July 7, 1959 R. G. ATKINSON 2,893,592

CONTAINER WITH IMPROVED SIDE SEAM

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Fig. 2

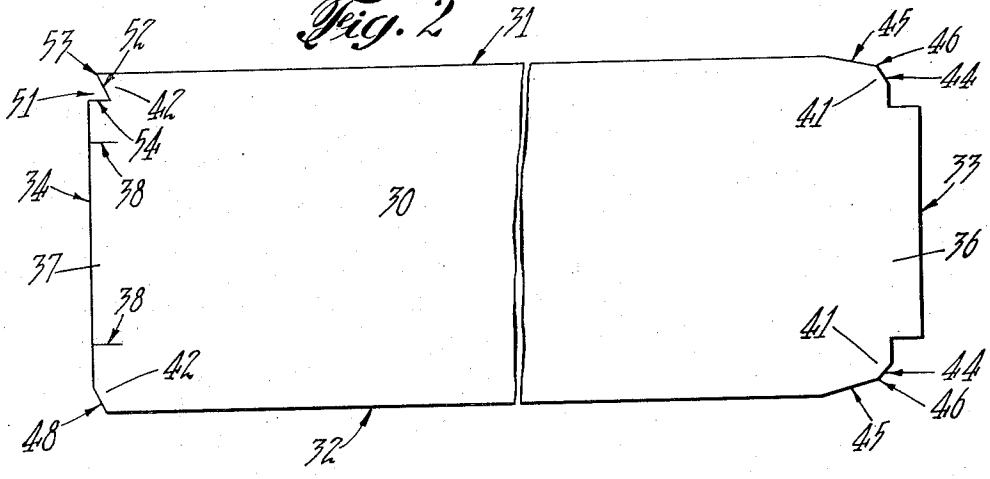


Fig. 5

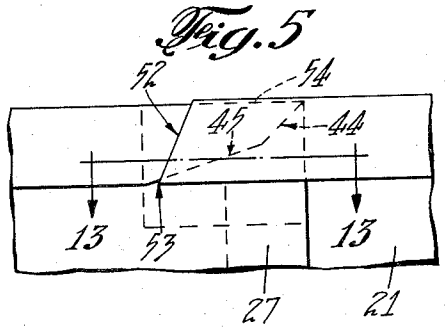


Fig. 4

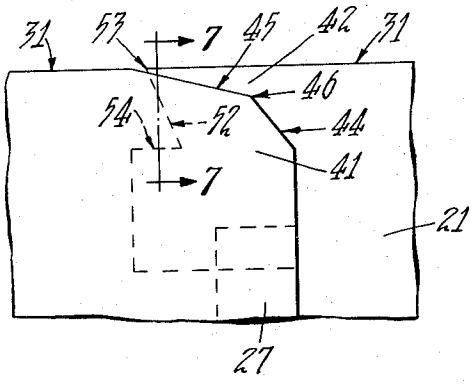


Fig. 1

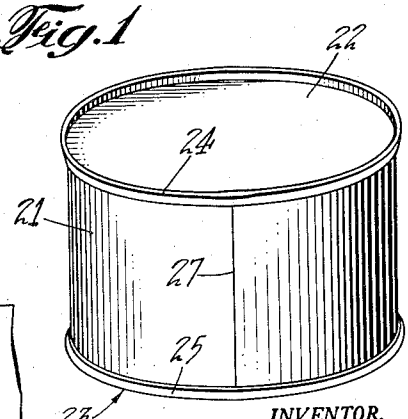
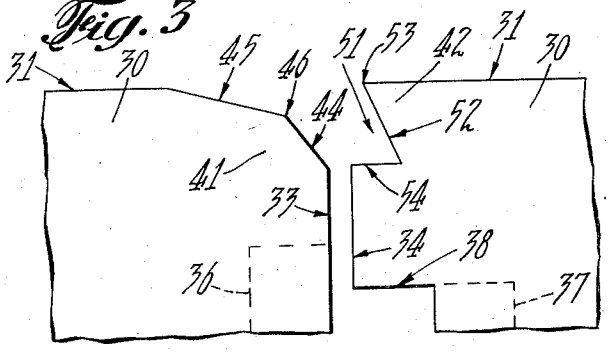


Fig. 3



INVENTOR.
REID G. ATKINSON
BY Charles H. Crane
Leland R. McCann
George W. Reiber
ATTORNEYS

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Fig. 6

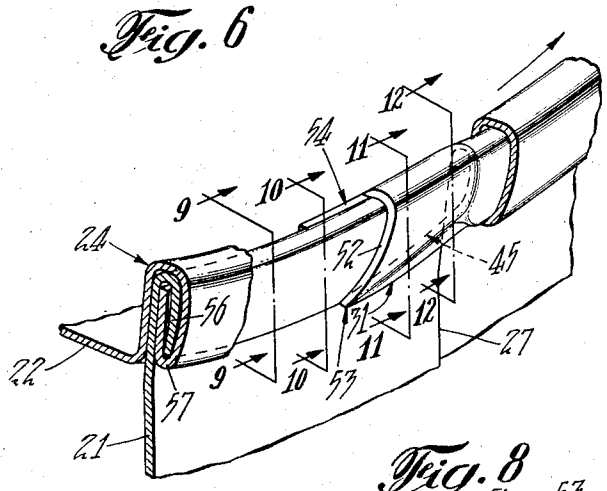


Fig. 7

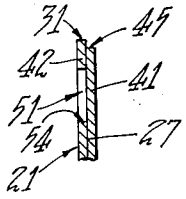


Fig. 8

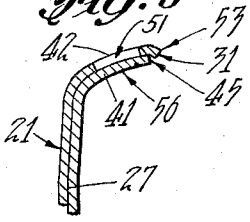


Fig. 11

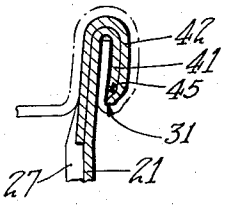


Fig. 9

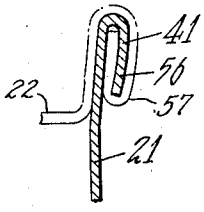


Fig. 10

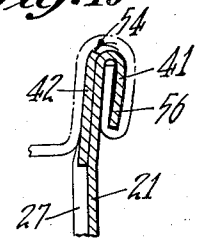
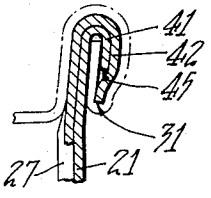


Fig. 12



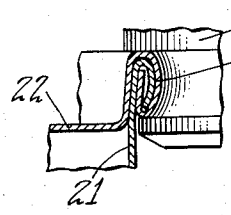


Fig. 14

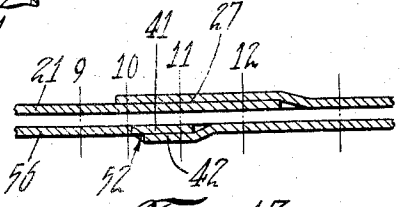


Fig. 13

INVENTOR.
REID G. ATKINSON
BY Charles H. Grove
Leland R. McCann
George W. Reiber
ATTORNEYS

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2,893,592

CONTAINER WITH IMPROVED SIDE SEAM

Reid G. Atkinson, Atherton, Calif., assignor to American Can Company, New York, N.Y., a corporation of New Jersey

Application June 22, 1956, Serial No. 593,077

1 Claim. (Cl. 220—77)

The present invention relates to sheet metal cans or containers adapted to be hermetically sealed and has particular reference to an improved lapped end section of the side seam of the can body for leakproof incorporation into the double end seam which unites the cover to the body.

In the manufacture of cans or containers, the bodies usually are made from flat blanks which are bent into a tubular form with their side edges incorporated in side seams. The end portions of the side seams are usually lapped to provide for a minimum number of thicknesses of material in the end seams which secure the covers to the bodies. Where the cans are to be vacuumized or pressurized, the lapped sections of the end seams usually are soldered together to provide hermetic joints to preserve the vacuum or pressure within the can.

In preparing for the attachment of the covers to the bodies in hermetic double seams, the marginal end portions of the bodies are bent outwardly to provide seaming flanges which are subsequently interfolded with cooperating seaming flanges on the covers to produce the end double seams. During this flanging and seam folding operation, it is well known that a certain amount of slippage or crawl-back takes place between the two soldered together thicknesses of material in the lapped sections of the side seam. Usually the solder in the lapped section joint is of sufficient thickness to be malleable or pliant and thereby permits this slippage without cracking or breaking so as to preserve the hermetic characteristic of the double seam.

However it sometimes happens under certain conditions that the slippage between the outer and inner laps during flanging and double seaming breaks the solder bond and permits the laps to separate so that the outer lap falls away from the inner lap and droops or hangs down below the raw edge of the flange. This results in a drooping bulge in the double seam and a defectively or improperly sealed portion in the double seam at the body side seam. Extensive investigation and experimentation has revealed that this drooping of the outer lap produces minute leaks along the line of bend of the body flange at the edges of the lapped portion and also along the drooped raw edge of the flange at the edges of the lapped portion. These minute leaks are not readily detectable and thus usually pass inspection but they are of sufficient size to greatly reduce the vacuum or pressure in the can over an extended period. These occasional leaks consequently reduce the commercial shelf-life of the cans and may ultimately result in spoilage of the product.

An object of the instant invention is to overcome this occasional slow leakage in the can end double seam at the body side seam by providing an improved and critical lapped section construction which during the body flanging operation and the double end seam rolling operation causes a portion of the inner lap to engage over and support an edge of the outer lap to hold the laps tightly together during bending, while permitting the necessary

slippage between them, without injuring the solder bond or causing drooping of the outer lap.

Another object is to facilitate the supporting of the outer lap of the lapped section to prevent separation of the laps, by provision of an improved and critical lap construction which is designed to cooperate with the seam rolling action utilized to produce the double end seam so that the hermetic characteristics of the double seam at the side seam will be preserved.

Another object is to provide for as great an area at the critical location as possible in the soldered portion of the lapped section and to provide for the proper yielding of this solder without breaking or shearing during bending of the lapped section into the double end seam so as to preserve the hermetic characteristics of the joint.

Another object is to produce a tighter end seam at the lapped side seam section while eliminating sudden excessive pressures and jumps during formation of the double seam, by the provision in the lapped section of gradually or progressively increasing and decreasing numbers of thicknesses of material in the lapped section so that seaming rollers used to form the double seam, pass over the lapped section smoothly.

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 perspective view of a sealed can embodying the instant invention;

Fig. 2 is an enlarged plan view of a flat blank from which the body of the can in Fig. 1 is made;

Figs. 3, 4 and 5 are enlarged fragmentary side views of portions of the lap sections of the side seam edges of the blank, Fig. 3 showing the sections in opposed relation prior to uniting in a side seam, Fig. 4 showing the sections united in a side seam and prior to flanging, and Fig. 5 showing the sections after formation of a double end seam;

Fig. 6 is an enlarged fragmentary perspective view of the double end seam of the can in Fig. 1, with portions broken away to illustrate the critical location of the lapped sections in the seam.

Fig. 7 is a sectional view taken substantially along the line 7—7 in Fig. 4;

Fig. 8 is a view similar to Fig. 7 showing the flange of the body at the lapped section;

Figs. 9, 10, 11, 12 are sectional views taken substantially along the respective planes indicated by the lines 9—9, 10—10, 11—11 and 12—12 in Fig. 6;

Fig. 13 is a sectional view taken substantially along the line 13—13 in Fig. 5, and

Fig. 14 is a sectional view of the double end seam shown in Fig. 6 with a portion of a seaming roller in position to illustrate how the seam is formed.

As a preferred or exemplary embodiment of the instant invention, the drawings illustrate a sheet metal can comprising a body 21 (Figs. 1 and 6) having top and bottom covers or end members 22, 23 secured thereto in double end seams 24, 25 conventionally produced by seaming rollers 26 (Fig. 14). The body 21 preferably is formed with a conventional lock and lap side seam 27 in which the major portion of the seam is a lock section and in which the ends of the seams are lapped sections and are incorporated in the end double seams.

The instant invention is particularly concerned with the top end seam 24, this top end of the can being left open when shipped to the customer for filling and therefore referred to as the customer's end. At this end of the can particularly, the lapped section of the side seam, where

the inner lap underlaps the outer lap when incorporated in the double seam as shown in Fig. 6, presents a raised step or shoulder which is opposed to the conventional direction of travel of the seaming roller **26**, indicated by the arrow in Fig. 6, and thereby causes increased or abnormal pressure to be exerted on this portion of the seam as the roller passes over it. It is this pressure that causes drooping of the outer or underlap and thereby causes slow leaks in this portion of the double seam as mentioned hereinbefore. At the bottom or factory end of the can, the seaming roller conventionally approaches the side seam from the opposite direction and so rides off the step instead of onto it and therefore does not cause the above difficulty.

In order to overcome this difficulty in the top double end seam **24**, the approaching edge of the inner lap which presents the step or shoulder is formed so as to extend diagonally across the end seam in a direction opposed to the direction of travel of the seaming roller **26** as shown in Fig. 6, with a portion of the inner lap tucked or crimped under the outer edge of the outer lap (Fig. 8). This construction in the end seam provides for easy rolling of the seaming roller **26** over the lapped section and more importantly provides for supporting the outer lap and holding it up tightly against the inner lap at the line of bend of the lapped section during the seam rolling action. This results in a tight seam at the lapped section and eliminates the slow leaks hereinbefore mentioned.

In such an improved can, the body **21** preferably is made from a flat rectangular blank **30** (Fig. 2) having top and bottom end edges **31**, **32** and side seam marginal edges **33**, **34**, the latter being notched and formed for incorporation in the side seam **27**. The marginal side seam edge **33** is formed to provide a projecting hook portion **36** while the marginal edge **34** is formed to provide a similar hook portion **37** defined by spaced slits **38** extending inwardly from the edge **34**. These hook portions **36**, **37** are reversely bent back on the blank into side seam hooks which when the blank is rolled or bent into body shape, are interengaged in the usual manner to provide the lock portion of the conventional side seam **27** which holds the body together permanently.

Adjacent the top and bottom ends of the hook portions **36**, **37** the blank **30** is provided with notched portions **41**, **42** which are overlapped in the formation of the body and which constitute the lapped sections of the side seam **27**. The notch portion **41** constitutes the outer lap and is lapped over the notch portion **42**, constituting the inner lap when incorporated in the side seam **27** as shown in Fig. 4.

Along the side edge **33** which forms the outer hook **36**, the lapped portions **41** preferably are cut away or clipped along a line of severance defined by two angularly disposed intersecting edges **44**, **45** which meet at a corner or apex **46** spaced inwardly from adjacent edges **31**, **33** and adjacent edges **32**, **33** of the blank. Along the opposite edge **34** which forms the inner hook of the blank, the bottom lap portion **42** is formed with a conventional beveled notch edge **48** for cooperation with the opposite lap portion **41** to provide a conventional bottom lap section. At the top edge **31** of the blank, the top lap portion **42** is formed with a reentering angle notch **51** (Figs. 2 and 3) defined partially by an angularly disposed edge **52** undercutting the top or outer edge **31** of the blank and providing along the top edge **31** a triangular area terminating in a sharp point **53**. The angular edge **52**, after flanging, forms the step or shoulder hereinbefore mentioned. This angular edge notch **52** inwardly of the blank edge **31** terminates in a notch edge **54** which is parallel with the edge **31** and which is located to fall adjacent the line of bend of the body flange as shown in Figs. 6 and 10.

When the blank **30** is formed into can body shape as shown in Fig. 1 and its marginal side seam hook edges **36**, **37** are locked together to form the side seam **27**, the top lapped sections **41**, **42** overlap each other in the relation shown in Figs. 4 and 7. The outer lap **41** overlaps the inner lap **42** with the triangular portion of the blank adjacent the re-entering angle notch edge **52** disposed adjacent and extending above the clipped edge **45** of the outer lap **41**. The sharp point **53** of the re-entering angle portion is disposed in spaced relation to the intersection of the clipped edge **45** with the top edge **31** of the body, in what is known as a "minus overlap" (Fig. 4). The locked hook portion of the side seam **27** holds the overlapped sections in place while the seam is soldered. This soldering is effected in the conventional manner and results in a permanent bonding together of the two thicknesses of body material in the lapped sections as well as a bonding together of the interlocked hook sections of the side seam.

After the side seam **27** is soldered, the ends of the body **21** are bent outwardly to produce flanges **56** (Fig. 8) for cooperation with a similar flange **57** on the top cover or end **22** in producing the top double seam **24** (see Fig. 6). In producing the top end seam flange **56** on the body, the outer edge **31** of the body at the re-entering angle portion of the inner lap beginning at and including the sharp point **53** is bent or crimped over the clipped edge **45** of the outer lap **41** as shown in Fig. 8. During this flange forming operation, some slippage takes place between the outer lap **41** and the inner lap **42**, causing the inner lap **42** to crawl-back over or shorten with respect to the outer lap **41** without breaking or shearing the solder bond. As this slippage or crawl-back takes place, the triangular portion of the inner lap adjacent the re-entering angle notch **51** which is crimped over the clipped edge **45** has a tendency to pull the outer lap **41** inwardly against the inner lap **42** as the latter slips back. This supporting or pulling tendency keeps the two laps **41**, **42** tightly together as the crawl-back occurs and thereby permits the solder between the laps to properly yield without breaking or shearing during the crawl-back without rupture and thereby preserves the hermetic characteristics of the solder bond in the joint.

This slippage or crawl-back continues during the double seaming operation which permanently joins the cover **22** to the flanged body **21**. In this seaming operation, effected by the roller **26** in the conventional manner, the outer and inner lapped portions **41**, **42** in the body flange **56** are further bent from the position shown in Fig. 8 to that shown in Figs. 11 and 12. During this seaming operation the roller travels around the can body in the conventional direction, toward the right as viewed in Fig. 6, and in so doing bends the flange **57** of the cover **22** downwardly and inwardly under the flange **56** of the body to produce the conventional double seam **24** (Fig. 6). In the body flange **56** at the overlapped section, the defining edge **52** of the re-entering angle notch **51** of the inner lap extends diagonally across the outer lap of the body flange **56** with the sharp point **53** disposed in a direction opposed to the direction of the rolling action of the seaming roller **26** as shown in Figs. 5 and 6. Hence when the seaming roller **26** passes over this lapped section of the side seam it bends the flange **57** of the cover **22** inwardly against the sharp point **53** of the re-entering angle notch **51** and progressively rides along the diagonal edge **52** of the notch and thus keeps progressively bending or crimping the outer edge **31** of the inner lap of the body under the clipped edge **45** of the outer lap **41** as the outer and inner laps are progressively bent down into the double seam and the inner lap **42** keeps crawling back over the outer lap **41** while bending. In this manner a constant supporting pressure is maintained on the clipped edge **45** while the double seam is being formed with the result that the outer lap **41** is constantly pressed against the inner lap **42** during bending so as to prevent rupture of the flexible solder bond. This pressure on the clipped edge

45 also supports the outer lap 41 against drooping or falling down below the lower straight edge of the body flange in the double seam and thus provides tight contact between the outer and inner laps along the line of bend of the body flange 56 at the top edge of the double seam and along the bottom edge of the seam where the edge 31 of the flange is tucked or crimped under the clipped edge 45 of the outer lap 41. This results in a tight double seam at the lapped sections of the side seam and thus prevents the slow leaks hereinbefore mentioned.

The re-entering angle notch 51 also provides for smoother operation of the seaming roller 26 over the lapped section in the double seam inasmuch as the number of thicknesses of the body material progressively increases and then decreases as the seaming roller approaches and leaves the lapped sections.

As shown in Figs. 9 and 13 the seaming roller 26 as it approaches the lapped section presses against only two thicknesses of the body stock (the three thicknesses of the cover stock as shown in Fig. 6 being omitted for purposes of simplicity). The seaming roller next presses against the portion which includes the inner lap 42 adjacent the reentering angle notch 51 as shown in Figs. 10 and 13 and this increases the thicknesses to three. Beginning at the point 53 there are four thicknesses and immediately above the point only three thicknesses. As the roller rides along the diagonal edge 52, the four thickness area increases and the three thickness area decreases until as shown in Figs. 11 and 13 beyond the re-entering notch, there are four full thicknesses. Further along the seam the number of thicknesses gradually decrease from partly four and partly three to a full three and then two as at the beginning.

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.

I claim:

A sealed container comprising a tubular sheet metal body having opposed end members hermetically sealed thereon in rolled double seamed end seams, said body having a soldered lock and lap side seam with the overlapped lap portions disposed at opposite ends thereof and incorporated in said end seams, a said overlapped side seam lap portion including an inner lap provided with an angular notch at an end of said body, said notch including an inclined edge terminating in a sharp point enclosed within a said end seam, said overlapped lap portion further including an outer lap provided with a convex angularly clipped multi-sided edge at the end of said body underlying said inner lap and said notch thereof, said multi-sided edge being embraced by said inner lap with the sharp point thereof projecting therepast in said end seam with said inclined notch edge crossing one of the sides of said multi-sided edge and positioning said sharp point thereover in locking engagement therewith, whereby to prevent separation of said laps and solder disrupting crawl back of said inner lap on and relative to said outer lap as a result of the outward flanging of said tubular container body and the double seaming of a said end member thereon.

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