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(54) Title: CAN END PRODUCTION

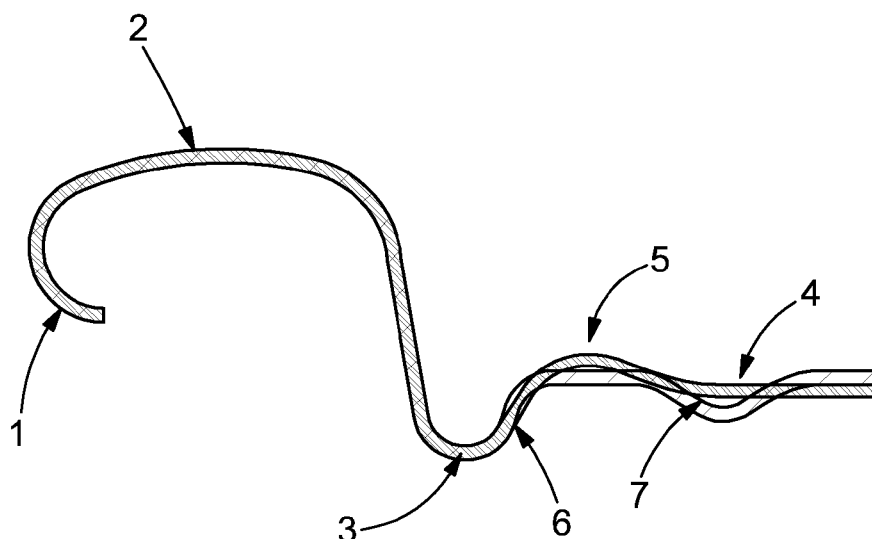


Figure 4

(57) **Abstract:** A method of making a can end by forming a can end shell in a shell press; and converting the shell into a can end. The step of forming the can end shell comprises pressing sheet metal into an end shell with a bead feature in the radially outer circumference of its centre panel. In a subsequent can end conversion operation material from the bead feature is used to set final geometry of the converted can end.

Description**CAN END PRODUCTION****Technical Field**

[0001] This invention relates to the production of a can end. In particular, it relates to the formation of a can end shell in a shell press and the subsequent formation of a can end from that shell in staged operations in a conversion press.

Summary of invention

[0002] According to the present invention, there is provided a method of making a can end, the method comprising: forming a can end shell in a shell press; and converting the shell into a can end; in which the step of forming the can end shell comprises pressing sheet metal into a shell, the shell having a seaming panel, countersink bead and centre panel; in which the step of pressing the shell further includes forming one or more features in the centre panel of the end. The method further comprising transferring the can end shell to a conversion press and, in a sequence of operations, moving material inwardly from the end shell feature towards the centre of the end to set the final geometry of the can end, without changing countersink features radially outwardly from the lowermost point of the countersink bead.

[0003] The centre panel of the shell is radially inward of the seaming panel and countersink.

[0004] The step of pressing the shell may, in one embodiment, form a higher centre panel, sometime referred to as a “panel step”, by using a deeper centre pad in a shell press. Alternatively, the pressing step may comprise forming a dished centre panel. Yet another forming step may comprise forming one or more steps or even a series of beads or corrugations in the centre panel.

[0005] A most preferred step of pressing the shell may comprise forming a bead in the radially outer circumference of the centre panel.

[0006] According to another aspect of the present invention there is provided an apparatus for forming a can end from an end shell, the apparatus comprising a shell press with shell tooling having: upper tooling including punch having a punch nose; and lower tooling comprising a cut edge; a draw ring; a die centre pad and

die centre ring; in which the die centre pad further includes a protrusion for forming a feature in a centre panel of the end shell.

[0007] The apparatus may typically further comprise a conversion press with tooling stations for a sequence of operations, at least one of the tooling stations being adapted to move material from the feature of the end shell formed in the shell press

Brief description of drawings

[0008] A preferred embodiment of the present invention is now described with reference to the drawings, in which

Figure 1 is a side section of a conventional end shell;

Figure 2 is a side section of an end shell in accordance with one example of the invention;

Figure 3 is a side section of a final converted end, formed from the shell of figure 2; and

Figure 4 is overlaid side sections of figures 2 and 3.

Description of embodiments

[0009] Figure 1 is a side section of a conventional end shell for forming a can end.

[0010] Figure 2 is a side section of a beaded shell according to one embodiment of the invention. The shell edge is formed with a peripheral curl 1. An annular seaming panel 2 is connected by a wall to countersink bead 3 which surrounds centre panel 4. An upwardly convex annular bead 5 between the countersink 3 and the centre panel 4 has been provided so as to provide material for use during conversion to an easy open end.

[0011] By adding a feature such as bead 5 to the shell, it is possible to move material inwardly of the countersink bead 3 to the centre of the end. The material of the bead is moved in one of a sequence of operations in a conversion press to reform the shell bead 5 into a step 6, a platform and annular bead 7 (figure 3).

[0012] Figure 4 is an overlay of the side sections of figures 2 and 3. This demonstrates how extra material from the shell bead 5 is used in a panel step 6 and panel bead 7 in the converted end.

[0013] Evaluation of performance of the converted end samples has observed that forming a converted end from the shell with a bead generally allows use of

material which provides a stronger and more uniform converted shell with improved peak and burst performance.

[0014] The invention has been described above by way of example only and changed may be made without departing from the scope of the invention as defined by the claims.

CLAIMS:

1. A method of making a can end, the method comprising forming a can end shell in a shell press and converting the can end shell into a can end, in which the step of forming the can end shell comprises pressing sheet metal into a shell, the shell having a seaming panel (2), countersink bead (3) and centre panel (4), the step of pressing the shell further including forming one or more features in the centre panel (4) of the end, the method further comprising transferring the can end shell to a conversion press and, in a sequence of operations, moving material inwardly from the end shell feature towards the centre of the end to set the final geometry of the can end.
2. A method according to claim 1, in which the step of pressing the shell forms a higher centre panel by using a deeper centre pad in a shell press.
3. A method according to claim 1, in which the step of pressing the shell comprises forming a dished centre panel.
4. A method according to claim 1, in which the step of pressing the shell comprises forming one or more steps in the centre panel.
5. A method according to claim 1, in which the step of pressing the shell comprises forming a series of beads or corrugations in the centre panel.
6. A method according to claim 1, in which the step of pressing the shell comprises forming a bead in the radially outer circumference of the centre panel (4).
7. An apparatus for forming a can end from an end shell, the apparatus comprising:
a shell press with shell tooling having upper tooling including a punch having a punch nose and lower tooling comprising a cut edge, a draw ring, a die centre

pad and die centre ring, the die centre pad further including a protrusion for forming a feature in a centre panel of the end shell.

8. An apparatus according to claim 7, further comprising a conversion press with tooling stations for a sequence of operations, at least one of the tooling stations being adapted to move material from the feature of the end shell, formed in the shell press.

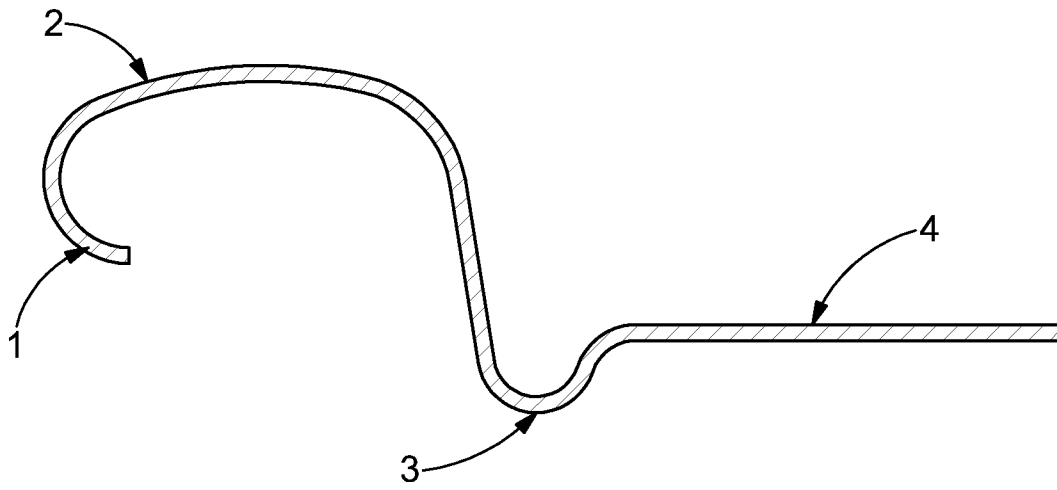


Figure 1

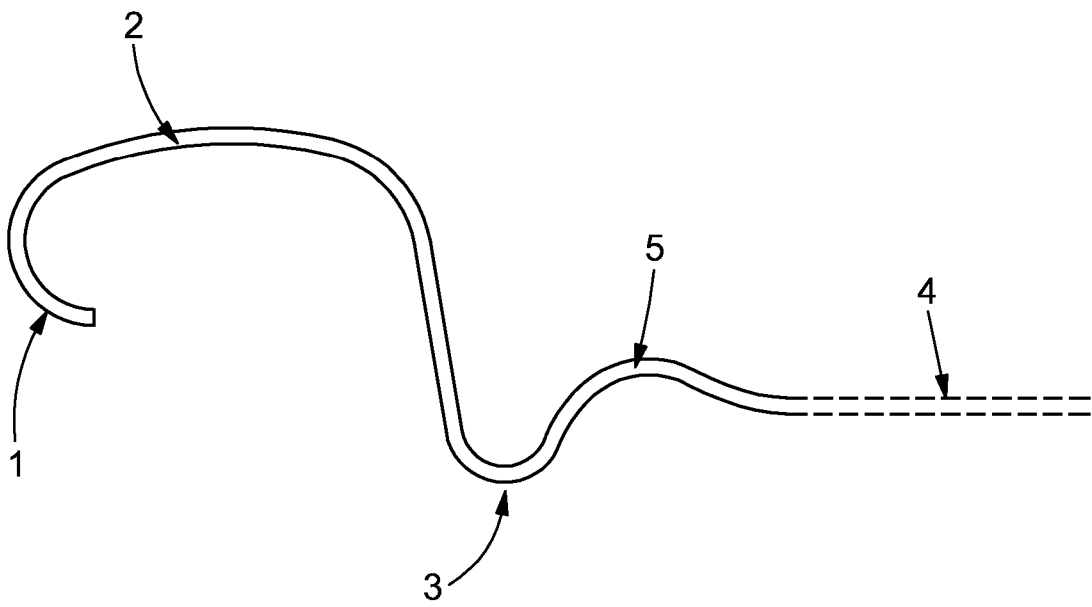


Figure 2

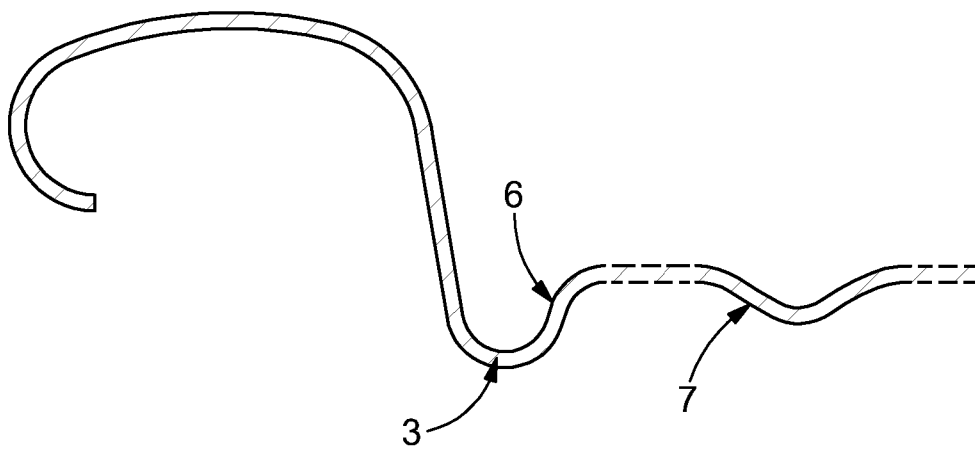


Figure 3

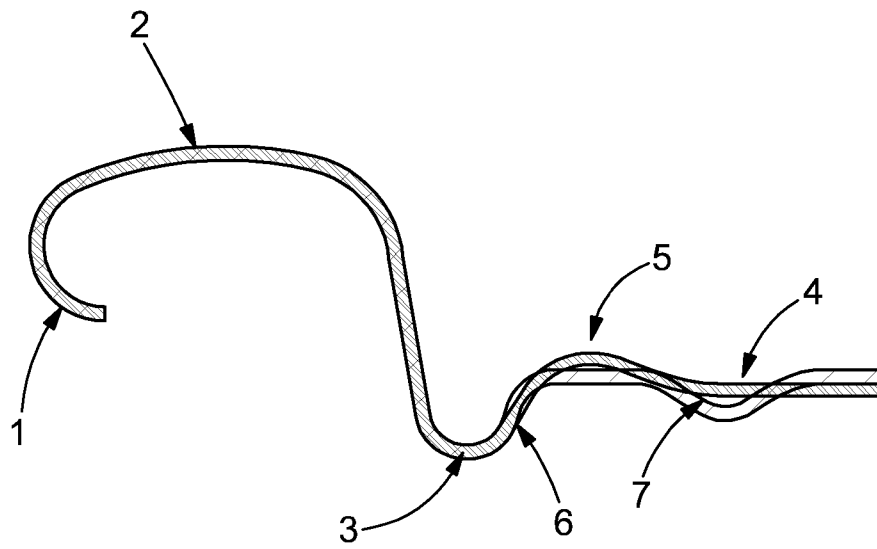


Figure 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/069735

A. CLASSIFICATION OF SUBJECT MATTER
INV. B21D22/22 B21D51/38
ADD.

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)
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 practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/60546 A1 (CROWN CORK & SEAL TECH CORP [US]; METAL BOX PLC [GB]) 23 August 2001 (2001-08-23) page 1, line 1 - line 4 page 16, line 10 - line 16; figures -----	1-8
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X	DE 299 06 170 U1 (SCHMALBACH LUBECA [DE]) 23 September 1999 (1999-09-23) the whole document ----- -/-	7



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"&" document member of the same patent family

Date of the actual completion of the international search

13 November 2014

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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