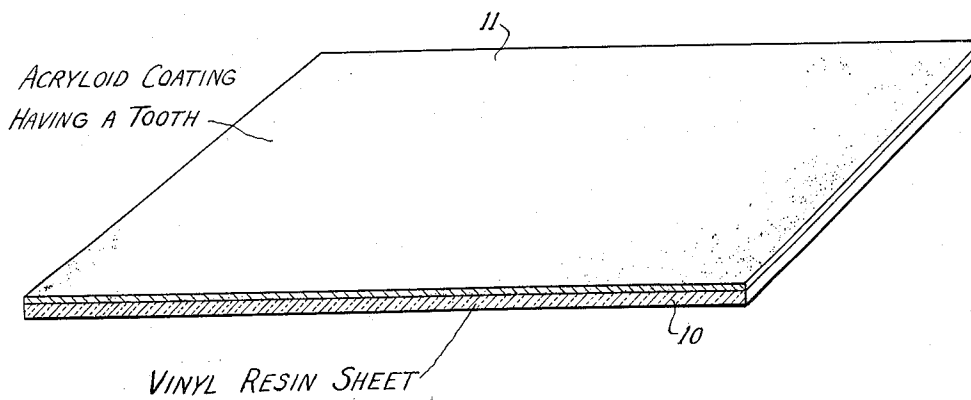


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DRAWING MATERIAL
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DRAWING MATERIAL

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This invention relates to drawing materials and more particularly to translucent sheet material suitable for drafting purposes.

For many engineering purposes, it is necessary to make large drawings where high degrees of accuracy are essential. For example, the drawings used in the manufacture of aircraft may be of very large size and must be extremely accurate. This is particularly true of drawings utilized in the manufacture of templates which are reproduced photographically on metal and the photographically reproduced lines used in cutting the templates out of metal. Ordinary drawing materials, such as vellum paper, tracing cloth and ordinary blue print paper are completely unsuited for such purposes because they change in size with changes in atmospheric conditions, being particularly sensitive to changes in humidity. For this reason it has heretofore been necessary to make the drawings for such purposes on large glass or metal plates. Both types of plates are difficult to work on and difficult to handle, and glass plates, which are required where photographic reproductions are needed, are fragile and very heavy, requiring special equipment for their handling.

It is therefore one of the objects of the present invention to provide a flexible sheet material suitable for drafting purposes which is light in weight, relatively inexpensive and which has a high degree of stability under varying atmospheric conditions. Another object of the invention is to provide such a drafting material which has a surface adapted to take pencil or ink markings and on which fine lines can be drawn with a high degree of accuracy. Another object is to provide such a drawing material which has a surface such that with reasonable care, lines can be erased and redrawn easily and without substantial loss in sharpness or accuracy. A further object is the provision of such a drawing material which has a surface to which blue print solution can be applied and to which the solution will adhere in the subsequent development.

Further objects and advantages of the invention will become apparent from the following description of preferred forms thereof, reference being made to the accompanying drawing in which the figure is a diagrammatic representation of a sheet of drawing material made according to the present invention with the thickness of the layers making up the material greatly exaggerated and not necessarily in proper proportion.

According to a preferred form of the present

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invention, the drawing material is made up of a sheet of clear or translucent plastic composed of a material having a high degree of dimensional stability under varying atmospheric conditions of temperature and humidity and coated with a thin film of a different resinous or plastic material, the film adhering firmly to the base material and having incorporated in it an abrasive flattening agent which gives the coating a matte surface and a "tooth" to enable it to take pencil and ink markings and also properly to receive and retain blue print solution. Preferably the base material is a sheet of thermoplastic resinous material of vinyl type. Such materials, which are polymers of vinyl chloride or copolymers of various vinyl compounds are readily available on the market, suitable materials being sold in sheet form by Carbide and Carbon Chemicals Corporation under the trade name "Vinylite" and by the B. F. Goodrich Company under the trade name "Geon." The sheets are composed of suitable vinyl resins formulated with plasticizers and the like so that the material can be made into sheet form with sufficient flexibility to permit bending without fracture. Preferably the base material is used in sheets having a thickness of about 0.010 inch. "Vinylite" plastic sheets No. VU-1310 (clear, calendered) and No. VU-3300 (translucent, white), marketed by Carbide and Carbon Chemicals Corporation and which are copolymers of vinyl chloride and vinyl acetate, have the desired combination of sufficient flexibility and dimensional stability under varying temperature and humidity conditions.

As furnished by the plastic manufacturers, the sheets have a smooth calendered surface on one side and may have either a calendered or a relatively uneven, rough surface on the other side. The sheets with one uneven surface are translucent, rather than transparent, the roughened side of the sheets having the appearance of obscure glass. The characteristics of both surfaces, however, are such that they will not take pencil or ink markings in a satisfactory manner, nor can they be coated with photographic materials such a blue print solution; in fact, one of the characteristics of vinyl plastics is the difficulty of securing satisfactory adhesion of other materials thereto.

I have found that resinous materials known as acryloids (i. e., acrylic esters and methyl-acrylic esters) have the property of adhering firmly to vinyl resin sheets and also can be given a surface suitable for drafting purposes.

Accordingly, in order to provide the vinyl sheet

material with a surface making it adaptable for drafting and photographic purposes, I preferably apply to the smooth side of the sheet a thin coating of an acryloid. For ease of application, the acryloid resin may be blended with other resins such as chlorinated diphenyls or various cellulose esters, for example, nitro-cellulose or cellulose butyrate, and suitable solvents so that it may be applied by spraying, by roll coating or by dipping the vinyl base material in a solution. In order to give the coating the required matte finish and tooth, the acryloid coating material also includes a flattening agent which preferably consists of finely divided diatomaceous earth, although other flattening agents such as magnesium carbonate, zinc stearate, aluminum stearate, silica flour and the like may be employed if desired.

Suitable formulas for the coating material are as follows:

Example 1.—A formula embodying an acryloid of the acrylic ester type.

Material:	Parts by weight.
Acryloid B-73	10
Aroclor #5460	4
Toluol	8
Xylol	2
Diatomaceous earth	5

Example 2.—A formula embodying an acryloid of the methacrylic ester type.

Material:	Parts by weight.
Acryloid A-10	10
Xylol	2
Diatomaceous earth	2½

Example 3.—A formula embodying an acryloid of the acrylic ester type and nitro-cellulose.

Material:	Parts by weight.
Acryloid B-73	5
25% solution of R. S. ½° nitro-cellulose in 50% butyl acetate and 50% toluol	3
Aroclor #5460	4
Toluol	3
Xylol	2
Diatomaceous earth	5

Acryloid B-73 is a 40% solution of acrylic resin in toluol, supplied by Resinous Products Co., Philadelphia, Pennsylvania.

Acryloid A-10 is a 30% solution of methacrylate resin in ethylene glycol monoethyl ether acetate, supplied by Resinous Products Co., Philadelphia, Pennsylvania.

Aroclor #5460 is a solid resin consisting of a mixture of chlorinated diphenyls, supplied by Monsanto Chemical Co., St. Louis, Missouri.

In the drawing, the base material, which is preferably composed of a vinyl resin sheet, is indicated at 10 while the coating material is indicated at 11. The thickness of these materials is greatly exaggerated in the drawing and the thickness of the coating with respect to the base material is probably greater than it would be in practice. The shading on the surface of the coating is intended to indicate diagrammatically the matte finish produced by the flattening agent, which enables the coating to take the various drafting materials.

The above coating materials can be applied readily by spraying, roll coating or dipping, and when applied in layers preferably about 0.001 inch in thickness, give the underlying base material a surface having the appearance of finely ground glass. The surface also has sufficient

tooth and hardness to enable it to take pencil markings with a hard drafting pencil (5H, for example). The surface is level and fine, with the result that the lines are accurate and can be drawn easily, and the abrasive quality of the surface is such that black lines can be made with hard pencils without excessive pressure. As the flattening agent extends throughout the thickness of the coating material, lines or markings can be erased from the surface of the coating, and the erased parts can be drawn over again so long as the erasing has not removed the entire coating. The surface is such that it will take markings of India or other inks, and blue print solution can be flowed smoothly on the surface and will adhere thereto during the subsequent developing operation.

While I preferably employ translucent sheet material as described above in the manufacture of my drawing material, it will be understood that for some purposes it may be desirable to employ opaque sheeting and for other purposes it is desirable to employ sheeting which is calendered on both sides so that it is transparent rather than translucent. Various coloring materials also can be incorporated in the plastic sheeting to provide tinted transparent, translucent or opaque base materials. While I preferably employ resinous materials of the vinyl type, it will be understood that other plastic sheet materials having the desired dimensional stability may also be employed within the broad teachings of my invention.

Because of the great dimensional stability of the underlying base material, drawings can be made upon my material with a high degree of accuracy, and the original accuracy of the drawing will be maintained regardless of substantial changes in atmospheric conditions. Thus drawings made on my material can be reproduced accurately by photographic methods. The material is light in weight as compared to glass plates previously employed and is strong and flexible so that it can be shipped and handled without damage and without requiring any special precautions. The material can be produced at relative low cost because of the ease with which the coating operation can be carried out. The nature of the coating material is such that it adheres permanently to the underlying vinyl base, while its surface is such that it will readily take all of the materials ordinarily used in drafting work, including pencil markings, inks and blue print solution.

Those skilled in the art will appreciate that various changes and modifications may be made in my invention without departing from the spirit and scope thereof. Therefore, it is to be understood that my patent is not limited to the preferred form of my invention described herein or in any manner other than by the scope of the appended claims.

I claim:

1. Drawing material comprising a sheet of thermoplastic resinous material consisting mainly of a vinyl polymer which sheet is highly resistant to dimensional changes by atmospheric influences and which has firmly adhered thereto a coating of an acrylic resin, said coating being derived from a dispersion of the resin in a volatile liquid vehicle containing a finely divided abrasive flattening agent which extends throughout and imparts a tooth to the coating, being comprised of from roughly one-third to roughly one-half of flattening agent on the basis of the total solids deposited,

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being adapted to take pencil markings by virtue of the tooth imparted to it by the flattening agent, being adapted to take blue print solution, and having the surface appearance of finely ground glass.

2. Drawing material comprising a sheet of polyvinyl chloride which sheet is highly resistant to dimensional changes by atmospheric influences and which has firmly adhered thereto a coating of an acrylic resin, said coating being derived from a dispersion of the resin in a volatile liquid vehicle containing a finely divided abrasive flattening agent which extends throughout and imparts a tooth to the coating, being comprised of from roughly one-third to roughly one-half of flattening agent on the basis of the total solids deposited, being adapted to take pencil markings by virtue of the tooth imparted to it by the flattening agent, being adapted to take blue print solution, and having the surface appearance of finely ground glass.

3. Drawing material comprising a sheet of vinyl chloride-vinyl acetate copolymer which sheet is highly resistant to dimensional changes by atmospheric influences and which has firmly adhered thereto a coating of an acrylic resin, said

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coating being derived from a dispersion of the resin in a volatile liquid vehicle containing a finely divided abrasive flattening agent which extends throughout and imparts a tooth to the coating, being comprised of from roughly one-third to roughly one-half of flattening agent on the basis of the total solids deposited, being adapted to take pencil markings by virtue of the tooth imparted to it by the flattening agent, being adapted to take blue print solution, and having the surface appearance of finely ground glass.

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