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(12) # EUROPEAN PATENT APPLICATION

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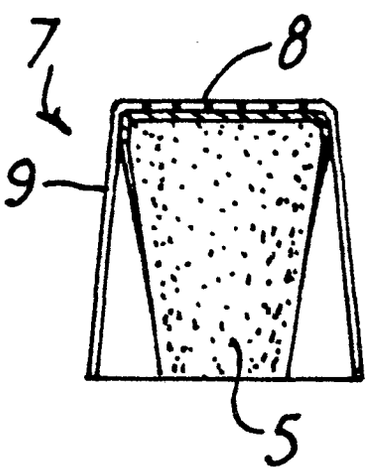
(54) **Improvements in or relating to closures for sterilisable containers.**

(57) . A closure for a container for a sterilisable object comprises a pleated outer shell, formed of a metal foil (4) which has been rendered gas permeable by an embossing operation, which perforates it, and a liner (5) formed of barrier paper, which is gas permeable, but impermeable to passage by bacteria. The perforated metal foil (4) and barrier paper (5) in strip form are superimposed and fed to a conventional machine for forming pleated foil capsules.



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"Improvements in or relating to closures for sterilisable containers"

The present invention relates to closures for containers for sterilisable objects.

It is well known for objects requiring sterilisation to be enclosed in a bag or the like made of a paper which is permeable to sterilising gas or steam, but which is impermeable to bacteria. For convenience a paper of this type is referred to below as "permeable barrier paper".

Permeable barrier paper is suitable for bags for containing relatively light and/or soft objects, but it does not possess sufficient mechanical strength for sealing rigid tubes, which are required for storing relatively rigid items under sterile conditions.

It is an object of the invention to provide a closure which takes advantage of the characteristics of the known permeable barrier paper but which is also of sufficient strength to reduce the possibility of accidental damage.

It is well known to provide a metal overseal formed of light gauge aluminium foil, as a protective over-cap for a cork or other form of bottle closure.

The known form of overseal is formed by pleating a flat blank of light gauge metal foil to form a cup-like shell having a top and a generally cylindrical or frusto-conical skirt.

The method and apparatus for the production of such overseals is widely known in the art and requires no description here.

The overseal is applied by placing it over the mouth of a container and it is brought into engagement with the container neck, usually by means of hydraulic or pneumatic pressure, acting through a rubber member or by rolling through a rubber ring.

A wide range of pneumatic and hydraulic sealing machines are commercially available and are employed in hospitals, medical laboratories, blood transfusion centres for oversealing a seal between a closure and a relatively rigid container.

The present invention provides a closure for forming a bacteria-proof, gas (including steam)-permeable seal for containers having a rigid neck, such as are employed in hospitals for containing sterilised items.

The closure of the present invention is formed of an internal liner made of barrier paper and an external, pleated metal foil shell, which is rendered porous, at least in an area of the top of the shell overlying the barrier paper liner. The closure relies on the mechanical strength of the pleated foil shell to maintain such close contact between the barrier paper and the container to avoid entry of bacteria and to protect the barrier paper liner against accidental damage. The force applied by known pneumatic and hydraulic sealing machines is entirely adequate to establish such contact.

The metal foil shell is preferably formed of aluminium of a thickness lying in the range of 0.015 to 0.035 mm. Below a thickness of 0.015 mm the foil would have inadequate strength to provide proper protection for the underlying barrier paper liner.

The barrier paper liner is preferably formed from a strip of barrier paper which is of a width somewhat in excess of the diameter of the top of the closure and the foil shell is preferably formed from a foil strip, which is perforated along its length in a width which is narrower than the barrier paper. Alternatively it may be perforated over its full width.

One example of the production of a closure is hereinafter described with reference to the accompanying drawings wherein:

Figures 1 and 2 illustrate the foil/barrier paper feed to an over-closure pleating machine,

Figure 3 illustrates an overseal closure before application to a container and

Figure 4 illustrates the mode of application of the closure to a standard container.

Referring to Figure 1, aluminium foil of 0.020 mm thickness is drawn from a reel 1 and passed through the nip of a pair of embossing rolls, patterned in such a manner and applied with such pressure as to form a central perforated region 3 in the foil strip 4 (Figure 2). The perforated region 3 is narrower than the barrier paper 5 drawn from a reel 6. Preferably the strip of barrier paper 5 is about four mm wider than the perforated region 3 of the foil, but in some circumstances may extend for the full width of the foil, particularly where an adhesive, sensitisable under conditions of heat and pressure, is employed between the foil and the barrier paper.

The foil strip 4 and superimposed barrier paper strip 5 are then led into a conventional machine for production of pleated metal foil overseals, to produce an overseal closure 7, illustrated in Figures 3 and 4. A typical pleating machine is manufactured by Andersen & Bruun's Fabriker A/S of Copenhagen, Denmark.

The closure 7 has a top 8, of a diameter approximately corresponding to the width of the perforated region 3 of the foil, and a pleated skirt 9, formed of the foil and, in part, of the barrier paper 5. The barrier paper can be seen to extend downwardly in all directions from the top 8 of the composite foil/barrier paper overseal closure, but down to the bottom edge of the skirt in the longitudinal direction of the barrier paper and only to a slight extent in the transverse direction of the barrier paper.

The closure is applied to a standard hospital container 10, which has a radial lip 11 and recess 12, by the application of hydraulic or pneumatic pressure to the skirt 9 by use of a conventional sealing machine for application of foil overseals.

Any suitable gas-permeable bacteria-barrier paper may be employed as the liner. One suitable sterilisable plain embossed barrier paper is supplied by Sterilin Ltd., Teddington, England.

The maintenance of engagement of the overseal closure with the container is ensured by deforming the skirt into close conformity with the neck of the container 10, with corresponding engagement of the foil under lip 11 and into recess 12. Where the container is provided with less pronounced neck formations, the engagement of the overseal closure with the container may be assured by coating the inner face of the aluminium foil with an adhesive which is sensitive to the sterilising gas. Thus where sterilisation is performed by use of steam in most instances the adhesive would be water-sensitive and/or heat-sensitive. The adhesive layer is applied in such a manner that it does not clog the perforations in the metal shell.

CLAIMS:

1. A closure for a container for sterilisable objects comprising a pleated metal foil shell having a top and a skirt, and an internal barrier paper liner, said liner being permeable to gases and impermeable to bacteria, the said pleated shell being porous at Ieast in an area of the top of the shell overlying the barrier paper liner.

2. A closure according to claim 1 characterised in that said metal foil shell is formed of aluminium foil having a thickness of at least 0.015 mm.

3. A closure according to claim 2 further characterised in that said aluminium foil has a thickness in the range of 0.015 - 0.035 mm.

4. A closure according to claim 1, 2 or 3 further characterised in that said liner is composed of a strip of barrier paper of a width greater than that of the top of the shell.

5. A closure according to claim 4 further characterised in that the foil shell is formed of foil, which is perforated lengthwise over a width less than the width of the barrier paper strip.

6. A closure according to any preceding claim further characterised in that the inner surface of the metal foil shell is coated with an adhesive layer.

7. A method of manufacturing a closure in accordance with claim 1 comprising drawing a strip of aluminium foil from a reel, perforating said strip along a central region thereof to render it gas-permeable, superimposing a strip of barrier paper on the perforated central region of the aluminium foil strip and pleating said aluminium foil and barrier paper in known manner to form a pleated closure having a top and a cylindrical or conical skirt.

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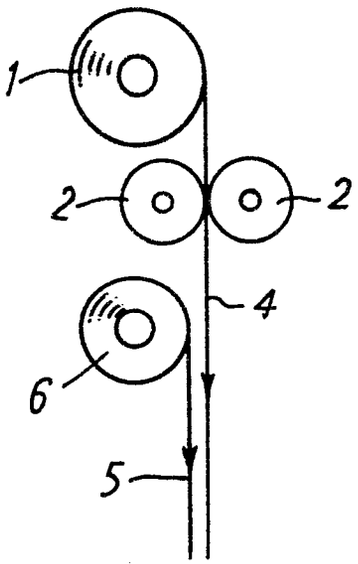

FIG. 1

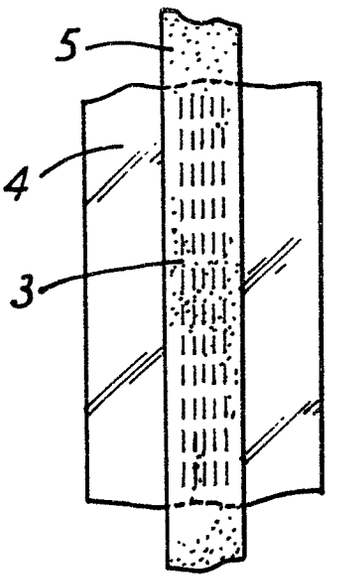

FIG. 2

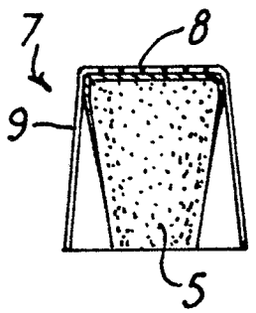

FIG. 3

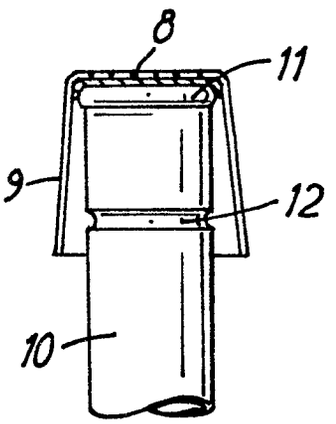

FIG. 4

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EUROPEAN SEARCH REPORT

Application number

EP 83 30 0192

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	US-A-3 410 395 (SELLERS) * Column 2, lines 18-67; column 3, lines 50-61; column 4, claims 1-6 *	1,2,4, 6,7	B 65 D 41/14 B 65 D 81/24
Y	US-A-2 353 879 (CLARK) * Page 3, claim *	1,2,4, 6,7	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21-04-1983	BESSY M.J.F.M.G.

CATEGORY OF CITED DOCUMENTS

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