Feb. 4, 1969 E. WESSELY 3,425,381

MANUFACTURE OF METALLIC CONTAINERS

Filed June 17, 1966 Sheet 1 of 4

FIG.1

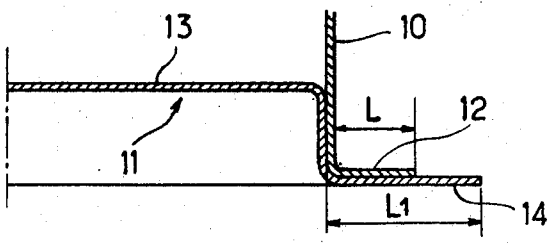


FIG.2

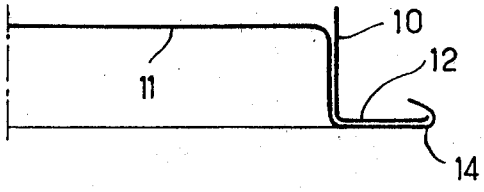


FIG.3

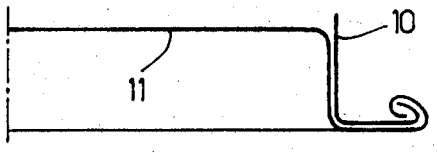


FIG.4

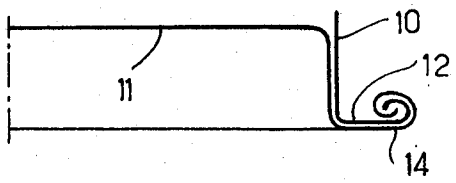


FIG.5

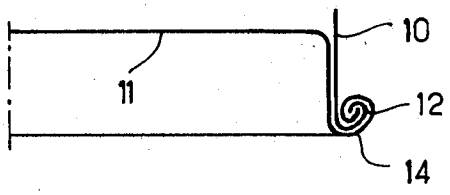
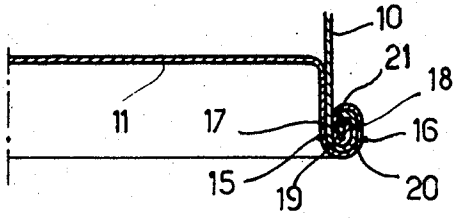


FIG.6



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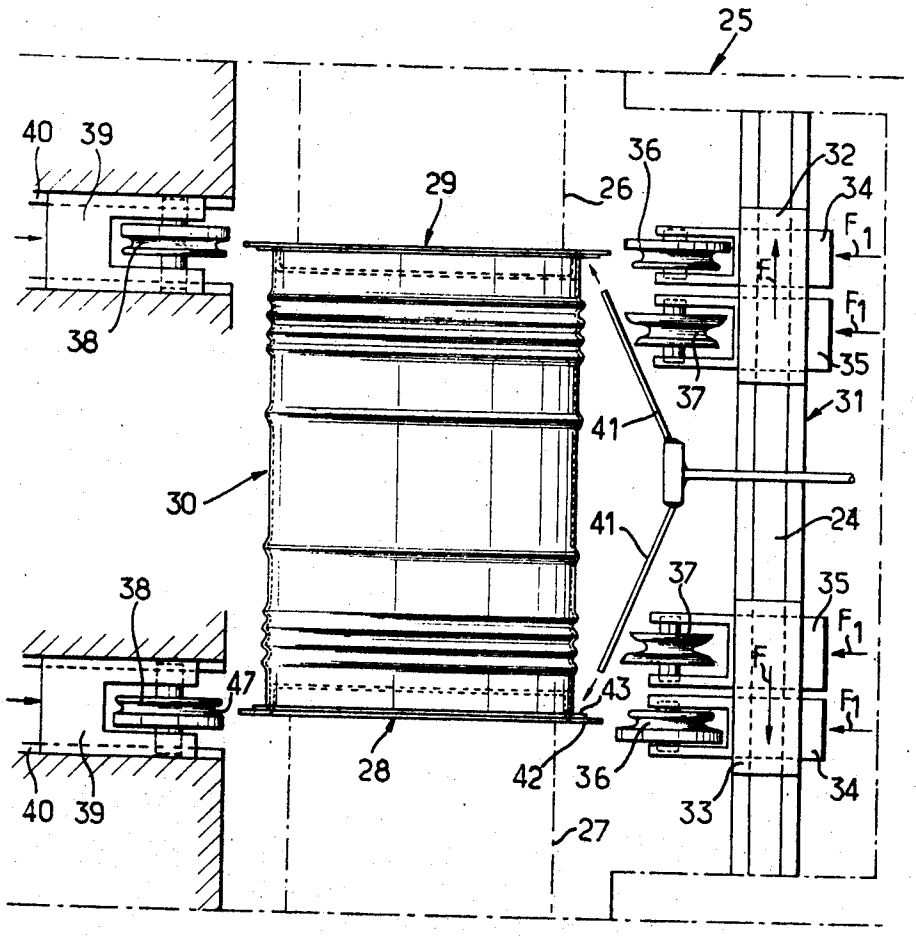
Feb. 4, 1969 E. WESSELY 3,425,381

MANUFACTURE OF METALLIC CONTAINERS

Filed June 17, 1966

Sheet 2 of 4

FIG. 7



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Feb. 4, 1969 E. WESSELY 3,425,381

MANUFACTURE OF METALLIC CONTAINERS

Filed June 17, 1966 Sheet 3 of 4

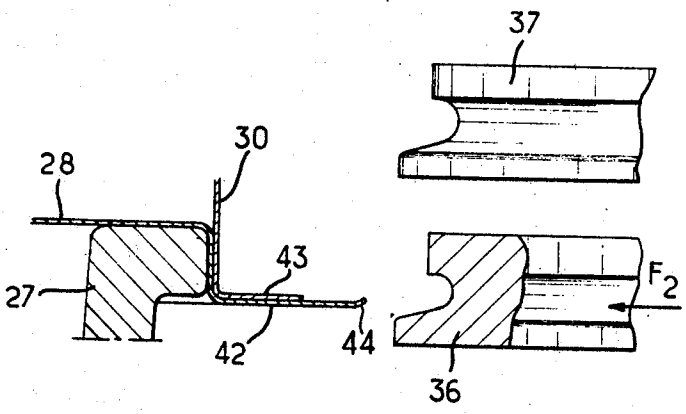


FIG. 8

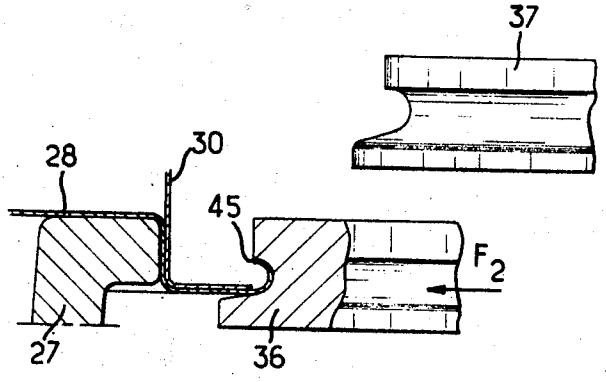


FIG. 9

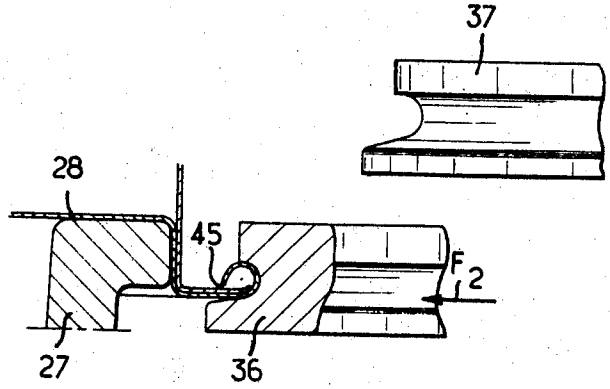


FIG. 10

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Feb. 4, 1969 E. WESSELY 3,425,381

MANUFACTURE OF METALLIC CONTAINERS

Filed June 17, 1966

Sheet 4 of 4

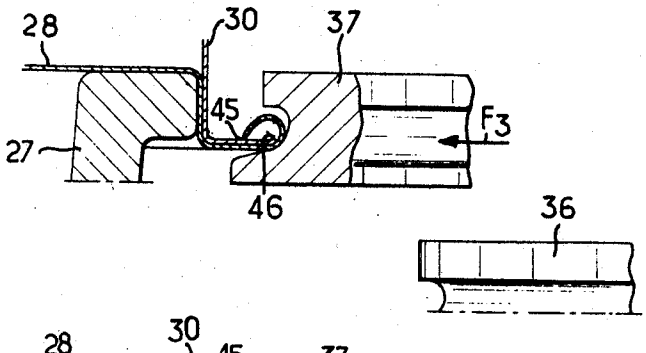


FIG.11

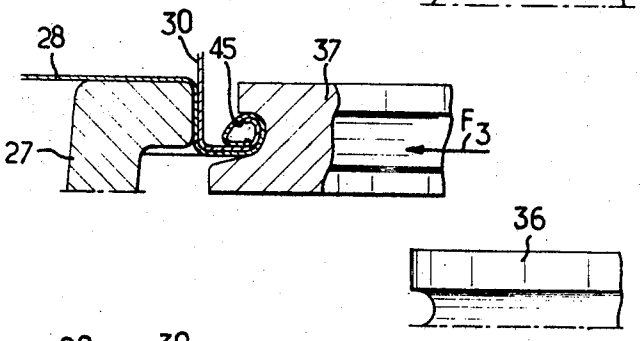


FIG.12

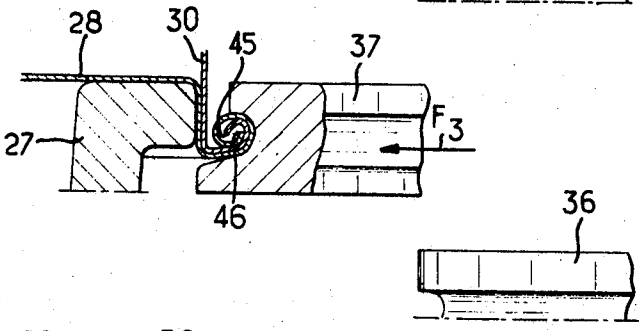


FIG.13

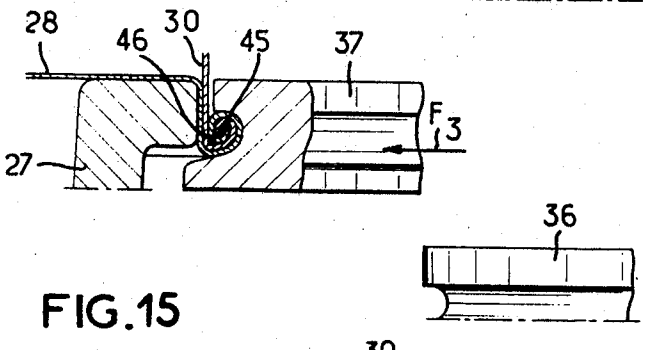
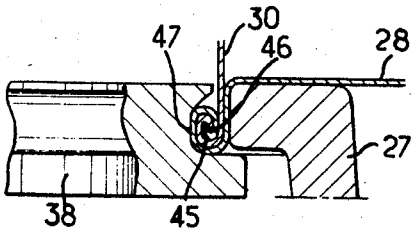


FIG.14

FIG.15



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MANUFACTURE OF METALLIC CONTAINERS

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Claims priority, application France, June 18, 1965, 21,391
U.S. Cl. 113—120 4 Claims
Int. Cl. B21d 51/32, 19/14

ABSTRACT OF THE DISCLOSURE

A process of securing bases in the ends of metallic container bodies by upsetting contiguous peripheral portions of the bases and container ends, in which overlapping bent-over peripheral base and container end portions are knurled to roll them over to produce a joint having seven superposed thicknesses of the base and the container body. At the end of the roll-over movement, a polymerized liquid is injected between at least some of the thicknesses of the metal of the base and container body.

The present invention relates to improvements in the manufacture of metallic containers such as casks.

In known methods of making casks and like containers the bottoms or bases are assembled onto bodies or onto securing rings by upsetting the contiguous edges of bases and containers.

Such containers in the course of handling during use, have to withstand shocks which cause such deformation thereof that they deteriorate to the point that the containers often become unusable. It has already been proposed to reinforce the joints by hoops or stiffeners, but in the manufacture of the casks difficulties arise which considerably increase the cost of manufacture.

It has also been proposed to reinforce the joints by forming a further crease in the normal upset edges so that the joints thus obtained instead of the normal five thicknesses of material have seven thicknesses imparting substantially increased resistance to shocks to the casks or like containers. This technique has proved to be somewhat impracticable and complex mainly due to the necessity of preparing the bases and the securing rings to be assembled and also due to the operations of transferring and adapting the casks in the course of manufacture on machines equipped to carry out the several phases of cask or like container manufacture.

This long and difficult manufacturing process is not satisfactory and is not suitable for large scale commercial production.

The main object of the present invention is to provide a simple process of making casks and like containers using the triple upsetting process in which the casks or like containers are made by a continuous process in the minimum time, and in one pass through the operating tools.

According to the present invention a process of upsetting the bases of metallic containers, such as casks or the like comprises rolling a bent over edge of a base, and a container sleeve rim associated therewith by forcing the metal progressively radially backwards on itself in a direction perpendicular to the longitudinal axis through the container while rotating the container, so that the edge of the base is first continuously upset alone round the rim of

the container sleeve, and thereafter the metal of the edge of the base and the container rim are together continuously upset by rolling until a threefold roll over joint is obtained.

In order that the invention may be more fully understood an embodiment in accordance therewith will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 shows partly in cross-section the body and the base of a cask or like container prior to the upsetting operations;

FIGS. 2 to 5 show diagrammatically different phases of shaping the assembled cask or like container;

FIG. 6 shows a cross-section of threefold upsetting on an enlarged scale;

FIG. 7 shows diagrammatically an apparatus for obtaining the threefold upsetting;

FIGS. 8 to 10 show on an enlarged scale phases of rolling the edge of the base on the sleeve ring during the upsetting;

FIGS. 11 to 14 show the course of the rolling operations;

FIG. 15 shows the upset joint obtained.

Referring to FIGS. 1 to 6 these show the wall **10** of the body or sleeve of a cask to which a base **11** is to be secured. The body or sleeve **10** as seen in FIG. 1 has a bent over edge **12**, while the base has a recessed part **13** to be disposed in the body **10** and a peripheral edge extension **14**. The length L of the bent over edge of the body and the length L_1 of the edge of the base are selected to provide the necessary material for making the roll over profile as a function of the sliding movement between the parts and the path taken by each edge, and is dependent on the material used and its thickness.

Referring to FIGS. 2 to 5 these show the various phases of shaping the sheet e.g. of iron for making a cask with bases, the edges of the bodies and bases rolled over to form firm joints.

In FIG. 2 the sheet metal base part L_1 projecting over the bent over edge L of the sleeve, is suitably forced back over the cask edge **12**, and FIGS. 3 and 4 show intermediate roll over deformations to produce the profile in FIG. 5.

At this stage the assembly of the base with the sleeve is completed and the successive upsetting or rolling operations form a joint having seven thicknesses **15** to **21** of sheet iron, which impart great resistance to the joint; by this upsetting process, this joint has some play between the thicknesses of the metal and lacks the tightness for a good seal; in some cases using this process the necessary seal is provided by filling the spaces between the thicknesses of metal with a polymerised liquid joint by any suitable means.

However to ensure that the upset material has the maximum resistance and at the same time it is tight enough to withstand all tests, the profile obtained at the end of the rolling is crushed which closely binds the sheet iron of the edges of the base and of the sleeve. This crushing could also be effected after a liquid joint had been injected in the spaces between the sheet iron.

When this crushing is carried out the joint has a cross-section having seven thicknesses of metal as seen in FIG. 6.

Such a joint which is simple and stout ensures effectively, without any stiffener or hoop being added to the

number of parts forming the cask, a sufficiently tight joint despite the unavoidable deformations arising from handling the casks in use.

In a preferred embodiment shown diagrammatically in FIG. 7, the upsetting device is mounted on an upsetting machine of the conventional type shown generally at **25**. This machine comprises in the known manner two rotating and axially movable mandrels **26**, **27** for supporting the cask during the upsetting of its bases **28** and **29** previously engaged in the corresponding terminal portions of the sleeve **30**.

The upsetting device disposed radially with respect to each base is disposed on a common support **31** carried by the frame of the machine, and comprises two knurling tool carrier bodies **32**, **33**, movable in the direction of the arrows F on a slide **24** parallel to the longitudinal axis through the cask sleeve **30**.

Each of the bodies **32**, **33** carries on members **34**, **35** sliding in a direction perpendicular to the slide **24** (arrow F1) first and second knurling tools **36**, **37** respectively.

The knurling tool bodies **32**, **33** are driven by any suitable known device (not shown) simultaneously displaced in two opposite directions; it will be obvious that the movement of these bodies could be carried out in the same direction by a suitable arrangement of the knurling tools.

The frame of the machine carries the so-called pressure knurling tools **38**, preferably disposed, as shown on the diametrical side of the cask sleeve to the knurling tools **36**, **37** and perpendicular to the axis of the cask, on slides **39** which slide in guides **40**.

Means **41** are also preferably provided as shown to project, if so desired, a polymerisable liquid jointing material between the thickness of the sheet metal during the upsetting or rolling operation.

Referring to FIGS. 8 to 10 these show a phase in joining a base **28**, comprising a bent over edge **42**, with a sleeve **30** comprising a sleeve rim **43**.

The bent over edge of the base preferably comprises as shown a peripheral upturned edge **44** to limit the wear of the throat of the knurling tool **36**; however, this edge is not essential since the rolling of the sheet iron can be similarly effected without it.

The rim of the sleeve and the bent over edge have dimensions which are such as to provide the material necesesary for obtaining a triple upsetting with seven thicknesses of the metal sheet.

In a first pass through the tools, the mandrels are rotated to drive the cask sleeve **30** at a predetermined speed; the knurling tool **36** is brought opposite the rim of the sleeve and the bent over edge and actuated in such a way that it moves radially and continuously (in the direction of the arrow F2) towards the longitudinal axis through the cask; in the course of its movement the knurling tool, arriving in contact with the terminal part of the bent over edge and passing in front of it, pushes back this edge imparting such a profile to it that at the end of the advance of the knurling tool, the terminal part of the bent over edge of the base is rolled, having its end **45** located facing the rim of the sleeve as shown in FIG. 10.

The knurling tool **36** is at that instant withdrawn to its starting position and the block **33** is moved to bring the knurling tool **37** (FIGS. 11 to 14) opposite the aforesaid rolled over metal, then the knurling tool **37** is driven in continuous radial displacement (in the direction of the arrow F3) towards the cask which is still being rotatably driven.

When the knurling tool **37** engages the rolled over metal formed by the previous knurling tool, its continuous radial displacement and the appropriate profile of its throat cause the sheet metal to be deformed, rolling back on itself in proportion to the combined movements of rotation of the cask and the continued advance respectively of the knurling tool.

As seen in FIG. 14 a triple upsetting is obtained with seven thicknesses of sheet metal, with a minimum of starting material, due to the fact that the ends **45** and **46** of the rim of the sleeve and the bent over edge, are interengaged over a minimum length which enables a very low upsetting to be obtained.

At the moment that the assembly of the bases with the sheet metal is carried out, the knurling tool **37** is driven back to its starting position and the mandrels are stopped, after which the cask may be directed to a following position.

However, after the knurling tool **37** has been returned to its starting point, a final operation may be carried out if desired, which consists in smoothing out the upsetting obtained with the knurling tool **38** having an appropriate profile **47**, this phase being shown in FIG. 15.

It will be understood that the continuous upsetting of the sheet metal has the advantage of modifying the original structure of the metal which is in some way matted giving it increased rigidity.

Such a process and apparatus are simple to operate and enable casks or like containers to be produced capable of effectively resisting unavoidable shocks which such containers have to undergo in the course of usage.

It is also possible with the process and apparatus described to make containers of the type of all sizes formed by a complex metal plastic or other similar material having a cylindrical section and the process may be employed for forming containers having square, rectangular or other shapes; in that case it would be of advantage to fix the container, while the knurling tool or tools are movable parallel to the periphery of the containers.

While the apparatus described comprises a pair of knurling tools radially arranged with respect to each base a single knurling tool movable radially with respect to each base may be employed to upset each base to a suitable profile.

I claim:

1. A process of securing bases in the ends of metallic container bodies by upsetting contiguous peripheral portions of the bases and container ends, comprising supporting a container body, inserting a recessed base portion within the container body end with overlapping bent-over peripheral base and container end portions, said base peripheral portion extending beyond the container end peripheral portion, moving a knurling tool radially towards said edge portions and effecting continuous relative rotary movement between said container and contiguous base on the one hand and said tool on the other hand about the longitudinal axis of said container body to upset said base peripheral portion on itself in a continuous roll-over movement, and effecting further movement of said tool radially with respect to said base and container body successively to roll said base and body edge portions together over each other until a roll-over joint between said base and body edge sections is formed which consists of seven superposed thicknesses of said base and container body.

2. A process according to claim **1** wherein at the end of said roll over movements said joint is crushed.

3. A process according to claim **1** wherein at the end of said roll over movement a polymerised liquid product is injected between at least some of the thicknesses of the metal of said base and container body.

4. A process of securing bases in the ends of metallic container bodies by upsetting contiguous peripheral portions of the bases and container ends, comprising supporting a container body, inserting a recessed base portion within the container body end with overlapping bent-over peripheral base and container end portions, said base peripheral portion extending beyond the container end peripheral portion, moving a knurling tool radially towards said edge portions and effecting continuous relative rotary movement between said container and contiguous base on the one hand and said tool on the other

hand about the longitudinal axis of said container body to upset said base peripheral portion on itself in a continuous roll-over movement, and effecting further movement of said tool radially with respect to said base and container body successively to roll said base and body edge portions together over each other until a roll-over joint between said base and body edge sections is produced, and at the end of said roll-over movement injecting a polymerized liquid product between at least some of the thicknesses of the metal of said base and container body.

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U.S. Cl. X.R.

113—30