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CONTAINER SEAM AND METHOD OF MAKING SAME

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*Fig. 1*

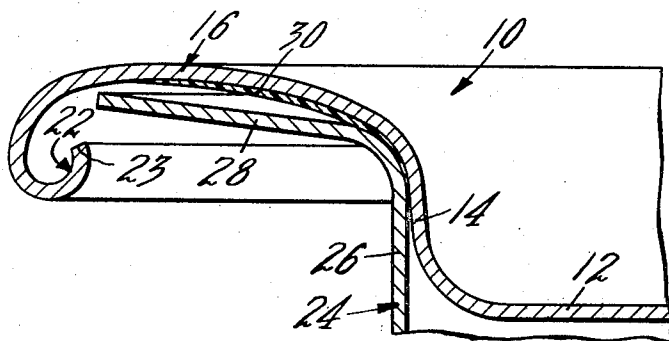


*Fig. 2*

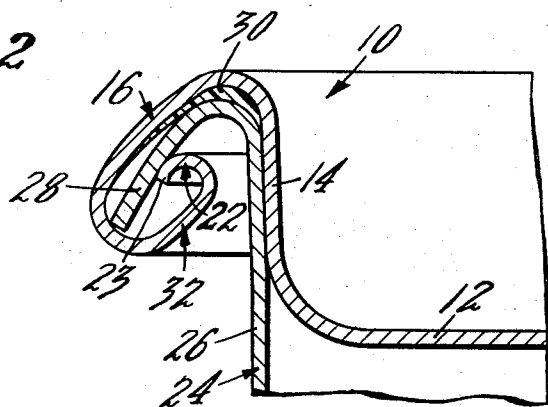
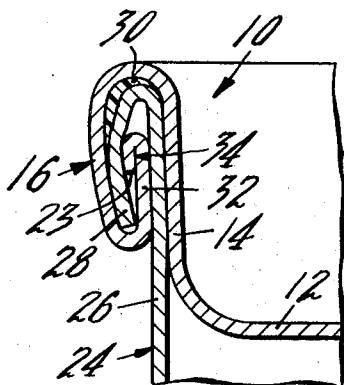


*Fig. 3*



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## CONTAINER SEAM AND METHOD OF MAKING SAME

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### ABSTRACT OF THE DISCLOSURE

A container having a can body and end closure of light-weight sheet metal has an end seam wherein the end portion of the end closure flange is provided with a closed hem disposed between the body flange and the adjacent portion of the body to provide a seam which can be formed without wrinkles, folds, corrugations, or other deformities

The present invention relates generally to improved double seams and more particularly to a method of double seaming an end formed of thin tinplate of high hardness and low ductility onto a can body.

In attempting to form double seams between a can body and a conventionally configured end closure formed of lightweight sheet metal of relatively high hardness and low ductility, such as 60 lb., 2CR tinplate, it has been found that deformities such as wrinkles, folds or corrugations, are formed in the flange of the end closure during the first seaming operation because of a diameter reduction effected in the closure flange by the first operation double seaming rolls. These deformities not only result in unsightly double seams, but also break the continuity of the seam and in some instances even result in perforation of the can body during the double seaming operation, and thus often prevent the formation of a tight, hermetic seal between the can end and can body.

This problem has been solved by providing the marginal portion of the end closure flange with a tight, hollow, inward curl which serves to reinforce or stiffen the marginal portion of the flange and thus prevents the formation of the undesirable deformities in the flange during the seaming operation. The curl is so construed as to enable it to be collapsed into a closed hem during the second seaming operation in order to permit the formation of a tight, solid double seam. As a result, it has been possible for the first time to utilize lightweight 2CR plate for commercially acceptable double seamed can ends.

It is an object of the present invention, therefore, to provide a can end made of thin sheet metal having a flange configuration which is designed to prevent wrinkling of the flange when the flange is reshaped during a seam forming operation.

Another object is to provide such a can end which is made of thin tinplate of relatively high hardness and low ductility.

Yet another object is the provision of such a can end which is designed to be attached to a can body in conventionally known seams, such as double seams, which are free of pin lips or other irregularities in the seam caused by wrinkled end flanges.

A still further object of the present invention is to provide a tight, hermetic double seam and method of making the same for a container formed of a thin, lightweight sheet metal.

Another object is to provide an improved method of making a double seam between two members formed of lightweight sheet metal, which method prevents the formation of wrinkles in the members during the seaming operation.

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A further object is the provision of such a method for forming a double seam between a can body and an end closure wherein the marginal portion of the end closure is reinforced to prevent it from wrinkling when it is curled and reduced in size during the seaming operation.

Still another object is to provide an improved double seam between a can body and an end closure formed of thin, lightweight sheet metal, which seam is so constructed as to be of sufficient thickness to allow easy gripping thereof by an opening tool.

A still further object is the provision of such an improved double seam wherein an additional thickness of metal is provided in the seam to make it sufficiently wide for easy gripping by an opening tool.

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 drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

FIGURE 1 is a fragmentary elevational view in section of a can body and an end closure positioned thereon prior to a double seaming operation, the marginal portion of the end closure flange being provided with a relatively tight curl in accordance with the principles of the instant invention;

FIG. 2 is a view similar to FIG. 1, showing the relative positions of the can body flange and the end closure flange after a first double seaming operation; and

FIG. 3 is a view similar to FIG. 2 showing the relative positions of the can body flange and the end closure flange after the second and final double seaming operation, in which the tight curl on the marginal portion of the end closure flange is reformed into a closed hem.

As a preferred or exemplary embodiment of the instant invention, FIG. 1 illustrates a can end closure 10 which is formed of thin tinplate known to the trade as 2CR tinplate. In making such plate, the steel base is cold rolled to a heavy gauge, annealed, electroplated with about double the finally desired thickness of tin and then given a heavy cold reduction of about 50% to its finally desired thickness, whereby both the steel and tin coating are reduced proportionately in thickness. The resulting tinplate has high hardness, high yield and tensile strength, no yield point or yield elongation, high directionality and low ductility, and is much more difficult to work than is conventional tinplate. The weight of such 2CR plate ranges downwardly from 100 lbs. per base box and its hardness ranges from about 70 to 83 "tinplate" Rockwell 30T. The instant invention is particularly useful in conjunction with can ends made from such stock in weights of 60 lbs. per base box (known in the trade as 60 lbs. 2CR plate) and under, since it has heretofore been impractical to double seam ends made from such stock without unacceptable wrinkling of the end flanges.

While the instant invention is particularly applicable for use with such 2CR plate, it will be realized that it is not necessarily limited for use with this type of stock, and that it can be used with advantage with other types of thin, hard stock wherein wrinkling of the can end flanges is encountered during the double seaming operations.

The end closure 10 generally comprises a flat countersunk central panel 12 which merges at its outer end with a generally upwardly extending countersink wall 14 which in turn merges at its upper end with a generally outwardly extending, curved flange 16 that terminates at its outer end in a relatively tight, downwardly, inwardly and upwardly extending open curl 22 having, for example, a radius of curvature of approximately .038 inch (see FIG. 3) and having its raw edge 23 facing in a generally upward direction. The tight curl 22 may be formed in the

flange 16 by any suitable or conventional apparatus, such as curling wheels and segments (not shown).

When the can end 10 is to be seamed onto a can body 24, the central panel 12 and countersink wall 14 of the end closure 10 are positioned within one end of the can body 24, which may be formed of a sheet metal similar to or the same as that from which the end closure 10 is formed, or may be formed of any other suitable material. The can body 24 comprises a side wall 26 which merges at one end thereof with a generally outwardly extending flange 28 (see FIG. 1). It is noted that at any time prior to the positioning of the end closure 10 over one end of the can body 24, the undersurface of the end closure flange 16 may be coated with a layer of a compressible sealing compound 30, such as a conventional latex-based material or a foamed plastisol, in order to provide a hermetic seam between the end closure 10 and the can body 24.

Referring now to FIG. 2, the end closure flange 16 and the can body flange 28 are initially formed into a loose, first operation double seam in a first seaming operation which is accomplished by any suitable apparatus, such as suitably contoured seaming rolls (not shown). Such rolls are conventional and are of the type generally disclosed in the United States Letters Patent 1,699,069. In this first operation double seam, the body flange 28 is rolled downwardly and inwardly toward the body wall 26 and the end closure flange 16 is rolled downwardly around the end of the body flange 28 and then upwardly into a hook portion 32 which is disposed between the body flange and the body side wall 26. The tight curl 22 in the end closure flange 16 thus is disposed between the hook portion 32 and the body flange 28, and now has its raw edge 23 facing downwardly and in outwardly spaced relationship to the hook portion 32.

It is noted that the formation of the tight curl 22 in the end closure flange 16 serves to reinforce and strengthen the end portion thereof, and thus serves to prevent wrinkling, corrugating or other undesirable non-uniform deformation of the end closure flange 16 during the formation of the first operation double seam (FIG. 2) between the can body 24 and the end closure 10. This reinforcement of the end portion of the closure flange 16 is vital to the successful formation of a commercially acceptable seam embodying lightweight 2CR plate ends, since without such reinforcement, it has been found that this first seam forming operation results in the formation of wrinkles or other deformities in the end closure flange owing to the size reduction thereof during the double seaming operation, and these deformities in turn result in various types of seam malformations, such as pin lips and/or perforation of the can body 24.

As shown in FIG. 3, the first operation double seam of FIG. 2 subsequently is compressed into a completed, tight double seam by any suitable apparatus, such as a final seaming roll (not shown) of the type disclosed in the aforementioned United States Patent 1,699,069, in a second seam forming operation. In the completed double seam, the tight curl 22 of the end closure flange 16 is collapsed or reformed into a closed hem 34 which is disposed outwardly of the hook portion 32 of the end closure flange 16. The closed hem 34 is disposed between and in tight engagement with the can body flange 28 and the hook portion 32, and has its raw edge 23 facing downwardly.

As a further advantage to the formation of a tight seam, the hem 34 serves to add an additional thickness of metal to the width of the completed double seam, and thus insures that the completed double seam between the end closure 10 and can body 24 of thin sheet metal will be of sufficient width so as to be more easily engageable by an opening tool to facilitate opening of the finished can.

It is obvious that the instant double seam and method of making the same could be utilized in forming a seam between any type of articles made of thin sheet metal, without departing from the spirit and scope of the instant invention.

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

What is claimed is:

1. A container comprising a body and an end closure of tinplate having a weight of not more than about 100 pounds per base box and a hardness from about 70 to 83 Rockwell 30T, secured to said body in a double seam, said body extending reversely back on itself to form an outwardly disposed end flange, said closure having a peripheral flange extending outwardly of said body flange and then inwardly around the end portion thereof, said end closure flange terminating in a hook portion having the end thereof formed into an outwardly extending narrow closed hem which is disposed between said body flange and the adjacent portion of said body.

2. The container of claim 1 wherein said hem is disposed in engagement with said body flange.

3. A container comprising a thin sheet metal body and a thin sheet metal end closure secured to said body in a double seam, said body extending reversely back on itself to form an outwardly disposed end flange, said closure having a countersink wall disposed within an end of said body and a peripheral flange extending outwardly from said countersink wall and over said body flange, said end closure flange being bent inwardly around the end portion of said body flange and terminating in a hook portion having the end thereof formed into an outwardly extending narrow closed hem which is disposed between said body flange and the adjacent portion of said body.

4. The container of claim 3 wherein a layer of sealing material is disposed between said body and said end closure flanges to provide a hermetic seam therebetween.

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