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PACKAGING MATERIAL

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This invention relates to packaging materials, more particularly paper or cardboard type materials used for the packaging of liquids subject to aging or oxidative deterioration, particularly such products as milk and citrus fruit juices, as well as to the packaged products containing the liquids subject to such deterioration, and methods of producing the packaging containers and methods of packaging the products therein.

In accordance with the present invention, oxidative and aging deterioration in food products is prevented by packaging such products in cardboard, paper, or other flexible containers by application of antioxidants or related substances to the surface or inner body of the container material, whereby such substances exhibit their antioxidant and anti-aging effects, materially lengthening the life of the food product, and without requiring addition of any such antioxidants or related materials into the packaged products themselves. Since the problems connected with the packaging of milk and milk products, particularly high butter-fat-containing liquid milk products, and citrus fruit juices, such as orange juice, raise unique and acute problems in the industry, the invention will be particularly explained in connection with the packaging of such liquid food products.

As noted, the particular types of packaging containers utilized in accordance with the present invention are flexible containers, particularly of the paper and cardboard types, usually carrying waterproof coatings, such as of paraffin or other wax combinations. The antioxidants or antioxygenic or related substances are in accordance with the present invention carried in or on the container surface, and particularly on the surfaces on the inside of the container which are normally in contact with the product to be packaged.

More desirably, therefore, there are employed in accordance with the present invention antioxidants or antioxygenic substances derived from vegetable substances by aqueous extraction. The vegetable substances are the cereals and grains, including oats, barley, hominy, rye, wheat, etc., and the oil-containing seeds, nuts and fruits, more particularly referred to herein as oil-containing seeds, including soya bean, sesame seed, cottonseed, peanuts, etc., the press cakes produced from such oil-bearing seeds, after removal of the oil from such oil-bearing seeds.

These various antioxygenic and antioxidative substances may be applied in any desirable way, either to the containers themselves, or to the flexible materials employed in the production of the containers before fabrication of the latter. Thus the invention includes the treatment of all paper and cardboard packaging materials, and other packaging materials in flexible form, whether made of paper or not, waxed and unwaxed packaging materials, or those treated with lacquers, resins, waterproofing and oilproofing substances, etc. The described packaging materials are those more generally employed in the art, particularly as a single service container in the distribution of market milk, orange juice, and similar products. Various methods and means of applying these antioxygenic substances in accordance with the present invention will be illustrated below.

The board or container is first treated with the extract, and then the paraffin or other coating may be applied over the board or container first treated with antioxidant. Or the antioxidants may be utilized as components of the sizing materials applied in the production of the paper or cardboard material from which the container itself is fabricated, after which the usual coating, such as paraffin coating is applied.

The packaging containers may be treated, either at the time of manufacture or just prior to the filling of such packaging container with the milk or other food product to be packaged therein. Thus spraying apparatus for spraying the inner walls of the packaging containers with the desired antioxidant materials may be made a part of the usual filling equipment, so that just prior to the container being filled with the milk or other food product, the container is sprayed with the antioxygenic composition or substance.

The antioxidant materials when utilized in any of the manners set forth above are not only effective in overcoming the pro-oxygenic activity of the cardboard or other packaging material, but actually improve the keeping quality of the entire packaged product.

In one test, a series of containers carrying pasturized, cooled milk was tested, the milk being pasteurized, cooled, placed in the stated containers and exposed to sunlight for from 15 to 20 minutes. All of the materials under test in the various containers were subjected to the same carefully controlled conditions, the only differences being in the nature of the container itself. Such milk in control glass bottles placed in a cooler, in which the glass bottle carried no antioxidant coating, developed no substantial degree of tallowy or oxidized flavor over a period of seventy-two hours. In the second series, where the milk carried 2 p. p. m. of copper placed in a glass bottle and exposed to sunlight showed a development of tallowy or oxidized flavor quite marked at the end of twenty-four hours, very marked at the end of forty-eight hours, and very pronounced at the end of seventy-two hours. In the third series of tests, the milk contaminated with 2 p. p. m. of copper was placed in a control paper bottle and exposed to sunlight, the paper bottle not carrying any antioxidant on its surface. In this instance, the develoment of tallowy or

oxidized flavor was slower than in the second test referred to above, but was marked at the end of twenty-four hours, very marked in several of the containers at the end of forty-eight hours, and quite pronounced at the end of seventy-two hours.

On the other hand, milk carrying 2 p. p. m. of copper placed in a treated paper bottle and exposed to sunlight showed no substantial tallowy or oxidized flavor at the end of forty-eight hours, and only some tallowy or oxidized flavor at the end of seventy-two hours, and then only in some of the containers. Utilizing a treated paper bottle and using milk contaminated with 2 p. p. m. of copper, otherwise exposed to sunlight as indicated above for the other tests, showed no development of tallowy or oxidized flavor, even at the end of seventy-two hours.

Similarly orange juice may be packaged in these containers to prevent the development of "browning," indicative of oxidation in the orange juice, similar to the development of talliness in milk, and the use of the antioxidant treated packaging containers preserves the orange juice and other similar fruit juices in an analogous manner.

As indicated above, the antioxidants particularly emphasized for use in connection with the present invention are those obtained from vegetative sources because of their particular value in connection with food materials. The vegetative antioxidants may be, as indicated above, those derived or present in the vegetative materials in their natural condition, so that extracts of various types containing concentrated antioxygenic activity may be produced from those materials. In addition, the various antioxygenic materials, either in the form of the naturally occurring substances which exert antioxygenic activity, or their extracts and derivatives may be activated. Activation may take place in a variety of ways, and result in antioxygenic materials of great value, because of their increased activity. Extracts of the oil-bearing seeds or any of the cereals described above, or products such as soya flour, peanut flour, barley flour, etc., such as the aqueous extract of oat flour, may be mixed with glucose or a sucrose syrup for example, or with glycerine, or other hydroxy-containing material, and heated, for example, to 400° F. for approximately 10 minutes to increase the normal antioxygenic activity of the vegetative material, and the resulting activated product may be utilized in lieu of the vegetative material itself.

The vegetative materials which are used by themselves without admixture with other substances may be activated from an antioxygenic standpoint in this same way to protect those substances against oxidative change of undesirable character, thus enabling the product used for food or other purposes to be treated in situ for development of protectants of marked character without involving the inclusion or addition of extraneous substances other than the activating agent, of the character referred to. Since the latter may, as indicated, be a material commonly used in foodstuffs, no restrictions or inhibitions apply to antioxidants or activated materials produced in this way.

The treatment of vegetative materials to activate or accentuate antioxygenic activity may take place at any time desired, before admixture with other materials, or after such admixture, or after application to the containers, or other products, so long as the heat treatment employed does not undesirably affect the product or container material, or other substances present under such conditions.

As indicated above, the use of the antioxidants may be applied to packaging materials of various types, and in any desired way, either prior to the manufacture of the container, or after the latter has been produced, or may be incorporated into the packing material during the manufacture of the same, and prior to fabrication into articles. Under particular circumstances, depending on the nature of the packaging material, various expedients may be employed for introducing the antioxygenic effect, or for applying the antioxygenic substances. Thus where the inner surface of the packaging material is of regenerated cellulose or of synthetic resin type, the antioxygenic substances may, for example, be added to the lacquer or coating composition with the solvent employed, and such additions may be made to the coating composition whether the latter is of low or high viscosity.

Various other methods of utilizing the antioxygenic materials in the treatment of packaging materials, either in the form of the stock from which the containers are made, or after fabrication of the latter can be carried out utilizing the various procedures and features referred to above.

The present application is similar in subject matter to copending applications, Serial No. 190,887, filed February 16, 1938, and Serial No. 276,413, filed May 29, 1939.

Having thus set forth my invention, I claim:

1. A paper packaging material for organic products susceptible to oxidative deterioration, said packaging material being interiorly surfaced with an antioxygenic water soluble extract of a material selected from the group consisting of the oil containing seeds and cereals, and said surfacing being coated with a paraffin waterproofing composition.

2. A paper packaging material for organic products susceptible to oxidative deterioration, said packaging material being interiorly surfaced with an antioxygenic water soluble extract of an oil containing seed, and said surfacing being coated with a paraffin waterproofing composition.

3. A paper packaging material for organic products susceptible to oxidative deterioration, said packaging material being interiorly surfaces with an antioxygenic water soluble extract of a press cake of an oil containing seed, and said surfacing being coated with a paraffin waterproofing composition.

4. A paper packaging material for organic products susceptible to oxidative deterioration, said packing material being interiorly surfaced with an antioxygenic water soluble extract of a material selected from the group consisting of the oil containing seeds and cereals, and said surfacing being coated with a waterproofing wax composition.

5. A paper packaging material for organic products susceptible to oxidative deterioration, said packaging material being interiorly surfaced with an antioxygenic water soluble extract of a cereal, and said surfacing being coated with a waterproofing wax composition.

6. A paper packaging material for organic products susceptible to oxidative deterioration, said packaging material being interiorly surfaced with an antioxygenic water soluble extract of oat flour, and said surfacing being coated with a waterproofing wax composition.

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