

[54] **METHOD FOR PREVENTING THE
SLIDING OR RIDING UP OF
PACKAGED ARTICLES BY COATING
WITH ADHESIVE COMPOSITIONS**

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[58] Field of Search.....106/205, 209;
117/155 UA, 156, 157; 156/290, 291, 336,
309; 161/146, 148, 246, 250; 214/10.5 R

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[57] **ABSTRACT**

An aqueous colloidal adhesive composition for preventing sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard comprising an aqueous colloidal solution containing from 0.1 to 2 percent by weight of xanthan gum and the method of preventing sliding or riding up of packaged articles which comprises interspersing between said package articles, a layer of said aqueous colloidal adhesive composition.

6 Claims, No Drawings

METHOD FOR PREVENTING THE SLIDING OR RIDING UP OF PACKAGED ARTICLES BY COATING WITH ADHESIVE COMPOSITIONS

THE PRIOR ART

It is known to prevent the sliding of packing materials during transport on flat pallets by inserting adhesive between the surfaces of the packages which are in contact. Aqueous alkali metal silicate solutions, starch solutions, rubber or natural resin dispersions and polymerize dispersions can be used as adhesives, which have a film formation temperature of not more than 10°C. Such products generally have a good adhesive power, so that the stacked packages are firmly connected together. However, this method has disadvantages which are particularly to be seen in that smooth surfaces are glued too firmly and owing to this, damage to the glued surfaces occurs when the stacked packages are taken apart. Moreover, when the said adhesives are used, there frequently remains so much adhesive on the surfaces that the packages are given a poor appearance. Finally, the said adhesives do not prevent sliding after the packages have been separated. However, this is often desirable when restacking.

OBJECTS OF THE INVENTION

An object of the invention is the obtention of an aqueous colloidal adhesive composition for preventing sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard which has, on drying, a fairly low shear strength and peeling strength and a relatively high coefficient of friction when the packaged articles are restacked.

Another object of the present invention is the obtention of an aqueous colloidal adhesive composition for preventing sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, comprising an aqueous colloidal solution containing from about 0.1 to 2 percent by weight of xanthan gum.

A further object of the invention is the development of a method for preventing the sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, which comprises interspersing between said packaged articles, a layer of from 25 to 500 gm/m² of an aqueous colloidal adhesive composition containing from about 0.1 to 2 percent by weight of xanthan gum, and drying said layer.

These and other objects of the invention will become more apparent as the description thereof proceeds.

DESCRIPTION OF THE INVENTION

According to the invention, there is provided an aqueous colloidal adhesive composition for preventing sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard comprising an aqueous colloidal solution of xanthan gum. The xanthan gums are advantageously utilized as from about 0.1 to 2 % by weight solutions.

By xanthan gum is meant a polysaccharide which is built up essentially from glucose, mannose, the potassium salt of glucuronic acid and acetyl groups in the approximate molar ratio of 2:1:1:1. It contains further minor amount of chemically bound pyro-racemic acid. The preparations of xanthan gum is known (cf. Journal of Biochemical and Microbiological Technology and Engineering, Vol III, No. 1 (1961) p. 51-63). It takes place in known way by the action of the strain of bacte-

rial *Xanthomas campestris* on aqueous solutions of glucose of starch.

Xanthan gum is a substance readily soluble in water. A 2 percent aqueous solution has at 20°C a viscosity between about 2,500 and 10,000 cP. The solutions of xanthan gum are extremely stable towards the addition of chemicals.

According to one form of the invention, in addition to the xanthan gum in the adhesives, further water-soluble colloids such as cellulose ethers, starch products or alginates may be added. Suitable water-soluble cellulose ethers are, for example, methylcellulose, hydroxyethylcellulose, hydroxypropylcellulose, methylhydroxy-propylcellulose and others. Suitable starch products are water-soluble starch degradation products such as, for example, water-soluble starch or its substitution products such as methyl-starch or carboxymethyl starch. Suitable water-soluble alginates are, for example, sodium or ammonium alginate. The quantity of these colloids, however, should not exceed a content of from 0.1 to 0.5 percent by weight, based on the total mixture.

Besides the natural water-soluble colloids mentioned, the adhesives according to the invention may additionally contain water-soluble polymerizates such as polyvinyl ether, polyvinylpyrrolidone or polyvinyl alcohol. The K-value of such polymerizates should lie between about 20 and 80, and it is advantageously used in an amount from 1 to 15 percent by weight, based on the total mixture. The co-use of polyvinyl methyl ether having a K-value of from 20 to 60, preferably about 40, in the indicated amount, is especially advantageous in the preparation of the adhesives according to the invention.

In some cases it has also been found suitable to add from 0.1 to 10 % by weight of inorganic or organic fillers to the adhesives. Inorganic fillers of this kind are, for example, finely divided silicic acid or calcium silicate or aluminum silicate. The organic fillers used may be, for example, starch or ground cellulose as well as hardened and ground melamine resins or urea resins. The use of finely-divided silicic acid as an additive is especially favorable. Owing to the high viscosity and thixotropy of the xanthan gum, the adhesives can be easily made, and since the xanthan gum has a high carrying capacity for fillers, relatively large amount of the inorganic or organic fillers mentioned may also be incorporated in the adhesives.

In many cases, a very favorable result is obtained by adding to the adhesives about 0.5 to 5 percent by weight of a poly-hydric alcohol and/or polyalkylene glycols. Suitable poly-hydric alcohols are, for example, lower alkane-polyols such as glycol, glycerine, trimethylolpropane, mannitol, sorbitol and the like. Also the term "polyhydric alcohol" is to be understood in the wider sense to include sugars such as glucose, laevulose or cane sugar. Suitable polyalkylene glycols are especially diethylene glycol, triethylene glycol and the addition products of ethylene oxide to ethylene glycol up to a molecular weight of about 800, and the still water-soluble addition products of propylene oxide to lower alcohols. Suitable additives are finally the polymerization products of glycerine, which are formed by etherification of 2 to about 12 glycerine molecules with one another.

In order to protect the adhesives against bacterial breakdown, known preservatives may be added to

them. Those which are used are principally those which are compatible with xanthan gum and the other additives. For example, formalin, pentachlorophenolates, p-hydroxybenzoic acid esters, which are on the market under a variety of names, are suitable.

The adhesives, according to the invention, may be used during the stacking of substances packed in paper or cardboard which during loading or transport must not be allowed to ride up, slide off or shift relative to

spindle 3 in 1 percent aqueous solution) and was dissolved with stirring in each case in so much water that, after addition of the further substances, all the components including water added up to 100. In the following Table I, the first column gives the number of the example, and there follow the percentage by weight of xanthan gum, polyvinyl methyl ether (K-value 40), and further colloids and fillers as well as the hardness of the water used according to German degrees of hardness.

TABLE I

Number	Xanthan gum/percent	PV-methyl-ether/percent	Further colloids/percent	Fillers, percent	Hardness
1.....	0.5	.....	.....	.....	16
2a.....	1.0	.....	.....	.....	16+
2b.....	1.8	.....	.....	.....	0+
3.....	0.5	7.5	.....	.....	10
4.....	0.7	5.0	.....	.....	25
5.....	0.5	.....	0.5 swelling starch	.....	10
6.....	0.4	.....	0.3 methylhydroxypropylcellulose	.....	16
7.....	0.7	.....	0.1 carboxymethylcellulose	.....	16
8.....	0.4	.....	0.2 Na-alginate	.....	16
9.....	0.7	.....	.....	2.0 finely-dispersed silicic acid (Aerosil)	10
10.....	0.5	.....	.....	2.0 finely-dispersed silicic acid (Aerosil), 2.0 corn starch	10
11.....	0.3	5.0	0.2 Na-alginate	.....	0
12.....	0.2	5.0	0.2 Na-alginate, 0.1 hydroxypropyl cellulose	.....	16
13.....	0.3	5.0	0.3 polyvinylpyrrolidone	.....	10

+ These solutions may be diluted for use by two to four times.

one another. The adhesives, according to the invention are used with particular advantage in the case of shipping cartons or packings with sensitive surfaces. They may also be used, however, for fixation of paper bags or cartons of solid fiberboard and corrugated board.

For the preparation of the adhesives, according to the invention, the xanthan gum is first dissolved in water with stirring in known way. The other components are then added with further stirring. If the pH value is displaced outside of pH6 to pH8 by the individual components, it is adjusted again to fall within the said range by the addition of acid or alkali.

For the application of the adhesives, according to the invention, these are applied by brushing, rolling or spreading, e.g., painting. It has been found especially suitable to apply them by means of jets in dots or strips on the surfaces to be treated. Preferable, the adhesive compositions of the invention are applied in amounts of from 25 to 500 gm/m².

Immediately after the application, the adhesives according to the invention become active. On the one hand, a certain sticking action exists, and on the other hand they have as a result after evaporation or driving off of the water, a surface equipped to prevent sliding. This effect also remains when the stacks have been taken apart and rebuilt again. With the adhesives according to the invention a problem was solved in which two opposed properties were to be brought in unison with one another. On the one hand a resistant union between the stacked packages and the base had to be effected, but on the other hand this union was not to be so firm that, on separating the stack, damage to the surface resulted. Moreover, after separating the stack, the adhesive on the surface had to be practically no longer perceptible.

The present invention will be further described, by way of reference to the following examples which are not to be deemed limitative.

EXAMPLES

Commercial xanthan gum was used (viscosity 3300 cP according to Brookfield RVT at 20°C and 20 Rpm,

For the examples 1 to 13 the shearing strength (kp/cm²), the peeling strength (gm/10 cm) and the coefficient of friction of the adhesive compositions as applied to paper were measured.

For the measurements, paper was used as conventionally applied for the manufacturing of paper bags. Two types of paper were employed, one was a soda kraft paper of 70 gm/m², the other was a wet-strength kraft paper of 73 gm/m². The latter was slightly crimped. For the examination, each time so much of the adhesive agent was applied with a sizing comb so that an average coat of 120 gm/m² was attained. Subsequently, the papers were stacked above each other, namely a treated one on an untreated one, and loaded with a brick so that an average pressure of 15 gm/cm² was attained. After storing for 24 hours at a room temperature of about 23°-25°C the measurements were taken.

For the examination of the shearing strength, the papers were pulled apart in a conventional tearing machine.

For the examination of the peeling strength, the papers were drawn apart also in a tearing machine whereby the peeling angle was almost 180°.

The coefficient of friction was measured in that the pulled apart papers were stacked one above the other, and the friction coefficient was determined with a load of 20 gm/cm² and a moving speed of 10 cm per minute. In the following Table II, the first column gives the consecutive number of the example, the second column gives the kind of paper (NK=soda kraft paper; LK= wet strength, slightly crimped kraft paper). The following columns give the shearing strength in Kp per cm², the peeling strength in gm/10 cm and the coefficient of friction.

TABLE II

Ex. No.	Paper type	Shear strength (Kp/cm ²)	Peeling strength gm/10 cm	Coefficient of friction of peeled samples
65				
1	NK	1.8	300	0.55
	LK	0.8	150	0.6
2a	NK	2.3	400	0.5

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	LK	2.9	250
3	NK	0.5	50
	LK	0.1	20
4	NK	0.8	100
	LK	0.1	20
5	NK	2.0	100
	LK	2.5	20
6	NK	2.0	200
	LK	2.3	100
7	NK	—	400
	LK	2.8	200
8	NK	1.3	250
	LK	0.1	400
9	NK	0.2	300
	LK	0.1	150
10	NK	0.1	250
	LK	0.1	100
11	NK	0.5	200
	LK	0.1	20
12	NK	0.6	250
	LK	0.2	50
13	NK	0.7	250
	LK	0.2	50

EXAMPLE 14

Strips of the adhesive composition of Examples 1 to 13 of 15 cm width were applied lengthwise to the middle of one side of paper bags filled with powdered material, utilizing an adhesive applicator which applied strips of adhesive through a series of jet orifices at an application rate of 100 gm adhesive per 1 m² of the paper bag surface. The paper bags were stacked and palletized. After shipping, the paper bags were received in their original stack without any sliding between them. They were readily separated without tearing of the surfaces. The paper bags could be restacked and when restacked, retained good adherence.

The preceding specific embodiments are illustrative of the practice of the invention. It is to be understood, however, that other expedients known to those skilled in the art may be employed without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a method for preventing the sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, which comprises applying a layer of adhesive material to the surfaces of packaged articles, drying the layer and placing the packaged articles in contact, the improvement which comprises utilizing as said adhesive material, a layer of from 25 gm/m² to 500 gm/m² of an aqueous colloidal adhesive composition consisting essentially of from about 0.1 to 2 percent by weight of xanthan gum.

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tion consisting essentially of from about 0.1 to 2 percent by weight of xanthan gum.

2. In a method for preventing the sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, which comprises applying a layer of adhesive material to the surfaces of packaged articles, drying the layer and placing the packaged articles in contact, the improvement which comprises utilizing as said adhesive material, a layer of from 25 gm/m² to 500 gm/m² of an aqueous colloidal adhesive composition consisting essentially of (a) from about 0.1 to 2 percent by weight of xanthan gum, and (b) from 1 to 15 percent by weight of polyvinyl methyl ether having a K-value of from 20 to 60.

3. In a method for preventing the sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, which comprises applying a layer of adhesive material to the surfaces of packaged articles, drying the layer and placing the packaged articles in contact, the improvement which comprises utilizing as said adhesive material, a layer of from 25 gm/m² to 500 gm/m² of an aqueous colloidal adhesive composition consisting essentially of (a) from about 0.1 to 2 percent by weight of xanthan gum, (b) from 1 to 15 percent by weight of polyvinyl methyl ether having a K-value of from 20 to 60, and (c) from 0.1 to 10 percent by weight of a filler.

4. The method of claim 3 wherein said filler is finely divided silicic acid.

5. In a method for preventing the sliding or riding up of packaged articles having coverings of paper, cardboard or pasteboard, which comprises applying a layer of adhesive material to the surfaces of packaged articles, drying the layer and placing the packaged articles in contact, the improvement which comprises utilizing as said adhesive material, a layer of from 25 gm/m² to 500 gm/m² of an aqueous colloidal adhesive composition consisting essentially of from about 0.1 to 2 percent by weight of xanthan gum; separating said packaged articles without damaging the adhesive coated surfaces thereof.

6. The method of claim 5 wherein the improvement further comprises the step of restacking said separated packaged articles by bringing the adhesive coated surfaces into unison with one another.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,734,801 Dated May 22, 1973

Inventor(s) Hans-Georg Sebel

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Title, Column 1, after Appln. No. 66,862 insert
--- Claims, Priority application Germany, August 28, 1969,
No. P 19 43 731.1 --. In the ABSTRACT, line 6, "ro" should
read -- or --. Column 1, line 60, "xantham" should read
-- xanthan --. Column 4, line 31, "a-plied" should read
-- applied --.

Signed and sealed this 27th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents