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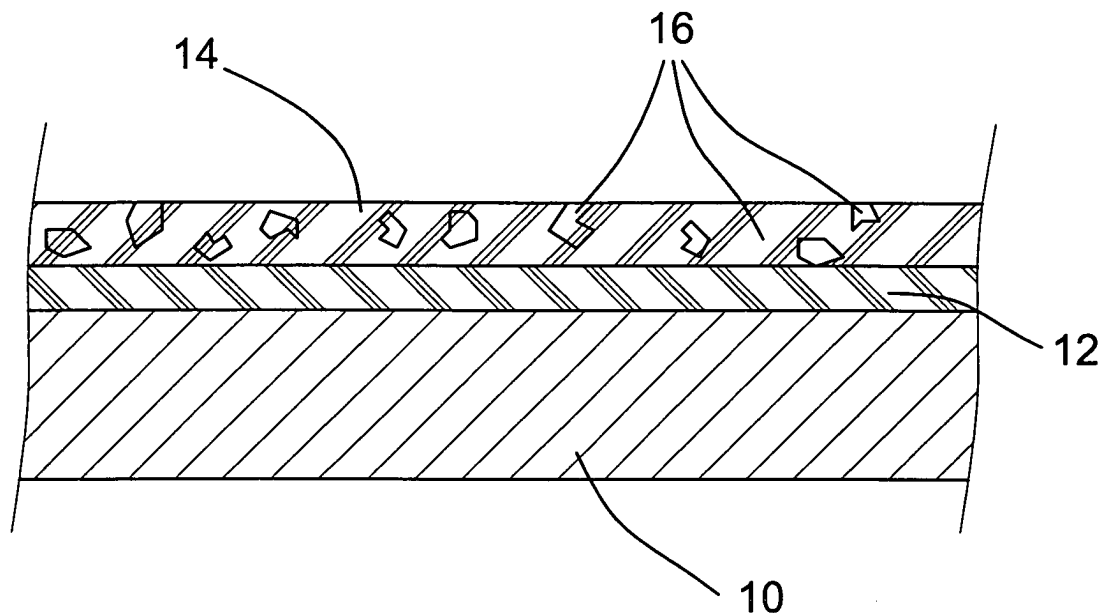
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(54) **Sheet-shaped metallic material for foodstuff packing**

(57) The sheet (10) of a malleable aluminium alloy, or the like, is coated, upon one of its surfaces, with a layer (14) of a synthetic material, such as a vinyl lacquer,

in which are incorporated silver granules (16). Preferably, a second intermediate layer (12) of a similar synthetic material is interposed between the sheet (10) and the layer (14).



**Fig. 1**

## Description

**[0001]** This invention relates to a malleable sheet for foodstuff packing of a metallic material, typically an aluminium alloy, of the kind used in the home or industrial environment, e.g. for the preservation of foodstuffs in refrigerators or freezers.

**[0002]** Nowadays, thin sheets of aluminium alloy are widely used in the home or industrial environment for wrapping foodstuffs such as meat, fish, salted meats, vegetables, and other perishable foodstuffs to be preserved in refrigerators, as well as for conveyance, e.g. in case of picnics and the like. Such sheets, with different thicknesses, are also used for the manufacture of trays and other food-containers. Although such sheets are generally smooth, naked plates, it is also known to manufacture treated sheets in order to enhance their performances, e.g. slightly embossed aluminium sheets for reducing or avoiding sticking of the sheet to the wrapped foodstuff, or, to the same purpose, sheets are manufactured which have one surface coated with lacquer or lined with a non-sticking, protective layer.

**[0003]** The main object of the present invention is now to provide a sheet-shaped material for foodstuff packing of the above-mentioned kind, which is improved to offer bacteriostatic, anti-microbial properties in order to delay the deterioration of the foodstuff wrapped in the sheet due to the bacterial action.

**[0004]** Another object is to provide such sheet with bacteriostatic properties by means of unexpensive processes.

**[0005]** The above-mentioned objects and advantages, which will better appear below, are achieved by the invention with a metal sheet for foodstuff packing having the features recited in claim 1, while the dependent claims state other advantageous, non-essential features of the invention.

**[0006]** A preferred embodiment of the invention will now be described with reference to Fig. 1 of the attached drawing, which shows an enlarged, transversal cross-section of a sheet for foodstuff packing according to this invention, by way of non limiting example.

**[0007]** The invention is based on the universal acknowledgment of the wide-spectrum, bacteriostatic and fungi-cidal properties of silver, which have been also confirmed by scientific studies since the first half of 1900s. The anti-microbial properties of silver are also described in scientific articles such as *Some Specific Cellular effects of Electrically Injected Silver and Gold Ions*, of J.A. Spadaro and R.O. Becker, published on *Bioelectrochemistry and Bioenergetics* 3, 449-57 (1976), or *Inhibitory and Cidal Antimicrobial Actions of Electrically Generated Silver Ions*, of Richard E. Hall and Robert E. Marquis, published on *Journal of Oral Maxillofac. Surg.*, 45, 779 (1987).

**[0008]** With reference to Fig. 1, a malleable sheet 10 of an aluminium alloy, of the kind normally used for foodstuff packing, has one surface coated with an intermediate layer of vinyl lacquer 12 and a successive main layer of vinyl lacquer 14, in which are incorporated silver granules 16 that are substantially uniformly dispersed.

**[0009]** Both the layers are deposited by rotogravure technics as well known in this field. The silver granules are dispersed in the lacquer dip, which is deposited on the aluminium sheet by rotogravure.

**[0010]** For uses in the home, for the preservation in refrigerator of foodstuffs, conveyance, etc., the blank sheet of aluminium alloy is preferably 9 to 18  $\mu\text{m}$  thick. The intermediate lacquer layer 12 preferably 0,5 to 3  $\mu\text{m}$  thick, although its thickness is not critical and could also be higher.

**[0011]** The main layer of lacquer 14 is 1 to 5  $\mu\text{m}$  thick and the silver granules 16 in the lacquer have an average gauge of about 1  $\mu\text{m}$ . Since the gauge of the silver granule is similar to the thickness of the layer of lacquer, a considerable fraction of the granules substantially surfaces from the free surface of the lacquer layer, while another considerable fraction of the granules, though it does not surface from the layer, may nevertheless be considered as at least partly exposed to the outside because of the porosity of the lacquer.

**[0012]** When the treated surface of the above-described sheet is made in contact with a food, the silver granules which surface from the lacquer, and probably also those which are just below the surface of the lacquer, enter in galvanic interaction with the food and accordingly exert their galvanic antimicrobial action upon it.

**[0013]** The first lacquer layer 12 between the aluminium 10 and the second layer 14 has the aim of preventing galvanic interactions between the aluminium and the silver granules. In fact, since foodstuffs often contain electrolytic fluids, any areas of direct contact between aluminium and silver would form bimetallic couples and accordingly generate galvanic currents which would damage or perforate the sheet. Accordingly, the intermediate layer 14 of vinyl lacquer is a barrier that avoids the direct contact of the silver with the aluminium, thereby preventing the formation of bimetallic couples.

**[0014]** In order to allow the user to locate without mistakes or doubts the active surface of the sheet, the active surface is marked with an identification inscription, preferably by embossment of the aluminium which is visible by translucence, though it may be envisaged to mark the opposite (inactive) surface with a suitable inscription. Of course, other identification methods are possible, e.g. by a distinctive colour of the lacquer.

**[0015]** With the improved sheet for foodstuff packing according to the present invention it is possible to achieve the advantages of the bacteriostatic properties of silver even by using small quantities of silver, thereby without excessively increasing its manufacturing cost.

**[0016]** A preferred embodiment of the invention has been described, but certainly many changes can be made which will be obvious for the persons skilled in the art. For example, the intermediate lacquer layer 12 is

useful but not essential. The lakes can be different from those which have been indicated, and also the thicknesses and the calibres may be changed with respect to the preferred values that have been indicated.

**[0017]** Moreover, although the described embodiment is referred to a thin sheet-shaped material that is suitable for wrapping foodstuffs because of its high flexibility, the same teachings may be applied without variations to a thicker, less-flexible sheet-shaped material, which is adapted to be moulded in form of trays, food-containers and the like.

## Claims

1. A sheet-shaped metallic material for foodstuff packing, **characterized in that** one of its surfaces is coated with a first layer ( 14) of a synthetic material in which are incorporated silver granules (16). 15
2. The sheet-shaped material according to claim 1, **characterized in that** said metallic material is of a malleable aluminium alloy. 20
3. The sheet-shaped material according to claim 1 or 2, **characterized in that** a second intermediate layer (12) of a synthetic material is interposed between said surface and said first layer ( 14). 25
4. The sheet-shaped material according to any of claims 1 to 3, **characterized in that** the synthetic material of said layers (12, 14) is a vinyl lacquer. 30
5. The sheet-shaped material according to any of claims 1 to 4, **characterized in that** said layers (12, 14) are deposited on the sheet (10) by rotogravure coating. 35
6. The sheet-shaped material according to any of claims 1 to 5, **characterized in that** said silver granules (16) have an average gauge of 0,1 to 5  $\mu\text{m}$ . 40
7. The sheet-shaped material according to any of claims 1 to 6, **characterized in that** said first layer ( 14) is 1 to 5  $\mu\text{m}$  thick. 45
8. The sheet-shaped material according to any of claims 1 to 7, **characterized in that** said intermediate layer (12) is 0,5 to 3  $\mu\text{m}$  thick. 50
9. The sheet-shaped material according to any of claims 1 to 8, **characterized in that** one of its surfaces is marked with a mark to distinguish its two surfaces from each other. 55
10. The sheet-shaped material according to any of claims 2 to 9, **characterized in that** said mark is made by embossment upon the aluminium alloy.

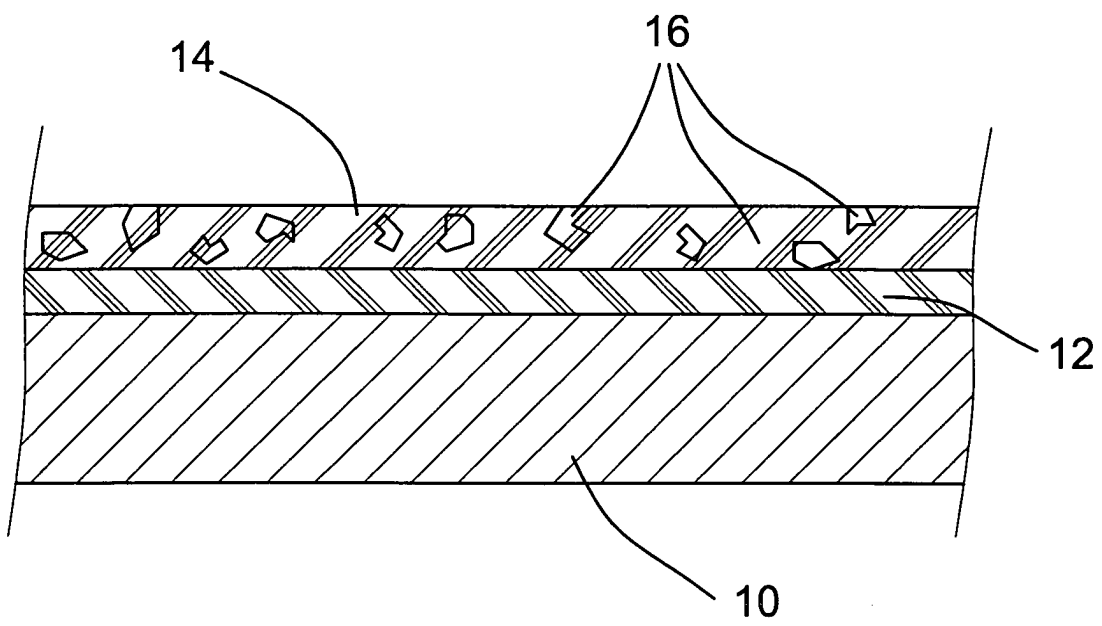


Fig. 1



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## EUROPEAN SEARCH REPORT

Application Number  
EP 03 02 0226

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 16 December 2003	Examiner Johne, O
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 03 02 0226

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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