

# ALIEN PROPERTY CUSTODIAN

## FILM PRINTING SCREENS AND A METHOD OF MANUFACTURING THEM

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The present invention relates to film printing screens and to a method of manufacturing them, and it especially relates to screens the coating layer of which is polyvinyl alcohol.

Film screens for screen printing are manufactured by applying, as is known, a layer of gelatin, glue, gum arabic or the like, mixed, if required, with bichromates to a stretched gauze (mesh material of silk or bronze gauze); after drying, the layer is shaped, for instance by exposure to light through a negative. The parts which have been exposed to light become insoluble so that during the subsequent washing operation only the covered parts of the design can be eliminated from the layer and a positive of the design remains on the screen. The layer of the printing screen thus obtained can, however, not yet be used for textile printing because it is not resistant to mechanical stress and to the action of chemicals, particularly alkalis in the printing colors. In order to increase the resistance of the layer forming the pattern to mechanical and chemical stress, it is coated with a stable lacquer. This coating of the screen requires not only much time, but the possibility of printing a fine design is limited to a certain extent since in spite of carefully operating on coating the screen thin lines and dots of the pattern are covered by the lacquer.

Now I have found that film screens of an excellent fineness of the design and a particularly good resistance may be obtained by applying as a layer polyvinyl alcohol or its derivatives still soluble in water, forming patterns for instance by a photo-chemical process and then hardening the layer by the action of aldehydes, especially formaldehyde. The process may, for instance, be carried out as follows: Polyvinyl alcohol is applied together with chromates, i. e. bichromates in an aqueous solution to a gauze and the layer is exposed to light through a negative; the portions of the layer which remain in the soluble condition are eliminated by washing and the pattern produced on the screen is finally hardened by the action of formaldehyde, while acetalization occurs. Contrary to the materials hitherto used as layers, the screen obtained is already of such a resistance that a subsequent application of a lacquer may be omitted. Apart from the fact that much time and labor is saved owing to the omission of the application of a lacquer, the layer forming the pattern is obtained in the same fineness of the design as it is to be seen in the original be-

cause the fine interstices are not covered by the lacquer. Moreover, the screens thus produced are extremely resistant to alkaline printing colors and mechanical stress. According to the hitherto usual processes it often occurs that the layer of lacquer separates from the layer of gelatin. According to the present process a homogeneous layer is obtained so that the drawback named cannot occur.

Instead of polyvinyl alcohol there may be used its derivatives which are soluble in water and still contain alcoholic hydroxyl groups, for instance a partially esterified or partially acetalized polyvinyl alcohol, furthermore saponification products of interpolymerization products of organic vinyl esters with other polymerizable compounds.

After the layer has been exposed to light and washed it is acetalized by the action of aldehydes, particularly formaldehyde or acetaldehyde. It is also possible to use higher aldehydes or substitution products of aldehydes, for instance dimethylol-acetaldehyde or substances giving off aldehydes, such as hexamethylene-tetramine, or ketones, such as cyclohexanone. The acetalization is preferably carried through in the presence of a small quantity of an inorganic or organic acid, of acid compounds or compounds splitting off an acid. The aldehydes may be caused to react in an aqueous solution or in the vaporous condition at ordinary temperature or at a raised temperature.

The following example serves to illustrate the invention, but it is not intended to limit it thereto, the parts being by weight:

A mixture of 3 parts of an aqueous solution of 10 per cent strength of polyvinyl alcohol and 1 part of a solution of 14 per cent strength of ammonium bichromate is applied in the form of a thin layer to a silk gauze stretched in the usual manner on a frame; the layer is dried in the dark, exposed to light through a negative which has been superposed, washed with hot water and dried. The layer is then coated on both sides with a solution of 2 parts of oxalic acid in 98 parts of an aqueous solution of 40 per cent strength of formaldehyde; after drying it is heated for 10 minutes to 120° C. or steamed for 10 minutes in a boiler at a pressure of 1.5 atmospheres. The layer is then neutralized with a strongly dilute solution of sodium carbonate, washed and dried.

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