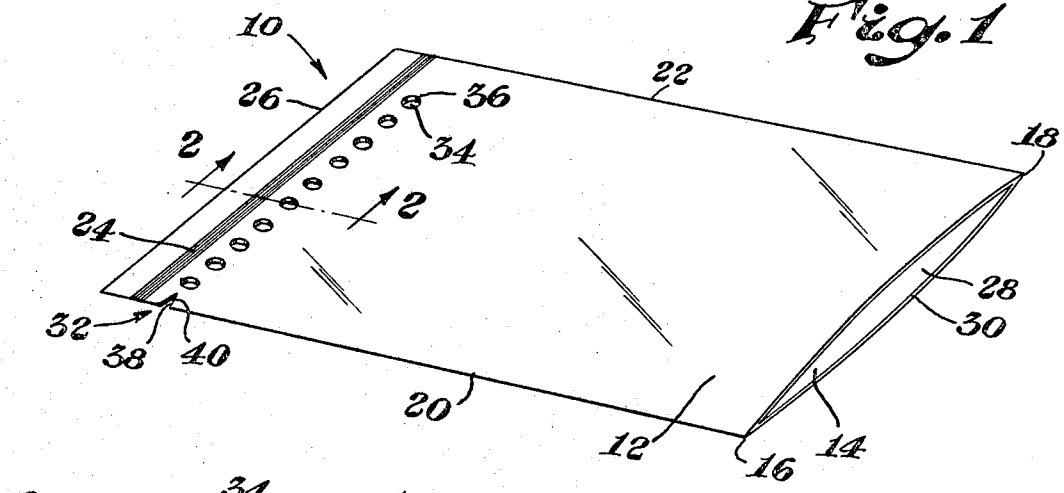
Nov. 25, 1969 J. P. REPKO 3,480,198

BAG OPENING DEVICE

Filed Nov. 3, 1967 2 Sheets-Sheet 1

Fig. 1



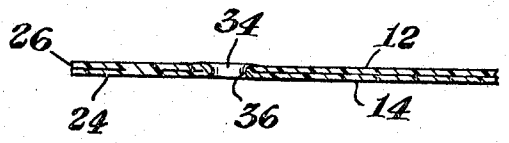


Fig. 2

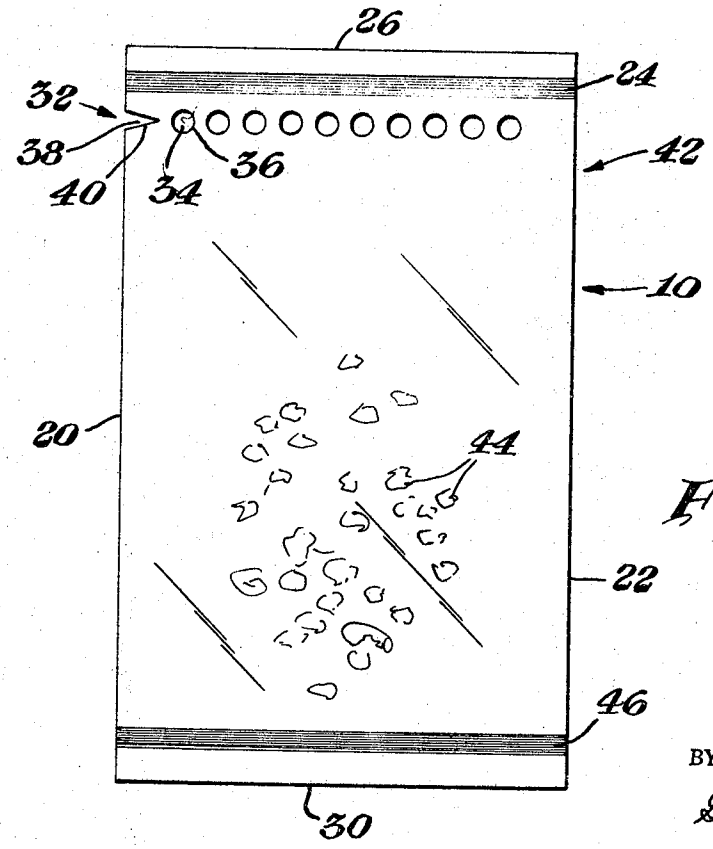


Fig. 3

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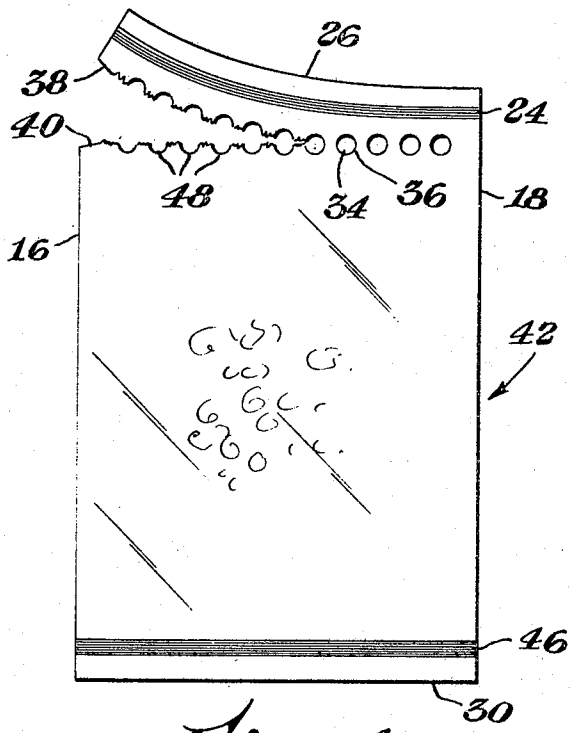

Fig. 4

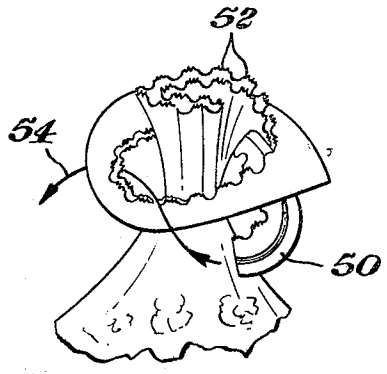

Fig. 6

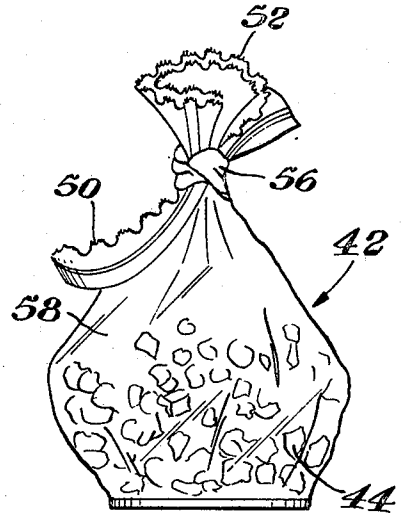

Fig. 7

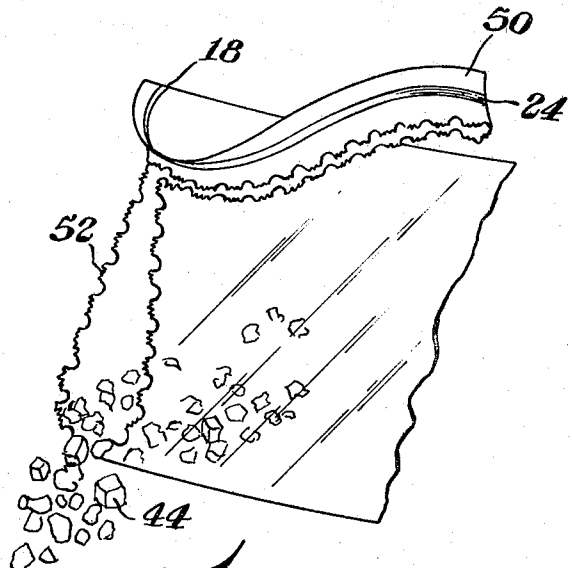

Fig. 5

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BAG OPENING DEVICE

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U.S. Cl. 229—66 8 Claims

ABSTRACT OF THE DISCLOSURE

An improved opening device for a bag constructed of heat fusible materials, as, for example, a heat fusible plastic like polyethylene film. A series of registered apertures are formed and spaced along a path on the opposed front and rear wall sections of the bag assemblage, and the walls fused together in local minute welds surrounding each of the registered apertures. Such apertures define an imperforate tear line along which a rupturing can be effected in a pre-determined manner for the convenient opening of the bag assemblage. In a specific arrangement the registered apertures extend inwardly from an edge of the bag assemblage at which point an imperforate edge notch is provided to locate the initial tearing action. The tear line provides a reclosing feature with a strip of material partially separated from the bag, on opening thereof, forming a tie string arrangement.

In the packaging art, the use of plastic film or sheet, such as polyethylene, to form an enclosure or bag assemblage has become quite common. A problem frequently associated with such packaging material is the difficulty involved in obtaining a satisfactory opening device for the bag. Plastic film as used for packaging often is stretchable such that it does not lend itself well to a rupturing or tearing action along a determinable path as would facilitate a clean, efficient opening of the bag. Previous solutions to this problem have generally contemplated a weakening of the material along a portion of the bag assemblage, such as by a series of serrations, to provide for a predetermined line of rupture or tear line. While an effective tear line can be obtained in this manner, the imperforate qualities of film and its resistance to a premature tearing or parting along its weakened portion are usually somewhat sacrificed.

Accordingly, it is an object of the present invention to provide an improved tear line arrangement for a bag assemblage constructed of heat fusible materials wherein destruction of the imperforate or air-tight qualities of the bag material is avoided while still providing a weakened portion along which the bag assemblage can be ruptured in a predetermined manner.

Another object of the present invention is to provide an improved tear line arrangement for a bag assemblage constructed of heat fusible material which arrangement offers advantages in its simplicity of fabrication.

Yet another object of the present invention is to provide an improved tear line for a bag assemblage constructed of heat fusible materials wherein a weakening of the overall tensile strength of the bag material adjacent the tear line location is minimized.

Still another object of the present invention is to provide an improved tear line for a bag assemblage constructed of heat fusible materials wherein the tear line is so arranged that after initial opening, a strategically located strip of material is provided to tie and close the ruptured portion of the bag assemblage, thereby retaining a protective enclosure for the unused portion of the product.

Briefly then, the invention contemplates an improved tear line arrangement for a bag assemblage of the kind

comprising an envelope-like enclosure formed of heat-fusible material as, for example, polyethylene film or sheet. The tear line envisioned, includes a series of registered apertures formed through opposed front and rear walls sections of the bag assemblage and spaced thereon along the path of opening desired. Imperforate qualities of the tear line are maintained by fusing the front and rear walls together in local minute welds immediately about each of the registered apertures. This can be simply and efficiently accomplished by employing a series of heated members, such as heated spikes maintained at a temperature in excess of the fusing point of the materials involved. The spikes are arranged on a path of spaced intervals corresponding to the desired path of the tear line to be effected, and are inserted through the overlying front and rear wall sections of the bag assemblage as they are supported in contacting engagement. By these means, a path of registered apertures with minute welds surrounding their respective peripheral extents can be obtained in a simultaneous manner. Preferably, the path chosen extends inwardly from an edge portion of the bag assemblage, at which point a similarly rendered imperforate edge notch is provided to locate the initial tearing action. In a desired arrangement the tear line terminates in spaced relationship with an edge portion of bag assemblage to leave an attached strip of material after opening. The strip of material left after opening provides an efficient means to tie and reclose the rupture portion of the bag assemblage to provide a protective enclosure for the unused portion of the contents.

Other objects and advantages of the present invention and its details of construction will be apparent from a consideration of the following specification and accompanying drawings wherein:

FIGURE 1 is an isometric view of a bag assemblage including an improved opening device constructed in accordance with the principles of the present invention;

FIGURE 2 is a fragmentary cross-sectional view thereof taken through the line 2—2 of FIGURE 1;

FIGURE 3 is an elevational view of a package including the bag assemblage of FIGURE 1 containing a product therewithin;

FIGURE 4 is a view like FIGURE 3 only showing the package partially opened;

FIGURE 5 is a fragmentary isometric view of the package of FIGURE 3 opened and the contents being poured therefrom;

FIGURE 6 is a fragmentary isometric view of the package of FIGURE 3 after it has been opened and illustrates a method of tying closed the ruptured portion; and

FIGURE 7 is an elevational view of the package of FIGURE 6 showing the ruptured portion of the package tied closed and the product protected therewithin.

Referring to FIGURE 1, there is illustrated a bag assemblage **10** disposed in collapsed relatively flat arrangement and comprising opposed rectangular walls, specifically, a front wall **12** and rear wall **14**. Bag assemblage **10** is formed of heat sealable material, such as a polyethylene film, joined together along three edges to form a basic enclosure, and unconnected across a fourth to provide a fill opening **28**. Bag assemblage **10** can be formed from rolled tubular stock, i.e., by suitable parting in the transverse direction the tube material employed at intervals corresponding to the bag length desired, and closing one of the two open ends of the tube length obtained as, for example, by effecting a heat seal across the width of the tube adjacent the free edges at one of the open ends thereof.

Thus, as represented by the manner of its fabrication, bag assemblage **10** includes folded edges **16** and **18** joining together the front wall **12** and rear wall **14** along the side edges **20** and **22** of bag assemblage **10**. A transverse

seam 24 completes the general enclosure described and extends across the width of bag assemblage 10 adjacent its first edge portion or top edge 26 securely fastening together therealong the front wall 12 and rear wall 14. The fill opening 28 extends across the second edge portion or bottom edge 30 of bag assemblage 10 along which edge location the front and rear walls 12 and 14 remain unsecured.

A tear line 32 having imperforate qualities extends inwardly of bag assemblage 10 beginning from a point along the folded edge 16 intermediate of seam 24 and fill opening 28. Tear line 32 runs parallel to seam 24 and terminates at a location remote from the opposite folded edge 18. This arrangement provides an attached strip of material after initial opening for tying the ruptured portion of the bag assemblage 10 as is explained more fully hereinafter. Tear line 32 basically includes a series or path of spaced and registered apertures 34 puncturing the front and rear walls 12 and 14. To maintain the air-tight qualities of the bag material along the tear line 32 location the front and rear walls 12 and 14 are fused together in local welds 36 surrounding the individual peripheral edges of registered apertures 34 as best illustrated in FIGURE 2. An edge notch 38 is located in line with the registered apertures 34 at folded edge 16 and locates the initial tearing action. The front walls 12 and 14 are similarly fused together about the periphery of notch 38 by a weld 40 so that imperforate quality is maintained throughout the length of tear line 32.

Tear line 32 described can be fabricated in a single step operation by employing a series of heated elements, as, for example, a series of heated spikes arranged on a path of spaced intervals corresponding to the desired path of tear line 32. The spikes, shaped to obtain the configurations desired of notch 38 and apertures 34, are heated to a temperature sufficient to fuse the wall material, and then pressed through the front and rear walls 12 and 14 as they are maintained in contacting engagement. A proper amount of heat radiating from the spikes simultaneously begins to form welds 36 and 40 as the notch 38 and apertures 34 are formed by the passage of the spikes through the wall material.

When using heated elements of this nature, the size and degree of welds 36 and 40 effected is determined largely by the temperature of the spikes, the rate at which they are pressed or inserted through the walls, which rate is commonly referred to as the dwell time, and the thicknesses and sealing characteristics of the wall material to be fused. Preferably, the temperature of the spikes and the dwell time is calculated in regard to the front and rear wall material so that only relatively small but sufficiently strong welds 36 and 40 are obtained about the peripheral edges of the apertures 34 and notch 38. This retards the build-up of a ridge of fused materials about the apertures 34 and notch 38 thereby maintaining at a minimum the force needed to rupture the walls of the bag assemblage 10 along the path of the tear line 32.

FIGURE 3 illustrates a package 42 including a bag assemblage 10 with a product 44 contained therein. After filling with the product 44 a seam 46 is formed across bottom end 30 of bag assemblage 10 securing together therealong the front wall 12 and rear wall 14 to close fill opening 28.

Package 42 is conveniently opened as illustrated in FIGURE 4. Here the package 42 is separately grasped at portions adjacent each side of notch 38 and forces applied to rupture and separate the front and rear walls 12 and 14 along the path of apertures 34. The absence of material in the registered aperture area 34 significantly reduces the forces necessary to rupture the package 42 therealong and in this manner, provides the desired path of predetermined tear or it will be noticed that the tear rupture is made through the individual welds 36 and 40 and across the apertures 34.

While the welds 36 and 40 can be split by a concentration of forces along the path of tear line 32, they still provide a measure of strength about the apertures 34. Usual aperture constructions with raw edges about their defining peripheral extents cannot stand much stress as a tear is likely to start in the raw edge locations. Once a tear starts, of course, it tends to propagate rapidly through the bag assemblage material. By forming the welds 36 and 40 immediately about the apertures 34 and notch 38 the edges adjacent the apertures and notch are secured together and strengthened to minimize the possibility of tear propagation therefrom.

After opening by the manner illustrated in FIGURE 4, the front and rear walls 12 and 14 remain partially secured together by unruptured portions, or as illustrated in FIGURE 4, the lower portions 48 of welds 36. The tearing action, however, does disrupt the strength of the welds 36 at their lower portions 48 leaving them in a partially parted condition. It is a simple matter to separately grasp the front wall 12 and rear wall 14 to split the bag assemblage 10 completely open by popping the walls apart adjacent the lower portions 48 of welds 36.

As previously noted, the tear line 32 terminates at a location in spaced relationship with folded edge 18 of bag assemblage 10. Thus, as best illustrated in FIGURE 5, after initial opening, a strip of material 50 remains attached to the bag assemblage 10 adjacent its folded edge 18. The strip of material 50 can be wrapped around the ruptured portion 52 of bag assemblage 10 and tied to secure the remaining or unused portion of the product in a protected condition. A particular manner of tying is illustrated in FIGURE 6. Here the strip 50 is looped once about the ruptured portion 52 of bag assemblage 10 and then threaded or looped about itself as indicated schematically by the arrow 54 and drawn tightly in a downwardly fashion.

FIGURE 7 illustrates a package 42 previously opened and a portion of its contents 44 removed. In the manner described in FIGURE 6, the ruptured portion 52 has been tied closed by a knot 56 to provide a protective enclosure 58 for the unused portion of the product 44.

Any of the common flexible package materials can be used to produce such bag assemblages provided they are of a heat fusible quality such that suitable welds 36 and 40 can be formed about the apertures 34 and notches 38. Polyethylene film is preferred in many of the packaging applications. For example, bag assemblage 10 can be constructed of a polyethylene film with a thickness of from about .75 mil to about 4 mils. Of course, heavier gauges of polyethylene wherein the thickness exceeds 4 mils can also be employed possibly in the heavier industrial type bag assemblages. By way of example, other suitable films or sheets for making bag assemblages 10 can include those made from polyvinyl acetate, polyvinyl chloride, cellulose acetate, saran, polypropylene, polystyrene, and rubber hydrochloride. Of course, these films are all well known for their heat sealable qualities and are generally referred to as being thermoplastic. Laminated or coated materials such as polyethylene to saran, aluminum foil to a thermoplastic film, or possibly paper to a thermoplastic film have found wide acceptance in packaging some products where it is desirable to have a combination of one or more properties such as low water or oxygen permeability, light opacity, resistance to puncturing, etc. These laminates usually with the thermoplastic film most generally providing the heat sealable qualities desired of the front and rear walls 12 and 14 are also suited for employment in connection with the present invention.

Especially for laminates, particularly those including a paper ply, or ply that might deteriorate under too great an application of heat, a method other than that described might advantageously be employed to form tear line 32. For instance, one could die cut the registered apertures 34 and notch 38 and follow with a heat sealing step about the peripheral edges thereof. This would eliminate or possibly lower the dwell time needed since here the

apertures **34** and notch **38** are already preformed and need not be melted away or melted back by the application of a heated element. Coatings of suitable adhesives, waxes, solvents, or other particular sealing substances are also a possibility for effecting welds **36** and **40**, particularly in instances as described above where heat sensitive materials are employed to form bag assemblage **10** and sealing at lower temperatures can be obtained.

While this invention has been described in particularity with regard to the construction of bag assemblage **10**, other advantageous bag constructions as, for example, those employing gussets or inverse folds to provide for a greater content fill, or those including seamed rather than folded edge portions could be readily adapted to the present invention when modified to follow the principles thereof.

For instance, a common bag assemblage construction including a gusset or inward tuck is illustrated and described in some detail in U.S. Patent No. 2,283,069. Here, and as a specific modification, it would be advantageous to form the tear line of the present invention along and adjacent the open end or fill opening of the bag assemblage so as not to interfere with the blooming out of the inward tuck as it receives the product. In this arrangement, the tear line would probably be formed after filling since otherwise it would most likely somewhat hamper entrance of the product into the bag assemblage due to the local welds about the registered apertures which, if preformed, would partially close the fill opening.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope of the invention.

Accordingly, what is claimed is:

1. In a bag assemblage including at least front and rear walls located opposite each other and forming an enclosure, the enclosure having a fill opening located along one edge portion of the bag assemblage and being closed along the remaining edge portions thereof, the improvement of which comprises a series of apertures defined in said rear wall and a series of apertures defined in said front wall, said series of apertures defined in said front and rear walls, respectively, being in registered relationship to form a series of registered apertures in said bag assemblage, said registered apertures extending in spaced relationship along a generally linear path and with the path located within the boundary defined by said closed edge portions and said fill opening, said path forming a tear line for rupturing said front and rear walls in a predetermined manner, said front and rear wall secured together locally about each other of said registered apertures to impart imperforate qualities to said bag assemblage along the tear line location, the joined regions about each of said registered apertures being separated by non-joined regions.

2. The bag assemblage of claim **1** wherein a region of said remaining edge portions comprising a location whereat the front and rear walls are joined to each other, said path starting from a point adjacent sad region and extending inwardly therefrom.

3. The bag assemblage of claim **1** wherein said path is located adjacent and extends parallel to the remaining edge portion of said bag assemblage located opposite to said fill opening.

4. The bag assemblage of claim **1** wherein said front and rear walls comprise heat fusible thermoplastic material, said front and rear walls being heat fused together in local welds about each of said registered apertures.

5. The bag assemblage of claim **4** wherein said thermoplastic material is polyethylene.

6. The bag assemblage of claim **4** wherein said front and rear walls each comprise at least two layers of material including an inner layer of thermoplastic material.

7. The bag assemblage of claim **1** wherein said tear line includes a notch located in line with the path of said registered apertures and disposed at an edge portion of said bag assemblage, said front and rear walls being secured together about the periphery of said notch.

8. The bag assemblage of claim **1** wherein said tear line extends inwardly from an edge portion of said bag assemblage and terminates at a location remote from the opposite edge portion thereof to provide a strip of material after initial opening of the bag assemblage to tie closed its ruptured portion.

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U.S. Cl. X.R.

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