United States Patent [19]

Uramoto

[11] **3,827,472**

[45] **Aug. 6, 1974**

[54] **RECLOSABLE BAG**

[75] Inventor: **Tatsuro Uramoto,** Tokyo, Japan

[73] Assignee: **Kabushiki Kaisha Seisan Nipponsha,** Tokyo, Japan

[22] Filed: **Feb. 16, 1972**

[21] Appl. No.: **226,680**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 882,491, Dec. 5, 1969, abandoned.

[52] **U.S. Cl.** **150/3,** 229/66

[51] **Int. Cl.** **B65d 31/02**

[58] **Field of Search** ..... 150/3; 229/66; 24/201 C

[56] **References Cited**

UNITED STATES PATENTS

3,198,228	8/1965	Naito	150/3 X
3,323,707	6/1967	King	229/66
3,473,589	10/1969	Gotz	150/3

Primary Examiner—Donald F. Norton

Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

A flexible bag structure having an outer layer and an inner layer with the layers bonded to each other and being coextensive to the top of the bag, and the inner layer formed of a plastic with interlocking rib and groove profiles integral with the plastic to close the top of the bag and tear strip means integral with the inner layer and opposite the coextensive outer layer for tearing the top off of the bag with the tear strip means preferably in the form of a pair of ribs.

11 Claims, 7 Drawing Figures

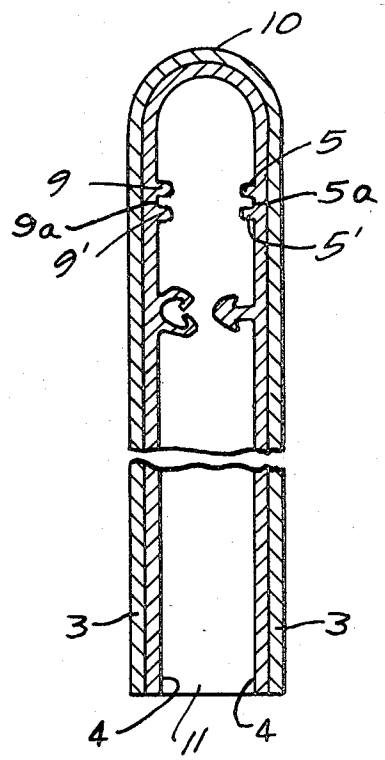


Fig. 1

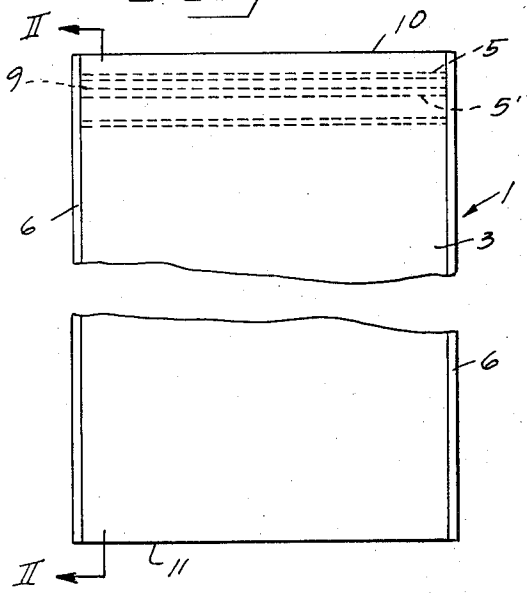


Fig. 2a

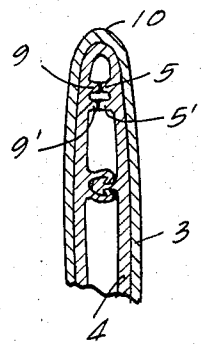
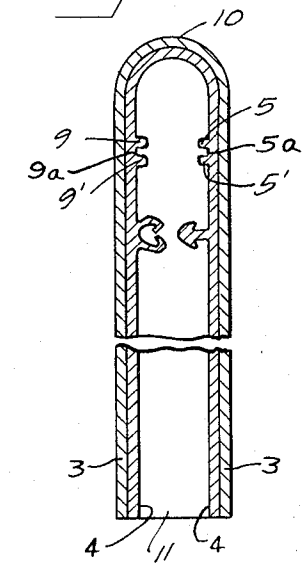


Fig. 2



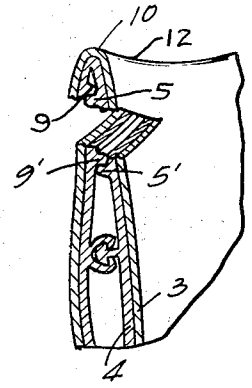


Fig. 2b

Fig. 3

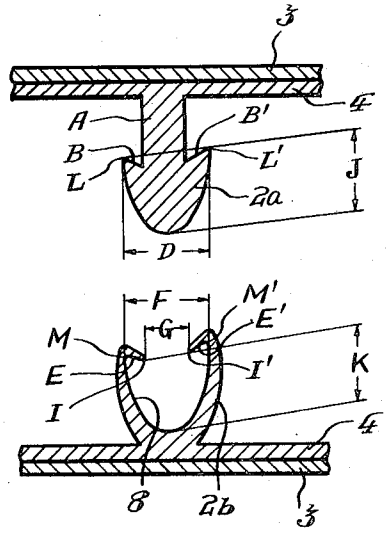


Fig. 5

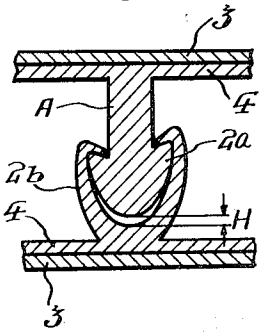
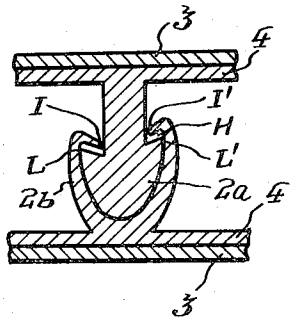


Fig. 4



INVENTOR
TATSURO URAMOTO
By Linton and Linton
ATTORNEYS

RECLOSABLE BAG

RELATED APPLICATIONS

The present application is a continuation-in-part of my copending application, Ser. No. 882,491, filed Dec. 5, 1969, entitled "Air-Tightly Sealable Pouch Formed of Laminate Members Integrally Combining Engaging or Coupling Fastener Elements", now abandoned.

BACKGROUND OF THE INVENTION

The invention relates to improvements in air-tight bags having reopenable closure structures at the top which interlock to exclude air and moisture from the contents thereof and which open when pulled apart to afford access to the interior thereof.

More particularly, the invention relates to an improved arrangement for bags of the reopenable type which are initially sealed, and are torn open by the user before using. After being torn open, interlocking rib and groove profiles beneath the torn part serve to reclose the bag when it is not in use and provide a reopenable closure for access to the contents of the bag. Such a bag has to comply with various functional requirements to be successful. For example if used for foodstuffs, it should be impervious to air and moisture to protect the foodstuffs from surrounding contamination, and should be impervious to greases, sugars or liquids or whatever the foodstuffs contain to prevent leakage. These requirements place heavy demands on any one material, and it is desirable to provide a multi-layered bag, and it is accordingly, an object of the present invention to provide an improved multi-layered bag of unique design which provides an improved tear strip arrangement at the top for initially opening the bag.

Before proceeding with a discussion of the specific features of this bag, a brief review of the importance of impervious reopenable bags will be useful. In the provision of plastic film bags, they are frequently used for contents which are subject to deterioration when permitted to come in contact with atmospheric air. The closure is, therefore, designed to exclude air and obtain preservation of the contents for a relatively long time. This type of bag and closure is conventionally made of suitable plastic such as polyethylene which can be obtained by extrusion processes. This type of bag is suitable for containing many types of products which require, for their preservation, the prevention of the penetration of air and moisture to the interior since the contents undergo chemical or physical changes due to the oxygen from the air and the moisture from the atmosphere, and if these are permitted to penetrate the bag, the contents are progressively deteriorated as time passes. Conventional types of containers employ vacuum packages or cans which evacuate atmospheric air from the contents before they are closed. This type of container, however, must be consumed after the container is open, or if a required amount is taken out of the container, the necessity arises for providing a container for the preservation of the remainder. Plastic film bags with air-excluding fasteners have an effective function for taking care of such contents to protect them.

However, in conventional flexible plastic bags, provisions are not made to absolutely prevent the penetration of air and to insure the prevention of inadvertent

opening or leakage and the resultant admission of air and deterioration of the contents.

In a sealing fastener means with a flexible pouch which is used to prevent the penetration of air into the interior of the bag, the following requisites must be met:

a. The physical function of the engaging fastener means must be sound enough to stand any pressure force exerted either from the outside or from the inside of the pouch and such engaging force must be strong enough to maintain its function until the bag is broken.

b. The disengagement or opening of the fastener means must be easily effected when the contents are partly or entirely taken out.

c. The sealing fastener means must have the ability to inhibit any penetration of air from the atmosphere outside of the pouch or the escape of air from inside the pouch.

d. The pouch body must have the ability to inhibit the passage of air from either the outside in or from the inside out so that through the cumulative effect of both the fastener and the pouch, the package as a whole is capable to prevent deterioration of the contents. Also, the conventional fastener means for closing pouches are formed from a simple combination of joining fastener means to the pouch body, both being of plastic such as polyethylene. In the relationship between the fastener and the pouch body, such conventional devices are satisfactory with respect to the above requisites (a) and (b) from maintenance of the contained products, but such devices lack the important structural arrangements to satisfy (c) and (d) for interception of the atmospheric air required to be excluded for safe perservation of the contents.

It is accordingly an object of the present invention to provide an improved flexible closure structure which will provide a more secure closure for a bag in the sense that it will exclude the passage of air in the atmosphere into the contents of the bag and prevent the flow of air from the interior out through the fastener for the bag.

A further object of the invention is to provide an improved plastic sheet suitable for making bags with the sheet having parts inter-related to be readily formed into a bag.

Another object of the invention is to provide a new and improved closed bag structure which can be torn open and which has releasably interlocking rib and groove elements within the opening.

Other objects and advantages will become more apparent with the disclosure of the preferred embodiment of the invention in connection with the claims, specification and drawings in which:

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a bag constructed in accordance with the principles of the present invention;

FIG. 2 is an enlarged fragmentary sectional view showing the parts separated for purposes of clarity;

FIG. 2*a* is an enlarged fragmentary sectional view taken substantially along line II–II of FIG. 1;

FIG. 2*b* is an enlarged fragmentary view showing the manner in which a bag constructed in accordance with the invention is opened;

FIG. 3 is a greatly enlarged sectional view showing a portion of the fastener of the invention;

FIG. 4 is a greatly enlarged sectional view showing the elements of FIG. 3 as they first interengage; and

FIG. 5 is a greatly enlarged sectional view similar to FIGS. 3 and 4 but showing the relative positions of the parts when fully interengaged.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. 1, 2, 2*a* and 2*b*, a bag or pouch construction 1 is formed with seams 6 along the side edges. The bottom of the bag is open for filling. The bag will normally be inverted when filled, and a heat seam will be formed along the bottom edge 11 for closing the bag.

The material of the bag is originally formed by an extrusion process which forms a flat sheet. The sheet may initially be extruded as flat or in a tube and slit to form a flat sheet. Actually, a multiple sheet is formed with the sheets bonded together, and these separate sheets may be extruded separately or extruded at the same time and brought together adjacent the extrustion head to be laminated to each other. The upper sheet will form the plain outer layer of the bag, and the lower sheet will form the inner layer which carries the rib and groove profiles and the tear guide elements. The sheet is extruded as a continuous length, and cut into short lengths which are doubled at their center to form the fold shown at 10 in FIG. 2*a*. The sides of the folded sheet are then sealed to each other to form the side seams of the bag with the bottom remaining open until the bag is filled.

When the sheet is folded to form the bag, as shown in the form of FIGS. 1 and 2*a*, the inner layer 4 will be a thin plastic film having a characteristic suitable for the inner surface of the bag and suitable for the interlocking rib and groove elements 2*a* and 2*b*. A very thin layer of plastic 4 may be employed which provides an air and moisture impervious layer and which, when combined with the outer layer 3, has sufficient stiffness to function as a bag wall. Thus, each layer can be chosen to supply its own optimum characteristic, e.g., the inner layer can be chosen to provide a seal, the outer layer can be chosen to provide stiffness.

The bag walls are made up of the first outer layer and the second inner layers of plastic film which are laminated to each other, such as by being joined at the time of extrusion, or by being placed together and subjected to external heat or by being joined by an adhesive material extending between the layers. In some instances the outer layers can also be formed of plastic film of a greater thickness or of a film which has an inherent characteristic of greater stiffness. By providing the two layers of film thus laminated, it becomes easier to form and extrude each of the layers. The extrusion process for the inner layer can be carefully controlled for better formation of the rib and groove elements, and the inner layer can be quite thin since it does not have to provide a support for these elements. The outer layer can be extruded more rapidly and with a coarser extrusion apparatus since it is not necessary to obtain the careful tolerances of formation that are necessary with the rib and groove element. Also, if there happen to be any pinholes in either of the two layers, they will be sealed by the laminated opposing layer of film.

As shown in FIG. 1, the bag is formed with an open bottom 11 and side seams 6. Integral with the inner layer 4 is the rib element 2*a* and groove element 2*b*. These elements may take different forms and shapes, but a preferred simple arrangement is shown in the drawings of FIGS. 2, 2*a* and 2*b*, and details of modified versions are shown in FIGS. 3 through 5.

The rib and groove elements 2*a* and 2*b* are cooperatively shaped so that they will interlock when pressed together and will separate when pulled apart by grasping the upper two edges of the bag.

The bag is initially formed as shown in FIG. 2*a*, and the rib and groove elements 2*a* and 2*b* are pressed together. The bag is then filled from the bottom, and a heat seal is formed so that a completely sealed bag results.

At the time of use, the top is torn open to afford access to the contents and to first permit separating the rib and groove elements. This tearing operation is shown in FIG. 2*b* wherein the user grasps the top edge and pulls it away from the bag so that a tear occurs between the upper and lower ribs 5 and 5′ and between the upper and lower ribs 9 and 9′. That is, along lines 5*a* and 9*a* as shown in FIG. 2. This tear line will follow straight across the top of the bag and will not deviate downwardly to tear down into the rib and groove elements, nor will it turn upwardly to run off the top of the bag. It will leave a relatively smooth top so that flanges will remain for pulling apart to separate the rib and groove elements. The ribs 9 and 5, and the ribs 9′ and 5′, may be either in alignment with each other as shown in FIG. 2*a* or may be slightly offset in location as shown in FIG. 2*b*.

While the means for guiding the tear across the top of the bag is shown in a preferred form as embodying pairs of ribs, it will be understood that other forms may be used such as a single rib, or a perforated line of weakened tear resistance such as by spaced notches or a V-groove. In any event, the entire tear guide means is carried by the inner layer 4 and contributed to the bag when the inner layer is laminated to the outer layer. This is a new concept which provides for an optimum tear function and yet does not interfere with the construction of the outer layer of the bag. Also, the tear guide ribs or other means are completely hidden within the bag and do not provide objectionable projections or grooves on the outer surface of the bag.

In some circumstances, the outer layer 3 may be transparent and the tear guide means may be colored so that the user may immediately locate and identify the tear guide means. It is also contemplated that tear starting means may be provided on either side of the bag such as a notch, which will indicate to the user where the tear is to begin and will insure that the tear occurs at the proper location.

Also, when the top of the bag is removed as indicated by the tear strip 12, the remaining portion provides convenient flanges, as provided by the ribs 9 and 5 for gripping the top of the bag and pulling apart the rib and groove elements.

The doubled over top 10 provides a complete seal for the bag until it is used. Also, the tear guide arrangement and the doubled over top provide a relatively stiff top for the bag which helps hold its form during storage and helps the top to be torn off.

It is also contemplated that the material of the tear guide ribs, whether a single rib or double rib is used, will be of harder plastic than the other material of the bag. This can be accomplished by supplying a harder plastic during the extrusion. With this structure, a rela-

tively thin inner layer can provide all of the guide support that is needed for a heavy outer layer.

The details of construction of the rib and groove elements are shown in FIGS. 3 through 5. The rib 2*a* has a stem A which supports it on the layer of film 4 and a head with rounded outer surfaces and which tapers to a smaller size at its distal end.

The groove element 2*b* has a pair of jaws 8 with hooks E and E′ at their outer ends with inwardly facing planar surfaces that are slanted to be parallel to the inner surfaces B and B′ of the head so as to lie in surface to surface contact when the elements are fully engaged as shown in FIG. 5.

The head 2*a* has a width D which is measured parallel to the film layer 4, and a depth or height J which is measured normal thereto.

Similarly, the groove element 8 has a width F and a depth or height K. These dimensions are such that the width of the head D is at least as great as the width F between the jaws of the groove element. The outer curved surface of the head 2*a* and the inner curved surfaces of the jaws 8 are such that they are complementary when the head is first fully inserted between the jaws to the position shown in FIG. 4. The depth J of the head is less than the depth K of the recess of the groove element so that the head 2*a* can be fully inserted into the recess and past the hooks E and E′ and then seat in the position shown in FIG. 5. The width of the stem A is such that inner tips of the hooks I AND I′ extend substantially to the sides of the stem A. In fully interengaged position as shown in FIG. 5, the difference between the depth of the head 2*a* and the groove element is shown at H.

As shown in FIG. 3, the fitting engagement between the head and the jaws are such that the engaging end portions L and L′ of the head pass the engaging end portions I and I′ of the jaws during insertion. Their positional relationship after engagement is such that the engaging end portions L and L′ of the head are positioned at a point lower than the end positions I and I′ of the jaws.

Because of the presence of space H after their engagement of the rib and groove elements, as shown in FIG. 5, the rib element can move loosely in the groove element whenever given impact or rocking force due to forces from either outside or inside of the bag. The head thus moves freely in the surface between the head and groove element and acts as a bearing permitting free rocking movement preventing the breaking of the seal formed between the rib and groove. This structural relationship is significant because it prevents the inadvertent passage of air which might occur in conventional structures even though the interengagement was not completely broken.

The pouches are formed by first forming the plastic film such as by extrusion, and preferably extruding the interengaging elements therewith in sheet form or tubular form. By cross-sealing individual bags are then completed.

As an example of use for the bag, a discussion will be provided where a product is contained which absolutely requires the exclusion of air for its preservation when packed in a conventional fastener. When only a desired amount of such a product is taken out of the pouch, the remainder is retained therein, the fastener means is closed. A slight amount of oxygen is inevitably intorduced into the bag when the needed amount of contents are taken out. In the case of oil containing foodstuffs (such as pies, crackers, potato chips or biscuits) the introduced oxygen is consumed by the oxidation of the oil, with the result that oxygen pressure in the pouch is reduced to substantially zero. Such oxygen has a partial pressure of about one-fifth a.t. in the atmosphere and there is produced a difference of partial pressure of oxygen between the inside and outside of the bag. Consequently, brisk oxygen penetration into the bag is expedited causing additional oxidation of the product therein which obviously results in the deterioration of the flavor and quality of the product and degeneration thereof. Oxygen in the atmosphere tends not only to deteriorate the quality of the product but also expedites growth of aerobic germs, causing early decomposition or degeneration of the product. In case the contained product is a foodstuff such as a pie, and the quality is greatly affected by humidity, which contains in itself a small amount of moisture necessary to maintain its shape and quality, if the ambient atmosphere is under equal humidity conditions, this permits maintenance of an optimum humidity of the pie and there will be no change of quality of the pie since no moisture absorption nor dehumidification takes place. However, if either moisture due to dehumidification exceeds the limit of the humidity condition necessary for maintaining the pie quality, the optimum humidity of the pie itself and the ambient humidity are unbalanced causing deterioration and rapid detraction of its value as a commercial product.

Obviously change of product quality is directly related not only to humidity but also to temperature to which the product is exposed. It is known, for example, that the optimum relationship between the temperature and humidity for preserving the commodities resides within the range shown in the following table:

	Temperature	Humidity
Wheat flour	21°–27°C	60%
Chemicals	16°–27°C	35–50%
Confectionary	16°–20°C	50–65%
Apple	−0.6°–1.0°	78–85%
Orange	0°C	80%
Sugar	27°C	35%

The above-mentioned units are only a portion of the commodities, but it may be observed that except for some specific articles which require low temperatures for their preservation, most of the commodities require an ordinary temperature of around 20°C, but are bound more strictly by the humidity in which they are placed. Thus, the protection against humidity is frequently more significant than temperature maintenance.

in a humid district, therefore, there is need of providing suitable means for preventing excess humidity absorption, and to this end, usually a complementary measure such as the enclosure of a dessicant is taken. However, such measure increases cost because of labor, expenses of dessicant and inconvenience of handling due to increase of the volume.

The foregoing are examples where a fastener means which has no airtightness allows penetration of air and humidity into and out of the pouch and causes deterioration of the combined product. In case the contained article is one having a high fragrance or aroma such as coffee or bread and the like which requires an optimum

humidity with a certain range for its preservation, it is required to prevent the release of fragrance or humidity from the container. Thus, the opening and closing function of an opening fastener for a flexible bag will attain its desired function only when it serves both the retention of the packed article, but also to maintain its quality, particularly when the article is a specific one which requires protection against humidity and oxidation.

In the improved bag of the instant invention, the bag walls are formed of a composite layer of material such as cellophane or polyethylene and aluminum foil or paper sheet. The inside layer is of plastic film so as to be joinable with the fastener assembly, and the outside layer of cellophane, foil or paper so as to give additional protection, body, resistance against scuffing and other properties which are afforded by the material of the outside layer.

Referring again to FIGS. 3 through 5, the structure is formed such that the profile or contour of any selected point of the outer surface of the head 7 corresponds or is the same as the profile of the inner surfaces of the jaws 8 except at the end points M and M' when the head is fully inserted in the groove element. With the head fully inserted as shown in FIG. 4, the jaws 8 are slightly pushed apart so that their natural resiliency to return to their normal position provides a restoring force that tends to urge the head 7 of the rib outwardly to its normal locked position as shown in FIG. 5. To enhance the resiliency of the jaws, their thickness is gradually increased from the outer distal end toward the bottom where they are attached to the wall. This provides a larger resilient force for them to grip the head. The relationship between the jaws 8 and their outer hook ends I, I' is such that they substantially engage the stem A in the closed position of FIG. 5 thereby further inhibiting the possibility of flow of air past the closure.

The surfaces B and B' of the head 7 are arranged so that a line drawn to intersect their tips intersects the plane of the bag wall within the bag. The surfaes E and E' of the hooks are similarly angled.

In the fully closed position of FIG. 5, the curved surface of the head and the recess, and the additional depth 11 of the recess coact to permit a rolling of bearing-like action between the interengaging head and the groove insuring airtightness and preventing inadvertent disengagement and consequent opening of the bag.

In addition to the materials above recited with respect to the eliminations of the bag walls, materials such as PP, nylon, polyester, polycarbonate, etc. obtain a wall which is extremely tough and strong and may be very difficult to open with the fingertips due to the high elastic resistance of each layer. The other engaging air-excluding rib members aid in the opening function as well as providing an air-excluding seal themselves. When the bag is to be opened, the operator pulls apart the upper flanges and the rib members first separate providing thumb gripping surfaces to aid in disengaging the rib and groove elements.

The rib members are arranged so that their mechanical strength is larger than that of the film between them. In other words, the rib members are formed thicker than the wall thickness of the film in the recess between the rib members. In the alternative, the rib members may be made of a material which is harder than that which constitutes the film of the bag walls in the recess between them.

Since the ridges are constructed to have stronger tear resistance than the layer of film in the recessed portion between them, the tearing force applied for opening purposes to the recessed portion between the rib members is inhibited by the ribs from advancing in other directions. Thus, the entire tearing force in opening the bag is concentrated on the recessed portion to permit easy opening along the rib walls. Thus, the desired opening of the pouch can easily be effected by simple finger operation as shown in FIG. 2*b* with no need or using a scissors, knife or other such opening means.

Thus, it will be seen that I have provided an improved fastener which meets the objectives and advantages above set forth and which provides an improved, more effective pouch and fastener.

I claim as my invention:

1. A bag structure comprising in combination,
a bag body having walls with an upper end,
said walls having an outer layer and having an inner layer formed of plastic coextensive with the outer layer to the upper end and bonded thereto,
said outer layer formed of a first material having predetermined characteristics for the outer layer of the bag,
said inner layer formed of a second material having predetermined characteristics for the inner layer of the bag,
rib and groove cooperatively shaped releasable interlocking profiles near the upper end of the bag integral with the plastic of the inner layer,
and tear guide means formed in the plastic of the inner layer above said profiles for guiding the tearing of both layers with the outer layer extending uniformly over the area of the inner layer carrying said tear guide means.

2. A bag structure constructed in accordance with claim 1 wherein said tear guide means includes a raised rib projecting inwardly and extending parallel to the profiles.

3. A bag structure constructed in accordance with claim 1 wherein said tear guide means includes a pair of parallel ribs defining a tear line between them.

4. A bag structure comprising in combination,
bag walls with a top end and with an inner layer formed of a plastic with releasably interlocking rib and groove elements on facing inner surfaces integral with said inner layer extending parallel to the top of the bag walls for closing the bag,
tear guide means extending across the top of the bag above the rib and groove elements defining a tear line and formed in said inner layer,
and an outer layer of a material having different physical characteristics than the inner layer to protect the inner layer and laminated thereto and extending to the top of the inner layer with the walls of the bag joined at the top end to form a closed top end.

5. A bag structure constructed in accordance with claim 4 wherein the bottom of the bag is open, and the rib and grooves are interlocked.

6. A bag structure constructed in accordance with claim 4 wherein said tear guide means includes a rib projecting inwardly from the inner layer.

7. A bag structure constructed in accordance with claim 4 wherein said rib element is of a material harder than the inner layer of film.

8. A bag structure constructed in accordance with claim 4 wherein said tear guide means includes a pair of parallel ribs with weakened material between the ribs in the inner layer.

9. A bag structure constructed in accordance with claim 4 wherein said tear guide means and said rib and groove elements are formed by extrusion with the inner layer.

10. A bag structure constructed in accordance with claim 4 wherein said inner and outer layers are fusion bonded.

11. A bag structure constructed in accordance with claim 4 wherein said layers are joined by an adhesive material extending therebetween.

* * * * *