Nov. 8, 1966 L. A. HANSON ETAL 3,283,992

EMBOSSED ANTI-SKID BAGS

Filed Feb. 10, 1965

FIG. 1

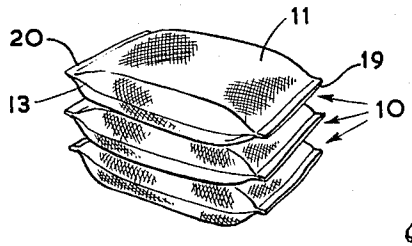
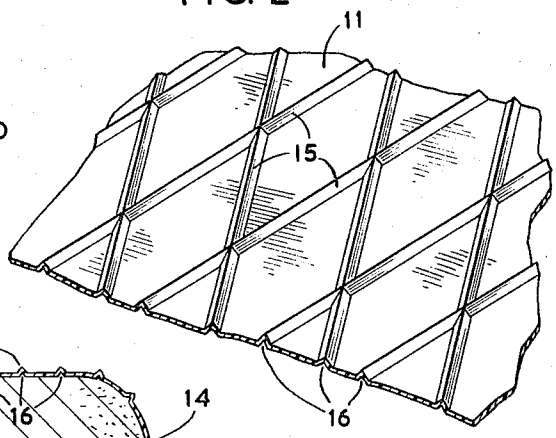


FIG. 2



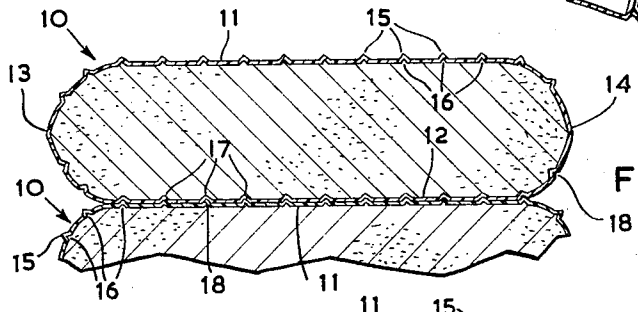


FIG. 3

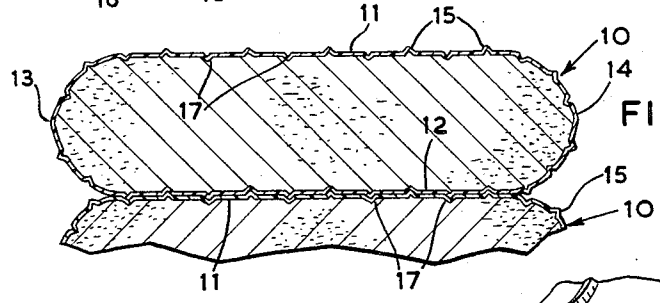


FIG. 4

FIG. 5

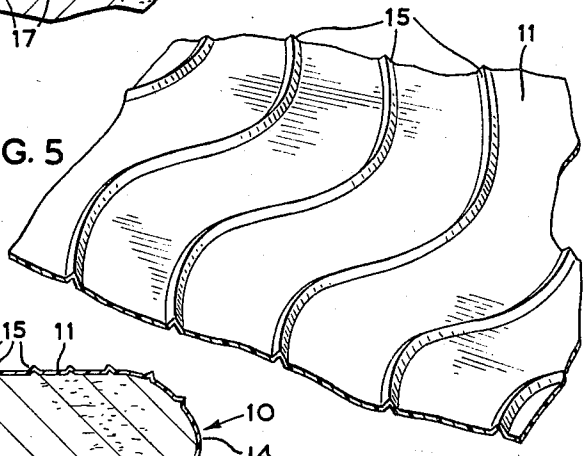
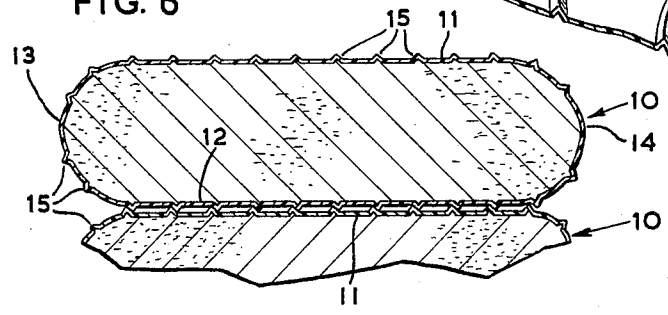


FIG. 6



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EMBOSSED ANTI-SKID BAGS

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7 Claims. (Cl. 229—53)

This invention relates to bags fabricated from a thin plastic film and provided with means such that when the bags are stacked upon each other, they resist sliding motion relative to each other.

As is well know, bags are employed throughout industry for packaging and shipping purposes. Industrial packaging and shipping bags, after having been filled and sealed, commonly are transported and stored in stacks that frequently are ten or more tiers high. The stacked bags generally are placed upon skids or pallets to facilitate handling by fork-lift trucks or other vehicles.

Multiwall bags fabricated from heavy paper or textiles such as burlap inherently have surfaces with a sufficiently high coefficient of friction that any tendency for bags of such material to slip relative to each other when the bags are in stacked relationship is quite strongly resisted. However, this is not the case with prior art types of industrial plastic bags. The surfaces of such bags are quite smooth, and, depending upon the type of plastic material, generally have surfaces with quite low coefficients of friction. When such bags are stacked upon each other, there is a decided tendency for the bags to slip, particularly during transportation thereof, so that the bags may fall from the stack or parts of the stack may shift. The consequence of this may be inconvenience in handling such bags, breakage of the bags and even injury to personnel or equipment.

The aforementioned disadvantages are particularly noticeable in industrial bags fabricated from polyolefins, such as polyethylene and polypropylene, and have been a factor which has rendered such bags unsuitable for use in certain applications where otherwise their use would be very desirable.

Many attempts have been made to solve the aforementioned problem. Thus, additives have been added to the plastic material itself to increase the coefficient of friction thereof; coatings have been applied to the bags in an attempt to provide a means for partially locking stacked bags together by adhesive action; coatings which will impart a rough surface to the bags have been applied thereto; and skid-resistant spacers, such as are shown in United States Patent No. 2,784,131, issued March 5, 1957, H. Fletcher, Jr., have been tried.

The use of additives generally has been unsatisfactory since the additives tend to cause the inner surfaces of the bags to stick together, thereby making filling of the bags difficult. In addition, the exterior surfaces of the unfilled bags also may stick together when the bags are stacked, making it difficult to separate the bags.

The application of coatings represents a considerable added expense, both from the standpoint of the cost of application as well as the cost of the coating material. In addition, the improvement in skid resistance properties achieved by coatings is generally only marginal.

The major disadvantages of skid-resistant spacers are cost and inconvenience.

Accordingly, it is an object of this invention to provide bags fabricated from plastic film which strongly resist sliding motion relative to each other when stacked, but which require no additives, coatings or skid-resistant spacers.

Briefly, in accordance with this invention bags fabricated from plastic film are provided which have multidirectional ridges formed in and constituting a part of at least the top and bottom walls of the bags, the ridges on one bag being adapted to interlock or engage similar ridges on another bag when the bags are stacked so as to resist sliding of the bags relative to each other.

This invention will become more apparent from the following detailed description, taken in conjunction with the appended drawings, in which:

FIGURE 1 shows a plurality of bags embodying this invention, the bags being filled and in stacked relationship;

FIGURE 2 is a perspective view of the top wall of one of the bags shown in FIGURE 3;

FIGURES 3 and 4 are sections through stacked bags embodying this invention;

FIGURE 5 is a perspective view of the top wall of one of the bags shown in FIGURE 6; and

FIGURE 6 is a section through stacked bags constituting another embodiment of this invention.

Referring to the drawings, particularly to FIGURES 1 to 3 inclusive, there are shown a plurality of bags **10** fabricated from a thin plastic film. Bags **10** may be fabricated from polyolefins such as polyethylene and polypropylene, for example. Each bag **10** has a top wall **11**, a bottom wall **12** and side walls **13** and **14**. The ends **19** and **20** of each bag are sealed by any known means such as a heat seal, for example. Bag **10** may have been formed from an extruded tube of plastic film or may have been formed from a sheet of plastic film, in which event there will be a seal running longitudinally along the bag along the bag in one wall thereof.

As best shown in FIGURES 2 and 3, a plurality of spaced-apart ridges **15** are formed in and constitute a part of top wall **11** of bag **10**. Ridges **15** are triangular in cross-section, are equally spaced apart from each other and run in two sets of parallel lines which intersect with one another. It is most important to note that ridges **15** run in two different directions. Also, it will be seen that ridges **15** open inwardly of the bag, i.e., the grooves or channels **16** defined by ridges **15** open into bag **10**.

Provided in bottom wall **12** are ridges **17** which are identical in all respects to ridges **15** except that ridges **17** open outwardly of the bag, i.e., the grooves or channels **18** defined by ridges **17** open exterior to bag **10**.

It will be seen that ridges **15** and **17** extend into side walls **13** and **14**, although this is not essential.

Ridges **15** and **17** preferably and most simply are formed by embossing. In this procedure the tubing for a bag **10**, which may previously have been printed with advertising material or the like by known processes, may be passed through preheater rolls and subsequently between an embossing roll having the diagonal ridges of FIGURE 2 thereon and a suitable rubber-covered backup roll. While the operating parameters of such an embossing process may vary widely, the following specific example illustrates one method which has been followed with good results. This example is intended as being illustrative only.

Example

Polyethylene tubing was extruded (blown process) in a flattened width of 20½ inches and a wall thickness of 0.008 inch from commercially available polyethylene resin having a density of 0.918 gram/c.c. at 25° C. and a melt index of 0.3. The tubing was printed by the flexographic process and then passed through preheater rolls operating at temperatures of between 145 and 150° F. The tubing subsequently was passed between an embossing roll held at 80 to 100° F. and a rubber-covered backup roll to produce the embossed pattern of ridges of FIGURE 2. The embossing roll and backup roll were hold together

by a pressure of 1,000 p.s.i., and the linear speed of the tubular film during processing was 35 feet/minute. The embossed tubular film was converted into 29½ inch bags using a commercial "Doughboy" (Trade Mark) bag-making machine.

The bag **10** of FIGURE 4 is similar to the bag shown in FIGURE 3 except that in the former bag ridges **15** opening inwardly of the bag together with ridges **17** opening outwardly of the bag are provided in both the top and bottom walls of the bag. Thus, in FIGURE 4 ridges **15** constitute one set of equally spaced-apart diagonal lines, while ridges **17** constitute the other set.

Referring now to FIGURES 5 and 6, ridges **15** opening inwardly of bag **10** and equally spaced apart and parallel to each other are provided in both top wall **11** and bottom wall **12**. Ridges **15** in this case are curved in a sinusoidal manner, as best shown in FIGURE 5, so that the ridges in both the top and bottom walls extend in two different directions.

As best shown in FIGURE 3, when two bags **10** of the type shown in FIGURE 3 are stacked one upon the other, ridges **15** in the top wall **11** of the bottom bag interlock with ridges **17** in the bottom wall of the top bag, and this interlocking makes the two bags extremely skid-resistant. Because ridges **15** and **17** are multidirectional, there is resistance to sliding of one bag relative to the other in any direction. It will be noted, however, that in order to obtain the full advantage of this invention with bags of the type shown in FIGURE 3, the bags always must be stacked with the top wall of one bag interlocking with the bottom wall of the bag above it.

The latter requirement is avoided with the bag construction of FIGURE 4, since, with bags **10** of the type shown in FIGURE 4 there is interlocking between ridges **15** and **17** of adjacent bags whether the bags are stacked with their bottom walls adjacent, their top walls adjacent, or the bottom wall of one adjacent to the top wall of the other. The latter requirement also is avoided with the bag construction shown in FIGURES 5 and 6 where the ridges **15** on one bag engage the ridges **15** on the other bag regardless which walls of the two bags are adjacent to each other. With respect to the bag construction of FIGURE 6, however, it will be noted that some sliding of the two bags relative to each other is permitted, the degree of sliding permitted being the spacing between adjacent ridges **15**.

It should be noted that tubular extruded films may advantageously be employed in the construction of bags **10** of the types shown in FIGURES 3 and 4 because the ridge formation on the top walls of these bags is simply the reverse of the ridge formation on the bottom walls of these bags, the top and bottom walls of the bags being embossed in one operation by merely passing the tubular extruded film through the embossing apparatus. However, the bag **10** of the type shown in FIGURE 6 generally will have to be formed from a sheet of thin plastic film which is first embossed and then formed in a tube, since unlike the bags of FIGURES 3 and 4, the ridges on the bottom wall of bag **10** in FIGURE 6 do not fit into the ridges in the top wall of this bag when the bag is empty and the top and bottom walls thereof are brought together.

The bag **10** of FIGURE 4 is a preferred embodiment of this invention because it can be fabricated from extruded tubular plastic material, can be embossed in the tubular form and will provide skid-resistance regardless of whether the bags are stacked with their top walls adjacent, their bottom walls adjacent or the top wall of one adjacent to the bottom wall of the other.

While the spacing between adjacent parallel ridges is not critical, it has been found that a spacing of less than about ¼" is desirable. Satisfactory results have been achieved with ridges projecting out of the film to the extent of .0005".

While ridges in the form of straight line diagonals and sinusoidal curves have been illustrated and described herein, it should be appreciated that the ridges may form other geometrical shapes such as circles, rectangles, triangles and hexagons, just so long as the ridges are such that they will contact similar raised or depressed ridges in a matching bag and so long as the ridges extend in at least two directions so that resistance to slipping is afforded in any direction.

Bags constructed in the manner specifically set out in the aforementioned example and of the type shown in FIGURE 3 with a spacing of 1/16" between the parallel ridges and with the ridges projecting .0005" above the film were filled with polyethylene resin (50 pounds per bag) sealed, and fifteen bags were loaded on a pallet in three tiers. The pallet was lifted by a fork-lift truck which was accelerated to approximately 5 miles per hour and suddenly braked to a full stop. The stacks remained intack after repeated stops. The same test applied to bags made by the same process but not embossed resulted in the stacks slipping apart.

The tubing used to fabricate the bags in the aforementioned example opened easily both before and after the bag-making operation with there being no noticeable difference in this regard between the embossed and unembossed stock. Tensile impact tests (a modification of A.S.T.M. D1822), Tensile strength tests (A.S.T.M. D882) and dart drop tests (A.S.T.M. D1709) yielded variations between the embossed and unembossed films that were within the limits of exeprimental error for the methods used.

Bags embodying this invention may be fabricated from any one of a number of thermoplastic materials such as polyethylene, polypropylene, nylon, vinyl chloride, vinylidene chloride, for example.

The embossing of the film for the bags preferably is in-line with the procedures of extrusion, printing and bag-making, and preferably the embossing operation is carried out subsequent to the printing operation. It will be appreciated, however, that the embossing may be carried out as a separate operation (not in-line) at any desired point subsequent to extrusion.

Preferably the whole of the top and bottom walls of the bag are embossed, and the embossing may extend into the side walls. However, the length and width of the embossed pattern can be the same as or less than the width or length of the finished bag.

It has been found that the embossing of bags **10** in the aforementioned manner also enhances the appearance of the bag.

While preferred embodiments of this invention have been disclosed herein, those skilled in the art will appreciate that changes and modifications may be made therein without departing from the spirit and scope of the invention as defined in the appended claims.

What we claim is:

1. In a bag fabricated from a thin plastic film and having opposed top and bottom walls joined by side walls, the improvement which comprises a plurality of spaced-apart first ridges formed in and constituting a part of each of said top and bottom walls of said bag, said first ridges opening inwardly of said bag, and a plurality of spaced-apart second ridges formed in and constituting a part of each of said top and bottom walls of said bag, said second ridges opening outwardly of said bag, said first and second ridges extending in at least two different directions in both said top and bottom walls of said bag, said ridges being adapted to interlock with and overlap similar ridges formed in another bag when said bags are in stacked relationship to resist sliding of said bags relative to each other.

2. The invention according to claim **1** wherein each of said first ridges is positioned between two of said second ridges and each of said second ridges is positioned between two of said first ridges.

3. The invention according to claim 1 wherein each of said first ridges is positioned between two of said second ridges and each of said second ridges is positioned between two of said first ridges and wherein said ridges extend diagonally across said top and bottom walls of said bag in two sets of intersecting parallel diagonal lines.

4. The invention according to claim 1 wherein each of said first ridges is positioned between two of said second ridges and each of said second ridges is positioned between two of said first ridges and wherein said ridges are curved in at least two different directions.

5. The invention according to claim 3 wherein said ridges extend into said side walls of said bag, and wherein said ridges are spaced apart from each other at equal intervals.

6. The invention according to claim 4 wherein said ridges extend into said side walls of said bag and wherein said ridges are spaced apart from each other at equal intervals.

7. The invention according to claim 1 wherein the spacing between adjacent ones of said ridges is less than ¼".

References Cited by the Examiner

UNITED STATES PATENTS

2,028,431	1/1936	Barber.	
2,778,173	1/1957	Taunton.	
2,917,223	12/1959	Le Bolt et al.	229—53
3,113,715	12/1963	Pangrac	229—53
3,224,574	12/1965	McConnell et al.	206—56

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