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(54) **Dishwasher provided with a hot warning device for the temperature of the dishes**

Geschirrspülmaschine mit Warnanzeige vor zu heissem Geschirr

Lave-vaisselle avec dispositif de mise en garde de la température de la vaisselle

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- **PATENT ABSTRACTS OF JAPAN vol. 1999, no. 03, 31 March 1999 (1999-03-31) & JP 10 328116 A (MITSUBISHI ELECTRIC CORP; MITSUBISHI ELECTRIC HOME APPLIANCE CO LTD), 15 December 1998 (1998-12-15)**
- **PATENT ABSTRACTS OF JAPAN vol. 2002, no. 05, 3 May 2002 (2002-05-03) & JP 2002 017647 A (MATSUSHITA ELECTRIC IND CO LTD), 22 January 2002 (2002-01-22)**

EP 1 582 136 B1

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Description

[0001] The present invention relates to a dishwasher, particularly of domestic type, comprising a washing tub provided with a door, at least one basket arranged to slide within the tub and provided with a handle, and a rotating arm to spray the dishes supported by said basket, at least one of said internal components being made or embodied by plastic material.

[0002] At the end of the washing and drying process dishes and cutlery can reach rather high temperatures so that it is not comfortable to touch them. The customer should wait some time to allow for cooling. Ideally, it would be possible to add a thermocouple to accurately measure the temperature and to warn the customer when the dishes are too hot to be touched. In practice, this solution is too expensive because it requires also an electronic circuitry accompanying the thermocouple.

[0003] For example, US 3 245 548 A addresses this problem by providing a rack with a special design allowing a better circulation of the cooling air.

[0004] The purpose of the present invention is to provide a dishwasher with a hot warning device which is simple, effective and cheap. With the definition "hot warning device" it is intended a means that gives an information to the user about the high temperature of the pieces contained into the washing tub of the machine.

[0005] There are known thermochromic pigments which are special pigments that change colour when heated. There are two basic types of such pigments, based on either Leuco dyes or liquid crystals. Said thermochromic pigments are used as an inexpensive way to indicate temperature changes in consumer products like baby bottles, beer bottles and various toys.

[0006] Therefore, according the present invention, the purpose is achieved by a dishwasher wherein at least one of its internal components is made of plastic material to which a thermochromic pigment has been added, as described in the appended claims.

[0007] The invention will be better appreciated from the following description given solely by way of non-limiting example.

[0008] A dishwasher, particularly of domestic type, normally comprises a washing tub provided with a door, adapted to close the aperture through which dishes and cutlery are charged in the tub. At least one basket is arranged to slide on support guides within the tub and a rotating arm is provided to spray the dishes supported by said basket.

[0009] Plastic materials are more and more largely used in manufacturing dishwashers, particularly their internal components. For instance, the basket is normally made by metallic wire coated by plastic material and it may be provided with a peripheral frame applied or over injected on the superior edge of the basket. Preferably, the basket is provided with a handle to facilitate the handling of the same.

[0010] Therefore, according to the present invention it

is proposed to manufacture at least one of said internal components by plastic material to which a thermochromic pigment has been added. The best technical solution is accomplished by manufacturing in the mentioned way a single piece that is easy to be moulded and already present as normal component in the machine. Therefore, the handle of the basket is a very suitable component to be manufactured in a plastic material added with a thermochromic pigment.

[0011] The scope of the invention is pointed out in the claims which are appended to this patent.

[0012] Features and advantages of the present invention will be better understood from the following description, given only by way of non-limiting example, with reference to the accompanying drawings, in which:

- Figure 1 shows a perspective view of a part of a dishwashing machine according with a first embodiment of the invention; and
- Figure 2 shows a front view of a part of a dishwashing machine similar to that of Figure 1 according with a second embodiment of the invention.
- Figure 3 shows a partial perspective view of a basket for a dishwasher provided with a device according to the present invention.

[0013] Figure 1 represents a handle 1 of a dishwashing machine made in plastic material, part of which is made by inserting a thermochromic component 2. Alternatively, said thermochromic component may be applied in various different ways known to the man skilled in the art, e.g. by using a thermochromic pigment.

[0014] Figure 2 represents again a handle 1 of a dishwashing machine made in plastic material similar to that of Figure 1. However, the handle of Figure 2 is made by a transparent material and the thermochromic component 2 is fully extended inside the handle body.

[0015] Figure 3 represents in a partial perspective view a basket 3 for a dishwashing machine, which is designed to support dishes in vertical place to be sprayed by water jets. The basket 3 is arranged to slide on lateral guides fixed on the internal walls of a washing chamber, as it is well known in the technical field. No further specification or references are needed. The basket 3 is provided with a handle 1 which is similar to that shown in Figure 1 or Figure 2, i.e. made at least partially by inserting a thermochromic component.

[0016] It is apparent that, alternatively to the handle, any other part of an internal component of the machine could be easily provided with such a device. For instance, the thermochromic component may be applied to the basket for cutlery or directly to the basket supporting dishes.

[0017] In all cases, at room temperature the thermochromic component is one colour (any colour may be used) and when heated above a certain temperature the thermochromic pigment loses its colour. This colour change indicates to the customer that the dishes are too

hot to be touched. As the handle and dishes cool, the colour of the thermochromic component returns to the original colour to signal that it is now safe to unload the dishwasher. The colour change cycle is indefinitely repeatable.

[0018] In practice, a colourless handle is not a very effective warning. A more effective warning colour should be used.

[0019] Red is a colour associated with fire and heat, so the pigment formulation needs to be conveniently modified. This is done by using two different pigments. One is an ordinary non-thermochromic pigment, for example pink. The second pigment is thermochromic, for example blue. At room temperature both red and blue pigments are visible and give the colour purple. As they are heated about a certain temperature (e.g. 45°C) the ordinary pigment remains pink and the thermochromic loses its colour. Therefore, the handle becomes pink.

[0020] Of course, the non-thermochromic pigment colour and the thermochromic pigment colour can be chosen freely. The temperature at which the thermochromic pigment loses its colour can be chosen by selecting from a wide range of commercially available colours. According to the present invention, the handle is made of polypropylene, but the polymer can also be changed as requested.

[0021] It is apparent that, above the already mentioned advantages, the proposed solution gives an immediately intuitive warning to the customer, who does not need of specific instructions.

Claims

1. Dishwasher, particularly of domestic type, comprising a washing tub provided with a door, at least one basket (3) arranged to slide within the tub and provided with a handle (1), and a rotating arm to spray the dishes supported by said basket, at least part of one of said internal components (1, 3) being made or embodied by plastic material, the dishwasher being **characterised in that** the plastic material of said at least one internal component (1, 3) is added with at least a thermochromic pigment (2), so as it changes its colour when a high temperature occurs in the tub.
2. Dishwasher according to claim 1, **characterised in that** the internal component made by plastic material added with thermochromic pigment (2) is the handle (1) of the basket (3).
3. Dishwasher according to claim 1 or 2, **characterised in that** the thermochromic pigment is a Leuco dye.
4. Dishwasher according to claim 1 or 2, **characterised in that** the thermochromic pigment is a liquid crystal.

5. Dishwasher according to any of the preceding claims, **characterised in that** the plastic material of the internal component (1, 3) is added with at least two different pigments, at least an ordinary non-thermochromic pigment and a thermochromic pigment, so as a more effective change of colour of the component may occur.

Patentansprüche

1. Geschirrspülmaschine, insbesondere vom Haushaltstyp, welche eine Spülwanne umfasst, die mit einer Tür, mindestens einem Korb (3), welcher dergestalt angeordnet ist, dass er innerhalb der Wanne gleitet, und mit einem Handgriff (1) versehen ist, und mit einem Dreharm zum Besprühen des von der genannten Spülwanne getragenen Geschirres ausgestattet ist, wobei mindestens eines der genannten inneren Bauteile (1, 3) aus Kunststoffmaterial hergestellt ist, wobei die Geschirrspülmaschine **dadurch gekennzeichnet ist, dass** dem Kunststoffmaterial des mindestens einen Bauteils (1, 3) mindestens ein thermochromes Pigment (2) zugesetzt ist, so dass es seine Farbe verändert, wenn in der Spülwanne eine hohe Temperatur auftritt.
2. Geschirrspülmaschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das innere Bauteil, welches aus Kunststoffmaterial, dem ein thermochromes Pigment (2) zugesetzt wurde, hergestellt worden ist, der Handgriff (1) des Korbes (3) ist.
3. Geschirrspülmaschine gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das thermochrome Pigment ein Leukofarbstoff ist.
4. Geschirrspülmaschine gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das thermochrome Pigment ein Flüssigkristall ist.
5. Geschirrspülmaschine nach einem beliebigen der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** dem Kunststoffmaterial des inneren Bauteils (1, 3) mindestens zwei verschiedene thermochrome Pigmente hinzugefügt sind, von denen mindestens eines ein gewöhnliches, nicht thermochromes Pigment ist und eines ein thermochromes Pigment ist, so dass eine wirkungsvollere Farbänderung des Bauteils auftreten kann.

Revendications

1. Lave-vaisselle particulièrement de type domestique comprenant une cuve de lavage comportant une porte, au moins un panier (3) conçu pour coulisser à l'intérieur de la cuve et muni d'une poignée (1), un

bras rotatif pour asperger la vaisselle contenue dans ledit panier ; au moins une partie de l'un desdits composant interne (1, 3) étant réalisée en ou enrobée de matière plastique ; ce lave-vaisselle étant **caractérisé en ce que** la matière plastique dudit au moins un composant interne (1, 3) est additionnée d'au moins un pigment thermochromique (2) de façon qu'elle change de couleur quand une haute température est atteinte dans la cuve.

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2. Lave-vaisselle selon la revendication 1 **caractérisé en ce que** le composant interne réalisé en matière plastique additionnée d'un pigment thermochromique (2) est la poignée (1) du panier (3).

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3. Lave-vaisselle selon la revendication 1 ou 2 **caractérisé en ce que** le pigment thermochromique est un leucodérivé de colorant.

4. Lave-vaisselle selon la revendication 1 ou 2 **caractérisé en ce que** le pigment thermochromique est un cristal liquide.

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5. Lave-vaisselle selon l'une des revendications précédentes **caractérisé en ce que** la matière plastique du composant interne (1, 3) est additionnée d'au moins deux différents pigments, c'est-à-dire, au moins un pigment ordinaire non thermochromique et un pigment thermochromique de façon qu'un plus effectif changement de couleur du composant puisse se produire.

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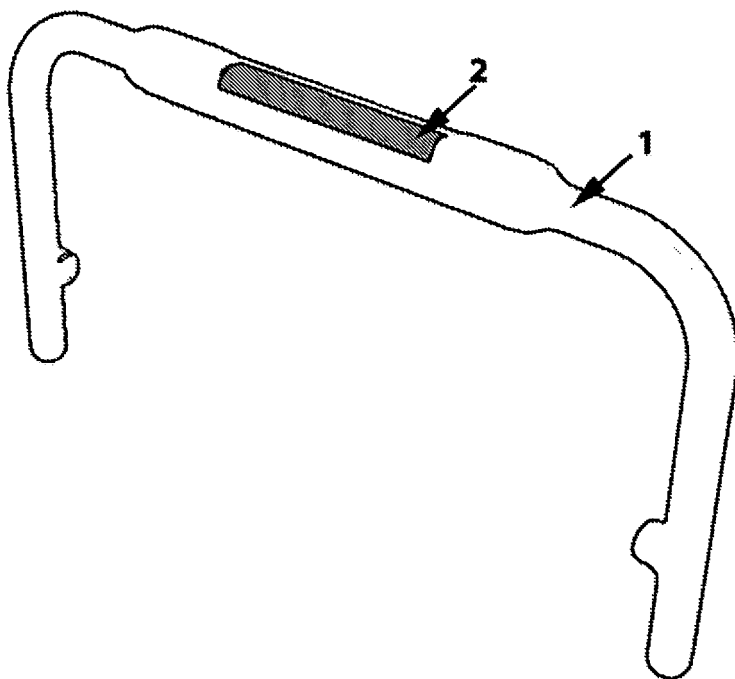


Figure 1

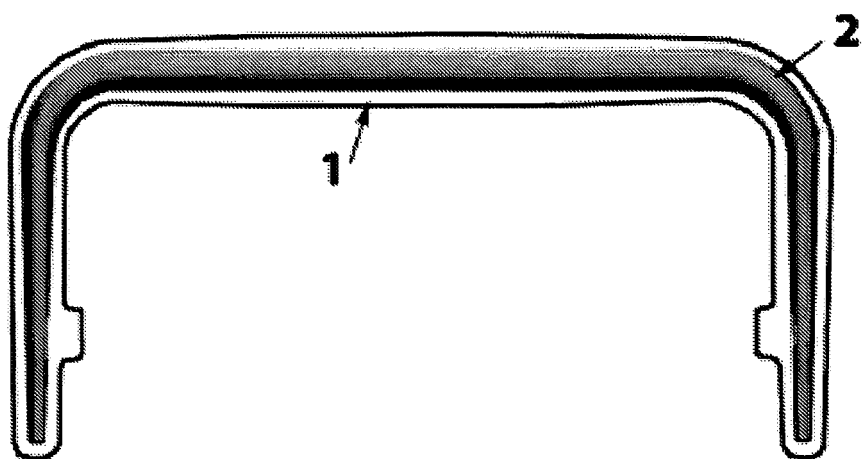


Figure 2

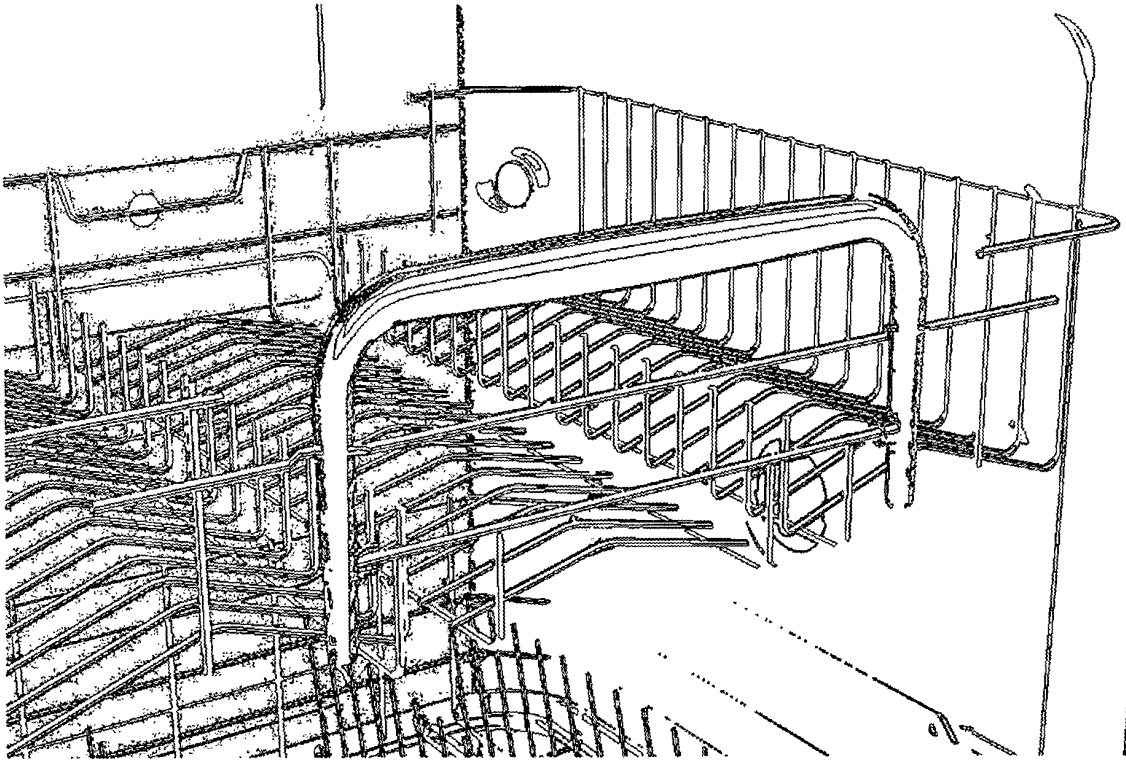


Figure 3