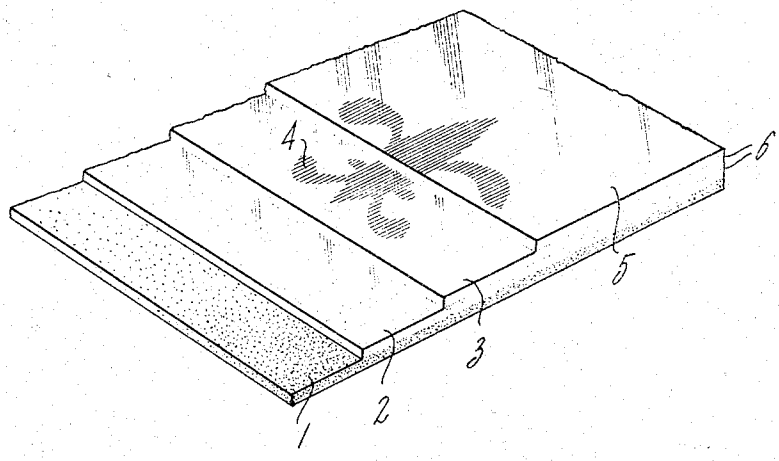
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DECALCOMANIA

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DECALCOMANIA

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3 Claims. (Cl. 41—33)

The present invention relates to decalcomania or transfer sheets, and more particularly, to a transfer sheet comprising a water-soluble adhesive coating upon which the design may be printed and a finish coating, preferably of cellulose acetate, applied over acid printing and bonded therewith so that the printing seems to be taken up into the finish coating. The product of the invention is characterized by great brilliancy of color and by the fact that the printing has all the appearance of having been applied to the surface of the finish coating.

The present application is a division of applicant's copending application Serial No. 284,443, filed July 14, 1939, now Patent No. 2,235,333, issued November 30, 1943.

Broadly, the invention contemplates the provision of a backing of water-absorbent paper and coating the same with an adhesive that is soluble in water. Upon this adhesive the design is printed and a coating of cellulose acetate or the like is cast or otherwise applied thereon. Instead of printing directly on the adhesive, however, a transparent base coat may first be applied on the adhesive, and the printing may then be effected upon the base coat, and the finish coat may then be applied over the printing. The finish coat, printing and base coat must be of such a nature as to bond together in a single integral structure.

As above indicated, I prefer to use for my finishing coat cellulose acetate which has considerable tensile strength and which is quite waterproof—qualities that are highly desirable for the purpose. It is well known, however, that cellulose acetate contracts powerfully when it dries, and that if it is applied directly to a sheet of paper, it will, on drying, wrinkle and distort the paper so that it cannot be restored to a flat sheet. If, however, the paper backing is coated with the water-soluble adhesive, or if the protective base coat is applied over the adhesive, the cellulose acetate will be prevented from distorting the paper.

According to the preferred form of the invention, it is of advantage to apply upon the adhesive coating a coating which is transparent or which may be pigmented so as to be opaque, but, in any case, whether transparent or pigmented, it is compatible with cellulose acetate or the like so as to form an integral, unlaminated bond therewith. Furthermore, this base coating is of such a nature as to afford an excellent printing surface, and particularly so with an ink having a carrier or vehicle of similar components with the base coating, so that the intermediate coating may be applied to any type of sheet, printing may be effected on said coating, and a transparent finish coating of cellulose acetate or the like may be then applied over the printing. Due to the thermoplastic nature of the materials employed in the two applied to any type of sheet, printing may be effected on said coating, and a transparent finish coating of cellulose acetate or the like may be then applied over the printing. Due to the thermoplastic nature of the materials employed in the two coatings and in the preferred ink, a firm, integral, single coating is formed, into which the printing is actually incorporated as an integral unitary part of the combined coating, in fact, lifted up into the finish coating so that it seems to be on the surface of the combined coating. This combined coating applied in two steps, including the printed matter, is, in fact, a single coating, of such tensile strength and texture, and of such a waterproof nature, that it can be removed from the sheet by wetting and dissolving the adhesive, in which case the coating with its printed matter remains intact with all its brilliancy of color.

For a base coating I prefer to use a polymerized vinyl compound, for example, a polymerized vinyl acetate. Polymerized vinyl halides may also be used as a base coating. However, in the form of the invention now discussed, the base coating is such as to unite and bond with the finish coating, which may be of cellulose acetate. Moreover, the base coating is capable of being printed upon, preferably with an ink of like composition to itself, in which case the printed matter appears to be lifted into the finish coating so that it seems to be on the surface.

This structure has hereinabove been described as an unlaminated structure. It is, of course, true that the base coating and the finish coating are of different composition; but, nevertheless, the base coating and the finish coating are so compatible in nature, and each of them is so compatible with the print that they combine and merge into an integral unitary bond and no

separation can be made by stripping one from the others. It is in this sense that the term "unlaminated" is here used.

The invention will be clearly understood by reference to the accompanying drawing, in which 1 is the water-absorbent paper backing. On this paper is a water-soluble adhesive 2. Over this adhesive is cast or otherwise applied the base coating 3, comprising a vinyl compound, such as vinyl acetate, or a vinyl halide. The printed design 4 is applied to the base coating 3, and the finish coating 5, of cellulose acetate, is case or otherwise applied over the base coating 3 and the printing 4. It is intended in the drawing to show by the indistinct lines at 6 between the base coating 3 and the finish coating 5 that there is a merging of these two coatings in a unitary bond; and also at 7 the printed design is shown to be taken up partially at least into the finish coating 5.

For example, I may employ for a transparent base coating, and also as a base for the ink printed thereon, the following:

	Per cent
Polymerized vinyl acetate	40
Acetone	50
Dibutyl phthalate	10

The vinyl acetate may be first added slowly to the acetone with vigorous agitation, and when a clear solution is obtained the dibutyl phthalate is slowly added with continued agitation. This coating is applied by any known methods in a thin film at about 110° F., at which temperature it immediately dries sufficiently to be printed upon if printing is desired.

A second transparent finish coating may then be applied, of which the following is an example:

	Per cent
Cellulose acetate	25
Acetone	70
Dibutyl phthalate	5

The cellulose acetate is first added slowly to the acetone with vigorous agitation, and when a clear solution is obtained the dibutyl phthalate is slowly added with continued agitation. This coating is then similarly applied in a thin film under a temperature of about 110° F. The second coating immediately dries and shows a strong, transparent, glossy coating without any distortion of the base coat to which it is applied, and with which it merges and unites in an integral bond.

The coatings above illustrated are, as has been said, transparent, and the color of the background is, therefore, the color of the sheet to which the coating is applied. However (and this is particularly true where cheap grades of paper are employed), it may be desirable to furnish a good color to the base coating, or to provide an ink to print upon the base coating. In such case the desired color may be introduced into the vinyl compound above described, the finish coating being still applied in transparent form over the colored base coating, printed or otherwise, at such temperatures as to form a single integral coating.

It must be understood that when an ink is desired, or when the base coating is to be colored, various other additions must also be made to the exemplary formula given above in order to hold the color in proper dispersion, and the solvents and plasticizers must be accordingly of different proportions and of such nature that the colors added should not be deleteriously affected.

I give the following practical formulae for the base coatings and inks of the invention, with colors as indicated added:

Red

Toluidine red	pints	1½
Dissolved cotton	oz.	8
Polymerized vinyl acetate, viscosity about 15	pt.	1
Ester gum	pt.	1
Acetone	pts.	2
Benzol	pts.	1½
Dibutyl phthalate	oz.	8

The whole should be ground from 24 to 30 hours in a ball mill.

Light blue (egg shell)

Lithopone	lb.	½
Blue ultramarine	lb.	½
Dissolved cotton 40 seconds	oz.	6
Dissolved cotton ½ second	oz.	10
Polymerized vinyl acetate, viscosity about 15	pt.	1
Acetone	pts.	2
Toluol	pt.	1
Tricresyl phosphate	oz.	8

If dark blue is desired, two ounces of a suitable black, such as carbon black or lamp black, may be substituted for an equal amount of lithopone in this formula.

Egg shell white

Zinc oxide	lbs.	1¼
Titanium oxide	lbs.	¾
Dissolved cotton about 40 seconds	oz.	4
Dissolved cotton about ½ second	oz.	20
Polymerized vinyl acetate, viscosity about 15	pts.	2
Acetone	pts.	2
Dammar solution	pts.	2
Butanol	pt.	1
Tricresyl phosphate	oz.	8

In the case of a flat black coating solution, a pigment stock may first be made of about the following composition:

Eight ounces medium viscosity dissolved cotton per gallon of a solvent consisting of ethyl acetate 1½ pints, butyl acetate 1½ pints, butanol ½ pint, alcohol ½ pint, benzol 2 pints, and toluol 2 pints. To this may be added about 8 ounces of carbon black and 2 ounces of lamp black to each gallon of solution. The whole should be ground about 36 hours in a ball mill.

The formula for the flat black coating follows:

	Pints
Foregoing pigment stock	1¾
Ester gum solution	½
16 oz. cotton dissolved in same solvents as the pigment stock to ½ second	4
Butyl acetate	½
Acetone	½
Polymerized vinyl acetate viscosity about 15	1½

All mixtures above described should be centrifuged to obtain a homogeneous particle size.

It will be observed from the composition of the ink used for printing on the base coat as shown by the formulae above given, that the ink is substantially the same as the base coat—in fact, is the same as the pigmented base coat—and that it is compatible with the finish coat of

cellulose acetate or the like. It is also the case that when the finish coat is applied the base coat and printing is taken up and merged integrally with the finish coating.

This property of the base coat and the ink makes it possible to produce an excellent decalcomania which is shielded and protected. For this purpose, a suitable water-absorbent paper is first coated with an adhesive that is soluble in water, the design or other matter is then printed in the ink above described directly upon the adhesive, and the finish coat of cellulose acetate is then applied over the printed matter. The printed matter thus becomes an integral part of the finish coat, is, in fact, taken up by the finish coat, but, owing to the presence of the water-soluble adhesive, the base coat or printed matter does not adhere to the paper. When, therefore, the paper support is wetted with water, the adhesive dissolves and releases the finish coat embodying the printed matter so that it will slide off the paper support and may be affixed to the desired object. This transfer sheet has a marked advantage over the ordinary decalcomania, in that the printed matter is sealed and protected from injury or marring by the acetate coating.

What I claim is:

1. A transfer sheet comprising a sheet of water absorbent paper, a water soluble adhesive thereon, a printing on said adhesive consisting of an ink having a vinyl compound base, and a finish coating upon said printing consisting of cellulose acetate.

2. A transfer sheet comprising a base web of water absorbent paper, a water soluble adhesive thereon, matter printed upon said adhesive in an ink having a vehicle comprising polymerized vinyl acetate, and a transparent cellulose acetate coating covering said printed matter and bonded thereto.

3. A transfer sheet comprising a backing of water absorbent paper, a coating of water soluble adhesive on said backing, a base coating of vinyl acetate on said adhesive, a design printed on said base coating in an ink having a vinyl compound as a base, and a finish coating over said design consisting of cellulose acetate.

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