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EUROPEAN PATENT APPLICATION

21 Application number: 90306916.9

51 Int. Cl.5: **E04G 11/48**

22 Date of filing: 25.06.90

30 Priority: 08.07.89 GB 8915695

43 Date of publication of application:
16.01.91 Bulletin 91/03

84 Designated Contracting States:
AT CH DE DK FR GB LI NL

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54 **Formwork system.**

57 A formwork system comprising a plurality of vertically disposable main legs (10), ledger frames (12) and bracing (26, 28) has each main leg provided with an end plate (38) to which is securable a rotatable female threaded element (44) of a screw

jack (20). A releasable metal retainer plate (48) is securable to the end plate (38) to engage a flange portion (46) of the female element (44) whereby the female element is retained captive to the end plate (38) in freely rotatable relation thereto.

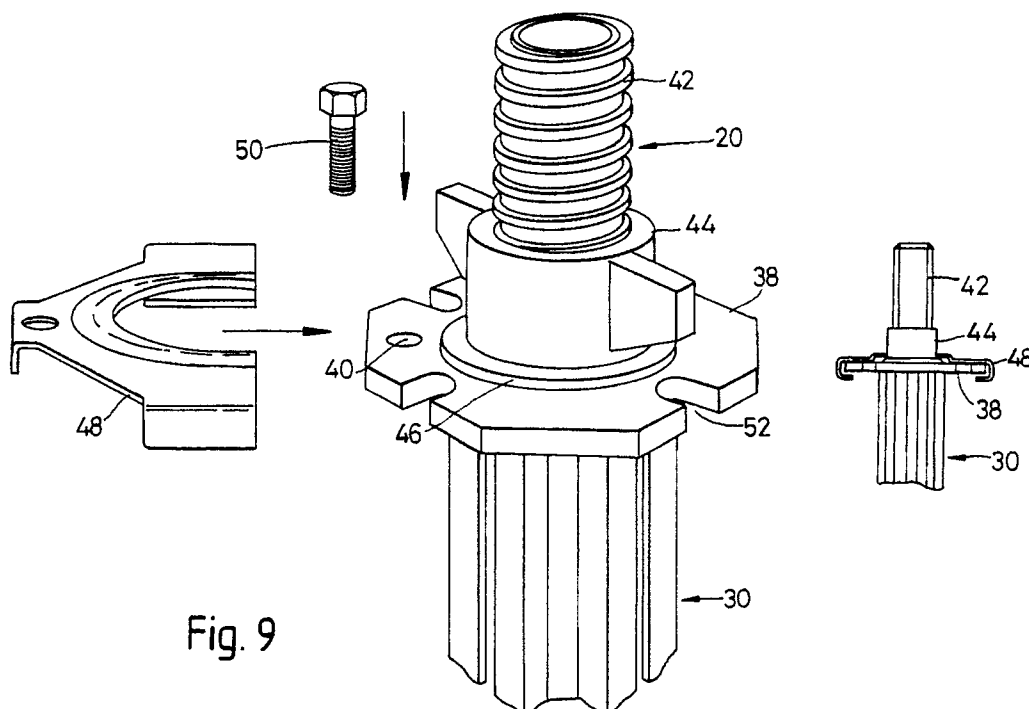


Fig. 9

This invention relates to a formwork system as utilised by the construction industry to provide what is known in the art as soffit, table or flying formwork/falsework. The invention particularly relates to a lightweight formwork system wherein the majority of its components are manufactured of an aluminium alloy by extrusion techniques.

It is an object of the present invention to provide a new or improved particular component part of a formwork system, namely retaining means for releasably connecting a screw jack to a main leg of the system.

In accordance with the present invention there is provided in a formwork system comprising a plurality of vertically disposable main legs, ledgers and bracing wherein each main leg is provided with an end plate at each end thereof to which a rotatable female threaded element of a screw jack is securable; releasable retaining means engaging a flange portion of said female threaded element and said end plate and being releasably secured to said end plate whereby said female element is retainable captive to said end plate in freely rotatable relation thereto.

Said releasable retaining means conveniently comprises a metal plate having a central semi-circular slot formed therein extending from an edge thereof with a peripheral rim of said slot being offset from the plane of the plate whereby the plate is releasably securable to a said end plate of a main leg with the said rim of the slot engaged over a said flange portion of a female element of a screw jack.

Said metal plate is conveniently provided with an aperture alignable with an aperture provided in a said end plate of a main leg whereby said metal plate may be bolted through said aligned apertures to the main leg end plate.

Other features of the invention will become apparent from the following description given herein solely by way of example with reference to the accompanying drawings wherein:

Figure 1 is an isometric view of one form of a lightweight formwork system showing the various components thereof and arranged with a central downstand section;

Figure 2 is a similar isometric view to that of Figure 1 but showing a different configuration of the formwork system including a downstand and a walkway;

Figure 3 is a further similar isometric view to that of Figure 1 showing an alternative configuration of the formwork system to provide a table form;

Figure 4 is a diagrammatic isometric detail illustrating the engagement of the end elements of the ledger frames with a main leg;

Figure 5 is a diagrammatic transverse cross-

sectional view through the clamped ledger frame end element and main leg of Figure 4;

Figure 6 is a detail isometric view of the T-shaped bolt utilised to clamp the ledger frame to the main leg;

Figure 7 is an isometric view showing the attachment of a primary beam to the top horizontal element of a ledger frame;

Figure 8 comprises diagrammatic isometric views of alternative head fittings at the upper end of a main leg for supporting a primary beam thereon;

Figure 9 is an isometric exploded view illustrating releasable retaining means constructed in accordance with the invention for attaching base or head screw jacks to the lower and upper ends respectively of a main leg;

Figure 10 is an isometric view of a ground engaging jack base member for supporting a main leg;

Figure 11 is an isometric view of a bracing collar securable about a main leg for the attachment of bracing; and

Figure 12 is an isometric view of the bracing collar of Figure 11 clamped around a main leg adjacent an end plate thereof.

The lightweight formwork system described and illustrated herein in accordance with the invention includes a plurality of components, the majority of which are manufactured as aluminium alloy extrusions. Referring to Figures 1 to 3, the systems illustrated therein comprise a plurality of horizontally spaced vertically disposed main leg assemblies 10, a plurality of ledger frames 12 each interconnecting and being releasably securable to adjacent pairs of main legs, a plurality of horizontally spaced apart horizontally disposed primary beams 14 supported either directly on the main legs or on the ledger frames, and a plurality of horizontally spaced apart horizontally disposed secondary beams 16 supported on the primary beams. Additionally there is shown base and head screw jacks 18 and 20 attached to the respective lower and upper ends of each main leg, jack base members 22 and bracing collars 24 for receiving bracing 26 and 28 for supporting the ledger frames.

For ease of understanding, the various components of the system will now be individually described in more detail with reference to the relevant drawings as follows.

Main Leg Assembly

Each main leg assembly 10 comprises a main leg proper 30 manufactured as an aluminium alloy extrusion of the profile shown in Figures 4, 5, 9 and

12. Thus the profile comprises a substantially square hollow centre section 32 with integral flanges 34 defining four longitudinally extending T-shaped slots 36 with the mouth of each slot facing outwardly of the leg. Each main leg also has secured thereto, as by welding, at each of its upper and lower ends an end plate 38 which in the embodiment illustrated in Figures 9 and 12 is of octagonal configuration. Each end plate 38 has an aperture 40 extending therethrough for the purpose further described hereinafter.

Each main leg assembly 10 also includes either or both base and head screw jacks 18 and 20, a head jack 20 being shown in more detail in Figures 8 and 9. As will be seen particularly from Figure 9, the head screw jack comprises a central male screw threaded element 42 of coarse pitch and a winged rotatable female screw threaded element 44 engaged about the male element 42. The female element 44 includes an end flange 46 which, as shown in Figures 8 and 9, rests on the upper end plate 38 of the main leg with part of the male element 42 extending into the central hollow section of the leg 30. A pressed metal retainer plate 48 is located to engage over respective parts of the associated end plate 38 and over the flange 46. As will be clearly seen in Figure 9, the metal plate 48 has a central semi-circular slot extending from one edge thereof with a peripheral rim of said slot offset from the plane of the plate whereby the plate 48 is releasably securable to the end plate 38 with the rim of the slot engaged over the end flange 46 of the female element 44. The retainer plate is clamped in position by a bolt 50 passing through an aperture in the plate 48 aligned with the aperture 40 in the main leg end plate 38 as shown in Figure 9 whereby the jack 30 is secured to the main leg with the female element 44 being freely rotatable. A similar arrangement of retainer plate assembly may be provided at the lower end plate of each main leg to secure a base jack 18 thereto.

Referring again to Figure 9 it will be seen that the end plate 38 is provided with four equi-angularly spaced slots 52. Such slots 52 in the end plate 38 enable an additional main leg 30 to be secured thereto by bolting passing through the slots in adjacent end plates of the two legs. Also, in some circumstances, a head jack 20 may not be utilised, and a primary beam 14 may be supported directly on the upper end plate of the main leg by bolting to the upper end plate 38 through the slots 52.

The upper end of the male element 42 of the head jack 20 may be provided with differing head fittings 54 or 56 as shown in Figure 8. For example, the head fitting 54 may comprise a channel-shaped member 58 within which a primary beam 14 may be disposed, and include a plurality of apertured

lugs 60 for receiving bracing members. Alternatively, the head fitting 56 may comprise a flat plate 62 having apertures therethrough in which are engaged T-bolts 64 clampable within the lower slot of a primary beam 14; the primary beam being described in more detail below. Such a plate type head fitting 56 may also include a plurality of apertured lugs 60 for the securing of bracing members thereto. In either embodiment, the head fitting 54 and 56 includes a downwardly depending collar 66 which fits over the upper end of the head jack male element 42 and is secured thereto by a bissell pin 68 passing through aligned apertures 70 in the collar 66 and a transversely extending bore 72 in the element 42.

The lower end of a base screw jack 18 is shown in Figure 10 which also illustrates a jack base member 22 comprising an aluminium alloy casting having a cylindrical central collar 74 for receiving the lowermost end of the base jack male element 42. The casting also includes four radially outwardly extending equi-distantly spaced apart wings 76 within each of which is provided an aperture 78 for the securing of bracing 26 thereto. The jack base member also includes a planar base plate 80 and is secured to the male element 42 by means of a bissell pin 82 extending through aligned apertures 84 in the collar 74 and a bore 86 in the male element 42. As mentioned above, the base jack member may be secured to the lower end plate of the main leg by a similar retaining plate 48 to that shown in Figure 9 and thus the effective length of the main leg assembly 10 may be varied by appropriate rotation of the female elements 44 of the base or head jacks 18 and 20.

Each main leg assembly 10 may also include a bracing collar 24 as shown in Figures 11 and 12. Such collar 24 comprises a two-part hinged aluminium alloy casting having central body parts 88 - 90 shaped to fit snugly around the main leg 30 and to be clamped thereon by a clamping nut and bolt assembly 92. The collar 24 includes four radially outwardly extending equi-distantly spaced apart wings 94 each having an apertured lug 96 therein for engagement by bracing members 28. As shown in Figure 12, and at various positions in Figures 1 and 2, the bracing collar 24 is conveniently clamped around a main leg 30 immediately adjacent and above the lower end plate 38 of the respective main leg. Thus, in the downstand beam construction shown in Figures 1 and 2, loading on the ledger frames is transmitted via bracing 28 and collar 24 to the lower end plate 38 of a respective main leg and thence to the associated base jack 18.

Ledger Frame

Various ledger frames 12 of the system are shown in Figures 1 to 3 and the manner of their attachment to the main leg is illustrated in Figures 4 and 5. Referring to Figure 3, each ledger frame 12 is comprised essentially of upper and lower horizontally disposed elements 98 and 100, a pair of vertically disposed end elements 102 extending between the horizontal elements and one or more intermediate vertically disposed elements interconnecting the horizontal elements 98 and 100. Diagonal bracing 106 may also be included at one or more positions in each ledger frame. Either or both of the upper and lower horizontal elements 98 and 100 may be provided with respective upwardly or downwardly projecting apertured lugs 108 for the securing of bracing members 26 or 28 thereto.

Each vertical end element 102 of each ledger frame 12 is illustrated in more detail in Figures 4 and 5 and comprises a hollow box section extrusion of a substantially T-shaped profile to provide a longitudinally extending projection 110 engageable within the mouth of a T-shaped slot 36 on a main leg 30. As stated above, each ledger frame 12 interconnects and is securable to adjacent pairs of main legs 30 and such securement is effected by the clamping bolt 112 shown in Figures 5 and 6. As is clearly illustrated in Figure 5, each of such clamping bolts 112 has a T-head 114 engageable within a T-shaped slot 36 of a main leg 30 and a threaded shank 116 which extends through aligned apertures 118 in opposed faces of the end element 102 of a ledger frame. A nut 120 with an integral lever arm 122 is threadedly engaged on the bolt shank 116 to engage that face of the ledger frame end element 102 remote from the projection 110 whereby tightening of the nut will clamp the frame to the main leg.

The Primary Beams and Secondary Beams

As illustrated in Figures 1 to 3 of the drawings the primary beams 14 and the secondary beams 16 are of somewhat similar configuration with the primary beams 14 being disposed in horizontally spaced relationship and supported either directly by a head fitting 54 or 56 of a main leg assembly 10 or on the upper horizontal elements 98 of the ledger frames 12. The secondary beams 16 are supported in horizontally spaced relationship on the upper surfaces of the primary beams 14 and secured thereto in a known manner.

Referring to Figure 7 each of said primary beams 14 is an aluminium alloy extrusion comprising two spaced I-section flanged elements 124 integrally interconnected by a planar central web 126 and also interconnected by two opposed channel-shaped integral webs 128 each located

intermediate the central web 126 and the upper and lower co-planar flanges 130 of the beam respectively.

Each of said secondary beams 16 is also an aluminium alloy extrusion conveniently substantially of the profile illustrated in British Registered Design 995006 comprising two spaced I-section flanged elements integrally interconnected by a pair of parallel spaced planar webs intermediate upper and lower co-planar flanges of the beam.

In the configuration of formwork illustrated in Figure 3, where all of the primary beams 14 are disposed in the same horizontal plane, such primary beams 14 are supported by head fittings 54 or 56 at the upper ends of the head screw jacks 20 of each main leg assembly 10.

As shown in part in Figures 1 and 2, where a downstand location is to be provided, the relevant primary beams 14 are supported directly on the upper horizontal elements 98 of the ledger frames 12 at a lower horizontal level than those primary beams 14 which are supported directly on the main leg assemblies 10. As shown in Figure 7, in such a downstand location, each primary beam 14 is secured to an upper horizontal ledger frame element 98 by a U-shaped clip 132 having a T-shaped head 134 at one end engageable within the T-shaped slot of the primary beam 14 and having a securing flange 136 at the other end through which passes a nut and bolt assembly 138 for clamping that end of the clip to the lower flanges 130 of the primary beam.

Bracing Members

As shown in Figures 1 to 3, bracing members 26, 28 may be connected between the ledger frames 12 and associated main leg assemblies 10. Thus, bracing may be connected between the wings 76 of the jack base members 22 and the lower horizontal elements 100 of the ledger frames, or between the wings 94 of the bracing collars and the lower horizontal elements 100 of the ledger frames, or between the lugs 60 of the head fittings 54 or 56 and the upper horizontal elements 98 of the ledger frames.

As shown in the table form configuration of Figure 3, the braces 26 may be of the form described in British Patent 1 599 646 comprising tubular telescopic elements extending from either or both the upper and lower horizontal frame elements 98, 100 of the ledger frames 12 to a respective main leg assembly 10. In a downstand application where the ledger frame 12 has to take vertical loading imparted thereto from the primary beams 14 supported on the ledger frame, the ledger frame 12 is supported in accordance with the invention by

bracing such as is shown at 28 in Figures 1 and 2. Such bracing 28 may comprise a vertically or substantially vertically disposed turn-buckle assembly extending, as shown in Figures 1 and 2, from the wings 94 of the bracing collar 24 to locations adjacent the ends of the lower horizontal elements 100 of the ledger frames.

Claims

1. A formwork system comprising a plurality of vertically disposable main legs (10), ledgers (12) and bracing wherein each main leg is provided with an end plate (38) at each end thereof to which a rotatable female threaded element (44) of a screw jack is securable characterised in that releasable retaining means (48) engage a flange portion (46) of said female threaded element and said end plate (38) and is releasably secured to said end plate whereby said female element is retainable captive to said end plate in freely rotatable relation thereto.
2. A formwork system as claimed in Claim 1 further characterised in that the releasable retaining means (48) comprises a metal plate having a central semi-circular slot formed therein extending from an edge thereof with a peripheral rim of said slot being offset from the plane of the plate whereby the plate is releasably securable to a said end plate (38) of a main leg with the said rim of the slot engaged over a said flange portion (96) of a female element of a screw jack.
3. A formwork system as claimed in Claim 2 further characterised in that said metal plate is provided with an aperture alignable with an aperture provided in a said end plate of a main leg whereby said metal plate may be bolted through said aligned apertures to the main leg end plate.

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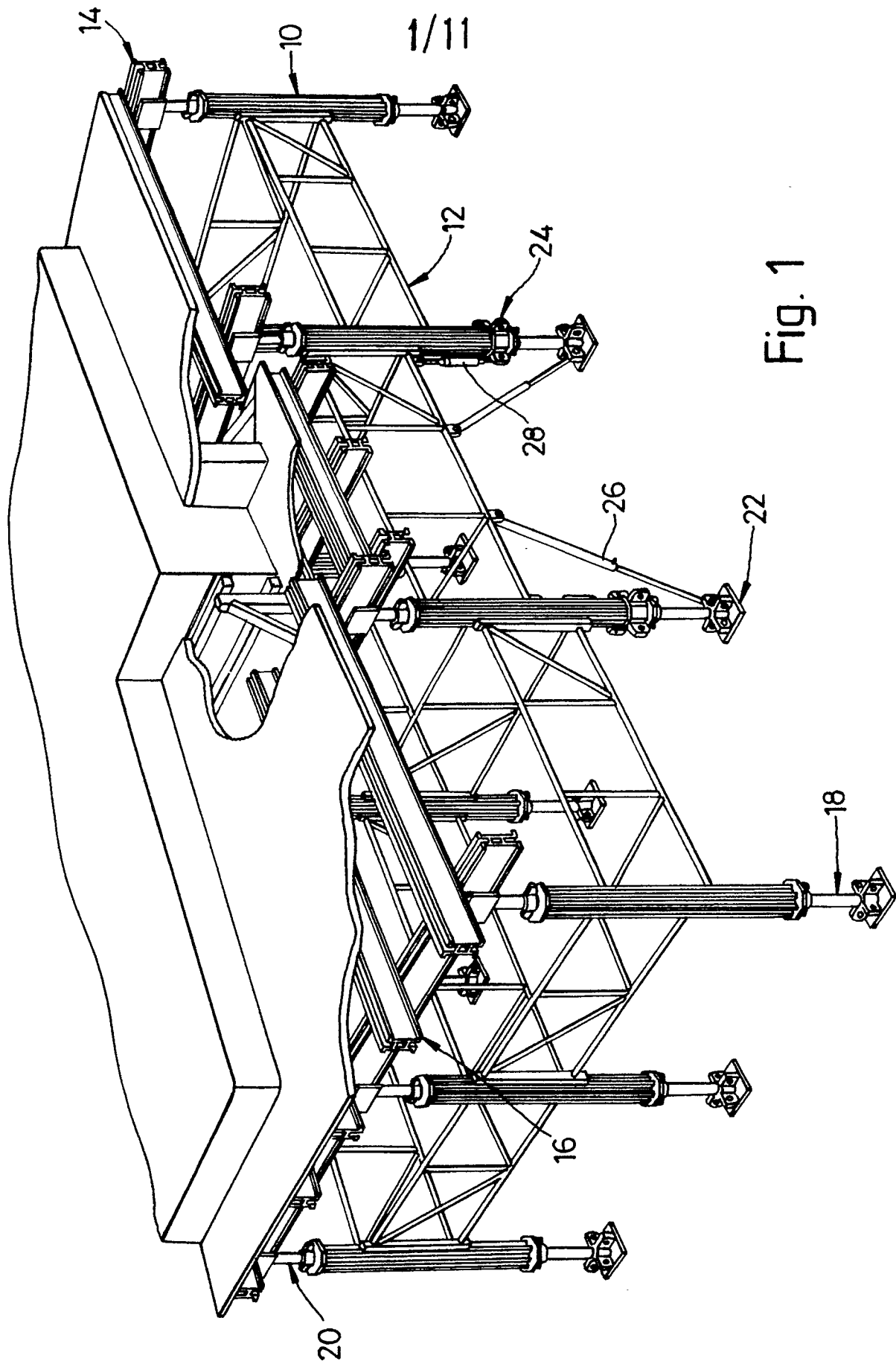
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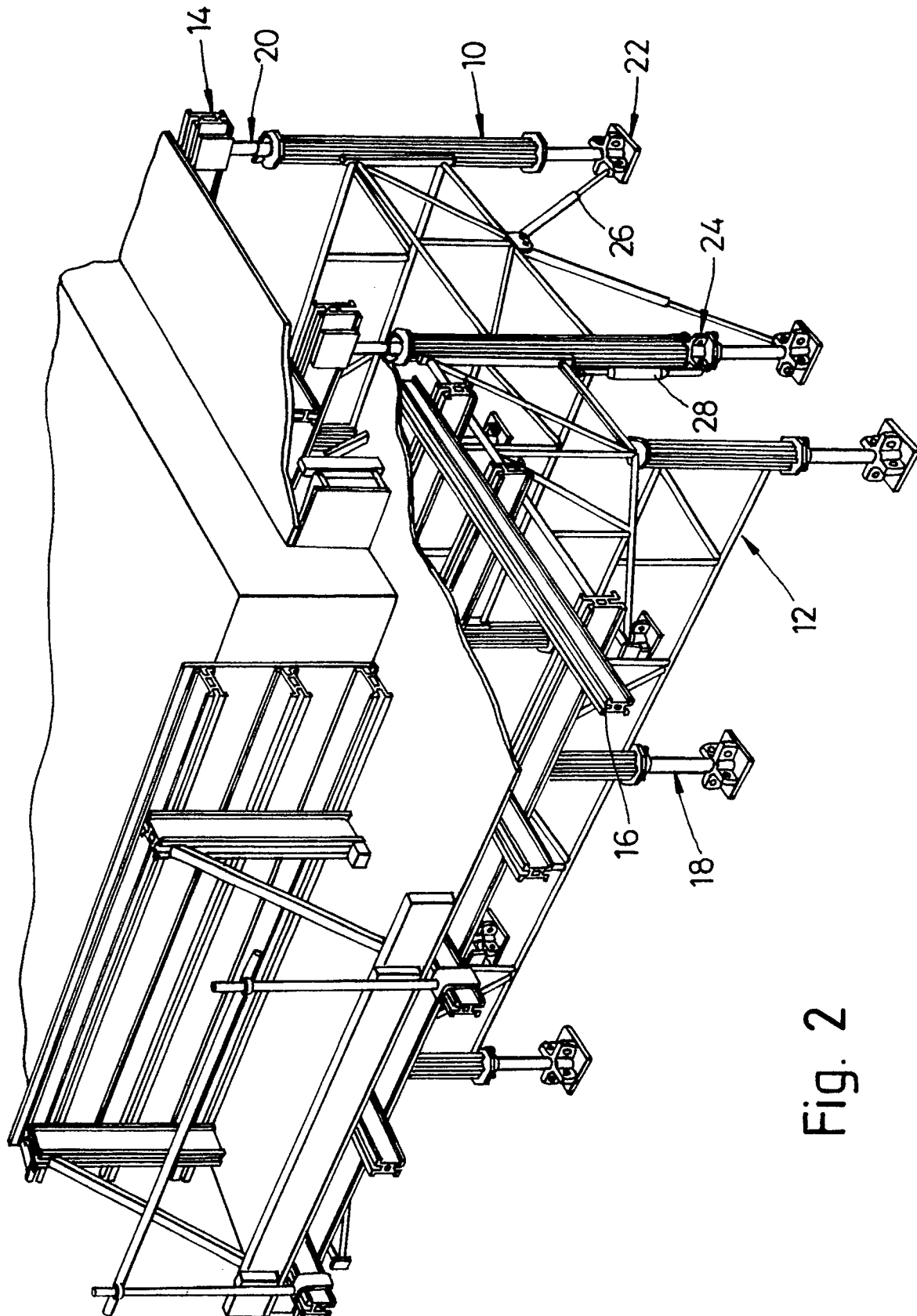


Fig. 2

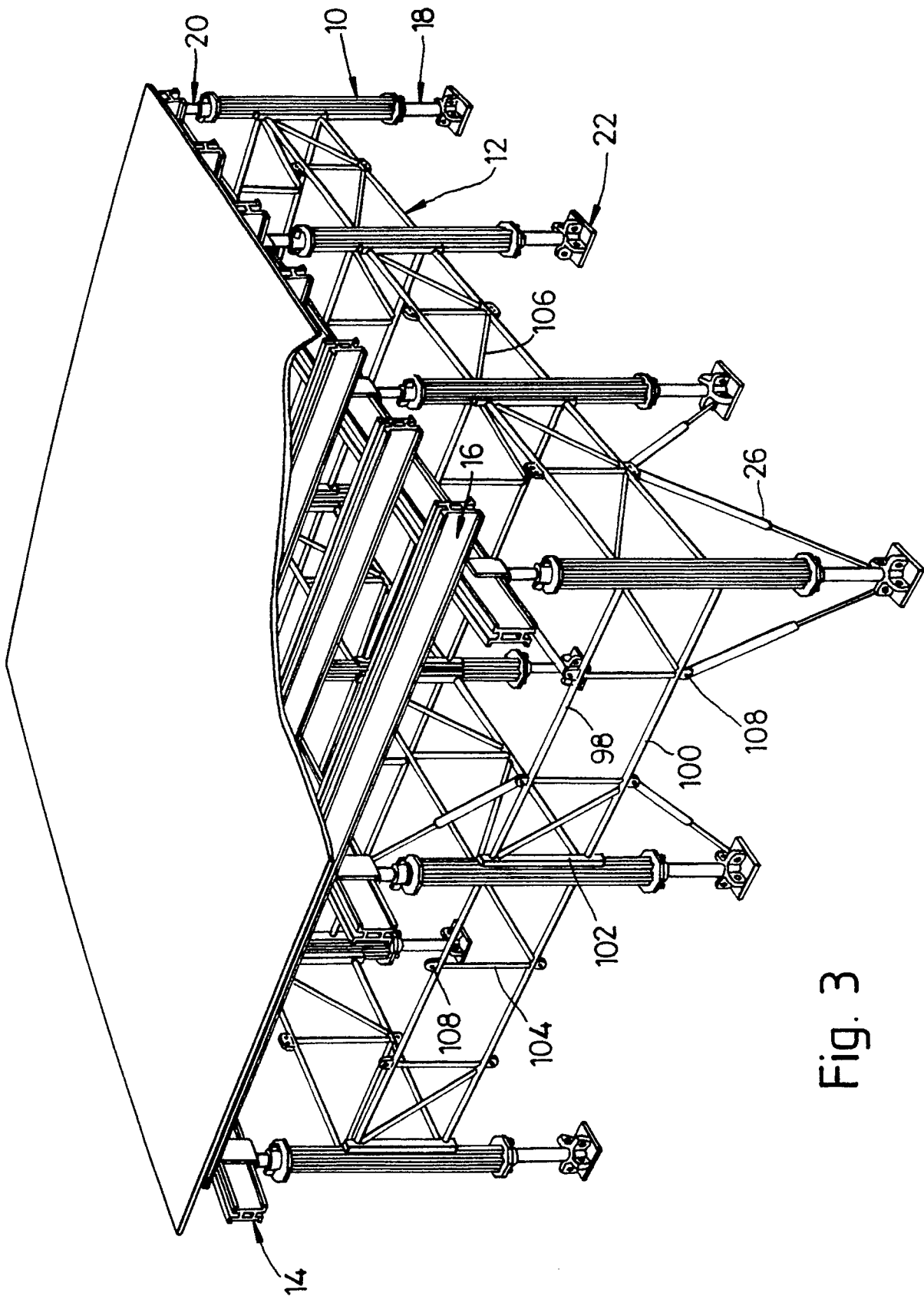


Fig. 3

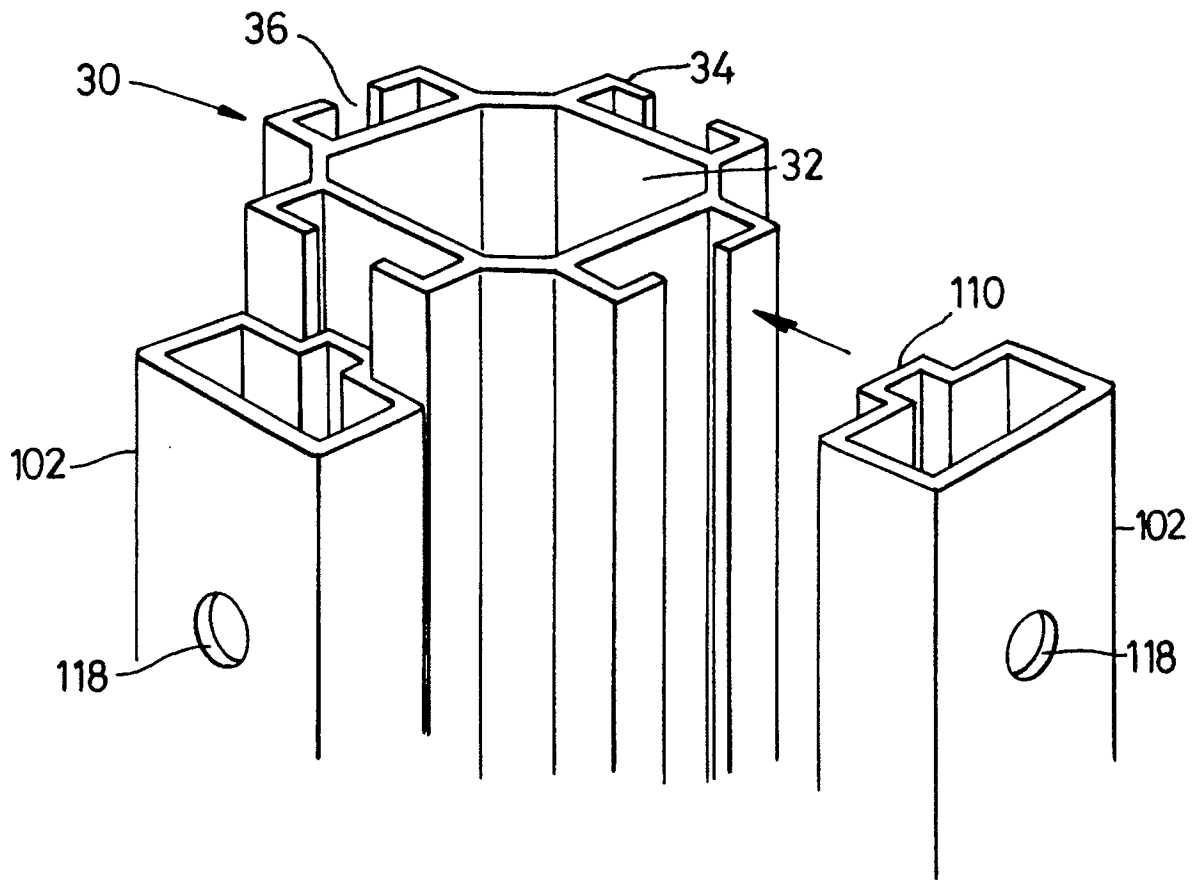


Fig. 4

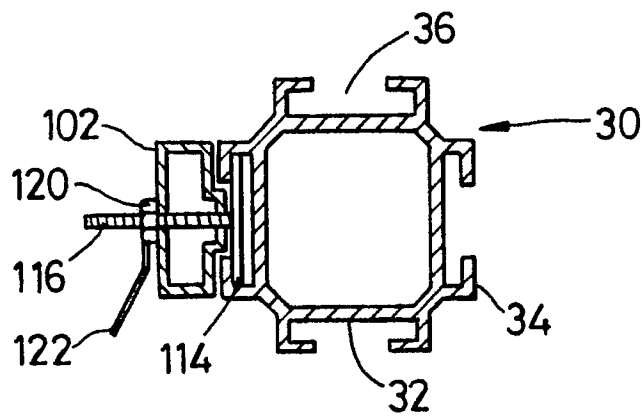


Fig. 5

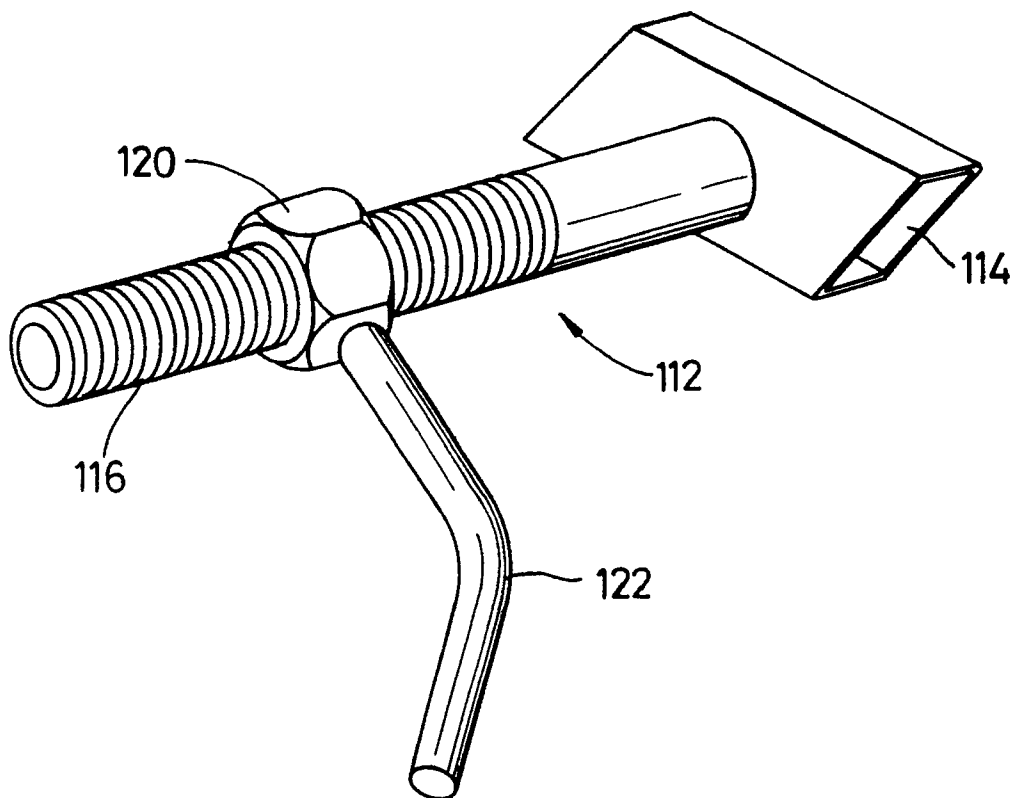


Fig. 6

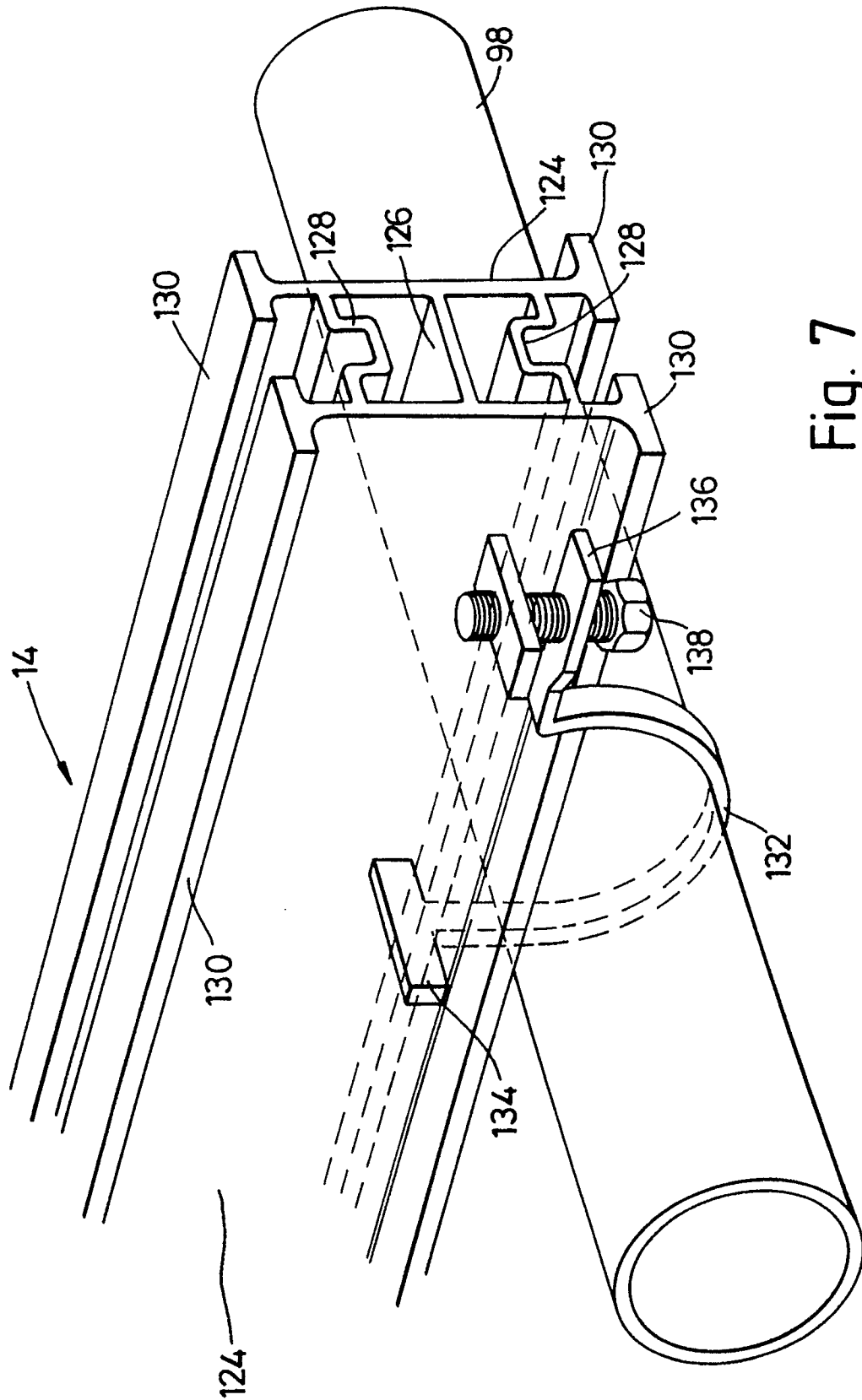


Fig. 7

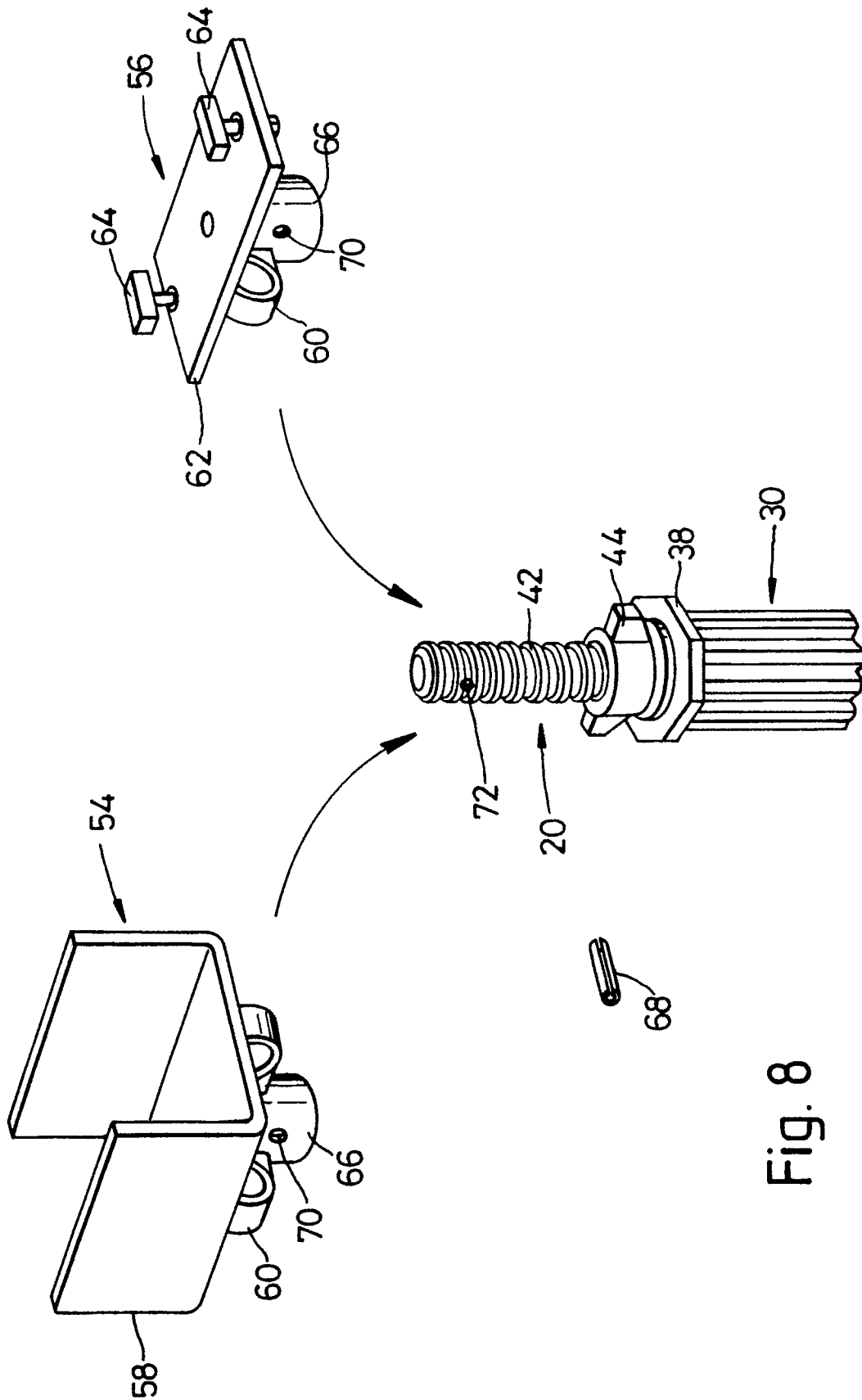


Fig. 8

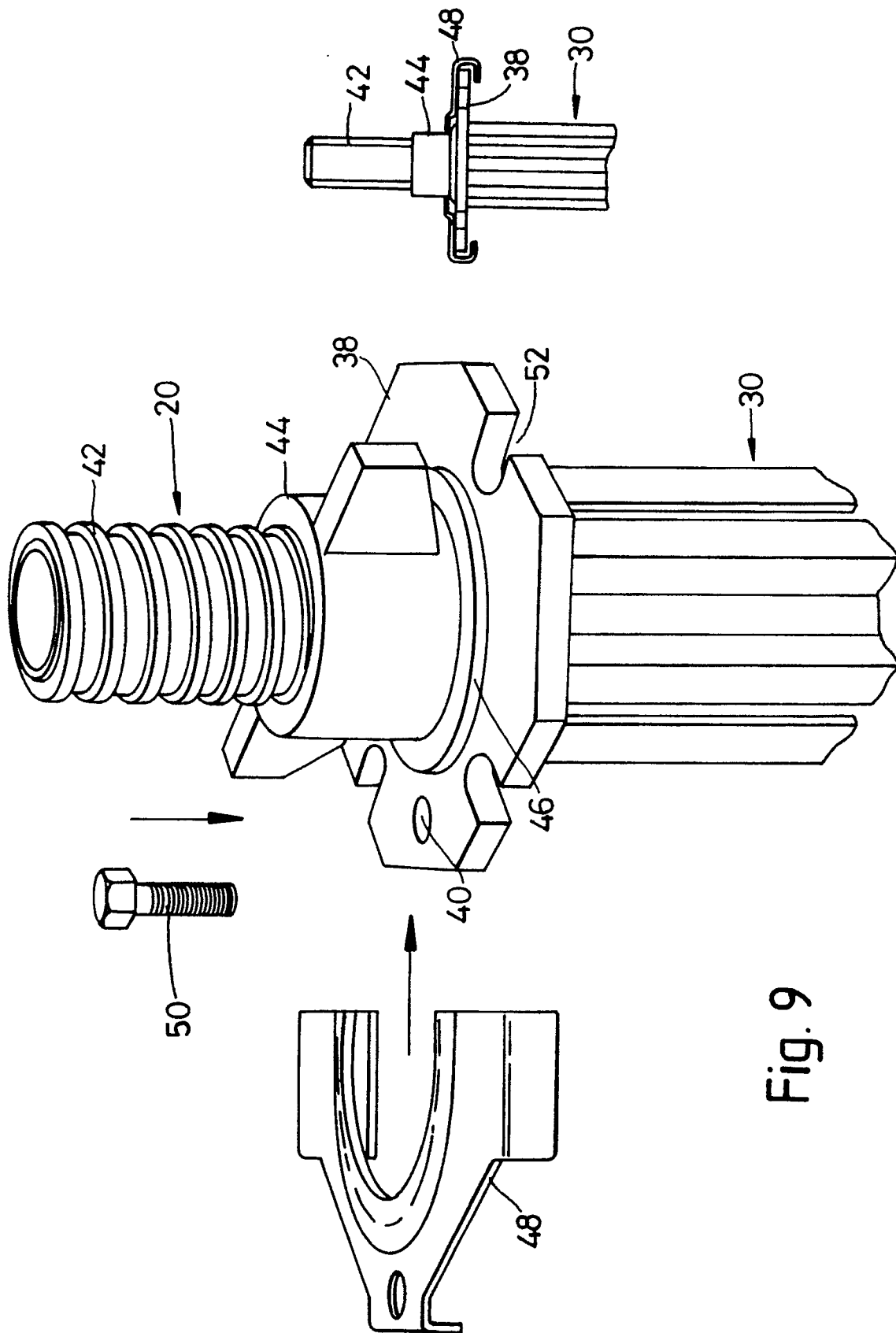


Fig. 9

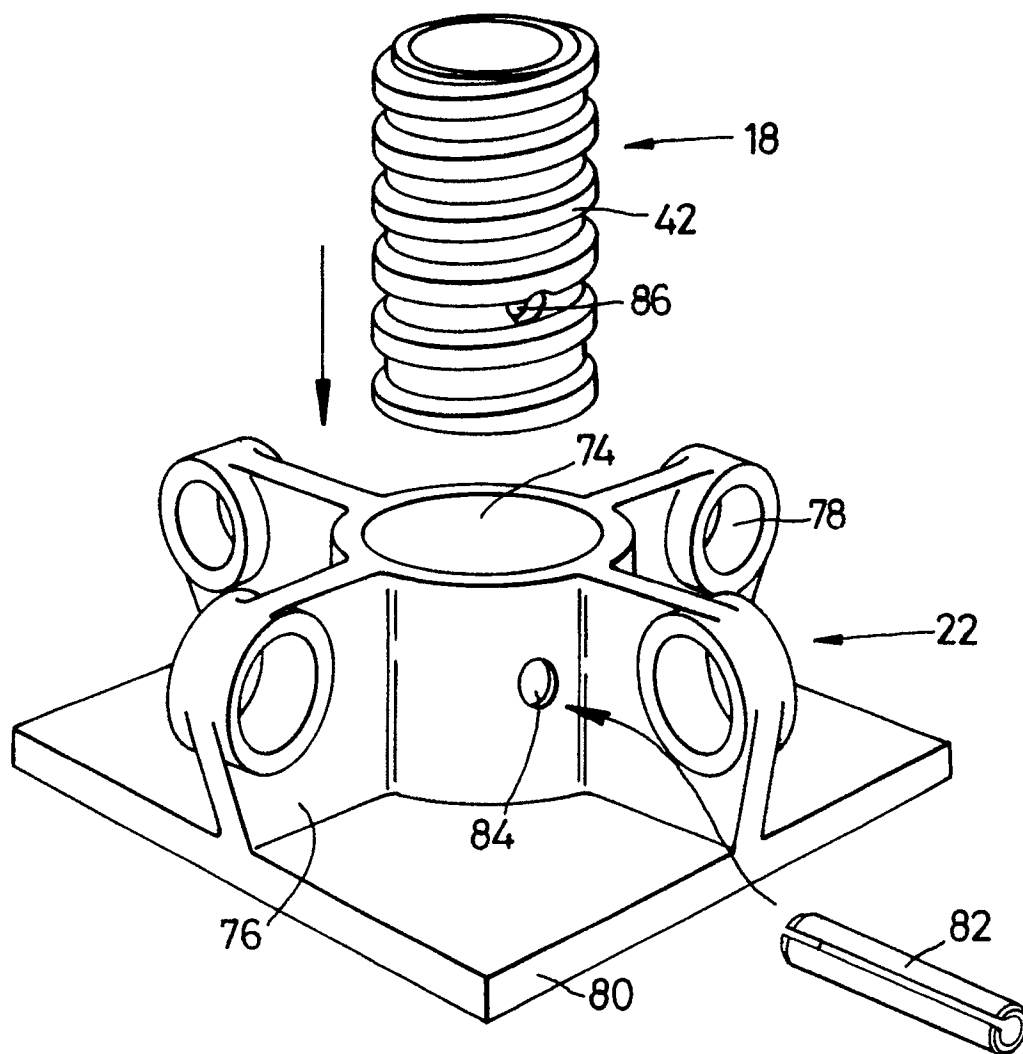


Fig. 10

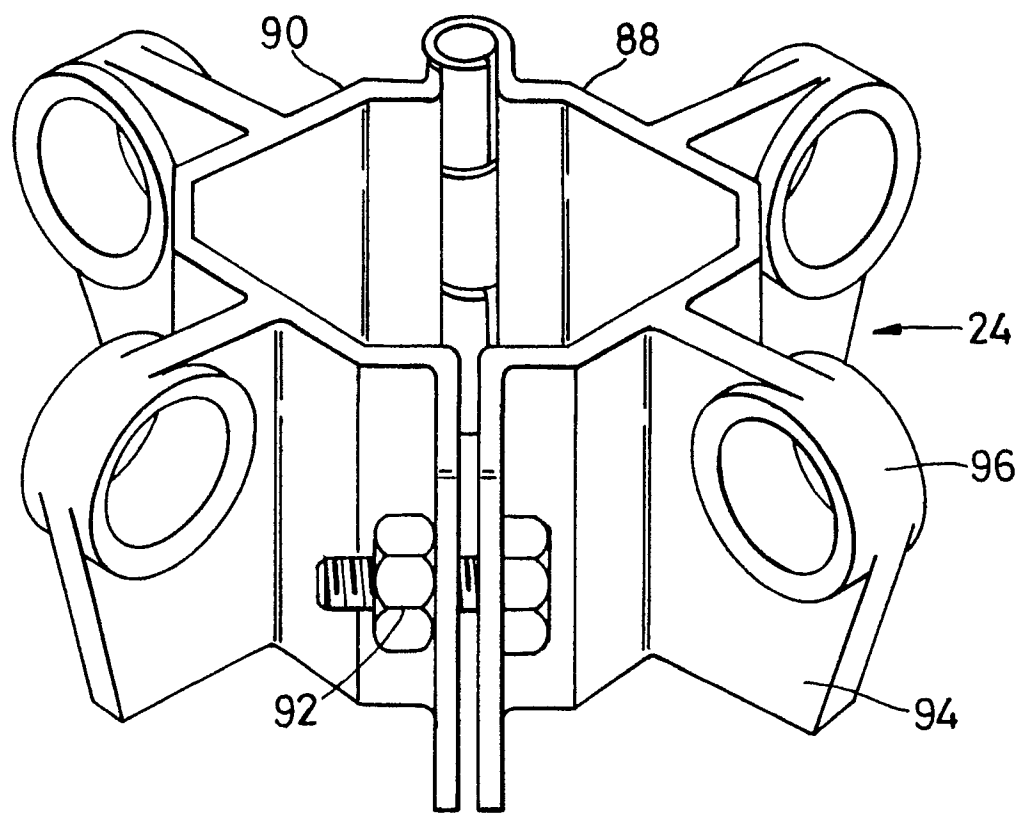


Fig. 11

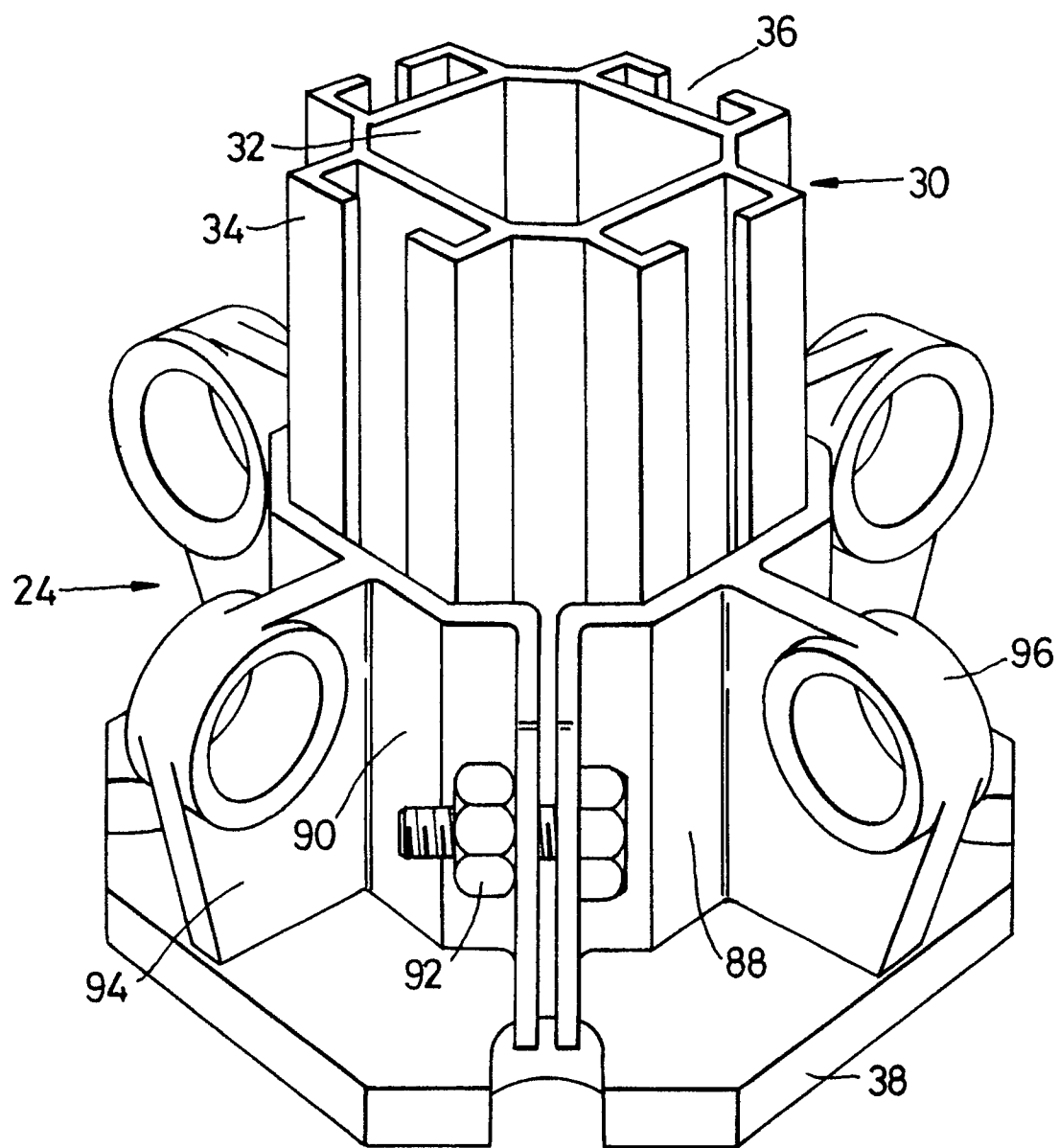


Fig. 12