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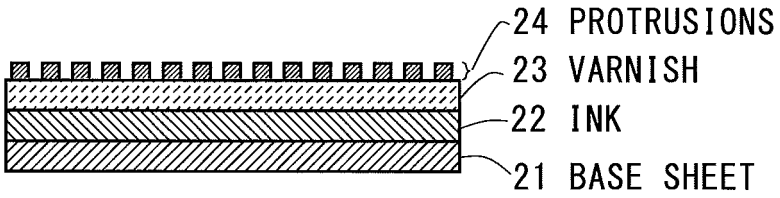
(54) **PACKAGE AND PRINTING METHOD THEREFOR**

(57) The invention addresses the problem of providing a package that does not develop a water-stained appearance even when a package with a very smooth printed surface is wrapped with a closely adhesive film, and a printing method therefor. The package is provided with: a base sheet, which configures the main body of the package; a colored ink layer, which is obtained from at least one colored ink that has been applied on the base sheet; a smooth gloss layer that confers a glossy feel to the colored ink layer; and a protrusion layer in which a transparent varnish is printed as protrusions on the gloss layer under prescribed conditions that preserve the glossy feel of the colored ink layer.

FIG. 4



EP 2 759 491 A1

Description

Technical Field

[0001] The present invention relates to a technology of a package and a printing method therefor.

Background Art

[0002] A known package for accommodating an accommodated item such as a tobacco commodity is exemplified such as a soft pack type package and a hard box type package. Further, these types of packages have brands, names of companies, etc, which are printed the surfaces of the packages by use of a variety of printing technologies.

[0003] On the other hand, without being limited to printing of the package, a printing technology (refer to, e.g., Patent documents 1, 2) is known as one of existing printing technologies, which uses varnish to provide glossy feeling and a matte feeling to a printing surface. For example, Patent document 1 discloses a technology of forming an ultraviolet ray curing type of varnish layer.

[0004]

[Patent document 1] Japanese Patent Application Laid-Open Publication No.2004-114654

[Patent document 2] Japanese Utility Model Application Laid-Open Publication No.H07-11580

Summary of Invention

Technical Problem

[0005] When wrapping the package having a printing surface having high smoothness with a highly adhesive film such as a shrink film, the film is adhered to the printing surface, and, as illustrated in FIG. 1, water-stained patterns occur in an adhered portion as if wetted with water droplets as the case may be. This phenomenon is derived from partial adhesion of the film onto the printing surface of the package as illustrated in FIG. 2 depicting particularly a portion indicated by a symbol X in a section taken along the line A-A in FIG. 1.

[0006] Such a phenomenon is conspicuous in the case of printing characters, graphics, etc on a glossy base sheet exhibiting high smoothness and coating varnish over the printed sheet as in the case of cast-coated paper, paper pasted with a PET (Polyethylene terephthalate) film on which aluminum is deposited, and paper onto which the aluminum deposited on the film is transferred.

[0007] The present invention, which was devised in view of the problem described above, addresses the problem of providing a package and a printing method therefor, in which water-stained patterns do not occur even when wrapping a package having a printing surface exhibiting high smoothness with a highly adhesive film.

Solution to Problem

[0008] The present invention is contrived to solve the problem so that transparent varnish is printed in a protruded shape on a smooth glossy layer which provides a glossy feeling to a color ink layer.

[0009] Specifically, a package according to the present invention includes: a base sheet to configure a main body of the package; a color ink layer to contain at least 1-layer color ink coated over the base sheet; a smooth glossy layer to provide a glossy feeling to the color ink layer; and a protruded layer to be configured by printing transparent varnish in a protruded shape under predetermined conditions for keeping the glossy feeling of the color ink layer.

[0010] The package according to the present invention is characterized by including a protruded layer configured so that protrusions are formed in a protruded shape on at least a part of the glossy layer under the predetermined conditions for keeping a glossy feeling of the color ink layer. Hence, even when this package is wrapped with a highly adhesive film such as a shrink film, it follows that the protruded layer gets the film to be separated from the glossy layer. With this contrivance, even when wrapping the package with the highly adhesive film such as the shrink film, it does not happen that the film is adhered to the glossy and smooth printing surface with the result that the water-stained patterns occur. It is preferable that the package is used as, e.g., a cigarette package for accommodating tobacco.

[0011] Herein, the predetermined conditions are a condition for keeping the glossy feeling of the color ink layer that is provided by the glossy layer, a condition that, e.g., the protrusions configuring the protruded layer do not affect the glossy feeling of the glossy feeling of the color ink layer when viewed by naked eyes, a condition about a shape pattern, a size or an interval of the protrusions configuring the protruded layer, and a condition that is determined on a trial run basis corresponding to the glossy feeling that occurs owing to the glossy layer and a color of the color ink layer.

[0012] The protruded layer satisfying these conditions can be exemplified by a protruded layer configured so that, e.g., a square measure of an upper surface portion of one protrusion is set approximately 0.003 - 0.006 mm^2, a protruded layer configured so that the protrusions are formed by printing in the dot shape in a way that sets screen ruling to approximately 150 - 200 lpi, a protruded layer configured so that the screen ruling is within a range of 150 - 200 lpi, a protruded layer configured so that a height is equal to or smaller than 1 μm, a protruded layer configured so that an ultraviolet ray curing type of transparent varnish is printed in a protruded shape, or a protruded layer configured so that: the dotted protrusions are printed by printing screen dots that are 10 - 20% in area ratio in the case of 150 lpi as the screen ruling; the dotted protrusions are printed by printing the screen dots that are 14 - 29% in area ratio in the case of 175 lpi as

the screen ruling; and the dotted protrusions are printed by printing the screen dots that are 19 - 38% in area ratio in the case of 200 lpi as the screen ruling. If the protruded layer is thus configured, it does not happen that the film is adhered to the glossy and smooth printing surface with the result that the water-stained patterns occur while keeping the glossy feeling of the color ink layer, which is provided by the glossy layer. Note that the water-stained patterns occur if the square measure of the upper surface portion of one protrusion is smaller than 0.003 mm^2, and the glossiness decreases whereas if larger than 0.006 mm^2 as the case may be. Moreover, the water-stained patterns occur if the screen ruling is smaller than 150 lpi, and the printing is hard to be done by the normal printing technology whereas if larger than 200 lpi. Still further, the water-stained patterns occur if an area ratio of screen dots is smaller than an area ratio corresponding to each screen ruling, and the glossiness declines whereas if larger than the area ratio corresponding to each screen ruling.

[0013] Note that the protrusions of the protruded layer may be regularly formed over, e.g., an entire area of the surface of the package. If the protrusions of the protruded layer are regularly formed over the entire area of the surface of the package, the water-stained patterns do not occur in any portions of the package.

[0014] It is to be noted that the present invention can be also grasped in terms of an aspect of a printing method. For example, the present invention may also be a package printing method including: a color ink layer printing step of printing at least one color ink layer on a base sheet configuring a main body of a package; a glossy layer printing step of printing a smooth glossy layer to provide a glossy feeling to the color ink layer on the color ink layer; and a protruded layer printing step of printing transparent varnish in a protruded shape on the glossy layer under predetermined conditions for keeping the glossy feeling of the color ink layer.

Advantageous Effects of Invention

[0015] According to the present invention, the water-stained patterns do not occur even when the package having the printing surface exhibiting the high smoothness is wrapped with the highly adhesive film.

Brief Description of Drawings

[0016]

[FIG. 1] A perspective view of a conventional package.

[FIG. 2] A sectional view of a paper member of the conventional package wrapped with a film.

[FIG. 3] A perspective view of a package according to an exemplary embodiment.

[FIG. 4] A sectional view of the paper member configuring the package to which printing is applied, corresponding to a section taken along the line a-a in FIG. 3.

[FIG. 5] A flowchart illustrating steps of a printing method according to the exemplary embodiment.

[FIG. 6] A diagram illustrating a case in which a pattern of protrusions configuring a protruded layer takes a dotted shape by way of one example.

[FIG. 7] A diagram illustrating a case in which the pattern of protrusions configuring the protruded layer takes a line shape by way of one example.

[FIG. 8] A diagram illustrating a case in which the pattern of protrusions configuring the protruded layer takes a lattice shape by way of one example.

Description of Embodiments

[0017] An exemplary embodiment of the present invention will hereinafter be described. The exemplary embodiment demonstrated below exemplifies an exemplary embodiment of the present invention but does not limit the technical scope of the present invention to an aspect which follows.

[0018] A cigarette package (which will hereinafter be simply referred to as a package) according to the exemplary embodiment is, as illustrated in FIG. 3, a hard box type package. A package 1 takes a rectangular parallelepiped shape to include a main body 2 and a cover portion 3, in which the cover portion 3 is enabled to open and close (rotationally) about a hinge 4, serving as an axis, provided at an upper portion of a rear surface of the main body 2. An interior of the package 1 can accommodate a tobacco product such as cigarettes (filter cigarettes, untipped cigarettes (no filter tip), cigars, cigarillo, an electronic cigarette, smokeless tobacco (chewing tobacco, snuff)). The package 1 is configured so that a brand, a name of company, a content indication, etc are printed on the surface, and further a whole or part of the print indication is covered with clear coat varnish, e.g., UV coater varnish (coating varnish for surface gloss) based on offset printing. Note that the package 1 may be configured to accommodate a variety of commodities as well as accommodating the tobacco.

[0019] Herein, the clear coat varnish is classified into two types such as an aqueous type and an UV curing type to attain hardening by ultra violet rays, in which each type is subcategorized into a gloss type exhibiting high glossiness and a matte type exhibiting low glossiness. Characteristics requested of the clear coat varnish used for the cigarette package are properties such as the glossiness, abrasion resistance, heat resistance and scratch resistance. In the present invention, it is desirable to use the clear coat varnish especially excellent of the glossiness. The present working example involves using, e.g., the gloss type of UV clear coat varnish. To be specific, "Dai Cure" (registered trademark) and "Clear UV Series" (brand name) made by DIC Corporation, "FD Clear Coat SPC" (brand name) made by Toyo Ink Co., Ltd and so on are exemplified. Further, it is desirable that

a glossy layer formed by the clear coat varnish according to the present invention is equal to larger than 2 μm in thickness.

[0020] FIG. 4 illustrates a sectional view depicting particularly a portion, indicated by a reference symbol Y, of the section taken along the line B-B in FIG. 3 in a paper member configuring the package 1 to which the printing is applied. As illustrated in FIG. 4, the printing is applied to the paper member of the package 1 according to the exemplary embodiment, thereby configuring a base sheet 21, a color ink layer 22, a glossy layer 23 and a protruded layer 24.

[0021] The base sheet 21 is a base material of the paper member configuring the main body 2 and the cover portion 3 of the package 1. The base sheet 21 can involve using a glossy base sheet exhibiting high smoothness, such as cast-coated paper, paper pasted with a PET (Polyethylene terephthalate) film on which aluminum is deposited, and paper onto which the aluminum deposited on the film is transferred.

[0022] The color ink layer 22 is a layer formed by applying color-ink printing to the surface of the base sheet 21. The color ink layer 22 is a layer that expresses a design of the package 1 and represents a brand, a name of company, a content indication, etc. Note that one type of color ink layer is formed as the color ink layer 22 in FIG. 4, however, the number of the color ink layers can be varied corresponding to the design of the package. Moreover, the color ink layer 22 may contain a high luminance metal color ink layer.

[0023] The glossy layer 23 is a layer formed by printing, e.g., the clear coat varnish on the surface of the color ink layer 22 and exhibiting the high smoothness. The glossy layer 23 protects the color ink layer 22 from flaws and contaminations, and provides a glossy feeling to the surface of the color ink layer 22.

[0024] Note that the package 1 may undergo an embossing finish, a debossing finish and a stamping finish, which are applied to the surface thereof.

[0025] FIG. 5 illustrates steps of a printing method according to the exemplary embodiment. In a color ink layer printing step (S01), the color ink layer 22 is printed on the base sheet 21. The color ink for use is properly selected corresponding to the design of the package 1. Next, in a glossy layer forming step (S02), the glossy layer 23 is formed by applying an OP (Over Print) varnish finish to the surface of the ink 22.

[0026] The color ink layer printing step (S01) and the glossy layer forming step (S02) can be also realized by a known printing technology such as gravure printing, offset printing and offset UV printing. In the case of being realized by the gravure printing, the printing can be done by use of a known printing machine. Moreover, in the case of being realized by other known printing technologies, the printing can be done by employing the printing machines corresponding to other known printing technologies.

[0027] Next, in a protruded layer forming step (step S03), transparent ultraviolet-ray curing UVOP varnish is offset-printed in a dotted shape on the surface of the smooth glossy layer 23.

[0028] Herein, the OP varnish is classified into three types such as the aqueous type, an oil type and the UV curing type to attain hardening by the ultra violet rays, in which each type is subcategorized into the gloss type exhibiting the high glossiness and the matte type exhibiting the low glossiness. Characteristics requested of the OP varnish for the cigarette package are properties such as the glossiness, transparency, the heat resistance and the scratch resistance. In the present invention, it is desirable to use the OP varnish especially excellent of the glossiness and the transparency and easy to form the protrusions. The present working example involves using, e.g., the gloss type of UVOP varnish. Further, it is desirable that the protruded layer formed by the UVOP varnish according to the present invention is equal to smaller than 1 μm in thickness.

[0029] The protruded layer 24 is configured to prevent water-stained patterns from occurring in an adhered portion as if wetted with water droplets by protecting the surface of the glossy layer 23 from adhering to the film with the protruded varnish on the occasion of wrapping the package 1 with the film exhibiting high adherence and therefore to form the protrusions to such a degree that the glossy feeling of the glossy layer 23 is not lost. Specifically, on the occasion of forming the protruded layer 24 by the offset UV printing, for instance, one protruded upper surface portion is formed approximately 0.003 - 0.006 mm^2 in square measure, and, when screen ruling is set to about 150 - 200 lpi, an area ratio of screen dots becomes approximately 10 - 40%, thereby making it possible to form the protruded layer 24 to such an extent that the glossy feeling of the glossy layer 23 is not lost when viewed by naked eyes. More specifically, the dotted protrusions are printed by printing the screen dots that are 10 - 21% in area ratio in the case of 150 lpi as the screen ruling; the dotted protrusions are printed by printing the screen dots that are 14 - 29% in area ratio in the case of 175 lpi as the screen ruling; and the dotted protrusions are printed by printing the screen dots that are 19 - 38% in area ratio in the case of 200 lpi as the screen ruling, thereby making it feasible to form the protruded layer 24 to such an extent that the glossy feeling of the glossy layer 23 is not lost when viewed by naked eyes. Note that if the thickness of the protruded layer is equal to or smaller than preferably 1 μm, it is feasible to form the protruded layer 24 to a greater degree that the glossy feeling of the glossy layer 23 is not lost. The protruded layer 24 is configured by forming the transparent varnish, e.g., the UVOP varnish in the protruded shape, and hence a screen angle does not matter.

[0030] On the occasion of forming the glossy layer 23 and the protruded layer 24 by the offset UV printing, printing conditions are properly selected in a way that corresponds to a coating method such as a roll coater and a chamber coater and to a coating agent as well.

[0031] Note that printing conditions on the occasion of forming the protruded layer 24 are not limited to those described above, and, if keeping the glossy feeling of the color ink layer 22 that is given by the glossy layer 23 and if within such a range that the protrusions configuring the protruded layer 24 do not affect the glossy feeling of the color ink layer 22 when viewed by the naked eyes, a size and an interval of the protruded-shape patterns configuring the protruded layer can be properly determined on a trial run basis corresponding to the feeling of the glossiness occurring owing to the glossy layer 23 and the color of the color ink layer 22.

[0032] The UVOP varnish immediately hardened upon being irradiated with the ultra violet rays facilitates, if used as the varnish used for forming the protruded layer 24, the formation of the protrusions, however, the varnish composed of other components may also be available if capable of forming the protrusions.

[0033] Note that the protruded layer 24 may be formed with the dotted protrusions as illustrated in FIG. 6, may also be formed with line-shaped protrusions as depicted in FIG. 7 and may further be formed with protrusions in lattice as illustrated in FIG. 8. However, in view of such requirements of the protruded layer 24 that the water-stained patterns do not occur in the adhered portion and that the glossy feeling of the glossy layer 23 is not lost, it is desirable to form the dotted protrusions having a small area covering the glossy layer 23.

[0034] Moreover, the protruded layer 24 is configured so that the protrusions may be formed over an entire area of the surface of the package 1 and may also be formed partially on portions (e.g., front and rear surfaces of the package 1, or the portion to which the stamping finish is applied) where the water-stained patterns, if occurring, greatly affect an aesthetic aspect.

[0035] If being the package 1, the protruded layer 24 is formed on the surface of the glossy layer 23, and hence, even when the package 1 is wrapped with a highly adhesive film such as a shrink film, it does not happen that the water-stained patterns occur in the adhered portion while keeping the glossy feeling of the glossy layer 23. Therefore, even when the package 1 is wrapped with the film such as the shrink film, the occurrence of the water-stained patterns does not cause a decline of the aesthetic aspect while keeping the glossy feeling of the printing surface.

[0036] Note that the exemplary embodiment has made the discussion by exemplifying the box type package with the upper side being open and can be also applied to a package with the right or left side being open, a package with its angles being chamfered, and so on.

Reference Signs List

[0037]

1 package (cigarette package)

2 main body

3 cover portion

4 hinge

21 base sheet

22 color ink layer

23 glossy layer

24 protruded layer

Claims

1. A package comprising:

a base sheet to configure a main body of the package;
a color ink layer to contain at least 1-layer color ink coated over the base sheet;
a smooth glossy layer to provide a glossy feeling to the color ink layer; and
a protruded layer to be configured by printing transparent varnish in a protruded shape under predetermined conditions for keeping the glossy feeling of the color ink layer.

2. The package according to claim 1, wherein protrusions of the protruded layer are regularly formed over an entire area of the surface of the package.

3. The package according to claim 1 or 2, wherein the protruded layer is formed so that a square measure of an upper surface portion of one protrusion is within a range of 0.003 - 0.006 mm^2.

4. The package according to any one of claims 1 through 3, wherein the protruded layer is formed so that screen ruling is within a range of 150 - 200 lpi.

5. The package according to any one of claims 1 through 4, wherein the protruded layer is formed so that a height is equal to or smaller than 1 μm.

6. The package according to any one of claims 1 through 5, wherein the protruded layer is formed so that an ultraviolet ray curing type of transparent varnish is printed in a protruded shape.

7. The package according to any one of claims 1 through 6, wherein the protruded layer is formed so that: the dotted protrusions are printed by printing screen dots that are 10 - 21% in area ratio in the case of 150 lpi as the screen ruling; the dotted protrusions are printed by printing the screen dots that

are 14 - 29% in area ratio in the case of 175 lpi as the screen ruling; and the dotted protrusions are printed by printing the screen dots that are 19 - 38% in area ratio in the case of 200 lpi as the screen ruling.

8. The package according to any one of claims 1 through 7, wherein the package is a cigarette package.

9. A package printing method including:

a color ink layer printing step of printing at least one color ink layer on a base sheet configuring a main body of a package;
a glossy layer printing step of printing a smooth glossy layer to provide a glossy feeling to the color ink layer on the color ink layer; and
a protruded layer printing step of printing transparent varnish in a protruded shape on the glossy layer under predetermined conditions for keeping the glossy feeling of the color ink layer.

10. The package printing method according to claim 9, wherein protrusions of the protruded layer are regularly formed over an entire area of the surface of the package.

11. The package printing method according to claim 9 or 10, wherein the protruded layer is formed so that a square measure of an upper surface portion of one protrusion is within a range of 0.003 - 0.006 mm^2.

12. The package printing method according to any one of claims 9 through 11, wherein the protruded layer is formed so that screen ruling is within a range of 150 - 200 lpi.

13. The package printing method according to any one of claims 9 through 12, wherein the protruded layer is formed so that a height is equal to or smaller than 1 μm.

14. The package a printing method according to any one of claims 9 through 13, wherein the protruded layer is formed so that an ultraviolet ray curing type of transparent varnish is printed in a protruded shape.

15. The package printing method according to any one of claims 9 through 14, wherein the protruded layer printing step is executed so that: the dotted protrusions are printed by printing screen dots that are 10 - 21% in area ratio in the case of 150 lpi as the screen ruling; the dotted protrusions are printed by printing the screen dots that are 14 - 29% in area ratio in the case of 175 lpi as the screen ruling; and the dotted protrusions are printed by printing the screen dots that are 19 - 38% in area ratio in the case of 200 lpi as the screen ruling.

16. The package printing method according to any one of claims 9 through 15, wherein the package is a cigarette package.

FIG. 1

PRIOR ART

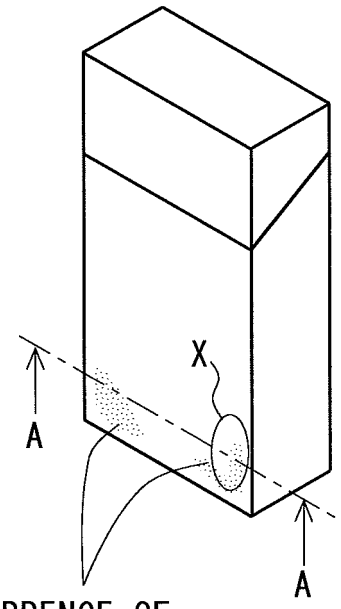


FIG. 2

PRIOR ART

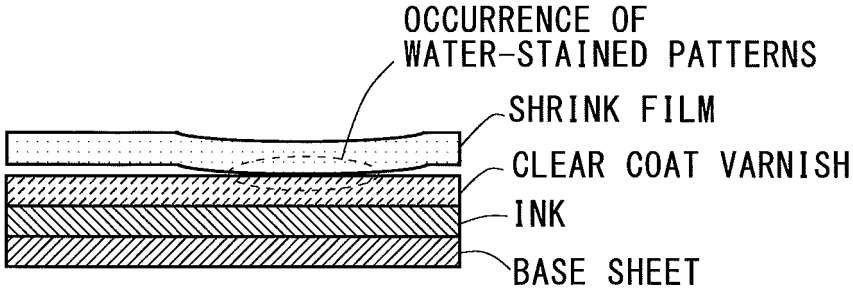


FIG. 3

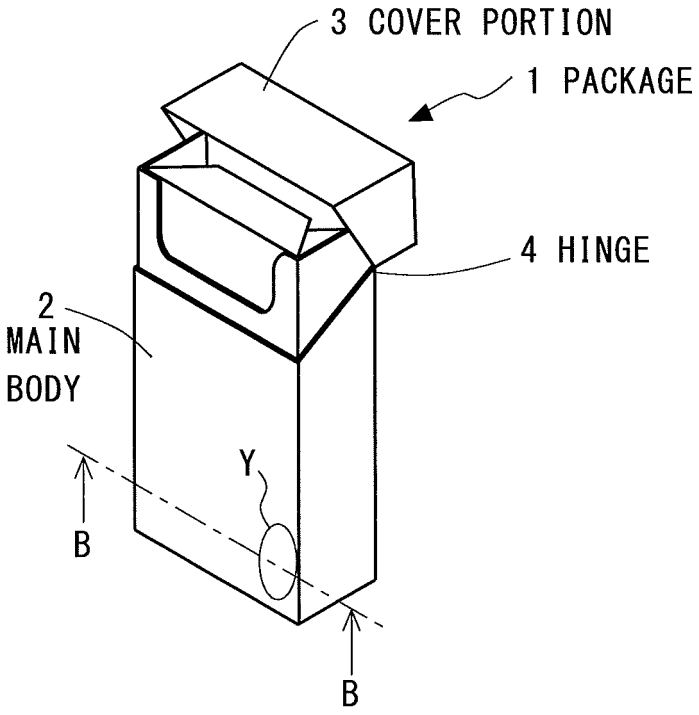

3 COVER PORTION
1 PACKAGE
4 HINGE
2
MAIN
BODY
Y
B
B

FIG. 4

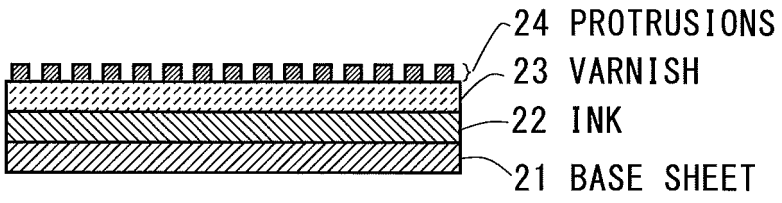

24 PROTRUSIONS
23 VARNISH
22 INK
21 BASE SHEET

FIG. 5

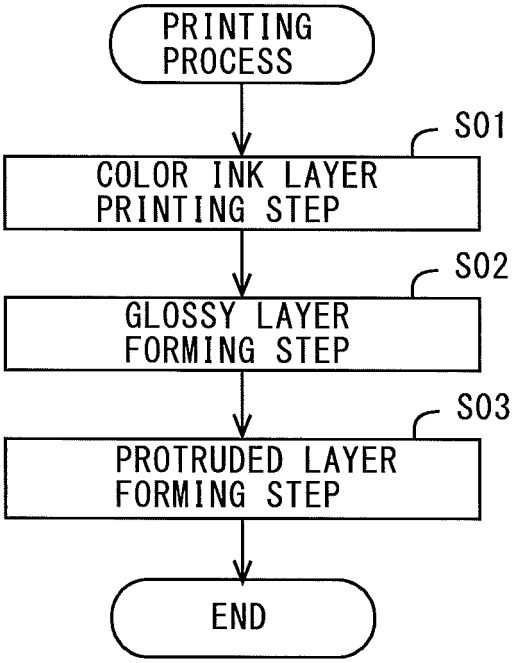

PRINTING PROCESS
S01
COLOR INK LAYER PRINTING STEP
S02
GLOSSY LAYER FORMING STEP
S03
PROTRUDED LAYER FORMING STEP
END

FIG. 6

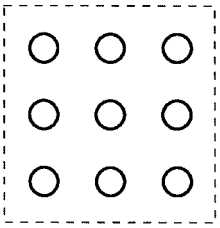


FIG. 7

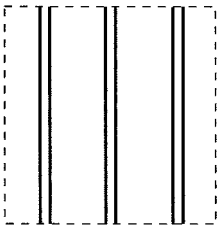
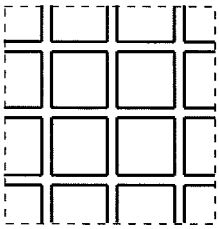


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/071343

A. CLASSIFICATION OF SUBJECT MATTER
B65D85/10(2006.01)i, *A24F15/00*(2006.01)i, *B41M3/00*(2006.01)i, *B65D25/20*(2006.01)i, *B65D65/40*(2006.01)i

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)
B65D85/10, A24F15/00, B41M3/00, B65D25/20, B65D65/40

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2011
Kokai Jitsuyo Shinan Koho	1971-2011	Toroku Jitsuyo Shinan Koho	1994-2011

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2009-154926 A (Yugen Kaisha BAT Pacific Corporation), 16 July 2009 (16.07.2009), paragraphs [0017] to [0021]; fig. 1 to 3 & EP 2234903 A & WO 2009/083344 A2 & AU 2008342802 A & CA 2708398 A & KR 10-2010-0112143 A & AR 72946 A & CN 101952182 A & MX 2010007168 A	1-16
Y	JP 11-208714 A (TDK Corp.), 03 August 1999 (03.08.1999), paragraphs [0006], [0013] to [0015]; fig. 1 to 7 (Family: none)	1-16

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 December, 2011 (13.12.11)	27 December, 2011 (27.12.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/071343

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2006-225004 A (Toppan Printing Co., Ltd.), 31 August 2006 (31.08.2006), claims 1 to 5; fig. 1 to 2 (Family: none)	1-16

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2004114654 A **[0004]**
- JP H0711580 B **[0004]**