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BEADED SURFACES

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This invention relates to a decorative material having a beaded finish and more particularly to either a flexible or rigid base having a surface of resinous beads suitable for applications where a high degree of light reflection is desirable. Heretofore, it has been proposed to apply beads, cylinders and the like to fabrics for moving picture screens in order to reflect light substantially perpendicularly to the surface of the screen.

The beads and cylinders applied to the fabric base were prepared from glass or other translucent material such as calcium tungstate or similar inorganic salt. It has also been proposed to distribute glass beads of different colors to intensify the color effects of colored images projected on the screen.

Glass beads have been successful with respect to providing satisfactory light reflecting surfaces, but they are objectionable to a certain extent due to the fact that they cannot be firmly anchored to the base and in time will become detached, especially if the material is subjected to flexing or creasing. This difficulty is even more pronounced in the preparation of small screens for home projection which are usually attached to a spring roller or must otherwise be rolled or folded when not in use.

An object of the present invention is the provision of a surface decorated with resinous beads which are firmly attached to the base and which are not easily detached therefrom.

A further object is the provision of a rigid base having a surface layer of resinous beads or granules and suitable for applications such as light reflectors on automobiles.

A still further object is the provision of a suitable flexible base having a surface of resinous beads or granules adapted for use as moving picture screens. Still further objects include the preparation of beaded flexible materials suitable for the manufacture of various decorative ornaments, novelties, etc. Other objects will be apparent as the description of the invention proceeds. These and other objects are accomplished by firmly uniting resinous granules or beads to suitable bases by means of suitable solvents.

In order to understand the invention, the following illustrations are given by way of example, but it is to be understood that the invention is not limited to these specific embodiments.

Example 1

A sheet of textile material consisting of a suitable cotton fabric such as commonly known as drill is treated with a fireproof agent such as tungsten salts, boric acid, or ammonium phosphate and the like. This step in itself does not form part of the invention since such expedients are well known in the art. The fabric so treated, or if desired, the fabric without treatment, is

coated with a cellulose derivative composition having approximately the following formula:

	Percent by weight
Cellulose nitrate	13.6
Pigment	14.2
Plasticizer	27.2
Ethyl acetate	17.9
Ethyl alcohol	27.1

This composition in itself is also conventional and methods for its preparation will be readily apparent to those skilled in the art of coating fabrics. This composition may be applied to one or both sides of the fabric. The coating is applied by means of a doctor knife coating machine or by dipping, spraying, or any other method desired. It has been found that from 11 to 18 oz. of solids per sq. yard give a film suitable for beading. Successive coats of the composition may be applied if desired. It is usually desirable to dry each coat before applying a subsequent coat.

The coated base material may be stored until needed for the next step in the preparation of the finished material. The coated base is activated by the application of a solvent or solvent mixture which possesses a mutual solvent action on the resin particles and the cellulose derivative coated base. The resin beads, cylinders, or granules of other shapes, are then applied to the activated coating. It has been found that beads prepared from polymeric methyl methacrylate or other transparent resins such as may be prepared by the method disclosed in the U. S. patent application of Crawford et al., Serial No. 749,500, filed Oct. 22, 1934, British Patent 427,494, may be used. A suitable mutual solvent for activating the coating given above and methyl methacrylate beads may be prepared by mixing 9 parts of toluol and 1 part of ethyl alcohol. The chemical bond prepared in this manner is far superior to the mechanical bond formed by the cementing of glass beads to dissimilar base material.

It has been found that spherical resin beads having a diameter between .344 millimeter and .516 millimeter are satisfactory for use in the present invention. This particle size represents beads which pass through a 32 mesh screen but remain on a 40 mesh screen. Beads which pass through a 32 mesh screen and remain on a 100 mesh screen have also been tried and found suitable. Such beads usually range between .138 millimeter and .516 millimeter in diameter. Particles having a smaller size than .138 millimeter are very difficult to apply in a manner so as to obtain a surface of beads one layer deep. It is to be understood, however, that while the above range is preferred when using methyl methacrylate beads, the invention is not limited to this particle size with other resins except as limited by the appended claims.

Example 2

In one of the preferred embodiments of the present invention, the spherical resin beads are screened to obtain those of uniform size. A fabric base is coated with a cellulose derivative composition, such as noted in Example 1. The coated surface is activated with butyl acetate. A liberal quantity of methyl methacrylate beads are applied on the activated surface. Only those beads which come in contact with the activated coating will adhere. After drying, those beads not coming in contact with the adhesive coating are removed by blowing or turning the beaded surface face down, which leaves a uniformly beaded surface one layer deep. It is also preferred in this embodiment of the invention to improve the anchorage of the resin particles to the coated base by means of a final operation in which the beaded surface is given an application of a solvent or mixture of solvents having a softening or colloiding action on the surface of the coated fabric and also of the resin beads. The mutual solvent disclosed above in Example 1 is suitable for this purpose. Although it is desirable to employ a mutual solvent in this connection, solvents having only a solvent action on the beads or cellulose derivative coated base may also be used.

While the preferred base material is cotton drill, weaves of other types of fabrics such as sheetings, sateens, broken twills, ducks and canvas as well as various similar constructions of woven base materials are satisfactory. The base may also be a non-woven fabric such as paper, felt, or precast film and the like.

The coating composition to which the beads are anchored may vary from the example given above by substituting other cellulose derivatives for the cellulose nitrate such as cellulose acetate, ethers, and the like. The composition may also be modified by adding resins with or without the elimination of the cellulose derivative. The following example illustrates such a composition in which the cellulose derivative is eliminated:

Example 3

	Percent by weight
Methyl methacrylate polymer.....	20.0
Tricresyl phosphate.....	9.0
Pigment.....	9.0
Acetone.....	62.0

The solvents used to activate this coating may be those given above or may consist of mixtures of esters and alcohols of the aliphatic series as well as single solvents such as ethyl acetate, butyl acetate, acetone, and the like.

Example 4

An application of the invention on rigid surfaces has been accomplished by activating the film forming coating which is applied on the letters and figures stamped on a metal plate used for an automobile license plate. As noted in Example 2 a liberal quantity of the spherical methyl methacrylated beads are applied to the activated coating on the letters and figures. The beads not coming in contact with adhesive are removed as noted above, and a limited surface beaded one layer deep results. The anchorage of the beads to the rigid base is further improved, as described in Example 2, by means of a final application of a mutual solvent for the methyl methacrylate beads and the surface to which they are bonded.

The beaded letters and numerals act as brilliant

reflectors when illuminated by automobile head lights at night. Nocturnal comparison of a license plate beaded as above described with an unbeaded license plate, both of which are illuminated by automobile headlights from a distance of approximately fifty feet results in complete visibility of the beaded portion whereas the remainder of the beaded plate and the entire unbeaded plate were undistinguishable.

It is also within the scope of this invention to deposit opaque or translucent resinous particles on the coated base material. In this case light is reflected from the exterior surface of the resinous beads. Pigmented methyl methacrylate beads containing 1.5% of titanium dioxide have been found satisfactory in this connection. This modification gives a very satisfactory diffused light in contrast to the highly specular surface of the transparent beads.

Moving picture screens prepared in accordance with the present invention are particularly desirable for theatres where the auditorium is relatively long and narrow. When the light is projected on the beaded surface, a major portion of it is reflected to a relatively narrow area thereby brightening the picture materially when viewed from a position directly in front of the screen.

Beaded surfaces are also useful in the preparation of anaglyphic calendars, novelties, fabrics for decorative clothing, shoes, belts, and the like.

The beaded material may also be used for lamp shades in which case a translucent or semi-translucent base such as parchment paper is used. In addition to these uses, it has been found that material may be prepared according to the present invention which is particularly suited for theatrical costumes where a light reflecting material is desired. The material may also be used as draperies in theatres or store windows, or in the home. Another use resides in the preparation of signals such as those used on road signs which reflect light from automobile headlights at night.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. A decorated fabric comprising an opaque base and discrete transparent particles of polymeric methyl methacrylate uniformly spaced and firmly attached thereto.

2. A moving picture screen comprising a textile base having a coating of a cellulose derivative adhesive and firmly embedded therein transparent resinous particles.

3. Product of claim 2 in which the particles are methyl methacrylate beads.

4. Product of claim 10 in which the particles cover a portion only of the rigid base, said covered portion forming a design.

5. Product of claim 10 in which the particles cover a portion only of the rigid base, said covered portion being in the form of a numeral or letter.

6. Method of preparing a reflective surface which comprises applying a cellulose derivative adhesive to a fabric base, allowing the adhesive to dry, activating the same by applying a solvent thereto, and before the solvent evaporates applying resin beads.

7. Process of claim 6 in which the beads are methyl methacrylate.

8. Process of preparing a decorative sheet material which comprises applying to a fabric base a composition containing a methyl methacrylate

polymer, allowing the composition to dry, activating the dry film with at least one solvent for the methyl methacrylate, applying methyl methacrylate beads to the surface while still tacky, again applying a solvent thereto, and allowing the material to dry.

9. Process of preparing a moving picture screen which comprises coating a cotton, textile fabric with a composition having approximately the following formula:

	Percent
Cellulose nitrate.....	13.6
Pigment.....	14.2
Plasticizer.....	27.2
15 Ethyl acetate.....	17.9
Ethyl alcohol.....	27.1

repeating the application of the composition until

between 11 and 18 ozs. of solids per sq. yd. have been applied, activating the dry film by applying a solvent consisting of 9 parts of toluol and 1 part of ethyl alcohol while the composition is still adhesive applying a single layer of spherical, methyl methacrylate beads thereto having a particle size between .138 millimeter to .516 millimeter, applying a mutual solvent thereto, and allowing the material to dry.

10. As a new article of manufacture, a rigid opaque base having a cellulose derivative adhesive composition coat and uniformly distributed transparent discrete particles of a synthetic resin, said resin particles being at least partially dissolved by the said cellulose derivative composition at the point of contact.

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