments of a building, **characterized in that** it comprises a plurality of modular elements made of elastically deformable material, which can be mutually associated in series and are arranged so that their lateral surfaces face said constructive segments, said modular elements being closed in a vise-like configuration between at least two elements for interconnection and compression, which are arranged respectively adjacent to the upper surface and the lower surface of said modular elements, said modular elements having, at a first end thereof, one or more first teeth and/or one or more first seats that can be associated respectively with a corresponding number of complementarily shaped second seats and/or second teeth provided at a second end of a distinct modular element, the mutual distance of said interconnection and compression elements being selectively modifiable, by way of appropriately provided adjustment means, so as to reduce or increase elastically the height of said modular elements and consequently respectively increase or reduce elastically their width, so as to adjust the contact pressure

between said lateral surfaces thereof and said constructive segments.

4. The device according to one or more of the preceding claims, **characterized in that** said modular elements are made of elastically deformable plastic material.

5. The device according to claim 4, **characterized in that** said modular elements are made of natural rubber or synthetic rubber, preferably the material by the acronym PVC (Poly Vinyl Chloride) or the material known by the acronym EPDM (Ethylene Propylene Diene Monomer), or polyurethane, molded or poured.

6. The device according to one or more of the preceding claims, **characterized in that** said modular elements are constituted by blocks that have, in a side view, the desired shape, in order to adapt to the specific profile of said constructive segments to be connected.

7. The device according to claim 6, **characterized in that** said modular elements comprise first blocks which are substantially shaped like parallelepipeds and can be interposed between two of said constructive segments in their rectilinear portions.

8. The device according to claim 6, **characterized in that** said modular elements comprise second blocks which have, in a side view, an approximately L-shaped configuration, preferably with rounded inner and outer vertices, which can be interposed between two of said constructive segments at the 90° curves of their perimetric edge.

9. The device according to one or more of the preceding claims, **characterized in that** protrusions protrude from the lateral surfaces of said modular elements, preferably have an approximately T-shaped transverse cross-section and can be embedded in said constructive segments during their production in order to couple said modular elements to them.

10. The device according to claim 9, **characterized in that** said protrusions are made are provided monolithically with said respective modular elements.

11. The device according to claim 9, **characterized in that** said protrusions are associated with said modular elements by way of appropriately provided fixing means.

12. The device according to one or more of the preceding claims, **characterized in that** said modular elements have, at and along part of said first end thereof, one of said first teeth followed axially by one of said first seats, which is shaped complementarily thereto.

13. The device according to claim 12, **characterized in that** said first seat is formed by a first recess, which has an approximately elliptical or rectangular or square plan shape and is provided starting from the upper surface of said modular element and affects it along approximately half of its height.

14. The device according to claim 13, **characterized in that** a second recess is provided at said second end of said modular elements, is similar to said first recess and forms a second seat, which is shaped complementarily to said first tooth, and a second tooth, which is shaped complementarily with respect to said first seat.

15. The device according to claim 14, **characterized in that** said modular elements can be connected axially in series to each other by arranging said first tooth and said contiguous first seat of one of said modular elements respectively in engagement with said second seat and with said adjacent second tooth of a distinct and contiguous one of said modular elements.

16. The device according to one or more of the preceding claims, **characterized in that** said interconnection and compression elements comprise two first profiles, which are substantially mutually identical, are approximately rectilinear, have a transverse cross-section that is preferably approximately square, and are narrower than said first blocks.

17. The device according to one or more of the preceding claims, **characterized in that** said interconnection and compression elements comprise two first profiles, which are substantially mutually identical and have a desired shape in plan view, so as to be able to connect in series to each other said modular elements according to a desired plan arrangement.

18. The device according to one or more of the preceding claims, **characterized in that** said interconnection and compression elements comprise a second profile, which is approximately L-shaped in a side view, with a blended wing connecting region, and is at least partially shaped complementarily with respect to said upper surface of said second blocks, so that it can be positioned adjacent thereto during use.

19. The device according to claim 18, **characterized in that** said interconnection and compression elements comprise a third profile, which is approximately L-shaped in a side view, with a blended wing connecting region, and is at least partially shaped complementarily with respect to said upper surface of

said second blocks, so that during use it can be positioned adjacent to it.

20. The device according to claim 19, **characterized in that** once they have been associated with said upper and lower surfaces of one of said second blocks, said second and third profiles protrude, with their free ends, approximately at right angles from said first and second ends of said second block, so that they can be positioned adjacent to said upper surface or said lower surface of two of said first blocks, which are axially associated in series respectively with said first and second ends of said second block.

21. The device according to claim 19, **characterized in that** said second and third profiles are shorter respectively than said upper surface and said lower surface of said second block, so that they can be associated with the latter only approximately respectively at said inner vertex and said outer vertex thereof, without protruding from the first or second end of said second block.

22. The device according to one or more of the preceding claims, **characterized in that** said adjustment means are constituted by tension elements, with the appropriately threaded ends of which it is possible to associate respectively two nuts, with the optional interposition of appropriately provided washers, said tension elements being insertable in appropriately provided first holes provided transversely to said first, second and third profiles and in facing second holes, formed axially to said modular elements.

23. The device according to claim 22, **characterized in that** at least two of said second holes are formed respectively axially to said first tooth and to said second tooth, in such a position that they face each other once two of said modular elements have been associated.

24. The device according to one or more of the preceding claims, **characterized in that** at least one of said second holes is formed at said inner and outer vertices of said second block.

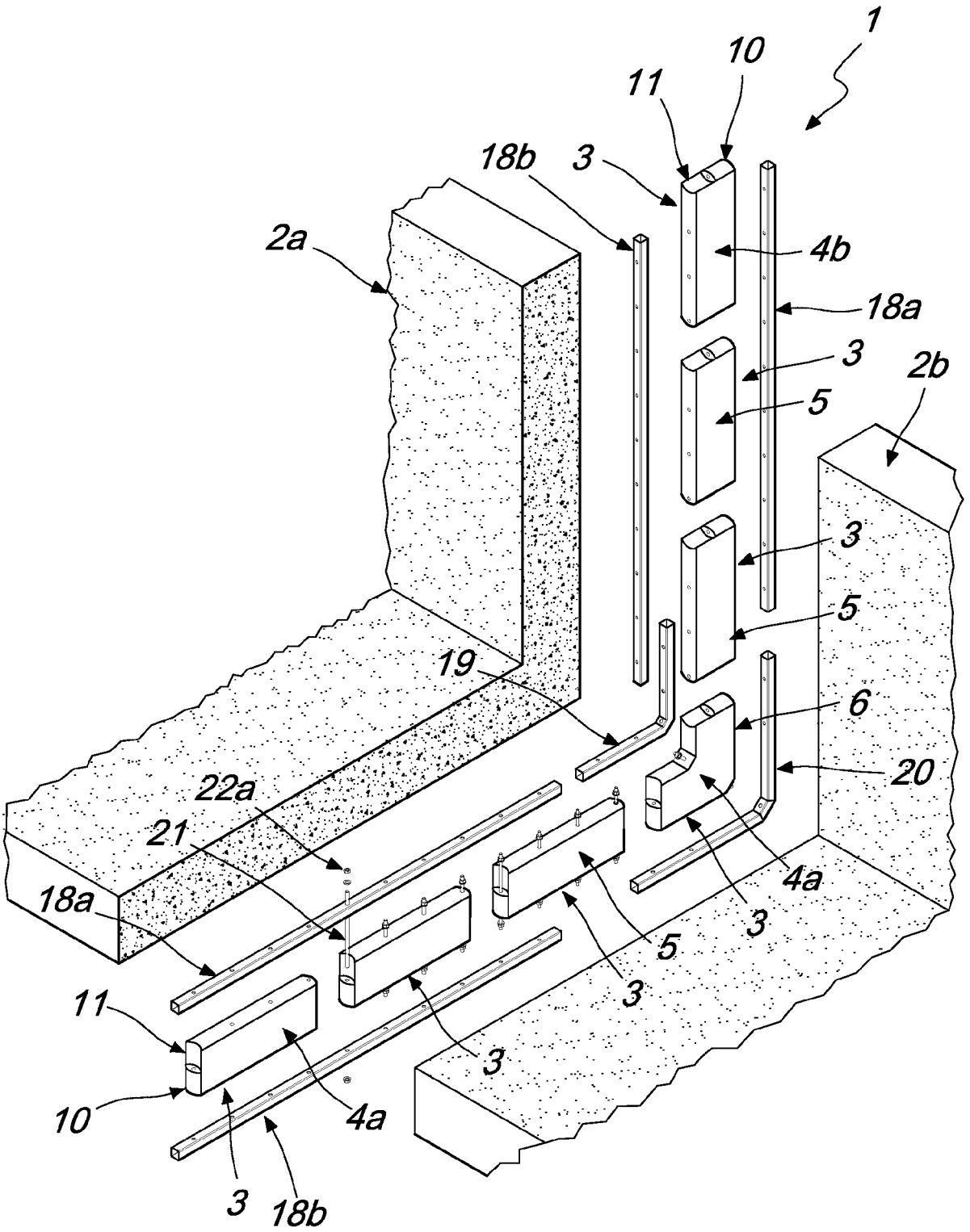
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Fig. 1

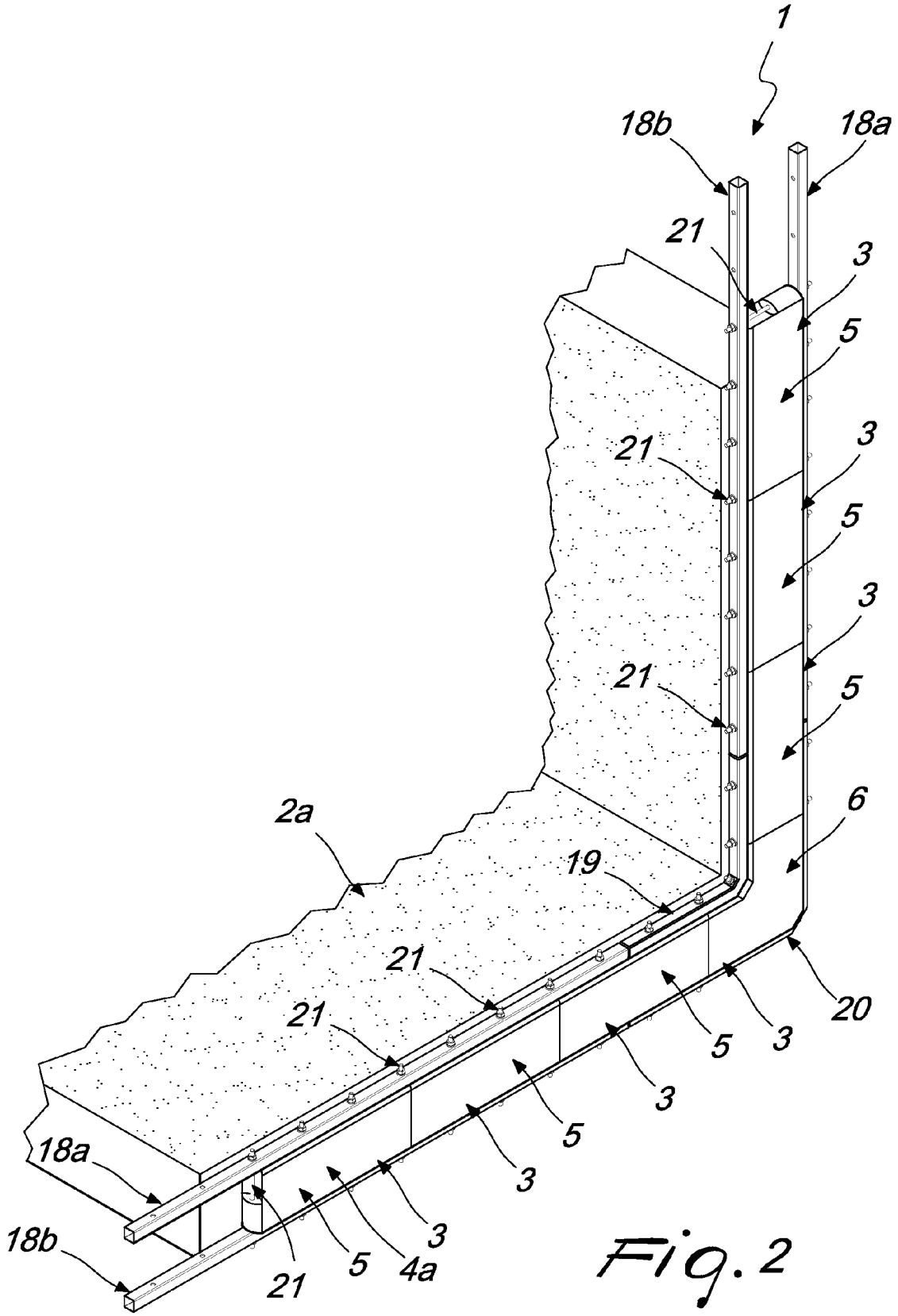
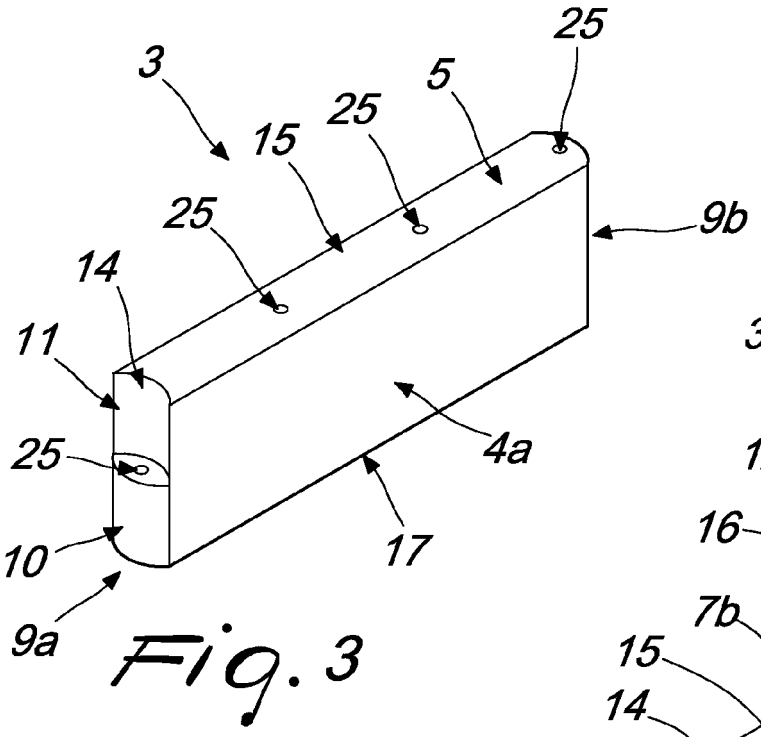


Fig. 2



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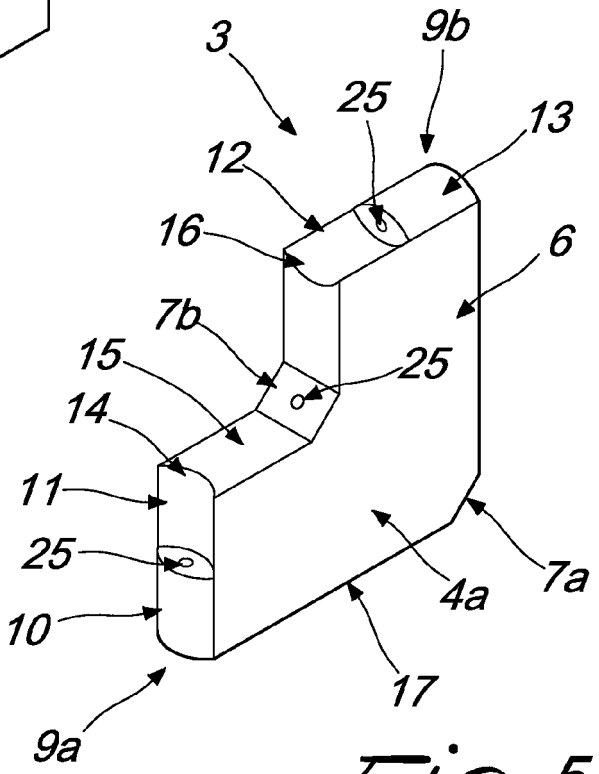
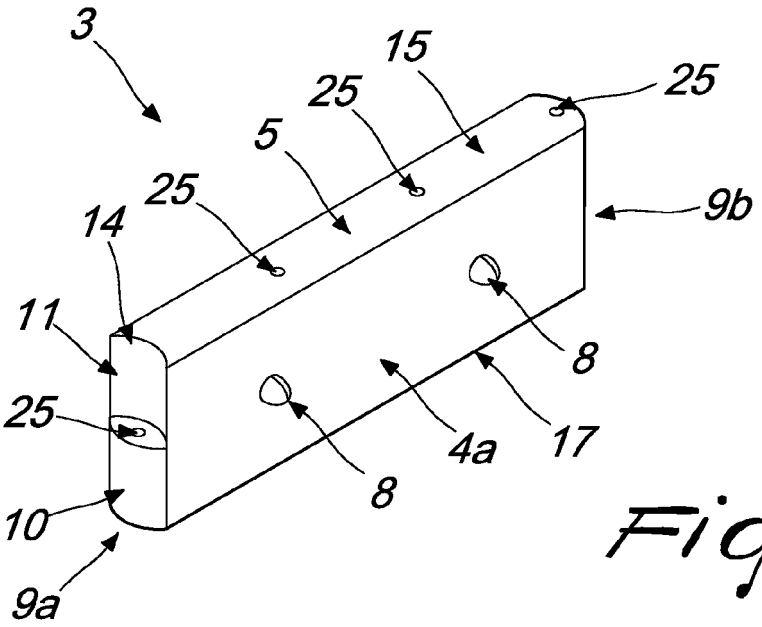


Fig. 5



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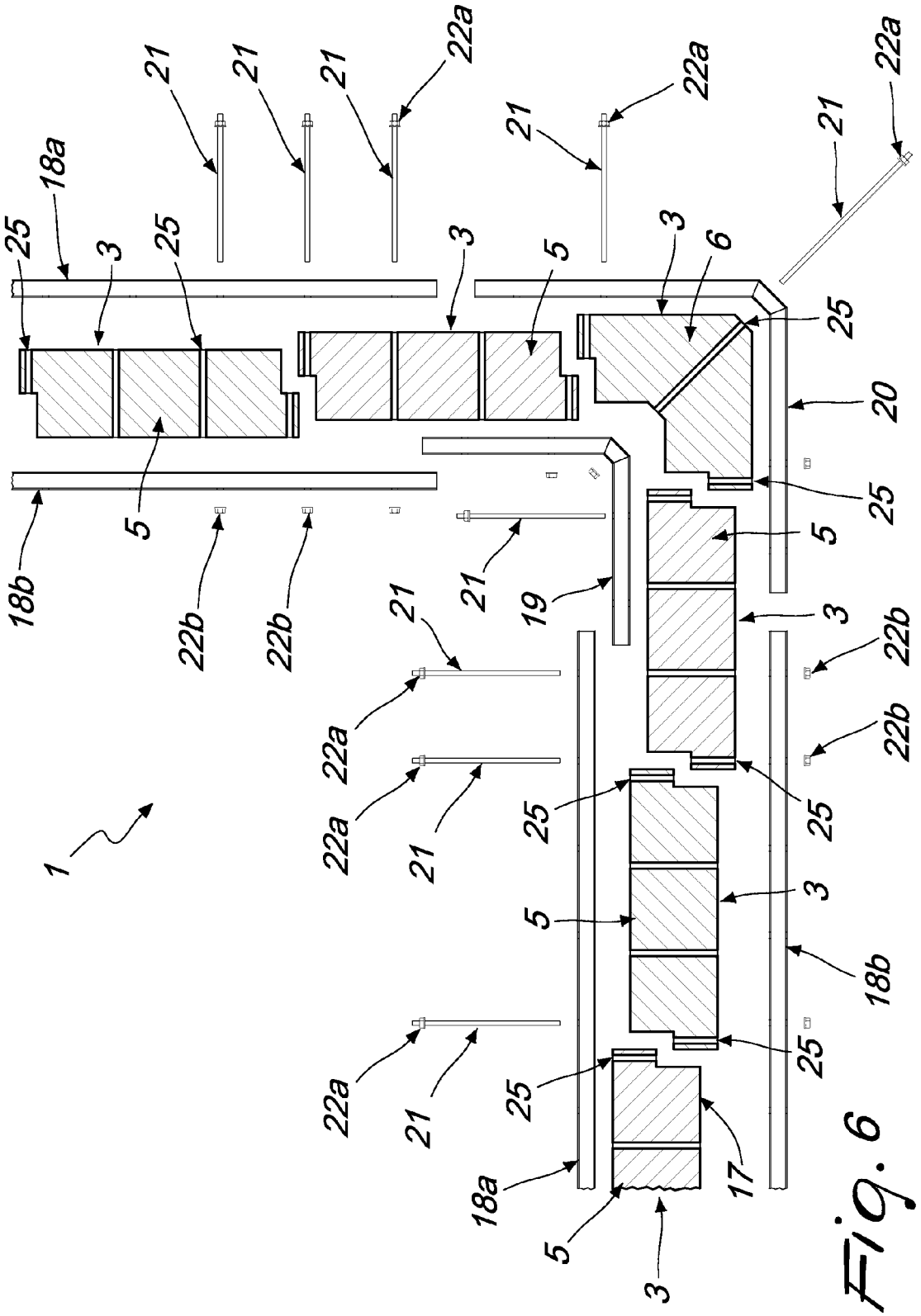

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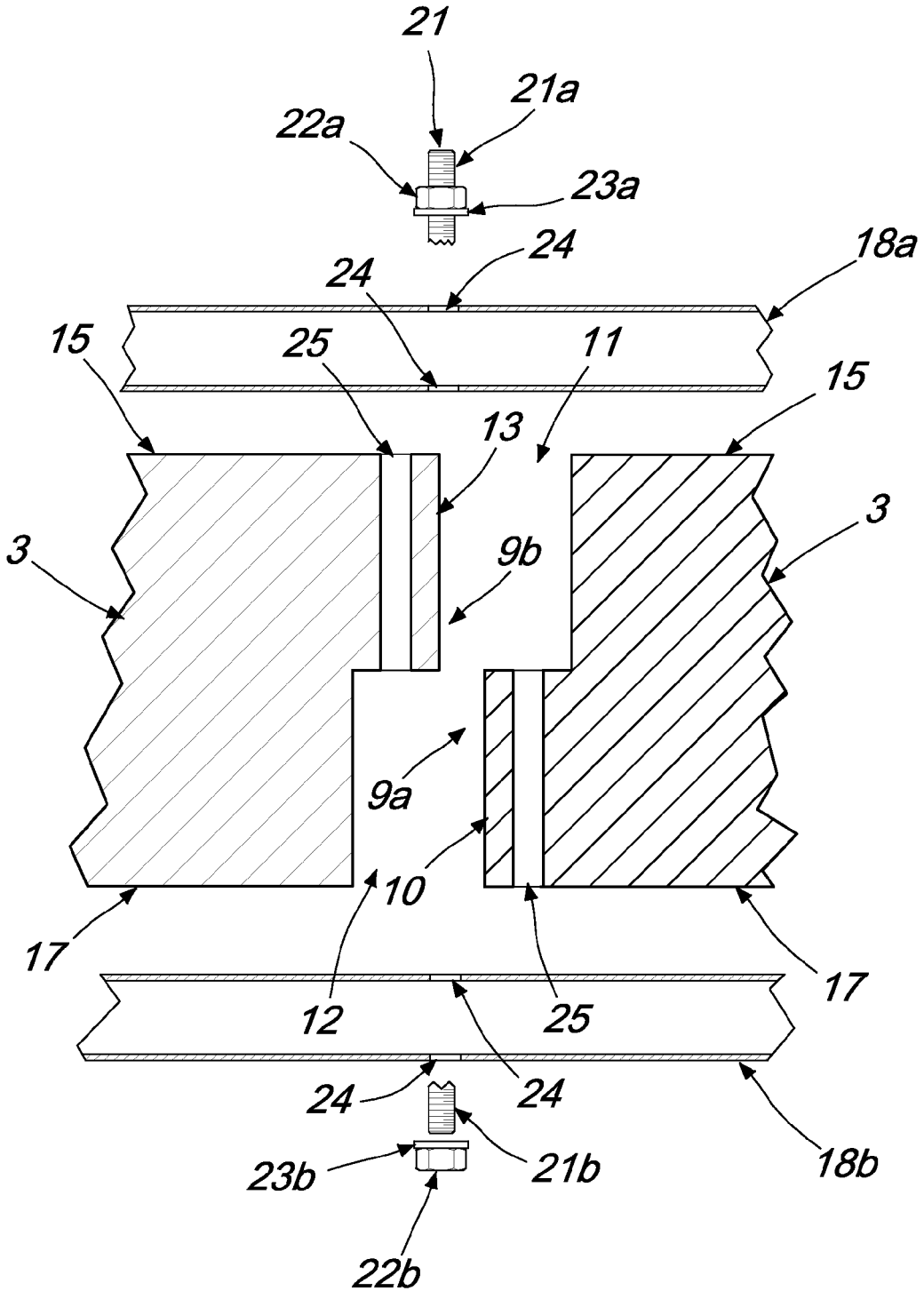
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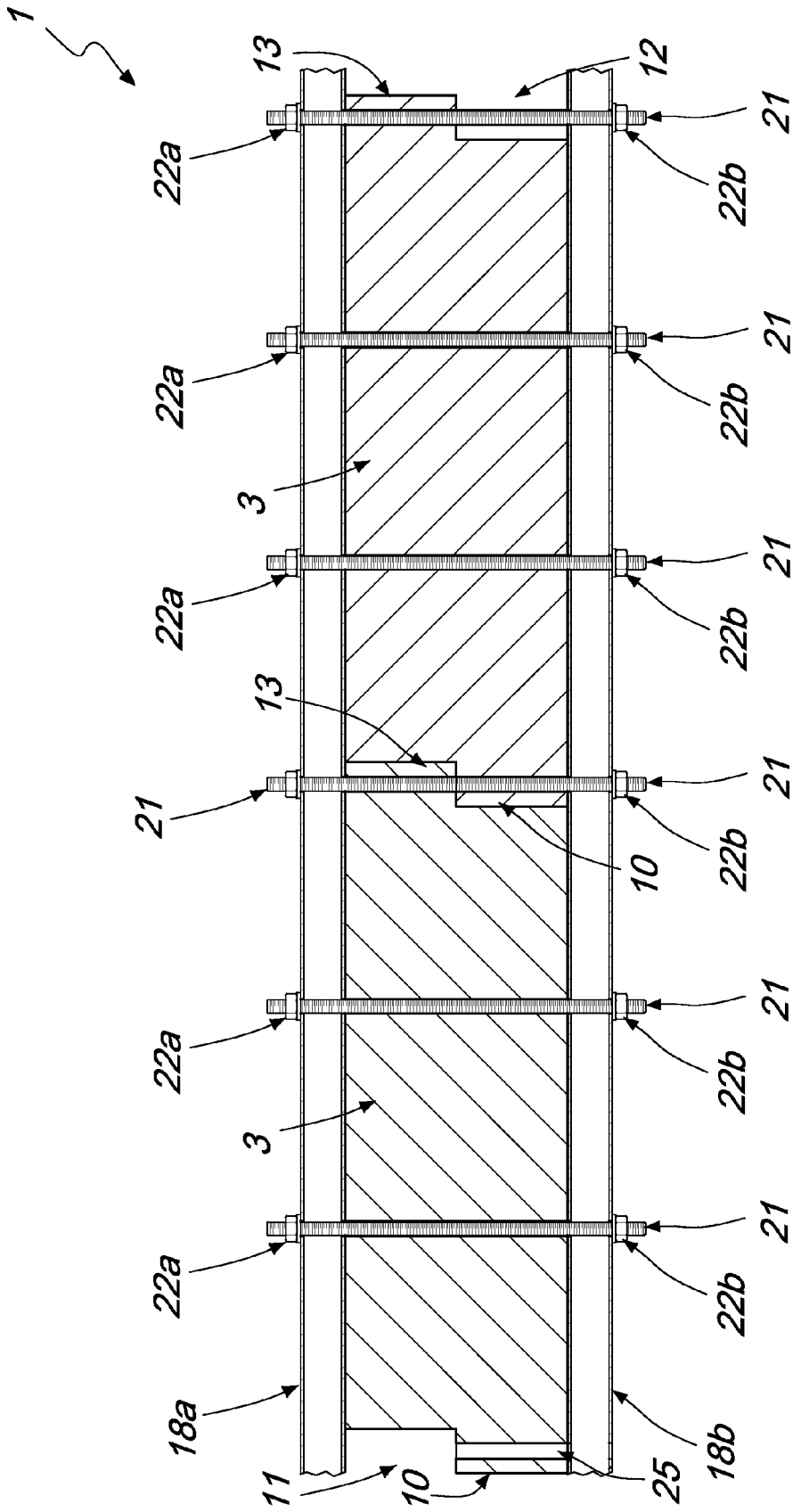
Fig. 7



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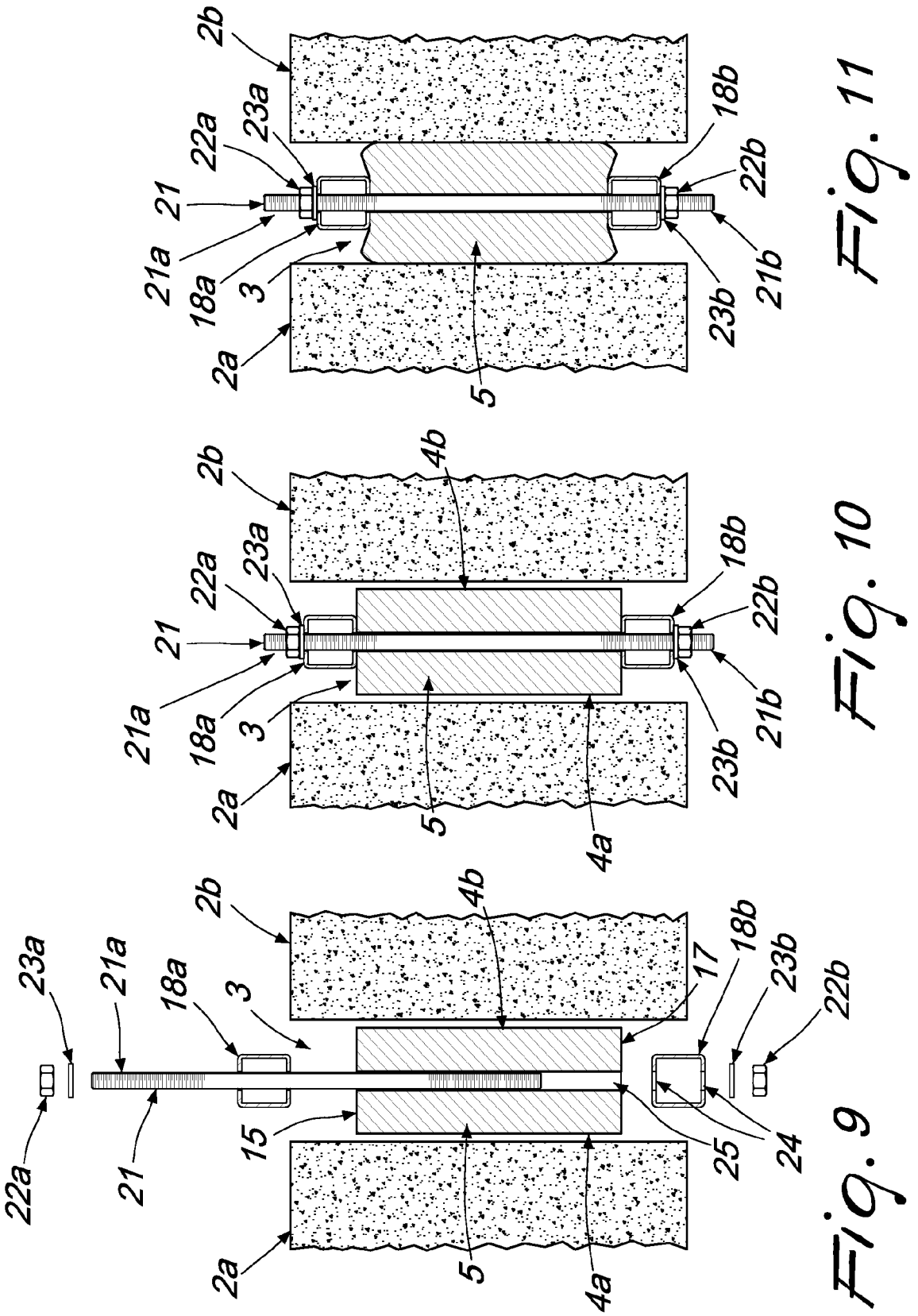

Fig. 11

Fig. 10

Fig. 9

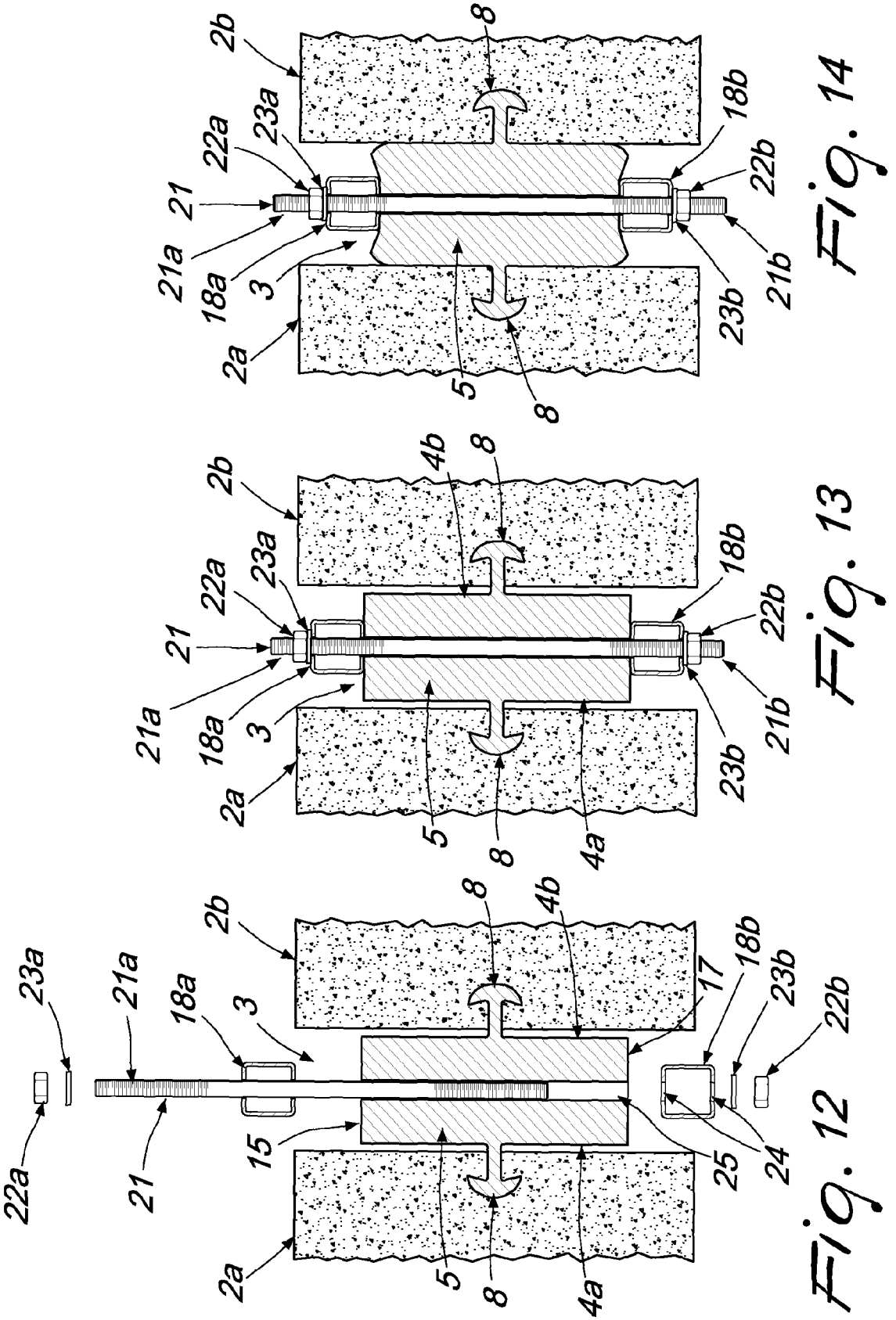

Fig. 12

Fig. 13

Fig. 14

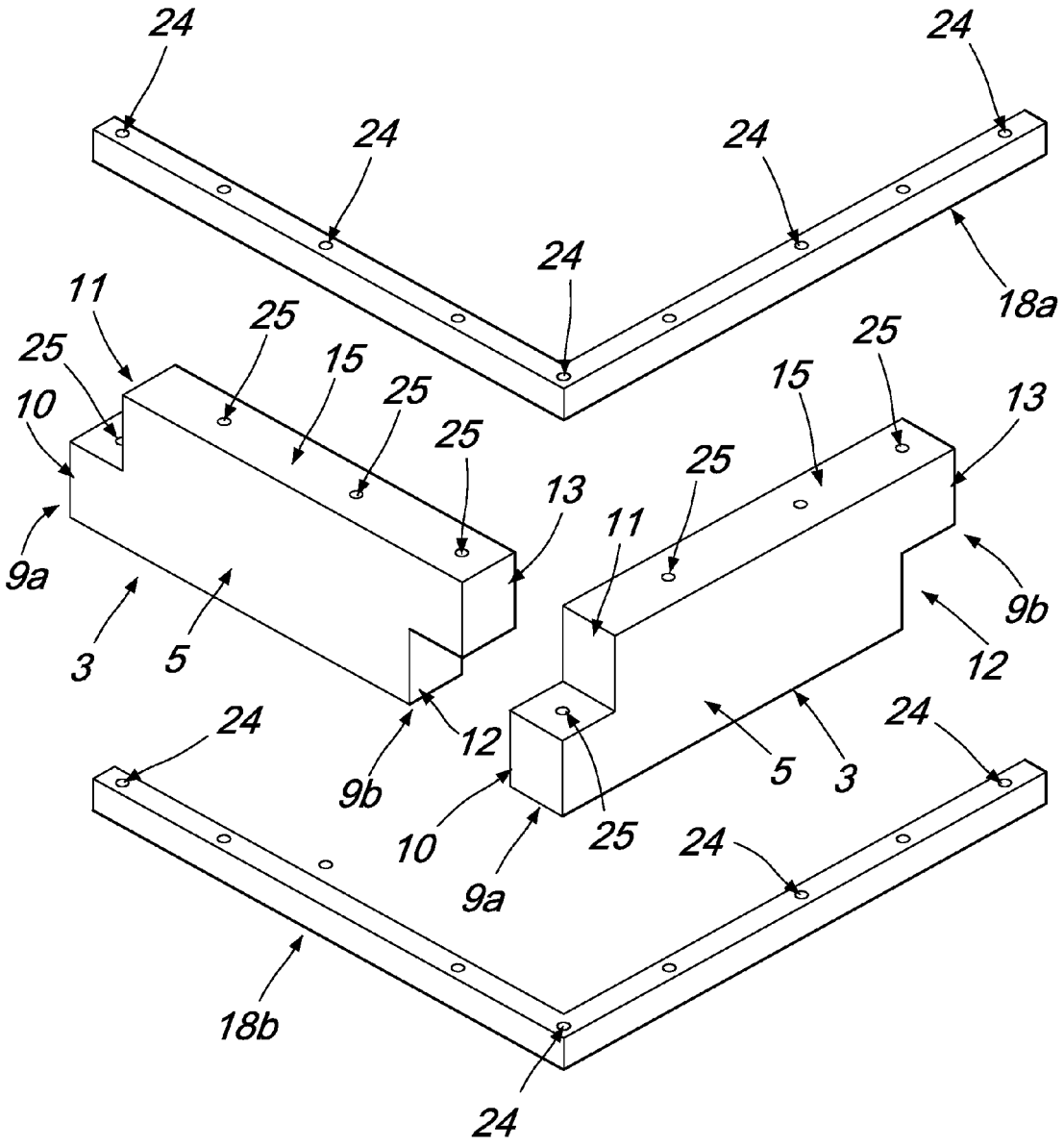
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Fig. 15

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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