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COATING FOR MULTI-WALL BAGS

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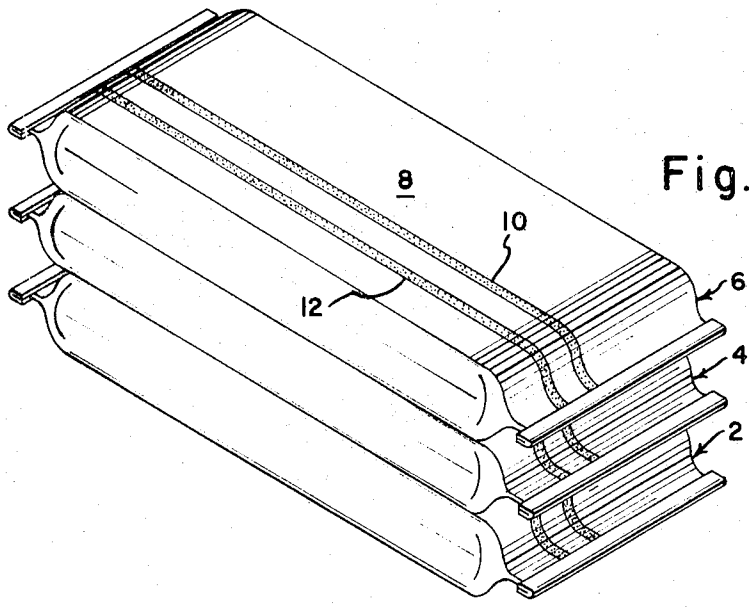
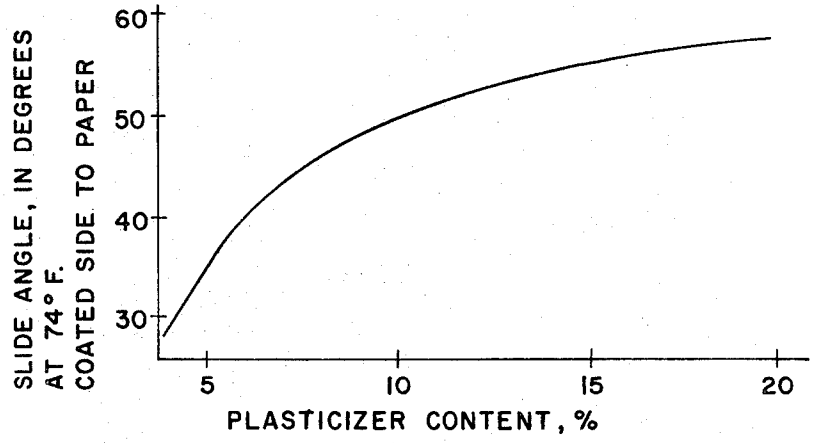


Fig. 1

Fig. 2



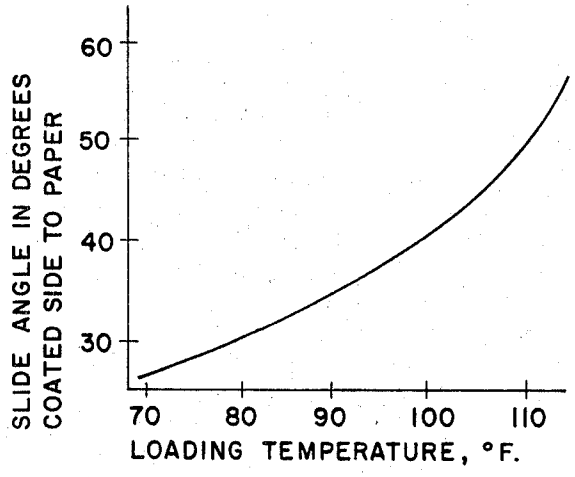


Fig. 3

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COATING FOR MULTI-WALL BAGS

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ABSTRACT OF THE DISCLOSURE

Multi-wall bags are surface coated with strips of "hot melt" coating for friction control. The coating becomes adhesive and cohesive when subjected to either heat or pressure, or both, but the cohesion and adhesion decreases greatly when there is no pressure. The amount present when the coating is at normal ambient temperatures is determined by varying the components in the "hot melt" coating composition, so that the desired friction control is achieved. While the coating has other uses, it is particularly desirable for preventing the slippage of multi-wall bags, for example of the type which are filled with products and stacked on pallets for storage and shipping.

This invention relates to a coating material and particularly to providing coatings for paper bags and the like of the type which are filled and stacked for storage and for shipping.

An object of this invention is to provide an improved "hot melt," anti-slip or anti-skid coating for multi-wall bags and the like which is free of the difficulties which have been encountered with such coatings in the past. A further object is to provide multi-wall bags with coatings of enhanced appearance and desirable, functional characteristics. A further object is to provide for the above with coating which may be applied efficiently and quickly and which may be varied to provide a range of friction characteristics. A still further object is to provide improved coatings which enhance the appearance of an article or package and which coatings provide releasable adhesion or cohesion during use. These and other objects will be in part obvious and in part pointed out below.

In the field of multi-wall paper bags, it is common practice to stack filled bags for storage and shipment often employing a pallet as a platform therefor. Stacking of filled bags is an awkard process, subject to much inaccuracy, so exact balance and alignment of the bags is difficult. A bag is generally filled so that its thickness is of the order of one-third of its width. Packaging of different materials requires different bag sizes, if, for instance, uniformity of weight is desired. Stacked bags that are slightly unaligned or that are overfilled tend to shift due to vibration, movement or gradual drifting. As a result, a stack of bags may become severely unbalanced and may fall over. That result is particularly likely when a pallet of bags is being moved by a fork-lift truck or in a railroad car or truck. To minimize that problem, anti-skid or anti-slip coatings have been applied to the outer surfaces of bags.

A convenient basis for evaluating the effectiveness of such coatings is to measure the angle at which the bags in a stack on a pallet start to slide when the pallet is tilted. That angle is herein termed the "slide angle" and it may vary with the temperature and the coating thickness. As an example of that test, a stack of bags whose surfaces are coated with silica will resist slide angle up to 40 degrees, and resins have slide angles up to 55 degrees. Various of those coatings have not been fully satisfactory for a number of reasons, e.g. because they give the bag a generally dull and objectionable overall appearance and because they often chip, peel or flake giving

an unsightly appearance to the bags. It is an object of the present invention to provide satisfactory anti-skid coatings which are superior to those previously available.

In the field of packaging, apperance is of great importance for a number of reasons. The outer surfaces of multi-wall bags are printed, e.g. to make them attractive, to identify the product and to give information as to the manufacturer. Prior non-skid and anti-friction coatings have decreased the attractiveness and legibility of indicia on the bags. It is, thus, a further object of the present invention to provide an improved outer surface coating for multi-wall bags which has the characteristics of improving the overall appearance of the bag while imparting such non-skid characteristics to the bag as are suitable and appropriate for the intended use of the bags.

In accordance with the invention, the novel interrelation of the coating components of the present composition, bags with the novel coating, and a stack of three bags are illustrated with reference to the attached drawings in which:

FIG. 1 shows an illustrative embodiment of the invention in the form of a stack or filled multi-wall bags; and,

FIGS. 2 and 3 show the relationships between temperature and plasticizer content in coatings of the type used on the bags of FIG. 1.

Referring to FIG. 1 of the drawings, three bags 2, 4 and 6 are shown stacked one upon another, and each has an outer ply 8. Extending longitudinally and respectively on the top and bottom faces of each of the bags are two strips 10 and 12 of an anti-skid or anti-slide coating to be described below. In this embodiment the two strips are offset toward the opposite side edges of the bags although they may be along the center of the side faces for example. Hence, with the bags stacked as shown in FIG. 1, or stacked in other patterns, each of the top and bottom exposed surfaces of the outer plys 8 presents a layer of the coating to the next adjacent bag above or beneath it.

Coating strips 10 and 12 have the characteristics of being substantially non-adhesive at normal ambient temperatures and when not subjected to pressure, but being heat-sensitive so as to become adhesive when heated, and pressure-sensitive so as to become adhesive when under pressure. Hence, when a bag is being handled by itself the coating strips do not exhibit adhesive characteristics and the bags can be handled and treated in the same manner as if there were no such coating. However, when one bag is stacked upon another the pressure causes the coating to become somewhat adhesive and when a number of bags are stacked one upon another, the coating on the lowermost bags exhibits very substantial adhesive characteristics. Therefore, in a stack of bags such as in FIG. 1, the strip of coatings 10 and 12 on the bottom of the lower bag 2 exhibits substantial adhesion to the supporting surface; for example a pallet or the floor in a truck or car. In a high stack of bags, those below the top one or two tend to adhere tenaciously to each other and the stack tends to behave in the manner it would if it were strapped together. The topmost bag 6 in the stack of FIG. 1 has relatively little tendency to slide upon bag 4 beneath it because that tendency is a function of the weight of the material within bag 6. Bag 4, however, exhibits a pressure against bag 2 which is the total weight of bags 4 and 2; whereas bag 2 exerts a pressure on its supporting surface which is the total weight of bags 2, 4 and 6. On a pallet or in a truck or car where the bags are subjected to vibration and tipping actions tending to slide the bags one upon another, that tendency is a function of the weight and height of the stack. Hence, progressively downwardly from the top of the stack, there is an increasing tendency for the bags above a particular supporting surface to slide, but the increased weight also causes an increased adhesion. The

characteristics of the coating are so controlled that the increase in adhesion is sufficient to resist in a satisfactory manner the tendency for the bags to slide one upon another even in a relatively high stack.

In the present embodiment, the coating is applied on one of the two major surfaces, such as shown in FIG. 1, generally, three strips, although two strips or more than three may also be used. These strips may be continuous or discontinuous. Application is very easy, requiring only that the coating be heated, and also efficient, using less coating than would be necessary to cover the total outer surface of the bag. The coating is relatively transparent, glossy flexible and colorless, so that it does not impart an objectionable color or cast to the surface of a multi-wall bag. More importantly, the coating components may be varied within certain, particular limits to obtain a desired degree of tack or slip characteristics.

As mentioned before, the coating is glossy; hence, it can be used to enhance the appearance of the surface to which it is applied. For instance, by coordinating the pattern in which it is applied with the printing on the bag, an attractive graphic effect can be achieved.

The novel coating disclosed herein is a particular blend of thermoplastic materials which give a glossy, flexible film with adjustable tack to provide for resistance to sliding at slide angles within the range from 25° to 60°. The slide angle is determined by inclining a stack of loaded bags, on a pallet either in a three-bag or five-bag pattern, and observing the smallest angle to the horizontal at which slippage occurs.

According to the present invention, two parts by weight of a polyolefin resin or a copolymer thereof are blended with three parts of tackifying resin. Thereafter, an amount of plasticizer is added, the amount being that which will provide the desired slide angle characteristic. The finished product will have ingredients in the following percentage ranges:

TABLE I

	Composition range of components in percent by weight
Polymer	30–40
Tackifying resin	50–60
Plasticizer	0–20

For the purpose of the invention, the percent ranges of these constituents are important. Thus, if the polymer content is raised and the tackifier content lowered, the coating approaches an ordinary hot melt barrier coating; whereas if the tackifier content is raised or the plasticizer content increased beyond the upper limit, the material becomes a pressure-sensitive adhesive.

As the olefin polymer, 30 to 100 melt index, low density polyethylene or any polyolefin such as polypropylene or copolymer thereof having the equivalent melt viscosity and elastomeric quality are suitable. These materials are readily available and are sold under a variety of names.

As tackifiers, pale refined rosins or terpene resins may be used. Synthetic resins based on rosins, terpenes or cumarone-indene are equally suitable. These materials are readily available under a variety of names. For example, Wing Tack-95 is a terpene-like hydrocarbon resin available from Goodyear Tire & Rubber Co.; Staybelite, a hydrogenated rosin, is a suitable tackifier and available from Hercules Chemical Co. as well as another suitable material which is a refined rosin derivative sold under the trade name Polypale.

Plasticizers useful in the present combination are white mineral oil, safflower oil, or a dialkyl ester of phthalic acid or adipic acid such as a dibutyl adipate or dioctyl phthalate, i.e. esters derived from alcohols of 3 to 18 carbon atoms, preferably 3 to 10 carbon atoms.

Generally, the mineral oil employed is of medium to heavy weight and the properties for this type of oil are as follows:

TABLE II

	Medium to heavy
Specific gravity, gms./cc.	0.84–0.92
Specific gravity, ° Bé. at 60° F.	24–28
Boiling point, ° F.	Above 500
Flash point, ° F.	Above 400
Viscosity, Saybolt, sec. at 100° F.	250–450

Again, the coating can be tailored from the desired slide angle by varying the plastizer content. In Table III to follow, various amounts of plasticizer are employed in the coating composition disclosed herein. The anti-slip properties of the present combination are illustrated in FIGS. 2 and 3 herein.

TABLE III.—ANTI-SLIP COATING WITH VARYING AMOUNTS OF PLASTICIZER

	Components in parts by weight			
Polyethylene [1]	40	40	40	40
Tackifying resin, Wing Tack-95 [2]	60	60	60	60
Heavy mineral oil, plasticizer	5	10	15	20
Total	105	110	115	120

[1] Melt index 70, density 0.912.
[2] Wing Tack-95 is a hydrocarbon resin obtainable from Goodyear Tire & Rubber Co.

The above composition is applied to the bags in strips varying in width according to needs, for example from one and a half to three inches. It has been found that coating can vary from 5 to 25 lb./ream, preferably from 10 to 15 lb./ream in the coated area, the coating being of one mil or less in thickness with the minimum being of the order of one-half mil. Although thicker coatings may be employed, these do not offer any practical advantages.

It is to be understood that while the coated strips have been disclosed as being placed longitudinally of the bags, the strips can also be placed, if desired, transversely to the bags without destroying the anti-slide capabilities.

What is claimed is:

1. As an article of manufacture, paper coaterd in an amount from five to twenty-five lb./ream of a composition consisting essentially of about 30 to 40 percent by weight of a low density polypropylene or polyethylene polymer, 50 to 60 percent by weight of a tackifying resin of a natural rosin, refined rosin, terpene, or coumarone-indene, and up to twenty percent by weight of a plasticizer selected from the group consisting of white mineral oil, safflower oil, an alkyl ester of phthalic acid and an alkyl ester of adipic acid.

2. As an article of manufacture, a paper bag, said bag having on at least one exterior surface thereof a coating in a thickness of from 0.0005 inch to 0.005 inch consisting essentially of about 30 to 40 percent by weight of a low density polypropylene or polyethylene polymer, 50 to 60 percent by weight of a tackifying resin of a natural rosin, refined rosin, terpene, or coumarone-indene, and up to 20 percent by weight of a plasticizer selected from the group consisting of white mineral oil, safflower oil, an alkyl ester of phthalic acid and an alkyl ester of adipic acid.

3. As an article of manufacture, a paper bag according to claim 2 suitable for receiving bulk materials wherein the composition comprises 30 to 40% by weight of a 30 to 100 melt index polyethylene polymer, 50 to 60% by weight of a polyterpene as a tackifying resin, and 5 to 20% by weight of a white mineral oil, heavy grade.

4. As an article of manufacture, a paper bag according to claim 2 suitable for receiving bulk materials, wherein the thickness of the coating is 0.0008" to 0.001".

5. As an article of manufacture, a paper bag according to claim 2 wherein the coating displays a slide angle from 25° to 60°.

6. A coating for a paper sheet suitable for anti-slip purposes consisting essentially of about 30 to 40 percent by weight of a low density polypropylene or polyethyl-

ene, 50 to 60 percent by weight of a tackifying resin of a natural rosin, refined rosin, terpene, or coumarone-indene, and up to 20 percent by weight of a plasticizer selected from the group consisting of white mineral oil, safflower oil, an alkyl ester of phthalic acid and an alkyl ester of adipic acid.

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