

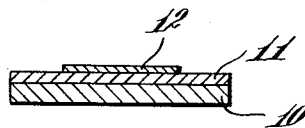
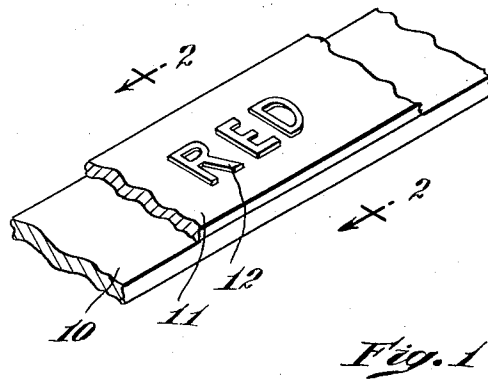
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HEAT TRANSFER

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HEAT TRANSFER

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The present invention relates to heat transfers and particularly to improvements in heat transfers embodying a wax release coating.

The objects of the present invention are to provide an improved heat transfer embodying a wax release layer, to provide an inexpensive heat transfer receptive to high quality printing, to provide a heat transfer which can be readily printed on conventional equipment and with conventional inks, and to provide a heat transfer which can be transferred to impermeable as well as permeable surfaces without the need for special adhesive layers over the printed design and without need for sizings on the paper carrier.

Heat transfer products embodying release coatings of wax have long been known but the products heretofore disclosed have possessed severe limitations which have prevented their wide-spread use. One limitation has been the difficulty in printing due to ink striking into the wax during printing, ink migration into the wax after printing, ink crawling on the wax surface, wax offset during storage, and picking and embossing of the wax during printing.

A further limitation in prior wax transfers has been the faulty transfer of the design, particularly where the surface to be labeled is smooth and impermeable. This faulty transfer is commonly manifested as an ink-split with part of the design transferring and part remaining on the backing or carrier. Attempts have been made to remedy this latter limitation by using heavy wax layers but this increased the distortion of the design during transfer and promoted wax staining of the surface being labeled. Heavy image layers which were intended to split have also been used but fine reproduction detail is impossible with such materials. Images with high strength properties overlaid with adhesive coatings have also been disclosed but these are expensive and are difficult to apply with conventional printing equipment. Finally, impermeable paper backing or carriers such as glassine and coated papers have been suggested to overcome the drawbacks of wax transfer coatings but such materials are not entirely satisfactory and increase the cost of the product.

Thus ideally a wax release coat should be inexpensive, be effective in thin films as a release agent when coated on inexpensive paper, be receptive to high quality printing, resist strike through or migration of an ink design, have low staining properties, resist picking during printing, show no offset tendency during storage, and be easy to apply on production equipment. None of the prior disclosures meet all of these requirements.

According to the present invention, the above requirements and objects are met by a heat transfer comprising a backing and a release coating thereon comprising an oxidized wax obtained as the reaction product of the oxidation of hard, high-melting, aliphatic, hydrocarbon waxes. These oxidized waxes include the oxidation products of both natural and synthetic hydrocarbon waxes such as petroleum waxes, low-molecular weight

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polyethylene, and waxes obtained from the Fischer-Tropsch synthesis. The oxidized waxes useful for transfer coatings are those which have melting points between about 50° C. and 110° C., saponification values between about 25 and 100, acid values between about 5 and 40, and which have a penetrometer hardness (ASTM D5-52) below about 15 as measured with 100 grams for 5 seconds at 25° C.

Minor amounts of certain additives such as fillers and resins may be added to the oxidized wax without adverse effect.

The present invention may better be understood by reference to the accompanying drawing in which

Fig. 1 is an isometric view of the present transfer; and Fig. 2 is a section on line 2—2 in Fig. 1.

Referring to the drawings, a backing 10 is coated with an oxidized wax 11 and a design 12 is printed on the exposed surface of the wax. While any convenient backing may be used, paper is preferred for economy. Unlike prior wax transfer disclosures, no sizing is required for the paper before application of the wax and special papers are not required.

The oxidized, aliphatic, hydrocarbon waxes herein disclosed appear to be unique among waxes in having good printing and transfer characteristics. This is believed to be due to the polar nature of such materials which probably comprise a mixture of fatty acids, waxy alcohols, esters, aldehydes and ketones in addition to hydrocarbon wax. These oxidized waxes can be prepared by a number of well known methods which generally comprise heating the hydrocarbon waxes in the presence of oxygen or other oxidizing agents. In addition to these oxidation products, further derivatives, such as esterification products of the oxidized waxes, are included within the scope of this invention.

The oxidized waxes of the present invention may be applied to the carrier backing by any convenient method such as by emulsions, hot melts or as solvent solutions. Emulsions prepared with alkalis or organic amines are preferred since they are easily formed and give emulsions of low foam-forming characteristics making them easy to apply with conventional paper coating equipment.

The coated paper is printed with a design by conventional printing equipment such as letterpress, rotogravure, and flexographic presses and with conventional inks including those made from powdered metals. The term "design" as used herein includes both printing and art work or a combination of both.

The present invention may be more clearly understood by reference to the following examples. All parts are by weight:

Example No. 1

Fifty (50) parts of "Duroxon H-110," an esterification product of an oxidized, Fischer-Tropsch wax, available as a proprietary product from the Dura Commodities Corp., is melted. 5 parts of morpholine are added with agitation and the mixture then poured into 280 parts of boiling water. The resulting emulsion is cooled with agitation and is coated on a 50 lb. supercalendered sulfite paper on an air-knife coating machine to give a dry weight of wax of from 1 to 1.5 lbs. per ream (20 x 25—500).

The paper is then printed on the wax side with a glossy, oil-base ink. After the ink has dried, the design is transferred to MST-53 cellophane by rolling the cellophane, in contact with the design, over a hot plate at 175° F. with mild pressure. The paper backing is immediately removed while hot, leaving the design firmly attached to the cellophane.

"Duroxon H-110" wax melts at 90-95° C. with a solidification point (rotating thermometer) of 80-83° C. and has an acid value of 15-30, a saponification value of 60-75, and a penetration (ASTM D5-52) of 2-4 as measured with 100 grams for 5 seconds at 25° C.

After coating with the wax, the paper will have a glossy appearance, will show no signs of tackiness, and will exhibit excellent ink receptivity with sharp outline and good ink-drying properties. Substantially all of the ink design will transfer to the cellophane with only faint staining from the wax and without significant distortion.

Example No. 2

Two parts of stearic acid, 3 parts of triethanolamine and 10 parts of "AC-Polyethylene 629" (Semet-Solvay Co., New York, N. Y.), an oxidized, emulsifiable grade of low molecular weight polyethylene are melted at 100° C. and poured into 40 parts of boiling water. The resulting emulsion is chilled and coated on a supercalendered sulfite paper to give a coating weight of 1-2 lbs. per ream (20 x 25-500).

"AC-Polyethylene 629" has a melting point of 90-95° C., an acid value of 14-17, a saponification value of 14-17 and a penetrometer hardness of 2-4.

Example No. 3

Two parts of stearic acid, 3 parts of triethanolamine and 10 parts of "Cardis 320" (Warwick Wax Co., Long Island City, N. Y.), an oxidized, emulsifiable microcrystalline wax, are melted at 100° C. and poured into 40 parts of boiling water. The resulting emulsion is chilled with agitation and applied to a supercalendered sulphite paper to give a coating weight of 1-2 lbs. per ream (20 x 25-500).

"Cardis 320" has a melting point of 82-85° C., an acid value of 28-30, a saponification value of 75-80, and a penetrometer hardness of 5-7.

The transfer of the above examples will also transfer with good results to materials other than cellophane, such as for example, metal foil, wood, fabric, plastic, glass and the like.

It should be understood that the above disclosure is for the purpose of illustration only and that the invention includes all equivalents and modifications falling within the scope of the appended claims.

1. A heat transfer comprising a backing and a trans-

fer coating thereon, said coating comprising an oxidized wax obtained as the reaction product of the oxidation of a hard, high-melting, aliphatic hydrocarbon wax, said coating having a melting point between about 50° C. and 110° C., an acid value between about 5 and 40, a saponification value between about 25 and 100, and a penetrometer hardness below about 15 as measured with 100 grams for 5 seconds at 25° C., whereby designs comprising commercial inks can be printed on the surface of the coating by conventional commercial processes and transferred to permeable or impermeable surfaces by the application of heat and pressure.

2. A heat transfer according to claim 1 wherein the oxidized wax is obtained by oxidation of the high-melting wax fraction of the Fischer-Tropsch synthesis.

3. A heat transfer according to claim 1 wherein the oxidized wax is oxidized, low-molecular weight polyethylene.

4. A heat transfer according to claim 1 wherein the oxidized wax is oxidized, microcrystalline wax.

5. A heat transfer according to claim 1 wherein the transfer coating comprises the esterification product of an oxidized hydrocarbon wax.

6. A heat transfer comprising a backing and a transfer coating thereon, a major portion of said coating comprising an oxidized wax obtained as the reaction product of the oxidation of a hard, high-melting, aliphatic hydrocarbon wax, said coating having a melting point between about 50° C. and 110° C., an acid value between about 5 and 40, a saponification value between about 25 and 100, and a penetrometer hardness below about 15 as measured with 100 grams for five seconds at 25° C., and a design on said coating, whereby said design printed by conventional commercial inks and processes can be transferred to permeable or impermeable surfaces by the application of heat and pressure.

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