Patented Dec. 29, 1936 2,065,792

UNITED STATES PATENT OFFICE

2,065,792

MOISTUREPROOF GELATINE

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No Drawing. Application August 9, 1928, Serial No. 298,634

1 Claim. (Cl. 91—68)

This invention relates to moistureproof articles of manufacture and more especially to a method of making a moistureproof gelatine film or sheet. By the term "moistureproof" I mean the ability to resist the transmission or diffusion of water vapor to an extent at least as great as or exceeding that displayed by ordinary waxed papers employed as wrappers and functioning to resist the penetration of water vapor therethrough to a substantial degree for a substantial period of time, depending on the article being wrapped and/or being approximately 7 times or more as effective as uncoated sheets or films of gelatine when tested in accordance with the test set forth in the Journal of Industrial and Engineering Chemistry on page 575, vol. 21, No. 6 (June 1929).

Today it is the practice to wrap various articles, such as cakes, cookies, cigars, candies, drugs, and the like in moistureproof materials. It is essential that these wrapping materials be transparent, flexible, non-tacky, odorless, and, of course, moistureproof.

I have found that I can produce a transparent, flexible, odorless, moistureproof material by coating a sheet or film of gelatine, preferably hardened, with a composition capable of rendering the gelatine moistureproof.

It is, therefore, the object of this invention to prepare a transparent, moistureproof material capable of being used as a wrapping material.

Another object of this invention is to provide a method of making a moistureproof material having gelatine as a base and being thin, flexible, colorless, odorless, non-tacky and preferably also transparent.

A specific object of this invention is to provide a method of preparing a moistureproof material comprising a sheet or film of gelatine coated with a composition comprising a cellulose derivative and a wax.

Further objects will appear from the following description and appended claim.

In carrying out my invention I coat a sheet or film of gelatine, preferably hardened by any of the well-known hardening agents, such as tannins, potassum bi-chromate, formaldehyde, and the like, with a suitable moistureproofing solution. Preferably, the solution which I use comprises a cellulose derivative, a wax, a plasticizer, a gum and a solvent or solvent mixture. After the application of the coating composition to the base, which may be by spraying, immersion or other manner to one or both sides of the base, the solvent mixture is removed by subjecting the treated material to a drying or heated atmosphere. This step is best carried out at a temperature approximately that of the melting point of the wax used in the coating solution for the reason that separation of the wax and, therefore, "blushing" is prevented.

The drying step may render the coated sheets somewhat brittle. If this is the case, the coated sheets may be subjected to an atmosphere, wherein the coated sheets are humidified and whereby the flexibility of the product is restored. This step is also preferably carried out at a temperature approximately that of the melting point of the wax in the coating composition. The flexibility of the final product may be partly controlled by incorporating in the gelatine composition forming the sheet or film, any of the well-known softening agents for gelatine.

A gelatine film or sheet coated in this manner produces a satisfactory moistureproof material in which the adhesion of the coating to the base is satisfactory. However, if desired, the adhesion of the coating to the base may be increased by hydrolyzing the surfaces of the gelatine film or sheet prior to coating.

When the coating composition is applied to gelatine having hydrolyzed surfaces the solvent in the coating composition tends to partially dissolve the layer of hydrolyzed gelatine, thereby anchoring the super-imposed coating to the base of gelatine. The hydrolysis may be obtained and produced in various ways. I have found that when the gelatine film is subjected to a 1–2% acetic acid solution at a temperature of between 50°–90° C. for a relatively short period of time, about one to ten minutes, satisfactory results are obtained.

The composition may be applied to one or both sides of the gelatine base to form, when dry, coatings ranging from .00005 to .0005 of an inch in thickness. The thickness of the final product will depend largely on the thickness of the gelatine base and whether or not both surfaces of the base are coated. Thus the thickness of the final product may vary from .0005 to .01 of an inch or even greater.

The composition which I employ as my moistureproofing solution, as previously stated, comprises a cellulose derivative, a wax, gum or resin, a plasticizer and a solvent or solvent mixture. The cellulose derivative which may be used may be nitro-cellulose, cellulose acetate, cellulose ether and the like.

The gum or resin that I may use may be estergum, resin, gum-mastic, copal resins or synthetic resins. These gums or resins may be used either singularly or in combination.

For the wax I prefer to use a high melting point paraffin wax. Other waxes such as beeswax, carnauba wax, ceresin wax and the like, or combination of waxes, may be used.

The plasticizer which I employ may be any of the compounds or mixtures having a high boiling point and which are known as "plasticizers" or "softeners" for cellulose derivatives. I prefer to use a plasticizer which shall be substantially colorless and have obtained successful results when tri-cresyl phosphate, tri-phenyl phosphate, di-amyl phthalate or di-butyl phthalate, or castor oil were used.

The above ingredients when used in proper proportions and with suitable solvents produce a material which, after evaporation of the solvent, is not only moistureproof, but is flexible without cracking, perfectly transparent, devoid of greasiness or tackiness and has the requisite tensile strength for the purposes for which it is desired to be used.

Various proportions of the above ingredients may be used. I have found that satisfactory results may be obtained when the ingredients are used in the following percentages, by weight:

	Percent
Cellulose derivative	30–70
Gum	30–60
Wax	2–6
Plasticizer	5–30

The following specific examples have produced satisfactory results:

Example I

	Percent
Nitro-cellulose	52
Ester-gum	35
Di-butyl phthalate	8.7
Paraffin	4.3

Example II

	Percent
Nitro-cellulose	50
Gum dammar	34
Tri-cresyl phosphate	12
Paraffin	4

The wax and cellulose derivative base ordinarily do not mix to form a clear film. However, by a proper choice of gum it has been found possible to make the combined gum and wax mix with the plasticizer and cellulose derivative. The solvent mixture is then chosen to retain the gum, wax, cellulose derivative and plasticizer in their proper proportions in complete solution until the entire solvent is evaporated.

It is desirable to employ solvents for the waxes up to 50% or over, by weight, in order to maintain the wax in solution during the process of drying the coating or sheet. Also, it is desirable to employ relatively low percentages of intermediate boiling solvents for the nitro-cellulose. By employing these solvents in a proportion of 10% and under of the total solvent a too rapid drying of the coating is prevented. While the particular solvent must be determined separately for the particular composition, I have found that the following specific solvent combinations when used with the respective examples of compositions above described, produce satisfactory results:

Solvent for Example I:

	Percent based on total volume of solvent
Alcohol	25
Ether	43
Toluene	18
Butyl acetate	14

Solvent for Example II:

Ethylacetate	62
Toluene	27
Alcohol	9
Butyl acetate	2

In this application I make no claim to the particular coating composition, since it is claimed in the co-pending application of Charch and Prindle, Serial No. 308,873 filed Sept. 27, 1928.

Though the moistureproof gelatine has been described as particularly adapted as a wrapping material this invention is in nowise limited thereto, since various other uses will become apparent to one skilled in the art.

I claim:

In a method of making a transparent, flexible, non-tacky and moistureproof sheet material suitable for use as a wrapping tissue wherein the moistureproof coating effectively adheres and is secured to the base, the steps which comprise treating the surface of a film of gelatine with an aqueous solution containing 1 to 2% of acetic acid at a temperature of approximately between 50° to 90° C. for approximately 1 to 10 minutes to form a hydrolyzed gelatine surface to which a moistureproof composition will effectively adhere, and thereafter applying to the hydrolyzed surface a moistureproofing composition comprising a cellulose derivative and a wax in proportions to produce a transparent, flexible, adhering, non-tacky and moistureproof coating, whereby a moistureproof coating is effectively secured to the gelatine base sheet or film.

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