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TRANSFER SHEET HAVING COMPLETELY TRANSFERABLE COATING

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Fig. 1

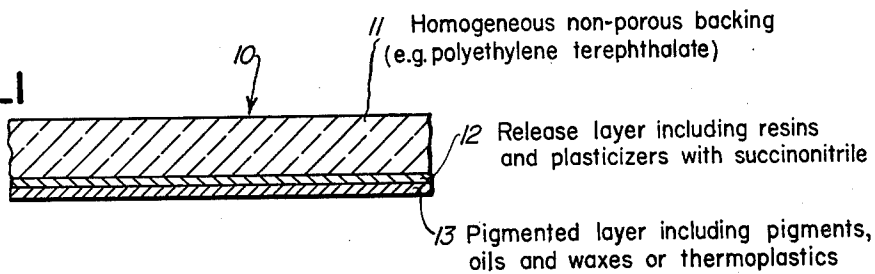
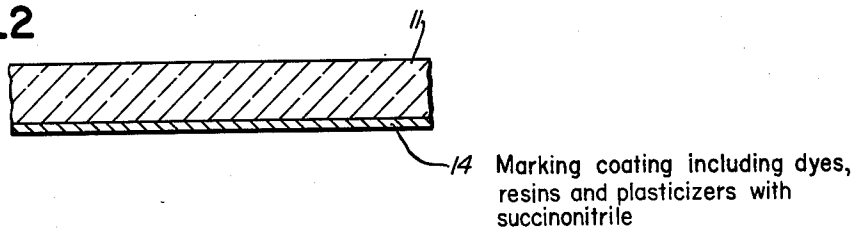


Fig. 2



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4 Claims. (Cl. 117—36.4)

This invention relates to coated sheets, strips, and/or ribbons such as are used in the graphic arts to transfer or receive sensible and/or legible graphical impressions; more particularly it relates to coated ribbons employing a synthetic homogeneous backing member for carrying a coating which is adapted to be substantially entirely displaced upon application of writing or printing pressure to the backing member; and more specifically it relates to coatings compounded with a novel release control agent which materially reduces the static charge effects characteristic of backing members of the synthetic homogeneous non-porous type.

In substituting synthetically produced homogeneous backing members for the paper backing members previously employed in so called "one time" carbon ribbons to gain the advantage of being able to produce a materially thinner yet stronger backing member, several problems were encountered. One was due to the fact that the colored coating had too much affinity for the synthetic backing material with the result that complete release of the coating could not be obtained, thereby reducing the clarity of the print work. One solution proposed a coating comprising an intermediate layer between the backing member and a colored layer. The intermediate layer desirably has a greater affinity for the colored layer than for the backing member such that it will transfer with the colored layer rather than remain with the backing member in response to printing pressure. The release layers heretofore proposed, in numerous instances, exhibit either too little affinity for the backing member with the result that flaking from the backing member occurs, or too much affinity for the backing member with the result that complete release is not realized. Another shortcoming of coated ribbons employing synthetic backing members are subject to the accumulation of static charge.

In accordance with the invention a release layer incorporating a novel affinity control agent has been formulated. The affinity control agent, succinonitrile, permits controlling the degree of affinity of the constituents in the release layer for the backing member whereby optimum release characteristics are achieved. In addition, succinonitrile in combination with the other constituents of the release layer acts to minimize to a negligible degree static charge effects.

In one embodiment of the instant invention, the colored coating comprises a dye incorporated in the novel release layer formulation thereby providing a two layer transfer sheet. In another embodiment the colored coating comprises a release layer placed intermediate the backing member and a colored layer; its affinity for the colored layer being greater than for the backing member whereby both the release layer and the colored layer are transferred upon application of printing pressures.

An object of the invention is to provide a multi-layer transfer element having a novel release layer formulation.

Another object of the present invention is in the provision of a novel affinity control, dye solvent, and static charge reducing agent in the marking layers of multi-layer transfer elements.

A further object of the invention is in the provision of a carbon ribbon employing a synthetic backing member which completely releases a marking layer and which exhibits inconsequential static charge.

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A still further object of the invention is to provide a bonding or release layer which includes succinonitrile as an affinity control, dye solvent, and static charge minimizing agent.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is a fragmentary exaggerated cross sectional view of a transfer sheet in accordance with the invention; and

FIGURE 2 is a fragmentary exaggerated cross sectional view of an alternative form of the invention.

Referring now to the drawings there is shown in FIGURE 1 a portion of a transfer sheet generally designated by reference numeral 10 comprising a synthetic homogeneous, non-porous backing member 11. In one embodiment polyethylene terephthalate known by the trademark "Mylar" owned by Du Pont De Nemours and Company was used, though it is to be understood that other polymers like polyethylenes, polypropylenes, polyvinylidene chlorides, polyesters, polyamides, polystyrenes and others, as well as derivatives and copolymers of the film forming polymers mentioned are within the scope of the invention. On the Mylar member 11 is a colored coating comprising a release layer 12 on top of which is a colored layer 13. As used in the specification the terms colored layer and colored coating are to be understood as inclusive of materials adapted to transfer or receive sensible and/or legible impressions. As for example the colored coating may, either in the release layer or in the colored layer, contain dyes or pigments, conductive material, and/or iron powders capable of being magnetized as is understood in the art.

The novel release layer 12 comprises film forming substances, plasticizers and succinonitrile. More particularly the release layer 12 consists of a resin or combination of resins, plastic and solvent constituents in combination with a plasticizer which acts as an affinity and static charge regulator. More specifically the release layer may consist of a film forming resin, such as sandarac or shellac, or in a preferred embodiment, pontianac, dissolved in low boiling alcohols, ethers, or esters, and preferably the glycol ether known by the trade name "Cellosolve." The dissolved filmformer is mixed with a dissolved plastic solution comprising polyvinyl acetate, known as AYAT (Bakelite Co.), which also has the property of a film-former, dissolved in mutual solvents of the same characteristics as the solvents for the filmforming resin. In one embodiment ethyl alcohol and dioxane acting together to dissolve the polyvinyl acetate more readily were used. To the above solutions a unique static charge regulator, succinonitrile, a polar non ionic compound of the formula $CN-CH_2-CH_2-CN$, is added.

Succinonitrile has been found to be unique not only as a static charge inhibitor but also as an affinity control agent; a characteristic not exhibited by other static charge inhibitors.

In the above formulation the resin, pontianac, has little affinity for Mylar and is brittle, while the plasticizer, AYAT, has great affinity for Mylar and is tacky. Succinonitrile, also a plasticizer, has only moderate affinity but serves in combination with pontianac and AYAT to form a film after evaporation of the solvent constituents, which is releasably adherent to the Mylar layer. While none of three alone have very much affinity for a colored layer 13 of FIGURE 1 their combination in a film has sufficiently more affinity for the colored layer than for the Mylar layer.

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The following percent by weight ranges for preferred constituents have been found suitable to achieve the desired characteristics:

	Range
Pontianac -----	20-40
Cellosolve -----	60-80
AYAT -----	.5-1.0
Ethyl alcohol -----	1-1.25
Dioxane -----	1.5-2.0
Succinonitrile -----	5-15

The dimensions of the layers in the drawings are exaggerated; it being understood that after deposit of the release layer on the backing member 11 by conventional coating equipment, and after evaporation of the solvents, the thickness of the release layer 12 will be on the order of from .00005" to .0005" thick.

The colored layer 13 is coated over the release layer 12 by conventional coating equipment. The colored layer 13 is in one embodiment, similar to carbon paper inks known to the art, comprising pigments, oils or other suitable liquids and waxes or suitable thermoplastics. A preferred combination comprising the following constituents by weight:

	Percent
Carnauba wax -----	34
Beeswax -----	10
Mineral oil -----	18
Petrolatum -----	9
Fatty acid -----	6
Violet dye -----	5
Blue dye -----	2
Carbon black -----	16

Another characteristic of succinonitrile is that it is a solvent for dyestuffs. This permits of a transfer sheet or ribbon of only two layers i.e. the backing layer and a layer 14 comprising the releasable layer having a dye added thereto as illustrated in FIGURE 2. Dyes of any desired color may be added as will be understood in the art.

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As stated hereinbefore the antistatic agent, succinonitrile, is the affinity control agent which when used in the proportions stated permits the realization of optimum release characteristics such that when the transfer sheet of FIGURE 1 or FIGURE 2 is subjected to pressure, complete release of the colored coating comprising layers 12 and 13 (FIGURE 1) or layer 14 (FIGURE 2) from the member 10 is achieved.

It should be understood that the foregoing disclosure relates only to preferred embodiments of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention claimed is:

1. A transfer medium comprising a synthetic homogeneous carrier member and a marking coating on and entirely releasable from said carrier member in response to writing pressure, said marking coating comprising a film releasably adherent to said carrier member, said film being produced by the application of a solution having dissolved therein 20-40 parts by weight of pontianac, .5-1 part by weight of polyvinyl acetate and 5-15 parts by weight of succinonitrile.
2. A transfer medium as recited in claim 1 wherein said solution includes dyes.
3. A transfer medium as recited in claim 1 wherein said marking coating comprises a colored layer on and adherent to said film.
4. A transfer medium as recited in claim 1 wherein said carrier member is polyethylene terephthalate.

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