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(54) **Drum of washing machine**

(57) The invention relates to a drum of a washing machine designed for washing clothes. The sheet (2) of the washing drum (1) is provided with indentations (3) of a bump shape directed towards the inside of the washing drum (1). The indentations (3) are arranged into parallel lines with the central axis of the washing drum (1). The

indentations (3) are mutually shifted in axis parallel with the central axis of the washing drum (1) about the radius of the indentation (3) and about the half of the distance of the flat parts (9). Always an aperture (6) is provided between four indentations (3) on the flat part (9) of the sheet (2), while the contact places of neighbouring indentations (3) are performed as a transitional radius (4).

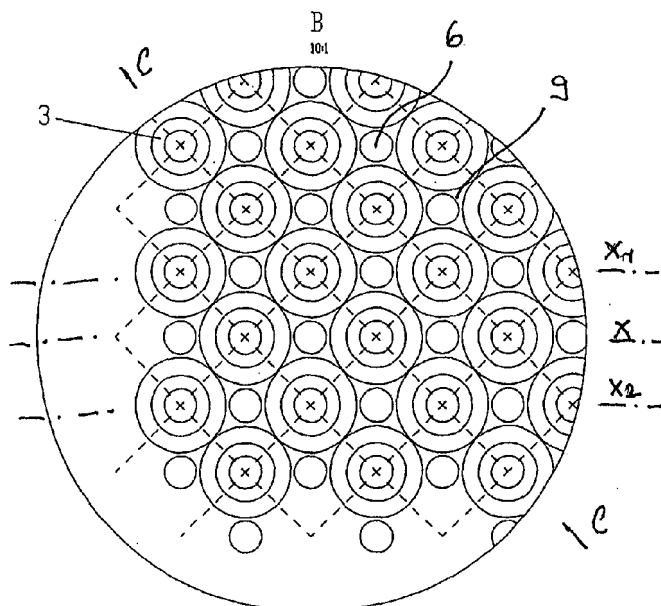


FIG. 2

## Description

### Background of the Invention

**[0001]** The invention concerns the drum of a washing machine, especially its surface design.

### State of the art

**[0002]** In order to achieve high-quality washing of clothes, drying and dewatering, the surface of drums of washing machines are equipped by variants of apertures and indentations.

**[0003]** In WO 9820195 the surface of a washing drum is presented which consists of hexagonal domed structure directed towards inside of the washing drum. The sheet of the washing drum is provided by apertures arranged among domed indentations intended for influx and outflow of water.

**[0004]** In WO 03054275 a washing drum is presented surface of which is similar to the above mentioned. The sheet and the front side of the washing drum is provided with domed indentations directed towards inside of the washing drum. Shape of those domed indentations is circular, with various diameters and the indentations cover the whole surface of the washing drum.

**[0005]** In EP 1293594 the surface of a washing drum is presented which is made as a honeycomb structure with indentations rounded structure directed towards inside of the washing drum.

**[0006]** In DE 19731666 there is a rounded structure of a washing drum covering the whole surface of the washing drum. Consequently such structure of the washing drum is lighter and more stable.

**[0007]** In DE 4445669 there is a washing drum covered by indentations for reduction of a humidity of clothes. Apertures are perforated among said indentations.

**[0008]** In GB 2268939 there is a washing drum covered by airpockets suitable to scoop up water from the bottom of the washing drum and to pour it out on clothes at top position of the washing drum.

**[0009]** In CZ 21028 U1 there is a washing drum comprising plurality of half-moon shaped indentations and apertures. Lines of those indentations are similar to curly lines of a surface of a washboard which is historically considered to be the most suitable performance for clothes washing.

**[0010]** EP 2177656 presents more design solution of the sheet of a washing drum covered by a honeycomb structure directed towards inside of the washing drum supplemented by a circular wave dividing that sheet of the washing drum into a front part and a rear part.

**[0011]** In WO03054275 there is a washing drum with circular shaped indentations directed towards inside of the washing drum, whereas said indentations are arranged in parallel lines with axis of the washing drum. The arrangement of said indentations is quite complicated due to fact that the sheet of the washing drum is cov-

ered by plurality of nests of seven domed indentations. One of indentations is in the middle of the nest surrounded by remaining six orbital indentations imaginary mutually overlapping. A connecting line between the centers of the orbital six indentations forms a hexagon. In the connecting point of three neighbouring domed indentations an aperture is made. Said washing drum is difficult for manufacturing and among others, flat parts between indentations are not optimal for drawing-off water from the inner of the washing drum.

**[0012]** The aim of the present invention is to disclose an improved drum of a washing machine with modified surface of its sheet which is able to assure smooth washing and increase effectivity of drawing-off the water from the inner of the washing drum during the washing operation.

### Feature of the Invention

**[0013]** The above mentioned disadvantages are considerably eliminated by use of the drum of a washing machine, where indentations are mutually shifted in axis parallel with the central axis of the washing drum about the radius of the indentation and about the half of distance of flat parts, whereas always among four indentations an aperture is provided on the flat part of the sheet, whereas the contact places of neighbouring indentations are performed as a transitional radius.

**[0014]** In another advantageous embodiment the indentation is a symmetrical bump with a maximum depth on its top.

**[0015]** In another advantageous embodiment the indentation has a shape of an asymmetrical bump with a maximum depth outside of its top.

**[0016]** In another advantageous embodiment the indentation has a shape of a prism, a pyramid or another similar shapes.

**[0017]** In another advantageous embodiment apertures are arranged in lines parallel with the axis of the washing drum.

**[0018]** In an advantageous embodiment the depth of indentation is 1,5 mm.

### Description of the Drawings

**[0019]** The invention will be further explained using the drawings, in which Fig. 1 is a view of an unrolled washing drum according to the invention, Fig. 2 is a B - detail of a part of the sheet of the washing drum, Fig. 3 is a schematic view of the washing drum in the vertical cross-section, Fig. 4 is an enlarged A - detail of indentations of the Fig. 3 and Fig. 5 is a detail of cross-section according to the line C-C of the Fig. 1.

### Preferred Embodiments of the Invention

**[0020]** Fig. 1 represents the sheet 2 of the unrolled washing drum 1. It is clear that the sheet 2 of the unrolled

washing drum 1 is provided by domed indentation 3 directed towards inside of the washing drum 1. It is shown better in Fig. 4 and 5. Depth of domed indentations 3 could be advantageously 1,5 mm, whereas the indentation 3 is deepest on its top. This is good presented in Fig. 4 showing the enlarged A - detail of the domed indentation 3 of Fig. 3. It is possible to imagine any different deepness. Lines  $X_1$ ,  $X_2$  of indentations 3 are parallel with central axis of the washing drum 1, whereas the indentations 3 are mutually shifted in axis parallel with the central axis of the washing drum 1 about the radius of the indentation 3 and about the half of distance of flat parts 9 and in connecting point on the flat part 9, which is situated between four indentations 3, an aperture 6 is punctured, whereas the contact edge between neighbouring indentations 3 is performed as a transitional radius 4. It is shown in a detail in Fig. 5.

**[0021]** Flat parts 9 are provided with apertures 6 advantageously of the diameter 3,5 mm, intended for influx and outflow of the water. Due to various necessities of dewatering, said diameter of apertures 6 can be different. In the presented embodiment the washing drum 1 contains twenty-five apertures 6. Apertures 6 are the lowest points of the sheet 2 of the washing drum 1, into which indentations 3 incline. There are no places to keep water inside of the washing drum 1, because between two neighbourings indentations 3 there are no flat places, therefore the water is immediately pooring down to apertures 6.

**[0022]** By the production of the sheet 2 of the washing drum 1 according to the invention in a first phase apertures 6 are perforated by a stamping tool and indentations 3 are pressed in a second phase. Apertures 6 are perforated from the inner side of the washing drum 1, so the eventual cutting edges of apertures 6 cannot damage washed clothes.

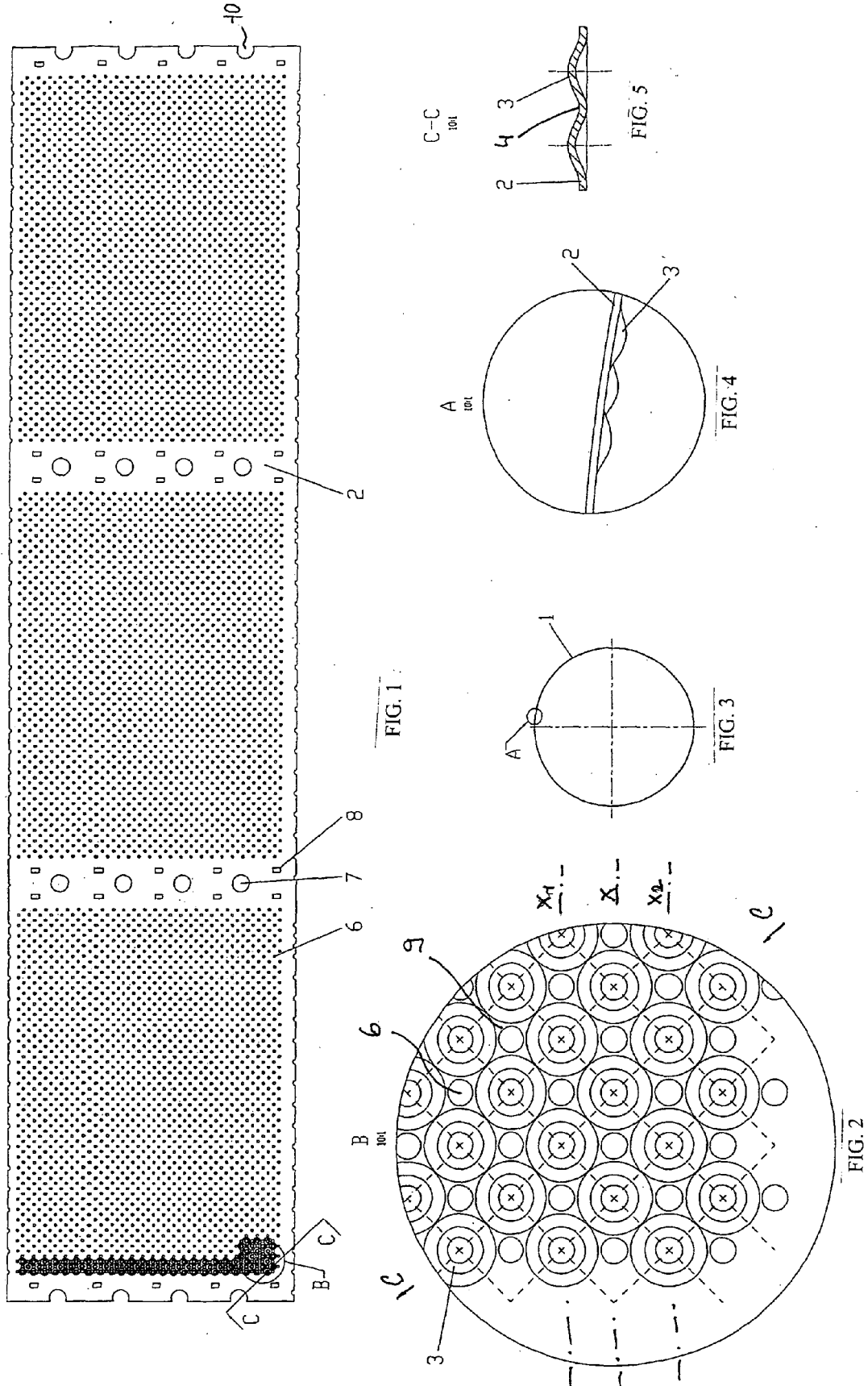
**[0023]** The washing drum 1 according to the presented embodiment has an inner diameter 530 mm.

**[0024]** The surface of the sheet 2 of the washing drum 1 contains three lines of further apertures 7 placed in the direction of the axis of the washing drum 1 intended for scoop up of water into three ribs, not shown in figures, placed on the inner side of the washing drum 1. Semi-apertures 10 in two outer front edges are joined into one line when the sheet 2 is rolled into the washing drum 1. Said ribs are intended for better mixing of clothes. During the washing operation the water is scooped up by apertures 7, then it is pouring out from ribs apertures and creates a shower for washed clothes. Ribs are connected to the washing drum 1 by ten rectangular fixation apertures 8 forming two lines by five apertures 8 perforated on the surface of the washing drum 1. Fixation tongues of ribs are inserted into fixation apertures 8.

**[0025]** It was proved that the shape of indentations 3 decrease breaking of the washed clothes, increase its sloughing and because there are no places to keep the water, perfect centrifugation takes place. Washing and drying is uniform, more effective and cost effective.

## Claims

1. Drum of a washing machine designed for washing clothes, where sheet (2) of the washing drum (1) is provided by indentations (3) of a bump shape directed towards inside of the washing drum (1), whereas indentations (3) are arranged into parallel lines with central axis of the washing drum (1) **characterized in that**, indentations (3) are mutually shifted in axis parallel with the central axis of the washing drum (1) about the radius of the indentation (3) and about the half of distance of flat parts (9), whereas always among four indentations (3) a aperture (6) is provided on the flat part (9) of the sheet (2), whereas the contact places of neighbouring indentations (3) are performed as a transitional radius (4).
2. The drum of a washing machine designed for clothes according to the claim 1, **characterized in that** the indentation (3) is a symmetrical bump with a maximum depth on its top.
3. The drum of a washing machine designed for clothes according to the claim 1, **characterized in that** the indentation (3) has a shape of an asymmetrical bump with a maximum depth outside of its top.
4. The drum of a washing machine designed for clothes according to the claim 1, **characterized in that** the indentation (3) has a shape of a prism, a pyramid or another similar shapes.
5. The drum of a washing machine designed for clothes according to the claim 1, **characterized in that** apertures (6) are arranged in lines parallel with the axis of the washing drum (1).
6. The drum of a washing machine designed for clothes according to the claim 1, **characterized in that** the depth of indentation (3) is 1,5 mm.





## EUROPEAN SEARCH REPORT

Application Number  
EP 10 01 3621

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2008 001230 U1 (KAGANOV IOURI [DE]) 21 May 2008 (2008-05-21) * the whole document *	1,2,5,6	INV. D06F37/02 D06F37/04
A	EP 1 964 960 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 3 September 2008 (2008-09-03) * paragraphs [0040] - [0048] * * claims 1-18; figures 3-5 *	1,2,4-6	
A	WO 2008/077394 A2 (MIRTSCH GMBH DR [DE]; MIRTSCH SCHOKUFEH; MIRTSCH MICHAEL [DE] MIRTSCH) 3 July 2008 (2008-07-03) * page 20, line 5 - page 22, line 29 * * figures 1-5 *	1,2,4-6	
A	US 2 904 982 A (JOHN BOCHAN) 22 September 1959 (1959-09-22) * column 5, line 41 - column 6, line 14 * * figures 4,5 *	1,2,5,6	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 April 2011	Examiner Weinberg, Ekkehard
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 01 3621

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15-04-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202008001230 U1	21-05-2008	NONE	
EP 1964960 A2	03-09-2008	CN 101333746 A	31-12-2008
		JP 2008212635 A	18-09-2008
		KR 20080079897 A	02-09-2008
		RU 2372425 C2	10-11-2009
		US 2008202171 A1	28-08-2008
WO 2008077394 A2	03-07-2008	AT 475497 T	15-08-2010
		CA 2673541 A1	03-07-2008
		CN 101610858 A	23-12-2009
		DE 102006062189 A1	24-07-2008
		EP 2125262 A2	02-12-2009
		ES 2350060 T3	17-01-2011
		JP 2010513070 T	30-04-2010
		KR 20090101465 A	28-09-2009
		US 2010058589 A1	11-03-2010
US 2904982 A	22-09-1959	NONE	

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- WO 9820195 A [0003]
- WO 03054275 A [0004] [0011]
- EP 1293594 A [0005]
- DE 19731666 [0006]
- DE 4445669 [0007]
- GB 2268939 A [0008]
- CZ 21028 U1 [0009]
- EP 2177656 A [0010]