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CONTAINER WITH NARROW TEARING STRIP

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Fig. 1

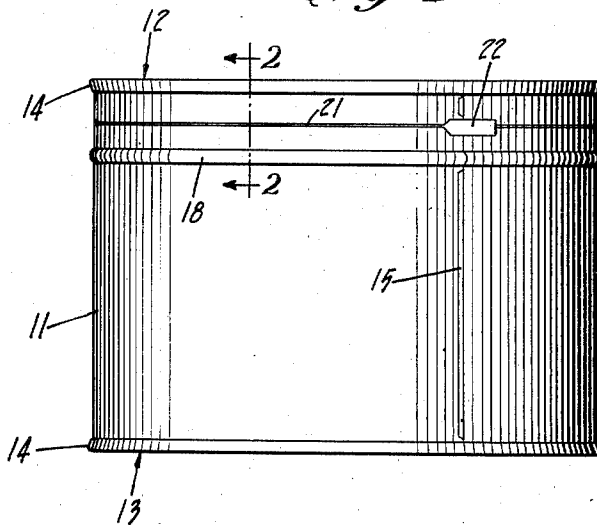


Fig. 2

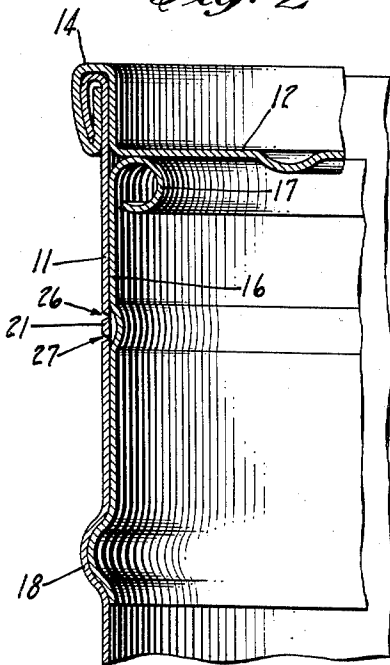


Fig. 3

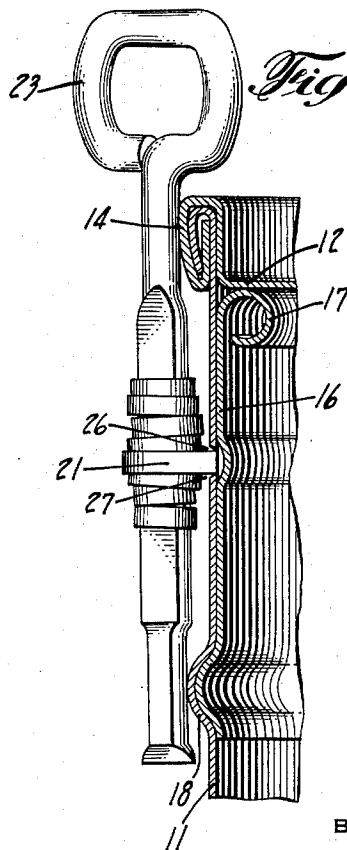
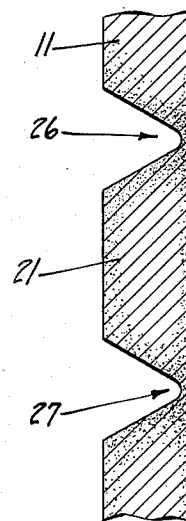


Fig. 4.



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CONTAINER WITH NARROW TEARING STRIP

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1 Claim. (Cl. 220—54)

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The present invention relates to cans or containers of the type which are opened by the removal of a tearing strip formed in a wall of the container and has particular reference to a narrow removable tearing section of wire form integral with a wall of the container and readily windable in a helix or irregular manner upon an opening key for tearing the section out of the wall.

In the manufacture of sheet metal containers made of tin plate and the like material and of the type embodying an integral tearing strip in the body wall of the container, considerable material is allotted to the width of the usual tearing strip in order to provide a strip which will remain in one piece and tear out properly. Such a tearing strip adds considerably to the cost of materials in making the container. Such a strip also requires considerable force to tear it out of the container wall. This force increases steadily as the wound layers of the strip build up on the key into a roll of greatly increased proportions.

In some cases attempts have been made to overcome these difficulties by the use of a separate wire arranged in the container in such a manner that it will tear the container wall when the wire is pulled or wound upon an opening key. Such a wire makes a rough, jagged tear line, which is undesirable and in most cases is a hazard in that it is liable to inflict injury upon the consumer.

The instant invention contemplates overcoming these difficulties by providing as an integral part of the container a tearing section of such narrow dimensions as to approach wire form which is easily removed.

An object of the invention is the provision in a wall of a container made of tin plate or the like material, of a narrow removable tearing section which because of its predetermined thickness and width approaches wire form, wherein the tearing section will tear with little effort and will wind up on an opening key in helical manner conveniently spreading longitudinally of the key in the form of a wire or thread and thereby maintaining a minimized pulling leverage relative to the key so that the force required to turn the key while removing the tearing section is reduced to a minimum.

Another object is the provision of such a tearing section wherein the tearing section is hardened by cold working of the metal, resulting in an increase in tensile strength beyond that of the container wall thus facilitating easy tearing of the section from the wall.

Another object is the provision of such a tearing section wherein the hardness of the section is graduated from its tearing edges toward its middle, leaving a soft core and thus forming a

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flexible and pliant section which is readily wound without fracture upon an opening key in any convenient manner.

Still another object of the invention is the provision of such a tearing section which combines strength and pliability with a minimum quantity of metal in its makeup thus permitting considerable saving of sheet material in the manufacture of the container.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side view of a container having a removable tearing section embodying the instant invention;

Fig. 2 is a greatly enlarged sectional view taken substantially along the line 2—2 in Fig. 1;

Fig. 3 is a view similar to Fig. 2 showing the container being opened by use of an opening key for removing the tearing section; and

Fig. 4 is a greatly enlarged portion of the container wall including the tearing section.

As a preferred embodiment of the instant invention the drawings illustrate a sheet metal container made of tin plate or the like material, the container comprising a tubular body 11 (Fig. 1) and top and bottom end members 12, 13 secured thereto in a suitable joint 14, such as for example, the well known double seam formed by an interfolding of flange parts provided on the body and on the end members. The side edges of the body are joined in a lock and lap side seam 15.

The upper end of the container, usually carries an internal collar band 16 (Fig. 2) which fits snugly in place against the inside surface of the body 11. The upper edge of the band terminates in an inwardly bent edge curl 17 which preferably engages against the inner surface of the top end member 12. The lower edge of the band is secured in an outwardly extending bead 18 formed in the body 11 and disposed in spaced relation to the end seam 14 of the top end member.

Intermediate the top end seam 14 and the bead 18, the container body 11 is formed with a narrow removable tearing section 21 (Figs. 1 and 2) which encircles the body and which preferably is of the same thickness as the body wall. The ends of the tearing section terminate at the body side seam 15. One end of the tearing section is formed with a slightly wider tongue 22 which extends beyond the body side seam and which is adapted to be engaged by an opening key 23 (Fig. 3) in the usual manner for opening the container by tearing the section 21 out of the container body.

The tearing section 21 is defined and set off

in the container body 11 by a pair of closely spaced and parallel score lines 26, 27 formed in the body and along which the body is torn when the tearing section is removed by the opening key 23. These score lines are formed in the body preferably by scoring rollers which compress and displace the metal of the body and thereby form grooves comprising the score lines which extend into the body for slightly more than half its thickness (see Fig. 4).

The score lines 26, 27 completely encircle the body. One end of each of the score lines terminates adjacent the seam edge of the body. The other end of each of the score lines flares outwardly adjacent the side seam edge of the body and merges into the enlarged tongue 22. The usual notches in this edge of the body are provided adjacent the tongue. This flaring of the score lines and their merging into the tongue facilitates starting of the tearing action when removing the tearing section 21 from the body and provides for a tongue of substantial dimensions for withstanding handling during the can body forming operations.

The spacing of the score lines is such as to set off a tearing section having a width and a thickness defining a cross-sectional area approaching wire form. In the usual tin plate, ranging from 0.0075 inch to 0.0125 inch in thickness it has been found that the maximum spacing of the score lines of the present invention should not exceed 0.062 inch (one sixteenth of an inch) or from five to six times the thickness of the plate. Good results have been obtained with a spacing of 0.038 inch but a preferable spacing is 0.042 inch.

Such a narrow tearing section in a container body approaches a mere thread or wire form which has revealed advantages which greatly exceed all expectations and produce some unusual results. No one, up to the time of the present invention has apparently dared to use or discovered how to make and condition such a narrow tearing strip for practical use. The narrowest tearing strip now in commercial use is about three times as wide as the aforementioned maximum. Most of them are even wider. Due to its wire form, the narrow tearing section of the present invention tears easily from the body wall and winds up readily on the opening key in a helical or irregular fashion, spreading out longitudinally along the key, as best shown in Fig. 3. This prevents any material building up of the tearing section on the key as compared with the usual building up into a comparatively large diameter spiral form roll when the conventional wide strip is used. This helical convenient distribution of the wire form tearing section along the length of the key keeps constant the required power leverage with respect to the key at a minimum and thus maintains the force required to turn the key. Such a force is comparatively small and is well within a comfortable range of the average housewife.

In the formation of the score lines 26, 27, as disclosed in Fig. 4, the metal of the body wall at the bottom of the groove is highly compressed as mentioned above. The compression of the metal greatly hardens it and thereby sets off hardened zones which are brittle and which tear easily when the tearing section is wound upon the key.

In providing such a narrow, wire form tearing section, factors other than those of ease in tearing the section out, must be considered. One of these factors is the greatly reduced tensile strength of such a wire form section as compared with the usual wide tearing strip. As for example,

for a material of 0.011 inch thick having a tensile strength per square inch of 57,600 pounds, a tearing strip three sixteenths of an inch wide has an actual tensile strength; i. e. a strength equal to break it by pulling it apart, of 118.48 pounds whereas a wire form tearing section of 0.038 inch in width will break at a mere 24.08 pounds. It is therefore desirable to increase the actual tensile strength of the wire form tearing section, and this is effected in the instant invention by accurately hardening portions of the section to a degree which strengthens it but which is below that which makes the section brittle so that the strength of the section will be well within factors of safety required for rough handling by consumers.

Another factor is that of bending strength. In removing a conventional wide tearing strip from the container by the use of an opening key, the strip winds up spirally into a roll on the key and thus tears from the container in an easy curve which in no manner strains the strip so that it breaks. In the wire form tearing section, the very narrowness of the section permits of easy bending and hence as it is wound upon a key, a substantially right angle sharp bend in the section is produced at the point of tear as compared with the long curve of the conventional wide strip. This sharp bend acts in the same manner as in bending a metal strap at right angles and tends to crystallize the metal and weaken it to a point of breaking. Especially is this so where the metal has been or is partially hardened. In the instant invention this difficulty is overcome by leaving a soft core in the section. This core renders the section flexible and pliant and is thus resistant to breaking by sharply bending the section.

Still another factor is that of twisting strength. It has been found that under very unusual circumstances a wire form tearing section as it spreads along the key during its removal may slip off the free end of the key and this results in a twisted kink in the section. With a conventional tearing section such a twisted kink usually results in a break or a tearing across the section. However with the reenforced tearing section of the instant invention, such a twisted kink is of no concern. Removal of the section may be continued without any break by a mere redirecting of the section back onto the key.

This strengthening or reenforcing of the wire form tearing section is brought about by the partial hardening of the section below the brittle stage. This partial hardening of the section graduates from the high degree of brittle hardness along the walls of the score lines as shown by the stippled portions in Fig. 4 to a soft tough core at the middle of the section. It is this partial graduated hardness that increases the actual tensile strength of the section while it simultaneously retains its flexibility and pliancy against breakage during bending and twisting. Thus a strong wire form tearing section results, giving the unexpected advantages above listed in a container of the character contemplated, while being easily torn from its place in the container without fracture or breakage.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the

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invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

A sheet metal container made of comparatively light gauge tin plate or like material, comprising a container wall having a thickness of from 0.0075 to 0.0125 of an inch and having a pair of substantially V-shaped score lines cut therein and spaced apart a distance not to exceed 0.0625 of an inch, said cut score lines defining between them an extremely narrow removable tearing strip of wire-like dimensions having a zone of compressed and retempered metal at the base of each score line and at the surfaces of said strip, said strip having hardened surfaces of increased tensile strength at and extending slightly inwardly of its surfaces resulting from compression of metal during the score cutting operation, said hardened surfaces extending inwardly in

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gradually lessening degrees of graduated hardness to a non-compressed soft central core in the tearing strip, said soft central core preserving the flexibility of said strip to facilitate easy tearing of the strip from the container wall without breaking of the strip.

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