Patented Dec. 8, 1953 2,662,040

UNITED STATES PATENT OFFICE

2,662,040

MILDEW-RESISTANT MINERAL-COATED SOAP WRAP

Joseph J. Thomas, Westbrook, Maine, assignor to S. D. Warren Company, Boston, Mass., a corporation of Massachusetts

No Drawing. Application August 17, 1949, Serial No. 110,881

7 Claims. (Cl. 117—155)

1

This invention relates to a mildew-resistant mineral coated paper product suitable for use in wrapping cakes of soap.

Soap is customarily made by reacting an alkaline reacting, alkali-metal compound, e. g. sodium hydroxide or sodium carbonate, with a suitable fat or suitable fatty acid in aqueous medium. The soap so formed is separated from the mixture, as by salting out, and if desired other materials may be added thereto, e. g. coloring or perfuming materials. The soap is then pressed into bars or cakes which are usually wrapped individually in paper wrappers before being stored.

Soap usually, and probably always, contains a considerable amount of water at the time it is pressed into cakes and wrapped. While some of the water content is doubtless lost during prolonged storage, nevertheless sufficient moisture remains for a comparatively long time so that the paper wrapper for a considerable period is kept somewhat damp and slightly alkaline by reason of the alkalinity of the soap dissolved by the water. Consequently conditions are favorable for discoloration of the paper wrapper by alkali and for development of mildew or mold on or in the wrapper because of its damp and alkaline condition.

Obviously neither alkali-stain nor mildew can be tolerated in the wrapper of an article offered for sale. Various suggestions have been made in regard to prevention of alkali-staining of uncoated paper soap wrappers; for example, to use only high-alpha cellulose fiber; to avoid use of rosin size; and to include acid in the paper.

Although trouble from alkali stains can be minimized or avoided by proper choice of paper, danger of mildew has in the past made impracticable the use of mineral-coated paper for wrapping soap. Naturally, the well-known superiority of mineral coated paper in respect to appearance and printing quality have made many soap manufacturers try to use such mineral-coated paper as a soap wrap, but trials have encountered so much difficulty from mildew that it has never been considered safe to wrap any of the largest selling brands of soap in mineral-coated paper. Mineral-coated papers have traditionally been made by applying to a suitable paper base or body stock an aqueous slurry comprising mineral pigment such as clay, calcium carbonate, or titanium dioxide, and adhesive material, usually casein, glue, or starch, and drying the so coated paper. It has been found that the adhesives commonly used in most mineral coatings for paper provide a medium highly favorable for the development of the molds which produce mildew. In fact such conventional adhesive materials support mold growth so much more effectively than does cellulose that it is not practicable in the case of coated soap wrap paper containing such adhesives to use sufficient mold inhibitor to prevent mold growth thereon. To make such paper mold-proof requires such excessive amounts of mold-inhibitor that the resulting product is objectionable from consideration of odor and/or toxicity.

2

Practice of the present invention yields a satisfactory mineral-coated soap-wrap paper which is capable of being printed satisfactorily, which is satisfactorily alkali-proof, and which is free of mold-nutrient material at least as resistant to mold or mildew as are usual uncoated soap-wrap papers.

According to the invention, a paper web of any desired weight is prepared from a furnish comprising bleached chemical wood pulp which is of high quality, but not necessarily of the highest quality high-alpha fiber. The furnish may contain filler, if desired, such as clay or calcium carbonate, and may be sized with rosin size, but it should not contain starch, casein or other substance which readily supports mold growth. The paper web is then coated, preferably on one side only, by any desired method, with an aqueous mineral-coating composition which is free from the natural adhesive materials aforesaid which mold so easily. Instead, the composition is made up of mineral matter such as clay, calcium carbonate, titanium oxide, or the like and an adhesive comprising synthetic material which is not readily attacked by the common molds which cause mildew. The coated paper is dried and smoothed in known fashion. It is then usually printed, and finally it is used to wrap a somewhat moist cake of soap. The wrapped cakes of soap may be stored for a considerable time. It is found that packages so prepared show no more tendency to develop mildew or alkali-stain than similar packages in which an uncoated paper wrap is used. That is to say, under ordinary storage conditions no trouble whatever occurs from mildew or alkali-stain. It is to be understood, of course, that neither type of package, either the one wrapped in uncoated paper or the improved package of the invention wrapped in mold-resistant mineral-coated paper containing only synthetic adhesive, is intended to withstand immersion in water or actual condensation of a visible film of water on its surface.

Several synthetic adhesive materials are available which are certainly as mold-resistant as cellulose fiber, and in some cases are considerably more mold-resistant. While generally speaking any such material may be used as adhesive in a mold-resistant coating, adhesives of the class known to the trade as "synthetic elastomers" are extremely useful—a typical synthetic elastomer being the common styrene-butadiene copolymer usually called GR–S rubber. The elastomers are used as coating adhesives in the form of an aqueous dispersion, commonly referred to as a "latex" from analogy with natural rubber latex.

While it is possible to use such a synthetic elastomer latex as the sole adhesive component in a mineral coating, the coating composition is made much more stable by inclusion therein of a protective colloidal material. It has been found that synthetic protective agents can be used in this relation with good results. For example, polyvinyl alcohol can be used effectively to protect the synthetic elastomer in the coating composition. Other suitable protective agents include methyl cellulose, carboxymethylcellulose, hydroxyethyl cellulose. Obviously, for the reasons previously stated, such known natural protective colloidal materials as casein, starch or glue cannot be used as protective agents for the synthetic elastomers employed in the mineral coating compositions contemplated herein.

Suitable synthetic elastomers include styrene-butadiene copolymers typified by GR–S rubber, butadiene-acrylonitrile copolymers, styrene-isoprene copolymers, methyl acrylate-acrylonitrile copolymers, polychloroprene, plasticized polystyrene, plasticized polyvinyl chloride, and plasticized copolymer of vinyl chloride and vinylidene chloride. Any of such synthetic elastomers or any of the protective agents mentioned in the preceding paragraph can be used as the sole adhesive in a mineral-coating composition according to the invention, but the preferred practice is to use a mixture of a synthetic elastomer and a synthetic protective colloid of the type mentioned previously.

Owing to the before-mentioned necessity for exclusion from the paper base of substances which actively support mold growth, it is practically essential under the invention to restrict the fiber content to new or socalled virgin fiber. That is because of the practical impossibility of being certain that any specific lot of reworked or "old paper" pulp is made from papers entirely free from mold-promoting substances. Avoidance of old paper pulp does not, of course, preclude the reuse of trimmings and broke made during the actual manufacture of the paper described. Naturally such material is recycled through the paper making process and is the full equivalent of the original virgin fibers.

Of the synthetic elastomer latexes available, consideration of cost tends to narrow the choice for the paper coating field to the styrene-butadiene copolymers, that is to the GR–S type of latex. Some of the other synthetic elastomers mentioned are actually somewhat superior in their physical qualities to GR–S latex, but their present higher price discourages their replacing the relatively cheap GR–S latex. The GR–S type latex is quite satisfactory as a paper-coating adhesive, the 60 styrene-40 butadiene copolymer being one which is especially good for such use.

When only a small quantity of synthetic protective colloid is used to protect the latex it makes little difference which one is used. Polyvinyl alcohol is very satisfactory for this purpose, and when a large quantity of colloid is desired to be used with the latex, polyvinyl alcohol is probably the most convenient to use.

The coating compositions of the invention appear to be somewhat less susceptible to mold growth than is ordinary uncoated paper made from purified cellulose fiber without addition of natural organic matter such as starch, casein, etc. In fact the coating of the invention probably to some extent acts actually to increase the mildew-resistance of paper coated therewith. Nevertheless, some users may prefer to include in the coating an unobjectionably small but effective quantity of mold-proofing agent equivalent to that frequently used in uncoated paper soap-wrapper. For example, about 0.5% of "Preventol G. D." may be included in the coating, "Preventol G. D." being the trade designation of a mold-inhibitor consisting essentially of the organic chemical 2,2'-dihydroxy-5,5'-dichlorodiphenylmethane. Tests have not shown the inclusion of such an agent to be necessary in practicing the invention, but such an addition does probably give an increased factor of safety. It may be said that addition of that quantity of mold-inhibitor to an ordinary casein-containing mineral coating for paper is not effective to prevent mold-growth in paper coated therewith and subsequently used as a soap-wrap.

Following are examples of mineral coated papers according to the invention:

Example 1

A paper making furnish was prepared from about equal quantities of bleached sulfiite pulp and bleached soda pulp. Added to this were rosin-size, alum, and clay filler. The furnish was formed into a paper web and dried. The paper so made contained 8 per cent of clay and weighed 48 pounds on the basis of 500 sheets 25 x 38 inches in size. The paper web was then coated on one side with 12 pounds, dry weight per ream, of a coating composition consisting (in addition to water) of:

100 parts coating clay
0.5 part tetrasodium pyrophosphate (a dispersing agent)
0.5 part low viscosity polyvinyl alcohol
16 parts (dry basis) of a 60–64 styrene-butadiene copolymer
2 parts tributyl phosphate (an anti-foaming agent)

Example 2

The experiment described in Example 1 above was repeated, but there was added to the coating composition 0.4 part of a mold inhibitor, "Preventol G. D." consisting essentially of 2,2'-dihydroxy-5,5'-dichlorodiphenylmethane.

Example 3

A paper web was made from a furnish containing 60 parts of good quality bleached wood fibers, from coniferous trees, prepared by the sulfite pulping process and 40 parts of good quality bleached wood fibers, from deciduous trees, prepared by the soda pulping process. The furnish was sized with rosin-size and alum, and contained no filler, no waste paper, and no added mold-supporting organic matter. The weight of the paper web was 43 pounds on the basis of a 500 sheet ream 25 x 38 inches in size. The paper web was coated on one side by means of a Warren

air-knife coater with 17 pounds dry weight per ream of a coating composition containing (in addition to water) the following ingredients:

100 parts high quality calcium carbonate
0.5 part tetrasodium pyrophosphate
0.5 part low viscosity polyvinyl alcohol
20 parts (dry basis) 60–40 styrene-butadiene copolymer
2 parts tributyl phosphate

Example 4

The experiment described in Example 3 above was repeated, but there was added to the coating composition 0.4 part of "Preventol G. D."

The sheets of all four examples were supercalendered to a high finish, printed with appropriate indicia, and used to wrap cakes of freshly made soap of about 30 per cent moisture content. The wrapped cakes were packed in cartons as is customary, and were stored for several months under storage conditions normally conducive to mold formation. No mildew developed in any case and all samples were considered satisfactory.

The term "mineral-coated paper" as used herein refers to paper having a supercalendered surface layer consisting essentially of a major proportion of finely divided mineral matter, i. e., pigment, and a minor proportion of organic adhesive material or binder, said surface layer being deposited from an aqueous medium. Such paper provides an excellent surface to be printed by conventional printing methods and is quite distinct from a lacquered or varnished surface which may have equal gloss, but which is usually not printable in the same manner and of which the ingredients and proportions are quite different.

I claim:

1. A mold-nutrient-free supercalendered mineral coated paper soap wrapper comprising a paper base and a mineral coating, said paper base consisting essentially of cellulose fibers and said mineral coating consisting essentially of finely divided mineral matter, a synthetic adhesive elastomer of the group consisting of styrene-butadiene copolymers, butadiene-acrylonitrile copolymers, styrene-isoprene copolymers, methyl acrylate-acrylonitrile copolymers and polychloroprene and a protective colloid of the group consisting of polyvinyl alcohol, methyl cellulose, carboxymethyl cellulose and hydroxyethyl cellulose.

2. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the cellulose fibers are rosin sized.

3. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the paper base contains a mineral filler.

4. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the adhesive elastomer is styrene-butadiene copolymer.

5. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the protective colloid is polyvinyl alcohol.

6. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the adhesive elastomer is styrene-butadiene copolymer and the protective colloid is polyvinyl alcohol.

7. A mold-nutrient-free supercalendered mineral coated paper soap wrapper as defined in claim 1 in which the cellulose fiber is virgin cellulose.

JOSEPH J. THOMAS.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,982,018	Owen	Nov. 27, 1934
2,267,310	Shearer	Dec. 23, 1941
2,287,348	Hayden	June 23, 1942
2,322,887	Schwartz	June 29, 1943
2,328,057	Coulter	Aug. 31, 1943
2,453,880	Vanderbilt	Nov. 16, 1948
2,474,801	Owen	June 28, 1949
2,496,566	Szwarc	Feb. 7, 1950
2,537,114	Young et al.	Jan. 9, 1951

OTHER REFERENCES

Partridge, "Latex Compounds for Paper Industry," May 1948, pages 221–223, India Rubber World.