Disclosed is a can end with an improved opening and drinking convenience. The can end includes a body having an opening piece defined in a predetermined region of an upper surface thereof by scores, and a tab coupled to the body by means of a rivet. The tab has a first end located at one side of the rivet to form a grip portion, and a second end located at the other side of the rivet to form a pressure portion for pressing the opening piece. The scores include a center score formed at the center of the opening piece and having a center axis extending in the same direction as an extending direction of the tab, a first boundary score continuously extended symmetrically left and right from a first end of the center score adjacent to the rivet, and a second boundary score having a drinking line portion continuously extended symmetrically left and right from a second end of the center score opposite to the rivet, and lengthened line portions extended downward from both ends of the drinking line portion to the vicinity of both ends of the first boundary score. The first and second boundary scores divide the opening piece from the remaining region of the upper surface of the body. At least a region between the first boundary score and the second boundary score forms a stay portion.
[FIG. 3B]

[FIG. 4]
CAN END WITH IMPROVED OPENABILITY AND DRINKABILITY

BACKGROUND OF THE INVENTION

[0001] Field of the Invention

[0002] The present invention relates to a can end having a score cutting tab, and more particularly, to a can end in which a score, defining an opening piece, is designed to improve opening and drinking conveniences of the can end.

[0003] Description of the Related Art

[0004] FIG. 1A is a perspective view illustrating a conventional beverage can, and FIG. 1B is a plan view illustrating a can end having a score cutting tab as shown in FIG. 1. The conventional can end 100 is known as a so-called “push open type can cover” developed for the sake of an easy opening feature, and is made of an aluminum or steel material. The push open type can cover 100 includes an approximately circular continuous score 310 formed at a predetermined region of an upper surface of the can cover 100. The score 310 is a line previously carved on the can cover 100, and divides an opening piece 300 from the remaining region of the upper surface of the can cover 100. To press a part of the opening piece 300, the can end 100 further includes opening means, such as a so-called “stay-on-tab” 500. The stay-on-tab 500 is coupled to the upper surface of the can cover 100 at a position adjacent to the opening piece 300 by means of a rivet 700. The periphery of the can cover 100 is mechanically engaged with an end of a beverage can body 200.

[0005] Conventionally, beverage cans have requirements of pressure-resistance and pressure-reducing properties. Also, the beverage cans have a water hammer phenomenon in that contents inside the beverage can rise quickly to thereby push the can cover. Therefore, to prevent the score, which is a weak portion of the can cover, from being unintentionally cut by the water hammer phenomenon and causing a sudden unwanted opening of the beverage can, the above described push open type can cover for use in the beverage cans generally has a need for a score processing for providing the score with a predetermined or more thickness suitable to stably endure a pressure variation inside and outside of the beverage can. As a result, to physically cut the score having the predetermined or more thickness for the opening of the beverage can, a predetermined or more external force has to be applied to the score. The external force depends on a force transmitted to a pressure portion of the score cutting tab.

[0006] To open the above described conventional can end 100, if one end of the tab 500, which forms a grip portion 510, is raised upward, the other end of the tab 500, which forms a pressure portion 520, presses the center of the opening piece 300 on the basis of the principle of leverage, and simultaneously, a portion of the tab body 500 coupled with the rivet 700 is raised relative to the pressure portion 520. Thereby, the score 310 begins to cut from the vicinity of the rivet 700, and the score cutting is continuously progressed along the remaining score 310 in a circumferential direction. As the grip portion 510 of the tab 500 is raised upward sufficiently, the opening piece 300 is further lowered into the beverage can, and the score cutting, progressed clockwise along the annular score 310, is completed at a distal end of the score 310 by a stay portion 350 that is an unprocessed portion forming a discontinuous score. In this way, the above described opening procedure is completed. Here, the lowered opening piece 300 is obliquely tilted inside the beverage toward the stay portion 350.

[0007] In the above described conventional can end 100, however, since the score 310 has an approximately annular shape surrounding the opening piece 300, a part of the external force, transmitted from the pressure portion 520 of the tab 500 to the center of the opening piece 300, is inevitably dispersed. This may cause the breakage of a beginning portion of the score 300, or may have a need for an increased amount of external force required for the progress of the score cutting. Therefore, the old and the weak including patients and children have a difficulty to open the beverage can. Furthermore, when an excessive force is applied to the tab, it may result in a damage to the tab 500 or the rivet 700, and consequently, make it impossible to open the beverage can without using a separate tool such as a cutter.

[0008] Moreover, after completion of the above opening procedure, the opening piece 300 is kept in a posture downwardly tilted from a side of an opening into the beverage can as shown in FIG. 1C. Such an orientation of the opening piece 300 may hinder the flow of contents in the course of drinking or discharging the contents, and have a risk of unintentional spill of the contents.

SUMMARY OF THE INVENTION

[0009] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a can end, which can be easily opened even by a low force, and assure stable discharge of contents inside a beverage can without any interference in flow.

[0010] In accordance with the present invention, the above and other objects can be accomplished by the provision of a can end comprising: a body having an opening piece defined in a predetermined region of an upper surface thereof by scores; and a tab coupled to the body by means of a rivet and having a first end located at one side of the rivet to form a grip portion, and a second end located at the other side of the rivet to form a pressure portion for pressing the opening piece, wherein the scores comprise; a center score formed at the center of the opening piece and having a center axis extending in the same direction as an extending direction of the tab; a first boundary score continuously extended symmetrically left and right from a first end of the center score adjacent to the rivet; and a second boundary score having a drinking line portion continuously extended symmetrically left and right from a second end of the center score opposite to the rivet, and lengthened line portions extended downward from both ends of the drinking line portion to the vicinity of both ends of the first boundary score, the second boundary score dividing the opening piece from the remaining region of the upper surface of the body, together with the first boundary score, and wherein at least a region between the first boundary score and the second boundary score forms a stay portion.

[0011] Preferably, the center score has a straight shape, to assure an easy progress of cutting.

[0012] The lengthened line portions of the second boundary score may have a straight shape. In this case, after completion of the opening of a beverage can, the opening piece is kept in a bent state inside the beverage can, rather than being completely separated, at the lengthened line portions thereof, from the upper surface of the can cover body, thereby efficiently guiding the discharge of contents inside the beverage can.

[0013] Alternatively, the lengthened line portions of the second boundary score may have a curved shape. In this case, after completion of the opening of the beverage can, the
opening piece is completely separated, at the lengthened line portions thereof, from the upper surface of the can cover body, thereby achieving an increase in the size of an opening.  

[0014] The drinking line portion of the second boundary score may have a length longer than a horizontal length of the first boundary score. This has the effect of increasing the discharge amount of contents from the opened beverage can.  

[0015] Alternatively, the drinking line portion of the second boundary score may have a length shorter than a horizontal length of the first boundary score, so as to reduce the discharge amount of contents.  

[0016] The stay portion between the first boundary score and the second boundary score may be located in the central region of the opening piece. This reduces a force required for an opening operation and assures a rapid opening of the beverage can.  

[0017] Preferably, the opening piece includes an embossing portion formed at a position adjacent to a contact point of the pressure portion of the tab so as not to interfere with a cutting path of the center score. Theembossing portion reinforces the rigidity of the opening piece, for preventing deformation of the opening piece. This achieves an efficient transmission of an opening pressure transmitted from the pressure portion of the tab.  

ADVANTAGEOUS EFFECTS  

[0018] As apparent from the above description, the present invention provides a can end, which can be easily opened even by a low force, and assure stable discharge of contents inside a beverage can without any interference in flow, resulting in a convenience in use.  

BRIEF DESCRIPTION OF THE DRAWINGS  

[0019] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:  

[0020] FIG. 1A is a perspective view illustrating a conventional metal beverage can;  

[0021] FIG. 1B is a plan view illustrating a can end shown in FIG. 1;  

[0022] FIG. 1C is a sectional view taken along the line A-A of FIG. 1, illustrating an opened state of the can end;  

[0023] FIG. 2 is a plan view illustrating a can end according to an embodiment of the present invention;  

[0024] FIGS. 3A(a) to 3A(c) are plan views illustrating the opening procedure of the can end shown in FIG. 2;  

[0025] FIG. 3B is a sectional view taken along the line B-B of FIG. 3A(c); and  

[0026] FIGS. 4 to 8 are plan views illustrating different embodiments of the can end according to the present invention.  

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS  

[0027] Now, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.  

[0028] FIG. 2 is a plan view illustrating a can end 1 according to an embodiment of the present invention. The can cover 1 includes an approximately flat plate shaped body 10, and a tab 50 fixed to the center of the body 10. In FIG. 2, the tab 50 is shown by a dotted line. Hereinafter, the extending direction of the tab 50 is referred to as a longitudinal or vertical direction, and a direction perpendicular to the extending direction of the tab 50 is referred to as a transverse or horizontal direction.  

[0029] A predetermined region of the body 10 is divided from the remaining region of an upper surface of the can cover 1 by scores 31, 32, and 33, to define an opening piece 30. A dented portion 20 is engraved in the body 10 throughout a region where the opening piece 30 and the tab 50 are formed, to have a long elliptical shape. The dented portion 20 receives the tab 50 therein and provides the body 10 with rigidity during an opening operation.  

[0030] The tab 50 is fixed to the body 10 by means of a rivet 70. One end of the tab 50, located at one side of the rivet 70, forms a grip portion 51 to be gripped by the user's fingers during the opening operation, and the other end of the tab 50, located at the other side of the rivet 70, forms a pressure portion 52 to press the center of the opening piece 30. In this case, it is advantageous that a distal end of the pressure portion 52 is located to press a position on the opening piece 30 at approximately ½ to ⅚ of the longitudinal length of the opening piece 30 from the rivet 70, for the sake of reducing an external force required to open the opening piece 30. The dented portion 20 includes a plurality of protrusions 21 formed on an upper surface thereof where the grip portion 51 of the tab 50 is located. The protrusions 21 support the grip portion 51 to define a space between the grip portion 51 and the upper surface of the dented portion 20.  

[0031] One of features of the present invention is to optimize the design of the scores 31, 32, and 33, provided on the opening piece 30, for reducing the loss of an external force required to open the opening piece 30. The scores 31, 32, and 33 divide the opening piece 30 from the remaining region of the body 10, and have to be cut or bent during the opening operation as will be described hereinafter. For this, the scores 31, 32, and 33 take the form of dimples obtained by pressing using a mold, etc.  

[0032] Specifically, a center score 31 is formed at the center of the opening piece 30 in a longitudinal direction of the opening piece 30. The center score 31 has one end 31a located in the vicinity of the rivet 70 and the other end 31b located adjacent to the periphery of the dented portion 20. To achieve an easy score cutting during the opening operation, in the embodiment as shown in FIG. 2, the center score 31 preferably has a straight shape.  

[0033] The end 31a of the center score 31, located in the vicinity of the rivet 70, is connected to a first boundary score 32. The first boundary score 32 is continuously extended symmetrically from the end 31a of the center score 31 in a horizontal direction of the opening piece 30. The first boundary score 32 constitutes a part of the periphery of the opening piece 30, and acts as an opening beginning portion in the course that the upper surface of the body 10 around the rivet 70 is raised during the opening operation.  

[0034] Preferably, the first boundary score 32 is curved by a gentle curvature corresponding to the circular periphery of the rivet 70 in the vicinity of a position intersecting the end 31a of the center score 31. With this curved shape, when the upper surface of the body 10 around the rivet 70 is raised during the opening operation, a tensile force required to cut the first boundary score 32 is efficiently transmitted to the first boundary score 32, thereby assuring an easy score cutting operation.
In the present embodiment, the first boundary score 32 generally extends in a horizontal direction of the opening piece 30, and both ends 32a of the first boundary score 32 are terminated at the periphery of the opening piece 30. A processing-buffer score 34, which will be described hereinafter in detail, is formed along an inner side of the first boundary score 32 parallel to the first boundary score 32.

The other end 31b of the center score 31 opposite to the rivet 70 is connected to a second boundary score 33. The second boundary score 33 includes a drinking line portion 33c continuously extended symmetrically from the other end 31b of the center score 31 in a horizontal direction of the opening piece 30, and lengthened line portions 33d extended downwardly from both ends of the drinking line portion 33c, such that distal ends 33a thereof are located in the vicinity of the respective ends 32a of the first boundary score 32. Along with the above described first boundary score 32, the second boundary score 33 divides the opening piece 30 from the remaining region of the upper surface of the body 10.

A pair of stay portions 35, which are unprocessed portions forming a discontinuous score, are provided between the ends 32a of the first boundary score 32 and the ends 33a of the second boundary score 33. The stay portions 35 serve to prevent the opening piece 30 from being dropped into a beverage can when the opening piece 30 is separated from the upper surface of the can end 1 after completion of the opening operation of the can end 1.

Similar to the above described dented portion 20, the drinking line portion 33c has approximately the same contour as that of the periphery of the annular can cover body 10, and extends horizontally with a smooth streamlined shape. The center of the drinking line portion 33c intersects the other end 31b, i.e. the node, of the center score 31 in the embodiment as shown in FIG. 2, the drinking line portion 33c of the second boundary score 33 and the first boundary score 32 have approximately the same horizontal length as each other.

In the present embodiment, the lengthened line portions 33d have a straight shape and extend downward from the drinking line portion 33c by a steep slope. With the lengthened line portions 33d, an angle θ defined between an extending direction D33c of the drinking line portion 33c and an extending direction D33d of the lengthened line portions 33d increases during the opening operation, thus restricting the progress of the cutting in the extending direction D33c of the drinking line portion 33c. Therefore, even after the grip portion 51 of the tab 50 is sufficiently raised during the opening operation and the pressure portion 52 is lowered to the maximum extent into the beverage can, the straight lengthened line portions 33d are only bent rather than being cut. In the present embodiment, since the drinking line portion 33c of the second boundary score 33 and the first boundary score 32 have approximately the same horizontal length as each other, the straight center score 31 and the lengthened line portions 33d of the second boundary score 33 are parallel to each other.

Meanwhile, in addition to being formed at the inner side of the first boundary score 32 parallel to the first boundary score 32, the processing buffer score 34 is further formed at both left and right sides of the center score 31 and along an inner side of the second boundary score 33, to extend parallel to the center score 31 and the second boundary score 33. The processing buffer score 34 begins from the respective ends 32a of the first boundary score 32, and extends parallel to the first boundary score 32, the center score 31, and the second boundary score 33, and finally, is terminated at the respective ends 33a of the second boundary score 32. In the course of engraving the first boundary score 32, the center score 31, and the second boundary score 33 in the body 10, the processing buffer score 34 absorbs or reduces the displacement of a material constituting the body 10 of the can cover 1, thereby preventing a rapid change in the texture of the material. Also, since the processing buffer score 34 is not intended to be cut or bent during the opening operation, the processing buffer score 34 preferably has a shallower depth than that of the first boundary score 32, the center score 31, and the second boundary score 33.

Now, the opening procedure of the can end 1 having the above described configuration will be described with reference to FIGS. 3A(a) to 3A(c). If the grip portion 51 of the tab 50 is raised to lower the pressure portion 52 for opening the beverage can, the center of the opening piece 30 is pressed by the pressure portion 52, and simultaneously, a part of the upper surface of the can cover body 10 adjacent to the rivet 70 is raised, thereby applying a tensile force to the first boundary score 32 in a direction substantially perpendicular to the first boundary score 32. When the tensile force exceeds a predetermined limit value, a score cutting begins from the vicinity of the connecting node 31a of the center score 31 and the first boundary score 32 (See FIG. 3A(a)). Continuously, as the grip portion 51 is further raised to further lower the pressure portion 52, the score cutting is progressed vertically along the center score 31, and then, progresses horizontally along the drinking line portion 33c through the node 31b of the center score 31 opposite to the rivet 70. As a result, the opening piece 30 is separated into two symmetrical left and right pieces 33a and 33b on the basis of the center score 31. In a final stage of the opening procedure, the tab 50 is aligned substantially perpendicular to the upper surface of the can cover 1. As a result, the straight lengthened line portions 33d are bent, and the two pieces 33a and 33b of the opening piece 30, which are separated from each other on the basis of the center score 31, are pushed into the beverage can by both side ends of the pressure portion 52 of the tab 50 (See FIG. 3A(c)). The bent two pieces 33a and 33b of the opening piece 30 serve as sidewalls defining the drinking or discharge passage of contents, thereby efficiently guiding the contents toward the center of an opening (See FIG. 3B).

Although the preferred embodiment of the present invention has been disclosed, the scope of the present invention is not limited to the above described embodiment, and various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention.

For example, referring to FIG. 4 illustrating an alternative embodiment of the present invention, in consideration of aesthetic appearance of the opening piece 30 before and after cutting thereof, the center score 31 may have a curved shape, rather than the above described straight shape. In this case, it is preferable to appropriate regulate the radius of curvature of the curved center score 31 within a range having no bad effect on the progress of the score cutting.

In a further alternative embodiment of the present invention as shown in FIG. 5, the second boundary score 33 may have curved lengthened line portions 33d, instead of the straight lengthened line portions 33d, as shown in FIG. 2. With the use of the curved lengthened line portions 33d, an angle θ defined between an extending direction D33c of the drinking line portion 33c and an extending direction D33d of the
curved lengthened line portions 33d is reduced. Therefore, after being progressed along the extending direction D33c of the drinking line portion 33c, the cutting is continuously progressed throughout the curved lengthened line portions 33d, and is ceased at the stay portions 35 provided between the first boundary score 32 and the second boundary score 33. After completion of the above opening procedure, the first boundary score 32 and the second boundary score 33 are completely cut except for the stay portions 35, and the separated two pieces 33a and 33b of the opening piece 30 are bent into the beverage can such that they are supported by the stay portions 35 while being tilted toward the rivet 70. As a result, the opening piece 30 has no risk of interfering the flow of contents such as fluid to be discharged through the opening of the beverage can, thereby achieving an increase in the discharge flow rate of the contents.

In a still further alternative embodiment of the present invention, the horizontal length of the first boundary score 32 and/or the drinking line portion 33c of the second boundary score 33 can be appropriately regulated according to a desired discharge flow rate of contents. Specifically, when the horizontal length of the drinking line portion 33c is longer than the horizontal length of the first boundary score 32 as shown in FIG. 6A, it is possible to increase the discharge flow rate of contents through the opened beverage can. On the other hand, when the horizontal length of the drinking line portion 33c is shorter than the horizontal length of the first boundary score 32 as shown in FIG. 6B, it is possible to decrease the discharge flow rate of contents through the opened beverage can. This is helpful to assure safe and comfortable drinking of contents by the old and the weak including patients and children.

In another alternative embodiment of the present invention, the stay portion 35 may be provided in the central region of the opening piece 30. In this case, as shown in FIG. 7, the first boundary score 32 may include a horizontal line portion 32c and lengthened line portions 32d extending upward from both ends of the horizontal line portion 32c toward both ends 33a of the second boundary score 33. In the above described embodiment of FIG. 2, the time spent upon the opening procedure fully depends on the time required for the cutting of the second boundary score 33, and thus, is relatively long. On the other hand, in the embodiment of FIG. 7, since the lengthened line portions 33d of the second boundary score 33 have a reduced length, the time required for the progress of cutting can be reduced. In this case, the shape of the lengthened line portions 32d of the first boundary score 32 and whether or not the lengthened line portions 32d will be cut can be controlled in the same manner as those of the lengthened line portions 33d of the second boundary score 33 shown in FIG. 2.

Meanwhile, to facilitate an easy cutting or deformation of the scores 31, 32, and 33 during the opening operation, it is important that an external force is efficiently transmitted to the scores 31, 32, and 33 through the pressure portion 52 of the tab 50 without the risk of loss. For this, each of the two pieces 33a and 33b of the opening piece 30 preferably includes a rigidity reinforcement embossing portion 37 around the press position of the opening piece 30, to prevent deformation of the opening piece 30 against a vertical force applied by the pressure portion 52 (See FIG. 8). In this case, the embossing portion 37 is positioned so as not to interfere the cutting path of the center score 31.

As apparent from the above description, the present invention provides a can end, which can be easily opened even by a low force, and assure stable discharge of contents inside a beverage can without any interference in flow, resulting in a convenience in use.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A can end comprising: a body having an opening piece defined in a predetermined region of an upper surface thereof by scores; and a tab coupled to the body by means of a rivet and having a first end located at one side of the rivet to form a grip portion, and a second end located at the other side of the rivet to form a pressure portion for pressing the opening piece, wherein the scores comprise:
   - a center score formed at the center of the opening piece and having a center axis extending in the same direction as an extending direction of the tab;
   - a first boundary score continuously extended symmetrically left and right from a first end of the center score adjacent to the rivet; and
   - a second boundary score having a drinking line portion continuously extended symmetrically left and right from a second end of the center score opposite to the rivet, and lengthened line portions extended downward from both ends of the drinking line portion to the vicinity of both ends of the first boundary score, the second boundary score dividing the opening piece from the remaining region of the upper surface of the body, together with the first boundary score, and wherein at least a region between the first boundary score and the second boundary score forms a stay portion.
2. The can end according to claim 1, wherein the center score has a straight shape.
3. The can end according to claim 1, wherein the lengthened line portions of the second boundary score have a straight shape.
4. The can end according to claim 1, wherein the lengthened line portions of the second boundary score have a curved shape.
5. The can end according to claim 1, wherein the drinking line portion of the second boundary score has a length longer than a horizontal length of the first boundary score.
6. The can end according to claim 1, wherein the drinking line portion of the second boundary score has a length shorter than a horizontal length of the first boundary score.
7. The can end according to claim 1, wherein the stay portion between the first boundary score and the second boundary score is located in the central region of the opening piece.
8. The can end according to claim 1, wherein the opening piece includes an embossing portion formed at a position adjacent to a contact point of the pressure portion of the tab so as not to interfere a cutting path of the center score.

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