

TAMPER-EVIDENT METAL PAIL AND LID

Technical Field

- 5 The invention relates to tabbed lids for crimping onto metal pails. More particularly, though not necessarily, the invention relates to tabbed lids comprising tinplate.

Background

- 10 Metal containers comprising pails and lids for storing industrial products, such as paints, lacquers, oils, lubricants, chemicals and the like, are well known in the art. Typical pail sizes include 5, 10 and 20 gallons. A 5 gallon pail may have a diameter of around 30 cm and a height of around 47 cm. Whilst such pails are often cylindrical, they can be other shapes such as conical and rectangular. In some cases pails are
15 tapered so that they can be nested before filling and after use. The pails and their lids may be manufactured from tinplate or from other materials such as steel or aluminium, and may be provided with a handle for lifting.

- As illustrated in Figure 1a, a known tinplate pail 1 comprises a cylindrical sidewall 3
20 and a base 5 seamed onto the sidewall 3. A curled rim 2 with a smooth surface is formed around an opening of the pail 1. The pail 1 can be sealed by a lid 6 to form a container. The lid 6 is formed by a drawing operation from a blank of tinplate or aluminium and has a centre panel 7 from which depend a plurality of castellations or tabs 8, each of which has an aperture 9 defined in a central region thereof.

- 25 As illustrated in Figures 1b and 1c, after the pail 1 is filled, the lid 6 is placed over the pail 1 opening and is crimped over the curled rim 2 and against the pail sidewall 3 using a crimping tool, which may be manually operated or may form part of an automated production line process. In some applications, an underside of the lid is
30 provided with a layer of sealing compound which forms a seal against the rim of the pail.

- As described above, each castellation or tab 8 of the lid 6 is provided with an aperture
35 9. The apertures 9 are generally circular in shape and typically have a diameter of around 8 mm. In order to open the sealed pail 1, the blade of a tool such as a

screwdriver is inserted into a tab aperture 9 and used to lever the respective tab 8 away from the pail sidewall 3 and rim 2. The process is repeated until substantially all the tabs 8 have been "released" and the lid 6 can be lifted off the pail 1.

5 Typically, the pail and the castellated lid are undamaged during the crimping and opening processes. As a result, once the original product has been used the pail and the lid may be reused or recycled. However, used pails and their lids are sometimes re-filled with counterfeit (i.e. fake, low quality) products. The original lid can be re-crimped onto the pail and a potential purchaser or consumer has no way of telling that
10 the product stored in the pail is not genuine.

Summary

15 According to a first aspect there is provided a metal lid for closing a pail. The lid comprises a centre panel, a multiplicity of crimpable tabs surrounding the centre panel, each tab defining an aperture passing therethrough for insertion of a lid removal tool through the tab, and a breakable feature linking and formed integrally with at least two of the tabs. The breakable feature is configured to break as a result of uncrimping of one of the at least two tabs.

20 The lid may be a single sheet of metal.

The breakable feature may be a bridge defined by a notch between the at least two tabs and a hole radially inwards of the notch. The bridge may have a minimum radial
25 dimension of between 0.8 and 1.5 mm.

The aperture for insertion of the lid removal tool may be a substantially circular aperture defined through a centre of the tab. A diameter of the aperture may be at least 9 mm. The aperture may be spaced at least 5 mm from an outer edge of the tab.

30 The multiplicity of tabs may comprise a plurality of pairs of tabs with the tabs of each pair comprising a breakable feature therebetween. The lid may comprise one or more crimpable tabs between each said pair of tabs, these one or more crimpable tabs not being linked to a breakable feature.

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A circumferential extent of each tab linked to a breakable feature may be between 15 and 30 degrees. At least one further tab may be provided in the gap, the further tab circumferentially depending from the centre panel and defining a substantially circular aperture in a centre thereof.

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The metal lid may comprise one of tinplate, aluminium, and may have a thickness of between 0.2 and 0.5 mm. The metal lid may comprise a layer of sealing compound extending circumferentially around the lid, radially inward of said tabs.

10 According to a second aspect there is provided a container comprising a metal pail defining an opening and the metal lid of the first aspect above. The tabs of the lid are crimped onto the pail to close the opening.

15 According to a further aspect there is provided a metal lid for closing a pail. The lid comprises: a centre panel; a multiplicity of crimpable tabs surrounding the centre panel; and a breakable feature linking and formed integrally with at least two of the tabs, the breakable feature being configured to break as a result of uncrimping of one of the at least two tabs.

20 Brief Description of the Drawings

Figure 1a is a perspective view of a known metal pail and castelled lid;

Figure 1b is a perspective view of an upper portion of the pail of Figure 1a, with an uncrimped lid;

25 Figure 1c is a perspective view of the pail of Figure 1b, with the lid crimped onto the pail;

Figure 2 is a plan view of a metal blank for forming a castellated lid according to a first embodiment of the invention, with a call-out illustrating a tamper-evident feature;

30 Figure 3a is a perspective view of a castellated lid formed from the blank of Figure 2, with a call-out illustrating the tamper-evident feature;

Figure 3b is a side view of the lid of Figure 3a;

Figure 3c is a cross-sectional view of the lid of Figure 3b;

Figure 4a is a perspective view of a metal pail and uncrimped lid according to the first embodiment;

35 Figure 4b is a perspective view of a metal pail and crimped lid according to the first

embodiment;

Figure 5a is a perspective view of the pail and lid of Figure 4b illustrating removal of the lid;

Figure 5b is a cross-sectional view of a portion of Figure 5a;

5 Figure 6a is a plan view of a metal blank for forming a castellated lid according to a second embodiment of the invention;

Figure 6b is a perspective view of the blank of Figure 6a;

Figure 7a is a schematic of the metal blank of Figure 6a;

Figure 7b is a schematic of an enlarged portion of the metal blank of Figure 6a;

10 Figure 7c is a schematic of an area A of Figure 7a comprising a tamper-evident feature;

Figure 7d is a schematic of an area B of Figure 7a;

Figure 7e is a schematic of an area C of Figure 7a;

15 Figure 8a is a perspective view of a metal pail and uncrimped lid according to the second embodiment; and

Figure 8b is a perspective view of a metal pail and crimped lid according to the second embodiment.

Detailed Description

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A metal pail and castelled or tabbed lid according to a first embodiment will be described with reference to Figures 2 to 5. The lid comprises multiple pairs of tabs, each pair comprising a tamper-evident breakable feature. A metal pail and castelled or tabbed lid according to a second embodiment will be described with reference to
25 Figures 6 to 8. This second lid comprises a combination of paired and conventional tabs.

Figure 2 illustrates a metal blank 15a which can be drawn into a castelled or tabbed lid 15b for sealing a metal pail. The blank 15a is formed, i.e. stamped out or cut, from a
30 single sheet of tinplate with a thickness of between around 0.2 and 0.5 mm. The metal blank 15a is generally circular in shape and defines a plurality of paired tabs or castellations 17a, 17b around a periphery thereof, each tab 17a, 17b having a circular aperture 18 defined in a central region thereof. Each circular aperture 18 is provided substantially in the centre of each tab 17a, 17b and has a diameter of at least 9 mm
35 and preferably around 10 mm.

Eight pairs of tabs 17a, 17b are provided, comprising sixteen individual tabs 17a, 17b. However, fewer or additional tab pairs 17a, 17b may be provided, as required. Each tab 17a, 17b in the pair has a circumferential extent α of between 15 and 30°. A gap 22 is defined between each of the pairs of tabs 17a, 17b. In other words, the periphery of the blank 15a defines a pair of tabs 17a, 17b, followed by a gap 22, followed by another pair of tabs 17a, 17b, etc.

As best illustrated in the detail of Figure 2, each pair of tabs 17a, 17b includes a tamper-evident feature. The tamper-evident breakable feature comprises a breakable bridge 19 which joins the two tabs 17a, 17b together. The bridge 19, which is integrally formed with the tabs 17a, 17b, is defined by a notch 20 between the tabs 17a, 17b, and a bridge hole 21 radially inwards of the bridge 19. An angular extent $\emptyset$ of the notch 20 opening may be around 90°. The diameter of each bridge hole 21 may be around 6.5 mm.

The radial extent 23 of the bridge 19 (i.e. the radial distance between the notch 20 and the bridge hole 21) is adjusted depending upon the size of the pail 10 and its lid 15b, such that the metal blank 15a may be reliably manufactured from the sheet metal material and drawn into a lid 15b without breaking the bridge 19. For a 300 mm diameter lid 15b, a bridge 19 width or thickness of around 0.8 to 1.5 mm is preferred. Surprisingly, even a bridge this narrow has been found not to break during drawing and crimping. It is believed that this is because the blank 15a / lid 15b material is radially compressed during the drawing and crimping operations.

Figures 3a to 3c illustrate a lid 15b drawn from the blank 15a. The lid 15b comprises a recessed centre panel 16 surrounded by a stepped sidewall 16a from which the plurality of paired tabs 17a, 17b depend. From the detail of Figure 3a it will be appreciated that, after the lid 15b has been drawn from the blank 15a, the tab apertures 18 and the tamper-evident features 19, 20, 21 are located below a rim of the lid 15b. Figure 3b is a side view of the drawn lid 15b and Figure 3c is a cross-sectional view through the line AA' of Figure 3a.

Figures 4a and 4b illustrate a lid 15b according to the first embodiment covering an opening defined by the metal pail 10. As previously discussed, the pail 10 is formed from a cylindrical sidewall 12 and base 13 and comprises a curled rim 11 around its

opening. The pail 10 is further provided with a handle 14. In Figure 4a, the lid 15b is uncrimped. In Figure 4b, the lid 15b has been crimped onto the pail 10 rim 11, such that the opening of the pail 10 is sealed by the lid 15b. The pail 10 and lid 15b together form a container.

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The bridge holes 21 and the tab apertures 18 of the lid 15b are located such, that after crimping onto the pail 10, the upper edge of each of the bridge holes 21 and tab apertures 18 are just below the curled rim 11 of the pail. The gap 22 between each of the pairs of tabs 17a, 17b (as described with reference to Figure 2) ensures that the lid
10 15b can be crimped onto the pail rim 11 without twisting or irregular folding caused by excess material, since excess material from the lid 15b can flow into the gaps 22 between tab pairs 17a, 17b as the diameter of the lid 15b decreases during crimping. During crimping, the apertures 18 in the tabs 17a, 17b become oval in shape, thus also absorbing excess lid material.

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Figures 5a and 5b illustrates the sealed pail 10 of Figure 4b being opened using a bladed tool, in this case a screwdriver. The blade of the screwdriver is inserted into a tab aperture 18 of a first tab 17a of the tab pair and used to lever the tab 17a away from the sidewall 12 of the pail 10. During this process, the bridge 19 located between
20 the tab 17a into which the blade has been inserted and the second tab 17b of the tab pair, breaks. In other words, the metal between the notch 20 and the bridge hole 21 is severed or sheared, such that the notch 20 and the bridge hole 21 become contiguous. After breakage of the bridge 19, the second tab 17b remains crimped against the pail sidewall 12 until it is levered away using the screwdriver. The width of each tab 17a,
25 17b is adjusted such that it is wide enough to form its own fold axis when crimped onto the pail 10, so that the pair 17a, 17b of tabs does not behave like a single tab during removal of the lid 15b. In order to achieve this, the circumferential extent of each tab 17a, 17b should be at least 15° from the bridge 19 to the centre of the gap 22 between tab pairs 17a, 17b.

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In order to avoid tearing of the tabs 17a, 17b themselves as the lid 15b is removed, a distance between a lowest circumferential point of the tab aperture 18 (i.e. the point nearest the tab 17a, 17b outer edge) and the tab 17a, 17b edge is preferably no less than 5 mm.

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The breakage of the bridges 19 between tabs 17a, 17b of the tab pairs provides a tamper-evident feature that enables a prospective user or purchaser of the pail 10 to see that the pail 10 has already been used. This reduces the likelihood of the pail 10 being re-used to store and sell counterfeit products. Further, the breaking of the bridges 19 creates a loud noise, such that it is obvious upon attempting to remove the lid 15b of a re-used pail 10 that the bridge 19 has already been broken. Importantly however, the breakage of the bridges 19 does not prevent reclosing and sealing of the pail 10, e.g. for storage following opening.

It will be appreciated that in order to remove the lid 15b completely from the pail 10, each bridge 19 must be broken and each tab 17a, 17b must be levered away from the pail sidewall 12 using the bladed tool, until the lid 15b can be lifted off the pail 10. In the case where there are eight pairs of tamper-evident tabs 17a, 17b, there are eight bridges 19 to break. These bridges 19 may be broken in any order.

Figures 6a, 6b and 7a to 7e illustrate a castellated or tabbed blank 25a according to a second embodiment. A lid 25b formed from this blank 25a may be used with the pail 10 of the first embodiment and may be crimped to and removed from the pail 10 in substantially the same way.

As illustrated in Figure 6a and 6b, the metal blank 25a from which the lid 25b is drawn is substantially circular in form and includes a plurality of paired tabs or castellations 27a, 27b comprising a tamper-evident feature around a periphery thereof, each tab 27a, 27b defining a circular aperture 28. The tamper-evident feature comprises a notch 30, a bridge hole 31 and a bridge 29 therebetween. Four pairs of tamper-evident tabs 27a, 27b are provided, comprising eight individual tabs 27a, 27b. However, fewer or additional tab pairs may be provided, as required.

In addition to the pairs of tamper-evident tabs 27a, 27b the periphery of the blank 25a includes a plurality of standard or conventional tabs 27c. The conventional tabs 27c do not include any tamper-evident bridges, notches or bridge holes, but each conventional tab 27c does define a tab aperture 28 for use in removal of the lid 25b. The blank 25a comprises eight conventional tabs 27c in addition to the four pairs of tamper-evident tabs 27a, 27b, but this number may be varied according to the pail diameter.

As illustrated in Figures 6a and 6b, each pair of tamper-evident tabs 27a, 27b is separated by two conventional tabs 27c, there being a gap 32a between each of the conventional tabs 27c and a gap 32b between the conventional tabs 27c and the pair of tamper-evident tabs 27a, 27b. Each conventional tab 27c may have a circumferential extent β of around 22.5° . Similarly, each tamper-evident tab 27a, 27b may have a circumferential extent ϵ of around 22.5° . As described above, a tamper-evident feature is included between each tab 27a, 27b of the pair of tamper-evident tabs 27a, 27b.

Figures 7a to 7e illustrate the various configurations of the notch 30 (region A; Figure 7c), the gap 32a between two sequential conventional tabs 27c (region B; Figure 7d) and the gap 32b between a conventional tab 27c and a pair of tamper-evident tabs 27a, 27b (region C; Figure 7e). It will be appreciated that a circumferential extent of the gap 32a between the two conventional tabs 27c (illustrated by Figure 7d) is less than that of the gap 32b between a conventional tab 27c and a pair of tamper-evident tabs 27a, 27b (illustrated by Figure 7e). Gap 32a has a circumferential extent 34a of approximately 9.20 mm at its narrowest point, whereas gap 32b has a circumferential extent 34b of 11.32 mm at its narrowest point. It will be further appreciated that an overall depth 33a of gap 32a is greater than that of gap 32b. Gap 32a has an overall depth 33a of approximately 14.48 mm while gap 32b has an overall depth 33b of approximately 13.48 mm. The increased gap 32b between the conventional tab 27c and the pair of tamper-evident tabs 27a, 27b absorbs excess material from the crimping operation, minimising wrinkling of the lid material in the region between the tabs 27a, 27b, 27c.

Figures 8a and 8b illustrate a lid 25b according to the second embodiment covering an opening defined by the metal pail 10. The lid 25b is drawn from the blank 25a of Figures 6 and 7. In Figure 8a, the lid 25b is uncrimped. In Figure 8b, the lid 25b has been crimped onto the pail 10 rim, such that the opening of the pail 10 is sealed by the lid 25b. As previously discussed, the lid 25b is crimped onto the pail 10 in the same way as the lid 15b of the first embodiment. The lid 25b is removed from the pail 10 by breaking the bridges 29 and using a bladed tool to lever the tabs 27a, 27b, 27c away from the pail 10 in substantially the same way as the lid of the first embodiment.

In the lid 25b of the second embodiment, the provision of pairs of tamper-evident tabs 27a, 27b interspersed with conventional tabs 27c allows more space for excess material from the tabs 27a, 27b, 27c to spread out during crimping, as discussed above. Fewer tamper-evident tabs 27a, 27b also enables faster opening of the pail 10 since fewer bridges 29 are required to be broken.

A further benefit of the tamper-evident lids 15b, 25b described above is an improvement in lid security in terms of pressure and drop performance. This can lead to a reduction in the thickness (gauge) of the lid material.

It will be appreciated by the skilled person that various modifications may be made to the above described embodiments without departing from the scope of the present invention. For example, although the embodiments described herein comprise circular pails and lids, the pails and lids may be non-circular i.e. square, rectangular, tapered. Where the lid is rectangular the tamper-evident bridges may be formed between tabs on the corners of the lid.

In an alternative embodiment, all of the tabs on the lid are tamper-evident tabs and each tab is joined to the two adjacent tabs by a tamper-evident bridge. In a further alternative embodiment, tamper-evident tabs can be opened by lifting up with a finger rather than by using a screwdriver. In such an embodiment, the tabs are not provided with apertures for insertion of a removal tool and the outer rim of the tab has a curled edge to improve safety.

CLAIMS:

1. A metal lid for closing a pail, the lid comprising:
a centre panel;
5 a multiplicity of crimpable tabs surrounding the centre panel, each tab defining an aperture passing therethrough for insertion of a lid removal tool through the tab; and
a breakable feature linking and formed integrally with at least two of the tabs, the breakable feature being configured to break as a result of uncrimping of one
10 of the at least two tabs.
2. A metal lid according to claim 1, wherein the lid is a single sheet of metal.
3. A metal lid according to claim 1 or claim 2, wherein the breakable feature is a
15 bridge defined by a notch between the at least two tabs and a hole radially inwards of the notch.
4. A metal lid according to claim 3, wherein the bridge has a minimum radial dimension of between 0.8 and 1.5 mm.
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5. A metal lid according to any one of the preceding claims, wherein the aperture for insertion of the lid removal tool is a substantially circular aperture defined through a centre of the tab.
- 25 6. A metal lid according to claim 5, wherein a diameter of the aperture is at least 9 mm.
7. A metal lid according to any one of the preceding claims, wherein the aperture is spaced at least 5 mm from an outer edge of the tab.
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8. A metal lid according to any one of the preceding claims, wherein the multiplicity of tabs comprises a plurality of pairs of tabs with the tabs of each pair comprising a breakable feature therebetween.

9. A metal lid according to claim 8 and comprising one or more crimpable tabs between each said pair of tabs, these one or more crimpable tabs not being linked to a breakable feature.

5 10. A metal lid according to any one of the preceding claims, wherein a circumferential extent of each tab linked to a breakable feature is between 15 and 30 degrees.

10 11. A metal lid according to any one of the preceding claims, wherein the lid comprises one of tinplate, aluminium.

12. A metal lid according to any one of the preceding claims and having a thickness of between 0.2 and 0.5 mm.

15 13. A metal lid according to any one of the preceding claims and comprising a layer of sealing compound extending circumferentially around the lid, radially inward of said tabs.

20 14. A container comprising:
a metal pail defining an opening; and
the metal lid of any one of claims 1 to 13, wherein the tabs of the lid are crimped onto the pail to close the opening.