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ANTIFUNGUS WRAPPER AND METHOD OF PRODUCING SAME

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This invention relates to improvements in anti-fungus wrappers, etc. for use in wrapping food stuffs such as loaves of bread to prevent or inhibit the growth of molds and fungi.

The new anti-fungus wrappers are multi-coated papers having an undercoating of a grease-resistant filmogen immiscible with wax and containing a lower dialkyl dichloro succinate incorporated therein and blended therewith, and an outer coating of wax.

The improved method of forming the new anti-fungus wrappers is one in which a solution of the dialkyl dichloro succinate in a readily volatile solvent such as alcohol and which also contains the filmogen is first applied to the paper with evaporation of the solvent to form a homogeneous undercoat of filmogen and dialkyl dichloro succinate, and in which the paper is then coated with wax.

The paper which is coated by the multi-layer coating process to form the new anti-fungus wrapper is advantageously a sulfite paper such as is used in making waxed bread wrapping. Other common types of wrapping paper such as glassine or cellophane can be similarly treated.

The lower dialkyl dichloro succinates are effective anti-mycotic agents. The dimethyl dichloro succinate is somewhat more effective than the di-isopropyl dichloro succinate. The diethyl dichloro succinate has somewhat similar properties. These dialkyl dichloro succinates which are manufactured and sold, e. g., as dimethyl dichloro succinate, etc. are the alkyl esters of alpha-beta dichloro succinic acid having the general formula R.COO.CHCl.CHCl.COO.R, where R represents the alkyl group.

The filmogen which is used in solution with the alkyl dichloro succinate is one which is soluble in readily volatile solvents such as alcohol in which the dialkyl dichloro succinate is also soluble and which forms an undercoat on the paper which is grease-resistant and immiscible with the wax subsequently applied. A particularly valuable filmogen is ethyl cellulose which is readily soluble in alcohol. Other filmogens include other cellulose ethers and esters which are readily soluble in the low-boiling solvents in which the dialkyl dichloro succinate is soluble such as alcohol, acetone and ethyl acetate. Among such other filmogens are cellulose acetate, cellulose acetate butyrate, and certain grades of cellulose nitrate, which are soluble in acetone and ethyl acetate; also filmogens such as vinyl acetate, ordinary shellac and zein which are resins soluble in alcohol. Filmogens which are soluble in

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ordinary alcohol are particularly advantageous.

The solutions are made by dissolving the dialkyl dichloro succinate and the filmogen in the readily volatile solvent such as alcohol and these solutions are used for coating the paper on one side only, advantageously the inner side of the wrapper, or on both sides, followed by removal of the solvent prior to the waxing treatment. The use of such solutions has the advantage that they can be applied at ordinary temperatures and the solvent readily evaporated without heating the coated paper to a high temperature.

The proportions of dialkyl dichloro succinate and filmogen in the solution can be varied and may be, e. g., from 5–20% of filmogen and 1–5% of dialkyl dichloro succinate, and an amount of dialkyl dichloro succinate corresponding, e. g., to 5–25% of the filmogen. The dialkyl dichloro succinate blends with and acts as a plasticizer for the filmogen to form a homogeneous film, and the amount should be within the limits that will so blend with the filmogen. The amount of dialkyl dichloro succinate may be such that its percentage, based on the total coating of filmogen plus wax, is around 1–2%, or such that its weight per ream of paper coated with the multi-layer coating is around one to three ounces.

Bread wrappers are commonly printed before waxing by the use of an aniline press, a roto-gravure press or other types of printing equipment. The treatment of the paper with the solution of filmogen and dialkyl dichloro succinate is advantageously applied prior to the printing of the paper and in the same machine with the use of means for applying the solution to one side only, particularly to the inside of the paper where it is printed on the outside, or to both sides of the paper, by the use of rolls for applying the solution to the paper, such as small applicator rolls, or by passing the paper through the solution, followed by removal of the solvent without heating the coated paper to a high temperature.

The paper coated with the homogeneous coating of filmogen and dialkyl dichloro succinate is then coated with wax by passing it through a bath of molten wax and then rapidly cooling the waxed paper. The short period of time that the paper is in contact with the hot wax, followed by rapid cooling, results in forming an outer wax coating which encloses and seals the inner coating without blending the inner coating with the wax.

By using a filmogen for the inner coating which is not miscible with wax and which contains the

dialkyl plastic succinate in the form of a homogeneous plastic coating, the dialkyl dichloro succinate is held in this coating, and this coating in turn is enclosed or covered up by the wax. This arrangement is also one in which the transparentization of the wax is decreased and the opacity of the paper increased, which is desirable in opaque wrappers.

The dialkyl dichloro succinate has a poor solubility in hot wax and poor compatibility with cold wax, tending to sweat out from the wax. If the dialkyl dichloro succinate is added to the hot molten wax there is danger of loss by volatilization at the high temperature at which the wax bath is maintained. But by coating the paper first with the coat of dialkyl dichloro succinate and filmogen immiscible with wax and by then coating the paper with wax, these objections are overcome. The dialkyl dichloro succinate is kept from blending with the wax and is covered thereby; but it will very slowly vaporize and escape from the coated paper, making the coated paper an effective and advantageous anti-mycotic wrapper. As a result, too rapid loss of the dialkyl dichloro succinate is avoided and it is released slowly in vapor form over a longer period of time.

The lower dialkyl dichloro succinate which is particularly advantageous is the dimethyl dichloro succinate. The invention will be further illustrated by the following specific example but it will be understood that the invention is not limited thereto.

A solution was made of ethyl cellulose as the filmogen with dimethyl dichloro succinate as the anti-mycotic agent by dissolving them in alcohol ("Quakersol") in the following proportions:

22.5# alcohol
2.5# ethyl cellulose
.5# dimethyl dichloro succinate

This solution was applied to one side of sulfite paper of the kind commonly used in bread wrappers by an applicator roll, using about three to five pounds of the above solution per ream of paper. The solvent was removed by heating at a low temperature and the paper was then water waxed by passing it through molten wax at a temperature of around 180–200° F. followed by rapid cooling of the coated paper with water. The amount of wax applied was about ten pounds of wax per ream of the paper.

Mold tests were conducted using the paper thus produced as a bread wrapper in comparison with bread wrapped with ordinary waxed sulphite wrapping paper. After nine days in a high humidity room the bread wrapped with the above bread wrapper was entirely free of mold while the control samples were practically covered with various mold growths.

In a similar manner other filmogens can be used in solution with the dialkyl dichloro succinate followed by waxing to give a multi-coated anti-mycotic wrapper. As above indicated, in making printed wrapping paper, the coating of the paper on one or both sides with the solution of filmogen and dialkyl dichloro succinate is advantageously combined with the printing operation and the waxing treatment is applied to the coated and printed paper, giving an overcoat of wax over both the printing and over the filmogen-anti-mycotic layer. Where coating of the paper on one side only with the filmogen-anti-mycotic layer is used, this coating is advantageously applied to the inner side of the wrapper and the printing to the outer side, both prior to the waxing treatment. In this case the paper will be coated on one side only with a filmogen and anti-mycotic, will be printed on the opposite side, and will be waxed on both sides.

The improved process of the present invention can be readily carried out in ordinary printing and waxing apparatus with the provision of a coating roll or applicator roll or the like for applying a solution of the filmogen and anti-mycotic and with or without provision for heating to remove the solvent before the waxing treatment.

I claim:

1. An anti-fungus wrapping of paper having an inner coating layer thereon of a dialkyl dichloro succinate and a grease-resistant wax-immiscible filmogen and an outer coating of wax enclosing and covering said inner coating layer.

2. An anti-fungus wrapping of paper having an inner coating layer thereon of dimethyl dichloro succinate and a grease-resistant wax-immiscible filmogen and an outer coating of wax enclosing and covering said inner coating layer.

3. An anti-fungus wrapper as defined in claim 1 in which the filmogen is an alcohol soluble filmogen.

4. An anti-fungus wrapper as defined in claim 2 in which the filmogen is an alcohol soluble filmogen.

5. An anti-fungus wrapping of paper having an inner coating layer thereon of a dialkyl dichloro succinate and ethyl cellulose and an outer coating of wax enclosing and covering said inner coating layer.

6. An anti-fungus wrapping of paper having an inner coating layer thereon of dimethyl dichloro succinate and ethyl cellulose and an outer coating of wax enclosing and covering said inner coating layer.

7. The method of producing an anti-fungus wrapper which comprises coating paper first with a solution in a low-boiling solvent of a dialkyl dichloro succinate and of a grease-resistant wax-immiscible filmogen, removing the solvent and subsequently coating the paper with wax followed by rapid cooling of the wax coating.

8. The method of producing an anti-fungus wrapper which comprises coating paper first with a solution in a low-boiling solvent of dimethyl dichloro succinate and of a grease-resistant wax-immiscible filmogen, removing the solvent and subsequently coating the paper with wax followed by rapid cooling of the wax coating.

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