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Rentmeester

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[54] **METHOD AND APPARATUS FOR FORMING CREASE ON BLANK OF LAP SIDE SEAM TUBULAR BODY**

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[51] **Int. Cl.** **B21d 51/26**

[58] **Field of Search** ..... 113/7 R, 7 A, 12, 113/8, 11, 120 R, 120 F, 120 K, 120 V, 120 Y; 156/231; 220/75; 29/482; 156/217, 218

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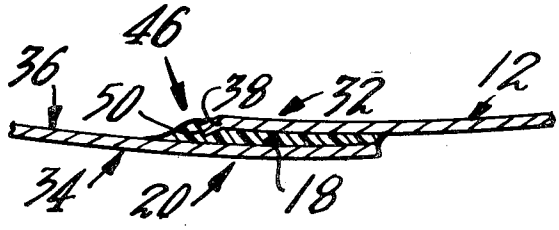
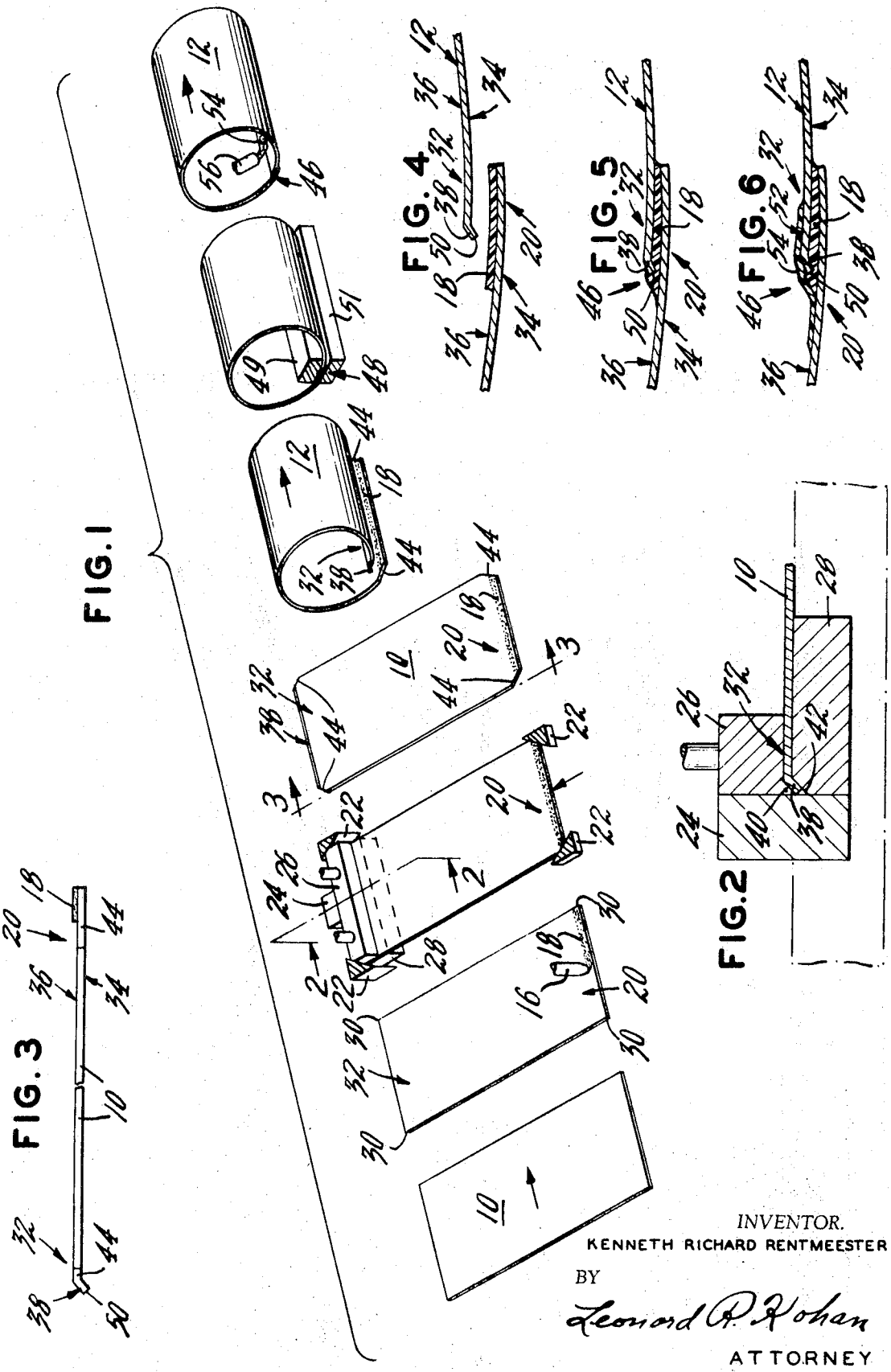
[57] **ABSTRACT**

The raw metal edge on the inside lap in an adhesively-bonded lap side seam of a tubular body is protected from chemical attack by a corrosive substance from within the tubular body by applying a side seam adhesive along one marginal edge portion of the body blank, bending the other parallel marginal edge portion of the blank to form a crease thereon, rolling the blank into tubular form to place the adhesively-coated marginal edge portion and the creased marginal edge portion in an overlapping, facing position, and imbedding the creased marginal edge portion into a portion of the adhesive on the one marginal edge portion to bury the raw metal edge, the imbedding being achieved by compressing the overlapped marginal edge portions together to assemble the lap side seam of the tubular body.

7 Claims, 6 Drawing Figures





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METHOD AND APPARATUS FOR FORMING CREASE ON BLANK OF LAP SIDE SEAM TUBULAR BODY

BACKGROUND OF THE INVENTION

The present invention relates to tubular bodies formed with a longitudinally extending adhesively-bonded lap side seam and more particularly is concerned with the construction of the adhesively-bonded lap side seam.

In the formation of a lap side seam, the overlapped marginal edges usually terminate in a raw metal edge. The outer surface of the tubular body may be readily protected against various forms of chemical attack by the application over this surface, including the raw metal edge on the outside lap, of some sort of protective coatings.

However, it has been found to be exceedingly difficult to adequately protect and cover the raw metal edge on the inside lap by means heretofore known to the prior art. This is the case, for example, where the tubular body is a container in which it is desired to package a particularly corrosive substance, such as a carbonated beverage.

Accordingly, the present invention is concerned with a novel construction of the adhesively-bonded lap side seam wherein the inside lap has a crease running the entire length of the body blank, which crease is imbedded into the side seam adhesive on the opposite surface of the outside lap.

The purpose, therefore, for creasing or bending the inside lap edge portion of the body blank is so that during the subsequent tubular body forming operations the raw metal edge on the inside lap will be more easily and effectively buried and covered with the side seam adhesive and, further, the side seam stripe and topcoat.

The advantage or benefit to be gained by covering the raw metal edge on the inside lap is the protection of the raw metal edge from chemical attack by a corrosive substance within the tubular body. Particularly, with regard to containers for packaging carbonated beverages, the advantage in burying the raw metal edge on the inside lap into the side seam adhesive is in the substantial reduction of iron pickup by a corrosive carbonated beverage which will ultimately be packaged within the container.

Even though the present invention has particular importance with regard to tubular bodies used as containers for carbonated beverages, the invention also has been found useful in connection with other uses for lap side seam tubular bodies, such as telephone cables, where certain materials within the cable may chemically attack any exposed raw metal surfaces inside the cable.

SUMMARY OF THE PRESENT INVENTION

The present invention relates to a method and apparatus for providing a crease on the inside lap in an adhesively-bonded lap side seam of a tubular body and the particular construction of the lap seam which includes the crease on the inside lap as a part thereof. As a novel way of protecting the raw metal edge on the inside lap from chemical attack by corrosive materials within the tubular body, the marginal edge portion of the inside lap is creased when the tubular body is in blank form, then the creased marginal edge portion is overlapped by an adhesively-coated opposite marginal edge portion and buried into the adhesive when the lap side seam of the tubular body is assembled, assembly of the lap side seam being effected by compressing the overlapped marginal edge portions together. Also, provision of the buried creased marginal edge portion allows for more effective coverage of the inside lap side seam area by a side seam stripe.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view in perspective illustrating the method and apparatus of the present invention;

FIG. 2 is an enlarged fragmentary sectional view taken substantially along lines 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary side elevational view taken substantially along line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary sectional view of the overlapped marginal edge portions before the adhesively-bonded lap side seam is formed;

FIG. 5 is an enlarged fragmentary sectional view of the adhesively-bonded lap side seam having the crease on the inside lap; and

FIG. 6 is an enlarged fragmentary sectional view of the adhesively-bonded lap side seam having the crease on the inside lap and a side seam stripe on the inside lap side seam surface area.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As a preferred or exemplary embodiment of the instant invention, FIG. 1 shows a sequence of operations for forming a substantially rectangular body blank, generally designated **10**, into an open ended tubular body, generally designated **12**, wherein such sequence of operations, novel steps provide a new lap side seam construction for the tubular body **12**. The term tubular as used herein is meant to denote an elliptical, rectangular or polygonal cross sectional shape as well as circular.

In the usual manner of fabricating tubular bodies having adhesively-bonded lap side seams, an organic cement or adhesive is extruded or otherwise, in a suitable manner, deposited on one marginal edge portion of a body blank. A detailed disclosure of one such suitable process for preparing body blanks with an adhesive on one marginal edge portion thereof is more particularly set forth in U.S. Pat. No. 3,481,809 which issued Dec. 2, 1969, which process may be used in conjunction with the present invention. As shown in FIG. **1**, an applicator nozzle **16** deposits a suitable organic cement or adhesive **18** along the full length of one marginal edge portion **20** of the body blank **10**. The side seam adhesive **18**, as applied to blank **10**, extends inwardly from the edge of the marginal portion **10**, i.e. has a width of from seven thirty-seconds to nine thirty-seconds inch and preferably one-fourth inch, and upwardly from the marginal portion **20**, i.e. has a thickness of from 0.003 to 0.006 inch and preferably from 0.004 inch to 0.005 inch.

The body blank **10** with the side seam adhesive **18** on one marginal edge portion **20** thereof is then positioned by a suitable means, such as a conveyor as shown in the aforementioned U.S. Pat. No. 3,481,809, within a set of notching dies, generally designated **22**. Between the notching dies **22** on the left hand side of the blank **10**, as shown in FIG. **1**, provision is made for the incorporation of a novel creasing operation. As further shown in FIG. **2**, a gage plate **24** is adjustably positioned adjacent a creasing member **26**, which member **26** is movably

positioned above a notch cut edge member **28.** The blank **10** is moved, in the direction of the arrow on the right hand side of the blank **10** in FIG. **1,** against gage plate **24** in order to properly align the blank **10** for the subsequent notching and creasing operations. The notching operation per se forms no part of the present invention and may be omitted where the concept of the present invention is used in the construction of lap side seam tubular bodies for applications other than for beverage containers, for instance, for telephone cables.

Concurrently with the operation of notching dies **22** which cut off the corner edge portions **30** of the blank **10,** the other marginal edge portion **32** of the blank **10** is bent down by the creasing member **26.** The creasing member **26** bends the marginal edge portion **32** down through an angle within the range of approximately 20° to 45° toward the surface **34** of the blank **10** which is opposite the surface **36** on which the side seam adhesive **18** is applied, to form a crease **38** thereon having a width within the range of approximately 0.015 to 0.060 inch.

The creasing member **26,** as shown in FIG. **2,** which may be actuated with, or independently of, the notching dies **22** by any suitable driving means (not shown), has an angular projection **40** on one edge thereof which contacts the marginal edge portion **32** and bends it down into contact with a groove surface **42** on one edge of the notch cut edge member **28.** The angular profile of projection **40** and groove **42** are selected to give the desired bend angle of the crease **38.**

The blank **10** emerges from the notching and creasing operations, as shown in FIGS. **1** and **3,** having notched corners **44** and the crease **38** formed on the left hand side of the blank **10.**

The blank **10** is then formed into an open ended tubular body **12** by any suitable means, for example, on a high speed, automatic, can bodymaker by wrapping the blank around a mandrel, heating the side seam adhesive to a semi-fluid, tacky condition and compressing the overlapped marginal edge portions into intimate contact with the tacky side seam adhesive. Immediately thereafter the adhesively - bonded lap side seam is chilled to set the adhesive and to secure the lapped marginal edge portions together. Details of a particular bodymaker and other means which may be used for carrying out the above described operations are shown in U.S. Pat. Nos. 1,625,091 which issued on Apr. 17, 1927 and 3,508,507 which issued on Apr. 28, 1970.

As schematically shown in FIG. **1,** the blank **10** is rolled clockwise through a 180° path into the tubular body **12** in order to place the marginal edge portion **32** having the crease **38** thereon and the marginal edge portion **20** having the side seam adhesive **18** thereon in an overlapping, facing position, as shown in greater detail in FIG. **4.** The marginal edge portion **20** now becomes the outside lap **20** and the marginal edge portion **32** now becomes the inside lap **32** of an adhesively - bonded lap side seam, generally designated **46,** which is subsequently formed, as shown in FIGS. **5** and **6.**

Next, compressing means, generally designated **48,** comprised by an upper spline means **49** and a lower hammer means **51,** bring the inside lap **32** having the crease **38** thereon into contact with the side seam adhesive **18** on the surface **36** of the outside lap **20** in order to assemble the lap side seam **46** of the tubular body **12.** Thus, by the operation of the compressing means **48,** the crease **38** on the inside lap **32** becomes imbedded into a portion of the side seam adhesive **18** on the outside lap **20** so as to bury the raw metal edge **50** on the inside lap in the side seam adhesive **18,** as shown in FIG. **5.** The side seam adhesive **18,** after being chilled, has a thickness between the inside and outside laps **32, 20** of approximately 0.003 to 0.004 inch. The thickness of the side seam adhesive **18** between the raw metal edge **50** and the surface **36** of the outside lap **20** is preferably from approximately 0.0005 to 0.001 inch. The thickness of the tubular body wall is approximately 0.006 inch.

The provision of the buried crease **38** on the inside lap **32** in the adhesively-bonded lap side seam **46** further allows for more effected coverage of the inside lap side seam surface, generally designated **52** as shown in FIG. **6,** by a side seam stripe **54** which is applied from an applicator means **56.** The applicator means **56** is aligned with the buried raw metal edge **50** on the inside lap **32** so that the applied side seam stripe **54** is centered on the buried raw metal edge **50** and extends approximately one-fourth inch on either side of the raw metal edge **50** along the inside lap side seam surface **52.**

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 and that changes may be made in the steps of the method described and their order of accomplishment 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 or exemplary embodiment thereof.

I claim:

1. A method of providing a crease on the inside lap in an adhesively-bonded lap side seam of a tubular body, comprising the steps of:

applying a side seam adhesive along one marginal edge portion of a body blank;

bending the other marginal edge portion of the body blank in a single direction to form a crease thereon which points toward the adhesive on the one marginal edge portion when the blank is formed into tubular form;

forming the body blank into tubular form in order to overlap the creased marginal edge portion with the one marginal edge portion so that the creased marginal edge is the inside lap and so that the crease points toward and is proximate to the adhesive on the one marginal edge portion; and

imbedding the creased marginal edge portion into a portion of the side seam adhesive on the one marginal edge portion by compressing the overlapped marginal edge portions together to assemble the lap side seam of the tubular body.

2. A method of providing a crease on the inside lap in an adhesively-bonded lap side seam of a tubular body, comprising the steps of:

applying a side seam adhesive along one marginal edge portion of a body blank;

bending the other marginal edge portion of the body blank in a single direction toward the surface of the body blank which is opposite the surface on which the side seam adhesive is applied, to form a crease thereon;

forming the body blank into tubular form in order to place the other marginal edge portion with the crease thereon and the one marginal edge portion

with the side seam adhesive thereon in a slightly offset overlapping, facing position, said other marginal edge portion forming the inside lap and said crease pointing toward and being proximate to the adhesive on said one marginal edge portion; and

imbedding the other creased marginal edge portion into a portion of the side seam adhesive on the one marginal edge portion by compressing the overlapped, facing marginal edge portions together to assemble the lap side seam of the tubular body.

3. A method of joining the opposed longitudinal marginal edge protions of a body blank to form the longitudinally extending lap side seam of a tubular body and simultaneously therewith protecting the raw metal edge on the inside marginal lap edge portion from chemical attack by a corrosive substance within the tubular body, comprising the steps of:

applying a side seam adhesive along one marginal edge portion of a body blank;

bending the other marginal edge portion of the body blank in a single direction to form a crease thereon;

forming the body blank into tubular form in order to overlap the creased marginal edge portion with the one marginal edge portion; so that the creased marginal edge is the inside lap and so that the crease points toward and is proximate to the adhesive on the one marginal edge portion; and

imbedding the creased marginal edge portion into a portion of the side seam adhesive on the one marginal edge portion by compressing the overlapped marginal edge portions together to assemble the lap side seam of the tubular body; and

applying a side seam stripe to the inside lap side seam surface.

4. A method of protecting the raw metal edge on the inside lap in an adhesively-bonded lap side seam of a tubular body from chemical attack by a corrosive substance with the tubular body, comprising the steps of:

applying a side seam adhesive along one marginal edge portion of a body blank;

bending the other marginal edge portion of the body blank in a a single direction toward the surface of the body blank which is opposite the surface on which the side seam adhesive is applied, to form a crease thereon;

forming the body blank into tubular form in order to place the other marginal edge portion with the crease thereon and the one marginal edge portion with the side seam adhesive thereon in an overlapping, facing position, said other marginal edge portion forming the inside lap and said crease pointing toward and being proximate to the adhesive on said one marginal edge portion; and

imbedding the other creased marginal edge portion into a portion of the side seam adhesive on the one marginal edge portion in order to bury the raw metal edge on the inside lap by compressing the overlapped, facing edge portions together to assemble the lap side seam of the tubular body.

5. A method of reducing metal pickup from the raw metal edge on the inside lap in an adhesively-bonded lap side seam of a container body by a corrosive product to be packaged within the container, comprising the steps of:

applying a side seam adhesive along one marginal edge portion of a body blank;

positioning the body blank in a notching die;

concurrently with the notching of the blank corner portions, bending the other marginal edge portion of the body blank in a single direction toward the surface of the body blank which is opposite the surface on which the side seam adhesive is applied, to form a crease thereon;

forming the body blank into tubular form in order to place the other marginal edge portion with the crease thereon and the one marginal edge portion with the side seam adhesive thereon in a slightly offset overlapping, facing position, said other marginal edge portion forming the inside lap and said crease pointing toward and being proximate to the adhesive on said one marginal edge portion; and

imbedding the other creased marginal edge portion into a portion of the side seam adhesive on the one marginal edge portion in order to bury the raw metal edge on the inside lap by compressing the overlapped, facing marginal edge portions together to assemble the lap side seam of the container body.

6. A method of reducing metal pickup from the raw metal edge on the inside lap in an adhesively-bonded lap side seam of a container body by a corrosive product to be packaged within the container, according to claim **5**, further comprising the step of:

bending the other marginal edge portion of the body blank through an angle within the range of approximately 20° to 45° toward the surface of the body blank which is opposite the surface on which the side seam adhesive is applied, to form a crease thereon having a width within the range of approximately 0.015 to 0.060 inch.

7. A method of reducing metal pickup from the raw metal edge on the inside lap in an adhesively-bonded lap side seam of a container body by a corrosive product to be packaged within the container, according to claim **5**, further comprising the step of:

applying a side seam stripe to the inside lap side seam surface, said stripe being centered on the buried raw metal edge on the inside lap.

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