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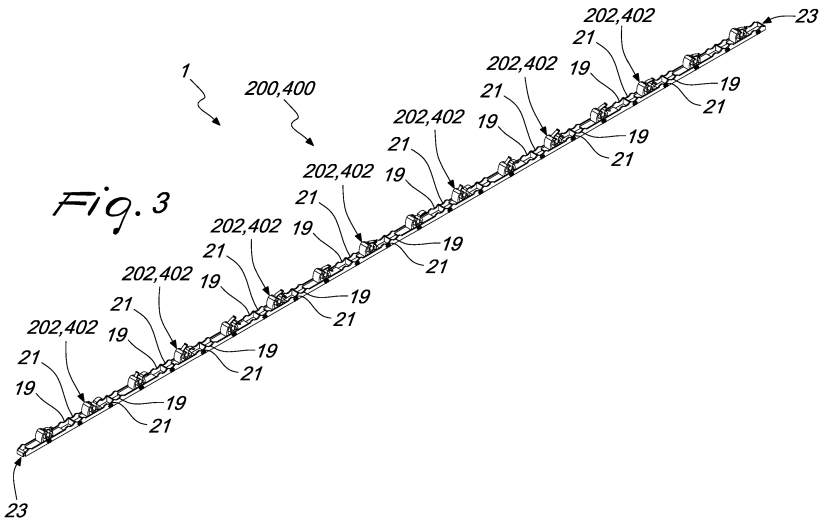
(54) SYSTEM FOR LAYING BARS, PARTICULARLY FOR PROVIDING REINFORCED CONCRETE STRUCTURES

(57) A system (1) for laying bars, particularly for providing reinforced concrete structures, which comprises at least one first laying element (100, 300) which comprises a plurality of first fixing means (102, 302) which are distributed in an equidistant manner along the longitudinal extension of such first laying element (100,300). The first fixing means (102, 302) are configured to receive and immobilize a first group (104, 304) of bars (103, 303).

The peculiarity of the invention consists in that it comprises at least one second laying element (200, 400) which comprises a plurality of second fixing means (202, 402) which are distributed in an equidistant manner along the longitudinal extension of such second laying element (200, 400). The second fixing means (202, 402) are configured to receive and immobilize a second group (204, 404) of bars (203, 403). The second laying element (200, 400) is associable with the first laying element (100, 300) along a direction that is perpendicular to the direction of longitudinal extension of the first laying element (100,300), so that the first group (104, 304) of bars (103, 303) and the second group (204, 404) of bars (203, 403) define a first reinforcement mesh.

Fig. 3



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Description

[0001] The present invention relates to a system for laying bars, particularly for providing reinforced concrete structures.

[0002] The provision of reinforced concrete structures requires first of all the laying of one or more reinforcements, which are constituted by bars, or rods, made of iron, steel or other materials of the type of metal, and which are suitably mutually interconnected, and then the casting of liquid concrete around such reinforcements. In this manner the structure that is formed once the concrete has cured is strengthened by the presence of the above mentioned reinforcements.

[0003] In the construction of horizontal reinforced concrete structures, for example for foundations, the bars that provide the reinforcement are generally arranged at right angles to each other so as to define a rectangular or square mesh, which is supported at a certain distance from the ground or from the surface on which the liquid concrete is to be cast. In this manner, the liquid concrete can flow under and around the bars, enveloping them during its step of curing.

[0004] In many cases the provision of a reinforcement involves laying a first series of bars, which are mutually parallel, at a certain distance from the ground (first laying), then laying a second series of bars, which are mutually parallel and at right angles to the first bars (second laying), thus providing what is called the "first reinforcement mesh". Then, according to the type of reinforced concrete structure to be built, the process further involves laying a third series of bars, which are mutually parallel, at a certain distance from the first mesh (third laying) and then laying a fourth series of bars, which are mutually parallel and at right angles to the previous bars (fourth laying), thus providing a second reinforcement mesh, parallel to the first, and at a determined distance from it.

[0005] Making the reinforcements is a very delicate, complex and laborious step of providing reinforced concrete structures, as they must meet precise design specifications. For example, the reinforcements must be arranged at a suitable distance from the ground, or from the underlying reinforcements, and the bars must be at a specific distance from each other. Furthermore the bars are generally joined at right angles to each other, manually, for example by way of using iron wire, in order to prevent them from moving out of position during the step of casting the liquid concrete.

[0006] The difficulties workers experience when they have to arrange the bars at the correct distance from each other are therefore evident, as is the laboriousness of having to fix them together one by one.

[0007] In order to facilitate the step of laying the bars in order to provide reinforcements, some solutions are currently adopted, such as, for example, the use of trestles capable of supporting the bars at a desired distance from the ground, or the use of special supporting elements capable of supporting two bars at right angles, at the point of intersection between the two bars, or even the use of supporting elements capable of supporting two or more bars which are mutually parallel.

[0008] However, none of the solutions currently adopted makes it possible to overcome the drawbacks associated with the provision and laying of reinforcements for reinforced concrete structures.

[0009] The aim of the present invention consists in providing a system for laying bars, particularly for providing reinforced concrete structures, which overcomes the drawbacks of the known art.

[0010] Within this aim, an object of the present invention is to provide a system for laying bars which facilitates the work of the workers tasked with building the reinforced concrete structure, both by making it simpler and by making it faster.

[0011] Another object of the invention consists in providing a system for laying bars which makes it possible to position them with precision.

[0012] Another object of the invention consists in providing a system for laying bars which prevents the possibility of human error.

[0013] Another object of the invention consists in providing a system for laying bars which makes it possible to keep the bars in position during the entire phase of building the reinforced concrete structure.

[0014] Another object of the invention consists in providing a system for laying bars which can be used to provide a plurality of reinforcement meshes, suitably spaced from each other.

[0015] Another object of the invention consists in providing a system for laying bars which is capable of offering the widest guarantees of reliability and safety in use.

[0016] Another object of the invention consists in providing a system for laying bars which is easy to implement and economically competitive when compared to the known art.

[0017] This aim and these and other objects which will become better apparent hereinafter are achieved by a system for laying bars, particularly for providing reinforced concrete structures, which comprises at least one first laying element which comprises a plurality of first fixing means which are distributed in an equidistant manner along the longitudinal extension of said first laying element, said first fixing means being configured to receive and immobilize a first group of bars, characterized in that it comprises at least one second laying element which comprises a plurality of second fixing means which are distributed in an equidistant manner along the longitudinal extension of said second laying element, said second fixing means being configured to receive and immobilize a second group of bars, said second laying element being associable with said first laying element along a direction that is perpendicular to the direction of longitudinal extension of said first laying element, so that said first group of bars and said second group of bars define a first reinforcement mesh.

[0018] Further characteristics and advantages of the

invention will become better apparent from the detailed description of a preferred, but not exclusive, embodiment of a system for laying bars, particularly for providing reinforced concrete structures, which is illustrated by way of nonlimiting example with the assistance of the accompanying drawings wherein:

Figure 1 is a perspective view of a first laying element of the system for laying bars, according to the invention;
Figure 2 is an enlarged portion of the first laying element shown in Figure 1;
Figure 3 is a perspective view of a second laying element of the system for laying bars, according to the invention;
Figure 4 is an enlarged portion of the second laying element shown in Figure 3;
Figure 5 is a perspective view of a third laying element of the system for laying bars, according to the invention;
Figure 6 is an enlarged portion of the third laying element shown in Figure 5;
Figure 7 is a front elevation view of the enlarged portion of the third laying element shown in Figure 6;
Figure 8 is a perspective view of the means for engagement of two contiguous laying elements;
Figure 9 is a perspective view of a connecting element of the system for laying bars, according to the invention;
Figure 10 is a perspective view of the system for laying bars, according to the invention, in its configuration of use for providing a first reinforcement mesh;
Figure 11 is a perspective view of the system for laying bars, according to the invention, in which a third laying element is shown placed on a first reinforcement mesh;
Figure 12 is a plan view from above of Figure 11;
Figure 13 is a perspective view of the system for laying bars, according to the invention, in its configuration of use for providing a second reinforcement mesh;
Figure 14 is a plan view from above of Figure 13;
Figure 15 is a front elevation view of the system for laying bars, according to the invention, in its configuration of use for providing two reinforcement meshes;
Figure 16 is a perspective view of a first variation of a laying element, according to the invention;
Figure 17 is a side view of the laying element in Figure 16, according to the invention;
Figure 18 is a perspective view of a second variation of a laying element, according to the invention;
Figure 19 is a side view of the laying element in Figure 18, according to the invention.

[0019] With reference to the figures, the system for laying bars, generally designated by the reference numeral 1, comprises at least one first laying element 100, 300, which comprises a plurality of first fixing means 102, 302 which are distributed in an equidistant manner along the longitudinal extension of the laying element 100, 300. Such first fixing means 102, 302 are configured to receive and immobilize a first group 104, 304 of bars 103, 303.

[0020] According to the invention, the system 1 comprises at least one second laying element 200, 400, which comprises a plurality of second fixing means 202, 402 which are distributed in an equidistant manner along the longitudinal extension of the laying element 200, 400. The second fixing means 202, 402 are configured to receive and immobilize a second group 204, 404 of bars 203, 403. The second laying element 200, 400 is associable with the first laying element 100, 300 along a direction that is perpendicular to the direction of longitudinal extension of the first laying element 100, 300, so that the first group 104, 304 of bars 103, 303 and the second group 204, 404 of bars 203, 403 define a first reinforcement mesh.

[0021] Advantageously, the system 1 for laying bars comprises at least one connecting element 5 which comprises at least two fixing means 7 which are configured to receive and immobilize at least two bars 103', 303' that belong to the first group 104, 304 of bars 103, 303, which is associated with the first laying element 100, 300. The connecting element 5 also comprises a seat 9 for accommodating the second laying element 200, 400.

[0022] In particular, the system 1 for laying bars comprises a plurality of connecting elements 5 which, distributed at an optimal distance from each other along the extension of at least two bars 103', 303' that belong to the first group 104, 304 of bars 103, 303, which is associated with the first laying element 100, 300, fulfill the task of providing a resting base for the second laying elements 200, 400. This connecting element 5 comprises at least two fixing means 7 which are configured to offer a connection on such at least two bars 103', 303' and a seat 9 for accommodating the second laying elements 200, 400.

[0023] In this manner, by way of such connecting element 5, the bars 203, 403 which are fixed to the second laying element 200, 400 have a preset and well defined placement with respect to the bars 103, 303 which are fixed to the first laying element 100, 300.

[0024] Advantageously, the first laying element 100, 300 comprises at least one spacer element 106, 306 which is associated with its lower face, so as to define its height with respect to a lower resting surface, which can be constituted by the ground, or by a reinforcement mesh.

[0025] The first laying element 100, 300 and the second laying element 200, 400 can comprise, at one of their ends, means 23 for engaging respectively an end of an additional first laying element and an end of an additional second laying element, as illustrated by way of example in Figure 8, with reference to the first laying element 100. In this manner it is possible to provide reinforcements

with very ample surface extensions.

[0026] The first fixing means 102, 302 of the first laying element 100, 300, the second fixing means 202, 402 of the second laying element 200, 400 and the fixing means 7 of the connecting element 5 advantageously comprise a seat 11 for a bar 103, 103', 203, 303, 303', 403. Such seat is defined by at least two curved elastic side walls 13 and 15, which are configured to retain the bar 103, 103', 203, 303, 303', 403 elastically inside the seat 11. The side walls 13 and 15 of the seat 11 have in fact an inactive position which is disturbed by the insertion of the bar 103, 103', 203, 303, 303', 403, which entails a certain elastic splaying of the walls 13 and 15. In this manner, the side walls 13 and 15 press against the bar 103, 103', 203, 303, 303', 403 which is inserted in the seat 11.

[0027] Preferably furthermore, the two side walls 13, 15 which define the seat 11 can be mutually closed by way of a hook 17, so as to stably and safely retain the bars 103, 103', 203, 303, 303', 403.

[0028] The hook 17 can advantageously be extracted from a seat provided in the side wall 13 of the fixing means 102, 202, 302, 402, and be hooked to a tab 18 protruding from the opposite side wall 15 of the fixing means 102, 202, 302, 402.

[0029] Advantageously, the first fixing means 102, 302 and the second fixing means 202, 402 are distributed in an equidistant manner along the longitudinal extension respectively of the first laying element 100, 300 and of the second laying element 200, 400, at a preset distance that can be selected from the following values: 15 centimeters, 20 centimeters and 25 centimeters.

[0030] Advantageously, furthermore, either or both of the first laying element 100, 300 and the second laying element 200, 400 comprises a plurality of resting seats 19, 21 for further bars, which are distributed in an equidistant manner along the longitudinal extension respectively of the first laying element 100, 300 and of the second laying element 200, 400, at a different spacing from the spacing that characterizes the fixing means 102, 202, 302, 402.

[0031] In particular, the first laying element 100, 300 and/or the second laying element 200, 400 can comprise a plurality of resting seats 19, which are interspersed between the fixing means 102, 202, 302, 402, and equidistant from them.

[0032] For example, Figure 2 shows the first laying element 100, which has first fixing means 102 arranged at a distance of 15 centimeters from each other. The resting seats 19 are interspersed between the fixing means 102, at a distance of 7.5 centimeters from them. In this manner it is possible to lay bars with a spacing of 7.5 centimeters, considering that one bar will be resting in the resting seat 19 and the contiguous bar will be fixed to the fixing means 102.

[0033] Advantageously, furthermore, further resting seats 21 can be present, spaced apart from each other according to a different spacing.

[0034] Again by way of example, with particular reference to Figure 2, the first laying element 100 comprises further resting seats 21 which define a spacing of 10 centimeters for laying bars. Since the spacing defined by the first fixing means 102 is equal to 15 centimeters, one resting seat 21 in every three corresponds to the actual fixing means 102.

[0035] The system 1 for laying bars, in addition to comprising the first laying element 100 and the second laying element 200 described above, can also comprise:

- a third laying element 300, which comprises a plurality of third fixing means 302 which are distributed in an equidistant manner along the longitudinal extension of the third laying element 300 and are configured to receive and immobilize a third group 304 of bars 303,
- a fourth laying element 400, which comprises a plurality of fourth fixing means 402 which are distributed in an equidistant manner along the longitudinal extension of the fourth laying element 400 and are configured to receive and immobilize a fourth group 404 of bars 403.

[0036] The fourth laying element 400 is associable with the third laying element 300 along a direction that is perpendicular to the direction of longitudinal extension of the third laying element 300, so that the third group 304 of bars 303 and the fourth group 404 of bars 403 define a second reinforcement mesh which is arranged above the first reinforcement mesh.

[0037] Figures 1 and 2 show a first laying element 100, which is intended to be placed on the ground. Such first laying element 100 comprises a plurality of spacer elements 106 which are associated with the lower face of the laying element 100, and which define the placement height of the bars 103 with respect to a lower resting surface constituted, for example, by the ground on which the reinforced concrete structure will be built.

[0038] According to the design choices, such spacing elements 106 can have a height comprised between 3 and 8 centimeters. Advantageously such spacing elements have a height that can be selected from the following heights: 3, 4, 5 and 6 centimeters.

[0039] Figures 3 and 4 show a second laying element 200, which is intended to be accommodated in the seat 9 of the connecting element 5, shown in Figure 9. Such second laying element 200 has no spacing elements.

[0040] As shown in Figures 9 and 10 with reference to the first reinforcement mesh, but corresponding to what is shown in Figures 13 and 14 with reference to the second reinforcement mesh, the depth of the seat 9 of the connecting element 5 defines the height of the bars 203 that belong to the second group 204 of bars with respect to the bars 103 that belong to the first group 104 of bars. For example, the seat 9 can have a depth such that the second laying element 200 is arranged just above the first laying element 100.

[0041] In particular, the depth of the seat 9 can define

a height of the bars 203, which is equivalent to the perpendicular resting height derived from the diameter of the bars 103 with respect to the height of their resting base. For example, the seat 9 has a depth such that the extrados of the second laying element 200, which is inserted in the seat 9, is arranged at the same height as the plane derived from the diameter dimension of the bars 103 of the first group 104 with reference to the height of their resting surface.

[0042] The first laying element 100 and the second laying element 200 are used in order to provide a first reinforcement mesh.

[0043] Figures 5, 6 and 7 show the third laying element 300. Together with the fourth laying element 400, such third laying element 300, as shown in Figures 13 and 14, forms a second reinforcement mesh, which can be arranged at a certain distance from the first reinforcement mesh.

[0044] The third laying element 300 therefore comprises a spacer element 306, which has a height comprised between 10 and 40 centimeters.

[0045] Advantageously, such third laying element 300 has a longitudinal extension with an undulating pattern. For example, as shown in Figures 5, 6 and 7, the third laying element 300 has a zigzag longitudinal extension. Such undulating, i.e. zigzag, pattern is adapted to confer greater stability to the third laying element 300, given the significant height of the spacer element 306 with respect to the width of the laying element 300, which otherwise would tend to fall on its side.

[0046] The third laying element 300 comprises third fixing means 302 which can substantially correspond to the first fixing means 102 of the first laying element 100. Resting seats 19, 21 can also be provided in the third laying element 300.

[0047] The fourth laying element 400, which is intended to be associated with the third laying element 300 in order to provide the second reinforcement mesh, advantageously corresponds to the second laying element 200. The connection means 5 used to associate the second laying element 200 with the first laying element 100 are likewise used to associate the fourth laying element 400 with the third laying element 300.

[0048] Advantageously, all the laying elements 100, 200, 300 and 400 can be provided by way of techniques of molding materials of the type of plastics.

[0049] Advantageously, furthermore, all the laying elements 100, 200, 300, 400 comprise perforated surfaces, both in order to lighten the structure proper, and in order to enable the correct envelopment thereof in the liquid concrete, preventing for example the formation of air bubbles.

[0050] The laying elements 100, 200, 300, 400 can further comprise through holes 25 which can be used to nail down and fix the laying elements to the formworks containing the concrete.

[0051] The laying elements 100, 200, 300 and 400 can also be used to provide vertical reinforcements.

[0052] Advantageously, furthermore, the fixing means 102, 202, 302, 402, 7 are configured to be able to accommodate bars 103, 103', 203, 303, 303', 403 of different diameters, and in particular bars with a diameter comprised between 8 and 22 millimeters. Alternatively, two different types of fixing means, of different dimensions, can also be provided, a first type configured to accommodate and retain bars with a diameter comprised between 8 and 16 millimeters, and a second type configured to accommodate and retain bars with a diameter comprised between 16 and 24 millimeters.

[0053] A first variation of a laying element 50 is illustrated in Figures 16 and 17. The laying element 50 comprises a plurality of fixing means 52 distributed in an equidistant manner along the longitudinal extension of the laying element 50. Such fixing means 52 are configured to receive and immobilize each at least one reinforcement bar.

[0054] Advantageously, the fixing means 52 can be configured to receive and immobilize a pair of reinforcement bars, i.e. they can define a pair of seats 53 for a pair of reinforcement bars.

[0055] The fact that the fixing means 52 have a double seat 53 makes it possible to fix two reinforcement bars side by side, thus allowing the partial surmounting of the reinforcement bars which is necessary in order to properly cover an extended work surface.

[0056] The seat 53 can be defined by a first wall 54, which may be central to two contiguous seats 53, and by a second, elastic, abutment wall 55, where such walls 54 and 55 are configured to retain the reinforcement bar.

[0057] Advantageously, a further retention element of the reinforcement bar can further be provided, which preferably comprises an elastically deformable body 56, which is adapted to deform by bending laterally in order to allow the insertion of the reinforcement bar in the seat 53 and prevent its egress, for example when the reinforcement bar is placed under stress by the casting of the concrete or by the passage of workers walking on the reinforcement.

[0058] In substance, therefore, the reinforcement bar, which has various different diameters as defined above, is held elastically inside the seat 53 by the walls 54 and 55. Furthermore the egress of the reinforcement bar from the seat 53 is further prevented by way of the retention element.

[0059] Advantageously the laying element 50 can have a reduced length, for example substantially equal to 60 cm, and it can be configured to be associated in a modular fashion with other, contiguous laying elements 50, so as to provide a laying element with a desired length. Preferably in fact the laying element 50 can comprise, at its ends, engagement means 57 for the mutual fixing of contiguous laying elements 50.

[0060] Advantageously, such engagement means 57 can comprise a first fixing element 58 which can be mated with a second fixing element 59. Preferably the first fixing element 58 defines a slit in which a slider associated with

the second fixing element 59 is insertable slideably. In particular, each laying element 50 can comprise, at a first end, a first fixing element 58 defined by a slit and, at a second end, a second fixing element 59 defined by a slider, where the slit is adapted to receive and retain the slider.

[0061] A second variation of a laying element 70 is illustrated in Figures 18 and 19. The laying element 70 also comprises a plurality of fixing means 72 distributed in an equidistant manner along the longitudinal extension of the laying element 70. Such fixing means 72 are configured to receive and immobilize each at least one reinforcement bar, and preferably a pair of reinforcement bars, i.e. they can define a pair of seats 73 for the reinforcement bars.

[0062] The seat 73 can be defined by a first wall 74, which may be central to two contiguous seats 73, and by a second, elastic, abutment wall 75, where such walls 74 and 75 are configured to retain the reinforcement bar.

[0063] In this case also, the elastic deformability of the walls 74 and 75 is adapted to allow the fixing of reinforcement bars of different diameter.

[0064] In this case, it is possible to use adapted staple guns, if deemed convenient, for further fixing the reinforcement bars which would risk, owing to external forces, exiting from the respective seats.

[0065] Advantageously the laying element 70 can also have a reduced length, for example substantially equal to 60 cm, and it can be configured to be associated in a modular fashion with other, contiguous laying elements 70, so as to provide a laying element with a desired length. Preferably, the laying element 70 can comprise, at its ends, engagement means 77 for the mutual fixing of contiguous laying elements 70.

[0066] Advantageously, such engagement means 77 can comprise at least one pair of hooks 78 which mutually cooperate by way of a snap-fitting connection mechanism.

[0067] Operation of the system for laying bars is clear and evident from the foregoing description.

[0068] In particular, building a reinforced concrete structure by way of the system 1 for laying bars comprises the steps of:

- arranging a plurality of first laying elements 100 on the ground, at a desired distance from the ground;
- fixing a plurality of bars 103 to the first fixing means 102, so as to define a first group 104 of bars 103, or "first laying";
- optionally placing further reinforcement bars at the resting seats 19 or 21, where increasing the reinforcement is required;
- engaging two bars 103' that belong to the first group 104 of bars 103 to one or more connecting elements 5, by way of the fixing means 7;
- positioning, in each seat 9 of each connecting element 5, a second laying element 200;
- fixing a plurality of bars 203 to the second fixing means 202, so as to define a second group 204 of bars 203, or "second laying";
- optionally placing further reinforcement bars at the resting seats 19 or 21, where increasing the reinforcement is required.

[0069] In this manner the first reinforcement mesh is obtained.

[0070] If it is necessary to superimpose a second reinforcement mesh on the first reinforcement mesh, the above steps can be repeated using the third laying element 300, which is placed conveniently on the first reinforcement mesh, and the fourth laying element 400, as illustrated in Figure 15.

[0071] Alternatively, once the first reinforcement mesh has been provided, it is possible to use conventional trestles, made of metal, placed directly on the ground, which are capable of supporting, at a desired height, a third laying element with a shape like that of the second laying element shown in Figures 3 and 4. In substance, the third laying element 300, as shown in Figures 5, 6 and 7, can be substituted by a laying element such as that shown in Figures 3 and 4, mated to trestles, conventional, made of metal or of another material.

[0072] In practice it has been found that the system for laying bars, particularly for providing reinforced concrete structures, according to the present invention, achieves the intended aim and objects in that it makes it possible to simplify, rationalize, and ensure the correct provision of reinforcements for reinforced concrete, according to the design specifications.

[0073] Another advantage of the system for laying bars according to the invention consists in that it provides an exact guide for the workers who build the reinforcements, in this manner reducing human errors which can lead to the construction of reinforced concrete structures that contain structural defects, and drastically speeding up the operations to build the reinforcements.

[0074] Another advantage of the system for laying bars according to the invention consists in being able to fix, very quickly and safely, the bars that provide the reinforcement meshes.

[0075] Another advantage of the system for laying bars, according to the invention, consists in being able to increase the reinforcement in regions where this is necessary.

[0076] Another advantage of the system for laying bars, according to the invention, consists in being able to select, in addition to the spacing between the bars of a reinforcement mesh, also the height thereof.

[0077] Another advantage of the system for laying bars, according to the invention, consists in that the reinforcements provided do not undergo movements or deformations during the step of casting the liquid concrete.

[0078] The system for laying bars thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0079] Moreover, all the details may be substituted by

other, technically equivalent elements.

[0080] In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements.

[0081] The content of Italian patent application no. MI2014A001305, the priority of which is claimed in the present application, is incorporated as a reference.

[0082] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A system (1) for laying bars, particularly for providing reinforced concrete structures, which comprises at least one first laying element (100, 300) which comprises a plurality of first fixing means (102, 302) which are distributed in an equidistant manner along the longitudinal extension of said first laying element (100, 300), said first fixing means (102, 302) being configured to receive and immobilize a first group (104, 304) of bars (103, 303), **characterized in that** it comprises at least one second laying element (200, 400) which comprises a plurality of second fixing means (202, 402) which are distributed in an equidistant manner along the longitudinal extension of said second laying element (200, 400), said second fixing means (202, 402) being configured to receive and immobilize a second group (204, 404) of bars (203, 403), said second laying element (200, 400) being associable with said first laying element (100, 300) along a direction that is perpendicular to the direction of longitudinal extension of said first laying element (100, 300), so that said first group (104, 304) of bars (103, 303) and said second group (204, 404) of bars (203, 403) define a first reinforcement mesh.

2. The system (1) for laying bars according to claim 1, **characterized in that** it comprises a connecting element (5) which comprises at least two fixing means (7) which are configured to receive and immobilize at least two bars (103', 303') that belong to said first group (102, 302) of bars (103, 303) which is associated with said first laying element (100, 300), said connecting element (5) comprising a seat (9) for accommodating said second laying element (200, 400).

3. The system (1) for laying bars according to claim 1 or 2, **characterized in that** said first laying element (100, 300) comprises at least one spacer element (106, 306) which is associated with the lower face of said first laying element (100, 300) in order to define its height.

4. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** said first fixing means (102, 302) of said first laying element (100, 300), said second fixing means (202, 402) of said second laying element (200, 400) and said fixing means (7) of said connecting element (5) comprise a seat (11) for a bar (103, 103', 203, 303, 303', 403), which is defined by at least two side walls (13, 15) which are elastic and curved and are configured to retain said bar (103, 103', 203, 303, 303', 403) in said seat (11).

5. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** said first fixing means (102) of said first laying element (100) and said second fixing means (202, 402) of said second laying element (200, 400) comprise a seat (11) for a bar (103, 103', 203, 303, 303', 403), which is defined by at least two side walls (13, 15) which can be mutually closed by way of a hook (17).

6. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** said first laying element (300) has a longitudinal extension with an undulating pattern.

7. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** either or both of said first laying element (100, 300) and said second laying element (200, 400) comprises a plurality of resting seats (19, 21) for additional bars, which are distributed in an equidistant manner along the longitudinal extension of said first laying element (100, 300) and of said second laying element (200, 400).

8. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** said first laying element (100, 300) and said second laying element (200, 400) comprise, at one of their ends, means (23) for engaging respectively an end of an additional first laying element and an end of an additional second laying element.

9. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** said first fixing means (102, 302) and said second fixing means (202, 402) are distributed in an equidistant manner along the longitudinal extension of said first laying element (100, 300) and of said second laying element (200, 400) at a preset distance that can be selected from the following values: 15 centimeters, 20 centimeters and 25 centimeters.

10. The system (1) for laying bars according to one or more of the preceding claims, **characterized in that** it comprises:

- a third laying element (300), which comprises a plurality of third fixing means (302) which are distributed in an equidistant manner along the longitudinal extension of said third laying element (300), said fixing means (302) being configured to receive and immobilize a third group (304) of bars (303),
- a fourth laying element (400), which comprises a plurality of fourth fixing means (402) which are distributed in an equidistant manner along the longitudinal extension of said fourth laying element (400), said fourth fixing means (402) being configured to receive and immobilize a fourth group (404) of bars (403),

said fourth laying element (400) being associable with said third laying element (300) along a direction that is perpendicular to the direction of longitudinal extension of said third laying element (300), so that said third group (304) of bars (303) and said fourth group (404) of bars (403) define a second reinforcement mesh which is arranged above said first reinforcement mesh.

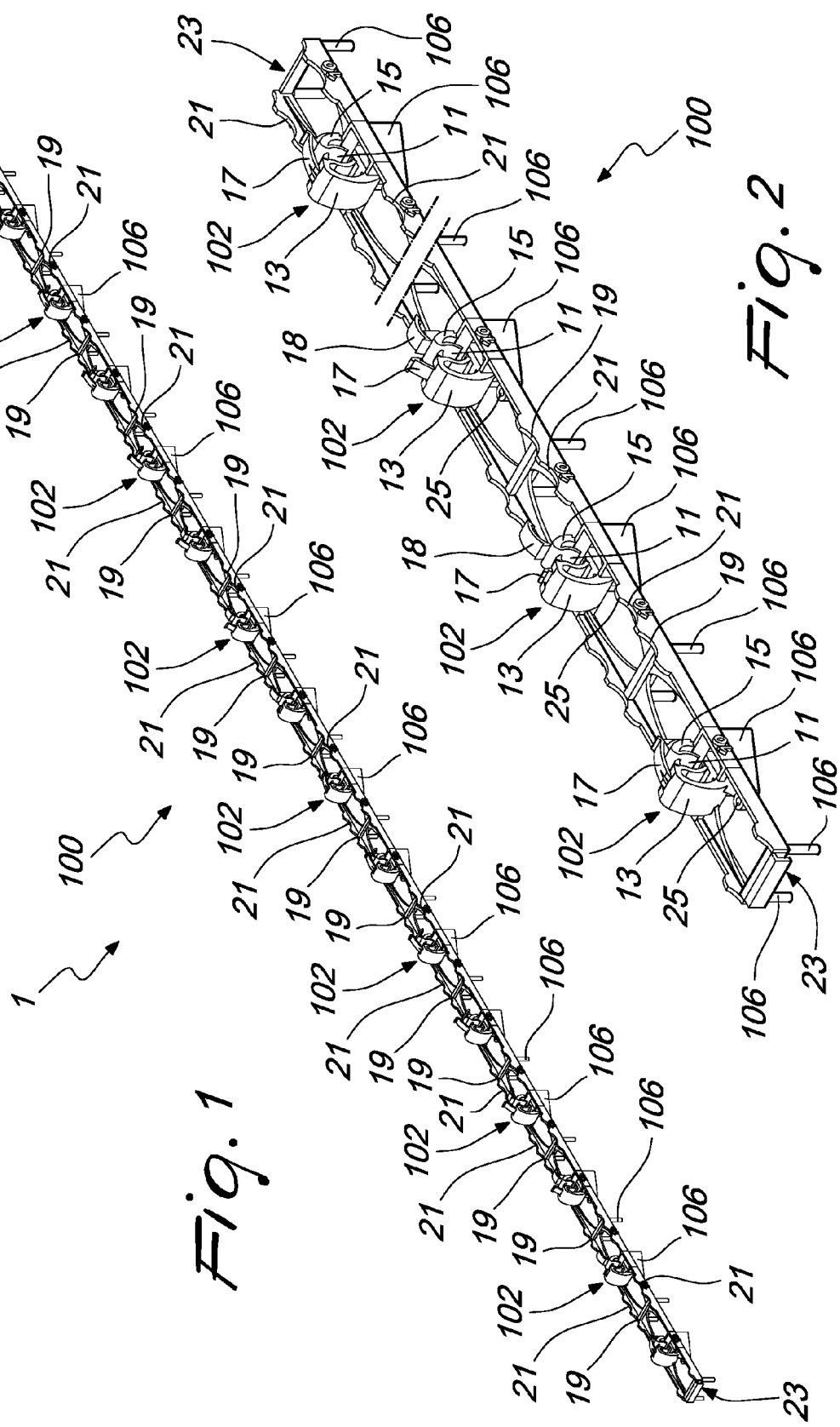


Fig. 1

Fig. 2

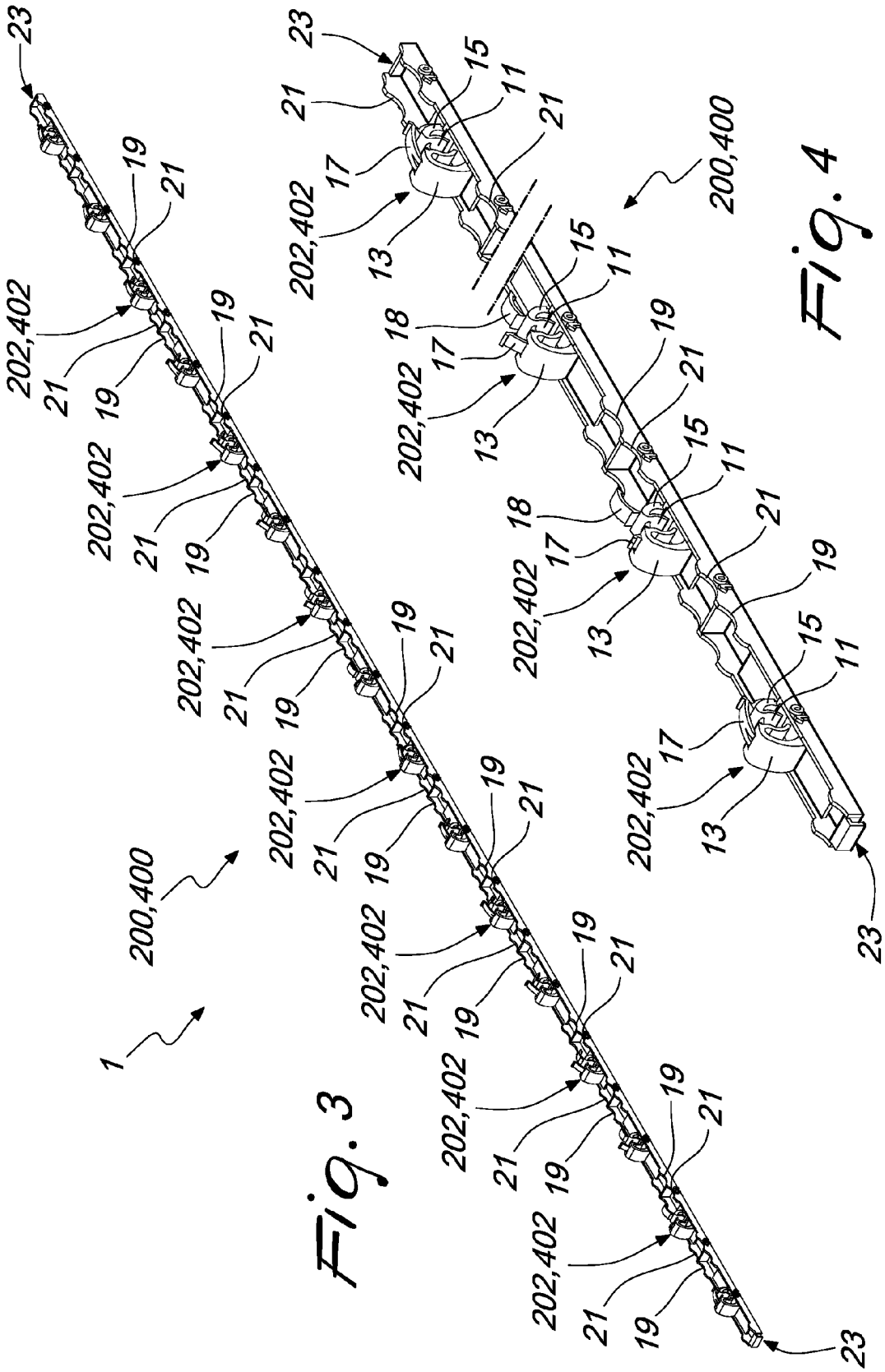


Fig. 3

Fig. 4

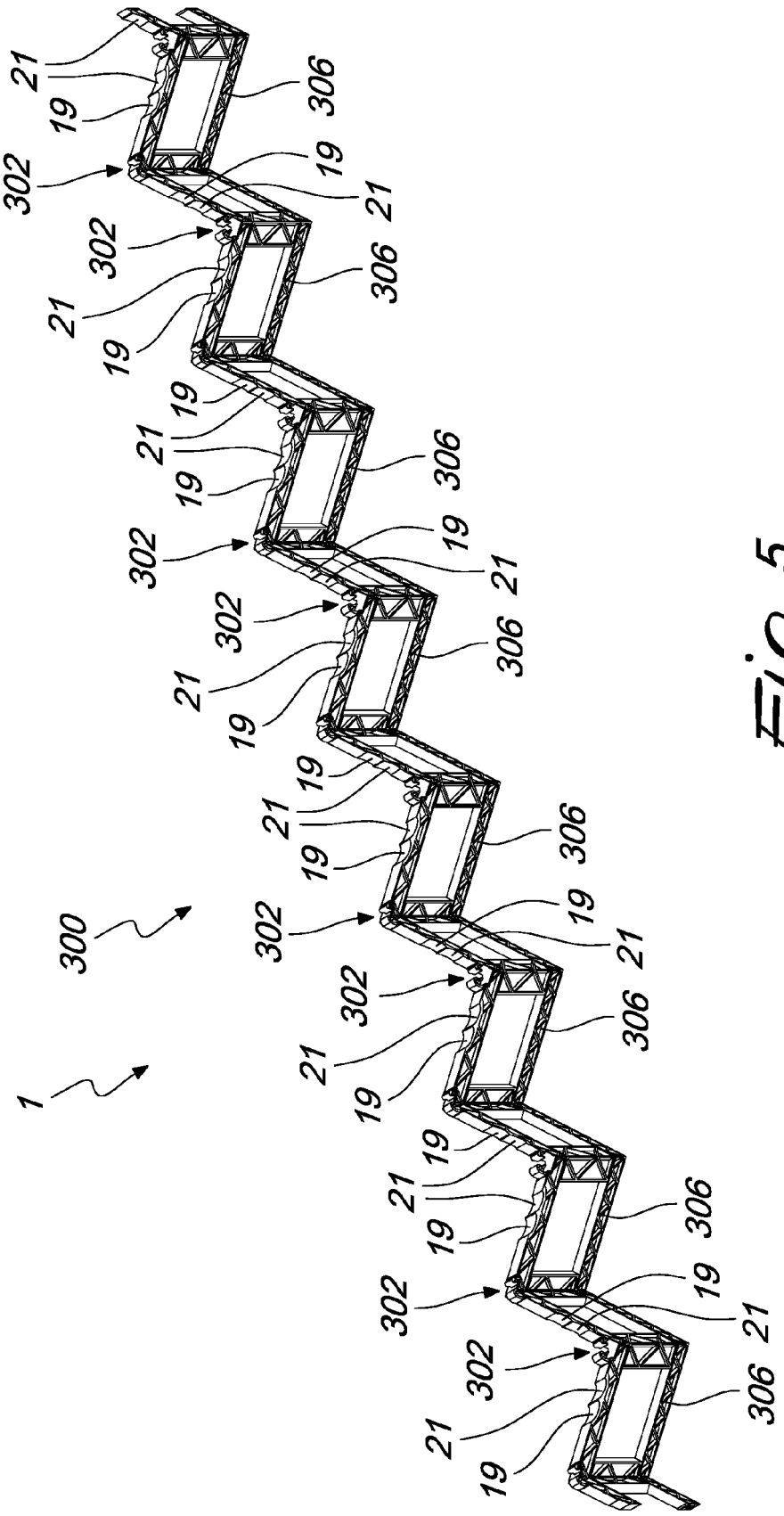


Fig. 5

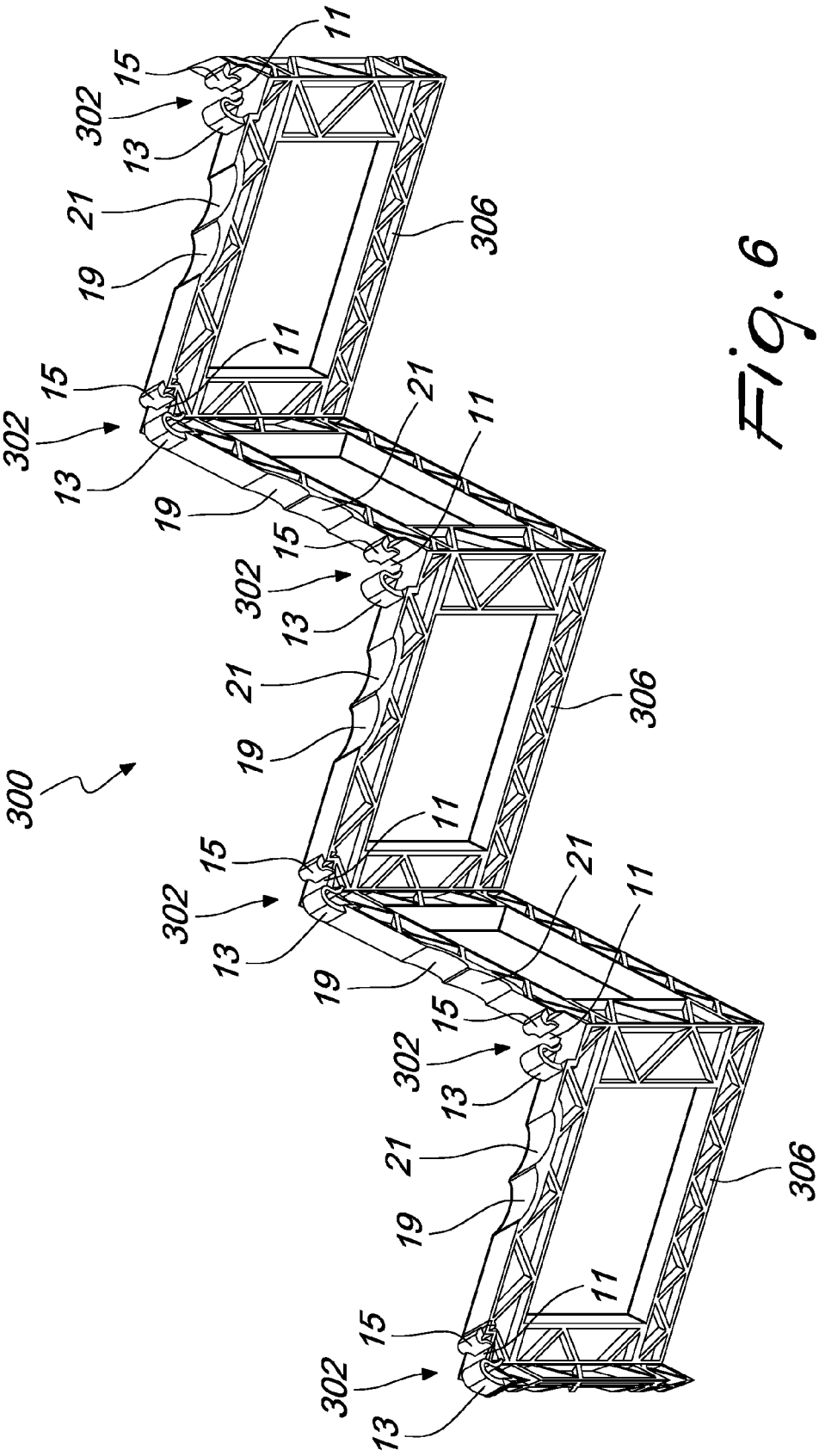


Fig. 6

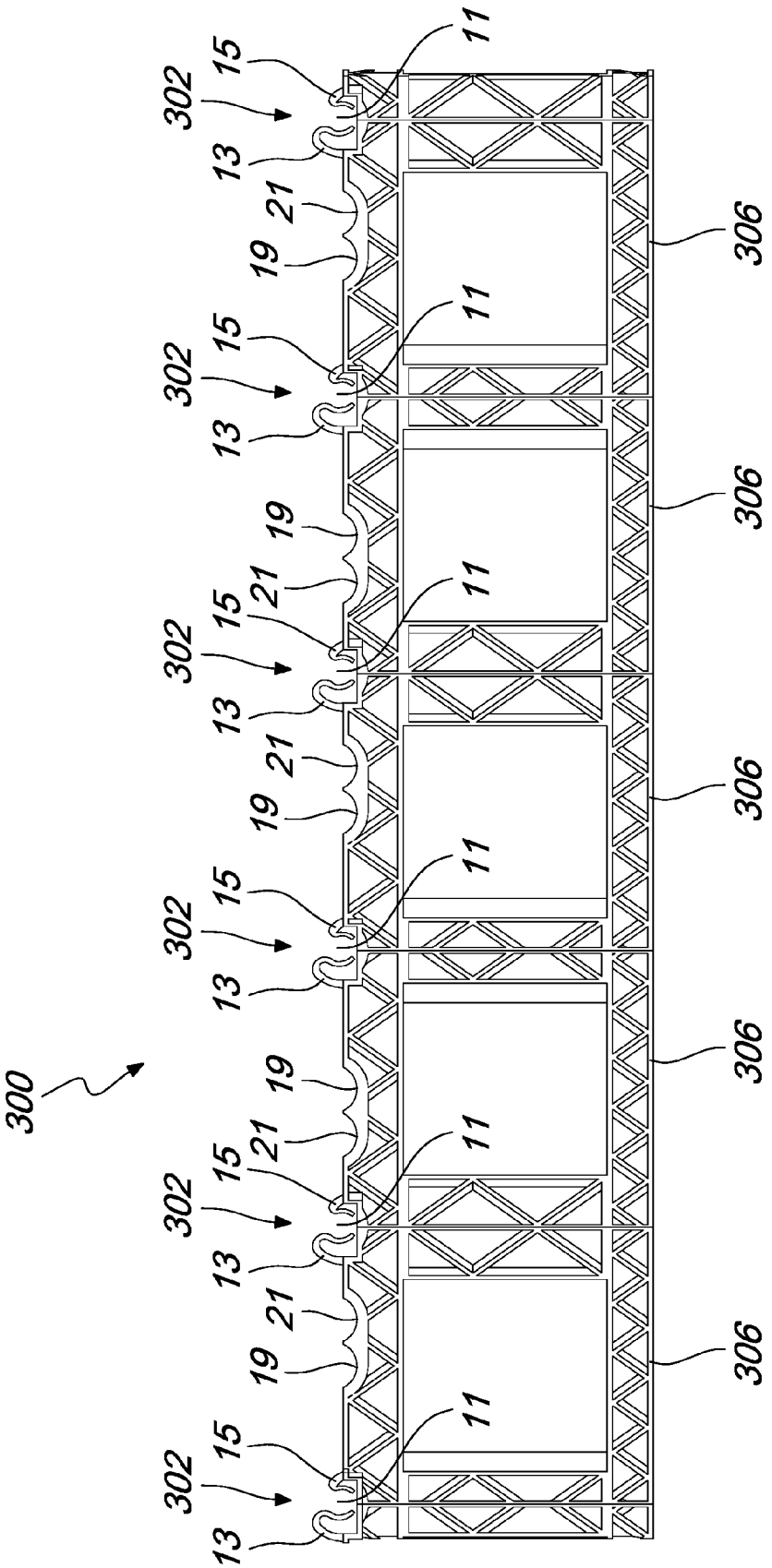


Fig. 7

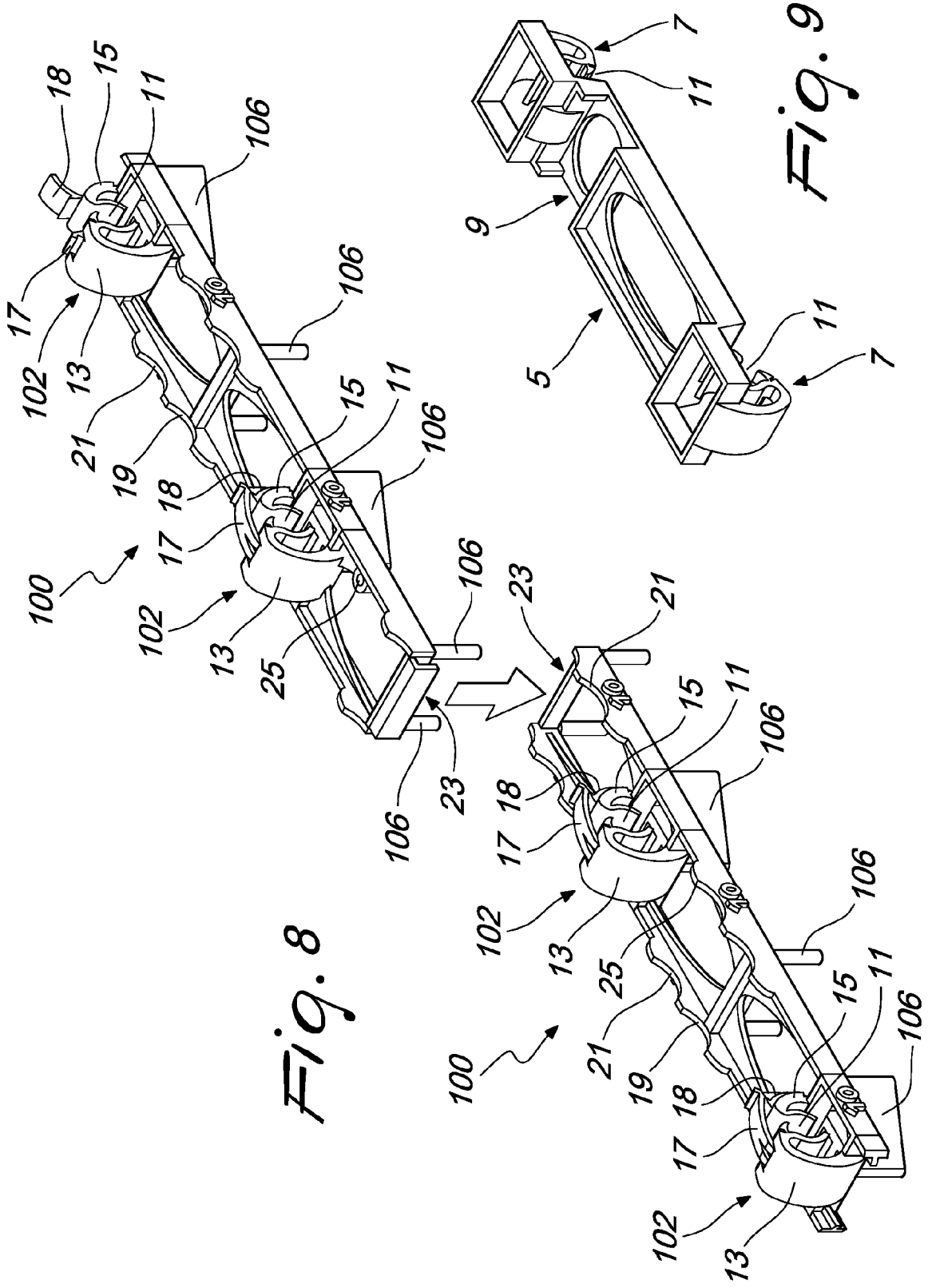
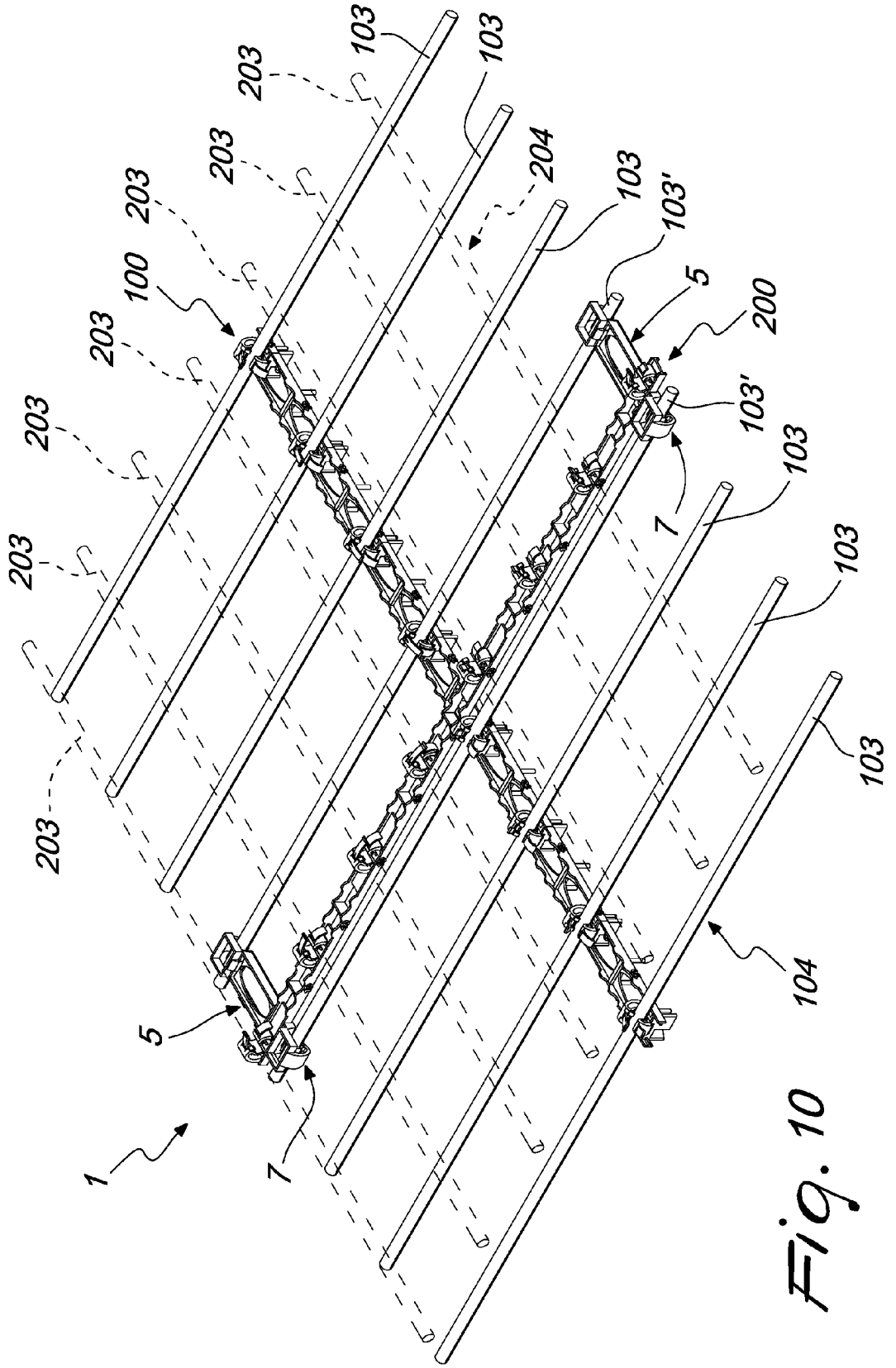


Fig. 8

Fig. 9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104
5
1
7

Fig. 10

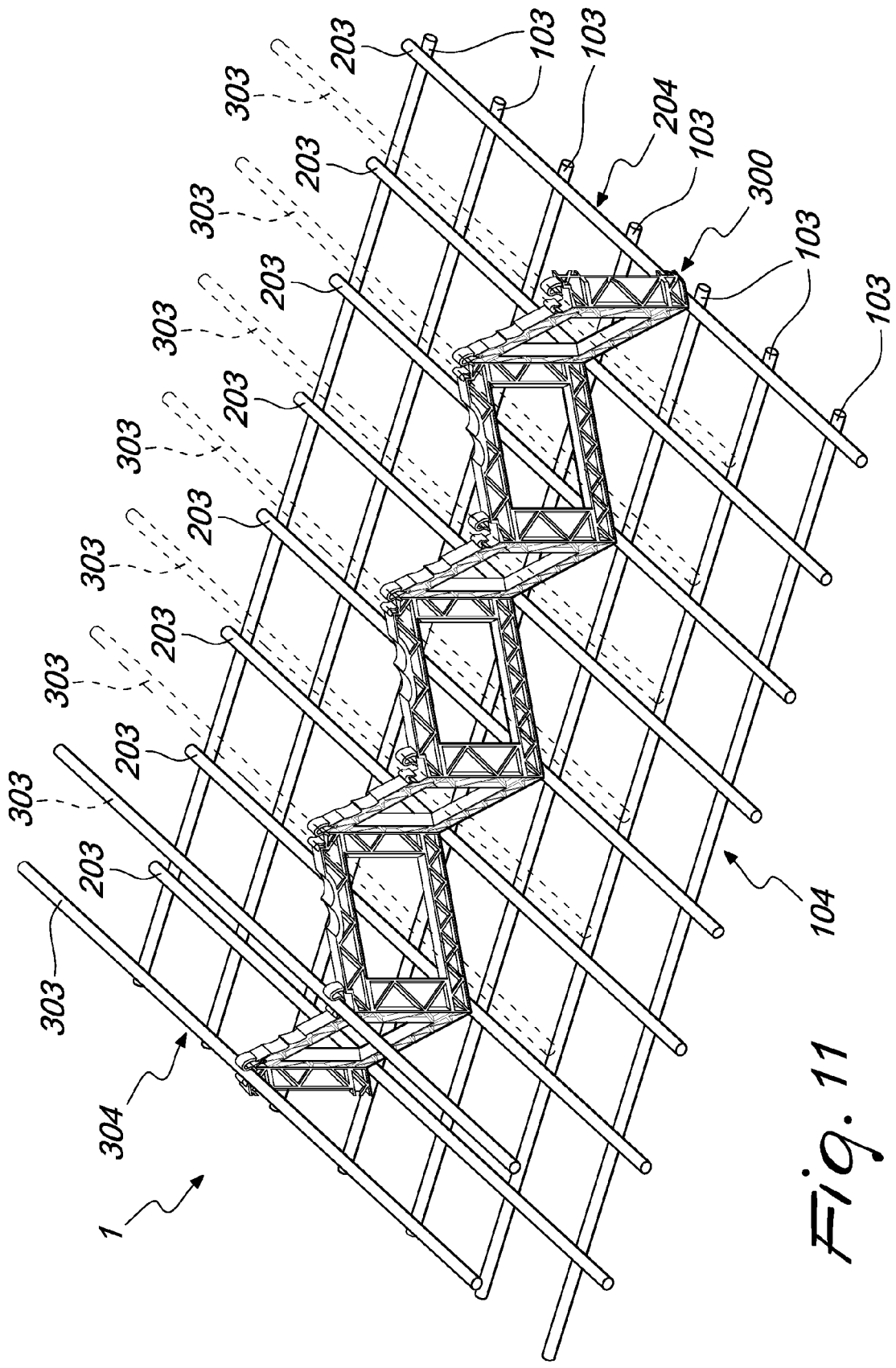
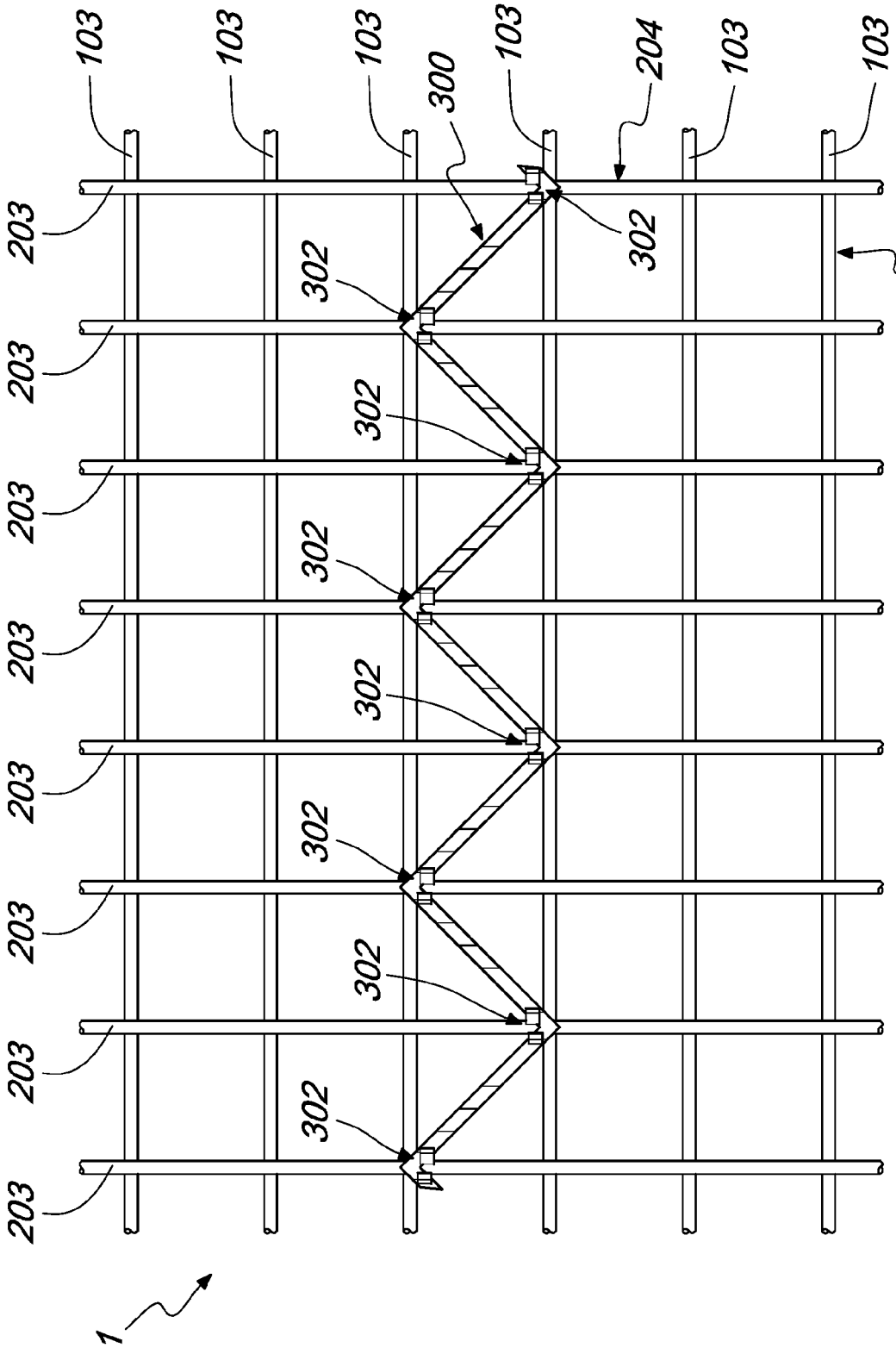


Fig. 11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204
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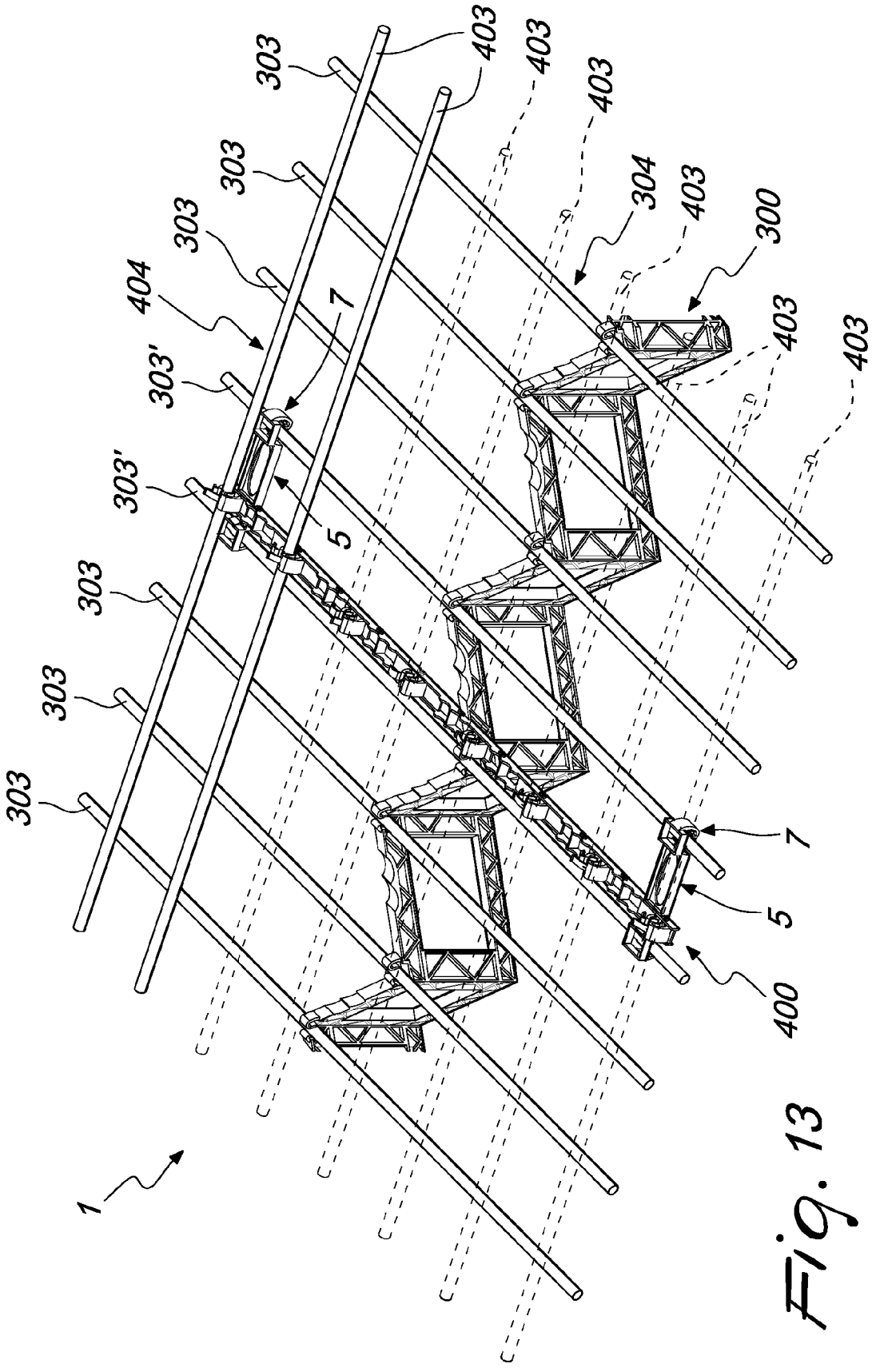
302
104
1

Fig. 12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303
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304
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303'
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403
303'
5
303
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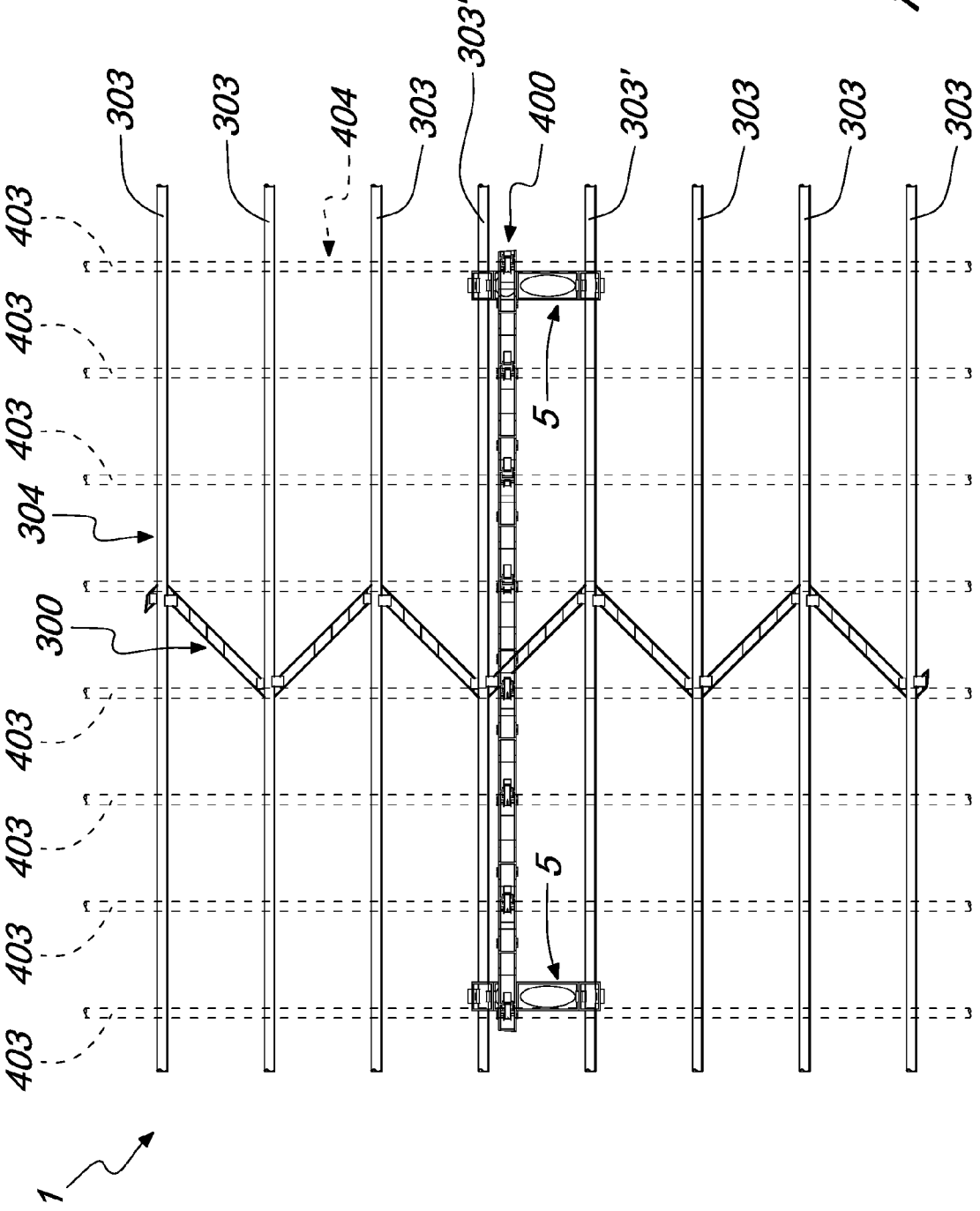
303
7
5
400
1

Fig. 13


303
303
404
303
303'
400
303'
303
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303
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304
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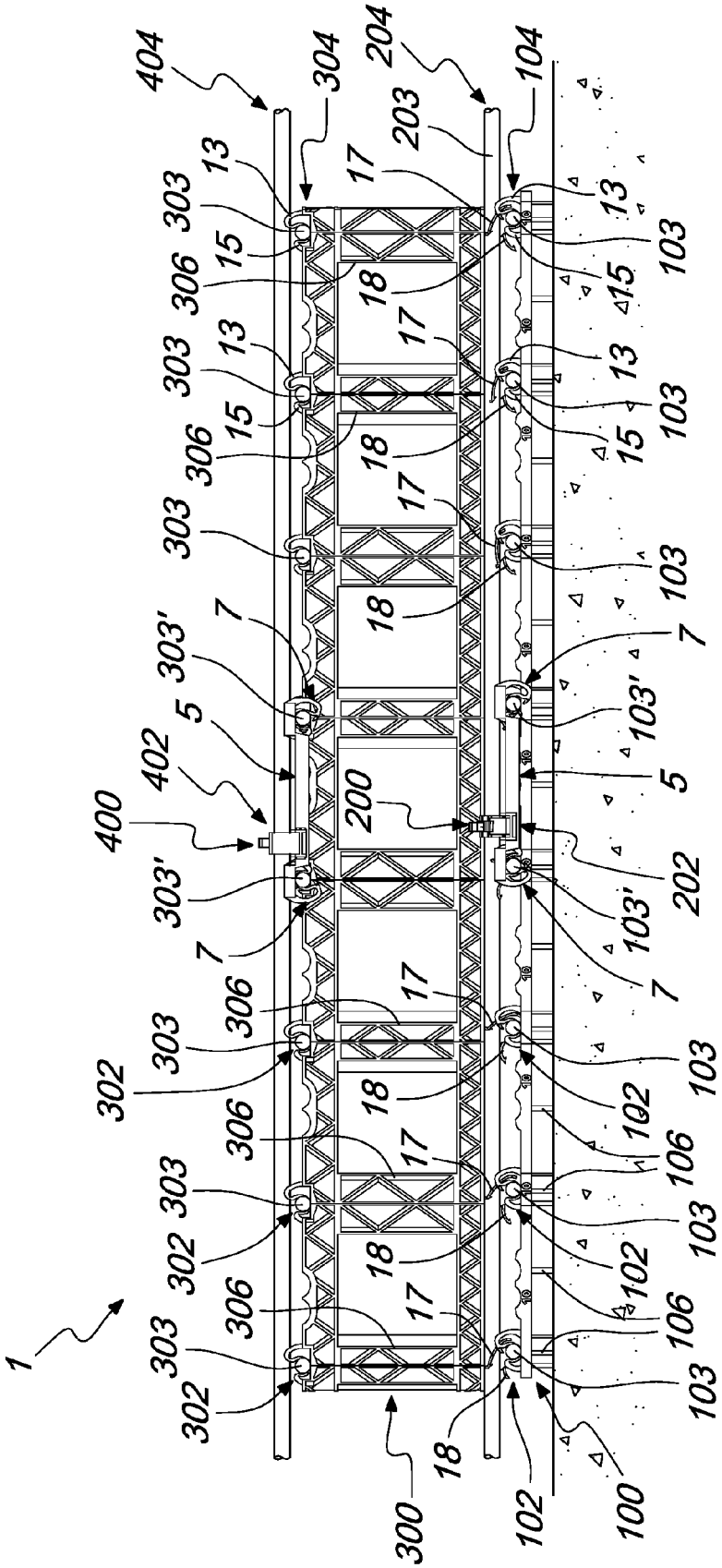
5
1

Fig. 14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304
204
104
13
303
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306
18
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303'
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200
202
103'
302
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102
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300
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Fig. 15

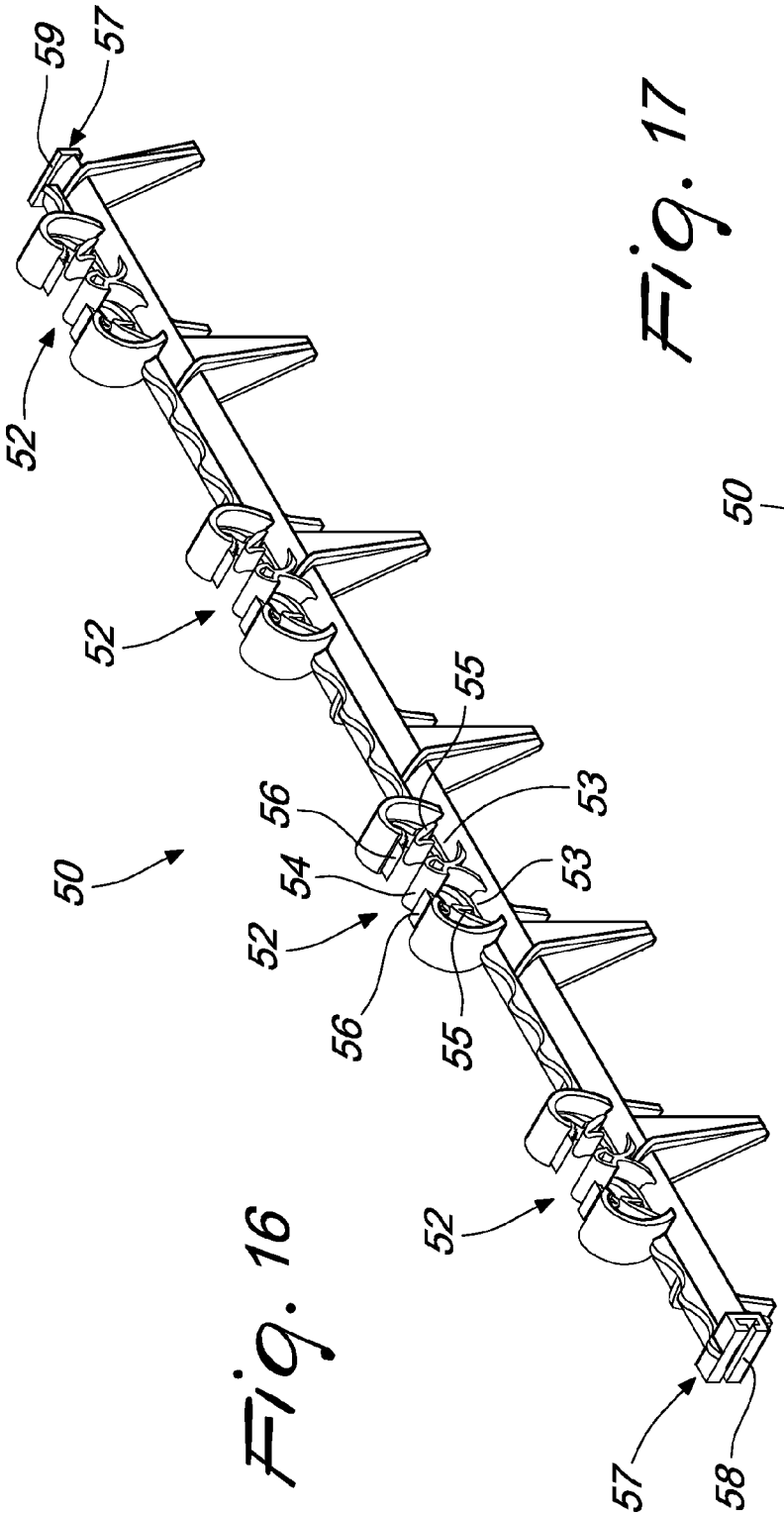
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Fig. 16

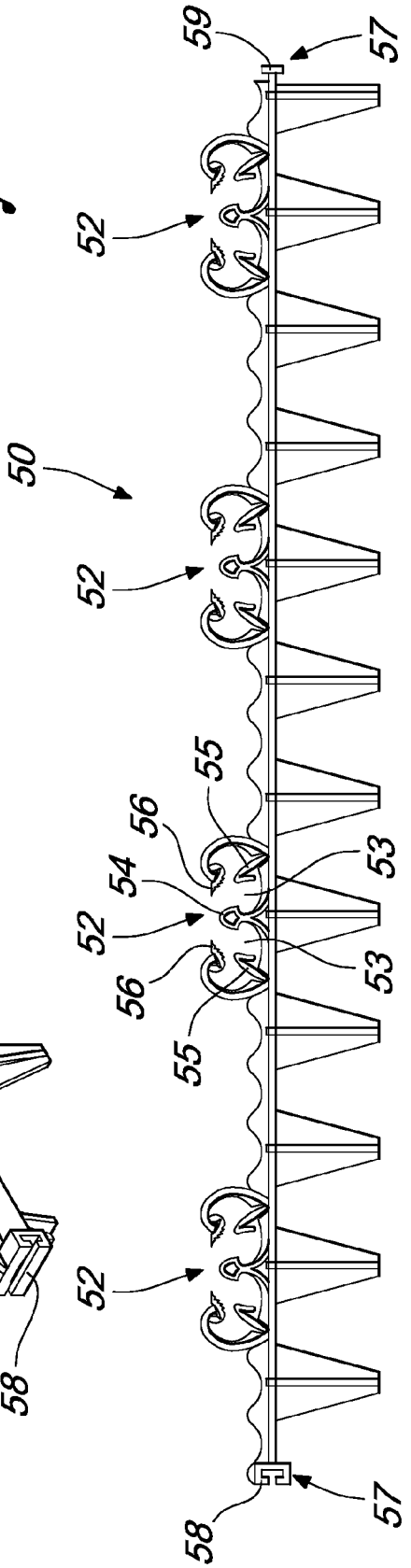
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Fig. 17

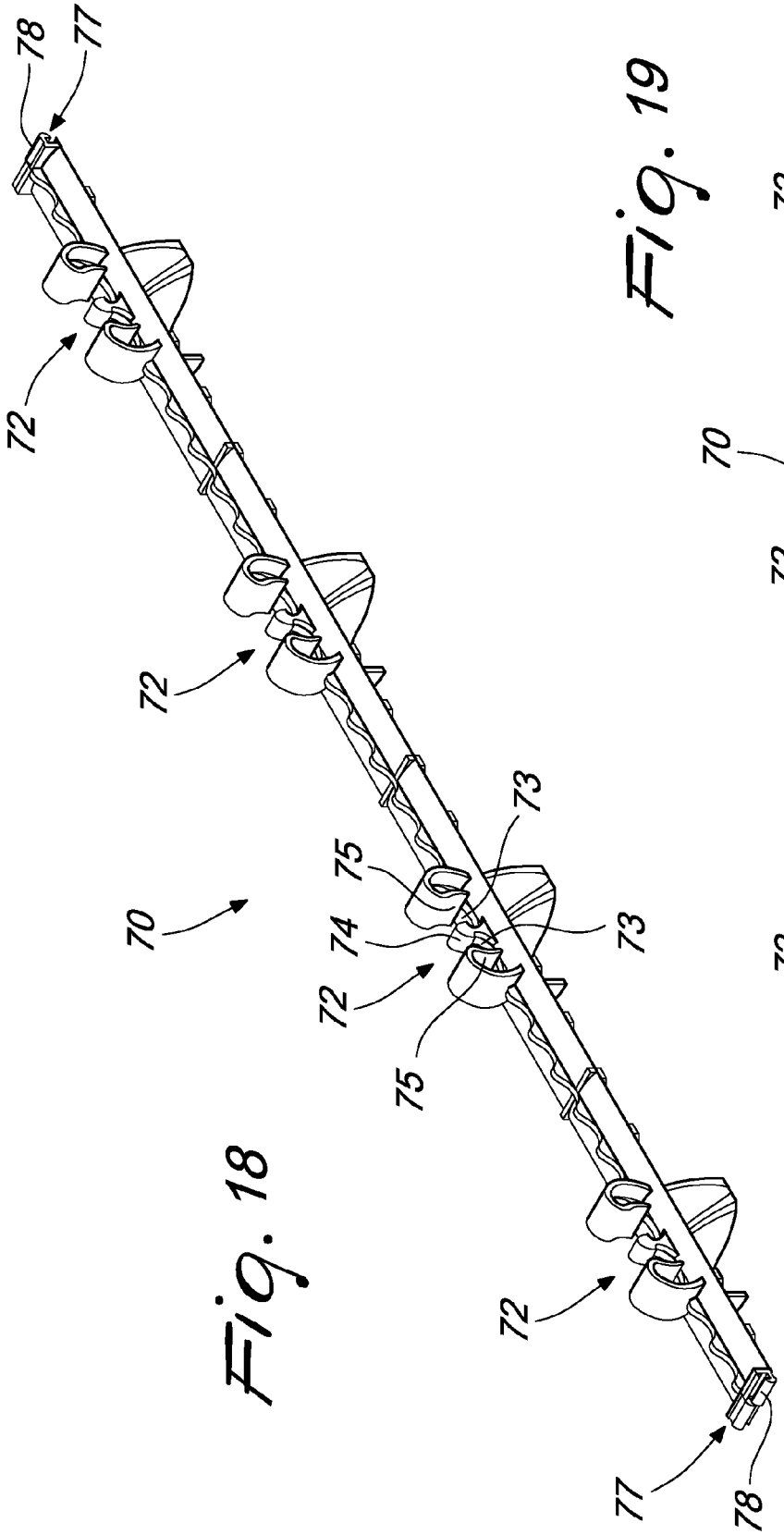
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Fig. 18

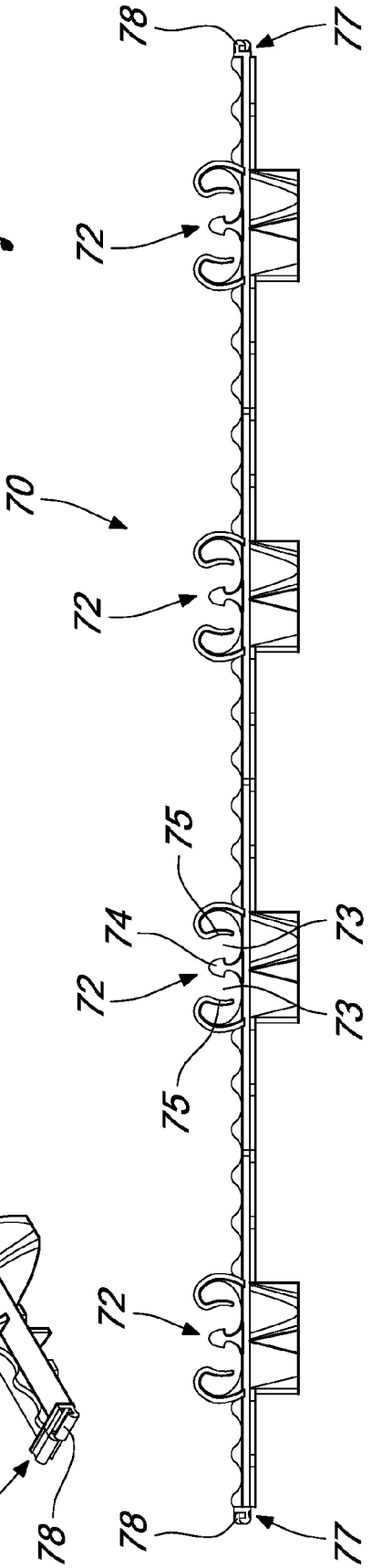
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Fig. 19

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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 6929

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A	* page 2, line 12 - line 60; figures *	6	
X	DE 31 17 050 A1 (J. AKRAPOVIC) 2 December 1982 (1982-12-02)	1-3,6-10	
A	* abstract; figures *	4,5	
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A	* claim 1; figures *	3,5,6,8,9	
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A	DE 79 00 197 U1 (H.W. DAUSEND) 26 April 1979 (1979-04-26) * page 5, line 1 - last paragraph; figures *	1-3,8	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 September 2015	Righetti, Roberto

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