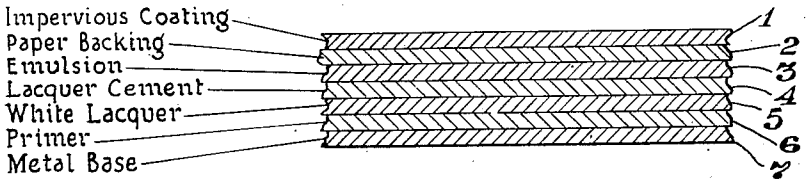
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PHOTOGRAPHIC TRANSFER PAPER

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PHOTOGRAPHIC TRANSFER PAPER

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This invention relates to sensitized photographic materials, and more particularly to improved sensitized photographic transfer paper used in the production of photo templates.

In recent years it has been found that the production of industrial patterns or templates may be speeded through the use of photographic methods. As commonly practiced, this involves photographing the original master engineering drawing and projecting an image of the resulting negative onto the specially photo-sensitized template material which is then developed to give a positive copy of the master drawing. The sensitized template material usually comprises a suitable substrate, such as sheet steel, aluminum, plywood or fiberboard, which is carefully cleaned and then spray-coated with an opaque white primer to a film build of 0.8 to 1.2 mils; this primer is allowed to dry for six to eighteen hours. Two coats of a white pyroxylin type matte transfer lacquer are then sprayed over the primed surface and allowed to dry for one to four hours. The template material prepared in this manner will hereinafter be referred to as template stock.

The coated sheets must now be moved to a photographic darkroom for application of the light sensitive emulsion. A low solids lacquer cement is applied to the lacquered surface which is then brought in contact with the sensitized emulsion side of a sheet of photographic matte transfer paper. The combined unit is then passed between rubber rolls under pressure in order to laminate the sensitized paper securely to the lacquered base material. After one or more hours the paper backing may be stripped off, leaving the sensitized emulsion securely affixed to the template stock and ready for exposure and further processing in a manner customary with photographic materials.

Another method eliminates the use of projection equipment by employing a master engineering drawing prepared on glass; this then serves as a negative for direct contact printing on the sensitized template stock described above. Still another method involves laying out the original master drawing on a board coated with a potentially phosphorescent lacquer, the phosphorescense being induced by short exposure to X-rays. The glowing drawing board is brought into contact with the sensitized template stock and allowed to remain several minutes. The pencil or ink lines of the drawing mask the glow at these points and when the exposed photosensitive template stock is processed a negative image results.

Originally it was the custom to use a matte transfer film instead of a matte transfer paper as the light sensitive material to be laminated to the lacquered template stock. In this case the transparent film was left permanently affixed to the template stock. Because of the relatively high cost of the transparent film backing, the temporary paper support, previously described, has since come into more general use. It has become customary to make up and store quantities of laminated template stock in a suitable dark-room for some time, prior to stripping the temporary paper backing before exposure and processing. However, under these conditions the matte transfer paper exhibits a serious defect which interferes with its successful use over conventional primers containing, among other ingredients, a quantity of drying or semi-drying oils or resins modified with drying or semi-drying oils. This defect, not common to transfer film, is apparent in the form of a general or mottled grayness, or fog, over the unexposed portions of the developed photo-sensitive template stock. This results in a black and gray image of poor contrast and visibility, whereas a black and white image of good contrast and visibility is normally desired. This fog is very similar in appearance to that obtained on commercial photo-sensitive materials which have been exposed to harmful volatile chemical vapors or improper safelights before or during processing, or have been developed in improperly compounded developers or fixed in overworked fixing baths, and is easily recognized by those familiar with the photographic art.

The fog is most severe when the lamination is performed before the pigmented primer has thoroughly dried; for example, no appreciable fog occurs with conventional primers if the primed template stock is first allowed to dry for four or five days at ordinary room temperatures, or if the primer coat is baked thoroughly in an oven at between 200° F. and 300° F. before the lacquer and the transfer paper are applied.

This invention has as an object an improved photo-sensitive transfer paper. A further object is an improved photo-sensitive transfer paper which may be used over surfaces primed with primers containing drying oils, without resultant fogging of unexposed areas. A further object is a process for producing an improved sensitized photographic transfer paper which may be used over surfaces primed with conventional primers containing drying or semi-drying oils or resins modified therewith, without resultant fogging of unexposed areas.

The objects are accomplished by the following

invention wherein a photo-sensitive transfer paper of improved resistance to fogging when applied over conventional primers is obtained by coating the back side of the photographic transfer paper with non-fogging, substantially gas impervious sealer prior to or during the lamination to template stock, or by coating one surface of a suitable photo-pure paper stock with a non-fogging, substantially gas impervious sealer prior to coating the other surface with a photo-sensitive emulsion.

In the drawing the single figure is a diagrammatic section of a treated photo-sensitive transfer paper cemented to a template. The metal base is shown as 7 and is provided with an oleaginous primer 6. After the primer is dry it is provided with a white lacquer 5 which contains pyroxylin, solvent and pigment but no plasticizer which may produce fogging of the photo-sensitive emulsion. Cemented to this template base is a transfer paper having a paper base 2 and a photo-sensitive emulsion 3. On the opposite side of the paper is a thin gas impervious film 1 of a composition to be described more fully hereinafter. The transfer paper is cemented to the template base by means of a cement 4 which can be of any type which does not have a deleterious effect on the photo-sensitive emulsion.

The invention will be more readily understood from the following examples which are given merely by way of illustration:

Example I

In a photographic dark room a sheet of commercial photographic transfer paper, known as matte transfer paper, is treated by coating one half of the back side of the sheet with an alcoholic solution of urea formaldehyde resin. After the film has dried, the prepared transfer paper is laminated to a sheet of primed and lacquered template stock, dried, and stripped in the usual manner, as previously described. After exposure and processing of the sensitized template stock, the unexposed areas on the emulsion transferred from the resin backed half of the matte transfer paper sheet are clean and unfogged, whereas the unexposed areas of the emulsion transferred from the untreated half of the matte transfer paper sheet are gray with fog.

Example II

Procedure as in Example I except that a pigmented white pyroxylin lacquer is substituted for the urea formaldehyde resin as a backing for half of the matte transfer paper sheet. After exposure and processing of the sensitized template stock, the unexposed areas, corresponding to the lacquer coated matte transfer paper, are quite free from fog, whereas the unexposed areas, corresponding to the unlacquered matte transfer paper are gray with fog.

Example III

The procedure of Example I is followed with a solution of ethyl cellulose substituted for the urea formaldehyde resin. The results are similar to those obtained in Example I.

Example IV

The procedure of Example I is followed with a solution of cellulose aceto-butyrate such as one sold as "Hercose C" substituted for the urea formaldehyde resin. The results are similar to those obtained in Example I.

Example V

A very striking illustration of the effects of this invention may be observed by substituting a strip of "cellophane" cellulose adhesive tape for the urea formaldehyde resin solution in procedure of Example I. After processing, the unfogged areas underlying the tape-covered transfer paper are clearly outlined against the surrounding fogged areas.

An example of a conventional fog-producing primer is:

Primer A

	Per cent
Resin A[1]	19.8
Talc	13.5
Silica	19.6
Fibrous magnesium silicate	2.8
Titanium dioxide	13.7
Petroleum solvent naphtha	29.7
Lead-manganese resinate solution	.5
Litharge	.4
	100.0

[1] Resin A is a 50% dehydrated castor oil alkyd of 50% solids in solvent naphtha.

The pigments may be ground in a buhrstone or ballmill to the desired fineness according to the conventional practice, then drier and remaining solvent added.

The urea formaldehyde resin of Example I was a conventional single-stage resin in butyl alcohol solution.

The transfer paper of Example I was Eastman's matte transfer paper.

Coating materials which had no value in preventing the fogging or were actually deleterious are: vinyl chloride-vinyl acetate copolymer, typical of which is "Vinylite" C; poly-methacrylate resins; dammar gum and "Petrex SS." Obviously no substance that in itself has a deleterious effect on the photosensitive transfer paper, or which gives rise to products having such deleterious effect, is suitable for use in the present invention. Similarly, coating materials of high permeability to gases are useless, as are also hygroscopic materials which may absorb moisture from the atmosphere which moisture in turn may serve to render the coating permeable to gases or loosen the bond of the photographic emulsion to the paper. By high permeability is meant permeability substantially on the order of, or greater than, that possessed by conventional photographic sensitized papers. By impermeable is meant impermeability substantially equal or superior to that possessed by a 0.0001 to 0.0002 inch thick film of water-insoluble urea formaldehyde resin or a conventional photographic sensitized paper impregnated with a quantity of such resin as will render the paper similarly impermeable.

It is within the scope of this invention to apply the impervious coating to suitable non-sensitized photographic paper stock prior to coating this paper stock with the photosensitive emulsion. In fact, this represents the most economical procedure in the event that large quantities of the improved photo-sensitive transfer paper are to be prepared and stocked.

Other coating materials which are not deleterious in themselves or which do not give rise to products which produce fog in the photo-sensitive emulsion may be used in combination with, and in some cases as a substitute for, those disclosed above. The films must have the property

of being sufficiently impermeable to prevent gases, such as oxygen, from diffusing to the photo-sensitive emulsion.

While we do not wish to be restricted to any theory, it is thought at present that the fogging of the unexposed photo-sensitive template stock areas, as described above, is the result of action on the photo-sensitive emulsion by products formed during the further drying of incompletely dried coatings comprised of semi-drying and drying oils or varnishes and resins modified with these oils. The procedure of coating the back of the photo-sensitive transfer paper with a solution of a film forming substance that renders the paper much less pervious to gases, perhaps oxygen in particular, results in preventing the continual and appreciable diffusion of these gases through the paper and emulsion where they otherwise are then seemingly able to catalyze the reduction of the unexposed silver salts by the products diffusing outward from the incompletely dried conventional primer underlying the adjacent coat of lacquer. It is to be understood that other equally plausible hypotheses for the performance of this invention may exist, and that the usefulness of the invention is not dependent on any particular hypothesis.

The improved photo-sensitive transfer papers and templates of this invention make possible clean contrasty images in place of the fogged low contrast templates of the prior art. Another advantage of the present invention is that it is unnecessary to allow 4 or 5 days for thoroughly drying the conventional primer coats. The invention also eliminates baking and its attendant cost in fuel and equipment.

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.

We claim:

1. The process of producing photo-templates which comprises applying an oleaginous primer to a base and thereafter cementing thereto a transfer paper comprising a photosensitive emulsion, a paper base and a gas impervious coating in the order named, the said emulsion being in contact with the cement and forming a firmer bond than that between the said emulsion and the paper of the transfer paper, whereby the paper may be stripped therefrom.

2. The process of claim 1 in which the impervious film contains a cellulose derivative.

3. The process of claim 1 in which the impervious film contains a cellulose ester.

4. The process of claim 1 in which the impervious film contains a cellulose ether.

5. The process of claim 1 in which the impervious film is regenerated cellulose.

6. The process of claim 1 in which the impervious film contains a saturated monohydric alcohol modified ureaformaldehyde resin.

7. A photographic template comprising a metal base primed with an oleaginous primer and having superimposed thereon in order a cement, a photosensitive emulsion, paper and a gas impervious coating, the bond between the said photosensitive emulsion and cement being stronger than the bond between the said emulsion and the paper.

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