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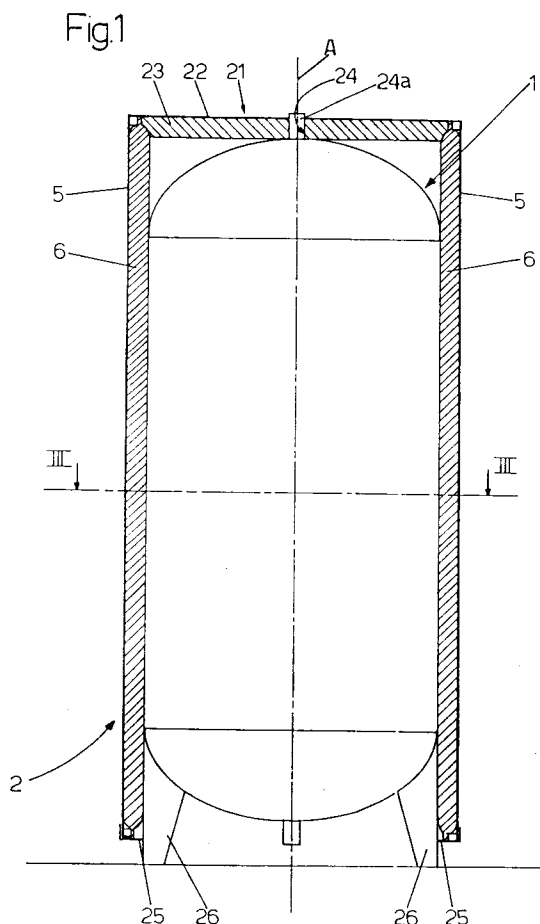
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AT CH DE ES FR GB IT LI SE(71) Applicant: **CIB S.r.l.**
Via Strada Statale 16, 2502/A
I-45038 Polesella(IT)(72) Inventor: **Bulgari, Luca**
Via della Repubblica, 32
I-45038 Polesella(IT)(74) Representative: **Jorio, Paolo et al**
Studio Torta,
Via Viotti, 9
I-10121 Torino (IT)(54) **Insulating system particularly for cylindrical hot-water tanks.**

(57) An insulating system for a cylindrical hot-water tank (1) is described. This system comprises an insulating structure (2) of modular type which has a cylindrical peripheral wall and an upper closure wall. The main characteristic of the present invention lies in the fact that the peripheral wall of the structure (2) comprises a plurality of panels (3) each of which includes at least two circular-circuate, profiled metal sections (8) arranged with their longitudinal axes horizontal, a metal sheet (5) fixed to the metal sections (8) so as to determine its curvature, and a layer (6) of thermally insulating material fixed to the inner face of the metal sheet (5).

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The present invention relates to an insulating system particularly for cylindrical hot-water tanks.

It is known that insulating systems are fitted to cylindrical hot-water tanks and comprise an insulating structure which covers the tank in close contact therewith and also has a cylindrical shape. The insulating structure is constituted by a flat polyvinyl chloride sheet which is curved during the covering stage so as to have an annular shape in section. Before the covering stage, a layer of glass wool is glued to the inner face of the sheet which will face the tank.

The insulating system described above has numerous disadvantages.

In particular, polyvinyl chloride is a material which, as well as having poor mechanical characteristics, is photosensitive. In fact it is known that polyvinyl chloride has a short working life in that it stiffens with time, losing its mechanical characteristics and elasticity. Moreover the polyvinyl chloride sheet, if subject to mechanical stress, may break (fragment) or become permanently deformed. Polyvinyl chloride degrades if subjected to ultra-violet radiation and atmospheric agents and expands permanently if close to heat sources. If the glue used for fixing the glass wool has a chlorinated base, the polyvinyl chloride degrades since chlorides alter its molecular structure; for this reason it is necessary to use a suitable glue. Finally, polyvinyl chloride cannot easily be broken down or recycled, with all the disadvantages resulting therefrom as regards environmental pollution.

The object of the present invention is to provide an insulating system which does not have the disadvantages mentioned above.

On this basis, the present invention provides an insulating system for a cylindrical hot-water tank comprising an insulating structure of modular type which has a cylindrical peripheral wall and an upper closure wall, characterised in that the peripheral wall of the structure comprises a plurality of panels each of which includes at least two circular-arcuate, profiled metal sections arranged with their longitudinal axes horizontal, a sheet of metal fixed to the metal sections so as to determine its curvature, and a layer of thermally insulating material fixed to the inner face of the metal sheet.

In order to provide a better understanding of the present invention, a preferred embodiment will now be described purely by way of non-limitative example, with reference to the appended drawings, in which:

Figure 1 is a section of an insulating system applied to a hot-water tank;

Figure 2 is a view of a detail of the system of Figure 1 on an enlarged scale;

Figure 3 is a section taken on the line III-III of Figure 1 on a slightly enlarged scale;

Figure 4 is a view of a detail of Figure 3 on an enlarged scale;

Figure 5 is a perspective view of a component of the system of Figure 1 on an enlarged scale.

Figure 1 shows an insulating system applied to a cylindrical hot-water tank 1 commonly called a boiler. The insulating system comprises an insulating structure 2 which covers the tank 1 and which, for this purpose, has a cylindrical shape which is adapted to the shape of the tank 1. This structure 2 has a cylindrical shape with axis A and, in particular, is constituted by a cylindrical peripheral wall with axis A and an upper circular wall lying in a horizontal plane and sealing the structure 2.

As illustrated in Figure 3, the structure 2 is of modular type in that its peripheral wall is defined by a plurality of part-cylindrical panels 3 connected together. Each panel 3 comprises a metal sheet 5 and a sheet 6 of thermally insulating material applied to the inner face of the sheet 5. The layer 6 may be of glass wool, polyurethane, expanded polystyrene, polystyrene, phenolic resin or ureic resin.

With reference to figures 3 to 5, the sheet 5 has a rectangular outline and thus has four edges, two horizontal and two vertical. Two flanges 7 are formed along the vertical edges of the sheet 5 and are formed by inward bending of portions of the sheet 5 close to these edges. The panel 3 has two profiled metal sections 8 the lengths of which lie on circular arcs and which are channel-shaped in section. In use, the sheet 5 is flat and is fitted and fixed to the profiled sections 8 so as to take up the curvature thereof. Each profiled section 8 has, in cross-section, a central portion 11 which lies in a vertical plane and two parallel flanges 12 lying in respective horizontal planes. The sheet 5 is welded to the outer faces of the portions 11 by welds 13. The upper flange 12 of the upper profiled section 8 is at substantially the same level as the upper edge of the sheet 5 and, similarly, the lower flange 12 of the lower profiled section 8 is at substantially the same level as the lower edge of the sheet 5. Naturally different means for fixing the sheet 5 to the profiled sections 8 may be used and, in particular, screws, upset rivets, or other equivalent systems.

The layer 6 may be fixed to the inner face of the sheet 5 by glue or by mechanical fixing systems such as those illustrated in Figure 2 which provide for the deposit of the layer 6 on the inner face of the sheet 5, with the profiled section 8 attached thereto so that an upper edge portion of the layer 6 is in correspondence with the edges of the flanges 12 of the upper profiled section 8 and, similarly, a lower edge portion of the layer 6 is in correspondence with the edges of the flanges 12 of the lower profiled section 8. Each edge portion of

the layer 6 is pressed towards the corresponding flanges 12 by a respective plate 14. A screw 15 with a threaded shank is passed in succession through a hole 16 in the sheet 5, a hole 17 formed in the portion 11, through the said edge portion of the layer 6 and is screwed into a threaded hole 18 in the plate 14. The screwing of the shank of the screw 15 into the hole 18 draws the plate 14 towards the flanges 12 and hence compresses the said edge portion of the layer 6 between the plate 14 and the flanges 12, ensuring effective anchoring of the layer 6 to the sheet 5. Several fixing points may be provided for each profiled section 8 with the use of several small plates 14 or a single plate 14 of semi-circular shape corresponding to that of the profiled section 8.

With reference to Figures 1 and 2, the upper wall of the structure 2 is constituted by a panel 21 comprising a metal sheet 22 and a layer of thermally insulating material 23 fixed to the inner face of the sheet 22. In use, the layer 23 remains in the space enclosed between the plates 14 while the diameter of the sheet 22 is substantially equal to the diameter of the peripheral wall of the structure 2. The fixing of the layer 23 to the sheet 22 may be of the same type as the fixing of the layer 6 to the sheet 5. The panel 21 is formed with a through hole 24 along the axis A engaged by a pin 24a projecting from the tank 1; this engagement centres the structure 2 on the tank 1.

In use, once the panels 3 have been formed, they are placed alongside each other so as to define the cylindrical peripheral wall of the structure 2. More particularly, the flanges 7 of adjacent sheets 5 come into contact with each other as shown in Figure 4. For this purpose, it should be stressed that it is possible to make use of the arrangement of the flanges 7 described above for fixing these flanges 7 together by screws, upset rivets, or welding and hence for fixing a panel 3 to the adjacent panel 3.

Once the peripheral wall of the structure 2 has been formed, this wall is fitted onto the tank 1 which has L-shaped support brackets 25 on its own feet 26, which brackets are engaged by the lower edge of the peripheral wall of the structure 2. Next the panel 21 is installed on the upper edge of the peripheral wall of the structure 2. Due to the presence of the plates 14, the layer 23 remains compressed between these and between the upper regions of the layers 6 as is well illustrated in figure 2. The peripheral ring of the sheet 22 which extends beyond the layer 23 rests on the upper edge of the peripheral wall of the structure 2 and on the flanges 12 of the upper profiled sections 8. Moreover a system for fixing this peripheral ring of the sheet 22 to the upper profiled sections 8 is provided; this fixing system comprises a plurality of

screws 27 (of which only one is illustrated in Figure 2) with threaded shanks. Each screw 27 passes through a respective hole 28 in the sheet 22 and is screwed into a corresponding hole 31 in the upper flange 12 of the upper profiled section 8. An annular element 32 of inverted L-section is finally fitted onto the upper edge of the structure 2.

As illustrated in Figure 1, the inner diameter of the structure 2, that is, in essence, the thickness of the layers 6, is such as to cause this to contact the peripheral surface of the tank 1. The thickness of the layer 23 is such that it contacts the upper part of the tank 1.

From what has been described above, the advantages achieved by the present invention will be apparent.

In particular, an insulating system is provided in which the insulating structure includes insulating material supported by metal sheets which have mechanical properties and resistance to ultra-violet radiation, atmospheric agents and heat which are considerably better than those of polyvinyl chloride. Moreover the molecular structure of the metal sheets is not affected by the type of glue used whereby it is possible to use any type of glue including chlorinated compounds. With the use of metal sheets as the support for the thermally insulating material, it is possible to install this either by gluing or by mechanical fixing systems. In the latter case, the insulating system may fall within Class O of the Italian classification of insulating systems; Class O constitutes a clear improvement over Class 1 in which current insulating systems are classified. As described and illustrated, both the panels and the insulating structure are easy to assemble and also the metal components in this structure can easily be separated from the plastics materials. All this results in an undoubted simplification, and inter alia lower costs, in the production of the various panels of the structure, and enables individual components to be recycled properly and effectively and also enables individual components to be replaced with significant economic advantages.

Finally it is clear that modifications and variations may be made to the insulating system described and illustrated herein without thereby departing from the protective scope of the present invention.

In particular, the insulating structure may have a different number of components from that illustrated and, in particular, there may be fewer or more of the panels 3 than the four illustrated. Finally, the number and cross-sectional shape of the profiled sections 8 may be different from those illustrated.

Claims

1. An insulating system for a cylindrical hot-water tank (1) comprising an insulating structure (2) of modular type which has a cylindrical peripheral wall and an upper closure wall, characterised in that the peripheral wall of the structure (2) comprises a plurality of panels (3) each of which includes at least two circular-circuate profiled metal sections (8) arranged with their longitudinal axes horizontal, a sheet (5) of metal fixed to the metal sections (8) so as to determine its curvature, and a layer (6) of thermally insulating material fixed to the inner face of the metal sheet (5). 5 10 15
2. A system according to Claim 1, characterised in that the metal sheet (5) has a rectangular outline and hence has four edges, two horizontal and two vertical; respective flanges (7) are formed along the vertical edges and are defined by the inward bending of portions of the sheet (5) close to these vertical edges. 20
3. A system according to Claim 2, characterised in that one of the flanges (7) of one of the panels (3) is in contact with one of the flanges (3) of an adjacent panel (3). 25
4. A system according to Claim 3, characterised in that it includes first fixing means for fixing the flanges (7) of adjacent panels (3) together. 30
5. A system according to at least one of the preceding claims, characterised in that each of the profiled metal sections (8) is channel-shaped in cross-section and thereby includes a central portion (11) lying in a vertical plane and two parallel side portions (12) lying in respective horizontal planes; the sheet (5) being fixed to the outer face of the central portions (11) of the profiled sections (8). 35 40
6. A system according to Claim 5, characterised in that it includes second fixing means for fixing the plate (5) and the corresponding profiled sections (8) together; the second means being selected from screws, upset rivets and welds (13). 45 50
7. A system according to at least one of claims 2 to 6 as dependent from Claim 2, characterised in that each of the panels (3) includes two profiled sections (8), one in correspondence with the horizontal upper edge of the sheet (5) and the second in correspondence with the lower horizontal edge of the sheet (5). 55
8. A system according to at least one of the preceding claims, characterised in that the layer (6) is fixed to the inner face of the sheet (5) by glue.
9. A system according to at least one of claims 1 to 7, characterised in that the layer (6) is fixed to the inner face of the sheet (5) by third mechanical fixing means.
10. A system according to Claim 9 as dependent from Claim 7, characterised in that the third fixing means comprise plates (14) adapted to compress edges of the layer (6) against the profiled sections (8) and screws for fixing the plates (14) to the corresponding profiled sections (8).
11. A system according to at least one of the preceding claims, characterised in that the upper wall of the structure (2) includes a second metal sheet (22) fixed by fourth fixing means to the peripheral wall of the structure and a second layer (23) of thermally insulating material fixed to the inner face of the second sheet (22).
12. A system according to at least one of the preceding claims, characterised in that the thermally insulating material is selected from glass wool, polyurethane, expanded polystyrene, polystyrene, phenolic resin or ureic resin.

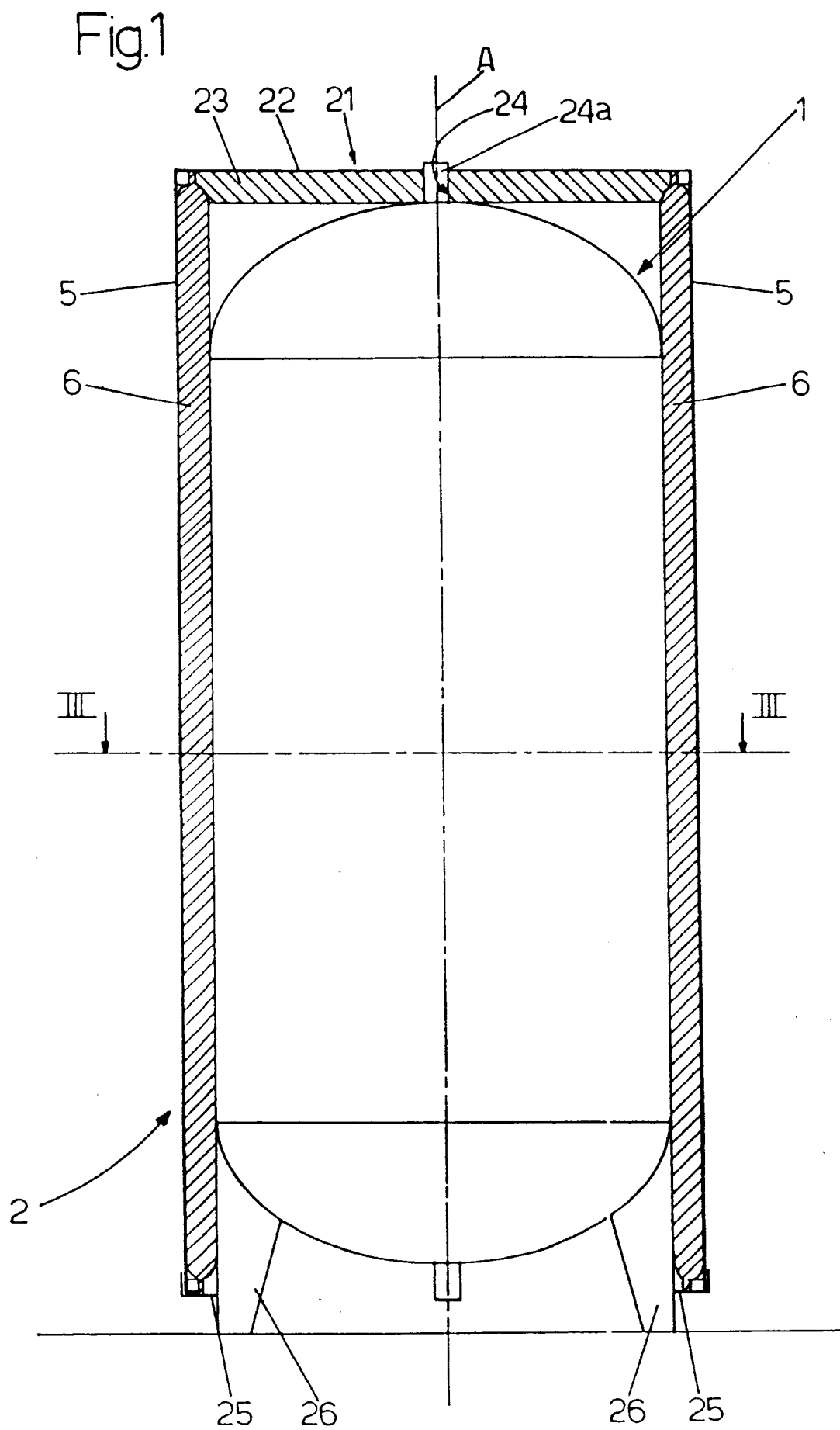


Fig.2

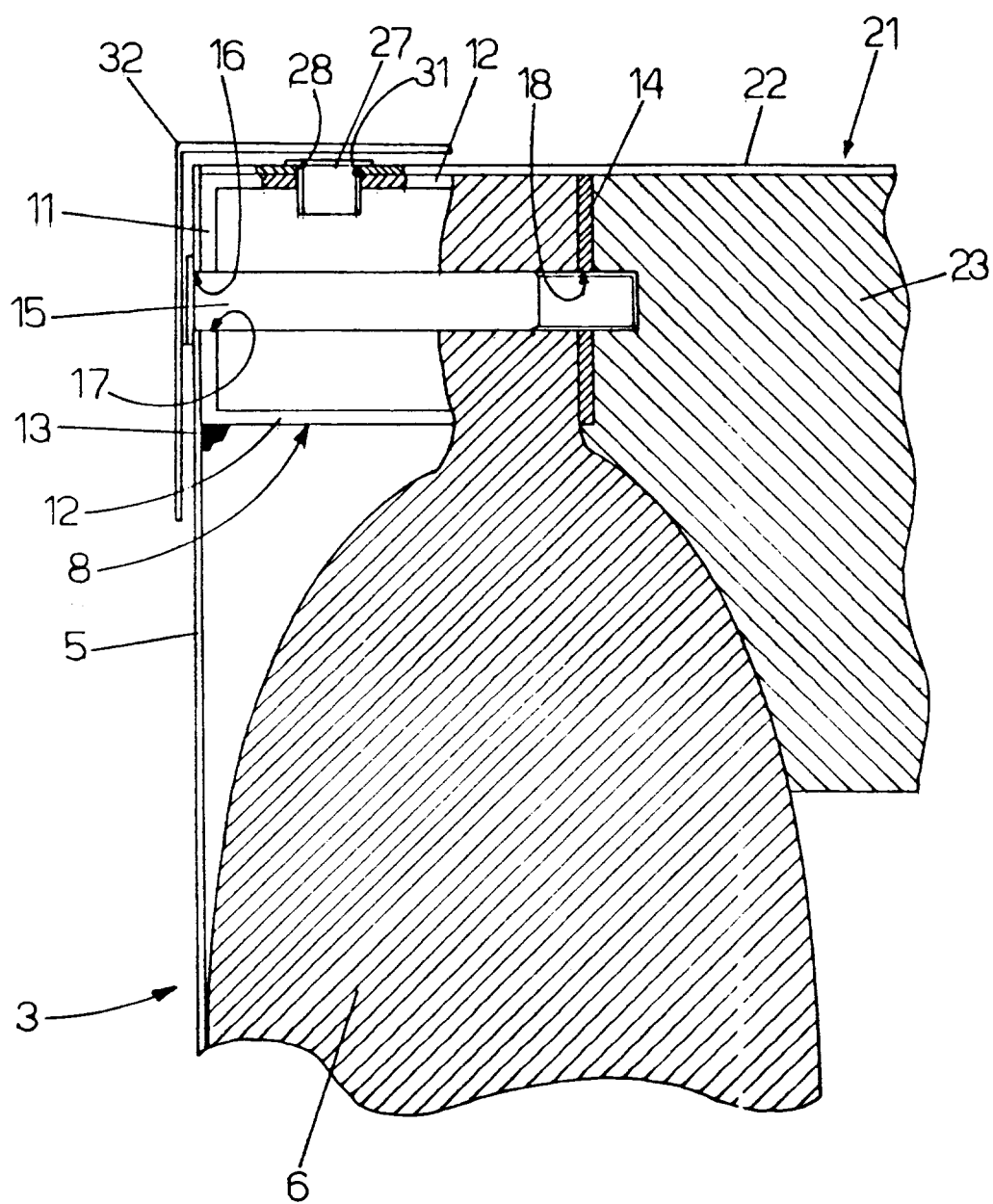


Fig. 4

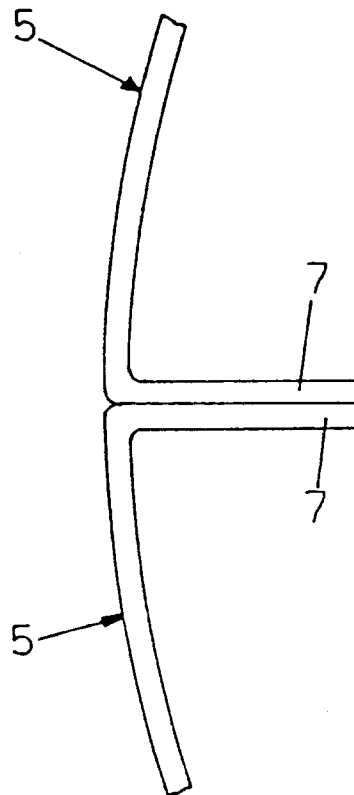


Fig. 3

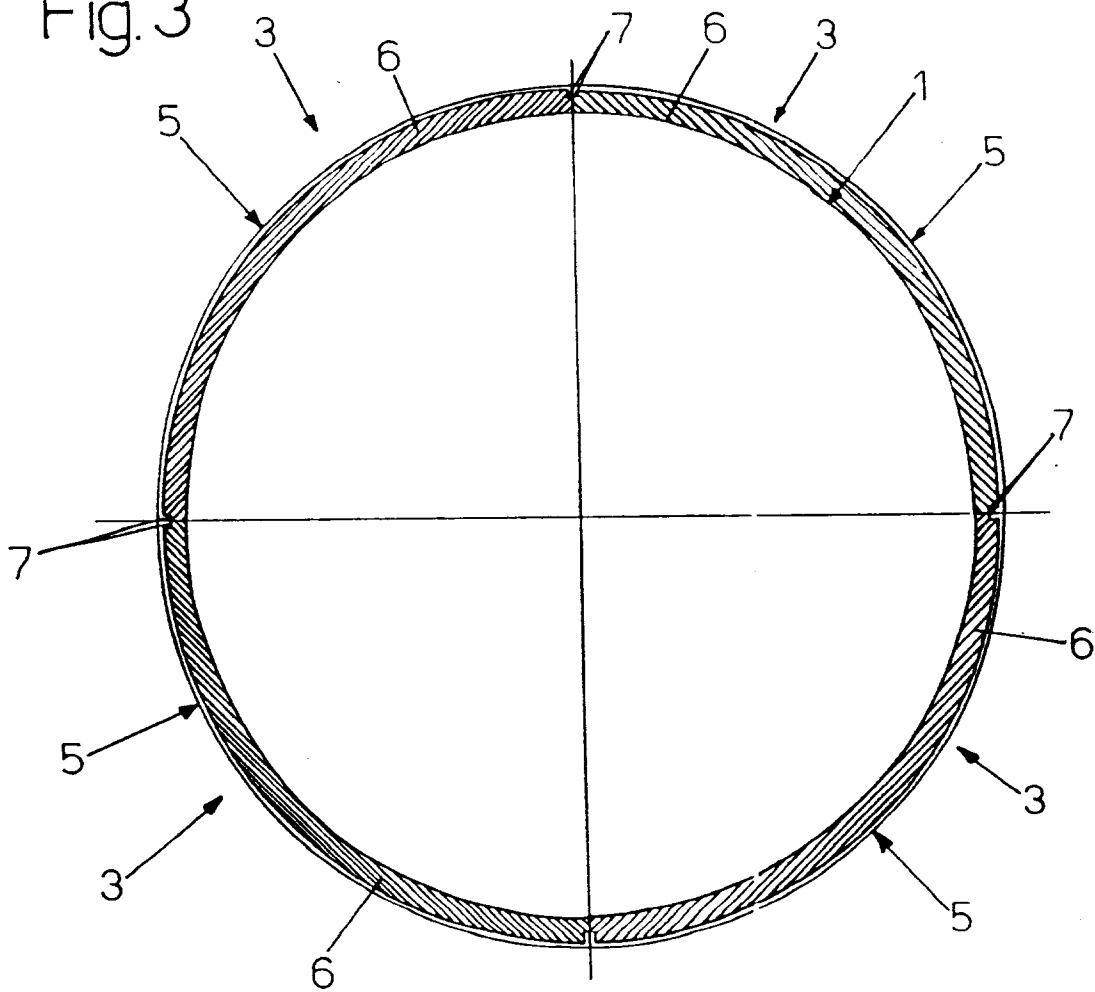
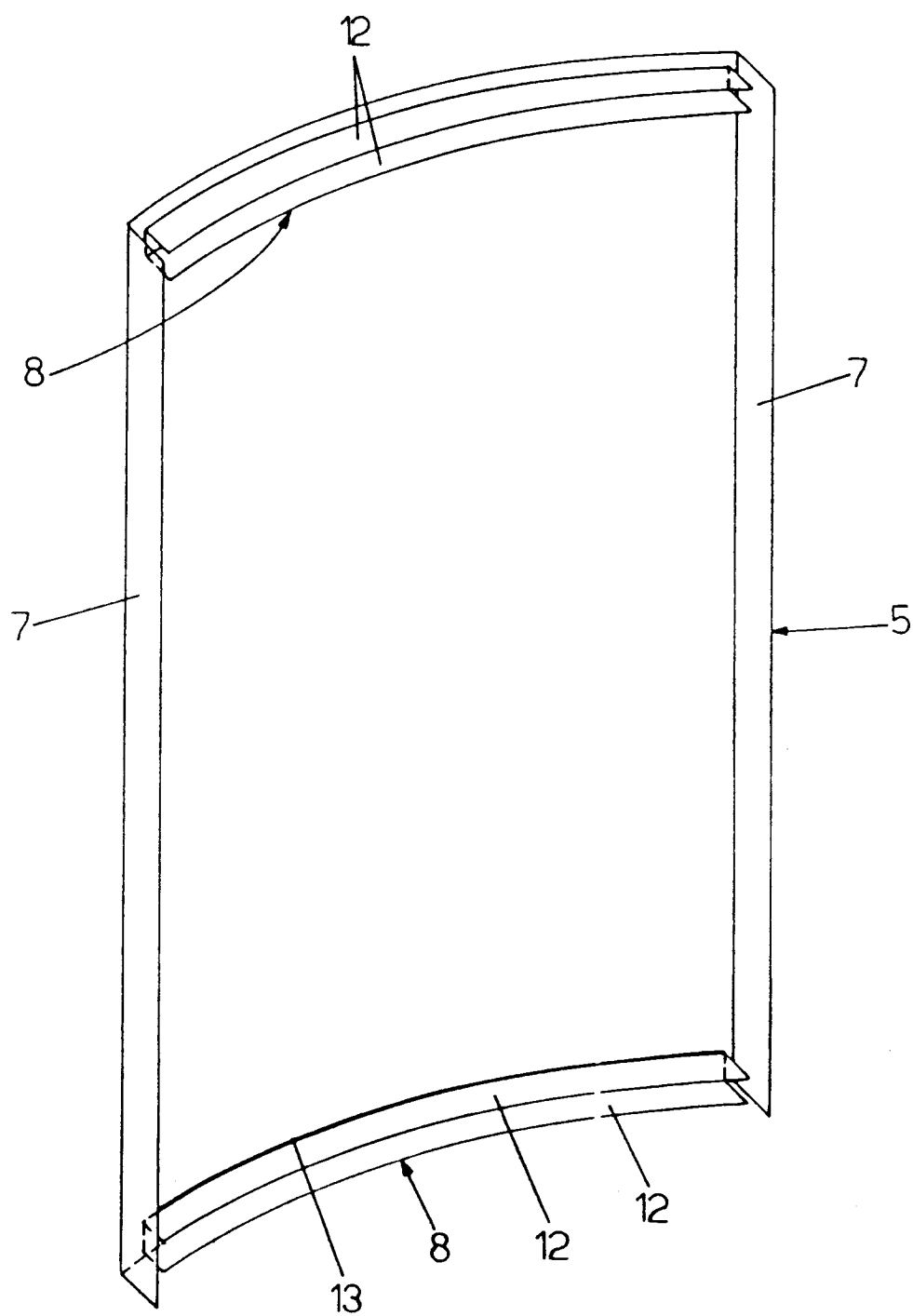


Fig.5





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EUROPEAN SEARCH REPORT

Application Number
EP 93 12 0818

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)
A	CH-A-522 183 (ORTLIEB) * the whole document * ---	1-3, 11, 12	F24H1/18
A	FR-A-2 548 338 (PRODUCTIONS GIANOLA) * figures * ---	1-3, 11, 12	
A	EP-A-0 030 930 (SEMPERIT AKTIENGESELLSCHAFT) * abstract * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			F24H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 March 1994	Examiner Van Gestel, H
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