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(54) **FORMWORK FIXING AND METHOD**

ANKERVORRICHTUNG FÜR SCHALUNGSWAND UND VERFAHREN

FIXATION DE COFFRAGE ET PROCEDE CORRESPONDANT

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Description

[0001] The present invention relates to a formwork fixing and to a method of fixing a formwork.

[0002] A starter wall, also known as an upstand wall or kicker, is a short wall which is upstanding from a concrete slab that forms the base or floor of a building. The starter wall provides a base for a main wall. A formwork may be secured to the starter wall in order to allow the main wall to be cast. Typically, a starter wall has within it reinforcement or "starter" bars which are tied to the main slab reinforcement, and to which further reinforcement is subsequently tied for the main wall.

[0003] A starter wall is typically poured monolithically with the concrete slab. The fixing of a formwork for allowing the starter wall to be formed has always been a difficult and time-consuming task in the construction industry, for a number of reasons. For example, conventionally the formwork for the starter wall has to be suspended above the slab which is being poured, which is difficult in practice and means that the formwork for the starter wall is susceptible to movement and may not be arranged as vertically as required. The slab typically contains reinforcement, often in the form of a steel mesh or grid, which impedes the use of formwork supports. As a practical point, the starter wall formwork fixing has to be firmly supported because in practice operatives will inevitably walk on or hit the formwork fixing with shovels, and the like. It will be understood that proper vertical and horizontal alignment of the formwork for the starter wall is practically essential.

[0004] An example of a formwork fixing for a starter wall is disclosed in US-A-3473778. However, this known formwork fixing is complicated to use and/or does not provide for sufficient flexibility in order to allow accurate alignment of the fixings.

[0005] EP-A-1106748, FR-A-2642460 and US1672760 disclose various devices for supporting formworks that are used when forming or casting a kerb of a pavement. To achieve some stability, each has a spiked peg which is driven into the ground adjacent the region where the kerb is to be formed.

[0006] According to a first aspect of the present invention, there is provided a formwork fixing in accordance with claim 1.

[0007] Typically, plural such fixings will be used in order to provide support for a formwork. The fixings have application in supporting a formwork for a starter wall. The fixing allows for, in practice, horizontal and vertical adjustment of the position of the support portion, which allows the support portions of plural such fixings to be set for line and level. The fixing can be made of an inert material, such as plastics, which means that the fixing can be left in situ after the starter or other wall has been formed.

[0008] In an embodiment, the fixing comprises a second post on which the first post is movably mounted, the first and second posts being arranged so that the first post can be moved relative to the second post in a direction generally along or parallel to the longitudinal axis of the first post so that the height of the support portions relative to a said floor can be adjusted. In practice, the bottom of the second post will be in contact with the decking or other surface on which the concrete slab floor is to be poured. In one preferred embodiment, the first post is screw-threadedly mounted to the second post whereby rotation of the second post relative to the first post causes the first post to move relative to the second post in a direction generally along or parallel to the longitudinal axis of the first post (i.e. in practice vertically). This provides for easy adjustment of the position of the first post relative to the second post, whilst friction in the thread holds the first post in position relative to the second post.

[0009] In an embodiment, the support portions are slidably mounted at one end of the second post. This provides for easy adjustment of the support portion relative to the first post.

[0010] In an embodiment, the fixing comprises a block slidably mounted in the first support portion and to which the post is movably fitted to mount the first support portion on the post. This sliding movement of the block allows the (usually) horizontal position of the support portion to be adjusted relative to the post. In an embodiment, the post is fitted to the block by a screw threaded connection whereby rotation of the post relative to the block enables the height of the support portions relative to a said floor to be adjusted.

[0011] The first support portion may have a lug around which a tie can be fixed to fix a said beam of a formwork to the fixing. This helps to retain the beam in the desired position whilst concrete is being poured for example.

[0012] The second support portion may have a lug around which a tie can be fixed to fix a said beam of a formwork to the fixing. This further helps to retain the beam in the desired position whilst concrete is being poured for example.

[0013] In an embodiment, the second support portion has an opening therethrough through which a tie rod can be passed.

[0014] There may be provided in combination, two fixings as described above and a clamp having at least two depending legs which can be respectively received in the channels provided in the second support portions of said fixings so that the fixings can be clamped together. The clamp can be used to support the fixings in position during pouring of concrete, and helps to keep the second support portions parallel to each other and vertical.

[0015] There may be provided in combination, a fixing as described above, an anchor plate and a connecting arrangement, the channel of the second support portion of the fixing receiving in use one end of the connecting arrangement and the other end of the connecting arrangement being fixable in use to the anchor plate so as to connect the anchor plate to the fixing. The second support portion of the fixing preferably has an opening therethrough through which a tie rod can be passed in

use to engage with at least one of the connector and the anchor plate.

[0016] According to a second aspect of the present invention, there is provided a method of monolithically forming a concrete slab floor with a starter wall, the method comprising: fixing a formwork using a plurality of fixings, each fixing comprising a support portion on which the base of a beam of a formwork can be supported above a deck floor; and, a post on which the support portion is movably mounted, the post having a longitudinal axis; the post and support portion being arranged so that the support portion can be moved relative to the post in at least one direction generally perpendicular to the longitudinal axis of the post and so that the height of the support portion relative to a said floor can be adjusted; the fixing method comprising: placing posts of plural ones of the fixings at intervals on the deck floor so that the posts are substantially vertical; horizontally and vertically moving the support portions as necessary so that the support portions are arranged in a line; and, fitting the beam of the formwork to the support portions; and, monolithically forming the concrete slab floor with the starter wall by pouring concrete over the deck and around the formwork.

[0017] The method may comprise repeating the placing, moving and fitting steps for a second series of fixings and a second beam of the formwork such that the second beam of the formwork is fitted substantially parallel to the first beam. On the other hand, for an end starter wall, a so-called slab end-shutter may act in lieu of the second series of fixings and second beam.

[0018] The method may comprise prior to the pouring of the concrete, clamping respective ones of the fixings of the first and second series of fixings together.

[0019] According to a third aspect of the present invention, there is provided a method of monolithically forming a concrete slab floor with a starter wall, the method comprising: fixing a formwork using a plurality of fixings, each fixing comprising a support portion on which the base of a beam of a formwork can be supported above a floor; and, a post on which the support portion is movably mounted, the post having a longitudinal axis; the post and support portion being arranged so that the support portion can be moved relative to the post in at least one direction generally perpendicular to the longitudinal axis of the post and so that the height of the support portion relative to a said floor can be adjusted; the fixing method comprising: fitting plural said fixings to the beam of the formwork; and, placing the assembly of said fixings and said beam on the floor and horizontally and vertically moving the support portions as necessary; and, monolithically forming the concrete slab floor with the starter wall by pouring concrete over the deck and around the formwork.

[0020] The method may comprise repeating the fitting and placing steps for a second series of fixings and a second beam of the formwork such that the second beam of the formwork is fitted substantially parallel to the first beam. The method preferably comprises clamping the first and second beams together prior to placing either of said beams on the floor, and then placing the assembly of the clamped beams and respective fixings on a said floor.

[0021] In either aspect of the method, the method may comprise connecting an anchor plate to at least one of the fixings to provide an anchor point for a tie rod.

[0022] At least one of the fixings is preferably a fixing as described above.

[0023] Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of a first example of a fixing in accordance with an embodiment of the present invention;

Fig. 2 is a front elevation of the fixing of Figure 1;

Fig. 3 is a rear elevation of the fixing of Figure 1;

Fig. 4 is an elevation of a second post of the fixing of Figure 1;

Fig. 5 shows a cross-section through a monolithic concretes slab and internal starter wall showing a first example of a formwork in situ;

Fig. 6 is a side elevation of a second example of a fixing in accordance with an embodiment of the present invention;

Fig. 7 is a front elevation of the fixing of Figure 6;

Fig. 8 is a rear elevation of the fixing of Figure 6;

Fig. 9 shows a cross-section through a monolithic concrete slab and internal starter wall showing a second example of a formwork in situ;

Fig. 10 shows a first example of a formwork fixings and anchor point for use at an end wall;

Fig. 11 shows a second example of a formwork fixings and anchor point for use at an end wall;

Fig. 12 shows a cross-section through a monolithic concrete slab and starter wall at an end wall showing an example of a formwork in situ;

Fig. 13 shows a cross-section through a monolithic concrete slab for a kickerless system; and,

Fig. 14 is a view similar to Figure 13 showing the formwork in situ.

[0024] Referring first to Figures 1 to 5, a first example of a formwork fixing 1 has a first generally planar support

portion 2 and a second generally planar support portion 3 arranged perpendicularly to the first planar support portion 2. In practice, the first planar support portion 2 will be horizontal and the second planar support portion 3 will be vertical.

[0025] The planar support portions 2,3 are provided by perpendicular faces of a support 4 which has a generally L-shape cross-section. The underneath surface of the support 4 has recessed channels or a slot 5 (shown in dashed lines in Figures 1 and 2) which receives the head 6 of a first post 7. The slot 5 is open at the rear of the support 4 in order to allow the head 6 of the first post 7 to be inserted, the slot 5 stopping short of the front of the support 4 in order to prevent the first post 7 passing straight through. As will be appreciated, this arrangement allows the support 4 to be moved relative to the first post in a direction generally parallel to the plane of the first support portion 2 which, in practice, is in a horizontal plane and in a direction from the front to the back of the support 4.

[0026] The first post 7 is hollow and has an internal screw thread 8. A second post 9 is provided as a discrete item and has a corresponding external screw thread 10 at at least one end. The second post 9 can be screwed into the first post 7 as far as is necessary, as will be discussed further below. In the preferred embodiment, the second post 9 has a hexagonal or other polygonal male head 11 at one end and a correspondingly shaped female recess 12 at the other end, which facilitates adjustment, as will again be described further below .

[0027] In order to set up the fixings 1 in order to provide a formwork for a starter or similar wall, in one example method plural such fixings 1 are first taken and fixed in a horizontal line. These fixings 1 can be fixed in place, at least loosely, by tying the first posts 7 to the steel grid or other reinforcement 13. A typical spacing between the fixings 1 might be of the order of 1 metre or so. The horizontal position of the supports 4 is adjusted as necessary, by sliding the supports 4 on the respective first posts 7, so that the second or vertical planar support portions 3 are all aligned. Similarly, where necessary, the vertical position of the first or horizontal planar support portions 2 of the fixings 1 is adjusted so that the horizontal planar support portions 2 are all in approximately the same plane. This vertical adjustment is achieved by screwing the second post 9 into the first posy 7 of a fixing 1. Rotation of the second post 9 within the first post 7 can be carried out by use of another second post 9 which has its male head 11 inserted into the female end 12 of the second post 9 of the fixing 1, entry being obtainable through an opening in the surface of the horizontal planar support portion 2 of the fixing 1.

[0028] Importantly, the lower end of each second post 9 seats against the floor or "decking" or "blinding". This means that the fixings 1 are effectively supported on the decking independent of the steel grid 13, and are not suspended above the decking as in the prior art, which makes the formwork more stable.

[0029] A second row of fixings 1 is then set into place parallel to the first row of fixings 1 and their horizontal and vertical positions adjusted as necessary.

[0030] Respective timber joists or, more preferably, plastics beams 14 are then placed on the rows of fixings 1 parallel to each other and separated by a distance equal to the width of the wall to be cast. The beams 14 can be fixed in this position by nailing timber straps between the beams 14 at intervals along the beams 14. The beams 14 can alternatively or additionally be temporarily secured to the fixings 1 by tying wire. Lugs 15,16 projecting from the planar support portions 2,3 can be used as attachment points for the tying wire.

[0031] As an alternative to the fixing method described above, it is also possible to pre-assemble each beam 14 with its plural fixings 1. In particular, plural fixings 1 can be attached at intervals along each beam 14. If necessary or desirable, tying wire can be used to secure the beams 14 to the fixings 1, though this may not always be necessary. The pair of beams 14 with their fixings 1 can then be fixed parallel to each other by for example nailing timber straps between the beams 14 at intervals along the beams. The beams 14 are again spaced by a distance equal to the width of the wall to be cast. This assembly of the two beams 14 and their respective fixings 1 can then be lowered manually into position on the decking, the fine position of the fixings 1 being adjusted vertically and horizontally as necessary.

[0032] Concrete is then poured to form the concrete slab 17 and also into the space between the two rows of fixings 1 and beams 14 in order to form the starter wall 18. The starter wall 18 is thereby formed monolithically with the concrete slab 17.

[0033] Once the concrete has set, the beams 14 are then removed. The fixings 1 are preferably made of an inert material, such as plastics, which will not rust or otherwise affect the concrete, so that the fixings 1 do not have to be removed. It will be understood that the fixings 1 will typically be bound to the concrete and so their removal would be difficult.

[0034] In a known manner, shutters (not shown) are then positioned either side of the starter wall 18 to allow the main wall (not shown) to be formed on the starter wall 18. Conventional L-shape starter bars 19 and lacers 19' are shown in Figure 5.

[0035] The fixings 1 accordingly provide in a very simple manner a fixing for a formwork for a starter wall in which the fixings 1 can be adjusted in vertical and horizontal directions in order to achieve alignment. The alignment of the support portions 4 is not affected or constrained by the presence of the reinforcing mesh 13.

[0036] Given that the floor or blinding may not be level and/or may have irregularities that affect its height, feet (not shown) may be fitted under the second posts 9 during the fitting of the fixings 1. Alternatively or additionally, a range of second posts 9 having different lengths may be provided and the fitter simply selects the second post of the appropriate length.

[0037] Referring now to Figures 6 to 9, a second example of a formwork fixing 1 is shown. The same reference numerals as used for the first example are used for the same or corresponding features in the second example.

[0038] In this second example, a screw block 60 having an internally screw-threaded through hole 61 is slidably mounted in the channel 5 so as to be able to slide in use in a horizontal plane (i.e. to the left and right in Figure 6). In this example, the support 4 is supported on the concrete floor or decking by a plastics screw-threaded rod 62 which passes through the open lower surface of the support 4, is threaded into the screw block 60, and passes through the open upper surface of the first support portion 2. Similarly to the first example described above, the height of the support 4 relative to the decking can be adjusted by screwing the screw rod 62 in the screw block 60, and the horizontal position of the support 4 can be adjusted simply by sliding the screw block 60 in the channel 5. The second (vertical) support portion 3 has an opening 64 therethrough, the purpose of which will be described below.

[0039] Referring particularly now to Figure 9, the setting up of the fixings 1 of this second example is similar to the setting up of the fixings 1 of the first example and will therefore not be described in detail and only the significant differences will be discussed. In this second example, a ledge or stop 63 is mounted on the upper surface of the first support portion 2 on each side of the channel 5. Each stop 63 may be integrally formed with the support 4. As shown particularly clearly in Figure 9, the distance from the stop 63 to the second support portion 3 may be a standard width, such as 75mm, so as to be able to accommodate and fix the beam 14 in position. This avoids having to tie the beams 14 to the support 1, which simplifies assembly. Moreover, it means that the lugs 15, 16 do not have to be provided on the supports 1.

[0040] In this example, a clamp 70 in the form of an inverted rectangular U-shape is used to hold the supports 4 in position. The clamp 70 has downwardly projecting parallel legs 71 which are received in a respective channel 72 in the supports 4. The clamp 70 is preferably made of a rigid material, such as metal. Thus, once the supports 4 are in position and the beams 14 placed in position on the supports 4, a respective clamp 70 is fixed between opposed pairs of supports 4. This arrangement ensures that the supports 4 are firmly held in position relative to each other with the second support portions 3 held parallel to each other and vertically arranged. This therefore provides for a very quick and simple arrangement for ensuring that the formwork itself is vertically arranged and securely held.

[0041] As in the first example described above, the supports 4 can first be placed individually in position on the decking, and then the beams 14 put in position on the supports 4 and, in this example, the clamps 70 positioned between respective pairs of supports 4. Alternatively, again as in the second example, pre-assembly of the beams 14 and supports 4 can be carried out, clamps 70 again being used to hold the pre-assembled beams 14 and supports 4 together, and the whole assembly then being lifted into position.

[0042] After the starter wall 18 is poured and cast, the beams 14 and the clamps 70 can be removed and reused. It will be appreciated that this clamp 70 can be used with a suitably adapted version of the first example of a support 4 shown in Figures 1 to 4.

[0043] In one variation, the clamp 70 has a further pair of parallel depending legs 73 (shown in dashed lines in Figure 9) which are positioned outwardly of and parallel to the first pair of depending legs 71. The spacing between the respective pairs of first and second depending legs 71,72 is preferably a standard width, of for example 75mm. Thus, when the first legs 71 are inserted into the respective supports 4, the outer depending legs 73 fit round the respective beams 14 to hold the beams 14 in position, thus avoiding the need to use tying wire.

[0044] Referring now to Figure 10 and 11, there are shown first and second examples of formwork fixings 1 for use at an end wall. Those parts that are the same as or that correspond to parts in the example described above have the same reference numerals.

[0045] Typically, an external shutter 20 has a water bar 21 which has projections 22 that are intended to prevent ingress of water through the joint between the top of the starter wall 23 and the main wall that is subsequently cast above the starter wall 23. Conventionally, tie bars for the formwork for forming the main wall have had to be placed above the water bar 21 in waterlogged conditions, but even then the formed main wall is still susceptible to seepage of water through the bolt hole above the water bar 21.

[0046] This can be avoided by using an anchor plate 24 in conjunction with each support 4. The anchor plate 24 is generally square and has plural holes 25 which allow for additional steel bars to be tied to it if required by specific designs. The anchor plate 24 in the example of Figures 10 and 10A has a centrally positioned.and externally screw-threaded tie rod 26 projecting outwardly therefrom. The tie rod 26 may be integrally formed with the body of the anchor plate 24 or welded or otherwise fixed thereto. An internally threaded connecting tube 27 is screwed at one end onto the tie rod 26 of the anchor plate 24, and is received at the other end in a channel 28 provided in the first support portion 3 of the support 4. The connecting tube 27 can slide up and down in the channel 28, allowing the vertical position of the connecting tube 27 to be adjusted, at least down to a predetermined height above the first support portion 2 by a stop (not shown) in the channel 28. In this example, a clamp 80 of generally lazy Z-shape cross-section is used to hold the respective supports 4 in position. This clamp 80 has a downwardly depending leg 81 which is received in the channel 28 of the support 4. A facing leg or plate 82 at the other end of the clamp 80 can be nailed or otherwise fixed to the shutter 20. Similarly to the example of a clamp

70 described above, a further downwardly depending leg 83 may be provided outwardly of the first depending leg 81 so as to accommodate the beam 14 therebetween.

[0047] In an alternative arrangement shown in Figure 11, a connecting tube 29 is fixed to or integrally formed with the anchor plate 24 and a short piece of threaded tie rod 30 is used to connect between the connecting tube 29 of the anchor plate 24, and the connecting tube 27 that is slidably received in the support 4. Walls of different widths can easily be accommodated by using tie rods 30 of different lengths.

[0048] Referring to Figure 12, once the concrete for the slab 17 and starter wall 23 has been poured and has set, the clamps 80, beam 14 and external slab shutter 20 are removed. Depending on site conditions, a conventional external shutter 20', with "walers" 44 and "soldiers" 33,34, may be used and a similar conventional internal shutter 32 is then fixed in place. The external shutter 20', if used, can be propped from the outside in a manner known per se. The internal shutter 32 is propped by props 35.

[0049] Props 35, as shown in the inset drawing in Figure 12, are conventionally bolted into the concrete slab 17. However, this bolting of the props 35 into the concrete slab 17 means that it is necessary to drill into the slab 17, which is a labour-intensive exercise, especially as steel reinforcement may be encountered, and an error in drilling can allow ingress of water.

[0050] To avoid this, a long tie bar 36, optionally via a short tie bar 37 and tie bar connector 37' as shown, is screwed into the first end of the connector tube 27 through the opening 64 in the second support portion 3, the internal shutter 32 and its soldier 34. An adjustable anchor 38 is mounted over the free end of the long tie bar 36 and can be slid along the length of the long tie bar 36. A nut 39 is screw threaded on the free end of the long tie bar 36 in order to limit the movement of the adjustable anchor 38. The prop 35 is pivotally mounted at one end to the adjustable anchor 38. The other end of the prop 35 is pivotally mounted via a tilt plate 40 which is fixed to the soldier 34. This arrangement, which uses the connector tube 27, means that the internal shutter 32 is fully propped and yet it is not necessary to drill into the concrete slab 17 in order to provide an anchor point for the propping arrangement. The anchor points for the subsequent wall formwork are provided by the anchor plates 24 and connector tubes 27 and are therefore optimally positioned low down in the wall. The use of the connector tube 27 and adjustable anchor 38 also makes fixing and alignment of the prop 35 much easier and quicker. A nut 41 on the short tie bar 37 secures the lower end of the internal soldier 34. Additional tie bars 42 and nuts 43 tie the internal and external soldiers 34,33, with walers 44 being positioned between the soldiers 33, 34 and the shutters 20',32 as is conventional.

[0051] Referring now to Figures 13 and 14, in some circumstances it is desired to be able to pour a concrete main wall without having first formed a kicker wall. This is sometimes known as a kickerless system. The supports 4 of any of the examples described above can be used in such a system.

[0052] Referring first to Figure 13, similarly to the examples described above, a formwork support 4 is provided either side of the region where the main wall is to be formed. The formwork supports 4 are then positioned at the correct horizontal position and correct vertical position as described above, in this example by sliding the screw blocks 60 in the respective supports 4 and by screwing the rods 62 relatively up and down in the screw blocks 60 as required. The respective pairs of supports 4 can then be clamped relative to each other using the clamp 70 as described above, with the additional depending legs 73 to hold the beams 14 in position.

[0053] Importantly in this example, a respective short internally threaded connecting tube 50 is fitted to each support 4, with one end of each connecting tube 50 being vertically slidably received in the respective channel 72 in the supports 4 and pushed down to the stop (not shown) in the channel 72 to be at the optimum vertical position. A short threaded tie bar 51 is screwed between pairs of connecting tubes 50 to hold the pairs of supports 4 in position. Once the concrete floor 17 has been poured and set, the connecting tubes 50 can then receive screw threaded tie bars 36/37. As in the example shown in Figure 12, these tie bars 36/37 can be used to adjustably mount a prop 35 and other necessary equipment for the formwork fixings to allow the main wall to be poured. To provide additional support, it is preferred that the short threaded rod 51 have a downwardly depending leg 52 which is set in the concrete of the main concrete floor 17.

[0054] In various embodiments, the present invention provides fixings for formwork which do not have to be suspended above a decking on which a concrete floor is to be poured. The formwork fixings of the preferred embodiments can be supported on and by the decking whilst the concrete floor and, optionally, a kicker wall is poured. The height of the support portion of the formwork fixings can be easily adjusted, and the position of the support posts for the fixings can easily be adjusted in a horizontal plane. The formwork fixings of the present invention are able to provide a much more stable support during the phase of concrete pouring and setting. Certain embodiments help to ensure that the kicker is formed vertically with parallel sides. Certain embodiments provide for anchor points to facilitate the fixing of the subsequent wall formwork. Such anchor points can be accurately placed to suit the formwork design. Moreover, as well as being used to form walls, the fixings can be used in the formation of columns, etc.

[0055] Embodiments of the present invention have been described with particular reference to the examples illustrated. However, it will be appreciated that variations and modifications may be made to the examples described within the scope of the present invention, as defined by the attached claims.

Claims

1. A formwork fixing (1) for providing support to a formwork for a starter wall to be poured monolithically with a concrete slab, the fixing comprising:

   a first support portion (2) on which the base of a beam (14) of the formwork can be supported above a floor;
   a second support portion (3) for supporting a rear wall of a said beam (14) of a formwork; and
   characterised in that it further comprises
   a post (9,62) on which the support portions (2,3) are movably mounted, the post (9,62) having a longitudinal axis and a lower end suitable for seating against the floor;
   the post (9,62) and support portions (2,3) being arranged so that the support portions (2,3) can be moved relative to the post (9,62) in at least one direction generally perpendicular to the longitudinal axis of the post (9,62) and so that the height of the support portions (2,3) relative to a said floor can be adjusted;
   the second support portion (3) having a channel (28,64,72) for receiving a connector or clamp leg.

2. A fixing (1) according to claim 1, comprising a second post (7) on which the first post (9) is movably mounted, the first and second posts (9,7) being arranged so that the first post (9) can be moved relative to the second post (7) in a direction generally along or parallel to the longitudinal axis of the first post (9) so that the height of the support portions (2,3) relative to a said floor can be adjusted.

3. A fixing (1) according to claim 2, wherein the first post (9) is screw-threadedly mounted to the second post (7) whereby rotation of the second post (7) relative to the first post (9) causes the first post (9) to move relative to the second post (7) in a direction generally along or parallel to the longitudinal axis of the first post (9).

4. A fixing (1) according to claim 2 or claim 3, wherein the support portions (2,3) are slidably mounted at one end of the second post (7).

5. A fixing (1) according to claim 1, comprising a block (60) slidably mounted in the first support portion (2) and to which the post (62) is movably fitted to mount the first support portion (2) on the post (62).

6. A fixing (1) according to claim 5, wherein the post (62) is fitted to the block (60) by a screw threaded connection whereby rotation of the post (62) relative to the block (60) enables the height of the support portions (2,3) relative to a said floor to be adjusted.

7. A fixing (1) according to any of claims 1 to 6, wherein the first support portion (2) has a lug (15) around which a tie can be fixed to fix a said beam (14) of a formwork to the fixing (1).

8. A fixing according to any of claims 1 to 7, wherein the.second support portion (3) has a lug (16) around which a tie can be fixed to fix a said beam (14) of a formwork to the fixing (1).

9. A fixing (1) according to any of claims 1 to 8, wherein the second support portion (3) has an opening therethrough through which a tie rod can be passed.

10. A combination comprising two fixings (1) according to any of claims 1 to 9 and a clamp (70) having at least two depending legs (71) which can be respectively received in the channels (72) provided in the second support portions (3) of said fixings (1) so that the fixings (1) can be clamped together.

11. A combination comprising a fixing according to any of claims 1 to 7, an anchor plate (24) and a connecting arrangement (27), the channel (28) of the second support portion (3) of the fixing (1) receiving in use one end of the connecting arrangement (27) and the other end of the connecting arrangement (27) being fixable in use to the anchor plate (24) so as to connect the anchor plate (24) to the fixing (1).

12. A combination according to claim 11, wherein the second support portion (3) of the fixing (1) has an opening therethrough through which a tie rod can be passed in use to engage with at least one of the connecting arrangement (22) and the anchor plate.

13. A method of monolithically forming a concrete slab floor with a starter wall, the method comprising:

    fixing a formwork using a plurality of fixings (1), each fixing (1) comprising a support portion (2) on which the base of a beam (14) of a formwork can be supported above a deck floor; and, a post (9,62) on which the support portion (2) is movably mounted, the post (9,62) having a longitudinal axis; the post (9,62) and support portion (2) being arranged so that the support portion (2) can be moved relative to the post (9,62) in at least one direction generally perpendicular to the longitudinal axis of the post (9,62) and so that the height of the support portion (2) relative to a said floor can be adjusted; the fixing method comprising:

    placing posts (9,62) of plural ones of the fixings (1) at intervals on the deck floor so that the posts (9, 62) are substantially vertical;
    horizontally and vertically moving the sup-

port portions (9,62) as necessary so that the support portions (2) are arranged in a line; and,
fitting the beam (14) of the formwork to the support portions (2); and,
monolithically forming the concrete slab floor with the starter wall by pouring concrete over the deck and within the formwork.

14. A method according to claim 13, comprising repeating the placing, moving and fitting steps for a second series of fixings (1) and a second beam (14) of the formwork such that the second beam (14) of the formwork is fitted substantially parallel to the first beam (14).

15. A method according to claim 14, comprising, prior to the pouring of the concrete, clamping respective ones of the fixings (1) of the first and second series of fixings (1) together.

16. A method of monolithically forming a concrete slab floor with a starter wall, the method comprising:

fixing a formwork using a plurality of fixings (1), each fixing (1) comprising a support portion (2) on which the base of a beam (14) of a formwork can be supported above a floor; and, a post (9,62) on which the support portion (2) is movably mounted, the post (9,62) having a longitudinal axis; the post (9,62) and support portion (2) being arranged so that the support portion (2) can be moved relative to the post (9,62) in at least one direction generally perpendicular to the longitudinal axis of the post (9,62) and so that the height of the support portions (2) relative to a said floor can be adjusted; the fixing method comprising:

fitting plural said fixings (1) to the beam (14) of the formwork; and,
placing the assembly of said fixings (1) and said beam (14) on the floor and horizontally and vertically moving the support portions (2) as necessary; and,
monolithically forming the concrete slab floor with the starter wall by pouring concrete over the deck and within the formwork.

17. A method according to claim 16, comprising repeating the fitting and placing steps for a second series of fixings (1) and a second beam (14) of the formwork such that the second beam (14) of the formwork is fitted substantially parallel to the first beam (14).

18. a method according to claim 17, comprising clamping the first and second beams (14) together prior to placing either of said beams (14) on the floor, and then placing the assembly of the clamped beams (14) and respective fixings (1) on a said floor.

19. A method according to claim 13 or claim 16, comprising connecting an anchor plate (24) to at least one of the fixings (1) to provide an anchor point for a tie rod.

20. A method according to any of claims 13 to 19, wherein at least one of the fixings (1) is a fixing according to any of claims 2 to 9.

Patentansprüche

1. Ankervorrichtung (1) für eine Schalung, die zum Stützen der Schalung für einen Wandfuß vorgesehen ist, der monolithisch mit einer Betonplatte gegossen werden soll, wobei die Ankervorrichtung umfasst:

einen ersten Stützabschnitt (2), auf dem der Fuß eines Trägers (14) der Schalung über einem Boden abgestützt werden kann;
einen zweiten Stützabschnitt (3) zum Stützen einer rückwärtigen Wand des Trägers (14) der Schalung; und **dadurch gekennzeichnet ist, dass** sie weiterhin umfasst:

einen Ständer (9, 62), auf dem die Stützabschnitte (2, 3) beweglich angebracht sind, wobei der Ständer (9, 62) eine Längsachse und ein unteres Endes aufweist, das sich zum Auflagern auf den Boden eignet;
wobei Ständer (9, 62) und Stützabschnitte (2, 3) so angeordnet sind, dass die Stützabschnitte (2, 3) relativ zu dem Ständer (9, 62) in wenigstens einer Richtung im Allgemeinen senkrecht zur Längsachse des Ständers (9, 62) beweglich sind und so, dass die Höhe der Stützabschnitte (2, 3) relativ zu einem Boden verstellt werden kann;
wobei der zweite Stützabschnitt (3) eine Auskehlung (28, 64, 72) zum Aufnehmen eines Verbindungsstücks oder eines Klemmschenkels aufweist.

2. Ankervorrichtung (1) nach Anspruch 1, die einen zweiten Ständer (7) umfasst, an dem der erste Ständer (9) beweglich angebracht ist, wobei der erste und der zweite Ständer (9, 7) so angeordnet sind, dass der erste Ständer (9) relativ zu dem zweiten Ständer (7) im Allgemeinen in einer Richtung längs oder parallel zur Längsachse des ersten Ständers (9) bewegt werden kann, so dass die Höhe der Stützabschnitte (2, 3) relativ zu einer Decke verstellt werden kann.

3. Ankervorrichtung (1) nach Anspruch 2, wobei der erste Ständer (9) über ein Schraubgewinde an dem zweiten Ständer (7) angebracht ist, wobei eine Rotation des zweiten Ständers (7) relativ zum ersten Ständer (9) bewirkt, dass sich der erste Ständer (9) relativ zu dem zweiten Ständer (7) im Allgemeinen in einer Richtung längs oder parallel zur Längsachse des ersten Ständers (9) bewegt.

4. Ankervorrichtung (1) nach Anspruch 2 oder Anspruch 3, wobei die Stützabschnitte (2, 3) einenends des zweiten Ständers (7) gleitend angebracht sind.

5. Ankervorrichtung (1) nach Anspruch 1, die einen Blockstein (60) umfasst, der gleitend in dem ersten Stützabschnitt (2) angebracht ist und an dem der Ständer (62) beweglich befestigt ist, um den ersten Stützabschnitt (2) an dem Ständer (62) anzubringen.

6. Ankervorrichtung (1) nach Anspruch 5, wobei der Ständer (62) an dem Blockstein (60) durch eine Schraubgewindeverbindung befestigt ist, wobei eine Rotation des Ständers (62) relativ zu dem Blockstein (60) bewirkt, dass die Höhe der Stützabschnitte (2, 3) relativ zu einem Boden verstellt werden kann.

7. Ankervorrichtung (1) nach einem der Ansprüche 1 bis 6, wobei der erste Stützabschnitt (2) eine Öse (15) aufweist, um die herum ein Zuganker verankert werden kann, um den Träger (14) einer Schalung an der Ankervorrichtung (1) zu verankern.

8. Ankervorrichtung nach einem der Ansprüche 1 bis 7, wobei der zweite Stützabschnitt (3) eine Öse (16) aufweist, um die herum ein Zuganker verankert werden kann, um den Träger (14) einer Schalung an der Ankervorrichtung (1) zu verankern.

9. Ankervorrichtung (1) nach einem der Ansprüche 1 bis 8, wobei der zweite Stützabschnitt (3) eine Durchgangsöffnung aufweist, durch die eine Zugstange hindurch geführt werden kann.

10. Kombination, umfassend zwei Ankervorrichtungen (1) nach einem der Ansprüche 1 bis 9 und eine Halteklammer (70) mit zumindest zwei abhängigen Schenkeln (71), die jeweils in den Auskehlungen (72), die in den zweiten Stützabschnitten (3) der Ankervorrichtungen (1) vorgesehen sind, aufgenommen werden können, so dass die Ankervorrichtungen (1) zusammengeklemmt werden können.

11. Kombination, umfassend eine Ankervorrichtung nach einem der Ansprüche 1 bis 7, eine Ankerplatte (24) und eine Verbindungsanordnung (27), wobei die Auskehlung (28) des zweiten Stützabschnitts (3) der Ankervorrichtung (1) im Verwendungsfall ein Ende der Verbindungsanordnung (27) und das andere Ende der Verbindungsanordnung (27), das im Verwendungsfall an der Ankerplatte (24) verankerbar ist, so aufnimmt, dass die Ankerplatte (24) mit der Ankervorrichtung (1) verbunden wird.

12. Kombination nach Anspruch 11, wobei der zweite Stützabschnitt (3) der Ankervorrichtung (1) eine Durchgangsöffnung aufweist, durch die eine Zugstange im Verwendungsfall hindurch geführt werden kann, um zumindest entweder in ein Verbindungsstück oder in die Ankerplatte einzugreifen.

13. Verfahren zum monolithischen Ausbilden einer Betonbodenplatte mit einem Wandfuß, wobei das Verfahren umfasst:

Verankern einer Schalung unter Verwendung einer Vielzahl von Ankervorrichtungen (1), wobei jede Ankervorrichtung (1) umfasst: einen Stützabschnitt (2), auf dem der Fuß eines Trägers (14) einer Schalung über einem Deckenboden abgestützt werden kann und einen Ständer (9, 62), auf dem der Stützabschnitt (2) beweglich angebracht ist, wobei der Ständer (9, 62) eine Längsachse aufweist; wobei Ständer (9, 62) und Stützabschnitt (2) so angeordnet sind, dass der Stützabschnitt (2) relativ zu dem Ständer (9, 62) zumindest in einer Richtung im Allgemeinen lotrecht zur Längsachse des Ständers (9, 62) beweglich ist und so, dass die Höhe des Stützabschnitts (2) relativ zu einem Boden verstellt werden kann; wobei das Verankerungsverfahren umfasst:

abschnittsweises Platzieren der Stützen (9, 62) einer Vielzahl von Ankervorrichtungen (1) auf dem Deckenboden, so dass die Ständer (9, 62) im Wesentlichen vertikal verlaufen,
Bewegen der Stützabschnitte (9, 62) nach vertikal und horizontal je nach Erfordernis, so dass die Stützabschnitte (2) in einer Reihe angeordnet sind, und
Befestigen des Trägers (14) der Schalung auf den Stützabschnitten (2); und
monolithisches Ausbilden der Betonbodenplatte mit dem Wandfuß, indem Beton über die Decke und zwischen die Schalung gegossen wird.

14. Verfahren nach Anspruch 13, umfassend das Wiederholen der Schritte des Platzierens, Bewegens und Befestigens für eine zweite Serie von Ankervorrichtungen (1) und eines zweiten Trägers (14) der Schalung, derart, dass der zweite Träger (14) der Schalung im Wesentlichen parallel zu dem ersten Träger (14) befestigt ist.

15. Verfahren nach Anspruch 14, das vor dem Gießen des Betons das Zusammenklemmen entsprechender Ankervorrichtungen (1) der ersten und zweiten Serie von Ankervorrichtungen (1) umfasst.

16. Verfahren zum monolithischen Ausbilden einer Betonbodenplatte mit einem Wandfuß, wobei das Verfahren umfasst:

Verankern einer Schalung unter Verwendung einer Vielzahl von Ankervorrichtungen (1), wobei jede Ankervorrichtung (1) umfasst: einen Stützabschnitt (2), auf dem der Fuß eines Trägers (14) einer Schalung über einem Boden abgestützt werden kann, und einen Ständer (9, 62), auf dem der Stützabschnitt (2) beweglich angebracht ist, wobei der Ständer (9, 62) eine Längsachse aufweist; wobei Ständer (9, 62) und Stützabschnitt (2) so angeordnet sind, dass der Stützabschnitt (2) relativ zu dem Ständer (9, 62) in zumindest einer Richtung im Allgemeinen lotrecht zur Längsachse des Ständers (9, 62) bewegt werden kann und so, dass die Höhe des Stützabschnitts (2) relativ zu einem Boden verstellt werden kann; wobei das Verankerungsverfahren umfasst:

Befestigen einer Vielzahl der Ankervorrichtungen (1) an dem Träger (14) der Schalung und
Platzieren der Baugruppe aus Ankervorrichtungen (1) und dem Träger (14) auf dem Boden und Bewegen der Stützabschnitte (2) nach horizontal und nach vertikal je nach Erfordernis; und
monolithisches Ausbilden der Betonbodenplatte mit dem Wandfuß, indem Beton über die Decke und zwischen die Schalung gegossen wird.

17. Verfahren nach Anspruch 16, umfassend das Wiederholen der Schritte des Befestigens und Platzierens einer zweiten Serie von Ankervorrichtungen (1) und eines zweiten Trägers (14) der Schalung derart, dass der zweite Träger (14) der Schalung im Wesentlichen parallel zu dem ersten Träger (14) befestigt wird.

18. Verfahren nach Anspruch 17, umfassend das Zusammenklemmen des ersten und des zweiten Trägers (14) vor dem Platzieren der beiden Träger (14) auf dem Boden und sodann Platzieren der Baugruppe aus den zusammengeklemmten Trägern (14) und entsprechender Ankervorrichtungen (1) auf dem Boden.

19. Verfahren nach Anspruch 13 oder Anspruch 16, umfassend das Verbinden einer Ankerplatte (24) mit zumindest einer der Ankervorrichtungen (1), um einen Verankerungspunkt für eine Zugstange vorzusehen.

20. Verfahren nach einem der Ansprüche 13 bis 19, wobei zumindest eine der Ankervorrichtungen (1) eine Ankervorrichtung nach einem der Ansprüche 2 bis 9 darstellt.

Revendications

1. Fixation de coffrage (1) pour fournir un appui à un coffrage pour un mur de départ devant être coulé monolithiquement avec une dalle en béton, la fixation comprenant :

une première partie d'appui (2), sur laquelle la base d'une poutre (14) du coffrage peut être en appui au-dessus d'un plancher ,
une seconde partie d'appui (3) pour l'appui d'un mur arrière d'une dite poutre (14) d'un coffrage ; et **caractérisée en ce qu'**elle comprend en outre
un montant (9, 62) sur lequel les parties d'appui (2, 3) sont montées mobiles, le montant (9, 62) ayant un axe longitudinal et une extrémité inférieure adaptée au logement contre le plancher , le montant (9, 62) et les parties d'appui (2, 3) étant disposés de sorte que les parties d'appui (2, 3) puissent être déplacées par rapport au montant (9, 62) dans au moins une direction généralement perpendiculaire à l'axe longitudinal du montant (9, 62) et de sorte que la hauteur des parties d'appui (2, 3) par rapport audit plancher puisse être ajustée ,
la seconde partie d'appui (3) présentant un canal (28, 64, 72) pour recevoir un connecteur ou une jambe de serrage.

2. Fixation (1) selon la revendication 1, comprenant un second montant (7), sur lequel le premier montant (9) est monté mobile, les premiers et seconds montants (9, 7) étant disposés de sorte que le premier montant (9) puisse être déplacé par rapport au second montant (7) dans une direction généralement le long ou parallèlement à l'axe longitudinal du premier montant (9) de sorte que la hauteur des parties d'appui (2, 3) par rapport à un dit plancher puisse être ajustée.

3. Fixation (1) selon la revendication 2, dans laquelle le premier montant (9) est monté par filetage au second montant (7), moyennant quoi la rotation du second montant (7) par rapport au premier montant (9) entraîne le déplacement du premier montant (9) par rapport au second montant (7) dans une direction généralement le long ou parallèle à l'axe longitudinal

du premier montant (9).

4. Fixation (1) selon la revendication 2 ou 3, dans laquelle les parties d'appui (2, 3) sont montées à coulissement au niveau d'une extrémité du second montant (7).

5. Fixation (1) selon la revendication 1, comprenant un bloc (60) monté à coulissement dans la première partie d'appui (2) et dans lequel le montant (62) est inséré mobile pour le montage de la première partie d'appui (2) sur le montant (62).

6. Fixation (1) selon la revendication 5, dans laquelle le montant (62) est inséré dans le bloc (60) par une connexion filetée, moyennant quoi la rotation du montant (62) par rapport au bloc (60) permet d'ajuster la hauteur des parties d'appui (2, 3) par rapport à un dit plancher.

7. Fixation (1) selon l'une des revendications 1 à 6, dans laquelle la première partie d'appui (2) présente une saillie (15) autour de laquelle une boucle peut être fixée pour fixer une dite poutre (14) d'un coffrage à la fixation (1).

8. Fixation selon l'une des revendications 1 à 7, dans laquelle la seconde partie d'appui (3) présente une saillie (16) autour de laquelle une boucle peut être fixée pour fixer une dite poutre (14) d'un coffrage à la fixation (1).

9. Fixation selon l'une des revendications 1 à 8, dans laquelle la seconde partie d'appui (3) présente une ouverture au travers de laquelle une tige de traction peut être passée.

10. Combinaison comprenant deux fixations (1) selon l'une des revendications 1 à 9 et un collier de serrage (70) ayant au moins deux jambes dépendantes (71) qui peuvent être reçues respectivement dans les canaux (72) prévus dans les secondes parties d'appui (3) desdites fixations (1) de sorte que les fixations (1) puissent être serrées ensemble.

11. Combinaison comprenant une fixation selon l'une des revendications 1 à 7, une plaque d'ancrage (24) et un ensemble de connexion (27), le canal (28) de la seconde partie d'appui (3) de la fixation (1) recevant en usage une extrémité de l'ensemble de connexion (27) et l'autre extrémité de l'ensemble de connexion (27) pouvant être fixée en usage à la plaque d'ancrage (24) de sorte à connecter la plaque d'ancrage (24) à la fixation (1).

12. Combinaison selon la revendication 11, dans laquelle la seconde partie d'appui (3) de la fixation (1) présente une ouverture au travers de laquelle une tige de traction peut être passée en usage pour s'engager avec au moins le connecteur ou la plaque d'ancrage.

13. Procédé de formation monolithique d'un plancher de dalle en béton avec un mur de départ, le procédé comprenant :

la fixation d'un coffrage en utilisant une pluralité de fixations (1), chaque fixation (1) comprenant une partie d'appui (2) sur laquelle la base d'une poutre (14) d'un coffrage peut être en appui au-dessus d'un plancher de terrasse ; et un montant (9, 62) sur lequel la partie d'appui (2) est montée mobile, le montant (9, 62) ayant un axe longitudinal ; le montant (9, 62) et la partie d'appui (2) étant disposés de sorte que la partie d'appui (2) puisse être déplacée par rapport au montant (9, 62) dans au moins une direction généralement perpendiculaire à l'axe longitudinal du montant (9, 62) et de sorte que la hauteur de la partie d'appui (2) par rapport à un dit plancher puisse être ajustée ; le procédé de fixation comprenant :

le placement des montants (9, 62) d'une pluralité de fixations (1) à intervalles sur le plancher de terrasse de sorte que les montants (9, 62) soient essentiellement verticaux ;
le déplacement horizontal et vertical des parties d'appui (9, 62) autant que nécessaire de sorte que les parties d'appui (2) soient disposées en ligne ; et
l'insertion de la poutre (14) du coffrage dans les parties d'appui (2) ; et
la formation monolithique du plancher de dalle en béton avec le mur de départ en coulant le béton sur la terrasse et dans le coffrage.

14. Procédé selon la revendication 13, comprenant la répétition des étapes de placement, de déplacement et d'insertion pour une seconde série de fixations (1) et une seconde poutre (14) du coffrage de telle sorte que la seconde poutre (14) du coffrage soit insérée essentiellement parallèlement à la première poutre (14).

15. Procédé selon la revendication 14, comprenant, avant le coulage du béton, le serrage des fixations (1) respectives de la première et seconde séries de fixations (1) ensemble.

16. Procédé de formation monolithique d'un plancher de dalle en béton avec un mur de départ, le procédé comprenant :

- la fixation d'un coffrage en utilisant une pluralité de fixations (1), chaque fixation (1) comprenant une partie d'appui (2), sur laquelle la base d'une poutre (14) d'un coffrage peut être en appui au-dessus d'un plancher , et un montant (9, 62) sur lequel la partie d'appui (2) est montée mobile, le montant (9, 62) ayant un axe longitudinal ; le montant (9, 62) et la partie d'appui (2) étant disposés de sorte que la partie d'appui (2) puisse être déplacée par rapport au montant (9, 62) dans au moins une direction généralement perpendiculaire à l'axe longitudinal du montant (9, 62) et de sorte que la hauteur de la partie d'appui (2) par rapport à un dit plancher puisse être ajustée ; le procédé de fixation comprenant :
- l'insertion d'une pluralité de dites fixations (1) dans la poutre (14) du coffrage ,
- le placement de l'ensemble desdites fixations (1) et de ladite poutre (14) sur le plancher et le déplacement horizontal et vertical des parties d'appui (2) autant que nécessaire et
- la formation monolithique du plancher de dalle en béton avec le mur de départ en coulant le béton sur la terrasse et dans le coffrage.

17. Procédé selon la revendication 16, comprenant la répétition des étapes d'insertion et de placement pour une seconde série de fixations (1) et une seconde poutre (14) du coffrage de telle sorte que la seconde poutre (14) du coffrage soit insérée essentiellement parallèlement à la première poutre (14).

18. Procédé selon la revendication 17, comprenant le serrage de la première et seconde poutres (14) ensemble avant le placement de chacune desdites poutres (14) sur le plancher, et le placement ensuite de l'ensemble des poutres serrées (14) et fixations (1) respectives sur un dit plancher.

19. Procédé selon la revendication 13 ou 16, comprenant la connexion d'une plaque d'ancrage (24) à au moins l'une des fixations (1) afin de fournir un point d'ancrage pour une tige de traction.

20. Procédé selon l'une des revendications 13 à 19, dans lequel au moins l'une des fixations (1) est une fixation selon l'une des revendications 2 à 9.

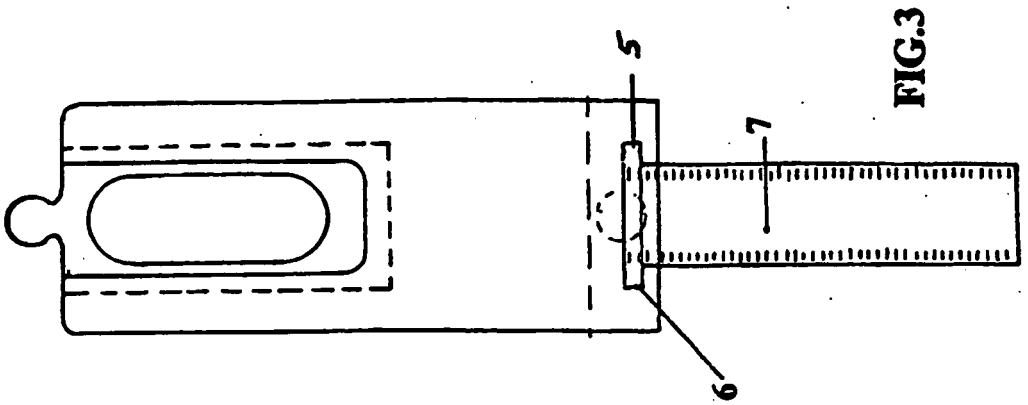


FIG.3

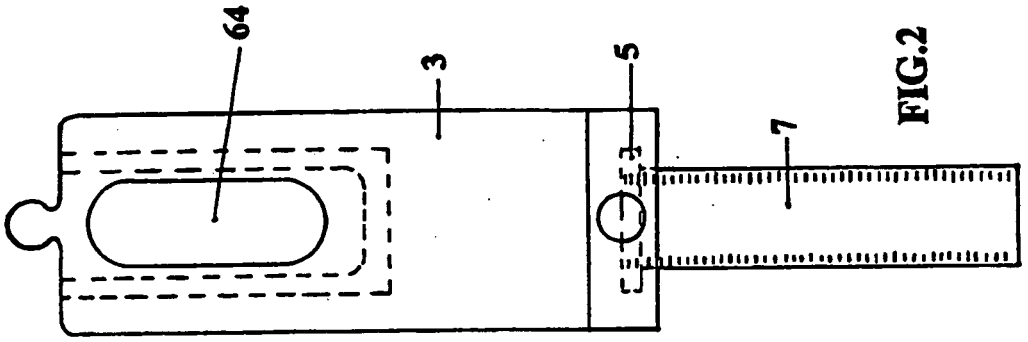


FIG.2

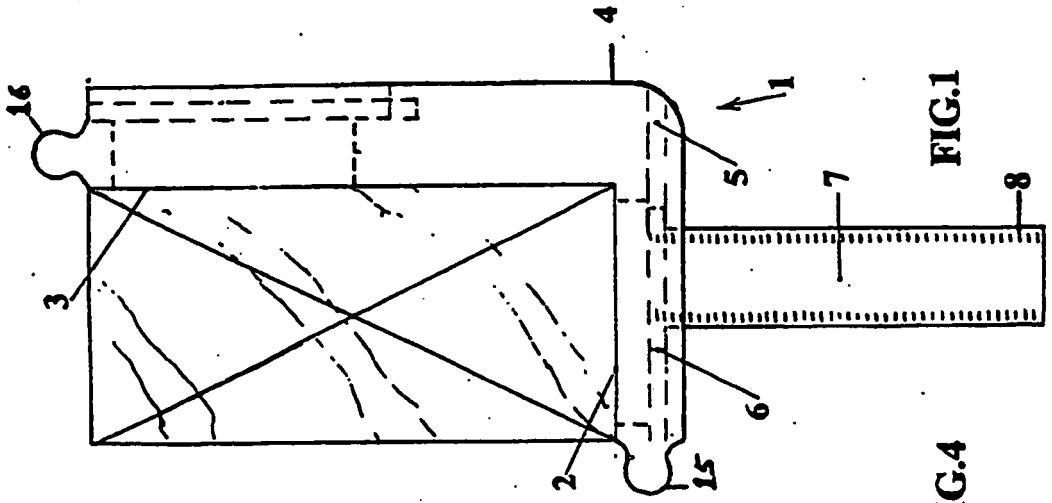


FIG.1

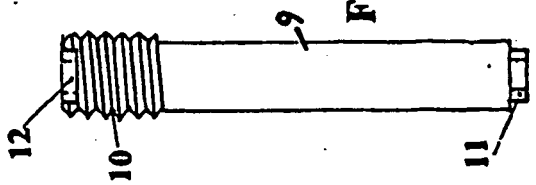


FIG.4

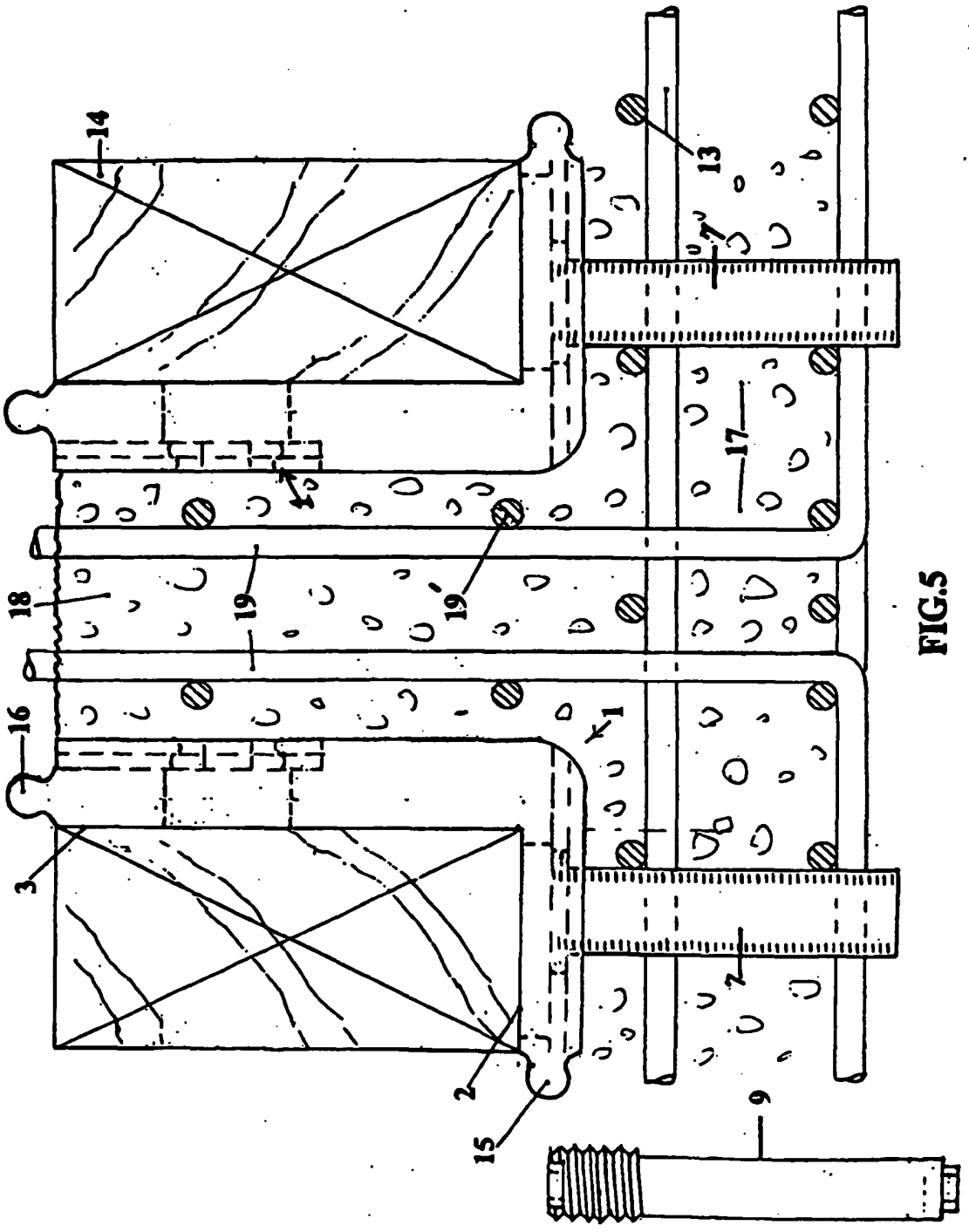


FIG.5

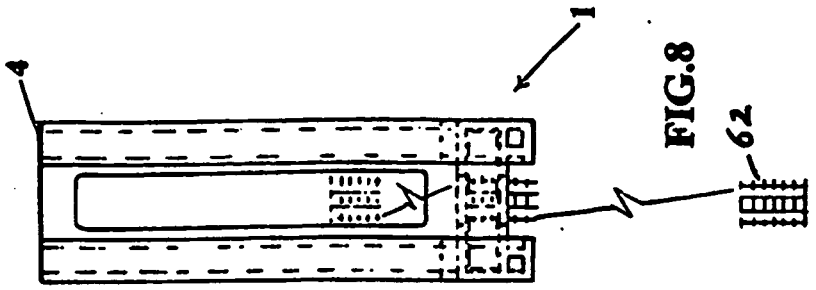


FIG.8

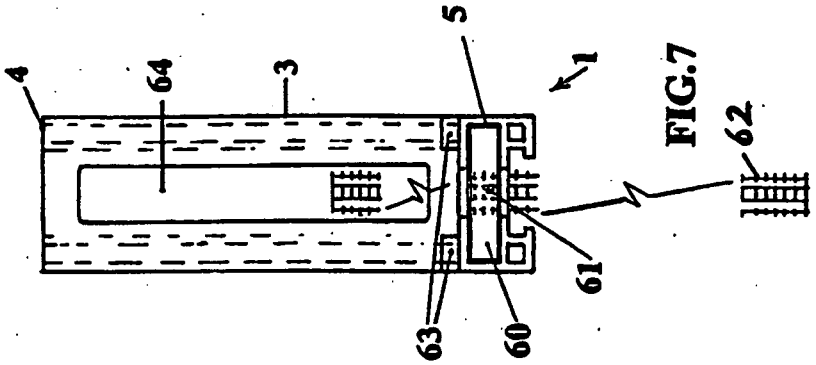


FIG.7

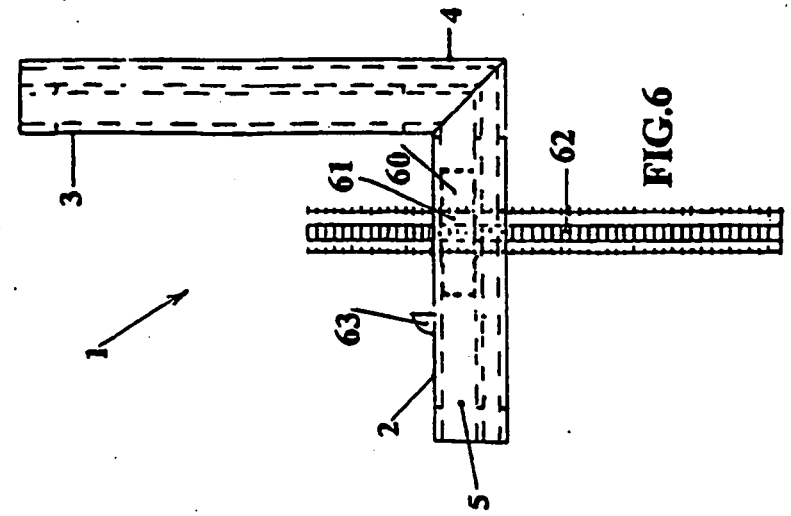


FIG.6

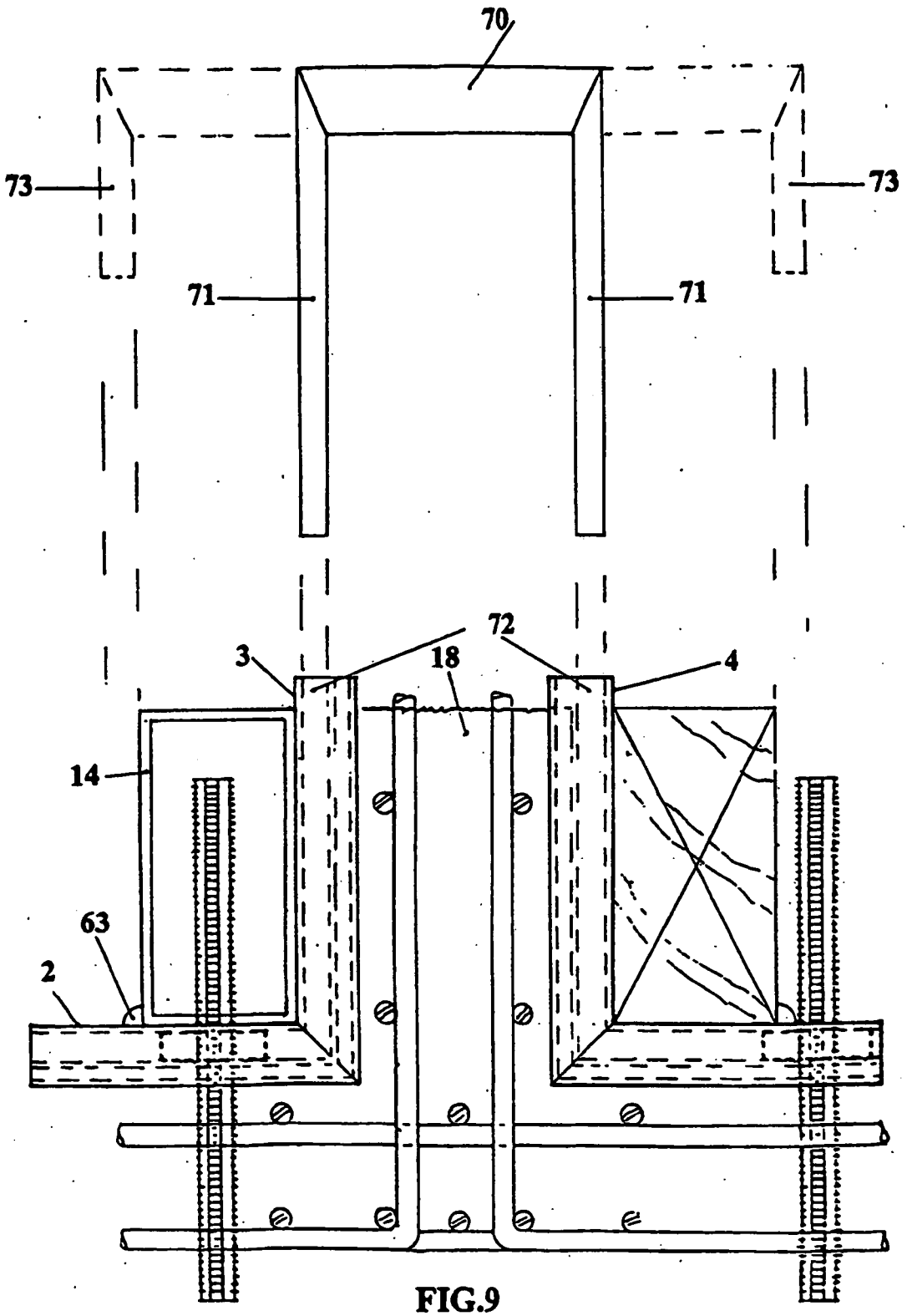


FIG.9

FIG.10

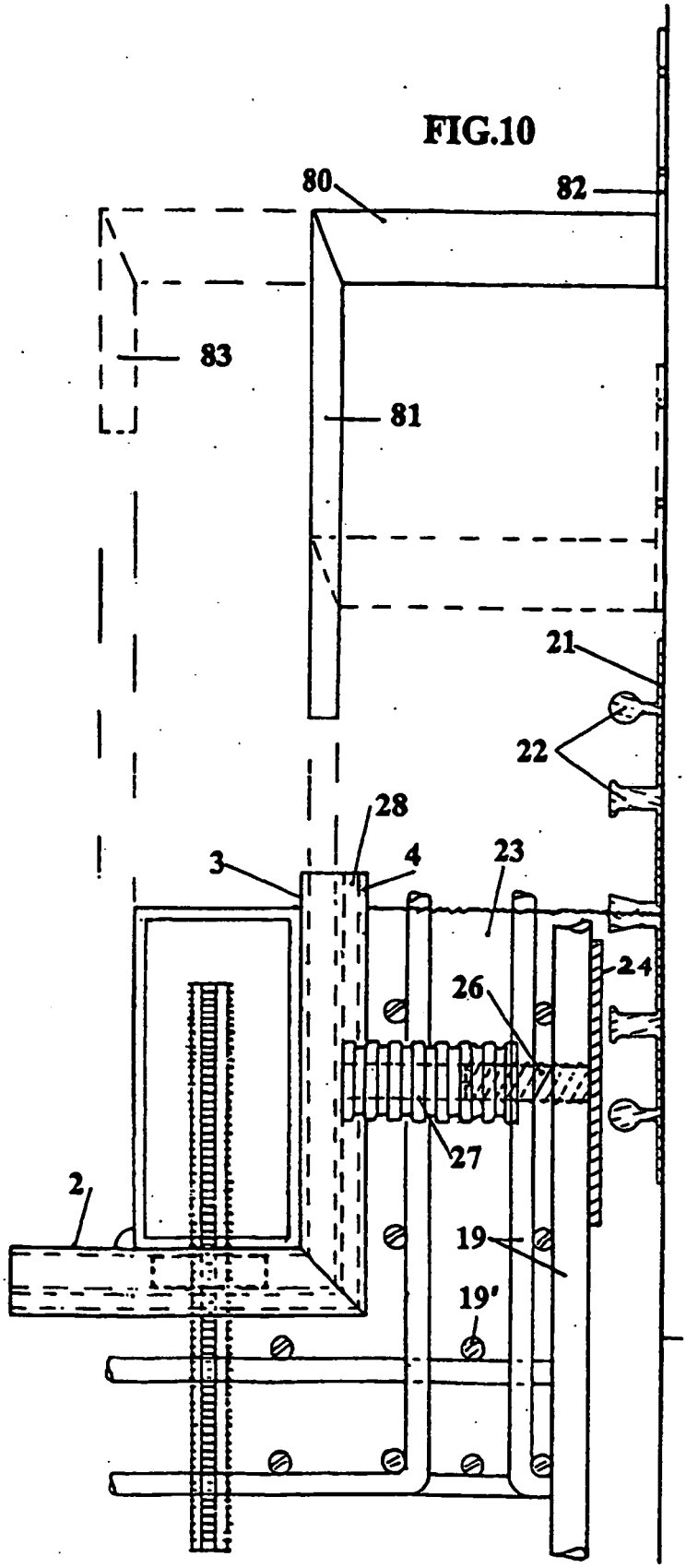


FIG.10A

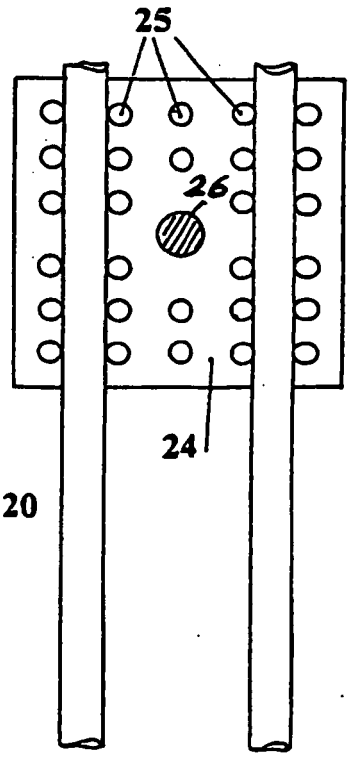
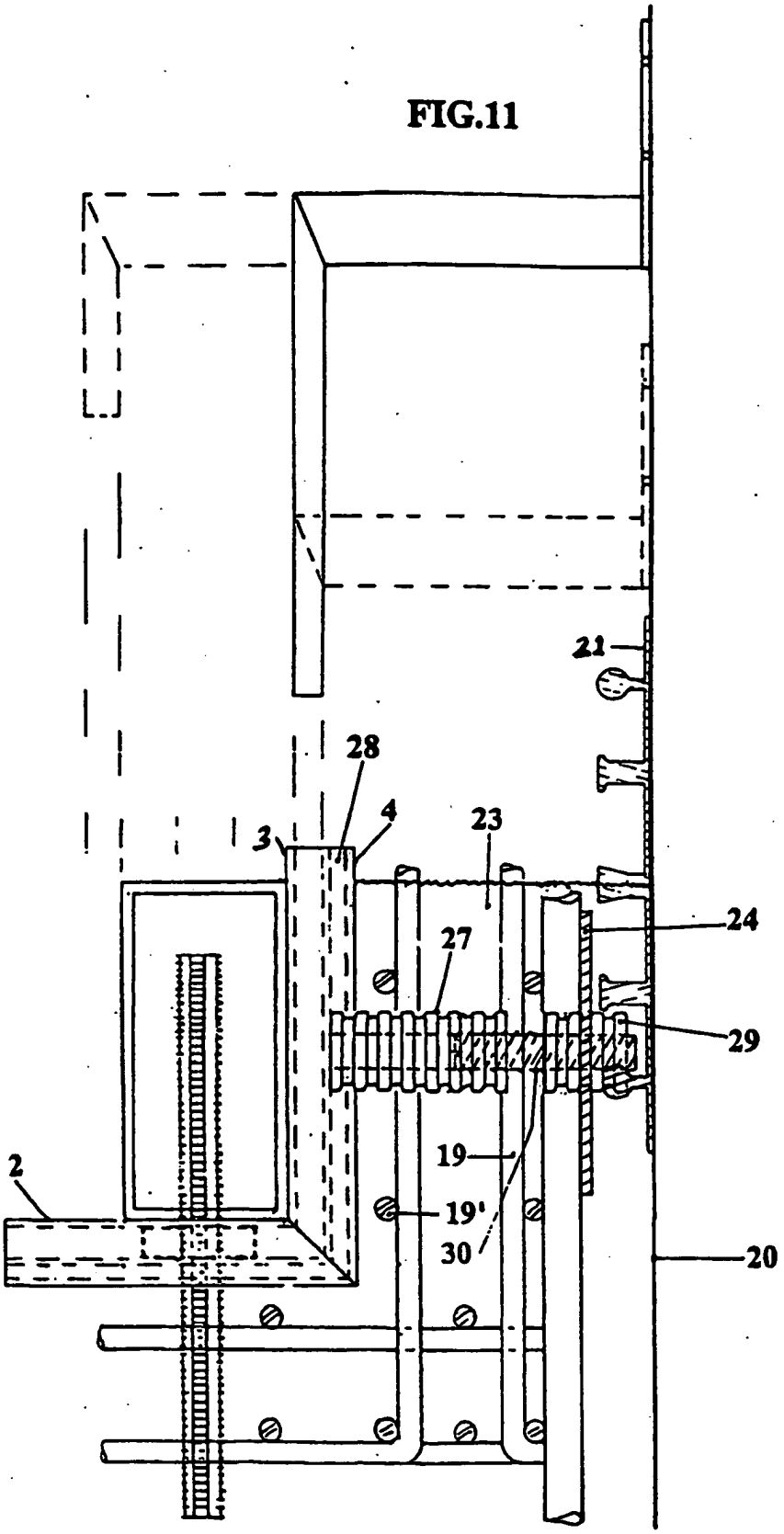


FIG.11



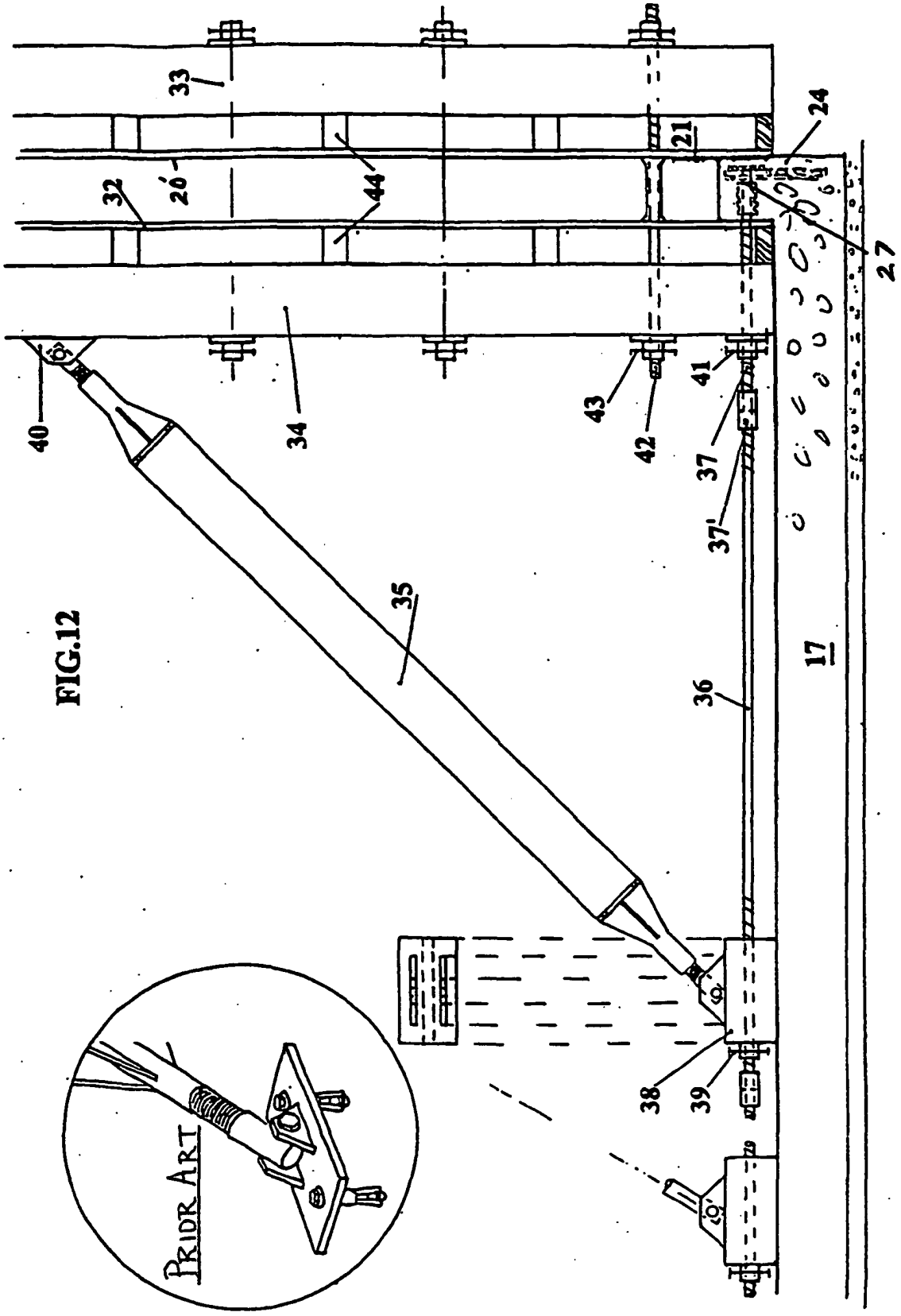


FIG.12

FIG.13

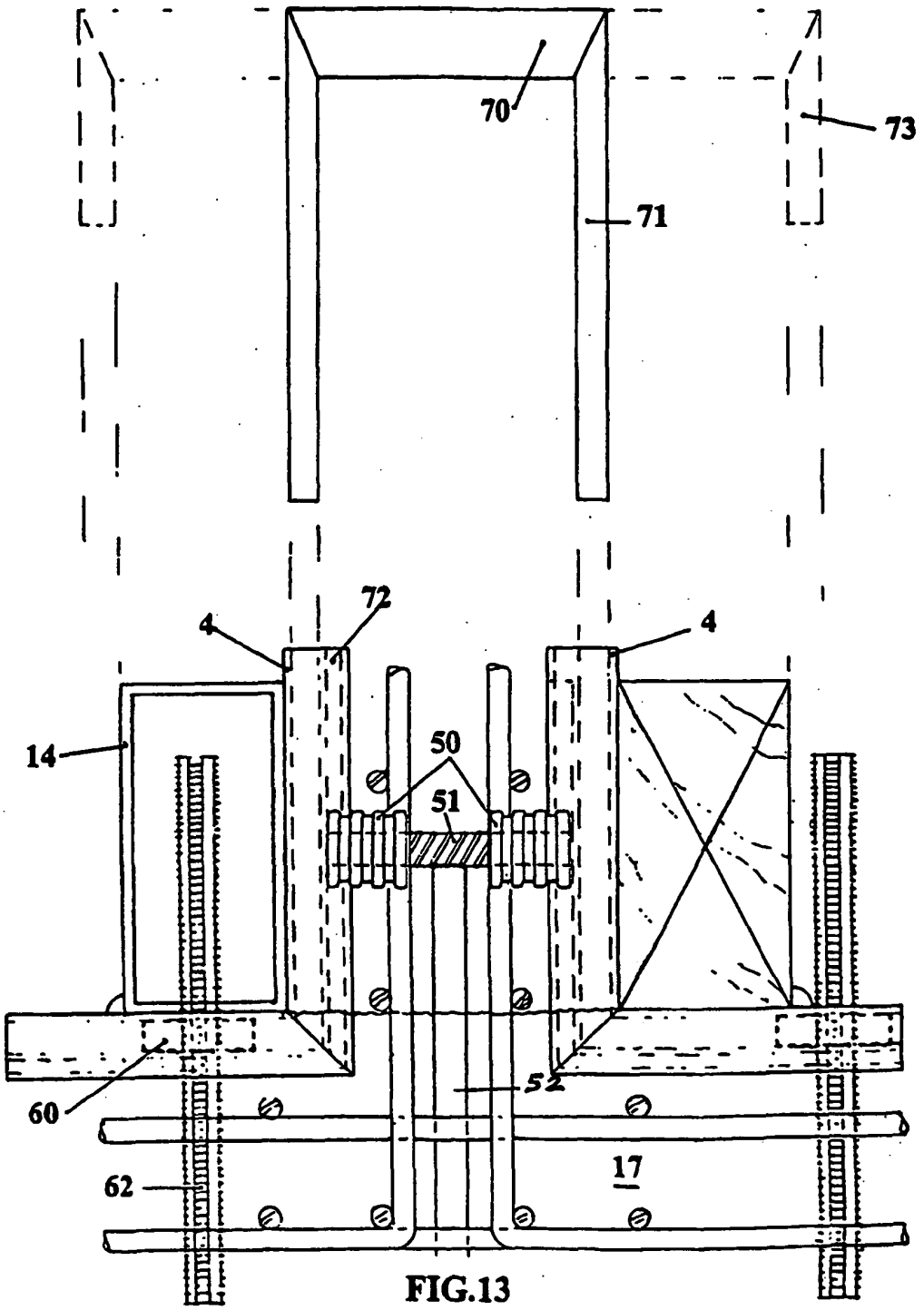


FIG.13

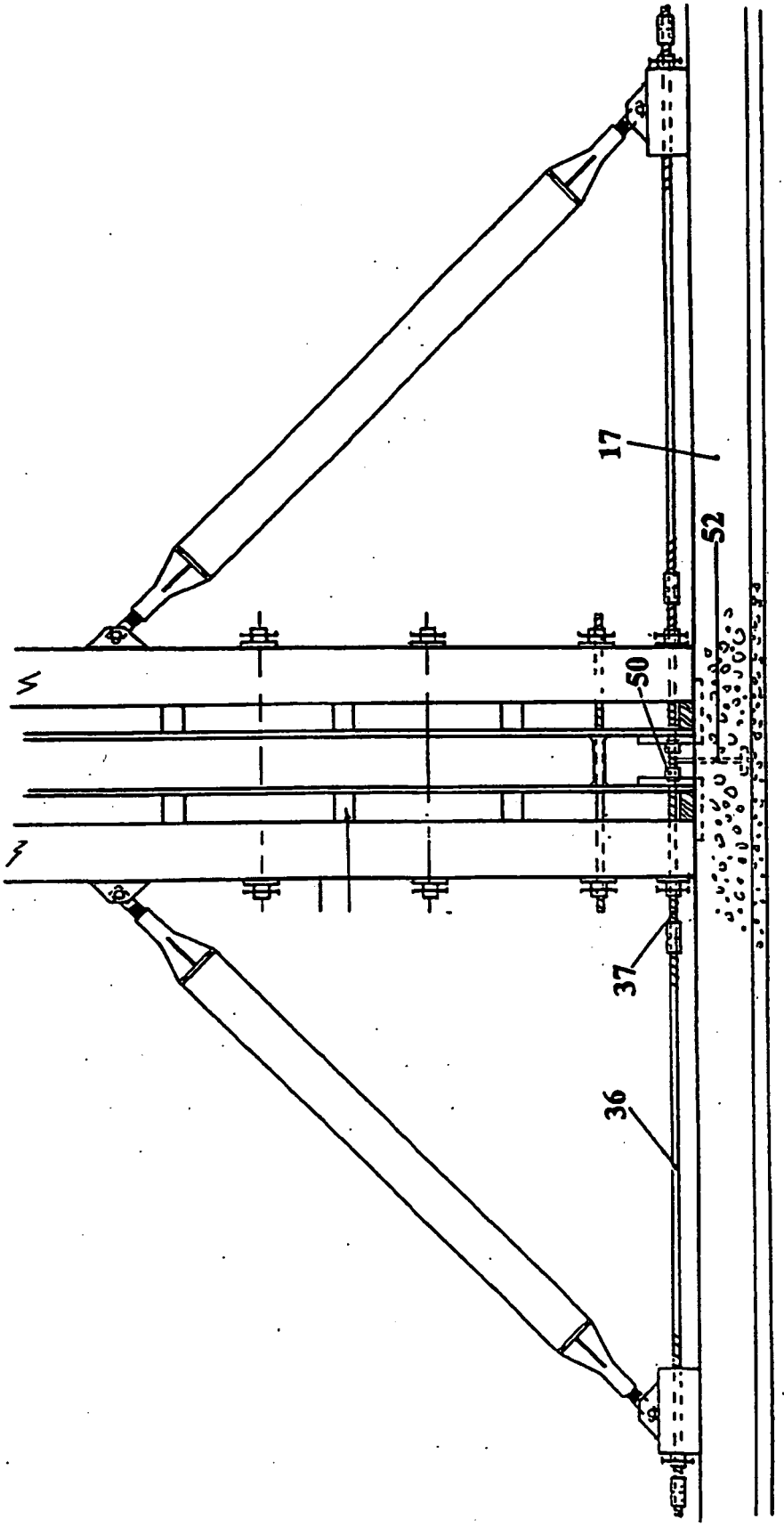


FIG.14

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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