Patented Apr. 14, 1942 2,279,459

UNITED STATES PATENT OFFICE

2,279,459

SIGN AND DISPLAY DEVICE

Ellery G. Harris, Cleveland, Ohio, assignor to The Sherwin-Williams Company, Cleveland, Ohio, a corporation of Ohio

No Drawing. Application February 27, 1941, Serial No. 380,896

2 Claims. (Cl. 41—22)

This invention relates to signs and display devices embodying a pictorial or other design made by the stencil screen process.

In the manufacture of signs as heretofore carried out by the stencil screen process, coating material of relatively high solids content has been used with the result that half-tone dots of substantial thickness are produced and when successive layers of the different colors are applied a coating is produced which is relatively thick at some points and relatively thin at others. Such coatings, as heretofore made, have had a rough and uneven surface which is undesirable because it renders the coating less durable and because the relatively thicker portions cast shadows which in visual association with the different colored dots materially modify the desired color values of different portions of the surface with the result that these portions of the surface lack gloss and have a grayish appearance.

It is an object of this invention to overcome these disadvantages and provide a sign or device of this type adapted for prolonged exposure to sunlight and in which the dots of color material are substantially incapable of casting shadows and a relatively uniform, smooth and even surface is formed that will permit the application of a protective coating of transparent varnish or lacquer or other suitable material that will provide a substantially smooth and glossy surface throughout.

Another object of my improvement is to enable the use of stencil screens made by the photographic half-tone color separation process, the Ben-Day process and other similar processes for reproducing pictorial designs in the manufacture of signs and display devices having the advantages above mentioned.

I have discovered that the disadvantages of the prior procedures in the manufacture of these signs and devices result from the relatively high build of the dots of the various colors and that the improved characteristics can be obtained by the use of materials which, while possessing the desired color values, are of low solids content and such nature that on application to the surface the dots, through evaporation of the solvents, are reduced to a thickness of such low order and of such shape that they are incapable of casting shadows.

Other objects and advantages of my invention will be apparent from the following description.

In practicing my invention I use a lacquer-type material, that is, a material of nitrocellulose base into which the desired pigments may be ground to produce the finished process material. This lacquer-type material is well suited for use in the stencil screen process, which, as understood by those skilled in the art, involves the use of one or more stencil screens for producing a design or reproduction on the surface of the sign by means of half-tone dots whose location, size, number and relative association are determined by the design or illustration which has been photographically or otherwise produced on the stencil screen. The coating material is forced through the openings of the stencil screen by means of a squeegee or equivalent instrument which is scraped over the surface of the screen.

A nitrocellulose base that may be used is prepared by dissolving commercial regular soluble 60 to 80 second nitrocellulose in butyl cellosolve (butyl ether of ethylene glycol) with the aid of any efficient mechanical means of agitation until a smooth homogeneous solution is obtained. An alkyd resin of the maleic acid-modified type in pulverized form is then added along with a plasticizing type non-drying oil-modified alkyd. Agitation is then continued until the mixture again becomes homogeneous.

As an example of the proportions of the above-specified materials, 122 pounds of 60 to 80 second R/S nitrocellulose; 608 pounds of the butyl cellosolve; 43 pounds of the alkyd resin; and 38 pounds of the plasticizer may be used. As commercially supplied the nitrocellulose comprises 70% dry nitrocellulose and 30% ethyl alcohol, that is to say, 85.4 pounds of 60 second dry nitrocellulose and 36.6 pounds of ethyl alcohol. The nitrocellulose base as thus prepared will have a viscosity of 750 to 900 poises at 25° C. and will have a solids content on the order of ten to twenty percent by weight of the base. The composition can be pigmented to the extent necessary to obtain the colors desired in the finished material.

The viscosity of the nitrocellulose may be determined by the Hercules falling ball method which is commonly used in the industry for specification purposes. The above-mentioned 60 to 80 second viscosity corresponds to an absolute viscosity of 226 to 301 poises when a 12.2% solution of the dry nitrocellulose is dissolved in the following composition:

	Per cent by weight
Nitrocellulose (dry)	12.2
#1 Denatured ethyl alcohol	22.0
Ethyl acetate	17.5
Toluol	48.3

The viscosity measurements are taken at 25° C.

While the composition comprising the above-mentioned ingredients provides a workable base material which will give very satisfactory results, it should be understood, however, that this is by way of example and that the ingredients can be varied as well as the amounts and characteristics of the particular ingredients specified. Instead of the 60 to 80 second R/S nitrocellulose above-mentioned, grades of nitrocellulose having a viscosity up to 1000 seconds or higher, or as low as 6 seconds may be used and good results obtained. Nitrocellulose of higher or lower nitration may also be used, such as the AS and SS grades of commercial nitrocellulose or any of the other cellulose derivatives such as ethyl cellulose, cellulose acetobutyrate or cellulose acetopropionate.

The solvent which is mentioned above as butyl cellosolve may be any combination of organic liquids which singly, or together in proper proportions, will dissolve both the nitrocellulose and the resins used. The solvents should be such that they will have an evaporation rate sufficiently slow to permit the composition to be easily worked through a silk screen without too fast drying of the material and clogging of the screen. Among the solvents which are considered to be satisfactory for my composition are the following:

Normal butyl acetate
Ethyl butyrate
Amyl acetates
Butyl butyrate
Normal butyl propionate
Isobutyl propionate
Butyl cellosolve acetate
Carbitol acetate
Cellosolve
Butyl cellosolve
Carbitol (diethylene glycol-mono ethyl ether)
Secondary butyl propionate
Hexyl acetates
Ethyl lactate
Octyl acetate
Isopropyl lactate
Butyl lactate
Glycol diacetate
Methyl cellosolve acetate
Isopropyl cellosolve
Methyl carbitol

As diluents for the above solvents, the following may be used:

Normal butyl alcohol
Amyl alcohols
Hexyl alcohols
Octyl alcohols
Xylol
Hi flash naphtha
Varnish makers and paint naphtha
Mineral spirits

The distinctive features of the above-listed solvents are that they have a boiling range falling between 110° C. and 230° C. and may be used in combination or singly to produce a slow drying solvent for the nitrocellulose and resins.

The alkyd resins mentioned above are used in the base for the purpose of adding gloss, durability and adhesion to the material. Instead of the resins specified, I may use various other resins or combinations of resins and/or plasticizers capable of producing a similar result. Other resins which may be used for this purpose are non-drying oil-modified alkyds, drying oil-modified alkyds, resin-modified alkyds, resin-and-oil modified alkyds, natural resins and pure and modified phenolics, and also modified resins. The qualifications required for these resins are that they be compatible with the nitrocellulose and any other cellulose derivatives such as ethyl cellulose, cellulose acetobutyrate and cellulose acetopropionate and give a clear adherent flexible film when properly compounded with the nitrocellulose.

Another satisfactory base material may be made according to the following formula:

	Per cent
1000 second viscosity, R. S. Nitrocellulose	6.4
Cook's HR–25 (modified non-drying alkyd resin)	10.3
Rezyl X–315 (American Cyanamid Co. non-drying alkyd resin)	2.9
Denatured ethyl alcohol	2.8
Toluol	4.5
Butyl lactate	35.7
Carbitol (mono-ethyl ether of diethylene glycol)	37.4
	100.0

The materials having a nitrocellulose base prepared as above described and having the desired pigments incorporated therein, may be screened onto the surface of the sign to provide the pictorial representation or other design intended to be portrayed thereon. The surface of the sign is preferably first coated with a paint background of any appropriate character such as a synthetic (although a lacquer can be used as the first coat if desired), and my lacquer-type material is screened onto the painted surface of the sign. This lacquer-type material may be applied as a single coat or by coats applied over each other in any number necessary to produce the desired design or color shading.

The panel to which the materials are applied, as above described, may be of metal, wood, plywood, glass, paper stock or other composition material and the selection of such material will depend upon whether the sign or display device is intended for indoor or outdoor use.

By following the above-described procedure it will be found that after the various color materials have been applied and allowed to dry, the surface will be of such uniformly smooth and even texture that upon the application of a varnish coat the exposed surface of the latter will be smooth and have a high gloss throughout.

To improve the durability of a sign or display device prepared with my lacquer-type material particularly for outdoor use, it is preferably given a protective clear coating of varnish or synthetic material.

Having thus described my invention, I claim:

1. A reproduction of a pictorial design or the like consisting of a panel which is coated with a suitable background color, a plurality of colors applied through a stencil screen on said background in the form of minute dots capable of maintaining their size and contour to correspond substantially exactly with a design fixed in said screen and which contain color pigments in sufficient quantity to be substantially non-fading when subjected to prolonged exposure to sunlight and which dots are so arranged and distributed as to form the desired design and color effects by association of the different colors in

varying quantitative relations, the thickness of said dots being of such order that they are substantially incapable of casting shadows.

2. A reproduction of a pictorial design or the like consisting of a panel which is coated with a suitable background color, a plurality of colors applied through a stencil screen on said background in the form of minute dots capable of maintaining their size and contour to correspond substantially exactly with a design fixed in said screen and which contain color pigments in sufficient quantity to be substantially non-fading when subjected to prolonged exposure to sunlight and which dots are so arranged and distributed as to form the desired design and color effects by association of the different colors in varying quantitative relations, the thickness of said dots being of such order that they are substantially incapable of casting shadows, and a transparent coating over the design forming an exterior surface which is relatively uniform in smoothness and gloss throughout.

ELLERY G. HARRIS.