

EASY TEARING BAGS AND PACKAGING MATERIAL

G00002

Field of Invention

5 This invention relates to bags, packages or packaging material which can easily be torn, without the need for scissors, for instance. In particular, although not exclusively, the invention relates to sealable plastic bags for the containment of food or beverages. However the invention is not limited in its application to food packages and may have application to other industries such as pharmaceuticals



166166

Background to the Invention

15 The waterproof, air-tight and durable nature of plastic bags means that they are widely used for packaging goods. Various ways for facilitating the opening of such bags are known. The simplest approach is to print a line on the bag to indicate where an opening should be cut. This cut might open directly onto the contents of the package (eg Figure 1) or it might open onto a spout integrated into the package (eg Figure 2; see also US patents 4491245, 4793121 & 4935283 and the "AmpacTM spout-pack"). Such a spout also makes a convenient opening for the insertion of a drinking straw.

20 Bags are also available which can be opened without the need for scissors. Whilst this can be achieved very easily by simply perforating the intended opening, this is not suitable where the package must be kept air-tight (eg liquids or perishable goods). To overcome this difficulty, it is known to integrate a guide wire or string into a package which, when pulled, opens the package (eg Figure 3). Another system incorporates two strong parallel tracks into the plastic which define a channel between them (eg Figure 4). The end of this channel typically contains a nick in the plastic. When tearing begins at this nick, the two tracks guide the tear down the channel, giving a straight tear.

30 US patent 5,552,202 describes an arrangement for guiding a tear which utilises bonded strips of materials which differ in stiffness. This difference assists the breaking of the bond between the strips and guides a tear along the bond.

35 GB patent 1,147,846 describes how a thin strip incorporated in the body of a sheet can provide a guide for tearing. The thin strip may be either weaker or stronger than the body of the sheet. In the former case, the strip provides a weaker path through the film than the surrounding body, along which a tear is guided; where the strip is stronger, the strip can

28 JUN 2002

4

be easily torn out of the body of the sheet, thereby separating the sheet in two.

In GB patent 1,335,036, a tear is guided by incorporating a flexible reinforcement across a sheet of material. This reinforcement itself contains a localised line of weakness and a tear along the line of weakness is transmitted to the attached sheet of material.

These tearing systems can also be integrated into re-sealable bags. Once the tear has been made, the bag can still be re-sealed by means of a zip-lock for instance (eg Figure 5). This gives a tamper-proof re-sealable bag.

It is an object of the invention to provide further means for facilitating the tearing of a sheet of packaging material. It is a further object of at least a preferred embodiment of the invention to provide various types of packages which can be opened easily, and also to provide easy-tear materials and packages which can be manufactured at relatively low cost.

Summary of Invention

In accordance with a first aspect of the present invention, there is provided a bag formed of one or more sheets of flexible material wherein at least one of the sheets is multilayered including an inner layer and an outer layer relative to the interior of the bag, the inner layer including two pieces with substantially abutting edges and having at least one line of weakness which is defined by the interface of the two pieces with the outer layer being substantially intact along the line of weakness and tearable along the line of weakness.

It will be understood that the bag may comprise one or more sheets. Where the invention comprises two sheets, one or both of them may be multilayered with a line of weakness present in the respective inner layers. The following references to "sheet(s)" therefore may apply to either one sheet having the multilayered construction defined above or both sheets having this multilayered construction.

28 JUN 2002

The inner layer may be formed from pieces of different materials which together form the inner layer.

5 In preferred embodiments, the line of weakness is substantially straight.

10 In order to facilitate the initiation of a tear, preferred embodiments include a small opening, break, nick, notch or the like along the first edge of the bag. Suitably, the tearing line extends from the first edge of the bag to a second opposite edge. In this case, the nick may be disposed at or adjacent one end or both ends of the tearing line. Furthermore, the tearing line may be visibly indicated on the bag, for example by printing a dotted line at the relevant position.

15 Being situated in the inner layer, rather than the outer layer, the tearing line is less likely to break or split due to any internal pressure exerted by contents of the package. In addition, the tearing line is protected from external damage such as rubbing.

20 The inner layer of the flexible sheet(s) is preferably attached to the outer layer of the flexible sheet adjacent to the tearing line for substantially the length of the line of weakness.

The outer layer of the sheet(s) of flexible material can be formed from anything that can be torn. It can thus be formed from, for instance, plastic, paper, metallic film etc.

25 The inner and outer layers are preferably of the same size or area. The layers may extend across the whole area of the sheet(s) of flexible material.

30 The sheet(s) of flexible material may, however, comprise additional layers. For example, the outer layer of the sheet(s) of flexible material need not be the outermost layer of the package; nor need the inner layer be the innermost layer of the package.

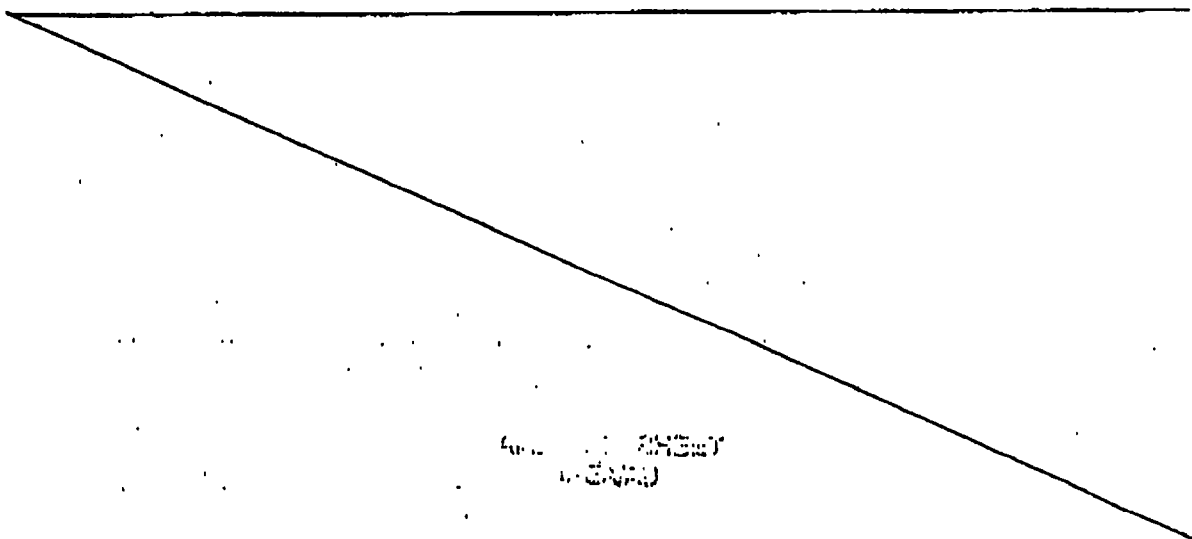
28 JUN 2002

Indeed, it may be desirable to ensure that the tearing line is not exposed to the contents of the package, for instance by adding a further layer to the sheet(s) of flexible material. Furthermore, if the sheet of flexible material is to be thermally bonded to another sheet of material ie laminated, it is preferred that it includes an additional layer which protects the tearing line from being sealed itself. This additional layer could, for instance, be heat-sealable at a temperature substantially below that required to melt the inner layer of material containing the line of weakness.

International patent application WO98/16382 describes how in plastic laminates, a plurality of pieces in the form of strips may be placed with their longitudinal edges in substantially abutting relationship. The interface between abutting strips forms a line of weakness. With reference to the two-layer laminated material described in WO98/16382, layer "A" can form the outer layer of the flexible material used in the present invention, and layer "C" (formed from abutting strips) can form the inner layer.

The strips which make up layer "C" may be made from the same or different materials, as set out in WO98/16382 (eg alternating transparent and opaque strips, such as holographic or metallised strips). It will be appreciated that, where two abutting strips are of the same material, they can be formed by cutting a sheet of material into two before laminating to the outer layer; where the abutting strips are of different materials, however, they will typically be supplied from separate supply rollers.

Furthermore, layer "E" in the three-layer laminate of WO98/16382 can form a layer additional to the inner and outer layers of the present invention, to protect the tearing line from the contents of the package or during thermal bonding. Figure 6 shows an example of a suitable sheet of material comprising three layers.



- 5 -

It will be appreciated that, unlike the tear-guiding materials disclosed in the prior art, the present invention does not require any additional or special material to be incorporated into the bag or package in order to guide the tear, as the line of weakness is integral to the sheet(s) of flexible material. Thus, there is minimal additional production cost. For example, a line of weakness can be formed simply by cutting the inner layer into two pieces, or by introducing a perforation or thin zone, before bonding to the outer layer - no extra material is required. Furthermore, the present invention does not rely on any difference in mechanical strength of the materials either side of the line of weakness. Nor does the line of weakness "enable" tearing of the package - the outer layer is made of tearable material, and the line of weakness serves to control or guide the tear along a predetermined route.

In addition, the inner and outer layers of material which are used in the bags or packages of the invention may be made from any suitable flexible materials (eg plastics, paper), provided that the outer layer is tearable and the inner layer includes a line of weakness.

The bags or packages of the invention can take various forms, all of which utilise "one or more sheets of tearable flexible material, with one or more of the sheets including an outer layer and an inner layer, the inner layer being provided with a line of weakness", hereafter simply an "easy-tear sheet".

These packages will typically be over-printed with a design or pattern.

An easy-tear sheet may, for instance, be attached to a sheet of non-tearable material and sealed to form a package which can be opened along the tearing line of the easy-tear sheet. For example, the invention provides a bag having a easy-tear front sheet and a non-tearing back sheet, sealed together at or adjacent the edges of the two sheets.

Where the line of weakness is the interface between abutting pieces, the invention thus provides a bag with a front and a back, with two abutting pieces of material situated between the front and the back, the line of abutment constituting a tearing line.

Alternatively, an easy-tear sheet may be attached to another easy-tear sheet eg a bag can be formed having a front and a back both each of which are easy-tear sheets. These two sheets can be positioned such that the tearing lines in the two sheets are aligned (ie essentially co-linear, but possibly deviating slightly eg within 1 mm), thus ensuring that the tear in the front and back sheets of the bag are also aligned. In the empty state of the

- 6 -

bag the two sheets may lay directly one upon the other with the sheets sealed at or adjacent their edges.

5 Bags of the invention can also be produced by folding a single easy-tear sheet back on itself so that the tearing line is aligned with itself.

In addition, bags according to the invention may incorporate means for re-sealing an opened bag, such as a zip-lock. In such embodiments, the tearing line should be straight.

10 Packages or bags of the invention are preferably sealed around the periphery of the sheets. Additionally, the sheet(s) may be sealed together adjacent the tearing line for substantially the length of the tearing line. A gusset portion may be accommodated into the bag with the sealing of the sheet(s) accommodating the gusset portion.

15 In one preferred form of the invention, the interior of the bag includes a main portion and a spout portion narrower than the main portion and extending beyond the main portion with the tearing line extending across the spout portion such that the spout portion is openable on tearing along the tearing line. Preferably, the spout portion is sealed closed on filling of the bag. After opening, the contents of the package may be sucked or
20 squeezed out. The spout may also be of a size and shape which allows it to be plugged or stopped.

As well as being suitable for pouring, the spout-like opening can also accept articles such as drinking straws, pipes, pumps etc. These may be included within the sealed package
25 where appropriate eg the sealed bag or package may include an integral drinking straw such that, when the package is torn open, the drinking straw is already immersed and ready for use. The immersed drinking straw can preferably be extended after the package is torn open.

30 In packages containing an immersed drinking straw, the line of weakness will typically be substantially straight, and will guide the tear away from the portion of the package containing the beverage, in order to avoid spillage.

35 Placing a drinking straw inside a bag or package together with a beverage offers a number of advantages eg production costs are lower, because the straw is not packaged separately; the straw will not be lost inadvertently; the straw is more hygienic, as it cannot be contaminated after it is packaged.

- 7 -

Packaging a drinking straw *in situ* with a carbonated beverage in particular offers advantages over conventional carbonated beverage packages (ie plastic bottles and cans). Although still beverages, such as orange juice, are often distributed in packages which are punctured by drinking straws in order to access the beverage, this form of packaging is not suitable for carbonated beverages - due to the sudden pressure change when the package is punctured, the carbonated drink is forced out of the package through the straw, causing spillage. In the packages of the present invention, however, when the package is torn open along the tearing line, the *in situ* drinking straw provides a buffer zone allowing the internal and external pressures to equilibrate, thereby preventing spillage. As no puncturing operation is required, the problem of spillage caused by sudden pressure change is avoided or minimised. Furthermore, flexible packages for carbonated beverages offer advantages over traditional hard containers such as production cost, storage space and cost when empty, transportation space and cost when empty, and environmental concerns.

Similarly, packaging a straw or tube or other opening within a sealed bag or package, such that the contents can leave the package via the straw or tube, offers hygienic advantages in other situations eg medical situations, where the contents of the bag and straw/tube can both be packaged in sterile conditions. When the bag is torn open, the contents can be accessed easily, without the need to introduce a potentially-contaminated straw/tube from an external source.

The sheets of flexible material used to produce bags or packages of the invention may comprise more than one line of weakness. Where a single sheet comprises two parallel lines of weakness, for instance, the sheet is, in effect, divided into three strips, the middle of which may easily be removed or separated from the bag. The easy-tear sheet may thus be in the form of a cover for a bag or package, a strip of which can be torn away to give access to the contents of the bag or package. Each pair of tearing lines allows a separate strip of the sheet to be removed, each of which can give access to a different region of the package.

The package may contain a plurality of separate internal compartments. The partitions may be created by sealing the two sheets together at the locations corresponding to the partitions. Partitions may be provided between adjacent compartments. If a tearing line crosses the partition between two separate compartments, both compartments can be opened with one tear. If it is desired to halt the tear between opening successive compartments, this can be achieved by, for instance, providing a slight break in the tearing

28 JUN 2002

line.

Furthermore, means for assisting the removal of portions of the bag which have been opened may be incorporated. For instance, if perforations are included which are within
5 the partition between two compartments and which cross the tearing line, the tear will tend to halt when it meets the perforation, and the torn part of the package can be removed by tearing along the perforated line, rather than along the tearing line. Alternatively, in certain embodiments, the perforated line could be torn first, stopping when the tearing line
10 has been crossed, followed by tearing along the line of weakness. In this case, the junction between the perforation and the tearing line acts as a nick for facilitating initiation of the tear. Where a tear starts from the edge of the package, the tear can still be initiated, although a little more force may be required.

Packages of the invention are also suitable for storing liquids, such as beverages. In a
15 preferred embodiment, the package of the invention comprises a first and a second sealed internal compartment. The first sealed internal compartment contains a drinking straw which can be accessed by removing a portion of the package along the package's tearing line. The second sealed internal compartment contains a beverage. The beverage is not
20 accessed via the tearing line used to access the drinking straw, however, but by puncturing the package using the drinking straw. Thus the package contains a beverage and a drinking straw, with the straw stored in sanitary conditions within the package, preventing its inadvertent loss, but separate from the beverage. In addition, the tear is guided without
25 tearing the package such that the beverage spills. This approach to packaging a drinking straw is a less-preferred alternative to the "immersed straw" approach described above.

The interface between the abutting pieces creates in effect a thin straight channel ("tearing line") in the bag, along which a tear is naturally guided. This allows the bag to be opened easily.

AMT. 550 58217
1999/06/30

If desired, there may be more than one layer of abutting pieces between the front and the back of the bag. For instance, a bag could be formed from two sheets of laminated plastic material, both of which comprise a layer consisting of abutting pieces of material. These two sheets can be juxtaposed such that the layers comprising abutting pieces are both
5 between the front and back of the bag, with their lines of abutment aligned (ie essentially co-linear, but possibly deviating slightly eg within 1 mm). This creates, in effect, a composite tearing line.

A suitable laminated plastic material which contains a tearing line is one which may be
10 made using the method as disclosed in International Patent Application WO98/16382 as discussed previously. Briefly, the laminated plastic comprises a base layer onto which are adhered a plurality of parallel strips of material which abut and do not overlap. An example of a suitable laminated plastic material, which also comprises a third layer, such that the abutting parallel strips are sandwiched, is shown in Figure 6, and this type of
15 material is used in the most preferred embodiments of the invention.

In preferred embodiments, one end or both ends of the tearing line contains a small opening, break, nick, notch or the like. This facilitates the initiation of a tear. The tearing line may be visibly indicated on the bag, for example by printing a perforated line at the
20 relevant position.

The bag is preferably sealed at or adjacent its edges. In one preferred form of the invention, the interior of the bag includes a main portion and a spout portion narrower than the main portion and extending beyond the main portion with the tearing line
25 extending across the spout portion such that the spout portion is openable on tearing along the tearing line. Preferably, the spout portion is sealed closed on filling of the bag. After opening, the contents of the package may be sucked or squeezed out. The spout may also be of a size and shape which allows it to be plugged or stopped.

It will be appreciated that the sheet(s) of flexible material which are used to make the bag may comprise more than two layers. For instance, whilst they might comprise just a base layer and a layer of abutting parallel strips, they might also comprise a further layer, covering and protecting the abutting parallel strips, for instance. Suitably, the layers of
30 each of the sheets will be laminated together. Furthermore, the sheets will typically be over-printed with a design or pattern. The front and back of the bag need not, of course, be made from the same material.

- 10 -

The parallel abutting pieces within the laminated plastic may be made from the same or different material. For instance, both pieces could be transparent, or one strip could be metallised whilst the other is transparent.

- 5 In addition, bags according to the invention may incorporate means for re-sealing and opened bag, such as a zip-lock.

AMENDED SHEET
PCT/NZ98/00195

- 11 -

Further, as a preferred feature the bag may have a strip of flexible material inserted between the front and the back, the strip extending substantially parallel to the line of weakness such that the strip is adapted to function as a handle when the bag is torn along the line of weakness.

5

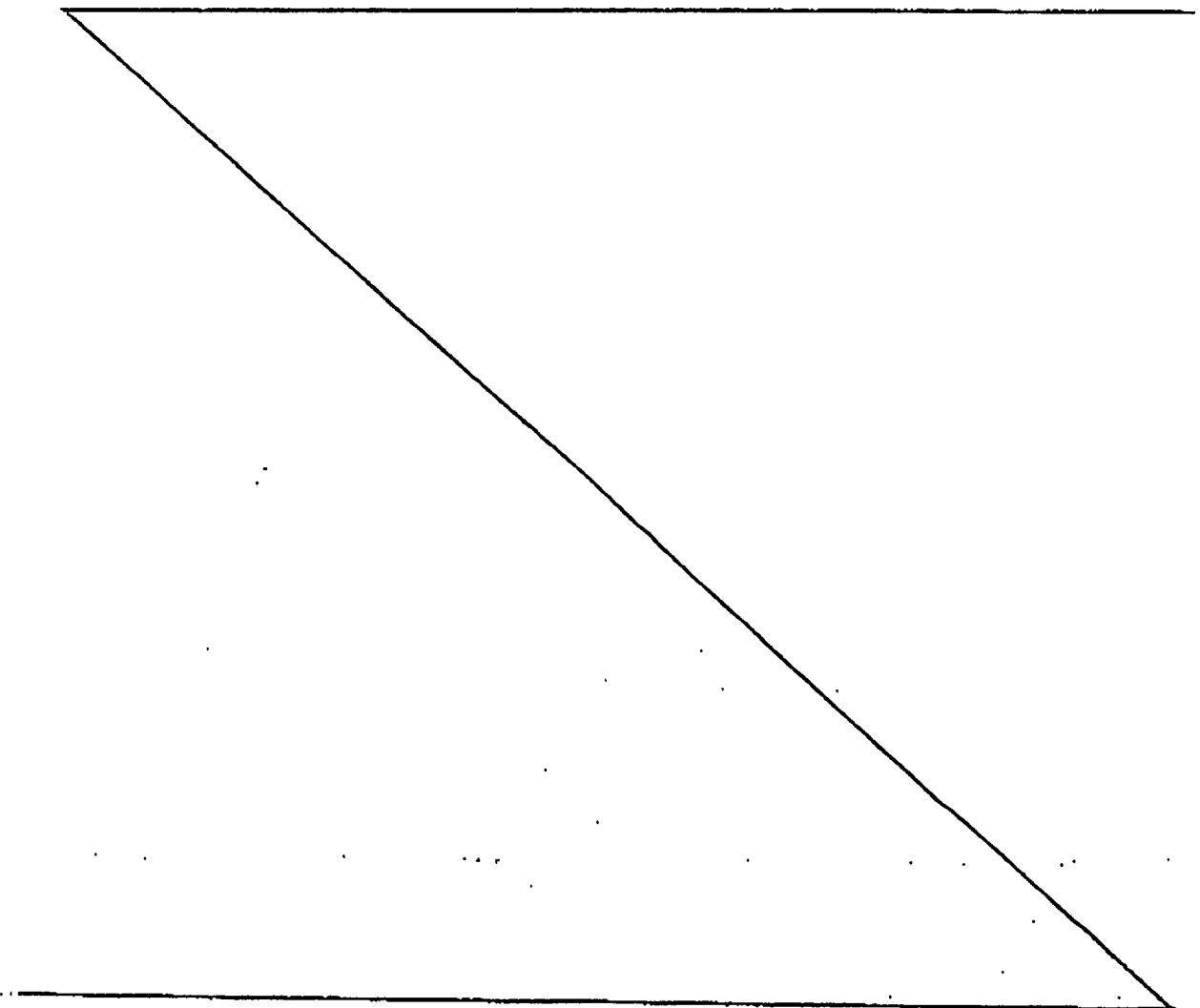
Preferably, the bag includes a gusset portion formed at an end of the bag opposite to the strip when the bag has been torn along the line of weakness.

10

In accordance with a second broad aspect of the present inventions, there is provided a multi layer packaging material having a first layer and a second layer wherein the first layer includes two pieces with substantially abutting edges and having at least one line of weakness which is defined by the interface of the two pieces with the second layer being substantially intact along the line of weakness and tearable along the line of weakness.

15

Brief Summary of the Drawings



- 12 -

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 illustrates a conventional sealed package;

Figure 2 illustrates another prior art sealed package;

5 Figure 3 illustrates yet another prior art form of sealed package;

Figure 4 illustrates a further prior art sealed package;

Figure 5 illustrates still another prior art package;

Figure 6a and b illustrate the composition of a sheet of laminated plastic material which can be used to make the bag or packages according to the present invention;

10 Figure 6c illustrates an apparatus for manufacturing the sheet of laminated plastic material shown in Figures 6a and 6b;

Figure 7 illustrates a bag or package constructed in accordance with a first preferred embodiment of the present invention;

15 Figure 8 illustrates a package or bag constructed in accordance with a second preferred embodiment of the present invention;

Figures 9a to 9g illustrate a bag or package constructed in accordance with a third preferred embodiment of the present invention;

Figures 9h and 9i illustrate a bag or package constructed in accordance with a fourth preferred embodiment of the present invention;

20 Figure 9j illustrates a bag or package constructed in accordance with a fifth preferred embodiment of the present invention;

Figure 10 illustrates a bag or package constructed in accordance with a sixth preferred embodiment of the present invention;

25 Figures 11a and b illustrate a bag or package constructed in accordance with a seventh preferred embodiment of the present invention;

Figures 11c to e illustrate a bag or package constructed in accordance with an eighth preferred embodiment of the present invention;

Figure 12 illustrates a bag or package constructed in accordance with a ninth preferred embodiment of the present invention;

30 Figures 13a and b illustrate a bag or package constructed in accordance with a tenth preferred embodiment of the present invention;

Figure 13c illustrates a package constructed in accordance with an eleventh preferred embodiment of the present invention;

35 Figure 14 illustrates a bag or package constructed in accordance with a twelfth preferred embodiment of the present invention;

Figure 15 illustrates a modified bag construction in accordance with the present invention; and

Figure 16 illustrates a bag or package constructed in accordance with a thirteenth preferred embodiment of the present invention.

Best Modes for Carrying Out the Invention

Figure 6 illustrates a sheet 10 of flexible plastic material which may be used to make any of the bags illustrated in Figures 7 to 16. The sheet 10 comprises an outer layer A and inner layer C and an additional layer E. Layer A might for example, be a transparent film made from polyethylene, over-printed with a design. Layer C is formed of two adjacent parallel strips C_1 , C_2 which are substantially in abutment along their adjacent longitudinal edges. The two strips C_1 and C_2 do not overlap. The strips might, for instance, be a wide transparent strip C_2 abutting with a thin metallised holographic strip C_1 . Layer E is typically a heat-sealable film. The three layers A, C, E are laminated together by the apparatus illustrated in Figure 6c which is a drawing from International Patent Specification No. WO98/16382. The contents of this International specification are hereby incorporated herein by reference.

In the apparatus illustrated in Figure 6c, the transparent film A is loaded onto supply roller 1. Similarly the strips C_1 , C_2 , C_3 which form layer C are loaded onto respective supply rollers 7 which are mounted on system 5. The rollers 7 are laterally arranged such that the edges of the strips leaving the rollers 7 which make up layer C are in substantial abutment.

During operation, film A proceeds through the glue tank to where adhesive layer B is applied to its back surface and then into drying tunnel 3. At the heated roller assembly 8, layer A meets the strips which form layer C. The strips are bonded to adhesive layer B to form a laminated material AC which is collected on receiving roller 9.

To complete the packaging material, the laminate AC is removed from the receiving roller 9 and reloaded onto supply roller 1. The process is repeated on material AC, with adhesive being applied to layer C and the heat sealable film E (not shown in Figure 6c) being attached to form finished product ACE laminate.

It will be appreciated that the finished ACE laminate may be cut into smaller sheets suitable for the production of the bags illustrated in Figures 7 to 14. As such, the strips C_1 , C_2 ... are commonly referred to as "pieces" in the specification although they originate from the longitudinal strips.

- 14 -

Figure 7 illustrates a first preferred bag. As shown in Figure 7a, a sheet of laminated plastic material AC is formed from an outer layer A of transparent plastic material and an inner layer consisting of two abutting pieces, the first C₁ being a thin metallised strip and the other C₂ being a transparent piece. The laminated sheet AC may be formed using the first part of the method described in conjunction with the apparatus shown in Figure 6c.

The laminated sheet AC is aligned with a sheet of strong polythene P and these two sheets are sealed around all four edges as illustrated in Figure 7c to form a bag 20. In the assembled bag, the line of abutment between sheets C₁ and C₂ defines a line of weakness to guide a tear along the sheet of laminated material AC. This is illustrated by dotted line 22 shown in Figure 7c. It can also be seen from Figure 7c that the top end of the bag 20 is sealed together for substantially the area of the strip C₁, almost down to the line of weakness 22 in the laminated sheet AC. Since the bag will be filled and sealed in use, the unsealed areas of the first sheet AC and the second sheet P will be separated. With the two sheets sealed adjacent the line of weakness 22 for the complete length of the line of weakness, this will provide a guide for straight tearing along the line of weakness.

Additionally, it can be seen that a nick 24 is made along a first edge of the bag 20, the nick 24 being located at the line of weakness 22 to provide easy initiation of the tear along the line of weakness 22. Suitably, the nick 24 is made in both sheets. In a less preferred embodiment the nick can be made in only the transparent outer layer A, prior to the laminated sheet being formed. This bag is less preferred because it does not enable tearing of the polythene sheet P.

The second embodiment illustrated in Figure 8 utilises two sheets of the ACE laminate illustrated in Figure 6. Each of the sheets ACE include three layers namely:

- a transparent outer layer A over-printed with a colour pattern;
- an inner layer C comprising two abutting pieces, one being a thin metallised strip and the other being a wide transparent piece;
- and an additional transparent layer.

The two sheets ACE of laminated flexible material are aligned and overlapped with one sheet laid directly upon the other, ensuring that the interface between the abutting pieces on respective sheets are aligned. As illustrated in Figure 8b, three edges of the two sheets are heat sealed together leaving unsealed aligned edges at one open end. The bag can then be filled with contents as illustrated in Figure 8b through the open end prior to the edges at the open end being sealed as illustrated in Figure 8c. The bag 30 so formed is then

- 15 -

provided with a nick 32 along a first edge of the bag 30, the nick being at or adjacent the lines of weakness 34 provided on the two sheets ACE. The nick 32 facilitates initiation of the tear along the lines of weakness to release the contents of the bag in the manner illustrated in Figure 8d.

5
Figure 9 illustrates a third embodiment using two sheets of ACE laminate material having their respective lines of weakness 34 aligned in the assembled bag 40. Like the embodiment illustrated in Figure 8, the bag 40 has the two sheets sealed together around three sides. At the end of the bag 40 adjacent the aligned lines of weakness 34, the two
10 sheets are sealed together so as to extend beyond the lines of weakness 34 except for a small gap as shown in Figure 9c. As illustrated, this provides the bag 40 with an interior comprising a main portion 42 and a spout portion 44. The spout portion 44 may be formed with a closed end if the end of the bag 40 is sealed after the contents have been inserted. Alternatively, the spout 44 may be left open initially so that the bag may be
15 filled through the open spout with subsequent closing of the spout portion 44.

It can be seen from Figure 9d that when the bag 40 is torn open along the lines of weakness 34, most of the spout portion 44 is separated from the bag leaving a small opening 46. This opening 46 allows the contents of the bag 40 to be poured more easily
20 and also makes a convenient opening for a straw 48 (see Figure 9e) or a pump 52 (see Figure 9f). The opening 44 may also be plugged or stopped by the use of a stopper 54 as shown in Figure 9g.

In a fourth preferred embodiment illustrated in Figures 9h and i, a drinking straw 62 may
25 be immersed in the contents of the bag 60. The bag 60 in most respects, is similar to the bag 40 illustrated in Figures 9a to 9g. One end of the drinking straw 62 is received within the spout portion. The drinking straw 62 may be extendable as illustrated in Figure 9i. The provision of a drinking straw sealed within the bag 62 with the drinking straw immersed in the contents is convenient since the straw 62 is ready for use as soon as the
30 package or bag 60 is opened. This is especially useful for carbonated beverages.

Figure 9j illustrates a fifth preferred embodiment of the present invention. The bag 70 illustrated is similar in construction to the bag 40 illustrated in Figures 9a to 9g. The bag 70 is intended as a food storage bag suitable for microwave cooking of the contents of the
35 bag. Initially, the bag 70 is formed by sealing around three of the edges. Food may be then inserted into the partially open bag whereupon it is vacuum sealed with further sealing occurring on the shaded area illustrated. The sheets making up the bag should be

- 16 -

strong enough to withstand vacuum sealing as well as exhibiting minimum deterioration under microwave cooking conditions. Suitably, the material making up the sheets should be such that they can be torn when required along the lines of weakness 34 formed on respective sheets.

5 Prior to microwave cooking, the consumer tears the bag open along the lines of weakness 34. It will be appreciated that this creates a small opening allowing partial release of vapour or gas from the inside of the bag during cooking in order to achieve desirable cooking effects. Depending on the type of food contained in the bag, the size of the opening, which is determined by the size of the spout portion 44, can be determined to ensure optimum cooking conditions for the bag's contents. Undesirable results may occur if the opening is too big or too small. Ease of use is assured because the consumer only needs to tear open the bag to achieve optimum cooking effects.

10 Following microwave cooking, the contents of the bag may be released by cutting the bag in the normal manner. Alternatively, the bag 70 may be opened by constructing the bag so as to have further aligned lines of weakness 45 in respective sheets extending within the main portion 42 of the bag 70. These further aligned lines of weakness 45 may extend substantially parallel to the lines 34, no greater than 15mm apart.

15 In a sixth embodiment illustrated in Figure 10, a zip-lock is incorporated during manufacture to provide a resealable bag 80. The zip-lock 82 is disposed closer to the contents of the bag than the aligned lines of weakness 34. In this way, once the bag has been torn along the lines of weakness 34, the bag can be resealed through the use of the zip-lock 82.

20 Figures 11a and 11b show a bag 90 which is similar in construction to the bag 30 illustrated in Figure 8, except that a top end of the bag is sealed to almost the lines of weakness 34 and additionally the bag is sealed together in strips along its length to form partitions 92 thus creating compartments ABC in the bag. It can be seen from Figure 11a that the partitions 92 cross the lines of weakness 34. As this bag is torn open, the compartments A, B and C are opened in series. With a single tearing motion, these three compartments can be opened essentially simultaneously. However, if the tearing motion is punctuated then the compartments can be easily opened one by one. This can be effected by retarding the tearing motion within each of the partitions 92. To achieve this, breaks can be provided in the lines of weakness 34 within the partitions.

By way of example, the sealed end of the bag can be provided with perforations extending from the end edge 94 of the bag towards the lines of weakness 34, extending a short distance across the lines of weakness 34. The perforations 96 will serve to naturally retard the tear at each of the perforated lines 96. Additionally, the edge portions of the bag defined by the tear line and one or more lines of perforation 96 can be torn off along the one or more perforated lines 96 as illustrated in Figure 11d. As an alternative, the perforated line could be torn first as shown in Figure 11e, followed by a tear along the lines of weakness 34.

Figure 12 illustrates a ninth preferred embodiment of the present invention. The bag 100 is produced from two sheets of material as illustrated in Figure 12a. The first sheet may comprise ACE laminate of the kind shown in Figure 6. The inner layer C includes three pieces 102, 104 arranged so that their adjacent edges extend across the ACE sheet. The adjacent edges of the sheets 102, 104 are substantially in abutment and create two spaced lines of weakness 106. The three pieces making up the inner layer C includes two strips 102 at either end of the sheet and an intermediate piece 104 which is holographic.

The ACE sheet is aligned with a sheet of polythene P of the same size and these two sheets are sealed together around the external periphery and also internally, to form three spaced compartments 108 extending in the lengthwise direction of the bag 100.

As illustrated in Figure 12b, nicks 110 disposed at or adjacent the lines of weakness 106 facilitate tearing of the ACE sheet to separate a middle portion of the sheet from the remainder of the bag 100. The compartments 108 are thus opened in series as the middle portion is separated and the bag is torn along the lines of weakness 106. As before, by the incorporation of perforations along the internal partitions, the tearing action be retarded to enable the compartments 108 to be opened one by one. (See Figure 12d).

Figures 13a and b illustrate a tenth embodiment of the present invention. The bag formed 120 is similar in principal to the bag 100 shown in Figure 12, except that there are nine compartments arranged in a three by three grid array. Additionally, the ACE sheet has six parallel lines of weakness 122, adjacent pairs of which extend across three aligned compartments as illustrated in Figure 13b.

As an alternative to using a sheet of polythene P as the backing sheet as per Figure 13a, a preformed blister sheet can be used as illustrated in Figure 13c. Such an embodiment of the invention may have application in the pharmaceutical industry.

A twelfth embodiment is illustrated in Figure 14. In this embodiment a bag 130 is formed by two overlapping and aligned sheets. A gusset portion 139 is provided in the base of the bag and the sheets and the gusset portion are sealed together. The sheets of the bag are also sealed together at a top portion 132 of the bag 130.

5 Additionally, a gusset portion 137 is provided intermediate the ends of the bag 130 and extending across the bag 130 substantially parallel to the tearing line 134. The space between the top sealed portions 132 and the gusset portion 137 defines an internal compartment in which a drinking straw 136 is located. As the tearing line 134 extends
10 along the internal compartment in which the drinking straw 136 is located, tearing along the tearing line 134 will open this compartment so that the drinking straw 136 will be accessible to the user.

15 Figure 14b is a partial sectional view of the bag 130 shown in Figure 14a. Once the straw is removed from the opened compartment, the straw 136 can be used by the user to puncture through the gusset portion 137 to reach the second sealed compartment containing the contents 138. The material of the gusset portion should be such that it can be punctured by the straw.

20 Figure 16 illustrates a further preferred embodiment. The bag 150 includes a first sheet 152 of ACE laminate material having a line of weakness 153 extending across the bag approximately half-way down the length of the bag as illustrated in Figure 16a. Additionally, the bag 150 includes a strip 154 of flexible sheet material extending
25 lengthwise across the bag. The strip 154 is spaced only a short distance from the line of weakness formed in the first sheet 152 towards the base of the bag. The bag additionally includes a gusset strip 156 located at the base of the bag. It can be seen from Figure 16d that the gusset strip enables the bag to stand up when opened.

30 The first sheet 152 together with strip 154 and gusset strip 156 are sealed to a second sheet of polythene 158. The two side edges of the first and second sheets 152, 158 are sealed together. Additionally, the base of the first and second sheets 152, 158 are sealed with respective edges of the gusset strip as shown in Figure 16c. The bag 150 is thus ready for filling following which, the top edges of the bag are sealed together. To open the bag, the bag is torn along the line of weakness 153. This exposes the strip 154 which is then able
35 to operate as a handle enabling the bag to be carried. The bag 150 may be useful for containing instant noodles since the bag can be stood once opened.

- 19 -

Each of the embodiments illustrated in Figures 7 to 14, 16 utilise two aligned overlapping sheets with one sheet laid directly upon the other with the empty bag adopting a flat configuration. However, the invention is not restricted in this respect since the two sheets may be connected in such a way as to provide additional folds or gussets as required.

5 Additionally, some of the aforementioned embodiments may also be constructed with a single sheet folded over on itself, as illustrated in Figure 15. The single sheet 140 constructed of ACE laminate includes a line of weakness 142 extending across the sheet. The sheet 140 may be folded back on itself to define two sheet portions at the front and back. The sheet 140 is folded such that the line of weakness in the front portion is aligned

10 with the line of weakness in the back portion. The bag is then sealed around the three unsealed edges and may even be sealed along the fold line. Additional sealing may be provided as per any of the embodiments shown in Figures 9, 10, 11, 14 and 16.

CLAIMS

1. A bag formed of one or more sheets of flexible material wherein at least one of
5 the sheets is multi layered including an inner layer and an outer layer relative to the
interior of the bag, the inner layer including two pieces with substantially abutting edges
and having at least one line of weakness which is defined by the interface of the two
pieces with the outer layer being substantially intact along the line of weakness and
tearable along the line of weakness.
- 10 2. The bag as claimed in claim 1 wherein the line of weakness extends from a first
edge and the first edge of the bag includes a nick at or adjacent to the or each line of
weakness.
- 15 3. The bag as claimed in claim 1 wherein the or each line of weakness extends from
a first edge of the bag to a second opposite edge of the bag.
4. The bag as claimed in any one of the preceding claims wherein the or each line
of weakness is straight.
- 20 5. The bag as claimed in any one of the preceding claims wherein the or each line
of weakness is visibly indicated on the bag.
6. The bag as claimed in any one of the preceding claims wherein the inner and outer
25 layers are substantially the same size.
7. The bag as claimed in any one of the preceding claims wherein the or each sheet
includes an additional layer disposed inwardly of the or each inner layer.
- 30 8. The bag as claimed in any one of the preceding claims wherein the inner and outer
layers are attached to each other adjacent to the or each line of weakness for substantially
the length of the line of weakness.
- 35 9. The bag as claimed in any one of the preceding claims wherein the inner and outer
layers are laminated together.

- 21 -

10. The bag as claimed in claim 8 or claim 9 including a heat-sealable layer disposed inwardly of the inner layer relative to the interior of the bag, wherein the heat-sealable layer is meltable at a temperature lower than the melting point of the inner layer.

11. The bag as claimed in any one of the preceding claims including means for resealing.

12. The bag as claimed in any one of the preceding claims wherein the inner layer includes three or more pieces with edges of adjacent pieces being substantially in abutment, there being lines of weakness defined at each of the interfaces between the pieces, two of which are spaced to define an intermediate portion separable from the bag.

13. The bag as claimed in any one of the preceding claims wherein the interior of the bag includes a main portion and a spout portion which is narrower than the main portion and extends beyond the main portion with the or each line of weakness extending across the spout portion.

14. The bag as claimed in claim 13 wherein the bag is sealed with the spout portion closed, the bag being openable upon tearing along the or each line of weakness.

15. The bag as claimed in claim 13 or claim 14 wherein the bag contains a drinking straw or tube and an end of the straw is disposed within the spout portion.

16. The bag as claimed in any one of claims 13 to 15 wherein the spout is such that tearing of the bag along the or each line of weakness provides a mouth portion which is adapted to receive a stopper.

17. The bag as claimed in claim 13 or claim 14 wherein the spout is sized to allow the release of steam or gas from the interior of the bag.

18. The bag as claimed in any one of the preceding claims wherein the bag is formed of one sheet of flexible material folded back on itself to define two sheet portions, with first and second lines of weakness being formed on respective ones of said sheet portions, the first and second lines of weakness being substantially aligned with each other.

19. The bag as claimed in any one of claims 1 to 17 wherein the bag is formed of two overlapping sheets, with first and second lines of weakness formed on respective ones of

said sheets, the first and second lines of weakness being substantially aligned with each other.

20. The bag as claimed in claim 19 wherein, in the empty state, the two sheets lay one directly upon the other and are sealed together at or adjacent their edges.

21. The bag as claimed in claim 19 or 20 wherein the two sheets are sealed together adjacent the lines of weakness for substantially the length of the lines of weakness.

22. The bag as claimed in any one of claims 1 to 12, 18 to 21 wherein the interior of the bag includes a plurality of internal compartments.

23. The bag as claimed in claim 22 with a partition between two adjacent compartments wherein the or each line of weakness extends substantially parallel to the partition to open a first one of the compartments.

24. The bag as claimed in claim 23 wherein a drinking straw or tube is provided within the first one of the compartments.

25. The bag as claimed in claim 22 with a partition between adjacent compartments wherein the or each line of weakness extends across the partition(s).

26. The bag as claimed in claim 25 wherein the or each line of weakness includes breaks therein which are disposed in the partition(s).

27. The bag as claimed in claims 25 or 26 wherein associated with each compartment are respective detachable edge portions which are disposed along a third edge of the bag.

28. The bag as claimed in claim 27 wherein perforations extend along each partition from the or each line of weakness to the third edge of the bag.

29. The bag as claimed in any one of the preceding claims wherein the bag contains a drinking straw or tube.

30. The bag as claimed in any one of claims 22 to 28 wherein one compartment contains a drinking straw and another contains a consumable substance.

- 23 -

31. The bag as claimed in any one of claims 1 to 18, wherein the bag is formed as one sheet of flexible material folded back on itself to define two sheet portions and wherein the bag includes a strip of flexible sheet material inserted between the two sheet portions and extending with its lengthwise direction substantially parallel to the line of weakness such that the strip is adapted to act as a handle when the bag has been torn along the line of weakness.

32. The bag as claimed in claim 31 wherein the bag includes a gusset portion formed at an end of the bag opposite to the strip when the bag has been torn along the line of weakness.

33. The bag as claimed in any one of claims 1 to 17, 19 to 21 wherein the bag is formed of two overlapping sheets of material, the bag being further provided with a strip of flexible sheet material inserted between the two sheets and extending with its lengthwise direction substantially parallel to the line of weakness such that the strip is adapted to act as a handle when the bag has been torn along the line of weakness.

34. The bag as claimed in claim 33 wherein the bag includes a gusset portion formed at an end of the bag opposite to the strip when the bag has been torn along the or each line of weakness.

35. The bag as claimed in any one of claims 1 to 19, further including a gusset portion formed in the base of the bag.

36. A multi layer packaging material having a first layer and a second layer wherein the first layer includes two pieces with substantially abutting edges and having at least one line of weakness which is defined by the interface of the two pieces with the second layer being substantially intact along the line of weakness and tearable along the line of weakness.

37. The packaging material as claimed in claim 36 further including an additional layer over the first layer.

38. The packaging material as claimed in claim 36 or claim 37 wherein the first and second layers are laminated together.

39. The packaging material as claimed in any one of claims 36 to 38 wherein the bag includes a nick to facilitate tearing along the line of weakness.

40. The packaging material as claimed in any one of claims 36 to 39 wherein the material is formed into a sheet and the line of weakness extends from an edge of the sheet to an opposite edge of the sheet.

41. The packaging material as claimed in any one of claims 36 to 40 wherein the line of weakness is straight.

42. The packaging material as claimed in claim 40 or claim 41 wherein the line of weakness is visibly indicated on the sheet.

43. The packaging material as claimed in any one of claims 36 to 42 wherein the first and second layers are substantially the same size.

44. The packaging material as claimed in any one of claims 36 to 43 wherein the first layer includes three or more pieces with edges of adjacent pieces being substantially in abutment, there being lines of weakness defined at each of the interfaces between the pieces, two of which are spaced to define an intermediate portion separable from the material.

45. The bag as claimed in any one of claims 1 to 35 wherein a first one of said pieces comprises holographic material.

46. The bag as claimed in claim 45 wherein said first piece of holographic material is configured as a strip.

47. The bag as claimed in claim 45 or claim 46 wherein another of said pieces comprises transparent material.

48. The packaging material as claimed in any one of claims 36 to 44 wherein a first one of said pieces comprises holographic material.

49. The packaging material as claimed in claim 48 wherein said first piece of holographic material is configured as a strip.

28 JUN 2002

- 25 -

50. The packaging material as claimed in claim 48 or 49 wherein another of said pieces comprises transparent material.