Jan. 10, 1933. W. S. LAWRENCE 1,893,626

METHOD OF TRANSFERRING DESIGNS AND TRANSFER COMPOSITION

Filed June 20, 1928

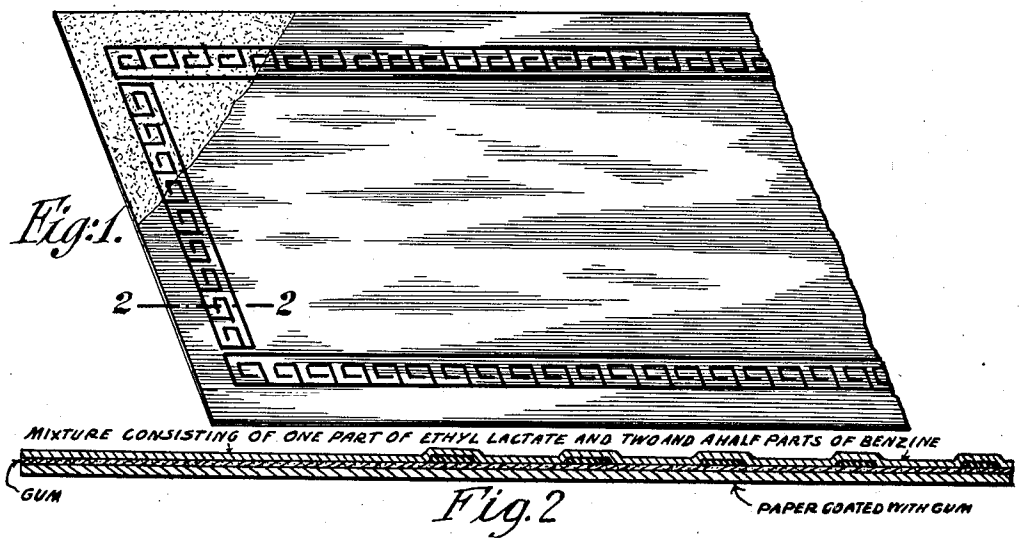


Fig:1.

Fig:2

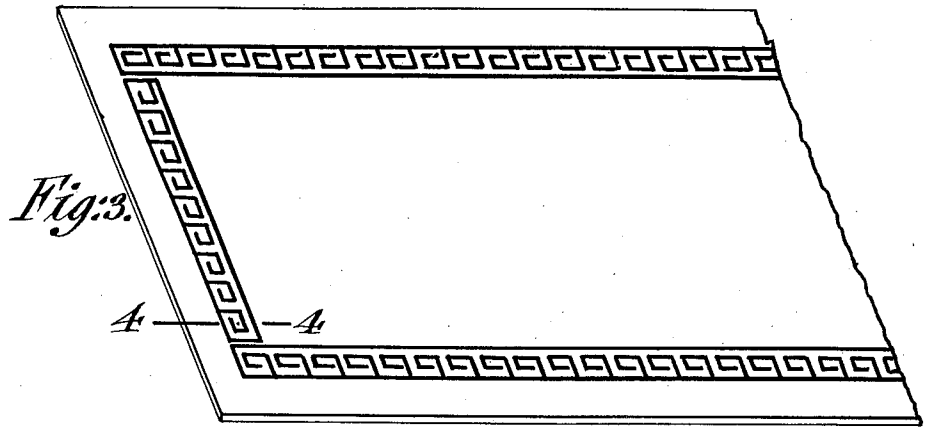


Fig:3.

Fig:4.



Fig:5.

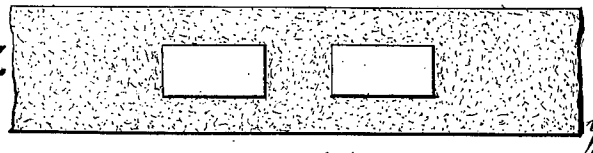
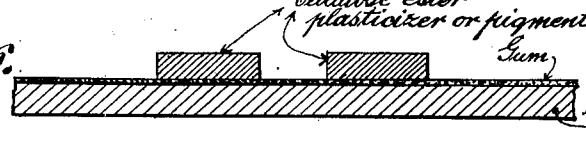


Fig:6.



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UNITED STATES PATENT OFFICE

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METHOD OF TRANSFERRING DESIGNS AND TRANSFER COMPOSITION

Application filed June 20, 1928. Serial No. 287,041.

My invention relates to a new and improved method of transferring designs, and a new and improved transfer composition.

One of the objects of my invention is to provide an improved transfer and a method of making the same which can be used for transferring designs to hard surfaces like mica, celluloid, glass, metal, etc.

Another object of my invention is to provide an improved method and an improved transfer which employs improved solutions of cellulose derivatives.

Another object of my invention is to provide an improved transfer composition and a method of making transfers which employs cellulose nitrates and cellulose acetates, and other substances.

Other objects of my invention will be set forth in the following description which illustrates a preferred embodiment of my invention, it being understood that the above general statement of the objects of my invention is intended merely to generally explain the same and not to limit it in any manner.

Fig. 1 is a perspective view of the improved transfer, with the film of transferring liquid applied thereto.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view showing the transfer, without the film of transferring liquid applied thereto.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a detail face view of the improved transfer.

Fig. 6 is a sectional view of Fig. 5.

It has heretofore been proposed to use plastic cellulose ester compositions for transferring designs to the surfaces of hard materials like mica, celluloid, glass, metal, etc. The transfer of such designs has been found very difficult, especially when the material, like celluloid, was non-absorbent. Heat alone could not be effectively used for transferring such materials because cellulose nitrate for example is decomposed by heat, and the derivatives of cellulose nitrate and cellulose acetate are infusible.

It has also been proposed to make transfer compositions of this kind by incorporating lacquer, varnish, or a solvent of the cellulose ester employed, etc. However, if a lacquer or varnish were used, it had the disadvantage of producing a coating on the object to be marked. Likewise, if a solvent were employed, then the transfer marking was smeary. Experience also has shown that it is very difficult for an unskilled person to handle a cellulose ester solution because too much or too little solvent may be employed or too much pressure may be used in the transferring operation.

It is well known that certain solvents produce a colloidal solution or suspension of cellulose esters, this action being dependent upon the solvent employed. Some of the solvents which produce colloidal suspensions or solutions of cellulose esters are acetone, most esters, glycol ethers, etc. Other liquids such as benzol and its homologues, turpentine, pine oil, petroleum spirits, the alcohols, etc. do not dissolve the cellulose esters.

By mixing these solvents and non-solvents in suitable proportions, a satisfactory mixed solvent is produced which is less expensive than the pure solvents. Of course, the diluting non-solvent must not be used in too high proportion, as otherwise, the cellulose ester is precipitated.

The rate of evaporation of the mixture of solvent and nonsolvent should be such as to allow a certain proportion of the solvent to always remain in the residual lacquer in either as high or in an even higher proportion than that originally used. This prevents preciptation in the lacquer film.

For transferring, I prefer to use a mixture of a non-solvent such as benzine which quickly evaporates because it has a low boiling point, with a solvent such as ethyl lactate which has a high boiling point. I prefer intermixing these two constituents so that when the design is immersed in the mixture it is not affected save that it is completely impregnated with the mixture. If the paper carrying the design is allowed to set in the air for a short time after the design has taken up the mixture, then the benzine evaporates very quickly leaving the transfer in

a very moist sticky condition without any running. If desired, the excess solvent could be removed before allowing the transfer to set in the air thus preventing any danger of running. If the transfer (which has a paper base) is then pressed against the object to be marked and allowed to remain there under pressure until the ethyl lactate has completely evaporated, the mark will then be transferred to the surface of the object and the paper can be readily removed by sponging with water. I prefer to use a gum coated paper as the removal thereof is much more easy. If a fabric is to be marked by a transfer of this improved type, it is unnecessary to use the sponging operation because the paper can be removed after the cellulose composition has been forced into the fabric by pressure, before the ethyl lactate has completely evaporated. The design on the transfer can be transferred by means of heat and pressure, if these are utilized before the ethyl lactate has thoroughly evaporated. This would be useful in marking fabrics and other absorbent materials. It will be noted that the transfer marking has an outer exposed face so that the transfer marking is directly applied to the surface of the object.

This method has great advantages over the use of a lacquer or varnish because it eliminates the lacquer film and it is also much more simple to use than if a pure solvent were utilized, such as ethyl lactate.

Likewise, the improved method leaves no spots.

Instead of using benzine and ethyl lactate any other composition having the same properties could be employed, as long as the non-solvent is more volatile than the solvent, and the original mixture has sufficient non-solvent to prevent any solution of the design therein. The design may embody all coloring matters such as a soluble dye, a lake, or a mineral pigment depending upon the particular purpose.

It is desirable to utilize pressure in applying the design to the object since this produces a clean cut and finer transfer.

Cellulose nitrate or cellulose acetate may be employed according to the particular use. In marking fabrics, the washing of the fabric must be considered so that the cellulose acetate or the hydroxalated derivative thereof (properly plasticized) is more desirable than the nitrate.

A practical example of my invention is given although it is understood that I do not wish to be limited to the details thereof.

13 parts of nitrated cellulose (having half-second viscosity) are dissolved in 25 parts of ethyl lactate without the use of heat. Then 10 parts of lindol, into which 20 parts of any suitable pigment such as vermillion have been ground, are added to the solution. Lindol is the trade name for a composition which is well known and which is commonly added to nitro-cellulose to give it flexibility and to eliminate the brittleness thereof. Likewise, the addition of lindol increases the adhesiveness of a nitro-cellulose film. Lindol is non-volatile and consists substantially of tricresyl phosphate. Instead of grinding pigment into the lindol, three grams of oil-soluble blue may be dissolved in the mixture of the nitrocellulose solution and the lindol to obtain the necessary transparent effect.

A homogenous liquid is thus produced which can be used for intaglio printing. By thinning down the mixture with more ethyl lactate it can be used for printing with an ordinary printing press, that is, by a relief or surface printing process. The printing is done upon a suitable paper base. When the print (consisting of any suitable design or the like) is dry, it may be immersed in a mixture consisting of one part of ethyl lactate and two and one-half parts of benzine, and the print is then allowed to stand in the air until it becomes tacky. It is then pressed against the article to be marked. Instead of using ethyl lactate I prefer to use carbitol or butyl oxalate, when the composition is being used with an ordinary printing press, since the last mentioned substances are less volatile than the ethyl lactate.

Instead of using lindol, I can employ any suitable plasticizer which will have the action above mentioned. The term "plasticizer" is also generally used in the trade for any agent which can combine with cellulose esters to render a film of cellulose ester suitable for the purpose intended, by partially or wholly eliminating the brittleness and hardness of the film.

The ethyl lactate employed is a mobile liquid which becomes thicker in which the nitrocellulose has been dissolved therein so that when the mixture has become uniform, it has the appearance of honey. The mixture of lindol and pigment is a paste which gives the nitro-cellulose solution sufficient body so that it works like an ordinary printing ink.

In the above example, the respective proportions are by weight.

The amount of plasticizing material which should be added to the composition depends upon the material upon which the design is to be transferred. For example, if a soft flexible material such as a fabric is to be marked, considerably more of the plasticizing material should be added than if a hard substance like glass is to be marked. That is, the mark should correspond in hardness to the material upon which the design is to be transferred. Any number of colors can be simultaneously handled without any danger of the colors running into each other or smearing on the object. This is because the design printed on the paper transfer base is

not soluble in the transfer fluid, which is the name that may be given to the fluid in which the printed design is immersed before it is transferred. It is only when a considerable proportion of the original transfer fluid has evaporated that the residue contains a sufficiently large proportion of active solvent to affect the design. The method is particularly suitable for producing intaglio prints when considerable ink is deposited upon the paper as a raised effect is produced upon the object which is marked. The composition specified in U. S. Patent No. 1,596,545, which comprises cellulose acetate and butyl tartrate can be utilized in this method and either ordinary coloring materials or bronze powder may be used, depending upon the nature of the work.

It is preferable to use a plasticizer which is not too soluble in the transfer liquid and to avoid immersing the design too long in the transfer liquid in case a soluble plasticizer is used. Otherwise, the plasticizing agent is removed from the cellulose composition so that the final mark becomes brittle. Since triacetin is not soluble in benzine, it makes a good plasticizing agent.

A transfer made according to this method can be utilized for many purposes whenever an ordinary heat transfer would not be satisfactory.

If a resinous transferring medium is employed, the same principle can be followed by using the mixture of a solvent and a non-solvent for the resin employed. For example, shellac dissolves in alcohol, but does not dissolve in benzine, so that by making a mixture having a large proportion of low boiling benzine, and ethyl alcohol, the same result can be secured.

The principle of my invention can thus be generally applied whenever a transferring medium is soluble in a given solvent, but is not readily soluble in another liquid having a lower boiling point than the solvent. For example, I can utilize gums such as gum arabic when can be printed in combination with metallic salts both of which are soluble in water but are insoluble in alcohol.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions could be made without departing from its spirit.

I claim:

1. The method of transferring a design consisting of a film of soluble material intermixed with coloring matter and located on a base, which consists in immersing the said base in a transfer liquid comprising a plurality of liquids in which said film has varying solubilities, the more active solvent having the higher boiling point, and the said transfer being immersed in said transfer liquid for a sufficiently short period of time to prevent the film from being dissolved or running, and then applying the transfer design directly to the surface to be marked after permitting the liquid having the lower boiling point to evaporate until the transfer can be utilized without any substantial running.

2. In the art of transferring a design comprising a film of material having coloring matter and located upon a base, those steps in the art which consists in rendering the film sticky by immersing it in a transfer liquid having a plurality of intermixed liquids in which the film has varying solubilities, the more active solvent having the higher boiling point, and then permitting the liquid having the lower boiling point to evaporate until the transfer can be utilized without any substantial running.

3. In the art of transferring a design comprising a film of material having coloring matter and located on a base, those steps in the art which consist in immersing the base in a transfer liquid comprising a plurality of liquids in which said film has varying solubilities, the more active solvent having the higher boiling point, leaving the base in the said transfer liquid without permitting the design to dissolve or run, and then allowing the more volatile liquid to evaporate until the transfer is in a moist sticky condition.

4. A method of transferring a design consisting of a cellulose ester film located on a base, which consists in immersing the said base in a transfer liquid comprising an active solvent for the cellulose ester having a relatively high boiling point and a non-solvent for the ester having a relatively low boiling point, there being sufficient non-solvent in the transfer liquid to prevent the design from dissolving or running, removing the transfer from the transfer liquid and allowing sufficient of the more volatile non-solvent to evaporate until the cellulose ester film is moist and sticky, and then applying the film by pressure to the surface to be marked.

In testimony whereof I affix my signature.

WINTHROP STANLEY LAWRENCE.