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(11)

EP 1 696 069 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

30.08.2006 Bulletin 2006/35

(51) Int Cl.:

D06F 37/06 (2006.01)

D06F 58/04 (2006.01)

(21) Application number: **06110180.4**

(22) Date of filing: **20.02.2006**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

Designated Extension States:

AL BA HR MK YU

• **D'Alessandro, Luisa**

67038 Scanno (AQ) (IT)

• **Colucci, Nicola**

74020 Leporano (TA) (IT)

• **Vota, Roberto**

13061 Andorno Micca (VC) (IT)

• **Bombardieri, Giovanni**

24021 Albino (BG) (IT)

(30) Priority: **23.02.2005 IT TO20050105**

(71) Applicant: **Indesit Company S.p.A.**

60044 Fabriano (AN) (IT)

(74) Representative: **Dini, Roberto**

c/o Metroconsult S.r.l.

Piazza Cavour 3

10060 None (Torino) (IT)

(72) Inventors:

• **Mariotti, Costantino**

06028 Sigillo (PG) (IT)

(54) **Laundry treatment household appliance having a rotating drum fitted with soft and/or elastic elements**

(57) Laundry treatment household appliance (1), in particular for washing and/or drying laundry, comprising a rotating drum (2) adapted to contain the laundry to be treated (3); the drum (2) is fitted on the inside with soft and/or elastic elements (4, 5, 6) which prevent the laundry (3) contained in the drum (2) from being damaged during the treatment processes.

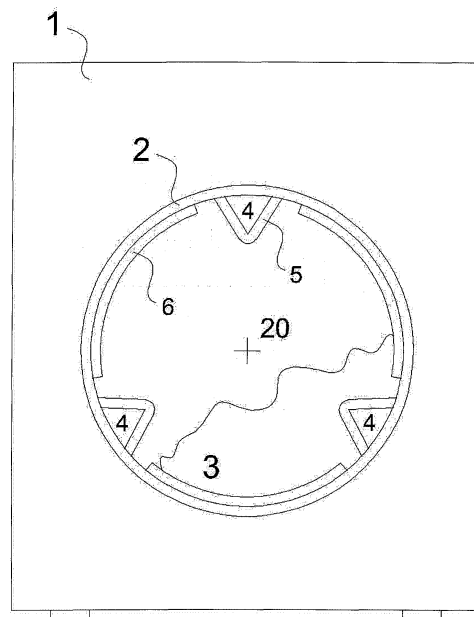


Fig.2

EP 1 696 069 A1

Description

[0001] The present invention relates to a laundry treatment household appliance according to the preamble of claim 1.

[0002] Typically, the appliances according to the present invention are washing machines, washing/drying machines and clothes dryers, and therefore are used for carrying out laundry washing and/or drying processes.

[0003] Such appliances are fitted with a rotating drum adapted to contain the laundry to be treated.

[0004] During the treatment processes, the drum rotates and the laundry items hit the inner surface of the drum. Such hitting may cause slight damages to the laundry items.

[0005] The things being most subject to damage are those rigid elements applied to laundry items, such as buttons and zippers; some types of slight damage to the fibres of the fabrics of laundry items may also be caused by water-soaked (i.e. heavy) laundry hitting the inner surface of the drum.

[0006] Besides, during the treatment processes the laundry items are dragged by the lifters, which may cause slight damage to the fibres of the fabrics of the laundry items, especially if the latter are soaked with water and therefore heavy.

[0007] So far, the manufacturers of household appliances have not paid particular attention to this slight damage.

[0008] The present invention is based on the recognition of the importance of this slight damage.

[0009] Clearly, these problems are especially felt by customers becoming increasingly demanding, particularly in the richer countries, and for articles being particularly delicate and expensive.

[0010] The object of the present invention is to solve such problems in a simple and economical way.

[0011] Said object is achieved by the household appliance incorporating the features described in the annexed claims.

[0012] The idea at the basis of the present invention is to use soft and/or elastic elements inside the drum of the household appliance.

[0013] In this way, the risks of damaging the laundry items are eliminated or at least extremely reduced.

[0014] The present invention will become more apparent from the following description and from the annexed drawings, wherein:

Fig. 1 shows, in a very schematic way, two vertical cross-sections of a washing machine having a drum according to the prior art,

Fig. 2 shows, in a very schematic way, a vertical cross-section of a washing machine having a drum according to the present invention, and

Fig. 3 shows, in a very schematic way, some embodiment examples of lifters according to the present invention.

[0015] Said description and said drawings are to be considered as non-limiting examples.

[0016] Fig. 1 shows a washing machine 1 of the front-loading type; being a sectional view, the door glass bowl is not visible. However, the present invention is not limited to front-loading washing machines; on the contrary, it is altogether independent of the drum loading type and position.

[0017] The washing machine 1 is fitted with a drum 2 adapted to contain the laundry to be washed, designated 3 in the illustration.

[0018] The drum 2 can rotate about an axis 20; the axis 20 is horizontal in Fig. 1. However, the present invention is not limited to washing machines having a horizontal rotation axis; on the contrary, it is altogether independent of the direction of the drum rotation axis.

[0019] Fig. 1 corresponds to a condition wherein the drum 2 is stationary and the laundry 3 accumulates on the bottom of the drum 2.

[0020] On the inner surface of the drum 2 there are lifters 4, i.e. those elements that drag and lift the laundry during the treatment processes carried out by the washing machine. In the example of Fig. 1, the lifters are three and are applied to the drum 2; solutions are known which use a different number of lifters (e.g. four or five); in other known solutions, the lifters are obtained directly on the drum by appropriately shaping the inner surface of the drum itself.

[0021] In general, the drum is made of stainless steel and the lifters are made of plastic; drum and lifters are therefore quite hard and rigid.

[0022] Fig. 2 shows an embodiment example of a washing machine 1 according to the present invention; the difference from the washing machine according to the prior art, shown in Fig. 1, lies in the drum.

[0023] The inner surface of the drum 2 is almost completely covered by three mats 6 made of a soft and elastic material, applied to the surface of the drum 2.

[0024] Moreover, the lifters 4 are coated with a layer 5 of soft and elastic material, applied to the surface of the lifters.

[0025] The solution of Fig. 2 solves both the problem of the slight damage caused by hitting and the problem of the slight damage caused by dragging.

[0026] As said, due to the hardness and rigidity of the drum and lifters, the laundry items may suffer slight damage as the drum rotates during the treatment processes.

[0027] In general, the laundry treatment household appliance according to the present invention comprises a rotating

drum adapted to contain the laundry to be treated and fitted on the inside with soft and/or elastic elements.

[0028] If the element is soft, when hitting the laundry it will reduce its size without damaging the laundry.

[0029] If the element is elastic, when hitting the laundry it will change its shape without damaging the laundry, and subsequently will regain its original shape.

5 **[0030]** The simplest and most economical method for obtaining softness and/or elasticity consists in using a soft and/or elastic material. Of course, the elements inside the drum may be made of several different materials.

[0031] Advantageously, the above-mentioned elements protrude from the inner surface of the drum of the household appliance.

[0032] Typically, these elements are adjacent to the inner surface of the drum.

10 **[0033]** The above-mentioned elements may be mats, e.g. like the mats 6 shown in Fig. 2. The soft and/or elastic mats mainly solve the problem of damage caused by hitting. The mats may vary in size, be more or less protruding from the inner surface of the drum, and be either solid or holed. The mats may also be shaped in such a way as to obtain pleasant aesthetic effects.

15 **[0034]** The above-mentioned elements may be lifters; for example, these may be made as shown in Fig. 2, with a layer 5 of a soft and/or elastic material. The soft and/or elastic lifters mainly solve the problem of damage caused by dragging. The lifters may be diversely arranged in the drum.

[0035] In the drum according to the present invention, there may be one or more soft and/or elastic elements; these may also be different from one another.

20 **[0036]** According to a first embodiment example, the element is wholly made of a soft and/or elastic material. An example of such an element is shown in Fig. 3A, and corresponds to a lifter.

[0037] According to a second embodiment example, the element is made up of a first portion preferably made of a hard and/or rigid material and a second portion made of a soft and/or elastic material. Examples of such elements are shown in Fig. 3A and Fig. 3B, and correspond to lifters; the first portion is designated 8B and 8C, respectively, whereas the second portion is designated 7B and 7C, respectively.

25 **[0038]** For instance, said first portion may be provided in the traditional way, i.e. made of plastic, or else be made of metal.

[0039] Said second portion may consist, for instance, simply of a coating layer, as shown in Fig. 3C.

[0040] It should be clear that Figs. 3A, 3B and 3C represent (in a very schematic way) sectional views of lifters applied to the inner surface of a drum (indicated with a straight and horizontal line).

30 **[0041]** In all three drawings, the lifter end is rounded to avoid any risk of damage to the laundry items.

[0042] The easiest and most effective way to obtain elements made of two (or more) materials consists in using the overmoulding technique; this technique can be applied to the examples of Fig. 3B and Fig. 3C.

[0043] The above-described elements must be applied to the drum of the household appliance.

35 **[0044]** This application may advantageously be obtained through the first portion of the element, especially if it is made of a hard and rigid material; in fact, by so doing it is possible to obtain a very strong fastening.

[0045] As said, the present invention may be applied to household appliances.

[0046] In order to obtain good-quality and reliable products, the choice of the elastic and/or soft material is important.

[0047] A material which has proven to be particularly suited to the present invention is produced by Bayer Polymers under the name "Desmopan DP 9370AU".

40 **[0048]** The mechanical features of this material are as follows:

Shore A hardness :	70	ISO 868 standard
Permanent compression deformation (24h, 70°C) :	49%	ISO 815 standard
Abrasion loss :	69mm ³	ISO 4649 standard
Elastic yield :	63%	ISO 4662 standard
Tearing resistance :	39kN/m	ISO 34-1 standard

50 **[0049]** The above-listed parameters must be taken into account when choosing the material for the drum elements; in other words, the material should be sufficiently soft, elastic, and resistant to abrasion and tear.

[0050] The following indications may be advantageously used for choosing the material:

- Shore A hardness between 20 and 90
- elastic yield between 30% and 80%
- tearing resistance between 25kN/m and 80kN/m
- abrasion loss between 40mm³ and 200mm³
- permanent compression deformation between 20% and 60%.

Claims

1. Laundry treatment household appliance (1), in particular for washing and/or drying laundry, comprising a rotating drum (2) adapted to contain the laundry to be treated (3), **characterized in that** said drum (2) is fitted on the inside with soft and/or elastic elements (4, 5, 6).
2. Appliance according to claim 1, wherein said elements (4, 5, 6) are made of a soft and/or elastic material.
3. Appliance according to claim 1 or 2, wherein said elements (4, 5, 6) protrude from the inner surface of said drum (2).
4. Appliance according to claim 3, wherein said elements (4, 5, 6) are adjacent to the inner surface of said drum (2).
5. Appliance according to claim 4, wherein said elements are mats (6).
6. Appliance according to claim 4, wherein said elements are lifters (4, 5).
7. Appliance according to one or more of claims 1 to 6, wherein at least one of said elements (7A) is made entirely of a soft and/or elastic material.
8. Appliance according to one or more of claims 1 to 6, wherein at least one of said elements is made up of a first portion (8B, 8C) preferably made of a hard and/or rigid material, preferably a plastic material, and a second portion (7B, 7C) made of a soft and/or elastic material.
9. Appliance according to claim 8, wherein said second portion consists of a coating layer (7C).
10. Appliance according to claim 8 or 9, wherein said second portion (7B, 7C) is placed on top of the first portion (8B, 8C) and is obtained by overmoulding on the first portion (8B, 8C).
11. Appliance according to claim 8 or 9 or 10, wherein said element is applied to the drum through said first portion (8B, 8C).
12. Appliance according to one or more previous claims, wherein the material of said elements is **characterized by** a Shore A hardness between 20 and 90.
13. Appliance according to one or more previous claims, wherein the material of said elements is **characterized by** an elastic yield between 30% and 80%.
14. Appliance according to one or more previous claims, wherein the material of said elements is **characterized by** a tearing resistance between 25kN/m and 80kN/m.
15. Appliance according to one or more previous claims, wherein the material of said elements is **characterized by** an abrasion loss between 40mm³ and 200mm³.
16. Appliance according to one or more previous claims, wherein the material of said elements is **characterized by** a permanent compression deformation between 20% and 60%.

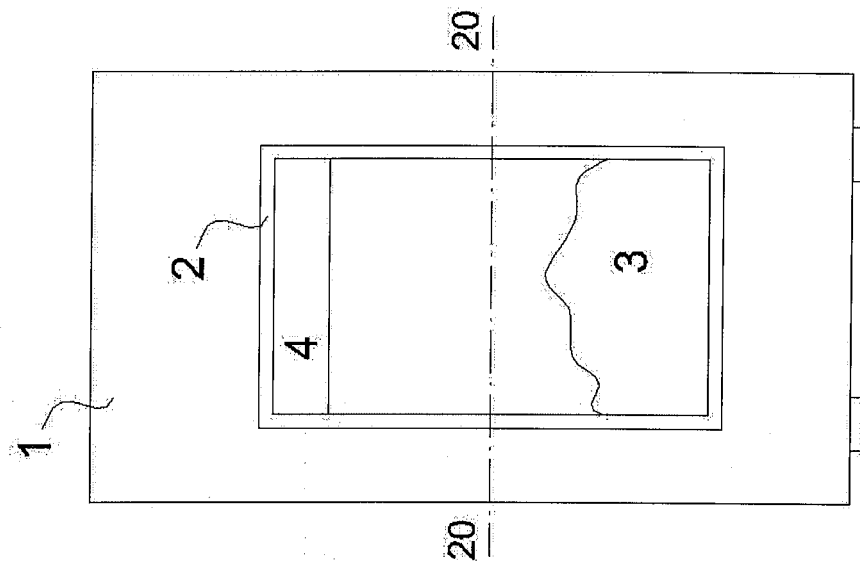


Fig. 1A

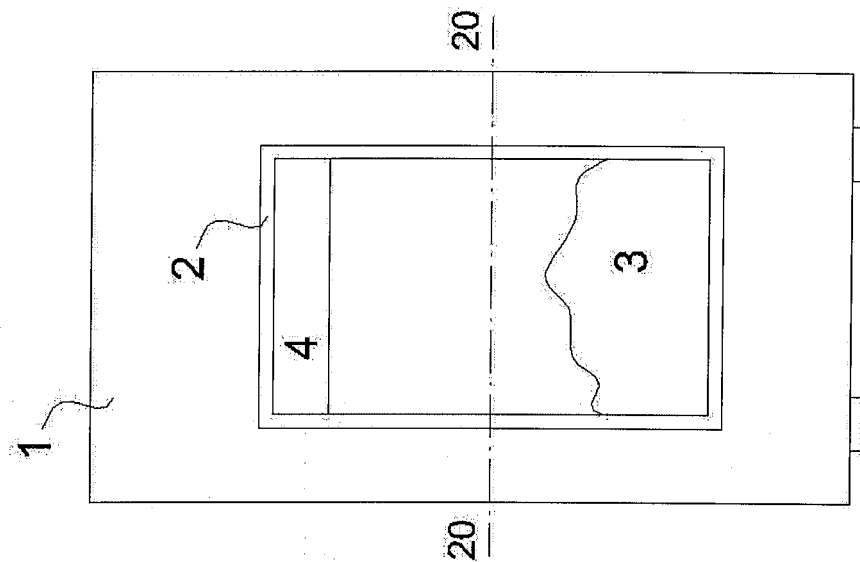


Fig. 1B

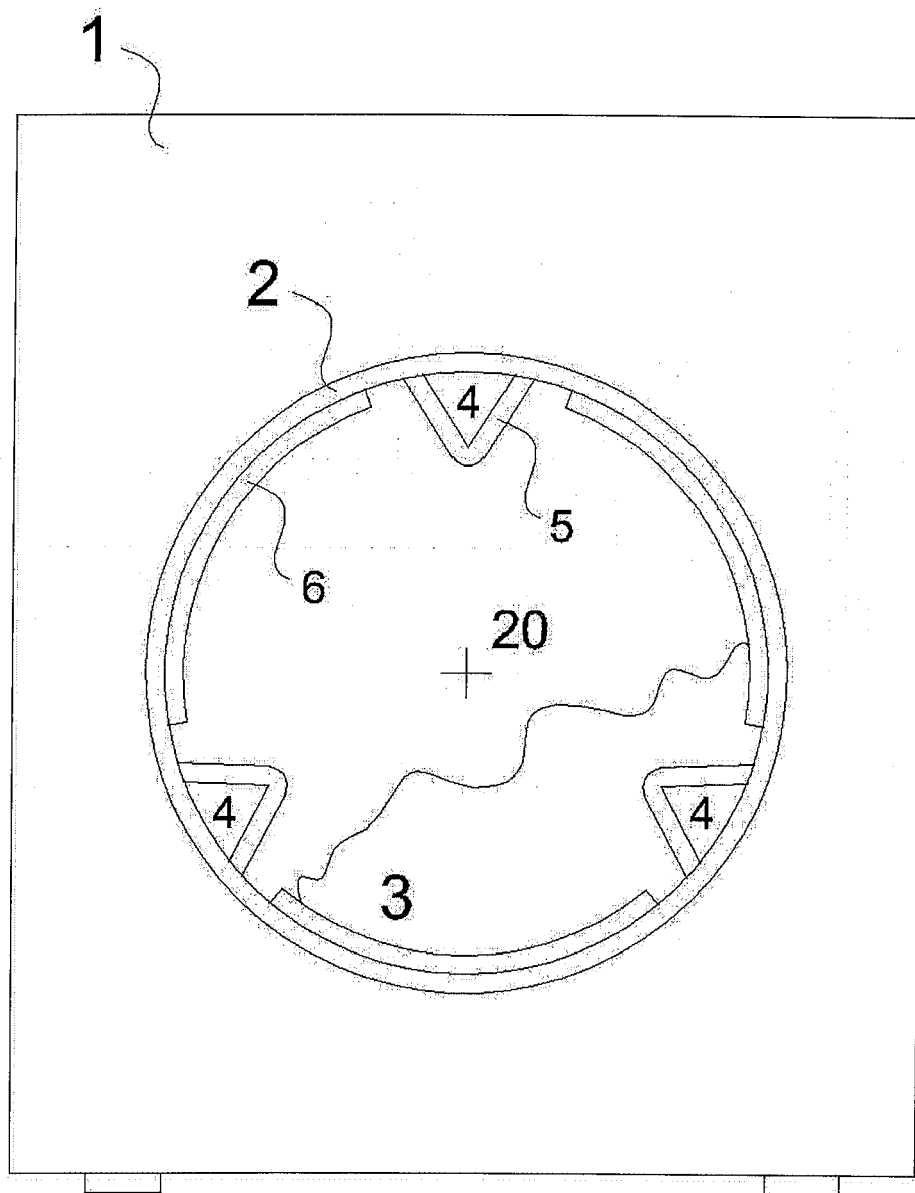


Fig.2

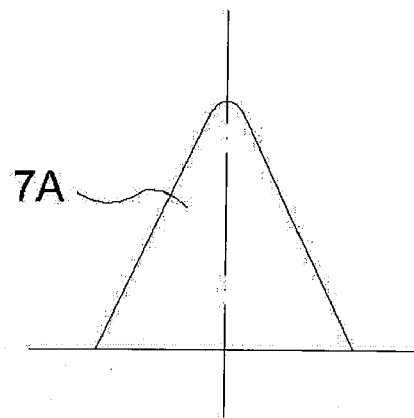


Fig.3A

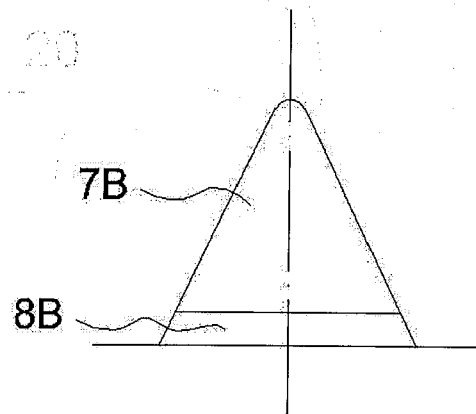


Fig.3B

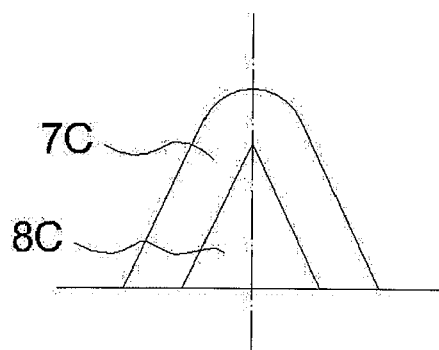


Fig.3C



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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 0180

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 2 771 766 A (DUNLAP CHARLES M) 27 November 1956 (1956-11-27) * column 1, lines 35-65 * * column 2, lines 24-45 * * column 4, lines 6-18 * * figures 1-4 * -----	1-4,6-8	
X	DD 293 616 A5 (VEB WASCHGERAETEWERK SCHWARZENBERG,DE) 5 September 1991 (1991-09-05) * page 2, lines 8-13 * * claim 1; figures 1-3 * -----	1-7	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 1 June 2006	Examiner Weinberg, E
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 06 11 0180

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