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[54] FOOD PACKAGING METHOD EMPLOYING RELEASE AGENT COATED PACKAGING MATERIAL

[72] Inventors: **Arthur L. Gordon,** Des Plaines; **Leonard A. Warwick,** Niles, both of Ill.

[73] Assignee: **Kraftco Corporation,** New York, N.Y.

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[58] **Field of Search** .....99/171 R, 171 CA, 171 LP, 178; 117/165, 166, 84, 85, 92

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Primary Examiner—Frank W. Lutter
Assistant Examiner—Steven L. Weinstein
Attorney—Fitch, Even, Tabin & Luedeka

[57] **ABSTRACT**

An improved package for moisture-containing food products and a method for providing improved release properties for such food products is provided. The release properties are provided by a thin film or layer of a suitable readily hydrated hydrocolloid. Suitable hydrocolloids may be selected from pregelatinized starches, modified cellulose materials or mixtures thereof.

5 Claims, No Drawings

FOOD PACKAGING METHOD EMPLOYING RELEASE AGENT COATED PACKAGING MATERIAL

The present application is a continuation-in-part of copending application Ser. No. 652,041, filed July 10, 1967, which has now issued as U.S. Pat. No. 3,519,470.

The present invention relates generally to packaging material and more particularly relates to packaging materials for use in packaging foods, with improved release properties.

It is desirable to wrap certain foods in a packaging material prior to distribution. However, various of these foods, such as some types of cheese, margarine, or some types of candy, tend to stick or cling to the packaging material when the consumer attempts to remove the packaging material prior to consumption. Such sticking or clinging is undesirable in that it may lead to food wastage or tearing of the packaging material.

Various materials have been used on the interior surface of packaging materials to prevent blocking. Blocking is defined as undesired adhesion between touching layers of a packaging material such as occurs under moderate pressure conditions which occur during storing or wrapping operations. For example, it is known to provide a thin coating of dry granular starch on the packaging material. Such coating of dry granular starch, however, is not satisfactory in effecting release of the packaging material from the food product that is wrapped therein.

Accordingly, it is an object of the present invention to provide an improved packaging material. It is another object of the present invention to provide a packaging material with improved release properties when used for food products. It is further object of the present invention to provide a method for treating packaging materials which provides easy release of the packaging material from the food products at the time of consuming.

These and other objects of the present invention will become more clear from the following detailed disclosure.

In general, in accordance with certain features of the present invention, packaging materials which are used to package food products are coated with a hydrocolloid which forms a thin film on the interior surface of the packaging material. As used herein, the term hydrocolloid refers to any of several substances which may be hydrated with water to yield gels and which will subsequently form thin films upon drying of a thin coating of the hydrated hydrocolloid. In particular such classes of hydrocolloids as treated or untreated starches, polysaccharide gums, farinaceous flours, and modified cellulose materials are suitable for the practice of the present invention. For example, cornstarch, wheat flour, guar gum, carrageenan and carboxy methyl cellulose and combinations of these materials are suitable for the practice of the present invention.

In accordance with the present invention the hydrocolloid may first be mixed with cold water to form a paste or suspension. The suspension is then heated to a predetermined elevated temperature to promote hydration of the hydrocolloid. The suspension is maintained at the elevated temperature under stirring conditions until the hydration is completed and a colloidal solution or gel is formed. The hydrocolloid gel is then applied to the packaging materials by any suitable technique. For example, a Gravure cylinder and knife combination may be used to apply a controlled thin film layer of the hydrocolloid to a continuous web of packaging material.

The hydrocolloid material is added to water at a level so as to provide a suitable viscosity at the temperature of application to the web of packaging material. For example, when the hydrocolloid material is cornstarch, the cornstarch is added so as to provide from about 3 percent to about 10 percent by weight of cornstarch in water. Suitable levels of other hydrocolloids or mixtures of hydrocolloids are readily determined by one skilled in the art. These levels are, in general, from about 2 to about 12 percent by weight.

After the hydrocolloid suspension has been hydrated by heating, it is held at a temperature so as to provide the desired viscosity for application to the packaging material. In general,

this temperature will be from about 15° to about 35° F. below the boiling point of the hydrocolloid-water mixture.

After application to the packaging material the hydrated hydrocolloid is dried so as to form a thin continuous film on the packaging material. This hydrocolloid film is subsequently placed in contact with the food product during the wrapping operation so as to provide improved release properties.

Certain readily hydrated hydrocolloid materials such as pregelatinized starch, which may be derived from any suitable food source such as rice, potato or tapioca, dextrin, and nonionic water soluble cellulose ethers may be applied to the surface of the packaging material in a substantially dry condition.

It is believed that these readily hydrated hydrocolloid materials have the ability to hydrate so as to form a thin film in situ by absorption of moisture from the packaged product. Application of these readily hydrated hydrocolloid materials to the packaging material may be effected by any suitable method. One such method is simply dusting of the hydrocolloid material onto the surface of the packaging material. Another method is to provide a slurry of the hydrocolloid material in a suitable inert organic carrier, such as isopropanol or ethanol. The hydrocolloid slurry may then be applied to the surface of the packaging material and the organic carrier removed by drying so as to provide a thin, dry layer of the hydrocolloid material.

The thin, dry film of readily hydrated hydrocolloid material is subsequently placed in contact with the food product during the wrapping operation. The thin, dry layer of hydrocolloid material absorbs moisture from the packaged food product so as to form a thin substantially continuous hydrocolloid film with improved release properties.

The hydrocolloid, whether hydrated by heating of a slurry of the hydrocolloid or whether applied in a substantially dry condition is applied to the packaging material so as to provide a level of from about 0.5 to about 5.0 pounds of the hydrocolloid (dry basis) per ream of packaging material. For purposes of this application a ream refers to an area of 3,000 square feet. At levels above about 5.0 lbs./ream no substantial additional benefit is derived and the total cost of the hydrocolloid material used is consequently greater. However, levels above about 5.0 lbs./ream may sometimes be used to achieve improved machining and handling properties for the coated packaging material. While the advantages of the invention are attained at levels of application within the above indicated range, higher levels may sometimes be used in commercial practice of the present invention. Such higher levels are primarily encountered due to lack of control during application of the hydrocolloid material with particular commercial application equipment. Also, variations during application may result in higher levels of up to about 15 lbs./ream at a particular local point even when the average level is within the indicated range of about 0.5 to about 5.0 lbs./ream. Local variation in levels of hydrocolloid present is particularly prevalent when a readily hydrated hydrocolloid is applied by dusting or by application of a slurry of the hydrocolloid in an organic carrier. For this reason, it is preferred that the average level of application of the hydrocolloid be at the higher end of the indicated range, that is, at a level of from about 2.0 to about 5.0 lbs./ream. When the average level is within this preferred range or higher a sufficient margin of error is established to compensate for local variations due to lack of control.

The packaging material of the present invention is particularly suitable for wrapping process cheese and certain details are hereinafter described with particular reference to process cheese. However, it should be understood that the packaging material is equally suitable for wrapping other food products which have a tendency to stick or adhere to the packaging material. Such food products include cream cheese, margarine, caramels, or toffee. When process cheese is being packaged in accordance with the present invention it is preferred to select a release agent that provides a dull, translucent film rather than one which provides a glossy, shiny finish

to the packaging material. Particularly preferred release agents for packaging process cheese are pregelatinized and nongelatinized starch and carrageenan.

Process cheese in general is made by grinding and mixing together by heating and stirring one or more cheeses of the same or of two or more varieties, together with other ingredients, until a homogeneous plastic mass is formed. American cheddar cheese and other American-type cheeses such as colby, and also Swiss, gruyere, brick, limburger and other cheeses are examples of cheeses which are used in the production of process cheese.

The cheese for each batch is cleaned and cut into uniform size if the cheese pieces are large. The cheese pieces are then passed through a grinder into a steamjacketed kettle or a horizontal cooker. The other ingredients, such as emulsifiers and flavoring materials, are added either as the cheese is run through the grinder or while it is being heated. The cheese is heated and is held at an elevated temperature for at least 30 seconds. When the cheese is smooth, homogeneous, glossy and creamy it is automatically packaged into carbons while in a heated fluid condition. The cartons are lined with a packaging material which may be sealed to exclude air. The packaged cheese is then cooled to room temperature and is placed under refrigeration. The high temperature attained in heating, together with the heat retained during the time required to cool the cheese to room temperature makes the cheese practically sterile, and the cheese keeps well and does not ripen further. However, the cheese tends to adhere to the packaging material and subsequent removal of the packaging material is difficult.

Any suitable packaging material which is commonly used for packaging food products that tend to adhere to the packaging material may be used in accordance with the present invention. One such commonly used packaging material for use in packaging cheese is a cellophane/aluminum foil/fortified wax lamination. Fortified wax refers to well-known wax-resin blends, wherein the resin is a polymer selected to provide desired viscosity or body.

The following examples further illustrate various features of the present invention but are intended to in no way limit the scope of the invention which is defined in the appended claims.

EXAMPLE I

Dry cornstarch was added at a level of 5.7 weight percent to water which had been heated to 85° F. The mixture was stirred vigorously for 5 minutes until the starch was uniformly dispersed in the water. The starch mixture was then gradually heated over a period of about 30 minutes to a boil (212° F.) under conditions of mild agitation. The starch mixture was held at a boil for 1½ minutes to fully gelatinize the starch. Heating was then stopped and the mixture was then cooled rapidly in less than 1 minute to 190° F. and held at that temperature until used.

The starch mixture was then applied to a web of cellophane/aluminum foil/fortified wax laminate packaging material. The starch mixture was applied with a Gravure cylinder and knife combination so as to provide starch at a level of one pound per ream of packaging material (dry basis). The coated packaging material was then dried to provide a thin film of dry starch adjacent to the fortified wax layer. The packaging material was then cut and folded to provide an open-mouthed rectangular package with a flap that could subsequently be folded over to seal the mouth. The package was folded to place the starch film on the interior surface of the package. Process cheese was then introduced into the package at a temperature of 165° F. to provide a 2 pound block of process cheese. The packages were then sealed.

Process cheese at a temperature of 165° F. was also packaged in a similar manner into cellophane/aluminum foil/fortified wax packaging material which had not been treated to provide a thin film of starch. The packaging material was, however, treated in accordance with known procedures to prevent blocking of the packaging material by providing a thin coating of dry, granular, nongelatinized starch on the fortified wax surface. Such coating of dry starch is known to prevent blocking of packaging materials. The coating of dry starch was applied by spraying the fortified wax surface of the packaging material with a 60 weight percent starch slurry in alcohol so as to provide a level of 5 pounds of dry granular starch per ream of packaging material. This packaging material was then dried, leaving a coating of dry granular starch on the fortified wax surface. The process cheese which had been packaged in accordance with the present invention and the process cheese which had been packaged with a coating of dry granular starch were compared after various periods of storage at temperatures of 72° and 45° F. to determine the release properties. The release properties were visually noted by observing and rating the amount of cheese which adhered to the wrapper after a specified period of storage. After each 2-pound package of process cheese was unwrapped the condition of the wrapper was observed and noted according to the following schedule:

1. Clean (no sign of cheese adherence to the packaging material)
2. Very slight to clean
3. Very slight
4. Slight
5. Slight to moderate
6 Moderate
7. Moderate to definite
8. Definite (definite signs of cheese adherence to the packaging material)

TABLE 1

Average grading of packing material at given examination periods and storage conditions

	Initial		1 month		2 months		3 months		4 months		5 months	
Release coating material	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°
Starch film	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
Dry granular starch (control)	7.5	6.0	7.0	5.0	7.0	4.5	7.0	4.0	7.0	4.0	7.0	3.0

The data collected according to the above schedule was used to prepare the following table:

The data for the above Table 1 was obtained by unwrapping 16 2-pound blocks of process cheese at the intervals noted and visually grading the appearance of each of the packaging materials. The average of the grades was then recorded in Table 1. As can be seen from the above grading scale, the lower the average grade the better the release properties of the packaging material.

It can readily be seen that packaging material treated in accordance with the present invention to provide a thin film of release agent material adjacent the surface of the processed cheese is superior to the known method of applying a dry starch coating.

EXAMPLE II

A cellophane/aluminum foil/fortified wax packaging material was coated with a 5.7 weight percent mixture of starch and carrageenan which had been hydrated in ac-

cordance with the method of Example I. The mixture was applied to the packaging material at a temperature of 185° F. The ratio of starch to carrageenan was 4 to 1 on a weight basis. Process cheese was packaged in the packaging material coated with the starch-carrageenan mixture and was then compared with the process cheese which had been packaged in packaging materials which had been coated with dry granular starch in a manner as heretofore described. The data from the above investigation was then used to prepare Table 2.

TABLE 2

Average grading of packing material at given examination periods and storage conditions

	Initial		1 month		2 months		3 months		4 months		5 months	
Release coating material	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°
Carrageenan/starch film	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
Dry granular starch (control)	7.0	6.0	7.0	5.5	7.0	4.5	7.0	4.0	7.0	4.0	7.0	3.0

From the above it can readily be seen that the packaging material of the present invention which had a hydrated starch-carrageenan film is superior.

EXAMPLE III

Various other hydrocolloid mixtures were used to coat cellophane/aluminum foil/fortified wax packaging materials in accordance with the present invention. Data in connection with the release properties of these hydrocolloid materials are presented below in Table 3.

TABLE 3

Average grading of packing material at given examination periods and storage conditions

	Weight	Initial		1 Month		2 Months		3 Months		4 Months		5 Months	
Release coating material	percent	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°	45°	72°
CMC	20	1.5	2.0	1.0	1.5	1.0	2.0	1.0	1.5	2.0	3.0	1.0	3.0
Starch	80												
Guar gum	20	6.5	7.5	6.0	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0	8.0
Starch	80												
Wheat flour	20	1.5	2.0	1.0	4.5	1.0	5.0	1.0	7.0	2.0	5.0	2.0	8.0
Starch	80												
Dry granular starch (control)	100	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

From the above, it can be seen that various mixtures of hydrocolloids may be used in the practice of the present invention. Certain release coating materials are particularly effective in preventing sticking when the food product is stored at relatively low temperatures, while others are more suitable for relatively high-temperature storage, such as at room temperature. A suitable hydrocolloid or mixture of hydrocolloids for particular conditions of storage is readily determined by one skilled in the art.

EXAMPLE IV

A cellophane/aluminum foil/fortified wax packaging material was coated with dry, pregelatinized starch in accordance with the following procedure. Sixty pounds of pregelatinized starch was added to 48 pounds of 99 weight percent isopropanol. The starch-isoproponal mixture was agitated so as to provide a uniform starch slurry. The starch slurry at a temperature of 70° F. was applied to the packaging material by means of a Gravure cylinder. The starch slurry was applied at a rate sufficient to provide 3 pounds of starch per ream of packaging material (dry basis). The coated packaging material was then passed through a 10-foot long drying tunnel maintained at a temperature of 200° F. at a rate of 100 feet per minute to evaporate the isopropanol.

The coated packaging material was then used to package process cheese. after 90 days storage, the release properties of the packaging material prepared in accordance with the above procedure were still excellent.

EXAMPLE V

A cellophane/aluminum foil/fortified wax packaging material was coated with a mixture of pregelatinized starch and a nonionic water soluble cellulose ether. One hundred pounds of slurry containing a mixture of readily hydrated hydrocolloids in an inert organic carrier was prepared. The slurry contained 5 weight percent of pregelatinized starch and 8 weight percent of nonionic water soluble cellulose ether. Isopropanol was used as the inert organic carrier. The slurry was applied to the packaging material by means of a Gravure cylinder so as to provide 0.8 pounds of the hydrocolloid mixture (dry basis) per ream of the packaging material. The coated packaging material was then passed through a ten foot long oven at a rate of 100 feet per minute. The oven was maintained at a temperature of 175° F.

Process cheese was then packaged in the coated packaging material and the packaged process cheese was stored at a temperature of 45° F. The release properties of the packaging material were excellent after 90 days storage.

It can be seen that a superior release coating material and method have been supplied by the present invention.

What is claimed is:

1. A method for treating the surface of packaging materials which are used for packaging moisture containing food products so as to provide a release coating thereon, which method comprises providing a dry thin layer of a readily hydrated hydrocolloid or mixture of readily hydrated hydrocolloids on the surface of packaging material, wrapping a moisture-containing food material with said packaging material, and hydrating said hydrocolloid by moisture transfer from said food material so as to provide a thin substantially continuous film of said hydrocolloid, said hydrocolloid being applied at a level sufficient to provide from about 0.5 to about 5.0 pounds of hydrocolloid on a dry basis per ream of packaging material.

2. The method of claim 1 wherein the readily hydrated hydrocolloid is selected from pregelatinized starch, nonionic water soluble cellulose ethers, and mixtures of the same.

3. The method of claim 1 wherein said moisture-containing food product is cheese.

4. A method in accordance with claim 1 wherein said dry thin layer of a readily hydrated hydrocolloid is provided by mixing said hydrocolloid with an alcohol to provide a dispersion, spraying said dispersion onto the surface of said packaging material and drying said dispersion to remove said alcohol.

5. A method in accordance with claim 1 wherein said dry thin layer of a readily hydrated hydrocolloid is provided by dusting a substantially dry readily hydrated hydrocolloid powder onto the surface of the packaging material.

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