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(54) A demountable support structure

(57) A demountable support structure (10,20,30) is provided upon which lifting gear capable of lifting weights up to 2 tonnes can be mounted. The structure comprising lightweight support elements (12) in the form of aluminium box sections releasably linked together to form the structure. The lifting gear can be mounted on an I-Beam which is secured to the support members (12) and can be moved along the I-Beam. Each of the lightweight support member (12) is capable of being carried by a single person thereby rendering the structure readily transportable.

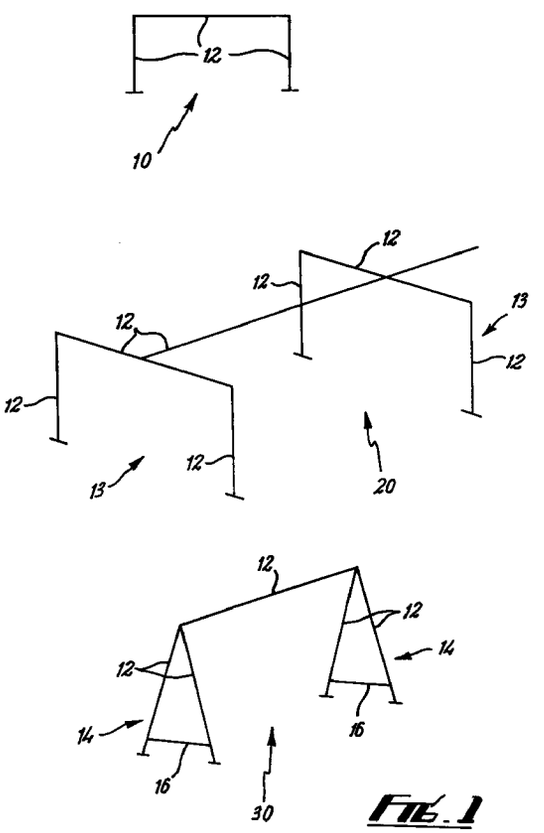

FIG. 1

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Description

This invention relates to a demountable support structure and more particularly to such a structure for use in supporting lifting gear.

It is known to provide demountable support structures for many applications, for example stage lighting. Whilst these structures can be assembled and disassembled, the finished structure is not usually sufficiently strong and stiff enough to be rated with a working load limit (W.L.L.) or a safe working load (S.W.L.) under BS 2853 which is necessary for use in supporting lifting gear and lifting loads. Furthermore, when support structures are to be used for supporting lifting gear which is for lifting loads, it has to be capable of withstanding not only static loading, as with stage lighting, but also all possible dynamic loadings. Still further there will also be longitudinal and lateral stresses in the support structure caused by the lifting gear movement and these also have to be tolerated by the support structure.

There is accordingly a long felt need for a lightweight and easily transportable support structure which is capable, when assembled, of withstanding the loading and stresses mentioned above when supporting lifting gear whereby, in use, the lifting gear can lift loads of up to 2 tonnes safely whilst mounted on the structure.

Accordingly it is an object of the present invention to provide such a support structure.

According to the present invention therefore there is provided a demountable support structure comprising mounting means for mounting lifting gear on the structure, said structure comprising multiple releasably interconnected support members formed from a lightweight material, each member being capable of being carried by a single person.

With this arrangement it is possible to provide a lightweight demountable support structure for a lifting gear which is easily transported and assembled but which is capable of supporting a lifting gear when lifting loads. Furthermore, the lifting gear can be rated with a working load limit with the support structure of the present invention.

Preferably the support members are made from a lightweight metallic material and in particular may be formed from aluminium. The support members may comprise elongate members of generally box section having internal support struts which extend between opposite sides of the box section to provide additional support and load capacity. Alternatively the elongate members may have a generally triangular cross section or any other cross section as desired or as appropriate. Most preferably the box sections have a design strength to adequately prevent unacceptable deflection of the elements due to loading or stresses caused by the load being lifted. Preferably the support elements also have a weight of less than 25 kg.

The mounting for the lifting gear may comprise a moveable mounting which is mounted on one of the support members so as to be movable longitudinally thereof. In one embodiment the mounting comprises a trolley mounted on the support members by way of rollers which, in use, may be in rolling engagement with an upper surface of the support members and in this case, the lifting gear may be mounted so as to depend from the trolley. In another embodiment the mounting comprises an I-Beam upon which the lifting gear is mounted for movement therealong.

Alternatively the mounting for the lifting gear may comprise a stationary fixed mounting.

The structure may be adapted to be secured, relative to a ground surface by way of securing means and the securing means may comprise ground engaging members or alternatively may comprise weighted structures which secure the structure relative to a ground surface.

An adjustable height platform may be provided which is capable of mounting support members relative to a ground surface when the ground surface is uneven, thereby ensuring that the structure is supported securely.

The invention will now be described further by way of example only and with reference to the accompany drawings of which:-

Fig. 1 shows three schematic representations of demountable structures according to the present invention;

Fig. 2 shows a side view of one form of support member for use in forming a demountable structure according to the present invention;

Fig. 3 shows one form of releasable connection between support members in a demountable structure;

Fig. 4 shows an alternative form of releasable connection between support members in a demountable structure;

Fig. 5 shows a still further form of releasable connection between support members;

Figs. 6 to 8 shows schematic representations of three alternative forms of securing means for securing the support members relative to a ground surface; and

Figs. 9 and 10 shows diagrammatic side views of two alternative forms of moveable trolley mounting for the lifting gear for use with a demountable structure according to the invention.

Referring now to Fig. 1, there is shown a schematic form three different forms of demountable support structure according to the invention. The first embodiment

shows a structure 10 formed from three support members 12 and this structure would be used when space is limited in which the support structure is to be erected or a simple low cost support structure is required. The second embodiment 20 is formed from seven interconnected members 12, formed into two generally U-shaped support sections 13 and a central top beam. This structure will inevitably provide greater stability than the structure shown in the first embodiment and will be used where there is more space for the structure shown in the first embodiment and will be used where there is more space for the structure to be erected. The third embodiment 30 is formed from five support members 12, formed into two generally A-shaped support sections 14 and a central top beam. The support members 12 which form the support sections 14 are linked across lower ends thereof, in the manner shown in the figures, to increase the stability thereof by way of the members 16. This structure is as stable as the structure of the second embodiment, and can support loads up to about the same weight. In all embodiments the support member has a design strength to adequately prevent unacceptable deflection of the elements due to loading or stresses caused by the load being lifted and a weight of less than 25 kg.

Referring now to Fig. 2, there is shown one embodiment of support member 12 which is used to form the structures shown in Fig. 1. As can be seen, the support member 12 is formed as a generally hollow box shaped frame formed by top and bottom bars 17, 18 linked by end bars 19 on each side of the member 12, each respective side of the member being linked by cross bars (not shown). The cross section of the support member can take any suitable form as desired or as appropriate. For additional strength, support struts 21 extend between the top and bottom bars on each side of the member 12. End support plates 26 can be provided which attach to the ends of the support members 12 and which can provide means of attachment to other members forming part of the structure.

The support members can be attached together in the manner shown in Fig. 3 to form demountable structures. In this arrangement the upper support member 12 is releasably connected to the lower support member 12 by use of the end support plate 26. An additional end support plate 26 can be provided and bolts can be extended through each plate 26 and into attachment with the respective top or bottom bar 17 or 18 of each member 19. An alternative form of releasable connection is shown in Fig. 4. In this alternative a cradle arrangement 27 is releasably secured to the plate 26 between the lower support member 12 and the upper support member 12 using bolts. The cradle comprises a securing plate 28 from which extends on opposite sides thereof a pair of shaped members 29 which terminate at each end in downwardly depending hooks 31. It can be seen from the figure that an upper support member 12 can, when the cradle 27 is secured to the lower support member 12, extend across the securing plate 28 transversely of the shaped members 29 whereby the bottom bars 18 on each side of the member 12 abut an inner portion of the hooks. This form of connection is particularly advantageous where securing of the support members together is not necessary.

A still further alternative connection between support members 12 is shown in Fig. 5. In this form of connection two support members 12 positioned one above the other can be linked together using a pair of cradles 27 of the type shown in Fig. 4 linked together by relatively long bolts 33. In this form of connection, one cradle 27 is located on the top of a top support member 12 in such a manner that the hooks 31 engage the top bar 17 on each side of the member 12. Similarly, a cradle 27 is located on the bottom of a bottom member 12 in such a manner also that the hooks 31 engage the bottom bar 18 on each side of the member 12. The securing plates 28 of each cradle 27 are then releasably connected using a number of long bolts 33 of which, for example, four may be used as shown in the figure. It will be appreciated that using the connections shown in Figs. 3, 4 and 5, any of the structures shown in fig. 1 can be constructed.

As mentioned above, support members 12 which are in contact with a ground surface 36 can be secured to the ground surface 36 in order to provide greater stability to the structure. These methods of achieving this are shown in Figs. 6 to 8. In Fig. 6, a securing plate 37 is provided to close off the end of the support member 12. If the structure is mounted on a solid ground surface, then holes can be drilled into the surface and the structure can be secured relative to the surface by extending one or more bolts 38 through the securing plate 37 and into the bores. If the surface is not solid, then in place of bolts it may possible to use ground engaging spikes. Alternatively, as shown in Fig. 7, a heavy weight member 39, or receptacle containing heavy weights, can be provided on each side of the support member 12 to provide a more temporary securing of the position of the structure relative to the ground surface 36, particularly when more permanent fixing to the ground surface is not possible.

If the member 12 is to be mounted on an uneven surface, then a height adjustable platform 40 can be utilised to mount the member 12 on. As shown in the figure, the platform comprises a platform member 41 upon which the member 12 is mounted. On each side of the platform there is provided at least one adjustable foot 42. The adjustable foot comprises a cranked handle 43 which extends through a bore (not shown) in the platform 41 and terminates in a flat foot member 44. At least a portion of each cranked handle 43 is screw threaded in order to allow the amount by which the handle 43, and hence the foot member 44, projects below the platform can be varied. Accordingly, by appropriate adjustment of the foot 42, by turning of the handle 43, any slope or unevenness in the ground can be compensated

for whereby the support member 12 extends generally vertically and thereby provides maximum stability and support.

The support structure, once erected, is utilised to mount lifting gear. The lifting gear is mounted on the support structure by way of a trolley 50 which is movably mounted to a generally horizontally extending support member 12 of the structure, for example the top member 12 in which the examples shown in Fig. 1.

The movable trolley 50 can take two forms shown in Fig. 9 and Fig. 10 and can be movable along either the top bar 17 of the top member 12 or can be movable along the bottom bar 18 of the top member 12. In Fig. 9, the trolley comprises two generally Z-shaped members 51, the upper arm 52 of which extends generally parallel to the side bar of the member 12. At least one pair of roller members 54 extend inwardly from the upper arm 52 and into rolling contact with the upper bars 17 of the top member 12. More than one pair of roller members 54 can be provided if desired or as appropriate. Lower arms 53 of the Z-shaped members 51 are secured together in any suitable manner and the arm strengthened if desired by support struts 55. It can be seen that lifting gear can be supported from the lower arms 53 and is movable along the top bars 18 by a rolling motion of the roller member 54.

In Fig. 10 is shown an arrangement in which a lifting gear mounting plate 56 is secured by bolts 57 to the lower bar 17 of the support member 12. Secured to the plate 56 is a hollow generally U-shaped member 58 having a longitudinal aperture 59 in the lower surface thereof. The U-shaped member 58 can be of any suitable shape as desired or as appropriate. An attachment member 61 extends through the aperture 59 into an interior of the U-shaped member 58 and is provided with a pair of roller members 62 on each side of the part of the member 61 which is internally of the member 58. It will be appreciated that with this arrangement lifting gear can be attached to a lower part of the attachment member 61 and the lifting gear can be moved relative to the member by rolling motion of the roller members 62 internally of the U-shaped member 58.

It will be appreciated that the present invention provides a demountable structure which is capable of rapid assembly and disassembly and yet when erected is capable of supporting lifting gear and allowing the lifting of loads thereby in a particularly safe manner. In particular, the lifting gear may be rated with a working load limit. The advantages of the present invention arise particularly, although not exclusively, as a result of the structure of the support members, their mode of attachment together to form the structure, and the configuration of structures erect. Additional support is also given by the manner in which the members 12 are secured relative to a good surface.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example only.

Alternatively the lifting gear can be mounted on an I-Beam which is secured to, or forms part of, the support structure and is moveable therealong.

Claims

1. A demountable support structure comprising mounting means for mounting a lifting gear, said structure comprising multiple releasably interconnected support members formed from a lightweight material, each member being capable of being carried by a single person.

2. A support structure according to claim 1, wherein the support members are made from a lightweight metallic material.

3. A support structure according to claim 2, wherein the metallic material comprises aluminium.

4. A structure according to any one of claims 1 to 3, wherein the support members comprise elongate members of generally box section having internal support structures which extend between opposite sides of the box section to provide additional support and low capacity.

5. A structure according to claim 4, wherein the elongate members have a generally triangular cross section.

6. A structure according to any one of claims 1 to 5, wherein the mounting for the lifting gear comprises a moveable mounting.

7. A structure according to any one of claims 1 to 6, wherein the mounting for the lifting gear comprises a trolley mounted on the support members by way of rollers which, in use, are in rolling engagement with an upper surface of the support members with the lifting gear depending from the trolley.

8. A structure according to any one of claims 1 to 6, wherein the mounting for the lifting gear comprises an I-Beam secured to the structure, the lifting gear being moveably mounted on said I-Beam for movement therealong.

9. A structure according to any one of claims 1 to 5, wherein the mounting for the lifting gear is a stationary fixed mounting.

10. A structure according to any one of claims 1 to 9, wherein the structures are adapted to be secured relative to a ground surface by way of securing means, the securing means comprising ground engaging members.

11. A structure according to any one of claims 1 to 9, wherein the structure is adapted to be secured relative to the ground surface by way of securing means, the securing means comprising weighted structures which secure the structure relative to a ground surface.

12. A structure according to any one of claims 1 to 11 further comprising an adjustable height platform which is capable of mounting support members relative to a ground surface when the ground surface is uneven, thereby ensuring that the structure is supported securely.

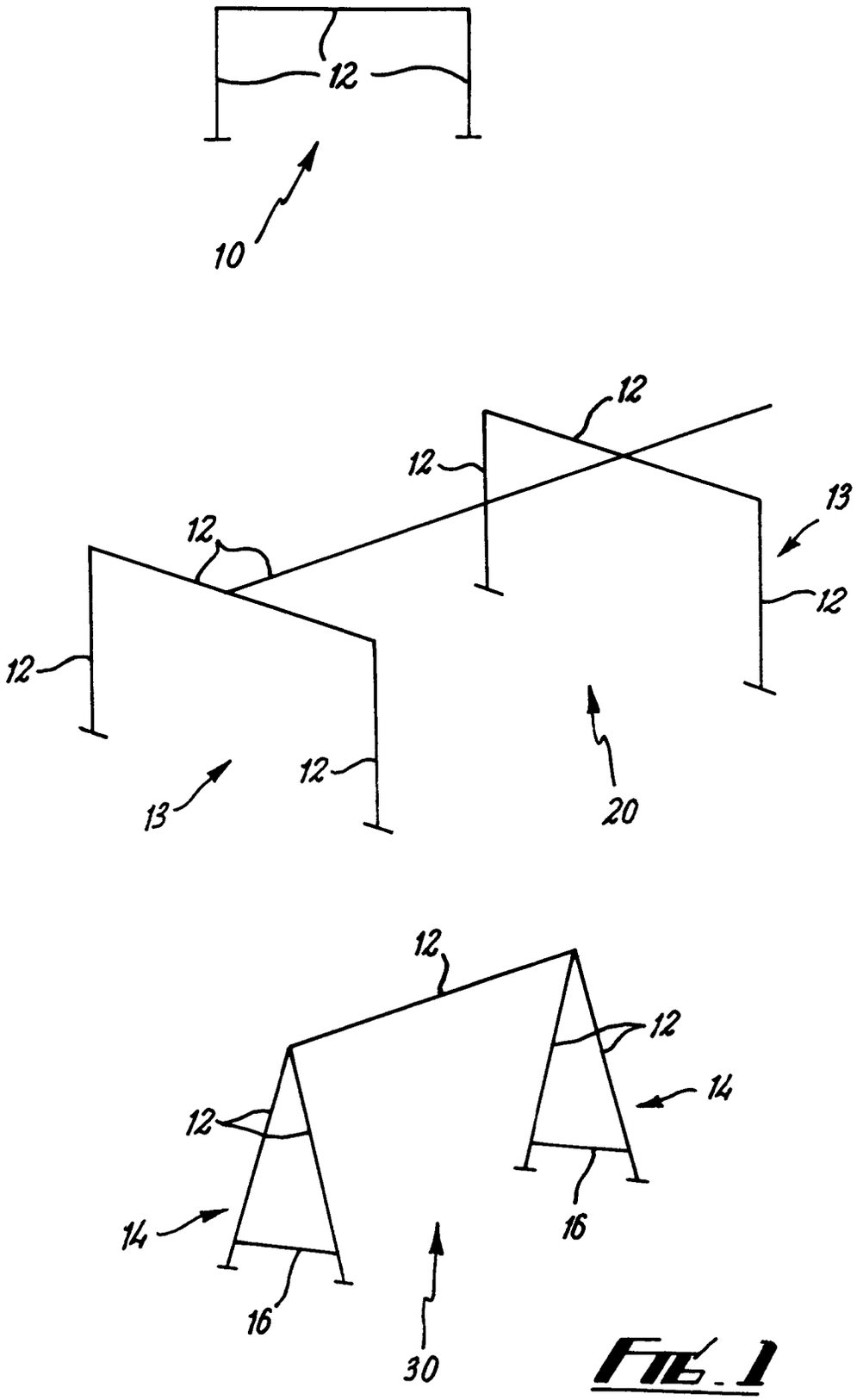

FIG. 1

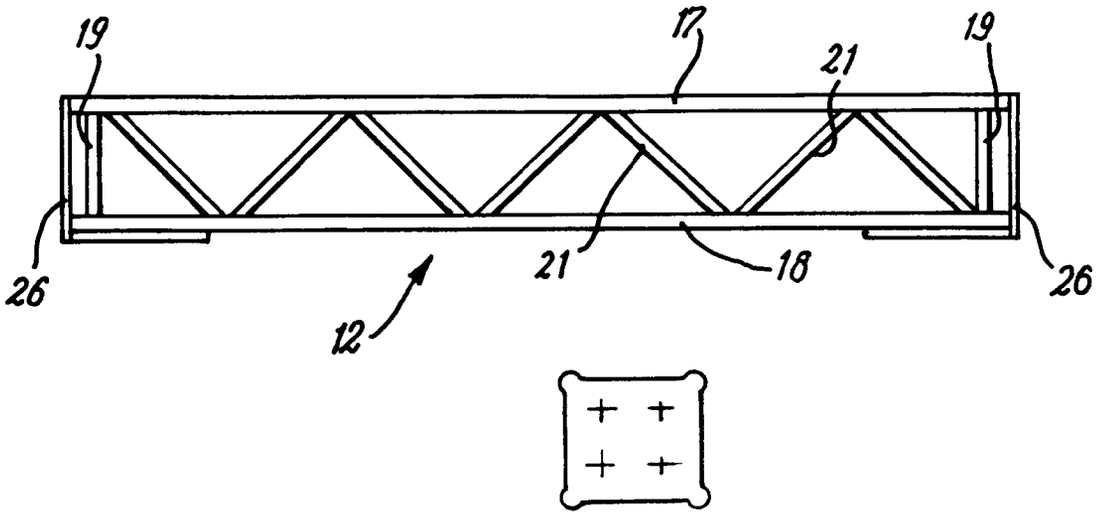

FIG. 2

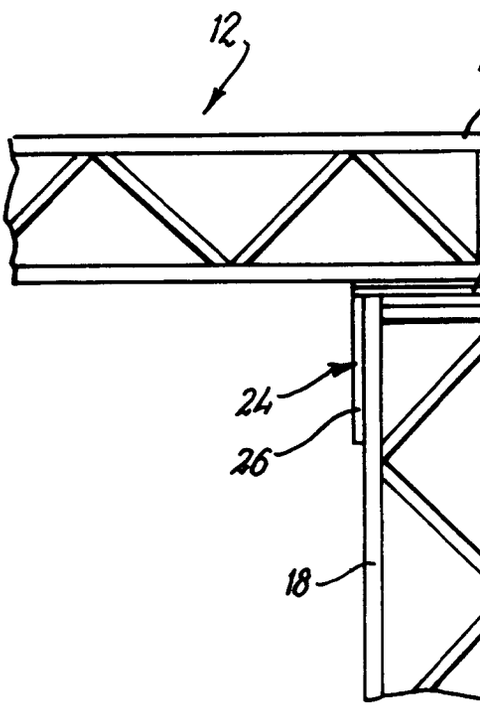

FIG. 3

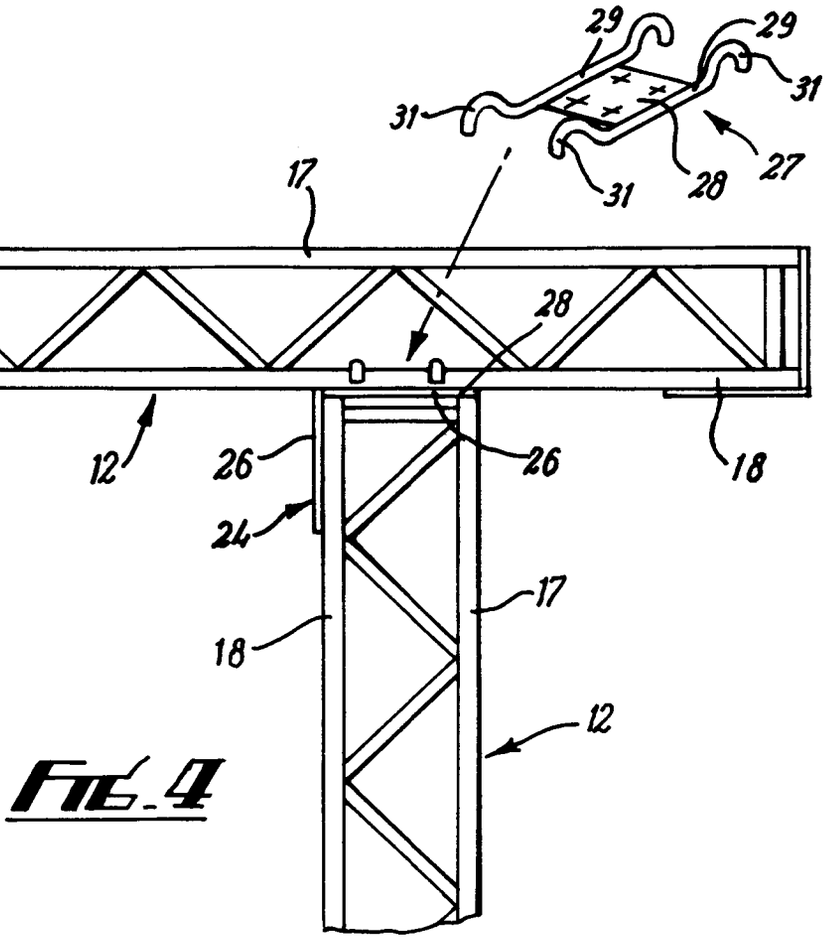
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FIG. 4

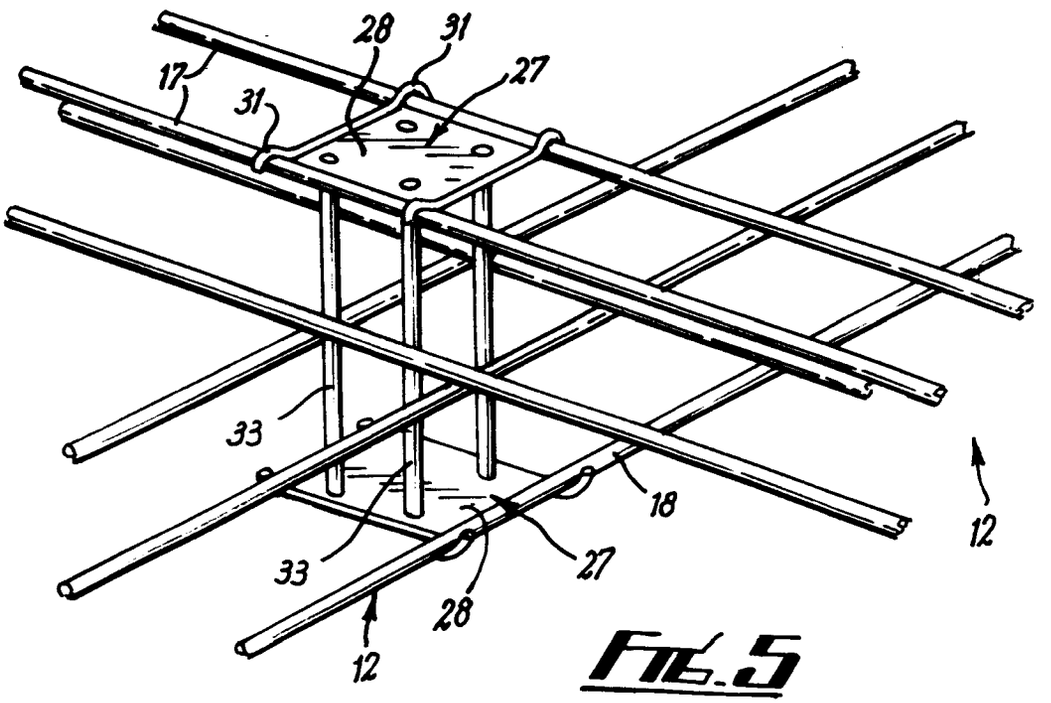
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FIG. 5

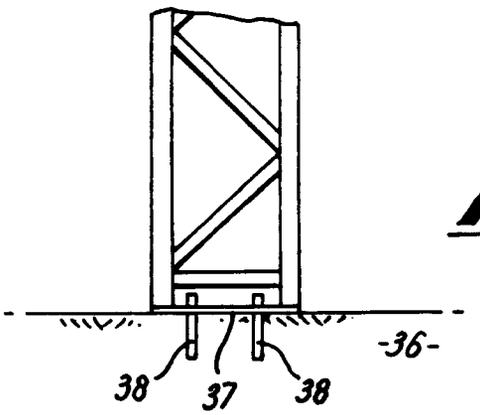

FIG. 6

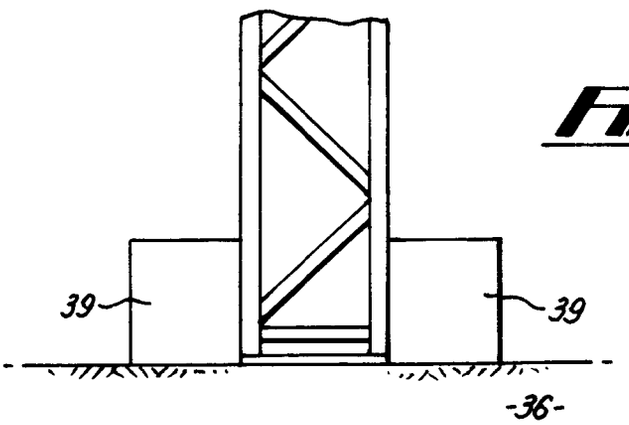

FIG. 7

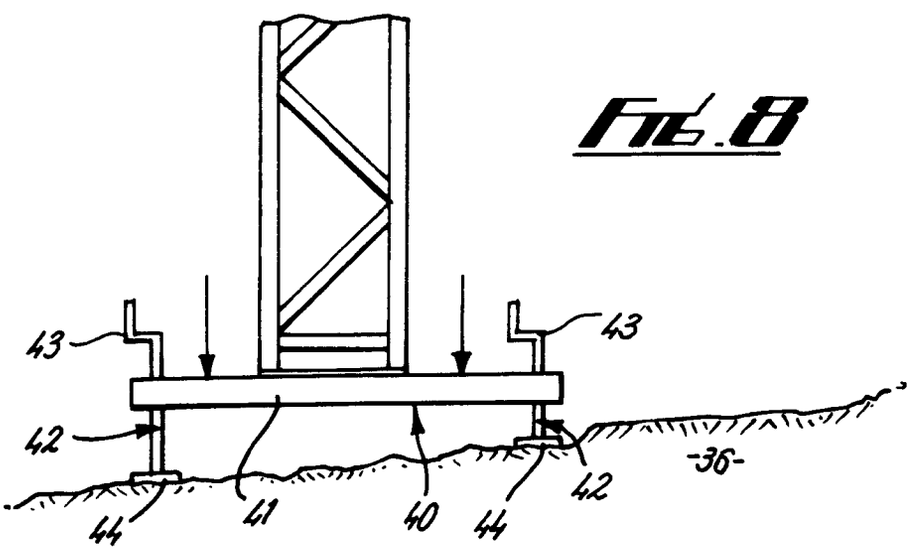

FIG. 8

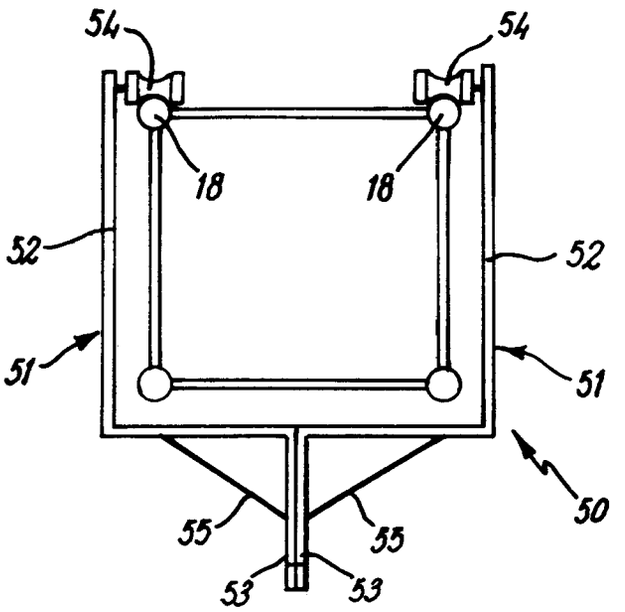

FIG. 9

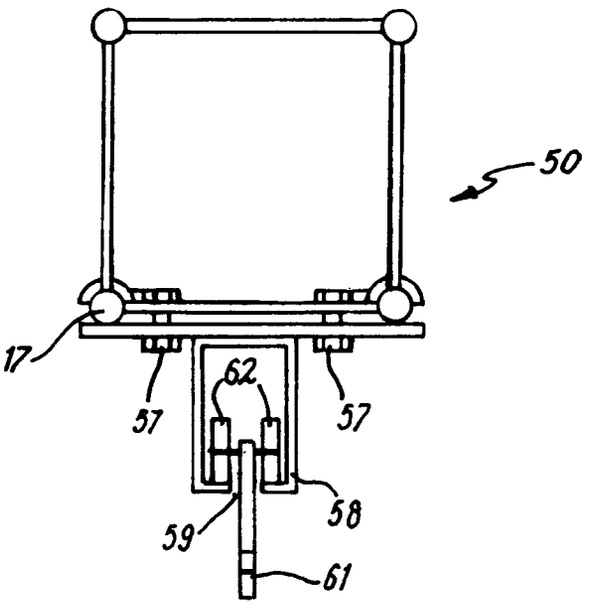

FIG. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 31 0204

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US 3 000 329 A (FARGO) * the whole document *	1-3,8-10 4,5	B66C1/00 B66C19/02 B66C5/02
Y	FR 920 433 A (METZ) * the whole document *	4,5	
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A	US 4 334 480 A (WALLACE)		
A	DE 10 12 047 B (KRUPP-ARDELT)		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US 3 259 250 A (PARKER)		B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 March 1998	Van den Berghe, E

CATEGORY OF CITED DOCUMENTS

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