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(54) **Prefabricated vertical one-piece element made or reinforced concrete for building skeletons, skeleton formed by this element, and form for manufacture of the said element.**

(57) The prefabricated vertical one-piece element (1) made of reinforced concrete and being particularly designed for the construction of pillars for building skeletons, consists of four posts (2) that are located at the angles of a square, and that are interconnected at a certain level, preferably about midway of their height, by horizontal crosspieces (3) extending along the sides of the square, and which may be either straight or arched pieces. Holes (4, 5) are provided in the crosspieces (3) for passing pipes or for anchoring horizontal beams and/or floors.

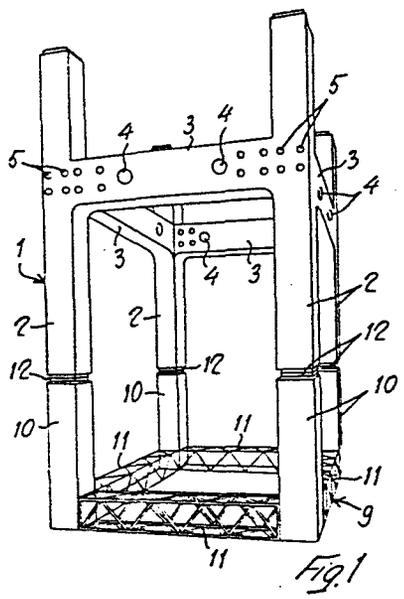

Fig. 1

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TAMBURINI S.p.A., Bologna, Italy.

Prefabricated vertical one-piece element made of reinforced concrete, for building skeletons, skeleton formed by this element, and form for manufacture of the said element.

This invention has for its object a prefabricated vertical one-piece element made of reinforced concrete, for erecting the skeleton of a building, and the like, and contemplates also a building skeleton that is formed by using these prefabricated vertical elements, as well as a form for manufacture of the said element.

The invention aims to realize a prefabricated vertical element of the aforementioned kind, that is extremely strong from the static view point, but very light at the same time, and that can be used for quite a variety of building structures, while permitting an easy and quick installation.

This problem is solved by the invention by providing a prefabricated vertical one-piece element made of reinforced concrete, and characterized in that it consists of four posts that are located at the angles of a quadrangle, and that at a certain level are interconnected by horizontal crosspieces extending along the sides of the quadrangle.

Preferably, the four posts are located at the angles of a rectangle, more particularly of a square, whereby the use is permitted of the prefabricated vertical elements according to the invention in the usual type of skeletons with right-angle frames.

The horizontal cross pieces for the prefabricated vertical elements of the invention may be provided either at the bottom end section of the posts or at the top end section thereof. Preferably, however, according to a further characteristic feature of the invention, the horizontal cross pieces are located at an intermediate level of the posts, more particularly in a median area between the ends of said posts. Thus, under a same height of the prefabricated vertical element according to the invention, there is avoided any post having a considerable height clearance, whereby it is increased the strength and the self-supporting capability of the individual prefabricated vertical elements, before they are fitted in the skeleton of a building.

The crosspieces of the prefabricated vertical

element, according to the invention, may be either straight pieces, or may consist of arches, such as, for example, Roman or depressed arches, or ellipitic or mixed arches, with the extrados upper surface of the arches being preferably flat, whereby to obtain their adaptability to any of different architectural requirements.

According to a further characteristic feature of the invention, in at least one crosspiece of the prefabricated vertical element, one or more through holes can be provided for allowing pipes, cables, or the like, to be passed therethrough. Further through and/or dead horizontal holes that are perpendicular to the crosspieces, and are intended for receiving the anchor means (such as reinforcing rods, prestressing or tension wires, or the like) for anchoring horizontal beams and/or floors to be connected to the prefabricated vertical element, can be provided in the ends of the crosspieces and in the adjoining sections of the posts. These holes for the beam- and/or floor-anchoring means can be obtained in a very simple manner when they are formed from one or more grillworks of tubes being incorporated in the prefabricated vertical element.

According to a further characteristic feature of the invention, the top and bottom ends of the posts are preferably so shaped as to produce a joint of the male and female type for fixing together the posts of two super= imposed prefabricated vertical elements according to the invention. Such a joint prevents any reciprocal side

displacement between two superimposed prefabricated vertical elements, and guarantees a sufficient connection between these elements, even with no reinforcing vertical through rods.

In any case, the particular construction of the prefabricated vertical element according to the invention permits to obtain very high moments of inertia, although very slender structures are adopted, which leads to a considerable light weight of the prefabricated vertical elements. This light weight allows to considerably economize in the conveyance and the lifting of the prefabricated vertical elements, while it gives rise to an appreciable reduction of the loads on the foundation under the same external stresses. The prefabricated vertical element according to the invention furthermore has a great stability and the capability of absorbing any side thrust in every direction, so that it is particularly fit for being employed in seismic regions, since the need is avoided of additional metal reinforcements in the reinforced concrete. Moreover, the prefabricated vertical element according to the invention - while maintaining its relative light weight, may be of any desired, even considerable dimensions, which allows to erect buildings of great proportions in a short time. The prefabricated vertical elements of the invention are self-supporting, whereby it is avoided to have resort to any supporting fixture and framework. When erecting the skeleton of a building, it is possible to superimpose two, three, or more vertical elements without any horizontal frame being required.

The prefabricated vertical elements of the invention may be used in any desired manner and in any type of building skeletons. Preferably, however, in a building skeleton comprising pillars that are connected by means of horizontal beams and/or floors, at least one pillar is formed by two or more prefabricated vertical one-piece elements of reinforced concrete, made according to the invention, and placed the one upon the other. In such a skeleton, according to a further characteristic feature of the invention, the crosspieces of the super= imposed prefabricated vertical elements are located substantially at the level of the horizontal beams and the floors, while the joints between the posts of the super= imposed vertical elements are substantially located in the reversal area of the sign of the bending moment acting upon the whole height of the posts between two floors, that is to say, they are located at about midway of the height between two floors. Thus, the joints between the posts of two superimposed prefabricated vertical elements are not flexure stressed, so that it is possible to do without any particular flexure-resistant connection between the posts of the superimposed vertical elements, and the said male and female joint between the posts, in correspondence of the junctions, and possibly with the interposition of a layer of a binder or a glue, is sufficient for guaranteeing a reliable bond between the superimposed prefabricated vertical elements.

In one advantageous embodiment of the skeleton according to the invention, the superimposed vertical

elements of two pillars are interconnected at the level of a floor and in correspondence of their posts and the adjoining ends of their crosspieces, by two spaced apart, parallel horizontal beams, while the space between these beams is covered preferably by means of prefabricated tiles being laid on the beams, and is intended for accomodating pipes, cables, and the like, for the several systems of the building. In this case, the space inside at least one of the pillars in the skeleton, which consists of two or more superimposed prefabricated vertical elements, may be left entirely or partly clear of internal horizontal partitions, so as to form a continuous vertical shaft for the installation of a lift, of a staircase, and/or of pipes, cables, or the like, for the several systems of the building. Thus, all the pipes for any installed system can be arranged within the building skeleton-lightening spaces, whereby a high degree of independence between carrying structures, internal partitions, and installed systems, is obtained.

On the other hand, in at least one of the pillars in the skeleton, which consists of two or more super= imposed prefabricated vertical elements, slabs may be provided, particularly at the level of the crosspieces in said elements, whereby to form dwelling or duty rooms, office or trade premises, or the like, at the interior of the pillar.

Generally speaking, there is no particular limit or restraint in the use of the prefabricated vertical

elements according to the invention in any skeleton of a building, both with regard to the vertical succession and the horizontal succession of said prefabricated vertical elements.

The peculiar features of a preferred form according to the invention, for manufacture of the said prefabricated vertical elements made of reinforced concrete, appear in the dependant claims 16, 17, 18. This form affords the advantage of permitting an easy and damageless extraction therefrom of the vertical element according to the invention, notwithstanding the relatively complicated shape of said elements, and the undercuts provided therein, with the construction of said form being relatively simple.

The peculiar features and the advantages of the invention will appear more in detail in the following specification of some embodiments thereof, which are shown in the accompanying drawings, wherein:

Figure 1 is a perspective view showing a first embodiment of a prefabricated vertical element, with the respective base element.

Figure 2 is a perspective view showing a modified embodiment of the prefabricated vertical element.

Figures 3 and 4 are a perspective view and a top plan view showing the tube grillworks which are incorporated

in the end sections of a crosspiece and in the adjoining portion of a post of a prefabricated vertical element according to Figure 1, in order to form the holes for anchoring any horizontal beams.

Figure 5 is a vertical sectional view showing the male-female joint between the posts of two superimposed prefabricated vertical elements.

Figure 6 is a perspective view showing a part of a building skeleton made with prefabricated vertical elements according to Figure 2.

Figure 7 is an exploded perspective view showing the part of the skeleton according to Figure 6, however made by using prefabricated vertical elements according to Figure 1.

Figure 8 is a plan view showing some constructional examples of utilization in the skeleton of a building of the prefabricated vertical elements according to the invention.

Figure 9 is a diagrammatic perspective view showing a form for manufacture of the prefabricated vertical element according to Figure 1.

Figure 10 shows a vertical section of the form according to Figure 9, which is taken through two posts of the vertical element according to the invention.

Figure 11 shows a vertical section of the form according to Figure 9, which is taken through a horizontal crosspiece between the posts of the vertical element according to the invention.

Referring to Figures 1 and 7, numeral 1 denotes a prefabricated vertical element made of reinforced concrete for building skeletons. This prefabricated vertical element 1 consists of four posts 2 that are located in correspondence of the angles of a square, and that are interconnected by horizontal crosspieces 3 being provided in a same plane, at the median zone of the height of posts 2, and extending along the sides of the square. In the embodiment of the vertical element 1 according to Figures 1 and 7, the horizontal crosspieces 3 are straight pieces.

In the modified embodiment according to Figures 2 and 6, the four posts 2 that are provided in correspondence of the angles of a square, are interconnected by means of horizontal crosspieces 3' that are also provided in a same plane at about midway of the height of posts 2, and extend along the sides of the square, but that are made in form of Roman arches, with their extrados upper surface being flat and horizontal.

In both cases, in the crosspieces 3, 3' for the vertical elements 1, 1', horizontal through holes 4 are provided, which are intended for passing pipes, cables, or the like, and which are obtained, for example, by incorporating corresponding tubes in the reinforced

concrete of a prefabricated vertical element 1, 1'. In both of the ends of each crosspiece 3, 3' and in the adjoining sections of posts 2, horizontally extending holes 5 that are perpendicular to the crosspieces 3, 3' are provided, and are intended for accomodating the means for anchoring any horizontal beams and/or floors, to be connected to a prefabricated vertical element 1, 1'. These anchor holes 5 are obtained by incorporating corresponding grillworks of tubes 6 in the reinforced concrete of the prefabricated vertical elements 1, 1', as diagrammatically shown by a perspective view in Figure 3, and a top plan view in Figure 4. In the shown embodiment, two grillworks of tubes 6 are provided in an overlying relation, since two superposed lines of anchor holes 5 are to be obtained. Each one of these grillworks of tubes 6 constitutes a single piece that can be easily handled and positioned. Also two or more superposed grillworks of tubes 6 can be connected and made integral with one another.

The bottom end face of each post 2 of the prefabricated vertical element 1, 1' has a post centering and fixing median projection 7 which is preferably shaped like a truncated cone or a truncated pyramid, while in the top end face of each post 2 there is provided a mating post centering and fixing recess 8 which is in form of a truncated cone or a truncated pyramid, or vice-versa, as shown in Figure 5.

The prefabricated vertical elements 1, 1' can be used in any desired manner in any skeleton of a building,

but are preferably used for erecting pillars by superimposing two or more prefabricated vertical elements 1, 1' as shown in Figures 6 and 7. Each one of these pillars comprises a base element 9 consisting of four posts 10, that are located at the angles of a square being equal to the base square of the prefabricated vertical elements 1, 1'. At their bottom ends, the posts 10 are interconnected by horizontal cross beams 11 extending along the sides of the square and preferably consisting of metal lattice girders. This base element 9 is to be positioned on a suitable foundation 45, so as to have the cross beams 11 lying, for example, below the groundfloor walking surface. The cross beams 11 may be incorporated, if so desired, in a concrete casting. Onto the upper ends of posts 10 of the base element 9 there are placed the posts 2 of a first prefabricated vertical element 1, 1', onto which one or more prefabricated vertical elements can be superimposed, so as to form a pillar. The bottom ends of posts 2 of the first prefabricated vertical element 1, 1' are fixed by their bottom end projections 7 in mating top end recesses 8 provided in the top ends of posts 10 of the base element 9. In the same way, the ends of posts 2 of the several superimposed vertical elements 1, 1' are fixed to each other. Between the ends of posts 2, 10 of the superimposed elements 1, 1', 9, bearing metal frames 12 extending all around the respective post-fixing projections 7 and recesses 8, are preferably interposed. These bearing frames 12 space apart the post-fixing projections 7 and the respective post-fixing recesses 8, and the resulting gap is filled with a suitable binder 13, for example, with

cement, or possibly even with a glue, as it clearly appears in Figure 5.

The height of posts 2 of the superimposed pre= fabricated vertical elements 1, 1' making up a pillar, and the height of posts 10 of the respective base element 9 are preferably so selected as to have the crosspieces 3, 3' of the vertical elements 1, 1' located at the level of the floors of the building, while the joints between the posts 10 of the base element 9 and the posts 2 of the first superimposed vertical element 1, 1', as well as the joints between the posts 2 of the successive superimposed vertical elements 1, 1', come to be located in the reversal area of the sign of the bending moment acting upon the whole height clearance of the posts between two floors, that is to say, they come to be located about midway between two floors, or the like.

At the level of their crosspieces 3, 3', the superimposed vertical elements 1, 1' are interconnected by means of horizontal beams and/or floors. These beams and these floors may be made, and may be connected to the pillars in any suitable manner, more particularly they may be either entirely or partly prefabricated, or entirely or partly prefabricated, or entirely or partly cast in situ. In the embodiment shown in Figures 6 and 7, the super= imposed vertical elements 1, 1' of two pillars are connected to each other in correspondence of their posts 2 and the ends of their crosspieces 3, 3', by means of two horizontal beams 14 being arranged in a parallel spaced

apart relation and abutting against the vertical side surface of the posts 2 and the crosspieces 3, 3' of the vertical elements 1, 1', to which they are connected through any suitable anchoring members (such as reinforcing rods, prestressing wires, tie bars, or the like), which are either engaged in the anchor holes 5 or are passed therethrough. As shown particularly in Figure 6, pipes 15, 16 and/or cables, or the like, for the several systems of the building, are preferably housed in the space between the two beams 14. These pipes 15, 16, or the like, may be inserted into the interior of the pillars, or may extend horizontally thereacross, by being passed through the holes 4 in the crosspieces 3, 3' of the vertical elements 1, 1'. The space between the beams 14 is covered, for example, with prefabricated tiles 17 which are laid onto internal steps 114 in said bemas 14. The floors (not shown) can be laid onto external brackets 214 in beams 14.

The space in the inside of a pillar formed by the superimposed vertical elements 1, 1' may be entirely or partly left vertically clear, whereby a continuous vertical shaft is obtained for a connection between the storeys of the building. In such a vertical shaft in a pillar, a staircase 18 or a lift 19 may be arranged, just as diagrammatically shown in Figure 8, in which the pillars obtained with the superimposed vertical elements 1 are indicated by their four posts 2. Also pipes 20, flues, and/or air tubes 21, cables, and the like, for the several systems of the building may be lodged in any vertically continuous shaft in any pillar formed by the superimposed

vertical elements 1, 1', as shown in Figures 6 and 8, while iron steps 22 permitting the free access to any level, may be also provided.

However, a pillar formed by the superimposed vertical elements 1, 1' may be divided into stages corresponding to the storeys of the building, by means of slabs 23 being provided in the superimposed vertical elements 1, 1' at the level of their crosspieces 3, 3', as shown in Figure 7. Thus, rooms are obtained at the interior of any pillar formed by the vertical superimposed elements 1, 1', which may be used for any desired purpose, for example, as bathrooms 24, as duty or dwelling rooms, as office premises, or the like.

For manufacture of the vertical elements 1, 1' according to the invention, any suitable forms may be used. A preferred form according to the invention is shown in Figures 9, 10 and 11, and comprises a square inner frame 25 having vertical sidewalls, which is mounted onto a form-supporting fixed inner structure 26. To permit the extraction from the form, the inner frame 25 is enlargeable and contractable by means, for example, of one or more driving cylinders 27, in the manner as known, for example, from tunnel forms. The square inner frame 25 delimits the inner sides of the crosspieces 3 of the vertical element 1, for which the shown form is designed.

At each one of the sides of the inner frame 25 there is provided a portal 28 consisting of two angled

half portals 128, which at their upper section are articulatingly connected to each other along their center line by a horizontal pivot pin 29. The horizontal plane upper sides of the four portals 28 delimit the lower sides of the crosspieces 3 of an element 1. The standards of these portals 28 delimit the inner sides of the posts 2 of an element 1, for that part of said posts 2 which lies below the crosspieces 3. The intermediate upper pivot pins 29 for the pivotal connection of portals 28, are supported by respective extensions 126 of the fixed form-supporting structure 26. To extract a vertical element from the form, the portals 28 are contracted by causing the two half portals 128 to swing inwardly, i.e., the one toward the other, about their intermediate upper pivot pin 29, for example by means of driving cylinders or of hand operated driving devices in form of turnbuckles 30.

The inner sides of each post 2 are delimited for that part which lies over the crosspieces 3, by an upright 31 presenting a matching angle profile, and having its lower end articulatingly connected to the inner form--supporting structure 26, so as to be swingable about a horizontal pivot 32 being arranged perpendicularly to the diagonal of the square frame 25. To extract a vertical element from the form, the angle profile uprights 31 are swung about the pivots 32, from their vertical position for casting into an inwardly inclined or tilted position, as shown in the right-hand side of Figure 9.

The outer sides of the crosspieces 3 of an element

1, and both outer sides of posts 2 throughout their height, are delimited by H-shaped vertical outer panels 33 being each provided in correspondence of one of the sides of the square frame 25, and which when in casting position, adhere to each other and also against the outer edges of portals 28 and the angle uprights 31. To extract a vertical element from the form, the H-shaped vertical outer panels 33 are drawn outwardly from the central assembly of the form, which comprises the inner frame 25, the four portals 28, and the four upper angle uprights 31. To this end, each H-shaped vertical outer panel 33 is supported by a carriage 34 running in horizontal rails 35, and which can be shifted by a driving cylinder 36. Also work platforms 38 may be mounted on these carriages 34.

The upper sides of the chambers for casting the crosspieces 3 of an element 1 can be closed by means of openable or removable horizontal panels 37 which may be supported and held in position in any suitable manner, not shown. The vertical chambers for casting the posts 2 of an element 1 are closed at their bottom ends by bottom plates 39 which are so profiled as to obtain the post-fixing projections 7 at the bottom ends of posts 2, and are fastened to the form-supporting structure 26, possibly with the level thereof being adjustable. The top end sides of the vertical chambers for casting the posts 2 can be closed by top plates 40 which, for example, may be swingably fulcrumed to the stiffening structure for the H-shaped vertical outer panels 33, and which may be tied, when in casting position, to the inner angle uprights 31,

so that the upper ends of panels 33 and uprights 31 are fastened together in such a manner as to determine a higher resistance to the cast concrete pressure. For this purpose, each top plate 40 can be secured to a bracket 41 which at 42 is pivotally connected to the corresponding H-shaped vertical outer panel 33, while this top plate can be fastened at 43 to the respective inner angle upright 31. The top plates 40 are so profiled as to obtain the post-fixing recesses 8 in the top ends of posts 2.

In Figures 10 and 11 there also clearly appear the grillworks of tubes 6 that are lodged in the form to obtain the anchor holes 5 in an element 1, as well as the lost tubes 44 that are also incorporated in the form to obtain the holes 4 in the crosspieces 3 of an element 1.

The vertical element 1' having arch-shaped crosspieces 3' can be manufactured by using a form like the form as above described with reference to Figures 9 to 11, however with the only difference of presenting arched portals 28, in place of the shown rectangular portals.

CLAIMS

1. A prefabricated vertical one-piece element (1, 1') made of reinforced concrete, for erecting the skeleton of a building, and the like, characterized in that it consists of four posts (2) that are located at the angles of a quadrangle, preferably at the angles of a rectangle or a square, and that at a certain level are interconnected by horizontal crosspieces (3, 3') extending along the sides of the quadrangle, preferably of the rectangle or the square.

2. The element according to claim 1, characterized in that the horizontal crosspieces (3, 3') are located at an intermediate level of posts (2), more particularly in a median zone between the ends of said posts (2).

3. The element according to any one of claims 1 or 2, characterized in that the horizontal crosspieces (3) are straight pieces.

4. The element according to any one of claims 1 or 2, characterized in that the crosspieces (3') consist of arches with the extrados upper surface of the arch being preferably a plane surface.

5. The element according to any one or more of the preceding claims, characterized in that in at least one crosspiece (3, 3') one or more through holes (4) are provided for passing pipes (15, 16), cables, or the like.

6. The element according to any one or more of the preceding claims, characterized in that in the ends of the crosspieces (3, 3') and in the adjoining sections of posts (2), either through and/or dead horizontal holes (5) are provided, that are perpendicular to the crosspieces, and are intended for anchoring horizontal beams (14) and/or floors.

7. The element according to claim 6, characterized in that the horizontal anchor holes (5) that are provided in the ends of the crosspieces (3, 3') and in the adjoining sections of posts (2), are formed by means of one or more grillworks of tubes (6) being incorporated in the prefabricated vertical element (1, 1').

8. The element according to any one or more of the preceding claims, characterized in that the bottom and top ends of posts (2) are so shaped that a joint of the male (7) and female (8) type is provided for fixing together the posts (2) of two superimposed vertical elements (1,1').

9. A building skeleton comprising pillars which are connected by means of horizontal beams and/or floors, characterized in that at least one pillar consists of one or more prefabricated vertical one-piece elements (1, 1') of reinforced concrete, made according to any one or more of claims 1 to 8, and placed the one upon the other.

10. The skeleton according to claim 9, characte= rized in that the horizontal crosspieces (3, 3') of the

superimposed prefabricated vertical elements (1, 1') are substantially located at the level of the horizontal beams (14) and of the floors, while the joints (7, 8, 12, 13) between the posts (2) of the superimposed vertical elements (1, 1') are substantially located in the reversal area of the sign of the bending moment acting upon the whole height of the posts between two floors, i.e., they are located about midway between two floors.

11. The skeleton according to claims 9 and 10, characterized in that the prefabricated lower vertical element (1, 1') of a pillar has its posts (2) standing on a base element (9) consisting of four vertical posts (10) that are located at the angles of a quadrangle, preferably of a rectangle or a square, and that at their bottom ends are interconnected by crossbeams (11) extending along the sides of the quadrangle, preferably of the rectangle or the square, the said posts (10) having such a height that they substantially reach to half the height of the respective storey.

12. The skeleton according to any one or more of claims 9 to 11, characterized in that the superimposed vertical elements (1, 1') of two pillars are inter= connected at the level of a floor and in correspondence of their posts (2) and the adjoining ends of their crosspieces (3, 3'), by means of two spaced apart, parallel horizontal beams (14), while the space between these beams (14) is covered preferably by prefabricated tiles (17) being laid on the beams (14), and is intended for accommodating pipes

(15, 16), cables, and the like, for the several systems of the building.

13. The skeleton according to any one or more of claims 9 to 11, characterized in that the space in the inside of at least one pillar consisting of one or more superimposed vertical elements (1, 1') is left entirely or partly clear of horizontal partitions, so that it forms a continuous vertical shaft for installation of a lift (19) or a staircase (18), of pipes (20), of flues or air pipes (21), of cables, or the like, for the several systems of the building.

14. The skeleton according to any one or more of claims 9 to 13, characterized in that in at least one of the pillars formed by one or more superimposed vertical elements (1, 1'), slabs (23) are provided, particularly at the level of the crosspieces (3, 3') in said elements (1, 1'), whereby to form rooms (24) at the interior of the pillar, to be used as dwelling or duty rooms, as office or trade premises, or the like.

15. A form for manufacturing prefabricated vertical elements made of reinforced concrete, according to claims 1 to 8, characterized in that it comprises an either rectangular or square inner horizontal frame (25) having vertical sidewalls, which is intended for delimiting the inner sides of the crosspieces (3, 3') of an element (1, 1'); four either rectangular or arched portals (28) provided along the sides of said inner frame (25) for

delimiting the lower sides of the crosspieces (3, 3') and the two inner sides of posts (2) which lie below the crosspieces (3, 3'); four angle uprights (31) provided over the said inner frame (25), at the angles thereof, for delimiting the two inner sides of posts (2) which lie over the crosspieces (3, 3'); four H-shaped vertical outer panels (33) provided along the sides of the inner frame (25) for delimiting the outer sides of the crosspieces (3, 3') and also the outer sides of posts (2) over their entire height; removable or openable upper panels (37) for delimiting the upper sides of the crosspieces (3, 3'), and profiled top plates (40) and bottom plates (39) for delimiting the top and bottom end sides of posts (2).

16. The form according to claim 15, characterized in that the inner frame (25) is contractable, and the portals (28) consist each of two half portals (128) which in their top section are intermediately fulcrumed about a support structure (26, 126) so as to be inwardly swingable the one toward the other, while the vertical angle uprights (31) are inwardly tiltable about horizontal pivots (32), and the H-shaped vertical outer panels (33) are horizontally shiftable, parallelly to themselves.

17. The form according to claims 15 and 16, characterized in that the H-shaped vertical outer panels (33) are mounted onto horizontally slidable carriages (34) supporting also work platforms (38).

18. The form according to claims 15 to 17,

characterized in that the profiled plates (40) delimiting the top ends of posts (2) are articulatingly connected in a swingable manner to the H-shaped vertical outer panels (33), and can be fastened to the angle uprights (31).

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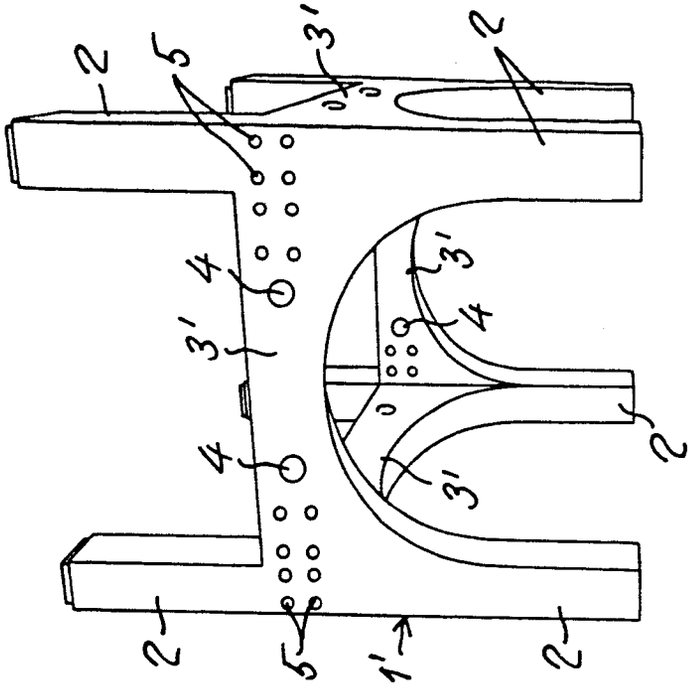

Fig.2

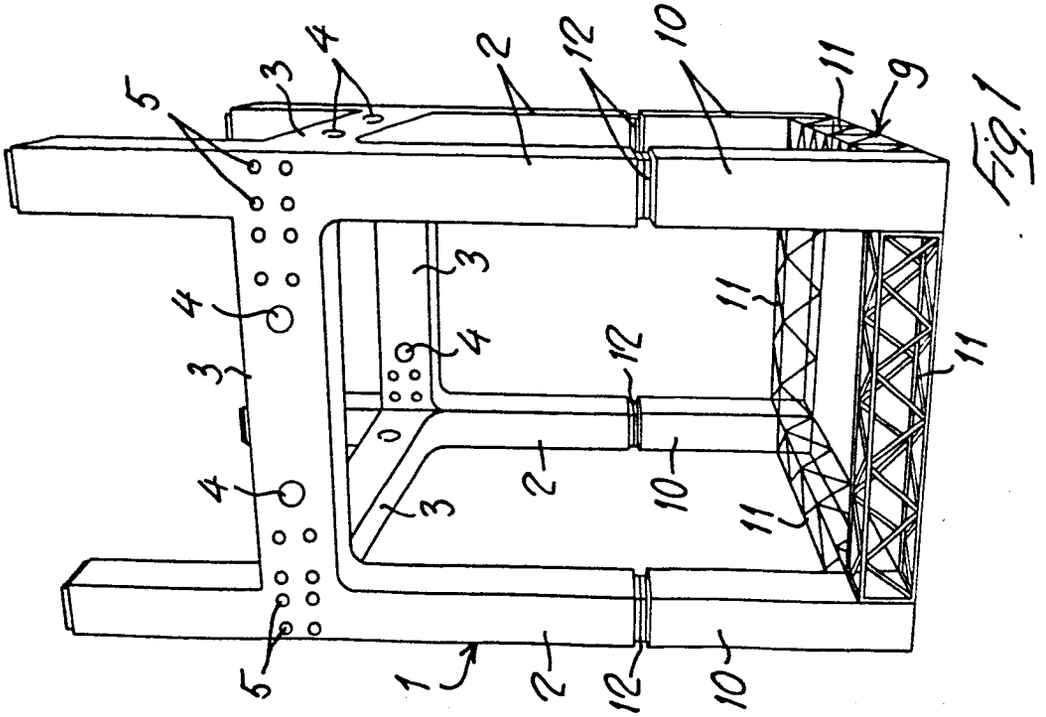

Fig.1

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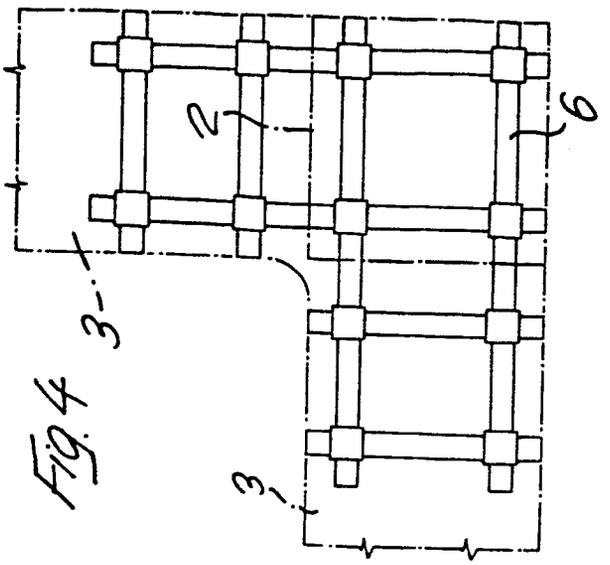

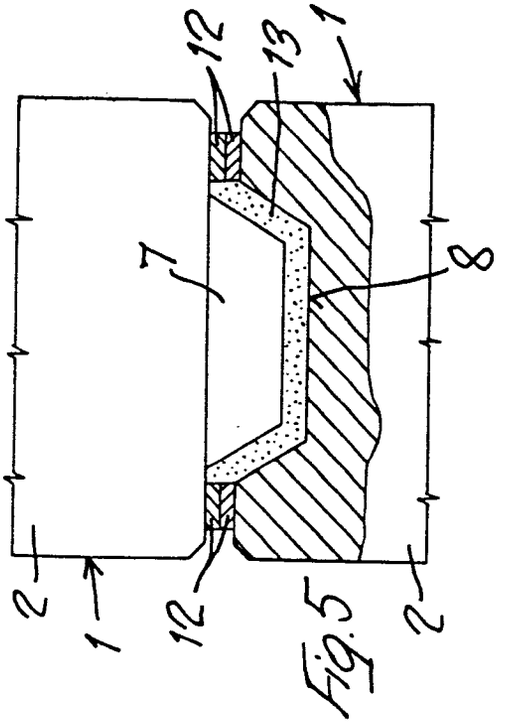

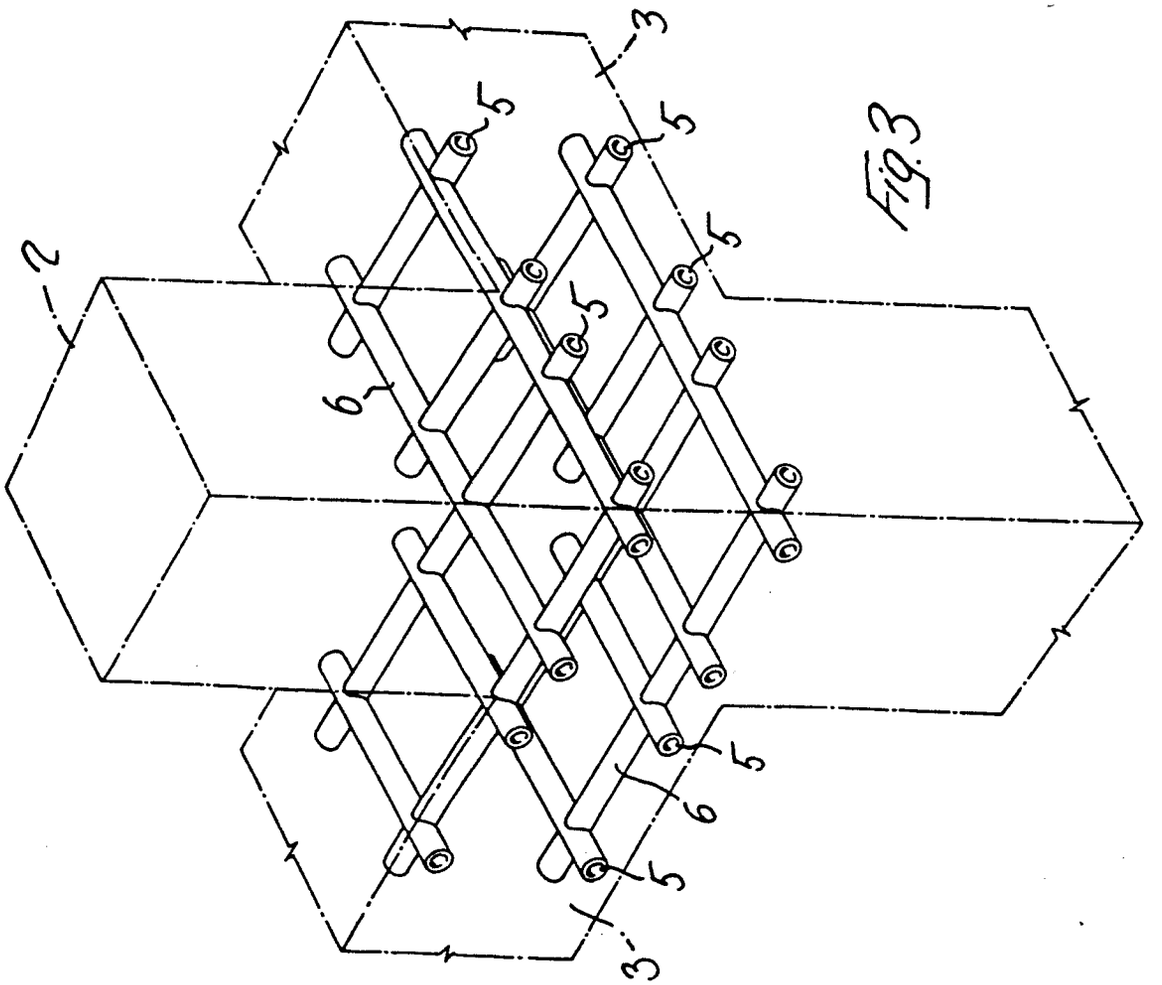

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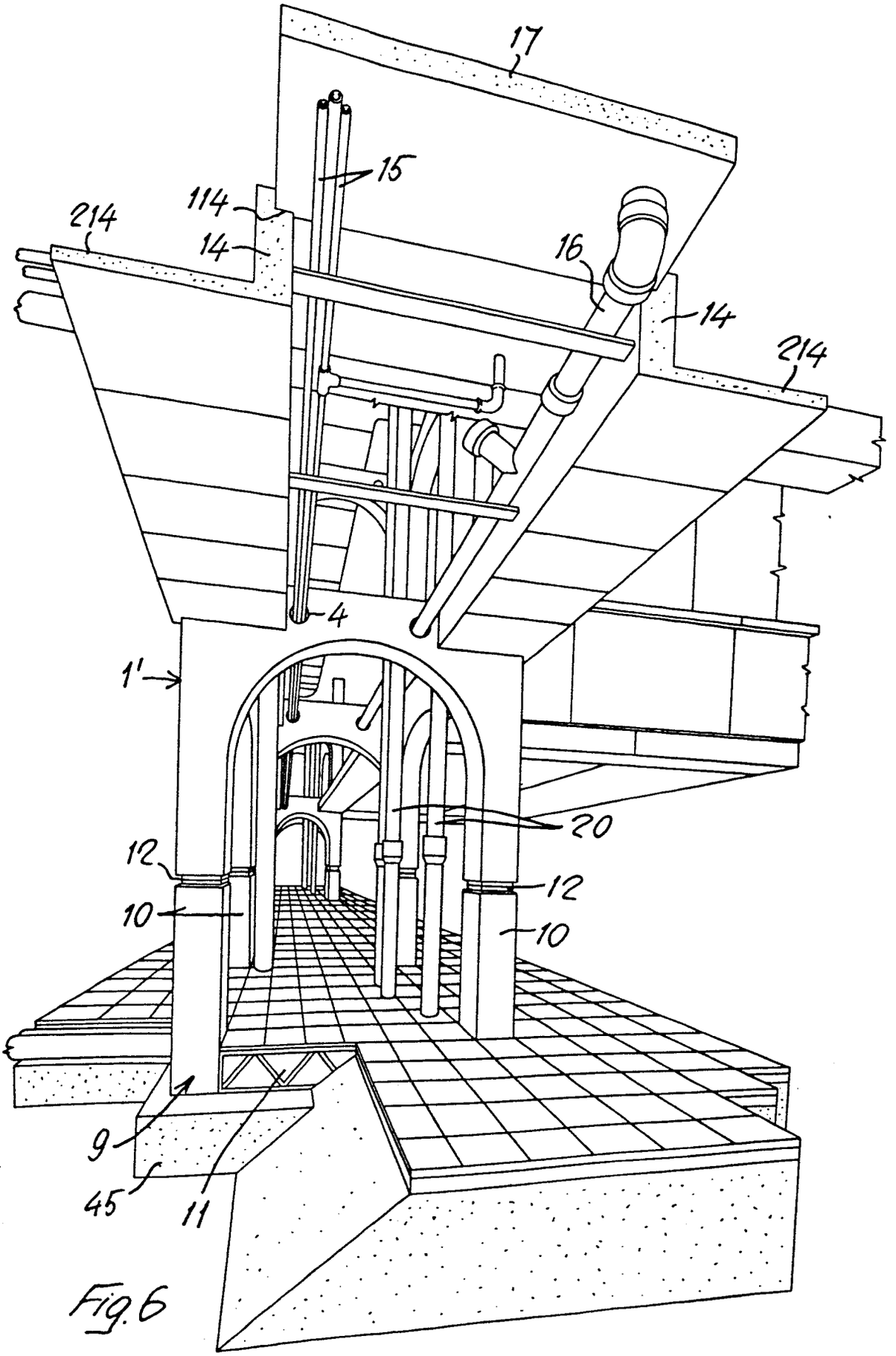

Fig. 6

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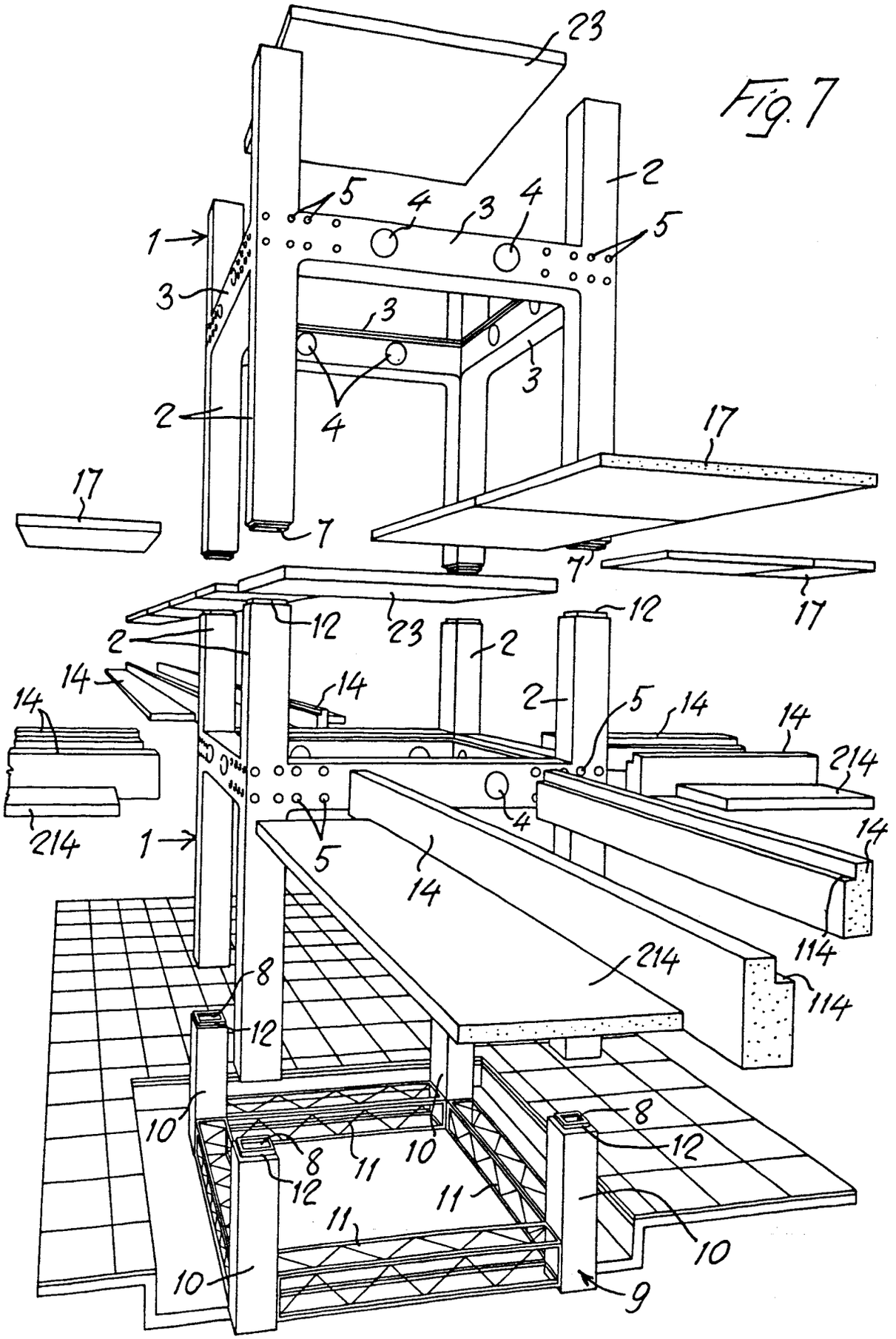

Fig. 7

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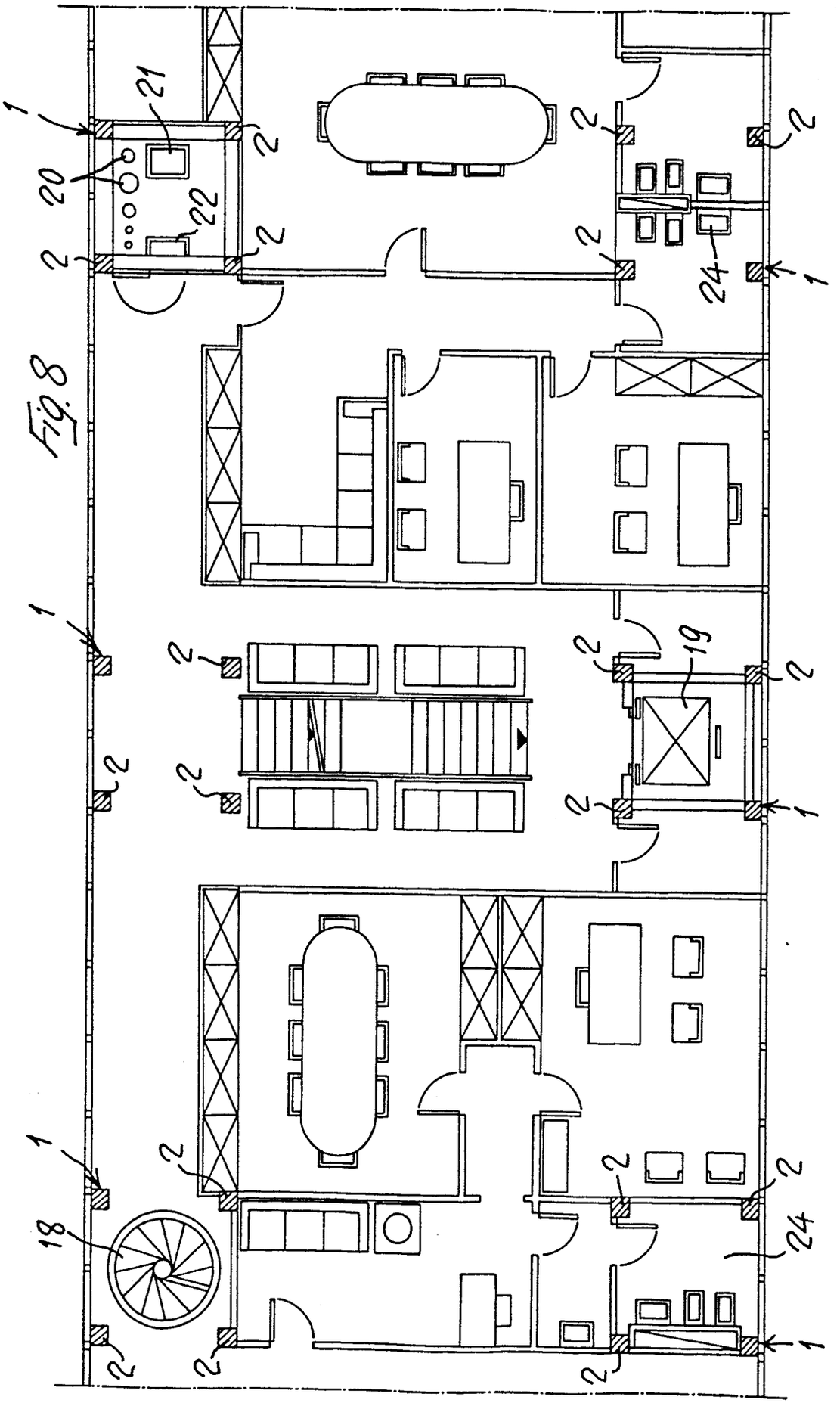

Fig. 8

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Fig. 9

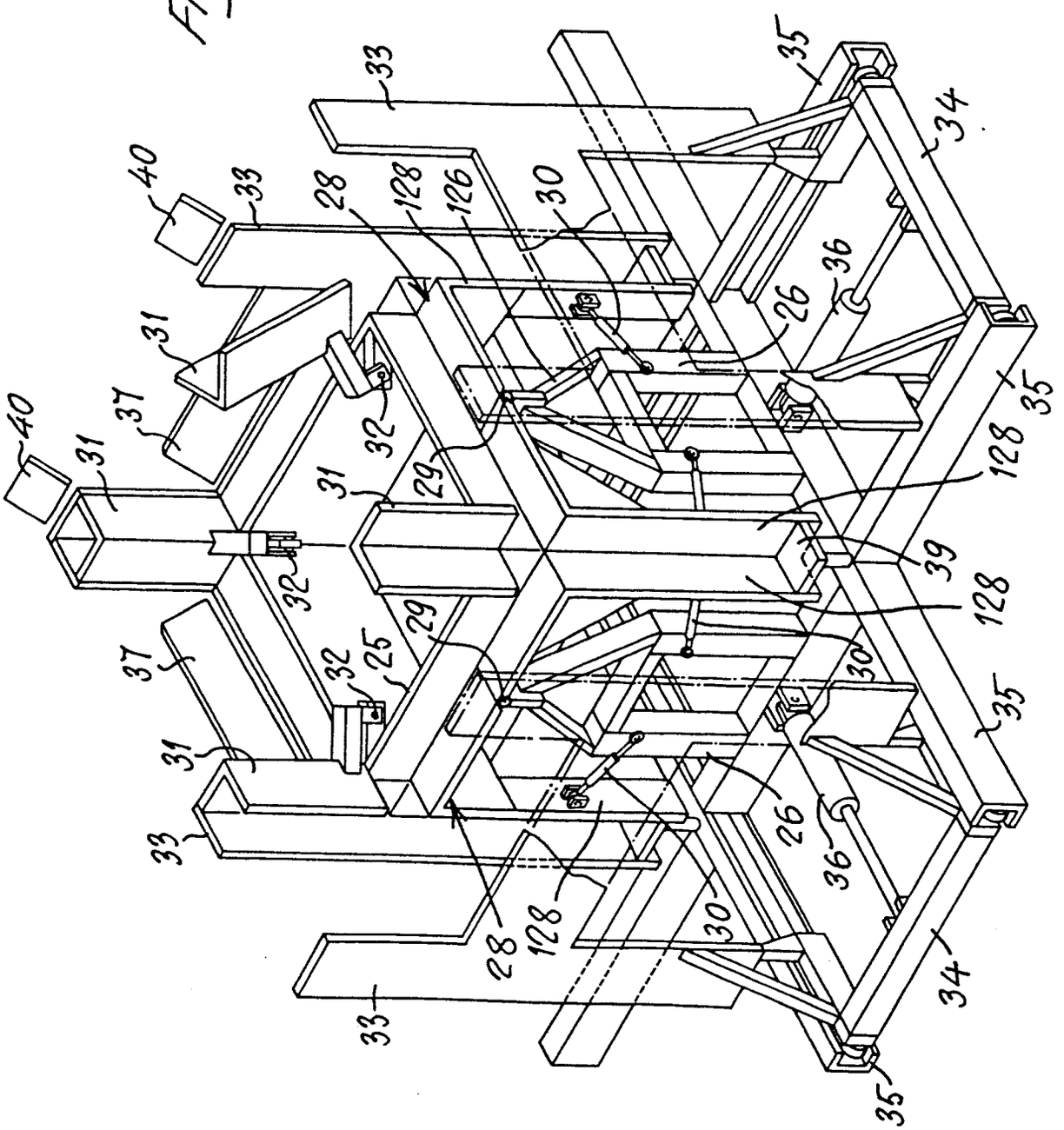

Fig. 10

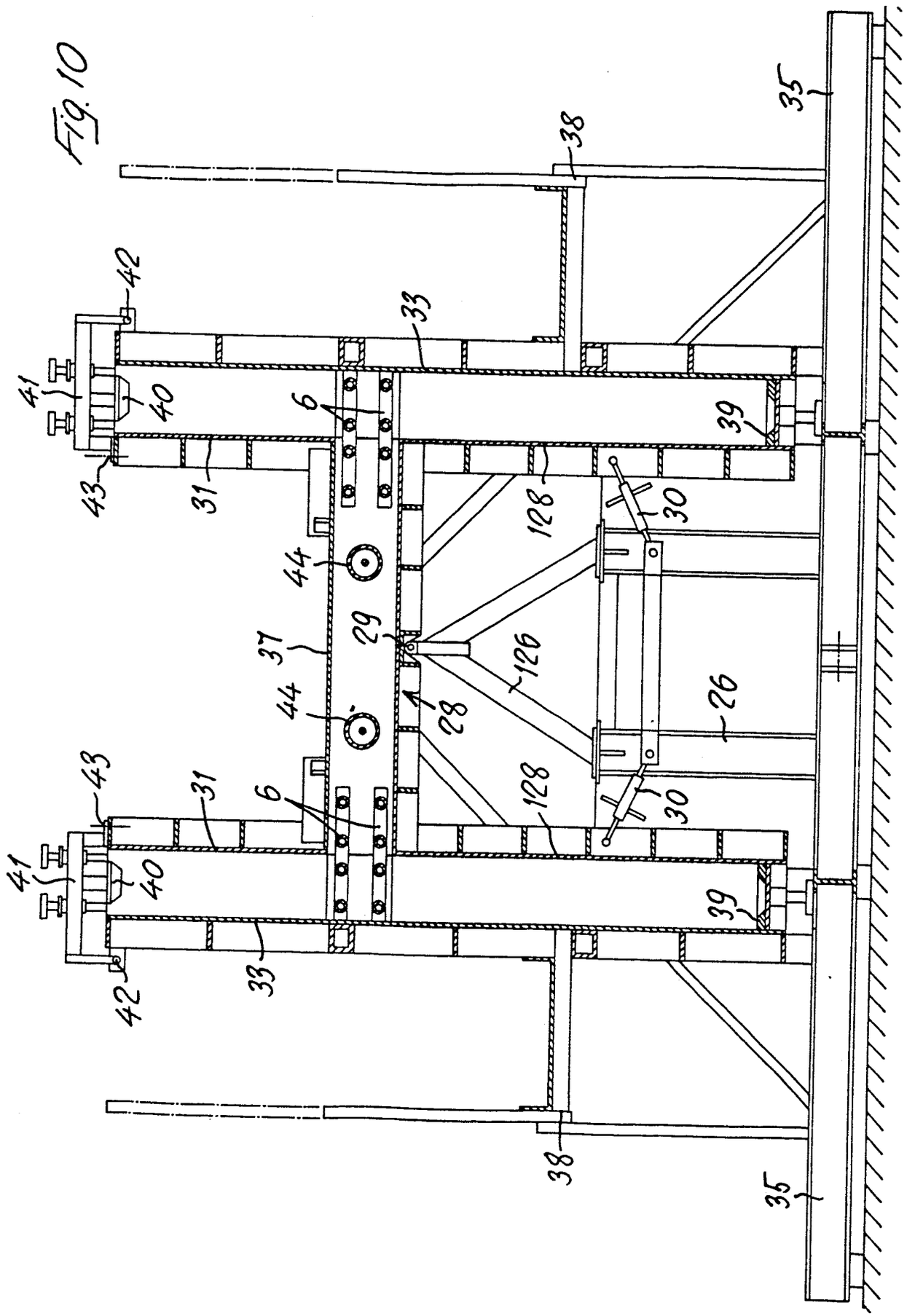
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Fig. 11