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(54) Wall of pre-cast panels, particulary for earth-retaining and for building liquid-holding tanks.

(57) The wall is adapted to structurally cooperate with a cast-in-place, reinforced-concrete foundation bed, each panel comprising a facing and a back rib at right angles to the facing and integral therewith; the facing and the rib extending downwardly into substantially tripod-arranged support members.

According to the invention, each panel further comprises:

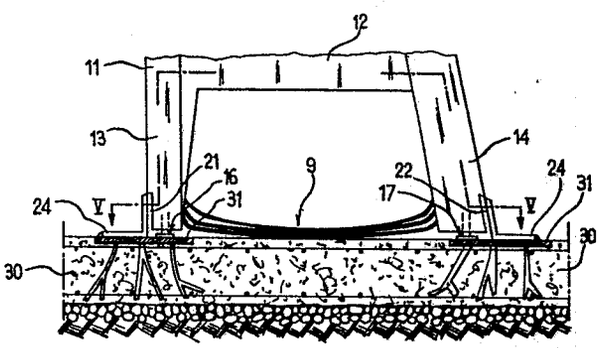
– three levelling screws in said support members for adjusting the plumbing of the panel, and adapted to cooperate with corresponding first metal plates buried in a support floor of pre-cast concrete;

– second metal plates integral with said support members, adapted to cooperate with angle members which are welded to said first and second plates for provisionally stabilizing the panel;

– portions of bare reinforcement extending between said support members, adapted to be buried in the casting of the foundation bed;

– cylindrical hinge couplings with vertical axis and conjugated profiles, provided at the edges of said facing;

– a web at the outside edge of the rib, adapted to act both as a tie and as a strut, depending on the direction of the stresses acting on the wall.



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Wall of pre-cast panels, particularly for earth-retaining and for building liquid-holding tanks

This invention is related to a wall of pre-cast panels, suitable for retaining earth and generally embankments and for building liquid-holding tanks.

More specifically, the invention is directed to a wall erected by placing side by side a plurality of panels having a substantially T-shaped horizontal cross-section, the panels being laid on a pre-cast support floor and being joined with a reinforced concrete foundation bed, which is cast in place, said panels being then structurally bound to said foundation bed when erection is completed.

When building known walls of the above type, the problem arises of provisionally stabilizing and plumbing the panel before and during the reinforcing and casting of the foundation bed.

Though panels of known structure are self-stabilizing, due to a tripod support provided at their base, in practice such self-stabilization can be seriously affected by a non-uniform support floor, an imperfectly vertical panel, and by wind pressure and other accidental causes, which make it mandatory to prop the panel. For the same reasons, plumbing the panel is also time-consuming, and requires skilled manpower and extended use of hanging means such as cranes, with undesirable consequences on the cost of the completed work.

The invention is substantially directed to avoid these drawbacks.

More particularly, the most important objects of the invention are:

- to provide a wall of pre-cast panels where laying each panel is less time-consuming and more economical than laying a known panel;

- to provide a wall of pre-cast panels where plumbing is easy and not requiring use of expensive equipment such as scaffolding;

- to provide a wall of pre-cast panels where each panel is provided with with means for provisionally stabilizing it, said means also improving the overall structural strength of the completed wall;

- to provide a wall of pre-cast panels having an improved structural efficiency, and capable, in particular, of absorbing any strains caused by variable and opposite stresses, without cracking or being otherwise affected;

- to provide a wall of pre-cast panels where adjacent panels can be laid along mutually intersecting planes.

In order to achieve the above important objects, together with other which will appear from the following detailed disclosure, the invention provides a wall of pre-cast panels adapted to structurally cooperate with a cast-in-place, reinforced-concrete foundation bed, each panel comprising a facing and a back rib at right angles to the facing and integral therewith; the facing and the rib extending downwardly into substantially tripod-shaped support members; characterized in that each panel further comprises:

- three levelling screws in said support members for adjusting the plumbing of the panel, and adapted to cooperate with corresponding

first metal plates buried in a support floor of pre-cast concrete;

- second metal plates integral with said support members, adapted to cooperate with angle members which are welded to said first and second plates for provisionally stabilizing the panel;
- portions of bare reinforcement extending between said support members, adapted to be buried in the casting of the foundation bed;
- cylindrical hinge couplings with vertical axis and conjugated profiles, provided at the edges of said facing;
- a web at the outside edge of the rib, adapted to act both as a tie and as a strut, depending on the direction of the stresses acting on the wall.

The invention will be best understood from the following detailed disclosure, with reference to the attached drawings, wherein:

Fig. 1 is an elevation view of the wall of pre-cast panels according to the invention;

Fig. 2 is an enlarged, partially broken-away view of the support bed of a panel;

Fig. 3 is a perspective view showing in detail a supporting member of the panel, with levelling screws and a plate for provisional stabilization;

Fig. 4 is a perspective view showing the assembly steps of the foundation bed;

Figg. 6 and 7 are enlarged details of Fig. 5;

Fig. 8 is an enlarged cross-section made along line VIII-VIII of Fig. 4.

With reference to the drawings, 10 is a pre-cast panel, 40 is a reinforced-concrete foundation bed, which has been set up and cast in place, and 30 is a support floor for the wall, formed with concrete cast over a light reinforcement.

Each panel 10 comprises a facing 11 and a rib 12, the latter being at right angles with the facing and integral with it. In their lower portions, facing 11 and rib 12 extend into a front support member 13 and a back support member 14, substantially laid as a tripod; a central front extension 13a, intermediate between members 13, does not have a support action, but only a retaining action for the reinforcement of the foundation bed, as it will appear from the following disclosure.

A bare portion of reinforcement 9 of panel 10 extends between members 13 and 14, so that it can be buried in the foundation bed.

Levelling screws 16 and 17, respectively, are provided on the support members 13 and 14, in order to adjust plumbing of the panel when the latter, during installation, is erected on the supporting floor.

As shown on Fig. 3, each levelling screw is engaged in a corresponding threaded sleeve 18, which is provided with retaining rag bolts 19 and is buried in panel 10 during casting. Screws 16-17 cooperate with corresponding first metal plates 31, which are buried and bolted in the cast of the support floor.

Second metal plates 21-22 are provided on, and bound to, the support members 13 and 14.

Preferably, said second plates 21-22 are channel-shaped as shown at 210 on Fig. 3, and therefore contain the ends of each corresponding support member 13-14; holes are provided in the lower parts of said channel plates for insertion of levelling screws 16, 17, respectively.

The first and second metal plates above described cooperate with retaining angle members 24 which, after erecting and plumbing the panel 10, are rigidly bound to the plates, preferably by means of weld beads 25-26, in order to provisionally stabilize the panel.

In order to assemble the wall, a plurality of panels are erected, plumbed and provisionally stabilized as explained above, in side-by-side relationship as shown on Fig. 4, upon support floor 30, which has been previously cast, reinforced and set.

Facings 11 of said plurality of panels can lie in one plane or in mutually intersecting planes, in order to impart the wall a profile having a desired shape, comprising a ssuccession of concave and convex, as well as rectilinear, portions.

For this purpose, the edges of the facing in each panel are provided with cylindrical hinge members having conjugated profiles, respectively a male member 27 and a female member 28.

In the side-by-side arrangement of the panels, the hinge male member 27 of each panel will engage the hinge female member 28 of the adjacent panel. After the panels 10 have been placed and stabilized, the reinforcement 41 of foundation bed 40 is laid. As

shown on Fig. 4, the reinforcement 41 includes transverse and longitudinal stirrup rods 42 and 43. Stirrup rods 42 are housed in the ports between the front support extensions 13 and the intermediate central extension 13a, the latter being provided to this purpose.

Foundation bed 40 is then cast. This incorporates reinforcement 41 and the reinforcement portion 9, thus forming the finished wall. If the wall is intended for retaining liquids, e.g. being the wall of a tank, the joint between facings 11 and the foundation bed 40 will have to be hydraulically sealed, as shown by 50 on Fig. 1; and hinges 27-28 will also have to be sealed, as shown by 51 on Fig. 8.

In order to improve the operative performance of panel 10, by increasing its resistance to stresses due to tilting torques of opposite directions, a web 120 is provided on the edge of rib 12, the web being able to act both as a tie and as a strut.

Although a preferred embodiment of the invention has been described above, it is understood that changes may be made to it by a person skilled in the art within the scope of the invention.

Claims

1. A wall of pre-cast panels adapted to structurally cooperate with a cast-in-place, reinforced-concrete foundation bed (40), each panel (10) comprising a facing (11) and a back rib (12) at right angles to the facing and integral therewith; the facing and the rib extending downwardly into substantially tripod-arranged support members (13, 14); characterized in that each panel further comprises:

- three levelling screws (16, 17) in said support members for adjusting the plumbing of the panel, and adapted to cooperate with corresponding first metal plates (31) buried in a support floor (30) of pre-cast concrete;

- second metal plates (21, 22) integral with said support members (13, 14), adapted to cooperate with angle members (24) which are welded to said first and second plates for provisionally stabilizing the panel;

- portions of bare reinforcement (9) extending between said support members (13, 14), adapted to be buried in the casting of the foundation bed (40);

- cylindrical hinge couplings (27, 28) with vertical axis and conjugated profiles, provided at the edges of said facing;

- a web (120) at the outside edge of the rib (12), adapted to act both as a tie and as a strut, depending on the direction of the stresses acting on the wall.

2. A wall of pre-cast panels according to claim 1, wherein the levelling screws (16, 17) for adjustment of the plumbing are engaged in corresponding threaded sleeves (18) which are buried and bolted in the support members of the panel.

3. A wall of pre-cast panels according to claim 1 or 2, wherein said second metal plates (21, 22) are channel-shaped and receive the end of each corresponding support member.

4. A wall of pre-cast panels according to any of claims 1 to 3, wherein said cylindrical hinge couplings (27, 28) comprise a hinge male member (27) along one edge of the facing, and a hinge female member (28) on the opposite edge, and wherein the hinge male member of each panel engages the hinge female member of the adjacent panel.

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Fig. 1

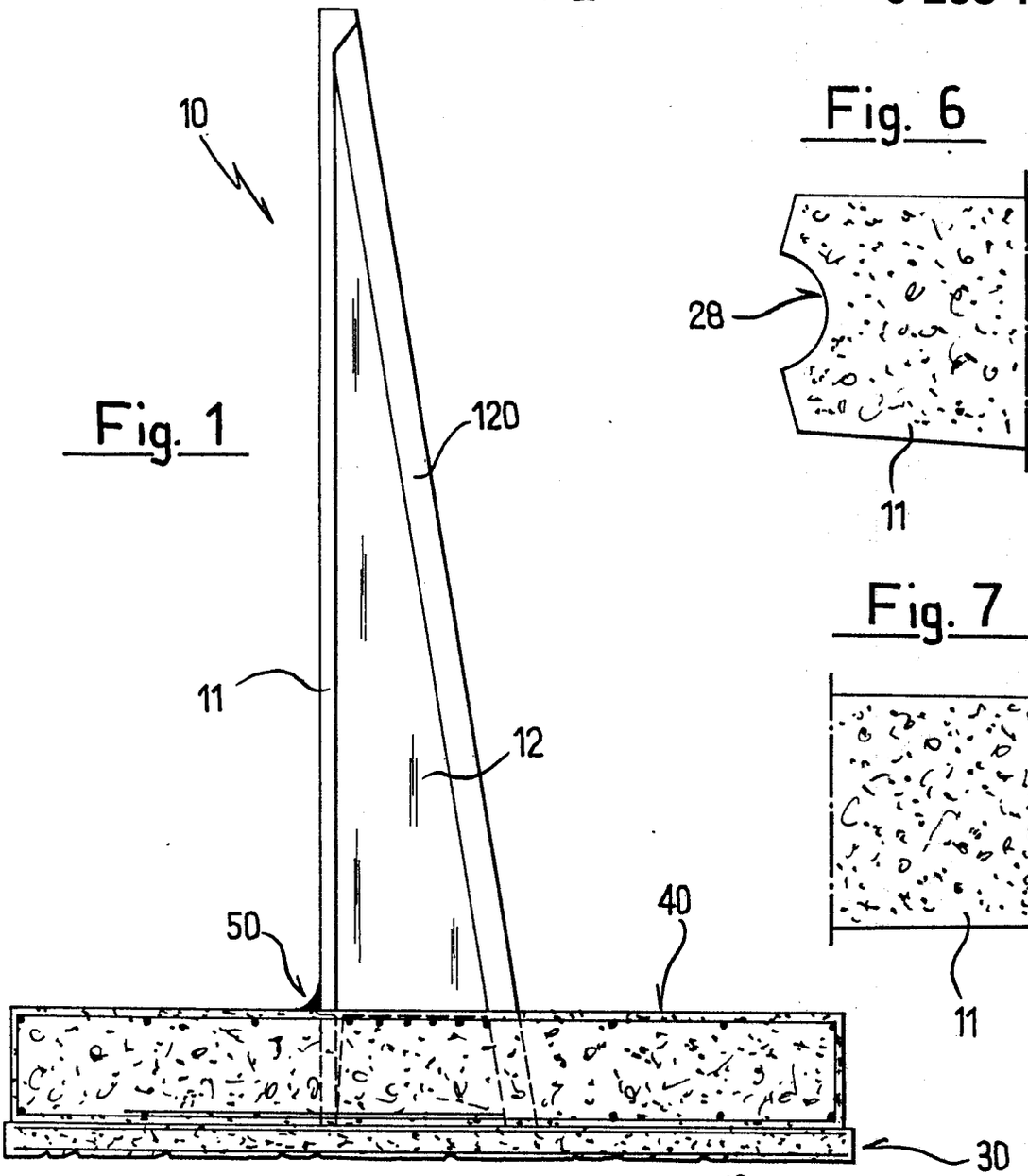


Fig. 6

Fig. 7

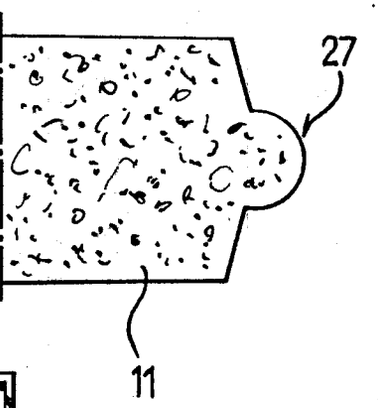


Fig. 2

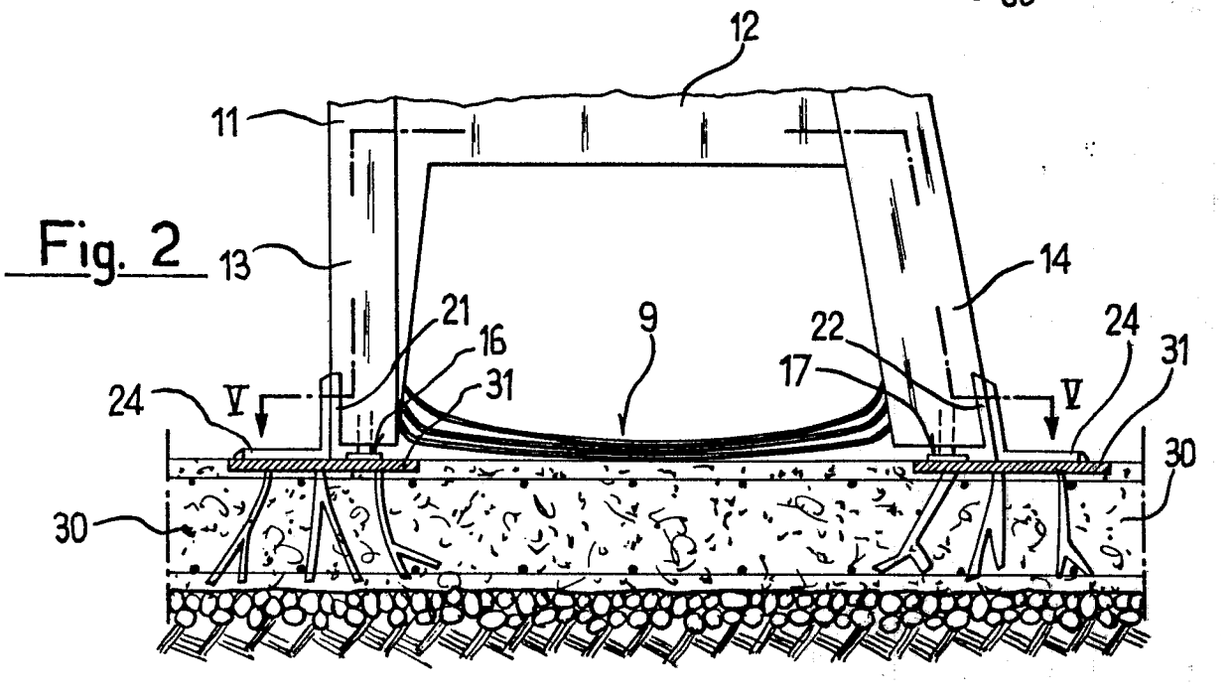


Fig. 4

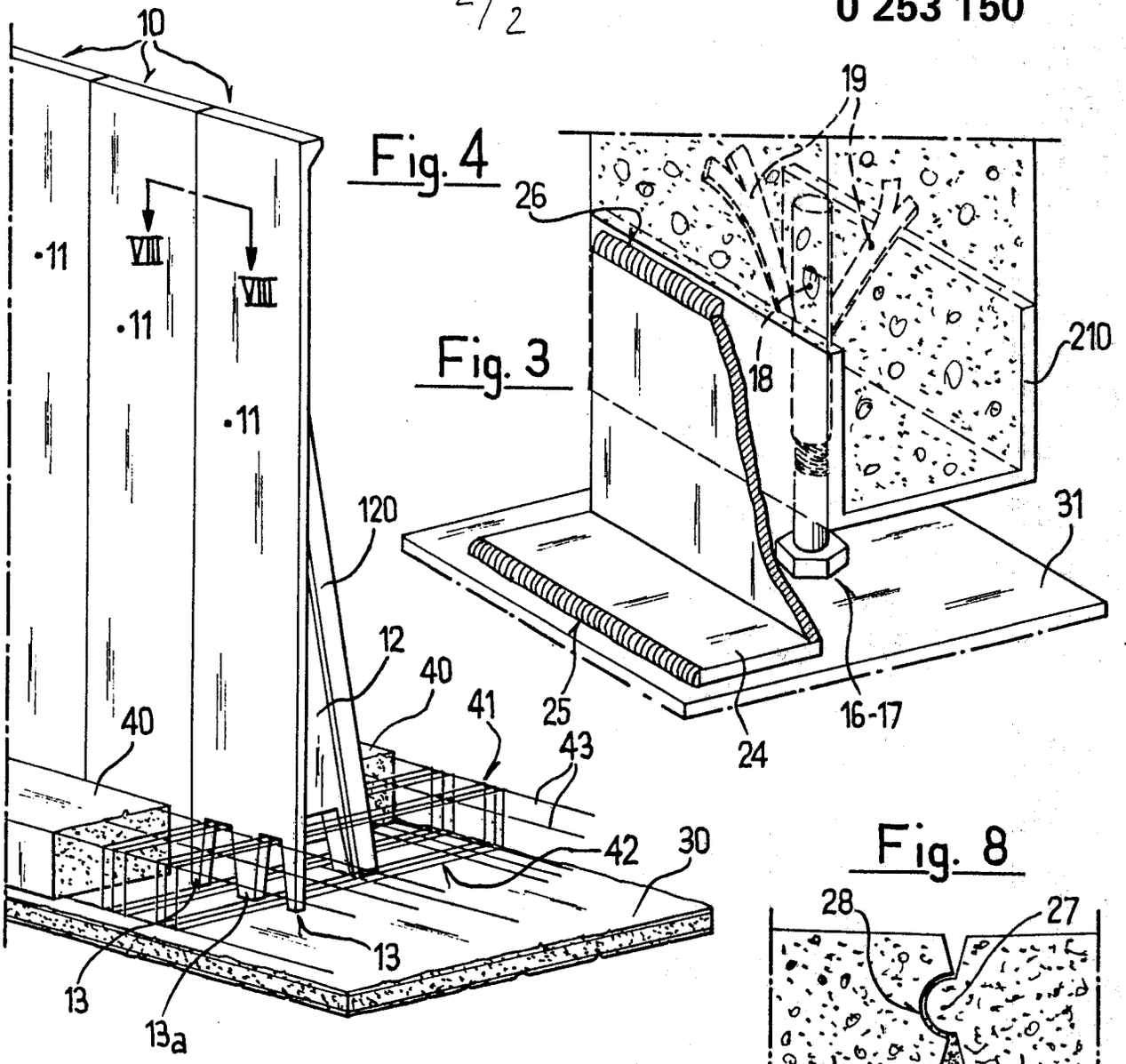
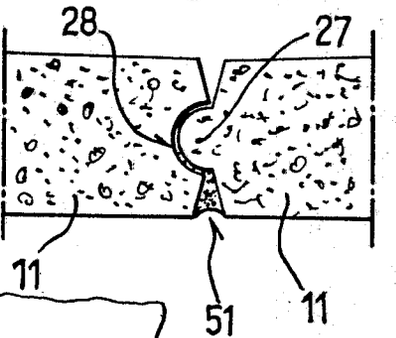


Fig. 3

Fig. 8



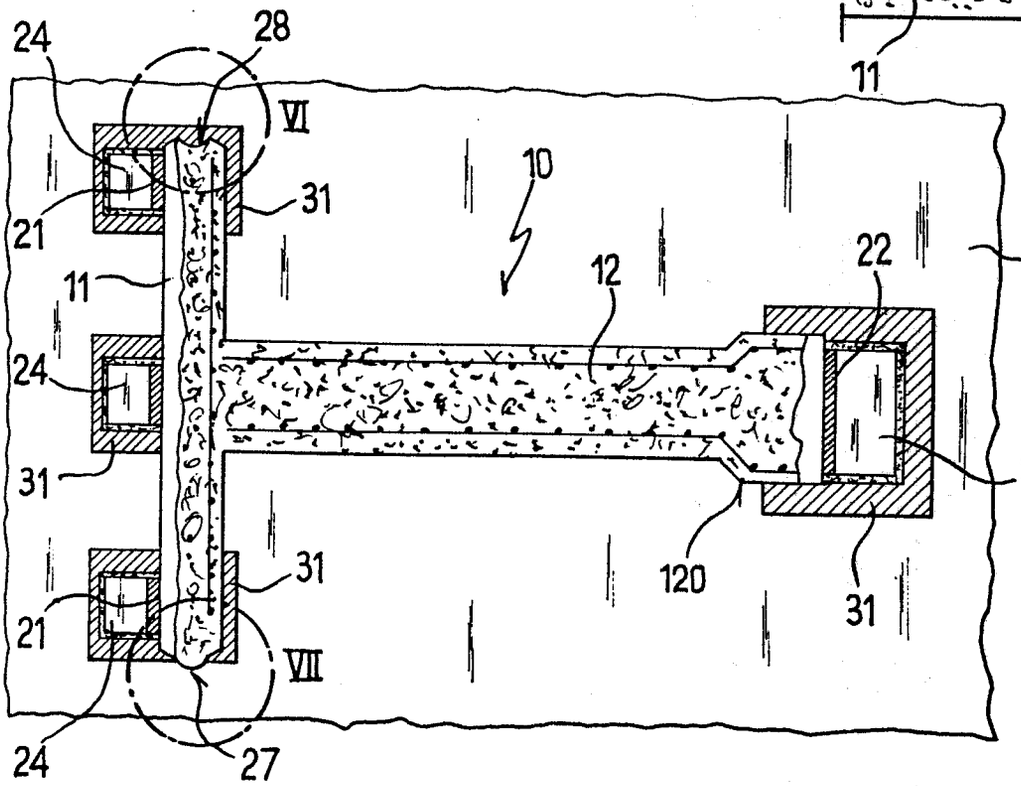


Fig. 5