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(54) **THERMOCHROMIC CONTAINER FOR DEPILATORY COMPOSITIONS**

(57) The invention relates to a container for depilatory compositions, which is made from a plastic material and is characterised in that its composition includes at least one thermochromic material containing two or more reversible thermochromic compositions, the first in a concentration of 0.1-8% and the second in a concentration of 0.05-8% by weight of the thermochromic material, both being heat-sensitive at a temperature above 40 °C but

at different temperatures from one another, such that the first is heat-sensitive in a lower temperature range than the second. Owing to the thermochromic properties of the container of the invention, the container is able to change colour according to the temperature applied to it, once heated, indicating the suitable moment of use and the moment for non-use.

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Description**Object and technical sector of the invention**

5 **[0001]** The invention falls within the field of cosmetics, specifically depilation, and it is aimed at a container with thermochromic properties for depilatory compositions.

Background of the invention

10 **[0002]** Very different products are known in the field of depilation to remove superfluous body hair, other than shaving. A type of composition, the most common, requires initial heating before being applied to the skin in a generally molten state, being known as hot waxes. Once applied, it is allowed to solidify before being removed from the skin along with the unwanted hair. This is known in the technical field as epilation, since the hair is pulled from the skin at the root (patent ES2442918 T3). They can also be found in prior art, warm waxes being of common use, wherein there is also a previous
15 heating but at a lower temperature and bands of wax that are spread and applied in the area to be depilated, that use a support material to facilitate the removal thereof (international application WO9730608 A1; ES2123430 B1).

[0003] Some of the most innovative compositions are in the form of an emulsion or cream, and can be applied to the skin, at room temperature. The cream includes a substance that degrades the keratin in the hair. Conventionally, said compositions are applied to the skin in areas where unwanted hair is present, leaving them in that area for a predetermined
20 time to allow the keratin of the hair to degrade. Lastly, the composition together with the degraded hair are removed from the skin, usually with an instrument such as a sponge or spatula that drags it. Such compositions are known in the art as depilatory creams (patent EP2355788 B1).

[0004] The compositions of depilatory waxes, that need pre-heating, can cause burn problems if the necessary pre-caution is not taken and the instructions for use are not properly followed, especially in hot waxes.

25 **[0005]** The problem with these waxes is usually caused because the consumer does not have a reference of the temperature reached by the wax until it is used on the body, causing the burns. Thus, the products that exist on the market either do not indicate to the consumer the change in temperature of the product to be applied or only indicate when the use or non-use temperature has been reached. However, they do not indicate the temperature at which it should be used due to being the suitable temperature and it should not be used due to overheating in the same product.
30 An example is found in patent ES2189990, wherein a container for depilatory wax is described that includes an applicator with a thermochromic compound to indicate the application temperature, which changes colour between 40 °C and 60 °C. However, the invention described in ES2189990 exhibits limitations: within the waxes that need heating, there are fat-soluble waxes and water-soluble waxes, and the applicator with a thermochromic compound does not work properly for the former, since it does not allow to correctly visualise the change of the pigment in repeated uses due to the wax
35 film that remains on the applicator during use.

[0006] To solve the problems detected in the state of the art, and avoid possible burns with these depilatory products, a container has been developed that indicates to the consumer the moment in which they can make good use of the wax by simple observation and in which it is not recommended due to being at unsuitable temperature conditions, either low or very high. The container proposed herein makes this information available to the user by means of a triple change
40 in colour and intensity of said colour:

- At the origin thereof, the product cannot be used and the colour of the container is observed at room temperature;
- At the first colour change due to the change in one of the pigments, the product is suitable for use; and
- When certain areas of the container begin to appear in which the colour changes to a different one due to the change
45 in colour of a second pigment, the product is too hot in these areas and there is a risk of burns, so it is advisable not to use until it is tempered.

General description of the invention

50 **[0007]** The present invention relates to a container for depilatory compositions (such as preferably warm waxes and hot waxes), which is made of a plastic material that exhibits thermochromic properties, characterised in that its composition comprises at least one thermochromic material (colouring type, for example masterbatch, called in Spanish Master colorant) that contains two or more reversible thermochromic or thermosensitive compositions (pigments), the first in a concentration of 0.1-8% and the second in a concentration of 0.05-8% by weight of the total weight of the thermochromic
55 material, both being heat-sensitive at a temperature above 40 °C (still cold for the application of the wax) but different from each other, such that the first is heat-sensitive in a lower temperature range than the second.

[0008] Owing to the thermochromic properties of the container of the invention, the container is able to change colour according to the temperature applied to it, once heated. As the container is specially designed to contain depilatory

compositions, such as waxes that must be heated for use thereof, the purpose of the change in colour and intensity thereof is to warn the consumer of the temperature that the container acquires when heated, such that it is possible to check the temperature thereof by simple observation to know if it is ideal for the use and/or application of the wax it contains.

[0009] The type of plastic material for the container of the wax is not particularly limited. Nevertheless, the container can be made of many different types of plastic materials, preferably selected from the group consisting of: polypropylene (PP), polyethylene (PE), polystyrene (PS), polycarbonate and a combination thereof. Preferably, it is manufactured at a maximum temperature of 200 °C.

[0010] The depilatory composition is preferably a warm or hot depilatory wax. Thus, it should be understood that any embodiment of the container, wherein the pigments are added, adapts to the product it contains, in other words, depending on the temperature suitable for use thereof or the excess temperature for each type of wax used, such that the composition of the thermochromic material is adjusted according to the temperature of use.

[0011] In this manner, the thermochromic material is not particularly limited to a particular or specific type; the only condition, due to the nature of the invention itself, is that said thermochromic material must change colour and intensity of said colour in an appropriate temperature range, which is determined by the wax contained by the container. Preferably, the first pigment is contained in the thermochromic material in a concentration of 0.5-5% and the second pigment in a concentration of 0.1-5% by weight of the total weight of the thermochromic material. When the present specification indicates that the pigment or composition is heat-sensitive at a certain temperature, it means that this pigment changes colour from the original colouring thereof at room temperature to another colouring, the colouring even disappearing, by stimulation at the indicated temperature. By using (at least) one colouring with two heat-sensitive compositions or pigments, the container can show at least three colours according to the temperature applied in heating the container, namely: 1) the colour formed by the base colour itself of the container plus that of the colouring formed by the two thermochromic pigments at room temperature (room temperature being understood as comprised between 25 °C - 30 °C); 2) a characteristic colour after the disappearance or modification of the colour of one of the thermochromic pigments when a temperature is applied that is suitable for applying the wax; and 3) a characteristic colour after the disappearance or modification of the colour of the second of the thermochromic pigments when a temperature is applied that is too high for applying the wax.

[0012] Preferably, the upper temperature limit at which the first pigment completely changes colour and reaches the maximum level of said change (the acquired colour is homogeneous) coincides with the lower temperature limit at which the second pigment begins to change colour.

[0013] The first pigment, which is the one that changes colour at a temperature lower than the second, responds to temperatures equal to or above 40 °C. A suitable temperature for applying the wax (preferably warm or hot) is understood to be that comprised between 42 °C-64 °C depending on the type of wax. In the most preferred embodiment, the first pigment changes colour at a temperature comprised between 40 °C and 65 °C, while the second pigment changes colour at a temperature comprised between 45 °C and 70 °C.

[0014] It is evident that the container acquires a different (lower) temperature with heating than that acquired by the wax it contains. In this manner, for example, the container, depending on the thickness thereof and the formulation of the wax it contains, usually acquires a temperature of between 1 °C-11 °C less than the wax it contains.

[0015] Obviously, the essence of the invention is the double change in colour of the container as the heating temperature varies, indicating the suitable moment of use and the moment for non-use; in this manner, the type of colour that indicates these moments is secondary, and depends on the type of thermochromic material chosen. Nevertheless, in a particular preferred embodiment, the container with the colouring composition is purple in colour at room temperature; the colour of the first pigment disappears and the container changes to pink in colour when the temperature is comprised between 60-65 °C and the colour of the second pigment disappears and the container changes to white in colour (base colour) when the temperature is equal to or above 65 °C, preferably above 70 °C.

[0016] Based on the previous considerations, there is a wide variety of thermochromic compositions or pigments that can form part of the thermochromic material of the plastic container, such as those described in patent US 4,028,118, document included for reference. The determining factor is that: a) said pigments change colour at suitable temperatures; b) they change colour at different temperatures, covering between the two of them the temperature range of interest for the object of the invention, and c) they change colour over a wide temperature range, as specified above.

Preferred exemplary embodiment

[0017] The experimental results of tests carried out with containers prepared in accordance with the present invention are described below. The objective of the test is to check if the containers with colouring or ink with thermochromic pigments exhibit a suitable behaviour to change colour at the desired times and conditions with the warm or hot depilation wax, and compare if said behaviour is the same with containers of different geometry, materials, capacity and colours.

Method

[0018] The container is purple in colour at room temperature, while it turns pink in colour with the suitable use temperature (due to change or disappearance of the colour of the first pigment) and white in colour when it is too hot for application (due to change or disappearance of the colour of the second pigment).

[0019] Three containers were used according to the invention, of various geometries and capacities (100 grams, 250 and 400 grams) and were filled with two types of fat-soluble wax, allowing it to cool down before starting the tests. Subsequently, the wax was heated, following the instructions for use of the same and subsequently at successive intervals of 20 seconds of heating and 20 seconds of rest. To heat the container, a Daewoo 800W microwave was used. The temperature of the wax was measured with a laboratory thermometer and the temperature of the walls of the container was measured with an infrared thermometer.

Results

[0020] The results with the containers filled with 100 g, 250 g and 400 g of wax can be seen in the following table:

Table 1 - Behaviour of the containers in accordance with the present invention and of the waxes they contain according to temperature

Turning of wax colour 1 (PFC00272)	100 g			250 g			400 g		
	T _a Jar wall	T _a wax	Depilation OK/NOT OK	T _a Jar wall	T _a wax	Depilation OK/NOT OK	T _a Jar wall	T _a wax	Depilation OK/NOT OK
Homogeneous colour (pink)	55 °C	61 °C	OK	55 °C	65.3 °C	OK	55 °C	61.3 °C	OK
It starts to turn from pink to white	63 °C	71 °C	NOT OK	68 °C	68.3 °C	NOT OK	60 °C	66 °C	NOT OK
Turning of wax colour 2 (pfc00252)	100 g			250 g			400 g		
	T _a Jar wall	T _a wax	Depilation OK/NOT OK	T _a Jar wall	T _a wax	Depilation OK/NOT OK	T _a Jar wall	T _a wax	Depilation OK/NOT OK
Homogeneous colour (pink)	53 °C	53.8 °C	OK	51 °C	56 °C	OK	55 °C	59 °C	OK
It starts to turn from pink to white	60 °C	66 °C	NOT OK	65 °C	67 °C	NOT OK	64 °C	69.6 °C	NOT OK

Conclusion

[0021] After the results were obtained, it was concluded that the containers exhibited an optimal behaviour for the intended objective. Both the change in colour of the container, and the temperature of the wax in the 250 g and 400 g containers are a few degrees above those observed for the 100 g container. This difference in the temperature of the container and the wax may be due to the homogenisation itself of the product and the geometry and thickness of the container.

[0022] Thus, the container exhibits a good operation with regard to the change in colour due to temperature if the colour code is appropriately explained in the instructions for use:

- Wax suitable for depilation when the container exhibits a homogeneous pink colour;
- As soon as the white colour begins to appear on the container, allow the wax to cool as it is too hot for application.

[0023] These results are able to be extrapolated to other container formats of different capacities and geometries such as 250 ml jars and 120 ml bottles and other types of wax such as warm fat-soluble or water-soluble wax.

Claims

1. A container for depilatory compositions, which is made from a plastic material and is **characterised in that** its composition includes at least one thermochromic material containing two or more reversible thermochromic compositions, the first one in a concentration comprised between 0.1-8% and the second one in a concentration between 0.05 and 8% by weight of the total weight of the thermochromic material, both being heat-sensitive at a temperature above 40°C but at different temperatures from one another, such that the first one is heat-sensitive in a lower temperature range than the second one.
2. The container of claim 1, wherein the plastic material of which it is made of is selected from the group consisting of polypropylene, polyethylene, polystyrene, polycarbonate and any combination thereof.
3. The container according to any one of claims 1 or 2, wherein the depilatory composition is warm or hot depilatory wax.
4. The container according to any one of the preceding claims, wherein the first pigment is contained in the thermochromic material in a concentration between 0.5 and 5% and the second pigment in a concentration between 0.1 and 5% by weight of the total weight of the thermochromic material.
5. The container according to any one of the preceding claims, wherein the upper temperature limit at which the first pigment completely changes colour and reaches the maximum level of said change, causing a homogeneous colour in the container, coincides with the lower temperature limit at which the second pigment begins to change colour.
6. The container according to any one of the preceding claims, wherein the first pigment changes colour at a temperature comprised between 40 °C and 65°C, whereas the second pigment changes colour at a temperature comprised between 45 °C and 70 °C.
7. The container according to any one of the preceding claims, which is purple in colour at room temperature; pink in colour when the colour of the first pigment disappears; and white in colour, when the colour of the second pigment starts to disappear.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070752

A. CLASSIFICATION OF SUBJECT MATTER

A45D26/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A45D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 6174319 B1 (DESNOS ANNE) 16/01/2001, description.	1-7
A	EP 0813828 A1 (MAGIC DREAMS COSMETICA INFANTI) 29/12/1997, description. figures 1 - 2.	1-7
A	WO 2006089375 A1 (NOSHMELL PTY LTD ET AL.) 31/08/2006, description; figures 1 - 7.	1-7
A	GB 2348703 A (AMG INNOVATIONS LTD) 11/10/2000, description; figure 1.	1-7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

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- WO 9730608 A1 [0002]
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- EP 2355788 B1 [0003]
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