

DescriptionTechnical Field

5 The present invention relates to bar code labels outstanding in heat resistance and chemical resistance.

Technical Background

10 In recent years, bar codes are widely used for automation of commodity distribution control, stock control, sales control and the like. Various attempts have been made to introduce into a production site a system for performing production control, quality control and the like using this bar code.

Such control system in plants is conducted as follows. A printed bar code paper label is attached to products running on a production line, the bar code is read at each operation location, specific operation is carried out according to the information on working schedules preset in a host computer, and results on
15 production and on inspection obtained according to the information stored in bar codes are transmitted to the host computer in order to accomplish, on a real-time basis, quality control and production control over the entire area of the plant.

However, for example, conventional bar code labels of the paper-based type can not be used at a diffusion procedure in the production of semiconductors at which a product is treated in various corrosive
20 atmospheres at high temperatures of approximately 500 to 1000 °C. The same problem arises in various procedures other than the diffusion for semiconductors such as firing of ceramics and glass or porcelain ware. Conventional bar code labels usable at such high temperatures include one prepared by treating an aluminum substrate with Alumite to print a bar code pattern. This bar code label, however, is usable only at about 500 °C or lower and exhibits a poor durability in a highly corrosive atmosphere.

25 US-A-4 514 456 published 30 April 1985, discloses a method of producing a coded marking on a glass workpiece which is typically the envelope of television picture tube. It consists in applying to a selected area of the glass workpiece an undercoating comprising pigments and an alkali silicate binder, in applying to the undercoating an overcoating comprising other pigments and an alkali silicate binder, and in recessing a plurality of marks through the overcoating by abrasion or ablation. The coatings are fired either
30 before or after the recessing step.

Such a glass envelope is not subjected to severe thermal and chemical conditions.

Disclosure of the Invention

35 In view of the foregoing prior art problems, we conducted extensive research to obtain bar code labels excellent in high-temperature durability, chemical resistance and other properties. Our research has revealed that a bar code label high in high-temperature durability and chemical resistance can be obtained by forming a bar code from a vitreous material excellent in heat resistance and chemical resistance on a substrate outstanding in heat resistance, chemical resistance and the like such as ceramics, pottery,
40 porcelain enamel-coated metal. Based on this finding, the present invention has been accomplished.

The present invention provides a bar code label comprising a bar code marking which is made from a vitreous material and which is formed on a substrate made of ceramics, pottery or porcelain enamel-coated metal, said bar code being formed directly on the substrate by printing, screen-printing, transfer or the like and being then fired.

45 Substrates to be used for the bar code labels of the present invention are required to be outstanding in high-temperature heat resistance, chemical resistance and the like. Suitable examples thereof are porcelain enamel-coated metal comprising a metal having a fired glaze layer, ceramics and pottery. The substrate is usually used in the shape of a plate but is not limited thereto. For example, the substrate may be in the form of flexible cloth or paper made of, e.g. ceramics fibers of alumina or like material. OF these substrates,
50 porcelain enamel-coated metal has further advantages of being resistant to impact and unlikely to readily break.

For formation of a bar code on a substrate, a vitreous material is used in order to produce a pattern excellent in heat resistance, chemical resistance and the like. Useful vitreous materials are not limited only to those in completely amorphous state, but even those incomplete in amorphous form, e.g. those in a
55 sintered state, are usable insofar as they are high in heat resistance, chemical resistance and the like. While vitreous materials having a definite color themselves can be used as they are, transparent vitreous materials may be made usable by dispersing a suitable pigment therein. Included among such vitreous materials is a reaction product of acidic oxide and basic oxide. Examples of acidic oxide compounds are silicon oxide,

boric acid, phosphoric acid and the like. Examples of basic oxide compounds are carbonates or oxides of Na, K, Ca, Mg, Ba, Sn, Pb, Zn, Sb, Al or the like. Although inclusive of colored ones, the reaction products, when required, can be colored with iron oxide, manganese oxide, copper oxide or like metallic compounds or may be given a desired color by being mixed with a metallic oxide-type pigment containing at least one of NiO, Cr₂O₃, CoO, Fe₂O₃, MnO₂, TiO₂, UO₂ and the like. Examples thereof are glazes for pottery, coloring materials for glass ware, etc. Vitreous materials for the bar code of the present invention are not limited to the examples described above and may be suitably selected from known materials according to the temperature and atmosphere in which the bar code is used.

The colors of substrate and vitreous material are not specifically limited, but are required to make sharp the contrast between the substrate and the bar code. For example, if a substrate having a white or whitish color is used, it is preferred to use a vitreous material having a black or blackish color. Conversely a black or blackish substrate is preferably used in combination with a white or whitish vitreous material.

The bar code label of the present invention is produced, for example, by the following process. First, the required pattern is formed on a substrate from a glaze or a coloring material by methods such as screen process printing, transfer, drawing by hand or the like. Then the pattern formed on the substrate is heated for firing under suitable conditions depending on the glaze or coloring material used. The bar code label thus obtained has the bar code formed from the vitreous material on the substrate and is remarkable in heat resistance and chemical resistance.

The bar code label of the present invention can be used as attached directly to an article or to a pallet on which the article is placed.

Brief Description of the Invention

Fig. 1 is a perspective view showing an embodiment of the bar code label of the present invention.

Industrial Feasibility

The bar code label of the present invention is outstanding in heat resistance, chemical resistance and the like and is suitable for use in the control of articles to be treated at high temperatures and/or in corrosive atmospheres. The attachment of the bar code label facilitates the quality control and production control under conditions under which conventional bar code labels have not been usable. Also the use of such bar code labels makes it possible to automate mixed production lines for manufacture of various kinds of articles each in small quantities.

Examples

The present invention will be described below with reference to the following Examples.

Example 1

On a substrate 1 made of 96% alumina and measuring 5.08 cm X 1.7 cm X 0.8 cm was printed a bar code pattern by a screen printing machine from a pasty black glaze prepared by kneading and dispersing the following components by a roll mill.

Composition of paste for bar code	
Fe ₂ O ₃	14 parts by weight
CrO ₂	4 parts by weight
MnO ₂	17 parts by weight
CoO	28 parts by weight
Kaolin	8 parts by weight
Ethyl cellulose	10 parts by weight
Butyl cellosolve acetate	21 parts by weight

Subsequently the printed substrate was fired at 1200 to 1300 °C for 10 minutes during which no printed pattern fluidized. In this way, a bar code 2 having a sufficient contrast was produced.

The substrate and print of the bar code label thus obtained were high in heat resistance and chemical resistance and was one effectively usable even at a high temperature of about 1000 °C and in a corrosive

atmosphere.

Example 2

A black pigment containing predominant amounts of Fe_2O_3 , SiO_2 , Al_2O_3 , TiO_2 , MnO_2 and MgO_2 was mixed with a borosilicate glass frit powder to make a paste. A bar code pattern was printed from the paste on an alumina substrate of the type used in Example 1. The printed substrate was fired at 1100°C for 10 minutes, providing a bar code with a clear contrast.

The bar code label thus obtained underwent no change even when immersed in each of 37% HCl , 95.6% H_2SO_4 , 69% HNO_3 and 10% NaOH at room temperature for 1 month or longer.

Composition of paste for bar code	
Pigment (Fe_2O_3 , SiO_2 , Al_2O_3 , TiO_2 , MnO_2 and MgO_2)	40 parts by weight
Borosilicate glass frit powder	36 parts by weight
Ethyl cellulose	12 parts by weight
Terpinol	12 parts by weight

Example 3

A blue pigment (CoO) alone was made into a paste. A bar code pattern was printed on a 99.5% alumina substrate after which the printed substrate was fired at 1500°C for 10 minutes. The CoO component was mixed with the Al_2O_3 component in the substrate material to form a vitrified mixture, whereby a bar code pattern was provided on the substrate. The bar code label thus produced was found to have a sufficient heat resistance at 1400°C .

Composition of paste for bar code	
Pigment (CoO)	70 parts by weight
Ethyl cellulose	20 parts by weight
Terpinol	10 parts by weight

Example 4

A mixture of white pigment (TiO_2) and lead borosilicate glass frit powder was made into a paste. A bar code pattern was printed on a transfer paper for pottery (paper coated with dextrin) and dried. Thereafter an overcoat was printed on the transfer paper and dried. The bar code pattern was peeled off in water and transferred onto a blackish blue substrate of porcelain enamel-coated metal. The substrate with the bar code pattern so transferred was fired at 600°C for 10 minutes, and formed with the bar code pattern having a white portion with a black background. The bar code label was immersed in 69% HNO_3 at room temperature for 1 month or longer but no change was detected.

Composition of paste for bar code	
Pigment (TiO_2)	35 parts by weight
Borosilicate glass frit powder	35 parts by weight
Ethyl cellulose	15 parts by weight
Terpinol	15 parts by weight

Claims

1. A bar code label comprising a bar code marking which is made from a vitreous material and which is formed on a substrate made of ceramics, pottery or porcelain enamel-coated metal, said bar code being formed directly on the substrate by printing, screen-printing, transfer or the like and being then



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atmosphere.

Example 2

5 A black pigment containing predominant amounts of Fe_2O_3 , SiO_2 , Al_2O_3 , TiO_2 , MnO_2 and MgO_2 was mixed with a borosilicate glass frit powder to make a paste. A bar code pattern was printed from the paste on an alumina substrate of the type used in Example 1. The printed substrate was fired at 1100°C for 10 minutes, providing a bar code with a clear contrast.

10 The bar code label thus obtained underwent no change even when immersed in each of 37% HCl , 95.6% H_2SO_4 , 69% HNO_3 and 10% NaOH at room temperature for 1 month or longer.

Composition of paste for bar code	
Pigment (Fe_2O_3 , SiO_2 , Al_2O_3 , TiO_2 , MnO_2 and MgO_2)	40 parts by weight
Borosilicate glass frit powder	36 parts by weight
Ethyl cellulose	12 parts by weight
Terpinol	12 parts by weight

20 Example 3

A blue pigment (CoO) alone was made into a paste. A bar code pattern was printed on a 99.5% alumina substrate after which the printed substrate was fired at 1500°C for 10 minutes. The CoO component was mixed with the Al_2O_3 component in the substrate material to form a vitrified mixture, whereby a bar code pattern was provided on the substrate. The bar code label thus produced was found to have a sufficient heat resistance at 1400°C .

Composition of paste for bar code	
Pigment (CoO)	70 parts by weight
Ethyl cellulose	20 parts by weight
Terpinol	10 parts by weight

35 Example 4

A mixture of white pigment (TiO_2) and lead borosilicate glass frit powder was made into a paste. A bar code pattern was printed on a transfer paper for pottery (paper coated with dextrin) and dried. Thereafter an overcoat was printed on the transfer paper and dried. The bar code pattern was peeled off in water and transferred onto a blackish blue substrate of porcelain enamel-coated metal. The substrate with the bar code pattern so transferred was fired at 600°C for 10 minutes, and formed with the bar code pattern having a white portion with a black background. The bar code label was immersed in 69% HNO_3 at room temperature for 1 month or longer but no change was detected.

Composition of paste for bar code	
Pigment (TiO_2)	35 parts by weight
Borosilicate glass frit powder	35 parts by weight
Ethyl cellulose	15 parts by weight
Terpinol	15 parts by weight

55 Claims

1. A bar code label comprising a bar code marking which is made from a vitreous material and which is formed on a substrate made of ceramics, pottery or porcelain enamel-coated metal, said bar code being formed directly on the substrate by printing, screen-printing, transfer or the like and being then



fired.

2. A bar code label according to claim 1 wherein the vitreous material is amorphous.
- 5 3. A bar code label according to claim 1 wherein the vitreous material is in a sintered state.
4. A bar code label according to one of claims 1 to 3 wherein the substrate is so combined with the vitreous material as to make sharp the contrast between the substrate and the bar code.
- 10 5. A bar code label according to one of claims 1 to 4 wherein the substrate has a white or whitish color and the vitreous material has a black or blackish color.
6. A bar code label according to one of claims 1 to 4 wherein the substrate has a black or blackish color and the vitreous material has a white or whitish color.
- 15 7. A bar code label according to one of claims 1 to 6 wherein the bar code is formed by reaction between the substrate component and the coating material component.

Patentansprüche

- 20 1. Balkencode-Etikette, die eine Balkencodemarkierung aufweist, welche aus einem glasartigen Material hergestellt ist und auf einem Substrat ausgebildet ist, das aus einem mit Keramik-, Ton- oder Porzellan-Emailbeschichteten Metall besteht, wobei dieser Balkencode direkt auf dem Substrat durch Druck Siebdruck, Transferdruck oder dergleichen gebildet und danach gebrannt wird.
- 25 2. Balkencode-Etikette nach Anspruch 1, bei welcher das gläserne Material amorph ist.
3. Balkencode-Etikette nach Anspruch 1, bei welcher sich das gläserne Material im gesinterten Zustand befindet
- 30 4. Balkencode-Etikette nach einem der Ansprüche 1 bis 3, bei welcher das Substrat mit dem gläsernen Material so kombiniert ist, daß zwischen dem Substrat und dem Balkencode ein scharfer Kontrast besteht.
- 35 5. Balkencode-Etikette nach einem der Ansprüche 1 bis 4, bei welcher die Farbe des Substrates weiß oder weißähnlich und die Farbe des gläsernen Materials schwarz oder schwarzähnlich ist.
6. Balkencode-Etikette nach einem der Ansprüche 1 bis 4, bei welcher die Farbe des Substrates schwarz oder schwarzähnlich und die Farbe des gläsernen Materials weiß oder weißähnlich ist.
- 40 7. Balkencode-Etikette nach einem der Ansprüche 1 bis 6, bei welcher der Balkencode anhand einer Reaktion zwischen der Substratkomponente und der Beschichtungsmaterialkomponente hergestellt wird.

45 Revendications

1. Une étiquette à code à barres comprenant un marquage de code à barres qui est réalisé en une matière vitreuse et qui est formé sur un support en céramique, en faïence ou en métal revêtu de porcelaine émaillée, le code à barres étant formé directement sur le support par impression, sérigraphie, transfert ou analogue et étant ensuite cuit.
- 50 2. Etiquette à code à barres selon la revendication 1, dans laquelle la matière vitreuse est amorphe.
3. Etiquette à code à barres selon la revendication 1 dans laquelle la matière vitreuse est à l'état fritté.
- 65 4. Etiquette à code à barres selon l'une des revendications 1 à 3, dans laquelle le support est combiné avec la matière vitreuse de façon à accentuer le contraste entre le support et le code à barres.



5. Etiquette à code à barres selon l'une des revendications 1 à 4, dans laquelle le support a une couleur blanche ou blanchâtre et la matière vitreuse a une couleur noire ou noirâtre.
6. Etiquette à code à barres selon l'une des revendications 1 à 4, dans laquelle le support a une couleur noire ou noirâtre et la matière vitreuse a une couleur blanche ou blanchâtre.
7. Etiquette à code à barres selon l'une des revendications 1 à 6, dans laquelle le code à barres est formé par réaction entre le composant du support et le composant de la matière de revêtement.

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