April 18, 1961 A. E. CHARLTON 2,980,533

TRANSLUCENT OBJECTS DECORATED WITH DESIGNS OR IMAGES

Filed March 6, 1953

Fig. 1

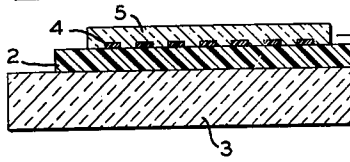


Fig. 2

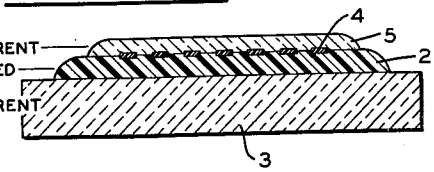


Fig. 3

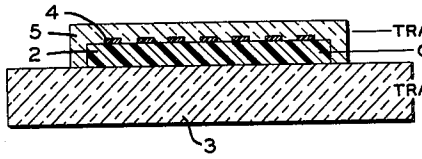


Fig. 4

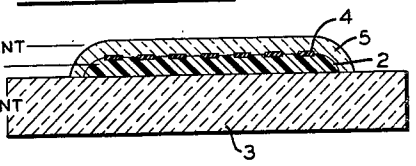


Fig. 5

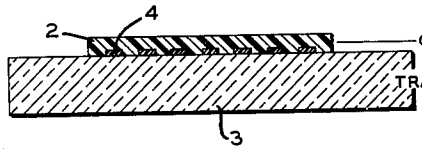


Fig. 6

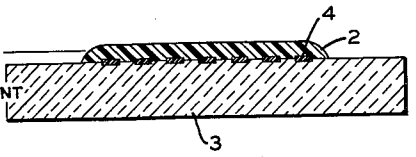


Fig. 7

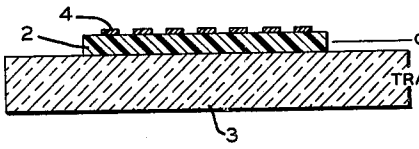


Fig. 8

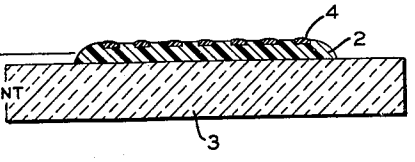


Fig. 9

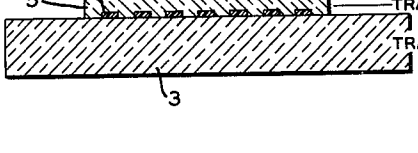
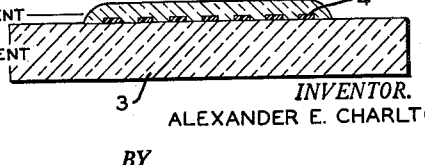


Fig. 10



INVENTOR.
ALEXANDER E. CHARLTON

BY
DESJARDINS, ROBINSON & KEISER
by
Albert F. Robinson
HIS ATTORNEYS

United States Patent Office

2,980,533

Patented Apr. 18, 1961

2,980,533

TRANSLUCENT OBJECTS DECORATED WITH DESIGNS OR IMAGES

Alexander E. Charlton, Cincinnati, Ohio, assignor to Photoceramics, Inc., Cincinnati, Ohio, a corporation of Ohio

Filed Mar. 6, 1953, Ser. No. 340,825

1 Claim. (Cl. 96—34)

This invention relates to translucent objects decorated with designs or images, and it particularly pertains to photographically decorated transparent or translucent glass or ceramic objects with the decorative design or image optionally underlaid or overlaid with a colored background contrasting in color with the decorative design or image and having said design or image reproduced in fine line detail and in subtle tonal graduations. The invention further pertains to a decorative design or image having a maximum amount of coloring pigment present therein, more especially if either is covered with an overlay of glaze or other protective material, and applied to a transparent object with a colored background.

Heretofore, photographically applied designs or images on transparent or translucent products have been reproduced, but with the objectionable result that light will shine through the images or designs and they are not sufficiently opaque to be of the same brightness and intensity as when viewed against an opaque background. Furthermore, the pigments in the light sensitive material in which the designs or images are formed contain a large amount of flux combined therewith which, of course, correspondingly dilutes the effectiveness of the pigment. Some of the glass vitrifiable coloring material often times contains as much as ninety (90%) percent flux and as little as ten (10%) percent pigment. When, therefore, such coloring material is used in photographic decoration, the amount of the actual coloring material or pigment contained therein is very small in proportion to the amount of flux. Then, too, photographic decorating methods are limited to the thickness of the coloring medium and flux which can be deposited. Furthermore, some light sensitive materials, particularly those containing metallic salts as a sensitizing agent, have an adverse effect upon some coloring oxides and thus greatly impair the effectiveness of the coloring material because of the small proportion of coloring pigment present in respect to the flux. This objection is avoided here by reducing the proportion of the flux, or eliminating it altogether, in the light sensitive material so that substantially all of the coloring matter will be composed of the coloring pigment with little, if any flux.

Accordingly, one of the objects of the present invention is in interposing an opaque background layer between a transparent or translucent object to be decorated and the decorative design applied thereon and having little, if any flux in the coloring material used in the design.

Another object of the invention is to utilize a maximum amount of coloring pigment in the light sensitive material in which the design or image is formed.

Another object of the invention is to overlay the design or image with a protective flux material rather than incorporating the flux with the pigment.

Another object of the invention is in forming the design or image in fine line detail and subtle tonal gradu-

ations by having the designs more intense and brighter in contrast with the background.

Further objects, and objects relating the details of construction and economies of operation, will readily appear from the detailed description to follow. In one instance, I have accomplished the objects of my invention by the device and means set forth in the following specification. My invention is clearly defined and pointed out in the appended claim. Structures constituting preferred embodiments of my invention are illustrated in the drawings, forming a part of this specification, in which:

Fig. 1 is a cross-sectional view of one embodiment of the invention before firing.

Fig. 2 is a cross-section of the embodiment after firing.

Fig. 3 is a cross-sectional view of a second embodiment of the invention before firing.

Fig. 4 is a cross-sectional view of the second embodiment after firing.

Fig. 5 is a cross-section of a third embodiment of the invention before firing.

Fig. 6 is a cross-sectional view of the third embodiment after firing.

Fig. 7 is a cross-sectional view of a fourth embodiment of the invention before firing.

Fig. 8 is a cross-sectional view of the fourth embodiment after firing.

Fig. 9 is a cross-sectional view of a fifth embodiment before firing.

Fig. 10 is a cross-sectional view of the fifth embodiment after firing.

In photographic designs on objects to be decorated, it will be appreciated that to reproduce the designs in the fine line detail necessary, the light sensitive coloring material in which they are reproduced must be in very thin layers or films, preferably of a thickness of .001 to .003 inch. However, on transparent or translucent objects this permits the light to shine through the designs and dim their brightness and intensity. Then, too, the pigment or coloring component of the coloring material contains a large amount of flux, more often a preponderant proportion, so that the color effectiveness of some colors thereof is materially reduced by reaction between the pigment and some light sensitive materials, more particularly that caused by metallic salts, usually contained in some light sensitive materials, upon the oxides in some coloring materials.

The aim of the present invention is to provide a colored background on one side of the design and a transparent or translucent foreground on the other side through which the design is visible. Then, too, the coloring matter in the light sensitive material is substantially free from flux so that a maximum amount of colored material will be in the design, thereby rendering said design brighter and more intense than if diluted with flux. If any protection is required for the designs, they are overlaid with a flux or glaze after being applied rather than being incorporated within the coloring material.

Referring specifically to the drawings in which like numerals are used to designate like parts, numeral 3 is an object to be decorated, such as glass, china, earthenware, porcelain-enamel or metal, more particularly transparent or translucent glass with a colored background for the design interposed between the object to be decorated and the design.

A colored layer 2 (Figs. 1 to 4) is applied to a selected surface on the object 3 to be decorated. This coloring layer comprises a pigment, in the form of oxides, with or without any substantial amount of flux mixed therewith. The flux is a soft glass ground to a very fine mesh

or powder, and which, upon being fired to melting temperature, will fuse itself to the colored oxide particle for imprisoning them in a glass surface. Such flux pigments are sold commercially under the name of overglaze pigments, overglaze colors, porcelain enamel pigments, porcelain-enamel colors, glass pigments, glass colors and glass paints. They will be referred to here for convenience as flux coloring material, meaning a mixture of pigment material and flux without limitation as to the particular pigment material or to the flux, or to their proportions. The proportion of the flux to the pigment or coloring matter, and the type of flux, vary considerably, depending upon the article to be decorated and the firing temperature to which it is to be subjected. The flux should be of a nature to assist in the development of the color used and be of a character suitable to the purposes for which the decorated object is used. It should resist abrasion and chemical reaction with materials with which the decorated object may be contacted, such as cleaning and sterilizing materials. Then, too, the flux should have the same thermal expansion characteristics as the material or object on which it is fired.

A photographic design 4 is reproduced in light sensitive material in any conventional manner, or preferably by the method of my application Serial No. 162,754 which is incorporated herein by reference and relied upon in full as a part of the disclosure for photographically decorating the objects. All of the portions of the light sensitive coating, except that in which the design is formed, are removed, leaving only the design 4 as shown in the drawing. While design 4 is referred to as a photographic design, it will be understood that it may be applied in any other manner, such as rubber stamping, transfers and the like.

The design applied by the method of my application is particularly suitable, since it is formed in two separately applied light sensitive layers, the first applied layer being free of the pigment and the second applied layer containing pigment. Consequently, the design is brighter and more intense, as well as being sharper and in finer detail than conventionally applied designs as there will be no objectionable shaded background.

The decorated design or image is overlaid with a transparent fusible flux layer 5, free of pigment, this serving as a protective layer both for the design and the colored background. The colored background layer 2 may be somewhat greater in area than the area of the design or image (Figs. 1 and 2), particularly if said colored background contains sufficient flux to cover and protect the coloring pigments therein, but if the colored background material is substantially free from flux as is the coloring material in the design, the superimposed layer 5 is of greater area than the colored background 2, as shown in Figs. 3 and 4 to completely cover the design and the background layer. Except for this difference as to the areas of the protective overlay layer and the background in respect to each other, the embodiments in Figs. 1 to 4 are the same.

In the embodiment of Figs. 5 and 6, the design 4 is applied directly to the transparent or translucent base 3, with the colored layer 2 overlying the design or image 4. In this embodiment, the design, or the material forming same, may be free from flux since it is protected between the base 3 and the overlying colored layer. However, sufficient flux is contained in the overlay layer to protect the design and also the pigment in said overlying colored layer, and if there be any flux in the design it will fuse with that in the overlay layer. Or the design and colored layer can both be free of flux with a transparent protective layer of flux as an overlay, as in Figs. 1 to 4.

The embodiment in Figs. 7 and 8 is the same as the embodiment in Figs. 1 to 4, except that the superimposed overlying transparent glaze 5 has been omitted, sufficient flux being contained within the colored background layer 2 and the design 4 to imprison the pigments thereof and protect them.

The embodiment of Figs. 9 and 10 discloses the design 4 applied directly to the surface of transparent or translucent object 3 and said design is overlaid with the transparent layer 5, there being no colored background, such as shown in Figs. 1 to 8. This embodiment particularly pertains to designs utilizing pigments of intense coloring properties and which retain such properties after being fired, it being understood that some pigments which are inherently intense are unstable in the firing operation so as to lose some of their inherent color intensity.

Figs. 1, 3, 5, 7 and 9 show the various embodiments as they are manufactured and prepared prior to firing, whereas Figs. 2, 4, 6, 8 and 10 show the respective embodiments after they have been fired. The superimposed layers will flow to some extent, and the design will, when superimposed on the background layer (Figs. 1 to 8), slightly settle itself to be partially embedded within the colored background.

It will be understood that any carrier or binding medium for the coloring material, in addition to or in lieu of flux will be of such a nature as to burn out and leave no residue when the prepared decorated object is fired at a temperature to melt the protective flux layer or the fluxed design and/or colored background.

In the embodiments of Figs. 1 to 4, the design is laid down on the colored background, and will be visible through the transparent overlaid glaze 5, the colored background being interposed between the transparent or translucent object 3 and the superimposed design 4 and overlay 5. So, too, will the embodiment in Figs. 7 and 8 be visible from the top above the colored background on which it is formed.

In the embodiment of Figs. 5 and 6, the design is visible from the bottom through the transparent or translucent object which is decorated, it being overlaid with the colored background, whereas in the embodiment of Figs. 9 and 10 the design is visible from either side.

However, in all of the embodiments, the design is made from colored material having a maximum amount of pigment therein so that it will be of maximum brightness and intensity, there being only a small amount of flux, if any, used with the pigment. If any carrier or binder is used for applying the pigment, it is such that it will burn out and disappear without any objectionable residue being left, leaving a maximum amount of pigment deposited both in the colored background and the design.

The terms transparent and translucent are used interchangeably referring broadly to objects which are transparent or translucent.

While the foregoing has been described particularly in reference to fireable fusible layers in which the designs are found, it will be understood that the invention is also applicable to layers which need not be fired for fusion purposes but simply heated sufficiently to set or harden them. Accordingly, the background layer for the design or the protective layer over the design, or both, could be formed of such materials as transparent or opaque plastics of which organic silicon oxide polymers are representative.

I am aware that there may be various changes in details of construction and composition without departing from the spirit of my invention, and, therefore, I claim my invention broadly as indicated by the appended claim.

Having thus described my invention, what I claim as new and useful, and desire to secure by U.S. Letters Patent, is:

A fireable photographically decorated object comprising a translucent base, a colored background layer applied thereto, a photographic design formed in a fireable pigmented light sensitized layer superimposed on a non-pigmented burnable light sensitized layer applied to the

colored background layer, and a fusible protective layer over the photographic design.

References Cited in the file of this patent

UNITED STATES PATENTS

223,762 Salvy ---------- Jan. 20, 1880
1,647,362 Hughes ---------- Nov. 1, 1927
1,898,500 Schulz ---------- Feb. 21, 1933
2,216,017 Matthes ---------- Sept. 24, 1940
2,226,913 Schlegel ---------- Dec. 31, 1940
2,311,876 Sheetz ---------- Feb. 23, 1943
2,472,182 Staehle ---------- June 7, 1949
2,732,297 Minsk et al. ---------- Jan. 24, 1956