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(54) **Sectional modular system for making sanitary plumbing fixtures**

(57) A sectional modular system for making sanitary plumbing fixtures comprises: one or more base components (2) which are designed to be placed in a wall in a built-in position and to be put in fluid communication with one another and/or with a water distribution line; at least one removable component (3) such as a mixer, associated in fluid communication with the base component and a support and centering structure (4) for supporting two or more base components (2); advantageously, each base component (2) comprises a body divided into a first water chamber (14) and at least four additional water chambers (15).

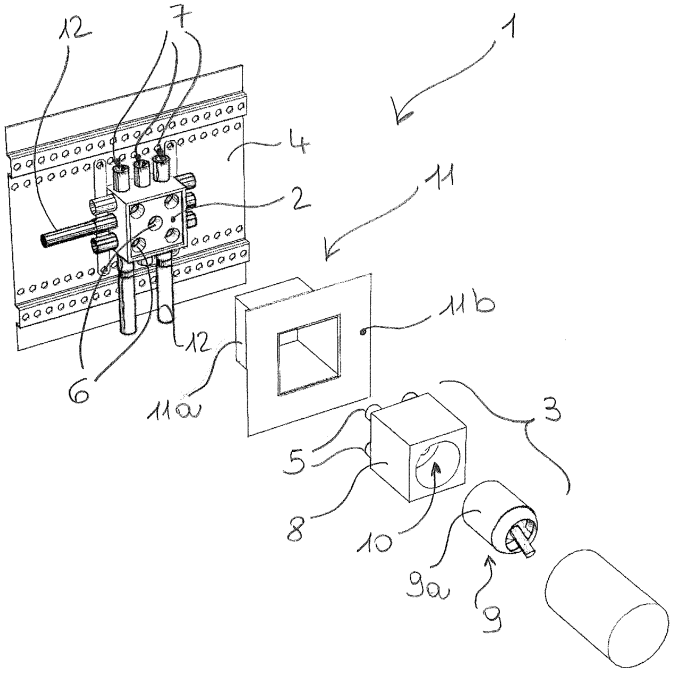

Fig. 8

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Description

[0001] The present invention relates to a sectional modular system for making sanitary plumbing fixtures according to the preamble of claim 1.

[0002] Reference will be specially made hereinafter to sanitary plumbing systems, but it shall be understood that, as used herein, the term sanitary plumbing systems will be used to designate the fixtures required to ensure feeding and proper delivery of water to a shower, a sink, a wash basin and/or other water delivery points in a bathroom, a kitchen, a laundry and the like.

[0003] In recent times, sanitary fixtures, and particularly those used in showers or tub sets, have been increasing their complexity. This is because, in addition to simple water delivery through one outlet or shower head, these fixtures may have multiple water delivery outlets (e.g. front and upper outlets or rinsing spray sets) adapted to be activated selectively and/or in various combinations.

[0004] Therefore, the presence of many plumbing components, such as mixers, multiple-way diverters, regulators, thermostatic regulators and the like has evidently caused a considerable increase of the fixtures of the water distribution network, which is generally embedded in the building frame.

[0005] In this respect, it should be noted that wall mounting of these plumbing means is somewhat troublesome, in that it requires both compliance with distances, alignments, planarities and tolerances between the various parts and the outer wall of the building frame and combined and sometimes substantially simultaneous work by a plumber, a mason and/or an electrician. This is because installation of these plumbing components requires the steps of forming special receptacles in the wall, positioning and connecting together the components and finally restoring and finishing masonry units.

[0006] It shall be further considered that, for self-evident reasons, these plumbing components shall be wall-mounted when the wall surface in which these plumbing components have to be embedded is still in the raw state, particularly when it has not been completed and finished yet. As a result, during masonry works for completing and/or lining the wall, the portion of these plumbing components that juts out of the wall stands in the way and may incur damages due to accidental impacts with tools and masonry debris or to contact with the wall finishing raw materials.

[0007] The above clearly shows that a need exists, in the field of sanitary plumbing fixtures, for plumbing components that allow easier and faster installation and more accurate positioning, and avoid the risk of damages thereto during wall finishing masonry works.

[0008] Furthermore, it shall be noted that, due to such increased complexity and figurative differentiation of sanitary plumbing fixtures, the manufacturers of such plumbing components must manufacture and keep in stock a huge number of components per collection, each with different structural and/or functional features.

[0009] Therefore, the need is strongly felt by the manufacturers of these plumbing components to minimize the number of component variants to be manufactured and kept in stock, without losing competitiveness to their customers concerning the offer of types and designs of products in the various collections in stock.

[0010] The present invention is based on the problem of providing a sectional modular system for making sanitary plumbing fixtures, that has such structural and functional characteristics as to fulfill the above needs, while obviating the above prior art drawbacks.

[0011] This problem is solved by a sectional modular system for making sanitary plumbing fixtures as defined in the features of claim 1.

[0012] The solution is to create built-in parts substantially common to various applications, i.e. designed to be prearranged for use in different modes/configurations, and to interface with external parts that, in spite of their different structural and functional characteristics, can interface in the same manner, i.e. interchangeably, with the common built-in part, thereby affording a considerable reduction of the number of components to be manufactured.

[0013] Further features and advantages of the sectional modular system for making sanitary plumbing fixtures of this invention will be apparent upon reading the following description of a few preferred embodiments thereof, which is given by way of illustration and without limitation with reference to the accompanying figures, in which:

- Figure 1 is a partially sectional perspective view of an exemplary portion of a sectional modular system of the invention;
- Figure 2 is an exploded perspective view of a base component and a removable component of the sectional modular system of the invention;
- Figures 3 and 4 are partially sectional perspective views of the base component of Figure 2;
- Figure 5 is a planar cross sectional view of the base component of Figure 2;
- Figure 6 is a planar cross sectional view of a different embodiment of a base component;
- Figure 7 is a partially sectional perspective view of an exemplary portion of a sectional modular system of the invention according to a different embodiment;
- Figure 8 is an exploded perspective view of Figure 7;
- Figure 9 shows a sectional modular system of the invention according to a possible implementation configuration.

[0014] Referring to the accompanying figures, numeral 1 generally designates a sectional modular system for making a sanitary plumbing fixture.

[0015] The sectional modular system 1 comprises:

- one or more base components 2 which are designed to be embedded in a wall 13 or alternatively mounted

to such wall in a semirecessed or external position, and to be put in fluid communication with each other and/or with a water distribution line,

- at least one removable component 3 selected from the group comprising:

  a two- or more way diverter, a mixer, a mechanical and/or motorized thermostatic mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery outlet with which a wash basin or tub spout, a shower head, a rinsing spray set may be connected, and

- a support and centering structure 4 designed to be mounted to said wall, preferably in built-in relation, as shown, for supporting two or more base components to ensure proper placement and relative position thereof,
- a support and centering structure 4 designed to be mounted to the wall 13, preferably in built-in relation, for supporting two or more base components 2 to ensure proper placement and mutual spacing thereof, as well as stability of the various components during assembly and transport.

[0016] In the sectional modular system 1:

- each removable component 3 is associated in fluid communication with a respective base component 2;
- each removable component 3 comprises a back wall 3b which faces toward the base component 2 with which it is associated;
- each removable component 3 is prearranged with rear water passages 5 at said back wall 3b;
- the base components 2 comprise a body having a front wall 2a which is designed to face toward the back wall 2b of their respective removable component 3, a back wall 2b opposite thereto, and side walls 2c;
- the body of said base component 2 is divided into a plurality of independent water chambers;
- the front wall 2a of the body of the base components 2 is prearranged with front water passages 6, which are adapted to put a respective water chamber of the base component 2 in fluid communication with a corresponding rear water passage of a removable component 3.

[0017] Therefore, in operation, the back wall 2b of the box-like body lies against the metal plate that forms the support and centering structure 4, whereas the front wall 2a of the box-like body faces toward the back wall 3a of the removable component associated with the particular external element 2.

[0018] In the illustrated embodiments, the support and centering structure 4 consists of a metal supporting plate 4 which is made of a ribbed sheet and has a plurality of holes for mounting thereof to the wall 13 and especially for allowing easy fastening of the base components 2 thereto. Otherwise, the support and centering structure 4 may be formed of a framework or other functionally similar structures.

[0019] Preferably, the support and centering structure 4 is entirely held within the thickness of the wall 13 (as shown in Figure 1), although embodiments may be also provided in which said support and centering structure is externally mounted to and may be even spaced from the wall (not shown), to accommodate piping in the space defined between said wall and the back of said support structure.

[0020] Preferably, the base components 2 are substantially identical modular elements having engagement means for fixation to said support and centering structure 4, namely said metal plate. For instance, said engagement means may consist of holes or slots formed in the box-like body and/or jutting out of it for the passage of engagement means such as screws or the like.

[0021] As mentioned above, each water chamber of the base components is prearranged to have a respective front water passage 6 at the front wall 2a and is prearranged with lateral water passages 7 at said side walls 2c of the box-like body of the base component. Preferably, the lateral water passages 7 of each base components are all coplanar.

[0022] With a base component 2 and a removable component 3 associated in fluid communication with each other, it will be understood that the front water passages 6 and the rear water passages 5 can be effectively used to put the water chambers of the base component 2 in fluid communication (as shown in the exploded view of Figure 2) with the removable component 3, which may be a two- or more way diverter, a mixer, a mechanical and/or motorized thermostatic mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery outlet with which a wash basin or tub spout, a shower head, a rinsing spray set may be connected.

[0023] It shall be noted in this respect that, according to the type of the removable component 3 associated with a particular base component 2, only one or more water chambers of the box-like body have to be put in fluid communication with the particular removable component 3.

[0024] The lateral water passages 7 in the side walls 2c of the box-like body of the base components 2 are designed to put the water chambers of a base component 2 in fluid communication:

- with water distribution lines;
- with the lateral water passages 7 of other base components 2 (see Figure 9) and/or
- with a lateral water passage 7 of a different water chamber of the same base component 2 by means of special connection pipes.

[0025] Advantageously, while the base components 2 are designed to accomplish various different mixing

and/or hydraulic connection tasks, they are conceived as pieces manufactured substantially in the same manner. This is possible because the structural characteristics of the individual base components 2, i.e. the presence of multiple independent water chambers each prearranged with a front water passage 6 and lateral water passages 7, allow them to be combined together for use in various positions of a plumbing fixture, and be associated in fluid communication with removable components 3 of different types, as well as to the water supply system or other base components 2. As mentioned above, connection to the water supply system or other identical base components 2 is established by connection pipes that engage the lateral water passages 7 of the individual water chambers of the box-like body of the base components 2.

[0026] Also as mentioned above, the rear water passages 5 of each removable component 3 are in fluid communication with a respective front water passage 6 of a water chamber of the respective base component. Preferably, this is achieved by tubular connection and sealing joints using a seal, preferably an O-ring seal. In short, such tubular joints afford connection of two parts by mutual press fitting of a tubular male part to a predetermined extent into a tubular female part, clamp screws or screw dowels being provided to secure connection of the two tubular parts.

[0027] Advantageously, each base component 2 comprises a first water chamber 14 and at least four remaining water chambers 15, each being prearranged to have at least two lateral water passages 7 at the side walls of the body of the base component 2.

[0028] The first water chamber 14 and its prearrangements for the at least two lateral water passages 7 advantageously divide the body of the base component 2 into a plurality of portions, each having at least one of said remaining water chambers 15 therein.

[0029] Preferably, the first water chamber 14 is prearranged to have at least two opposed lateral water passages 7. In the example of Figures 2 to 5, the first chamber 14 is prearranged to have two pairs of opposed lateral water passages 7, which divide the body of their respective base component 2 into four quadrants, each accommodating one of said four remaining water chambers 15.

[0030] As shown in Figure 5, the first water chamber 14 is located in the central region of the box-like body, which has a substantially four-sided, preferably square, parallelepipedal shape in this example, and the four lateral water passages 7, orthogonally extend in a cross arrangement from said first chamber to overreach the side walls at their center line. Therefore, the first water chamber 14 has a central position relative to the remaining water chambers 15.

[0031] Preferably, said remaining water chambers 15 are prearranged to have two orthogonal lateral water passages each.

[0032] Preferably, both the first water chamber 14 and each of the remaining water chambers 15 are prearranged to have a rear water passage 16 at the back wall 2b of the body of their respective base component 2. These rear passages may be conveniently used to establish a fluid communication with the water chambers 14 and 15 if the base component is mounted to the wall in a semirecessed position or even located external thereto.

[0033] It shall be noted that not all the water passages of the chambers 14 and 15 need to be used, and hence each base component 2 may be conveniently manufactured with said water passages sealed by removable or pierceable diaphragms o by closure plugs. As needed, if a particular water passage has to be used for access to a respective water chamber, what is simply needed is to pierce the diaphragm that obstructs such water passage, or remove the diaphragm or the closure plug. Conversely, the irrelevant water passages may be left closed as they are of no hindrance.

[0034] Figure 6 is a cross sectional view of a base component 2 according to a different embodiment. Particularly, in this embodiment, there are eight remaining water chambers 15, which are located in pairs at each of the four quadrants.

[0035] Concerning the removable components 3, it shall be noted that, in a preferred and advantageous embodiment, each of them is defined by two parts joined together by a watertight mating form fit.

[0036] Namely, each removable component 3 comprises a rear body 8 and a front body 9, which are sealingly joined together by a mating form fit.

[0037] The rear body 8 of the removable component 3:

- comprises said back wall 3a having rear water passages 5 and
- comprises a front housing 10 which receives an end portion 9a of the front body.

[0038] The front body 9 of the removable component 3 is a component selected from the group comprising: a two- or more way diverter, a mixer, a mechanical and/or motorized thermostatic mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery outlet with which a wash basin or tub spout, a shower head, a rinsing spray set may be connected, and has said end portion 9a of such a shape and size as to sealingly and matingly fit in said front housing 10 of the rear body 8.

[0039] It should be noted that said end portion 9a of the front body 9 has channels for establishing fluid communication between said rear water passages 5 of the rear body 8 and the water passages and/or the chambers of the diverter, the mixer, the fluid shut-off valve means, the multiple-way regulator/diverter of the water delivery spout that forms the front body 9 of the removable component.

[0040] Therefore, according to the above preferred embodiment, each removable component 3 is divided into:

- an unchanging rear body 8 adapted to interface with a base component 2, namely with the front water passages 6 of its water chambers 14, 15 and
- a front body 9 that, while being able to have different structural and/or functional characteristics (as a diverter, a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter or a water delivery spout), is characterized by the peculiarity of having an unchanging portion 9a, which allows sealing engagement with the housing 10 of a rear body 8, while ensuring fluid communication.

[0041] According to the above embodiment, it will be appreciated that a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter or a water delivery spout forms an element that, in spite of its own structural and/or functional peculiarity, can be easily associated in fluid communication with any base component 2 embedded in the wall.

[0042] This may be achieved because the rear body 8 acts as an interface element for associating in fluid communication an element such as a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter or a water delivery spout to the water chambers of the box-like body of the base component 2 embedded in the wall.

[0043] It will be appreciated from the above that a plurality of the following components will be simply needed to make sanitary plumbing fixture for water delivery:

- support and centering structures 4 possibly cut to size as needed;
- base components 2, which will be differentiated by piercing/removing from time to time the diaphragms/plugs that obstruct water passages in the box-like body, according to the water chambers that need to be accessed;
- front bodies 9, which will differ according to whether a diverter, a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter or a water delivery spout is needed, each having a rear end 9a, and sharing an identical end portion 9a;
- rear base bodies 8 for interfacing the rear end portion 9a of the front bodies 9 and the front water passages 6 of the front wall 2a of the box-like body of the removable components 2 and
- connection pipes 12 for interfacing with the lateral water passages 7 of the water chambers of the removable components 3.

[0044] Figures 1 and 7 and especially Figure 9 show a few possible examples of sanitary plumbing fixtures made from simple combinations of these components of the sectional modular system of the invention.

[0045] It will be appreciated from the above that a very small number of different components have to be manufactured and kept in stock, excepting the front bodies 9 which, apart from the rear end 9a, are required to be formed through various types, as a diverter, a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter or a water delivery spout.

[0046] As an alternative to the above, the removable components 3 may be formed as single pieces, i.e. with the part that forms the mixer, the fluid shut-off valve means, the multiple-way regulator/diverter or the water delivery spout being equipped with the rear water passages 5 required for interfacing with the front water passages 6 of the box-like body of the base components. This will provide the advantage of simplifying the set of components to be used, but will also affect stock flexibility, as the removable body 3 will be designed as a particular water control/delivery component.

[0047] The sectional modular system for making sanitary plumbing fixtures for water delivery also comprises finishing boxes 11 that are designed to be placed in the wall in semirecessed position where the various removable components 3 jut out from the wall.

[0048] Preferably, for base components designed to be embedded in the wall 13 in the wall (see Figure 7), each fixing box comprises a tubular portion 11a designed to be embedded in the wall in such a position as to encircle and protect the portion of the removable component 3 that is embedded in the wall, namely the rear body 8. The tubular body 11a is open at both opposed ends. The end of the finishing box 11 which is designed to jut out of the wall has a front opening from which a peripheral flange 11b (see Figure 8) juts out and covers a predetermined portion of the wall surface in the area from which it projects.

[0049] Preferably, this opening of the tubular portion has a front plug, which is designed to be removed or pierced to allow insertion of said removable component, once masonry or wall finishing works have been completed.

[0050] As clearly shown in the above description, the sectional modular system for making sanitary plumbing fixtures according to the present invention fulfills the above mentioned need and also obviates prior art drawbacks as set out in the introduction of this disclosure. Namely, the sectional modular system for making sanitary plumbing fixtures according to the invention affords:

- a reduction of component manufacturing costs;
- a reduction of the number of components to be manufactured and kept in stock, particularly for all the sets with common built-in, semirecessed or wall-mounted base components, which will be assembled at the factory by the component manufacturer, regardless of the expected right or left positioning or finishing thereof;
- maximum freedom in design and composition, in view of minimized size and maximized combinability of components with variable center-to-center distances, and with the use of identical water control components and
- the possibility of prearranging and selling aggregate assemblies, to minimize the work on site and facili-

tate product installation by plumbers.

[0051] The great flexibility of the sectional modular system of the invention may be conveniently utilized to make aggregate assemblies at the factory, which are ready to be placed in the building frame in a recessed, semirecessed or externally mounted position, while allowing the end installer to replace one or more removable parts with other removable parts. This is useful, for instance, to replace a set of taps and fittings while leaving the building frame unaffected. Such replacement may occur by driving the screws or dowels that act upon the tubular joints.

[0052] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the sectional modular system for making sanitary plumbing fixtures as described hereinbefore, without departure from the scope of the invention, as defined in the following claims.

Claims

1. A sectional modular system for making sanitary plumbing fixtures of the type comprising:

- one or more base components (2) which are designed to be placed in a wall in an embedded, semirecessed or externally mounted position and to be put in fluid communication with each other and/or with a water distribution line;
- at least one removable component (3) selected from the group comprising: a two- or more way diverter, a mixer, a mechanical and/or motorized thermostatic mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery outlet with which a wash basin or tub spout, a shower head, a rinsing spray set may be connected, and
- a support and centering structure (4) designed to be mounted to said wall, for supporting two or more base components (2) to ensure proper placement and relative position thereof,

wherein:

- each removable component (3) is associated in fluid communication with a respective base component (2);
- said base components (2) comprise a body having a front wall (2a) which is designed to face toward the back wall of their respective removable component (3), a back wall (2b) opposite thereto, and side walls (2c);
- each removable component (3) comprises rear water passages (5) at said back wall (3b);
- the body of said base component (2) is divided into a plurality of independent water chambers (14, 15);
- the front wall (2a) of the body of the base components (2) is prearranged with front water passages (6), for putting a respective water chamber (14, 15) of the base component (2) in fluid communication with a corresponding rear water passage (5) of a removable component (3), **characterized in that:**
- said plurality of independent water chambers comprises a first water chamber (14) and at least four remaining water chambers (15);
- each water chamber (14, 15) is prearranged to have at least two lateral water passages (7) at said side walls (2c) of the body of said base component (2).

2. A sectional modular system as claimed in claim 1, wherein said first water chamber (14) divides the body of the base component (2) into a plurality of portions, each having at least one of said remaining water chambers (15) therein.

3. A sectional modular system as claimed in claim 2, wherein said first water chamber (14) is prearranged to have at least two opposed lateral water passages (7).

4. A sectional modular system as claimed in any claim from 1 to 3, wherein said first water chamber (14) is prearranged to have at least two pairs of opposed lateral water passages (7) that divide the body of their respective base component (2) into four quadrants, with at least one chamber of said at least four remaining water chambers (15) being located at each of them.

5. A sectional modular system as claimed in any claim from 1 to 4, wherein said at least four remaining water chambers (15) are prearranged each to have at least two orthogonal lateral water passages (7).

6. A sectional modular system as claimed in any claim from 1 to 5, wherein each water chamber (14, 15) is prearranged to have at least one water passage (16) at said back wall of the body of said base component (2).

7. A sectional modular system as claimed in any claim from 1 to 6, wherein a plurality of said base components (2) are in fluid communication with one another by connection pipes (12) connecting the lateral water passages (7) of the water chambers (14, 15) of respective base components (2).

8. A sectional modular system as claimed in any claim from 1 to 7, wherein the rear water passages (5) of each removable component (3) are in fluid communication with a respective front water passage (6) of a water chamber (14, 15) of the respective base component (2) by tubular connection joints using a seal.

9. A sectional modular system as claimed in any claim from 1 to 8, wherein said lateral water passages (7) of each base component (2) are coplanar.

10. A sectional modular system as claimed in any claim from 1 to 9, wherein said removable component (3) comprises a rear body (8) and a front body (9), which are sealingly joined together by a mating form fit, wherein:

- said rear body (8) comprises said back wall (3b) having said rear water passages (5) in fluid communication with a respective base component (2) and
- said rear body (8) comprises a front housing (10) which receives an end portion (9a) of said front body (9),

wherein:

- said front body (9) of the removable component (3) is a component selected from the group comprising: a diverter, a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery spout,
- said front body (9) of the removable component (3) is sealingly engaged by mating form fit in said front housing (10) of the rear body (8) and
- said end portion (9a) of the front body (9) has channels for putting said rear water passages (5) of the rear body in fluid communication with the water passages and/or the chambers of said component selected from said group comprising: a diverter, a mixer, a fluid shut-off valve means, a multiple-way regulator/diverter and a water delivery spout.

11. A sectional modular system as claimed in any claim from 1 to 10, wherein one or more of said water passages of said water chambers of the base component (2) are closed by removable or pierceable plugs and/or diaphragms.

12. A sectional modular system as claimed in any claim from 1 to 11, comprising a finishing box (11) having:

- a tubular portion (11a) which is designed to be embedded in said wall (13) to encircle the portion of said removable component (3) that is embedded in said wall (13),
- a front opening and
- a removable or pierceable front plug, which is located at the opening of said tubular portion of said finishing box.

13. A sectional modular system as claimed in claim 12, wherein said finishing box (11) comprises a front opening with a peripheral flange (11b) jutting out of it, and designed to cover the surface of the wall from which said removable component (3) projects.

14. A building frame comprising at least one support and centering structure (4), a base component (2) and a removable component (3) of a sectional modular system as claimed in any claim from 1 to 12, wherein said support and centering structure (4) and said base component (2) are located in said building frame in a built-in position, and said removable component (3) is located in such position as to allow handling or operation thereof by a user outside said building frame.

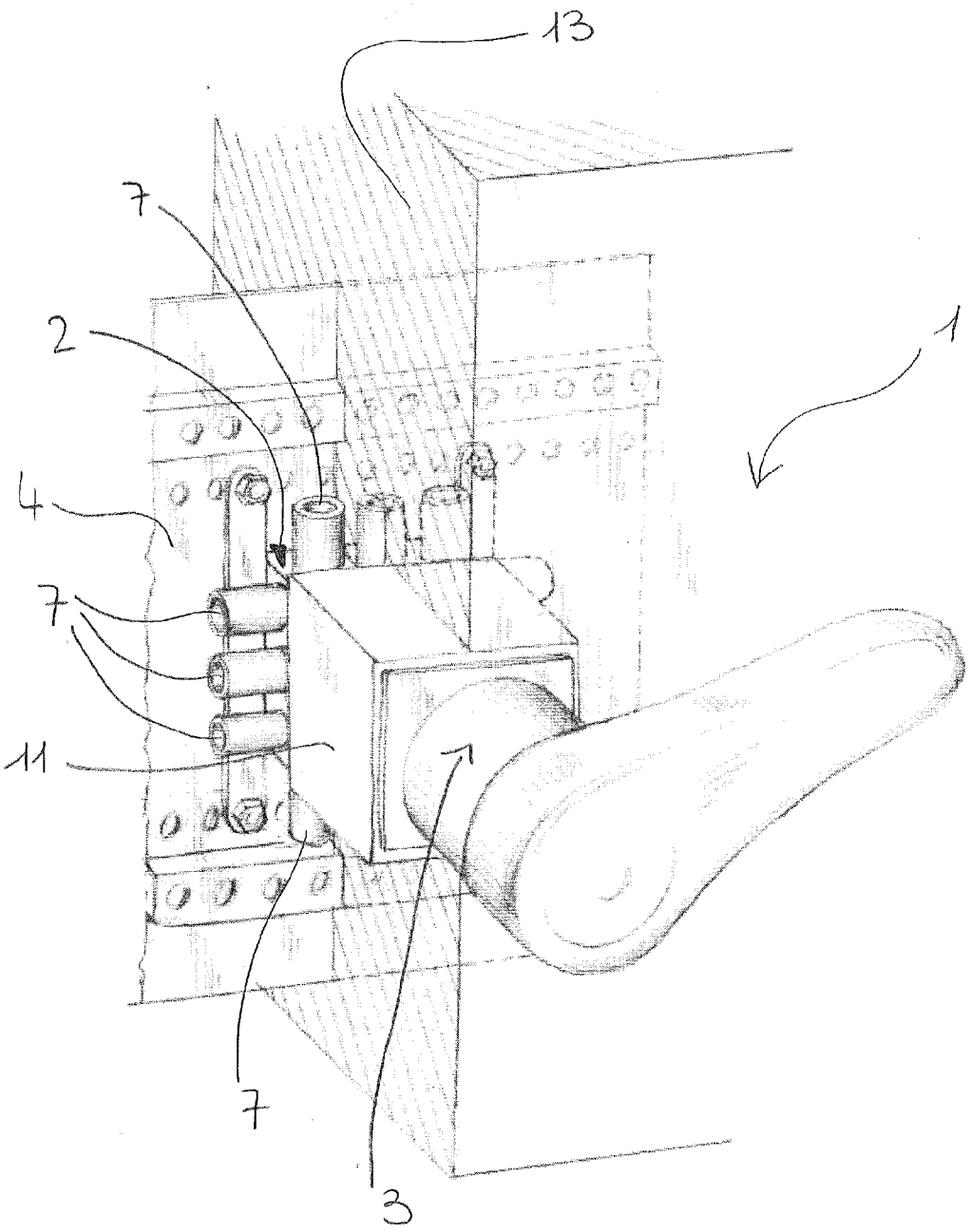

Fig. 1

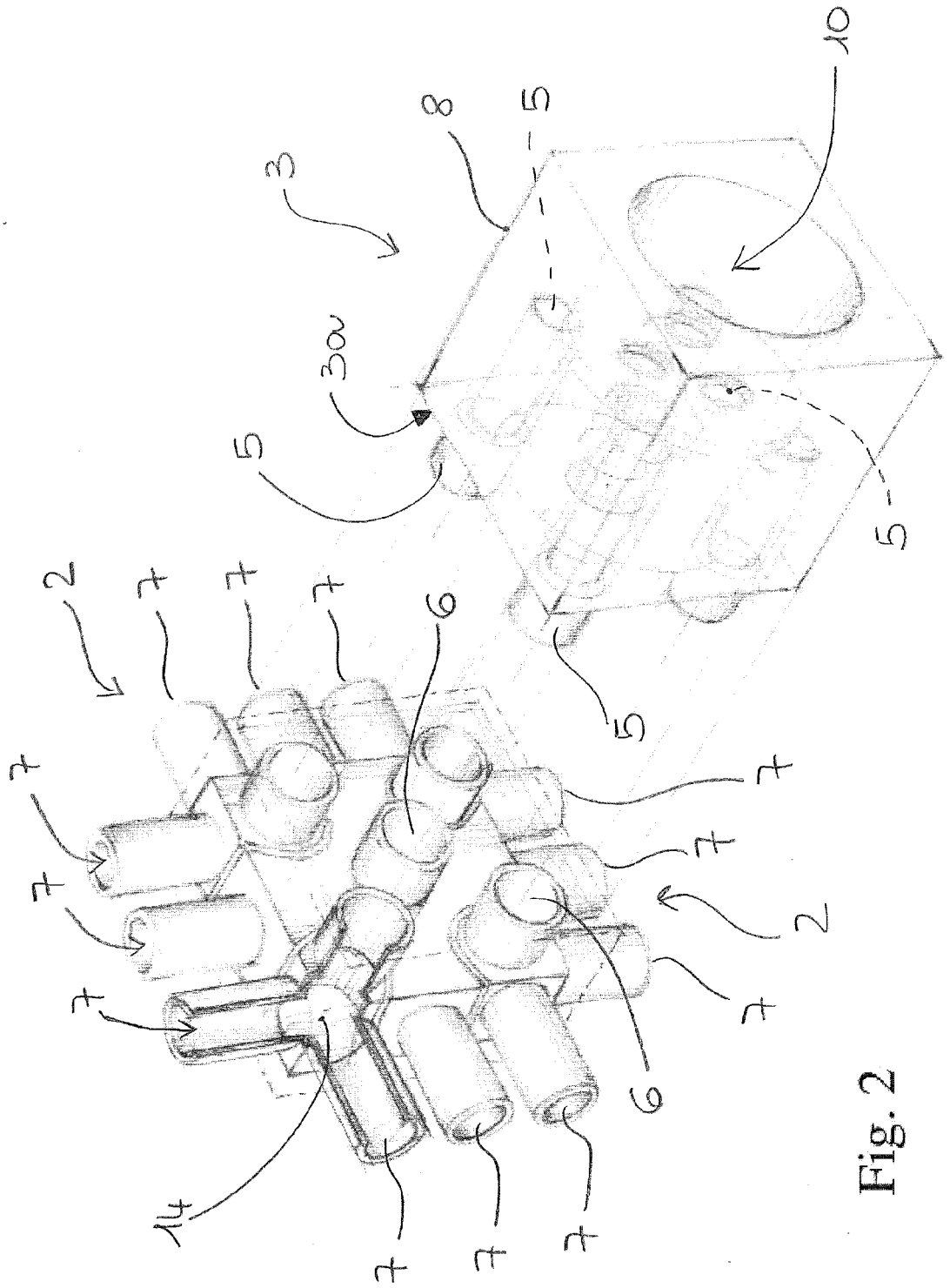

Fig. 2

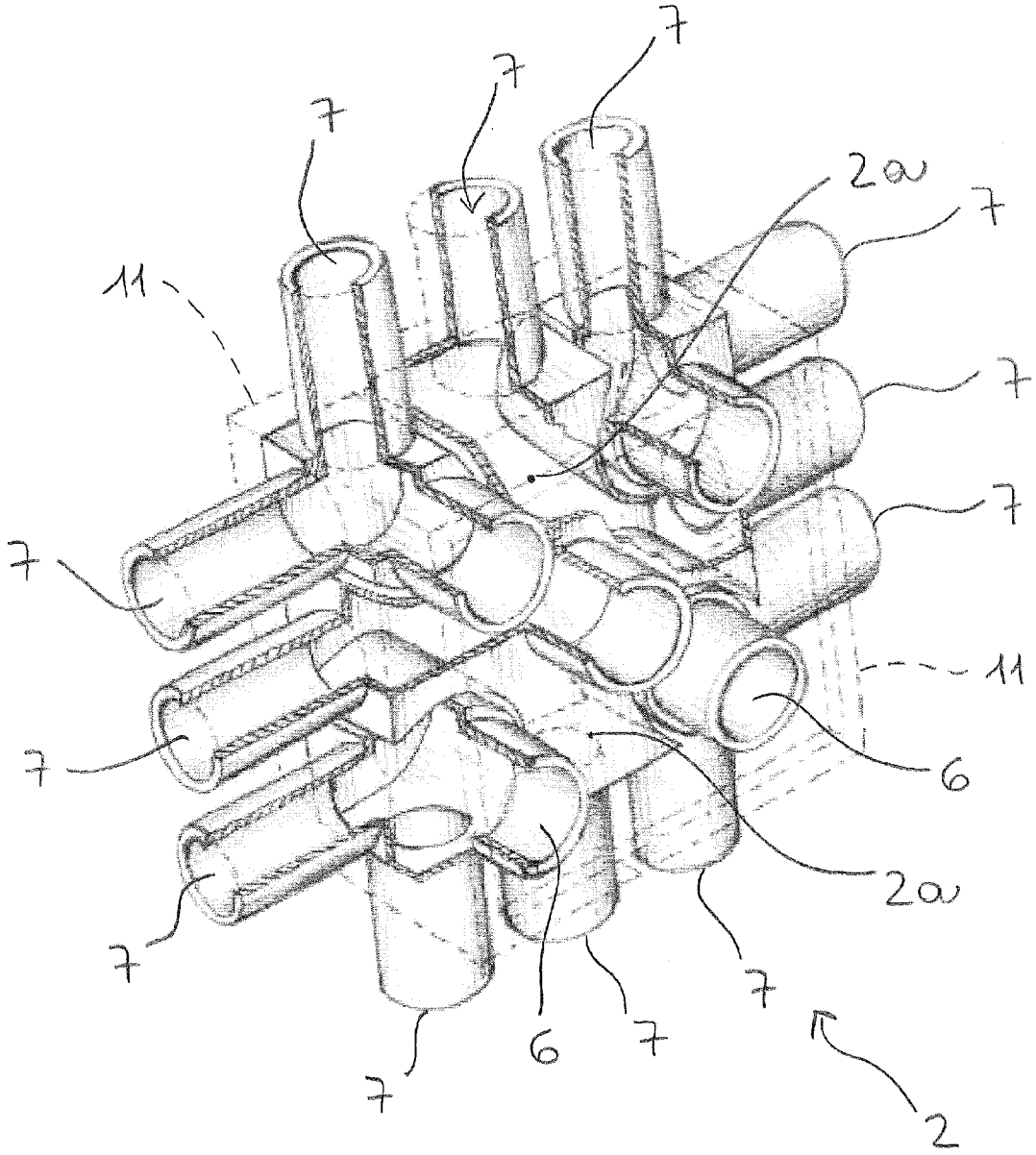

Fig. 3

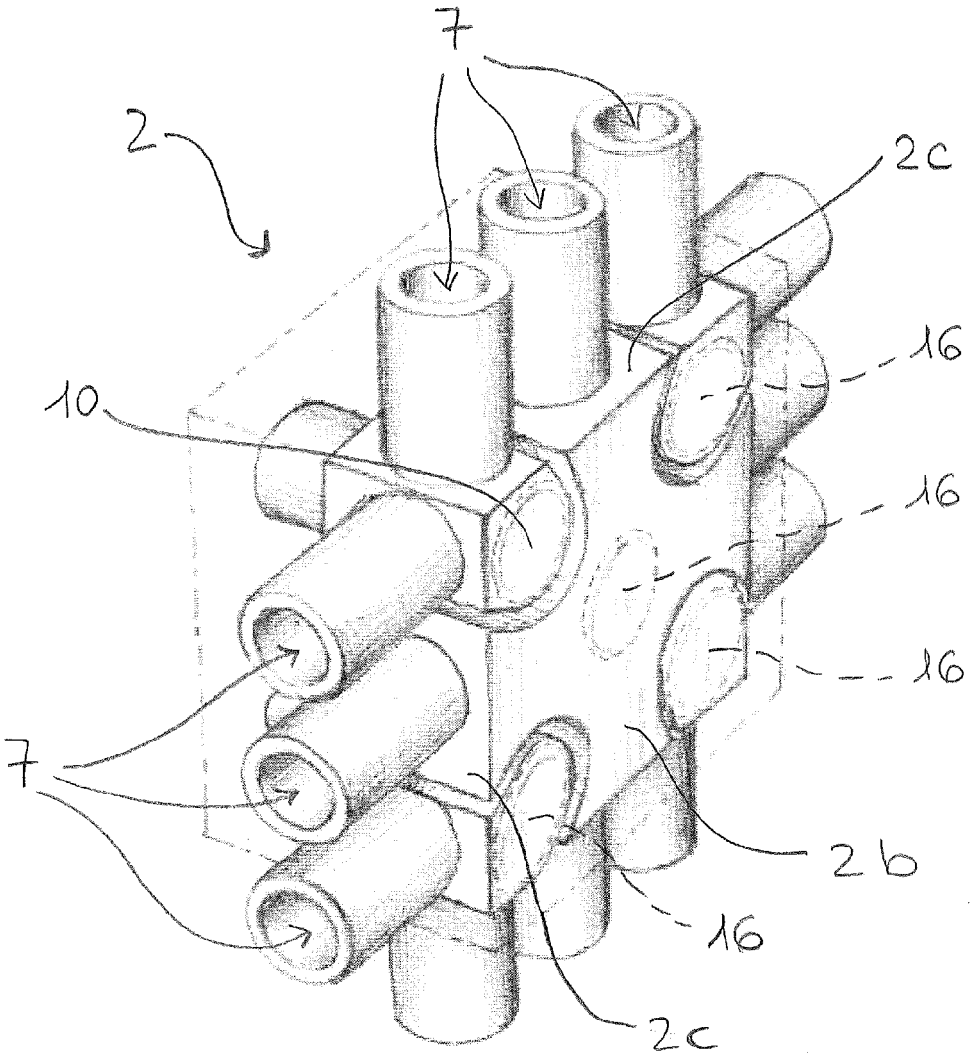

Fig. 4

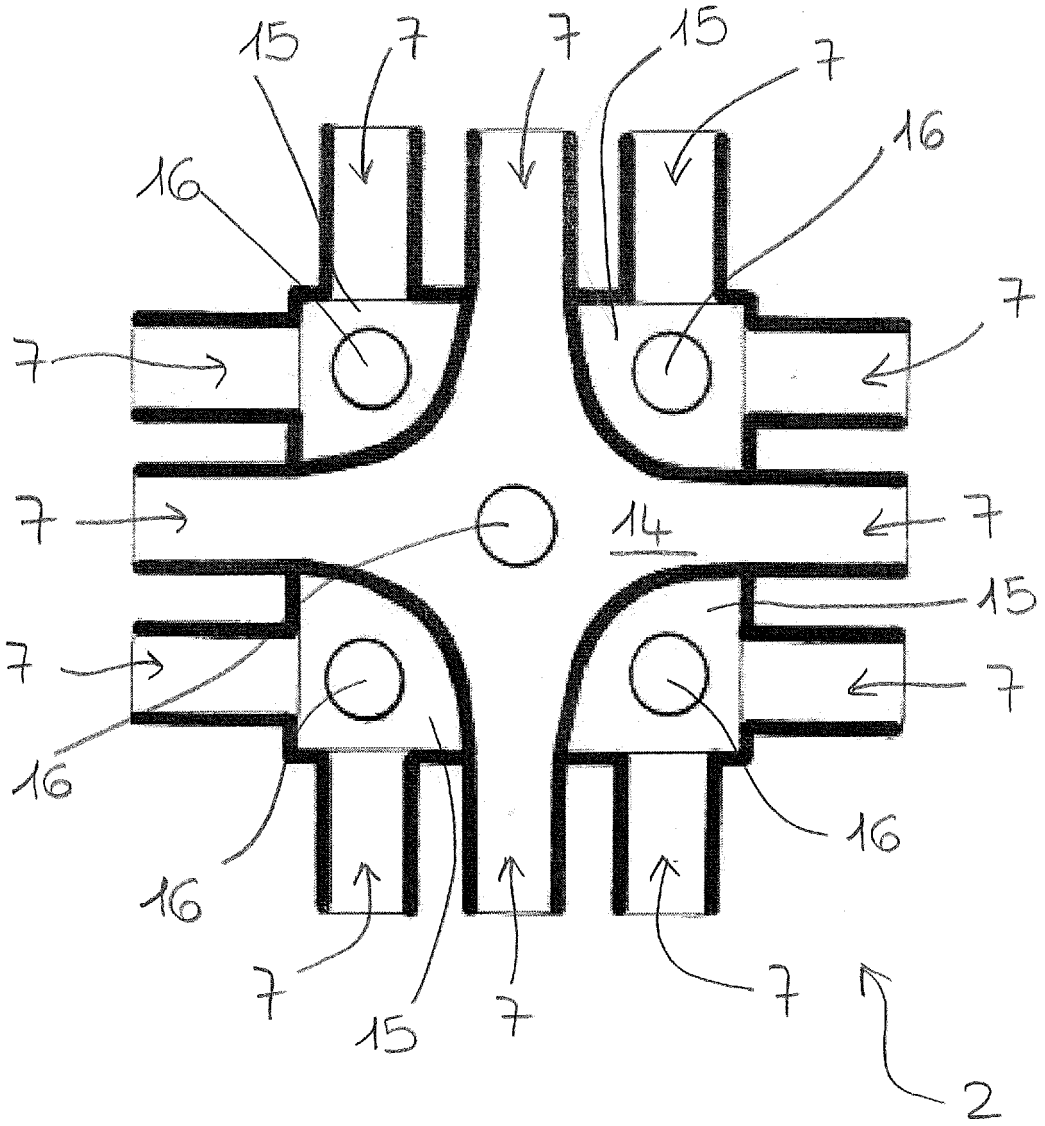

Fig. 5

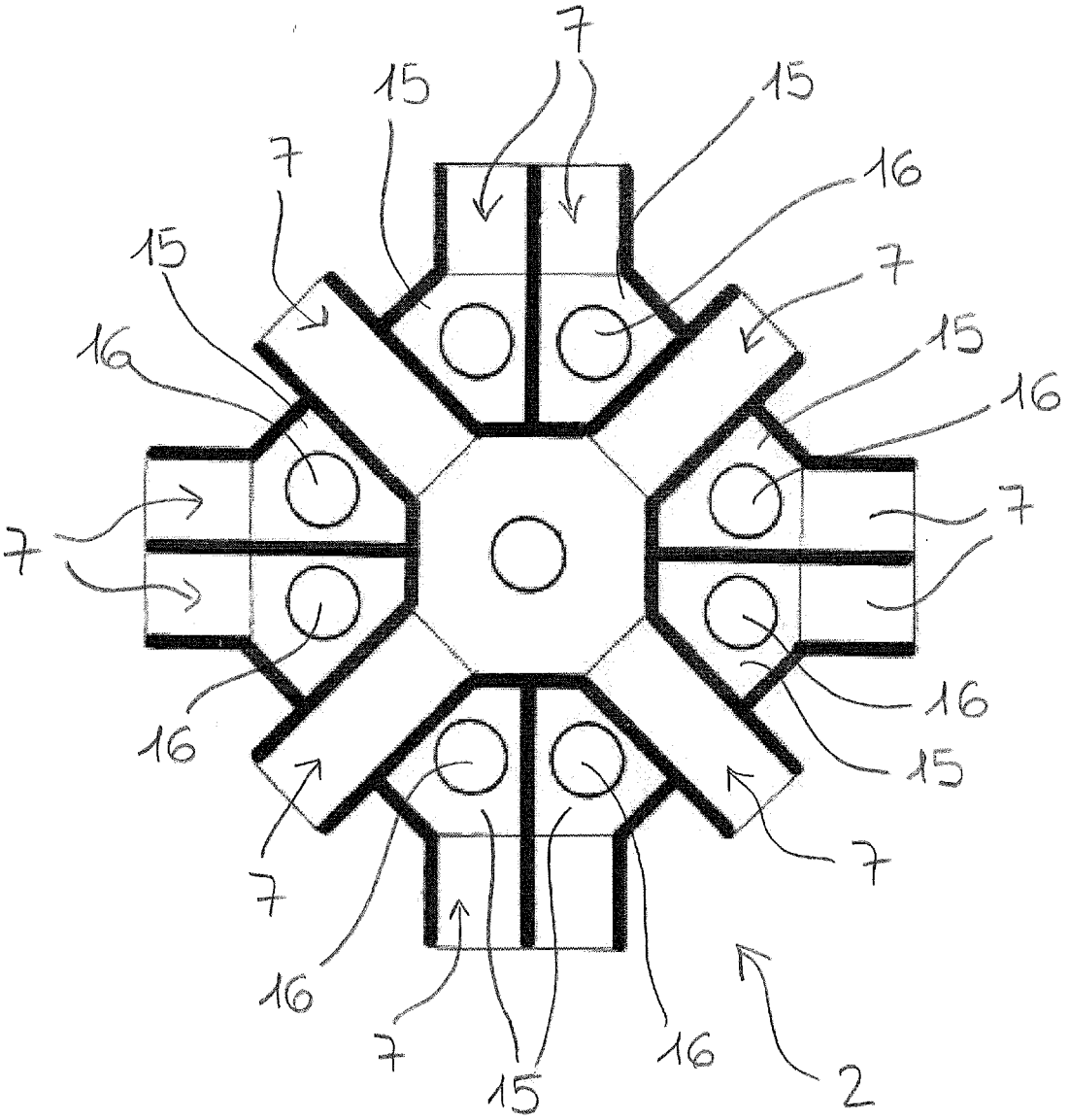

Fig. 6

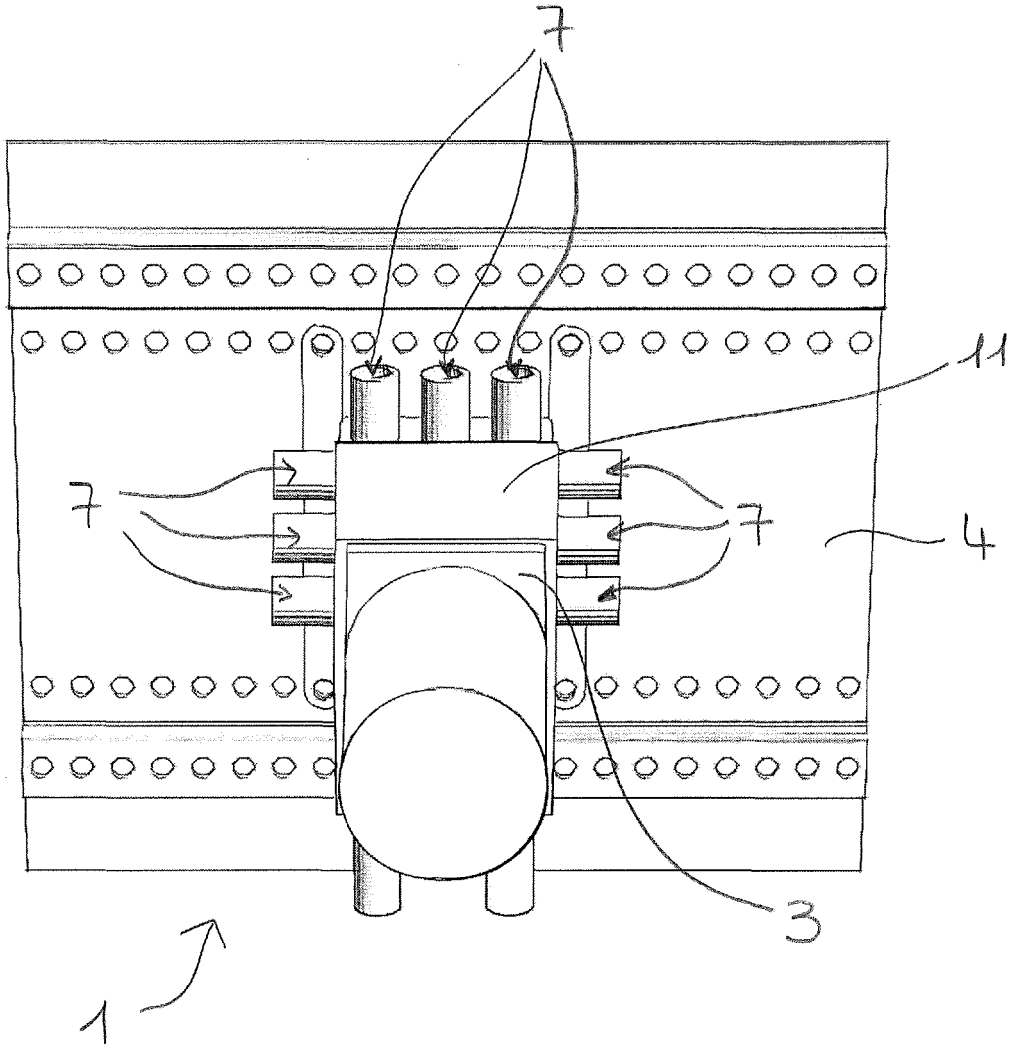

Fig. 7

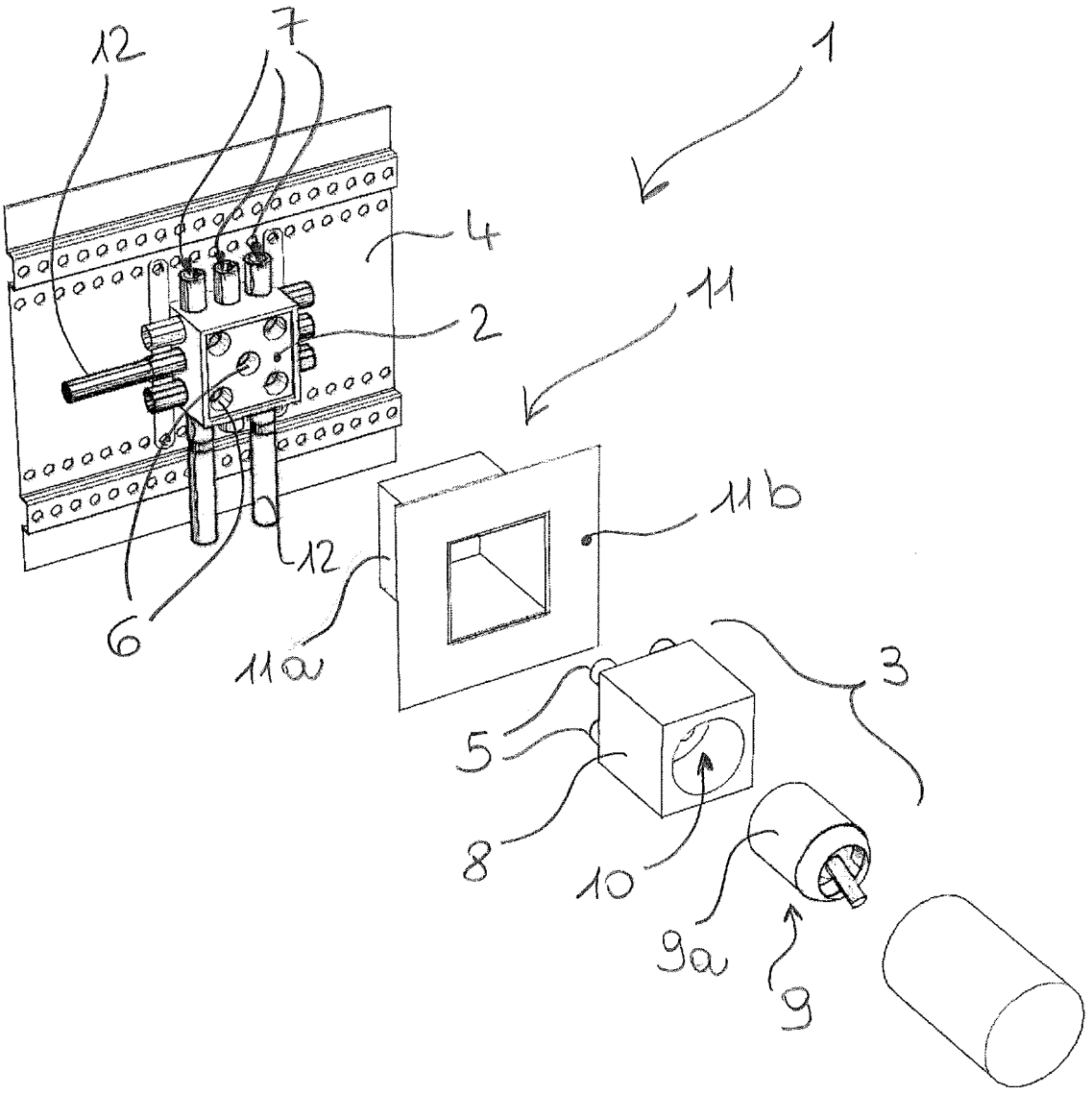

Fig. 8

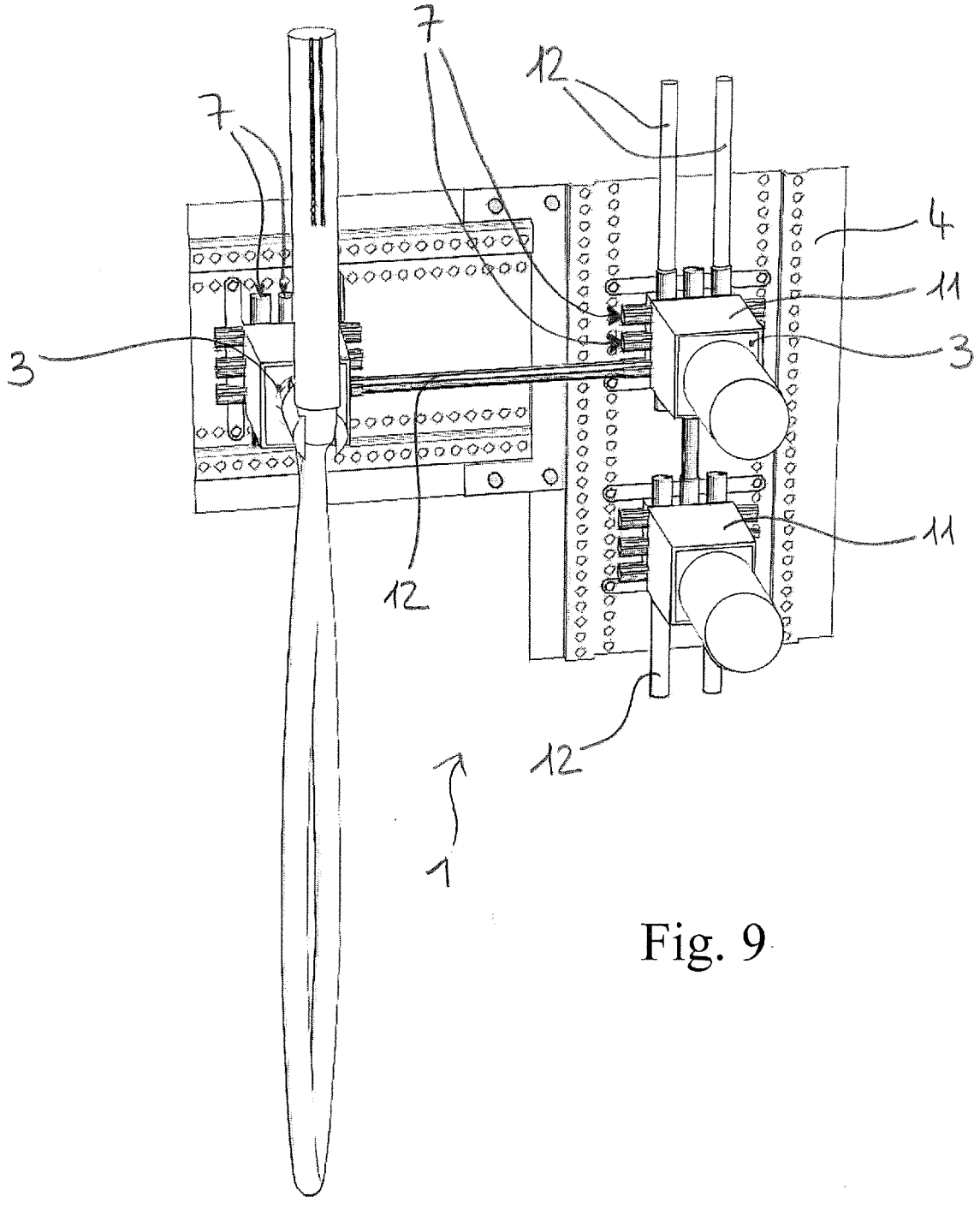

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 1410

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Place of search	Date of completion of the search	Examiner
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