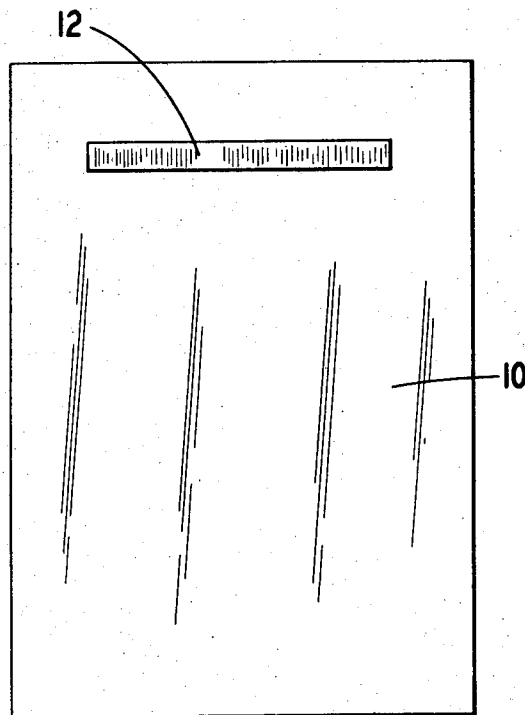


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PLASTIC BAG AND PEELABLE PLASTIC TIE CLOSURE
TAPE ATTACHED THERETO
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PLASTIC BAG AND PEELABLE PLASTIC TIE CLOSURE TAPE ATTACHED THERETO

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ABSTRACT OF THE DISCLOSURE

A plastic bag is provided with a new twist tie closure made of a tape of high tensile modulus plastic material. The tape has semi-rigidity and dead fold characteristics similar to those of a conventional twist tie closure made of wire coated with paper tape and is heat-sealed to the bag with a peelable heat seal.

The present invention relates to a plastic bag and to a new tie member for closing said bag.

Such bags are widely employed in the packaging industry and also in households where they are used to package foodstuffs and various other items to be stored. These bags are usually closed by gathering the top end of the bag over the contents and placing around the gathered end a tape having a pressure sensitive adhesive applied on one side thereof, or tying the gathered end with a piece of string or a wire twist tie (generally a tin wire coated with paper). The wire twist ties are often supplied by the bag manufacturer, as separate items in each package of bags. A wire twist tie provides an easier and quicker way of closing a bag than a piece of string or of adhesive tape since the ends of said wire tie are simply twisted around each other and around the gathered end of the bag, thus eliminating the making of a knot in the case of the string or the careful wrapping of the tape around the end of the bag. However, the wire twist ties present three major disadvantages: they can tear the bags in packages before the customer uses them, especially when said bags are made of a thin plastic film, they can also occasionally cause minor injuries to the fingers of the user, and they are frequently misplaced or lost by the customer once the packages have been opened.

It is, therefore, the object of the invention to provide a bag with a new tie member from which the wire has been eliminated and which has the desirable characteristics of semi-rigidity and dead fold found in a wire twist tie, yet is perfectly harmless both to the bags and to the users, and is always at hand when needed.

Accordingly, the invention provides a plastic bag having a plastic tie member removably attached thereto by a peelable heat-seal, said tie member being in the form of a semi-rigid tape made of a plastic material having a high tensile modulus (ASTM D-882) and dead fold characteristics similar to those of a wire.

The sole figure of the accompanying drawing illustrates a preferred embodiment of the plastic bag of the invention. It is a front view of a plastic film bag 10 having a semi-rigid tie member tape 12 peelably attached thereto by a heat seal.

The expression "dead fold characteristics," used herein in conjunction with the semi-rigid tape and with a wire, means that the tape, like the wire, tends to retain the shape given to it when bent, twisted and/or folded by the user.

The essential characteristics of the plastic material suitable for making the semi-rigid tie member of the invention is that it should have a tensile modulus higher than 100,000 p.s.i. and preferably higher than 125,000 p.s.i.,

good dead fold characteristics and that it be heat-sealable to the plastic bag.

The preferred materials for the tape tie member are unplasticized vinyl halide polymers such as unplasticized polyvinyl chloride or polyvinyl fluoride, unplasticized polyvinylidene chloride or unplasticized polyvinylidene fluoride, or copolymers of unplasticized vinyl halides and ethylenically unsaturated monomers such as unplasticized vinyl chloride-vinyl acetate copolymers or unplasticized vinyl chloride-acrylonitrile copolymers. All these vinyl materials have a tensile modulus of at least 300,000 p.s.i. The vinyl tapes may be satisfactorily heat-sealed, with a peelable seal to plastic bags made of ethylene-vinyl acetate copolymer and of plasticized vinyl halide polymers such as plasticized polyvinyl chloride or polyvinyl fluoride.

High density olefin polymers, such as polyethylene having a density of at least 0.95 and a tensile modulus of at least 100,000 p.s.i., are also suitable for making the tape tie member. A preferred olefin material is a high density polyethylene containing, in a preferred amount of from about 10% to about 30% by weight, an inorganic filler such as calcium carbonate, silica, titanium dioxide and the like, and having a tensile modulus higher than 125,000 p.s.i. Copolymers of ethylene such as ethylene-butene or ethylene-propylene copolymers having a tensile modulus of at least 100,000 p.s.i. may also be used to produce the tie member of the invention. These copolymers may, if desired, contain an inorganic filler in the preferred amount of from about 10% to about 30% by weight. The semi-rigid tapes made of these olefin polymers may be satisfactorily heat-sealed with a peelable seal to plastic bags made of olefin polymers such as polyethylene, polypropylene, ethylene-propylene or ethylene-butene copolymers, or of ethylene-vinyl acetate copolymer.

When the bags are made of olefin polymers or copolymers and the tape of a high density olefin polymer, a further embodiment of the invention is possible. If desired, one end of the tape tie member may be heat-sealed with a permanent seal to a top edge portion of the bag, while the rest of said tie member is peelably heat-sealed to said top edge portion of the bag. In use, the tape is peeled from the bag but remains attached at one end; it is then twisted around the gathered neck of the bag.

The tie member may also satisfactorily be made of rubber-modified polystyrene or of acrylonitrile-butadiene styrene copolymer. The latter material may or may not be rubber-modified as desired. These styrene materials have a tensile modulus in the range of from about 160,000 to about 440,000 p.s.i. The tapes made from these styrene materials may be satisfactorily heat-sealed with a peelable heat-seal to plastic bags made of ethylene-vinyl acetate copolymers.

The tie member may be manufactured in various manners, for example, by extruding the plastic material in the form of a tape which is thereafter cut into any desired lengths. While still hot after the extrusion, the tape may be embossed by passage through embossing rolls, if desired. Also, the plastic material may contain pigments to produce tapes of various colors.

Alternatively, a tape might be slit or cut from an extruded or calendered sheet of the plastic material. The sheet may have been embossed with a pattern or not, as desired.

The method of producing the plastic bag of the invention is not critical and may be determined by one skilled in the art. For example, the plastic tape could either be applied to the finished plastic bag coming out of the bag-making machine, or to the feed stock bag material entering the bag-making machine, and peelably heat-sealed thereto. The method of making a peelable heat seal is not critical either. For example, a peelable heat

seal may be obtained by using a roller type sealer electrically heated to a temperature in the range of from about 250° F. to about 450° F. and rotating at a linear speed in the range of from about 20 feet to about 200 feet per minute, with sufficient pressure from the heat seal roller to insure intimate contact of the plastic tape with the plastic bag. The optimum conditions for each particular plastic tape and bag may easily be selected by one skilled in the art.

Another method of producing the plastic bag of the invention would be to extrude the tape in line with the extrusion of the film for the bag and to apply the extruded tape directly onto the extruded film. Alternatively, the tape could be extruded in line at the bag-making machine onto the feed stock bag material.

Although the bag illustrated in the accompanying drawing is made of a plastic film, the invention is not limited thereto. The plastic bag may also be made of materials such as a plastic net, or of a woven or non-woven fabric made of plastic strands or strips, or of a laminate of a plastic film and a woven, or non-woven, plastic fabric layer, for example.

The dimensions of the tie member are not critical. They depend on the dimensions of the bag which it will close and can be easily determined by one skilled in the art. The smaller the dimensions, the more economical the tie member.

What is claimed is:

1. An open plastic bag having a plastic tie closure member attached thereto by a peelable heat-seal, said plastic bag being made of a material selected from the group consisting of an olefin homopolymer and copolymer, an ethylene-vinyl acetate copolymer and a plasticized vinyl halide polymer and said plastic tie member being a semi-rigid tape having dead fold characteristics and made of a material selected from the group consisting of a polyolefin, a styrene polymer, an unplasticized vinyl halide polymer and a copolymer of unplasticized vinyl halide and ethylenically unsaturated monomer, said tape material having a tensile modulus over 100,000 p.s.i.

2. A plastic bag as claimed in claim 1, in which said bag is made of an olefin material selected from the group consisting of ethylene and propylene homopolymers and ethylene-butene and ethylene-propylene copolymers and the semi-rigid tape is made of a polyolefin material selected from the group consisting of polyethylene having a density of at least 0.95, a copolymer of ethylene and butene and a copolymer of ethylene and propylene.

3. A plastic bag as claimed in claim 2, in which the semi-rigid tape polyolefin material contains an inorganic filler in an amount of from about 10% to 30% by weight and has a tensile modulus higher than 125,000 p.s.i.

4. A plastic bag as claimed in claim 2, in which an end of the polyolefin semi-rigid tape is permanently heat sealed to a top edge portion of said bag.

5. A plastic bag as claimed in claim 1, in which said bag is made of an ethylene-vinyl acetate copolymer and

the semi-rigid tape is made of a polyolefin material selected from the group consisting of polyethylene having a density of at least 0.95, a copolymer of ethylene and butene and a copolymer of ethylene and propylene.

6. A plastic bag as claimed in claim 1, in which said bag is made of an ethylene-vinyl acetate copolymer and the semi-rigid tape is made of a styrene polymer material selected from the group consisting of rubber-modified styrene homopolymer and acrylonitrile-butadiene-styrene copolymer, said styrene polymer material having a tensile modulus of at least 160,000 p.s.i.

7. A plastic bag as claimed in claim 1, in which said bag is made of an ethylene-vinyl acetate copolymer and the semi-rigid tape is made of an unplasticized vinyl halide polymer selected from the group consisting of unplasticized polyvinyl chloride, polyvinyl fluoride, polyvinylidene chloride and polyvinylidene fluoride, said unplasticized vinyl halide polymer having a tensile modulus of at least 300,000 p.s.i.

8. A plastic bag as claimed in claim 1, in which said bag is made of an ethylene-vinyl acetate copolymer and the semi-rigid tape is made of a copolymer of unplasticized vinyl halide and ethylenically unsaturated monomer having a tensile modulus of at least 300,000 p.s.i. and selected from the group consisting of unplasticized vinyl chloride-vinyl acetate copolymer and unplasticized vinyl chloride-acrylonitrile copolymer.

9. A plastic bag as claimed in claim 1, in which said bag is made of a plasticized vinyl halide polymer selected from the group consisting of plasticized polyvinyl chloride and polyvinyl fluoride and the semi-rigid tape is made of an unplasticized vinyl halide polymer having a tensile modulus of at least 300,000 p.s.i. and selected from the group consisting of unplasticized polyvinyl chloride, polyvinyl fluoride, polyvinylidene chloride and polyvinylidene fluoride.

10. A plastic bag as claimed in claim 1, in which said bag is made of a plasticized vinyl halide polymer selected from the group consisting of plasticized polyvinyl chloride and polyvinyl fluoride and the semi-rigid tape is made of a copolymer of unplasticized vinyl halide and ethylenically unsaturated monomer having a tensile modulus of at least 300,000 and selected from the group consisting of unplasticized vinyl chloride-vinyl acetate copolymer and unplasticized vinyl chloride-acrylonitrile copolymer.

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