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Description

[0001] The invention relates to an arrangement comprising a connector strip for slab formwork. The invention also relates to a method for erecting at least a portion of slab formwork.

[0002] Until now, in order to accomplish such connection tasks, solutions were applied on a case-by-case basis or the transition region between a first structure and a second structure was closed, which is more technical.

[0003] US 10 501 948 B2 relates to horizontal formwork, which makes it possible to extend the support base.

[0004] CN 201 738 566 U discloses a shaped steel beam for a system for horizontally supporting templates.

[0005] Post-published document WO 2020/150539 A1 relates to a formwork system for supporting forming panels for forming a horizontal concrete surface.

[0006] Furthermore, reference is made to ES 2 269 006 A1.

[0007] The problem addressed by the present invention is to simplify connection tasks.

[0008] This problem is solved by an arrangement according to claim 1.

[0009] Furthermore, the problem is solved by a method according to claim 4.

[0010] The connector strip for slab formwork of the arrangement according to the invention comprises a plurality of coupling regions spaced apart along its length for engagement with prop heads of formwork props.

[0011] The connector strip of the arrangement according to the invention can be used for slab formwork in order to pour concrete. However, it can also be used for other slab formwork, for example for temporarily underpinning a slab construction during repair work. The connector strip can therefore be used to create the connection between a first structure and a second structure during building work. The first structure can, for example, be an arrangement of elements of the slab formwork and the second structure can be a wall of a building, for example. The use of said connector strip in other connections is possible, for example connecting slab formwork to an adjacent horizontal steel girder.

[0012] In the connector strip of the arrangement according to the invention, the function of establishing the connection is innovatively associated with the inclusion of formwork props assigned to the connector strip.

[0013] The connector strip of the arrangement according to the invention can comprise a plurality of coupling regions spaced apart along its length for positive engagement with prop heads of formwork props. The positive engagement can be of such a kind that it substantially

acts in the longitudinal directional of the connector strip with respect to forces; a positive fit with respect to forces acting in different directions may be provided, but does not have to be.

[0014] According to the invention, said spaced-apart coupling regions include an end coupling region in each of the two longitudinal end regions of the connector strip. The connector strip thus spans the distance between a first formwork prop and a second formwork prop when mounted.

[0015] The respective end coupling regions can be designed such that the connector strip can either substantially only cover half of the width – measured in the longitudinal direction of the connector strip – of the prop head or can cover the entire width of the prop head when coupled to the relevant prop head. Said half coverage provides a possible way of continuing with another connector strip in the longitudinal direction of the connector strip that is easy to put into practice. The above-mentioned full coverage is in particular advantageous when said connector strip is not continued using another connector strip here, for example since the end of the connector strip abuts a wall of a building at this point.

[0016] According to the invention, the connector strip comprises at least one intermediate coupling region between the two end coupling regions for engagement with the prop head of a formwork prop, wherein the intermediate coupling region can have a different design to the design of the end coupling regions, but does not have to. The connector strip interacts with three or more formwork props in this case. The advantages of this embodiment will become even clearer below in the embodiments.

[0017] The connector strip of the arrangement according to the invention, as disclosed in the previous part of the description, can also be characterized in that at least one of the coupling regions comprises an insertion region for engagement with a receiving region on a prop head, or in that each of the coupling regions comprise an insertion region for engagement with a receiving region on a prop head. The "opposite configuration" is also possible, specifically that at least one of the coupling regions comprises a receiving region for engagement with an insertion region on a prop head or that each of the coupling regions comprise a receiving region for engagement with an insertion region on a prop head. Said insertion region/receiving region engagements, which can be formed as positive engagements but do not have to be, can be implemented in a simple manner when mounting the connector strip on the prop heads of formwork props. The insertion region/receiving region engagements are very robust. The effort of producing the connector strip and the prop heads is also comparatively low.

[0018] The connector strip of the arrangement according to the invention, as disclosed in the previous part of the description, can also be characterized in that, in cross section, it comprises

a leg that is horizontal during use and a leg that is vertical during use; and in that at least some of the coupling regions are positioned on the side of the leg that is vertical during use. This basic design of the connector strip is a good prerequisite for securely positioning the connector strip on the formwork props.

[0019] The connector strip of the arrangement according to the invention can have a main body made of metal, in particular of aluminum including aluminum alloys. The main body can be a metal extrusion to which additional parts are fastened.

[0020] The connector strip of the arrangement according to the invention can be designed such that its upper side is provided as part of the shaping surface of the slab formwork. In this case, the connector strip is a functional component of the formlining of the slab formwork during use. In this case, the upper side of the connector strip can be provided with a formlining. This can be brought about by a strip of formlining being attached to the top.

[0021] The connector strip of the arrangement according to the invention can comprise at least one abutment region, which is intended for abutting a wall, in particular a wall of a building. On account of this feature, it is possible to establish a connection function between the connector strip and the wall particularly effectively and the connector strip can be positioned relative to the wall in a particularly reliable manner.

[0022] The connector strip of the arrangement according to the invention, as disclosed in the previous part of the description, can also be characterized in that the distances between the coupling regions are of such a kind that engagement with prop heads of formwork props that are positioned at the center distance of the width of slab formwork panels is possible. As a result of being mounted on the prop heads of the relevant formwork props, the connector strip formed in this way requires the formwork props to be positioned at specified center distances, each of which correspond to the width of slab formwork panels. As a result, the slab formwork panels connecting to the connector strip can be installed in a particularly simple manner.

[0023] The connector strip of the arrangement according to the invention, as disclosed in the previous part of the description, can also be characterized in that, when coupled to the relevant prop head, it covers substantially only half of the width – measured transversely to the longitudinal direction of the connector strip – of the prop head. This does not exclude the fact that the width, measured transversely to the longitudinal extension of said connector strip, is greater than half of said prop head width, wherein some of the width of the connector strip then protrudes beyond the prop head. Said “half coverage” makes it possible to cover the other half of the prop head width by means of the edge region of a formwork panel or the corner sections of two formwork panels next to one another.

[0024] The invention relates to an arrangement, which comprises at least one formwork prop for slab formwork and a connector strip, as is disclosed in the previous part of the description, which is coupled to the prop head of the at least one formwork prop, characterized in that the connector strip rests on the prop head by its underside and one of the end coupling regions of the connector strip is in engagement with a counter-coupling region of the prop head. This arrangement is implemented in such a way that two formwork props are provided for slab formwork and the connector strip is coupled in said manner to the two formwork props by one of its two end coupling regions each time.

[0025] At least one other formwork prop is provided between said two formwork props, wherein the connector strip rests on the prop head of the other formwork prop by its underside and an intermediate coupling region of the connector strip is in engagement with a counter-coupling region of the prop head of the other formwork prop.

[0026] The formwork prop(s)/connector strip arrangement, as disclosed in the previous part of the description, can be designed such that the two formwork props assigned to the two end coupling regions of the connector strip can be provided with a stabilization means, for example a tripod, whereas the other formwork prop(s) assigned to the intermediate coupling region(s) of the connector strip can be designed so as not to comprise a stabilization means but can also be designed so as to comprise a stabilization means. The arrangement according to the invention can be implemented such that, on account of being positioned on formwork props, the connector strip defines the mutual distance between the formwork props, for example the distance or distances suitable for the width or the widths of slab formwork panels.

[0027] The arrangement according to the invention, as disclosed in the previous part of the description, also comprises at least one slab formwork panel, which rests on the prop head of a relevant formwork prop assigned to the connector strip in each of its two corner sections adjacent to the connector strip and is in engagement with this prop head. Therefore, the connector strip constitutes a starting slab formwork member; it provides a connection between the slab formwork and a wall, for example; it provides a transition between the wall and slab formwork panels, for example. The connector strip can have such a height that its upper side and the upper side of the at least one slab formwork panel lie substantially in one plane.

[0028] The formwork prop(s)/connector strip arrangement, as disclosed in the previous part of the description, can be designed such that the connector strip covers substantially only half the width – measured transversely to the longitudinal direction of the connector strip – of the prop head of the at least one formwork prop. This does not exclude the fact that the width of the connector strip measured transversely to its longitudinal extension is greater than half of said

prop head width, wherein some of the width of the connector strip then protrudes beyond the prop head. The remaining width of the prop head can be used for the edge region of a slab formwork panel or the corner sections of two adjacent slab formwork panels. Connected to one another, the upper side of the connector strip and the upper side(s) of this slab formwork panel or these slab formwork panels form a portion of a shaping surface for the concrete.

[0029] The formwork props provided in the arrangement according to the invention and assigned to the connector strip can comprise prop heads that each comprise a lowering region on the side facing the at least one adjacent formwork panel, which can be lowered relative to the rest of the prop head in order to lower the two corner sections of the at least one slab formwork panel that are adjacent to the connector strip.

[0030] In the arrangement according to the invention, as disclosed in the previous part of the description, the feature "is in engagement" is designed to become "is in positive engagement." The feature "in engagement" therefore preferably means that a positive engagement is present or provided.

[0031] The invention also relates to a method according to claim 4 for erecting at least a portion of slab formwork comprising a connector strip, as is disclosed in the previous part of the description, characterized by the steps of:

(a) placing a first formwork prop next to a wall;

(b) placing a second formwork prop next to the wall, specifically essentially at the center distance specified by the two end coupling regions of the connector strip; and

(c) placing the connector strip on the first and the second formwork prop, wherein one end coupling region of the connector strip is brought into engagement with a counter-coupling region of a prop head of the relevant formwork prop, and wherein said engagements define the center distance between the first and the second formwork prop in the portion of the slab formwork.

[0032] As already mentioned above, it is also possible in this case to install the first and the second formwork props, each provided with a stabilization means.

[0033] This method is continued by the additional step of:

(d) placing at least one further formwork prop next to the wall between the first and second formwork prop, with an intermediate coupling region of the connector strip being brought into engagement with a counter-coupling region of a prop head of the at least one further formwork prop, and with said engagement defining the positioning of the at least one further formwork prop in the portion of the slab formwork. Said engagements therefore define the center distances between the formwork props

assigned to the connector strip. These center distances can be adapted to match the width or widths – which may also be different from one another – of slab formwork panels.

[0034] As an additional step, the method according to the invention can comprise:

(e) attaching a retaining element that acts between the wall and the connector strip and holds the connector strip against the wall. The retaining element can be designed such that it not only prevents the connector strip from moving away from the wall, but also ensures that the spatial position of the connector strip is maintained, in particular the alignment of the upper side of the connector strip as part of the – mainly horizontal – shaping surface of the slab formwork.

[0035] The method according to the invention, as disclosed in the previous part of the description, is continued by the additional step:

(f) that a slab formwork panel or a plurality of slab formwork panels of a row of slab formwork panels is/are hung at two corner sections on the prop heads of two adjacent formwork props assigned to the connector strip, and then pivoted upwards with the two other, non-hung corner sections and is/are propped up by a formwork prop in at least one of these two other corner sections. "Propping up the relevant slab formwork panel at these two other corner sections by a formwork prop in each case" can also be carried out in two steps, specifically firstly propping it up in one of the two other corner sections using a formwork prop, then hanging and pivoting the adjacent slab formwork panel of the row of slab formwork panels upwards, and then positioning another formwork prop that props up the second of the two other corner sections and a first of the two other corner sections of the adjacent slab formwork panel. This procedure will become even clearer below in the embodiments.

[0036] Furthermore, a method for removing at least a portion of slab formwork, which comprises a connector strip as disclosed in the previous part of the description and optionally a slab formwork panel or a plurality of slab formwork panels of a row of slab formwork panels, which is/are adjacent to the connector strip, is characterized by the steps of:

(g) optionally removing the slab formwork panel or the slab formwork panels that is/are adjacent to the connector strip;

(h) optionally removing the at least one other formwork prop assigned to the connector strip; and

(i) taking the connector strip off of the prop heads of the first and the second formwork props and removing the first and second formwork props.

[0037] The last-mentioned method achieves the advantageous effect that, when the process of dismantling or taking down the slab formwork has practically finished, an arrangement remains consisting of the connector strip and a row of formwork props assigned to the connector strip. This arrangement remains securely standing on account of the stabilization means of at least some of these formwork props without a person having to hold it in some way or another. Again, a single person can then dismantle it in their own time at the end. In this case, there are two possibilities for step (i): firstly taking the connector strip off of the prop heads of the first and the second formwork props and then removing the first and the second formwork props, or the first or the second formwork prop is removed first and the connector strip is then taken off of the prop head of the other of these two formwork props and the other of the two formwork props is lastly removed.

[0038] It is emphasized that said method steps (a) to (f) and (g) to (i) are not supposed to establish a mandatory order for these steps, although in some cases a step sequence as per the order of steps (a) to (f) and (g) to (i) – specified by technical sense – is logical.

[0039] Therefore, for example the connector strip can either be placed on the first and the second formwork prop at virtually the same time or alternatively the connector strip can firstly be placed on the first formwork prop, then pivoted further upwards and then propped up by the second formwork prop. The retaining element can be attached either before or after step (d). Step (i) can be carried out either before or after step (h).

[0040] After constructing a row of slab formwork panels as per step (f), another row of slab formwork panels can be constructed or a plurality of rows of slab formwork panels can be constructed one after the other in a corresponding manner. The same applies for removing at least a portion of slab formwork in the reverse order.

[0041] In several cases, the above-mentioned erection of formwork props includes bringing the prop heads to a desired or required height. For formwork props that are popular in formwork construction, this is often done by "spindling," i.e. by adjusting the height of part of the formwork prop by means of a nut/lead screw drive. Accordingly, when dismantling or removing the formwork props, it is necessary at least in some cases to lower at least the part of the prop head on which one or more slab formwork panels or the connector strip rests(s). This can be done at least in some cases by lowering a prop portion, for example by means of a nut/lead screw drive. The process of moving part of the formwork prop upward, which is mentioned in this paragraph of the description, and moving part of the formwork prop downward, as mentioned in this paragraph, will become even clearer below in the embodiments.

[0042] It is highlighted that, as an alternative, it is possible within the invention to start with fastening the connector strip to a wall and to then couple the formwork props assigned to the connector strip to the connector strip in the positions specified by the connector strip. According to another alternative according to the invention, the connector strip is firstly coupled to the two end formwork props in an assembled condition that does not correspond to the condition described above comprising upright formwork props next to a wall. For example, in a condition in which the two end formwork props lie on the ground, the connector strip can be coupled to these formwork props. The coupled arrangement is then moved into the use position next to a wall, for example by being set in an upright position from the lying-down condition.

[0043] The invention and more specific embodiments of the invention will be explained in more detail in the following on the basis of embodiments shown by the drawings, in which:

Fig. 1 is a perspective view of a connector strip showing the upper side of the connector strip at an angle from above;

Fig. 2 is a perspective view of the connector strip in Fig. 1 showing the connector strip at an angle from below;

Fig. 3 is a first lateral view of the connector strip in Fig. 1 and 2, viewed in the direction of arrow III in Fig. 1;

Fig. 4 is a second lateral view of the connector strip in Fig. 1 and 2, viewed in the direction of arrow IV in Fig. 1;

Fig. 5 is a view from below of the connector strip in Fig. 1 and 2 according to arrow V in Fig. 1;

Fig. 6 shows the connector strip in Fig. 1 and 2, viewed in the direction of one of its end faces according to arrow VI in Fig. 2;

Fig. 7 to 12 are perspective views of a plurality of temporally successive phases of the erection of a portion of slab formwork;

Fig. 13 is a larger scale end view of the connector strip/formwork prop arrangement in Fig. 8, viewed in the direction of arrow XIII in Fig. 8;

Fig. 14 shows a larger scale cut-out of Fig. 13 according to circle A;

Fig. 15 is a larger scale perspective view of the connector strip/formwork prop arrangement in Fig. 9, viewed in the direction of arrow XV in Fig. 13;

Fig. 16 is a larger scale perspective view of the connector strip/formwork prop arrangement in Fig. 9, viewed in the direction of arrow XVI in Fig. 13; and

Fig. 17 shows a larger scale cut-out of Fig. 16 according to circle B.

[0044] The connector strip 2 shown in Fig. 1 to 6 is largely made of aluminum or an aluminum alloy. In this embodiment, it has a length of 300 cm. Connector strips 2 having longer lengths or shorter lengths are possible; normally the manufacturer will offer a range of connector strips 2 graded according to length.

[0045] The connector strip 2 has – roughly speaking – a T-shaped cross section, as is most easily seen in Fig. 1 and 2 at the end face and in Fig. 6. The "T" has a leg 4 that is horizontal during use of the connector strip 2 and a leg 6 that is vertical during use of the connector strip 2. The vertical leg 6 has a wider region 8 for approximately 1/3 of its height, where it adjoins the horizontal leg 4, that has a width – measured transversely to the longitudinal extension of the horizontal leg 4 and the vertical leg 6 – that is greater than the width in the lower part of the vertical leg 6. The cross section of the wider region 8 is shaped as a substantially square hollow profile, which comprises a longitudinally extending central slot on its upper side that takes up a large part of the width of the wider region 8. A strip 10 made of wood or plastics is inserted into the cavity of the hollow profile in the longitudinal direction. Screws 12 are screwed through the horizontal leg 4 and through said slot into this strip 10 from above, as a result of which the horizontal leg 4 is fastened to the vertical leg 6. The vertical leg 6 is, excluding said strip 10, an extruded aluminum or aluminum alloy part.

[0046] Another strip 14 made of wood or plastics is fastened in the angular space between a longitudinal side of the wider region 8 and the lower side of the horizontal leg 4 by means of horizontal screws 16, which pass through the hollow profile and into said strip 10. It can be seen in Fig. 4 that the additional strip 14 consists of a plurality of portions. The additional strip 14 comprises an approximately square cross section. The side of the additional strip 14 facing away from the wider region 8 is vertically aligned with the connecting longitudinal side of the horizontal leg 4.

[0047] The connector strip 2 comprises a total of four coupling regions 20, 22 for positive engagement with a coupling region on a prop head of a formwork prop, which coupling region is to be described below. Two of the coupling regions are end coupling regions 20, each of which are provided in a longitudinal end region of the connector strip 2. The other two coupling regions are intermediate coupling regions 22, which are provided between the two end coupling regions 20 on the connector strip 2. The four coupling regions 20, 22 can be seen in particular in the view from below the connector strip 2 in Fig. 5. The intermediate connection regions 22 can also be easily seen in Fig. 1 and 2. The lower end regions 24 of the end coupling regions 20, which lower end regions 24 protrude downwards beyond the lower end of the vertical leg 6 and are beveled slightly on two sides, can be seen in Fig. 2. The two

end coupling regions 20 and the end regions 24 thereof that protrude downwards can also be easily seen in Fig. 4 and 6. The two intermediate coupling regions 22 can be easily seen in Fig. 1, 2, 3 and 6.

[0048] Each of the coupling regions 20 and 22 represents an insertion region, which, when assembling the connector strip 2 with prop heads of formwork props, as is to be described below, is received in a receiving region of the relevant prop head.

[0049] Each of the coupling regions 20 and 22 divides – in the embodiment drawn – into two pins 21 and 23 that are vertical during use and are spaced apart in the longitudinal direction of the connector strip 2. In the embodiment drawn, the two pins 21 of the relevant end coupling region 20 are a common component made of metal, which is fastened to the side of the vertical leg 6 of the connector strip 2, for example by means of screws. In the embodiment drawn, the two pins 23 of the relevant intermediate coupling region 22 are each a separate component made of metal, which is fastened to the side of the vertical leg 6 of the connector strip 2, for example by means of screws. The pins 21 and 23 are each substantially shaped – in horizontal cross section – as a hollow square having a fastening region affixed thereto for fastening to the connector strip 2. The pin components can be made from bent sheet metal, in particular sheet steel.

[0050] The pins 21 of the end coupling regions 20 are arranged on one of the two longitudinal sides of the vertical leg 6, whereas the intermediate coupling regions 22 are arranged on the opposite side of the vertical leg 6.

[0051] Furthermore, in the embodiment drawn, there are three positioning regions 26 across the length of the connector strip 2. Each of the positioning regions 26 divides into two pins 27, which are spaced apart in the longitudinal direction of the connector strip 2 and are vertical when the connector strip 2 is in use. The two pins 27 of each positioning region are combined to form a common component that, in the embodiment drawn, is made from bent sheet metal, in particular sheet steel, and is fastened to the side of the vertical leg 6 of the connector strip 2, for example by means of screws, on the same side as the end coupling regions. The pins 27 are each substantially shaped – in horizontal cross section – as a hollow trapezoid.

[0052] The pins 23 and 27 do not protrude downward beyond the lower end of the vertical leg 6. The pins 21, 23, 27 are not free on all sides, but are each positioned close to the vertical leg 6 on one side, as can be easily seen in the drawings.

[0053] The distance between the end face of the connector strip 2 on the left in Fig. 5 and the center 30 of the next intermediate coupling region 22 is 1 m. This is the same distance as that between the center 30 of the two intermediate coupling regions. In turn, this is the same

distance as that between the center of the intermediate coupling region 22 on the right in Fig. 5 and the end face of the connector strip 2 on the right in Fig. 5. The particular distance between the center 28 of one end coupling region 20 and the center 30 of the adjacent intermediate coupling region is slightly shorter than 1 m. The positioning regions 26 are each arranged approximately in the center between two adjacent coupling regions 20 and 22.

[0054] Fig. 7 to 12 demonstrate – by means of a graphic representation of a plurality of temporally successive construction phases – how a connector strip 2 is constructed and then how a row of slab formwork panels 40 is constructed.

[0055] It is pointed out that some of the details of the connector strip 2 drawn in Fig. 7 to 17 are different to those of the connector strip 2 drawn in Fig. 1 to 6. This applies in particular to the fact that, in the connector strip 2 drawn in Fig. 7 to 17, the vertical leg 6 of the connector strip 2 is made of wood instead of metal and that pieces of wood 32 or plastics pieces 32 are provided instead of the positioning regions 26 (see Fig. 15). Nevertheless, Fig. 7 to 17 effectively demonstrate how the connector strip 2 drawn in Fig. 1 to 6 can also be used.

[0056] Fig. 7 to 12 each schematically show a corner of a room, wherein a floor 50 (= ceiling of an underlying room, for example), a first wall 52 and a second wall 54 extending at a right angle thereto are shown. Together, the two walls 52 and 54 form a corner of a room.

[0057] In the first phase drawn in Fig. 7, a first formwork prop 60 has previously been installed right next to the second wall 54 and a second formwork prop 62 has been installed right next to the second wall 54. The first formwork prop 60 is also positioned right next to the first wall 52, and therefore right in the corner of the room. Each of the two formwork props 60 and 62 is provided with a stabilization means 64 in the form of an adjustable tripod, and therefore the formwork props 60 and 62 are also vertically positioned without being held. The center distance between the formwork props 60 and 62 (i.e. horizontal distance between the vertical central axes of the formwork props 60 and 62) is slightly less than 3 m1 in the embodiment drawn. It goes without saying that, in a connector strip 2 of a different length, the formwork props 60 and 62 have to be installed at a correspondingly larger or smaller distance. In order to put the formwork props 60 and 62 up at the correct distance, the connector strip 2 can be placed on the floor as a measure, but a different approach can also be taken.

[0058] For the sake of conciseness, the following shall only refer to “prop” instead of “formwork prop.”

[0059] Fig. 7 also shows how the connector strip 2 can be placed on the previously positioned props 60 and 62 by just one person (other ways of placing the connector strip 2 on said props being possible). The connector strip 2 has firstly been placed on a prop head 61 of the first prop

60 from above in a slightly oblique position. A formwork aid 66 (i.e. a rod whose length is slightly smaller than the height of the room specified) is used to grab under the connector strip 2, and specifically at a point that is logically not very far from the end of the connector strip 2 that is on the right in Fig. 7. By means of the formwork aid 66, the operator can lift this right end of the connector strip 2 slightly higher than a prop head 63 of the second prop 62 and then set it down onto the prop head 63 from above; see the second phase drawn in Fig. 8.

[0060] The step described of placing the connector strip 2 on the prop heads 61 and 63 is carried out in that the end coupling region 20 of the connector strip 2 that is on the left in Fig. 7 comes into positive engagement with a receiving region 70 of the first prop 60 (see in particular also Fig. 14 in this regard) and in that the end coupling region 20 of the connector strip that is on the right in Fig. 7 comes into positive engagement with a receiving region 70 on the prop head 63 of the second prop 62 (see in particular also Fig. 14 in this regard).

[0061] The props 60, 62, etc. drawn in Fig. 7 to 17 each comprise an upwardly protruding positioning extension 72 in the center of the prop head 61, 63, etc.; see in particular Fig. 14 and 17. As can be seen particularly clearly in Fig. 13 and 14, the vertical leg 6 of the connector strip 2 is lowered into the space between the second wall 54 and the positioning extensions 72 of the prop heads 61 and 63 such that the positioning regions 26 of the connector strip 2 rest against the second wall 54 by means of their side 29 facing away from the vertical leg 6. When bringing the end coupling region 20 of the connector strip 2 that is on the left in Fig. 7 into engagement with the receiving region 70 of the prop head 61, the two pins 21 of this end coupling region 20 each enter a receiving space between two substantially vertical jaws 74 of the prop head 61. This can be seen at the top right of Fig. 15. In addition, we have to imagine that the four jaws 76 shown in Fig. 17 are also provided on the other side of the prop head 61 substantially in the form of a mirror image, i.e. behind the positioning extension 72 and behind the vertical leg 6 of the connector strip 2 covering the jaws 74. By means of the engagement of the two pins 21 into the two receiving spaces described, a positive engagement forms here between the connector strip 2 and the prop head 61 with respect to forces acting in the longitudinal direction of the connector strip 2.

[0062] It can be seen in particular in Fig. 15 that the connector strip 2 on the right-hand end in said drawing (= left-hand end in Fig. 7 to 12) projects slightly beyond the receiving region of the prop head 61 by the four described jaws 74 in the direction of the length of the connector strip 2. As a result, the connector strip 2 can be erected with the end face there resting against the first wall 52. The connector strip 2 covers the entire width of the first prop head 61, measured in the longitudinal direction of the connector strip 2.

[0063] In the second prop head 63 of the second prop 62, only the pin 21 of the end coupling region 20 of the connector strip 2 there that is closer to the end face there of the connector strip 2 is used for engagement with a receiving region 70 of the second prop head 63. For this engagement, only the spacing between two jaws 74 of the prop head 63 is used. The spacing between the two other jaws 74 on the side of the second prop 62 facing the second wall 54 remains free (at first). The connector strip 2 only covers half the width of the prop head 63, measured in the longitudinal direction of the connector strip 2. However, even when using just half the prop head width, a positive engagement is created between the connector strip 2 and the prop head 63 with respect to forces in the longitudinal direction of the connector strip 2.

[0064] After the process described of setting or placing the connector strip 2 down on the prop heads 61 and 63, the lower end of the vertical leg 6 of the connector strip 2 rests on abutment surfaces 78 of the prop heads 61 and 63; see Fig. 14. The pins 21 of the end coupling regions 20 protrude further downward than the level of the abutment surfaces 78, which facilitates "threading" each of the end regions 24 of the pins 21 into the space between two jaws 74. In the direction according to the double-headed arrow A in Fig. 14, i.e. transversely to the longitudinal extension of the connector strip 2, the vertical leg 6 of the connector strip 2 is confined between the positioning extension 72 and the face of the second wall 54 facing the space. Fixing said vertical leg 6 in this way ensures that said vertical leg is vertically oriented as a whole and that the upper side of the horizontal leg 4 of the connector strip 2 lies in a horizontal plane. Since the connector strip 2 rests against the second wall 54 by means of its longitudinal edge or a longitudinal edge of the additional strip 14 attached thereto, the passage of liquid concrete between the second wall 54 and the connector strip 2 is very limited.

[0065] It can be seen particularly clearly in Fig. 13 and 14 that the connector strip 2, more specifically the horizontal leg 4 thereof, substantially only covers half the width – measured transversely to the longitudinal extension of the connector strip 2 – of the relevant prop head 61, 63, 81, and therefore the other half of this width can be covered by an edge region of a slab formwork panel 40 placed thereon or by two corner sections 90 and 92 of two slab formwork panels 40 placed thereon next to one another. The upper sides of the connector strip 2 and the above-mentioned slab formwork panel 40 lie in a common plane and, lying directly adjacently to one another, together form a portion of a shaping surface for concrete.

[0066] It can be seen that the first prop 60 and the second prop 62, as is standard in formwork props, are provided with a possible way of adjusting the vertical position of the prop heads 61 and 63, this being by means of an external thread on the upper end region of a lower prop portion 85 in the embodiment drawn, and an internally threaded sleeve 82 in threaded

engagement therewith, the upper end face of which acts on a bolt 84 that passes through one of a plurality of horizontal holes in an upper prop portion 86. That which has been described can be seen particularly clearly in Fig. 7, 15 and 16. Adjusting the height of the relevant prop head 61 or 63 by rotating the internally threaded sleeve 82 is called "spindling."

[0067] Before continuing with the erection of at least a portion of slab formwork, the props 60 and 62 are spindled such that the upper side of the horizontal leg 4 of the connector strip 2 has the target height (= height of the lower side of the ceiling to be poured) and as a whole extends horizontally between the two props 60 and 62.

[0068] In the third phase drawn in Fig. 9, two additional props 80 have been placed between the two props 60 and 62. The additional props 80 have the same structure as the props 60 and 62, but without the stabilization means 64 each time. For each of the two additional props 80, the prop head 81 comprising a receiving region 83 has been brought into positive engagement with one of the two intermediate coupling regions 22. This engagement can be best seen in Fig. 16 and 17. The receiving region 83 used for this engagement is limited to the left and right – in the viewing direction in Fig. 17 – by a jaw 85 that protrudes upward and leads away to the outside at an angle with the exception of its base region. The positioning extension 72 is also arranged in the space between the two jaws 85 but with the relevant part of its height located between the two pins 23. By means of their outer side 87 that faces an end face of the connector strip 2, the two pins 23 each just fit between the base regions of the two jaws 85, which provides the above-mentioned positive engagement. The pins 23 do not protrude downward beyond the vertical leg 6 of the connector strip 2. It can therefore be seen that the receiving region 83 of the relevant additional prop 80 for the intermediate coupling region 22 of the connector strip 2 that is designed as an insertion region is a receiving region having a different design to the receiving region 70 described above for the end coupling region 20 of the connector strip 2 that is designed as an insertion region.

[0069] As a result of the engagement between the prop head 81 of each of the two additional props 80 and an intermediate coupling region 22, the two additional props 80 have to be positioned so as to have a center distance of 1 m between them and the additional prop 80 on the right in Fig. 9 has to be at a center distance of 1 m from the prop 62. Between the prop 60 and the additional prop 80 on the left in Fig. 9, the center distance is slightly smaller than 1 m (since the connector strip 2 covers the entire width – measured in the longitudinal direction of the connector strip 2 – of the prop head 61). The engagements between the coupling regions 20 and 22 of the connector strip 2 and the four prop heads 61, 63, 81, 81 of the four props 60, 62,

80, 80 assigned to the connector strip 2 force all the props to be arranged at the center distances described, or specify this.

[0070] The additional props 80 can each be installed by just one operator. The additional props 80 are spindled to the correct height.

[0071] It can also be seen in Fig. 9 that a retaining element 86 has been attached to the second wall 54. The retaining element 86 has the shape of a substantially vertically extending rail. The retaining element 86 comprises a lug 88 at its upper end, which can be moved in the longitudinal direction of the retaining element 86 and in the extended state passes toward the lateral face of the vertical leg 6 of the connector strip 2 facing away from the second wall 54 (see in particular Fig. 16). In this way, the retaining element 86 holds the connector strip 2 against the second wall 54.

[0072] In the fourth phase drawn in Fig. 10, a slab formwork panel 40 having two corner sections 90 and 92 is hung on the prop head 61 of the first prop 60 and on the prop head 81 of the additional prop 80 adjacent thereto. As can be seen in particular in Fig. 14, the four jaws 76 provided on the side of the relevant prop head 61 and 81 that faces away from the second wall 54 comprise portions that protrude upward beyond the level of the abutment surface 78, and also each comprise small lugs 90 pointing towards the connector strip 2 at the upper end. The corner sections 90 and 92 of the slab formwork panel 40 can therefore each be hung in the space between the positioning extension 72 and the regions of the jaws 76 protruding upward. The corner section 90 has the same width – measured in the longitudinal direction of the connector strip 2 – of the prop head 61, the corner section 92 only has half the width – measured in the same way – of the prop head 81. The hung slab formwork panel 40 firstly hangs downward.

[0073] In the fifth phase drawn in Fig. 11, the slab formwork panel 40 is pivoted upward by its two other corner sections 94 and 96, and specifically by means of a formwork aid 66. Such a formwork aid 66 has already been described in connection with Fig. 7. However, it is clearer in Fig. 11 that the rod-like formwork aid 66 telescopically consists of two portions that can move relative to one another such that the effective length of the formwork aid 66 can be adjusted. By means of the formwork aid 66, an operating person can pivot the slab formwork panel 40 upward into an altogether substantially horizontal position or therebeyond. Another prop 80 is then positioned in the corner section 94 that is adjacent to the first wall 52 (can be seen in the sixth phase in Fig. 12 as a result). The prop head 81 of this additional prop 80 is designed just like the previously described prop heads 61, 63, 81, 81 such that a positive engagement

between the corner section 94 and the prop head 81 of the most recently positioned additional prop 80 is possible.

[0074] It can also be seen in Fig. 11 that two additional slab formwork panels 40 have been hung on the prop heads 81 and 63 of the two additional props 80 and the second prop 62, respectively, by the two corner sections 90 and 92 in each case. In the sixth phase drawn in Fig. 12, the second formwork panel 40 has been pivoted upward and a joint additional prop 80 has been brought into position for the corner section 96 of the first formwork panel 40 and for the corner section 94 of the second formwork panel 40. It goes without saying that the additional props 80 of the second row of props that is spaced apart from the second wall 54 by slightly more than one formwork panel's length are spindled such that all the formwork panels 40 of this first row of formwork panels altogether lie horizontally.

[0075] The portion of slab formwork visible in Fig. 12, which contains four props 60, 62, 80, 80 next to the second wall 54 and a second row of props 98, which is spaced apart from the second wall 54 in the described manner, and three slab formwork panels 40, can continue to be extended in the longitudinal direction of the second wall 54. For this purpose, a prop having a stabilization means is placed next to the second wall 54, substantially at a distance of the length of an additional connector strip 2. The additional connector strip 2, which is aligned with the previously described connector strip 2, is then placed on two props in the described manner. The first row of slab formwork panels 40 can continue to be constructed along the second wall 54.

[0076] The portion of the slab formwork containing a first row of slab formwork panels 40 can also continue to be built using a second, third, etc. row of slab formwork panels 40. For this purpose, the slab formwork panels 40 are hung in the described manner on the prop heads 81 of the second row of props 80, pivoted upward and propped up on the upwardly pivoted corner sections by props 80. In this way, it is possible to continue working until the entire slab formwork has been completed, optionally with the aid of fitting pieces.

[0077] It is once again emphasized at this point that the described length of the connector strip 2 and the described number of coupling regions 20 and 22 of the connector strip 2 are one embodiment. According to the invention, longer or shorter connector strips 2 are also provided. The number of coupling regions 20 and 22 is directed to the slab formwork panel widths and the number of slab formwork panels 40 for which the connector strip 2 is designed. Connector strips 2 are also possible that only comprise two end coupling regions 20 and no intermediate coupling region 22, i.e. are only designed for a single slab formwork panel width. It is also possible to design connector strips 2 such that the coupling regions have different distances

from one another, and therefore slab formwork panels 40 having different widths can be connected to the same connector strip 2.

[0078] When removing or taking down a portion of slab formwork, the process previously described for erecting the portion of the slab formwork is reversed. Here, only the dismantling or removal of the first row of slab formwork panels, which connects to the connector strip 2, is described in more detail. For this purpose, it shall first be specified that the prop heads 61, 63, 81, 81 of the above-mentioned props 60, 62, 80, 80 each comprise a lowering region 92, as can be seen in particular in Fig. 14. The four jaws 76 comprising the four lugs 90 can be pivoted downward together with a portion of the abutment surface 78 by 30°, for example, after a wedge plate 95 has been moved into a position that enables the pivoting lowering movement. As a result, the edge beam that is assigned to the two corner sections 90 and 92 of the relevant slab formwork panel 40 moves into a lower position. The relevant slab formwork panel 40 can be pivoted downward by its two corner sections 94 and 96 without an edge region of the formlining of the slab formwork panel 40, which edge region is adjacent to the connector strip 2, digging into the concrete of the poured ceiling from below.

[0079] Solely the removal of the slab formwork panel 40 of the first row of slab formwork panels on the far left of Fig. 11, which is connected to the connector strip 2, is described in more detail here as an example. The slab formwork panels 40 of the additional rows of slab formwork panels and the second slab formwork panel 40 and the third slab formwork panel 40 of the first row of slab formwork panels have correspondingly been removed beforehand.

[0080] Spare props (not drawn) have been placed next to the corner sections 94 and 96, slightly further away from the connector strip 2 than the corner sections 94 and 96, where they prop up the poured ceiling. The spare props are props having prop heads that have a much simpler design that the previously described prop heads 61, 63, 81; these simpler prop heads go directly from below against the poured ceiling where they prop it up. Therefore, the prop heads 81 of the props 80, which prop heads 81 prop up the corner sections 94 and 96, can be spindled downward slightly. A formwork aid 66 is attached. The lowering regions 92 of the prop heads 61 and 80, which are in engagement with the corner sections 90 and 92, are pivotally lowered by releasing the wedge plate 95. The slab formwork panel 40 can now be pivoted downward by its corner sections 94 and 96 with the aid of the formwork aid 66. The corner sections 90 and 92 are then taken off of the prop heads 61 and 81 and the slab formwork panel 40 is removed.

[0081] Spare props are then placed next to the props 60, 62, 80, 80 of the first row of props at a slightly larger distance from the second wall 54 than these props are, and are spindled upward

toward the poured ceiling. In several cases, this placement of spare props is superfluous, since the poured ceiling is sufficiently propped up here by the second wall.

[0082] First of all, the additional props 80 are removed. For this purpose, the prop heads 81 thereof are spindled slightly downward. The additional props 80 can then be easily removed. The retaining element 86 is removed. The arrangement consisting of the end props 60 and 62 and the connector strip 2 now stands by itself, and removal of these parts can easily be started. The prop heads 61 and 63 are spindled slightly downward. By means of a formwork aid 66, the connector strip 2 is removed in the opposite way to that described for erecting it.

[0083] The described removal of a portion of the slab formwork was carried out as early formwork removal. This is understood to mean the removal of formwork from a poured concrete ceiling a few days after the concrete has been poured, long before this has achieved its final strength from having set fully. In turn, all described props having the complex prop heads are replaced by spare props having simple prop heads, which go directly against the concrete ceiling from below, and can then be removed prop by prop.

[0084] It is expressly emphasized that the described combination of the connector strip 2 and the slab formwork panel 40 with props 60, 62, 80, which have complex prop heads 61, 63, 81, is only one of several possibilities. The connector strip 2 can be combined with various types of prop heads as well as with other types of slab formwork panels. Types of early formwork removal exist in which the props used for erecting the slab formwork, for example provided with dropheads, remain standing and the slab formwork panels are removed from these props. Also against this backdrop, the connector strip 2 can be used. The connector strip 2 can also be used for slab formwork in which early formwork removal is not intended to be carried out. The invention is therefore defined solely by the attached claims.

Patentkrav

1. Indretning med:

- en tilslutningsliste (2) til dækforskallinger, som langs sin længde har flere koblingsområder (20,22) med indbyrdes afstand til indgreb med støttehoveder (61,63) på forskallingsstøtter (60,62,80), hvor den i sine to langsgående endeområder har hvert et ende-koblingsområde (20) og mellem de to ende-koblingsområder (20) mindst et mellemliggende koblingsområde (22) til indgreb med støttehovedet (61,63,81) af en forskallingsstøtte (60,62,80);
- to forskallingsstøtter (60,62) til en dækforskalling, hvor tilslutningslisten (2) er koblet med støttehovederne (61,63) af de to forskallingsstøtter (60,62) på en sådan måde, at tilslutningslisten (2) ligger med sin underside på støttehovedet (61,63), og et af ende-koblingsområderne (20) af tilslutningslisten (2) er i indgreb med et modsvarende koblingsområde af støttehovedet (61,63);
- mindst en yderligere forskallingsstøtte (80) mellem de nævnte to forskallingsstøtter (60,62), hvor tilslutningslisten (2) ligger med sin underside på støttehovedet (81) af den yderligere forskallingsstøtte (80), og et mellemliggende koblingsområde (22) af tilslutningslisten (2) er i indgreb med et modsvarende koblingsområde af støttehovedet (81) af den yderligere forskallingsstøtte (80); og
- mindst et dækforskallingspanel (40), **kendetegnet ved, at** det mindst ene dækforskallingspanel (40) i hvert af sine to endeområder, som ligger ved siden af tilslutningslisten (2), ligger på støttehovedet (61,63,81) af en respektiv forskallingsstøtte (60,62,80) tilknyttet tilslutningslisten (2) og er i indgreb med dette støttehoved (61,63,81).

2. Indretning (2) ifølge krav 1,
kendetegnet ved, at mindst et af koblingsområderne (20,22) har et optageområde (70) til indgreb med et indsættelsesområde på det respektive støttehoved (61,63,81), eller alle koblingsområder (20,22) hver har et optageområde (70) til indgreb med et indsættelsesområde på det respektive støttehoved (61,63,81).

3. Indretning ifølge krav 1 eller 2,
kendetegnet ved, at støttehovederne (61,63,81) af forskallingsstøtterne (60,62,80) tilknyttet

tilslutningslisten på den side, der vender mod det mindst ene dækforskallingspanel (40), har et sænkningsområde, der kan sænkes i forhold til det resterende støttehoved (61,63,81) for at sænke de to hjørneområder af det mindst ene dækforskallingspanel (40), som ligger ved siden af tilslutningslisten (2).

4. Fremgangsmåde til at opbygge mindst et delområde af en dækforskalling, som har en indretning ifølge et af kravene 1, 2 eller 3, **kendetegnet ved** trinnene:

(a) placering af en første forskallingsstøtte (60) ved siden af en væg (52);

(b) placering af en anden forskallingsstøtte (62) ved siden af væggen (54), i det væsentlige i den centerafstand, som er defineret af de to ende-koblingsområder (20) af tilslutningslisten (2);

(c) placering af tilslutningslisten (2) på den første og den anden forskallingsstøtte (60,62), hvor et respektivt ende-koblingsområde (20) af tilslutningslisten (2) bringes i indgreb med et modsvarende koblingsområde af et støttehoved (61,63) af den relevante forskallingsstøtte (60,62), og hvor de nævnte indgreb definerer centerafstanden mellem den første og den anden forskallingsstøtte (60,62) i delområdet af dækforskallingen;

(d) placering af mindst en yderligere forskallingsstøtte (80) ved siden af væggen mellem den første og den anden forskallingsstøtte (60,62), hvor et mellemliggende koblingsområde (22) af tilslutningslisten (2) bringes i indgreb med et modsvarende koblingsområde af et støttehoved (81) af den mindst ene yderligere forskallingsstøtte (80), og hvor det nævnte indgreb definerer positioneringen af den mindst ene yderligere forskallingsstøtte (80) i delområdet af dækforskallingen; og

(f) at et dækforskallingspanel (40) eller flere dækforskallingspaneler (40) af en dækforskallingspanel-række hænges med to hjørneområder i støttehovederne af to forskallingsstøtter ved siden af hinanden tilknyttet tilslutningslisten (2), og dernæst vippes opad med de to andre, ikke-ophængte hjørneområder og i mindst et af disse to andre hjørneområder afstøttes med en forskallingsstøtte.

5. Fremgangsmåde ifølge krav 4, **kendetegnet ved** det yderligere trin: (e) placering af et holdeelement mellem væggen og tilslutningslisten (2), som holder tilslutningslisten (2) mod væggen.

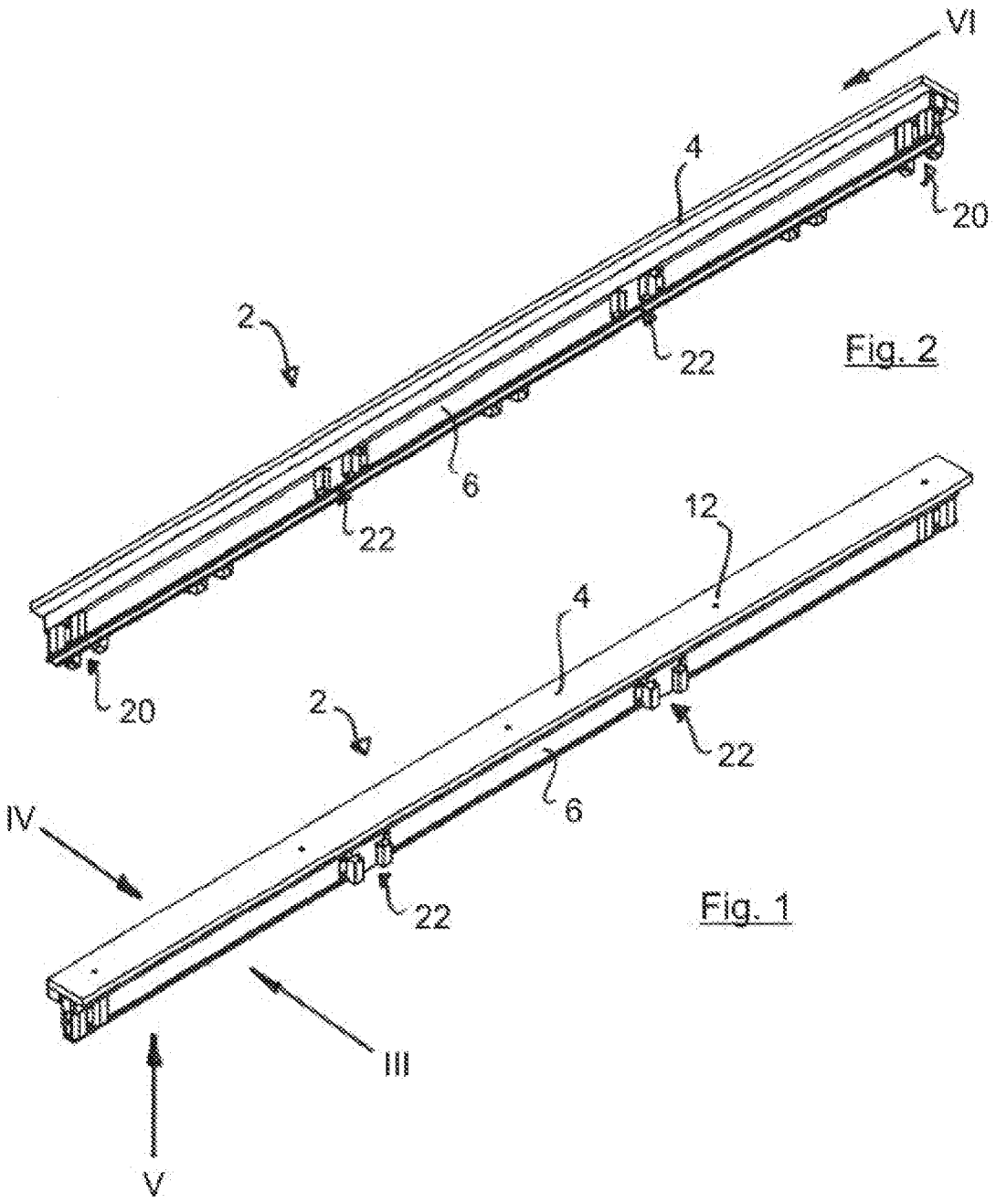


Fig. 2

Fig. 1

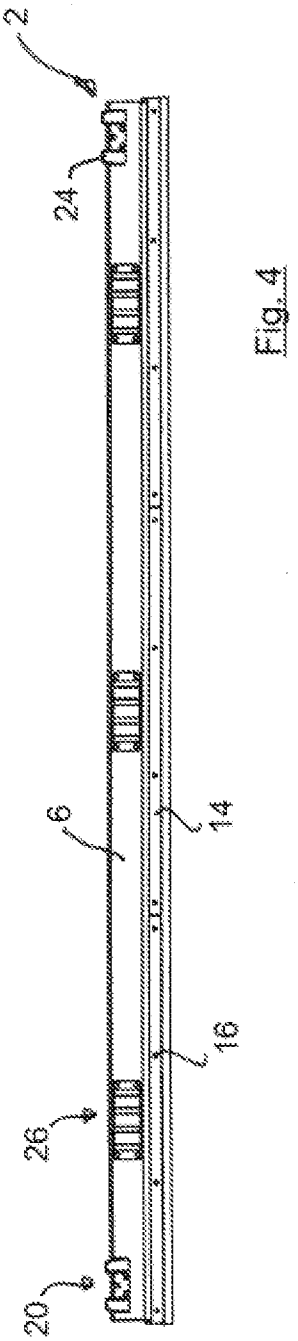


Fig. 4

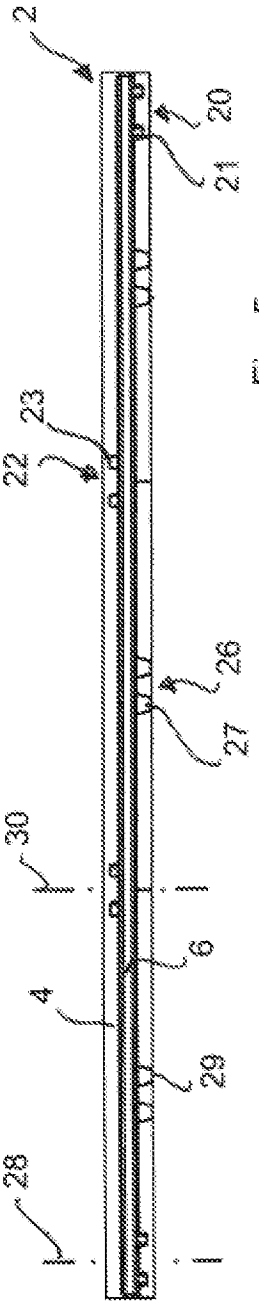


Fig. 5

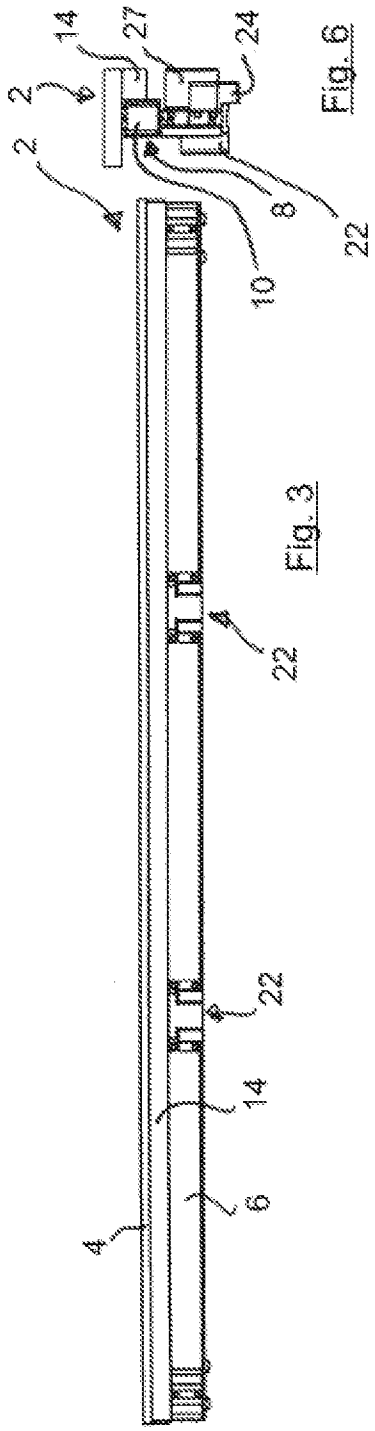


Fig. 6

Fig. 3

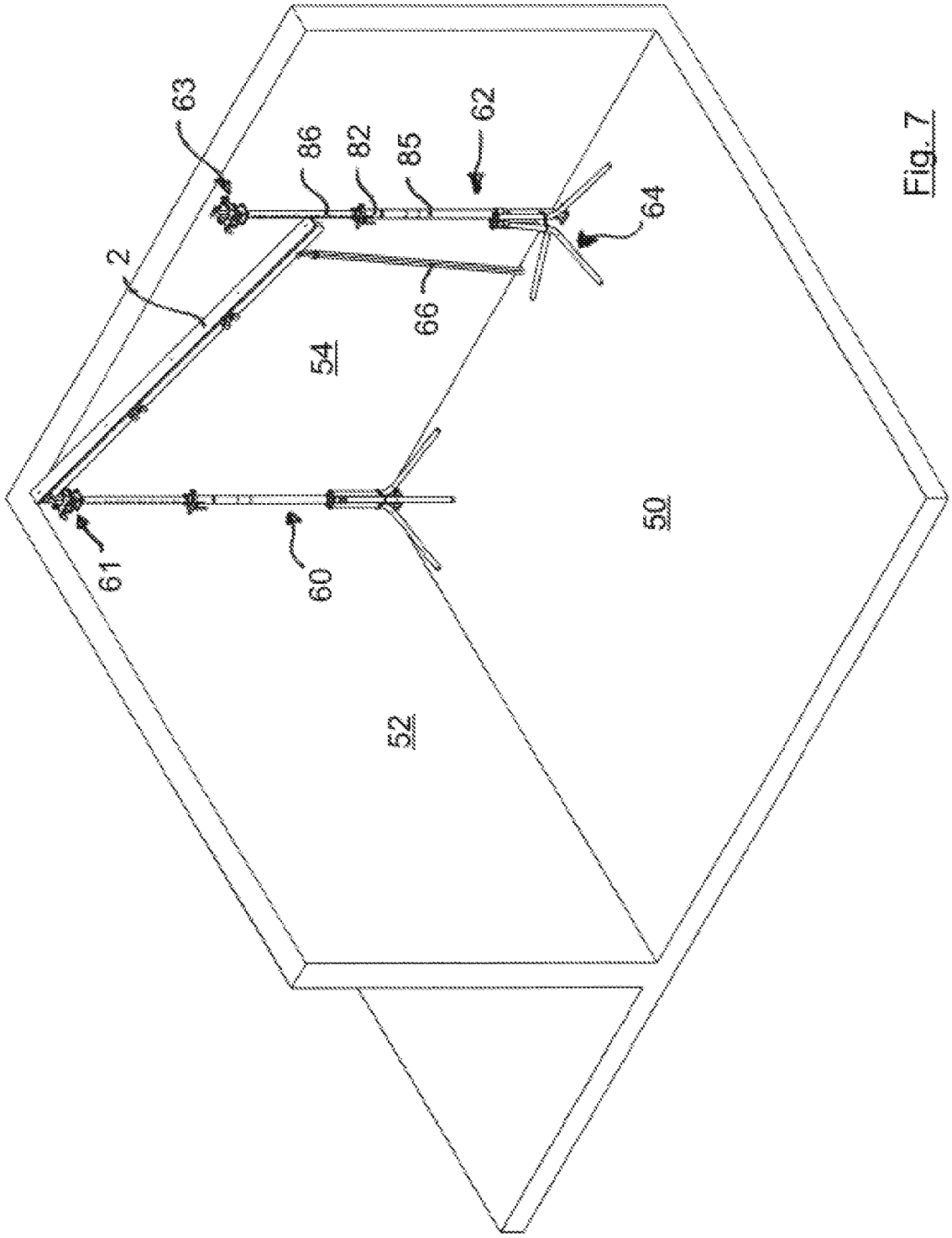


Fig. 7

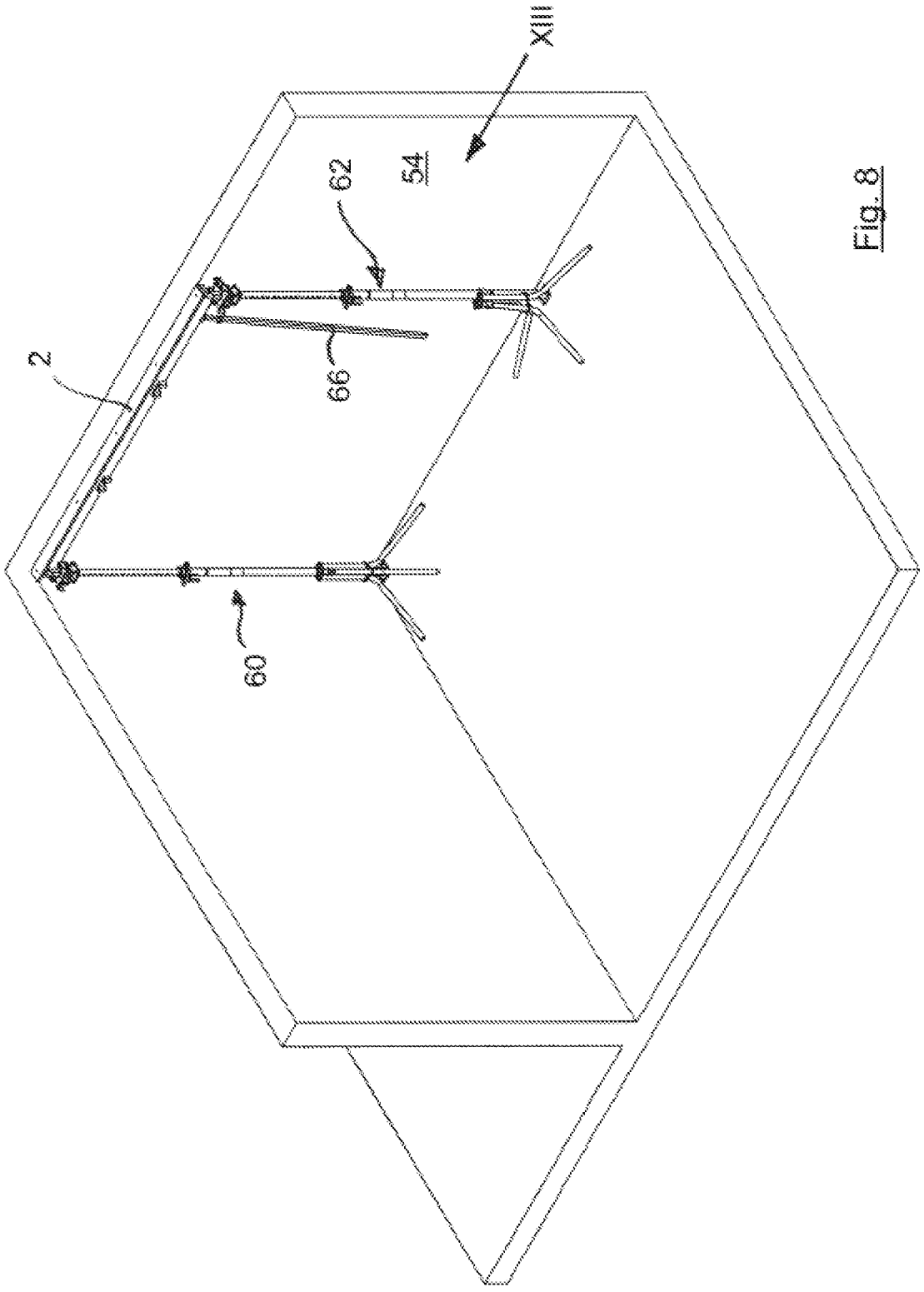


Fig. 8

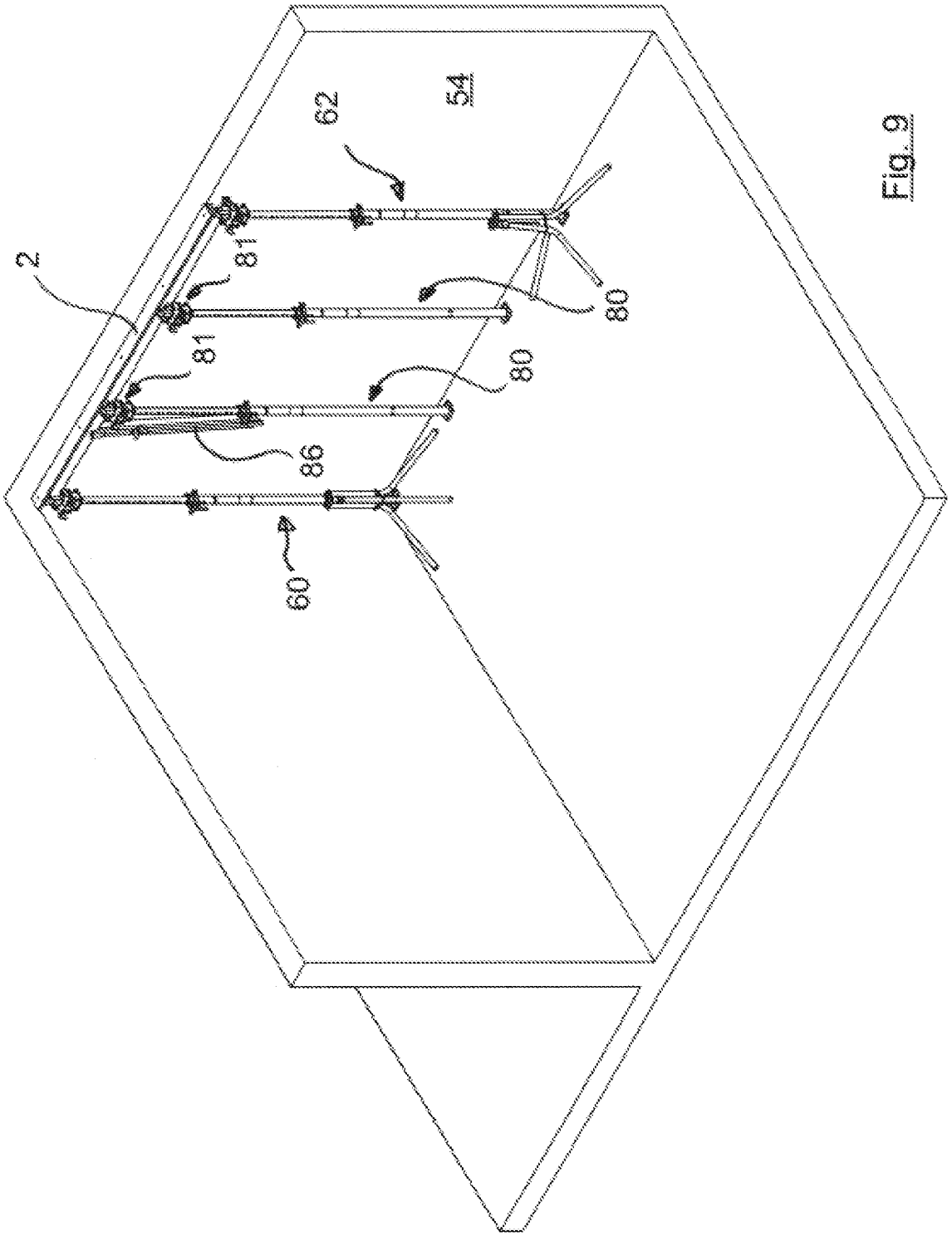


Fig. 9

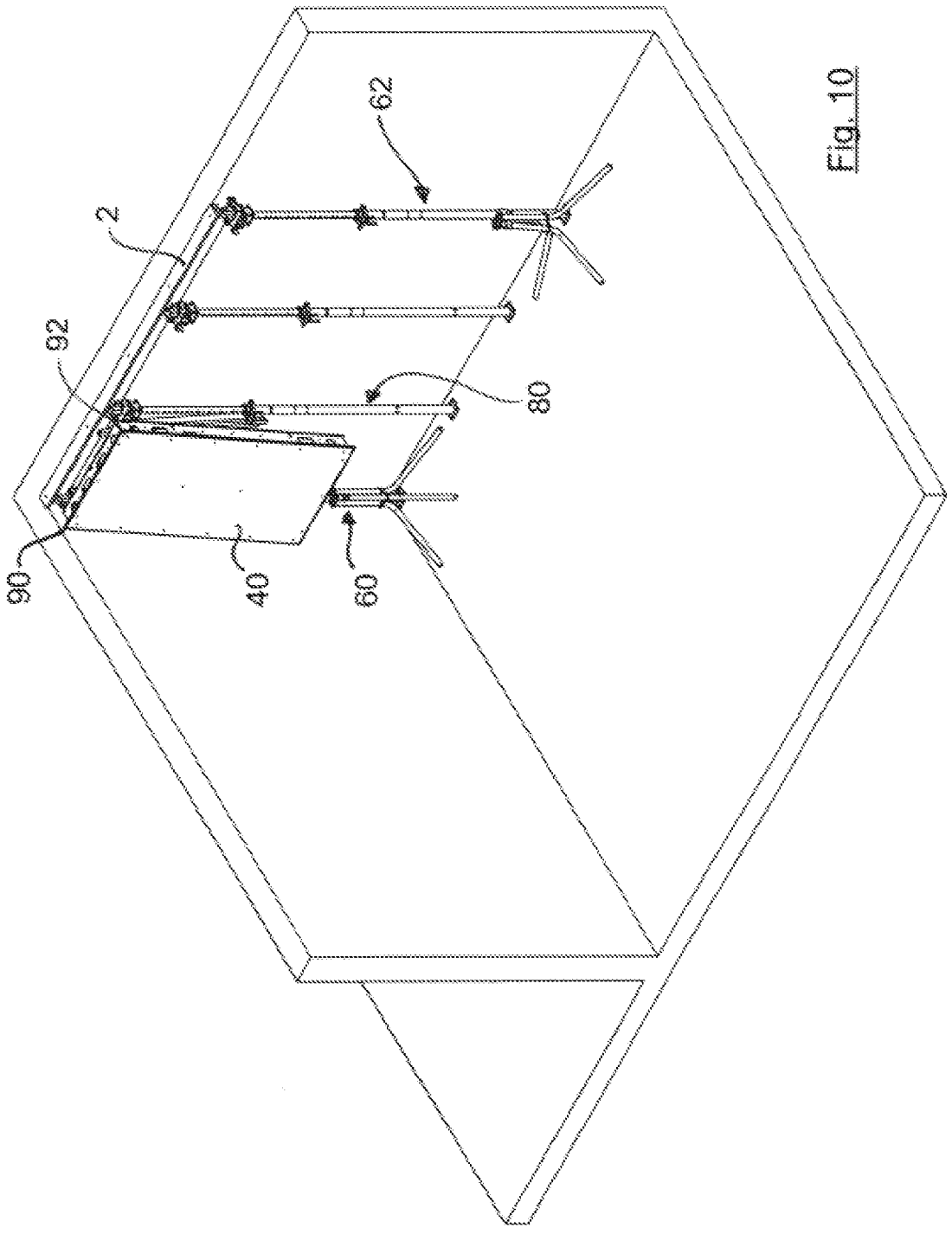


Fig. 10

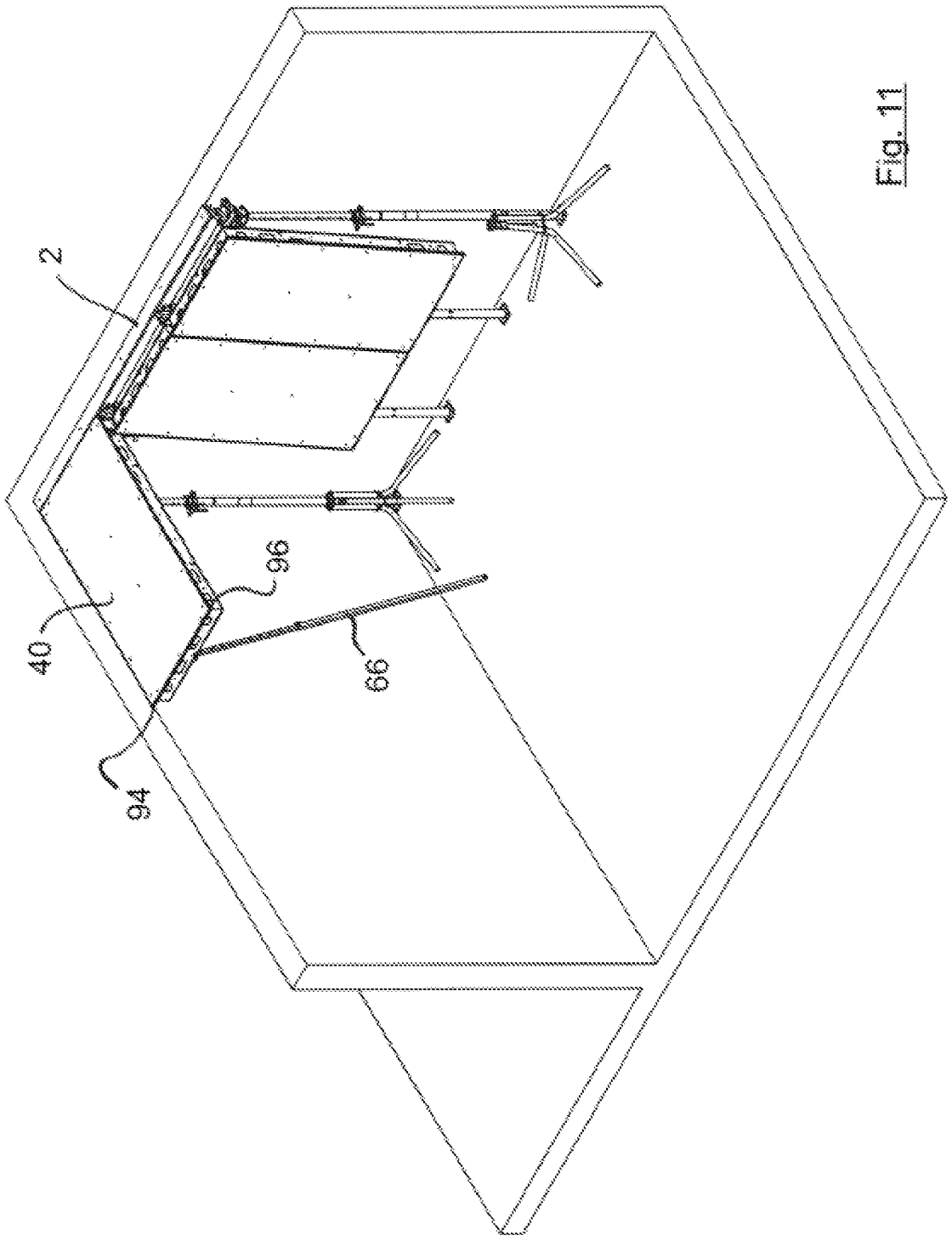


Fig.11

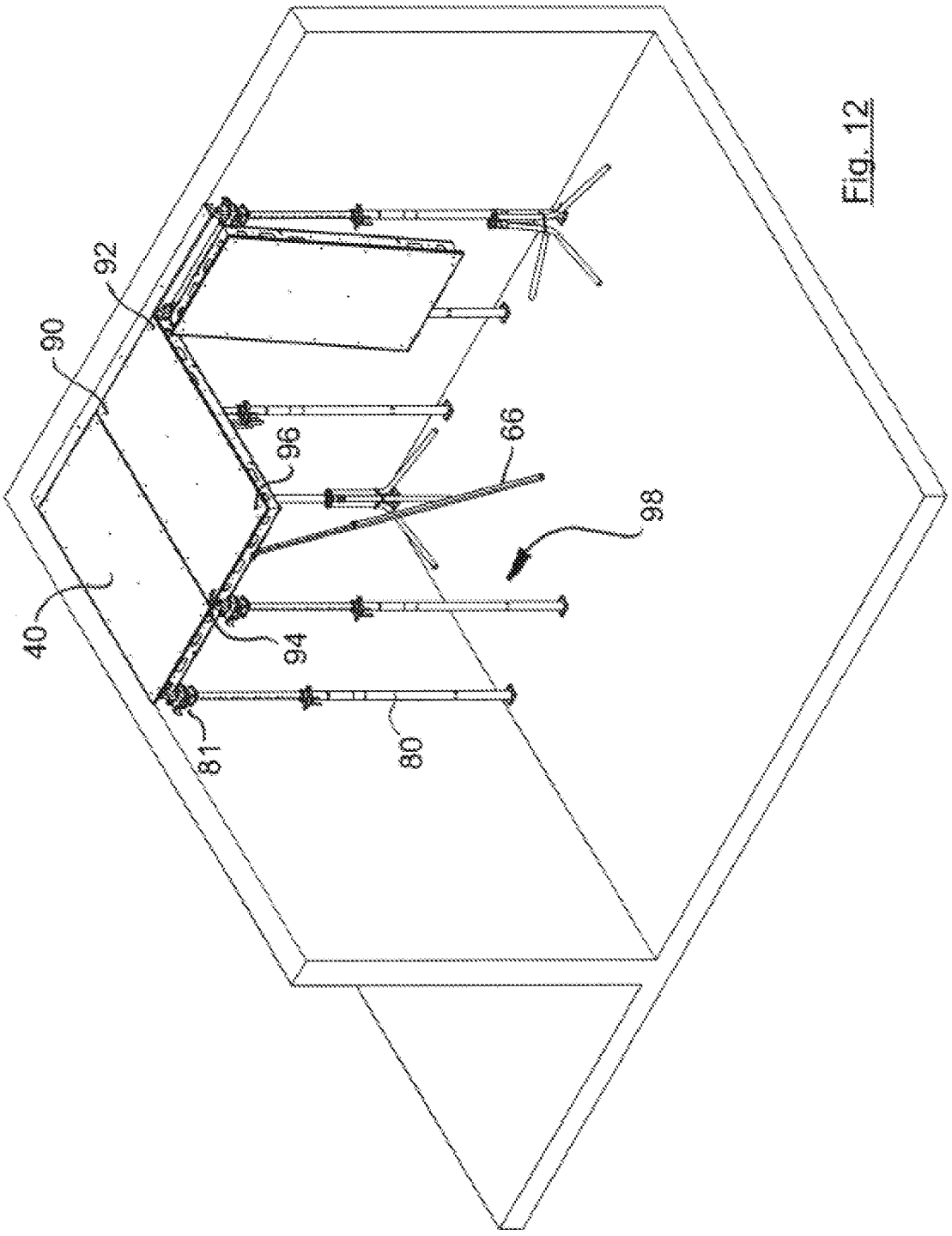
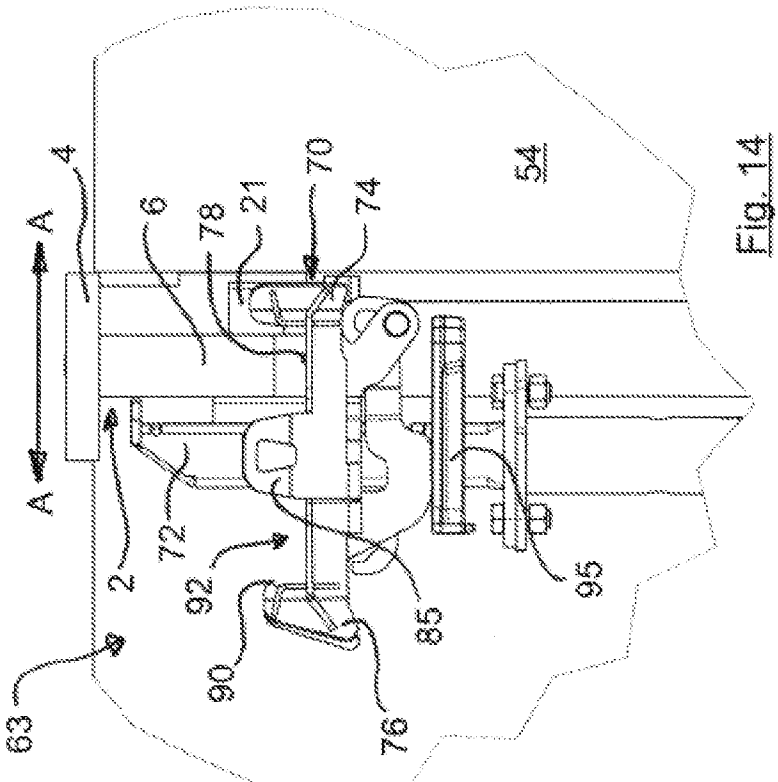


Fig_12


54
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A
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6
78
21
70
74
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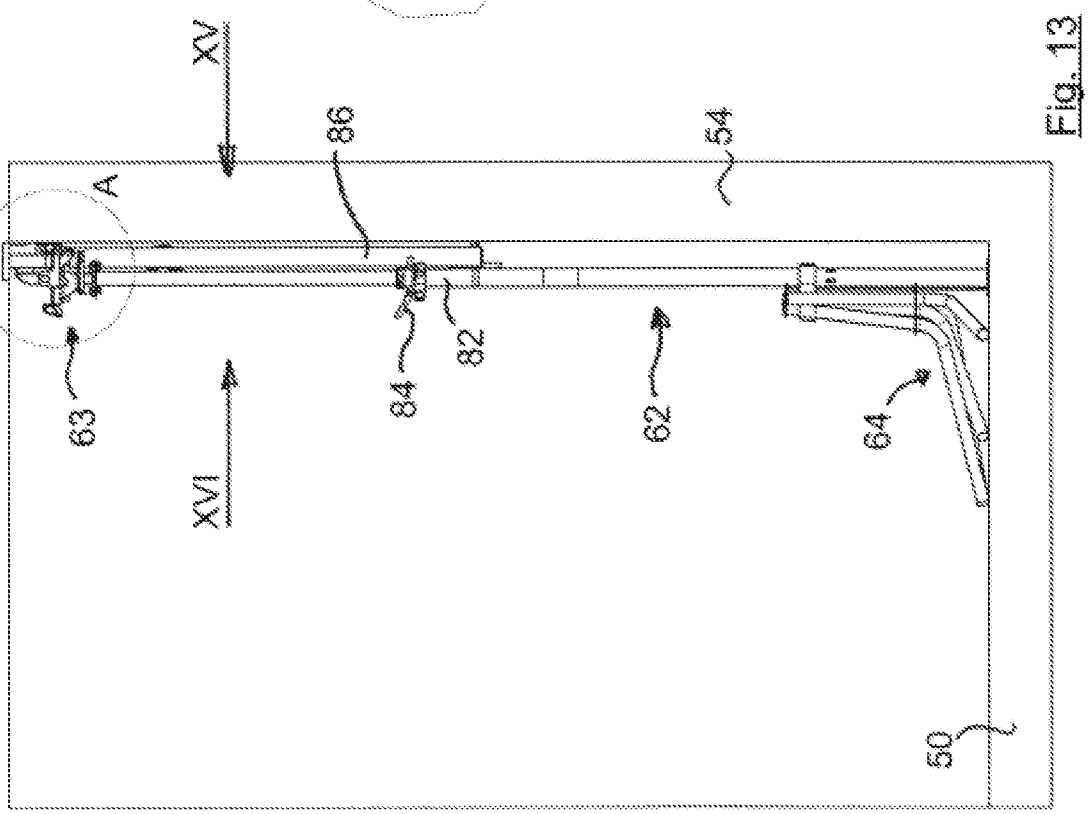
72
92
90
63
76
85
95

Fig. 14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64
50

Fig. 13

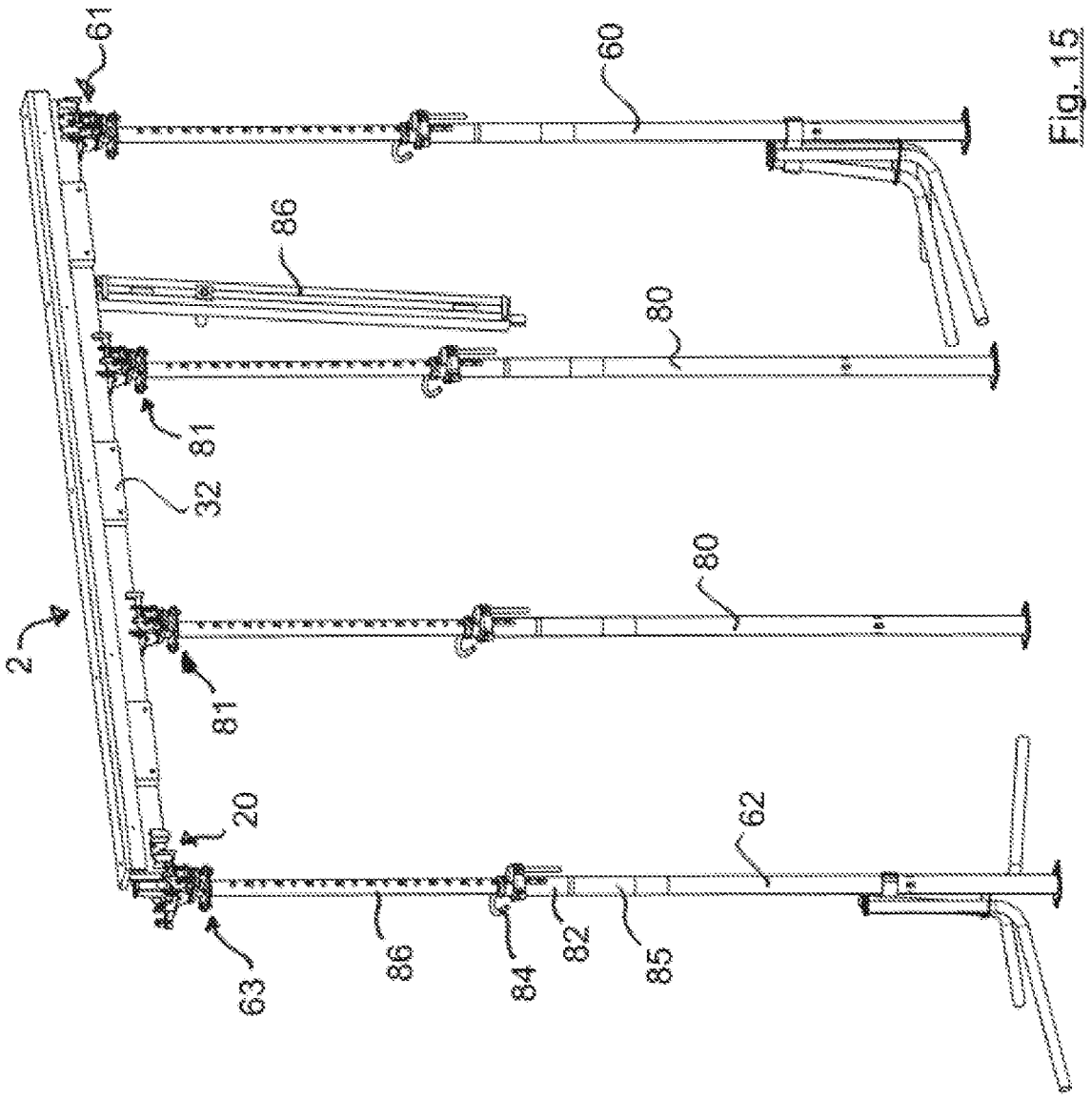

Fig. 15

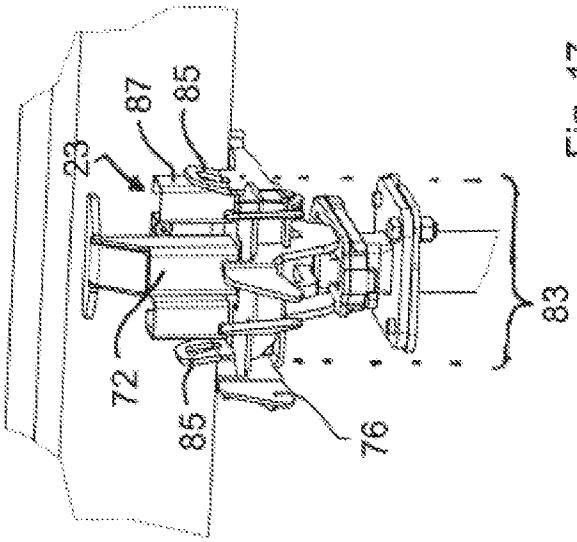

Fig. 17

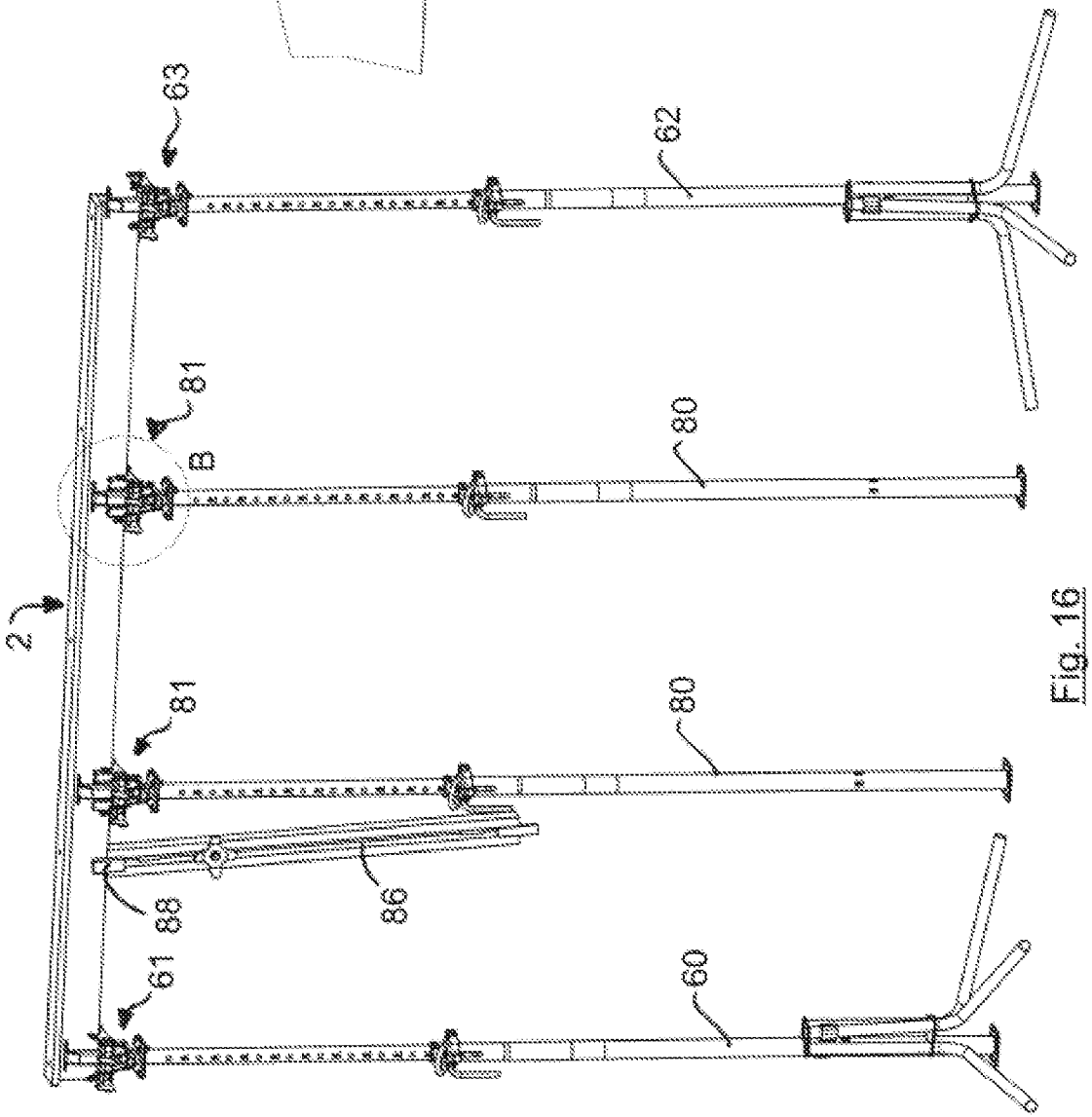

Fig. 16