

[54] LAMINATE OF COTTON PAPER CORE
WITH RESIN FLUORESCENT MATERIAL
SCRIBED TO EXPOSE CORE

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[57] ABSTRACT

A fluorescent material is added to the resin which is utilized to coat the core material in an engraving stock. After the surface of the stock is scribed into words or signals and the core material is exposed, the latter will fluoresce when exposed to an external source of light.

2 Claims, No Drawings

LAMINATE OF COTTON PAPER CORE WITH RESIN FLUORESCENT MATERIAL SCRIBED TO EXPOSE CORE

This invention relates to engraving stock and more specifically to engraving stock in which the core material is coated with a resin which contains a fluorescent dye material.

Engraving stock, which is a high pressure laminate, usually comprises a core material which is bonded to a cover material, the cover material either covering one side of the core or both sides. The cover material is usually available in a wide variety of grains or colors and the core material is usually of a contrasting color. By scribing the cover material by any means such as an electric saw, sand blasting or machine engraving by pantograph will result in an article of manufacture comprising multi-colored signs, etc. The thus formed engraving stock may be used as an effective means of communication or identification and may be employed as directional signs, room numbers, name plates, control panels, plaques, diagrams, directories, etc., said signs being placed on a wall surface or door in office buildings, hotels and motels, hospitals, schools, etc. However, the signs, room numbers, name plates, etc., usually require a relatively large amount of light in order that the signs may be legible or easily visible.

In some instances, however, it is impossible to provide an adequate source of light whereby the signs, numbers, etc. are readily visible; an example of this would be the cockpit of an airplane in which, especially during flights at night, it is impractical or hazardous to have the necessary amount of light present in the cockpit which would permit a reading of the instruments or signs. This would also apply to the bridge of a ship, such as oceangoing passenger liners, freighters, oilers, etc., or the cockpit of a pleasure boat such as a yacht or motorboat in which an absence of light in the bridge of the ship or cockpit of the boat is necessary, in order than an adequate watch may be had on the water ahead. Another illustration of an area in which an absence of light is desirable are places of entertainment in which the stage is illuminated by means of spot lights or foot lights and the remaining areas surrounding the stage outside of the immediate area is in either total darkness or very dim light. In instances where the absence of light is desirable or required, it is therefore necessary that directional signs, signals, numbers, etc., be illuminated by some other means.

It is therefore an object of this invention to provide an engraving stock which may be utilized for directional signs, numbers, etc. in areas subject to either a subnormal amount of light or an absence of visible light.

In one aspect an embodiment of this invention resides in an article of manufacture which comprises a laminate consisting of a resin coated core material and a surface material bonded to each other, said surface material being scribed to expose the core material, said resin which coats said core material containing a fluorescent material which is activated when exposed to an external source of light.

A specific embodiment of this invention is found in an article of manufacture which comprises a laminate consisting of an epoxy resin coated cotton paper and a surface material bonded to each other, said surface material being scribed to expose said cotton paper, the epoxy resin which coats said paper containing a non-

thermal degradable fluorescent dye which is activated when exposed to an external source of light less than about 4,000A.

Other objects and embodiments will be found in the following further detailed description of the present invention.

As hereinbefore set forth the present invention is concerned with an article of manufacture and more particularly to engraving stock which contains incorporated therein a fluorescent material. The desired engraving stock which contains the fluorescent material may be prepared by admixing a fluorescent dye which is non-thermally degradable in nature with a resin such as an epoxy resin, a phenolic-melamine resin, vinyl resins, etc., in an amount in the range of from about 1 percent to about 3 percent by wt. of the resin solids. The aforesaid mixing can be accomplished in any manner known in the art including physical mixing by stirring or other adequate means etc. Examples of fluorescent dyes which are not heat degradable under the conditions of curing hereinafter set forth in greater detail will include fluorescent coumarin dyes, fluorescent dihydrocollidine dyes, fluorescent acridine dyes, fluorescent monoazole dyes, fluorescent bisazole dyes, fluorescent dibenzophthalein dyes, fluorescent perylene dyes, fluorescent pyridotriazole dyes, fluorescent naphthalic acid imide dyes, fluorescent diaminostilbenedisulfonic dyes, fluoranthene, pyrene, fluorescent xanthane dyes, miscellaneous fluorescent dyes which are listed in the Color Index such as C. I. Basic Orange 10, having a Color Index No. 46305, C. I. Acid Red 1, having a Color Index No. 18050, C. I. Acid Red 87, having a Color Index No. 45380, C. I. Solvent Red 45, having a Color Index No. 45386, C. I. Basic Yellow 7, having a Color Index No. 46020, C. I. Basic Violet 10, having a Color Index No. 45170, C. I. Solvent Green 5, having a Color Index No. 59075, C. I. Acid Yellow 7, having a Color Index No. 56205, C. I. Disperse Yellow 13, having a Color Index 58900, C. I. Direct Yellow 59, having a Color Index No. 49000, C. I. Acid Violet 7, having a Color Index No. 18055, C. I. Acid Red 52, having a Color Index No. 45100, C. I. Acid Red 50, having a Color Index No. 45220, C. I. Solvent Red 36, having a Color Index No. 45160, etc. In addition, it is also contemplated within the scope of this invention that inorganic fluorescent materials such as the zinc sulfide phosphors, the zinc-cadmium sulfide phosphors, the calcium halide-phosphates, etc., or the oxygen dominated phosphors such as the silicates, borates, phosphates, tungstates, etc., which have been activated by the addition of a metal such as silver or copper in the case of the sulfides, or manganese, lead, or cesium in the case of oxides, may also be used, although not necessarily with equivalent results.

The resulting admixture of the resin and the fluorescent material is then utilized to coat the core material of the engraving stock. One method of effecting this coating or impregnating is to charge the core material, which as hereinbefore set forth may comprise a cotton paper or any other type of paper, to a tank containing the resin-fluorescent dye mixture. Following this passage through the tank, the coated core material which, in one embodiment, comprises a paper, is passed through squeeze rolls, the space between said rolls being of various thicknesses which will control the amount of resin which will remain on and coat the paper core material. After passage through the squeeze

rolls, the coated core material is thereafter passed through a curing oven whereby the resin is cured. In one embodiment, the curing oven will comprise two heating zones, the initial heating zone being maintained at a temperature of from about 220° to about 230°F. After passage through this heating zone, the resin coated core material is passed through a second heating zone at a slightly elevated temperature, the temperature of the second heating zone being maintained in a range of from 240° to 260°F. After passage through the curing oven, the core material which is coated with the cured resin, the latter containing the fluorescent dye, is recovered. Thereafter, the paper core material is cut into the desired size and a sufficient number of the core material sheets are stacked to give the desired thickness of the core. If so desired, in another embodiment, it is possible to utilize a core material which has not been coated with the fluorescent dye-containing resin for the desired number of sheets in the inner core, thus only utilizing the resin coated core material as the outermost ply in the finished core laminate. While it is possible to utilize various colors for the core material, the preferred color for the core material will be white.

After completion of the preparation of the core material in the predetermined number of ply to effect the desired thickness of said core, a surface material which may also be of a paper, plastic or any other suitable material is bonded to the core material. In the preferred embodiment of the invention, the surface material will be wood grained, leather grained or of a contrasting color such as yellow, red, blue, green, gray, black, brown, etc., to the color of the core material in order that, after being scribed, the core material will permit the various signs, numbers, names, etc., to be easily legible in ordinary light. The laminate comprising the two surface coatings and the core material is placed between stainless steel plates which have been treated with a release material such as a 1 percent stearic acid solution to facilitate removal of the stock after lamination and subjected to pressure for a predetermined period of time whereby an effective bond is formed between the surface material and the core material. As an example of this step of the process, the laminate may be subjected to a hydraulic pressure of from about 1,000 to about 2,000 pounds per square inch at a temperature in a range of from about 270°F. to about 280°F. for a period of about 0.5 to about 1 hour. As hereinbefore set forth, it is to be noted that a required characteristic of the fluorescent material which is admixed with the resin is that it must be that it is non-thermally degradable under the curing conditions and the pressure conditions which are required to effect the preparation of the desired laminate, that is, said dye material must be able to withstand a temperature of approximately 300°F. and still retain its ability to fluoresce.

The thus formed laminate is then scribed by various means hereinbefore set forth in greater detail whereby the desired sign, number, name, diagram, design, emblem, trademark, etc., is transcribed through the surface material and the core material of contrasting color is exposed. This scribing may be effected by electric saw, sand-blasting, pantograph engraving etc.

When utilizing the engraving stock in an area which is either lighted so dimly that it is difficult to read the thus prepared sign, number, nameplate, etc., or there is an absence of visible light due to the circumstances

which require the absence of said light, the engraving stock may be illuminated by an external source of light which will activate the fluorescent dye which is mixed in the resin coating of the core material. This activating light source will usually comprise an ultraviolet light having a wave length less than about 4,000A. and usually in a range of from about 2,500A. to about 4,000A. and may comprise a low pressure mercury vapor lamp where the predominant emission is a wave length of 2,537A., a high pressure mercury vapor lamp, a tungsten lamp, a carbon lamp, etc. The thus activated fluorescent dye will project a useful visible light of constant intensity and will therefore render the desired sign, number, design, diagram visible.

As an illustrative example of an article of manufacture of the present invention a core material comprising cotton paper is coated with a resin mix which has been prepared by physically admixing an epoxy resin, such as that resulting from the reaction between chlorohydrin and bisphenol-A, and 2 percent by wt. of a fluorescent dye such as those above enumerated. The coating is done by feeding the cotton paper through a tank of the resin mix and thereafter passing the coated paper through squeeze rolls whereby the excess mix is removed from the surface of the paper. Following this, the coated paper is passed through a curing oven which has a temperature at the inlet portion of the oven of 230°F and a temperature of 250°F adjacent to the outlet portion of the oven. After removal from the curing oven, the core material which is coated with the aforementioned resin mix is pressed between two layers of a surface material comprising a cotton paper and which is a contrasting color such as black to the color of the core material which is white. The three ply of the laminate are placed between stainless steel plates which have been treated with a 1 percent stearic acid solution and pressed for 40 minutes at a pressure of 50 pounds of steam and a temperature of 280°F., the hydraulic pressure which is maintained during the 40 minutes being 1,400 pounds per square inch. At the end of the 40 minute press period, the laminate is recovered. The resulting laminate is scribed by means of sand-blasting, whereby the surface material is removed to expose the resin coated core material, the particular design being scribed on the core material being a directional arrow. The engraving stock is then cut to the desired size and placed on a wall by any means necessary such as wood, sheet machine or machine screws, double-sided pressure sensitive tape or by the use of an epoxy adhesive that will adhere to plaster, paint, wood, glass, metal laminate or whatever the surface of the wall may comprise. An external light source comprising an ultraviolet light having a wave length of 2,537A. is activated whereby the exposed fluorescent dye-containing resin on the surface of the core material will be excited and fluoresce, thereby affording a directional signal in a relatively low amount of light.

It is to be understood that the above example is given merely for purposes of illustrating the present invention, and that the articles of manufacture are not necessarily limited thereto.

I claim as my invention:

1. An article of manufacture comprising a laminate consisting of a resin coated cotton paper core material and a surface material bonded to said core material, said resin selected from the group consisting of epoxy resin and phenolic-melamine resin, said resin contain-

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ing a fluorescent material consisting of a non-thermally degradable dye, said surface material being scribed to expose said core material, said fluorescent material being activated when exposed to an external source of light having a wave length of less than about 4,000A. 5

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2. The article of manufacture as set forth in claim 1 in which said dye is present in said resin in a range of from about 1 to about 3 percent by wt. of resin solids.

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