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TRANSFER SHEET AND METHOD

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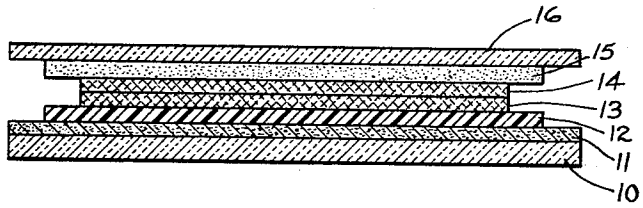

Fig. 1

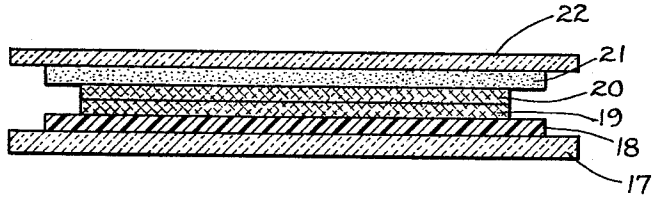

Fig. 2

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TRANSFER SHEET AND METHOD

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This invention relates to transfers. More particularly it relates to dry strip transfers and to the separation of the transfer film directly from its backing or base.

In the preferred embodiment, the gist of the present invention lies in coating the transfer sheet or film (which may have a visible image thereon) directly on the backing or base. This direct application is made possible by incorporating certain fatty acid esters of polyols into the composition of the transfer film. It has been discovered that the transfer film may thereafter be integrally released and removed from the backing sheet at the appropriate time. Further, the ease of release and removal of the transfer film from the backing sheet is directly related to the amount of ester incorporated into the transfer film.

The present invention accordingly provides several advantages and improvements over prior art techniques. The previously used polyethylene coating on the backing sheet upon which the transfer film has been disposed is eliminated with attendant economic benefits and manufacturing simplification. More important, the present techniques is more positive and reliable in its operation. For example, where the previously used polyethylene film at times exhibited a tendency to release at inopportune times, the present transfer film uniformly adheres to the backing sheet until used. Further, the transfer film may be made to adhere to the backing sheet as tenaciously as desired by simply adjusting the amount of the ester (to be particularly described hereinafter) to a lesser proportion in the transfer film. When release and separation is desired, the transfer film is still readily removed in one piece. Even at relatively high concentrations where release occurs quite readily, it will not occur before the application of some separation forces.

Thus one of the more outstanding features of the present discovery is the ability to control the degree of retention of the transfer film on the backing sheet by the amount of ester incorporated in the transfer film. As a result of this feature, it has become possible to manufacture feasible transfers of various sizes and shapes and designed for use under various conditions that have heretofore not been possible. In effect, the transfer, at least with respect to the strength of the bond between the transfer film and the backing sheet, can now be custom designed to meet the needs of the particular end use of the transfer.

In the accompanying drawings there is shown in:

FIG. 1, a schematic vertical section through a conventional transfer.

FIG. 2 shows a corresponding schematic vertical section of a transfer made in accordance with the present invention.

Dry strip transfers as conventionally available today and as illustrated in FIG. 1 consist of a thick paper backing **10** permanently coated with polyethylene or a polyethylene composition **11** on one surface thereof. Transfers are printed upon the polyethylene coated surface of the paper and may comprise a suitable clear resinous layer **12** with an image printed with a plurality of color layers **13, 14** thereon. Commonly, a suitable adhesive **15** is overprinted on the clear and colored layers **12, 13, 14**. An adhesive release paper **16** is placed in contact and over adhesive layer **15** to protect the adhesive layer **15**

and prevent adherence to anything prior to use of the transfer.

The transfer is applied to any selected object or surface by removing the adhesive release paper **16** and pressing the transfer into contact with the surface, the adhesive layer **15** being disposed in contact with the surface. After a bond between the surface and adhesive layer **15** has been created, the backing sheet **10** together with the polyethylene layer **11** are simultaneously peeled away from the remainder of the transfer.

As noted above and in accordance with the present invention, the polyethylene coating **11** has been eliminated. In the preferred embodiment of the present invention, a backing sheet of glassine paper **17** is provided upon which a clear resinous film **18** is directly coated. As before, colored layers **19, 20** defining an image may be printed upon clear layer **18**. An adhesive layer **21** is coated on the colored and clear layers and as before, an adhesive release paper **22** is provided. The present transfer is used by removing the adhesive release paper **22**, applying the adhesive layer **21** to a selected object or surface, and causing it to bond thereto by means of pressure, for example, where adhesive layer **21** is a pressure sensitive adhesive. The image is then exposed to view through the clear layer **18** by removing glassine paper **17** by pulling and stripping it from clear layer **18**.

The direct application of the clear layer **18** to backing sheet **17** with its subsequent capability of being integrally released therefrom is made possible by the incorporation in the clear layer **18** of a fatty acid ester of an alkyl polyol where the ester has at least two free hydroxyl groups in the molecule, i.e., the hydroxyl groups are not esterified during the formation of the ester and are not otherwise in a chemical combination.

For present purposes, suitable esters include all fatty acid esters of monomeric and polymeric alkyl polyols (which may also have various noninterfering substituents thereon) provided at least the minimum number of free hydroxyl groups is present. Preferably, the alkyl polyol is glycerol and the fatty acid portion of the ester is derived from a member of the group consisting of saturated and unsaturated fatty acids having up to about 30 carbon atoms. Accordingly, examples of suitable esters for incorporation in the clear resin layer include, but are not limited, to the following materials:

Glyceryl mono-oleate
Glyceryl mono-stearate
Glyceryl mono-laurate
Glyceryl mono-ricinoleate
Glyceryl tri-ricinoleate
Polyethylene glycol fatty acid ester (Nopco Chemical Co., Catalog Item 1225–L)

Whereas all of the above materials illustrate the principle of the invention wherein the requisite number of free hydroxyl groups are present in the molecule by attachment to carbon atoms having only hydrogen otherwise bonded to the hydroxyl containing carbon atom, it is to be noted that the hydroxyl groups may also be associated with non-carbon atoms or with carbon atoms having other than hydrogen atoms bonded thereto. Thus very suitable materials have been found to include esters wherein the hydroxyl groups are part of a sulfonic radical such as in 75% sulfonated castor oil. It should also be noted that the requisite free hydroxyl groups may be contributed by the polyol and/or by substituents in the fatty acid chain as in ricinoleate esters.

The selected ester is incorporated into the clear resin, preferably during the formulation of the clear resin and prior to the coating of the clear resin on the backing sheet, in an amount sufficient to permit integral release of the transfer film from the backing sheet. The precise

amount will vary depending upon the clear resin employed, the surface characteristics of the backing sheet, and the type of release desired. In most cases it has been found that about .3–20% by weight of ester to the clear resin formula (including solvents) provides the desired release characteristics to the transfer. Preferably the ester is added to the clear resin formula in an amount of about .3–5% by weight.

The clear resin is formed from materials well known in the art and previously used for the formation of the transfer film so long as they are releasable from the backing sheet when used as noted herein. Most of the common film forming resins have been found to be suitable for present purposes and include the following: vinyl resins, cellulosic film forming resins such as nitrocellulose, cellulose acetate, and ethyl cellulose and acrylic resins. Some of the polyester resins and particularly the alkyds are not adapted to the formation of the clear resin because of their poor or absence of release properties when in combination with the present esters. However, even these materials when used in combination with other suitable resins produce releasable clear resin films.

When desired the color layers printed on the clear film to form the composite transfer film may be made by any of the usual painting or printing processes using any of the various lacquers, paint, and resins normally employed for such purposes in the trade. A preferred technique for application of these layers is by the silk screen procedure.

The backing sheet may be any suitable surface for holding and releasing the transfer film. Preferred materials include vegetable parchment paper and glassine paper. It is desirable to calendar the backing sheet to obtain as high a gloss as possible.

Where an adhesive layer on the color and/or clear resins is desired, the choice is again wide and in accordance with prior techniques. In the preferred embodiment a pressure sensitive adhesive is employed with a suitable protective adhesive release paper. It should be obvious that where an adhesive is applied to the resin layers it should be of the type permitting mechanical removal of the protective adhesive release paper from the adhesive layer without causing separation of the transfer film from the backing sheet. Mechanical disruption of the bond between the transfer film and the backing sheet occurs only when the adhesive layer has been bonded to a selected surface upon which the transfer film is to ultimately rest. In the event that removal of the adhesive release paper disturbs the bond between the transfer film and the backing sheet, it would of course only be necessary to reduce the amount of fatty acid ester present in the transfer film.

The following example will illustrate the use of the present invention:

EXAMPLE

2 grams (4%) of glycerol mono-oleate was added to 50 grams of a clear resin film forming solution of ethyl cellulose. The mixture was stirred vigorously with a stirring rod until homogeneous. A thin coating of the mixture was then applied to a piece of glassine paper (2–40 lbs. laminate, basis 24 x 36) by spreading and rubbing out with a finger tip. It was then allowed to dry. A piece of cellophane adhesive tape was then pressed into bonding contact with the dried coating and pulled away from the glassine paper. The clear resin-ester layer was integrally released and pulled away from the glassine paper.

Where colored resin layers are printed on the dried resin layer to form an image and then over coated with a suitable adhesive, the adhesive surface is pressed into contact with a suitable surface and the glassine paper is then stripped and removed to leave an integral resin layer on the selected surface. The material known as #9010 Pressure Sensitive Adhesive (Cudner & O'Connor, Chicago, Illinois) has been used as a pressure sensitive adhesive for this purpose with excellent results.

The ease of release of the clear resin from the glassine paper is progressively and proportionally increased by increasing the concentration of the ester upwardly to 5%, 6%, etc. Conversely, the ease of release of the clear resin layer from the glassine layer is proportionally decreased by decreasing the ester concentration in the clear resin to 3%, 2%, 1%, etc.

The following formulas for clear resin layers have been successfully utilized in the present invention:

Plasticized ethyl cellulose lacquer

Component:	Amount in grams
Ethyl cellulose	75.0
Dow 276 V2, plasticizer	30.0
Xylene	150.0
Methyl isoamyl ketone	45.0

Plasticized nitrocellulose lacquer

Component:	Amount in grams
Nitrocellulose	45.0
Duraplex ND–78, plasticizing alkyd	90.0
Hercoflex 600, plasticizer	13.0
Methyl isoamyl ketone solvent	75.0
Xylene	60.0
Pent-oxone solvent (Shell)	30.0

Cellulose acetate butyrate lacquer

Component:	Amount in grams
Cellulose acetate butyrate	46.0
40% solution acryloid B82 in toluene	90.0
Plasticizer, Santicizer M17 (Monsanto plasticizer)	9.0
Xylene	55.0
Methyl isoamyl ketone	55.0
Pent-oxone solvent (Shell)	55.0

The various esters enumerated as examples hereinbefore have been incorporated at varying percentages in the above clear resins with successful release properties being exhibited when the combined resin-ester was applied to glassine paper in the manner described above.

Various modifications to the composite transfer of the present invention will be suggested to those skilled in the art, a few of which are here mentioned. The clear layer may be pigmented or dyed where an overall hue is desired for a background. If the clear layer is pigmented or dyed, the color layers can be omitted and the pigmented clear layer cut to any desired pattern or image. Another alternative (especially for interior uses where protection is not as vital) is to eliminate the clear layer and employ only resinous color layers. In this case the color layers cooperate directly with the backing sheet in the same way as the clear layer does and of course would have a suitable ester incorporated therein for obtaining the release properties. Also, it should be noticed that the transfers of the present invention may be made for use so that any visual display which may be disposed on the clear layer can be viewed from either side of the transfer as desired by placing the display either face up or face down on the clear layer. Placing the display face up permits for example, the attachment of a transfer to the inside of a window so that the display may be viewed through the window from the outside. A further modification would be to place two displays on the clear layer both face up and face down in back to back relation so that when the transfer is placed on a window it may be viewed from either side of the window. In this latter case an opaque layer between the back to back displays is necessary.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced with-

in the spirit of the invention as limited only by the scope of the appended claims.

What is claimed is:

1. A transfer comprising: a paper backing sheet selected from the group consisting of glassine and vegetable parchment; a film of resin disposed directly on said paper backing sheet of the type that is releasable from the paper sheet by inclusion of an ester as specified hereinafter in the resin film; and about .3–20% by weight of the formula (including solvents) of the transfer film resin of an ester operable to cause integral release of the transfer film from the paper at a preselected time only, said ester being a fatty acid ester of an alkyl polyol and having at least two free hydroxyl groups.

2. A transfer in accordance with claim **1** wherein said ester is about .3–5% by weight of the formula (including solvents) of said transfer film and wherein said backing sheet is glassine paper.

3. A transfer film in accordance with claim **1** wherein said ester is a mono-ester of glycerol and the fatty acid portion of the ester is derived from a number of the group consisting of saturated and unsaturated fatty acids having up to about 30 carbon aoms.

4. A transfer in accordance with claim **1** wherein said ester is glyceryl mono-oleate.

5. A transfer in accordance with claim **1** wherein said ester is glyceryl mono-ricinoleate.

6. A transfer in accordance with claim **1** wherein said ester is glyceryl tri-ricinoleate.

7. A transfer in accordance with claim **1** wherein said ester is glyceryl mono-laurate.

8. A transfer in accordance with claim **1** wherein said ester is sulfonated castor oil.

9. A transfer comprising a glassine paper backing sheet, a releasable clear resinous transfer film directly coated on said backing sheet, said transfer film formula (including solvents) having incorporated therein about .3–5% by weight of a fatty acid ester of an alkyl polyol, said ester having at least two free hydroxyl groups, a color image printed on the exposed side of said transfer film, an adhesive on the exposed side of said color image and remainder of the exposed side of said transfer film for the bonding thereof to a selected surface, and an adhesive release paper on the said adhesive for protecting said adhesive prior to bonding, said adhesive release paper being mechanically removable from said adhesive without separating said transfer film from said glassine backing sheet, said fatty acid ester permitting the mechanical separation of said glassine paper backing sheet from said transfer after said adhesive has bonded said color image and transfer film to a selected surface, the resistance to separation of said glassine paper backing sheet from said clear resin film being directly related to the amount of said fatty acid ester incorporated in said transfer film, the resistance increasing with decreasing ester concentration.

10. A method of transferring a releasable resinous film having an image thereon from a glassine paper backing sheet to a selected surface which comprises incorporating into said resinous film formula (including solvents) about .3–20% of a fatty acid ester of an alkyl polyol operable to cause integral release of said resinous film from the glassine paper backing sheet at a preselected time only wherein the ester contains at least two free hydroxyl groups whereby a mechanically disruptable bond is formed between said backing sheet and said resinous film directly related to the amount of the ester incorporated therein, ease of disruption increasing with increasing ester concentration, coating said resinous film with an adhesive, placing said resinous film with its adhesive coating in contact with a selected surface to bond said film to said surface, and stripping the backing sheet from the film to expose the film.

11. A method in accordance with claim **10** wherein said ester is a fatty acid ester of glycerol wherein the acid derived chain has up to about 30 carbon atoms.

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