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(54) **Drum for a washing machine and washing machine provided with such drum**

Waschmaschinetrommel und Waschmaschine mit einer solchen Trommel.

Tambour de machine à laver et machine à laver avec un tel tambour.

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Description

[0001] The present invention relates to a drum adapted to be rotatably mounted in a washing machine or washer-dryer, said drum having a cylindrical wall provided with perforations and with a plurality of bulges.

[0002] A drum of this kind is shown in EP-A-1028189 in which the bulges or raised sections are oriented towards the interior of the drum. In this known solution the perforations or openings are provided in indentations between the bulges.

[0003] DE-A-4437986 discloses a method to form a cylindrical structure with bulges in form of different polygons. Bulges having a square pattern are disclosed, but no detail is given as far as the perforations and bulge shape are concerned.

[0004] EP-A-935687 discloses a drum for washing machines in which bulges are still oriented towards the interior of the drum, and in which perforations are provided on the edge contours of the bulges.

[0005] The above known solutions do not offer a good combination of a stiff drum and gentle treatment of laundry.

[0006] DE 297 05 226 U1 describes a drum having bulges, according to the preamble of claim 1.

[0007] An object of the present invention is to provide a drum of the type mentioned above which increases the gentleness of laundry treatment in high spin speed drums and in which the stiffness of the drum basket is increased.

[0008] The above object is obtained by a drum claimed in the appended claims.

[0009] One of the main features of the present invention is to provide bulges which are oriented towards the exterior of the drum and in which the perforations are centred within the bulges, whereby each bulge is punched like a frustum of pyramid from the inside of the drum, and each perforation or hole is in the centre of each punch and whereby each bulge has a pyramid shape with a square base.

[0010] According to a preferred feature of the invention, the pyramid-shape bulges are arranged in a rows/columns matrix, in which the position of a column of bulges to the next column of adjacent bulges is offset of 1/3 of the distance between two adjacent rows, which is also the pitch between bulges.

[0011] A particular advantage of the drum according to the invention is the possibility to change the distance of one row of pyramid-shaped bulges to the next one without reducing distance of punched areas. Flat space between bulges will not increase by changing offset. Moreover, changing the offset will not change the shape of the bulges.

[0012] Preferably the bulges are shaped in order to avoid substantially flat area between bulges so that water drops will be immediately on an inclined/deformed surface and then driven towards perforations due to the centrifugal force and funnel-shaped bulges.

[0013] Another important advantage of the present in-

vention is the increase of drum stiffness in bending, which is around 25% if compared to known drums of washing machines.

[0014] Other advantages and features of the present invention will be clear from the following detailed description, provided purely as an example of the invention, with reference to the attached drawings in which:

- Figure 1 is a schematic perspective view of a drum according to the invention adapted to be used in a washing machine;
- Figure 2 is an enlarged view of a detail of the drum shown in figure 1;
- Figure 3 is a detail of figure 2, showing a plan view of a single bulge of the drum; and
- Figure 4 is a cross section along line IV-IV of figure 3.

[0015] With reference to the drawings, a drum 10 of a washing machine comprises a cylindrical metal wall 12 closed at one end by a substantially flat rear wall (not shown) and presenting, on its other end, an opening 14 for loading/unloading laundry (the opening 14 being aligned with a door - not shown - of the washing machine). Even if the drum shown in figure 1 is for the mounting thereof in the tub of a front loading washing machine, nevertheless the drum can have two opposite end walls and it can be used in a top loading washer as well (in this latter a closable opening for loading/unloading laundry being provided in the cylindrical wall of the drum).

[0016] The wall 12 of the drum 10 is provided with a plurality of bulges 16 arranged in a sort of row-column matrix as shown in figures 1 and 2. The columns of the matrix, indicated with reference Y, are all parallel among them and to the rotational axis of the drum 10 as well, indicated with reference R. In the shown example, each column Y is offset 1/3 of the pitch P between each bulge 16. Such offset is indicated with reference K in figure 2. Due to this offset K of adjacent columns of the matrix, it is not possible to identify parallel rows of the matrix, rather "irregular" rows of the matrix of bulges. The applicant has tested this arrangement with others and it has been considered as the preferred one in term either of drum stiffness or gentle treatment of laundry during washing. Nevertheless also a regular matrix pattern of the bulges, or an offset K of different value (for instance a 1/2 offset) offers many technical advantages compared to the prior art and has to be considered within the scope of the present invention.

[0017] Each bulge has a square base and has a centred perforation or hole 18 for the passage of water during the washing/drying process. The distance between adjacent bulges is chosen in order to reduce or avoid any flat surface of the drum therebetween. The holes 18 are obtained by punching the metal sheet of the wall 12 and the direction of punching is from the inside of the drum 10 to the outside thereof, in order to avoid burrs.

[0018] The peculiar shape of each bulge 16 is shown in figures 3 and 4. Since the shape is substantially a frus-

tum of pyramid, at least two different regions can be identified: a first region defined by inclined flat walls 16a radiused by corner zones 16b and a second region defined by a bottom flat wall 16c (top of the frustum of pyramid) in which the corresponding hole 18 is centrally located.

[0019] The above described shape of the bulges 16, together with the hole design, has given a surprising increase of the drum stiffness, particularly with reference to shear and bending. The new design is particularly advantageous in term of its bending stiffness, which is the most important mechanical features when the drum rotates at high speeds, as in the modern high spin speed washers.

Claims

1. Drum (10) adapted to be rotatably mounted in a tub of a washing machine or washer dryer, said drum (10) having a cylindrical wall (12) provided with perforations (18) and with a plurality of bulges (16), said bulges (16) being oriented towards the exterior of the drum and the perforations (18) being substantially centred within the bulges (16), **characterised in that** each bulge (16) has a pyramid shape with a square base.
2. Drum according to claim 1, **characterised in that** each bulge (16) is shaped as a frustum of pyramid.
3. Drum according to any of the preceding claims, **characterised in that** the bulges (16) are arranged in a sort of rows-column matrix in which the columns (Y) are parallel to the axis (R) of the drum (10) and they are offset of a predetermined pitch fraction with reference to adjacent columns (Y).
4. Drum according to claim 3, **characterised in that** the offset (K) is 1/3 of the pitch (P).
5. Drum according to any of claims 2-4, **characterised in that** each bulge (16) has inclined flat walls (16a) radiused by corner zones (16b).
6. Washing machine or washer dryer **characterised in that** it comprises a drum (10) according to any of the preceding claims.

Patentansprüche

1. Trommel (10), ausgeführt um drehbar in einem Bötch einer Waschmaschine oder einer Waschmaschinen-Trockner Kombination montiert zu sein, besagte Trommel (10) eine zylindrischen Außenwand (12) aufweisend, ausgestattet mit Perforationen (18) und einer Vielzahl von Ausbuchtungen (16), besagte Ausbuchtungen (16) in Richtung der Trommelaus-

ßenseite orientiert und die Perforationen (18) im Wesentlichen innerhalb der Ausbuchtungen (16) zentriert, **dadurch gekennzeichnet, dass** jede Ausbuchtung (16) eine Pyramidenform mit einer rechtwinklige Grundfläche hat.

2. Trommel nach Anspruch 1, **dadurch gekennzeichnet, dass** jede Ausbuchtung (16) als stumpfe Pyramide ausgeführt ist.
3. Trommel nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Ausbuchtungen (16) in einer Art Zeilen-Spalten Matrix angeordnet sind, in der die Spalten (Y) parallel zur Achse (R) der Trommel (10) sind und sie um einen vorgegebenen anteiligen Versatz in Bezug zur anliegenden Spalte (Y) versetzt sind.
4. Trommel nach Anspruch 3, **dadurch gekennzeichnet, dass** der Versatz (K) 1/3 der Teilung (P) ist.
5. Trommel nach einem der Ansprüche 2 bis 4, **dadurch gekennzeichnet, dass** jede Ausbuchtung (16) geneigte flache Wände (16a) mit abgerundeten Randzonen (16b) hat.
6. Waschmaschine oder Waschmaschinen-Trockner Kombination, **dadurch gekennzeichnet, dass** sie eine Trommel (10) entsprechend einem der vorhergehenden Ansprüche umfasst.

Revendications

1. Tambour (10) adapté pour être monté à rotation dans une cuve d'un machine à laver ou d'un laveur sécheur, ledit tambour (10) comportant une paroi cylindrique (12) pourvue de perforations (18) et d'une pluralité de bombements (16), lesdits bombements (16) étant orientés vers l'extérieur du tambour et les perforations (18) étant sensiblement centrées dans les bombements (16), **caractérisé en ce que** chaque bombement (16) a une forme pyramidale avec une base carrée.
2. Tambour selon la revendication 1, **caractérisé en ce que** chaque bombement (16) est formé comme un tronc de pyramide.
3. Tambour selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les bombements (16) sont agencés dans une sorte de matrice lignes-colonnes dans laquelle les colonnes (Y) sont parallèles à l'axe (R) du tambour (10) et sont décalées d'une fraction de pas prédéterminée par rapport aux colonnes adjacentes (Y).
4. Tambour selon la revendication 3, **caractérisé en**

ce que le décalage (K) est de $1/3$ du pas (P).

5. Tambour selon l'une quelconque des revendications 2-4, **caractérisé en ce que** chaque bombement (16) a des parois plates inclinées (16a) avec des surfaces de coin pour rayons (16b). 5
6. Machine à laver ou laveur sécheur **caractérisé en ce qu'**il comprend un tambour (10) selon l'une quelconque des revendications précédentes. 10

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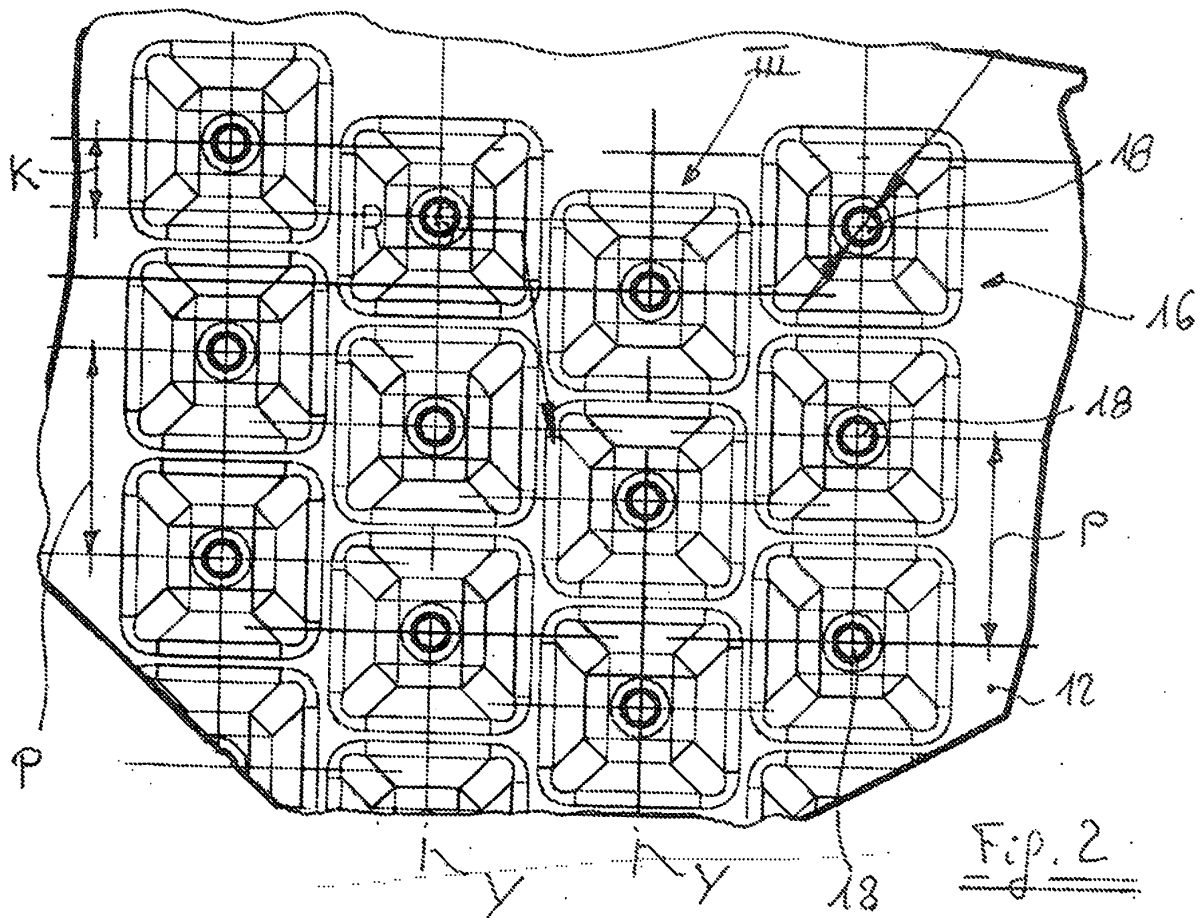
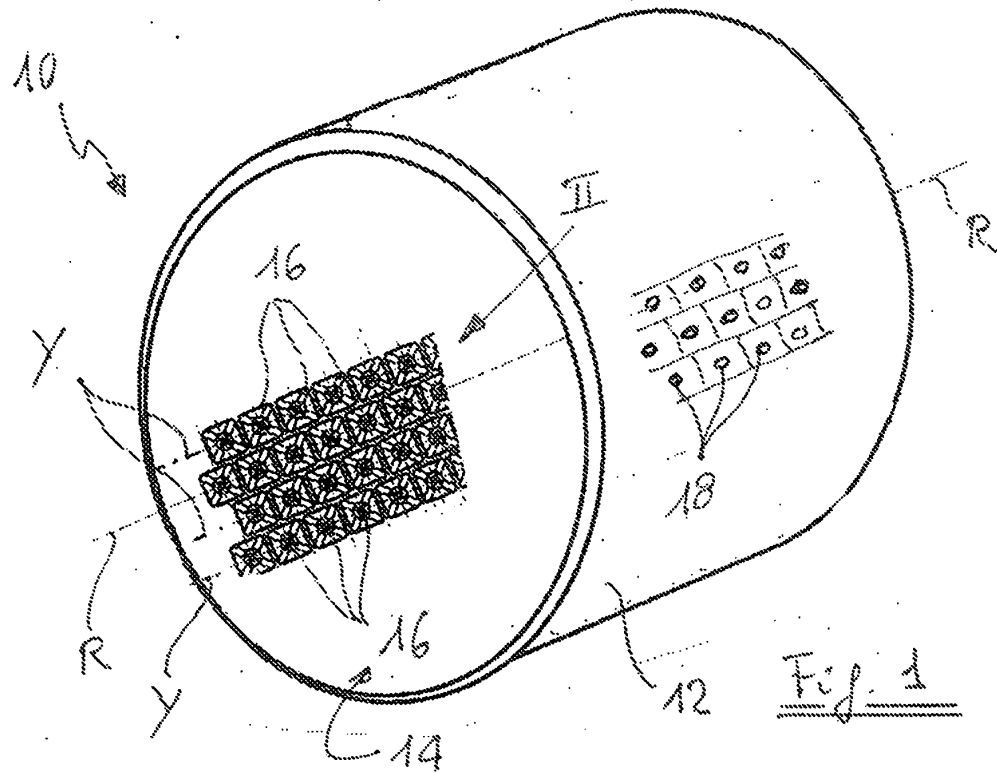
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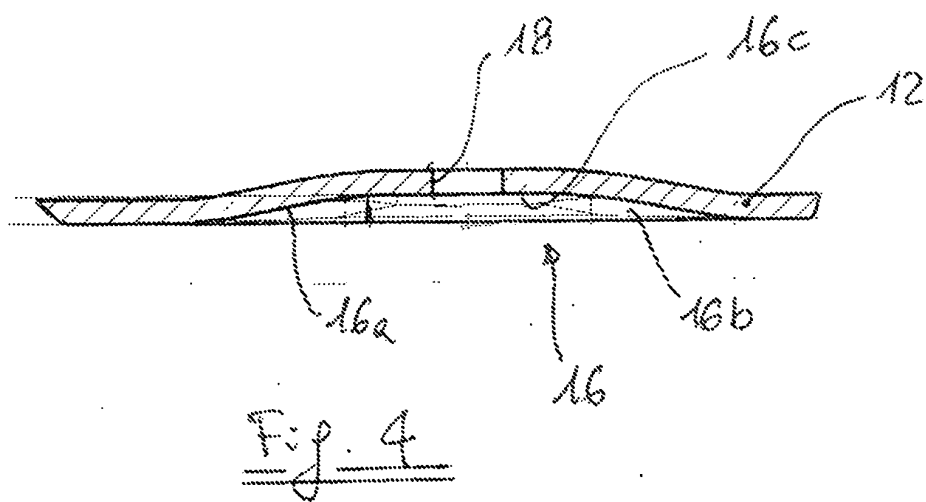
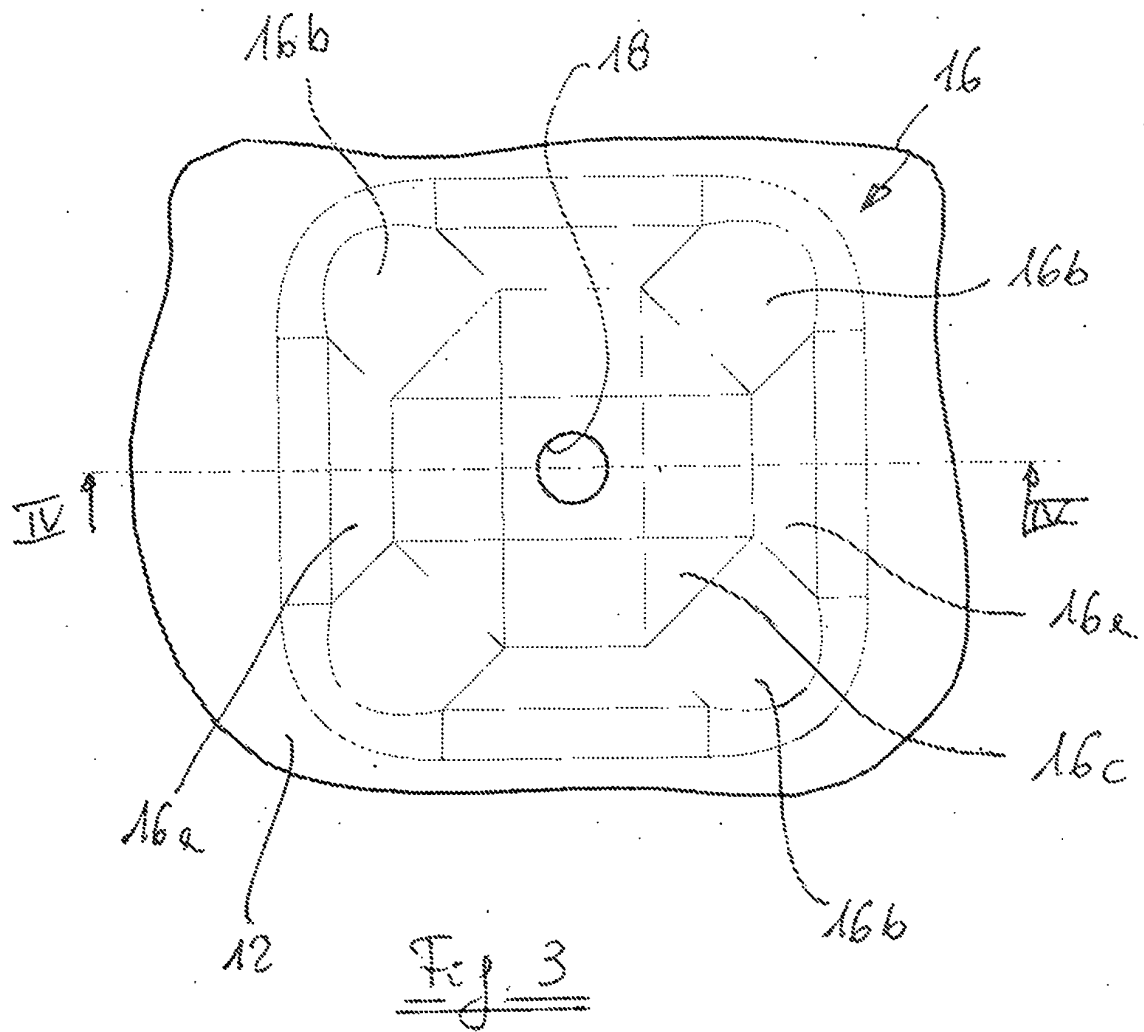
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REFERENCES CITED IN THE DESCRIPTION

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