

UNITED STATES PATENT OFFICE

2,030,962

MOISTUREPROOF MATERIAL AND METHOD OF MAKING SAME

William Hale Charch, Buffalo, and William L. Hyden and John C. Siemann, Kenmore, N. Y., assignors to Du Pont Cellophane Company, Inc., New York, N. Y., a corporation of Delaware

No Drawing. Application August 5, 1932,
Serial No. 627,600

42 Claims. (Cl. 91—68)

This invention relates to coated materials and the method of producing the same. More particularly it relates to sheets or films, specifically sheets or films of regenerated cellulose, surfaced with a coating, whereby said material is rendered resistant to the passage of moisture or water vapor therethrough, said surface coating being firmly anchored to the base.

Sheets or films of regenerated cellulose have been rendered resistant to the passage of moisture or water vapor therethrough by coating said sheets or films with a moisture-proofing composition comprising a cellulose derivative and a wax, with or without a gum or resin, and optionally a plasticizer. These coated sheets or films, in addition to possessing the desired property of resistance to the passage of moisture or water vapor therethrough, are also transparent, flexible, non-odorous, non-greasy and non-tacky. These sheets are used extensively as wrapping materials, particularly for wrapping food products and other products containing moisture, whereby said products are maintained in their original fresh and/or moist state for a substantial period of time. In addition to maintaining the original fresh, moist condition of the products wrapped, the wrapper enhances the beauty and appearance of the package.

It has been found that, while these coated sheets of regenerated cellulose are resistant to the passage or penetration of moisture or water vapor therethrough, particularly the moisture present in the air or in the product wrapped, they are not suitable for a prolonged or extended use in contact with products having an exceedingly large amount of moisture or water present or capable of being formed. More particularly the present coated sheets or films of regenerated cellulose are not well adapted for use with wet and/or soggy materials, such as, for instance, frozen or wet fish, butter, ice cream and other materials which have water associated therewith and which water it is desirable to keep in association therewith. When materials of the type just mentioned are wrapped in the coated sheets or films of regenerated cellulose, it has been found that the coating loosens from the base on prolonged contact therewith. This, of course, in view of the fact that the base of regenerated cellulose is not resistant to the passage or penetration of water therethrough, reduces the effectiveness of the wrapper and prevents the obtaining of the desired results.

We have found that we can produce a material capable of use as a wrapping tissue for

wrapping fish, butter, ice cream and other materials which have water associated therewith, and which water it is desirable to keep in association therewith by firmly securing or anchoring the coating to the base by means of a film of a drying oil, with or without gums and/or resins and/or softeners disposed intermediate said coating and said base. By the expressions "anchoring" or "anchored", or equivalent terminology used herein, is meant the securing of the surface coating imposed on a suitable base formed of a cellulosic material having a smooth, dense and non-porous surface, for example, a sheet of regenerated cellulose, and comprising a cellulose derivative and a wax, with or without a gum or resin, and optionally a plasticizer, so that the product will withstand the deleterious effect of water or high moisture to a greater degree than a product in which the intermediate anchoring coating is omitted.

It is therefore an object of this invention to provide a coated material which is resistant to the passage or penetration of moisture or water vapor therethrough and wherein the moisture-proof surface coating is anchored to a base formed of a cellulosic substance having a smooth, dense and non-porous surface by a layer or film of a drying oil, with or without gums and/or resins and/or softeners, interposed between said base and surface coating.

Another object of this invention is to provide a coated material having a base consisting, for example, of regenerated cellulose and a moisture-proof surface coating of a composition comprising a cellulose derivative and a wax, with or without a gum or resin, and optionally a plasticizer, said coating being anchored to said base by means of a film or layer of drying oil, with or without gums and/or resins and/or softeners disposed therebetween.

An additional object of this invention comprises a coated material having a base comprising a sheet or film of regenerated cellulose and a moistureproof surface coating which is anchored to said base by means of a layer or film comprising an oxidized drying oil, with or without gums and/or resins and/or softeners.

A still further object of this invention is to provide a method for producing an article having the properties above set forth.

Other objects will appear from the following description and appended claims.

As is apparent from the above-mentioned objects, this invention in one of its phases contemplates a material which is not only resistant to

to the passage or penetration of moisture or water vapor therethrough, but also wherein the moistureproof coating does not loosen when used in combination with materials having an exceedingly large moisture or water content.

As the base, this invention contemplates a cellulosic material having a surface which is smooth, dense and quite impermeable to the composition constituting the surface coating. When such materials are moistureproofed by coating with the selected composition, the latter will not penetrate therethrough and will normally result in surface coating. Sheets or films of regenerated cellulose, chemically treated papers, as papers which have been partially or wholly gelatinized or regenerated, highly calendered paper and glassine paper, may be cited as illustrative examples. In the preferred form of the invention, the base is also transparent.

As the composition constituting the surface coating, the instant invention contemplates any moistureproofing composition which would normally deposit a non-tenaciously adhering film on the base and which contains one or more substances which wets the anchor coating and/or unites therewith. Moistureproofing compositions comprising a cellulose derivative, a wax and a solvent or solvent mixture, with or without gums or resins, and optionally a plasticizer, may be used. In the preferred embodiment, the moistureproofing composition comprises a cellulose derivative, a gum or resin, a wax and a plasticizer of the type specifically set forth in Patent 1,826,696.

As the anchoring medium, the instant invention contemplates a coating preferably thin and transparent and comprising a drying or semi-drying oil, such as linseed, China-wood, cottonseed, etc. and wholly or partly dried. Gums, resins, condensation products, the usual varnish gums, shellac, resin made from a polyhydric alcohol and a polybasic acid, treated rosin, etc. may be added to the drying oils to constitute what are commonly known as varnishes of the drying oil type, i. e. quick drying varnishes. Also, various softeners may be added to the drying oil or varnish, whereby the flexibility of the coating resulting therefrom may be increased. By the addition of waxes, such as paraffin, to the varnish or drying oil compositions, the coating thereof may be rendered more effective against the passage or penetration of moisture or water vapor therethrough.

We have also found that a somewhat better anchoring may be produced when using cellulose films containing a high content of water and/or a softener, such as glycerin, if the anchoring composition contains a material which is capable of dissolving the water and softener present in the cellulose film. These materials may be either a solvent, such as ethyl acetate, ethylene glycol mono-ethyl ether or ethylene glycol mono-methyl ether; or such non-volatile materials as ethylene glycol mono-butyl ether, ethyl lactate or ethyl oxybutyrate.

The anchoring coating medium may be applied with or without the use of solvents or diluents. Preferably, a solvent or diluent is employed in order to more evenly distribute over the base a very thin film of a composition. After the application of the anchoring coating composition, the coating is dried prior to the application of the moistureproofing composition which is to form the surface coating of the final product. It is to be noted that this drying step not only refers to the removal of the solvent but also in-

cludes the chemical modification by oxidation of the drying oil in the composition.

In order to achieve this effect, the base material coated with the anchor coating medium may be permitted to dry as by allowing the coated base to remain in the air for a sufficient interval of time necessary to produce the desired result. Alternatively, the material coated with the anchor coating medium may be subjected to some artificial means of increasing or accelerating the drying operation. For example, the coated film may be passed through a heated chamber, or ozonized air may be caused to contact with the film. Again, the drying may be still further accelerated by incorporating into the anchor coating composition one or more of the well-known driers, for example, cobalt or manganese linoleate.

In order to more clearly illustrate the invention, the following example is given. It is to be understood that this example does not limit the invention in any manner whatsoever, but is merely illustrative of one modification thereof.

A solution is made by dissolving 10 grams of blown linseed oil and 1 gram of a common cobalt linoleate drier in 83 grams of toluene. If desired, to this solution there may be then added 5 grams of ethylene glycol mono-butyl ether and/or 1 gram of paraffin. A sheet or film of regenerated cellulose is coated with this solution and the solvent evaporated at an elevated temperature, such as between approximately 75° C. and 90° C. The dried coating is approximately one ten-thousandths of an inch thick (both sides). This coated sheet is then coated with the composition forming the surface coating and which comprises preferably a cellulose derivative and a wax, with or without gums or resins, and optionally a plasticizer. After the application of the surface coating composition, the resultant material is subjected to a temperature approximately that or higher than the melting point of the wax in the surface coating composition and treated as set forth in Patent 1,826,699.

The product which results from this process is capable of being suspended in water at room temperature without the surface coating becoming loose enough to be rubbed off between the fingers for a period which is at least 5, 10, 20, 30, 40, 50, 100, 150, 200, or even more times greater than that of regenerated cellulose coated with the surface coating without the anchoring coating. In addition, the product of this invention contains all the desirable properties of the prior material, i. e., glass-clear transparency, high degree of flexibility, good surface slip, non-tackiness, etc.

In the foregoing the expressions "resistant to the penetration or passage of water vapor or moisture therethrough" and "moistureproof" have been employed. By these expressions is meant the ability of the product to resist the penetration or passage of moisture or water vapor therethrough to an extent at least 7 times, and preferably 10, 15, 20, 30, 50, 100 or even more times, as great as that of the uncoated sheet or film when tested in accordance with the test set forth in the Journal of Industrial & Engineering Chemistry, page 575, vol. 21, No. 6, June 1929.

It is apparent that various modifications may be made in the specified details above set forth by one skilled in the art. The invention is, therefore, not limited to the exact and precise details described excepting as defined in the appended claims.

a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a varnish of the drying-oil type, drying the same, and applying the moistureproofing coating directly on the first coating.

21. In a method of coating sheets or films of regenerated cellulose containing moisture and a softener with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a drying oil and an agent capable of dissolving the moisture and softener present in or on said sheets, drying the same, and applying the moistureproofing coating directly on the first coating.

22. In a method of coating sheets or films of regenerated cellulose containing moisture and a softener with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of treating said sheets or films of regenerated cellulose with a composition consisting essentially of a varnish of the drying-oil type and an agent capable of dissolving the moisture and softener in or on said sheets, drying the same, and applying the moistureproofing coating directly on the first coating.

23. In a method of coating sheets or films of regenerated cellulose with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a drying oil, softener and drying the oil coating, and applying the moistureproofing coating directly on the first coating.

24. In a method of coating sheets or films of regenerated cellulose with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a varnish of the drying-oil type and softener, drying the same, and applying the moistureproofing coating directly on the first coating.

25. In a method of coating sheets or films of regenerated cellulose containing moisture and a softener with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a drying oil, a softener and an agent capable of dissolving the moisture and softener present in or on said sheets, drying the same, and applying the moistureproofing coating directly on the first coating.

26. In a method of coating sheets or films of regenerated cellulose containing moisture and a softener with a composition comprising a cellulose derivative, a gum, a wax and a plasticizer, the steps of coating said sheets or films of regenerated cellulose with a composition consisting essentially of a varnish of the drying-oil type, a softener and an agent capable of dissolving the moisture and softener in or on said sheets, drying the same and applying the moistureproofing coating directly on the first coating.

27. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil disposed directly between said sheet or film and surface coating and rendering the

product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating.

28. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil and a softener disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating.

29. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying-oil type disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating.

30. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying-oil type and including a softener disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating.

31. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of oxidized linseed oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating.

32. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating.

33. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil and a softener

disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating.

34. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying-oil type disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating.

35. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying oil type and including a softener disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating.

36. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of oxidized linseed oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating.

37. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

38. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying-oil type disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room

temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

39. A wrapping tissue consisting of a transparent sheet or film of a cellulosic material having a smooth, dense and non-porous surface, a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of oxidized linseed oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the cellulosic base and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

40. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of a drying oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

41. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed from a composition consisting essentially of a varnish of the drying-oil type disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

42. A wrapping tissue consisting of regenerated cellulose sheeting having a transparent moistureproof surface coating on each side thereof, and a transparent coating formed of a composition consisting essentially of oxidized linseed oil disposed directly between said sheet or film and surface coating and rendering the product capable of withstanding the deleterious action of water at room temperature for a period of time which is at least five times greater than a product consisting of the regenerated cellulose sheeting and moistureproof coating, the total thickness of the anchor coating on both sides of the base sheet or film being approximately one ten-thousandths of an inch.

WILLIAM HALE CHARCH.
WILLIAM L. HYDEN.
JOHN C. SIEMANN.