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(54) Molded plastic material, method for manufacturing it, and tamper-evident articles made of said material

(57) A method for the production of a tamper-evident plastic material, comprising the following steps:
a) printing, by means of flexographic or typographic technology, a plastic material whose surface has not undergone a treatment (such as corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like) that makes it suitable for types of printing that comprise ink anchoring;
b) treating the surface of the material obtained in step a) by means of a method selected among corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like so as to render receptive to ink the areas that have not been printed in step a);
c) printing with flexographic or typographic technology with UV or EB ink the parts of the material that were not printed previously and treated in step b).

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Description

[0001] The present invention relates to a method for manufacturing a molded plastic material, to an article or adhesive material comprising the material obtained by means of said method, and to their use.

[0002] Labels, optionally of the self-adhesive type, or adhesive tapes, whose primary function is security and prevention of counterfeiting/forgery, are particular products which, if one attempts to remove them, release onto the product to which they are applied a message or logo that is hidden in an internal layer thereof, or said message or logo irreversibly appears on the label or tape and therefore in a manner that can no longer be concealed.

[0003] These types of product are defined hereinafter as "tamper-evident" or "VOID" products.

[0004] These products are intended for the most disparate applications, where there is a need for security and for identification of any tampering that might have occurred, such as for example in the cosmetic, pharmaceutical, electronic or food industry, or in the transport of goods in airports, courier services, mail and the like.

[0005] Currently, said VOID products are supplied mainly by important groups (Avery Dennison, Raflatac, 3M) with a standard catalog-based offer.

[0006] The possibility to have the product customized with personalized material, colors, names and symbols is offered by these manufacturers at such high costs as to discourage all interest.

[0007] "Affordable" costs for said customized product are currently offered only with high order volumes, which do not correspond to the actual needs of the market, which is necessarily highly fragmented.

[0008] It is in fact necessary to take into account the fact that the function and particularity of the VOID product increases its optimization as the customization of the messages and logos increases.

[0009] Vice versa, the more the VOID is generic and generalized, the less it is effective in terms of security (a label can be removed and replaced with another identical one which is easily available on the market).

[0010] The present limitations to the customization of the VOID product are currently due mainly to technical reasons linked to the methods for their mass production.

[0011] Moreover, commercially available VOID products often are of unsatisfactory quality as regards the release and definition of the hidden messages and/or logos, since with the technology currently in use the VOID "effect", i.e., the capability of the product to release an image/logo in case of tampering can decay over time.

[0012] The backing/front of the VOID product (where the messages and logos are hidden in the lower layer) is in fact currently provided mainly by means of rotogravure or flexographic methods and solvent-based or water-based inks ("volatile" inks).

[0013] Rotogravure is a printing technology whose equipment (etched steel cylinders) is particularly expensive and whose startup is particularly onerous in terms of machine time and waste of materials and whose machines have an average span of 1000 to 1600 mm.

[0014] Solvent/water-based inks "dry" by dispersion and "extraction" of humidity.

[0015] The flexographic method used generally in the background art comprises the step of pre-treatment of the surface on which printing will be performed, in order to make said surface suitable for the printing process, i.e., make the material "receptive" or "anchored" permanently to the various types of ink used (which without these treatments would not anchor themselves on the surface). This step can include at least one treatment including the corona treatment, flame treatment, plasma treatment, chemical treatment or top-coated treatment. The top-coated treatment consists in spreading/laying on the surface of the material a chemical product such as paint or primer - of which many types are available - which makes the material receptive to ink, i.e., allows the ink to anchor itself thereon. This treatment is generally performed by the manufacturer of the material itself.

[0016] In known methods (performed with volatile inks), time, temperature, humidity and storage conditions can vary the VOID "effect" obtained in post-printing (and presented to the customer), to the point of inhibiting the VOID effect (complete lack of "release" of the messages/logos) or of limiting it, compromising the quality and definition of the security graphic elements (messages/logos).

[0017] The aim of the present invention is to provide a printing technology that produces a VOID that is more stable over time than known methods.

[0018] Within this aim, an object of the present invention is to provide a printing technology that has significantly lower costs than the background art for small/medium runs of "customized" product.

[0019] Another object of the present invention is to provide a printing technology that produces a VOID with graphic elements that are better defined and sharper than one that can be obtained according to the methods of the background art.

[0020] This aim and these and other objects that will become better apparent hereinafter are achieved by a method for the production of a tamper-evident plastic material, comprising the following steps:

a) printing, by means of flexographic or typographic technology, a plastic material whose surface has not undergone a treatment (such as corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like) that makes it suitable for types of printing that comprise ink anchoring;

b) treating the surface of the material obtained in step a) by means of a method selected among corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like so as to render receptive to ink the areas that have not been printed in step a);

c) printing with flexographic or typographic technology with UV or EB ink the parts of the material that were not printed previously and treated in step b).

[0021] This aim and these objects are also achieved by an adhesive material that comprises the plastic material obtained by means of said method, wherein at least one side of said plastic material comprises an adhesive substance.

[0022] The aim and objects of the invention have also been achieved by means of a tamper-evident article, comprising said adhesive material or the material obtained according to said method and by means of the use of said article to package a pharmaceutical, cosmetic, electronic, food product or a packaging intended for shipping goods.

[0023] Within the scope of the present invention, the expression "UV inks" references inks that dry by irradiation of ultraviolet light (radical and/or cationic inks) or of UV LEDs.

[0024] The expression "EB inks" references inks that dry by means of an electron beam.

[0025] It has been found surprisingly that by means of the method according to the invention it is possible to obtain VOID products that do not suffer the drawbacks of the background art as regards stability over time and graphic element quality; moreover, the method is suitable for the production of even relatively small quantities of said VOID products.

[0026] The preferred printing technology is flexographic technology, using UV or EB inks, hereinafter referenced as "UV Flexo".

[0027] UV Flexo is a printing technology whose equipment (photopolymeric printing plates) costs approximately one sixth the cost of rotogravure equipment.

[0028] UV Flexo is a printing technology that has significantly shorter startups in terms of machine times and of waste of material with respect to rotogravure and solvent/water-based Flexo.

[0029] The average startup time of a rotogravure/Flexo solvent/water-based system is 2-4 hours; the average startup time of a Flexo UV system is 0.5-1 hour.

[0030] The average feeding time for rotogravure is 150-200 linear meters; the average feeding time for Flexo UV is 30-40 linear meters.

[0031] Flexo UV is a printing technology whose machines have an average span from 250 to 800 mm.

[0032] UV/EB inks do not "dry" but "polymerize" upon exposure to irradiation with ultraviolet light (or LED or electron beam) generated by lamps installed on the printing lines.

[0033] This polymerization is irreversible and is not affected by temperatures, humidity and storage conditions. It has been found surprisingly that this allows to obtain a VOID "effect" that is extremely stable over time.

[0034] With Flexo UV technology, the VOID can be printed on all plastic materials offered commercially, such as polypropylene, polyester, et cetera.

[0035] According to the method of the invention, one proceeds with the printing, by means of a process of the flexographic or typographic type, of the message or logo that will have to be evident in case of tampering or attempted tampering on a plastic material that has not undergone treatments (e.g., chemical, corona, flame, plasma treatments, et cetera) that would make it suitable for printing according to the background art. Preferably, a solvent- or water-based ink of the UV or EB type is used in said printing. More preferably, said ink is of the UV or EB type.

[0036] Preferably, the initial material is selected among cast or mono-oriented or bi-oriented polypropylene, polyester, polystyrene or oriented polystyrene, PLA Nature Works (corn starch extract), nylon, or a multi-ply material derived from said materials. Said material can be transparent, white or colored.

[0037] The material thus printed is then treated on its surface (preferably by corona treatment) in order to improve its tension and so that the areas not previously printed become receptive to subsequent printing.

[0038] The part treated in the preceding step (and not printed previously) is then printed by means of a process of the flexographic or typographic type with an ink of the UV or EB type, producing a so-called "full surface", which is meant to conceal the message or logo that will have to appear in case of tampering.

[0039] In the method according to the invention, preferably at least one of the printing steps is of the flexographic type.

[0040] More preferably, the printing of the flexographic type uses a photopolymer printing plate as a matrix and an anilox roller.

[0041] Preferably, in the method according to the invention, the ink is of the cationic UV type in at least one of the printing steps.

[0042] In another aspect, the present invention relates to an adhesive material that comprises the plastic material obtained by means of the above method, wherein at least one portion of the plastic material comprises an adhesive substance.

[0043] The adhesive material according to the invention can be obtained by spreading an adhesive substance on at least one portion of the plastic material.

[0044] Depending on the type of spreading performed, it is possible to obtain a VOID that releases the messages or logos or makes them only appear irreversibly, without at the same time contaminating or damaging the product to which it has been applied.

[0045] Preferably, in the adhesive material according to the invention, the adhesive substance is of the hot-melt type, with an acrylic, polyurethane or solvent base.

[0046] In another aspect, the present invention relates to a tamper-evident article comprising the adhesive material or the material obtained according to the method that comprises steps a)-c).

[0047] Preferably, such article is in the form of a label, tape or sticker.

[0048] In another aspect, the present invention comprises the use of the article in the packaging of a pharmaceutical, cosmetic, electronic, food product or of a packaging intended for shipping goods.

[0049] The disclosures in Italian Patent Application no. VA2010A000039, from which this application claims priority, are incorporated herein by reference.

Claims

1. A method for the production of a tamper-evident plastic material, comprising the steps of:

   a) printing, by means of flexographic or typographic technology, a plastic material whose surface has not undergone a treatment (such as corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like) that makes it suitable for types of printing that comprise ink anchoring;
   b) treating the surface of the material obtained in step a) by means of a method selected among corona treatment, flame treatment, plasma treatment, chemical treatment of the top-coated type and the like so as to render receptive to ink the areas that have not been printed in step a);
   c) printing with flexographic or typographic technology with UV or EB ink the parts of the material that were not printed previously and treated in step b).

2. The method according to claim 1, wherein in steps a) and/or c) the printing is of the flexographic type.

3. The method according to claim 1, wherein the material of step a) is selected among cast or mono-oriented or bi-oriented polypropylene, polyester, polystyrene or oriented polystyrene, PLA Nature Works (corn starch extract), nylon, or a multi-ply material derived from said materials.

4. The method according to one or more of the preceding claims, wherein a solvent-based or water-based ink of the UV or EB type is used in step a).

5. The method according to claim 4, wherein an ink of the UV or EB type is used in step a).

6. The method according to one or more of the preceding claims, wherein the ink in step a) and/or c) is of the cationic UV type.

7. The method according to one or more of the preceding claims, wherein a photopolymer printing plate as a matrix and an anilox roller are used in the printing of the flexographic type.

8. The method according to one or more of the preceding claims, wherein the treatment of step b) is a corona treatment.

9. An adhesive material comprising a plastic material obtained by means of the method according to one of the preceding claims, wherein at least one portion of said plastic material comprises an adhesive substance.

10. The adhesive material according to claim 9, wherein said adhesive substance is hot-melt, acrylic-, polyurethane- or solvent-based.

11. A tamper-evident article, comprising an adhesive material according to claim 9 or 10, or the material obtained according to the method of one or more of claims 1-8.

12. The article according to claim 11 in the form of a label, tape or sticker.

13. Use of the article according to claim 11 or 12 in the packaging of a pharmaceutical, cosmetic, electronic, food product, or of a packaging intended for shipping goods.

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 2823

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 5 798 169 A (SMITH CHRISTOPHER A [US]) 25 August 1998 (1998-08-25) * column 10, line 43 - column 11, line 24 * * column 11, line 40 - column 11, line 60 * -----	1-13	INV. B41M1/04 B41M3/14 B41M5/00 B41M7/00 B41M1/30 B41M3/00
Y	US 2003/031861 A1 (REITER SVEN [DE] ET AL) 13 February 2003 (2003-02-13) * paragraphs [0097], [0181] - [0184] * -----	1-13	G09F3/02
Y	US 2005/191439 A1 (HIROSE TAKESHI [JP] ET AL) 1 September 2005 (2005-09-01) * paragraphs [0062] - [0065] * -----	1-13	
Y	EP 0 377 289 A2 (MINNESOTA MINING & MFG [US]) 11 July 1990 (1990-07-11) * page 7, line 38 - line 49; examples 18,19 * -----	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

B41M
G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 July 2011	Pulver, Michael

CATEGORY OF CITED DOCUMENTS

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20-07-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5798169 A	25-08-1998	US 5631068 A	20-05-1997
		ZA 9506452 A	14-03-1996
US 2003031861 A1	13-02-2003	DE 10139653 A1	20-02-2003
		EP 1283511 A2	12-02-2003
		ES 2305155 T3	01-11-2008
		JP 2003114621 A	18-04-2003
US 2005191439 A1	01-09-2005	AU 2003241891 A1	22-12-2003
		CN 1659027 A	24-08-2005
		EP 1514680 A1	16-03-2005
		WO 03103953 A1	18-12-2003
		TW I245059 B	11-12-2005
EP 0377289 A2	11-07-1990	AU 617022 B2	14-11-1991
		AU 4598689 A	12-07-1990
		CA 2005105 A1	05-07-1990
		JP 2251537 A	09-10-1990

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Patent documents cited in the description

- IT VA20100039 A **[0049]**