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PAPER CONTAINER WITH SLIP RESISTANT COATING

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Fig. 1.

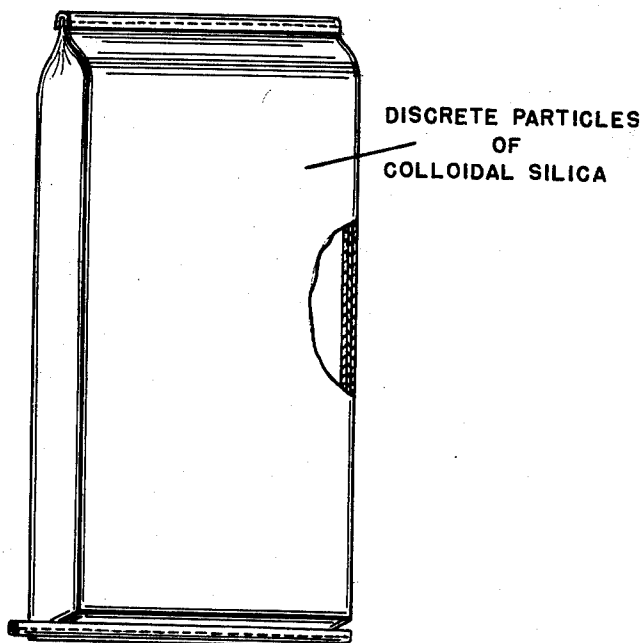
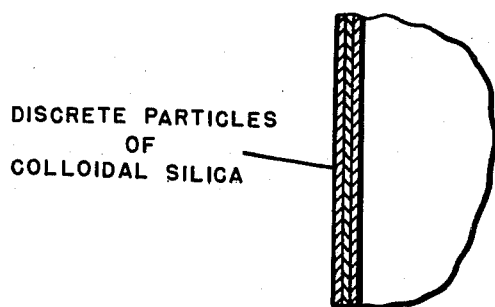


Fig. 2.



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PAPER CONTAINER WITH SLIP RESISTANT COATING

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7 Claims. (Cl. 229—53)

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The present invention relates to improved packaging containers fabricated from cellulosic materials.

Containers fabricated from bag papers, kraft papers and other types of cellulosic materials as used for the packaging of foodstuffs, chemicals and the like possess the inherent disadvantage of slipping and sliding against each other when being transported by hand trucks, motor vehicles, rail carriers, water carriers and the like, and even while in storage. This phenomenon results in shifting of loads, spillage, loss of containers from moving vehicles and accidents to handling and warehouse personnel. Attempts have been made to overcome this difficulty as, for example, by the employ of containers fabricated from creped paper or by the use of containers treated with a form of adhesive. Such containers are not entirely satisfactory either for reasons of economy, poor printing characteristics, insufficient slip resistance, unpleasant or uncomfortable handling characteristics, or for a combination of such reasons.

Accordingly, it is one object of the invention to provide improved anti-slip packaging containers fabricated from cellulosic materials.

A further object of the invention is to provide improved, anti-slip packaging containers conveniently and economically without detrimentally affecting their printing and/or handling characteristics.

Still further objects and advantages of the invention will appear from the following description when taken with the accompanying drawing and appended claims.

In the accompanying drawing, Figure 1 illustrates a conventional multi-walled cellulosic packaging container in perspective and partly in section, the outer surface of which has incorporated thereon discrete particles of colloidal silica, and Figure 2 represents an enlarged view in section of a portion of the container illustrated in Figure 1, illustrating the multi-layer construction of the walls of the container, the layers of which are not cemented or laminated.

The objects of the invention in general are attained by providing packaging containers fabricated from cellulosic materials, and having incorporated on the surface thereof colloidal silica. The discrete particles of colloidal silica on the surface of such containers may be in the form of a substantially continuous layer or discontinuous layer in the sense that they may be closely adjacent to each other or may be distributed in a more or less random fashion.

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The packaging containers of this invention may be fabricated from a wide variety of cellulosic materials such as, for example, bag papers, kraft papers, paperboard, cardboard, glassine paper, regenerated cellulose or cellulose derivative packaging materials, waxed papers and the like or they may be fabricated from one or more of the above mentioned packaging materials and then further covered with an additional cellulosic packaging material and/or a resin, wax or other similar type of coating. Moreover, such packaging materials may be creped or uncreped. The invention is particularly directed to anti-slip packaging containers fabricated from the above described packaging materials and which normally have a relatively frictionless surface, that is, surfaces which normally tend to slide and slip when in contact with each other or when in contact with other surfaces of a similar nature. Such relatively frictionless or smooth surfaces are generally encountered in packaging containers which have been fabricated from waxed papers, waterproofed papers, regenerated cellulose or cellulose packaging materials, hard sized and/or calendered bag papers or kraft papers and the like.

The amount of colloidal silica incorporated on the surface of the packaging containers of the invention may comprise from 0.01 to 5.0% and more preferably from 0.01 to 2.0% by weight of the packaging material. The colloidal silica may be incorporated on the surface of the packaging containers in a variety of ways. For example, the container may be fabricated and then sprayed, coated, dipped or otherwise treated with a solution comprising silica in a colloidal form or a packaging material may be treated with colloidal silica in the same way or in a similar manner and then fabricated into a packaging container or the colloidal silica may be suitably incorporated in paper pulp which is subsequently fabricated into paper and then into a finished container or by any other suitable method or combinations of the above methods may be used. It is not necessary that all surfaces of the container have colloidal silica incorporated thereon. It may be desirable, for example, to incorporate colloidal silica only on the surfaces of the container which are normally in contact with adjacent containers or other supporting surfaces or the like.

Colloidal silica as incorporated on the surface of the packaging containers of the invention may be obtained from any suitable source as, for example, from silica aquasols, silica organo-aqua-

sols, silica organosols and the like or from solutions comprising a suitably dispersed colloidal silica aerogel. As examples of such solutions may be mentioned aqueous solutions containing organic solvents, organic solvent solutions, oil solutions and the like and more particularly aqueous solutions comprising colloiddally dispersed silica aerogels which have been reduced to a very fine size. Silica aquasols of the type described may be prepared in any suitable manner, for example, as shown in U. S. patent to John F. White, No. 2,375,738 and U. S. patent to Paul G. Bird, No. 2,244,325. Silica organo-aquasols and silica organosols may be prepared, for example, as shown in U. S. patent to Morris D. Marshall, No. 2,285,449 and U. S. patent to John F. White, No. 2,285,477. Silica aerogels may be prepared as shown in U. S. patent to Morris D. Marshall No. 2,285,449 and may be suitably dispersed in colloidal form in a liquid medium. A preferred source of colloidal silica is silica aquasols having a pH of from 7 to 10.5 prepared, for example, as shown in U. S. patent to John F. White, No. 2,375,738 and described in detail hereinafter in Example I. Packaging containers of the type described above and having colloidal silica from this sol incorporated on the surface thereof not only possess enhanced resistance to slippage but additionally are not detrimentally tendered or weakened as readily as packaging containers having incorporated thereon colloidal silica derived from acid reacting silica sols, that is, silica having a pH of less than 7.

A further understanding of the invention will be obtained from the following examples which are intended to be illustrative, but not limitative of the invention.

Example I

A silica sol is prepared in the following manner, parts and percentages being by weight:

Seventy-three parts of 66° Bé. H_2SO_4 are diluted with 353 parts of water and charged to a mixing tank. Four hundred and seventy-two parts of a sodium silicate solution analyzing 8.9% Na_2O and 29% SiO_2 are diluted with 337 parts of water and added with stirring to the acid solution. The mixture sets to a gel a few minutes after the mixing is completed. After 16 hours aging, the syneresis liquor is siphoned off and the gel crushed in one-inch lumps. These lumps are washed with a continuous flow of water for 16 hours and the washed gel is then covered with 750 parts of water containing 0.9 parts of NaOH . After standing 6 hours, the excess solution is drained off and a portion of the gel is charged to an autoclave. The gel is heated for 3 hours, using steam at 215 pounds per square inch absolute pressure in the jacket of the autoclave. The contents of the autoclave are then blown out and the small amount of residual, undispersed gel is removed by filtration. The solution so produced can be diluted to concentrations as low as 0.1% SiO_2 if desired.

The above silica sol is converted by dilution into five separate silica sols comprising 0.1%, 0.2%, 0.3%, 0.5% and 1.0% SiO_2 respectively. Each solution is utilized to individually surface coat a number of sheets of kraft bag paper by dipping the paper in the solution, only one solution being used on the paper treated therewith. The papers are then allowed to dry and tested as given below. All sheets are hard-sized kraft bag paper of the same composition and are calendered prior to the above treatment.

The following table shows the improvement in slip resistance of the treated papers as compared to the control:

	Percent SiO_2 in Silica Sol					
	Control (0%)	0.1%	0.2%	0.3%	0.5%	1.0%
Angle of Slip, degrees	25.7	27.8	29.6	30.9	32.4	33.0
Percent Increase in Angle of Slip	0	8.5	15.2	19.5	26.0	28.4
Percent SiO_2 Deposited	0	-----	0.09	-----	0.14	-----

In addition to the improved slip resistance as shown by the above results, it is also noteworthy that the treated papers have satisfactory handle and printing characteristics, and improved tear strength.

The angle of slip, which is a direct indication of slip resistance, is determined as follows:

An adjustable inclined plane having a fixed glass plate fastened thereto and equipped with an angle measuring scale is used as a testing device; a piece of paper either the control or treated, is fastened in a suitable manner to the fixed glass plate; and a second piece of paper treated in the same manner is mounted on a glass plate which is free to slide on the fixed glass plate. This paper and glass plate are mounted on the paper covered fixed glass plate when the latter is in a horizontal position and is then weighted with a 150 gram weight. The angle of the inclined plane is gradually and slowly increased until the movable weighted paper begins to slide or move down the inclined plane. The angle so determined is the angle of slip. In carrying out the above test, the glass plates of the testing device were covered with the same treated or untreated paper.

Example II

A multi-wall hard sized bag paper was formed, calendered and treated on a paper machine equipped with a tub size press, and 0.5% SiO_2 from a silica sol prepared as described in Example I was coated on the surface of the paper by the size press. The paper was then dried in the normal manner.

The angle of slip of the untreated bag paper was about 17° and of the treated paper about 35°. This indicates an increased resistance to slippage of about 100%. Moreover, packaging containers fabricated from the treated paper handled satisfactorily, possessed good printing characteristics, and possessed improved tear strength.

What is claimed is:

1. A packaging container characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer paper layer, said container having a discontinuous film of discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 5% based on the weight of the outer paper layer.

2. A packaging bag characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer paper layer of sized paper, said bag having a discontinuous film of discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 5% based on the weight of the outer paper layer.

3. A paper packaging bag having side walls and a top and bottom closure composed of an outer

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paper layer of hard-sized and calendered paper, said bag having a discontinuous film of discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 5% on the weight of the outer paper layer and being supplied from an aqueous colloidal solution of silica having a pH of from 7 to 10.5.

4. A multi-walled packaging bag characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer paper layer, said bag having a discontinuous film of discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 5% based on the weight of the outer paper layer.

5. A multi-walled packaging bag characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer paper layer of sized paper, said bag having a discontinuous film of discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 2% on the weight of the outer paper layer.

6. A multi-walled packaging bag characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer paper layer of hard-sized and calendered paper, said bag having a discontinuous film of

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discrete particles of colloidal silica on the outer surface of said outer paper layer, said silica being present in amounts of 0.01 to 5% on the weight of the outer paper layer.

7. A packaging container characterized by a slip resistant surface and having side walls and a top and bottom closure composed of an outer layer of calendered paperboard, said container having a discontinuous film of discrete particles of colloidal silica on the outer calendered surface of said paperboard, said silica being present in amounts of 0.01 to 2% based on the outer layer of calendered paperboard.

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References Cited in the file of this patent UNITED STATES PATENTS

Number	Name	Date
914,238	Bruner	Mar. 2, 1909
1,092,601	Smetana	Apr. 7, 1914
1,656,368	Bates et al.	Jan. 17, 1928
1,699,843	Herting	Jan. 22, 1929
1,839,168	Stampe	Dec. 29, 1931
1,928,192	Walker	Sept. 26, 1933
2,173,517	Hughes	Sept. 19, 1939
2,178,447	Burk et al.	Oct. 31, 1939
2,223,240	Hughes	Nov. 26, 1940
2,431,873	Kennelly	Dec. 2, 1947
2,527,329	Powers et al.	Oct. 24, 1950