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METHOD OF ANCHORING COATINGS

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This application is a continuation of application Serial No. 269,781, filed April 24, 1939.

This invention relates to a method for anchoring coatings to fibrous sheet material having a closely formed surface, such as vegetable parchment and similar sheet materials having a relatively high strength when wet.

Recently there have been developed many types of thermoplastic coating materials of varying compositions and for various applications. These coatings may possess one or more of the following properties: waterproofness, moistureproofness, flexibility, heat sealing. They may be applied to sheet materials in the form of "hot melt" compositions or dissolved in volatile solvents, then applied with subsequent evaporation of the solvent.

The coated sheets may be used for a variety of purposes, particularly for packaging purposes in the food industry. One use of considerable importance requires a coated sheet which has a water- and moistureproof, flexible, heat sealing coating. This sheet is employed for making bags, or as a wrapper, for the packaging of frozen foods.

The foods to be frozen include different kinds of berries, fruits, meats, and other commodities. In many cases they have a very high water content when placed in the package. Moreover the frozen containers, during subsequent thawing may condense water on the outside surface. Hence it is necessary that the packaging material resist water; and that both the coating and the base sheet material should not disintegrate when wet.

Papers of high "wet strength" are usually employed for such packages. These papers may be of the vegetable parchment type or they may derive wet strength from treatments such as with viscose, glue-formaldehyde or with certain resins— for example, of the urea formaldehyde type.

When certain coatings are applied to a dense, closely-formed sheet such as vegetable parchment, the anchorage is largely of a superficial type. While the sheet is dry, good adhesion of the coating material may be obtained; but when the sheet is soaked for some time in water the coating may loosen and separate from the paper. This is particularly true if the base paper has been softened with a water-miscible, hygroscopic substance such as glycerine or invert sugar. Since the coating is generally used not only for waterproofing but also for heat sealing the filled bag, any separation between the coating and the paper may be the cause of considerable annoyance.

A coated paper of the type frequently used for frozen food packages is described in United States Patent 2,054,113, September 15, 1936. The coating composition comprises a waxy thermoplastic constituent and a compatible film-forming constituent. The coating composition may, for example, consist of a thermoplastic composition comprising pale crepe rubber and paraffin-wax, the rubber content ranging preferably from about 6 to 50% by weight of the composition. The composition is compounded under controlled conditions so as to have a viscosity not less than 8000 secs. (50 c. c. measured on a Scott viscosimeter at 90° C.) and is applied in hot condition to the base sheet by a hot roll or doctor bar. Instead of paraffin-wax other natural or synthetic waxy substances may be used such as beeswax, amorphous waxes, candelilla, spermaceti, carnauba, hydrogenated oils such as cottonseed and fish oils, and the like, singly or mixtures thereof, all of which substances are included in the term "wax" as used in the appended claims.

The film-forming constituent may be india rubber, balata, gutta percha, smoked sheet rubber, chlorinated rubber, rubber hydrochloride, isoprene polymers, Vistanex (isobutylene polymers) and the like, all of which substances are intended to be equivalents for the term "rubber" as used in the appended claims. The coating composition may be applied to the base sheet in hot molten condition or in a suitable solvent such as benzol, zylol, carbon tetrachloride, acetone, alcohols, ethers or esters and the like. When such a coated sheet is made with a base of wet strength paper it finds wide acceptance because of its unique properties.

However, one disadvantage has been that, if the sheet is soaked in water, the coating often separates from the base "wet strength" paper, particularly if a closely formed sheet such as parchment is used.

Our invention therefore relates to a method of securing tight adhesion of the coating to the fibrous base sheet, especially such as vegetable parchment and the like, when the coated sheet becomes wet and particularly when this sheet has been softened with water-miscible hygroscopic substances such as glycerine and invert sugar.

To accomplish this result we pass the base sheet through a bath of rosin size emulsion such as is ordinarily used in paper mills. This emulsion will usually contain about 3.0% of total solids. A typical analysis of the thick size from which this emulsion is prepared may be as follows: solids 70%, water 30%. Analysis of the solids shows free rosin 33%, combined rosin 56%, soda ash 11%. We prefer to use low concentra-

tion of size since higher concentrations (e. g. 25%) do not work satisfactorily.

After the sheet has passed through the size bath, any excess liquid is removed by running it through squeeze rolls. Then the sheet is again passed into a bath containing an acid coagulating or setting solution such as ordinary paper maker's alum (chemically known as aluminum sulphate). The concentration of this solution is maintained at about 3% by weight of solids. The sheet is then dried in any suitable manner.

The action of the alum solution is to precipitate the rosin on the surface of the sheet material in the form of rosin and/or aluminum resinate. Apparently this precipitate is firmly anchored to the sheet material and, in turn, becomes firmly bonded to the thermoplastic coating later applied.

For example, with rosin as the bonding material, excellent adhesion may be obtained with a thermoplastic coating consisting, for example, of rubber and wax which will not separate when the sheet is wet. The addition of say 8–10% of a resin such as ester gum, glyptal resins, phenol resins, rosin and the like improves the adhesion.

We are fully aware of the fact that a treatment of rosin size, followed by alum, is customarily employed in the paper industry for obtaining water resistance in pulp and paper products, but it is not used on vegetable parchment and similar sheet material. However, our treatment is for an entirely different purpose and accomplishes a different result. As previously indicated, our treatment permits of anchoring thermoplastic coatings to surfaces which are so closely knit that it is not possible to get actual penetration of the coating and bonding into the surface of the sheet. Without such bonding or anchorage, wetting of the sheet will cause the coating to loosen and separate; but with our treatment the coating remains attached to the sheet.

It is important to note that, for proper adhesion of the coating which will not separate when the sheet is wet, a number of conditions must be fulfilled, since the bonding material must (1) be impervious to water (2) anchor suitably to the sheet material (3) be miscible or compatible with the coating material. Thus, other resinous or equivalent materials may be used provided they fulfill the foregoing requirements.

Whereas softening of vegetable parchment, and the like, sheets may be accomplished on the paper machine or by subsequent operation, we find that this may be included with our treatment. For example, the glycerine, invert sugar, etc. may be combined with the rosin size emulsion and with the alum solution, so that the softening is carried out simultaneously with the treatment for anchoring coating.

It is to be understood that numerous changes and modifications may be made in our procedure and in the compositions used which are intended to be included within the scope of the appended claims.

We claim:

1. A coated sheet material comprising a fibrous base sheet having a closely formed surface, a bonding layer on said surface containing rosin size and a thermoplastic coating layer comprising essentially wax and rubber united to said bonding layer, said layers remaining attached when the said sheet is wet.

2. A coated sheet material comprising a fibrous base sheet having a closely formed surface, a precipitated bonding layer of rosin and aluminum resinate on said surface and a thermoplastic coating layer comprising paraffin-wax and 6 to 50% by weight of rubber united to said bonding layer, said layers remaining attached when the said sheet is wet.

3. A coated sheet material comprising a base sheet of vegetable parchment having a closely formed surface, a bonding layer on said surface containing rosin size and a thermoplastic coating layer comprising paraffin-wax and 6 to 50% by weight of rubber united to said bonding layer, said layers remaining attached when the said sheet is wet.

4. A coated sheet material comprising a base sheet of vegetable parchment having a closely formed surface, a bonding layer containing rosin size on said surface and a thermoplastic coating layer comprising paraffin-wax and 6 to 50% by weight of pale crepe rubber having, when applied, an initial viscosity of 8,000 seconds (50 cc. measured at 90° C. on a Scott viscosimeter), said layers remaining attached when the said sheet is wet.

5. The method of anchoring thermoplastic coatings upon a sheet of vegetable parchment which comprises coating said sheet material with a bonding material comprising essentially rosin size, and anchoring to said bonding material a thermoplastic coating composition comprising essentially wax and rubber miscible with said bonding material and compatible therewith.

6. The method of anchoring thermoplastic coatings upon a sheet of vegetable parchment which comprises passing the sheet through a bath of rosin size emulsion, passing the sheet through a coagulating bath, drying such sheet and then applying thereto a thermoplastic coating composition comprising essentially wax and rubber.

7. The method of anchoring thermoplastic coatings upon a fibrous sheet having a closely formed surface which comprises coating said sheet with a bonding material comprising essentially rosin size, and anchoring to said bonding material a thermoplastic coating composition comprising essentially wax and rubber.

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