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(54) Method, apparatus, and blank for forming a container with rounded edges

(57) The invention provides a blank (1) for forming a container having a curved or rounded edge, and comprises: a plurality of substantially linear grooves (5) formed in a region (2) of the blank (1) intended to form the rounded edge, the grooves (5) extending substantially parallel to one another and being debossed into a first surface or face (6) of the blank (1) that forms an inner surface of the rounded edge. Furthermore, an opposite or reverse surface or face (7) of the blank (1) in this region (2) is substantially smooth. The invention also provides a method and apparatus for forming a curved or rounded edge in a container made from a flat blank.

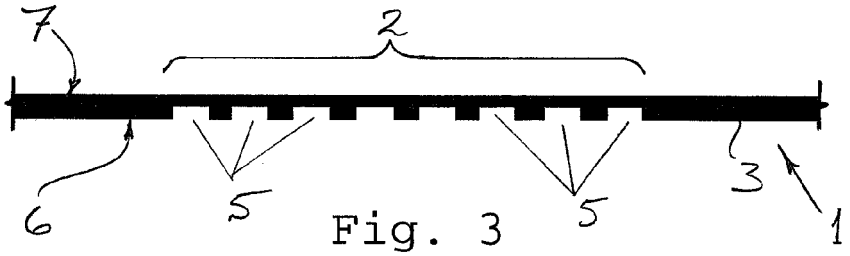

Fig. 3

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Description

[0001] The present invention relates to a method and apparatus for forming a container with one or more curved or rounded edge, such as a packet or box for cigarettes or the like, as well as to a blank for forming such a container.

[0002] Many consumers prefer to purchase cigarettes and other such products in substantially rigid or semi-rigid boxes rather than in soft packages. One of the reasons for this preference is the fact that a substantially rigid or semi-rigid box tends to protect its contents somewhat better than a soft package. A disadvantage of such boxes, however, is that they may have sharper and stiffer edges than a soft package, which may increase the wear on accessories, such as handbags, or articles of clothing in which the box is carried. Many consumers have also been found to prefer the "softer" feel of containers with curved or rounded edges.

[0003] To address these consumer preferences, techniques have been developed for making box-type containers having curved or rounded edges, as described for example in international patent publication WO 92/04179 A1. The curved or rounded edges of the containers disclosed in that publication address the issues discussed above. Nevertheless, such packets may still feel somewhat "rough" in the hand of the consumer, and they also reduce the available surface on the container for carrying information, branding, logos or the like.

[0004] It is therefore an object of the present invention to provide an improved method and apparatus for making containers, such as cigarette boxes, with one or more curved or rounded edges and an improved container blank which, when formed into a container, automatically tends to have at least one curved or rounded edge. It is furthermore an object of the invention to provide a method and apparatus, and also a blank, for making such containers which have a "smoother" feel and/or are more suited to carrying information, such as branding, logos or the like.

[0005] In accordance with the present invention, a method of forming a container with at least one curved or rounded edge as set out in claim 1 is provided. Furthermore, an apparatus for forming a container with one or more curved or rounded edge as recited in claim 12 is provided. Also, a blank as recited in claim 15 for forming a container with a rounded edge is provided. Advantageous or preferred features of the invention are recited in the dependent claims.

[0006] According to one aspect, therefore, the invention provides a method of forming a rounded edge in a container made from a substantially flat blank, comprising the steps of: forming a plurality of substantially linear grooves in a region of the blank intended to form the rounded edge, whereby the grooves extend substantially parallel to an axis defining a center of curvature for the rounded edge; and bending the grooved region of the blank about said axis such that a substantially rounded edge is obtained by virtue of bending deflection that is distributed over the plurality of grooves. According to the invention, the step of forming the grooves in said region of the blank comprises debossing a first surface or side of the blank.

[0007] Thus, the present invention is significantly different to the prior art techniques employed to date. By debossing the first surface or face of the blank, the grooves may be formed in that first surface or face only, recessed as substantially linear impressions or indentations in the blank but without forming any substantially raised profile on the opposite side of the blank. In this connection, the blank is desirably of a stiff paper or card material, as is known for making box-type containers for packaging cigarettes or the like.

[0008] In a preferred embodiment, the step of debossing the blank comprises pressing at least one substantially linear tool element into the first surface or face of the blank in the region intended to form the curved or rounded edge. At the same time - i.e. during debossing - an opposite or reverse side or face of the blank is supported on or against a flat or smooth counter surface. The at least one tool element is typically part of a debossing tool and comprises a raised or projecting ridge element to deboss a corresponding groove into the first surface of the blank. Desirably, the debossing tool has a plurality of substantially linear tool elements, which may be either simultaneously or consecutively pressed into said first surface or face of the blank to deboss the plurality of substantially linear grooves in the blank. In this regard, the debossing tool may be configured as a linear stamp or punch, and the counter surface may be provided as a substantially flat or planar surface, e.g. formed by a plate member. Alternatively, the debossing tool may be configured as a rotary stamp or punch. Thus, the counter surface may be provided as a substantially smooth surface of a cylindrical roller or drum member. Rotary drum members are particularly useful for high-speed processing of the blanks.

[0009] In a particularly preferred embodiment, each tool element of the debossing tool presents a blunt or flattened edge region to the surface of the blank to be debossed. Furthermore, each tool element of the debossing tool preferably projects from a base surface of the tool by a distance greater than an intended depth of the groove to be formed by the respective tool element. In this way, the base surface of the tool does not engage the surface of the blank to be debossed, which can help avoid the application of undesirable forces to the blank that may otherwise lead to marks or scratches on its second non-debossed surface as the grooves are formed.

[0010] In a particularly preferred embodiment of the invention, the step of bending the grooved region of the blank is such that the first surface or face of the blank forms an inner surface of the curved or rounded edge of the container. In this way, an opposite or reverse surface or face of the blank desirably forms a substantially smooth outer surface of this rounded edge.

[0011] In a preferred embodiment, the number of grooves in the region of the blank intended to form the rounded edge is in the range of 3 to 20, more preferably in the range of 5 to 15 and most preferably in the range of 6 to 12. Furthermore, in a preferred embodiment, a spacing or a pitch of the grooves is in the range of 0.1 mm to 3.0 mm, more preferably in the range of 0.2 mm to 2.0 mm, and most preferably in the range of 0.3 mm to 1.0 mm. In addition, a depth of the grooves is preferably in the range of 0.1 mm to 1.0 mm, more preferably in the range of 0.2 mm to 0.8 mm. In this regard, each of the grooves preferably has a transverse cross-section that tapers towards a base of the groove. Thus, each linear tool element will desirably have a corresponding frusto-conical transverse cross-section.

[0012] In a preferred embodiment, the plurality of substantially linear grooves debossed or impressed in the first surface of the blank all have a substantially uniform geometry. All of the tool elements therefore typically have a substantially uniform geometry. Alternatively, however, the geometry of the plurality of substantially linear grooves formed in the first surface of the blank may vary. Preferably each tool element of the debossing tool and/or the debossing tool as a whole is formed of a hard and robust material, such as steel.

[0013] According to another aspect, the present invention provides an apparatus for making a blank for a container having at least one rounded edge, comprising a first tool having one or more substantially linear tool element to impress or deboss a plurality of substantially linear grooves into a first surface of the blank. In this regard, the first tool may have a plurality of substantially parallel raised or projecting linear tool elements, such as ridge elements, for debossing a plurality of laterally spaced linear grooves into the first surface of the blank. The first tool is therefore preferably configured either as a linear stamp or punch, or as a rotary stamp or punch.

[0014] As noted above, in a particularly preferred embodiment, each tool element of the first tool presents a blunt or flattened edge region to the surface of the blank to be debossed. In addition, each tool element preferably projects from a base surface of the first tool by a distance which is greater than an intended depth of the groove to be formed by the respective tool element. The base surface of the tool is thus not able to engage the surface of the blank to be debossed as the grooves are formed, which in turn prevents any unwanted deformation or marking of the blank by the base surface.

[0015] In a particularly preferred embodiment, the apparatus further comprises a second tool having a flat or smooth surface for supporting the blank as a counter surface during the pressing or debossing of the grooves into the first surface of the blank with the first tool. In this regard, the second tool presents the counter surface for engagement with the opposite side or surface of the blank as a first surface of the blank is debossed with the tool elements of the first tool.

[0016] According to a further aspect, the invention provides a blank for forming a container having at least one curved or rounded edge, comprising: a plurality of substantially linear grooves in a region of the blank intended to form said rounded edge, the grooves extending substantially parallel to one another, wherein the grooves are debossed into a first surface or face of the blank that forms an inner surface of the rounded edge. An opposite surface or face of the blank in that region is desirably substantially smooth (non-corrugated) for forming a smooth outer surface of the rounded edge of the container.

[0017] For a more complete understanding of the invention and the advantages thereof, exemplary embodiments of the invention are explained in more detail in the following description with reference to the accompanying drawing figures, in which like reference characters designate like parts and in which:

Fig. 1 is a schematic cross-sectional view of a region in a prior art blank for forming a rounded edge in a container;

Fig. 2 is a schematic cross-sectional view of a region in another prior art blank for forming a rounded edge in a container;

Fig. 3 is a schematic cross-sectional view of a region in a blank according to a preferred embodiment of the invention for forming a curved or rounded edge in a container; and

Fig. 4 is a cross-sectional view of an apparatus of the invention for forming a region in a blank according to an embodiment of the invention for forming a curved or rounded edge in a container.

[0018] The accompanying drawings are included to provide a further understanding of the present invention and are incorporated in and constitute a part of this specification. The drawings illustrate particular embodiments of the invention and together with the description serve to explain the principles of the invention. Other embodiments of the invention and many of the attendant advantages of the invention will be readily appreciated as they become better understood with reference to the following detailed description.

[0019] It will be appreciated that common and well understood elements that may be useful or necessary in a commercially feasible embodiment are not necessarily depicted in order to facilitate a more abstracted view of the embodiments. The elements of the drawings are not necessarily illustrated to scale relative to each other. It will further be appreciated that certain actions and/or steps in an embodiment of a method may be described or depicted in a particular order of occurrences while those skilled in the art will understand that such specificity with respect to sequence is not actually required. It will also be understood that the terms and expressions used

in the present specification have the ordinary meaning as is accorded to such terms and expressions with respect to their corresponding respective areas of inquiry and study, except where specific meanings have otherwise been set forth herein.

[0020] Referring firstly to Fig. 1 and Fig. 2 of the drawings, two cross-sectional profiles of a prior art blank 1 for forming a box-like cigarette packet are shown schematically, specifically illustrating a region 2 of the blank 1 intended for forming a curved or rounded edge of the packet. In this regard, the blank 1 is formed from card material 3 and can be seen to include a plurality of parallel corrugations 4 that facilitate bending of the blank 1 in this region 2 to form the curved or rounded edge. One disadvantage of these prior art configurations, however, is that the outer surface of the packet in these corner regions has a "rough" feel. Another disadvantage is that the outer surface of the packet does not provide an optimal surface for applying information for the user, such as branding and/or logos.

[0021] Fig. 3 of the drawings, by contrast, illustrates a part of a blank 1 according to a preferred embodiment of the invention, again shown in cross-section. In this instance, the blank 1 of the invention incorporates a plurality of substantially linear grooves 5 arranged in a region 2 of the blank intended to form the rounded edge of the cigarette packet. In this case, the blank 1 is again formed from card material, but the grooves 5 are debossed into a first surface, face or side 6 of the blank 1 which is intended to form an inner surface of the rounded edge in the assembled cigarette packet. A reverse or opposite surface, face or side 7 of the blank 1 in that region 2 is substantially smooth for forming a smooth, non-corrugated outer surface of the rounded edge in the assembled cigarette packet.

[0022] With reference to Fig. 4 of the drawings, an embodiment of an apparatus 10 for forming a blank 1 according to the present invention is illustrated schematically. The apparatus 10 comprises a first debossing tool 11 having a plurality of linear tool elements 12 configured to impress or deboss the plurality of substantially linear grooves 5 into the first surface 6 of the card material 3 when forming the blank 1. Furthermore, the apparatus 10 includes a second tool 13 in the form of a plate member which presents a flat, smooth surface 14 for supporting the card material 3 of the blank 1 as a counter surface during the pressing or debossing of the grooves 5 into the first surface 6 of the blank 1 using the first tool 11. Both of the first and second tools 11, 13 are typically formed of a hard, tough material, such as steel.

[0023] In this example, the debossing tool 11 has ten of the linear tool elements 12, which are formed as substantially parallel raised or projecting ridge elements spaced apart with a pitch p in the range of 0.3 mm to 1.0 mm, here about 0.7 mm. Each of the ridge elements 12 presents a blunt or flattened outer edge region 15 for contact with, and debossing into, the first surface 6 of the blank 1. This edge region 15 typically has a width w in the range of 0.1 mm to 0.5 mm, in this case about 0.2 mm. In this embodiment, the first tool 11 is configured as a linear stamp or punch, such that each tool element 12 is configured to simultaneously engage the card material 3 of the blank 1. As apparent from Fig. 4, each of the tool elements 12 has a generally tapered, frusto-conical configuration in cross-section, sides of which form an angle of in the range of about 90° to 130° with a base surface 16 of the tool 11. Furthermore, a height h of each of the tool elements 12 is generally somewhat greater than a depth of each of the grooves 5 formed during the debossing procedure, with this height h optionally being larger than a thickness of the blank to avoid the base surface 16 from contacting the first surface 6. In this way, the base surface 16 does not contact or engage the first surface 6 of the blank 1 during the debossing procedure to minimize damage (e.g. deformation or scratching) on the second surface 7 of the blank 1.

[0024] Although specific embodiments of the invention have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that a variety of alternate and/or equivalent implementations exist. It should be appreciated that the exemplary embodiment or exemplary embodiments are only examples, and are not intended to limit the scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing at least one exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents. Generally, this application is intended to cover any adaptations or variations of the specific embodiments discussed herein.

[0025] In this document, the terms "comprise", "comprising", "include", "including", "contain", "containing", "have", "having", and any variations thereof, are intended to be understood in an inclusive (i.e. non-exclusive) sense, such that the process, method, device, apparatus or system described herein is not limited to those features or parts or elements or steps recited but may include other elements, features, parts or steps not expressly listed or inherent to such process, method, article, or apparatus. Furthermore, the terms "a" and "an" used herein are intended to be understood as meaning one or more unless explicitly stated otherwise. Moreover, the terms "first", "second", "third", etc. are used merely as labels, and are not intended to impose numerical requirements on or to establish a certain ranking of importance of their objects.

List of Reference Signs

[0026]

1	blank
2	region intended to form rounded edge

3 card material
4 corrugation
5 groove
6 first surface, face, or side of the blank
7 opposite or reverse surface, face, or side of the blank
10 apparatus
11 first debossing tool
12 linear tool element
13 second tool
14 flat or smooth counter surface
15 edge region of tool element
16 base surface of the first tool
p pitch or spacing of the tool elements
w width of edge region of the tool elements
h height of the tool elements

Claims

1. A method of forming a rounded edge in a container made from a substantially flat blank, comprising the steps:

forming a plurality of substantially linear grooves in a region of the blank intended to form said rounded edge, said grooves extending substantially parallel to an axis defining a center of curvature for the rounded edge; and
bending the grooved region of the blank about said axis such that a substantially rounded edge is obtained by virtue of bending deflection distributed over the plurality of grooves;
wherein the step of forming said grooves comprises debossing a first surface or face of the blank.

2. A method according to claim 1, wherein debossing the first surface or face of the blank comprises pressing at least one substantially linear tool element into said first surface or face of the blank, while an opposite or reverse surface or face of the blank is supported on or against a flat or smooth counter surface.

3. A method according to claim 2, wherein the substantially linear tool element comprises a raised or projecting ridge element to deboss a corresponding groove into the first surface of the blank.

4. A method according to claim 2 or 3, wherein a plurality of substantially linear tool elements are simultaneously or consecutively pressed into said first surface or face of the blank to deboss the plurality of substantially linear grooves in the blank.

5. A method according to claim 4, wherein the plurality of tool elements is provided on a debossing tool configured as a linear stamp or punch.

6. A method according to claim 4, wherein the plurality of tool elements is provided on a debossing tool configured as a rotary stamp or punch.

7. A method according to any of claims 2 to 6, wherein the counter surface comprises a substantially planar outer surface of a plate member; or alternatively, wherein the counter surface comprises a substantially smooth surface of a cylindrical roller or drum member.

8. A method according to any of claims 1 to 7, wherein the grooved region in the first surface or face of the blank forms an inner surface of the rounded edge and the opposite or reverse surface or face of the blank forms a substantially smooth outer surface of the rounded edge.

9. A method according to any of claims 1 to 8, wherein the number of grooves in said region of the blank intended to form the rounded edge is in the range of 3 to 20, preferably in the range of 5 to 15 and more preferably in the range of 6 to 12; and/or
wherein a spacing or a pitch of the grooves is in the range of 0.1 mm to 3.0 mm, preferably in the range of 0.2 mm to 2.0 mm, and more preferably in the range of 0.3 mm to 1.0 mm; and/or
wherein a depth of the grooves is in the range of 0.1 mm to 1.0 mm, and preferably in the range of 0.2 mm to 0.8 mm.

10. A method according to any of claims 1 to 9, wherein each of the grooves has a transverse cross-section that tapers towards a base of the groove, each linear tool element preferably having a corresponding frusto-conical transverse cross-section.

11. Apparatus for making a blank for a container having at least one rounded edge, comprising a first tool having one or more substantially linear tool element to impress or deboss a plurality of substantially linear grooves into a first surface of the blank.

12. Apparatus according to claim 11, wherein the first tool has a plurality of parallel raised or projecting linear tool elements, such as ridge elements, for debossing the plurality of laterally spaced linear grooves into said first surface of the blank, the first tool preferably being configured either as a linear stamp or punch, or as a rotary stamp or punch.

13. Apparatus according to claim 11 or claim 12, further comprising a second tool with a flat or smooth surface for supporting the blank as a counter surface during the pressing or debossing of the grooves into the first surface of the blank with the first tool.

14. A blank for forming a container having a rounded

edge, comprising: a plurality of substantially linear grooves in a region of the blank intended to form said rounded edge, said grooves extending substantially parallel to one another, wherein said grooves are debossed into a first surface or face of the blank that forms an inner surface of the rounded edge.

15. A blank according to claim 14, wherein an opposite or reverse surface or face of the blank in said region is substantially smooth to form an outer surface of the rounded edge.

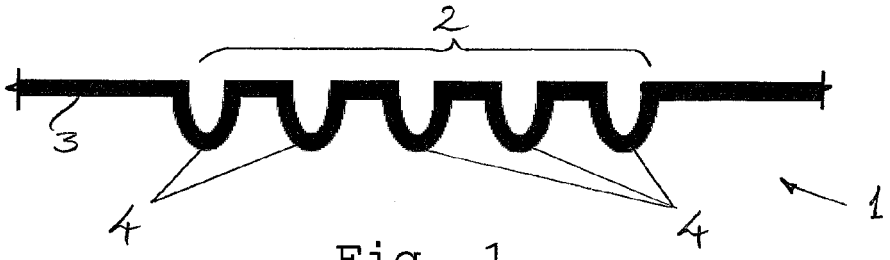

Fig. 1

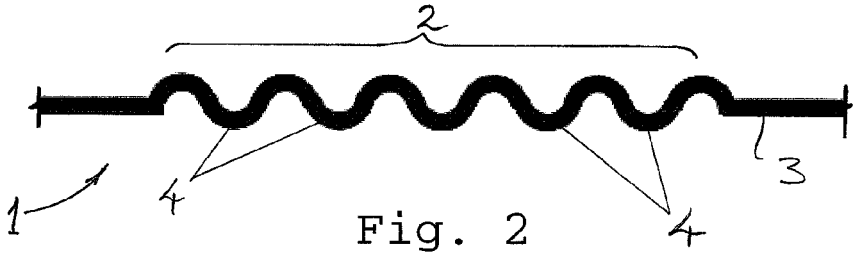

Fig. 2

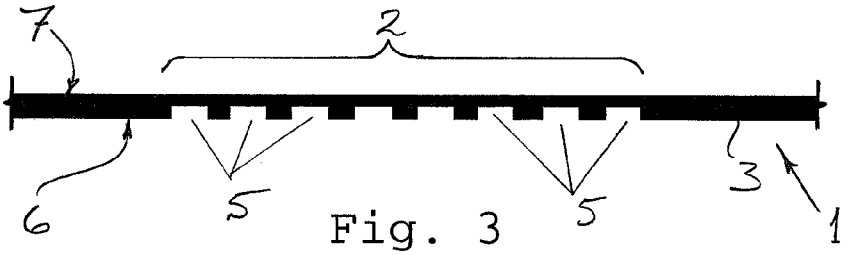

Fig. 3

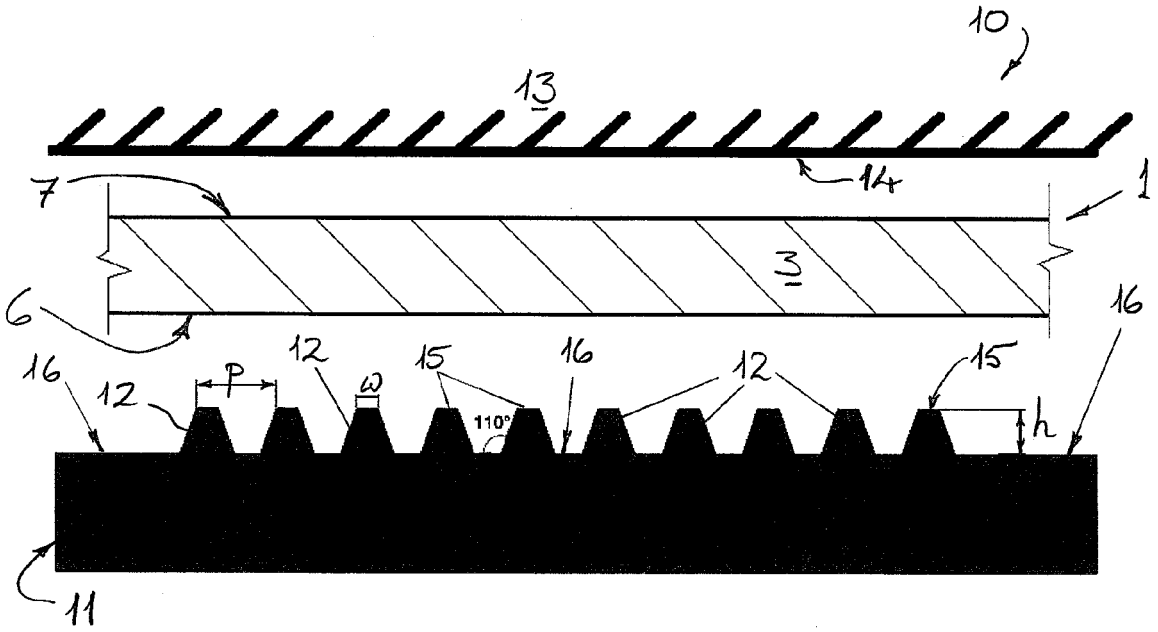

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 4567

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B31B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 April 2013	Sundqvist, Stefan

CATEGORY OF CITED DOCUMENTS

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