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(54) Panels and construction method to form circular basins above ground.

(57) Panels for forming circular basins above ground constituted by a curved wall (1) provided with vertical stiffening ribs (3) and, at the sides, polygonal connection joints designed to allow union between contiguous panels.

The panels have different inclinations of their lateral borders in relation to the radius of the basin to be formed, so that the elements (6, 7) forming the joint have contact surfaces perpendicular to the basin tangent in the junction point.

A plurality of horizontal ribbing (2) are provided, with holes (4) passing longitudinally and designed to permit the insertion and stretching of prestress cables.

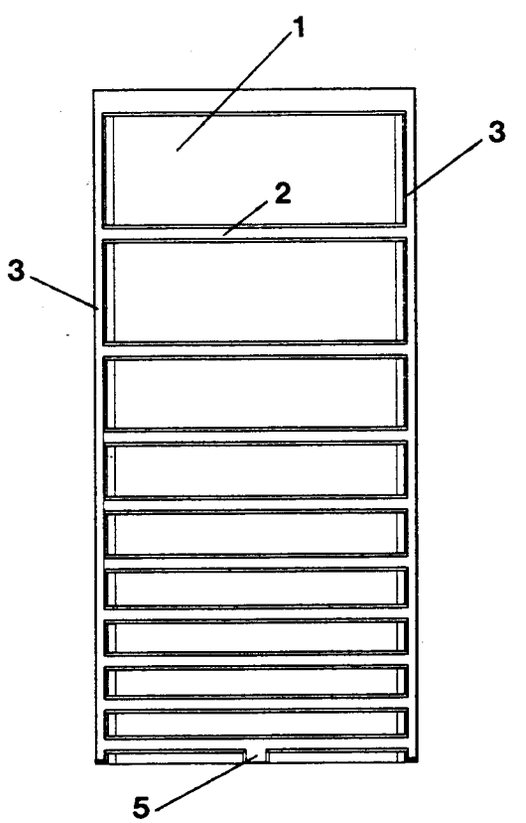

FIG.1

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The present invention relates to panels and the related method of construction in order to make circular basins above ground.

In particular it involves panels with an arc of a circle section, which have holes for the passage of prestress cables and which are placed side by side in order to form the basin.

For the assembly of the basin panels are arranged on a foundation plate, the prestress cables are stretched and a kerbing cast externally to the panels' base which impedes subsequent shifts due to the hydrostatic pressure which develops when the basin is in filled.

According to a preferred embodiment of the invention, on the sides of the panels there are polygonal joints which are arranged, with respect to the panel surface, with angles that differ according to the radius of the basin to be formed.

This makes it possible to always obtain, between contiguous panels, a contact surface of a sufficient size to support without any damage forces caused by the prestress.

According to a further embodiment of the invention, at the sides the panels are provided with cylindrical joints which allow an effective joining of the manufactured items in various mutual angular positions, while the seal is ensured by a strip in Neoprene or other deformable material, arranged between the contiguous panels.

Prefabricated above ground basins are well known, used for example in agriculture, or to form scrubber plants or similar, made using the union of panels mounted on a base arranged for that purpose, fixed to each other and appropriately sealed.

The use of prestress cables is also well known in the formation of these basins with prefabricated elements. Thus, for example, basins can be made using, side by side, a series of panels for the most part flat, provided with vertical ribbing within which there are holes for the passage of prestress cables, which are arranged outside the basin and tightened to keep the panels closely united. This system, however, has certain disadvantages both from the practical point of view, in so far as the prestress cables are exposed to the atmospheric agents, and from the aesthetic point of view.

Indeed with the known systems of construction, following the stretching of the cables, at times the panels slightly shift, causing the basin to be less than perfectly circular in shape.

It then happens that when the basin is filled the hydrostatic pressure of the liquid in it provokes a slight shift of the panels so as to make the basin take on a position that is exactly circular, thereby damaging the seal; in particular the seal kerbing which is arranged, after cable stretching, between the foot of the panels and the base on which they rest.

In addition, with panels of the known type it is necessary to proceed to a further cast of joint-sealing in relation to the contact zones between contiguous panels.

It can happen, however, that with these well known solutions the forces due to the prestress of the cables which unite the panels are distributed in a non-uniform way or over a surface that is too restricted, causing, locally, panel breakage.

It would instead be appropriate to be able to use panels which have joints shaped so as to have always a certain contact surface between contiguous panels and in which the surface is arranged at right angles with respect to the forces of compression exercised by the cables.

These disadvantages are avoided with the panels according to the characterising part of the appended claims.

- figure 1 is an elevation view of a panel in accordance with the invention;
- figure 2 is a plane view of the panel in figure 1;
- figure 3 is the horizontal section of a couple of flanking panels, in relation to the union zone of a different embodiment of the invention;
- figure 4 is the vertical section of the panel according to the invention;
- figure 5 shows, in horizontal section, the detail of a joint between two flanking panels;
- figure 6 shows, in horizontal section, the detail of two panels in correspondence with the union zone, with the various configurations set out which can form the connection joint;
- figures 7 and 8 are respectively the vertical section and the view of a basin formed with panels in accordance with the invention.

With reference to figures 1 and 2, a panel for realising circular basins comprises a wall 1 with an arc of a circle section, on the outside,a series of horizontal ribs 2 and, at the ends, a couple of vertical stiffening ribs 3.

In each of the horizontal ribbings there is a hole, marked with No. 4 in figure 2, for the passage of a prestress cable.

The distance between horizontal ribbings 2 is reduced gradually as one moves from above to below, so as to have a greater density of prestress cables in relation to the basin base, where the hydrostatic thrusts due to the liquid contained are greater.

At the panel base there is, in the central zone, a section of vertical ribbing 5, to better absorb the shocks and forces in the support phase and during the basin assembly.

The vertical ribbing 3 at the sides of the panel function as stiffeners and, in these zones, each panel is shaped so as to have, for the entire height

of the manufactured item, from one part a projecting element 6 with a polygonal profile and, on the other, a notch 7 whose profile joins with that of the projecting element 6 (figgs. 5-6).

A feature of the panel in the invention is that the lateral borders have, in accordance with the number of panels which form the basin and therefore according to the radius of the same, a different inclination.

In particular the inclination is such as that the contact surfaces of the joint elements 6 and 7 are always perpendicular to the tangent of the basin wall in the junction zone.

To vary the panel edge inclination an intervention is carried out on the corresponding sides of the caisson at the casting phase.

The walls of the caisson which define the shaped borders of the panels, indeed, are hinged at points A and A' which are on the extension of the internal wall 8 and the lateral wall 9 of the panel.

Slightly rotating these sides causes a corresponding light rotation of the joined profiles and the panels, as shown in figure 6, where the broken lines indicate the different configurations which the edges of the panel can assume.

Thus the edge 6 can be shifted into position 6' or into the withdrawn position 6''; in the same way, the edge 7 can also assume an advance position 7' or a withdrawn position 7''.

The result is that for different diameters of the basin and therefore for different angles of a panel with respect to the one contiguous, surfaces 6 and 7 of the joint are always parallel to each other and perpendicular to the tangent to the basin wall at the junction point between the two panels.

With this solution it is always possible to obtain a wide support surface between contiguous panels and this surface is at right angles to the force exercised by the prestress cables.

At the moment of assembly the panels ar arranged side by side and connected by way of prestress cables which are fixed to a head quoin, marked with No. 19 in figures 6, 7 and 8. This quoin is different from the preceding ones in having a greater thickness, so as to be able to house the hooking devices of the stretching cables and withstand the forces transmitted to the latter.

To assemble the basin (see item A in figure 7), a floor is prepared made for example from a cast 10 in reinforced concrete, with a series of reinforcements 11 projecting above in relation to the perimeter zone.

The panels are then arranged by resting them on the floor 10 and uniting them to each other, after inserting a layer of Neoprene 18 between each couple of junction elements 6 and 7.

Once all the panels are positioned, the prestress cables are arranged around the basin, passing through the holes 4 in the horizontal ribbing 2.

The ends of the cables are anchored to the head quoin 19, after which the same are stretched.

During this operation, as said in the introduction to the description, some panels can slightly shift position, so as to give the basin an imperfectly round shape.

For this reason, once the stretching of the cables has been carried out, a cast of concrete 12 is made all around the foot of the basin which functions as a locking element for the panels.

It is then possible to proceed with the positioning of a sealing bead 13 in relation to the lower projection within the basin, which can finally be filled.

Where the form is not perfectly circular, the hydrostatic thrusts which are generated on the panels will be effectively countered by the bead 12, so as to maintain the panels solidly locked in position.

According to a further preferred embodiment of the invention, elements 6 and 7 (fig.3) are rounded in form, so that it is possible to arrange each panel with various angles with respect to the contiguous panel, so as to be able to also form basins with different diameters with a single type of manufactured item.

In addition the particular conformation adopted for the joint is such that, whatever the angle is between two contiguous panels, these always have a contact surface sufficiently wide, so as to guarantee, due also to the insertion of sheet 6 in deformable material, a perfect seal for liquids which will be poured into the basin, and this without any need to use completion casts and With the panels in accordance with the invention, remarkable advantages are then obtained with respect to already known formations.

The assembly of the basin is extremely simple. It is sufficient to arrange a base plate on which the panels rest. The panels ar then united by simply insertion and stretching the prestress cables.

Claims

1. Panels for forming circular basins above ground of the type constituted by a curved wall (1), provided with vertical stiffening ribs (3) and, at the sides, joints designed to allow union between contiguous panels, characterised by having, on the external wall, a plurality of horizontal ribbing (2) provided with holes (4) passing longitudinally and designed to permit the insertion and stretching of prestress cables.

2. Panels for realising circular basins according to

claim 1, which have their sides shaped so as to define, for the entire height of the panels, a polygonal connection joint (6, 7), characterised by the fact that the said panels have different inclinations of their lateral borders in relation to the radius of the basin to be formed, so that the elements (6, 7) forming the joint have contact surfaces perpendicular to the basin tangent in the junction point.

3. Panels in accordance with the preceding claims, characterised by fact that they have, in relation to the lower and outer part of the panel, a section of vertical and central ribbing (5).

4. Panels in accordance with the preceding claims, characterised by fact that the distance between the said horizontal ribbing (2) for the passage of prestress cables decreases in relation to the lower part of the panel.

5. Panels in accordance with claim 1, characterised by the fact that the said joints in relation to the lateral edges of the panel have an arc of a circle section.

6. Method of forming circular basins above ground, characterised by having the following phases:

- casting of a base plate (10) in reinforced concrete, with a series of reinforcements projecting upwards, in relation to the external perimeter part of the basin;
- positioning of a series of panels (1) designed to form the lateral walls of the basin and equipped with horizontal ribbing (2) each provided with a hole (4) for the insertion of prestress cables, uniting them in relation to the lateral edges;
- positioning of a layer of sealing agent (13) in deformable material between the edges of the said panels;
- insertion and stretching of the prestress cables;
- casting of a kerbing (12) external to the base of the panels.

7. Method for forming panels in accordance with claim 2, characterised by the fact that the sides of the caisson rotate in the panel production, so as to confer on the shaped edges an inclination which is a function of the radius of the basin to be formed.

8. Basins formed with panels according to claims from 1 to 5.

9. Basins formed with the method set out in claim 6.

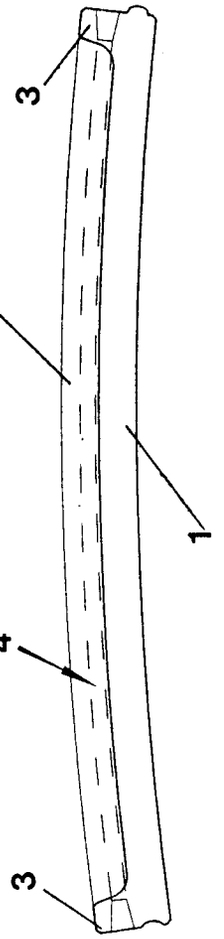


FIG.2

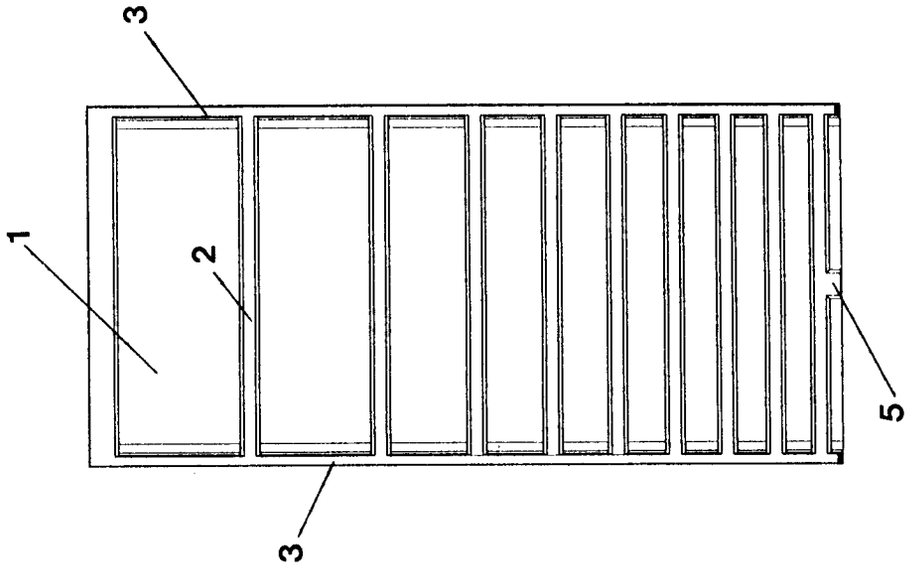


FIG.1

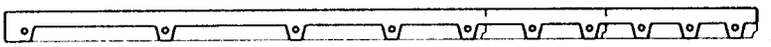


FIG.4

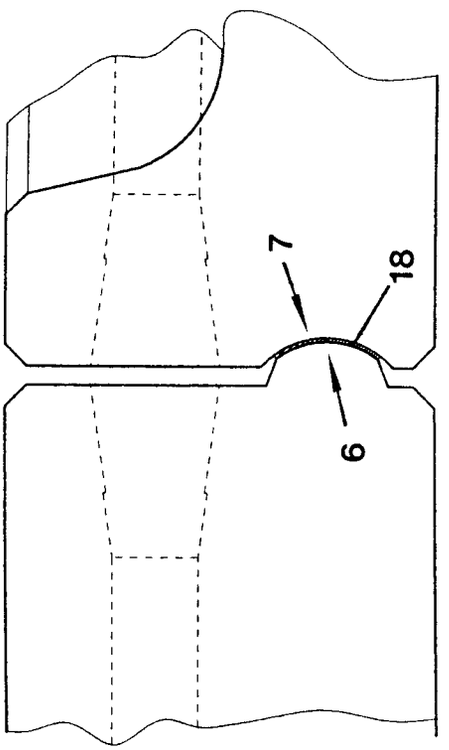


FIG.3

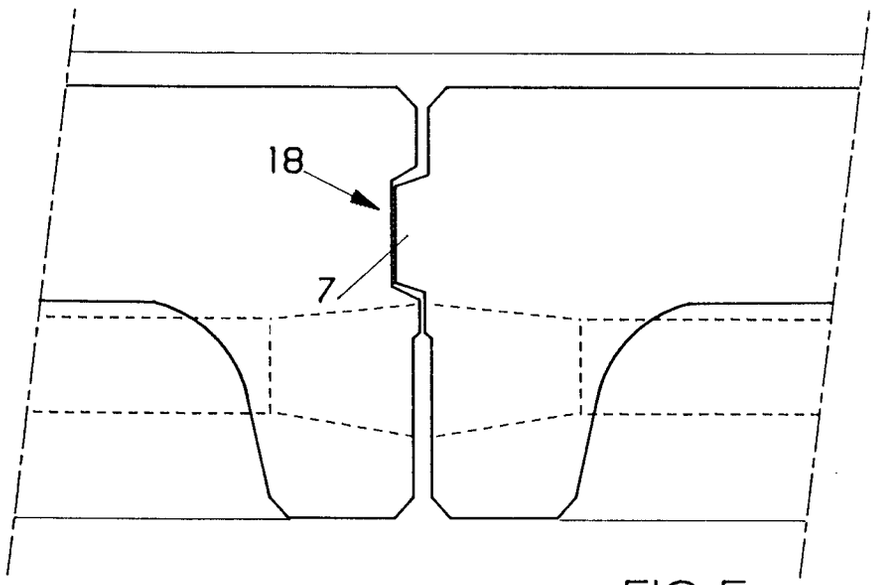
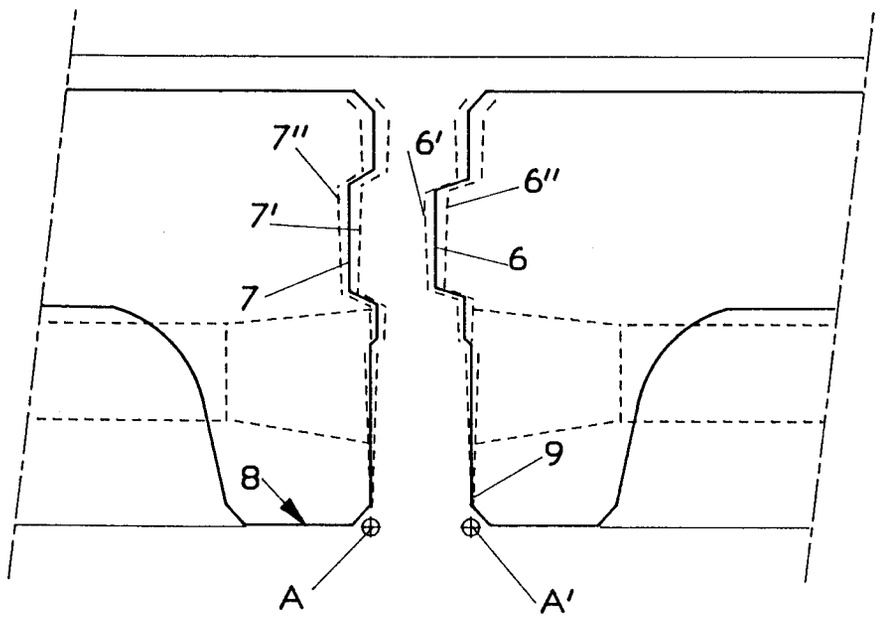


FIG.5

FIG.6



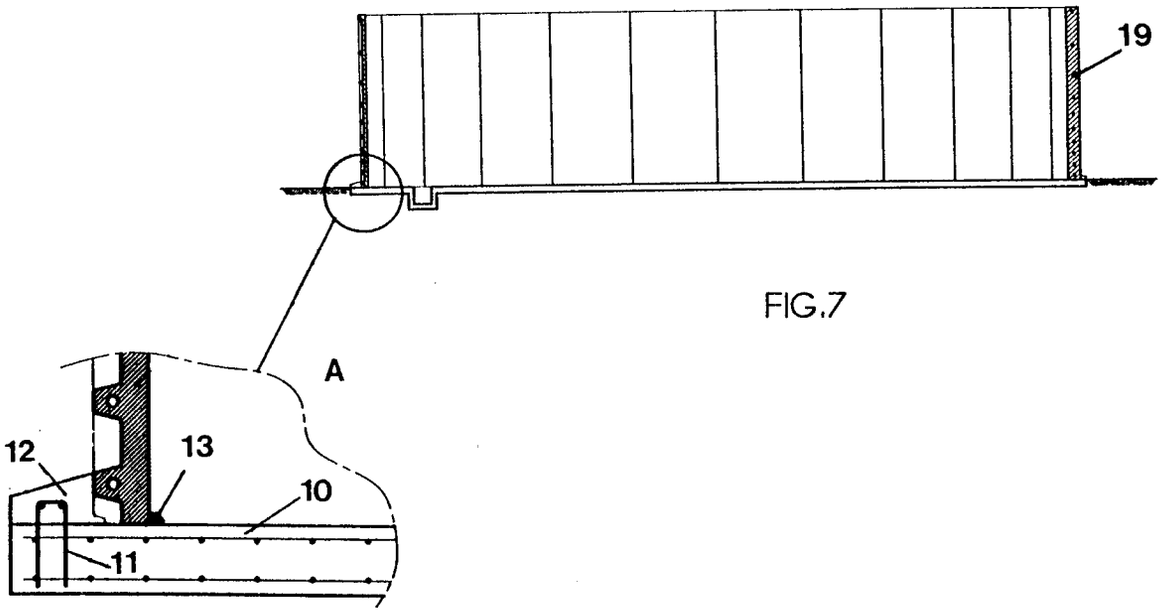


FIG.7

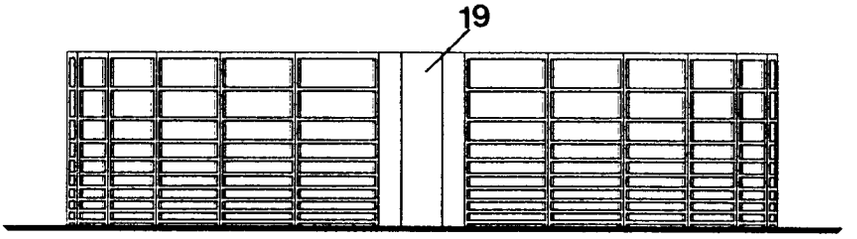


FIG.8

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EUROPEAN SEARCH REPORT

Application Number

EP 91 11 3128

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR-A-2 539 792 (MATIERE) * page 6, line 27 - page 7, line 8 *	1,2,8	E04H7/18
Y	GB-A-662 458 (NORCON LTD) * figures *	1,2,8	
A	DE-A-1 559 174 (HORNBACH) * figures *	1,2,8	
A	DE-A-3 305 932 (SCHMIED) * figures *	1,5,7,8	
A	FR-A-2 502 221 (SOCIETE AUXILIAIRE D'ENTREPRISES) * page 5, line 3 - column 14; figures *	1,6,9	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 MARCH 1992	HUBEAU M.G.

CATEGORY OF CITED DOCUMENTS

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