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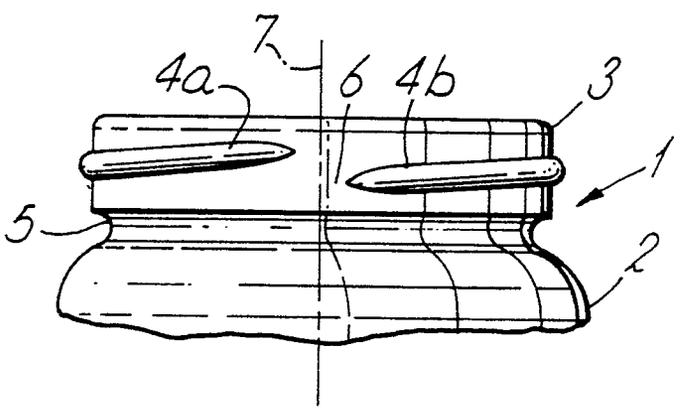
(54) Threaded container and closure therefor.

(57) A threaded container has non-overlapping thread portions 4a and 4b of a multi-start thread such that at the parting line 7 of the external mould parts for the moulded container I there is a zone in which the generatrices of the container rim do not intersect any of the thread portions of the multi-start container external thread. This facilitates parting of the external mould parts of the container.

Preferably the container rim is closed by a closure having an internal multi-start thread comprising thread portions which are overlapping such that in every position of the generatrix of the closure skirt the generatrix intersects a thread portion of the skirt.

Fig.1.



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THREADED CONTAINER AND CLOSURE THEREFOR

The present invention relates to a threaded container, and to a closure for such a container, and in particular the container may be a jar of glass or of relatively rigid plastic material.

When moulding threaded containers a difficulty arises in stripping the moulded container from the mould because the thread-defining undercut of the mould interferes with the moulded thread itself. GB-A-1351256 proposes interrupting the thread of a thin-walled container to impart radial deformability to facilitate stripping. However, this does not apply for containers of relatively rigid material such as glass or hard plastics (for example acrylonitrile-butadiene-styrene or polyethylene terephthalate). Here the moulding of the threads which are intended to follow a helical path around the rigid container rim is achieved by moulds designed to separate by movement perpendicular to the axis of the rigid container rim.

One commonly used solution to this problem has been to provide the helically extending threads, where they intersect the parting line of the mould parts, with a region in which the helical path of the thread portion is deformed to a short section which extends with zero pitch around the container rim so that at this point where the mould parts part from one another their movement is parallel to the localised extent of the thread portion. However, while this system has been used successfully on glass jars intended for metal caps of the "lug cap" type it has not been possible to provide a helically threaded cap, for example moulded of plastic material, to give adequate engagement with such a distorted container rim thread. As the threaded cap is screwed down there will be a tendency for only the lead-in part of the rim thread up to the parting line location to engage the threads of the cap. This restriction of the length of thread portion over which thread-to-thread engagement occurs also has the disadvantage that due to the stresses in the cap resulting from the screwing down forces being concentrated at these thread-to-thread contact zones the cap skirt tends to bulge outwardly at the contact zones and inwardly at locations away from the contact zones, and the cap assumes a non-circular configuration, by virtue of the elasticity of the cap skirt and tends to leak and/or to given an unsatisfactory appearance. This tendency of the cap to bulge is exacerbated if the cap is heated, for example, if the container after the cap has been closed on it is pasteurised or sterilised. Injection of steam into the head space of the container while the cap is being closed onto the container will also heat the cap and thereby increase the tendency to bulge.

It is an object of the present invention to overcome the above-mentioned deficiencies.

Accordingly, the present invention provides a moulded threaded container having a rim provided with a multi-start thread, the thread consisting of at least two non-overlapping thread portions characterised in that the thread portions are arranged such that at least at the parting line of the container mould parts the container rim generatrix fails to intersect any of the container rim thread portions at least in the main extent of the thread away from the thread run-out portions.

A glass container having two non-overlapping thread starts is disclosed in GB-A-225924, where the mould parting line intersects the thread.

A more detailed aspect of the present invention provides the combination of a threaded moulded container and a threaded closure, wherein the thread of the container is a multi-start external thread on a cylindrical container rim and the thread of the closure is a multi-start internal thread, wherein the thread portions of the container rim are non-overlapping, characterised in that the container rim mould parting lines occur where said container rim thread portions are non-overlapping, and in that the thread portions of the closure skirt are mutually overlapping such that at all positions around the closure skirt the generatrix of the closure skirt intersects at least one of the thread portions of the closure skirt thread.

In order that the present invention may more readily be understood the following description is given, merely by way of example, with reference to the accompanying drawings in which:-

FIGURE 1 is a side elevational view of a threaded container in accordance with the present invention;

FIGURE 2 is a development view showing one start of the container thread and a corresponding start of the thread of a closure intended to be screw-fitted on the container of Figure 1;

FIGURE 3 is detail view of an alternative embodiment of container having a closure attached;

FIGURE 4 is a view of yet a further embodiment of container having a closure attached; and

FIGURE 5 is a view of a still further modified form of container with a further modified form of closure equipped with a tamper-evident feature.

Referring now to the drawings, Figure 1 shows a container in the form of a jar 1 having a body 2 and a rim 3 at the open end.

Around the rim 3 is a two-start thread having thread portions 4a and 4b. Below the cylindrical rim 3, and between it and the jar body 2 is a transfer groove 5 designed to allow a hot just-moulded container I to be lifted from the moulding station to a cooling station by means of transfer forks well known in the glass blow moulding industry.

As shown in Figure I, the thread portions 4a and 4b are non-overlapping, and define between them a region 6 in which the mould parting line 7 for the container-forming mould arises. In this particular case, given a two-start thread 4a, 4b, the mould can be a simple two-part external mould which has opposed mould portions which advance towards and away from the parting plane defined by the line 7 of Figure I and extending perpendicular to the paper in Figure I.

At the parting line 7 where the two mould parts come into engagement, there is no helically extending thread part of the container rim 3 and hence no problem arising from purely tangential movement of the mould perimeters at that location.

Conventionally a multi-start thread on a container rim has the various thread portions overlapping, i.e. there is no generatrix of the container rim which is not intersected by a part of the thread. For example a four start thread has four regularly staggered thread portions which each extend over more than a quarter of the neck rim circumference. The present invention differs from such constructions in deliberately allowing for non-overlapping of the threads, at least in the main extent of the thread away from the thread run-out portions, and preferably even avoiding overlap of the thread run-out portions. Indeed, as shown in Figure I, the thread run-out portions stop short of one another so as to define, between the two thread portions 4a and 4b, the above-mentioned zone 6 in which the neck rim generatrix (not shown but which would be parallel to the parting line 7) does not intersect either of the thread portions 4a and 4b.

Figure 2 illustrates a still further feature of the present invention and is a development view of the container rim 3 of Figure I and shows only the thread portion 4a of Figure I. Figure 2 also shows a corresponding thread portion 8a of the multi-start internal thread of a container closure, such as a cap, to fit on the jar I of Figure I and it is clear from Figure 2 that the closure internal thread portion 8a is considerably longer than the container rim external thread portion 4a. In this particular case the closure thread portion 8a is sufficiently long for there to be overlap of the thread portions of the closure, and in this case the overlap is such that the main thread portions apart from the thread run-out portions are fully overlapping. In other words every generatrix of the closure intersects at least one portion 8a or 8b of the closure skirt interior.

The advantage of the overlapping configuration of the closure internal thread portions will now be explained:-

If we consider the situation in Figure I where an internally threaded closure is screwed onto the cylindrical rim 3 of the jar I, the screwing down forces result in the skirt of the cap being under tension, as a result of which the threads of the closure tend to ride-up over the threads of the jar. If there is an internal pressure in the closed jar or if an internal pressure results when the closed jar is subjected to a heat treatment operation, such as a pasteurisation or sterilisation, this internal pressure will further increase the tendency of the threads of the closure to ride-up those of the jar. Upward movement will be resisted by the engagement of the upper side faces of the closure thread portions 8a and 8b with the underneath side faces of the container rim thread portions 4a and 4b. Because of the generally tapering cross-section of the container threads 4a and 4b (see the right and left extremities of the illustrated rim 3 of Figure I) and the corresponding generally tapered configuration of the thread portions 8a and 8 b of the closure, the closure threads will tend to ride up over the container threads causing the closure to expand radially in the regions where there is thread-to-thread engagement between the closure and the container.

This distortion of the closure is possible because of the relatively flexible nature of the plastic closure which may, for example, be formed of polyethylene, polypropylene, ethylene-propylene copolymers, polyacetals, polycarbonates, polyesters or polystyrene, or mixtures of these. The closure may also include a filler such as calcium carbonate talc, china clay or glass fibres. These fillers would be incorporated into the material of the closure to improve their rigidity and mechanical strength and/or to render them less permeable to gases and water vapour.

The tendency for outward bulging of the closure where there **is** thread-to-thread engagement between the closure and the jar rim is facilitated by the existence of the region 6 at which all generatrices of the jar neck rim 3 **fail** to intersect a jar rim thread portion 4 a and 4b, since this allows the surrounding part of the closure skirt to deform radially inwardly as the skirt effectively acts as an inextensible but flexible hoop transforming itself from a truly circular configuration to a slightly oval or elliptical configuration. This effect results in undesirable change in the shape of the closure, likely to be made more noticeable if the closure is provided with a tamper-evident ring at its skirt lower rim and not subject to such radially inward and outward deformation. Furthermore the result could

be that the closure rises sufficiently for the seal provided by the conventional closure sealing gasket against the upper end face of the rim of the container to fail.

Such inward deformation of the part of the closure skirt immediately surrounding the zone 6 of no thread overlap is resisted in accordance with the present invention by virtue of the fact that the extra long closure skirt internal thread portions will in all rotational positions of the closure surround the equiangularly spaced (in this case diametrically opposed) zones 6 of non-overlap and will therefore limit the extent to which the closure skirt is able to deform inwardly at the zones 6. Thus the thread tip of the **closure** thread limits inward movement of the closure skirt towards the part of the neck finish cylinder 3 in the zone of non-overlap 6 and hence an inextensible closure skirt will be incapable of sufficient radially outward displacement upon upward axial thrust of the closure to permit the closure seal to be broken or to allow noticeable closure distortion from the truly circular configuration.

Generally the thread portions 8a and 8b of the closure are overlapping and able to intersect every position of the generatrix of the closure skirt, in order to provide for substantially the whole of the periphery of the container rim 3 to be closely surrounded by the thread tip of a closure skirt thread 8a or 8b.

In the preferred form illustrated in Figures I and 2, the container rim thread portions 4a and 4 b each extend over less than 180° and are arranged so that they do not overlap at the mould parting lines 7. On the other hand, each closure skirt thread extends over at least 180° of the closure, and preferably substantially 3/4 turns (270°) of the closure in order to provide the desired effect at the zone of non-overlap 6.

If it is desirable to adopt a container external mould consisting of more than two mould parts, for example three mould parts, then it is equally feasible for the multi-start thread on the rim of the container to have more than two starts, for example there may be three thread starts in the case of a three-part mould. However, even in this case there will be a non-overlapping arrangement of the container rim thread portions at the parting lines and there will preferably be adequate peripheral extent of the several thread portions (for example three) of the multi-start thread internally of the closure skirt so as to ensure that each of the several zones 6 of non-overlap (in the example three) has every generatrix of the closure skirt in that position intersecting one of the closure skirt thread portions.

As indicated above, it is envisaged that the closure to be used with the container shown in Figure I will be equipped with a tamper-evident feature. Any suitable tamper-evident arrangement can be used.

Furthermore, it is envisaged that the closures to be used with the container of Figure I may embody the barrier label characteristic of our British Patent Application No. 8604881 or may have a barrier coating of the type disclosed in our British Patent Application No. 8531717.

Furthermore, although glass and rigid plastic have been quoted above as the possible materials for the container, any other relatively rigid material may be used. Furthermore, such a relatively rigid material, including polyethylene terephthalate, may be coated with a barrier coating such as a coating of polyvinylidene chloride.

Although the above-described embodiment of the invention shows a glass jar, the container may be of any other form, such as a bottle, which has a threaded rim or neck.

Figure 3 shows a side elevational view, similar to that of Figure I, but showing only a detail and also showing the position of one form of threaded closure to fit on the container. In this case the container is a tall jar.

Figure 4 shows an alternative embodiment in which the container closure is much the same as that shown in Figure 3 but where the container is a bottle having an outwardly projecting bead II below the threads of the container rim. This bead II serves to facilitate transfer of a hot moulded bottle from the mould station to a cooling location.

Figure 5 shows yet a further possibility in which the underside of the threaded neck region borders on a transfer groove I2 below which is an outwardly extending bead I3 co-operating with a radially inwardly extending bead I4 of a tamper-evident feature I5 at the foot of the bottle closure skirt. In this particular embodiment the tamper-evident feature includes a tear-off peripheral strip I6 which has to be removed before the closure proper. I7, can be removed. However, any other suitable form of tamper-evident feature, such as a direct bridging between the rim of the closure I7 and the tamper-evident ring I5, can be used.

It will of course be understood that because of the generally tapering cross-section of the thread portions of the neck rim of the container, away from the neck mould parting line 7, there will not be any noticeable interference between the container neck thread portions and the mould parts.

Although, above, the closure has been exemplified as a moulded screw cap, it may instead be made of metal sheet and may either be pre-threaded with its multi-start thread or be rolled-on to the threaded container neck as the way of forming the threads.

Claims

I. A moulded threaded container having a rim (I) provided with a multi-start thread (4a and 4 b), the thread consisting of at least two non-overlapping thread portions (4a and 4b) characterised in that the thread portions are arranged such that at least at the parting line (7) of the container mould parts the container rim generatrix fails to intersect any of the container rim thread portions (4a and 4b) at least in the main extent of the thread away from the thread run-out portions.

2. A container according to claim I characterised in that in the vicinity of said container mould part parting line (7) the generatrix of the container rim does not intersect any of the extent of said thread portions (4 a and 4b), including the thread run-out portions thereof.

3. A container according to either one of the preceding claims characterised in that in the vicinity of the container rim mould part parting lines (7) there is a circumferentially extending zone in which all of the container rim generatrices fail to intersect any part of said container rim thread portions (4a and 4b).

4. A container according to any one of the preceding claims, characterised in that it is formed using two diametrically opposed external mould parts for the container, mounted for movement towards and away from a parting plane, and in that the container rim multi-start thread is a two-start thread with non-overlapping thread portions.

5. The combination of a container according to any one of the preceding claims, with a closure (I7) having a multi-start thread (8a, 8b) with the same number of thread starts as the container characterised in that the peripheral extent of the thread portions (8a and 8b) of the closure thread are considerably in excess of the peripheral extent of the thread portions (4a and 4b) of the container rim thread.

6. The combination of a threaded moulded container and a threaded closure, wherein the thread of the container is a multi-start external thread on a cylindrical container rim and the thread of the closure is a multi-start internal thread, wherein the thread portions of the container rim are non-overlapping, wherein the container rim mould parting lines occur where said container rim thread portions are non-overlapping, and wherein the thread portions of the closure skirt are mutually overlapping such that at all positions around the closure skirt the generatrix of the closure skirt intersects at least one of the thread portions of the closure skirt thread.

7. A container and closure according to claim 5 or 6, characterised in that the closure is moulded of plastic and has a tamper-evident feature.

8. A container and closure according to claim 5, 6 or 7, characterised in that the closure is moulded with an integrally moulded label serving as an oxygen barrier.

9. A container and closure according to claim 5, 6, 7, or 8, characterised in that the closure (I7) is moulded of a gas-permeable material and is then provided with a barrier coating of higher impermeability to gas, at least in the end panel of the closure.

I0. A container and closure according to any one of claims 5 to 9, characterised in that the closure (I7) is moulded of a material including at least one filler.

Fig.1.

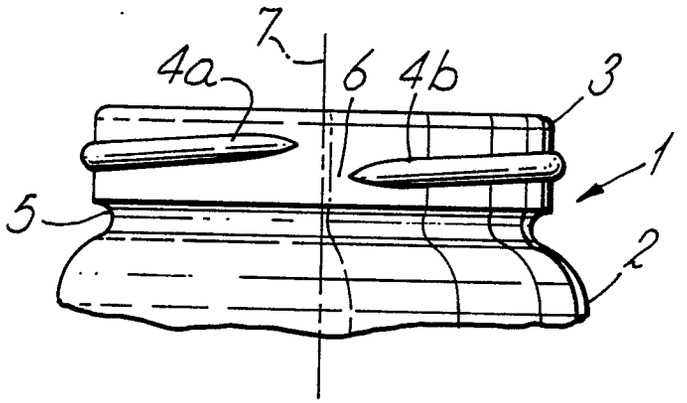

Fig.2.

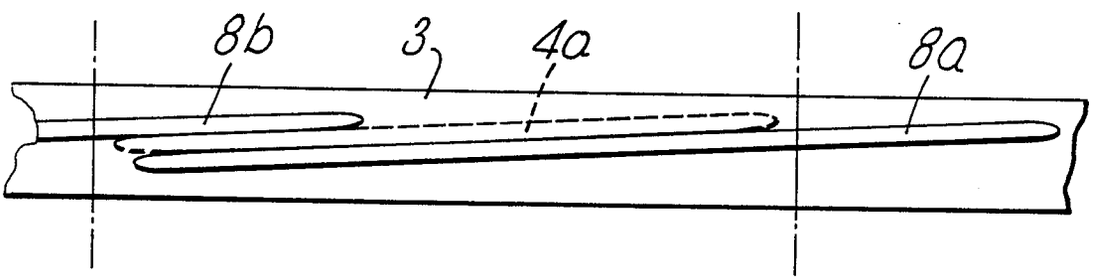

Fig.3.

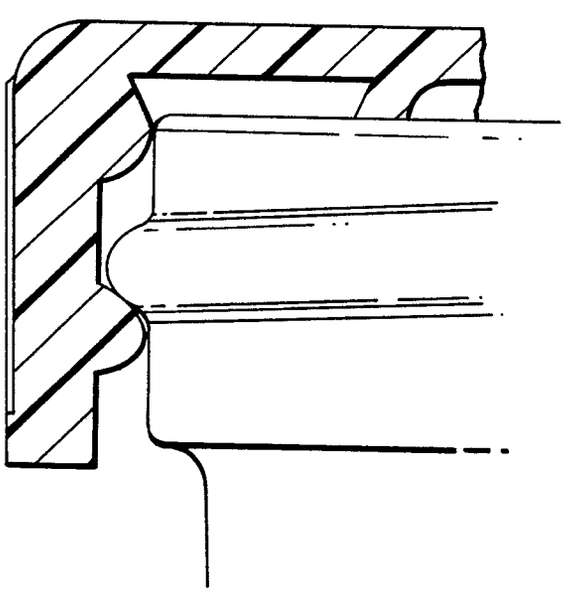

Fig.5.

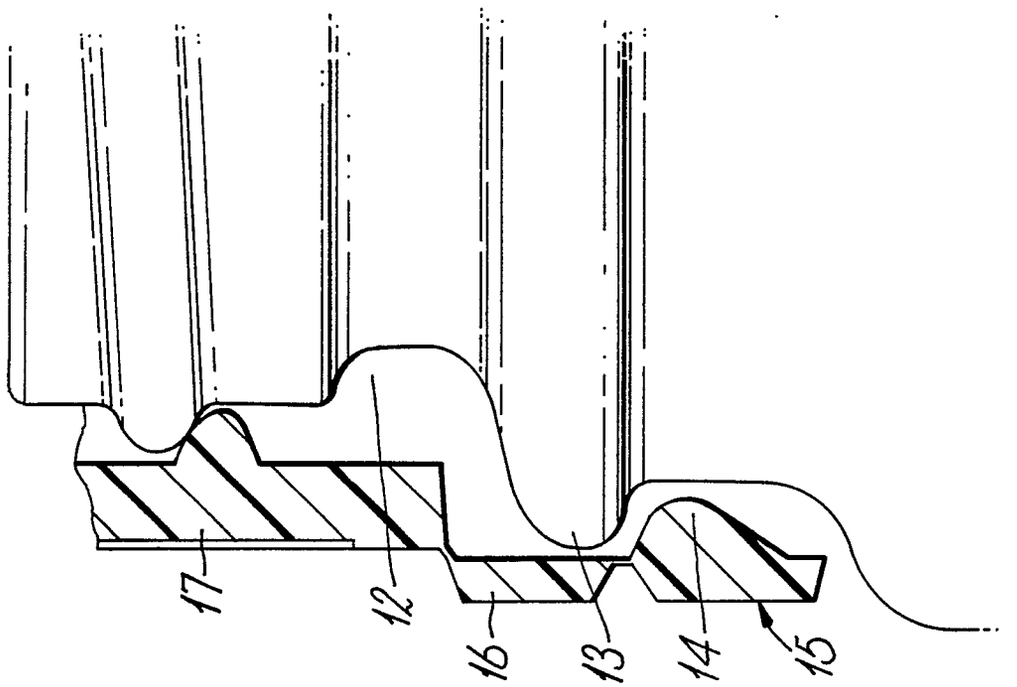

Fig.4.