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(54) Improvements in bathtubs and process for manufacturing them.

(57) A bathtub comprising a shell (10), molded through thermoshaping, from thermoplastic material and a countershell (11) mating the bottom and part of the wall height of said shell (10) to provide the necessary structural strength.

Tav. I

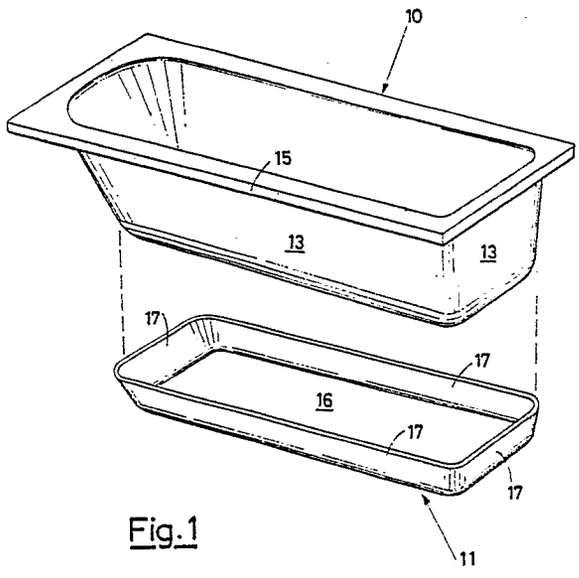

Fig. 1

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Improvements in bathtubs and process for manufacturing them

Present invention pertains to improved bathtubs and their manufacturing process.

It is well known that still some years ago the bathtubs were manufactured from very strong materials comprising enameled iron and glazed cast iron. It is also well known that the above tubs, further to a rather high weight, had the problem of irreparable wearing because any scratch or chipping in the enameling or in the glazed surfaces causes a remediless aesthetic damage.

Recently have obtained a larger and larger popularity tubs manufactured from thermoplastic materials, specifically tubs provided through thermoshaping.

Brieffly stated, this process consists in providing a thermoplastic preheated plate with a desired threedimensional shape, by applying vacuum inside a mold, so that the plate, made plastical and moldable by heat, follows the mold walls, taking over their shape.

The so shaped tub has an internal surface particularly glazed and perfectly finished. However, it needs a second manufacturing process because the walls are very thin, expecially at the rounded connections between bottom and side walls and at the bottom itself, and obviously cannot bear the strains due to the specific use.

To this purpose the herebefore used art, coming from the boat manufacturing art, consists in coating the outside and the bottom of a tub by resin-glass, i.e. providing the whole external surface of the tub with a coating of glass fibers, or similar material, soaking them with a thermosetting resing, compatible with the thermoplastic material forming the thermoshaped shell, to which it binds, and making it harden and crosslink.

This second manufacturing step has been and is presently prevailingly handmade, with obviously very high industrial costs and too long working times, so that said tubs remained an expensive and not bulk producible article.

Another problems of these tubs, according to the prior art, is that the external coating remains coarse (unless further rather expensive workings are performed) so that the so obtained tubs can be only buitl-in, or under suitable panel boards installed. Further, always owing to the above mentioned coarseness, it is impossible to strictly pile up the tubs for shipping, so that shipping and storage costs are rather high.

An alternative solution recently proposed has been to manufacture a countertub forming a complete seat for the thermoshaped tub and to stick tub and countertub together at the installation.

Said solution has been provided to hydromassage tubs wherein the countertub has the main purpose of housing many devices (pump, etc....) . It is obvious that the costs for this system are excessive for a common bathtub.

It is main object of present invention to provide a bathtub allowing on a first hand to use the above mentioned thermo shaping technology and, on a second hand, to get rid of the above mentioned second step (manufacture of a countertub), without, of course, impairing the structural strength and the useful like of the finished bathtub.

It is another object of present invention to obtain the above indicated object in the procedure of an advantageous industrial production and, consequently through an accettable industrial process.

These and other objects are obtained by the bathtub, according to the present invention, of the kind comprising a shell of thermoplastic material, preferably obtained through thermoshaping, characterized in that the bottom and the sides, the last mentioned at least for a limited height, mate a wrapping structural member or countershell, preferably molded from a proper plastic material, adhering to the above mentioned areas of the thermoshaped shell, providing the necessary mechanical strength with respect to the use of the tub.

In the preferred embodiment of the tub according to the present invention, said countershell is shaped as a tray of which the bottom exactly tallies together with the bottom of the thermoshaped shell, while the edges have such a height which is at least necessary to sustain and give mechanical strength to the rounded connections between the bottom and sides.

According to other embodiments, such a countershell can be divided into separated bands, of which anyone tallies together with a longitudinal bottom connection of the thermoshaped shell, in which case said shell has in the region corresponding to the junction between adjacent bands a strengthening longitudinal rib.

In turn, the process according to the present invention provides a first step for thermoshaping the shell of the tub in a thermoplastic material, of usual and well known kind, and is characterized by a second step in which through a proper separated mold or using as a mold the bottom and, along part of the height, the sides of said shell, it is provided through molding, preferably from thermosetting material, a countershell such as that here above mentioned.

The specific features and advantages of the present invention will appear more clearly from the following detailed description, having exemplifying but not limiting meaning, with reference to the

enclosed drawings. wherein:

figure 1 shows in diagrammatical form and in exploded perspective view the bathtub according the invention in the preferred embodiment;

figure 2 is a transverse cross-section of the tub in figure 1 in the finished form;

figures 3, 4 and 5 are diagrammatical perspective views of variations of the wrapping structural strengthening member.

Referring mainly to figures 1 and 2, a bathtub is shown comprising a shell 10 and a structural wrapping member or countershell 11.

The shell 10 comprises a bottom 12 and sidewalls 13, bottom and sidewalls being properly connected by portions 14 having a proper curvature. The walls 13 end upside with an edge 15 of usual kind.

The wrapping structural member or countershell 11, in this embodiment, is shaped as a tray and consists of a bottom 16 and sides 17.

The bottom 16 is shaped and sized in order to tally exactly with the bot tom 12 of the shell, as well as the sides 17 are shaped and slanted in order to tally exactly with the sidewalls of the shell 10.

As hereabove mentioned, the shell 10 is performed through thermoshaping from a thermoplastic material sheet, having small thickness, further reducing because of to the stretching due to the thermoshaping, expecially at the bottom 12 and the connecting member 14, while at the upside part of the shell 10 the presence of the edge 15 provides also to confer stiffness and structural strength to the shell.

On the contrary, the bottom 12 and the lowest portions of the walls 13 are prone to the highest strains due both to he hydrostatic pressure when the shell is filled with water, and to the presence and the movements of a user when being standing or kneeling, loads the whole weight on a very limited area.

In turn, the countershell is preferable provided from thermosetting material with proper thickness for strengthening the above mentioned weak areas of the shell 10.

Thus the tray 11 can have a thickness of many centimeters and show sides of substantial height in order to structurally strengthen the connecting parts 14 and the sidewalls 13.

It is apparent that the tray 11 is suited to an automated production and no longer to hand production, either using part of the same shell 10 (in particular the bottom and the sidewalls for a desired heigth), or a suitable and separated mold.

It is also apparent that the resulting shells 10 can be piled up for shipping without any damage due to coarseness of their external surfaces, being the shell 10 and the tray 11 matchable during the tub manufacture or at the final installation.

The embodiments shown in the figures 3, 4 and 5 refer to alternative shapes of the countershell 11.

In figure 3 such a member is equivalent to the tray 11, apart the omission of extreme walls. Such an embodiment is suited to a countershell production through extrusion.

The embodiment of figure 4 is equivalent to that of figure 3, apart the shell longitudinally divided in two shaped bands 18, anyone of which is symmetrical with respect to the connection line between the bottom 12 and the sidewalls 13 of the shell 10. In such a case, preferably, in the thermoshaping of the shell 10 and in particular of the bottom 12, is provided a longitudinal rib, not shown, corresponding to the connecting line between the two bands 18.

The embodiment shown in figure 5 is a variation of that of figure 4 because, further to the two lateral bands 18, a central band 19 is provided. In such a case instead of just one rib, two longitudinal ribs will be provided in the bottom 12 of the shell 10.

As already stated, the countershell 11 is preferably provided by molding of thermosetting material.

That does not exclude the possibility of using other materials such as an example forged and possibly ridged metallic plates.

From the foregoing description it appears clearly that the principle of the present invention is prone to many embodiments mechanically equivalent even if formally different, which will appear easily to those skilled in the art.

It is meant that these conceptually and mechanically equivalent embodiments come into the scope of the present invention as defined by the hereenclosed claims.

In this context it is to mention in particular the fact that further to bathtubs exist other sanitary devices, such as basins and sinks and, overall , the so-called shower plates having the same problems and suscettible of embodiment in accordance with the principles of the present invention.

Claims

1. Bathtub , of the kind comprising a thermoplastic material shell formed by a bottom and sidewalls, characterized in that said bottom and said sidewalls, the latter at least for a limited height, are mate a structural wrapping member or countershell which tallies together with the above mentioned parts of said shell, in order to provide the necessary mechanical strength with respect to the intended use of the tub.

2. Bathtub according to claim 1, characterized

in that said shell is provided through thermoshaping from a thermoplastic sheet and said countershell is provided through molding of a plastic material, specifically a thermosetting material.

3. Bathtub according to claim 1, characterized in that said countershell is provided from forged metal plate.

4. Bathtub according to claim 1, characterized in that said countershell is of the kind of a tray having a bottom and sides tallying together exactly with the bottom and the sidewalls of said shell.

5. Bathtub according to claim 1, characterized in that said countershell is provided in the form of a band enclosing the bottom and part of the longitudinal sidewalls of said shell.

6. Bathtub according to claim 5, characterized in that said band forming said countershell is provided in the form of two halfbands anyone symmetric with respect any longitudinal connecting line between bottom and sidewalls of said shell.

7. Bathtub according to claim 6, characterized in that the bottom of said shell has a longitudinal rib coinciding with the connecting line between said halfbands.

8. Bathtub according to claim 6, characterized in that between said halfbands a planar longitudinal band is interposed.

9. Process for the manufacture of bathtubs according to claim 1, of the kind in which in a first step the thermoshaping of the shell from thermoplastic material is provided, characterized in that in a second step a structural wrapping member or countershell mating the bottom and the sidewalls of said shell, at least for some height, is provided.

10. Process according to claim 9, characterized in that said countershell is provided through molding thermosetting material.

11. Process according to claim 10, characterized in that said molding of said countershell is provided using as a mold part of said shell.

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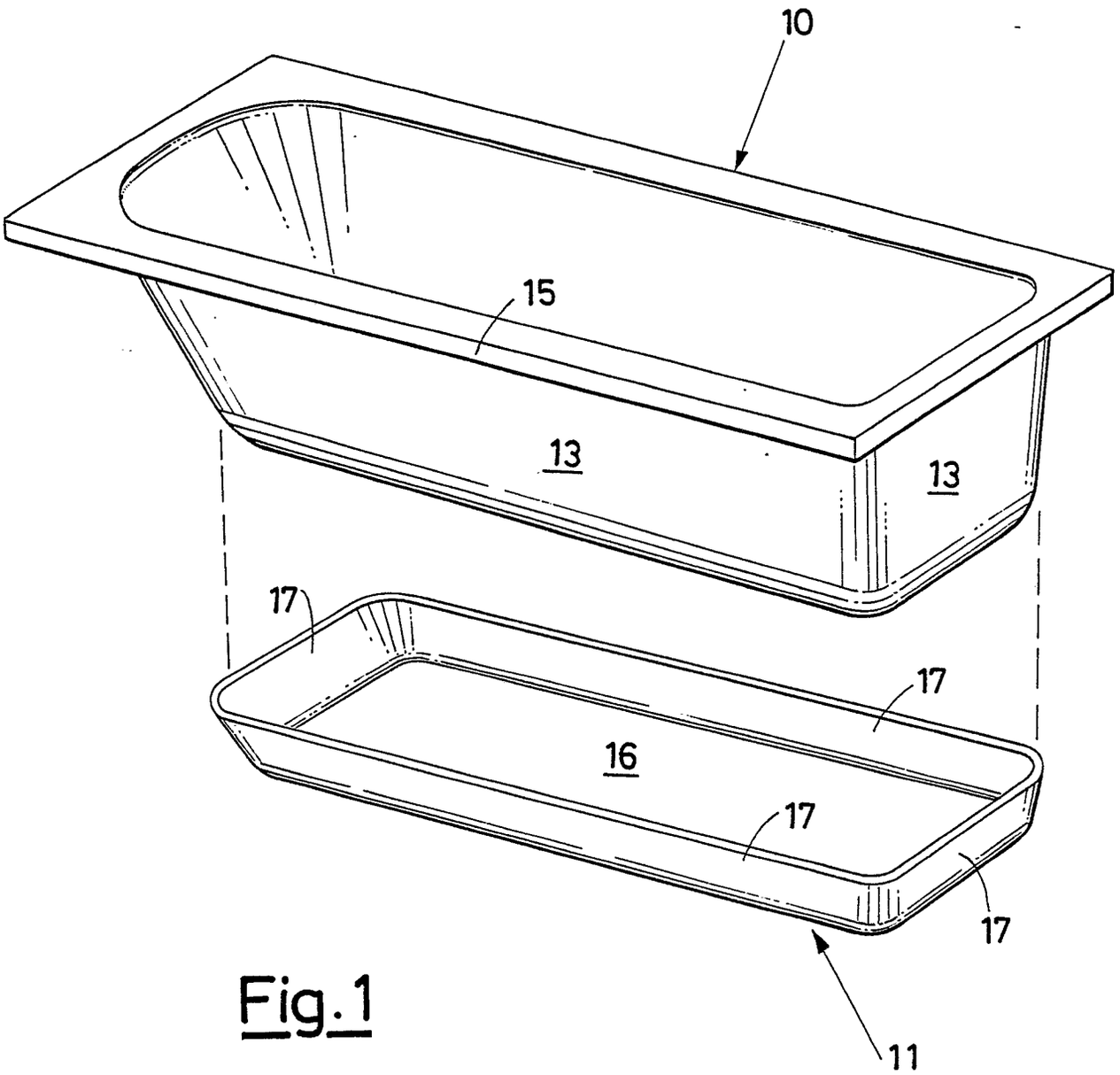

Fig. 1

Tav. II

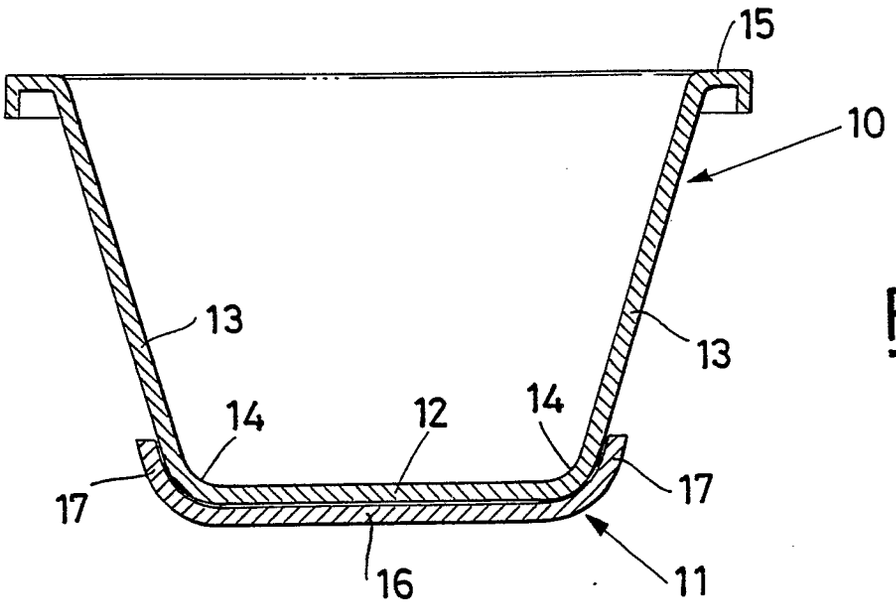

Fig. 2

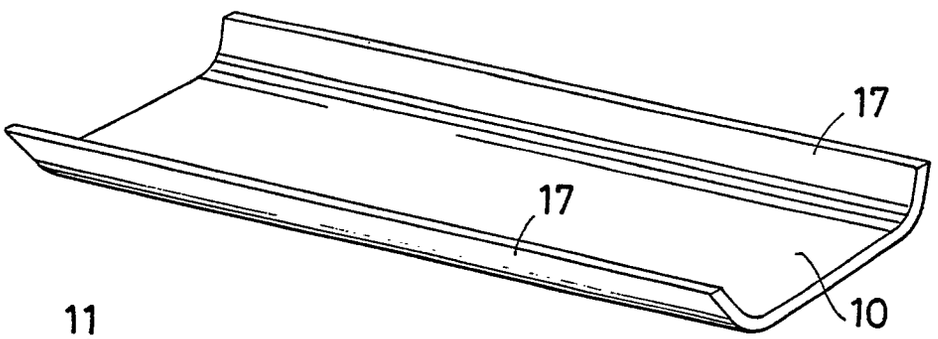

Fig. 3

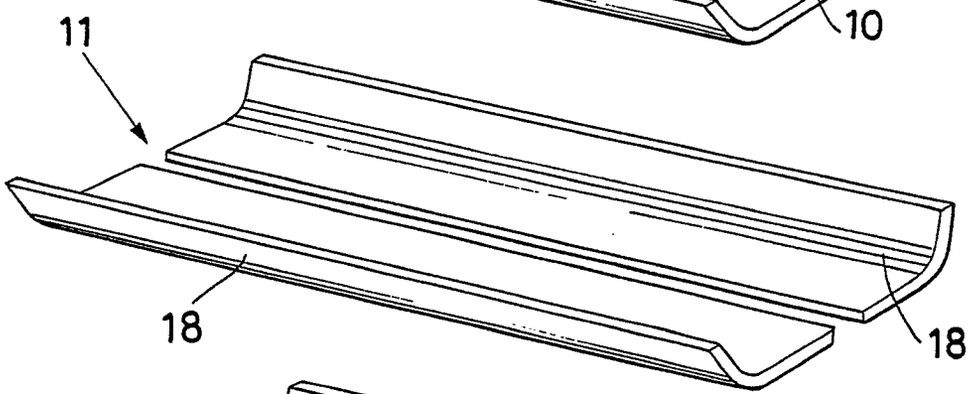

Fig. 4

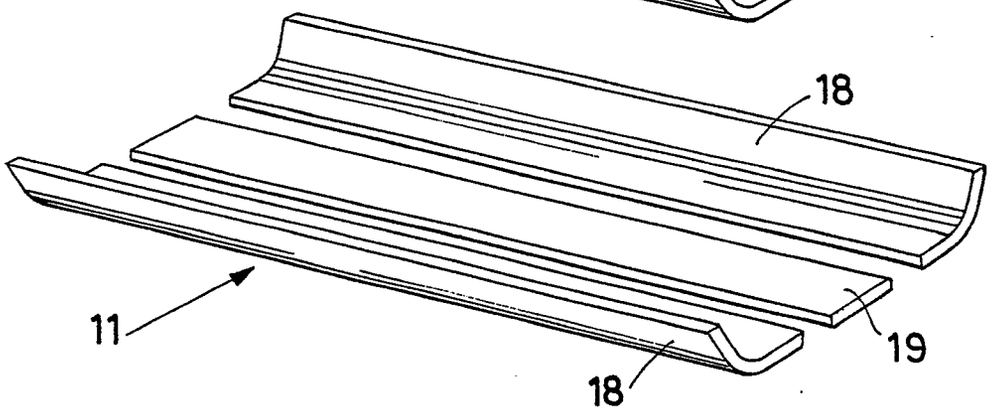

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2430

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)
X	GB-A-2 040 676 (EDWARD CURRAN LTD) * Page 1, line 87 - page 2, line 26; figures 1-4 *	1,3,4,9	A 47 K 3/02
Y		2,10,11	
Y	FR-A-2 356 399 (FIRME BUDERUS'SCHE EISENWERKE) * Page 1, lines 4-11; page 2, line 34 - page 3, line 29; figure *	2,10,11	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 47 K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21-12-1989	PORWOLL H.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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