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(54) **Plastic tub for a clothes washing machine**

(57) A plastic tub for a clothes washing machine, in particular a washing machine of front-loading type, comprising a front shell (10) and a rear shell (11), the rear shell being formed by a cylindrical envelope (12) and a rear wall (13) provided with reinforcing ribs, a passing through hub (18) provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub, said hub (18) being made by cast iron

over injected by plastic material.

The rear circular wall (13) of the rear shell (11) is shaped with a plurality of ribbed circular sectors (14,15) alternatively oriented in opposite axial direction, and at least one circular crown of radial ribs (21) is provided around the hub.

The tub structure results with a reduced and constant thickness of the rear part of the tub, so as the injection moulding cycle for producing it is correspondingly reduced.

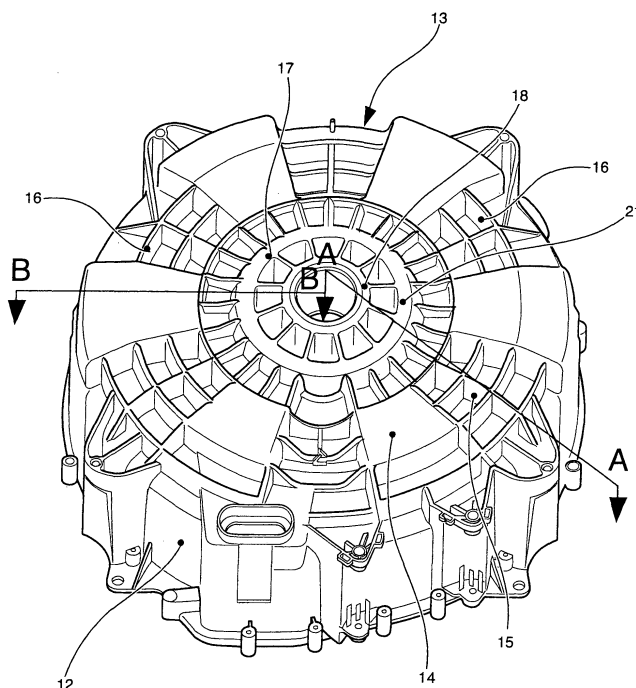


FIG.2

Description

[0001] The present invention relates to a new tub for a clothes washing machine, in particular a washing machine of front-loading type, said tub being made of plastic material and provided with an improved rear wall.

[0002] Plastic washing tubs for clothes washing machines are well known and substantially comprise a rigid structure forming a peripheral cylindrical envelope and a rear circular wall.

[0003] Usually, in correspondence of the rear wall of the tub, reinforcing ribs are integrally provided so as to increase the strength of the structure. In a preferred way, said ribs are arranged both circularly and radially in respect to the central portion of the rear wall.

[0004] A passing through hub is provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub.

[0005] Plastic washing tubs of this type are disclosed, for instance, in GB 2 261 881, EP 0 736 117 and EP 0 835 729.

[0006] At present, a washing tub is produced in a two-pieces construction, i.e. a front shell and a rear shell, by injection moulding of plastic material. The two shells are joined together by using any known means. Of course, the hub is provided in the centre of the rear shell.

[0007] Such a solution ensures both the support of the drum shaft and a watertight sealing of the tub, but has the drawback that the hub itself is directly exposed to the relatively high temperatures to which the washing liquor is usually heated up, said washing liquor touching directly the central portion of the rear shell.

[0008] This fact, owing to the mechanical action exerted by the rotating shaft against said hub, leads to a gradual stressing of the plastic material which, after a certain period, undergoes an aging process with a decay in its overall mechanical properties.

[0009] Therefore, in order to overcome this drawback the hub in the rear shell is made in cast iron and is embedded in the over injected plastic material.

[0010] This known solution, however, provides a large and not uniform thickness for the section of the rear shell, due to the mechanical constraints in the ejection from the mould. As a consequence, the tub moulding requires a long cycle time which reduces the moulding productivity and results in a costly working process.

[0011] It is therefore a purpose of the present invention to provide a plastic tub for a clothes washing machine having improved structural and functional characteristics with respect to prior art tubs, which is capable of ensuring long-term resistance to risks of decay and resulting loosening of the hub.

[0012] Another purpose of the present invention is to maintain the tub structure of a clothes washing machine of current type, but with a reduced and constant thickness of the rear part of the tub, so as the injection moulding cycle for producing it is correspondingly reduced.

[0013] According the present invention, this purpose is achieved by a washing tub as described in the appended claims.

[0014] The invention will be better appreciated from the following description given solely by way of non-limiting example and with reference to the accompanying drawings in which:

- Figure 1 shows schematically a perspective exploded view of a tub for washing machine according to the present invention;
- Figure 2 shows a perspective view of the rear shell of the tub represented in Figure 1;
- Figure 3 shows a partial section of the rear shell of the tub of Figure 2, taken along line A-A; and
- Figure 4 shows a partial section of the rear shell of the tub of Figure 2, taken along line B-B.

[0015] A tub for washing machine according with the present invention is schematically shown in Figure 1, wherein a front tub shell 10 and a rear tub shell 11 are represented in a perspective exploded view. The front shell 10 and the rear shell 11 are generally made by injection moulding of plastic material and are assembled by any known means, e.g. screws.

[0016] The rear shell 11 is substantially formed by a rigid body having a peripheral cylindrical envelope 12 and a rear circular wall 13.

[0017] The rear shell 11 is represented as a perspective view in Figure 2, this view being taken from the rear bottom of the tub.

[0018] According with a feature of the invention, the rear circular wall 13 shows a profile which is made of alternate sectors 14, 15, inwardly and outwardly directed, respectively, with respect to the axis of symmetry of the tub. Said sectors are developed along a circular crown, which starts from the external edge of the shell and extends to about half of the radius of the shell.

[0019] The shell in Figure 2 presents six sectors 14 and six sectors 15, but it is easy to understand that a different number of them may be carried out depending on the requested design of the tub.

[0020] Each of the sectors 14, 15 is shaped with ribs 16 which run both in radial and circular direction, mutually crossing, so as the strength of the rear shell is increased. According with a main feature of the invention, the rear circular wall 13 of the shell 11 is provided with a special profile in correspondence of its internal annular portion 17 which surrounds a central hub 18 for the spindle for the drum (not represented), as disclosed here below.

[0021] Figure 3 shows a schematic section of the rear shell 11, taken along line A-A of Figure 2, wherein the cylindrical envelope 12 and the central hub 18 are represented. The hub 18 is normally made with a core 19 of cast iron and is over injected by plastic material 20.

[0022] The plastic coating 20 has a constant thickness, as shown, but it ensures a stiffness comparable

to that of the previous known solution, which had a bigger plastic coating. This is due thanks to the additional crown of radial ribs 21 that is provided between the hub 18 and the envelope 12. There is also to note that the radial ribs 21 are connected together with the cylindrical envelope 12 through the ribbed sectors 15 of the rear wall 13. Moreover, between the rib 21 and ribs 15 is interposed a flat ring 22 which is substantially parallel to the rear wall 13, i.e. orthogonal to the rotation axis of the rear shell 12, see Figures 3 and 4.

[0023] Therefore, the bottom surface 22 of said circular crown of radial ribs 21 is in a plane different from those of the circular sectors 14,15. More precisely, the bottom surface 22 of said circular crown of radial ribs 21 is in a plane which is intermediate between the planes of adjacent circular sectors 14,15.

[0024] Thanks to the disclosed technical solution, the thickness of the plastic material over injected on the hub (18) may be steady all around the hub and substantially even to that of the ribs (14,15,21) on the rear wall (13) of the rear shell (11).

[0025] Of course, the whole shell 12 is integrally moulded and its specific profile is also designed with planes and undercuts, so as its extraction from the mould may be particularly easy and advantageous.

ised in that the thickness of the plastic material over injected on the hub (18) is steady all around the hub and substantially even to that of the ribs (14,15,21) on the rear wall (13) of the rear shell (11).

Claims

1. A plastic tub for a clothes washing machine, in particular a washing machine of front-loading type, comprising a front shell (10) and a rear shell (11), the rear shell being formed by a cylindrical envelope (12) and a rear wall (13) provided with reinforcing ribs, a passing through hub (18) provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub, said hub (18) being made by cast iron over injected by plastic material, **characterised in that** the rear circular wall (13) of the rear shell (11) is shaped with a plurality of ribbed circular sectors (14,15) alternatively oriented in opposite axial direction, and at least one circular crown of radial ribs (21) is provided around the hub.
2. A plastic tub according to claim 1, **characterised in that** the bottom surface (22) of said circular crown of radial ribs (21) is in a plane different from those of the circular sectors (14,15).
3. A plastic tub according to claim 1, **characterised in that** the bottom surface (22) of said circular crown of radial ribs (21) is in a plane which is intermediate between the planes of adjacent circular sectors (14,15).
4. A plastic tub according to claim 1 to 3, **character-**

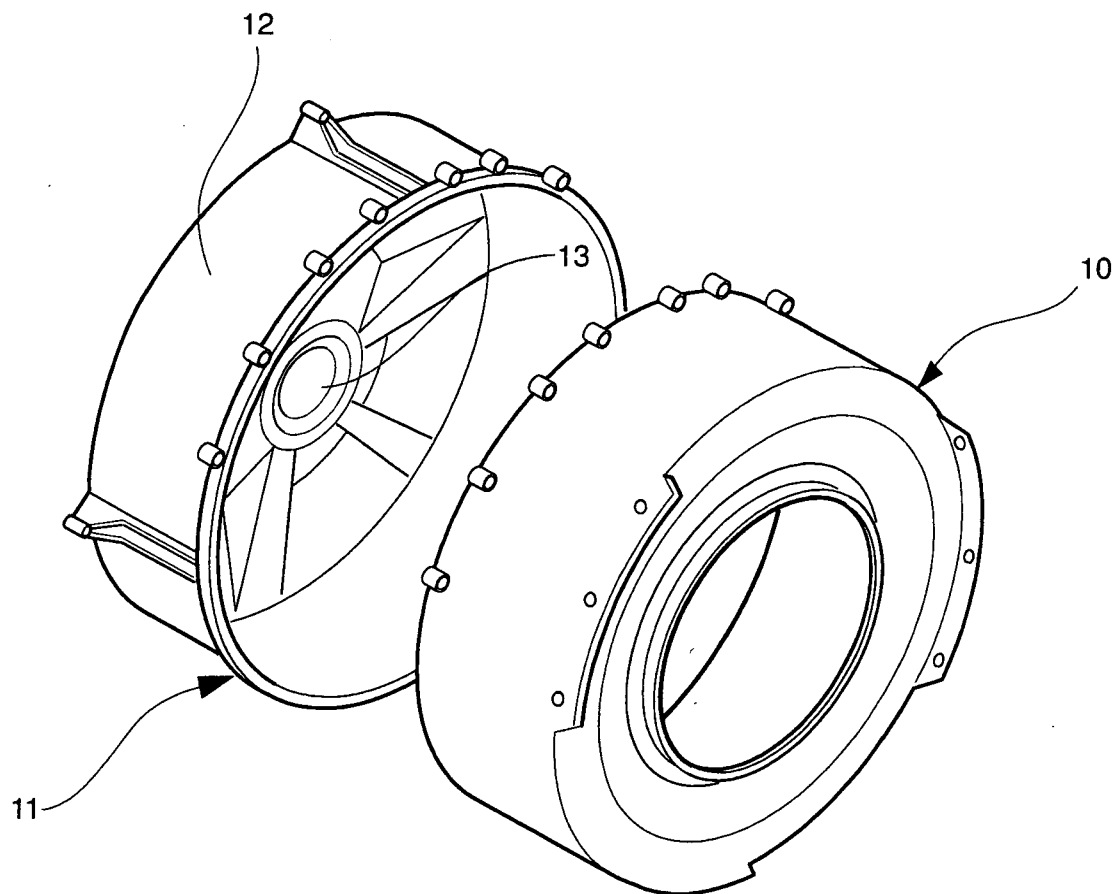


FIG.1

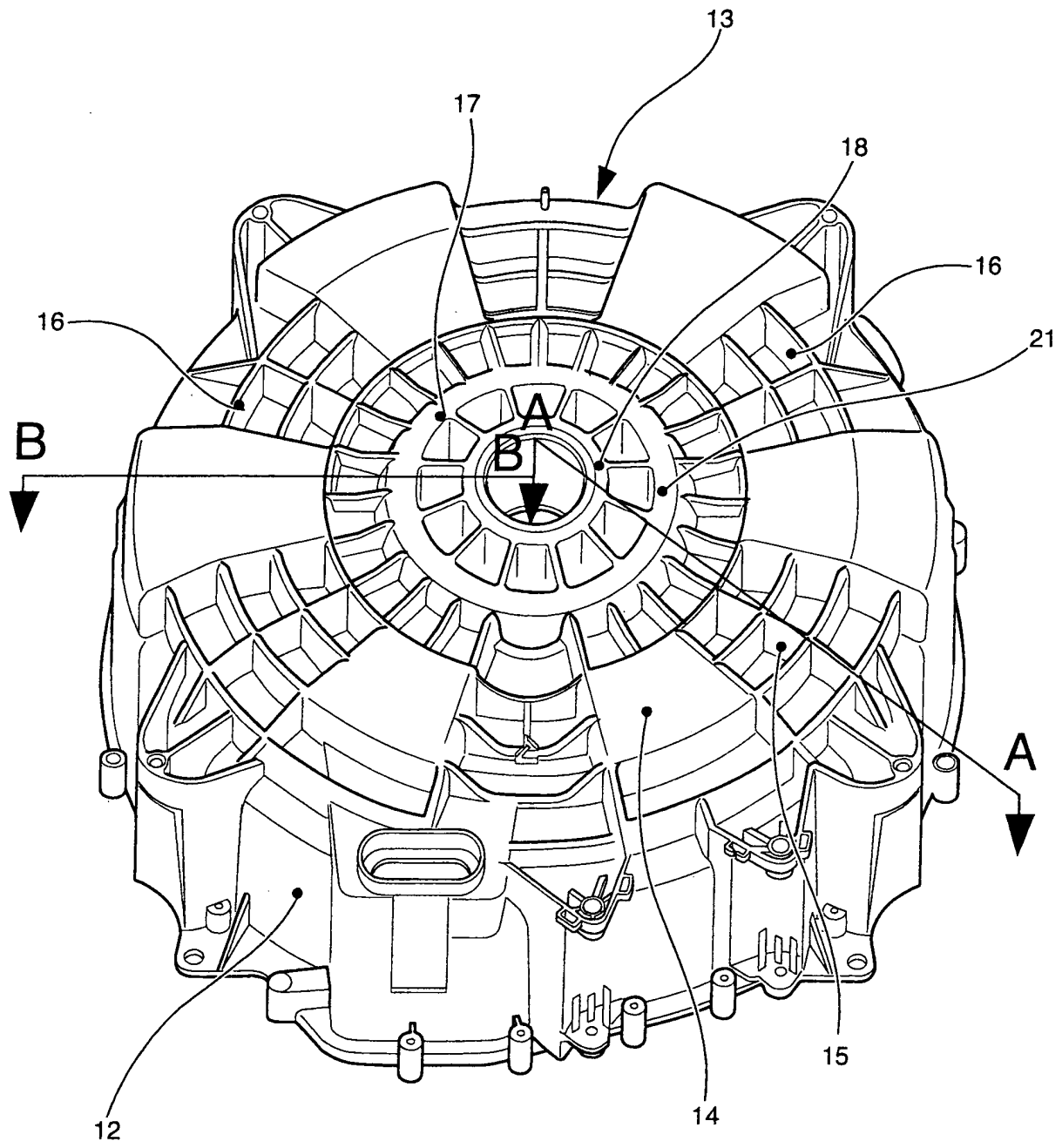
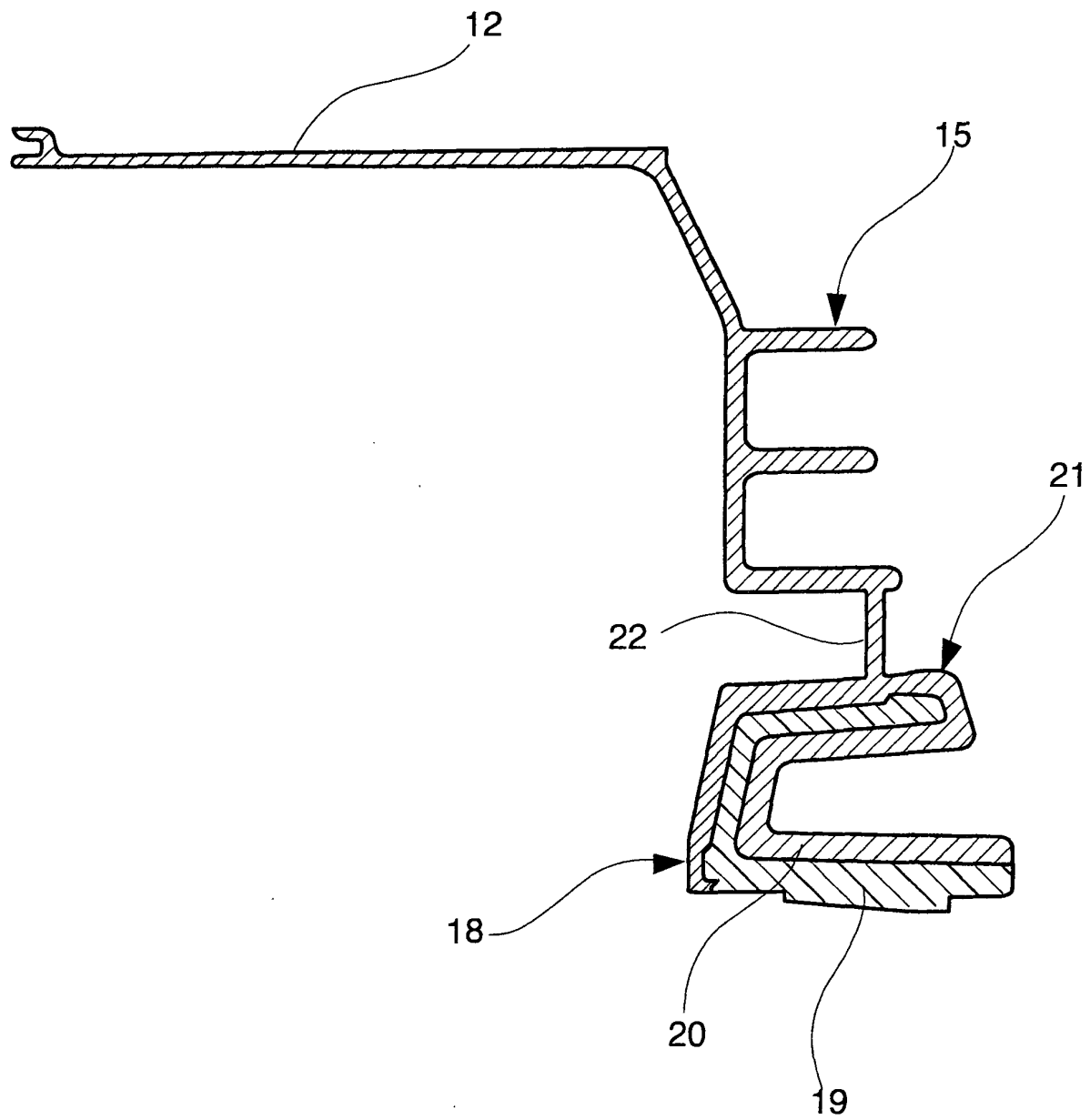


FIG.2



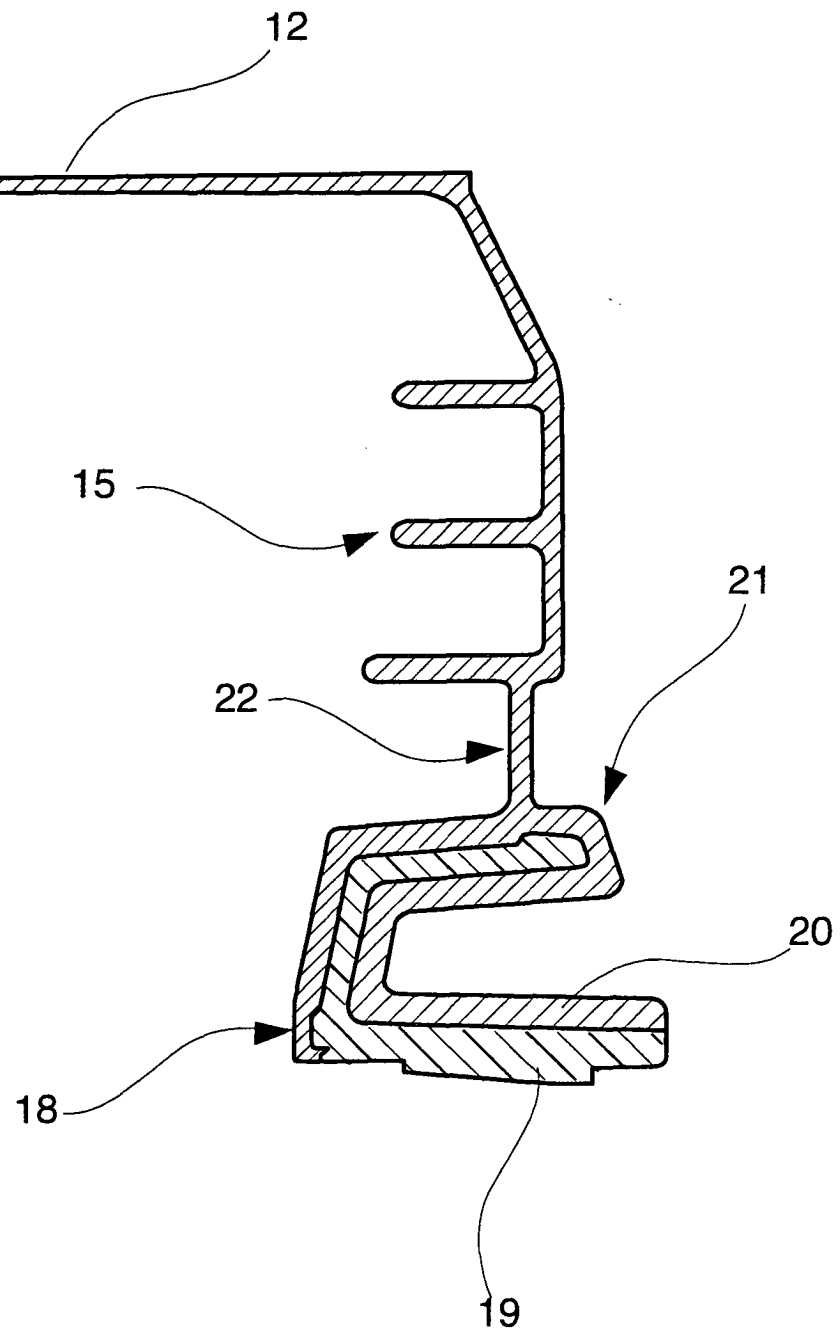


FIG.4



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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 7556

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 29 April 2004	Examiner Falkentoft, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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