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(54) Components for a support structure for pouring concrete.

(57) For use to secure bodies to legs (24) of a support structure,, the combination of a housing (82) secured to a leg (24) of a support structure, the housing (82) comprising a wall spaced from the leg and having an aperture there-through, the housing opening from opposite directions, a body for securing to the wall, the body having, upper and lower portions, a shank portion (100) extending from one end thereof for projecting through the aperture (90) of the wall (84) with the upper portion of the body over the lower portion, and a wall engaging ledge or flange (98) between the body and shank (100) portion for abutting the wall of the housing when the shank portion (100) is inserted through the aperture (90), the shank (100) portion including at least one sloped surface extending transverse the shank and sloping from the upper portion to the lower portion toward the ledge or flange, and a wedge (108) having at least one complementary sloped cooperating surface corresponding to the at least one sloped surface, and having a thickness at one end substantially the distance between the wall and the at

least one sloped surface when the shank (100) is inserted through the aperture (90) and the ledge or flange (98) abuts the wall, and of a thickness proximate its other end slightly greater than the distance between the wall and the at least one sloped surface to cause the body to be locked to the wall when the at least one complementary sloped surface of the wedge is applied to the at least one sloped surface on the shank and the wedge is pushed in.

In support structures carrying in combination at least one screw jack comprising a screw jack nut, the screw jack nut having at least one step and a handle spaced from the step of the nut closest the handle to provide a space between the handle and step, and means for securing the screw jack nut to the support structure to permit full rotation of the screw jack nut to the vertical legs of the support structure including means to engage the screw jack nut vertically between the handle and the step closest the handle, but not interfere with the full rotation of the screw jack nut.

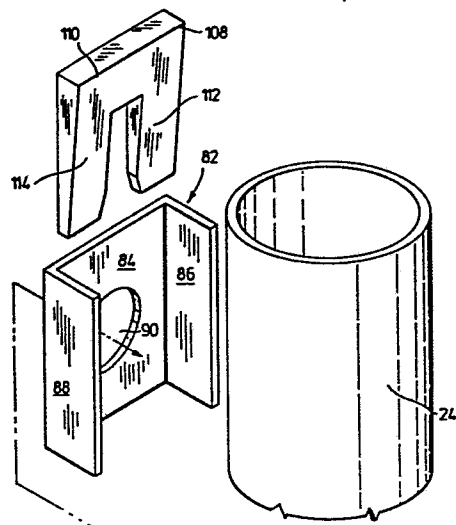
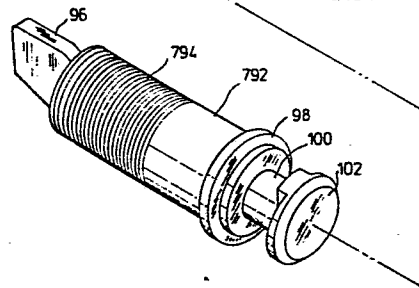


FIG. 6.



Components for a support structure  
for pouring concrete

FIELD OF THE INVENTION

This invention relates to support structures  
5 (for example, shoring, trusses and fly forms) useful in  
the forming of concrete slabs and structural component  
parts forming part of these support structures.

BACKGROUND OF THE INVENTION

In the pouring of concrete slabs during the  
10 construction of buildings, employing for example,  
support structures as shown in United States patents  
3,787,020, 3,899,152, 4,144,690 and 4,156,999 and in  
British patent specification 2 041 059A the equipment  
and structural components employed must be easily  
15 employed by the workmen on site with minimum instruction  
or supervision.

As time is money, the time of assembly and,  
either partial disassembly for movement to another  
location or, full disassembly for use in another manner,  
20 must be minimized.

British patent specification 2 041 059A  
discloses an improved support system and components  
therefor comprising shoring formed by more than one  
section surmounted one over the other, which shoring  
25 incorporates cross-bracing for bracing the sections.  
The bracing is fastened to the shoring by Jet Lock  
(Trade Mark) fasteners removably secured to a housing  
wall welded to, and spaced from, the vertical legs of  
the shoring by a nut screwed onto the threaded shank  
30 of the fastener. However, securing the nut to the shank  
of the fastener between the vertical legs and housing  
wall requires manipulation of the nut in a confined  
space--a waste of valuable time and effort.

The same shoring as well as the trusses shown in United States Patents 3,787,020, 3,899,152, 4,144,690 and 4,156,999, also comprise loosely inserted screw jacks in the vertical legs, and maintained therein by the weight of the structure thereover, each screw jack comprising a screw jack nut fitted into the lower end of each of the vertical legs for adjusting and levelling the leg into which it is fitted. In the instance where the support structures are to be moved (e.g. trusses or fly forms), they are usually lifted causing the screw jacks to fall out, if they are not tied in the truss or fly form as by chain or the like. If not, when the trusses or fly forms are repositioned, the screw jack must be reinserted--more time and effort wasted.

It is therefore an object of this invention to provide support structures and components for use with these support structures which reduce the complexity of use of the support structures and the time and effort necessary to erect, dismantle and relocate the structures for the pouring of concrete.

Further and other objects of the invention will be realized by those skilled in the art from the following summary of the invention and detailed description of preferred embodiments thereof.

#### SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided in combination a housing secured to a leg of a support structure, the housing comprising a wall spaced from the leg and having an aperture therethrough, the housing opening from opposite directions, (preferably opposite vertical directions) a body for securing to the wall, the body having, upper and lower portions, a shank portion extending from one

end thereof for projecting through the aperture of the wall with the upper portion of the body over the lower portion, and a wall engaging a ledge or flange between the body and shank portion for abutting the wall of  
5 the housing when the shank portion is inserted through the aperture, the shank portion including at least one sloped surface extending transverse the shank and sloping from the upper portion to the lower portion toward the ledge or flange, and a wedge having at least  
10 one complementary sloped co-operating surface corresponding to the at least one sloped surface, and having a thickness at substantially one end the distance between the wall and the at least one sloped surface when the shank is inserted through the aperture and the ledge or flange  
15 abuts the wall, and of a thickness proximate its other end slightly greater than the distance between the wall and the at least one sloped surface (and preferably being longer than the height of the wall of the housing), to cause the body to be locked to the wall when the at  
20 least one complementary sloped surface of the wedge is applied to the at least one sloped surface on the shank and the wedge is pushed in. Preferably, the surfaces are sloped about  $6^{\circ}$ .

According to another aspect of the invention,  
25 there is provided in combination, a housing secured to a leg, the housing comprising a wall spaced from the leg and having an aperture therethrough, and opening in opposed directions (preferably opposite vertical directions), a body for securing to the wall, the  
30 body having a shank portion for projecting through the aperture in the wall and a head on the end of the shank of greater cross-section than the shank, the body having a wall engaging flange or ledge to engage the wall when the shank projects through the aperture in the wall

to space the head from the wall, the head having at least one inner surface on a head portion at the end of the shank remote the body, sloped from a thin head portion to a thicker head portion towards the ledge or flange in a inwardly direction (and preferably a pair of opposed such surfaces of the same angle on either side of the shank portion), and a U-shaped wedge having two arms spaced by a distance equal to the cross-wise dimension of the shank portion proximate the head for passing over the shank portion, the U-shaped wedge having complementary co-operating slope to the at least one inner surface and of sufficient increasing thickness from the ends of the arms to the other end to cause the body to be locked against the wall by the wedging action of the wedge and the at least one inner surface of the head when the wedge is applied to the shank.

This combination finds application in scaffolding used in for example, concrete forming and particularly in securing cross-bracing to support the support structure. Particularly, shoring comprises vertical legs secured together by horizontal ledgers and bracing. Jet Lock (Trade Mark) fasteners may be supported on the legs for quickly and securing affixing the cross bracing. For mounting the cross-bracing employing the Jet Lock (Trade Mark) fasteners, the housing is U-shaped having a back wall having an aperture therethrough and two arms secured (in one embodiment welded) to the vertical legs of the shoring and preferably opening from the top and the bottom. The combination, according to the invention, is then employed to mount the Jet Lock (Trade Mark) fasteners quickly and securely to the legs.

According to another aspect of the invention, there is provided for use in support structures, for example, shoring, scaffolding or trusses, at least

one screw jack for securing to the bottom of the support structures, each screw jack comprising a screw jack nut, the screw jack nut having at least one step (for supporting legs of different diameters of shoring, scaffolding, or truss legs) and a handle spaced from the step of the nut closest the handle to provide a space between the handle and step, and means for securing the screw jack nut to the support structure, for example, shoring, scaffolding or truss, to permit full rotation of the screw jack nut with respect to the legs of the shoring, scaffolding or truss, the means for securing the screw jack nut comprising means to secure the screw jack nut to the vertical legs of the support structures, including means to engage the screw jack nut vertically between the handle and the step closest the handle but not interfere with the full rotation of the screw jack nut.

Because for example, shoring or scaffolding can be made up of vertical legs and extension tubes extending therefrom, of different diameters, the screw jack nut in most instances will be stepped to provide a number of upper stepped support surfaces of different diameters to correspond with the cross-wise dimensions of the various sized vertical legs and extension tubes. These screw jack nuts may be used on top of the structure and secured in a similar manner as at the bottom.

In one embodiment, where the legs of a support structure, for example, shoring, scaffolding or truss, include holes therethrough, (as for example, opposed holes through the shoring or scaffolding legs as in British patent specification 2 041 059A) a collar is provided having projections secured to the inner surface of the collar to be positioned in the holes and means, for example, a clamp, is provided to tighten the collar

to the legs. In this instance, arms extend from the collar to extend to the screw jack nut and include inwardly projecting lips proximate their ends to project inwardly in the space between the handle and the step closest the  
5 handle to support the screw jack nut.

In another embodiment, where the support structures have similarly disposed holes through the legs, at least a pair of pins having arms at either end and extending in the same direction from the pin body are provided, one  
10 arm to be inserted in the space between the handle and step closest thereto and the other arm through a hole in the shoring, truss or scaffolding leg, and a collar is provided to fit over the pins to hold them and thus the screw jack nut to the shoring, scaffolding or truss  
15 leg. In a preferred embodiment, an intermediate portion of the pin body is deformed in the direction that the arms extend to provide a recess in the surface of the body remote the arms.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 Figure 1 is a perspective view of shoring or scaffolding used for illustrating embodiments of the invention.

Figure 2 is an exploded view of part of the structure of Figure 1.

25 Figure 3 is a cross-sectional view taken along the line 3-3 of Figure 1.

Figure 4 is an exploded view of an alternative structure to that in Figure 2, according to another embodiment of the invention.

30 Figure 5 is a cross-sectional view of the structural components of Figure 4 taken through the line 5-5 of Figure 4, in assembled state.



Figure 6 is an exploded view of an assembly structure according to an embodiment of the invention.

Figure 7 is a partially assembled top plan view of part of components shown in Figure 6.

5           Figure 8 is a partially assembled side view of component parts of the structure shown in Figure 6.

DETAILED DESCRIPTION OF DRAWINGS

          With reference to Figure 1, there is shown shoring or scaffolding 10, used to support forms during  
10 the pouring of concrete for forming a concrete floor (not shown). Shoring or scaffolding 10 comprises two (2) sections 12 and 14 secured together by coupling pins 13 (not fully shown) secured in the legs between the vertically aligned sections and U-shaped security pins 16 shown in  
15 British patent specification 2 041 059A extending through holes 18 in the legs. Screw jacks 20 secured on plates 22 are coupled to legs 24 by stepped screw jack nuts 26 each employing a pair of U-shaped pins 28 and collar shown in Figure 2 to lock each nut 26 into each leg 24.

20           With reference to Figures 2, 3 and 4, threaded screw jack rod 32 is supported in plate 22, extends upwardly therefrom and, is threaded into stepped screw jack nut 26 which in turn is secured by pins 28 to each leg 24.

25           Particularly, screw jack nut has three steps, 34, 36 and 38 (to support various sizes of legs or tubes) and a handle 40 spaced from step 34 closest to handle 40. Each leg 24 has pairs of spaced diametrically opposed holes 42 therethrough. Each pin 28 has a pair of arms 44  
30 and 46 extending in the same direction transverse body 48 of each pin 28. Body 48 is bent at 50 intermediate, and in the same direction as, arms 46 and 48. Square collar 52 having round hole 54 is provided having diametrically

opposed cut-outs 56 each being greater in cross-section than the cross section of pins 28.

In use, collar 52 is slipped into each leg 24. Screw jack nuts 26 are then threaded onto threaded rods 32 and slipped into the ends of each leg. Each pin 28 is then positioned so that arm 46 extends below step 34 between step 34 and handle 40 and engages the underside of step 34, and arm 48 extends into one hole 42 (two pins 28 per screw jack nut 26). Therefore, each pin 28 is of a length equal to the distance between the space between the bottom of the step 34 and handle 40 and aperture 42. Collar 52 is then squeezed over each upper pin portion 56 (which yields inwardly) to become lodged in recess or depression 58 locking the pins in position to secure each screw jack nut 26 and thus each screw jack to the bottom of each leg 24.

For adjustment purposes, handle 40 need only be rotated (as in Figure 3 relative to leg 24 and pins 28), to raise or lower the shoring or scaffolding on screw jack rod 32.

With reference to Figures 4 and 5, an alternative assembly is shown for securing each screw jack nut 26 to each leg 24.

In this embodiment, collar 60 is provided with inwardly directed opposed projections 62 for projecting through apertures 42 and clamp arms 64 to be drawn together by wing nut 68 tightened onto screw 66 for tightening collar 60 to each leg 24.

Depending arms 70 extend downwardly from collar 60 and have inwardly directed lips 72 at the ends thereof for positioning under step 34 in the space between handle 40 and lowermost step 34 for holding each screw

jack nut 26 within each leg 24 when collar 60 is tightened onto leg 24.

With reference to Figure 1, shoring or scaffolding 10 comprising sections 12 and 14 is braced by cross-braces 80 angularly secured between legs 24. Each leg 24 supports a U-shaped housing 82 comprising transverse wall 84 and arms 86 and 88 welded to each leg 24 (see Figure 7). Hole 90 is cut through wall 84. Housing 82 is open at the top and bottom. Jet Lock (Trade Mark) fasteners 792 are secured to housing 82 to secure bracing 80, each fastener 792 comprising barrel 794 and spring loaded pin 96 normally urged to extend angularly the longitudinal axis of barrel 792 proximate one end 794 in an upwardly direction. Annular flange 98 surrounds the other end of barrel 794 and is of greater outer diameter than the diameter of hole 90.

Shank 100 of a smaller diameter than barrel 794 extends axially of barrel 794 and has a head 102 on the end thereof of a lesser diameter than hole 90. As can be seen from Figures 7 and 8, head 102 has been notched at opposed side edges in a vertical direction parallel to the upward orientation of pin 96 (see Figure 8) to provide sloped notched surfaces 104 and 106, sloping from the top to the bottom toward flange 98 at an angle of about  $6^{\circ}$  to the vertical. U-shaped wedge 108 comprises top 110 and two spaced arms 112 and 114 spaced by a distance equal to the diameter of the shank less the notches. Wedge 108 is thicker at the top 110 than at the bottom of the arms 112 and 114 and provides sloped surface 109 at an angle of about  $6^{\circ}$  to the vertical to abut surfaces 104 and 106. Wedge 108 is slightly longer than the height of wall 84 for the purpose of inserting and removing the wedge from the space between wall 84 and leg 24. As can be seen in Figures 6, 7 and 8, head 102 of fastener 792 is pushed through hole 90 into the space

between leg 24 and wall 84 between side walls 86 and 88 until flange 98 abuts the outer surface of wall 84. At that point sloped surfaces 104 and 106 are spaced from the inner surface of wall 84. The thickness of wedge 108  
5 has been specifically chosen to be slightly less than this space between head 102 and wall 84 proximate the ends of arms 112 and 114 but of a greater thickness than this space proximate top 110 so that when the sloped surface 109 of wedge 108 is mated with sloped surfaces 104 and  
10 106, and wedge 108 pushed downwardly, fastener 792 becomes wedged in housing 82. Because wedge 108 is longer than the height of wall 84, arms 112 and 114 extend below housing 84 when top 110 is in its lowermost position on head 102, and wedge 108 can be removed by  
15 forcing the arms upwardly, as for example, by a hammer, quickly and efficiently for removing fastener 792 from housing 82.

As many changes can be made to the embodiments of the invention without departing from the scope of the  
20 invention, it is intended that all matter contained herein be interpreted as illustrative of the invention and not in a limiting sense.

## CLAIMS:

1. For use to secure bodies to legs of a support structure, the combination of a housing secured to a leg of a support structure, the housing comprising a wall spaced from the leg and having an aperture therethrough, the housing opening from opposite directions, a body for securing to the wall, the body having, upper and lower portions, a shank portion extending from one end thereof for projecting through the aperture of the wall with the upper portion of the body over the lower portion, and a wall engaging ledge or flange between the body and shank portion for abutting the wall of the housing when the shank portion is inserted through the aperture, the shank portion including at least one sloped surface extending transverse the shank and sloping from the upper portion to the lower portion toward the ledge or flange, and a wedge having at least one complementary sloped co-operating surface corresponding to the at least one sloped surface, and having a thickness at one end substantially the distance between the wall and the at least one sloped surface when the shank is inserted through the aperture and the ledge or flange abuts the wall, and of a thickness proximate its other end slightly greater than the distance between the wall and the at least one sloped surface to cause the body to be locked to the wall when the at least one complementary sloped surface of the wedge is applied to the at least one sloped surface on the shank and the wedge is pushed in.

2. The combination of Claim 1, wherein the wedge is longer than the height of the wall of the housing.

3. The combination of Claim 1, wherein the opposite directions are opposite vertical directions.

4. The combination of Claim 1, 2, or 3, wherein the at least one surface is sloped at an angle of about  $6^{\circ}$ .

5. The combination of Claim 1, 2 or 3, wherein the at least one sloped surface comprises two sloped surfaces at the same angle disposed on either side of the shank portion.

6. For use to secure bodies to legs of a support structure, the combination of a housing secured to a leg, the housing comprising a wall spaced from the leg and having an aperture therethrough, and opening in opposed directions, a body for securing to the wall, the body having a shank portion for projecting through the aperture in the wall and a head on the end of the shank of greater cross-section than the shank, the body having a wall engaging flange or ledge to engage the wall when the shank projects through the aperture in the wall to space the head from the wall, the head having at least one inner surface on a head portion at the end of the shank remote the body, sloped from a thin head portion to a thicker head portion towards the ledge or flange in an inwardly direction, and a U-shaped wedge having two arms spaced by a distance equal to the cross-wise dimension of the shank portion proximate the head for passing over the shank portion, the U-shaped wedge having a complementary co-operating slope to the at least one inner surface and of sufficient increasing thickness from the ends of the arms to the other end to cause the body to be locked against the wall by the wedging action of the wedge and the at least one inner surface of the head when the wedge is applied to

the shank.

7. The combination of Claim 5, wherein the at least one sloped surface comprises two sloped surfaces at the same angle disposed on either side of the shank portion.

8. The combination of Claim 6, wherein the opposite directions are opposite vertical directions.

9. The combination of Claim 6, wherein the wedge is longer than the height of the wall of the housing.

10. The combination of Claim 6, 7 or 8, wherein the at least one surface is sloped at an angle of about  $6^{\circ}$ .

11. The combination of Claim 1, 2 or 3, wherein the body comprises a fastener having a barrel, a spring loaded pin at one of the barrel normally urged to extend angularly the longitudinal axis of the barrel towards the upper portion, a flange at the other end of the barrel of a greater cross-wise dimension than the diameter of the aperture, and the shank portion of lesser diameter than the barrel extending axially of the barrel.

12. The combination of Claim 6, 7 or 8, wherein the body comprises a fastener having a barrel, a spring loaded pin at one of the barrel normally urged to extend angularly the longitudinal axis of the barrel towards the upper portion of the barrel, a flange at the other end of the barrel of a greater cross-wise dimension than the diameter of the aperture, the shank portion of lesser diameter than the barrel extending axially of the barrel to the head.

13. In support structures carrying in combination at least one screw jack comprising a screw jack nut, the screw jack nut having at least one step and a handle spaced from the step of the nut closest the handle to provide a space between the handle and step, and means for securing the screw jack nut to the support structure to permit full rotation of the screw jack nut with respect to the legs of the structure, said means for securing the screw jack nut to the vertical legs of the support structure including means to engage the screw jack nut vertically between the handle and the step closest the handle, but not interfere with the full rotation of the screw jack nut.

14. The combination of Claim 13, wherein the screw jack nut is stepped to provide a number of upper stepped support surfaces of different diameter.

15. The combination of Claim 13, where the legs of the support structures include opposed holes there-through and said means for securing the screw jack nut to the support structure comprises a collar having projections secured to the inner surface of the collar to be positioned in the holes and clamp means.

16. The combination of Claim 13, wherein said clamp means comprises arms extending from the collar to the screw jack nut and include inwardly projecting lips to project inwardly between the handle and step closest the handle to support the screw jack nut.

17. The combination of Claim 13, wherein the legs of the support structures have opposed holes therethrough and said means for securing each screw jack nut to the support structure comprises a pair



of pins, each having arms at either end extending in the same direction from the pin body, one arm to be inserted in the space between the handle and step closest thereto and the other arm through a hole in the leg, and a collar to fit over the pins to hold them and thus the screw jack nut to the leg.

18.           The combination of Claim 17, wherein an intermediate portion of the pin body is deformed in the direction that the arms extend to provide a recess in the surface of the body remote the arms.

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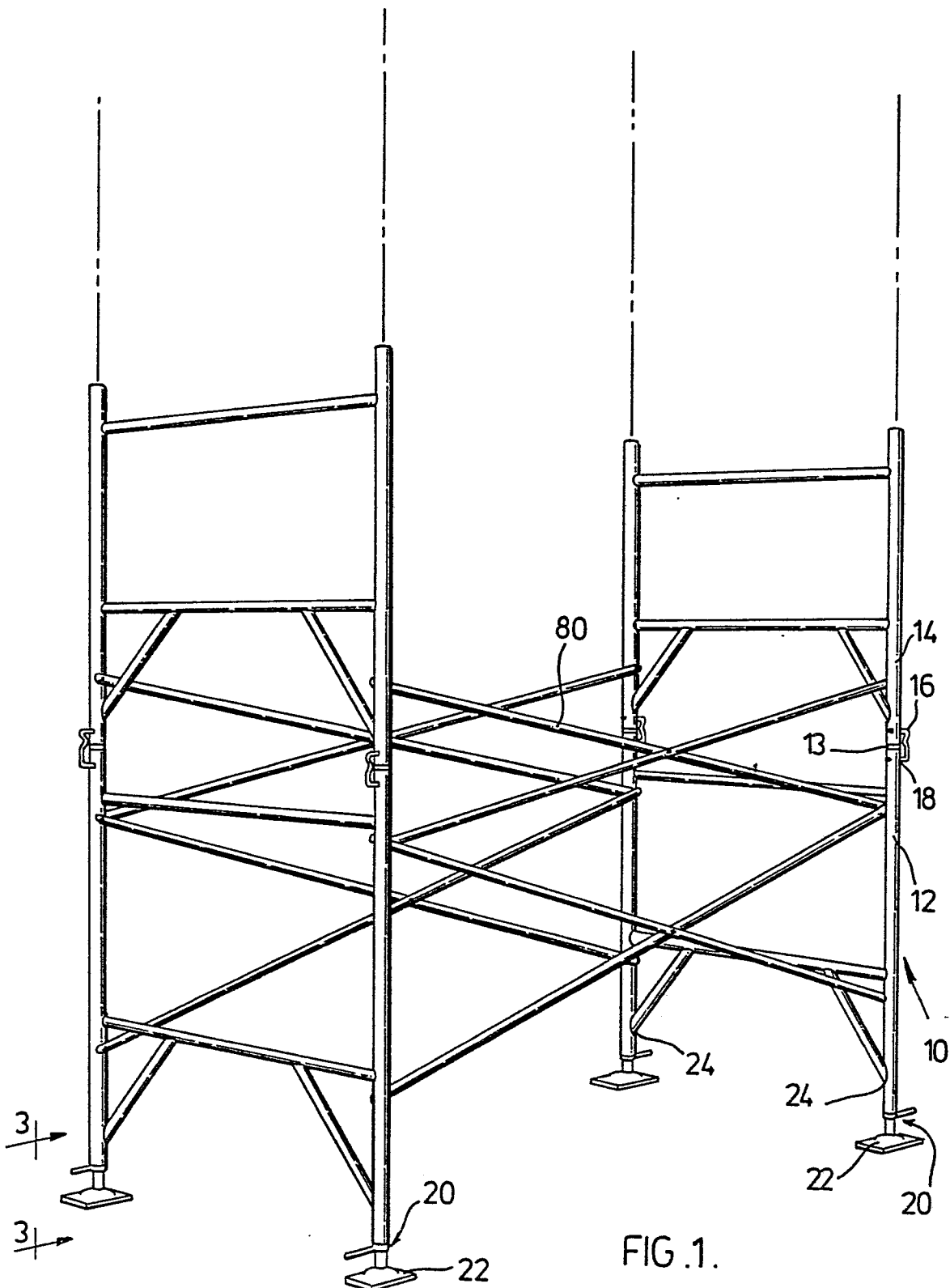
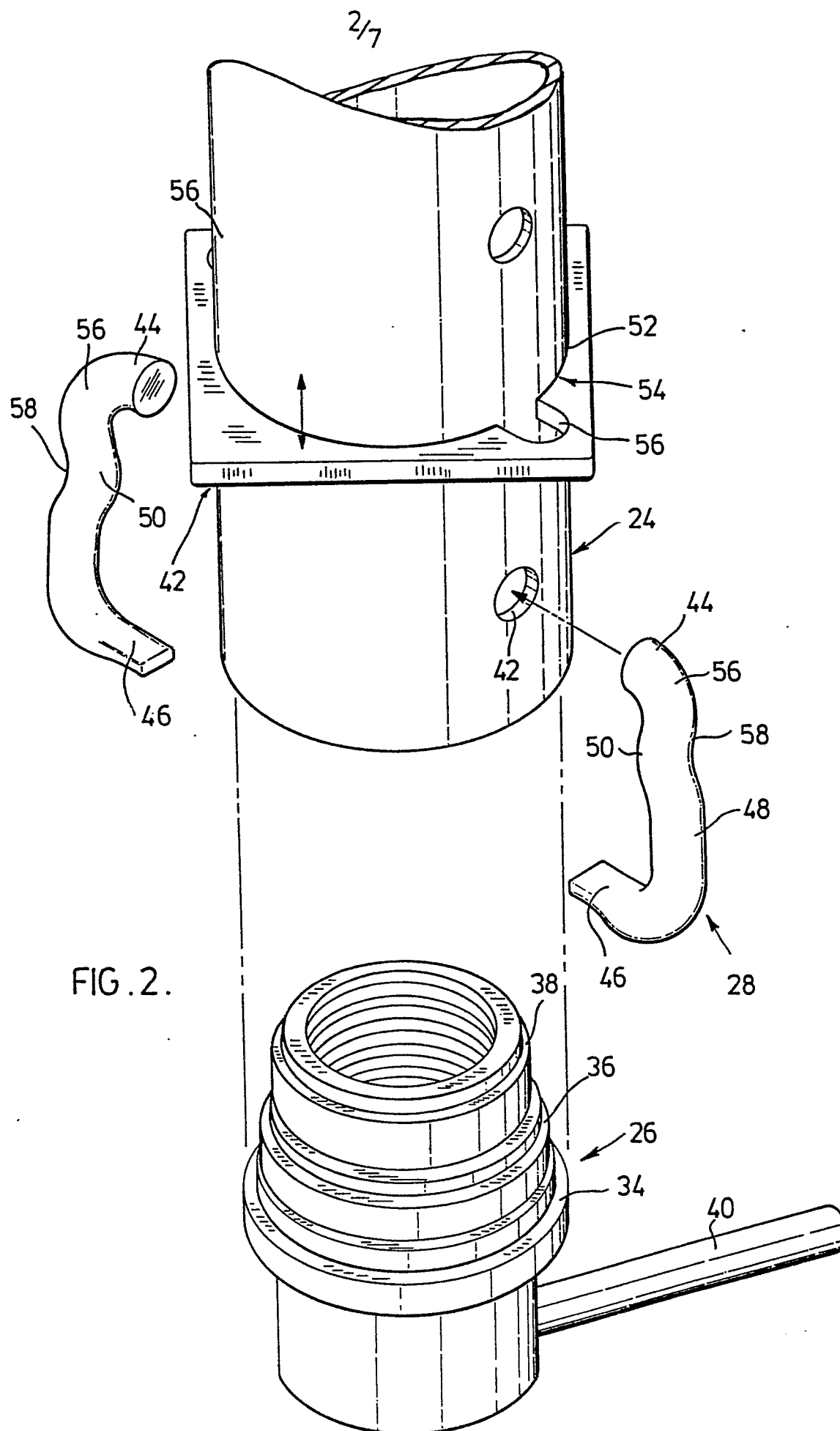


FIG. 1.



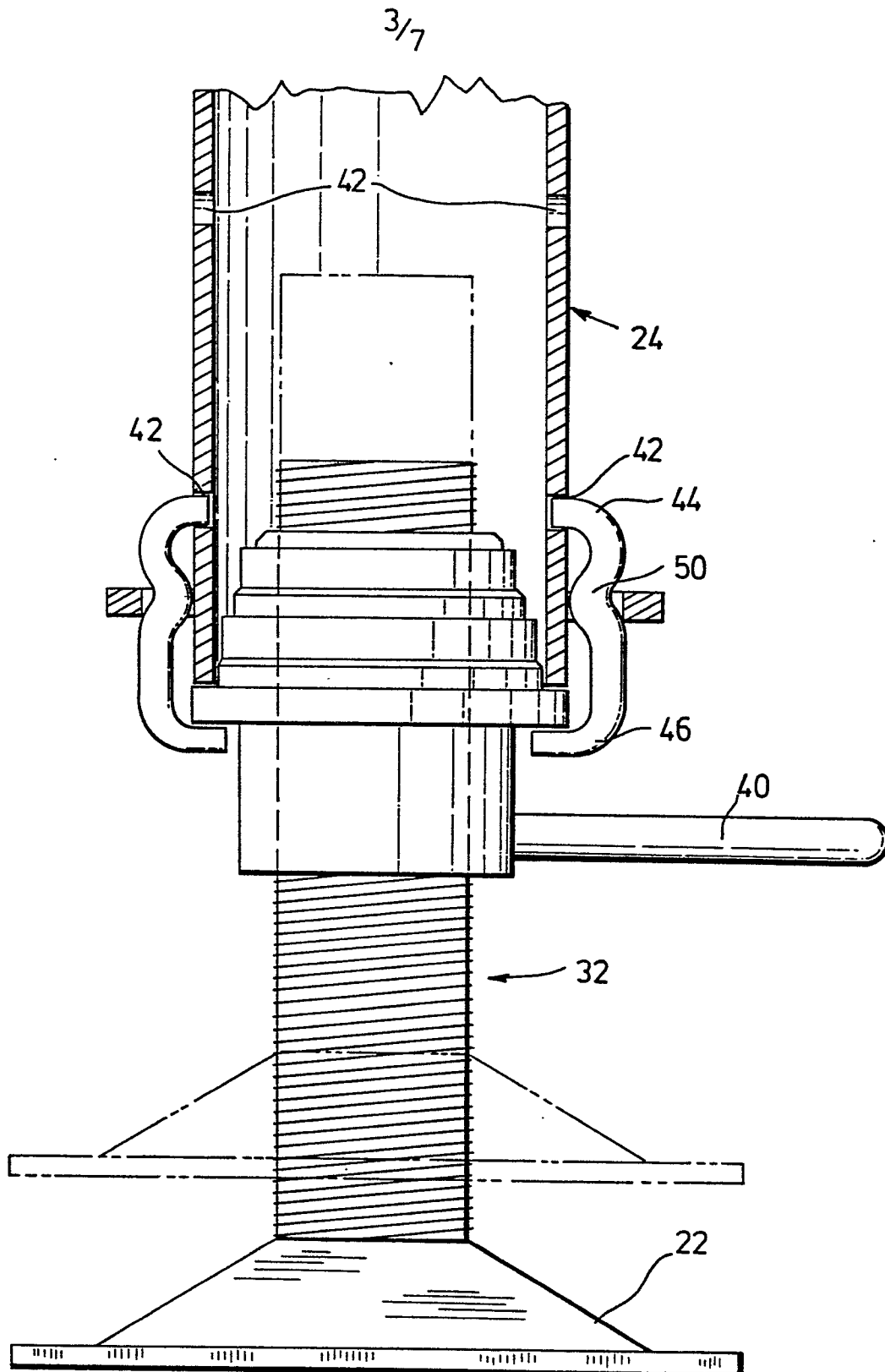


FIG. 3.

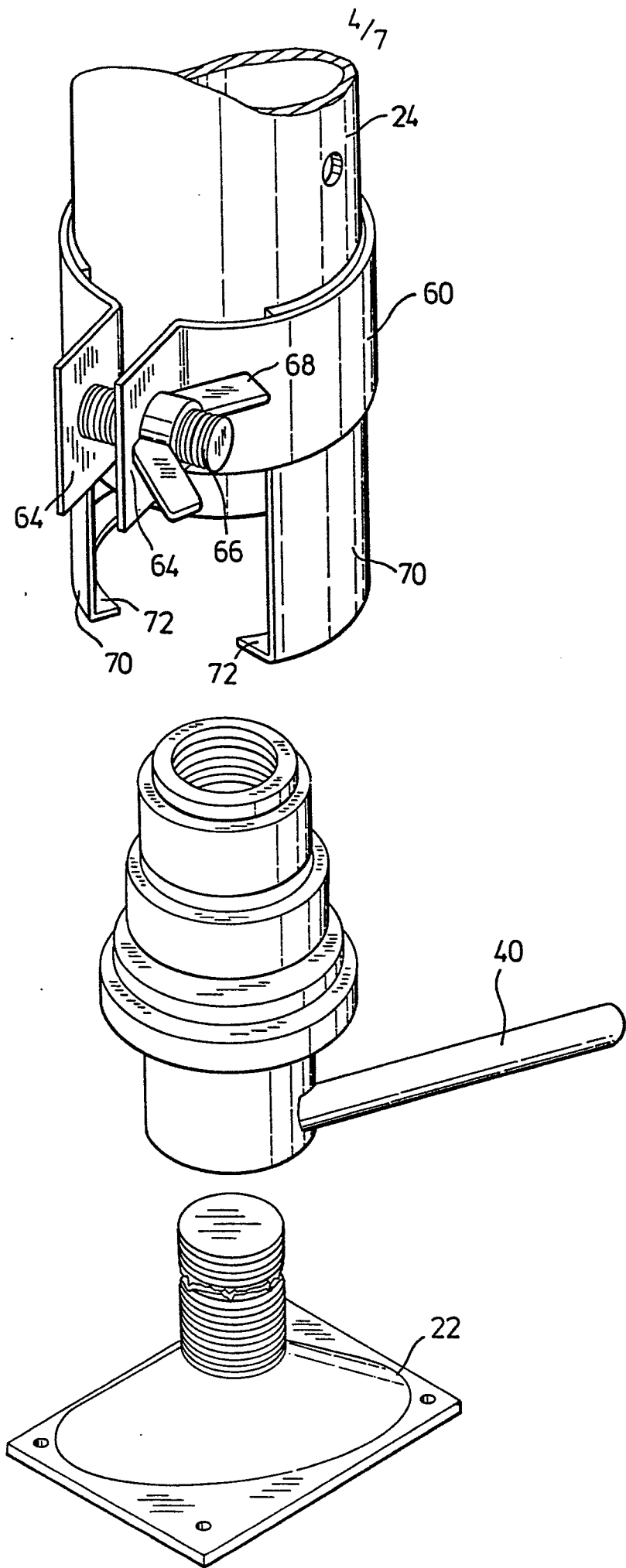


FIG. 4.

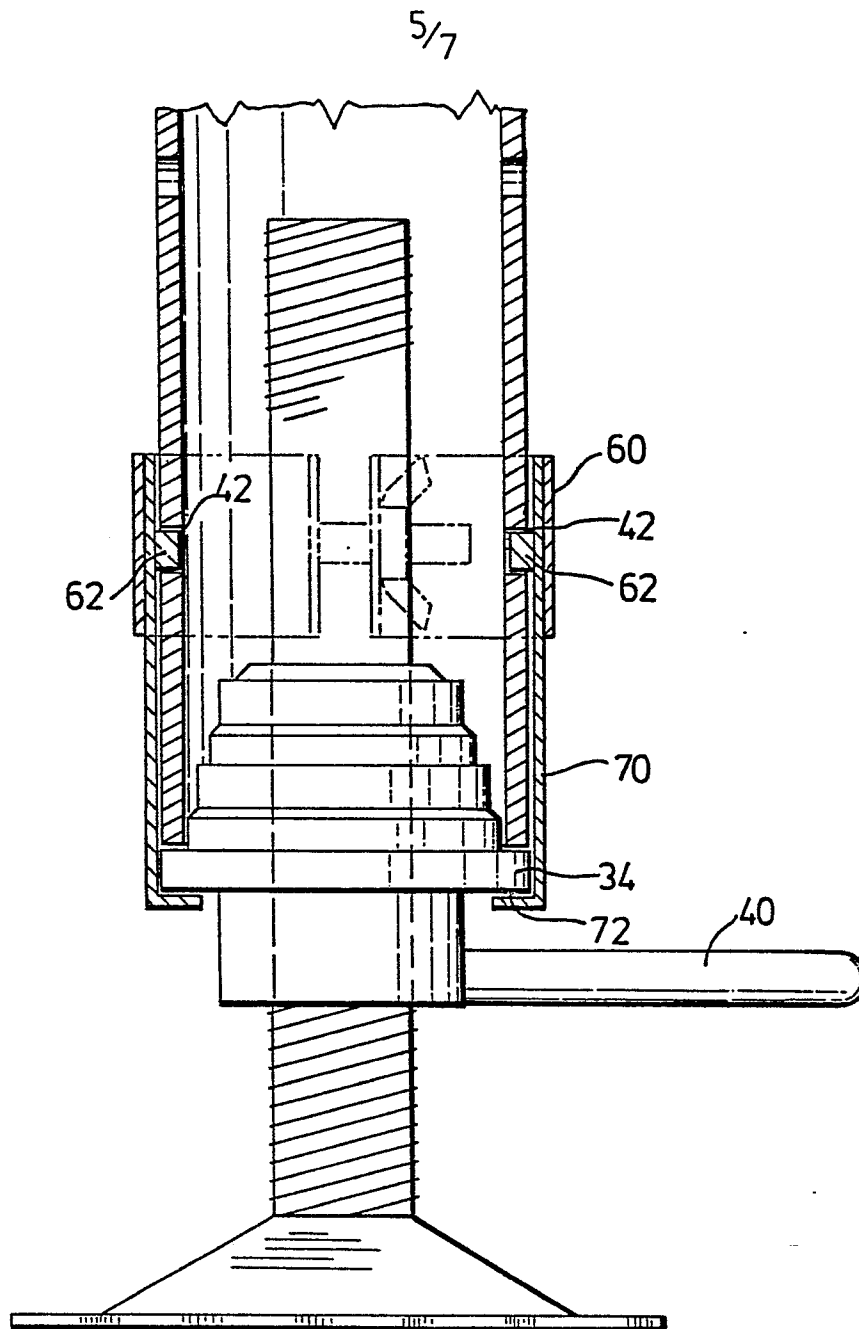


FIG. 5.

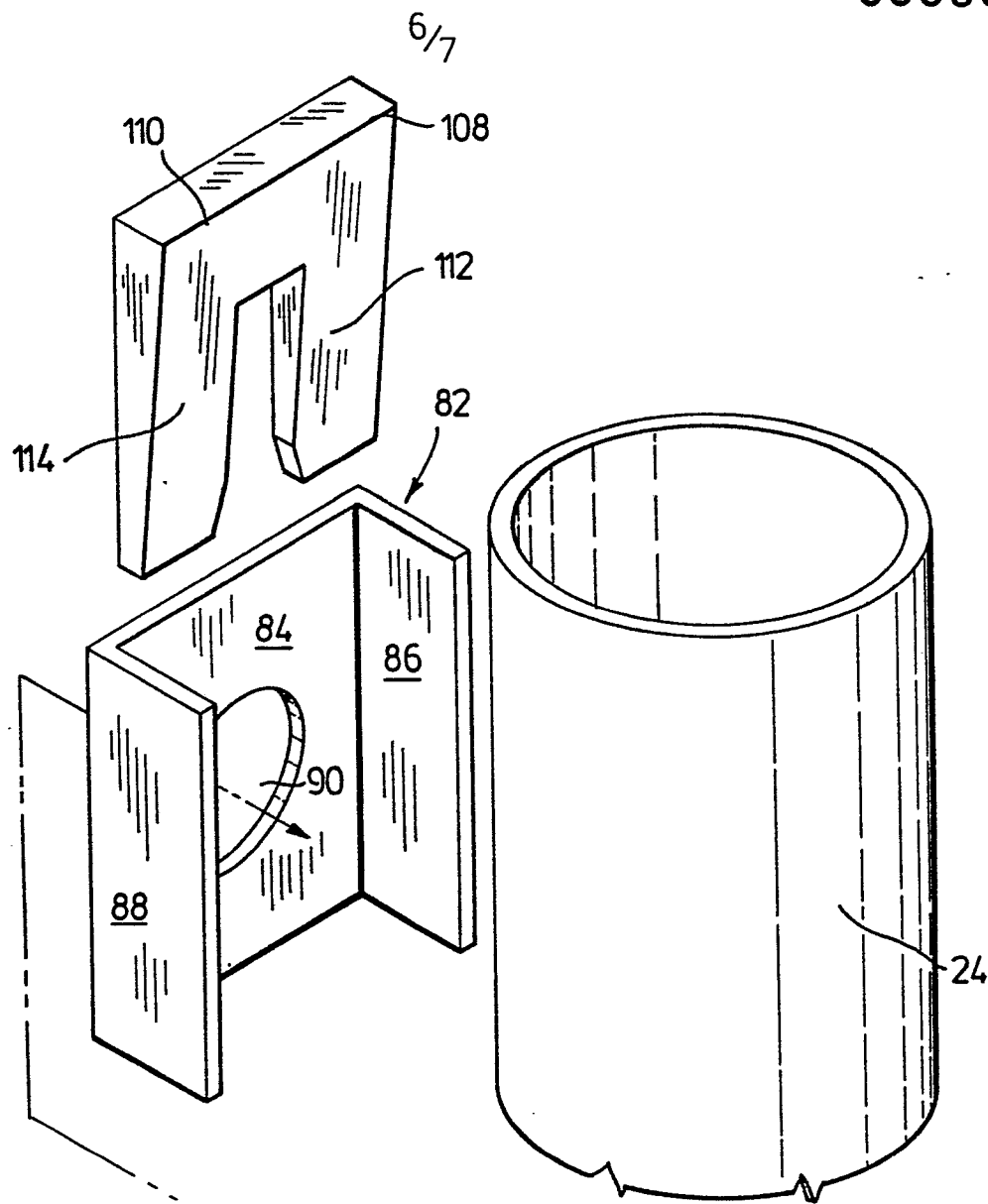
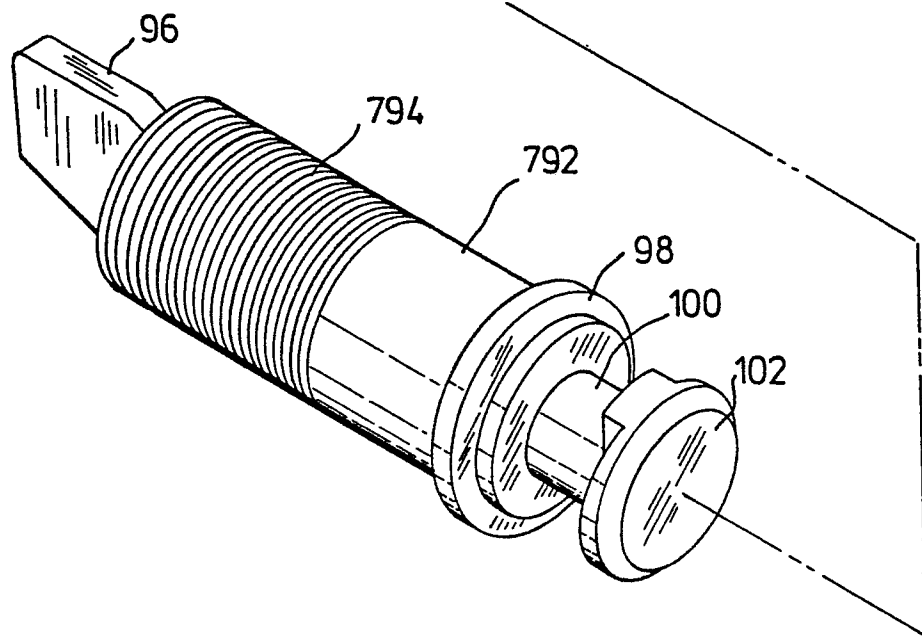
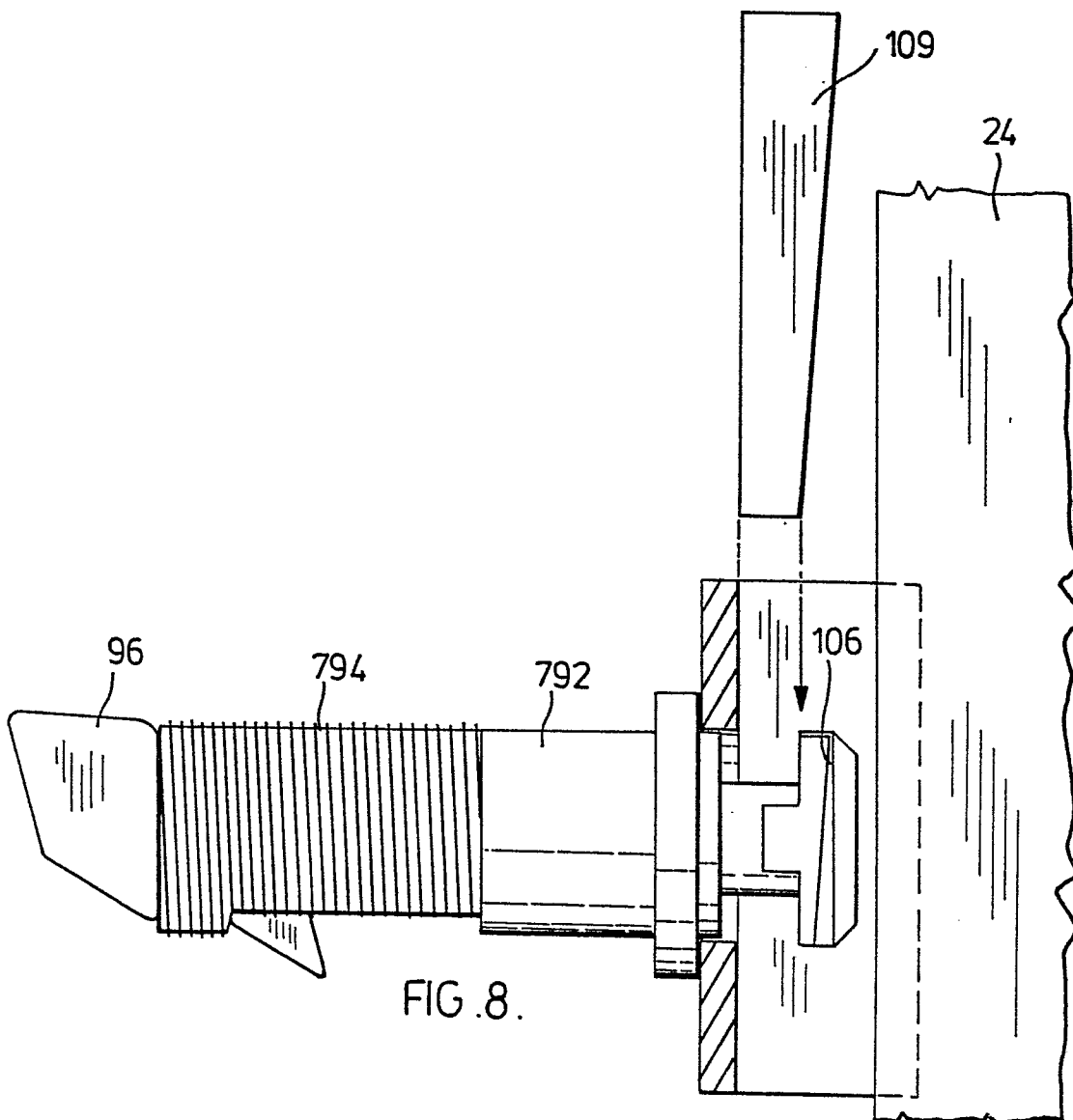
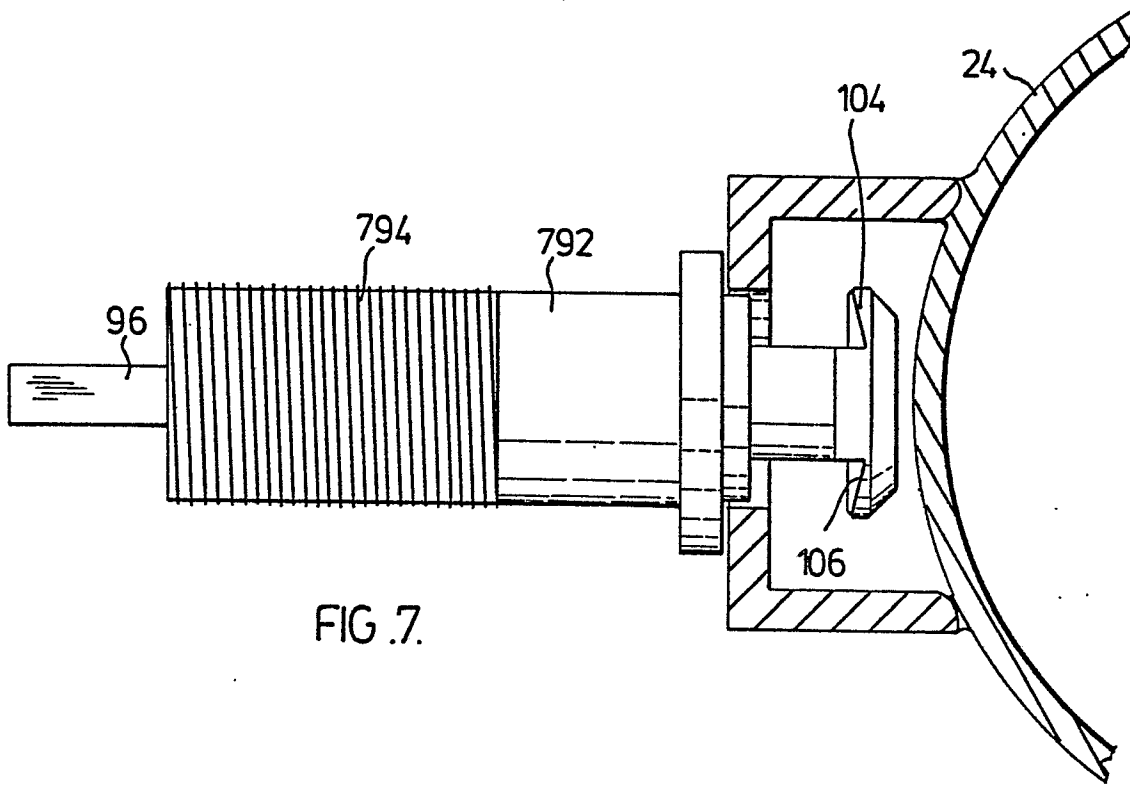


FIG. 6.









European Patent  
Office

# EUROPEAN SEARCH REPORT

0058042

Application number

EP 82 30 0533.5

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                            |                                                                                                                                      |                                                | CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                                                                                       | Citation of document with indication, where appropriate, of relevant passages                                                        | Relevant to claim                              |                                                                                                                                                                                                                                                                                                                                                                                                                                |
| P,A                                                                                            | <u>GB - A - 1 588 942</u> (ACCESS PLANT LTD.)<br>* whole document *<br>--                                                            |                                                | E 04 G 11/48<br>E 04 G 5/02                                                                                                                                                                                                                                                                                                                                                                                                    |
| A                                                                                              | <u>GB - A - 1 079 653</u> (ACCESS EQUIPMENT LTD.)<br>* whole document *<br>--                                                        |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                |
| A                                                                                              | <u>DE - U - 1 935 739</u> (R. BRÖSECKE)<br>* fig. *<br>--                                                                            |                                                | TECHNICAL FIELDS SEARCHED (Int.Cl. 3)                                                                                                                                                                                                                                                                                                                                                                                          |
| A                                                                                              | <u>DE - B2 - 2 237 698</u> (STE NOUVELLE DES ECHAFAUDAGES TUBULAIRES MILLS)<br>* fig. 1, 2 *<br>& <u>US - A - 3 835 612</u><br>----- |                                                | E 04 G 1/14<br>E 04 G 5/00<br>E 04 G 11/00                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                |                                                                                                                                      |                                                | CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                |                                                                                                                                      |                                                | X: particularly relevant if taken alone<br>Y: particularly relevant if combined with another document of the same category<br>A: technological background<br>O: non-written disclosure<br>P: intermediate document<br>T: theory or principle underlying the invention<br>E: earlier patent document, but published on, or after the filing date<br>D: document cited in the application<br>L: document cited for other reasons |
| <input checked="" type="checkbox"/> The present search report has been drawn up for all claims |                                                                                                                                      |                                                | &: member of the same patent family, corresponding document                                                                                                                                                                                                                                                                                                                                                                    |
| Place of search<br>Berlin                                                                      |                                                                                                                                      | Date of completion of the search<br>31-03-1982 | Examiner<br>v. WITTKEN                                                                                                                                                                                                                                                                                                                                                                                                         |