



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB98/03644</p> <p>(22) International Filing Date: 7 December 1998 (07.12.98)</p> <p>(30) Priority Data: 9726606.8 18 December 1997 (18.12.97) GB</p> <p>(71) Applicant (for all designated States except LS US): CROWN CORK &amp; SEAL TECHNOLOGIES CORPORATION [US/US]; 11535 S. Central Avenue, Alsip, IL 60803-2599 (US).</p> <p>(71) Applicant (for LS only): CARNAUDMETALBOX PLC [GB/GB]; Downsview Road, Wantage, Oxfordshire OX12 9BP (GB).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): IOANNIDES, Andrew [GB/GB]; 64 Fernhill Road, Begbroke, Oxon OX5 1RR (GB). JAHINA, Adrian, Cyrus [GB/GB]; 9 Denton Close, Botley, Oxford, Oxon OX2 9BN (GB). CULVERWELL, John, William [GB/GB]; 26 Farmstead Close, Grove, Wantage, Oxon OX12 0BD (GB).</p> <p>(74) Agent: RATLIFF, Ismay, Hilary; CarnaudMetalbox plc, Downsview Road, Wantage, Oxfordshire OX12 9BP (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report.</p>
<p>(54) Title: CAN SHAPING</p>		
<p>(57) Abstract</p>		
<p>A method of forming a shaped can which demonstrates improved abuse resistance over known shaped cans. The method comprises forming a radially outwardly extending neck and then expanding one or more parts of the can side wall to a maximum diameter which is no greater than that of the neck, i.e., its open end.</p>		

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CAN SHAPING

This invention relates to can shaping. In particular, it relates to a method of forming a shaped metal can which exhibits improved resistance to abuse.

Shaped metal cans have become increasingly popular  
5 in recent years as competitors seek to portray their own brand image and achieve market differentiation. Such can shaping has been achieved by a number of different means, including pressurised water jets, expanding mandrels and "blowforming" with pressurised air. All these shaping  
10 methods have limitations in terms of maximum expansion achievable without failure by splitting, for example, and the cans shaped in these ways have reduced axial and sometimes reduced panel performance due to their deviation from their original cylindrical shape.

15 Another problem which arises from the change in shape is that the cans are less readily stacked for transport or at the point of sale and generally fewer cans can be stored on a given surface area than equivalent volume cylindrical cans.

20 The present invention seeks to provide a shaped can and a method of forming that can which, whilst still inevitably losing some of the original axial and panel performance of its cylindrical form, nevertheless maintains good abuse and scuff resistance and is readily  
25 stackable.

According to the present invention, there is provided a method of forming a shaped can, the method comprising: providing a can body blank having a cylindrical side wall; outwardly necking an open end of  
30 the can body blank such that the neck is substantially

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frustoconical and tapers radially outwards away from the cylindrical side wall; and expanding the side wall in one or more regions such that the maximum diameter of the side wall is no greater than the maximum diameter of the frustoconical neck.

Preferably, the neck further comprises a cylindrical portion extending away from the maximum diameter end of the frustoconical region.

The can body blank may be open at both ends and the method comprises outwardly necking both ends of the can body blank. In addition, or alternatively, the can body blank is open at both ends and the method further comprises fixing an end wall to one of the open ends prior to the expanding step.

In one embodiment, the outward necking step comprises a die flanging operation. This method may thus comprise inserting a die having a tapered region corresponding to a desired final neck shape and a second region corresponding to a desired final flange shape into the can body; and limiting the maximum diameter of the flange thus formed by means of a limit ring. Alternatively, an operation such as spin flanging may be used.

The expanding step may comprise forming by pressurised fluid such as water or pressurised air. Alternatively, this step may use an expandable mandrel.

Usually, the expanding step may further comprise expanding the side wall onto an inner wall of a mould.

According to a further aspect of the present invention, there is provided a metal can comprising a

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side wall having a radially outwardly extending neck and one or more radially outwardly extending bulged regions, the maximum diameter of the bulged region or regions being no greater than the maximum neck diameter.

5 This can is particularly suitable for use on existing canning lines since when one or both ends are fixed to the can body by a double seam, the thick seam will act as a buffer during handling and effectively help to protect the thinner expanded can side wall.

10 The invention will also permit the can filler to use existing filling line equipment with minimal changes to the container handling, filling and closing equipment.

A preferred embodiment of the invention will now be described, by way of example, with reference to the  
15 drawings, in which:

Figure 1 is a schematic perspective view of a can body prior to shaping;

Figure 2 is a schematic perspective view of a can body after outward necking;

20 Figure 3 a schematic perspective view of a can body after side wall expansion;

Figure 4 is a side section of a necking and flanging die;

Figure 5 is a side section of a limit ring; and

25 Figure 6 is a side section of the necking and flanging die and limit ring of figures 4 and 5 as assembled for forming an outward neck and a flange.

Figures 1 to 3 show the progression of shaping a three piece can body 10. In figure 1, a can body blank is  
30 shown which comprises sheet metal formed into a cylinder

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2 with its side edges joined in a side seam 4 or weld. In a second stage, both ends 6 of the cylindrical blank have been necked outwardly into a frustoconical part 7 and a cylindrical region. Finally, the side wall of the can  
5 body is expanded, here only in the centre 12, such that the expanded region has a diameter which is no greater than that of the cylindrical neck part 8.

A suitable tool for outward necking and also for flanging is shown in figures 4 to 6. Figure 4 shows a  
10 flanging die 20 with an additional conical section 22 corresponding to the desired final shape of the radially outwardly extending neck. The die 20 further comprises a cylindrical section 24 and a flat section 26. Section 26 corresponds to the desired final shape of the flange of  
15 the can. The cylindrical section is provided so that the can will be able to be closed by double seaming a can end onto the can body.

Limit ring 30 is shown in figure 5. This ring is used to limit the radial extent of the flange by means of  
20 a cylindrical stop portion 32.

The operation of the necking and flanging operation can be seen more clearly from figure 6. A can body such as that shown in figure 1 is lowered onto the flanging die. Of course alternatively the flanging die 20 may be  
25 inserted into the can body. As the die 20 enters the can body, it pushes the side wall of the can body radially outwardly according to the shape of the die. The can body will thus form a complementary shape to that of the forming die, here terminating in a horizontal flange.

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A can end may be seamed onto one end of the can body prior to expansion, particularly where this is achieved by pressurised fluid. A blow forming operation such as that described in W097/12706 is one possible forming  
5 method.

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## CLAIMS:

1. A method of forming a shaped can, the method comprising:
  - providing a can body blank having a cylindrical side wall;
  - outwardly necking an open end of the can body blank such that the neck is substantially frustoconical and tapers radially outwards away from the cylindrical side wall; and
  - expanding the side wall in one or more regions such that the maximum diameter of the side wall is no greater than the maximum diameter of the frustoconical neck.
2. A method according to claim 1, in which the neck further comprises a cylindrical portion extending away from the larger diameter end of the frustoconical region.
3. A method according to claim 1 or claim 2, in which the can body blank is open at both ends and the method comprises outwardly necking both ends of the can body blank.
4. A method according to any one of claims 1 to 3, in which the can body blank is open at both ends and the method further comprises fixing an end wall to one of the open ends prior to the expanding step.

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5. A method according to any one of claims 1 to 4, in which the outward necking step comprises a die flanging operation.
6. A method according to any one of claims 1 to 5, in which the expanding step comprises forming by pressurised fluid.
7. A method according to any one of claims 1 to 5, in which the expanding step uses an expandable mandrel.
8. A method according to claim 6 or claim 7, in which the expanding step further comprises expanding the side wall onto an inner wall of a mould.
9. A metal can comprising a side wall having a radially outwardly extending neck and one or more radially outwardly extending bulged regions, the maximum diameter of the bulged region or regions being no greater than the maximum neck diameter.

Fig.1.

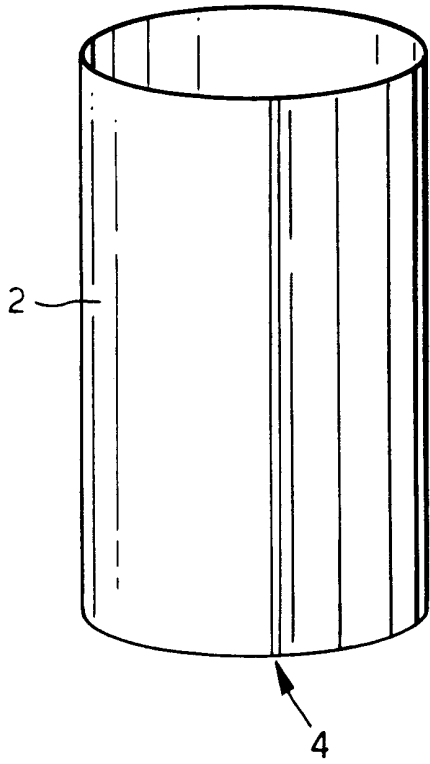


Fig.2.

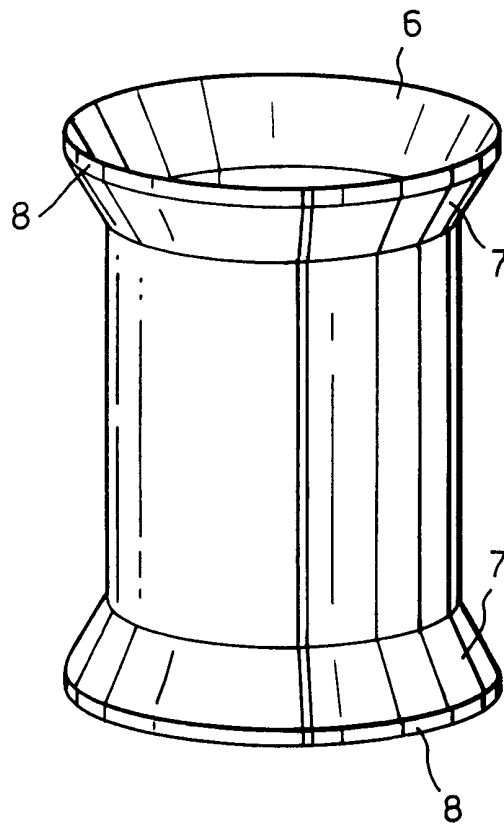


Fig.3.

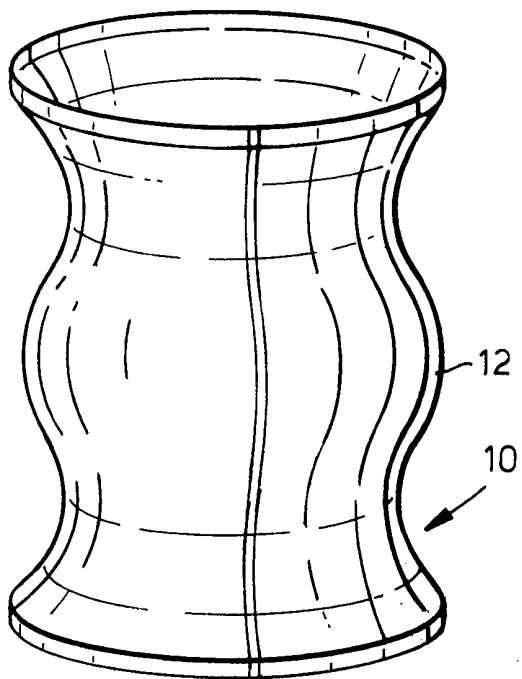


Fig.4.

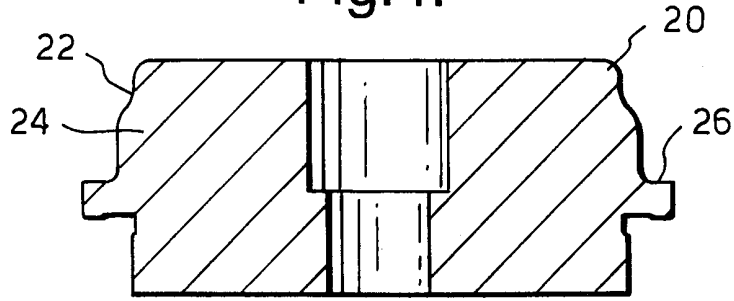


Fig.5.

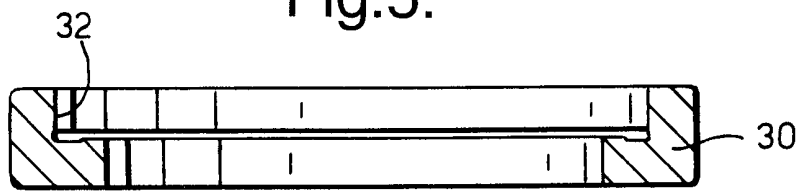
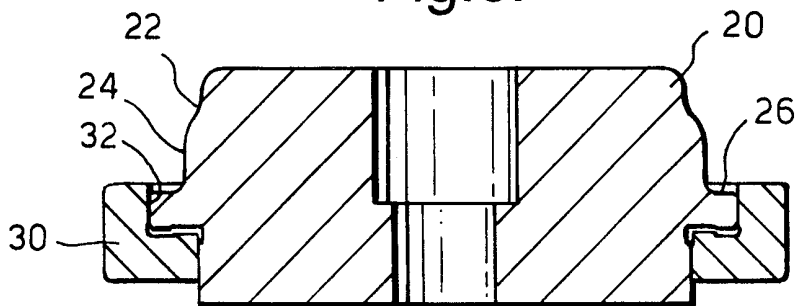


Fig.6.



# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 98/03644

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B21D51/26

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B21D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 12706 A (CROWN CORK & SEAL CO) 10 April 1997 cited in the application see the whole document ---	1,9
A	GB 2 224 965 A (METAL BOX PLC) 23 May 1990 ---	
A	US 5 687 599 A (DONALDSON ROGER H ET AL) 18 November 1997 -----	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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