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(54) Manufacturing method and bath tub made of composite material with improved supporting frame produced by such method.

(57) A method for manufacturing a bath tub made of composite material comprises the steps of moulding the tub (11), applying a first substantially annular frame member (12) around its edge, applying a second substantially flat frame member (15) to the underside of the bottom of the tub (11), and interconnecting said first and second with third frame members (14). Said method comprises a further step of applying lateral wall elements (34) around said tub by removably coupling said wall elements to at least said third frame members. The tub manufactured according to such method therefore comprises, in combination, a circumferential frame member (12), a flat frame member (15) on the bottom and frame members (14) to connect them together. Lateral walls 34 can be applied by fitting them into springs 25 and into coupling means 33.

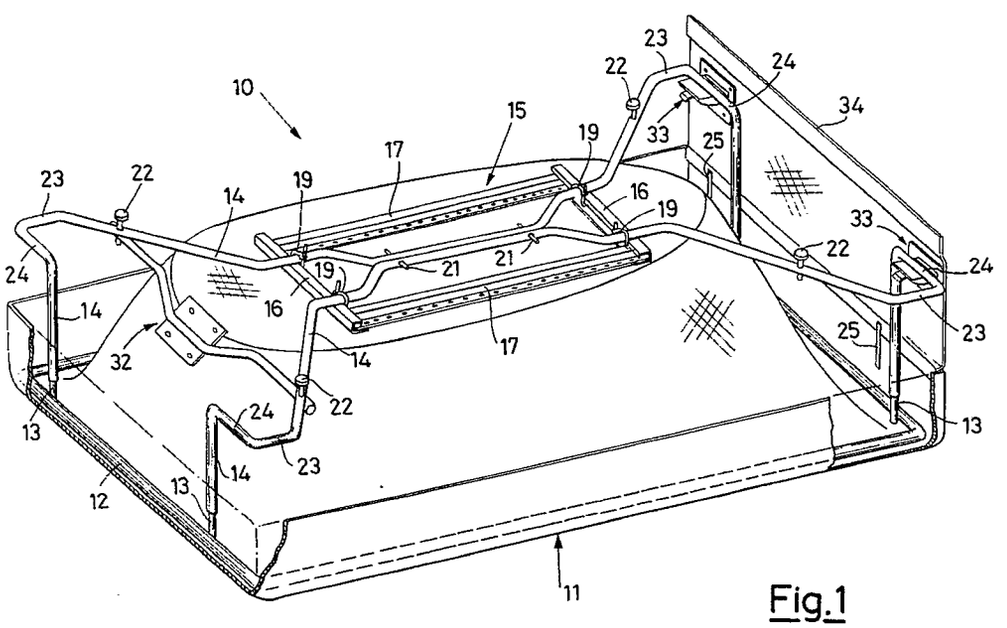

Fig.1

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MANUFACTURING METHOD AND BATH TUB MADE OF COMPOSITE MATERIAL WITH IMPROVED SUPPORTING FRAME PRODUCED BY SUCH METHOD

This invention refers to a bath tub made of composite material with an improved supporting frame.

In the technique for manufacturing bath tubs made of composite material, after moulding the tub the underside of the tub is usually fitted with a suitably shaped metal frame in order to strengthen the tub and to support it as it rests on the ground.

The frame is made of metal tubes welded together and is secured to the tub by means of fibreglass-reinforced plastic during the step of reinforcing the tub with said material.

Since once this operation has been carried out it is impossible to stack the tubs one on top of the other, resulting in handling and storage problems, it is carried out after the steps of trimming, finishing and drilling the moulded tub, and namely, when the tub is no longer in the moulding bay but in the assembly bay which must consequently also be provided with all the systems and protective devices required when handling potentially toxic compounds such as fibreglass-reinforced plastics. Moreover, since the setting time of fibreglass-reinforced plastic is approximately 40-50 minutes, it is necessary to provide the assembly line with a suitable storage unit which slows downs the production rate considerably and, together with the area required for glueing, takes up a considerable amount of space, in addition to involving a considerable amount of manual work. All this results in high production costs.

A further problem regarding the manufacture, handling and storage of the frames is that they are generally basket-shaped and practically complementary to the tub and, therefore, somewhat unwieldy. In fact, the frame structure is made of several curved cut and welded metal tubes which must be subjected to anticorrosion treatment, such as galvanization, which is particularly lengthy and costly, due both to the size of the frame and, because of the use to be made of the frame, to the need to provide it with a very efficient corrosion-proof coating, which is very difficult especially on the welded areas due also to tortuous shape of the frame.

A further problem encountered with the aforesaid known technique arises whenever the tubs are to be made with one or more sides surrounded with removable panels, as is customary for example in swirl baths in order to offer access to the devices of the swirl-bath system for installation and maintenance.

In fact, in this case, so as not to have unsightly fasteners on view use is made of snap-on couplings consisting of coupling means on the frame which fit into corresponding housings in elements glued onto the internal walls of the panels. Since the welded tube frame structure is relatively complicated to make, very often the coupling means are not in exactly the same place on all the frames, and it is therefore necessary to secure the coupling elements to the panels during the assembly of each individual tub. In addition to causing slowdowns due to the need to wait for the glue to dry, it also gives rise to a rather serious problem, especially for the spare parts department, due to the fact that the panels are not interchangeable.

Another problem encountered in the known technique is that in the case of bath tubs comprising a swirl-bath system the frame must be provided with devices to enable various parts of the system to be secured to it, such as for example the water recycling pump.

So as not to have to make and handle two different types of frames these devices, such as the pump housing, are included in all the frames which, in the case of bath tubs without swirl-bath systems, simply constitutes an additional cost.

The general scope of this invention is to obviate the aforementioned problems by providing a method for manufacturing a bath tub of the type made of composite materials, and a bath tub made according to said method which has a sectional supporting frame which is quick and easy to assemble.

This scope is achieved according to the invention by providing a method for manufacturing a bath tub made of composite material of the type comprising a supporting metal frame disposed on the underside of the tub, characterized by the fact of comprising the steps of moulding the tub, applying a first substantially annular frame member around its edge, applying a second substantially flat frame member to the underside of the bottom of the tub, and interconnecting said first and second with third frame members.

Said method also advantageously comprises the further step of applying lateral wall elements around said tub by removably coupling said wall elements to at least said third frame members.

The method is advantageously also characterized by the fact that the first and second frame members are applied to the tub by partially incorporating them in fibreglass-reinforced plastic during the step of reinforcing the moulded tub with said fibreglass-reinforced plastic.

By means of this method it is possible to obtain a bath tub made of composite material of

the type comprising a supporting metal frame disposed underneath the tub, characterized by the fact of comprising, in combination, a first substantially annular frame member (12) disposed and connected around its outer edge, a second substantially flat frame member (15) disposed and connected to the underside of the tub, and third frame members (14) interconnecting said first (12) and second (15) members.

The innovatory principles of this invention and its advantages with respect to the known technique will be more clearly evident from the following description of several possible exemplificative and non-restrictive embodiments applying such principles, with reference to the accompanying drawings, in which:

- figure 1 shows a schematic perspective view of a bath tub according to the invention, during assembly;
- figure 2 shows a schematic partial view of a detail of the tub of figure 1;
- figure 3 shows a schematic partial, cross-sectional view along a vertical plane of the tub of figure 1;
- figure 4 shows a schematic side elevation view of a part of the tub of figure 1, tilted by 180°;
- figure 5 shows a schematic partial view of a detail of the tub of figure 1.

With reference to the figures, as shown in figure 1, the embodiment according to the invention and generically indicated by reference 10, comprises a tub 11, moulded from composite material, inside the outer edge of which is secured a first frame member 12 made of bent metal tube. A second frame member 15, composed of cross members 16 and longitudinal members 17, made of welded metal sections, is secured externally to the underside of the tub 11.

Both the frame member 12 and the frame member 15 are advantageously incorporated into the structure of the tub during the reinforcing of the latter by means of fibreglass-reinforced plastic immediately after moulding.

As can be clearly seen in figure 2, the cross members 16 are advantageously generically shaped in the form of an upturned "G" while the longitudinal members 17 are generically shaped in the form of an upturned "U" and the portions of the members 16 and 17 in contact with the bottom of the tub are perforated so as to offer a better grip during their incorporation into the fibreglass-reinforced plastic.

The frame member 12 comprises four pins 13 which fit into a pair of shaped tubes 14.

As can be seen in figure 3, the ends of the tubes 14 are clamped onto the pins 13. Moreover, as shown in figure 1 and in detail in figure 2, the tubes 14 are secured to the frame member 15, in correspondence with edges 18 of the cross members 16, by means of hooked fasteners 19 with a lock nut 20.

The tubes 14 are also fastened to one another by means of rivets or screws 21 and are provided with feet 22 by which the tub rests on the floor.

The tubes 14 can easily be fitted with elements for supporting the components of a swirl-bath system whenever the tub is designed to include a system of this kind. For example, figure 1 shows a pump support 32 advantageously secured by means of the screws of the feet 22.

As can be seen in figure 1, the tubes 14 are shaped so as to define portions 23 and 24 substantially parallel to the lateral edges of the tub in correspondence with the four corners so as to enable the side panels 34 (for the sake of clarity only one of which is shown in the figure) to be fitted onto the tub by snapping into spring couplings 33.

Figure 4 and 5 show the fastening of a panel to the tub in greater detail. Unlike the previous drawings the tub is shown in the upright position.

As can be seen in figure 4, the panel 34 has an indented upper edge to enable it to fit between the internal surface of the edge of the tub and a plurality of wire or flat springs 25 which can also be advantageously secured with fibreglass-reinforced plastic either to the surface of the edge of the tub or to the frame member 12.

At the opposite end of the panel are incorporated, also by means of fibreglass-reinforced plastic during the step of reinforcing the panel, two plates 26 which are perforated close to the corners. As can be clearly seen in figure 5, fixed onto each plate (for example by welding) is a traversable element 27 through which is inserted an L-shaped flexible element 28 which is locked in place by tightening a screw 29 exerting pressure against its surface.

Fitted onto the free arm of the L-shaped element 28 is a coupling unit 30 which is frictionally locked in place by tightening a screw 31.

The unit 30 is provided from below with a complementary housing for part of a segment 23 or 24 of the tubes 14 so as to achieve the couplings 33.

It will be clear from the foregoing description that the assembly of a bath tub with the innovatory frame described above is quick and free from the defects of the known technique.

In fact, once the tub has been moulded according to the known methods, it is reinforced with fibreglass-reinforced plastic in the usual way. During this step the frame members 12 and 15 are secured to the tub and then the moulded tub is subjected to the typical operations of trimming,

finishing, drilling, etc. The twc frame members 12 and 15 do not prevent the tubs from being easily handled or piled one on top of the other since they are substantially adherent to the surface of the tub. At the same time, the side panels 34 are prepared and fitted with the plates 26.

The operations of reinforcing and incorporating with fibreglass-reinforced plastic can be carried out in the appropriate department equipped with systems, such as vapour exhausters, suitable for handling potentially toxic substances such as resins.

The overturned tubs can then go on to the normal assembly bays where the two tubes 14, joined together with rivets or screws 21, are applied by fitting their ends over the pins 13 and clamping them to lock them in place, and securing the intermediate portions to the frame member 15 by means of the hooks 19.

If the tub model so requires, the supporting elements, such as for example the pump support 32, are then secured to the frame. At the same time the feet 22 are fitted in place.

At this point the tub can be placed upright to complete the assembling of the swirl-bath system, if included, and for the final tests and inspections.

To fit the side panels 34 it is sufficient to insert their upper edges under the springs 25 and push the panel into place so that the units 30 engage with the corresponding tubes 14.

Any manufacturing tolerances are easily absorbed by adjusting the vertical position (by means of the screw 29) and horizontal position (by means of the screw 31) of the unit 30 with respect to the panel. It is thus also possible to subsequently adapt and replace the panels. The tub can also easily be used as a built-in bath simply by not fitting the tubes 14 and, if necessary, securing the feet 22 to the frame member 15.

The foregoing description of an embodiment applying the innovatory principles of this invention is obviously given by way of example in order to illustrate such innovatory principles and should not therefore be understood as a limitation to the sphere of the invention claimed herein.

For example, the shape of the tub can differ from the one shown and the conformation of the frame can consequently also be different. Moreover, the method of securing the tubes 14 to the frame member 15 can be achieved for example by means of screws, clamps or coupling pins, as can be easily imagined by any technician.

It is obvious that the aforesaid scopes are achieved by providing a tub with a supporting frame whose assembly is free from slow-downs due to the setting times of glues or fibreglass-reinforced plastic, does not require precautions in the assembly bays, and in which the frame members do not take up excessive space during storage.

Moreover, the various frame members can be individually subjected beforehand to anticorrosion treatment, thereby reducing their cost considerably.

Claims

1. Method for manufacturing a bath tub made of composite material of the type comprising a supporting metal frame disposed on the underside of the tub, characterized by the fact of comprising the steps of moulding the tub, applying a first substantially annular frame member around its edge, applying a second substantially flat frame member to the underside of the bottom of the tub, and
interconnecting said first and second members with third frame members.

2. Method as claimed in claim 1, characterized by the fact of comprising the further step of applying lateral wall elements around said tub by removably coupling said wall elements to at least said third frame members.

3. Method as claimed in claim 1, characterized by the fact that the first and second frame members are applied to the tub by partially incorporating them in fibreglass-reinforced plastic during the step of reinforcing the moulded tub with said fibreglass-reinforced plastic.

4. Bath tub made of composite material of the type comprising a supporting metal frame disposed underneath the tub, characterized by the fact of comprising, in combination, a first substantially annular frame member (12) disposed and connected around its outer edge, a second substantially flat frame member (15) disposed and connected to the underside of the tub, and third frame members (14) interconnecting said first (12) and second (15) members.

5. Bath tub as claimed in claim 4, characterized by the fact that the third frame members (14) comprise two shaped elements which are joined together in a generically median position and shaped in order to define substantially horizontal median portions and substantially vertical end portions.

6. Bath tub as claimed in claim 5, characterized by the fact that the end portions of the third frame members are secured to the first frame member (12) by fitting them onto pins (13) protruding from said first member (12).

7. Bath tub as claimed in claim 6, characterized by the fact that the median portions of the third members (14) are secured to the second frame member (15) by means of hooked elements (19) tightened by a screw.

8. Bath tub as claimed in claim 4, characterized by the fact that the second frame member (15) comprises a structure made of metal sections (16, 17) with a generically rectangular peripheral shape.

9. Bath tub as claimed in claim 4, characterized by the fact that of comprising side wall elements (34) connected to the tub by removable coupling means (33) disposed on the internal surface of said wall elements (34) and fitting into portions of said third frame members (14).

10. Bath tub as claimed in claim 9, characterized by the fact that each of said couplings (33) comprises means for adjusting the position in a direction parallel and perpendicular to the surface of the corresponding wall element (34).

11. Bath tub as claimed in claim 9, characterized by the fact that said portions of the third frame members (14) for coupling with the walls (34) comprise segments (23, 24) disposed substantially parallel to the edges of the tub close to the corners.

12. Bath tub as claimed in claim 10, characterized by the fact that said coupling means (33) each comprise, in combination, a plate (26) secured to the internal surface of the corresponding wall (34), a right-angle element (28) having one arm parallel to the wall (34) and slidingly inserted into a traversable element with a securing screw (29) in said plate (26) to permit movement parallel to the wall (34), a coupling element (30) slidingly disposed, with a securing screw (31), on the other arm of the right-angle element (28) to enable it to move at least in a direction perpendicular to the wall (34), the coupling element (30) having a recess for housing one of said portions of said third frame members (14).

13. Bath tub as claimed in claim 4, characterized by the fact that said first (12) and third (14) members are composed of bent metal tubes.

14. Bath tub as claimed in claim 4, characterized by the fact that the third frame members (14) are fitted with feet (22) by which the tub rests on the floor.

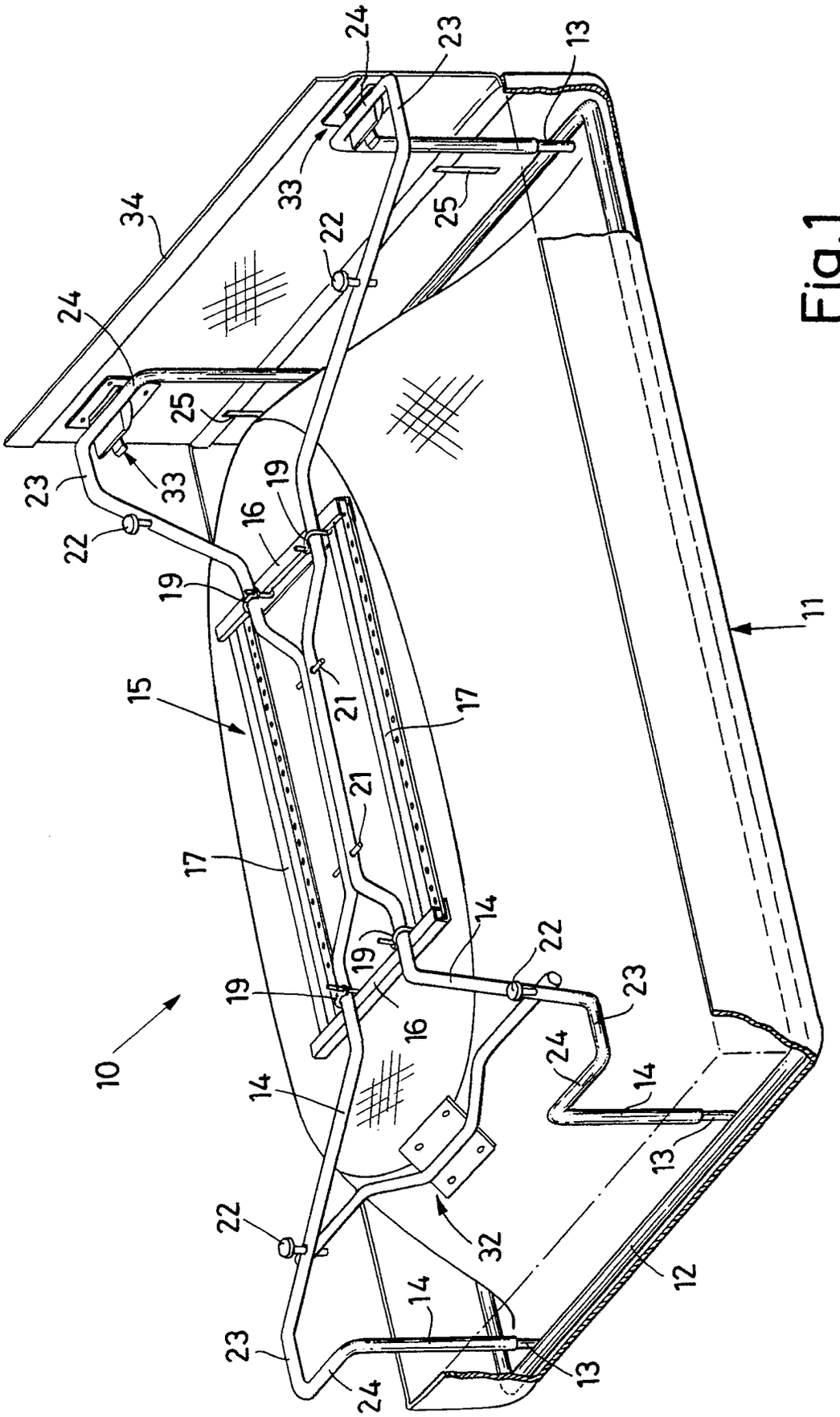

Fig.1

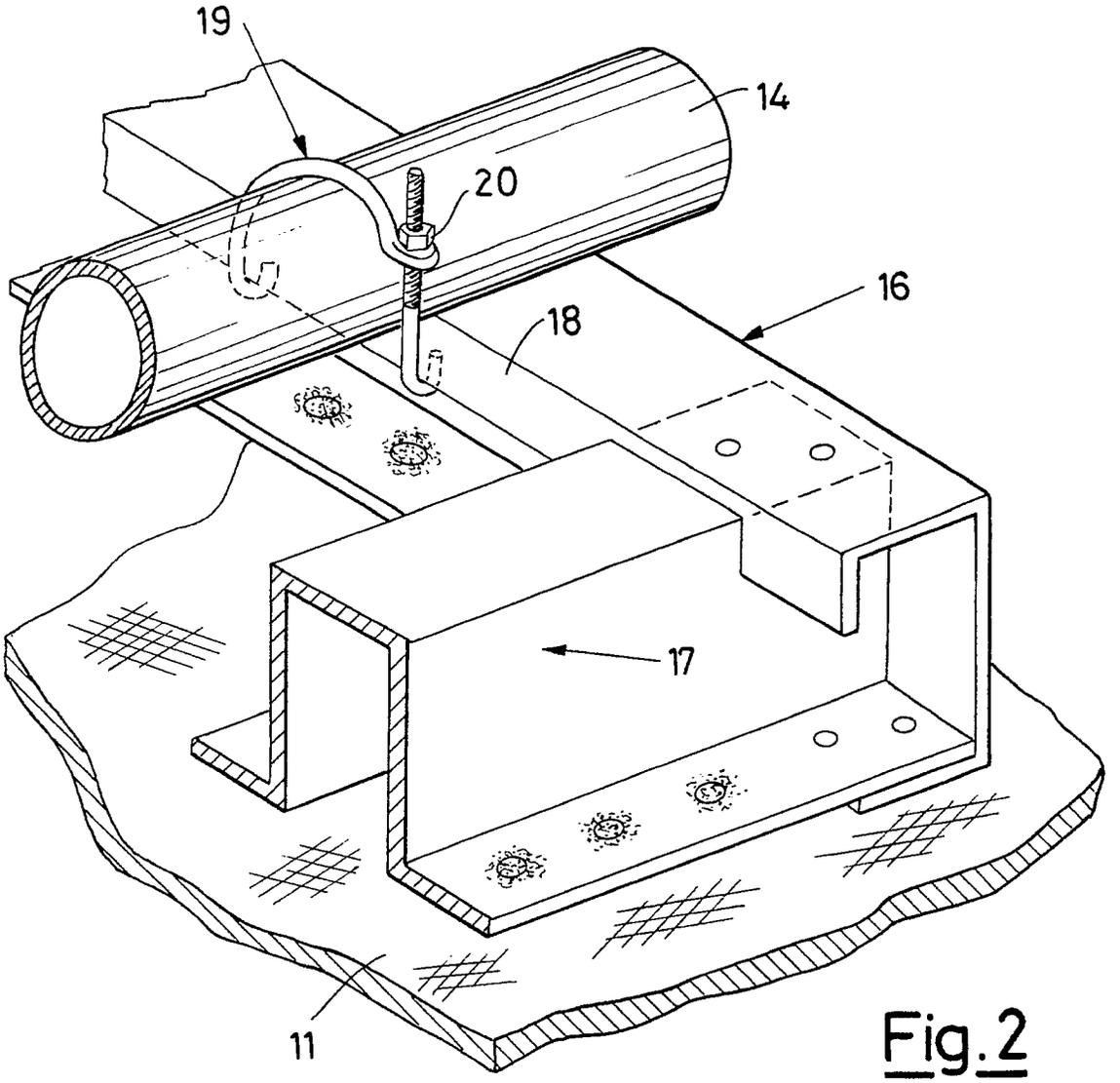

Fig.2

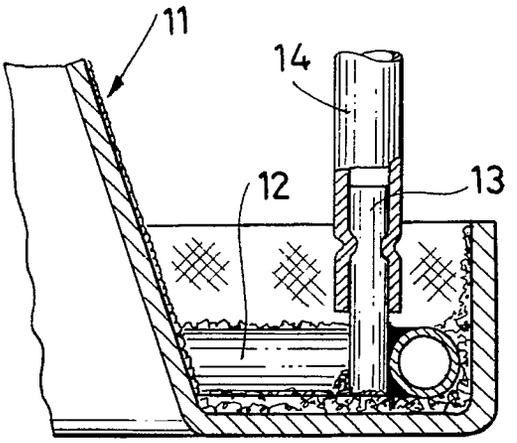

Fig.3

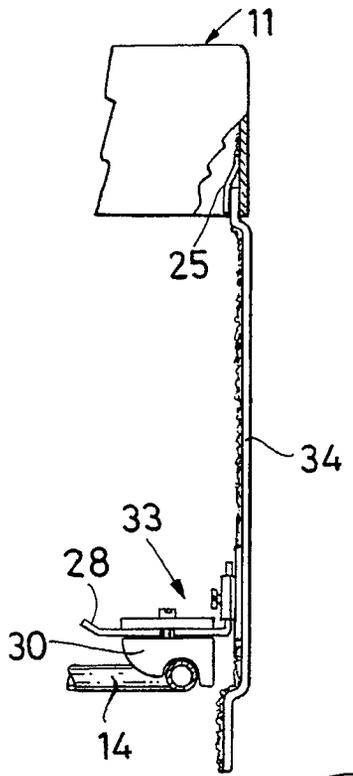

Fig.4

Fig.5