

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO	
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DEP: 2020 DIRECCION DE NUEVAS CREACIONES	EVE: 378 FASE NACIONAL INCLUIDO CAPITULO I
TRA: 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II	FOLIOS: 6
ACT: 430 REQUERSOLICITA	

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
SILVANA MARÍA LÓPEZ DÍAZ

Asunto: Radicación: 14-66683- -2
Trámite: 11
Evento: 378
Actuación: 430
Oficio: 5205
Folios: 6

Patente de Invención	X			Patente de Modelo de Utilidad	
Vía Nacional					
Vía PCT (Fase Nacional)	X	Capítulo I	X	Capítulo II	
No. Solicitud Internacional	PCT/US2012/057518				
Fecha de Presentación Internacional	27/09/2012				

Como resultado del examen de fondo realizado, con fundamento en el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

1. Documentos estudiados

Descripción:	Rad. N° 14-066683-00000-0000	28/Marzo/2014
Reivindicaciones:	Rad. N° 14-066683-00000-0000	28/Marzo/2014
Dibujos:	Rad. N° 14-066683-00000-0000	28/Marzo/2014
Prioridad:	US 61/539,784	27/Septiembre/2011

2. Análisis de la Prioridad

Se acepta la reivindicación de prioridad porque ésta solicitud fue presentada dentro del plazo establecido (Art. 9 D 486) y su contenido técnico corresponde con el de la prioridad reivindicada.

3. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del Capítulo Primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por el solicitante al momento de comenzar el examen para las reivindicaciones adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. Por lo tanto, se estudiarán las reivindicaciones 1 a 38.

Título de la solicitud: “Marcado de extremos de la lata y/o anillas que utilizan tinta fotónicamente sensible” (Fl. 1).

El problema planteado en esta solicitud, consiste en un proceso para la decoración a alta velocidad. Alta resolución por marcado con láser, para los extremos, las paredes, y las anillas de una lata de bebida.

Para resolver este problema técnico, la solicitud en estudio propone un método para decorar una lata, que comprende proporcionar un sustrato extremos de una lata, recubrir dicho sustrato con un barniz fotónicamente activo y aplicar un láser al sustrato recubierto para cambiar la apariencia de al menos una porción del componente fotónicamente activo.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): B 41 M 5/26, B 65 D 17/00.

4. De la solicitud de patente

Reivindicaciones (Art 30 D 486, Art 22 PCT)

El capítulo reivindicatorio no es claro porque:

- Las reivindicaciones 4, 13, 16 a 20, 25 a 28, 33 a 38 y las expresiones: “*para cambiar una apariencia (...) por lo que forma una imagen.*” (reivindicación 1), “*...y el cambio de apariencia de la etapa de aplicación es opaco.*” (reivindicación 15), “*...que cambia una apariencia de al menos una porción del componente fotónicamente activo de manera sustancial (...) o someter a ablación el barniz.*” (reivindicación 30); describen funciones, efectos, ventajas o resultados a alcanzar, los cuales no son aspectos susceptibles de patente. Para mayor claridad, el producto reclamado se debe definir técnicamente mediante sus características estructurales. Se sugiere al solicitante eliminar las reivindicaciones y expresiones citadas.
- La reivindicación 9 no cumple con lo establecido en el artículo 30 de la Decisión 486, toda vez que carece de concisión, debido a que las características descritas en esta reivindicación ya habían sido reclamadas previamente en la reivindicación 5. Se sugiere al solicitante eliminar la reivindicación 9.
- Los términos: “*sustancialmente*”, “*al menos*” y “*aproximadamente*” (reivindicaciones 1, 17 a 20 y 34 a 37), son imprecisos, por lo cual no permiten distinguir la invención del estado de la técnica. Se sugiere al solicitante eliminar dichos términos.
- Las reivindicaciones 29 y 30 son reivindicaciones de producto, y sólo pueden ser definidas en términos de su proceso de fabricación si: el producto es nuevo e inventivo y no se puede definir por sus características estructurales. En este caso, el producto

reclamado sí puede definirse utilizando solamente características estructurales. Se sugiere al solicitante describir la invención con base en sus características constructivas.

Por su parte, la reivindicación 29 presenta una falsa dependencia con la reivindicación 1, toda vez que la reivindicación 29 es de carácter de producto y la reivindicación 30 es de carácter de procedimiento. Se sugiere al solicitante eliminar la reivindicación 29, ya que no reclama características técnicas diferentes a las descritas en las reivindicaciones 1 y 30.

5. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de prioridad: septiembre 27 de 2011, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	EP 993.964	'Coatings for making by laser'	19/Abril/2000
D2	US 2005/0045637	'Containers having distinctive tabs with laser etching and void forming a promotional image'	03/Marzo/2005

El documento D1¹ divulga un recubrimiento sensible a la radiación, preferiblemente un recubrimiento claro transparente que tiene resina y un sistema de tintura activable que puede ser activado por radiación para aplicar en un sustrato como una lata de bebida (resumen).

El documento D2² divulga un extremo de lata, que contiene una bebida u otro producto a consumir, que incluye una superficie de anilla recubierta con una imagen promocional (resumen).

6. Examen de Patentabilidad (Art 14 D486)

Novedad (Art 16 D486)

La reivindicación 1 consiste en: “*Un método para decorar los extremos de lata comprende las etapas de: proporcionar un sustrato extremo de lata de un material que comprende metal...*” (Ver página 20 del radicado N° 14-066683-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1	D2
Método para decorar los	Recubrimientos para	Contenedores que tienen

1 http://worldwide.espacenet.com/publicationDetails/description?CC=EP&NR=0993964A2&KC=A2&FT=D&ND=&date=20000419&DB=&locale=en_EP

2 <https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US20050045637.pdf>

extremos de lata caracterizado por:	marcado por láser caracterizado por:	anillas distintivas con grabado en laser y vacío formando una imagen promocional caracterizado por:
Proporcionar un sustrato extremo de lata de un material que comprende un metal.	El sustrato (10) puede incluir latas de aluminio (Párr. [0014]).	Una lata de bebida de metal (reivindicación 5).
Recubrir al menos una porción del sustrato extremo de lata con un barniz que incluye un componente fotónicamente activo.	El método puede incluir aplicar al sustrato un recubrimiento e irradiar el sustrato con una radiación laser seleccionada para inducir el cambio de color (Párrs. [0002] y [0007]).	La anilla es comprende un recubrimiento que comprende un agente de color (Párr. [0026]).
Aplicar un láser al sustrato recubierto.		Remover una porción del agente de color en determinadas porciones utilizando laser (Párr. [0026]).

De acuerdo con la tabla anterior, las características esenciales del método de la reivindicación 1 habían sido divulgadas previamente en los documentos D1 y D2, por lo tanto, la materia reivindicada no es nueva.

Asimismo, los documentos antecedentes divulgan las características de las reivindicaciones dependientes así:

- Reivindicaciones 2 y 3: El recubrimiento puede ser fuertemente adherente a un metal como aluminio o acero (D1: Párr. [0011]).
- Reivindicaciones 5 a 7: La superficie de la anilla comprende una imagen decorativa (30) (D2: Párr. [0011]). Cabe aclarar, que la superficie de la anilla puede comprender la parte superior y la parte inferior de la misma.
- Reivindicaciones 11 y 12: El sustrato es el panel central de la parte inferior de la lata de bebida (D1: Párrs. [0014]).
- Reivindicación 14: El componente fotónicamente activo incluye un pigmento térmicamente activo (D1: Párrs. [0004] y [0005]).
- Reivindicación 15: El recubrimiento es transparente (D1: Párr. [0011]).
- Reivindicaciones 20 a 24: El láser es de 10.6 micras o con una longitud de onda de 1.064 micras transparente (D1: Párr. [0034]). De igual manera, es bien conocido en la técnica que el láser puede tener diferentes anchos de línea³, en consecuencia, estas reivindicaciones no pueden dar novedad a la invención.

La reivindicación 30 consiste en: “*Un extremo de lata decorado caracterizado porque comprende: una cubierta extrema y una anilla, cada uno de la cubierta extrema y la anilla comprenden un metal...*” (Ver página 20 del radicado N° 14-066683-00000-0000).

3 http://www.itlalaguna.edu.mx/academico/carreras/electronica/optica/OPTOPDF5_archivos/UNIDAD5TEMA3.PDF

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1	D2
Un extremo de lata decorado caracterizado por:	Recubrimientos para marcado por láser caracterizado por:	Contenedores que tienen anillas distintivas con grabado en láser y vacío formando una imagen promocional caracterizado por:
Una cubierta extrema y una anilla, cada uno de la cubierta extrema y la anilla comprenden un metal.	El sustrato (10) puede incluir latas de aluminio (Párr. [0014]).	Una lata de bebida de metal (reivindicación 5).
Un revestimiento comprende un barniz y un componente fotónicamente activo.	El método puede incluir aplicar al sustrato un recubrimiento e irradiar el sustrato con una radiación láser seleccionada para inducir el cambio de color (Párrs. [0002] y [0007]).	La anilla comprende un recubrimiento que comprende un agente de color (Párr. [0026]).
Una imagen aplicada a al menos uno de un panel central de la cubierta extrema y la anilla.	Una imagen en la parte inferior de la lata, o en cualquier otra área como el cuello de la lata (Párr. [0014]).	Una imagen promocional (30) en el panel central de la cubierta externa o la anilla (Figs. 3 y 3A; Párr. [0022]).

De acuerdo con la tabla anterior, las características esenciales del extremo de lata decorado de la reivindicación 30 habían sido divulgadas previamente en los documentos D1 y D2, por lo tanto, la materia reivindicada no es nueva.

Asimismo, los documentos antecedentes divulgan las características de las reivindicaciones dependientes así:

- Reivindicaciones 31 y 32: El recubrimiento puede ser fuertemente adherente a un metal como aluminio o acero (D1: Párr. [0011]).

Las reivindicaciones 4, 9, 13, 16 a 20, 25 a 28, 29, 30 y 33 a 38 fueron afectadas en el numeral 4 de la presente comunicación.

7. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	EP 993.964	1 a 38	Novedad/Nivel Inventivo
D2	US 2005/0045637	1 a 38	Novedad/Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta (60) días contados a partir del día siguiente de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Finalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones, no pagará la tasa de modificación voluntaria pero sí la correspondiente al pago por reivindicación adicional.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No. 10 de 2001.



JOSÉ LUIS SALAZAR LÓPEZ
Director de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-05-19

Elaboró: Monica Andrea Gutierrez Almonacid
Revisó: Sonia Andrea Diaz Pirazan



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(71) Applicant: **MARKEM CORPORATION**
Keene New Hampshire 03431 (US)

(72) Inventors:
• **Meneghini, Frank A.**
Harrisville, New Hampshire 03450 (US)
• **Secord, Michael P.**
New Hampshire 03470 (US)
• **Woudenberg, Richard C.**
Marlborough, New Hampshire 03455 (US)

(74) Representative:
Lucking, David John et al
FORRESTER & BOEHMERT
Franz-Joseph-Strasse 38
80801 München (DE)

(54) **Coatings for marking by laser**

(57) A radiation sensitive marking coating, preferably a clear, colourless coating, has a resin, and an activatable dye system which may be activated by radiation, for marking a substrate such as a beverage can.

EP 0 993 964 A2

Description

[0001] This invention relates to marking substrates.

[0002] One technique for marking substrates is known as laser marking. In laser marking, radiation is directed onto a substrate to modify the substrate, or a coating on the substrate, in a way that induces a colour change. The radiation can be directed, or addressed, in a pattern over the substrate such that a desired image is rendered.

[0003] In a first aspect, the invention features a marking coating which has a resin and an activatable dye system.

[0004] Embodiments may include one or more of the following features. The coating is substantially colourless prior to exposure to radiation at a wavelength and intensity sufficient to induce a select thermal variation that activates the dye system. The dye system is activated at a temperature of about 80-200°C. The coating is absorbing at a non-visible wavelength. The coating is absorbing in the infrared. The resin is absorbing in the infrared. The resin is a solvent cast resin. The resin is a polyketone resin. The resin is a UV curable resin. The dye system is a thermally-activated dye system. The dye system includes a thermally sensitive acid-base variation component, and a dye which changes colour in response to an acid-base variation. The acid-base variation component is a blocked acid. The dye includes a lactone. The coating includes a base additive. The base additive is an amine.

[0005] The dye system is a thermochromic dye which undergoes structural rearrangement. The thermochromic dye is a sulphonamide.

[0006] In another aspect, the invention features a method of marking a substrate.

[0007] The method may include applying to the substrate a coating as described herein and irradiating the substrate in a desired pattern with selected radiation effective to induce a colour change. The coating may be applied to a metal substrate such as a beverage can. The coating may be irradiated in a pattern indicating a date.

[0008] Embodiments of the invention may have one or more of the following advantages.

[0009] A preferred coating includes a resin which absorbs in the infrared and a dye system that includes a heat sensitive acid-base variation component, such as a blocked acid, and an acid-base sensitive dye, such as a leuco dye. The resin absorbs laser radiation, converting it to heat, which in turn induces an acid-base variation, such as unblocking the blocked acid, which in turn activates the dye.

[0010] Another preferred coating utilises a dye that undergoes an internal rearrangement when heated. The temperature required to induce the colour change is above the temperature normally encountered by the end product during use but is typically still rather mild. For example, temperature changes in the range of 100-150° C are typically sufficient. As a result, the colour change can be achieved rapidly with radiation energy levels that can be produced cheaply and safely. The coating maintains its integrity without substantial delimitation or thermal degradation.

[0011] The coatings may be colourless and clear prior to irradiation. As a result, the underlying substrate, and any markings directly on the substrate, will be visible in areas not exposed to radiation. The coatings may also be strongly adherent to a wide variety of substrate materials. For example, the coating may be strongly adherent to a metal, such as aluminium, tin, or stainless steel, as well as glass paper, and packaging film. The coating may be either cast from a solvent, followed by evaporation of the solvent, or cured, such as by heat or radiation. The radiation curing may use radiation at a wavelength different from the wavelength used to induce the colour change. For example, curing may be achieved by ultraviolet radiation, while marking is carried out with infrared radiation.

[0012] All percentages given herein are by weight unless otherwise indicated or apparent.

[0013] The invention will now be described with reference to the accompanying drawings in which:-

FIGURE 1 is a block diagram schematic of a laser marking system, and
FIGURES. 2 and 2a are a more detailed schematics of laser marking systems.

[0014] Referring to Figure 1, a laser marking system 1 includes a source of radiation 2, an optical system 4, and a controller 6. The radiation source is typically a carbon dioxide laser operating in the infrared range, preferably at 10.6 microns. The optical system is arranged to direct laser radiation 8 towards a substrate 10. The substrate 10 may be on a conveyor 12 which brings substrates in sequence into an area where they can be exposed to the radiation. For example, the substrates may be aluminium beverage cans which are oriented such that the radiation can be directed on to the bottoms of the cans for marking sell-by dates. The control system 6 is typically a computer programmed to direct the laser energy in a desired pattern on to the bottom of a can (or on another area, such as the neck of the can). The control system 6 can also be adapted to monitor and/or control the advance of the conveyor 12.

[0015] Referring to Figures. 2 and 2a, two suitable laser control techniques are vector scanning and dot matrix printing. Referring particularly to Fig. 2, in vector scanning the laser 2 is turned on, and a set of two scan mirrors M1, M2 move the beam 8 over the surface from point XIY1 to point X2Y2. The beam is turned off, the mirrors are moved to the next starting position, and the process is repeated. As the laser beam 8 is moved across the surface of the substrate, it leaves a line. A complex image is made of many individual line segments, usually straight. In "vector marking" two galvo scanners are used for vector scanning. A suitable system is described in Binge et al. USSN 08/568,269, filed

December 6, 1995, entitled "Scanned Marking of Work Pieces", the entire contents of which is incorporated herein by reference.

[0016] Referring to Figure 2a, in dot matrix (also called raster) printing, the laser beam 8 is moved across the entire image in an X-Y pattern, the laser 2 is turned on only in the places where a dot should appear. In dot matrix control an optical arrangement 4, e.g. an acousto-optic scanner, is used for scanning in the X direction. Y scanning is provided by motion of the substrate 10.

[0017] In each case prior to application of laser energy, the substrates are treated with a marking coating. The coating includes a resin and an activatable dye system.

[0018] The resin, which may be a natural resin, as well as other polymers, prepolymers, and monomers, is selected so that it will adhere to the desired substrate, provide a select background colour, and is robust in its ability to withstand radiation without substantially changing colour in a way that would obscure the intended marking. Preferably, the resin is colourless and remains colourless even when exposed to laser energy. The resin may be a solvent cast resin or a heat or radiation curable resin. Suitable solvent-cast resins include polyketone based resins. A preferred resin is Krum-bhaar K1717 HMP (CAS number 25054-06-2, available from Lawter, Northbrook, IL). Suitable UV curable resins include acrylates, epoxies, and vinyl ethers. A preferred resin is ethoxylated₆trimethylol propane triacrylate (available as Sartomer-499 from Sartomer, Exton, PA). The UV curable resin may be used in combination with a photoinitiator. Suitable photoinitiators include ketone-based components. A preferred photoinitiator is diphenol (2,4,6-trimethyl benzoyl) phosphine oxide, (available as Darocur 4265 from Ciba-Giegy, Terrytown, NY). For thermally cured resins, the cure temperature is preferably kept below the temperature at which the dye is activated. For example, resins that can be cured at around 110°C or less are typically suitable. Suitable resins also include unsaturated polyesters, and epoxies which can be applied as prepolymers and crosslinked on the substrate surface.

[0019] The resin may be capable of absorbing radiation at a select wavelength and converting the radiation to heat. Preferably, for clear coatings, the resin is essentially colourless in the visible range but absorbs at non-visible wavelengths, such as in the ultraviolet or the infrared. The coating preferably is sufficiently absorbent at a select wavelength that the coating is heated to a desired temperature which can induce the colour change. A polyketone resin absorbs strongly at 10.6 micron, a wavelength which can be produced by a carbon dioxide laser.

[0020] Alternatively or in addition, an absorptive component that absorbs laserlight and converts it to heat may be added to the resin. The absorption component may be at about 1 to 5% of the coating. Adhesion promoters that absorb in the laser wavelength range may also be used. Examples include methacrylate ester derivatives and carboxylic acid species. A preferred material is Ebecryl 168 (available from UCV Chemicals, Smirna, GA) which absorbs at 10.6 microns.

[0021] The heat needed to activate certain dye systems may also be provided by absorption of radiation by the substrate, rather than, or in addition to, absorption by the coating. For example, certain substrates (e.g., a metal substrate) may be highly efficient in absorbing infrared radiation and in conducting heat resulting from absorption to proximate portions of the coating.

[0022] The coating may also include a pigment so that, rather than a clear and colourless coating, the coating has a desired background colour to enhance contrast of the image. The pigment is preferably an inert material. For example, for a white coating, titanium dioxide may be added. Other suitable pigments include barium sulphate, and Rhoplex beads, (e.g., Rhoplex ac 1024, available from Rhom and Haas, Philadelphia, PA).

[0023] The activatable dye system changes colour (active colour or shade) in response to absorption of radiation by the coating. The dye system may be thermally activated or photochemically activated. The dye system is selected for compatibility with the resin and the substrate. In addition, the dye system is capable of inducing a colour change as a result of exposure to radiation at a select wavelength and intensity which does not adversely affect the resin.

[0024] The dye system is sufficiently robust in that colour change does not occur when the coating is exposed to conventional use conditions of the substrate, such as exposure to ambient temperatures in the range of 0-40°C, and ambient light. In preferred systems, the dye is activated at a relatively low temperature, e.g., 80-150°C, preferably 100-140°C. Preferably, the dye system is colourless prior to exposure to radiation.

[0025] The dye system may induce a colour change by creating an acid-base variation in the coating. Systems of this type may use a moiety, such as a heat sensitive or photochemically activated moiety which changes acid-base characteristics upon exposure to heat or radiation (e.g., UV) and a dye component that changes colour in response to the change of acid-base characteristics of the moiety. These dyes are preferably present in the amount of about 1 to 15% of the coating formulation. Suitable dyes include leuco dyes which include fluorams and lactones that interrupt conjugation until treated with an acid. Preferred acid-catalysed leuco dyes include the Copikem 20 dyes (e.g., 3,3-bis (butyl-2-methyl-1H-indol-3-yl-1-[3H]-isobenzofuranone, colour magenta, available from Hilton-Davis, Cincinnati, OH). Other dyes include phenolphthalein, and other dyes that change colour when exposed to a pH change.

[0026] Suitable heat sensitive moieties that change acid-base characteristics include blocked acids, blocked amines, and chelated amines that can be photorearranged. These moieties are preferably present at about 0.5 to 5% of the coating formulation. Blocked acids include salts of weak bases and strong acids, e.g., sulfonic acid salts. A pre-

ferred blocked acid is diethylammonium trifluoromethane sulfonate (Floured FC-520, 3M, St. Paul, MN), a salt of a strong acid which dissociates when heated. Jodonium salts can also be used as thermally or optically activated acid sources. An example is diaryliodonium hexafluoroantimonate (available as SARCAT CD-1012, Satomer, Exton, PA). The heat-sensitive moiety may also become basic upon exposure to heat or radiation to activate a dye sensitive to basic conditions. Examples include blocked amines, such as, t-butyl carbonates, which becomes unblocked by removal of the t-butyl group upon exposure to heat. In this latter system, carbon dioxide gas is evolved upon heat exposure, causing a refractive index variation, which can improve contrast. This feature may be particularly beneficial for colourless coatings.

[0027] Photochemically activated moieties, which vary acid-base characteristics in response to absorption at select wavelengths, by, e.g., photo rearrangement, are described in Kutal U.S. 5,691,113, U.S. 5,652,280, and Palmer et al. Macromolecules, Vol. 28, No. 4, 1995, (P.1326), the entire contents of all of which are incorporated herein by reference.

[0028] The dye system may also include an acid or base additive to neutralise components within the coating which might induce a partial colour change prior to application of laser energy. For example, a coating with a blocked acid may also be provided with a base, such as an amine, to neutralise any unwanted residual acidity in the coating. The base may be added in sufficient amount to produce a clear, colourless mixture prior to coating or curing. A preferred amine is n-methyldiethanolamine.

[0029] Other suitable dye systems include acidic or basic components that are physically separated from the dye in the resin matrix. When the coating is heated the acid-base component flows, permitting interaction that leads to activation of the dye. An example is a system including bisphenol A and a leuco dye which can be incorporated in the resin in particulate form. Formulas for the particulate systems, available from, Ciba-Giegy, are provided in Appendix A.

[0030] Dyes which change colour without an acid-base variation can also be used. These species typically undergo internal molecular rearrangement upon exposure to heat or photochemical reaction. These dyes are preferably present at about 2 to 8% of the coating formulation. Examples include thermochromic dyes including a sulphonamide groups that interrupt conjugation until heated. Preferred dyes are described in U.S. 5,451,478, (e.g. col.22), by Polaroid, the entire contents of which is incorporated herein by reference.

[0031] Suitable dye systems are also discussed in the following: U.S. Patent Nos. 5,539,446, 5,451,478, 5,424,475, 5,422,230, 5,350,870, 5,342,816, 5,236,884, 5,210,064, 5,206,208, 5,192,645, 4,960,901, 4,839,335, 4,826,976, 4,745,046, 4,720,450, 4,745,046, 4,720,450, 4,720,449, 4,663,518, 4,602,263, 5,795,981, 5,656,750, 5,627,014, 5,492,795, 5,405,9736, 5,354,873, 5,262,549, 5,231,190, 5,227,499 and 5,227,498, the entire contents of all of which are incorporated herein by reference.

[0032] The coating may also include multiple dye species or systems of different colours that can be activated to provide a desired blended colour. Alternatively, dye systems that are activated under different conditions, e.g., heat level or wavelengths, can be used to provide coatings that can be marked in a variety of different colours. For example, a coating may incorporate a first system that uses a dye of one colour that is activated by an acid condition using a blocked acid which unblocks at a first temperature and a second dye system of a different colour that is activated at a second, higher temperature. Marking in the first colour can be achieved by heating to the first temperature but below the second temperature. Marking in a colour that is the combination of the first and second colours can be achieved by heating to the second temperature. In addition, different portions of an image can be marked in different colours by heating the different portions to either the first temperature or above the second temperature.

[0033] The coating may be applied as a solvent cast coating or heat or radiation cured coating. The coating is typically 4-13 microns thick and can be applied by air brush and/or drawn by a doctoring arrangement. Preferred solvents are acetone, butylacetate, cyclohexane, water, and aqueous solvents. The dye may be dissolved first in a solvent, e.g., cyclohexane, with the other components added subsequently. The substrate may be cleaned prior to application of the coating by, for example, a solvent treatment or hydrogen flame treatment. For heat or UV curable coatings, the coating is exposed to an oven or UV station. The rate of cure and intensity of UV radiation may be varied by the use of a varying amounts of a photoinitiator.

[0034] Laser irradiation may be carried out using 100 watt carbon dioxide laser at 10.6 microns, which provides a power level at the film of 2 to 50 watts with a 64 to 128 microsecond pulse width. A preferred operating condition is 25 watts of 175 microsecond pulse width, one pulse per pixel and pixel diameter of 0.010 inch. Other suitable lasers include neodymium-YAG at a wavelength of 1.064 microns.

[0035] The following examples are illustrative.

Example 1

[0036] The following is an example of a solvent-cast colourless coating using an acid-base sensitive dye component.

	Grams
Acetone	4.884
Hilton-Davis Copikem 20	0.501
Magenta	
Krumbhaar K1717 HMP	4.615
Flourad FC-520	0.200

[0037] The Krumbhaar K1717 HMP resin is used as an energy gatherer due to its ability to absorb the energy at 10.6 microns. FC-520, a blocked acid catalyst, deblocks when the temperature reaches approximately 130° C, and creates the acid which turns the dye on. The resin and dye are dissolved in solvent in separate factions which are combined. The mixing may be facilitated by mild heating. The blocked acid is added to the combined solution. The dye is substantially colourless when in solution and prior to application of laser energy. The coating can be marked with a carbon dioxide laser.

Example 2

[0038] The following is an example of a colourless coating formulation using an acid-base sensitive dye system with an amine additive.

	Grams
Acetone	4.884
Hilton-Davis Copikem 20	0.501
Magenta	
Krumbhaar K1717 HMP	4.615
Flourad FC-520	0.200
N-Methyldiethanolamine	0.020

[0039] The amine was added to create a more colourless fluid. The FC-520 is slightly acidic and may turn the dye on slightly. The formulation was prepared similar to Example 1. The amine was added to the combined resin-dye solution. Colour change of the solution toward colourless can be observed as the amine is added. Alternatively, the blocked acid and amine can be prepared in a separate solution, which is added to the dye-resin solution. The coating can be marked with a carbon dioxide laser.

Example 3

[0040] The following is an example of a coating using a thermochromic dye.

	Grams
Krumbhaar K1717 HMP	4.44
N-Butyl Acetate	5.56
Polaroid 34402 Magenta	0.30

[0041] Krumbhaar again acts as the energy gatherer and at approximately 140° C, the coating turns into a deep magenta. The resin was solvated with the solvent using a high speed disk dispenser to produce a light amber fluid. The dye is addition to the fluid forming an emulsions which can be applied to the substrate. The coating can be marked with a carbon dioxide laser.

Example 4

[0042]

	Grams
SR 499	10
Ebecryl 168	0.1
Darocure 4265	0.2
Polaroid 34402 magenta	0.3
N-Methyldiethanolamine	0.02

[0043] This composition uses a curable acrylate resin. Ebecryl 168 is used as the energy gatherer, and the Darocure 4265 is a free radical photo initiator. Due to the slightly acidic nature of the 168, an amine is added to create a clearer film. The components are mixed together. The base is added last to neutralise the mixture. The coating is cured using a UV curing station. (Fusion 300, Fusion Technologies, Marblehead, MA). The system uses an H-bulb, at 300 watts/linear inch. The substrate may be passed under the beam (about 1" wide) at 35"/min. The coating can be marked with a carbon dioxide laser.

[0044] In other embodiments, heat may be provided by radiation with non-laser sources or by application of heat directly to the coating, e.g. with a resisting thermal element positioned closely adjacent to the coating.

[0045] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

APPENDIX "A"

5 **PRESCRIPTION FOR LABORATORY PREPARATION OF**
 THERMOGRAPHIC SLURRY

1. Products required and suppliers

15	- Bisphenol A (polycarbonate)	Rhône-Poulenc SA, Paris or BASF, Ludwigshafen
	- Carbomag TL (Magnesium carbonate)	Chemische Fabrik Schweizerhalle
20	- Zincum S (Zincstearate)	Chemische Werke München
	- Kronos AD (Titanium dioxide)	Kronos Titan GmbH, Leverkusen
	- Sobex 222 (starch)	Südstärke, Throbenhausen BRD
	- Polyviol VO 3/140 (PVA)	Wacker-Chemie Werk Burghausen OBG. BRD
25	- Tinopal ABP-X h.c. Optical brightener	Ciba-Geigy
	- Activator C-522 or equivalent	Ciba-Geigy
	- p-benzyl-biphenyl	Ciba-Geigy
30	- Pergascript Black T-R Diaminofluoran	Ciba-Geigy
	- Irgasol DAP FF (dispersing agent)	Ciba-Geigy

2. Equipment

35	a) Grinding equipment	Colloid mill MZ-80 (Fryma) CoBall-Mill MS-32 (Fryma)
40	b) Laboratory equipment	Laboratory mill, (Vollrath) Turbula stirrer (Bachofen) Magnetic Mixer
45	c) Measuring equipment	Coulter Counter (for evaluation of particle size distribution) Microscope (magnification 400 + 50 1000 fold)

3 Substance grinding

To obtain a state of the art formulation, every ingredient must be ground. As grinding in the laboratory is not economical, Bisphenol A, Activator C 522 and Pergascript Black T-OR are ground in an industrial mill to obtain results, that correspond to bulk working.

a) Industrial grinding.

Bisphenol A

- Recipe:
- 15 kg. water
 - 15 kg. Sobex 222 10% solution
 - 15 kg. Bisphenol A
- Procedure:
- The suspension is preground in a colloid mill MZ-80 (one pass without contact and a second one with contact). The suspension is then passed 7 times through the CoBall-Mill MS-32 and ground under the following conditions:
- 75% Steatite pearls 1-1.5 mm
 - Rotor speed: 12,6 m/sec
 - Flow rate: 205 kg/h.
 - Power consumption: 17 A
 - Pressure: 0,1 bar
 - Ideal exit temperature: 25°C.
- Objective:
- Homogenous dispersion with a median value of 2 µm particle size.

Activator C 522 or equivalent

- Recipe:
- 10 kg. water
 - 10 kg. Sobex 222 10% solution
 - 0.267 kg. Irgasol DAM liquid
 - 10 kg. Activator C-522
- Procedure:
- The suspension is preground in a colloid-mill MZ-80 (one pass without contact, one pass with contact). The suspension is then passed 7 times through the CoBall MS-32 and ground under following conditions:
- 75 % Steatit pearls 1-1,5 mm
 - Rotor speed: 12,6 m/sec.
 - Flow rate: 200 kg/h.
 - Power consumption: 17 A
 - Pressure: 0,2 bar
 - Ideal exit temperature: 25°C.
- Objective:
- Homogenous dispersion with a median value of 3 µm particle size.

Pergascript Black I. R

Recipe:

10 kg. Polyviol VO 3/140 10% solution

4 kg. Pergascript Black T-R

- Procedure:

The suspension is preground in a colloid-mill MZ-80 (one pass with contact). The suspension is then passed 6 times through the CoBall-Mill MZ-32 and ground under the following conditions:

75 % Steatite pearls:	1-1.5 mm
Rotor speed:	12,6 m/sec.
Flow rate:	280 kg/h.
Power consumption:	26 A
Pressure:	0.5 bar
Ideal exit temperature:	60°C

After grinding the Pergascript Black T-R dispersion is heated indirectly up to 85°C. After 5 min. under intense stirring one part of Sobex 222 (12% = 177.2 g) is added to the dispersion which is then cooled down to room temperature.

- Objective:

Homogenous dispersion with a median value of 1.5 μm particle size.

b) Laboratory grinding.

Carbomag TL

- Recipe:

350 g water

50 g Sobex 222 10% solution

100 g Carbomag TL

- Procedure:

The suspension is ground in a laboratory-pearl-mill using 1 mm glass pearls at a ratio 1 : 10.

- objective:

Homogenous dispersion with a median value of 1.5 μm particle size.

Kronos AD

- Recipe:

280 g water

20 g Irgasol DAM liquid

100 g Kronos AD

- Procedure:

The suspension is ground in a laboratory-pearl-mill using 1 mm glass pearls at ratio 1 : 10.

- Objective:

Homogenous dispersion with a median value of 2 μ m particle size.

Important note: For each dispersion preparation, the dry content must be evaluated.

Solutions and DispersionsZincum 5

- Recipe:

930 g water

70 g Irgasol DAM liquid

250 g Zincum 5

The suspension is thoroughly homogenous
in a mixer.Sobex 222

- Preparation:

A 12% starch solution is prepared at room
temperature shortly before formulation.Tinopal ABP-X h.c.

- Preparation:

A 25% solution of Tinopal ABP-X is
prepared.4. Suggested Recipes

	<u>Dry parts</u>	<u>Dispersions</u>	<u>Concentration</u>	<u>Amount in g</u>
1.	3,3 + 0,33	Bisphenol A Sobex 2122	38,61 %	200,0
2.	1,7 + 0,085	Carbomac IL Sobex 222	21,0 %	180,8
3.	0,5 + 0,05	Zincum 5 Irgasol DAM liquid	22,52 %	53,2
4.	0,4 + 0,04	Kronos AD Irgasol DAM liquid	27,5 %	34,0
5.	1,0	Sobex 222	12,0 %	177,2
6.	0,15	Tinopal ABP-X h.c.	25,0 %	12,8
7.	1,0 + 0,1 + 0,012	Acivator C-522 Sobex 22 Irgasol DAM liquid	30,36 %	77,9
8.	1,2 + 0,3 + 1,0	Pergascript Black T- R Polyviol VO 3/140 Sobex 222	36,75 %	86,9 177,2
	<u>11,177</u>			<u>1000,0</u>

Additive Variation

1. Water resistance is improved by adding 0 to 2 parts Latex.
If Latex is used, the additor must be at end of slurry preparation or strong reagglomeration can take place.
 2. Background discoloration (ageing) is improved by increasing PVA component to a max. of 50% (calculated on dry content of Pergascript Black T-R).
- Both modifications reduce intensity.

Important

The following points must be considered when the coating recipe is prepared:

1. the ingredients must be added in the given sequence.
2. After each addition the coating slurry must be homogenous.
3. Temperature increases due to outside influences must be avoided.
4. Bubbles should not be present in the dispersion: (if necessary de-aerate under vacuum).

Claims

1. A marking coating, characterised in that the coating includes a resin and an activatable dye system.
2. The coating of claim 1 characterised in that said coating is substantially colourless prior to exposure to radiation at a wavelength and intensity sufficient to induce a select thermal variation that activates said dye system.
3. The coating of claim 2 characterised in that said dye system is activated at a temperature of about 100-150°C.
4. The coating of claim 2 or claim 3 characterised in that said coating is absorbing at a non-visible wavelength.
5. The coating of claim 4 characterised in that said coating is absorbing in the infrared.
6. The coating of claim 5 characterised in that said resin is absorbing in the infrared.
7. The coating of any one of claims 1 to 6 characterised in that the resin is a solvent cast resin.
8. The coating of claim 7 characterised in that the resin is a polyketone resin.
9. The coating of anyone of claims 1 to 3 characterised in that the resin is a UV curable resin.
10. The coating of claim 1 characterised in that said dye system includes a thermally sensitive acid-base variation component, and a dye which changes colour in response to an acid-base variation.
11. The coating of claim 10 characterised in that said acid-base variation component is a blocked acid.
12. The coating of claim 11 characterised in that said dye includes a lactone.
13. The coating of any one of claims 10 to 12 characterised in that the coating includes a base additive.

14. The coating of claim 13 characterised in that said base additive is an amine.
15. The coating of claim 1 characterised in that said dye system is a thermochromic dye which undergoes structural rearrangement.
- 5 16. The coating of claim 15 characterised in that said thermochromic dye is a sulphonamide.
17. The coating of claim 1 characterised in that said coating absorbs in the UV and said dye system is photochemically activated.
- 10 18. A method of marking a substrate comprising: applying to the substrate a coating as claimed in any one of the preceding claims, and irradiating the substrate in a desired pattern with selected radiation effective to induce a colour change.
- 15 19. The method of claim 18 characterised in that the method includes applying said coating to a metal substrate.
20. The method of claim 19 characterised in that the method includes applying said coating to a beverage can.
21. The method of any one of claims 18 to 20 including irradiating said coating in a pattern indicating a date.
- 20

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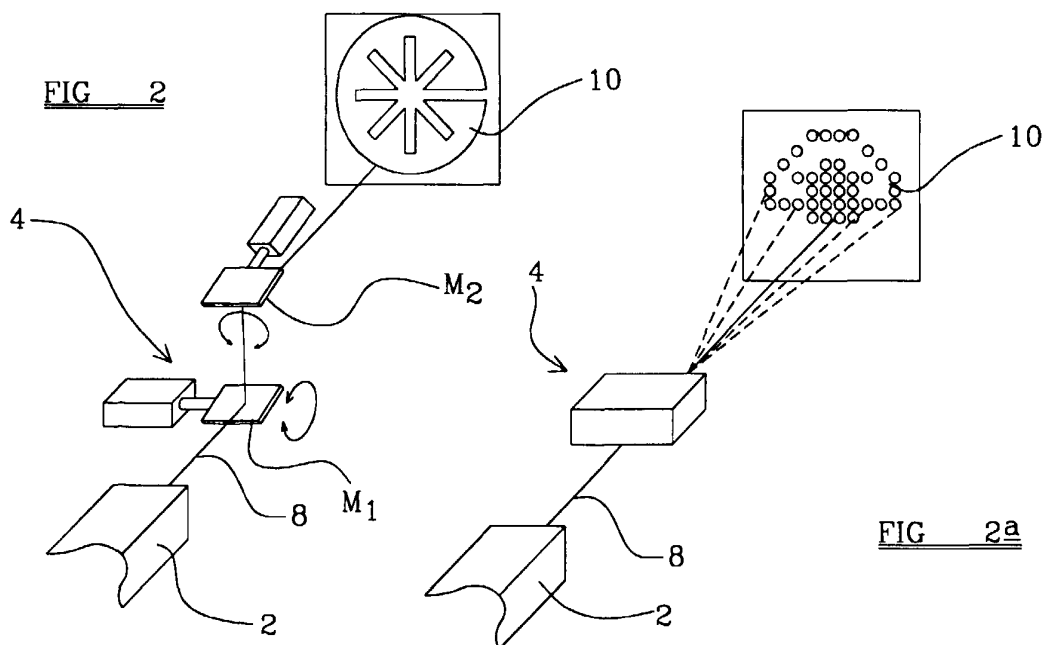
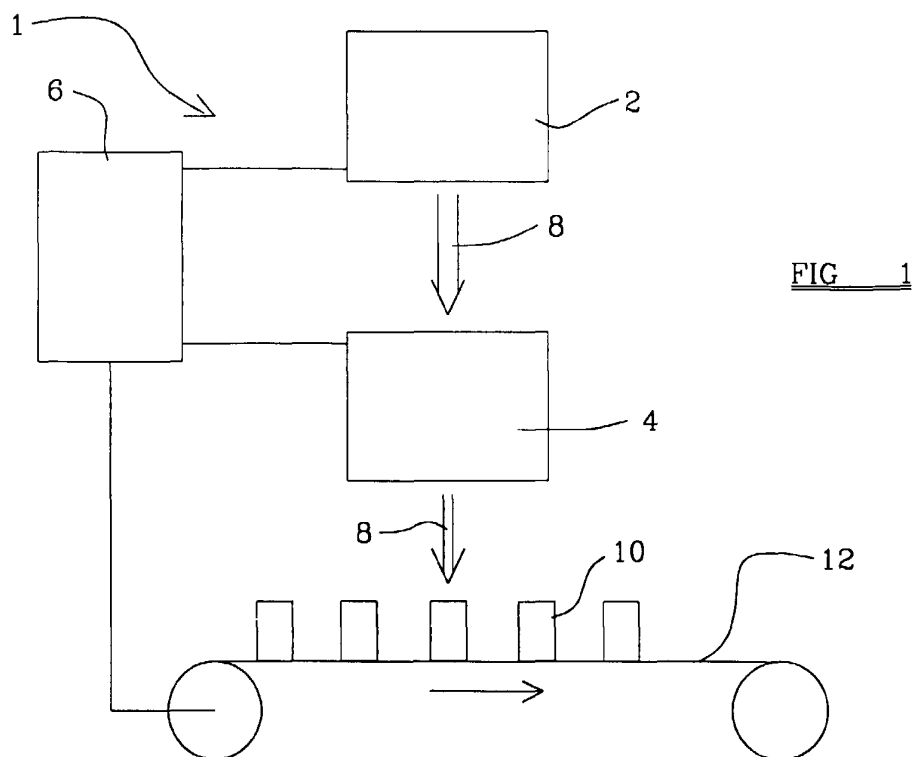
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US 20050045637A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0045637 A1****Rohr et al.**(43) **Pub. Date: Mar. 3, 2005**(54) **CONTAINERS HAVING DISTINCTIVE TABS WITH LASER ETCHING AND VOID FORMING A PROMOTIONAL IMAGE****Publication Classification**(51) **Int. Cl.⁷** **B65D 17/34**(52) **U.S. Cl.** **220/269**(76) **Inventors: Rainer Rohr, Dortmund (DE); Nathalie Verrac, Lons (FR); Michel Thibaut, Lescar (FR)**(57) **ABSTRACT**

An end for a can, such as a can containing a beverage or other consumer product, includes a tab with a tab surface containing a promotional image formed therein. The promotional image may be a logo or other symbol. The promotional image is formed as a combination of a void stamped in the tab surface and laser etching of the tab surface, such as by burning off a colored finish applied to the tab surface in a predetermined pattern. The combination of the void and the laser etching results in a distinctive container end. The end may also include a colored panel which cooperates with the colored tab stock to result in a distinctive appearance to the container end.

Correspondence Address:
MCDONNELL BOEHNEN HULBERT & BERGHOFF
300 South Wacker Drive
Chicago, IL 60606 (US)

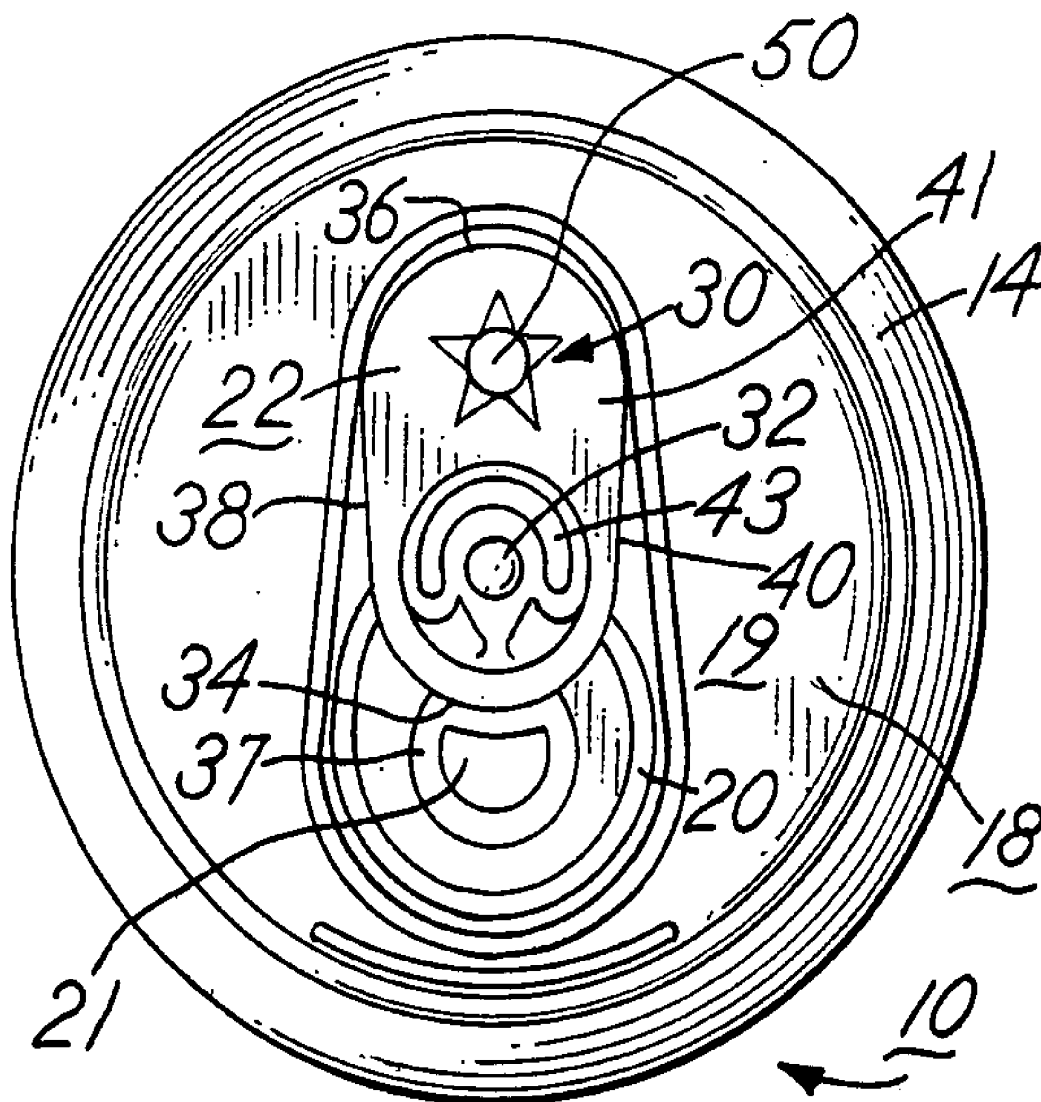
(21) **Appl. No.: 10/652,770**(22) **Filed: Aug. 28, 2003**

FIG. 1
(PRIOR ART)

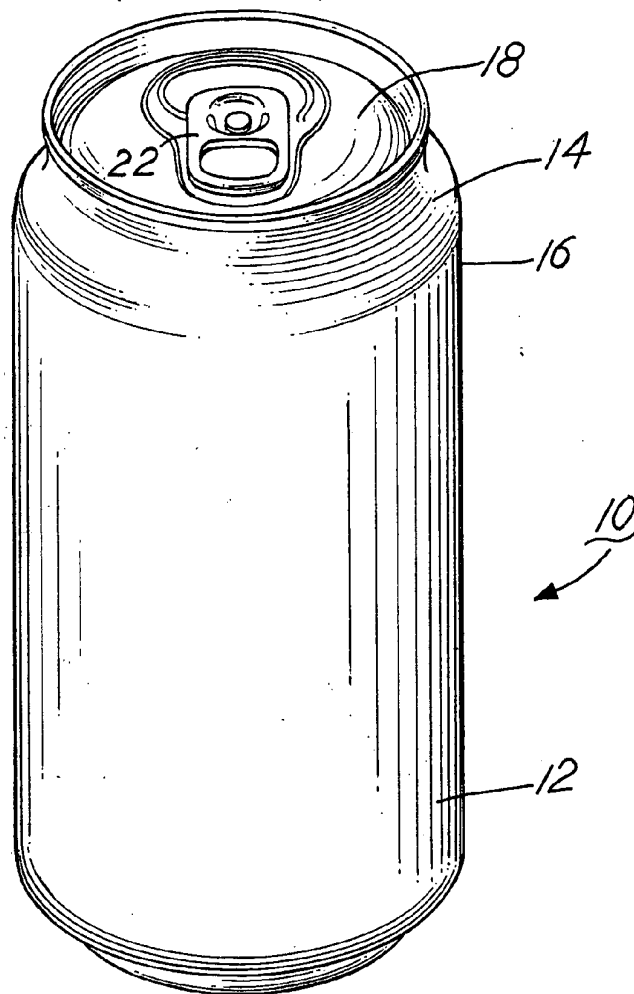


FIG. 2
(PRIOR ART)

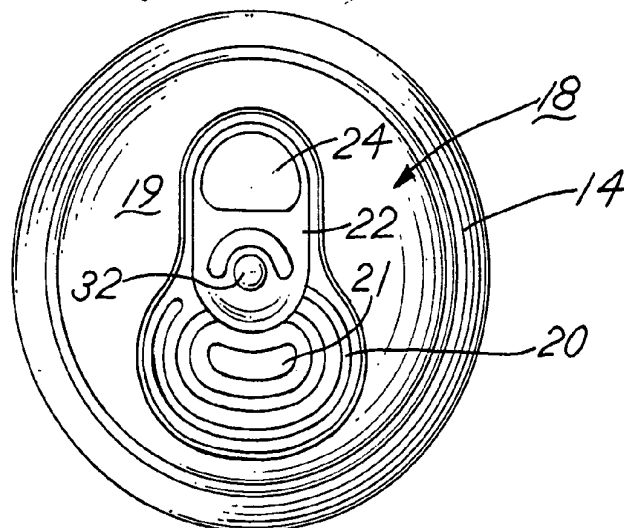


FIG.3

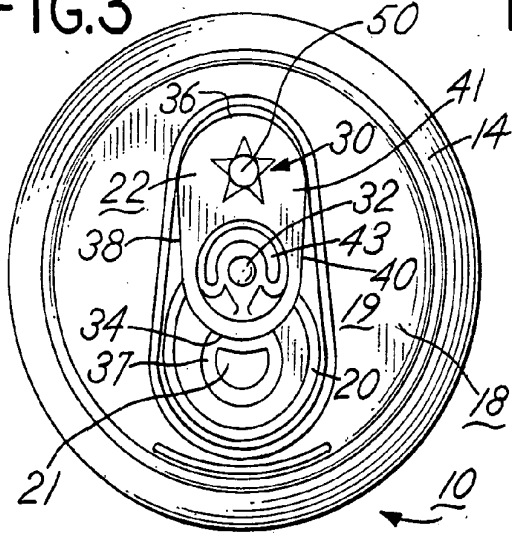


FIG.3A

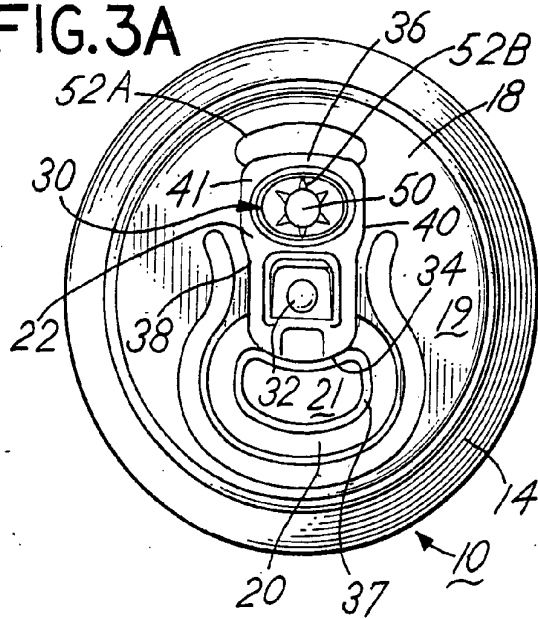


FIG.4

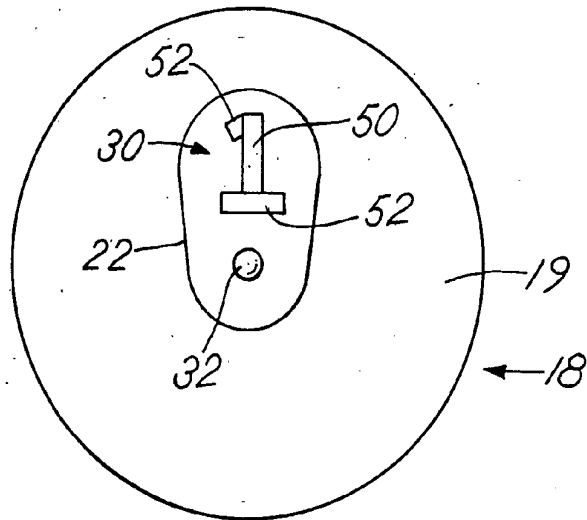
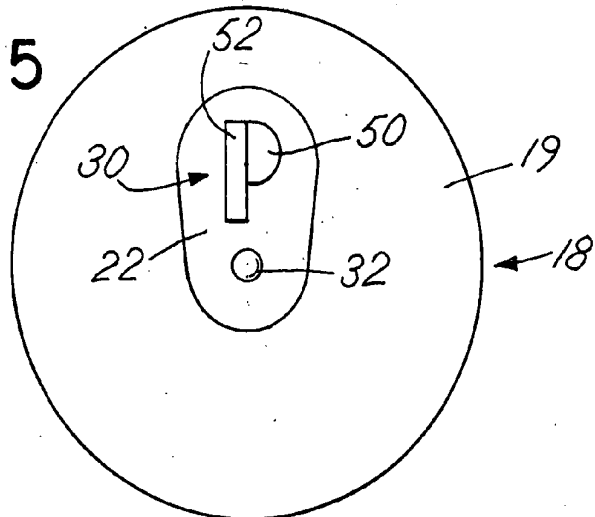


FIG.5



CONTAINERS HAVING DISTINCTIVE TABS WITH LASER ETCHING AND VOID FORMING A PROMOTIONAL IMAGE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates generally to the subject of containers, for example metal or plastic containers for consumer products such as food and beverages. More particularly, the invention relates to a cans and can ends having a manually manipulable tab used for opening such a container that contains a promotional or decorative image.

[0003] 2. Description of Related Art

[0004] **FIG. 1** is a perspective view of a conventional prior art beverage can **10**. The can **10** is formed from a one-piece drawn and ironed cup. The cup walls are stretched in a can body making station to form the side wall **12** of the can. A neck **14** is formed on the upper portion of the can by a set of necking stations, such as described in the patent to Caleffi et al., U.S. Pat. No. 4,774,839 or Tung et al., U.S. Pat. No. 5,755,130. After the neck **14** is formed on the upper portion **16** of the can **10**, the can is sent to a flanging station where a flange is formed around the upper peripheral edge of the can. The flange is seamed to the peripheral edge of a can end **18** after the can is filled, in accordance with well-known techniques.

[0005] Referring to **FIG. 2**, the can end **18** includes a generally flat center panel **19**, integrally connected to a circumferential countersink which is surrounded by a peripheral flange or curl. The center panel includes score lines which defines a panel, which when opened, allows the contents of the can to be removed.

[0006] The scored portion **20** cooperates with a manually manipulable tab **22** so as to enable the user to either remove, for example, most of the center panel, such as in a full panel easy open end that is used for cans containing cat food, snacks or other foods, or to remove or open the pour panel of a beverage can.

[0007] On a typical beverage can, such as shown in **FIG. 2**, the score **20** defines a pour panel **21** which, after opening, remains attached to the center panel by a hinge (not shown). The pour panel is opened by the tab **22**. Tab **22** is secured to the center panel **19** by a rivet **32**. The user inserts a finger underneath the tab **22** and lifts the tab up, causing the rivet **32** to pull up, which initiates the pop or initial fracture of the score line **20**. Further lifting of the tab **22** further propagates the severing of the score to complete the opening of the can. At that point the user may pour the contents out of the can or drink from the can.

[0008] Prior art references describing ornamental, promotional, or other similar features for beverage containers include the patents to Goodwin, U.S. Pat. No. 4,203,240; Januchowski, U.S. Pat. No. 1,257,710; Park, U.S. Pat. No. Des. 365,021; and Rheingold, U.S. Pat. No. 1,878,541. U.S. Pat. No. 4,557,505 to Schaefer et al. describes a stress-opacifying tamper indicating tape that is applied to the openings of containers, in which a visible message is displayed in the tape indicative of whether the seal has been opened or tampered with. Minder, U.S. Pat. No. 3,822,496 shows a can with a detachable display plate or button that is

affixed to a pull-ring of a can. Additionally, beverage cans have been previously sold in the United States with alpha-numeric characters formed on the tab with ink-jet printing. Published PCT application PCT/GB00/00463, publication no. WO 00/47487 published Aug. 17, 2000 discloses methods and apparatus for printing on tabs and various features for promotional containers and container ends.

SUMMARY OF THE INVENTION

[0009] An end for a can, such as a can containing food or beverages for human consumption, is provided that includes a scored portion forming a frangible portion in the end. A manually manipulable tab secured to the end is provided and has a first end portion and a second end portion and first and second opposite sides. The first end portion cooperates with the scored portion to open the end when the second end portion is lifted up with the user's finger or other implement. The tab further comprises a tab surface extending across the tab between the first and second sides. In accordance with the invention, the tab surface is distinctively decorated, as by forming a promotional or decorative image in the tab. The promotional image is formed as a combination of a void in the tab and laser etching of the tab surface in the region adjacent to the void. In preferred embodiment, the tab is colored and laser etching burns the color off the tab to reveal the base color of the tab material. The combination of the void, colored tab material, and laser etching of the color material to reveal the color of the base tab material (i.e., silver for an aluminum tab stock), with possible color applied to the end itself, results in a highly distinctive container.

[0010] In a preferred embodiment, the promotion image is formed by applying a layer of a color agent to the tab surface (such as by applying a lacquer containing a color agent to the tab), feeding the tab material to a laser station where a portion of the color agent is burned off revealing the silver aluminum color below the color agent, then feeding the tab into a press where the tab features are formed. The press includes a stamping tool that forms the void forming part of the promotional or decorative image.

[0011] The end in accordance with the invention can be provided for any suitable can, for example a can for containing a human or animal food product. In a preferred embodiment, the can comprises an aluminum beverage can, but cans for snack foods (e.g., peanuts), or other types of products can be used with the inventive ends and tab. The end may be a full panel easy open end, in which full panel is removed, or an end in which the tab is used to open a pour panel in the end to provide a means of access to the contents of the can.

[0012] The promotional or decorative image may be a logo or trademark of the manufacturer of the contents of the can, or other a promotional or fanciful image associated with the manufacturer of the contents of the can. Other examples of promotional images would be letters, numbers, symbols, or fanciful shapes.

[0013] These, and other advantages, features and improvements of the invention will be more apparent from the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Presently preferred embodiments of the invention are described below in conjunction with the drawings, in which like reference numerals refer to like elements in the various views, and in which:

[0015] **FIG. 1** is a perspective view of a prior art beverage can;

[0016] **FIG. 2** is a plan view of a prior art beverage can end and manually manipulable tab for the beverage can of **FIG. 1**;

[0017] **FIG. 3** is a plan view of an inventive end for the beverage can of **FIG. 1** showing a promotional or decorative image formed as a void on the surface of the tab in combination with adjacent laser etching of the tab.

[0018] **FIG. 3A** is an alternative arrangement of the tab of **FIG. 3**.

[0019] **FIGS. 4 and 5** show two alternative decorative or promotional images formed in the tab surface.

DETAILED DESCRIPTION OF THE
PREFERRED EMBODIMENTS OF THE
INVENTION

[0020] **FIG. 3** is a plan view of an inventive end **18** for the can **10** of **FIG. 1**. The end **18** has a scored portion **20** for defining an opening in the end, and a manually manipulable tab **22** having the promotional or decorative image **30** formed therein.

[0021] The tab **22** is secured to the end **18** by a rivet **32** or other suitable structure that allows the tab **22** to remain fixed to the end **18** when the tab is manipulated by the user to open the can **10**. The tab **22** has a first end portion **34** and a second end portion **36** and first and second opposite sides **38** and **40**, respectively. The first end portion **34** is forced into the region **37** bounded by the scored portion **20** to open the end when the second end portion **36** is lifted up with the user's finger or other implement.

[0022] The tab further comprises a tab surface **41** extending across the tab **22** between the first and second sides **38** and **40**. As shown in **FIG. 3**, the tab surface **41** has a promotional or decorative image **30** formed therein. In the example of **FIG. 3**, the tab is coated with a lacquer or other pigment to form a colored tab (e.g., black, red or blue), and the promotional image **30** is formed by forming a void **50** in the tab and laser etching of the color adjacent the void in a predetermined pattern or arrangement **52** to reveal the base metal (aluminum). The combination of the void **50**, which reveals the color of the end panel **19** (which may be colored, e.g., gold, or uncolored, i.e., silver), plus color tab surface **41**, plus laser etching at **52** forms a distinctive container end. Thus, it is possible to present to the consumer or viewer at least three colors: (1) the color of the end panel **19**, which would also be viewed through the void **50** in the tab, (2) the color applied to the tab surface **41**, and the color of the base tab material (silver for an aluminum tab) in the region **52** where the laser has burned off the color.

[0023] The particular image shown in **FIG. 3** is a promotional or decorative image in the shape of the star. The star has a circular punched hole **50** and the points **52** of the star consist of areas where the laser has burned off the color or

coating applied to the tab surface. Consider for example an end with a gold colored panel **19**, the void **50** reveals the gold color, and the silver points **52** against the black tab background in the tab surface **41** forms a highly distinctive arrangement. Moreover, the resulting star presents no sharp surfaces to the user which could possibly injure the user when the can is opened. The combination of void feature and laser etching opens many new possibilities for decoration of tabs for cans.

[0024] Two more examples are shown in **FIGS. 4 and 5**. **FIG. 4** shows a decorative image in the form of the letter "I" with the bar **50** formed as a void and the base and upper left hand portions of the number formed as laser etchings of the tab surface to burn off color that is applied to the tab. Alternatively, the tab has no color and the laser etching burns off the coating to the aluminum base stock, which may result in a darkening of the tab color in the area **52**. In the example of **FIG. 5**, the promotional or decorative image consists of the letter "P" and is formed from a void **50** and a laser etching in region **52**. The laser etching and void could be reversed in the examples of **FIGS. 4 and 5**, of course.

[0025] Various types of promotional or decorative images **30** may be formed in the tab surface, such as logos, sports team logos, trademarks, an image of a product or feature suggesting the contents of the can, letters, numbers, symbols of various kinds, arbitrary designs, and so on.

[0026] In one preferred embodiment, the promotional image **30** is formed in the tab **22** by first applying a layer of a color agent or lacquer containing a color agent to the tab surface, or by buying pre-coated tab stock, and then removing a portion of the color agent in predetermined locations using a laser. The tab stock is then introduced into a tab forming press (such as press from Dayton Reliable Tool). The tab is then formed in the press. One of the operations of the press includes a stamping operation wherein the void **50** is stamped out of the tab surface. The void will normally be formed immediately adjacent to where the color etching has occurred, so that the laser etching and the void together form a single unitary image. Consider, for example, a logo in the shape of a bull's head. The laser etching is performed to etch out the shape of the horns, ears and nose of the bull, revealing these features in the base material color. The remainder of the tab surface is colored tab material. An inverted triangle is stamped from the tab surface to form the basic head shape.

[0027] In an alternative and less preferred embodiment, the laser etching of the tab surface **41** in region **52** could be performed after the tabs have been formed and affixed to the end in a shell conversion press. With this embodiment, precise positioning of the end relative to the laser would have to be maintained in order to insure that the etching is performed at the correct locations.

[0028] Other embodiments are contemplated. It is possible that an uncolored tab could be used and the promotion image could be formed by the void in addition to other etched features, such as patterns, or other features, in the tab surface adjacent to the void.

[0029] Still further embodiments would introduce three-dimensional shapes to the tab from embossing or debossing, in addition to the etching and void forming features described herein. In these embodiments, the metal in the tab surface **41** is either pressed down (towards the end panel **19**) or raised.

[0030] The techniques of the invention can be applied to various types of ends for containers, and representative examples include ends for can for food, beverage and other types of products.

[0031] FIG. 3A is an alternative arrangement of the embodiment of FIG. 3, in which the laser etching is applied to trace a circular outline 52A and the outline 52B of the points of the star feature, showing the color of the panel 19 showing through the void 50.

[0032] Variation from the particular embodiments described above is contemplated and within the scope of the invention. This true scope of the invention is defined by the appended claims, to be interpreted in light of the foregoing specification.

1. A can, comprising:

a can body comprising a side wall and a base and defining an interior region for containing a product;

an end for said can body having a scored portion for defining an opening in said end; and

a manually manipulable tab secured to said end and having a first end portion and a second end portion and first and second opposite sides, wherein said tab further comprises a tab surface extending across said tab between said first and second sides, said tab surface having a promotional or decorative image formed therein,

said promotional or decorative image formed as a combination of a void formed in the tab surface and adjacent laser etching of one or more features on said tab surface adjacent to said void.

2. The can of claim 1, wherein a first color is applied to said tab surface and said laser etching removes color from said tab surface to reveal the base color of the tab material, the first color, revealed base color and void forming a distinctive tab appearance.

3. The can of claim 2, wherein said end comprises a base material and a color applied to said base material, and wherein said color applied to said base material of said can end is different from the color applied to said tab surface, whereby said can end presents three colors to a viewer: said color applied to said can end, said color applied to said tab surface, and the color of the base tab material.

4. The can of claim 1, wherein said can comprises a can for containing a human or animal food product.

5. The can of claim 1, wherein said can comprises a metal beverage can.

6. The can of claim 1, wherein said promotional image comprises a logo.

7. The can of claim 1, wherein said promotional image comprises a promotional image associated with the manufacturer of the contents of said can.

8. An end for a can body, comprising:

a scored portion for defining a frangible portion in said end; and

a manually manipulable tab secured to said end and having a first end portion and a second end portion and first and second opposite sides,

wherein said tab further comprises a tab surface extending across said tab between said first and second sides, said tab surface having a promotional image formed therein,

said promotion image formed as a combination of a void formed in the tab surface and adjacent laser etching of one ore more features adjacent to said void in said tab surface.

9. The end of claim 8, wherein a first color is applied to said tab surface and said laser etching removes color from said tab surface to reveal the base color of the tab material, the first color, revealed base color and void forming a distinctive tab appearance.

10. The end of claim 9, wherein said end comprises a base material and a color applied to said base material, and wherein said color applied to said base material of said can end is different from the color applied to said tab surface, whereby said can end presents three colors to a viewer: said color applied to said can end, said color applied to said tab surface, and the color of the base tab material.

11. The end of claim 8, wherein said can comprises a can for containing a human or animal food product.

12. The end of claim 8, wherein said can comprises a metal beverage can.

13. The end of claim 8, wherein said promotional or decorative image comprises a logo.

14. The end of claim 8, wherein said promotional or decorative image comprises a promotional image associated with the manufacturer of the contents of said can.

15. The can of claim 1, further comprising a three-dimensional decorative feature in combination with said void said etched feature.

16. The end of claim 8, further comprising a three-dimensional decorative feature in combination with said void said etched feature.

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