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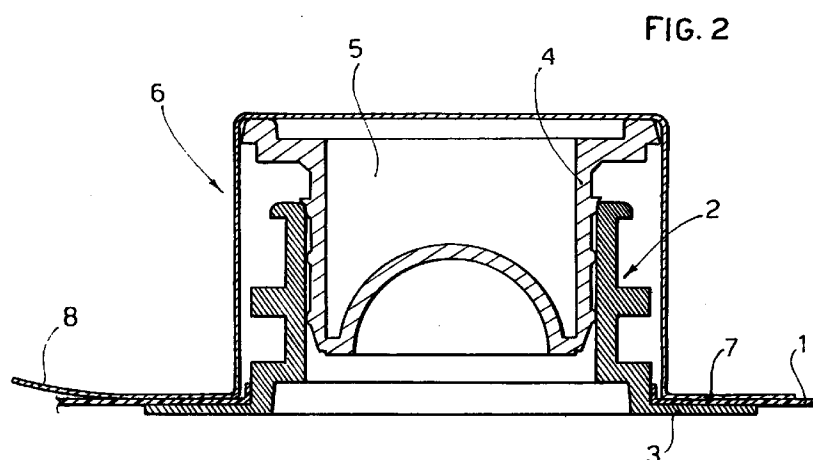
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**(54) System for maintaining sterile conditions at the filling spout of containers for aseptic packaging plants**

(57) A system for maintaining sterile conditions in the area of the filling spout (2) of containers (1) for aseptic packaging systems, comprising a cap (6) that can be applied in a removable manner to said spout (2), before

gamma ray sterilisation of the container (1), and can be removed immediately prior to filling of the container.



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## Description

The present invention relates to a system for preserving sterile conditions in the filling spout area of containers, in plants for packaging in aseptic conditions.

At present, especially in the preserved food packaging industry, use is made of containers consisting of large bags of plastic and/or metallized materials, laminated and/or in several layers, which are placed in special drums, or other suitable containers, for packaging products based on chopped tomatoes or tomato puree.

These bags are obtained by various procedures for coupling and welding film, depending upon the number of layers of material used. The wall of the bag generally comprises a barrier assembly with several outer layers and at least one inner polyethylene layer.

During manufacturing of these bags, one of their sides is suitably perforated for application, normally by heat-sealing, of a spout that serves for subsequent filling of the bag, said spout protruding externally from the wall and being closed with a stopper, which can be a press-on stopper or a soft stopper or otherwise. This stopper normally has a hollow in the external bottom wall, both for manufacturing reasons and to give it the elastic properties necessary to enable perfectly tight closure of the spout.

The bag thus prepared is normally subjected to gamma ray sterilisation to obtain complete sterilisation both of its inner surface and of its outer surface, including the spout and relative stopper.

The bags thus processed are then ready for use and are sent to the food packaging industries or food industries in general, who fill them with the relative product.

It is clear that for preservation of the product rigorously sterile conditions are required during the various manufacturing stages, obviously including the filling stage.

For this purpose the product is subjected to particular heat treatments, to eliminate the bacterial content present in it and then sent to the filling plant, where a sterilised chamber is provided which is positioned so as to enclose the filling spout, first delivering a jet of steam to the outside of the spout, which should restore it to the sterile conditions which were obviously lost during the stages prior to filling, for example during introduction of the bags into the special drums or containers. Appropriate means subsequently remove the stopper from the spout, keeping it inside the sterile filling chamber from which a tube is lowered and inserted into the spout to carry out filling of the bag with the product to be preserved.

From the foregoing it is clear that it is of fundamental importance that the sterility of the outer area of the filling spout should be maintained, to preserve the aseptic condition of the product.

These conditions of sterility are not ensured in the bags for aseptic filling currently produced.

In fact, the outer surface of the spout and the relative stopper, and that surrounding it, tends to lose the conditions of sterility obtained through gamma ray sterilisation, and restoration of these sterile conditions is not ensured by the jet of steam preceding filling, which acts for a very limited time.

For example spores or other micro-organisms may collect around the spout and pollute the filling chamber and consequently the product, damaging its quality.

In an attempt to limit this problem a solution has been proposed that consists in closing and levelling the outer bottom surface of the stopper, which as mentioned above often has a hollow. This prevents foreign polluting agents from entering this hollow before filling, but it does not solve the problem of maintaining the sterility of the outer surface of the spout and the stopper, which are in any case exposed to foreign agents between the sterilisation stage and the filling stage of the bag.

The aim of the invention is to overcome the above drawbacks by providing an extremely simple and economical system for preserving and ensuring sterile conditions in the filling spout area of containers of the above type.

The aim is achieved, according to the invention, by providing an external cap to cover the spout and the relative stopper.

This cap is advantageously fitted before gamma ray sterilisation of the container, so that it itself is sterilised and preserves the sterility of the spout beneath it during storage and transportation of the container and in the stages immediately prior to filling.

This cap is removed immediately prior to filling of the container, thus ensuring the sterile condition of the spout at the moment of filling.

The cap can be made by thermoforming flexible or rigid plastic material, advantageously with an inner layer of polyethylene or polyester, and has for example an annular flange at its base, which is heat-sealed or glued to the area of the bag surrounding the spout.

Provision can also be made for use of a cap that can be fitted mechanically by snap fastening around the spout, gripping onto an annular projection provided on the spout.

Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment, illustrated in the attached drawings in which:

Figure 1 is an axonometric diagrammatic view showing a protective cap during application on the filling spout of a container for aseptic packaging systems;

Figure 2 is a median section showing the cap in Figure 1 fitted on the spout and fixed to the container;

Figure 3 is a median section similar to that in Figure 2, but showing a glass-shaped cap applied in a dif-

ferent fashion to a spout, also shown with a different shape from that in Figures 1 and 2.

With reference first to Figures 1 and 2, the number 1 schematically indicates a portion of a container for aseptic packaging systems, consisting of a bag made of plastic material, with one or several layers, at least one of which may be metallized.

The attached figures show only the wall of the container on which the filling spout 2, which will be better described below, is applied.

For the sake of simplicity, this wall of the container 1 is shown as a single laminate, comprising for example an intermediate metallized layer enclosed between polyethylene-based layers. It is clear, however, that other layered arrangements of materials are possible and that instead of a single laminate a plurality of films coupled together can be provided, for example a metallized outer film consisting of polyethylene, metallized polyester, polyethylene, and an inner film, possibly double, consisting of polyethylene.

In other terms, the solution proposed by the invention, which will now be described, can be applied to any type of container of the above type for aseptic packaging that is known on the market or might be put onto the market in future.

As shown in the attached figures, the filling spout 2 is applied during production of the container 1, from the inside of the relative wall, in which a hole is made for it to pass, so that an annular base flange 3 of the spout remains inside the container and is welded to it by heat applied from the outside, for example by induction.

The spout 2 has a substantially tubular body, inside which a closing stopper 4 is inserted by pressure, said stopper normally having an inner hollow or recess 5.

The container 1, complete with the spout 2 and the closing stopper 4, as stated previously, is normally sterilised by gamma rays and then sent to aseptic packaging plant.

In order to avoid possible contamination of the spout area 2, which is the area most susceptible to bacterial contamination, between the sterilisation stage and the filling stage, the invention provides for a protective hood or cap 6 to be applied to cover the spout 2 and the stopper 4, said cap having a base flange 7 and possibly a pull-tab 8.

The cap 6 is advantageously obtained by thermoforming of plastic material, comprising an inner layer of polyethylene, preferably of the so-called easy-open type. In this way, the flange 7 can be heat-sealed to the outer surface of the relative wall of the container 1 and at the moment of filling the container the cap can easily be peeled away, an operation that is facilitated by the provision of the pull-tab 8.

Clearly the flange 7 can be fixed to the container 1 by different methods, for example by gluing.

The cap 6, as stated, is advantageously obtained by thermoforming of flexible or rigid plastic material, but

it could also be made by moulding, although this method is more costly.

Figure 3 shows a different embodiment of the cap 6 which will now be described using the same reference numbers introduced in relation to Figures 1 and 2.

In Figure 3 a different embodiment of the spout 2 and the stopper 4 are shown, merely by way of example and solely to demonstrate the versatility of the protection system according to the invention.

The stopper 4 in Figure 3 is made of relatively soft material and closes the upper outer edge of the spout 2 with a tight seal.

The cap 6 illustrated in Figure 3 is made of relatively rigid material and is shaped like a glass turned upside down, having an inner projection 9 which couples mechanically to an annular projection 10 provided around the spout 2.

Obviously other embodiments are possible, remaining within the scope of the solution proposed by the invention, which consists of providing protection against any contamination of the filling spout between the stages of sterilisation of the bag and filling with the product.

## Claims

1. A system for maintaining sterile conditions in the area of a filling spout (2) of containers (1) for aseptic packaging systems, characterised in that it provides for a cap (6) applied with a tight seal, in a removable manner, to said spout (2), so that it surrounds at least an end part of a spout portion protruding from the container.
2. A system according to claim 1, characterised in that said cap (6) is applied before gamma ray sterilisation of the container (1) and is removed immediately prior to filling of the container (1) through said spout (2).
3. A system according to claim 1 or 2, characterised in that said cap (6) has a base flange (7) that is fixed in a removable manner to the outer wall of said container (1).
4. A system according to claim 3, characterised in that said flange (7) has an inner layer of "easy-open" material and is heat-sealed to the container (1), removal taking place by peeling.
5. A system according to claim 3, characterised in that said flange (7) is fixed to the container (1) by gluing.
6. A system according to any one of claims 3 to 5, characterised in that said flange (7) has a pull-tab (8).
7. A system according to claim 1 or 2, characterised in that said cap (6) is shaped like a glass turned

upside down and is mechanically applied to snap fasten onto the spout (2), through engagement of an inner border or projection (9) on the cap with a corresponding annular projection (10) provided on the spout.

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8. A system according to any one of the preceding claims, characterised in that said cap (6) is obtained by thermoforming of flexible or rigid plastic material.

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9. A system according to any one of claims 1 to 7, characterised in that said cap (6) is obtained by moulding.

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10. A system according to any one of the preceding claims, characterised in that a closing stopper 4 of rigid or soft material, giving a tight seal, is applied to said spout.

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11. A system according to any one of claims 1 to 10, characterised in that said container (1) consists of a plastic laminate, comprising at least one metallized layer and outer layers of polyethylene.

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12. A system according to any one of claims 1 to 10, characterised in that said container (1) is formed by coupling several films, with at least one inner polyethylene film and an outer metallized film, with a outer layer of polyethylene.

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13. A system according to any one of claims 1 to 10, characterised in that said container (1) is formed by coupling several films, with at least one inner polyethylene film and an outer film consisting of a barrier multilayer assembly.

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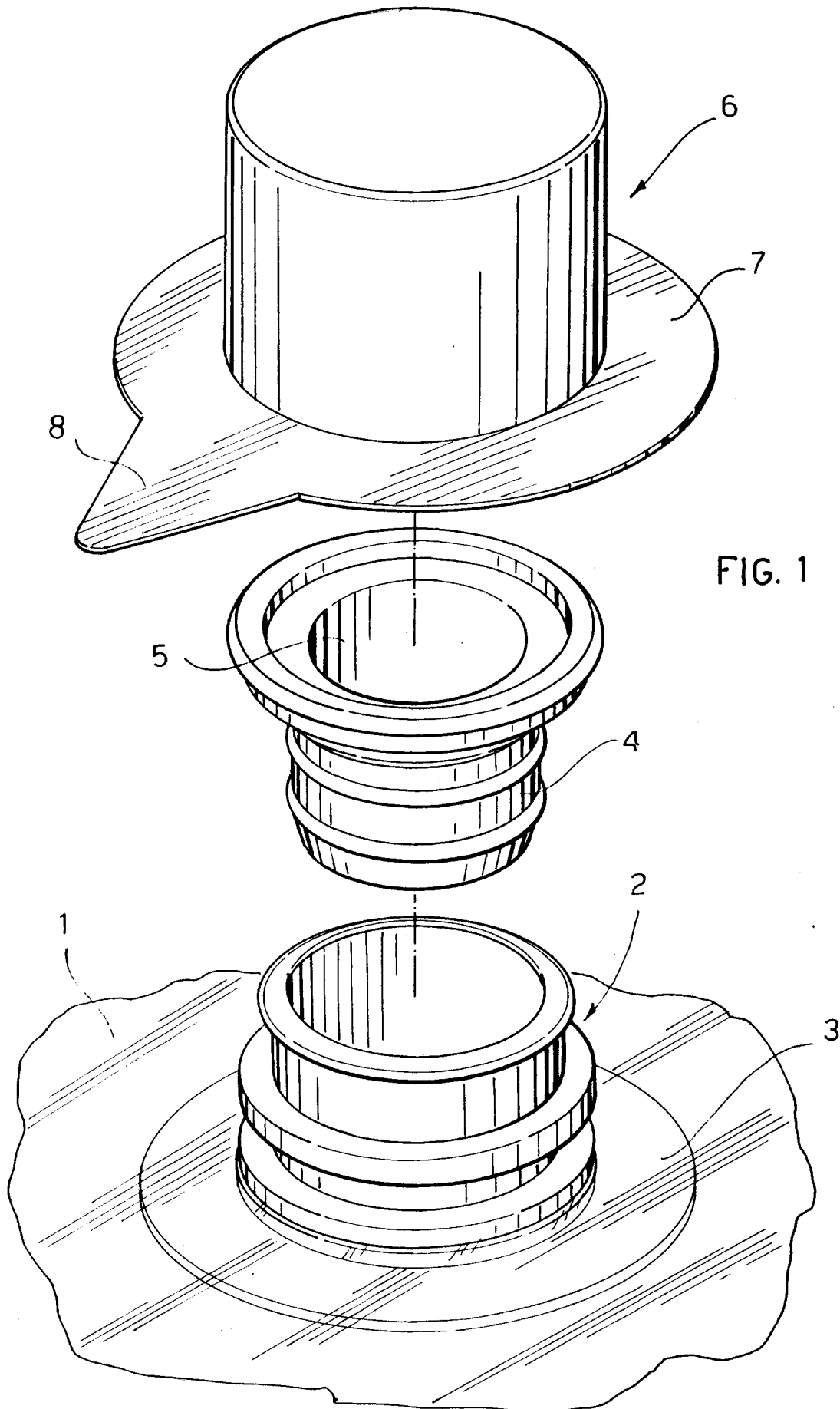


FIG. 2

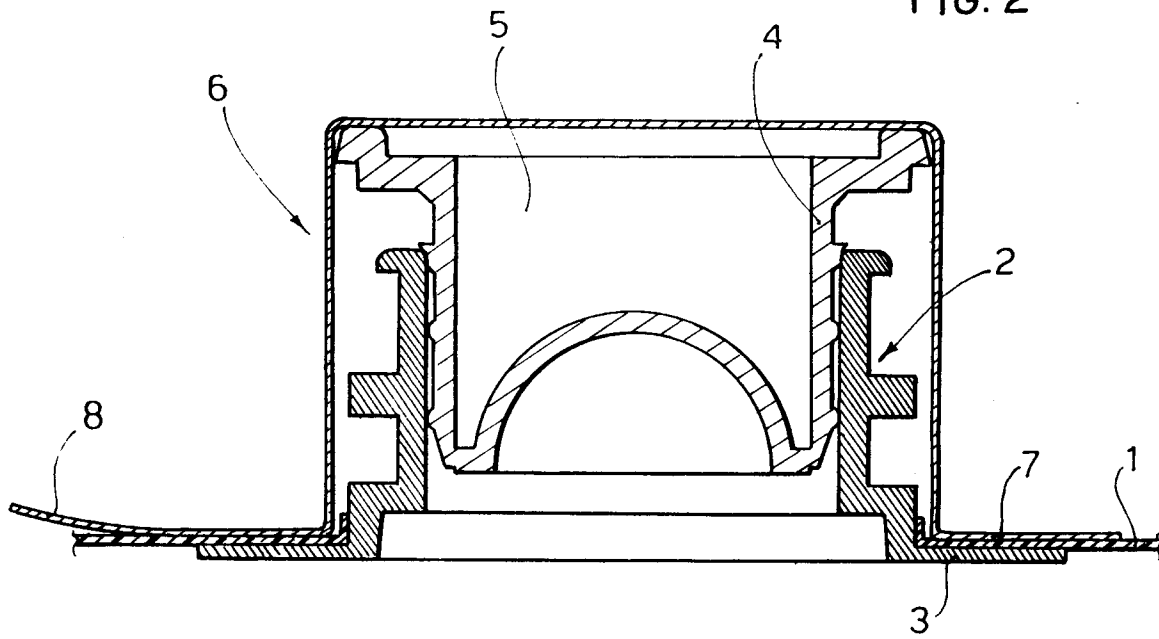
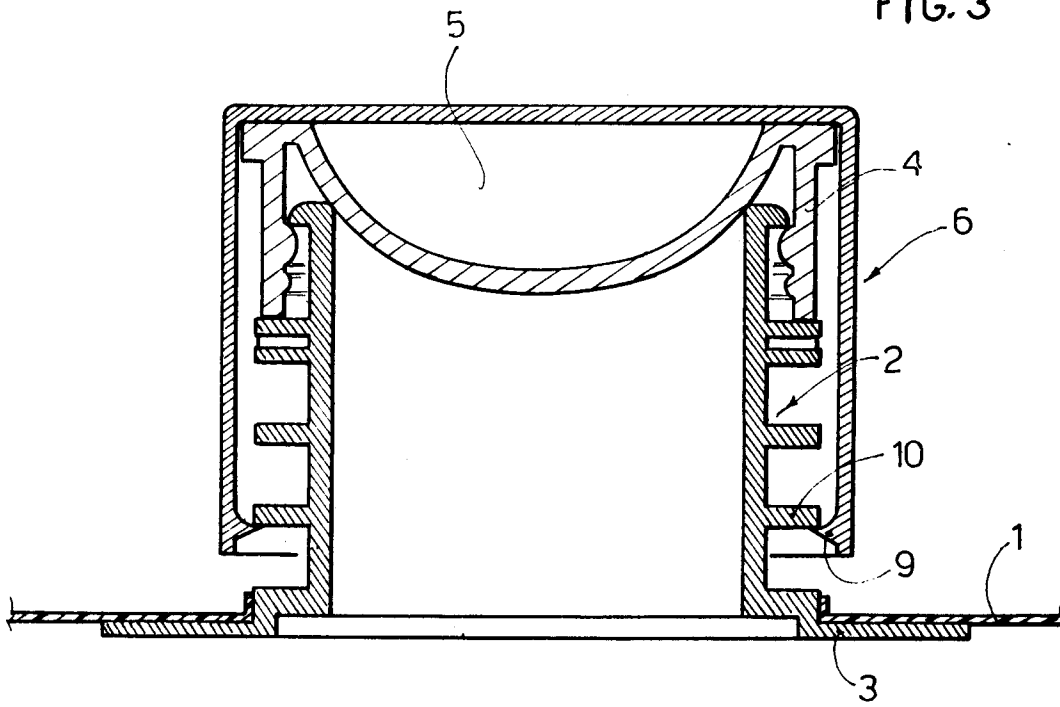


FIG. 3





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## EUROPEAN SEARCH REPORT

Application Number  
EP 96 10 3301

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.6)
X Y	US-A-4 616 760 (KERSTAEN ET AL) * the whole document *	1,3-5,8 2,6,7, 9-13	B65D41/62
Y	GB-A-2 112 735 (ACI AUSTRALIA LIMITED) * page 3, line 67 - line 70 *	2	
Y	US-A-4 687 114 (CRISCI) * column 2, line 12 - line 23; figures 1-5 *	6,7,9	
Y	US-A-3 108 732 (CURIE ET AL) * column 3, line 58 - line 64; figure 3 *	10	
Y	US-A-5 097 949 (HELDWEIN) * column 2, line 55 - column 3, line 3 *	11-13	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65D B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 June 1996	Examiner Smith, C
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>			

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