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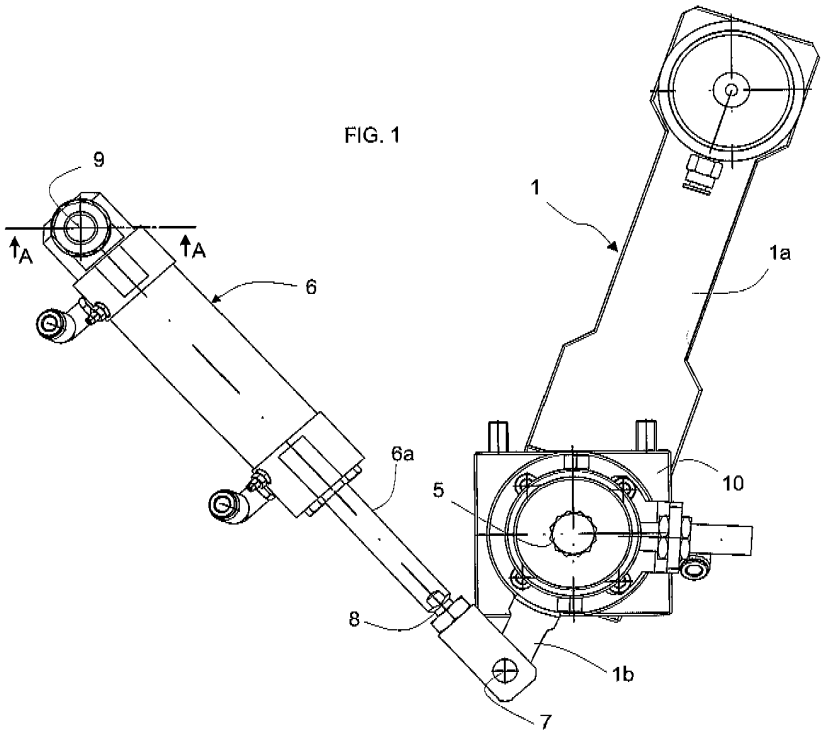
(54) Semiautomatic foil loading apparatus for use in an aseptic flexible container filling system

(57) The invention finds application in the field of aseptic flexible containers (bags) having a spout (50) fitted with a membrane, through which the food product is introduced by an aseptic filling system. These flexible containers have a spout through which the product is filled. Once the bags have been filled, they are sealed still in the filling head to prevent any disruption of the asepsis and to preserve the integrity of the product. The novel apparatus has means (1) for loading a foil (51) or (52), which consist of a mechanical arm external to the filling head. The arm moves the foil into the filling head through transfer means (6) and (10). The foil is captured by the vacuum created within the heat sealing head, and the bag spout is inserted therein to close the pre-chamber, whereupon sterilization of the spout and foil is initiated.

FIG. 1



EP 1 900 643 A1

Description

[0001] The present invention relates to a semiautomatic foil loading apparatus for use in an aseptic flexible container filling system.

[0002] Aseptic flexible containers (bags) are composed of low linear density polyethylene walls.

[0003] Their head includes a spout, which is formed of a suitable material, such as microcrack-resistant high density polyethylene, capable of withstanding sterilization treatments with ionizing radiation (γ rays). The spout has:

- A circular flange, heat sealed to the inside of the container wall;
- A rigid cylindrical collar providing an inlet. The latter has an outer locking flange higher than the above mentioned flange and at a sufficient distance therefrom, which is used to fix the bag to the aseptic filling head, and to seal the spout and foil sterilization prechamber. Its diameter is preferably smaller than that of the other flange.

[0004] The outer face of the collar has such a shape as to be able to hold a standard protection cover.

- A membrane or diaphragm, which extends across the inlet and hermetically seals the inside of the bag. It shall be able to withstand the pressures required by steam sterilization immediately prior to filling and to be easily ruptured by a blade on the filling dispenser.

[0005] Once the dispenser has been filled and cleaned with steam, the bag spout is sealed by a circular disk known as foil, which is placed above the collar and heat sealed to the top edge thereof.

[0006] This foil, made from a multilayered material (Nylon, low linear density polyethylene and aluminum) is provided in pre-embossed form. Thus, as the foil is laid on the spout, one part thereof rests on the top end of the collar and another part penetrates into the spout.

[0007] In prior art, the bag spout is introduced in the filling head with the foil thereon; the sealer is moved down to pick up the foil, and may undesirably seal it. Once the foil has been moved away from the spout, steam sterilization of the spout and foil is initiated, whereupon the sealer is lifted and offset, the dispenser moves down and breaks the spout to penetrate into the bag collar, the membrane is thus ruptured and the product can thus be filled.

[0008] Once filling is completed, the filling dispenser performs steam cleaning and is lifted up, the sealer is centered again, moves down and heat seals the foil, whereupon the bag is removed.

[0009] The prior art requires an operator to manually introduce the foil and the spout into the filling head.

[0010] The main drawbacks of prior art are:

- Unpractical and complex loading of foils by the operator, which involves longer processing times;
- Inaccurate centering of the foil in the collar and inadequate sealing effect.
- Use of pre-embossed foils. This may involve imperfect adhesion between the foil and the collar, as the foil might have wrinkles resulting from the embossing process; to prevent such wrinkles, high cost processes have to be carried out, thereby increasing the final costs of the foil.
- A further advantage consists in the risk of sealing the foil to the spout during the foil pick-up step prior to filling.

[0011] The object of the present invention is to obviate the above mentioned drawbacks by carrying out the foil loading step out of the filling head, in a safe and easily controllable environment.

[0012] A first advantage of the inventive apparatus is undoubtedly provided by a quicker foil loading step, which occurs on an interchangeable cup outside the filling head. Such external loading step provides easier positioning.

[0013] One advantage consists in accurate positioning of the foil (whether or not embossed) on the spout, which is reflected in an effective sealing effect between the foil and the top end of the collar, and adequate product preservation.

[0014] Another advantage is the possibility of adapting the loading operation to the foil size. Pre-embossed foils may have several different diameters.

[0015] A further important advantage provided by the apparatus of the invention is the possibility of simplifying the geometry of the foils, thereby affording further cost reduction.

[0016] Another important advantage is the prevention of any risk of sealing the foil to the spout during the foil picking up step prior to filling, which would involve the loss of sterile bag and recovery of the product in the bag.

[0017] These objects and advantages are achieved by the semiautomatic foil loading apparatus for aseptic flexible container filling systems of the present invention, which is characterized by the annexed claims.

[0018] This and other features will be more apparent upon reading of the following description of a preferred embodiment, which is shown by way of example and without limitation in the accompanying drawings, in which:

- Figure 1 is a top view of the apparatus;
- Figure 2 is a front view of the apparatus;
- Figure 3 is a sectional view of the hinge that connects the semiautomatic loading apparatus to the frame of the filling head;
- Figure 4 is a perspective view of the filling head including the inventive apparatus in the loading position outside the filling head;
- Figure 5 is the same view as Figure 4, in a position beneath the aseptic head;

- Figure 6 is the same view as Figure 5, in a position within the aseptic head which feeds the capsule to the heat-sealing head (sealer).
- Figure 7 shows a spout with two possible sealing foils.

[0019] Referring to the figures, numeral 1 designates a means for loading a foil (51), which is composed of two parts: an arm with an interchangeable foil holding cup 2 on its free end; a second part 1b, pivotally mounted to a vertical pin 5 (coinciding with the rod of a double acting piston 10), and connected by a small arm to the rod 6a of a double acting piston 6.

[0020] The rod 6a and the small arm of 1b are hinged in 7.

[0021] The skirt of the piston 6 is in turn hinged in 9 to a vertical pin supported by the frame of the filling head (Fig. 3 is a sectional view of the hinge 9).

[0022] A screw 8 is provided in the rod 6a of the piston 6, for adjusting the limit stop of the piston.

[0023] The interchangeable cup 2 is also composed of two parts: an upper part 2a having a circular foil holding recess 3; a lower part 2b with a connection for a vacuum source, connected to the recess 3 by a hole 4.

[0024] As shown in Figure 2, a second piston 10 moves the arm 1a in a vertical direction and transfers the foil in the filling head against the sealer, which is shown by thin lines and designated by 100.

[0025] Numeral 11 designates a second limit stop adjustment screw which adjusts the vertical lift of the loading means 1.

[0026] The pneumatic pistons 6 and 10 constitute the means for transferring the loading means and thus the foil into the filling head.

[0027] The operation of the inventive apparatus will be now described using the reference numerals of the figures.

[0028] The machine operator places the foil (51) in the circular recess 3 of the cup 2 at the free end of the arm.

[0029] Vacuum is then created in the recess 3 during transfer of the coil, to ensure that the foil is always correctly positioned until it is introduced in the filling head.

[0030] The operator initiates the foil transfer cycle: once the arm is moved to its position beneath the filling head by the rotary motion given by the piston 6, the piston 10 moves the arm 1a vertically and thereby introduces the foil in the head. Now, by releasing the vacuum in the recess 3 of the cup 2, the heat-sealing head can pick up the foil by means of a suction system. Then, the loading means may move back outside the filling head.

[0031] From now on, the procedure is as known: once the spout is introduced in the filling head (pre-sterilized with steam and held in aseptic condition by steam overpressure), both the spout and the foil are sterilized with steam, whereupon the dispenser penetrates the bag collar, the membrane is ruptured and filling occurs. As the filling process is completed, the filling dispenser is lifted up, the foil is placed in its position and heat-sealed to the top end of the spout collar and the bag is removed.

[0032] The novel apparatus will be appreciated for its versatility, which derives from the possibility of changing the cup 2 according to the foil to be used (different foil types are provided depending on the type of spout on the container), provided that the two limit stop adjustment screws 8 and 11 and the hinge 9 are also adjusted.

[0033] Also, flat foils (52) may be used instead of the above embossed foils (see Fig. 6).

[0034] If flat foils (52) are used, according to a variant embodiment, not shown, the cup 2 has a recess 3 with a slight undercut adapted for holding the flat foil.

[0035] According to possible variant embodiments, not shown, the rotation of the cup-transferring arm may be obtained using pneumatic motors or other systems, and the lifting motion may be obtained by other systems without departure from the scope as defined in the annexed claims.

Claims

1. A semiautomatic foil loading apparatus for an aseptic flexible container filling system, **characterized in that** it has means (1) for loading an aluminum foil (51) or (52) to an area external to the filling head and further has means (6) and (10) for later transferring the loading means and the foil to the filling head.

2. A semiautomatic apparatus as claimed in claim 1, **characterized in that** the loading means (1) comprise an arm (1a) with an interchangeable cup (2) on its free end, which has a recess (3) adapted to hold the foil to be transferred and having the same geometry as the foil; a second part (1b) pivotally mounted to a vertical pivot pin (5).

3. A semiautomatic device as claimed in claim 1, **characterized in that** the transfer means include a piston (6) which acts on the part 1b, and another piston (10) whose rod coincides with the vertical pin (5).

4. A semiautomatic apparatus as claimed in claims 1 and 2, **characterized in that** an interchangeable cup (2) has a recess (3) whose shape varies according to the foil to be applied.

5. A semiautomatic apparatus as claimed in claim 2, **characterized in that** a recess (3) has a hole (4) connected to a suction system which generates a degree of vacuum required for the foil to remain in the right position during its transfer into the filling head.

6. A semiautomatic apparatus as claimed in claims 1 and 2, **characterized in that** the transfer means for moving the foil from the loading station outside the aseptic filling area to insertion in the heat-sealing

head, consist of electric or pneumatic motors, connected to racks or gears in general.

7. A semiautomatic apparatus as claimed in the preceding claims, **characterized in that** the recess (3) is adapted to hold a flat, non embossed foil (52).

FIG. 3
Section A-A

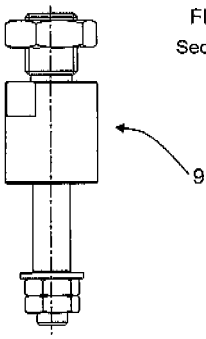


FIG. 1

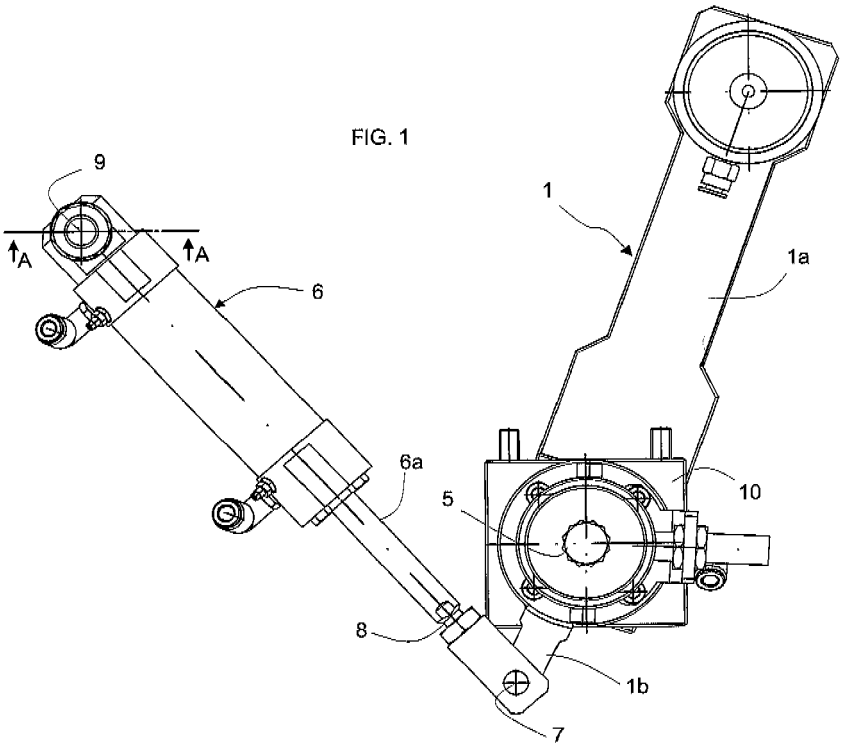


FIG. 2

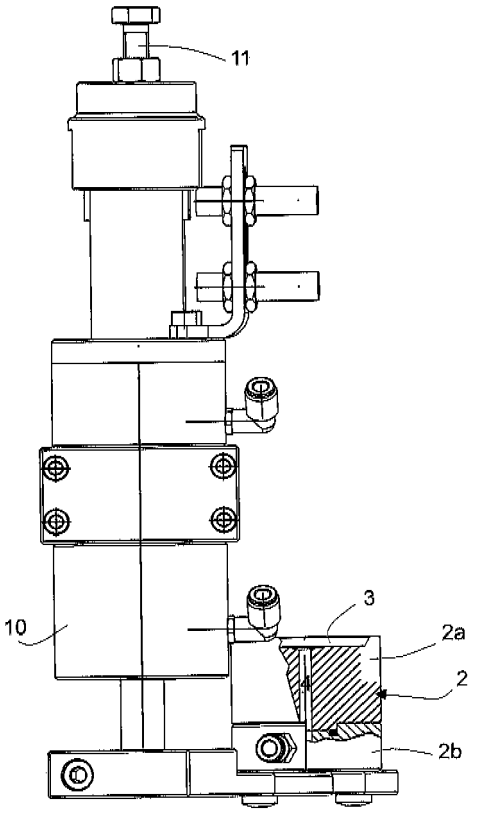


FIG. 4

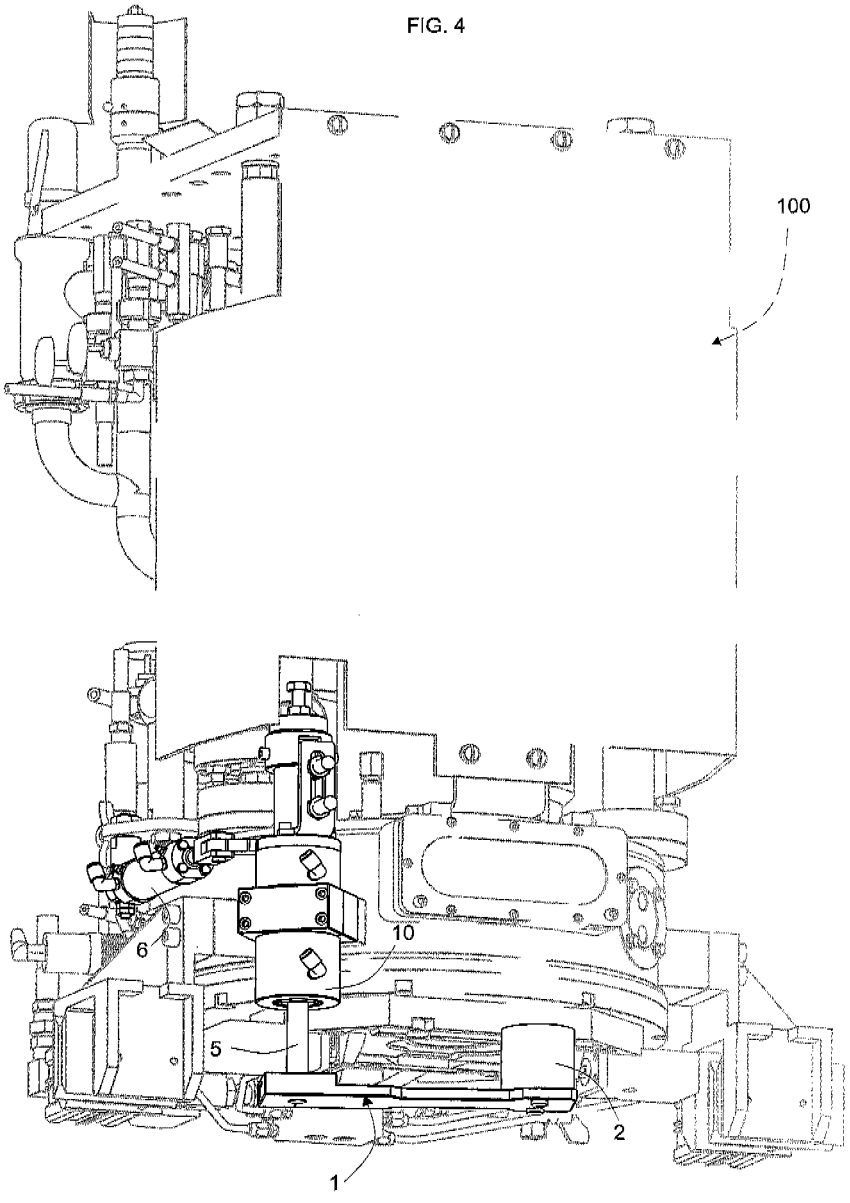


FIG. 5

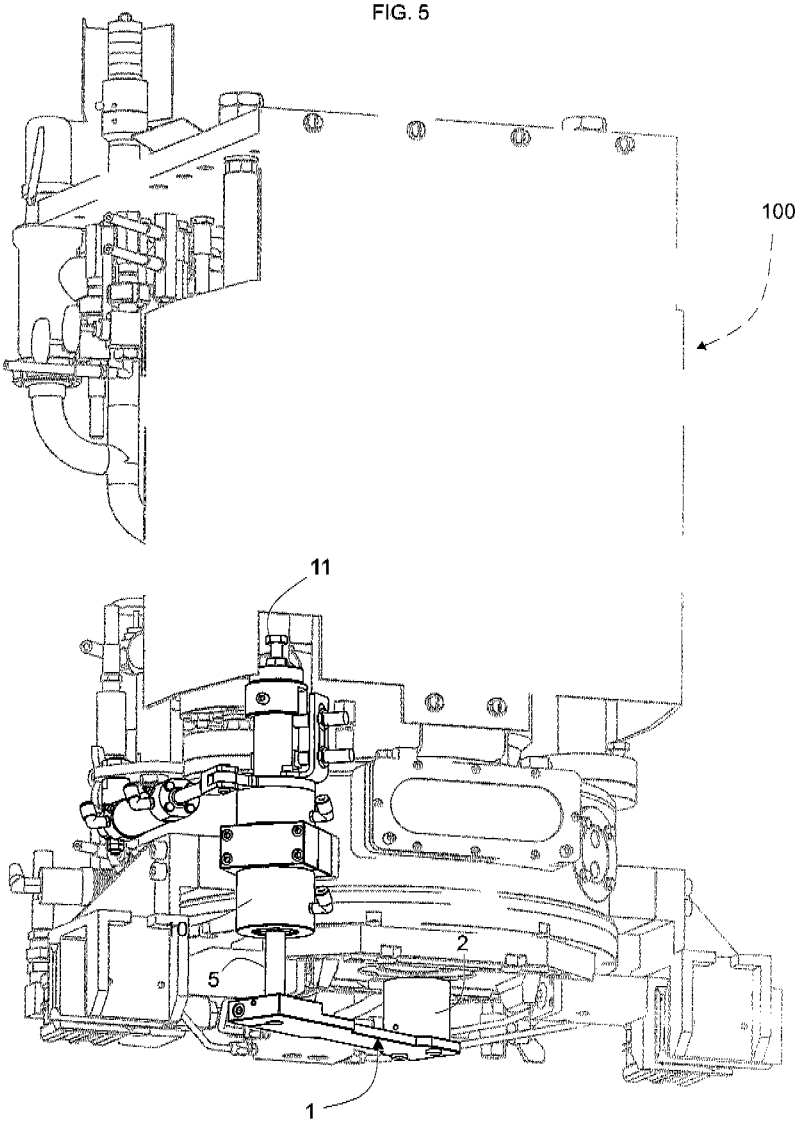


FIG. 6

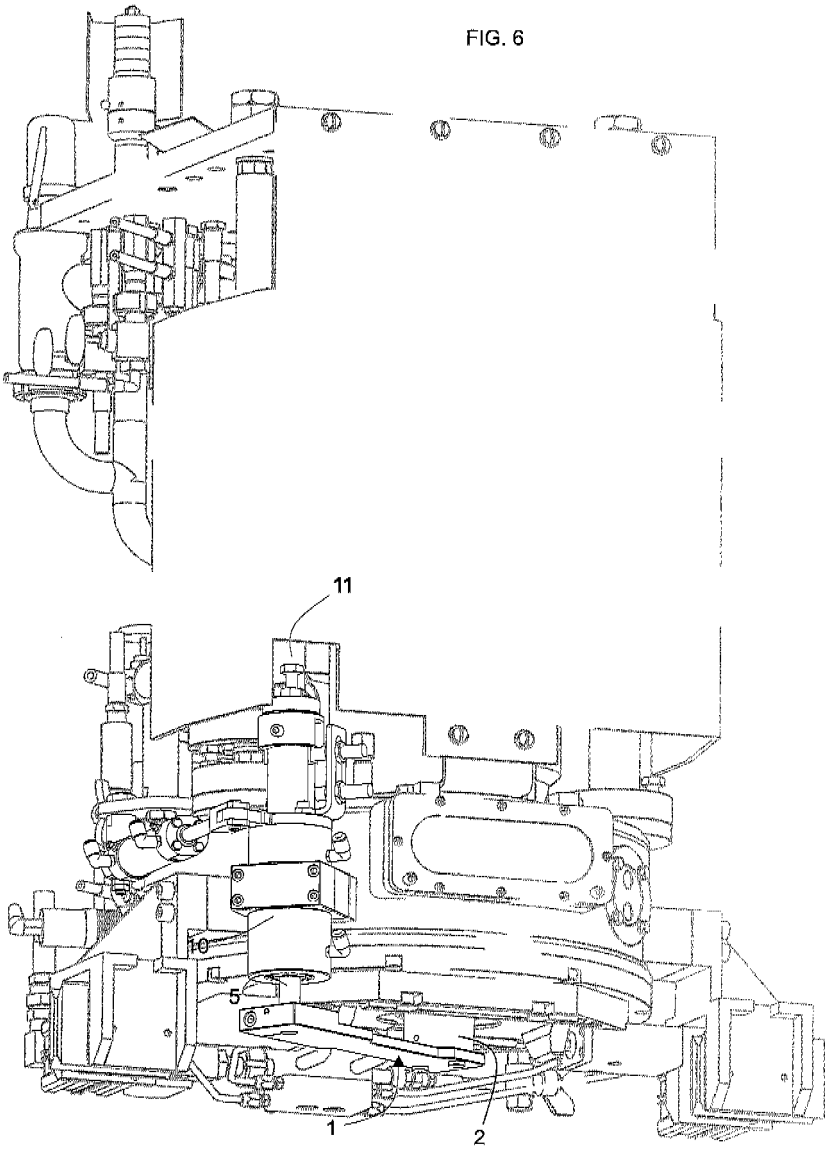
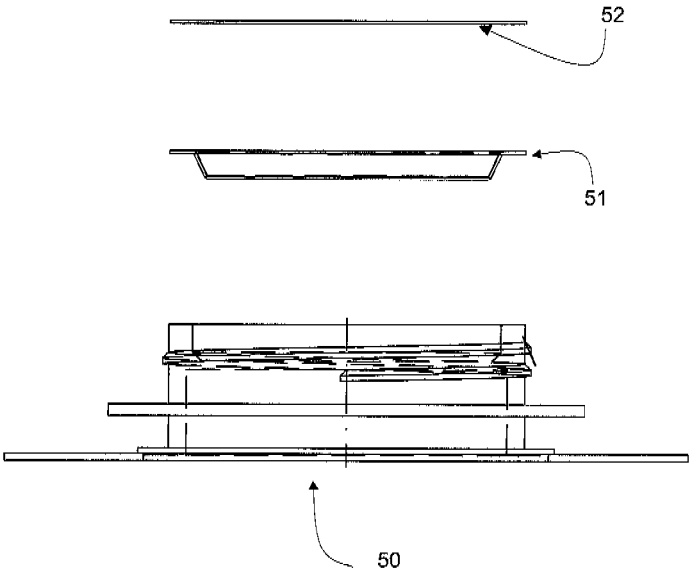


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 07 11 5758

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	WO 95/01280 A (INT FLAVORS & FRAGRANCES INC [US]; MUELLER ALFRED F [US]) 12 January 1995 (1995-01-12)		
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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 December 2007	Jagusiak, Antony

CATEGORY OF CITED DOCUMENTS

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