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(54) IMPROVEMENTS IN LIDS FOR CIRCULAR CONTAINERS

(71) We, THE METAL BOX COMPANY LIMITED, a Company Incorporated under the laws of Great Britain, of 37 Baker Street, London, W1A 1AN, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to lids for circular containers and in particular to a lid of the kind which comprises a top panel and a peripheral flange which respectively extend laterally from an inner and an outer limb of an annular plug portion of generally U-shaped channel section arranged to fit frictionally in the mouth ring of a container. Such a lid will be referred to below as "a lid of the kind described".

Lids of the kind described are well known but the construction of the known lids is such that when the lids are stacked one on the other the plug portion of one lid sometimes tends to become wedged in the plug portion of another lid thus rendering their separation difficult when the lids are to be automatically fed one at a time from a stack thereof to a high speed automatic container lidding machine. It is an object of the invention to provide a lid of the kind described which avoids or reduces to a minimum the risk of wedging when such lids are stacked.

According to one aspect of the invention there is provided a lid of the kind described in which the outer limb is substantially parallel to the axis of the lid and the inner limb converges upwardly from the base of the channel section towards the outer limb whereby the width of the open end of the channel section is less than the distance between the limbs at the base of the channel section thereby to prevent wedging of the base of the channel section of the lid in the open end of the channel section of a like lid when one lid is superimposed on the other.

According to another aspect of the invention a method of making a lid as set forth in the preceding paragraph comprises first pressing a circular blank into a die to form an annular plug portion of U-channel section with the inner and outer limbs of the channel section substantially parallel to the axis of the lid and the top panel and the flange respectively extending laterally from said inner and outer limbs and thereafter reducing the width of the open end of the channel section by causing the inner limb to converge upwardly from the base of the channel section towards the outer limb to an extent such that the width of the open end of the channel section is less than the distance between the limbs at the base of the channel section. The method may include the step of curling the flange.

In one embodiment of the invention the inner limb is caused to converge towards the outer limb by applying pressure to the side of the inner limb remote from the outer limb. The pressure may be applied by at least one frusto-conical roller rotatable about its axis and arranged to apply said pressure to the inner limb under control of a cam.

Another embodiment of the invention includes the step of forming, during the first pressing operation, a bead which extends upwards from the top panel and connects the top panel with the inner limb, and during a second press operation ironing out or flattening said bead thereby to cause the inner limb to converge towards the outer limb.

The flange may be curled while causing the inner limb to converge towards the outer limb.

In order that the invention may be fully understood, embodiments thereof will now be described by way of example with reference to the accompanying diagrammatic drawings, in which:—

Fig. 1 is a top plan of a lid according to the invention,

Fig. 2 is a section on line II-II, Fig. 1,

Fig. 3 is a section, to an enlarged scale, illustrating a part of each of two lids stacked one on the other,

5 Fig. 4 diagrammatically illustrates a stage of one method of making the lid, and

Figs. 5 and 6 respectively diagrammatically illustrate the first and second stages of another method of making the lid.

10 Referring to the drawings, the lid comprises a top panel 1 and a peripheral flange 2 which respectively extend laterally from an inner limb 3 and an outer limb 4 of an annular plug portion of generally U-shaped channel section arranged to fit frictionally in the mouth ring of a container not shown. The inner limb 3 converges upwardly from the base 5 of the channel section towards the outer limb 4, which is substantially parallel to the axis of the lid, so that the width W, Fig. 2, of the open end of the channel section is less than the distance D between the outer sides of the limbs at the base 5 of the channel, the base 5 preferably being of arcuate form as shown in Fig. 2. The top panel 1 and the flange 2 are respectively connected to the limbs 3, 4 by radiused portions 6, 7. The top panel 1 lies in a plane P1 between the respective planes P2, P3 in which lie the flange 2 and the base 5 of the channel section. The flange 2 is provided with a peripheral curl 8.

One method of making the lid will now be described with reference to Fig. 4. In this method a circular blank is, in known manner, 35 not shown, pressed into a die to form an annular plug portion of U-shaped channel section as illustrated in Fig. 4, with the top panel 1 and the flange 2 respectively extending laterally from the inner and outer limbs 3, 4, which are substantially parallel to the axis of the lid, of the U-section. The partly formed lid is then removed from the die and is transferred to a lid curling or beading machine of known kind but which is modified to effect convergence of the inner limb 3 towards the outer limb 4 which remains substantially parallel to the axis of the lid. In this embodiment the width of the open end of the channel is reduced by at least one 50 frusto-conical roller 9 rotatable about its axis, and pressure is applied to the side of the inner limb 3 remote from the outer limb 4 by the roller, or rollers 9 under control of a cam 10 provided with a spiral groove 11 to cause the limb 3 to converge upwardly from the base 5 of the channel section towards the limb 4. Preferably the curl 8 is formed on the flange 2 while the inner limb 3 is being caused to converge towards the limb 4 and curling is effected, in known manner, by a roller 12.

60 A second method of making the lid is diagrammatically illustrated in Figs. 5 and 6. When using this method a bead 13, Fig. 5 is formed during a first pressing operation performed by press tools T1, T2 shown in

broken lines, the bead extending upwards from the top panel 1 and connecting the top panel with the inner limb 3 as shown in Fig. 5. The partly formed lid is then transferred to a second press having an anvil 14 and an ironing tool 15, shown in broken lines, which iron out or flatten the bead 13 thus, as shown in Fig. 6, causing the inner limb 3 to converge towards the outer limb 4. Preferably, the curl 8 is formed on the flange 2, in known manner, while the inner limb 3 is being caused to converge towards the outer limb 4.

WHAT WE CLAIM IS:—

1. A lid of the kind described in which the outer limb is substantially parallel to the axis of the lid and the inner limb converges upwardly from the base of the channel section towards the outer limb whereby the width of the open end of the channel section is less than the distance between the limbs at the base of the channel section thereby to prevent wedging of the base of the channel section of the lid in the open end of the channel section of a like lid when one lid is superimposed on the other.

2. A lid according to Claim 1, wherein the top panel lies in a plane between the respective planes in which the flange and the base of the channel section lie.

3. A lid of the kind described substantially as herein described with reference to and as illustrated in Figs. 1 and 2 of the accompanying drawings.

4. A method of making a lid according to Claim 1 or Claim 2 by first pressing a circular blank into a die to form an annular plug portion of U-channel section with the inner and outer limbs of the channel section substantially parallel to the axis of the lid and the top panel and the flange respectively extending laterally from said inner and outer limbs and thereafter reducing the width of the open end of the channel section by causing the inner limb to converge upwardly from the base of the channel section towards the outer limb to an extent such that the width of the open end of the channel section is less than the distance between the limbs at the base of the channel section.

5. The method according to Claim 4, including the step of curling the flange.

6. The method according to Claim 4 or Claim 5, wherein the inner limb is caused to converge towards the outer limb by applying pressure to the side of the inner limb remote from the outer limb.

7. The method according to Claim 6, wherein the pressure is applied by at least one frusto-conical roller rotatable about its axis and arranged to apply said pressure to the inner limb under control of a cam.

8. The method according to Claim 4 or Claim 5, including the step of forming, during the first pressing operation, a bead which

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2. A lid according to Claim 1, wherein the top panel lies in a plane between the respective planes in which the flange and the base of the channel section lie.

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4. A method of making a lid according to Claim 1 or Claim 2 by first pressing a circular blank into a die to form an annular plug portion of U-channel section with the inner and outer limbs of the channel section substantially parallel to the axis of the lid and the top panel and the flange respectively extending laterally from said inner and outer limbs and thereafter reducing the width of the open end of the channel section by causing the inner limb to converge upwardly from the base of the channel section towards the outer limb to an extent such that the width of the open end of the channel section is less than the distance between the limbs at the base of the channel section.

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6. The method according to Claim 4 or Claim 5, wherein the inner limb is caused to converge towards the outer limb by applying pressure to the side of the inner limb remote from the outer limb.

7. The method according to Claim 6, wherein the pressure is applied by at least one frusto-conical roller rotatable about its axis and arranged to apply said pressure to the inner limb under control of a cam.

8. The method according to Claim 4 or Claim 5, including the step of forming, during the first pressing operation, a bead which



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5 extends upwards from the top panel and connects the top panel with the inner limb, and during a second press operation ironing out or flattening said bead thereby to cause the inner limb to converge towards the outer limb.

9. The method according to Claim 5 and any one of Claims 6 to 8 in which the flange

is curled while causing the inner limb to converge towards the outer limb.

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