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Kilgore

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[54] **MULTIWALL BAG CONSTRUCTION**

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[52] **U.S. Cl.**..... **229/55,** 161/251, 206/DIG. 34, 229/53

[51] **Int. Cl.**..... **B65d 33/02**

[58] **Field of Search**..... 229/3.5 R, 53, 55; 206/DIG. 34; 161/150, 250, 253

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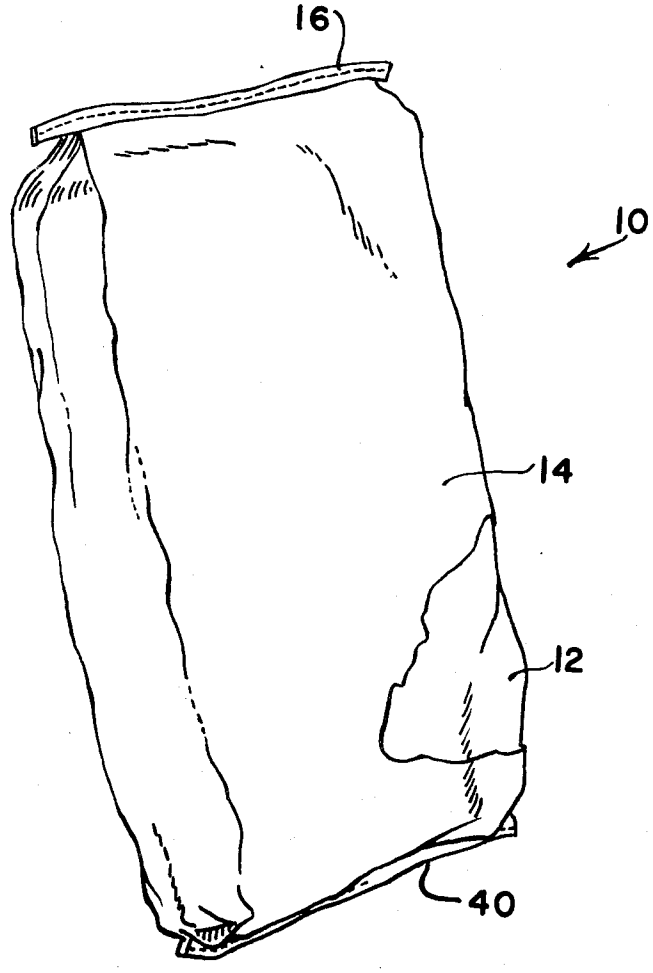
[57] **ABSTRACT**

A bag formed of spunbonded material has an outer surface and at least one ply of paper secured to the outer surface in order to reduce actinic degradation of the olefinic polymer material.

15 Claims, 6 Drawing Figures



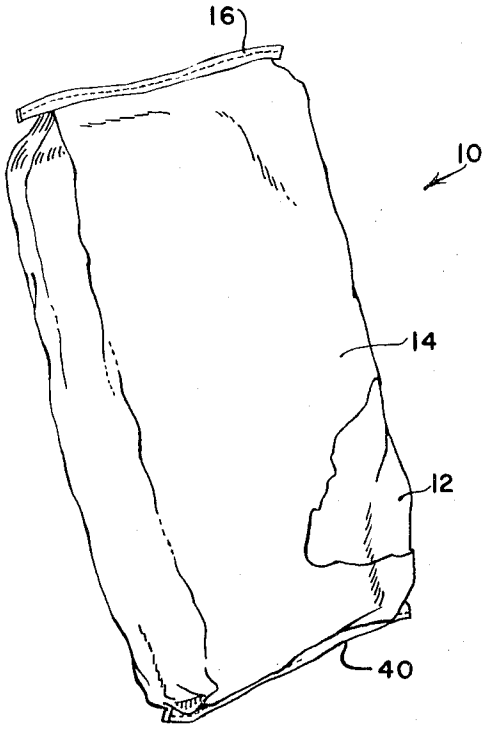


Fig. 1

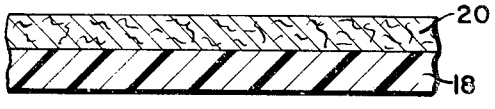


Fig. 2

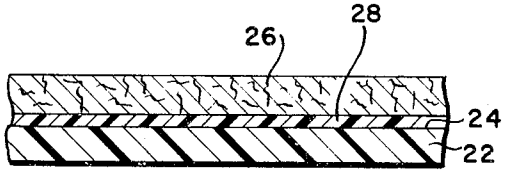


Fig. 3

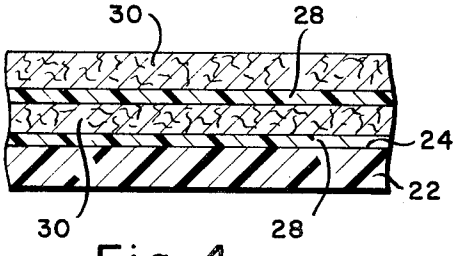


Fig. 4

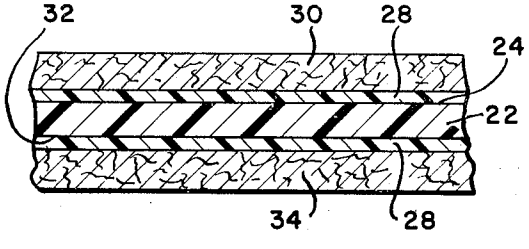


Fig. 5

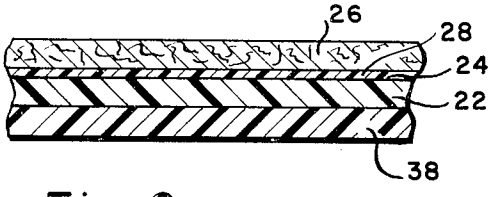


Fig. 6

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MULTIWALL BAG CONSTRUCTION

This invention relates to bag constructions and more particularly to bags formed of a spunbonded olefinic polymer material or other materials which are subject to actinic degradation.

It has previously been proposed that bags formed of an olefinic polymer material, such as, for example polypropylene, be utilized in a number of exterior applications such as for military sand bags and rip-rap bags. While such bags have proved generally satisfactory in use, the life expectancy thereof is seriously reduced by actinic degradation of the polypropylene fibers caused by exposure to the ultraviolet rays of the sun. Typically it has been found that failure of such bags occurs within less than three months after initial exposure.

Attempts have been made to extend the life of these bags by inclusion of inorganic and organic ultraviolet inhibitors within the material itself. Such inhibitors include carbon black, titanium dioxide and zinc oxide. While these inhibitors have achieved a stabilizing effect by converting the ultraviolet light into relatively harmless longer wave lengths, it is relatively expensive to include these materials in the polyolefin sheet material from which the bag is made. Further, the life expectancy of the bags is not increased sufficiently to justify the additional expense of combining these inhibitors with the polyolefin material.

Accordingly, it is an object of the present invention to reduce the rate of actinic degradation of bags formed of a polyolefinic material or other materials subject to this type of degradation.

It is another object of the invention to substantially increase the useful life expectancy of polypropylene in bags.

Yet another object of the invention is to provide a web material including a layer of olefinic polymer material adapted to produce a bag having a long life expectancy and which is inexpensive in construction and light in weight.

In accordance with an aspect of this invention, a bag construction is provided in which an inner bag formed of a sheet of olefinic polymer material is provided with at least one ply of paper secured to its outer surface to provide a barrier to utlraviolet light whereby to reduce actinic degradation of the olefinic polymer material.

In the preferred embodiment of the invention the material of which the inner ply is formed is a sheet of spunbonded polypropylene having an outer covering of kraft paper secured thereto by suitable adhesive.

The paper sheet may be formed from a plurality of plies of paper laminated in superimposed relation on the surface of the spunbonded polypropylene sheet to increase the size of the barrier and further limit light penetration to the olefinic material. The polypropylene sheet may be provided with a layer or ply of paper on both sides thereof to not only prevent or limit light penetration to the sheet but also to prevent contamination of the articles within the bag with polypropylene fibers.

The above and other objects, features and advantages of this invention will be apparent in the following description of illustrative embodiments of the invention which are to be read in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a bag constructed in accordance with one embodiment of the present invention;

FIG. 2 is a sectional view of a composite web utilized in accordance with the present invention;

FIG. 3 is a sectional view of another embodiment of the composite web constructed in accordance with the present invention;

FIGS. 4 and 5 are sectional views of still other embodiments of the web structure; and

FIG. 6 is a sectional view of another embodiment of the web structure in accordance with the present invention, including a waterproofing liner.

Referring now to the drawings in detail, and initially to FIG. 1 thereof, it will be seen that a bag 10 of the type in which the present invention may be employed generally comprises a main bag portion 12 formed of an olefinic polymer material and an outer paper covering 14 therefor. Main bag portion 12 is particularly adapted to be used for sand bags and for rip-rap bags wherein the bags are filled with sand or sand-cement mixture and placed at bridge bulkheads, sea walls, land fills and the like. The bags formed of olefinic polymer materials for such uses are highly desirable in that the bag construction is relatively inexpensive and the material has sufficient strength to contain the sand while being able to absorb the normal impacts and shocks incurred during use. However, one disadvantage of such bags is that the olefinic polymer material, which is preferably polypropylene in the form of a spunbonded sheet, is susceptible to actinic degradation when exposed to the ultraviolet rays of the sun, which rays activate degradation and oxidation reactions causing brittlement and deterioration of the bags.

The provision of outer paper covering 14 for polypropylene bag 12, in accordance with the present invention, produces a substantial increase in the life expectancy of the polypropylene bag, in addition to numerous other advantages. Outer covering 14 in one embodiment of the invention consists of an outer paper ply which receives and thereby covers the free or laminated polypropylene ply to provide a barrier to the penetration of ultraviolet rays produced by the sun.

As seen in FIG. 1, bag 10 is provided with a closure strip 16 which may be sewn to the edges of the bag adjacent the top opening to close the top of the bag when the latter is filled. However, it is contemplated that other conventional attaching mechanisms, such as for example strings or other known bag closure mechanisms may be utilized to close the top of the bag.

As mentioned, outer covering 14 is, in one embodiment, a paper bag in which the inner polypropylene bag is inserted. However, it is also contemplated that this covering may be in the form of a bag or sheets of paper which are secured to the polypropylene bag 12 in any convenient manner. For example, covering 14 may be secured to bag 12 by tacking or stitching.

In this manner a web construction is produced which, as seen in FIG. 2, includes a first layer 12 of polypropylene or other olefinic material utilized to form main bag 12 and an outer layer 20 of paper. It is noted that the paper utilized in conjunction with the present invention may be any suitable paper which significantly reduces penetration of ultraviolet light to the polypropylene sheet. However, in the preferred construction the paper utilized is a kraft or crepe paper which may be either natural or extensible.

A laminated web construction may also be utilized to form bag 10 and maintain the advantages of polypropylene bag construction for sandbag and rip-rap bag

usage while simultaneously providing an outer covering which resists the penetration of ultraviolet rays. Referring to FIG. 3 of the drawings, it is seen that a layer 22 of polypropylene material is provided which has an outer surface 24 to which a ply 26 of paper is secured by means of a layer 28 of adhesive material. The adhesive material may be any of those adhesives known to those skilled in the art for laminating paper materials together. Such adhesives may for example, constitute asphalt, hot melt adhesive, latex, acetate, polymer wax blend, or solution adhesive. The laminated web constructed in this manner is formed into a composite sheet which is then utilized to form bag 10.

It has been found that bags constructed in accordance with the present invention, that is, bags having an inner bag formed of polypropylene and an outer covering of paper have an increased life expectancy of from three to five months above bags formed only of polypropylene. This is true whether the outer covering merely constitutes an outer bag as in the embodiment disclosed in FIGS. 1 and 2 or whether the outer ply of paper is laminated or partially laminated to the outer surface of the polypropylene sheet.

It has also been found that additional increases in life expectancy are obtained by utilizing additional plies of paper on the outer surface of the polypropylene in order to further reduce the amount of ultraviolet rays reaching the polypropylene sheet. Referring to FIG. 4 of the drawings another embodiment of the invention is shown wherein a plurality of layers or plies 30 of paper are laminated to the outer surface 24 of polypropylene sheet 22. These plies may be laminated to the polypropylene sheet in any desirable configuration, as for example with a crosshatch pattern.

By laminating the paper plies to the polypropylene sheet additional advantages are obtained in that the laminant or adhesive holds the paper to the polypropylene sheet. This is particularly important since the polypropylene sheet has the ability to stretch up to 50 percent of its length whereas paper stretches only 1 percent to 8 percent of its length, and thus, when a bag is dropped, it may occur that the paper will split or tear while the polypropylene sheet will remain integral. The laminant in this case holds the broken paper ply in its place whereby the paper continues to serve as an ultraviolet barrier after dropping or breaking. In addition, the laminant prolongs the life of the paper by bonding the fibers thereof together and retarding the rate of disintegration of the kraft sheet under outside storage conditions. As a result, clearly the longer the paper sheet remains intact, the life of the polypropylene sheet is proportionately prolonged.

To further prolong the useful life expectancy of the bags, formed in accordance with the present invention the outer ply of paper may be treated with conventional mold proofing agents which are known in the art.

The composite webs constructed in accordance with the present invention are useful in other applications in addition to the production of sand, rip-rap bags, or the like. In particular, the material may be used to form wrappers or packages of various types, and it is contemplated that the material may be used to form cotton bale wraps. In such cases, it is desirable that the product which is to be wrapped in the web be protected from contamination by the spunbonded polypropylene fibers. In such cases a layer of paper is laminated to the interior surface 32 of the polypropylene sheet in order to prevent such contamination. Thus, the paper sheet 30, as seen in FIG. 5, will provide the barrier to ultraviolet radiation to prevent actinic degradation of the polypropylene sheet while the inner layer 34 protects the product within the wrapper from contamination. Further, the provision of a paper ply on both sides of the polypropylene sheet presents a smooth surface on the package and eliminates the roughness often associated with spunbonded polypropylene sheeting.

In yet another embodiment of the present invention, (FIG. 6), a waterproofing inner liner 38 formed from a material such as polyethylene is inserted in bag 10. The liner may typically be in the form of a flush cut tube inserted in the bag with its bottom edge sewn or taped closed with the remainder of the bag, as illustrated at 40 in FIG. 1. Liners of this nature are preferably used to protect the contents of the bag from deterioration due to any moisture which might enter the bag through the paper and polypropylene sheets 26 and 22.

In one contemplated use of this embodiment of the present invention, caustic soda may be contained within the bag 10. This material rapidly deteriorates paper bags, and in previously proposed bags and inner liner was supplied which has a top cuff portion overlying the top edge of the bag. The cuff prevented the caustic soda from entering the space between the liner and side walls of the bag during loading. While such precaution increased the life of the bag, the provision of the cuff resulted in increased manufacturing costs and reduced packing rates. With the present embodiment of the invention, however, no cuff is required as the inner layer 22 of polypropylene is unaffected by the caustic soda and so even if this material were inadvertently applied between the liner and the sidewall of the bag, the paper ply 26 would not be effected. As a result manufacturing time is decreased and the packing rates are increased. The benefits of this embodiment of the invention are clearly equally avoidable when packing other materials than caustic soda which must be kept dry and/or which tends to deteriorate paper.

In the preferred form of this embodiment, inner liner 38 is secured to the bag only at a small number of locations by a conventional adhesive or by spot heat welding. However, liner 38 may be secured along its entire extent to polypropylene layer 22. Further, the top of inner liner 38 may be closed by a simple heat sealing operation. In any case, the polypropylene liner serves to provide increased strength and toughness to the bag construction while the outer paper bag protects the polypropylene from actinic degradation

While the preferred embodiments of the invention as described above are constructed primarily with spunbonded polypropylene materials it is contemplated that multiwall bag construction according to the present invention may also be formed with other materials which are subjected to actinic degradation. For example, satisfactory multiwall bags have been formed from spunbonded nylon and film or sheet polypropylene.

Although illustrative embodiments of the invention have been described herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of this invention.

What is claimed is:

1. A bag construction comprising an inner article supporting bag member and an outer protective bag member laminated together by an adhesive material, said inner bag member being formed of non-woven porous spunbonded polypropylene which provides the article supporting strength to the bag construction, and said outer bag member being formed of kraft paper for protecting said spunbonded polypropylene article supporting bag against actinic degradation.

2. A bag construction as defined in claim 1 wherein said adhesive material is selected from the group consisting of latex solution adhesive, asphalt, polymer wax, acetate and hot melt adhesive.

3. A bag construction as in claim 1 wherein said outer bag member is formed of a plurality of plies of paper.

4. A bag construction as in claim 3 wherein said paper plies are laminated together.

5. A bag construction as defined in claim 1 including a paper bag member generally conforming in configuration to said inner bag member and positioned within the latter whereby said inner bag member is located between said paper bag members.

6. A bag construction as defined in claim 1 including a second inner barrier bag member generally conforming in configuration to said spunbonded polypropylene inner article supporting bag member and being formed of a water impervious material, said second inner bag member being positioned within said spunbonded polypropylene bag member as a waterproof barrier preventing discharge of liquid through said spunbonded polypropylene bag.

7. A bag construction as defined in claim 6 wherein said second inner bag member is formed of polyethylene.

8. A bag construction comprising an article supporting bag formed of a spunbonded olefinic polymer material providing the structural article supporting member of said bag construction, said spunbonded article supporting bag having an outer surface, and at least one ply of protective paper secured to said outer surface to protect said spunbonded olefinic polymer bag against actinic degradation.

9. A bag construction as defined in claim 8 wherein said paper ply is laminated to said spun bonded olefinic polymer bag by an adhesive material.

10. A bag construction as defined in claim 9 wherein said spun bonded olefinic polymer material is spunbonded polypropylene.

11. A bag construction as defined in claim 10 wherein said bag has an inner surface and at least one ply of paper is secured to said inner surface.

12. A bag construction as defined in claim 10 including a plurality of plies of paper secured to said outer surface.

13. A bag construction as defined in claim 12 wherein said paper plies are laminated to said bag and to each other in superimposed relation by an adhesive material.

14. A bag construction as defined in claim 8 including an inner bag member generally confirming in configuration to said olefinic polymer bag and being formed of a water impervious material, said inner bag member being positioned within said olefinic polymer bag.

15. A bag construction as defined in claim 14 wherein said inner bag member is formed of polyethylene.

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