

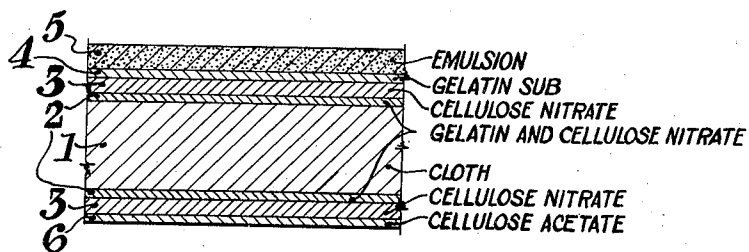
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PHOTOGRAPHIC TRACING CLOTH

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PHOTOGRAPHIC TRACING CLOTH

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This invention relates to a material on which tracings and drawings may be reproduced photographically and more particularly to a method for improving the adhesion of applied substances to the material.

Photographic tracing cloth consists of a sheet of sized tracing cloth which is waterproofed on both sides to prevent the aqueous photographic treating baths from attacking the sizing of the cloth, the photographically sensitive material being coated over one or both of the waterproofing layers. The waterproofing layer usually consists of a cellulosic material, such as cellulose nitrate, which material does not properly adhere to a starch-sized cloth without the application of some intermediate subbing material. When the exposed sheet containing the drawing or tracing is treated in aqueous solutions, even when a subbing material is used, the waterproofing layers may come loose and permit the water to reach and swell the starch sizing of the cloth, thereby making the drawing or tracing useless. Another objection to tracing cloth which is made in this way is that after photographic processing and drying of the material, the waterproofing layer and its emulsion sometimes peel or strip from the cloth base.

The principal object of the present invention is to overcome these difficulties by providing a method for improving the adhesive properties of the layers, especially the waterproofing layers, applied to the cloth base.

This object is accomplished according to the present invention by applying a layer of gelatin and cellulose nitrate or other suitable cellulose ester to the cloth base before application of the waterproofing and the sensitive layers.

The single figure of the accompanying drawing is a view in section of one form of tracing cloth made according to our invention.

In making a sensitive tracing cloth we apply to both sides of a calendered, starch-sized tracing cloth a solution of gelatin and cellulose nitrate. After this solution has dried a solution of cellulose nitrate of different composition is applied over both of the gelatin and cellulose nitrate layers and this solution is also permitted to dry. On one side of the element formed in this way a thin layer of gelatin is applied and over this layer is coated the sensitive emulsion. The opposite side of the element is coated with a backing layer of any suitable material, such as gelatin or cellulose acetate.

Our invention will now be described by reference to the accompanying drawing. In the drawing 1 represents a calendered starch-sized tracing cloth. On this cloth base we coat layers 2 of gelatin and cellulose nitrate. The proportion of gelatin to cellulose nitrate in this solution is approximately 1 to 1, although we are not limited

to this exact proportion. The following solution is typical of one which may be used.

	Percent
Gelatin.....	1.2
Cellulose nitrate.....	1.2
Methyl alcohol.....	55.6
Methyl cellosolve.....	25.0
Acetone.....	15.0
Acetic acid.....	2.0

The cellulose nitrate used in this solution is preferably a high alcohol soluble low viscosity nitrate. A suitable composition would be one which had a methyl alcohol solubility of 30-100%, a viscosity of 2 to 5 seconds by the "dropping ball method" and a nitrogen content of 11 to 12%. This composition, however, is given merely as an example, nitrates of different compositions being also suitable. The nitrogen content in particular, may be higher or lower than that of the example stated above.

The preferred proportion of gelatin to cellulose nitrate in the solution is 1 to 1, but this proportion may be varied over a wide range. There may be as little as 1/2 part of cellulose nitrate to 1 part of gelatin, or as much as 10 or more parts of cellulose nitrate to 1 part of gelatin.

The cellulose nitrate used in this coating may be substituted by any other cellulose ester which forms a sufficiently adherent coating on the tracing cloth when mixed with gelatin. Esters suitable for this purpose are well-hydrolyzed cellulose simple esters, such as cellulose acetate. The following is an example of this type of coating solution:

	Percent
Hydrolyzed cellulose acetate (precipitation value, 70%).....	1.2
Gelatin.....	1.2
Methyl alcohol.....	28.3
Acetone.....	67.3
Acetic acid (glacial).....	2.0

These layers are dried and over them are coated layers 3 which may be of cellulose nitrate. The nitrate used in this layer has a slightly lower alcohol solubility and a lower nitrogen content. A suitable composition for the solution used to coat this layer would be as follows:

	Percent
Cellulose nitrate.....	5.0
Acetone.....	16.23
Amyl acetate.....	60.0
Methyl alcohol.....	16.0
Butyl alcohol.....	2.0
Castor oil.....	0.12
Triphenyl phosphate.....	0.65

The layers 3 may also be composed of other cellulose esters such as cellulose acetate or cellul-

lose acetate propionate, or of synthetic resins such as the vinyl or alkyd types.

These layers are dried and on one of them is laid a thin gelatin layer 4 which may be coated from the following solution:

	Percent
Gelatin -----	1.0
Acetic acid -----	1.0
Water -----	5.0
10 Methyl alcohol -----	70.0
Acetone -----	23.0

This gelatin layer is dried somewhat and over it is laid an ordinary gelatino-silver-halide emulsion 5.

15 On the opposite side of the element formed by the application of these layers to the support, a layer 6 of any suitable backing material, such as cellulose acetate, is coated over the cellulose nitrate layer 3.

20 The precipitation value of a simple cellulose ester, referred to in the specific examples above, may be determined in the following manner, according to the scheme described in Sulzer U. S. Patent 1,833,136:

25 "Five grams of the dry cellulose acetate are accurately weighted and placed in a wide mouth 12 oz. bottle. To this are added 100 cc. of acetone (commercial grade of 99% or better), the mixture is stirred until homogeneous. (The bottle should be closed during the stirring with a rubber stopper fitted with a shaft for the stirrer.) To this dope is added slowly from a pipette and with thorough stirring, 150 cc. of a mixture consisting of 2 parts of distilled water and 1 part acetone by volume. Care should be taken to keep the solvents and mixtures at 20° C. wherever volumes are being measured.

40 "At the end of the addition of the acetone-water mixture, a mixture is obtained containing 40% water by volume (neglecting contraction) in which is suspended the precipitated acetate. This is allowed to stand for 12 hours at 20° C. At the end of this time precipitation has reached equilibrium and proceeds no further, and during the same time settling of the precipitate occurs. 25 cc. of the clearest portion (supernatant solution) are removed with a pipette. This 25 cc. is centrifuged in stoppered bottles at high speed until the liquid is perfectly clear. Exactly 5 cc. of the clear liquid are removed with a pipette and evaporated to dryness on a tarred watch glass. If W is the weight of the residue in grams the precipitation value which equals the per cent acetate precipitated,

$$= 100 - W \times \frac{250}{5} \times \frac{1}{5} \times 100$$

$$= 100 - 1000W$$

60 We have referred above to cellulose nitrate having a certain viscosity as determined by the "dropping ball method". Viscosity by the "dropping ball method" is determined as follows:

65 10 grams of dry nitrocellulose are dissolved in 100 cc. of a mixture comprising 50% by volume of methyl alcohol and 50% by volume of acetone at 25° C. Viscosity is measured by the time in seconds it takes for a steel ball having a diameter of 1/8 of an inch and weighing .1320 to .1340 gram to fall 15 centimeters through the nitrocellulose solution at 25° C. in a tube having a diameter of 1.7 ± .05 centimeters.

It is to be understood that we are not limited

to the exact type of sensitive tracing cloth and the sequence of layers described in the above specification. For example, the support may be any type of tracing cloth or tracing paper which has been sized with materials that swell or dissolve in water. Other materials may be used for the waterproofing layer and additional layers of gelatin or other material may be applied to improve the dry and wet stripping characteristics of the finished element. We contemplate the use of all modifications and equivalents coming within the scope of the appended claims.

We claim:

1. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth with a solution of gelatin and a cellulose simple ester, applying a waterproofing layer over the aforesaid layer, and applying a light-sensitive layer over the waterproofing layer.

2. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth with a solution of gelatin and a cellulose simple ester, applying a cellulose nitrate waterproofing layer over the aforesaid layer, applying a gelatin layer over the waterproofing layer, and applying a light-sensitive layer over the gelatin layer.

3. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth on both sides with a solution of gelatin and a cellulose simple ester, applying waterproofing layers over the aforesaid layers, and applying a light-sensitive layer over one of the waterproofing layers.

4. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth on both sides with a solution of gelatin and cellulose nitrate in substantially equal parts, applying waterproofing layers over the aforesaid layers, and applying a light-sensitive layer over one of the waterproofing layers.

5. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth on both sides with a solution of gelatin and cellulose nitrate, applying cellulose nitrate waterproofing layers over the aforesaid layers, applying a gelatin layer over one of the cellulose nitrate layers, and applying a light-sensitive layer over the gelatin layer.

6. A process of making a light-sensitive tracing cloth which comprises coating a sized cloth on both sides with a solution of gelatin and cellulose nitrate in substantially equal parts, applying cellulose nitrate waterproofing layers over the aforesaid layers, applying a gelatin layer over one of the cellulose nitrate layers, applying a light-sensitive layer over the gelatin layer, and applying a cellulose acetate layer over the cellulose nitrate layer on the opposite side of the cloth.

7. A light-sensitive tracing cloth comprising a sized cloth base, a layer of gelatin and cellulose nitrate on each side of the base, a layer of cellulose nitrate on each of the aforesaid layers and a light-sensitive layer over one of the cellulose nitrate layers.

8. A light-sensitive tracing cloth comprising a sized cloth base, a layer of gelatin and cellulose nitrate on each side of the base, a layer of cellulose nitrate over each of the aforesaid layers, successive layers of gelatin and sensitive emulsion over one of the cellulose nitrate layers, and a layer of cellulose acetate over the other cellulose nitrate layer.

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