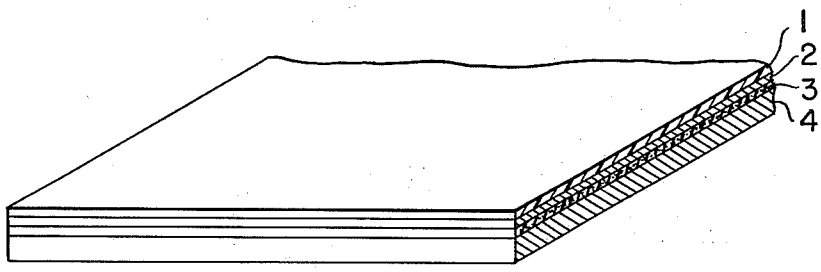
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LABEL FOR RE-USABLE BOTTLES

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LABEL FOR RE-USABLE BOTTLES

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This invention relates to labels which carry printed or otherwise coated surface areas of that type customarily applied to containers intended for reuse and primarily bottles of which beverage bottles are an example.

The specific object of the invention is to provide a label having a base either wholly of cellulose character, or a laminated product consisting of foil and paper, or of foil alone, together with a coating of high gloss and brilliance which may be disintegrated by solutions of sodium hydroxide or other "washing" baths, according to commercial practice, and which at the same time will remove a serious problem which consists in the formation of discrete particles which adhere to the bottles or other containers with great tenacity and are not removed by the agitated "washing" baths through which the containers are moved.

The drawing schematically shows the various layers of the composite structure. In the drawing, numeral 1 indicates the coating which is the basis of this invention, comprising a nitrocellulose of controlled nitrogen content, the resinous reaction product of a polyhydric alcohol, an organic polybasic acid and a hydrogenated abietyl alcohol, with or without the addition of a selected plasticizer, pigment or dyestuff. Numeral 2 indicates the foil on which the coating 1 has been applied. Numeral 3 indicates an adhesive layer employed to bond the foil 2 to the paper or cellulosic base 4.

In the following description, such containers will be referred to as "bottles" which term is intended to cover all reusable containers for which the label is appropriate.

As an example of the problem which is overcome by the present invention, a label consisting of a paper back and a facing of aluminum foil, the foil bearing a normal gravure-coated or "printed" surface, will be considered.

Current label removal practice for the removal of both paper and aluminum foil beverage labels consists in the passage of the labelled bottles through a solution of bottle-washing compounds such as from 1 to 7% of sodium hydroxide in aqueous solution, maintained at temperatures of from 90° F. to 170° F. Under these conditions, the labels are caused to react with the said bottle-washing compound. Gravure or intaglio process inks heretofore employed for the coating, printing or decorating of said labels, have been of such nature and composed of such constituents as to cause considerable difficulty in that the ink or decorative layer film will not readily disintegrate or break up into minute non-adhesive particles. The result is that adhesive ink flecks are formed which adhere strongly to the internal and external surfaces of the bottles, being carried to those surfaces by the wash solution, and resist repeated efforts to be removed. This condition is aggrevated where aluminum foil is used in the labels by the presence of sodium aluminate formed by the disintegration of the aluminum with the sodium hydroxide. Where resins are a constituent of the ink, which is a general condition, these resins, as a rule, consisting of abietic acid or other resin-forming esters, are hydrolyzed by the presence of sodium hydroxide in the washing solution and are immediately saponified to form with the sodium aluminate an insoluble aluminum soap or resinate which has the characteristic of strong adhesion, and which forms into small discrete particles carried by the bath to the inner and outer surfaces of the bottle.

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In the case of such labels as are gravure-printed but which do not incorporate aluminum foil or other metallic surfaces, the same general problem still resides in the wash-disintegration removal of the labels, because it is common to use sodium aluminate as an added factor in the washing baths for the purpose of reducing erosion of the glass during the action of the strong base salt of the bath. Furthermore, even in the absence of sodium aluminate, a problem exists in such washing-disintegrating method, because the gravure inks generally used resist disintegration and are broken into particles of substantial size, retaining strong adhesive characteristics, so that after the normal washing operation, a substantial percentage of the bottles have attached thereto, both interiorly and exteriorly, flecks of the gravure ink.

By my invention, I provide a gravure-printed or coated label, with or without aluminum or other metallic foil, in which a pigmented or clear "ink" composition is carried by the gravure-printed or coated label surface, of such character that the coating will be decomposed in the normal washing baths into exceedingly minute flecks which has no adhesive character, rapid disintegration of the coating being provided, and at the same time, the label is superior in gloss and brilliance, adherence of ink flecks to the bottle is wholly removed, and other additional factors of utility are provided.

The characteristic of my invention is the provision of a label having its surface or an area or areas thereof provided with a coating which consists of a mixture of nitrocellulose of controlled nitrogen content, and the resinous reaction product of a polyhydric alcohol, an organic polybasic acid or anhydride, and a hydrogenated abietyl alcohol. In those instances where it is desired to pigment or otherwise color the coating, the further addition of a pigment, together with a plasticizer capable of being rapidly hydrolized

or decomposed, is made to promote the dispersion characteristics of the vehicle for the pigment and to improve the flexibility of the coating. In both cases a solvent carrier such as normally used for the deposition of nitrocellulose coatings may be employed, such for example, as mixtures of a ketone or ester, ethyl or isopropyl alcohol, and an aromatic hydrocarbon. Thus, as one example, my label may consist of paper or metal foil, or composites of these materials, bearing a high gloss and brilliant coating in accordance with the invention, printed or to be printed by either a lithographic or letterpress printing method by inks which do not adhere satisfactorily to certain paper and metal foil surfaces to insure satisfactory adhesion, i. e., through the coating of the invention. However, in usual practice, the coating will of itself form the decorative and/or text of the exposed surface of the label and may be applied progressively in multicolor.

As an example, a label having a base of paper, or a laminated structure of foil and paper, or foil alone, is completed by the application of an adhesive layer at one face thereof, and a gravure-applied coating on the opposite face composed as follows:

Example 1

	Per cent by weight
Nitrocellulose containing 9.20 to 11.70% nitrogen	11.50
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride, and hydrogenated abietyl alcohol	9.38
Ethyl alcohol	6.25
Isopropyl alcohol	3.33
Methyl cellosolve	3.35
Isopropyl acetate	13.69
Acetone	7.60
Toluol	41.82

Additions of small amounts of alcohol-soluble and compatible dyestuffs or selected pigments may be made to add color to the described coating.

Examples of these pigmented coatings follow:

Example 2

	Per cent by weight
Lead-molybdenum chromate	34.20
Nitrocellulose containing 9.20 to 11.70% nitrogen	10.50
Ethyl phthalyl ethyl glycolate	1.06
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride, and hydrogenated abietyl alcohol	4.24
Toluol	27.50
Ethyl alcohol	4.50
Isopropyl alcohol	1.80
Methyl cellosolve	2.20
Isopropyl acetate	9.00
Acetone	5.00

Example 3

	Per cent by weight
Lithol rubine	11.00
Nitrocellulose containing 9.20 to 11.70% nitrogen	11.90
Ethyl phthalyl ethyl glycolate	1.80
Resinous reaction product of polyhydric alcohol organic polybasic acid or anhydride and hydrogenated abietyl alcohol	7.20

	Per cent by weight
Toluol	37.40
Ethyl alcohol	5.10
Isopropyl alcohol	3.50
Methyl cellosolve	3.00
Isopropyl acetate	12.30
Acetone	6.80

Example 4

	Per cent by weight
Titanium dioxide	28.00
Nitrocellulose containing 9.20 to 11.70% nitrogen	8.75
Ethyl phthalyl ethyl glycolate	0.90
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride and hydrogenated abietyl alcohol	11.050
Toluol	25.51
Ethyl alcohol	8.16
Methyl cellosolve	2.19
Acetone	4.98
Isopropyl acetate	8.96

Example 5

	Per cent by weight
Carbon black	9.83
Nitrocellulose containing 9.20 to 11.70% nitrogen	9.83
Ethyl phthalyl ethyl glycolate	1.78
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride, and hydrogenated abietyl alcohol	7.12
Toluol	39.30
Ethyl alcohol	4.24
Isopropyl alcohol	4.76
Methyl cellosolve	3.14
Isopropyl acetate	12.86
Acetone	7.14

The resinous reaction product specified in Examples 2 to 5 inclusive is not resistant to hydrolysis, is of low solubility in water, promotes or secures adhesion of the coating to the foil when the latter is used and has rapid hydrolysis in the washing bath described above. It is a product which can be made, for example, by reacting 2–3 moles phthalic anhydride, 3–4 moles hydrogenated abietyl alcohol and ⅔–1 mole glycerol, under heat for about three hours at 175° C.–180° C. followed by an increase in the temperature to 210° C.–230° C. for three to nine hours in an oil bath under an air condenser so that formed water is permitted to pass off. The acid number will be 19–20.

Other resins not resistant to hydrolysis and of low water solubility may be substituted. For example, succinic acid may be substituted for the phthalic anhydride in the above Example 1 and other polyhydric alcohols such as sorbitol can be substituted for the glycerol. The preferred nitrogen content of the nitrocellulose is 10.70 to 11.20%. The stated resinous reaction product, or its equivalent, may be 4.50% to 95.50% of nitrocellulose or a reverse ratio of 95.50% of the said resinous reaction product to 4.50% of the nitrocellulose, and, of course, all of the intermediates of these ranges. The general requirement as to the combined nitrocellulose and resinous product is to utilize as much as possible the toughness and abrasion resistance of the nitrocellulose whilst augmenting adhesive flexi-

bility and gloss by means of the resin. However, in some cases the resin may advantageously exceed the nitrocellulose as, where the requirement of toughness is not paramount and the requirement of maximum gloss and adhesion is the major factor. For example, in labels of light weight paper for application to the necks of bottles and thus largely protected against abrasion by the wider sides of the bottles, the proportion of the resinous product may be at or toward the upper range thereof with the nitrocellulose reduced, accordingly. Also where high flexibility is required a plasticizer may be used with corresponding reduction of either the resin or nitrocellulose, or both.

In explanation of the varying proportions of nitrocellulose and resinous products in the examples, the following may be observed:

In the examples, the variation in ratios of the said materials is not very great because the examples are particularly for gravure application of the coating, and such method requires close control of the viscosity of the ink at the time of application. In addition, the examples have been selected to illustrate the formulations observed to insure adequate opacity or covering of the paper or foil surface. Pigment concentration variations which will be observed by an examination of the formulas have been necessitated because of the variation in opacity, binder absorption and specific gravity of the pigment. In some instances, a limited or controlled amount of pigment is employed in the preparation of coatings for aluminum foil to permit of the retention of substantially all of the original transparency of the coating, permitting the metallic sheen of the aluminum foil to be seen colored by the small amount of pigment employed. In some instances, it may be desirable to intentionally employ a high pigment to binder ratio which results in a surface of less brilliance or lesser gloss to contrast with other sections of the label covered with coatings of higher gloss. Pigments vary as to their individual particle size and also vary as to their ability to absorb a lesser or greater quantity of the binder used in connection with them to prepare inks or coatings.

In addition, pigments vary in their ability to make the composite coating layer more or less rigid, and compensation must be provided for by variation in the ratio of nitrocellulose resin and plasticizer to provide for the manifold requirements necessitated by the printing method, the pigment absorption characteristics, the opacity of the pigment and its effect on the ultimate flexibility and the adhesion factor required in the coating.

As an example showing a high resinous product content and a low nitrocellulose content:

Example 6

	Percent by weight
Nitrocellulose containing 9.20 to 11.70% nitrogen	2.33
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride and hydrogenated abietyl alcohol	16.22
Ethyl alcohol	6.20
Isopropyl alcohol	3.11
Normal butyl acetate	3.34
Ethyl acetate	14.55
Methyl ethyl ketone	7.50
Toluol	46.75

As an example of a coating high in nitrocellulose content and low in resinous product content:

Example 7

	Percent by weight
Nitrocellulose containing 9.20 to 11.70% nitrogen	17.87
Resinous reaction product of polyhydric alcohol, organic polybasic acid or anhydride and hydrogenated abietyl alcohol	2.21
Ethyl alcohol	6.25
Isopropyl alcohol	3.46
Normal butyl acetate	3.28
Isopropyl acetate	14.12
Acetone	7.60
Toluol	45.21

The plasticizer may be any suitable plasticizer, many of which are well-known, for the general purpose of adding plasticity to films incorporating plastic constituents, but preferably the alkyl or aryl group which contain from 1–12 carbon atoms.

Having described my invention, what I desire to secure by Letters Patent is as follows:

1. A gloss coated label adapted to be decomposed in the normal washing of bottles into exceedingly minute non-adhesive flecks consisting of a flexible paper base adhesively joined to a metal foil, said metal foil having a gloss coating thereon comprising about 4.5% to about 95.5% nitrocellulose with a nitrogen content of 9.20% to 11.70%, about 95.5% to about 4.5% a resinous reaction product which is non-resistant to hydrolysis and consisting of about two-thirds to about a mole of a polyhydric alcohol, about two to three moles of an organic polybasic acid, and about three to four moles of hydrogenated abietyl alcohol, and a plasticizer.

2. A gloss coated label adapted to be decomposed in the normal washing of bottles into exceedingly minute non-adhesive flecks consisting of a flexible paper base adhesively joined to a metal foil, said metal foil having a gloss coating thereon comprising about 5 to about 15% nitrocellulose with a nitrogen content of 9.20% to 11.70%, about 2% to about 15% a resinous reaction product which is non-resistant to hydrolysis and consisting of about two-thirds to about a mole of a compound selected from the group consisting of glycerol and sorbitol, about two to three moles of a compound selected from the group consisting of phthalic acid and succinic acid, and about three to four moles of hydrogenated abietyl alcohol.

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