Jan. 9, 1968 G. H. RODDA, JR 3,362,615

CONTAINER AND PACKAGE

Filed June 4, 1964 2 Sheets-Sheet 1

Fig. 1

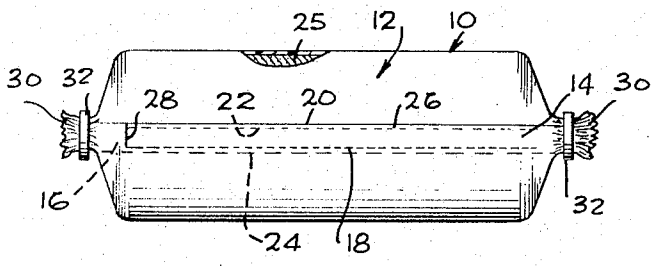


Fig. 5

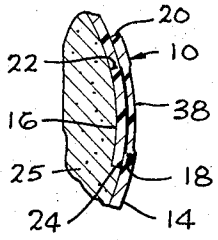


Fig. 3

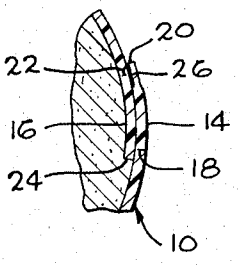


Fig. 2

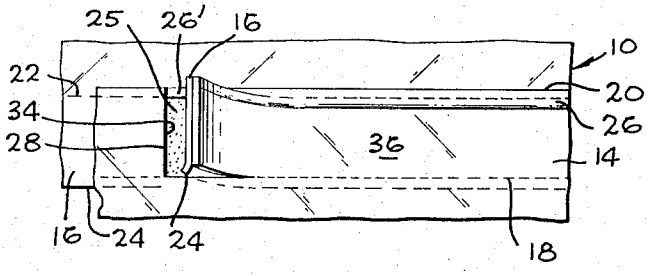


Fig. 4

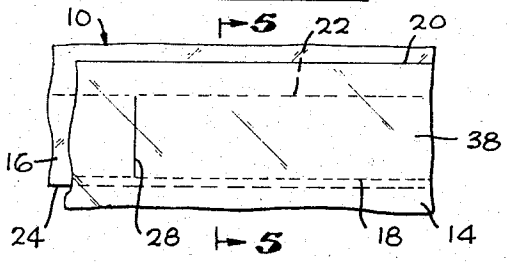


Fig. 6

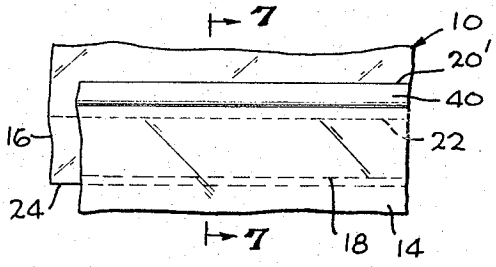
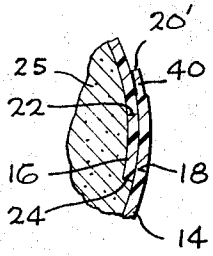


Fig. 7



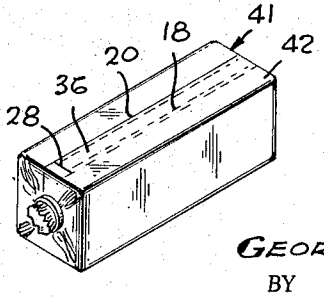


Fig. 8

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CONTAINER AND PACKAGE

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Fig. 9

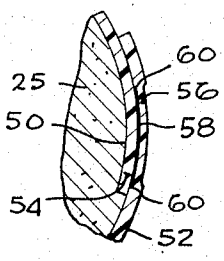


Fig. 10

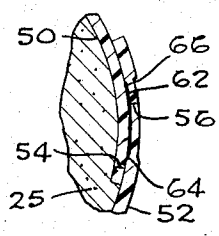


Fig. 12

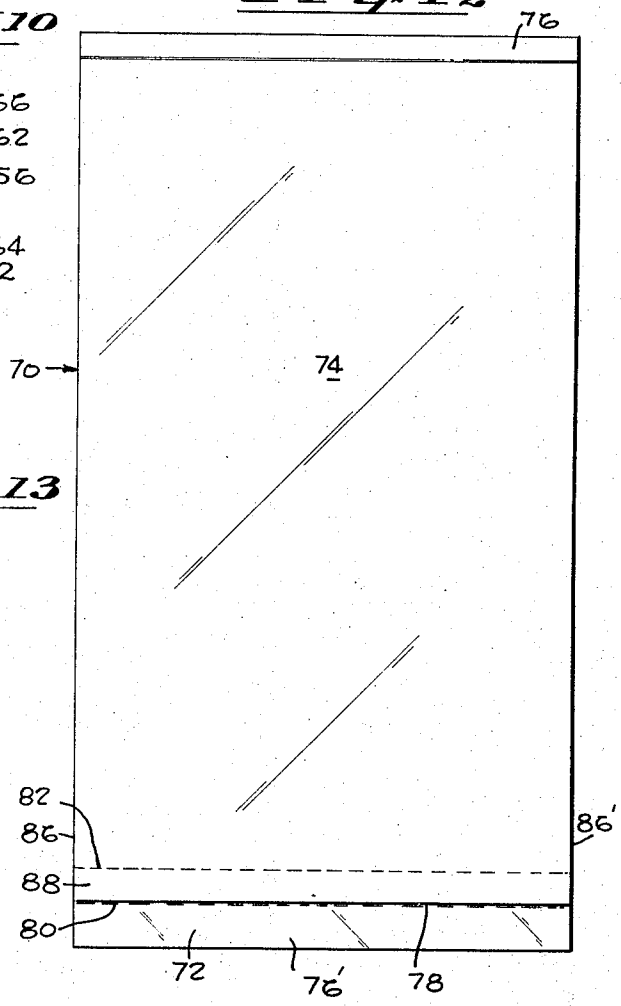


Fig. 11

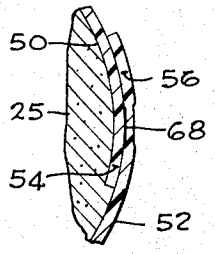


Fig. 13

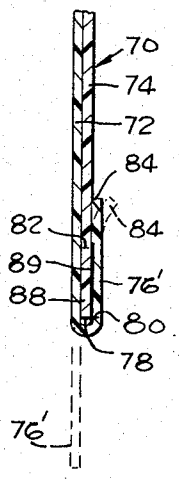


Fig. 15

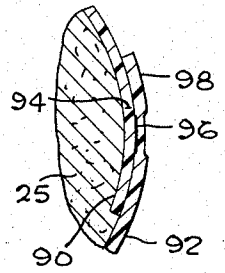


Fig. 16

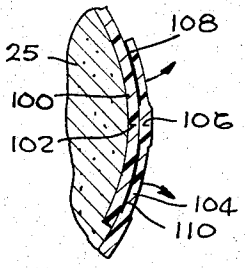


Fig. 14

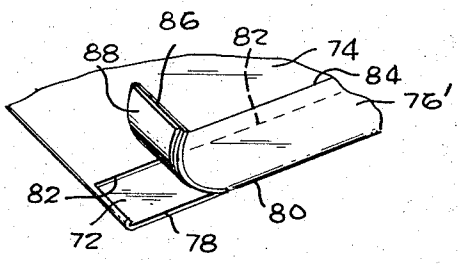
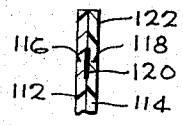


Fig. 17



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CONTAINER AND PACKAGE

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Filed June 4, 1964, Ser. No. 372,563

6 Claims. (Cl. 229—51)

ABSTRACT OF THE DISCLOSURE

An easily openable container for foodstuffs and the like is provided which comprises a wall section formed of thermoplastic film in a manner providing overlapped edge portions. A seal is formed between the overlapped edge portions. The inner film is provided with a serrated line spaced from the edge of the inner of the overlapped edge portions and under the seal between such portions.

This invention relates to the packaging of various products, and particularly grocery products, including, for example, foods, soap and soap products, and is especially concerned with a novel, easy opening container or bag for packaging food products such as cheese, meats and dough mixes, particularly frozen dough or bread mixes, and various other products including soaps.

Containers and bags formed of a flexible plastic material, such as polyethylene, have been widely utilized for the packaging of grocery products, e.g., food products. Such containers are advantageous in that the packaging material or plastic films or sheets employed in forming the container or package are relatively inexpensive, and such wrapper is substantially impervious to air and moisture, thus improving the keeping qualities of the package. Such containers or packages are also readily sealed and form an attractive package.

This type of container and packaging material lends itself ideally to the packaging of various products, particularly food products, including frozen dough mixes, the contents of the package being maintained in fresh, attractive condition over an extended period of time.

However, the provision of an easy and quick means for opening such packages to remove the contents has presented a considerable problem. Various modes of solving this problem have been advanced in the past, but in many cases have not proved sufficiently effective and sufficiently inexpensive so as to provide a completely satisfactory solution. Thus, for example, prior art containers and packages of this type have been designed employing means such as pull strings and wires which, when pulled, provide an opening in the container for removal of the contents. This package opening means, including such pull string, requires the incorporation of such a string on the package with means to hold it in position so as to provide an opening in the package when the string is actuated, and hence is relatively expensive.

It is accordingly an object of the instant invention to provide a container or package formed of plastic film or sheet and which incorporates a simple means for quickly and easily opening the package, without employing extraneous materials other than the plastic packaging film.

Another object is to provide a flexible plastic container of any desired shape, e.g., in the form of a plastic tube, bag, or the like, for packing products, particularly grocery products including foods, such as bread dough mixes, soap products, and the like, and which is provided with a novel, simple means which is designed so that by a simple pulling operation of a predetermined portion of the plastic film forming the container, the container can be opened for removal of the packaged contents.

Other objects and advantages of the invention will be apparent hereinafter.

According to the invention, a container or package formed of flexible, preferably thermoplastic film, e.g., in the form of a tubular or bag-type container, or package, is provided having as an integral part thereof an easy-open serrated portion or segment comprising a part of the container wall. Broadly, such easy-open means is provided according to the invention by sealing overlapped edge portions of the container to provide a seal between the overlapped edges and providing a serrated line or serration in at least the inner or underlap surface of the plastic film spaced from the outer edge of such underlap surface portion.

According to a preferred form or embodiment of the invention, an edge portion or layer of the plastic film is sealed over the opposite edge portion of the film, such underlying edge portion having a serration or serrated line therein which can extend, for example, longitudinally or transversely of the container. The outer overlapped portion also has a serration or serrated line formed therein, the serrations in the underlying and overlying lapped edge portions being spaced from each other and defining a strip of the container surface. For opening the container, the overlapped edge portions can be provided with a transverse slit extending across the serrations. This permits the user to insert the finger into the transverse slit and to lift the film layers between the serrations, causing a tear along the serrations and thus removing a longitudinal segment of the container wall and permitting easy removal of the container contents. The sealed overlapped edge portions of the container or tube and the spaced longitudinal serrations provided in the outer and inner overlapped edge portions thus provide an easy-open segment for opening the package according to the invention.

According to one preferred embodiment, the seal between the overlapped edge portion is in the form of a continuous seal which can be provided conveniently, e.g., by heat sealing of the thermoplastic film or sheet directly over or adjacent to the serrated line in the underlying layer or edge portion of the film, to form the container. Alternatively, such heat seal can be located in the area essentially between the outer and inner serrations and extending closely adjacent to or just over the inner serration. According to further embodiments, such sealed area can also be positioned between the overlapped edge portions of the container beyond the serrations of the underlying and/or of the overlap layer, as hereinafter more fully described.

In another preferred form of the invention, an easy-open means is provided at one end of a bag formed of two flexible plastic wall portions by folding an outwardly extending portion of one wall of the bag over the opposite wall portion of the bag, to form overlapped edge portions at said one end of the bag. A serration is provided in the overlap portion adjacent the bottom of the bag and a spaced, substantially parallel serration is formed in the inner surface of the overlapped edge portions. A seal is provided in the area between the serrations. When an outwardly extending flap on the overlap edge portion is pulled back substantially along the serrations, the wall portion of the bag between such serrations tears along the serrations, opening a segment of the bag at the end thereof, to permit easy removal of the bag contents.

By utilizing heat sealing or electronic sealing methods for providing the above-noted seal, it will be seen that the means for opening the container or package according to the invention principles does not require the utilization of any extraneous materials other than the plastic film itself employed to form the container wall. Thus, for example, in the preferred embodiments it is simply necessary to

form the two lines of serrations, each in opposite edge portions of the film and to seal such overlapped edge portions so as to provide the spaced serrations in the outer and inner films defining the easy-open segment as above described. Any suitable means such as the above-noted cut in the overlapped film portions can be provided as a means to commence the pulling or tearing of the easy-open segment.

In forming a container or package according to the invention, the two outer edge portions of the plastic film are provided with the serrations by means of serrating wheels. The outer edge portions containing such serrations are then overlapped, and such overlapped edge portions are sealed, e.g., by heat-sealing or electronic sealing means, to form the container. One end of the container is then closed, for example, by means of a clip, and the product to be packaged is then introduced into the container and the opposite end of the container is then also closed, e.g., by means of a clip.

The invention principles will be more clearly understood by reference to the description below of certain embodiments of the invention taken in connection with the accompanying drawing wherein:

FIG. 1 illustrates a container and package in tubular form having an easy-open segment incorporated therein according to the invention;

FIG. 2 illustrates the opening of the container or package of FIG. 1 by tearing away the portion of film between the serrations in the outer and inner layers of film;

FIG. 3 is an enlarged detail of a section across the overlapped edge portions of the film forming the wall of the package of FIG. 1;

FIG. 4 shows a modification of the sealing means disposed between the overlapped edge portions of the film;

FIG. 5 is a sectional detail taken on line 5—5 of FIG. 4;

FIG. 6 shows still another modification of the position of the seal between the overlapped edge portions of the film with respect to the serrations;

FIG. 7 is a cross-section taken on line 7—7 of FIG. 6;

FIG. 8 shows a modified form of the invention as applied to a container or package of oblong shape;

FIG. 9 illustrates another embodiment of the easy-open package means of the invention;

FIG. 10 shows a still further modification of the invention principles;

FIG. 11 illustrates yet another modified form of the improved container and package opening means of the invention;

FIG. 12 illustrates application of the easy-open segment principle of the invention for opening one end of a flexible plastic bag;

FIG. 13 is an enlarged section at one end of the bag of FIG. 12, showing the overlapped edge portions including the serrations along which the bag opening is formed;

FIG. 14 is a detail illustrating the manner of opening the end of the bag of FIG. 12, along the overlapped end portion thereof;

FIG. 15 illustrates another modification of the container opening principles of the invention; and

FIGS. 16 and 17 show still further modifications of the invention.

Referring to FIGS. 1 to 3 of the drawing, numeral **10** represents a flexible plastic film or sheet forming the wall of a tubular container or package **12**. Any thin, preferably heat-sealable plastic sheet or film can be used in producing the wall or jacket of the container. Thus, for example, the container or package of the invention can be formed of polyethylene film, polyethylene terephthalate (Mylar), cellophane, polyvinylidene chloride (Saran), rubber hydrochloride film (Pliofilm), nylon, cellulose acetate-butyrate, polyvinyl chloride (Vinyon), and the like.

The film **10** forming the tubular container or package of the invention, is provided with overlapping edge portions **14** and **16**. The overlapped edge portion **14** has a longitudinal serration **18** formed therein substantially coextensive with the length of the tubular container and substantially parallel to the outer edge **20** of the overlapped layer **14**. The underlying edge portion **16** has a longitudinal serration **22** formed therein which also extends substantially the entire length of the container. Such serration **22** is substantially parallel to serration **18**, and is spaced from the edge **24** of the underlying edge portion **16**.

The overlapping edge portions **14** and **16** are sealed along a narrow longitudinal area over the underlap serration **22**, as by heat sealing, said seal extending on both sides of such serration. Such seal indicated at **26** is continuous, and extends also for substantially the entire length of the container. In a preferred embodiment according to the invention, it will be seen, viewing FIGS. 1 to 3, that the edge **24** of the underlying layer **16** extends a short distance beyond the serration **18** in the outer layer **14**, and likewise the outer edge **20** of the overlapped layer **14** extends slightly beyond the serration **22** formed in the surface of the underlying layer **16**. By this means, the product such as food, e.g., bread dough mix, packaged in the container is protected from direct exposure to the air through the serrations **18** and **22** in the overlapped layers of film **14** and **16**.

A transverse or perpendicular cut **28** can be formed in the overlapped layers **14** and **16** at one end of the tube as indicated in FIGS. 1 and 2, such cut extending from the edge **20** of the outer layer **14** to the serration **18** formed in such outer layer. Such cut or slit need not be provided at the time the food is packaged in the container, but can be formed in the package by the user at the time the package is to be opened, e.g., by printing a line where the slit **28** is to be made and directing the user to cut along this line by means of proper directions or indicia printed on the package.

The opposite ends **30** of the film forming the container or package are gathered together and closed off by suitable means, e.g., clips **32** of conventional design.

For opening the package according to the invention, the user simply inserts a finger into the cut **28** and pulls or lifts the layers **14** and **16** of film, causing such layers to tear along the serrations **18** and **22**, as indicated in FIG. 2, removing a segment or strip **36** of the container wall and forming a rectangular opening permitting easy removal of the container contents **35**. In such stripping or tearing operation, it will be noted, viewing FIGS. 2 and 3, that the free edge **24** of the underlying layer **16** will be pulled free and through the opening **34** produced by the tearing of the segment along the serrations, as above described. The outer edge **20** of the outer layer **14** which remains sealed to the adjacent inner layer, as indicated at **26'**, will remain attached to the outer surface of the container during the tearing of the strip or segment **36** from the wall or jacket of the container during the opening thereof, as above described.

Thus, in the embodiment illustrated in FIGS. 1 to 3, wherein a narrow longitudinal seal is provided which extends over the underlap serration **22**, and wherein a portion of such seal extends into the area between the serrations **22** and **18**, such seal effectively seals the underlying layer **16** to the overlying edge portion **14**, while permitting easy tearing of the strip or segment **36** along the serration **22**.

According to an illustrative example, which is not intended as limitative of the invention, a convenient distance between the serrations **18** and **22** is about ½ inch, thus permitting easy insertion of the finger into the slit or cut **28**, as noted above, for commencing the pulling or tearing of the easy-open segment **36**, such segment **36** thus having a width of approximately ½ inch. The width of the heat-seal area **26** over the underlap serration **22** is about ¼ inch.

In forming the container or package illustrated in FIGS. 1 to 3, the plastic film **10** in essentially flat form

is serrated by any suitable means, e.g., by serrating wheels which are spring loaded, to provide the serrations 18 and 22 adjacent the respective edges 20 and 24 of the film. The outer edge portion 14 of film 10 is lapped over the underlying edge portion 16, as indicated in FIGS. 2 and 3, and the longitudinal heat seal 26 is then applied over the underlapped serration 22 in any suitable conventional manner. One end of the container is then closed off by means of a clip 32, and the food to be packaged is then inserted into the tubular container through the opposite open end. When the food has been packed in the container, the opposite end of the container is closed off by means of a similar suitable clip 32.

FIGS. 4 and 5 show a modified form of the invention in which the area between the serrations 18 and 22 is sealed as indicated at 38, such seal extending in width from the overlap serration 18 to the underlap serration 22, forming a relatively wide, longitudinally extending seal 38.

In FIGS. 6 and 7 is shown another modification, wherein the outer edge 20' of the overlapped layer 14 extends substantially beyond the underlapped serration 22, and a continuous longitudinal seal 40 is provided between layers 14 and 16 but beyond the underlap serration 22 and extending adjacent the outer edge 20 of the overlap 14, as indicated at 40. In this modification the seal 40 is not disposed between serrations 18 and 22.

FIG. 8 shows a modified form of the flexible plastic container 41 employing the invention principles wherein the container is in the form of an oblong, as indicated at 42. The means for providing the easy-open segment 36, according to the invention principles, is the same as shown in FIGS. 1 to 3, and as described above.

Referring now to FIG. 9 showing still another modification of the easy-open container seal of the invention, thermoplastic layers 50 and 52 have serrated lines 54 and 56 formed therein adjacent their respective outer edges and are overlapped so that the serrations 54 and 56 in the inner and outer layers, respectively, are spaced from each other. In this modification a seal, e.g., a heat seal 58, is provided which extends between the serrations 54 and 56 and beyond both of these serrations, as indicated at 60. As in the case, for example, of the modifications of FIGS. 3 and 5, upward pulling of both layers 50 and 52 of the overlapped portion between the serrations 54 and 56 will cause tearing along such serrations, removing a rectangular segment defined by both said layers between the serrations.

In the modification of FIG. 10, the overlapping edge portions formed by layers 50 and 52 are heat-sealed at 62 from a point 64 spaced from the inner serration 54, and between the serrations 54 and 56, to a point 66 beyond outer serration 56. On the other hand, in the modification of FIG. 11 the overlap edge portions formed from the flexible films 50 and 52 are sealed at 68 between the serrations 54 and 56. However, in this modification, the seal is spaced both from the inner serration 54 and the outer serration 56.

Although upward pulling of both of the layers 50 and 52 between serrations 54 and 56 in the modifications shown in FIGS. 10 and 11 will produce a tearing of both of the layers between the serrations 54 and 56, and also removing a segment of the container wall to reveal the contents, as in the case of the modifications of FIGS. 3, 5, 7 and 9 above, the modifications of FIGS. 3, 5 and 9, wherein the seal, e.g., heat-seal, is positioned over the serration of the inner layer or underlap, constitute the preferred forms of the invention for producing clean straight cuts along the serrations. The modifications of FIGS. 7, 10 and 11 wherein the seal is spaced from the serration on the inner surface of the overlapped edge portions do not function as satisfactorily for producing clean cuts along the spaced serrations, e.g., 54 and 56.

It will be noted that in the modifications of FIGS. 3, 5, 9 and 10 particularly, a hermetically sealed container is produced due to the positioning of the seal over the serrations, especially the inner serration, in the adjacent layers.

In FIGS. 12, 13 and 14 is illustrated the application of the invention principles for sealing one end of a plastic bag so as to provide an easy-open means at one end of the bag for removing the bag contents.

In this modification, the bag 70 is formed of opposite layers 72 and 74 of a flexible thermoplastic film which can be heat-sealed at one end of the bag, as indicated at 76 to form a closure. The opposite end of the layer 72 has an outwardly extending portion 76' which extends substantially beyond the outer edge 78 of the opposite layer 74 forming the bag. A serrated line 80 is formed in the surface of the layer 72 substantially along the outer edge 78 of the adjacent layer 74. A second serrated line 82 is formed in the outer surface of layer 74, such serrated line 82 being spaced from the outer edge 78 a distance somewhat less than the length of extension 76 beyond edge 78, and being disposed parallel to the serrated line 80.

The extension 76' is then folded substantially adjacent the serration 80 back over the bottom portion 88 of the layer 74, forming overlapped edge portions as seen in FIG. 13, with the outer end 84 of the extension 76' extending beyond the serration 82. The area between the overlap extension 76' and the adjacent underlap end portion 88 of layer 74 is sealed from one side 86 of the bag to the opposite side 85' thereof. Preferably, a heat-seal is employed, and such seal extends in width from approximately just over the serration 82 to about the serration 80 in the layer 72, as illustrated in FIG. 13. The outer free edge portion 84 of the extension 76', when pulled up and in a direction along the serration 82 will produce a tearing of the underlap layer 88 along the serration 82 and a tearing of the outer layer or extension 76' along the serration 80, removing both layers 76' and 88, and thus opening the bag along and beneath the serrated edge 82, for removal of the contents. Bags of the type described above and having the easy-open means at one end thereof, according to the invention principles and as illustrated above, can be employed for packaging a wide variety of foods, including, for example, cereals, cookies, potato chips, and the like, and can also be used for packaging other various products, including soap and cleaning powders generally, and the like.

The invention has been described essentially in terms of the provision of a pair of serrations in adjacent overlapped layers of thermoplastic material, and having a seal between such layers so positioned that tearing of such overlapped layers along both serrations can be accomplished by a pulling action of both of the overlapped layers along the spaced serrations, to remove a substantially rectangular segment of the container wall.

However, the invention principles can be employed broadly simply to provide an opening in the flexible plastic wall of a container without removal of a rectangular segment of the container wall. Thus, for example, in FIG. 15 is shown a modification in the form of a pair of overlapping edge portions 90 and 92 of a thermoplastic flexible material in which the underlap or inner layer has a serrated line 94 formed in the surface thereof, and a heat seal 96 is provided between layers 90 and 92, such heat seal being positioned closely adjacent to the serration 94. In this modification, by pulling the outwardly extending end flap 98 of the outer layer 92 outwardly and along serration 94, the inner layer 90 will tear along the serration 94 due to the outward tension transmitted to the inner layer 90 just below the serration 94, via the seal 96 between the layers. Such a tear will produce an opening in the container along the line of the serration, permitting removal of the contents of the container through such opening.

In the modification shown in FIG. 16, the inner layer 100 has a serration 102 formed therein and the outer

layer 104 likewise has a serration 106 formed therein, the serrations 102 and 106 being substantially in alignment. A seal 108 is formed between layers 102 and 104 on one side of the serrations 102 and 106 and spaced therefrom and a seal 110 is formed on the other side of the serrations 102 and 106 and spaced therefrom. Pulling the outer layer 104 on either side of the serration 106 as indicated by the arrows on FIG. 16, will produce tearing of outer layer 104 along serration 106 and will cause the inner layer 100 also to tear along the serration 102 as a result of the tension transmitted from the portion of layer 104 being pulled to the adjacent inner layer 102 through the seal 108 or 110. This forms an opening in the container wall along the serrations 102 and 106 to permit removal of the container contents.

Also, in FIG. 17 is shown a modification of the bag shown in FIGS. 12 to 14. In this embodiment the opposite thermoplastic side portions 112 and 114 of the bag each have a serrated line 116 and 117 respectively formed therein near the upper end of the bag, e.g. about a half inch from the top of the bag, such serrated lines being substantially in alignment, that is one over the other, and extending from one edge of the bag to the other, as illustrated for the serrated lines in the embodiment of FIG. 12. A seal 120, e.g. a heat seal, is provided between layers 112 and 114, such heat seal being disposed over both of the serrations 116 and 118. To open the bag, the upper portion 122 thereof above the serrations is pulled back, tearing such upper portion along both serrations and across the seal 120. If desired, seal 120 can extend upwardly a distance substantially to the upper end of the bag.

In the embodiment of FIGS. 12 to 14, it will be understood that the seal 89 thereof can be of smaller width than shown, that is, it can be located between serrations 80 and 82 without touching either serration, or it can extend up to or beyond either or both of the serrations 80 and 82.

It will be understood that containers or packages of any desired shape employing the invention principles can be provided. Further, it will be noted that although the embodiment shown in FIGS. 1 and 8 of the drawing illustrate the formation of an easy-open segment which extends longitudinally along the entire length of the container, the serration or the serrations, and cooperating heat-seal can be placed in any position on the container, e.g., transversely or diagonally thereof, and the length of such serrations and heat-seal can be varied as desired. Thus, for example, in the embodiment shown in FIG. 1, the length of the serrations 18 and 22 can be shortened so as to extend from the transverse cut at 28, say, for a distance of only ⅔ of the length of the container of FIG. 1 instead of the entire length thereof. Further, alternatively, the serrations 18 and 22 can commence at a point, say, ¼ the length of the container 10 from the point indicated by the cut 28, and then extend entirely to the rear of the container. In other words, the means providing the easy-open segment 36 can be positioned so as to form a rectangular opening in the container, as indicated at 34, over the entire length of the container or some shorter length thereof intermediate the ends of the container.

From the foregoing, it is seen that the invention provides a plastic container or food package having an effective, quick and easy means for providing a suitable opening in the container for removal of the contents, without requiring any extraneous means such as pull-strings and the like, as in prior art containers and food packages.

While I have described particular embodiments of my invention for the purpose of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention, as set forth in the appended claims. It will be understood therefore that any equivalent means can be employed by those skilled in the art to provide weakened tear lines exemplified by the serrations or serrated lines described above and shown in the drawings.

I claim:

1. A container comprising a wall formed of a flexible plastic sheet material having overlapped edge portions, a first serration along the outer overlapped edge portion and a second serration along the inner edge portion, said serrations being spaced apart and substantially parallel and longitudinally extended, and a seal between said overlapped edge portions, and disposed over said second serration.

2. A container comprising a wall section formed of a thermoplastic film having overlapped edge portions, a seal between said overlapped edge portions, a first serrated line along the outer film spaced from the edge of the outer overlapped edge portion, and a second serrated line along the inner overlapped edge portion, said serrated lines being spaced apart from each other, said seal being disposed over said second serrated line along the length thereof.

3. A container comprising an elongated tube of thermoplastic film, said tube having an outer edge portion overlying an inner edge portion, a first longitudinal serration in the outer edge portion of said film, spaced from the edge of said outer edge portion, a second longitudinal serration in the inner edge portion of said film substantially coextensive with the length of said first serration, said serrations being substantially parallel, and a substantially continuous longitudinal seal between said inner and outer edge portions, and overlying said second serration.

4. A container comprising an elongated tube of thermoplastic film, said tube having an outer edge portion overlying an inner edge portion, a first longitudinal serration in the outer edge portion of said film along said tube and spaced from the edge of said outer edge portion, a second longitudinal serration in the inner edge portion of said film substantially coextensive with the length of said first serration, said serrations being substantially parallel, the edge of said inner edge portion extending beyond said first serration, and the edge of said outer edge portion extending beyond said second serration, a substantially continuous longitudinal thermal seal between said inner and outer edge portions, and disposed in the area between said serrations and overlying said second serration.

5. A food package comprising an elongated tube of thermoplastic film, said tube having an outer edge portion overlying an inner edge portion, a first longitudinal serration in the outer edge portion of said film, spaced from the edge of said outer edge portion, a second longitudinal serration in the inner edge portion of said film substantially coextensive with the length of said first serration, said serrations being substantially parallel, a substantially continuous longitudinal thermal seal between said inner and outer edge portions, and overlying said second serration, food contents contained within said tube, and clips closing off opposite ends of said tube.

6. A food package comprising an elongated tube of thermoplastic film, said tube having an outer edge portion overlying an inner edge portion, a first longitudinal serration in the outer edge portion of said film along said tube and spaced from the edge of said outer edge portion, a second longitudinal serration in the inner edge portion of said film substantially coextensive with the length of said first serration, said serrations being substantially parallel, the edge of said inner edge portion extending beyond said first serration, and the edge of said outer edge portion extending beyond said second serration, a substantially continuous longitudinal thermal seal between said inner and outer edge portions, disposed in the area between said serrations and overlying said second serration, a transverse cut formed in said outer and inner edge portions and extending from said first serration to the edge of said outer layer and providing means for lifting and

tearing a longitudinal segment of said tube including said sealed outer and inner edge portions defined by said serrations, food contents contained within said tube, and means closing off opposite ends of said tube.

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