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(54) Method of making a tube of antibacterial plastic material

Verfahren zur Herstellung einer Tube aus antibakteriellem Kunststoffmaterial

Procédé de fabrication d'un tube à base de matériel plastique antibactérien

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(73) Proprietor: **Scandolaro S.p.A.**
20146 Milano (IT)

(72) Inventor: **Gussoni, Fabio Amilcare**
20100 Milano (IT)

(74) Representative: **Petruzzello, Aldo et al**
Racheli S.r.l.
Viale San Michele del Carso, 4
20144 Milano (IT)

(56) References cited:
EP-A- 1 616 549 EP-A- 1 795 449
US-A1- 2006 207 961 US-B1- 6 179 141

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Description

[0001] The present invention refers to a flexible tube made of an antibacterial plastic material of the type used to package cosmetics and/or creams for personal care, food pastes or pharmaceutical products like ointments and creams with a medicinal active ingredient.

[0002] For this purpose, an antibacterial product preferably consisting of nanometric silver (that is, silver powder in which the granules measure a few nanometres) of a commercially available type is added to the plastic material used to produce the tube.

[0003] The antiseptic and antibacterial properties of the silver are well known and have long been used in the medical field, but they have never been used, to the Applicant's knowledge, in the specific field of the flexible tubes for cosmetic, pharmaceutical or food products.

[0004] The bodies of the flexible tubes for cosmetic, pharmaceutical or food products, with different diameters and lengths, are generally produced by extrusion of plastic materials, particularly polyethylene, with various densities and degrees of polymerisation.

[0005] With the extrusion of said plastic materials, tubes having a more or less smooth and shiny surface are obtained, which are then decorated and customised for the various products contained and for the various clients, with different types of printing, also starting from extruded articles which can be coloured in bulk with various shades and depths of colour.

[0006] The tubes can also be decorated with self-adhesive labels, which determine their aesthetic appearance.

[0007] These tubes present the risk that, during the use, the bacteria always present on the user's hands may be deposited on the outer surfaces of the tube and especially on the opening through which the product leaves the tube: this can lead to the formation of bacterial colonies which can proliferate even rapidly inside the tube in the product and can pollute or in any case alter the product contained in the tube.

[0008] This drawback also occurs if air is sucked into the tube when, through the "shape-memory effect", the tube returns to its original shape after squeezing to allow the dispensing of the product.

[0009] Object of the present invention is to eliminate the possibility that such bacterial colonies might develop by providing a tube for cosmetic, pharmaceutical or food products that is able to destroy and to eliminate the bacterial flora in a short time and for the whole duration of use of the tube, and which maintains said antiseptic characteristic unchanged over time.

[0010] This object is achieved in accordance with the invention with the characteristics listed in appended independent claim 1.

[0011] Further advantageous characteristics of the invention are apparent from the dependent claims.

[0012] The Applicant has obtained a tube with the above mentioned antibacterial characteristics by adding

an additive, preferably consisting of nanometric silver dispersed in pure polyethylene powder, to the plastic material (normally polyethylene or mixtures thereof) commonly used for the production of the tubes; the additive advantageously contains from 1.8‰ to 2.5‰ (preferably 2‰) in weight of nanometric silver.

[0013] After mixing of the nanometric silver and of the pure polyethylene powder, the mixture thus obtained is thoroughly homogenised, extruded and granulated to obtain the additive to be added to the polyethylene (or to mixtures thereof) to obtain tubes with the characteristics necessary to meet the requirements of various clients depending upon the content.

[0014] US 2006/207961 discloses water containers including a body made of several intertwined arced sidewalls, some or all of the sidewalls are provided with longitudinal grooves. The body of the container includes several compartments namely a mouth, a neck, and a stem comprising shoulders, a waist, and a base. The compartments have dimensions that maintain a constant mathematical ratio in compliance with the golden phi ratio with respect to each other.

[0015] EP 1616549 A1 discloses a drug solution filling plastic ampoule having gas, steam and light ray barrier properties, a drug permeation preventing capability and an absorption/adsorption preventing capability said plastic ampoule including a container body (11), a fusion-bonded portion (13) which seals a mouth (12) of the container body, and a wrench-off holder tab (14) connected to the fusion-bonded portion.

[0016] US 6179141 discloses a container assembly provided with an antibacterial agent against "slow-leak" bacteria, comprising a container such as a plastic bottle which has a mouth portion having a rim; and a seal member such as a crown cap fitted to the mouth portion at the rim, wherein at least either a surface portion of the rim or the rim-contacting surface portion of the seal member includes an antibacterial agent such as silver zeolite in the form of a coating or a liner.

[0017] EP 1795449 A1 discloses a flat container molded by blow molding, in which the wall thickness of a container wall is made uniform, the flat container having a flatness ratio of not less than 1.3, and a body wall thickness ratio of a maximum wall thickness to a minimum wall thickness of not more than 1.6, a difference in elongation between a maximally stretched portion and a minimally stretched portion of not more than 150% in a tensile test at 95 DEG C, a crystallinity of not less than 30%, and a difference in TMA non-load change between a maximally stretched portion and a minimally stretched portion of not more than 500 [μm]m at 75 DEG C and 100 DEG C.

[0018] KR 10 200 500 28 251 A discloses an airtight container comprising nanosilver particles mixed in plastic resin powder in a proportion of 200-600 ppm.

[0019] The additive thus obtained is added, in the extrusion stage, to the plastic material (polyethylene or mixtures thereof) in a percentage between 4.8% and 5.5% (preferably 5%) in weight of the plastic material.

[0020] Without departing from the scope of the invention, the mixture for extrusion can be obtained by adding to the plastic material from 70 to 135 (preferably 100) parts per million in weight of nanometric silver.

[0021] The production by extrusion of the tubes produced according the present invention is done by using the apparatuses and the manufacturing methods that are used to produce a normal polyethylene tube since careful theoretical studies and experimental tests performed by the Applicant have shown that the addition of the additive to the polyethylene (or to the mixtures thereof) does not change its behaviour during the production of the tubes.

[0022] Lastly, in order to provide the user with a better protection against the formation and the development of bacterial colonies, the cap closing the tube is advantageously made of a plastic material suited to the purpose like a high-density polypropylene or a polyethylene with an anti-bacterial product added.

Claims

1. A method for obtaining a flexible tube for packaging cosmetics and/or creams for personal care, food pastes or pharmaceutical products like ointments and creams with a medicinal active ingredient, the tube being made of a plastic material constituted by polyethylene or mixtures thereof and containing powdery nanometric silver as antibacterial product, said method consisting of the following steps of

- preparing an additive in the form of granules containing from 1.8‰ to 2.5‰ by weight of powdery nanometric silver by dispersing the powdery nanometric silver in amount between from 1.8‰ to 2.5‰ by weight of powdery nanometric silver in pure polyethylene powder to obtain a mixture,
- then homogenising, extruding and granulating the mixture to obtain said additive;
- adding, in the extrusion stage, the so obtained additive in form of granules to said plastic material in amount between 4.8% and 5.5% by weight of said plastic material, without changing the behaviour of the plastic material during the production of the tube,

the tube including an antibacterial closure cap made of polypropylene or polyethylene with an antibacterial product added.

2. A method according to claim 1, **characterised in that** the additive contains 2‰ in weight of nanometric silver.
3. A method according to claim 1 or 2, **characterised in that** said additive is 5% by weight of said plastic material.

4. A method according to any one of the preceding claims **characterised in that** the powdery nanometric silver added to said plastic material is 100 parts per million (0,1‰) by weight of said plastic material.

5. Use of the method of claims 1 to 4 for packaging cosmetics and/or creams for personal care, food pastes or pharmaceutical products like ointments and creams with a medicinal active ingredient consisting of packaging said cosmetics and/or creams for personal care, food pastes or pharmaceutical products like ointments and creams with a medicinal active ingredient.

Patentansprüche

1. Verfahren zum Erhalten einer flexiblen Tube zum Verpacken von Kosmetika und/oder Cremes für die Hautpflege, Nahrungsmittelpasten oder pharmazeutische Produkte wie Salben und Cremes mit einem medizinischen Wirkstoff, wobei die Tube aus einem Kunststoffmaterial gefertigt ist, das aus Polyethylen oder Mischungen davon besteht und pulverförmiges nanometrisches Silber als antibakterielles Produkt enthält, wobei das Verfahren aus den folgenden Schritten besteht des

- Herstellens eines Zusatzmittels in Form von Granulat, das 1,8 ‰ bis 2,5 ‰, auf das Gewicht bezogen, pulverförmiges nanometrisches Silber enthält, durch Dispergieren des pulverförmigen nanometrischen Silbers in einer Menge von 1,8 ‰ bis 2,5 ‰, auf das Gewicht des pulverförmigen nanometrischen Silbers bezogen, in reinem Polyethylenpulver, um eine Mischung zu erhalten,
- dann Homogenisierens, Extrudierens und Granulierens der Mischung, um das Zusatzmittel zu erhalten,
- Hinzugebens, während der Extrusionsstufe, des so erhaltenen Zusatzmittels in Form von Granulat zu dem Kunststoffmaterial in einer Menge von 4,8 % bis 5,5 %, auf das Gewicht des Kunststoffmaterials bezogen, ohne das Verhalten des Kunststoffmaterials während der Herstellung der Tube zu verändern,

wobei die Tube eine antibakterielle Verschlusskappe umfasst, die aus Polypropylen oder Polyethylen mit einem zugegebenen antibakteriellen Produkt gefertigt ist.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** das Zusatzmittel 2 ‰, auf das Gewicht bezogen, nanometrisches Silber enthält.

3. Verfahren nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Zusatzmittel 5 %, auf das Gewicht bezogen, des Kunststoffmaterials ausmacht.
4. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das pulverförmige nanometrische Silber, das dem Kunststoffmaterial hinzugegeben wird, 100 Teile pro Million (0,1 ‰), auf das Gewicht bezogen, des Kunststoffmaterials ausmacht.
5. Anwendung des Verfahrens nach den Ansprüchen 1 bis 4 zum Verpacken von Kosmetika und/oder Cremes für die Hautpflege, Nahrungsmittelpasten oder pharmazeutische Produkte wie Salben und Cremes mit einem medizinischen Wirkstoff, bestehend aus dem Verpacken der Kosmetika und/oder Cremes für die Körperpflege, Nahrungsmittelpasten oder pharmazeutische Produkte wie Salben und Cremes mit einem medizinischen Wirkstoff.

Revendications

1. Procédé pour obtenir un tube souple pour emballer des produits cosmétiques et/ou des crèmes de soin, des pâtes nutritives ou des produits pharmaceutiques tels que des onguents et des crèmes avec un principe actif médical, le tube étant en matière plastique constituée de polyéthylène ou de ses mélanges et contenant de la poudre d'argent nanométrique en tant que produit antibactérien, ledit procédé comprenant les étapes suivantes consistant à :
 - préparer un additif sous la forme de granulés contenant entre 1,8 ‰ et 2,5 ‰ en poids de poudre d'argent nanométrique en dispersant la poudre d'argent nanométrique dans une quantité comprise entre 1,8 ‰ et 2,5 ‰ en poids de poudre d'argent nanométrique dans de la poudre de polyéthylène pur pour obtenir un mélange,
 - puis homogénéiser, extruder et granuler le mélange pour obtenir ledit additif,
 - ajouter, lors de l'étape d'extrusion, l'additif ainsi obtenu sous forme de granulés, à ladite matière plastique dans une quantité comprise entre 4,8 % et 5,5 % en poids de ladite matière plastique, sans modifier le comportement de la matière plastique pendant la production du tube,
 le tube comprenant un bouchon de fermeture antibactérien en polypropylène ou en polyéthylène avec un produit antibactérien ajouté.
2. Procédé selon la revendication 1, **caractérisé en ce**

que l'additif contient 2 ‰ en poids de ladite matière plastique.

3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** ledit additif représente 5 % en poids de ladite matière plastique.
4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la poudre d'argent nanométrique ajoutée à ladite matière plastique représente 100 parties par million (0,1 ‰) en poids de ladite matière plastique.
5. Utilisation du procédé selon les revendications 1 à 4 pour emballer des produits cosmétiques et/ou des crèmes de soin, des pâtes nutritives ou des produits pharmaceutiques tels que des onguents et des crèmes avec un principe actif médical, comprenant les étapes consistant à emballer lesdits produits cosmétiques et/ou lesdites crèmes de soin, lesdites pâtes nutritives ou lesdits produits pharmaceutiques tels que les onguents et les crèmes avec un principe actif médical.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2006207961 A [0014]
- EP 1616549 A1 [0015]
- US 6179141 B [0016]
- EP 1795449 A1 [0017]
- KR 1020050028251 A [0018]