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(71) Applicant *(for all designated States except US)*: **BIL-CARE LIMITED** [IN/IN]; 601 ICC Trade Tower, Pune 411 016 (IN).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GOPIKISAN, Bharadia, Rahul** [IN/SG]; #05-04, Tower 1B. "The Bayshore', 22 Bayshore Road, Singapore 469970 (SG). **BAOZONG, Zhao** [SG/SG]; Block 759, #10-306. Yishun Street 72, Singapore 760759 (SG). **YESHAWANT, Pande, Subodh** [IN/SG]; 320,#01-04 East Coast VilIe, Upper East Coast Road, Singapore 466452 (SG). **YAP, Long, Wen, Richard** [SG/SG]; 49 Hillview Avenue #03-08, Singapore 669615 (SG). **SHIV-AJI, Shitole, Ankush** [IN/SG]; 3 Tanah Merah Kechil Road #05-03, Singapore 466664 (SG).

(74) Agent: **GANGULI, Prabuddah**; 101-201 Sunview Heights, Plot 262, Sher-e-Punjab, Andheri East, Mumbai 400 093 (IN).

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(54) **Title**: PROCESS FOR PRINTING A PLASTIC FILM WITH WATER CONTAINING INKS AND WATER CONTAINING ADDITIVES

(57) **Abstract**: The present invention relates to a method of labeling an item of value wherein this method comprises: a) printing identification information on a substrate by using an ink composition comprising a water based transfer agent; and b) coating the printed identification information with an overcoat.

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Process for printing a plastic film with water containing inks and water containing additives

FIELD OF THE INVENTION

The present invention relates to a method of labeling an item of value such as a, but not limited to, a packaging of a pharmaceutical product, the packaging of a food product, the packaging of a diagnostic product (either in vivo or in vitro diagnostic product) or any other item that should be protected against counterfeiting.

This invention also relates to the printing on plastic films with water soluble inks. The optimum results for the printing on plastic films by using water based inks are achieved when the transfer agent quantity as well as the dilution amount is such that the viscosity of the ink is in the required limits and surface tension of the liquid is lower than the surface tension of the film. The ink further deposited on a plastic film coupled with tailored flexographic ink transfer means and dried to achieve the desired adhesion followed by cooling and ageing and coating of the printed surface coated with water-based dispersion of polymers such as PVDC.

Printing plastic films with water reducible acrylic based inks of appropriate viscosity, achieved with incorporation of transfer agents as polyacrylamides in a wide range of 1.96% to 14% to achieve the required surface tension (28-36mN/M), viscosity 18 to 22 sec (ford cup number 4 at 23 deg C.) and the contact angle (42 to 55 degrees) with the corona treated Rigid Polyvinylchloride Film, the ink deposited on a the corona treated Rigid Polyvinylchloride Film coupled with tailored flexographic ink transfer means (Anilox) and dried, thereby achieving the desired adhesion (tested by using scotch tape 3M 810, 25.4mm width tape and 180° lift up) and clarity, followed by cooling and ageing. Further the printed surface is coated with water-based dispersion of polymers such as Polyvinylidene Chloride.

BACKGROUND OF THE INVENTION

Plastic films are normally printed with solvent-based inks as they are quickly and easily dried as compared a process involving water-based inks. The conventional water based ink printing on plastics suffers from shortcomings of long drying ovens, inappropriate adhesion of the inks resulting in poor print quality.

US Patent No. 6,383,450 describes a method of producing a packaging laminate for aseptic packages of the type which is produced in that a web of the packaging laminate is, for the purpose of sterilization, led through a bath of hydrogen peroxide prior to the reforming of the web into aseptic packages. The packaging material is produced in that a web of paper which has, on the one side of the web, an applied outer coating of plastic, is, for the purpose of promoting adhesion, subjected to a surface treatment changing polarity, where after the treated outer plastic coating is provided with a decor of water-based printing ink which is applied in the desired pattern on the outside of the outer plastic coating. By selecting so-called flame treating as the surface treatment of changing polarity for the outer plastic coating, the above-mentioned sterilization can be carried out with considerably reduced hydrogen peroxide consumption, at the same time as good adhesion between the water-based printing ink decor and the outer plastic coating is ensured.

US Patent No. 5,567,747 relates to a water-based oxidizing printing ink especially suited for flexographic printing. The ink comprises an epoxy ester resin, an inorganic and/or organic pigment, a drier, a cyclodextrin and water. Preferably, the ink also includes a drier activator such as 2,2'-bipyridyl and a wax. The addition of epoxy ester resin, cyclodextrin is however a tricky solution due to the lower solubility of the resin in water and requires efforts to maintain the homogeneity of the ink.

US Patent no. 4,973,617 describes Water-borne printing ink compositions based on acrylic resins and maleated rosin modified polyamides. The ink compositions are especially useful for printing onto plastic substrates.

US Patent No. 6,361,847 discloses printing ink-decorated packaging laminate for aseptic packages of the type which is produced in that a web of paper which has an outer coating of plastic is, for the purpose of sterilization, led through a bath of hydrogen peroxide prior to the reforming of the web into aseptic packages. The packaging laminate has a decor of water-based printing ink which is applied in the desired pattern on the outside of the outer plastic coating. For the purpose of protecting the water-based printing ink decor against attack from hydrogen peroxide in connection with the sterilization process, the packaging laminate is provided with an outer layer of water-based polyethylene or water-based acid-modified polyethylene which, by means of so-called dispersion coating, is applied on the printing ink-decorated outer plastic coating after, or in connection with the application of said printing ink decor.

US Patent No. 6,361,847 talks about the application of the printed surface for aseptic packaging with an improved chemical resistance to the hydrogen peroxide.

US Patent No 5,498,661 describes ink binders and in particular, it relates to acrylic latex binders for use in preparing zinc-containing water-based inks for printing on plastic films. Inks containing these binders exhibit increased chemical resistance to commonly-used cleaning formulations and excellent heat resistance and water-crinkle resistance properties.

US Patent No. 4,765,243 discloses a method of flexographic or rotogravure printing onto a plastic substrate using a water-based ink wherein the improvement comprises adding to said ink from about 0.005 to about 5 weight percent of a low molecular weight silicone compound. The incorporation of the silicone compound provides good wetting of the substrate by the ink and results in improved printing characteristics.

US Patent No. 5.972,088 describes a single fluid water-based gravure printing ink comprising water: a macromolecular resin binder comprised of resins soluble in water

regardless of the pH of the water; resins water soluble at water pH value ranging from 7.5 to 10; and aqueous emulsion resins; pigment; and a hydroxyethyl ethylene urea re-wetting agent.

US Patent No. 5,413,041 describes a printer comprising a printing roller supporting a matrix strip; a pressure roller for pressing the web on to the matrix at a first portion of the printing roller; and an inking unit including an inking roller contacting the matrix at a second portion of the printing roller; the cylindrical outer surface of the inking roller presenting microincisions, and being partially immersed in water-based ink inside a tank; and surplus ink being removed from the surface of the inking roller by a doctor blade prior to transfer on to the matrix.

The printing methodology referred to in US Patent No. 5,413,041 is used to print calendared or glazed paper.

US Patent No. 5,830,927 discloses an aqueous based printing ink compositions adapted for use in gravure and flexographic printing on hydrophobic substrates which are prepared by combining a low-viscosity resin emulsion having an average particle diameter of less than about 0.5 microns and comprised of hydrophobic, moisture resistant, adherent resin forming components with a pigment paste containing a water-soluble polymer. The printing inks are substantially devoid of volatile organic solvent.

US Patent No 4,980,408 discloses an invention that relates to novel water-based surface and lamination printing ink compositions and to their use as surface printing inks for printing onto substrates and in particular for printing onto plastic substrates. The surface printing inks of the present invention are superior in printing aptitude and color strength.

The addition of polyamide resin is a tricky solution due to the lower solubility of the resin in water and requires continuous stirring to maintain the homogeneity of the ink.

SUMMARY OF THE INVENTION

In one aspect the present invention refers to a method of labeling (identifying) an item of value wherein this method comprises: a) printing identification information on a substrate by using an ink composition comprising a water based transfer agent (additive); and b) coating the printed identification information with an overcoat.

It is noted in this regard that this method is based on the surprising finding of the present inventors that a water based transfer additive, when used in a process of printing information (which can be used to identify or label an object later on) provides a reduction in the color development in the ink, thereby making the print (of the identification information) more subtle and less intense. This more subtle print, when arranged on an (exposed or visible) surface of a substrate can thus provide discrete identification information that is not visible at a first glance but only for the "trained eye" that deliberately looks for the identification information in order to examine whether a product is authentic or a counterfeit/fake product. The invention is also based on the finding that by integrating the step of overcoating the print of the identification information into a printing process (for example flexographic printing) an additional and yet very simple way of verifying the authenticity of an object or item is provided. This is because counterfeiters simply print a logo or the name of a brand manufacturer or the brand name of the product they want to fake on a substrate when producing the fake good.

Thus, as said above, in one aspect, the substrate with the printed identification information is to be arranged on a visible surface of said object of value.

In another aspect, the item of value is selected from the group consisting of a packaging of a pharmaceutical product and the packaging of a food product.

The ink composition used in the present invention can be any ink composition that is known for printing on substrates such as, but not limited to, plastic films, metal films,

paper or composite materials. The ink composition can either be a water based ink (composition) or, if compatible with the water based transfer agent, also an ink based on organic solvents. An example of a suitable ink composition is a composition that is used for flexographic or rotogravure printing. Illustrative examples of suitable ink composition include, but are by no means limited to, the compositions described in US patent 4,772,518, US patent 4,980,408, US patent 4,765, 243, US patent, 4,973,617, US patent 5,567,747, US patent 4,08,408, US patent or US 5,830,927.

In one aspect, the ink composition further comprises an extender, a pigment and a binder resin.

In one aspect, the binder resin comprises a compound such as water based acrylic polymers, polyvinyl alcohol (PVA) based resins, polyvinyl butyrals or polyvinyl acetals.

In another aspect, the water based acrylic polymer can be composed of a compound, as for example, styrenic monomers, acrylic acid, (meth)acrylic acid ester-acrylic acid copolymers or mixtures thereof.

In another aspect the compound is a (meth)acrylic acid ester-acrylic acid copolymer.

In still another aspect the ester group of the acrylic acid ester can be, for example, ethyl, butyl, isobutyl, n-hexyl, n-octyl, lauryl-2-ethylhexyl or stearyl. In one example, the acrylic acid ester is 2-ethylhexyl acrylat.

In another aspect the copolymers have a molecular weight of between about 30.000 to about 300.000 and/or have a glass transition temperature of between about 20 °C to about 105 °C.

In another aspect the binder resin can further comprise a carboxylated rosin modified polyamide resin. In one example, the carboxylated rosin modified polyamide resin is used

in an amount from between about 5 to 20 wt% or between about 7 to 10 wt% based on the total weight of the ink composition.

In still another aspect the water based transfer agent is a polyacrylamide. In one illustrative example, this transfer agent is GLASCOL® TA (Ciba® Speciality Chemicals). GLASCOL® TA is colourless and highly viscous liquid having a pH of 7.5. The solid content of the acrylamide polymer is about 12.5%. The acid value is below 1 and the viscosity at 25°C (Brookfield 20 rpm) is about 1300 mPa*s. The density at 20°C is about 1.05 $g*cm^{-3}$.

In another aspect the transfer agent is added in an amount of between about 1.96 wt% to about 14 wt% based on the total weight of the ink composition.

In still another aspect the overcoat can be a composition such as PVC, Tyvek®, polyethylene, polypropylene, acrylic coated polypropylenes, Saran® (PVDC) coated polypropylenes, cellophanes, Mylar® or aluminium foil.

In still another aspect the substrate is a plastic. In another aspect this plastic can be corona treated. In another example this plastic can be a polyvinyl chloride film or a corona treated polyvinyl chloride film.

In another aspect the substrate has a thickness of between about 150 to about 400 μm.

In still another aspect the printing is carried out using flexographic ink transfer means.

In one aspect an Anilox roller is used for printing wherein the Anilox roller can provide between about 120 to about 160 lines/cm or between about 240 to about 280 lines/cm.

In another aspect the extender is a compound such as water based acrylic polymers, polyvinyl alcohol (PVA) based resins, polyvinyl butyrals or polyvinyl acetals.

In principle, any pigment, either organic or inorganic that is used in inks such as flexographic inks can be used in the present invention. Illustrative examples of suitable pigments are for instance given in US patent 4,973,617, US patent 5,567,747, or US 5,830,927. In one aspect the pigment is an inorganic pigment such as carbon black, titanium dioxide, zinc sulfide, calcium carbonate, or China clay. In another aspect the pigment is an organic pigment such as CI Pigment Yellow 12, CI Pigment Yellow 42, CI Pigment Black 7, CI Pigment Black 11, CI Pigment Red 9, CI Pigment Red 17, CI Pigment Red 22, CI Pigment Red 23, CI Pigment Red 57:1, CI Pigment Red 67, CI Pigment Red 146, CI Pigment Red 224, CI Pigment Green 7, CI Pigment Green 36, CI Pigment Blue 15:3, CI Pigment Violet 23, CI Pigment Violet 32,.

In one aspect the substrate can be dried after the identification information has been printed on it. In one example the drying step can be carried out with an infrared dryer.

In still another aspect the identification information can consists of a logo, symbols, numbers, letters or combinations thereof.

In still another aspect the ink composition printed on the substrate has a contact angle of between about 42 to 55 degrees.

In another aspect the ink composition printed on the substrate can have a viscosity of between about 18 to 22 sec (ford cup number 4 at 23 °C).

In still another aspect the ink composition printed on the substrate has a surface tension of between about 28 to 36 mN/M.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 describes an example of the method of the present invention. In Fig. 1 a substrate 1 is used for printing the identification information (in this case the word

"Original") thereon. After printing of the identification information on the substrate, the printed identification information 2 is coated with an overcoat 3.

DETAILED DESCRIPTION OF THE INVENTION

It will become apparent that the solutions given in the prior art do not provide comprehensive solution to problems associated with the use of water-based inks for high quality printing on substrates especially on plastics. The prior inventions referred above are focusing towards the ink manufacturing and not on achieving the required results of the print quality by using specific proportion of a transfer additive such as polyacrylamide copolymer. The process parameters important for the printing are the percentage of the transfer additive, viscosity of the ink, surface tension of the liquid ink, surface tension of the solid plastic surface, contact angle of the liquid ink with the plastic surface Ink transfer means (the micro incisions on the ink carrying roller etc. Our focus in the invention is on the process parameters such as viscosity of the ink, the ink transfer means (Anilox roller etc), percentage of the transfer additive, viscosity of the ink, surface tension of the liquid ink, surface tension of the solid plastic surface, So the present invention provides the input of achieving good quality printing using water based ink on plastic surface. Further no prior inventions talk about the water based coating on top of the printed plastic surface whereas we have further coated the printed plastic surface with the PVDC(Polyvinylidene chloride) dispersion without affecting the quality of the print.

The binder resin useful in the water-borne surface inks of the present invention is typically based on an acrylic polymer.

Typical acrylic monomers for use as binder resin in the present invention include, for instance, styrenic monomers, acrylic acid or (meth)acrylic acid ester-acrylic acid copolymers. The ester group which constitutes one component of the foregoing copolymer can be ethyl, butyl, isobutyl, n-hexyl, n-octyl, lauryl 2-ethylhexyl or stearyl acrylates. In one example, 2-ethylhexyl acrylic has been used. Among these copolymers, those having a molecular weight in the range of 30,000-300,000 and a second glass

transition in the range of 20.degree.-105.degree Celsius are useful. In addition, water-borne resins other than acrylics can also be used according to this invention.

In addition, a carboxylated rosin modified polyamide resin is used at from 5-20% preferably 7-10% by weight as part of the binder resin composition. Carboxylated rosin modified polyamide can be prepared by a fusion process utilizing condensation chemistry. Suitable polymer compositions and the process used is detailed in US paztent application U.S.S.N. 241,533, filed Sept. 7, 1988 of Stone and Wasyliw and entitled Carboxylated Polyamides For Ink Formulations. If desirable an amine crosslinker can be used to increase the molecular weight. Polyamides useful according to this invention include any typically used in printing inks or as hot melt adhesives. Typical polyamides used include products offered by the Henkel Co. under the trade name Macromelts 6238, 6239, 6240; Versamid 750,900,930,940 and 950 as well as Polyamides sold by Union Camp under the trade names Unirez 2220 and 2211. It has been found that this carboxylated rosin modified polyamide, when incorporated into a waterborne printing ink, results in a printing ink exhibiting superior printing aptitude and color strength when used to print onto plastic substrates.

The addition of maleated rosin modified polyamide resin may help the superior printing aptitude and color strength when used to print onto plastic substrates, but the technical difficulties of printing finer prints to get clarity and sharpness of the print is not discussed in U.S.S.N. 241,533.

One object of the invention is to provide a process for printing on diverse plastic surfaces with water-based inks.

It is another object of the invention to modify dynamic viscosity and the surface tension and contact angle with respect to the plastic surface of water soluble inks to improve their adhesion and the clarity of the print on plastic surfaces.

It is yet another object of the invention to provide a process for the printing of diverse plastic surfaces with water-soluble inks with different surface tension and the contact angle values, without the need for longer drying times.

It is yet another object of the invention to provide a process for the printing of plastic surfaces with water-soluble inks without the problems of smudging.

It is yet another object of the invention to provide a process for the printing of plastic surfaces with water based inks with the use of tailored flexographic ink transfer means to achieve prints of high durability and quality.

It is yet another object of the invention to provide a process for the printing of plastic surfaces with water-soluble inks with the use of tailored flexographic ink transfer means and further coating them with water based coating agents.

The present invention provides a process of printing on a variety of plastic surfaces including PVC, Tyvek®, polyethylene, polypropylene, acrylic and Saran® (PVDC) coated polypropylenes, some cellophanes, Mylar®, and aluminum foils using water based inks. The ink system (ink composition) comprises of water based acrylic polymer, extender and polyacrylamide based transfer additive (or transfer agent).

Thus in accordance with the invention, the viscosity of water-based inks are appropriately tailored and then used for coating of the plastic surfaces.

Water Reducible modified acrylic polymers suitable for flexographic printing in combination with extenders that are water reducible modified acrylic polymers are used in one embodiment the present invention.

A substrate used in the method of the invention can be any substrate suitable to be used for printing technology. The substrate may, for example, be selected from a variety of plastic materials such polycarbonate, polyethylene, polypropylene, polytherephalate, or

polyvinylchloride films. In illustrative embodiments such substrates may have with thickness preferably from 150 to 400 microns although it is obvious for the person skilled in the art that the thickness in principle causes no limitation.

A tailored flexographic ink transfer means such as an Anilox roller – 120 -160 lines/cm, 240 - 280 lines/cm may be preferably used.

Typically a water based ink and the extender are mixed, diluted with water followed by addition of a polyacrylamide additive to achieve the desired viscosity. This is then fed through a pump to the anilox roller, which enables the transfer of the ink on to the printing rubber sleeve. The pressure between the film and the printing sleeve is adjusted so as to get the required print quality.

The invention will be further illustrated by the following non-limiting examples.

Example 1:

1 part of a non toxic liquid water reducible acrylic based white ink of the NT 23-ink family obtained from Colorcon Inc. USA was mixed with 0.5 parts of an respective extender for the NT23-ink family that had been chosen in accordance with the recommendation of the manufacturer (Colorcon Inc. USA) to achieve a viscosity of 70 secs. Water was added to reduce the viscosity to 11 secs by Ford cup No.4 at 24+/- 2 deg C. 0.25 parts (14%) of a water based transfer additive Glascol TA (obtained from Ciba Speciality Chemicals) was added slowly under continuous stirring to increase the viscosity to 18 Secs. The film was treated with on line corona treatment when the dyne value raises from 36 dynes to 42 dynes. Printing on PVC film was carried out at a speed of 30 meters/ min using Anilox roller with 160 lines/ cm. After printing the PVC film was passed through the online infra red dryer for effective drying of the ink. The temp of the film rises to 40-60 deg C.

This process lead to no ink lift up in a print adhesion using a Scotch tape test using 3M 810, 25.4mm width tape. The print quality was checked visually and was observed to be satisfactory.

Example 2:

1 part of a non toxic liquid water reducible acrylic based white ink of the NT 23-ink family obtained from Colorcon Inc. USA was mixed with 0.5 parts of an respective extender for the NT23-ink family that has been chosen in accordance with the recommendation of the manufacturer (Colorcon Inc. USA) to achieve a viscosity of 70 secs. Water was added to reduce the viscosity to 11 secs by Ford cup No.4 at 24+/- 2 deg C. 0.03 parts (2%) of a water based transfer additive Glascol TA (obtained from Ciba Speciality Chemicals) was added slowly under continuous stirring to increase the viscosity to 18 Secs. The film was treated with on line corona treatment when the dyne value raises from 36 dynes to 42 dynes. Printing on PVC film was carried out at a speed of 30 meters/ min using Anilox roller with 160 lines/ cm. After printing the PVC film was passed through the online infra red dryer for effective drying of the ink. The temp of the film rises to 40-60 deg C.

This process lead to no ink lift up in a print adhesion using a Scotch tape test using 3M 810, 25.4mm width tape. The print quality was checked visually and was observed to be on the darker side than the expected faint look.

Example 3:

1 part of a non toxic liquid water reducible acrylic based white ink of the NT 23-ink family obtained from Colorcon Inc. USA was mixed with 0.5 parts of an respective extender for the NT23-ink family that had been chosen in accordance with the recommendation of the manufacturer (Colorcon Inc. USA) to achieve a viscosity of 70 secs. Water was added to reduce the viscosity. 0.25 parts of the water based transfer additive Glascol TA (obtained from Ciba Speciality Chemicals) was added slowly under continuous stirring till the viscosity of the blend maintained between 18 – 22 Sec (60 - 80 cps) by Ford cup No.4 at 24+/- 2 degC. The film was treated with on line corona

treatment – dyne value rises from 36 dynes/cm to 42 dynes/cm. Printing on PVC film was carried out at a speed of 30 meters/ min using Anilox roller with 280 lines/ cm. After printing the PVC film passes through the online infra red dryer for effective drying of the ink. The temp of the film rises to 40-60 deg C. The printed roll was aged for 2 days and then coated with 60 gsm PVDC on the printed side.

The print adhesion was checked using a Scotch tape test using 3M 810, 25.4mm width tape and no ink lift up was observed. The print quality was checked visually and was observed to be satisfactory.

An optional corona treatment to improve the surface tension of the substrate and with an infra red drying system after printing may be employed.

Example 4

Experimental description of the manufacture

1 part of a non toxic liquid water reducible acrylic based white ink of the NT 23-ink family obtained from Colorcon Inc. USA was mixed with 0.5 parts of an respective extender for the NT23-ink family that had been chosen in accordance with the recommendation of the manufacturer (Colorcon Inc. USA) to achieve a viscosity of 70 secs. Water was added to reduce the viscosity. 0.25 parts of Glascol TA (obtained from Ciba Speciality Chemicals) as water based transfer additive was added slowly under continuous stirring till the viscosity of the blend maintained between 18 – 22 Sec (60 - 80 cps) by Ford cup No.4 @24+/- 2 degC. The film was treated with on line corona treatment – dyne value rises from 36 dynes/cm to 42 dynes/cm. Printing on PVC film was carried out at a speed of 30 meters/ min using Anilox roller with 280 lines/ cm. After printing the PVC film passes through the online infra red dryer for effective drying of the ink. The temp of the film rises to 40-60 deg C. The printed roll was aged for 2 days and then coated with 60 gsm PVDC on the printed side.

The print adhesion was checked using a Scotch tape test using 3M 810, 25.4mm width tape and no ink lift up was observed. The print quality was checked visually and was observed to be satisfactory.

The identifying label (film) obtained according to the method described above was formed into a blister package such that the printed identification information was been arranged at a visible surface. Due to the addition of the transfer additive the identification information was only visible under a certain angle of light.

Example 5:

97 parts of a non toxic liquid water reducible acrylic based extender of the NT 23-ink family obtained from Colorcon Inc. USA was mixed with 3 parts of Tinopol NFW LIQ obtained from CIBA Specialty Chemicals to achieve a viscosity of 70 secs. Water was added to reduce the viscosity to 18 secs by Ford cup No.4 at 24+/- 2 deg C. The film was treated with on line corona treatment when the dyne value rises from 36 dynes to 42 dynes. Printing on PVC film was carried out at a speed of 30 meters/ min using Anilox roller with 280 lines/ cm. After printing the PVC film was passed through the online infra red dryer for effective drying of the ink. The temp of the film rises to 40-60 deg C.

This process lead to no ink lift up in a print adhesion using a Scotch tape test using 3M 810, 25.4mm width tape. The print quality was checked visually against the UV light and was observed to be clearly visible under 365nm. The print visibility was also checked at 254 nm – the visibility was faint.

The printed roll was aged for 2 days and then coated with 60 gsm PVDC on the printed side.

The print adhesion was checked using a Scotch tape test using 3M 810, 25.4mm width tape and no ink lift up was observed.

The print quality of this PVDC coated film was checked visually against the UV light and was observed to be clearly visible under 365nm. The print visibility was also checked at 254 nm – the visibility was faint.

The identifying label (film) obtained according to the method described above was formed into a blister package. The identification printed information was only visible under a UV light at 365 nm.

The summary of the results of Examples 1-3

Printing Examples							Results			
Example No	INK Qty (Gm)	Extender Qty (Gm)	Transfer Additive Qty (Gm)	% Transfer Additive	Viscocity by Ford cup 4 (Sec)	Anilox roller-lines/cm	Surface Tension of liquid ink mN/M	Contact Angle with corona treated PVC film	Adhesion - Scotch test with 3M 810	Print Clarity
1	100	50	25	14	20	160	34.21	44.325	No ink lift up	Satis-factory
2	100	50	3	1.96	19	160	28.69	55.905	No ink lift up	Needs Improve ment
3	100	50	25	14	20	280	34.21	44.325	No ink lift up	Excellent

What is claimed is:

1. A method of labeling an item of value wherein this method comprises:

a) printing identification information on a substrate by using an ink composition comprising a water based transfer agent; and

b) coating the printed identification information with an overcoat.

2. The method of claim 1, wherein said substrate with said printed identification information is to be arranged on a visible surface of said object of value.

3. The method according to claim 1 or 2, wherein the item of value is selected from the group consisting of a packaging of a pharmaceutical product and the packaging of a food product.

4. The method according to any of the preceding claims, wherein said ink composition further comprises an extender, a pigment and a binder resin.

5. The method according to claim 4, wherein said binder resin comprises a compound selected from the group consisting of water based acrylic polymers, polyvinyl alcohol (PVA) based resins, polyvinyl butyrals and polyvinyl acetals.

6. The method according to claim 5, wherein said water based acrylic polymer is composed of a compound selected from the group consisting of styrenic monomers, acrylic acid, (meth)acrylic acid ester-acrylic acid copolymers and mixtures thereof.

7. The method according to claim 6, wherein said compound is a (meth)acrylic acid ester-acrylic acid copolymer.

8. The method according to claim 7, wherein the ester group of said acrylic acid ester is selected from the group consisting of ethyl, butyl, isobutyl, n-hexyl, n-octyl, lauryl-2-ethylhexyl and stearyl.

9. The method according to claim 8, wherein said acrylic acid ester is 2-ethylhexyl acrylat.

10. The method according to any of claims 6 to 9, wherein said copolymers have a molecular weight of between about 30.000 to about 300.000.

11. The method according to any of claims 6 to 9, wherein said copolymers have a glass transition temperature of between about 20 °C to about 105 °C.

12. The method according to any of claims 4 to 11, wherein said binder resin further comprises a carboxylated rosin modified polyamide resin.

13. The method according to claim 12, wherein said carboxylated rosin modified polyamide resin is used in an amount from between about 5 to 20 wt% or between about 7 to 10 wt% based on the total weight of the ink composition.

14. The method according to any of the preceding claims, wherein said water based transfer agent is a polyacrylamide.

15. The method according to claim 14, wherein said transfer agent is GLASCOL® TA (Ciba® Speciality Chemicals).

16. The method according to any of the preceding claims, wherein said transfer agent is added in an amount of between about 1.96 wt% to about 14 wt% based on the total weight of the ink composition.

17. The method according to any of the preceding claims, wherein said overcoat is a composition selected from the group consisting of PVC, Tyvek®, polyethylene, polypropylene, acrylic coated polypropylenes, Saran® (PVDC) coated polypropylenes, cellophanes, Mylar® and aluminium foils.

18. The method according to any of the preceding claims, wherein said substrate is a plastic.

19. The method according to claim 18, wherein said plastic is corona treated.

20. The method according to claim 18, wherein said plastic is a polyvinyl chloride film.

21. The method according to claim 20, wherein said polyvinyl chloride film is a corona treated polyvinyl chloride film.

22. The method according to any of claims 19 to 21, wherein said substrate has a thickness of between about 150 to about 400 μm.

23. The method according to any of the preceding claims, wherein said printing is carried out using flexographic ink transfer means.

24. The method according to claim 23, wherein an Anilox roller is used for printing.

25. The method according to claim 24, wherein said Anilox roller provide between about 120 to about 160 lines/cm or between about 240 to about 280 lines/cm.

26. The method according to claim 5, wherein said extender is a compound selected from the group consisting of water based acrylic polymers, polyvinyl alcohol (PVA) based resins, polyvinyl butyrals and polyvinyl acetals.

27. The method according to claim 5, wherein said pigment is an inorganic or organic pigment selected from the group consisting of CI Pigment Yellow 12, CI Pigment Yellow 42, CI Pigment Black 7, CI Pigment Black 11, CI Pigment Red 9, CI Pigment Red 17, CI Pigment Red 22, CI Pigment Red 23, CI Pigment Red 57:1, CI Pigment Red 67, CI

Pigment Red 146, CI Pigment Red 224, CI Pigment Green 7, CI Pigment Green 36, CI Pigment Blue 15:3, CI Pigment Violet 23, CI Pigment Violet 32, carbon black, titanium dioxide, zinc sulfide, calcium carbonate, and China clay.

28. The method according to any of the preceding claims, wherein said substrate is dried after said identification information has been printed on it.

29. The method according to claim 28, wherein said drying is carried out with an infrared dryer.

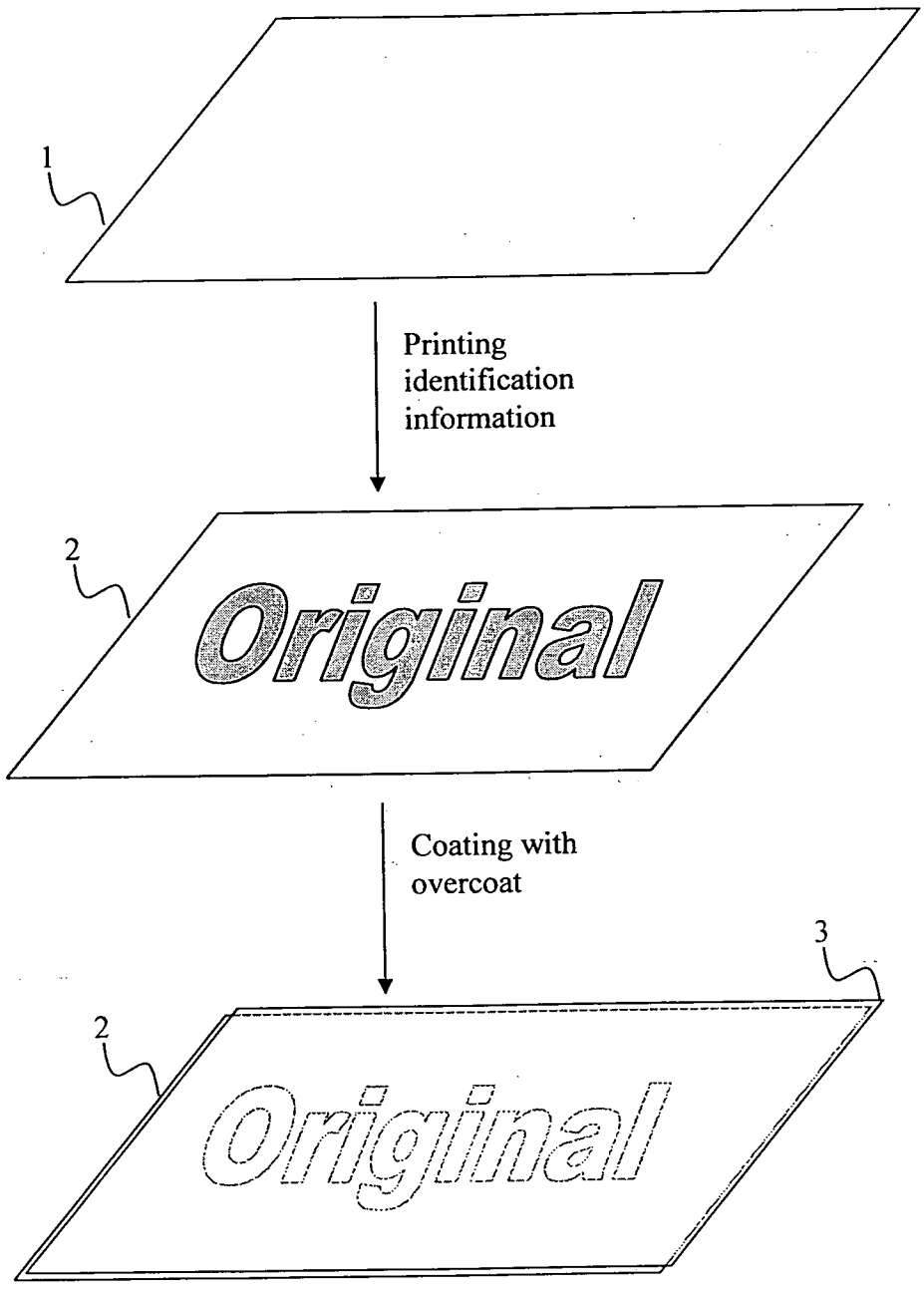
30. The method according to any of the preceding claims, wherein said identification information consists of a logo, or symbols, or numbers, or letters, or combinations thereof.

31. The method according to any of the preceding claims, wherein said ink composition printed on said substrate has a contact angle of between about 42 to 55 degrees.

32. The method according to any of the preceding claims, wherein said ink composition printed on said substrate has a viscosity of between about 18 to 22 sec (ford cup number 4 at 23 °C).

33. The method according to claim 16, wherein said ink composition printed on said substrate has a surface tension of between about 28 to 36 mN/M.

Fig. 1


1
Printing
identification
information
2
Original
Coating with
overcoat
3
2
Original