(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 697 927 B2

(12) **NEW EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the opposition decision:
22.12.1999 Bulletin 1999/51

(45) Mention of the grant of the patent:
04.12.1996 Bulletin 1996/49

(21) Application number: **94900077.2**

(22) Date of filing: **25.10.1993**

(51) Int. Cl.[6]: **B21D 51/26**, B21D 15/06

(86) International application number:
PCT/EP93/02949

(87) International publication number:
WO 94/09926 (11.05.1994 Gazette 1994/11)

(54) CONTAINER BEADING

VERFAHREN ZUM BÖRDELN VON BEHÄLTERN

PROCEDE PERMETTANT DE REALISER DES CANNELURES SUR UNE BOITE

(84) Designated Contracting States:
BE DE ES FR GB GR IT NL

(30) Priority: **27.10.1992 FR 9212764**

(43) Date of publication of application:
28.02.1996 Bulletin 1996/09

(73) Proprietor: **CARNAUDMETALBOX**
F-75017 Paris (FR)

(72) Inventors:
- **COCHET, Philippe**
  F-92210 Saint-Cloud (FR)
- **DUBREUIL, Philippe**
  F-78000 Versailles (FR)

(74) Representative:
Gadsden, Robert Edward
Group Manager Intellectual Property
CarnaudMetalbox Technology plc.
Downsview Road
Wantage, Oxon OX12 9BP (GB)

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Description

[0001] This invention relates to a method of beading a can according to the preamble of claim 1 (EP-A-0 356 269).

[0002] In the manufacture of a "three piece" cylindrical can, two longitudinal edges of a rectangular blank are typically welded together or seamed so as to form a sleeve to which two ends are attached, usually by a double seam, to form the completed container. Annular beading of the sleeve has been used in order to increase the radial strength of the can but this can only be achieved by a compromise involving a loss in the axial strength. The inclusion of a beading zone thus increases the radial strength of a metal container but reduces resistance to axial loads.

[0003] Beading of this type is known in which a number of circumferential beads are impressed in the form of grooves which are parallel to each other and regularly spaced to create an annular beading zone. The beading zone is generally located in the central part of the can body, between two smooth annular zones.

[0004] Similarly, for a "two piece" can, it is known to use the same beading technique on a can body which has been drawn and to which a single end is seamed.

[0005] According to the present invention, there is provided a method of beading a cylindrical can body comprising squeezing the can body between profiled tool parts to impress grooves which form a predetermined number of annular beads substantially parallel to and regularly spaced from each other, the beads providing an annular beading zone which is located between two smooth zones characterised in that the tool parts include complementary corrugations comprising peaks and troughs, at least one of the corrugations at each extremity of the beading zone being different from the others such that the tool impresses at least one bead at each extremity of the beading zone less deeply than the other beads, whereby axial loading performance is increased without decreasing radial strength of the can.

[0006] The provision of one or more shallow beads at the end of the beading zone has been found by the Applicant to improve the performance of the container when axially loaded. Furthermore, two types of deformation described below which give rise to weak points in the can and can be a source of collapse are alleviated or completely eliminated by the inclusion of these shallow beads. The removal of these deformations thus significantly improves the performance of the can when axially loaded.

[0007] The present invention has the advantage that the axial strength of the can is improved without any reduction in the radial strength. This radial strength is not reduced in comparison with a can having a traditional beading zone formed with equal depth grooves. The gain in mechanical performance when axially loaded over a can having nominally deep beading (0.4mm) has been shown to be of the order of 15%. Thus the performance of the can when axially loaded is greatly increased without decreasing the radial strength.

[0008] The first deformation which the provision of at least one shallower groove at the extremity of the beading zone has been found to eliminate completely is the problem of "springback". Springback is attributed to radial shrinkage of the metal after beading and leads to a more accentuated corrugation than foreseen, the corrugation projecting outwards at each extremity of the beading zone.

[0009] Any slight overall deformation, known as "en diabolo" of the can body is very greatly reduced by the provision of shallow beading in accordance with the present invention. This deformation results in curvature of the beading zone which decreases the can performance, in particular the ability of the can to withstand axial loads. Even where some slight curvature remains in the beading zone, the axial load performance is greatly improved by the use of shallow beads.

[0010] In one embodiment there may be a plurality of beading zones. Preferably, at least two shallower beads are provided, usually one at each extremity of the or each beading zone. Alternatively, a plurality of shallower beads may be provided at each end of the or each beading zone.

[0011] According to the form and type of can body, between two and four beads may advantageously be provided at each extremity of the or each beading zone. In a further embodiment, where several shallower beads are impressed, these may typically increase in depth with distance from the adjacent smooth annular zone.

[0012] A preferred embodiment of container beading will now be described, by way of example only, with reference to the drawings, in which:

Figure 1 is a side view of a can body manufactured in accordance with according to the invention;
Figure 2 is an enlarged partial side section of the area II of Figure 1 showing the beading of the present invention; and
Figure 3 is an enlarged section of beading apparatus and can side wall, illustrating the beading of a cylindrical sleeve with a smooth wall.

[0013] Figure 1 shows a cylindrical can body 11, here formed from a rectangular blank which has had its two longitudinal edges joined and then welded or seamed to form a sleeve. The join is not shown in figure 1. The two extremities 12, 13 of the sleeve have been flanged so as subsequently to form double seams with respective can ends.

[0014] In order to increase mechanical strength, particularly in the radial direction, the can body has been beaded around its circumference. Shock-resistant beads 15 in the vicinity of the two extremities of the sleeve are shown but do not form part of the present

invention.

[0015] An annular beading zone 17 is provided in the central portion with a number of circular beads 18 in the form of grooves, which are parallel and regularly spaced relative to each other. Consequently, this beading zone is located between two smooth annular zones 19, 20 where the initially cylindrical can body has not undergone any deformation.

[0016] In the example shown in the drawings, which corresponds to a typical type of can, the beading zone comprises nineteen beads 18, which have been obtained by rotating the can whilst squeezing the can body between a roll 21 and a fixed member 22, as shown in figure 3. Each bead comprises corrugations of adapted dimensions and shapes. In figure 3, the apparatus is shown prior to bringing the roll 21 and fixed member 22 together to bead the can body.

[0017] In accordance with the invention, at least one bead 18a is impressed less deeply than are the others, this bead being situated at the end of the beading zone. In the examples represented, two such shallower beads 18a, 18b have been impressed at each end of the beading zone with different depths increasing from each neighbouring smooth annular zone. Clearly a different number of shallower beads can be provided according to the form of the can.

[0018] By way of example, in the case specifically described, the beads are grooves with inclined sides, so that the side section of the sleeve as shown in figure 2 appears to be approximately sinusoidal in its beading zone. The nominal depth of each bead is d_0 = 0.4mm, with the bead nearest the smooth annular zone having a depth of d_1 = 0.3mm and the second bead from the smooth zone having a depth of d_2 = 0.35mm.

[0019] As noted above, any projection at the junction of the beading zone and each smooth zone has been eliminated and the can body maintains a substantially cylindrical shape after the beading has been formed.

[0020] It will be appreciated that the invention has been described above by way of example only, and that changes may be made without departing from the scope of the invention as defined by the claims.

Claims

1. A method of beading a cylindrical can body (11) comprising:

   squeezing the can body between profiled tool parts to impress grooves which form a predetermined number of annular beads (18) substantially parallel to and regularly spaced from each other, the beads (18) providing an annular beading zone (17) which is located between two smooth zones (19, 20),
   characterised in that:
   the tool parts include complementary corrugations comprising peaks and troughs, at least one of the corrugations at each extremity of the beading zone being different from the others such that the tool impresses at least one bead (18a) at each extremity of the beading zone (17) less deeply than the other beads, whereby axial loading performance is increased without decreasing radial strength of the can.

2. A method according to claim 1, characterised in that the tool impresses a plurality of shallower beads (18a, 18b) at each extremity of the beading zone (17).

3. A method according to claim 1 or claim 2, characterised in that the tool impresses a plurality of shallower beads which increase in depth with distance from the adjacent smooth zone (19, 20).

Patentansprüche

1. Verfahren zum Sicken eines zylindrischen Dosenkörpers (11), bestehend aus:

   einem Pressen des Dosenkörpers (11) zwischen profilierten Werkzeugteilen, um Rillen einzudrücken, die eine vorherbestimmte Anzahl ringförmiger, im wesentlichen parallel zueinander und jeweils einen gleichen Abstand voneinander aufweisender Sicken (18) zu bilden, wobei die Sicken (18) eine ringförmige Sickenzone (17) bilden, die sich zwischen zwei weichen Zonen (19, 20) befindet,
   dadurch gekennzeichnet,

   - dass die Werkzeugteile mit zueinander komplementären, Scheitel und Rillen aufweisenden Wellen versehen sind. wobei wenigstens eine der Wellen an einem jeden Ende der Sickenzone (17) sich von den anderen dahingehend unterscheidet, dass wenigstens eine Sicke (18a) an jedem Ende der Sickenzone (17) durch das Werkzeug weniger tief eingedrückt worden ist als die anderen Sicken, wodurch eine axiale Lastaufnahmefähigkeit ohne Abnahme der radialen Festigkeit der Dose erhöht ist.

2. Verfahren nach Anspruch 1,
   dadurch gekennzeichnet,

   - dass eine Vielzahl flacherer Sicken (18a, 18b) an einem jeden Ende der Sickenzone (17) durch das Werkzeug eingedrückt wird.

3. Verfahren nach Anspruch 1 oder 2,
   dadurch gekennzeichnet,

- dass eine Vielzahl flacherer Sicken, deren Tiefe mit dem Abstand von der benachbarten weichen Zone (19, 20) zunimmt, durch das Werkzeug eingedrückt wird.

Revendications

1. Procédé de nervurage d'un corps de boîte métallique cylindrique (11) comprenant :

   la compression du corps de boîte entre des parties d'outils profilées pour imprimer des rainures qui forment un nombre prédéterminé de nervures annulaires (18) sensiblement parallèles les unes aux autres et espacées régulièrement les unes des autres, les nervures (18) formant une zone de nervurage annulaire (17) qui est située entre deux zones lisses (19, 20), caractérisé en ce que :
   les parties d'outils comprennent des ondulations complémentaires comportant des crêtes et des creux, au moins l'une des ondulations de chaque extrémité de la zone de nervurage étant différente des autres afin que l'outil imprime au moins une nervure (18a) à chaque extrémité de la zone de nervurage (17) moins profondément que les autres nervures, grâce à quoi la tenue sous charge axiale est améliorée sans diminution de la résistance radiale de la boîte.

2. Procédé selon la revendication 1, caractérisé en ce que l'outil imprime plusieurs nervures moins profondes (18a, 18b) à chaque extrémité de la zone de nervurage (17).

3. Procédé selon la revendication 1 ou la revendication 2, caractérisé en ce que l'outil imprime plusieurs nervures moins profondes dont la profondeur augmente avec la distance depuis la zone lisse adjacente (19, 20).

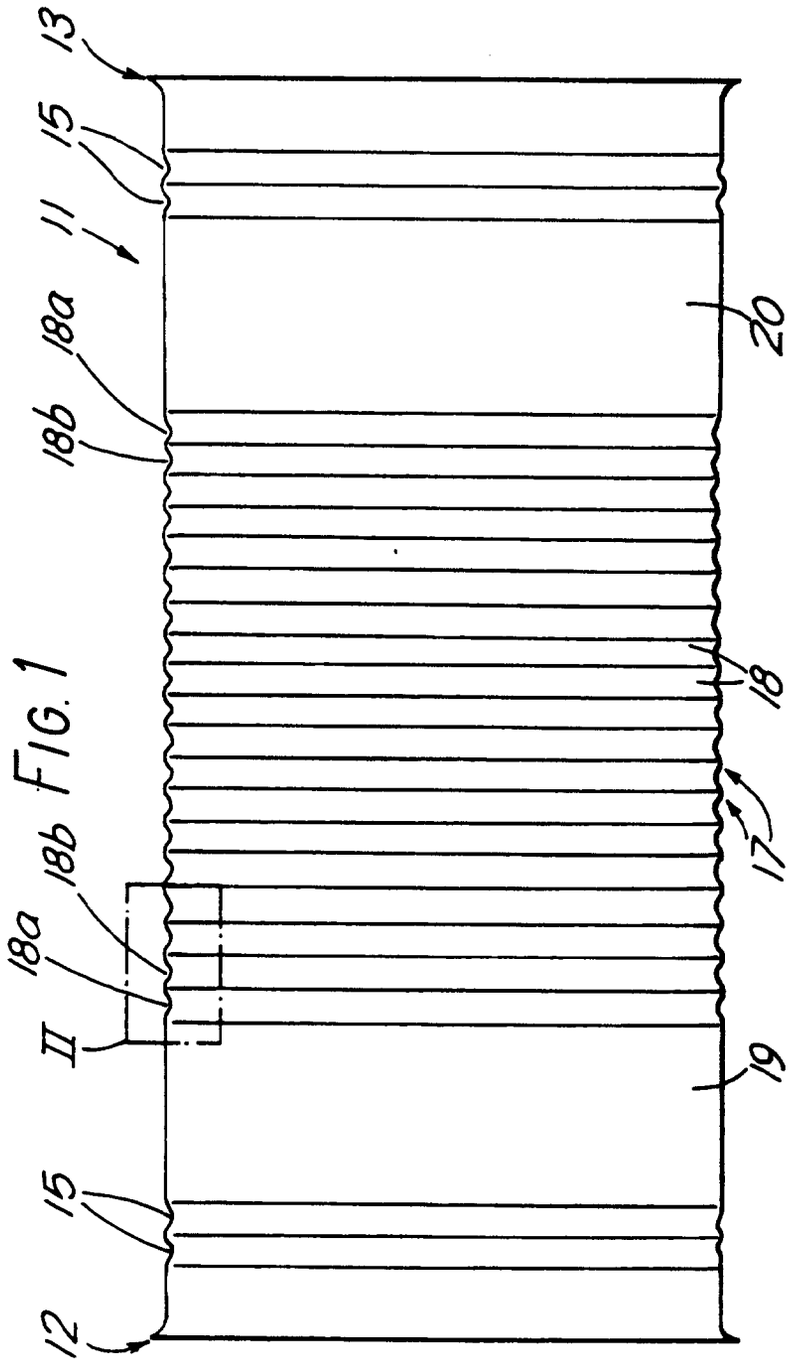

FIG. 1

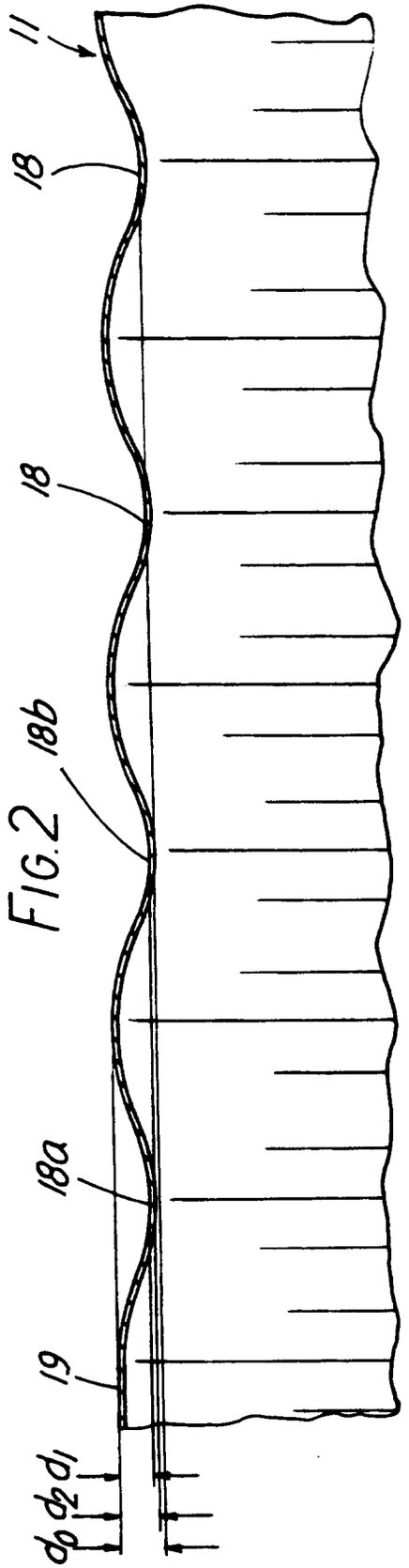

FIG.2

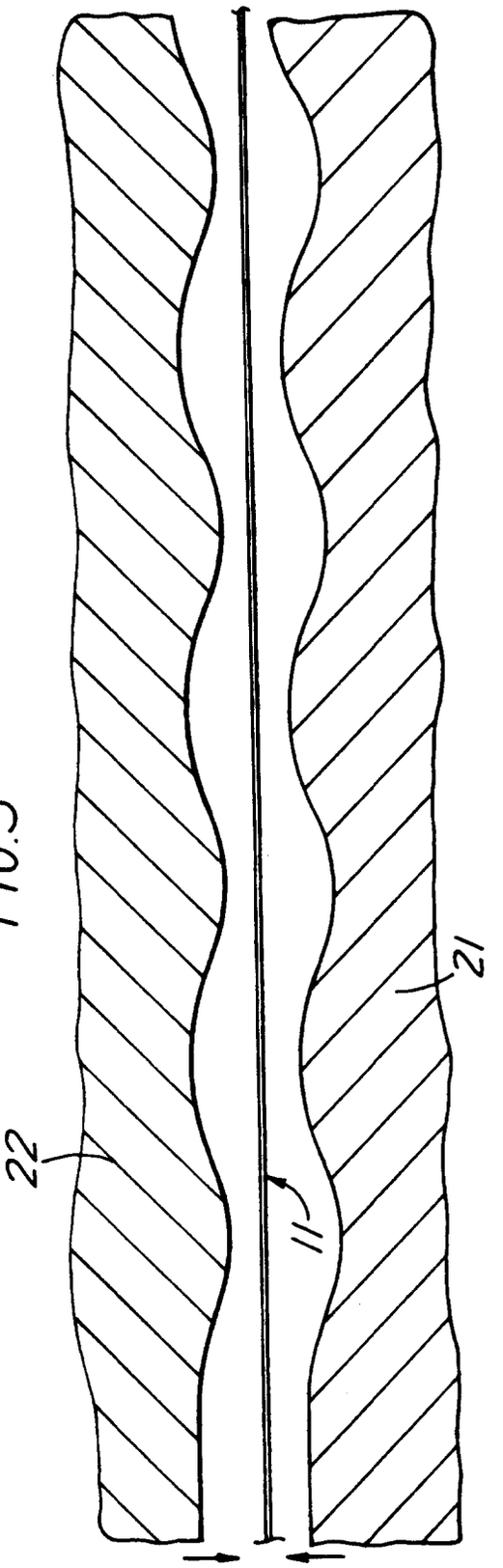

FIG.3