

Oct. 22, 1968

T. M. WESTPHAL ET AL

3,406,867

EASY OPENING CONTAINER END

Filed June 30, 1967

2 Sheets-Sheet 1

FIG. 1

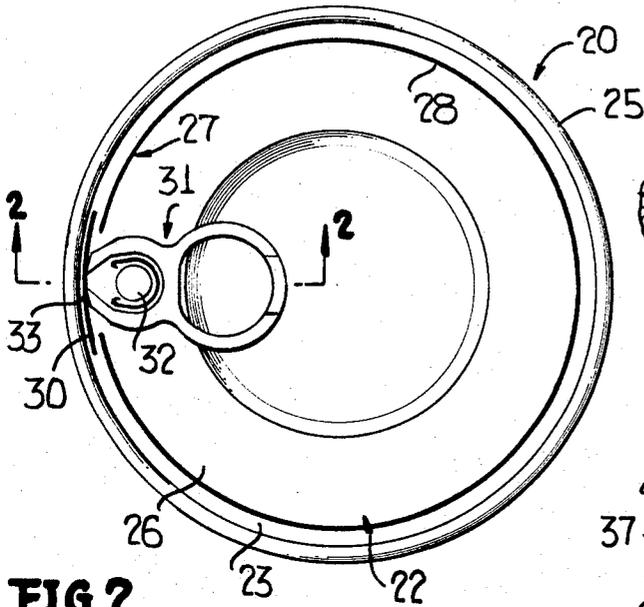


FIG. 3

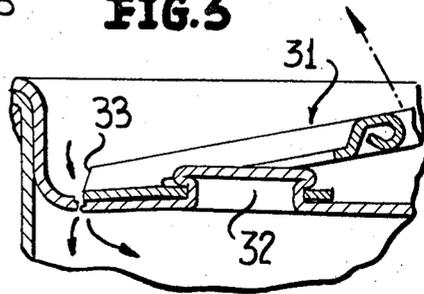


FIG. 2

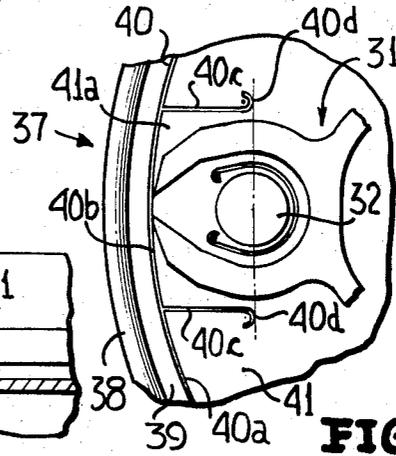
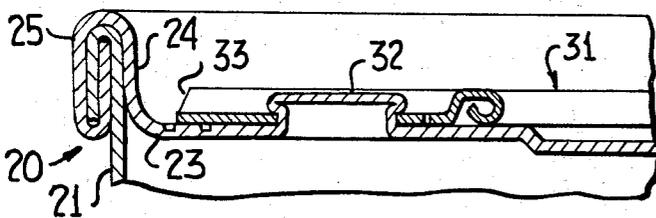


FIG. 8

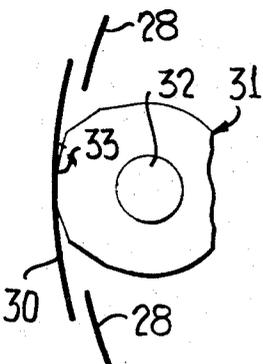


FIG. 4

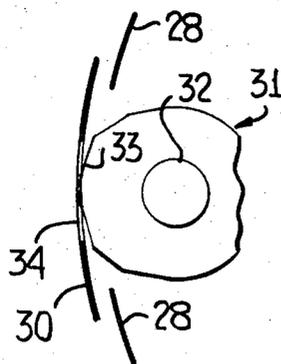


FIG. 5

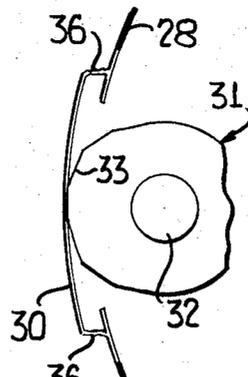


FIG. 6

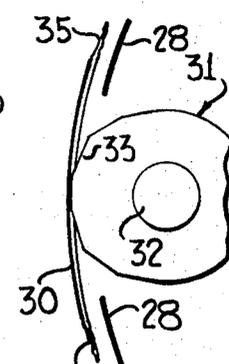


FIG. 7

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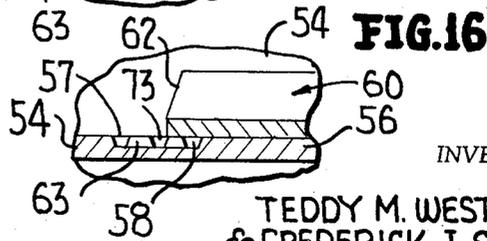
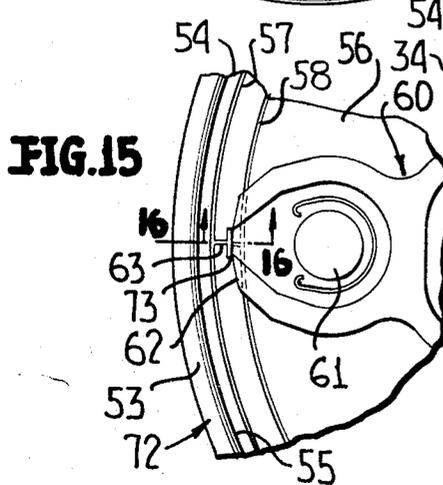
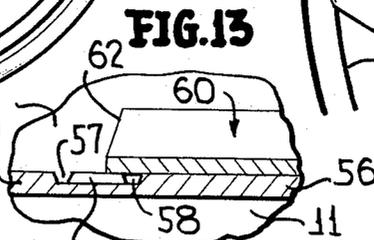
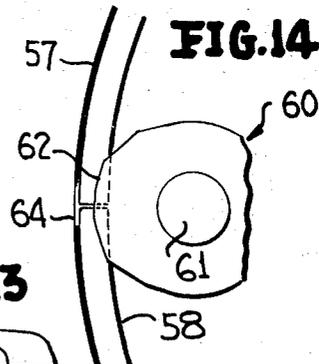
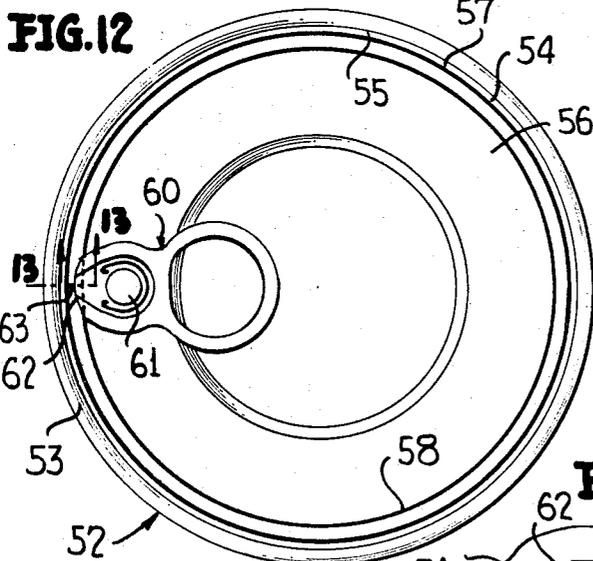
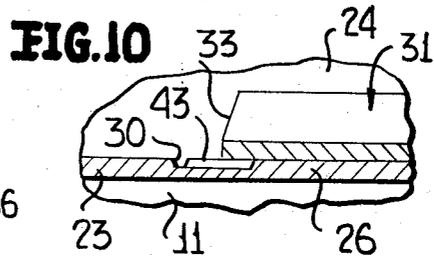
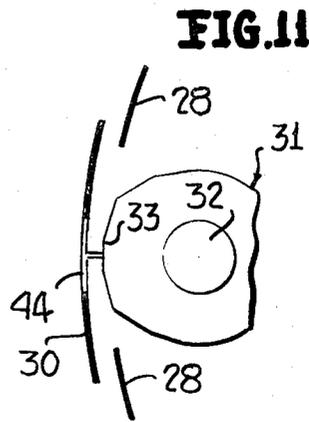
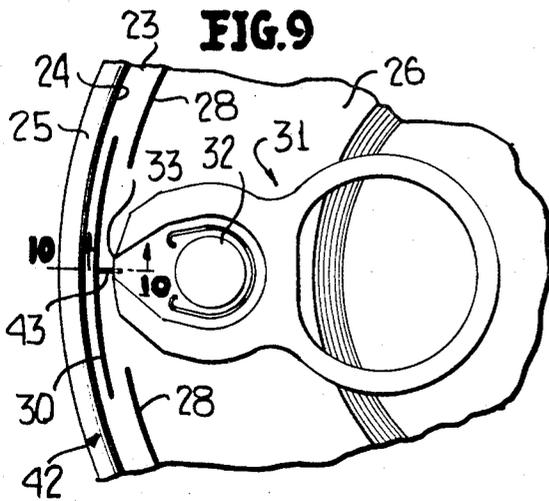
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EASY OPENING CONTAINER END

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 18 Claims. (Cl. 220-54)

ABSTRACT OF THE DISCLOSURE

This disclosure has to do with an easy opening container end wherein a removable panel portion is defined by a generally peripheral weakening line. This disclosure particularly relates to various weakening line details which, when used separately or in cooperation with one another, will permit the displacement of the nose of an associated pull tab from the starting portion of the weakening line so as to provide more clearance between the pull tab nose and an associated chuck wall, and wherein the starting portion of the weakening line may be formed separate and apart from the remainder thereof and offset therefrom so as to prevent the uncontrolled rupture of the container end panel due to the force exerted on the removable panel portion by differential gaseous pressure.

This invention relates in general to new and useful improvements in easy opening container ends, and more particularly to a novel weakening line or score line arrangement in such container ends.

When containers are sealed with the internal pressure thereof being different from that of the atmosphere, the pressure differential on the can end oftentimes results in an uncontrolled rupture after the initial rupture occurs with the result that when there is a product vacuum packed within a can, the removable panel portion will implode and when there is positive pressure in the can, the removable panel portion will explode. In the past, numerous means have been provided to prevent this uncontrolled rupture. However, these have normally required complicated scoring dies. In accordance with this invention, it is proposed to interrupt the score line which defines the removable panel portion and to offset the starting portion of the score line from the remainder thereof whereby rupture of the end panel along the score line due to differential gaseous pressure will be only along the starting score line portion and will terminate in the full thickness of the metal of the end panel.

Another problem encountered in easy opening container ends is that when it is desired that the container end be of the full opening type and the removable panel portion is pulled out in one piece, it is necessary that the starting score line portion be disposed closely adjacent the chuck wall of the end. In the past, it has been necessary to place the nose of the usual pull tab in alignment with this starting score line portion with the result that the nose of the pull tab is in the way of the usual seaming chuck. In accordance with this invention, it is proposed to provide the end panel with a rupture initiating score which extends radially inwardly from the score line starting portion and wherein the nose of the pull tab may be spaced inwardly from the score line starting portion, but aligned with the rupture initiating score line and the required opening process may be readily accomplished.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a plan view of a container having an

easy opening end formed in accordance with this invention.

FIGURE 2 is an enlarged fragmentary vertical sectional view taken along the line 2-2 of FIGURE 1 and shows particularly the details of construction of the easy opening end.

FIGURE 3 is a fragmentary vertical sectional view similar to FIGURE 2 and shows an initial step in the opening of the container.

FIGURES 4, 5 and 6 are schematic views showing the sequence of rupture along the score lines during the opening of the container.

FIGURE 7 is a schematic view showing the rupture which will occur when there is initial uncontrolled rupture due to differential gaseous pressures.

FIGURE 8 is a fragmentary plan view of another form of container end construction.

FIGURE 9 is an enlarged fragmentary plan view of a modified form of container end construction.

FIGURE 10 is an enlarged fragmentary vertical sectional view taken along the line 10-10 of FIGURE 9 and shows more specifically the details of the score line arrangement of FIGURE 9.

FIGURE 11 is a schematic view showing the sequence of rupture along the score lines of FIGURE 9 during the opening of the container.

FIGURE 12 is a plan view of still another form of container end and shows the general details of the scoring formed therein.

FIGURE 13 is an enlarged fragmentary sectional view taken along the line 13-13 of FIGURE 12 and shows the details of the scoring thereof.

FIGURE 14 is a schematic view showing the progressive rupture along the score lines of FIGURE 12 during the opening of the container end thereof.

FIGURE 15 is a fragmentary plan view of still another form of container end and shows the details of the score lines thereof.

FIGURE 16 is an enlarged fragmentary vertical sectional view taken along the line 16-16 of FIGURE 15 and shows further the specific details of the score lines of FIGURE 15.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIGURES 1 and 2 a container which is generally referred to by the numeral 20. The container 20 includes a conventional container or can body 21 which has the lower end (not shown) thereof closed in the normal manner. The upper end of the container body 21 is closed by means of a container end, which is generally referred to by the numeral 22. The container end 22, with the exception of the easy opening feature thereof, is a conventional container end and includes an end panel 23 and a surrounding upstanding chuck wall 24 which is part of a double seam 25 securing the container end 22 to the container body 21.

The container end 22 is of the full opening type and has defined therein a removable panel portion 26 which comprises substantially all of the end panel 23. The removable panel portion 26 is defined by a weakening line or score line assembly which is generally identified by the numeral 27. The score line assembly 27 is of an interrupted configuration and includes a primary score line 28 having the ends thereof terminating short of one another in opposed relation and with there being a gap therebetween. The score line assembly 27 also includes a starting score line 30 which is radially offset from the primary score line 28, which bridges the gap between the ends of the primary score line 28, and which is disposed in overlapping relation with respect to the ends of the primary score line 28.

The container end 22 also includes a pull tab, which is generally referred to by the numeral 31. The pull tab 31

is secured to the removable panel portion 26 by means of an integral rivet 32. It is to be understood that the pull tab 31 is of the lever type and has a nose 33 which is engageable with the end panel 23 to effect the rupture thereof along the starting score line 30. It is to be understood that the construction of the pull tab 31 may vary in accordance with the particular requirements of the container end 22.

Referring now to FIGURE 3 in particular, it will be seen that during the normal opening of the container 20, the inner end of the pull tab 31 will be elevated and the nose 33 will move downwardly to exert an opening force on the end panel 23. This opening force will be sufficient to effect rupture of the end panel along the starting score line 30, as is shown in FIGURE 5. The line of rupture is identified by the numeral 34.

With reference now to FIGURE 7, it is pointed out that when the pressure within the container 20 is different from that of the atmosphere, the differential gaseous pressure will result in a force being applied to the removable panel portion 26 sufficient to effect uncontrolled rupture of the end panel 23 along the starting score line 30. When the starting score line 30 is a continuation of the primary score line, this uncontrolled rupture of the end panel along the score line will result in a blow-out of the removable panel portion if the pressure within the container is greater than atmosphere, and an implosion of the removable panel portion 26 if the container 20 is sealed with a vacuum therein. For obvious reasons, it is desired to eliminate both explosion and implosion.

Inasmuch as the starting scoreline 30 is offset relative to the primary score line 28, as is clearly shown in FIGURE 7, there may be uncontrolled rupture of the end panel 23 along the score line 30 without either explosion or implosion of the removable panel portion 26. This is due to the fact that the force effecting such implosion or explosion will be dissipated within the thicker metal of the end panel 23 at the opposite ends of the score line 30 as at 35.

Although the offsetting of the starting score line 30 with respect to the primary score line 28 will provide for uncontrolled rupture of the end panel 23, it will not materially affect the opening of the container 20. With reference to FIGURE 6, it will be seen that as the pull tab 31 is progressively lifted, the rupture of the end panel 23 will continue along the starting score line 30 substantially to the ends thereof, after which there will be a transverse tearing of the end panel 23 as at 36 into the primary score line 28. Further manipulation of the pull tab 31 will result in the continued rupture of the end panel along the primary score line 28 with the entire removable panel portion 26 being removed as a unit together with the pull tab 31.

Referring now to FIGURE 8, it will be seen that there is illustrated a modified form of container end which is generally referred to by the numeral 37. The container end 37 includes an outer attaching portion 38, which may be in the form of a double seam, and an end panel 39. The end panel 39 is provided with a peripheral score line 40 which defines a removable panel portion 41 which preferably constitutes substantially all of the end panel 39. In order to facilitate the rupture of the container end 37 along the score line 40, the removable panel portion 41 is provided with a pull tab, which pull tab may be identical to the aforescribed pull tab 31. The pull tab 31 is secured to the removable panel portion 41 by means of a rivet 32.

It is to be noted that as opposed to the interrupted score line of the container end of FIGURE 1, the score line 40 is continuous. However, for descriptive purposes, the score line 40 may be described as including a primary score line 40a having the ends thereof terminating short of one another in opposed relation and with there being a gap therebetween. The score line 40 also includes a starting score line 40b which bridges the gap between the ends of the primary score line 40a. The starting score line

40b is provided at the opposite ends thereof with radial extensions 40c which are disposed on opposite sides of the pull tab 31. If desired, the score line extensions 40c may terminate in reversely turned portions 40d.

When the pull tab 31 is lifted for the purpose of opening the container of which the container end 37 is a part, the nose of the pull tab 31, which is aligned with the starting score line 40b, will exert a sufficient downwardly directed pressure on the end panel 39 to effect the rupture thereof along the starting score line 40b. In the event the container should be packaged with the internal pressure thereof different from the external, particularly at a lower pressure than atmospheric, and there is a tendency for the uncontrolled rupture of the end panel 39 along the score line 40, it will be apparent that due to the action of the pull tab 31 on that part of the removable panel portion 41 between the score line extensions 40c, any uncontrolled rupture of the end panel 39 will be first along the starting score line 40b and then along the score line extension 40c. As a result, a part 41a of the removable panel portion 41, which part is generally in the form of a flap defined by the starting score line 40b and the score line extensions 40c, will be displaced relative to the remainder of the end panel 39 and provide for the venting of the container. After the initial venting action has been completed, the pull tab 31 may be pulled upwardly to tear out the removable panel portion 41 along the primary score line 40a.

Although the score line extensions 40c have been illustrated as having reversely turned ends 40d, it is to be understood that if desired the ends 40d may be eliminated. However, the configuration of the ends 40d assures the termination of the radially inwardly tearing of the end panel 39.

Reference is now made to FIGURES 9, 10 and 11 wherein a slightly modified form of the container end of FIGURE 1 is illustrated, the container end being generally referred to by the numeral 42 and being identical with the container end 22 with one minor change and one minor addition. It is to be noted that the nose 33 of the pull tab 31 is radially inwardly displaced with respect to the starting score line 30. In order to accomplish this, in the container end 42 the rivet 32 is radially inwardly displaced from its position on the container end 22. By radially inwardly displacing the nose 33, sufficient clearance is provided between the nose 33 and the chuck wall 24 for the passage of the usual seaming chuck in the formation of the double seam 25. In addition, there has been provided a rupture initiating score line 43 which extends radially inwardly from the starting score line 30 generally normal thereto and in alignment with the pull tab 31.

Referring now to FIGURE 10 in particular, it will be seen that the rupture initiating score 43 extends beneath the nose 33 of the pull tab. Thus, when the pull tab 31 is initially lifted in a container opening operation, it will apply a force on the end panel 23 along the rupture initiating score line 43 with the result that initial rupture of the end panel 23 will occur substantially at the inner section of the score line 30 with the score line 43. The end panel 23 will then rupture in a generally T pattern along the score lines 30 and 43 to define a generally T-shaped initial crack or rupture line 44, as is shown in FIGURE 11. Further lifting of the pull tab 31 will result in the normal opening of the container and the removal of the removable panel portion 26.

Referring now to FIGURES 12, 13 and 14, it will be seen that there is illustrated another form of container end which is generally referred to by the numeral 52. The container end 52 is secured to a conventional container, such as the container 20, by means of a double seam 53 and includes an end panel 54 which is generally surrounded by an upstanding chuck wall 55.

The container end 52 is of the easy opening type and includes a removable panel portion 56 which is defined

by a peripheral weakening or score line 57 formed in the end panel 54 closely adjacent the chuck wall 55. The removable panel portion 56 is provided with a fracture resistant score 58 which is spaced radially inwardly of the score line 57 and is generally concentric thereto.

In order to facilitate the removal of the removable panel portion 56, there is provided a pull tab, which is generally referred to by the numeral 60. The pull tab is of a conventional type and is connected to the removable panel portion 56 by means of an integral rivet 61. The pull tab 60 has a nose 62 which is engageable with the end panel 54 for the purpose of applying a rupture effecting force thereon.

It is to be noted that the nose 62 of the pull tab 60 is spaced radially inwardly from the score line 57. The purpose of this inward displacement of the nose 62 is to provide clearance for the conventional seaming chuck which engages the chuck wall 55 during the formation of the double seam 53. In order that the pull tab 60 may be operative to effect the rupture of the end panel 54 along the score line 57 despite the inward displacement of the nose 62, there is provided a rupture initiating score line 63 which extends radially between the score lines 57 and 58 in alignment with the pull tab 60. It is to be noted that the nose 62 is disposed intermediate the score lines 57 and 58 in a position to apply a force on the end panel 54 generally in alignment with the score line 63.

In the opening of the container end 52, an upwardly directed force is applied to the inner end of the pull tab 60 with the result that the nose 62 is urged downwardly. The downward pressure applied to the end panel 54 by the nose 62 of the pull tab 60 results in an initial rupture of the end panel 54 at the intersection of the score line 63 with the score line 57 followed by an initial rupture or cracking of the end panel 54 in a generally T-shaped pattern, as indicated at 64 in FIGURE 14. Continued upward movement of the inner end of the pull tab 60 will result in the continued rupture of the end panel 54 along the score line 57 and in this manner the removable panel portion 56 may be readily torn from the end panel 54.

Referring now to FIGURES 15 and 16 in particular, it will be seen that there is illustrated a further form of container end, which is generally referred to by the numeral 72. The container end 72 is substantially identical to the container end 52, but with one addition, in addition to the score lines 57, 58 and 63 of the container end 52, the container end 72 has a score line 73 which extends transversely of the score line 63 in alignment with the nose 62 of the pull tab 60. This additional score line has proven to be beneficial in that it facilitates the initial rupture of the end panel 54. Rupture initially occurs generally along the score line 73, followed by the rupture along the score line 63 outwardly towards the score line 57. The score line 73 assures the rupture of the end panel 54 along the score line 57 notwithstanding the fact that the nose 62 of the pull tab 60 is spaced radially inwardly from the score line 57.

Although several preferred embodiments of the invention have been specifically illustrated and described herein, it is to be understood that other minor modifications may be made in the easy opening container end without departing from the spirit and scope of the invention, as defined by the appended claims.

We claim:

1. In an easy opening panel, a weakening line assembly defining a removable panel portion, said weakening line assembly comprising a primary weakening line extending substantially entirely around said removable panel portion and having spaced ends leaving a gap therebetween, and a starting weakening line generally bridging said gap and having ends in spaced offset relation to said primary weakening line ends, and opening means for applying a force on said panel assembly to effect an initial rupture along said starting weakening line followed by a controlled rupture between end portions of said primary weakening line

and said starting weakening line and thereafter along said primary weakening line whereby uncontrolled rupture of said panel assembly along said weakening line assembly due to gaseous pressure on said panel assembly is prevented by dissipation of a force due to said gaseous pressure in the tearing of unweakened material at the ends of said starting weakening line.

2. The easy opening panel of claim 1 wherein said starting weakening line ends overlap said primary weakening line ends.

3. The easy opening panel of claim 1 wherein the position of said opening means relative to said removable panel portion is one wherein displacement of said removable panel portion by said opening means is generally from said starting weakening line towards said primary weakening line.

4. The easy opening panel of claim 1 wherein said starting weakening line ends overlap said primary weakening line ends, the position of said opening means relative to said removable panel portion is one wherein displacement of said removable panel portion by said opening means is generally from said starting weakening line towards said primary weakening line.

5. The easy opening panel of claim 1 wherein said opening means is in the form of a pull tab anchored to said removable panel portion, extending generally through said gap and having a force applying nose disposed adjacent said starting weakening line.

6. The easy opening panel of claim 5 wherein said force applying nose is aligned with said starting weakening line.

7. The easy opening panel of claim 5 wherein said force applying nose is spaced from said starting weakening line, said panel having a rupture initiating weakening line, extending from said starting weakening line into underlying relation to said nose.

8. The easy opening panel of claim 5 wherein said force applying nose is spaced from said starting weakening line, said panel having a rupture initiating weakening line extending from said starting weakening line generally at right angles thereto into underlying relation to said nose.

9. A container end of the type including an end panel and a surrounding upstanding chuck wall, a weakening line formed in said end panel and defining a removable panel portion, said weakening line including a starting portion disposed closely adjacent said chuck wall, a pull tab secured to said removable panel portion and having a force applying nose disposed adjacent said weakening line starting portion in inwardly spaced relation thereto to provide clearance between said nose and said chuck wall, and a rupture initiating weakening line extending inwardly from said weakening line starting portion to a position underlying said nose.

10. The container end of claim 9 wherein said removable panel portion has a fracture resistant score line disposed substantially in spaced concentric relation relative to said weakening line and being disposed inwardly of said nose, and said rupture initiating weakening line extending to said fracture resistant score.

11. The container end of claim 10 wherein there is a further rupture initiating weakening line extending generally transversely of the first mentioned rupture initiating weakening line in alignment with said pull tab nose.

12. The container end of claim 9 wherein there is a further rupture initiating weakening line extending generally transversely of the first mentioned rupture initiating weakening line in alignment with said pull tab nose.

13. The container end of claim 9 wherein all of said weakening lines are in the form of score lines.

14. The container end of claim 9 wherein said weakening line defining said removable panel portion is of an interrupted construction with weakening line starting portions being outwardly offset from the remainder thereof whereby uncontrolled rupture of said end panel due to differential gaseous pressure on said removable panel portion is prevented.

15. An easy opening container end comprising an end

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panel, a score line assembly in said end panel defining a removable panel portion, said score line assembly including a primary score line extending substantially entirely around said removable panel portion and having spaced ends leaving a gap therebetween, and a starting score line generally bridging said gap and having portions extending beyond the ends of said primary score line and terminating remote from said primary score line, and opening means for applying a force on said end panel to effect initial rupture along said starting score line followed by rupture along said starting score line portions and thereafter along said primary score line whereby uncontrolled rupture of said end panel along said score line assembly due to differential gaseous pressure on said end panel is prevented by dissipation of a force due to the gaseous pressure in tearing the material of said end panel along said starting score line portion.

16. The container end of claim 15 wherein said start-

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ing score line is radially offset from said primary score line and said starting score line portions are disposed generally parallel to ends of said primary score line.

17. The container end of claim 15 wherein said starting score line portions extend radially inwardly in said removable panel portion and define a flap.

18. The container end of claim 15 wherein said starting score line is a continuation of said primary score line and said starting score line portions extend radially inwardly in said removable panel portion and define a flap.

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15 THERON E. CONDON, *Primary Examiner.*

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