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NON-BLOCKING COATED SHEET MATERIAL

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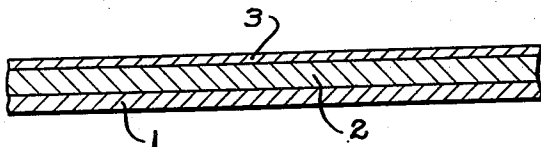


Fig. 1

1 = FLEXIBLE BASE SHEET, E.G. CELLULOSIC
PLASTIC OR METALLIC

2 = WAX COMPOSITION COATING NORMALLY
TACKY OR STICKY

3 = NON-BLOCKING COATING COMPOSITION
COMPRISING A NON-BLOCKING AGENT
(SOLID FATTY ACIDS, HYDROGENATED
CASTOR OIL, POLYETHYLENE GLYCOLS)
AND A BINDING AGENT (ETHYL CELLULOSE,
POLYVINYL ACETATE, POLYAMIDES).

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NON-BLOCKING COATED SHEET MATERIAL

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This invention relates to improvements in non-blocking coating compositions and more particularly to non-blocking compositions to be overcoated on flexible sheet materials coated with heat sealable wax compositions.

Heat sealable wax compositions have long been applied to flexible base sheets to form packaging materials suitable for the preservation and merchandising of food and other commodities. Sheet materials coated with wax compositions to form a composite material suitable for the packaging of foods such as natural and process cheese, for example, have exhibited an undesirable stickiness or tack on the surface of the coating. Rolls of the packaging materials tend to "block" so that it is impossible to unroll the material. Similarly, it is impossible to separate individual sheets of the packaging material when they have been stacked or piled one on top of another. Attempts have been made to overcome this disadvantage by interleaving the sheets or rolls with a non-blocking interleaving sheet which is separated and discarded at the time of use of the packaging material. The economic undesirability of such practice is obvious. The coated sheet materials have also been dusted with starch to provide a non-tacky coating surface, but the procedure involves operational difficulties because the starch seriously impairs the heat-sealability of the wax composition coating, rubs off on the back of the adjacent sheet and serves also as a nutrient source for growth of molds and bacteria. Furthermore, it is very difficult to prevent the starch dust from entering the coating machinery and cleanliness is therefore difficult to maintain.

By the practice of our invention, however, it is possible to achieve a non-blocking surface on normally tacky wax composition coatings applied to flexible sheet materials. This result is accomplished without the disadvantages attending previously used methods.

We have found that a non-blocking surface may be obtained by overcoating the wax composition with a composition containing a non-blocking agent and a material which acts as a binder to hold the non-blocking agent firmly on the surface of the coating. The non-blocking compositions of our invention are applied to the wax composition surface from solutions in suitable volatile solvents.

The novel features of our invention, together with the advantages thereof, may best be understood from the following description of specific embodiments when read in connection with the accompanying drawing, in which numeral 1 designates a flexible base sheet material, such as a cellulosic sheet material or metallic or plastic film, numeral 2 designates a wax composition coating having a normally tacky or sticky surface and applied as a protective coating over the base sheet and numeral 3 designates the non-blocking overcoating of our invention as applied over the surface of the tacky wax composition.

Our non-blocking overcoating composition may be applied to many types of known heat-sealable wax compositions which are comprised of any suitable mixture of

waxes and other ingredients such that the compositions are characterized by high surface tack and a tendency to block under the conditions of temperature and pressure normally encountered in storage of coated sheet materials. Wax compositions containing appreciable proportions of microcrystalline wax, polyisobutylene, unvulcanized rubber, petrolatum or similar materials fall in this category. Such compositions are often applied to flexible sheet materials for the preparation of protective wrappers for foodstuffs, particularly for natural and process cheese. A representative cheese wrapper coating composition might contain up to 25% polyisobutylene and up to 15% petrolatum, the balance of the composition being microcrystalline wax. Various tacky resins may also be introduced to obtain special desired characteristics. The non-blocking overcoatings of our invention are of particular value when applied to the surface of wax compositions of this type, and are advantageous for application on the surface of any similarly tacky wax composition.

The non-blocking agents useful in the preparation of our non-blocking overcoating compositions are solid, crystalline, organic compounds which are compatible, in the fused or molten state, with the underlying wax coating. They are applied to the wax coating surface from their solution, together with a binder, in a volatile solvent which wets but does not attack or dissolve the wax coating. Upon evaporation of the solvent, the non-blocking composition remains on the wax coating surface. When heat is applied, as in the heat-sealing operations common to the packaging industry, the non-blocking agent fuses together with the wax coating and so contributes to the heat sealing qualities of the wax composition.

The non-blocking agents which we have found effective for use in our invention are the solid straight chain saturated fatty acids, solid hydrogenated castor oil and solid polyethylene glycols. Palmitic acid, stearic acid, Hydrofol Glyceride 200, which is a solid hydrogenated castor oil sold by the Chemical Products Division of Archer, Daniels, Midland Company, Castorwax, which is solid hydrogenated castor oil sold by the Baker Castor Oil Company, and Carbowax 6000W, a solid polyethylene glycol sold by Carbide and Carbon Chemical Corporation, have been found particularly effective in the practice of our invention.

The binding agent may be a cellulose ether such as Ethocel, which is ethyl cellulose sold by Dow Chemical Company, a polyvinyl acetate such as Gelva V-7, which is polyvinyl acetate sold by Shawinigan Products Company, a polyamide such as Versamid 940, which is a polyamide formed by reaction of a dimerized and trimerized unsaturated fatty acid with ethylene diamine and sold by General Mills, Inc., or other film-forming binding agents which are soluble in the preferred solvents hereinafter described.

The binding agent may generally comprise between about 2% and 15% by weight of solids in the non-blocking composition. Lesser amounts of the binder do not hold the non-blocking component securely to the wax composition surface and it thereby tends to dust off, while higher percentages of binder are unnecessary and uneconomical. We prefer to maintain the binder content at about 5 to 10% by weight of solids in the composition. Correspondingly, the non-blocking component may comprise between 85 and 98% by weight of solids in the composition, the preferred compositions containing about 90-95% of this component.

The non-blocking agents mentioned above may be used singly with the selected binding agent or mixtures of two or more of the non-blocking agents in varying pro-

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portions may be used in the preparation of the non-blocking coating composition of our invention. For example, hydrogenated castor oil, when used as the sole non-blocking agent, has excellent non-block characteristics, and can be used where mild heat-sealing qualities are required and a relatively opaque overcoat is desired. When hydrogenated castor oil is used in combination with palmitic acid or stearic acid, or a mixture thereof, however, excellent blocking resistance is obtained together with excellent heat-sealing characteristics of the wax composition, and the coatings are transparent. The compositions containing stearic acid are less transparent than those which palmitic acid is used, so the former material is generally used when opaque coatings are desired, while

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Isopropyl alcohol and methyl ethyl ketone have proven to be excellent solvents for this use, though other solvents having similar properties may be employed quite satisfactorily.

To illustrate the principles of our invention, overcoating compositions as shown in the following Table I were prepared and applied to the surface of a cellophane sheet material coated with a normally tacky wax composition comprising 15% polyisobutylene, 7% petroleum and 78% microcrystalline wax. The amount of the overcoating composition applied was sufficient to leave, after evaporation of the solvent, 4 lbs. (solid basis) per ream (3000 sq. ft.) substantially evenly distributed over the surface of the wax composition.

Table I

Overcoat Solids Composition	Solids Concentration in Solvent, percent	Solvent	Resistance to Blocking	Heat Sealing Quality
95% Palmitic Acid.....	30.....	Isopropanol.....	good.....	good.
5% Ethocel.....	30.....	Isopropanol.....	good.....	good.
90% Hydrofol Glyceride 200.....	30.....	95% Isopropanol.....	excellent.....	fair.
10% Gelva V-7.....	30.....	5% Water.....	do.....	Do.
95% Hydrofol Glyceride 200.....	30.....	Methyl Ethyl Ketone.....	do.....	Do.
5% Ethocel.....	30.....	Isopropanol.....	good.....	good.
47.5% Stearic Acid.....	30.....	Isopropanol.....	good.....	good.
47.5% Palmitic Acid.....	30.....	Isopropanol.....	good.....	good.
5% Ethocel.....	30.....	Isopropanol.....	good.....	good.
40% Hydrofol Glyceride 200.....	30.....	Isopropanol.....	good.....	good.
55% Palmitic Acid.....	30.....	Isopropanol.....	good.....	good.
5% Ethocel.....	30.....	Isopropanol.....	good.....	good.
40% Hydrofol Glyceride 200.....	30.....	Isopropanol.....	good.....	good.
55% Carbowax 6000W.....	30.....	Isopropanol.....	good.....	good.
5% Ethocel.....	30.....	Isopropanol.....	good.....	good.

is generally used when opaque coatings are desired, while mixtures of these acids are used, the mixture is generally in the ratio of 10 parts by weight of palmitic acid to between 1 part and 50 parts by weight of stearic acid.

Solid unsaturated fatty acids also form similar non-blocking compositions, but are limited to use on packages for non-edible products, due to the development of undesirable off-odors caused by oxidation processes.

Our overcoating compositions are effective in preventing blocking when applied to the surface of tacky wax compositions in relatively small amounts. For example, when applied to the surface of a normally tacky wax composition such as is used for coating cheese wrappers, the application of about 4 lbs. per ream (3000 sq. ft.) of one of our compositions resulted in a completely satisfactory non-blocking surface. Application of less than about 2.5 lbs. per ream gives incomplete blocking protection, while application in excess of about 10 lbs. per ream had a deleterious effect on the heat sealing qualities of the wax composition.

The overcoating compositions are preferably applied from solvent solutions, the solvent being subsequently removed by normal evaporative techniques such as passing the sheet through an oven or over heated rolls. Solvent application results in an overcoating in the form of an essentially continuous film of substantially even thickness and permits an extremely close control of the weight of the overcoating composition which is applied to the substrate surface.

A variety of solvents may be used for this purpose. To be satisfactory in the use the solvent must: (1) have sufficient volatility to be readily removed from the overcoated sheet material after application of the overcoating solution, (2) have sufficient solubility for the desired solid overcoating components to maintain them in solution at temperatures not unduly elevated above room temperature, (3) have sufficient wetting power for the wax composition to allow the overcoating solution to spread evenly over the wax composition surface, and (4) be a non-solvent for the wax composition, at least at the temperature used for the overcoating application.

In the above table:

Ethocel is ethyl cellulose sold by Dow Chemical Company. The grade used was termed "25 Centipoise, Standard Ethoxy."

Hydrofol Glyceride 200 is a solid, hydrogenated castor oil sold by the Chemical Products Division of Archer, Daniels, Midland Company.

Gelva V-7 is a polyvinyl acetate sold by Shawinigan Products Company.

Carbowax 6000W is a solid polyethylene glycol having a melting point of 140° F. It is sold by Carbide and Carbon Chemicals Corporation.

In each of the foregoing examples, a polyamide such as Versamid 940, sold by General Mills, Inc., may be substituted for the Ethocel or Gelva V-7 binder with similar results.

Food wrappers prepared by coating cellophane with a wax composition comprising 15% polyisobutylene, 7% petrolatum and 78% microcrystalline wax were overcoated, in accordance with our invention, with a composition comprising 55% palmitic acid, 40% hydrogenated castor oil and 5% ethyl cellulose. The overcoating was applied from a 30% solution in isopropanol. The overcoating was non-blocking, transparent and the overcoated wrappers exhibited low surface friction and superior performance in machine packaging operations. Half-pound portions of sliced process cheese were packaged in these wrappers on a vacuum packaging operating at 24-26 inches (Hg) of vacuum. The heat seals on the resulting vacuum-packed cheese packages were excellent, all packages maintaining a satisfactory vacuum for 6 to 9 months.

Similarly prepared wrappers were used to package 6 ounce portions of sliced bologna under about 25 inches (Hg) of vacuum. Heat seals were excellent, all packages maintaining satisfactory vacuum for the 6 week duration of the test.

Having now disclosed several of the preferred compositions of our invention and the method of their application, it is evident that various modifications may be made within the spirit of our invention. We do not wish

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to be limited in the interpretation of our invention except as distinctly set forth in the appended claims.

We claim:

1. A flexible packaging sheet material coated with a heat-sealable normally tacky wax composition and overcoated with a non-blocking composition comprising a solid binding agent selected from the group consisting of ethyl cellulose, polyamides and polyvinyl acetate, and a non-blocking component selected from the group consisting of solid straight chain saturated fatty acids, solid hydrogenated castor oil, and solid polyethylene glycols, said solid binding agent being present in amount of at least 2 percent by weight of the solids in the non-blocking composition.

2. A flexible packaging sheet material coated with a heat-sealable normally tacky wax composition and superimposed thereon a non-blocking overcoating in an amount between 2.5 lb. and 10 lbs. per ream, said overcoating comprising between about 2% and about 15% by weight of solids of a binding agent selected from the group consisting of ethyl cellulose, polyvinyl acetate and polyamides, and between about 85% and 98% by weight of solids of a non-blocking component selected from the group consisting of solid straight chain saturated fatty acids, solid hydrogenated castor oil, and solid polyethylene glycols.

3. A flexible packaging sheet material coated with a heat sealable normally tacky wax composition and overcoated with between about 2.5 lbs. and 10 lbs. per ream of a non-blocking composition comprising between 2% and 15% by weight of ethyl cellulose, between 20% and 60% hydrogenated castor oil and between 30% and 75% solid straight chain saturated fatty acid.

4. A flexible packaging sheet material coated with a heat sealable normally tacky wax composition and over-

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coated with between about 2.5 lbs. and 10 lbs. per ream of a non-blocking composition comprising between 2% and 15% by weight of ethyl cellulose, between 20% and 60% solid hydrogenated castor oil, and between 30% and 75% palmitic acid.

5. A flexible packaging sheet material coated with a heat sealable normally tacky wax composition and overcoated with between about 2.5 lbs. and 10 lbs. per ream of a non-blocking composition comprising between 2% and 15% by weight of ethyl cellulose, between 20% and 60% hydrogenated castor oil and between 30% and 75% of a mixture of palmitic and stearic acids, said mixture being in a ratio of 10 parts by weight of palmitic acid to between 1 part and 50 parts by weight of stearic acid.

6. A flexible packaging sheet material coated with a heat sealable normally tacky wax composition and overcoated with between 2.5 lbs. and 10 lbs. per ream of a non-blocking composition comprising between 2% and 15% by weight of ethyl cellulose and between 85% and 98% by weight of palmitic acid.

7. A flexible packaging sheet material coated with a heat-sealable normally tacky wax composition and overcoated with between 2.5 lbs. and 10 lbs. per ream of a non-blocking composition comprising between 2% and 15% by weight of ethyl cellulose and between 85% and 98% by weight of solid hydrogenated castor oil.

References Cited in the file of this patent

UNITED STATES PATENTS

2,319,957	Speicher	May 25, 1943
2,339,200	Sowa	Jan. 11, 1944
2,447,506	Jubanowsky	Aug. 24, 1948
2,603,576	Cook et al.	July 15, 1952
2,750,302	Camarda et al.	June 12, 1956