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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Closures

We, METAL CLOSURES LIMITED, a British Company, of Bromford Lane, West Bromwich, Staffordshire, 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:—

The present invention relates to improvements in closure seals for containers having externally threaded necks and in particular to an improvement of the well-known "Pilferproof" (Registered Trade Mark) closure seal described in British Patent No. 369494.

The closure seal described in that Patent is applied to an externally screw-threaded bottle by a rolling process and is formed of a shell of thin ductile metal, such as light gauge aluminium. It has a top and skirt formed of an upper part, which although it may be pre-threaded, is usually thread-rolled into engagement with thread on the bottle neck during application to a bottle, and a lower part, which, in application to a bottle, is rolled into engagement under a rib on the bottle neck to act as a locking ring. An interrupted slit line forms a boundary between the upper part and lower part of the skirt so that they are connected to each other only by a series of angularly spaced bridges. When a sufficient torque is applied to the upper part of the closure in the unscrewing direction, the bridges rupture, leaving the lower part anchored under the rib on the bottle neck.

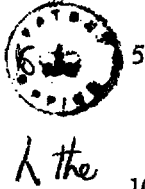
A number of attempts have been made to modify this type of closure in such manner that the locking ring, formed by the lower part of the skirt, automatically separates from the bottle neck at the same time as the bridges are ruptured when the closure is first removed from the bottle by the normal unscrewing movement of the upper part. There are obvious advantages in achieving such result, particularly when the bottle is intended

to be re-used eventually. However, although such attempts have been made, the modified closures have not heretofore operated satisfactorily in this respect.

The reasons for such failure have now been carefully analysed and it has been concluded that where a weakening has been introduced into the locking ring, to permit it to be separated from the bottle, it is impossible in an ordinary manufacturing process to form a weakening in the locking ring with such accuracy that frequent failure will not occur. In previously known seals the bridges connecting the upper part to the locking ring were substantially all of equal thickness so that the application of torque to the upper part of the closure led to substantially simultaneous rupture of all the bridges. Failure of previously suggested seals having a locking ring intended to burst automatically on unscrewing the upper part of the closure were basically due to one of two causes, (1) weakening too weak so that bridges did not break, but locking ring separated from bottle, thus defeating the function of the locking ring, or (2) weakening in locking ring too strong, so that the bridges all ruptured leaving the locking ring on the bottle.

The successful solution to the problem has arisen out of a fresh approach. If one of the bridges joining the locking ring to the upper part of the skirt of the closure is made stronger than the other bridges, under the practical conditions encountered when closures are applied to bottles, it is found that this bridge will survive the other bridges on unscrewing the closure. This surviving bridge may be employed to transmit sufficient torque to the locking ring to burst it open, so that the burst locking ring may be removed with the upper part of the closure and may then be torn off the upper part after removal from the bottle. The upper part is then used as a re-closure, as is usual with tamperproof seals.

[Price 4s. 6d.]



The stronger bridge may be considered to define the two ends of an interrupted slit line, which does not extend completely around the periphery of the closure. If the end of this interrupted slit line communicates with or is continued as a weakening line extending down across the locking ring, the locking ring can readily be made to break away from the bottle by reason of tension applied to it through the surviving strong bridge.

According to the present invention there is provided a closure seal of the type having a shell formed of thin ductile metal and having a top and a skirt, which is divided into an upper part, adapted to have thread formed therein, and a lower part, which constitutes a locking ring, by a peripheral slit line, interrupted by a series of angularly spaced bridges, characterised in that a narrow gap is provided between one pair of bridges in said slit line, one of said pair of bridges being substantially stronger than any of the other bridges and in that a weakening line extends transversely across the lower locking ring part to meet the peripheral slit line at said narrow gap. It will be understood that the strong bridge may be constituted by a width of metal, which might be considered to be too wide to be properly called a "bridge". Thus, the strong "bridge" might extend through an angle of 5° or more.

The weakening line in the locking ring may be constituted by a straight cut across the locking ring, extending from the bottom edge of the locking ring for the full distance up to the peripheral slit line. However, it is also possible to leave one or more narrow bridges in this line also, particularly at the top and bottom ends. Where the bridge is at the top end, the cut line across the locking ring could be considered as failing to extend right up to the peripheral slit line. The weakening line in the locking ring can also be formed in whole or in part by a line of perforations.

The weakening line in the locking ring part of the skirt is preferably a cut inclined at an angle of about 70° to the peripheral slit line and for ease of manufacture preferably extends up the side of the strong bridge, although when the weakening line in the locking ring is provided with one or more bridges or other interruptions it is preferred that it be perpendicular to the peripheral interrupted slit line.

Preferably the strong bridge is on the right-hand side of the gap (viewed from outside) for an ordinary right-hand thread bottle. The narrow gap between the pair of bridges is preferably of the order of about 0.075" (as compared with about 0.375" between the other bridges) and the bridge at the left-hand side of the gap is preferably weaker than all the other bridges. The strong bridge is preferably 40—60% wider than the ordinary bridges, but may be much more, whilst the adjacent bridge is preferably 5—20% narrower than them.

When a closure having a completely split locking ring is applied to the normal glassware designed for a "Pilferproof" closure, it is impossible to prise open the split locking ring far enough to permit the closure cap to be removed without rupture of one or more of the bridges. Since the bridge at the left-hand side of the gap is the weaker of the bridges adjacent the split, any tampering with the closure is liable to result in the rupture of that bridge, so that such tampering becomes obvious on inspection of the closure.

On the other hand, when the closure is opened in the ordinary way by applying a twist to the upper part of it, all the bridges, with the exception of the strong one, rupture, so that the locking ring then becomes a strip of metal attached at one end only to the bottom edge of the threaded skirt of the upper part. It then definitely separates from the bottle with the replaceable threaded cap, formed by the upper part of the closure and, if so desired, the remains of the locking ring can then be readily torn off the threaded cap.

As has been stated above, the "Pilferproof" closure is applied to a bottle by a rolling operation. The inclination of the slit in the locking ring portion at the base of the skirt is just sufficient to facilitate proper application when the skirt rollers pass over the slit area in a clockwise direction. The slit area always closes under the conventional rib on the bottle without disruption of the immediately adjacent bridges. The angle of the slit also permits metal at the two edges of the slit to overlap slightly to permit slack material to be tucked more readily under the rib.

The formation of a slit right across the whole width of the locking ring portion of the closure materially contributes to the ease with which it can be broken away from the bottle neck. In all the prior suggestions known to us for the modification of the "Pilferproof" closure the locking ring, although slit partially across and/or weakened across its full width, was not slit across its full width and in all cases remained in the form of a complete band.

It was to be expected that a satisfactory "Pilferproof" closure could not be produced with a fully laterally severed locking ring portion, because not only would such severance make it easier to try to prise open the locking ring without rupture of any of the bridges, but also would lead to great difficulties in applying the closure to a bottle using conventional machinery.

The locking ring is tucked under the bottle rib by the action of a roller. During the operation of tucking the ring under the rib there is a downward drag tending to pull the ring away from the upper part of the closure by reason of the reduction in the diameter of the lower edge of the ring. At the same time

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due to the rolling action there is a tendency to drive the band and twist it off the upper section so that these two effects together tend to cause a downward tearing movement. These effects are normally resisted by the connecting bridges, which join the lower, locking ring, portion of the closure to the upper portion, but when the span of the locking ring between any pair of bridges at the normal spacing is interrupted by a slit, the local system of support for the particular span is disturbed and there will be a tendency during the tucking operation for the portion of the ring in the area of the slit to be dragged down and to be distorted by the action of the forming roller. The larger is the span between adjacent bridges the more pronounced this possibility of distortion becomes.

However, by introducing an additional bridge close to the strong bridge the effect of the slit is contained in a relatively small space. The broken span is now considerably reduced in width and effect and hence the application of the locking ring can be successfully accomplished and the troubles before referred to are completely obviated.

It will be appreciated therefore that the adoption of the carefully disposed bridges permits a closure seal to be applied to a bottle with a fully laterally slit locking ring, which from normal consideration of the problem might be thought not to be possible.

One construction of closure made in accordance with the invention is hereinafter described with reference to the accompanying drawings wherein:

Figure 1 is a view of a closure, partly in section, in the unapplied condition,

Figure 2 is a view of the closure applied to a bottle top,

Figure 3 is a section on line A—A of Figure 1, and

Figure 4 is a scrap view illustrating the possible overlapping of the locking ring.

The closure seal takes the form of a metal shell, in the top end of which any suitable form of gasket may be placed. The metal shell is made as a pressing from light gauge aluminium container sheet and comprises a top 1 and a skirt, comprising an upper part 2 and a lower part 3. The upper part is formed with a ring of knurling 4 to act as a grip to facilitate removal. A plain cylindrical zone 5 is adapted to be rolled into engagement with thread on the neck of the bottle to which the closure seal is to be applied.

At the junction between the upper part and the lower part of the skirt there is a slight protuberance 6 and in this is cut a series of aligned slits 7, arranged so as to leave bridges 8 connecting the upper part 2 to the lower part 3 of the skirt. The comparative size and disposition of the bridges is shown in Figure 3, where it will be seen that there are normal bridges 8, separated from each other by slits

7 of equal length. The special feature of the invention lies in the provision of a stronger bridge 9, which is separated from an adjacent bridge 8' by a narrow gap in the form of a short slit 10. The bridge 8' is preferably somewhat narrower than the ordinary bridges 8, but it is not essential that it should be so. Indeed it can be somewhat stronger than them without departing from the invention. A cut line 11 crosses the lower part 3 at an angle of about 70° to the slit line 10 and is preferably an extension of the side of the strong bridge 9, although it may in fact join the slit line 10 anywhere between the bridges 9 and 8'.

When the closure seal is applied to a bottle, as shown in Figure 2, the lower margin of the lower part 3 is tucked under a rib on the neck of the bottle. Since the metal shell is made to a substantially fixed size, but the rib on the bottle neck is subject to the inevitable differences to be found in commercial glassware, it is necessary for the closure to be capable of being applied with a certain degree of overlap across the slit line 11 when the rib is towards the bottom limit of the tolerance permitted. With the angling of the slit line 11 given, the lower part 3 can in fact be overlapped without difficulty in the manner illustrated in Figure 4.

WHAT WE CLAIM IS:—

1. A closure seal of the type having a shell formed of thin ductile metal and having a top and a skirt, which is divided into an upper part, adapted to have thread formed therein, and a lower part, which constitutes a locking ring, by a peripheral slit line, interrupted by a series of angularly spaced bridges, characterised in that a narrow gap is provided between one pair of bridges in said slit line, one of said pair of bridges being substantially stronger than any of the other bridges and in that a weakening line extends transversely across the lower locking ring part to meet the peripheral slit line at said narrow gap.

2. A closure seal according to claim 1, further characterised in that, when intended for application to a container having a normal right hand thread, the strong bridge is on the right hand side of the gap.

3. A closure seal according to claim 1 or 2, further characterised in that the weakening line extends obliquely across the lower locking ring part.

4. A closure seal according to claim 1, 2 or 3, further characterised in that the weakening line is constituted by a cut line extending downwardly from the peripheral slit line.

5. A closure seal according to claim 4, further characterised in that the cut line extends across the full width of the lower locking ring part.

6. A closure seal according to claim 4, further characterised in that the cut line is interrupted by at least one bridge.



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due to the rolling action there is a tendency to drive the band and twist it off the upper section so that these two effects together tend to cause a downward tearing movement. These effects are normally resisted by the connecting bridges, which join the lower, locking ring, portion of the closure to the upper portion, but when the span of the locking ring between any pair of bridges at the normal spacing is interrupted by a slit, the local system of support for the particular span is disturbed and there will be a tendency during the tucking operation for the portion of the ring in the area of the slit to be dragged down and to be distorted by the action of the forming roller. The larger is the span between adjacent bridges the more pronounced this possibility of distortion becomes.

However, by introducing an additional bridge close to the strong bridge the effect of the slit is contained in a relatively small space. The broken span is now considerably reduced in width and effect and hence the application of the locking ring can be successfully accomplished and the troubles before referred to are completely obviated.

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7 of equal length. The special feature of the invention lies in the provision of a stronger bridge 9, which is separated from an adjacent bridge 8¹ by a narrow gap in the form of a short slit 10. The bridge 8¹ is preferably somewhat narrower than the ordinary bridges 8, but it is not essential that it should be so. Indeed it can be somewhat stronger than them without departing from the invention. A cut line 11 crosses the lower part 3 at an angle of about 70° to the slit line 10 and is preferably an extension of the side of the strong bridge 9, although it may in fact join the slit line 10 anywhere between the bridges 9 and 8¹.

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6. A closure seal according to claim 4, further characterised in that the cut line is interrupted by at least one bridge.



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7. A closure seal according to any preceding claim, further characterised in that the strong bridge is 40—60% wider than the other bridges in said interrupted peripheral slit line. 5
8. A closure seal according to any preceding claim, further characterised in that the other of said pair of adjacent bridges is weaker than all the other bridges in said interrupted peripheral slit line. 10
9. A closure seal according to claim 8, further characterised in that said weaker bridge is 5—20% narrower than the normal bridges. 15
10. A closure seal according to any of claims 4 to 9, further characterised in that the cut line across the lower part of the skirt is at an angle of about 70° to the interrupted peripheral slit line. 20
11. A closure seal according to any of claims 4 to 10, wherein the cut line across the lower part of the skirt is an extension of a side of the strong bridge. 25
12. A closure seal constructed and adapted to operate substantially as herein described with reference to the accompanying drawings. 25

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