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

Halbautomatische Folienladevorrichtung zur Verwendung in einem Füllsystem für aseptische flexible Behälter

Appareil de chargement de feuille semi-automatique à utiliser dans un système de remplissage de conteneur flexible aseptique

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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] European patent application n. 1 067 052 deals with a filling method and apparatus for such containers.

[0006] Once filling is completed and the dispenser has been 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] The prior art requires an operator to manually introduce the foil and the spout into the filling head.

[0011] 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 disadvantage consists in the risk of sealing the foil to the spout during the foil pick-up step prior to filling.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] Another advantage is the possibility of adapting the loading operation to the foil size. Pre-embossed foils may have several different diameters.

[0016] 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.

[0017] 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.

[0018] 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 and by the aseptic flexible container filling system according to claim 11.

[0019] 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.

[0020] 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.

[0021] The rod 6a and the small arm of 1b are hinged in 7.

[0022] 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).

[0023] A screw 8 is provided in the rod 6a of the piston 6, for adjusting the limit stop of the piston.

[0024] 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.

[0025] 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.

[0026] Numeral 11 designates a second limit stop adjustment screw which adjusts the vertical lift of the loading means 1.

[0027] The pneumatic pistons 6 and 10 constitute the means for transferring the loading means and thus the foil into the filling head.

[0028] The operation of the inventive apparatus will be now described using the reference numerals of the figures.

[0029] The machine operator places the foil (51) in the circular recess 3 of the cup 2 at the free end of the arm.

[0030] Vacuum is then created in the recess 3 during transfer of the foil, to ensure that the foil is always correctly positioned until it is introduced in the filling head.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] Also, flat foils (52) may be used instead of the above embossed foils (see Fig. 6).

[0035] 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.

[0036] 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 providing sealing foils to an aseptic flexible container filling system, the system comprising a filling head, at which the aseptic flexible containers are filled, **characterized in that** it has loading means (1) comprising a holding cup (2) for holding a foil (51 or 52) to an area external to the filling head, and further has means (6 and 10) for transferring the loading means (1) with the foil (51; 52) from an area external to the filling system, said foil (51; 52) being placed onto said holding cup (2) by an operator at said external area, to the filling head of the filling system so as to introduce said foil (51; 52) therein.

2. A semiautomatic apparatus as claimed in claim 1, wherein said holding cup (2) is interchangeable.

3. A semiautomatic apparatus as claimed in claim 1 **characterized in that** the loading means (1) comprises an arm (1a) with said 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; and a second part (1b) pivotally mounted to a vertical pivot pin (5).

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

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

6. A semiautomatic apparatus as claimed in any of claim 3 to 5, **characterized in that** a said 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.

7. A semiautomatic apparatus as claimed in any of claims 1 to 6, **characterized in that** the transfer means (1) for moving the foil from the loading station outside the aseptic filling area to insertion in the heat-sealing head, consists of electric or pneumatic motors, connected to racks or gears in general.

8. A semiautomatic apparatus as claimed in any of claims 5 to 7, **characterized in that** the recess (3) is adapted to hold a flat, non embossed foil (52).

9. A semiautomatic device as claimed in any of claims 4 to 8, **characterized in that** the transfer means includes a piston (6) which acts on the part (1b), and another piston (10) whose rod coincides with the vertical pin (5).

10. An aseptic flexible container filling system comprising a semiautomatic foil loading apparatus according to any of claims 1 to 9.

Patentansprüche

1. Halbautomatische Folien-Ladevorrichtung, für die Bereitstellung von Dichtfolien zu einem von aseptischen flexiblen Behältern Füllsystem, wobei das System einen Füllkopf umfasst, bei dem die aseptischen flexiblen Behälter gefüllt werden, **dadurch gekennzeichnet, dass** es Lademittel (1) enthält, die eine Halteschale (2) umfassen, um eine Folie (51 oder 52) bei einem außerhalb des Füllkopfes gelegenen Bereich zu halten, und auch Mittel (6 und 10) umfasst, um die Lademittel (1) zusammen mit der Folie (51; 52) aus einem außerhalb des Füllsystems zu übertragen, wobei die besagte Folie (51; 52) auf der besagten Halteschale (2) durch einen Operator bei des besagten äußeren Bereich zu der Füllkopf des Füllsystems derart platziert wird, dass die besagte Folie (51; 52) darin eingeführt wird.

2. Halbautomatisches Gerät nach Anspruch 1, wobei die besagte Halteschale (2) austauschbar ist.

3. Halbautomatisches Gerät nach Anspruch 1, **dadurch gekennzeichnet, dass** das Lademittel (1) einen Arm (1a) mit der besagten austauschbaren Schale (2) auf seinem freien Ende umfasst, der eine Ausnehmung (3) aufweist, die so angepasst wird, dass sie die zu übertragende Folie zu halten vermag, und die dieselbe Geometrie der Folie aufweist; und ein zweites Teil (1b), das drehbar auf einem senkrechten Drehzapfen (5) aufgebracht ist.

4. Halbautomatisches Gerät nach Anspruch 3, **dadurch gekennzeichnet, dass** die Übertragungsmittel einen Kolben (6) umfassen, der auf dem zweiten Teil (1b) wirkt, und einen anderen Kolben (10), dessen Stange mit dem senkrechten Zapfen (5) zusammenfällt.

5. Halbautomatisches Gerät nach Ansprüchen 2 bis 4, **dadurch gekennzeichnet, dass** die besagte austauschbare Schale (2) eine Ausnehmung hat, die eine solche Gestalt aufweist, dass sie nach der aufzutragenden Folie variiert.

6. Halbautomatisches Gerät nach einem der Ansprüche 3 bis 5, **dadurch gekennzeichnet, dass** die besagte Ausnehmung (3) eine Bohrung (4) aufweist, die mit dem Saugsystem verbunden ist, das ein Vakuum erzeugt, dass erforderlich ist, um die Folie in der richtigen Lage während seiner Übertragung in den Füllkopf zu halten.

7. Halbautomatisches Gerät nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Übertragungsmittel, um die Folie aus der Ladestation außerhalb der aseptischen Füllbereich für die Einführung in den heißsiegelnden Kopf zu verlagern, aus elektrischen oder pneumatischen Motoren besteht, die im allgemeinen mit Racks oder Getrieben verbunden sind.

8. Halbautomatisches Gerät nach einem der Ansprüche 5 bis 7, **dadurch gekennzeichnet, dass** die Ausnehmung (3) so angepasst ist, um eine ebene, nicht eingeprägte Folie (52) zu halten.

9. Halbautomatisches Gerät nach einem der Ansprüche 4 bis 8, **dadurch gekennzeichnet, dass** die Übertragungsmittel einen Kolben (6) umfassen, der auf dem Teil (1b) einwirkt, und einen anderen Kolben (10), dessen Stange mit dem senkrechten Zapfen (5) zusammenfällt.

10. Aseptisches flexibles Füllsystem von Behältern, eine halbautomatische Ladevorrichtung von Folien umfassend, nach einem der Ansprüche 1 bis 10.

Revendications

1. Appareil de chargement semi-automatique de

feuilles pour fournir des feuilles d'étanchéité à un système flexible de remplissage de conteneurs aseptiques et flexibles, le système comprenant une tête de remplissage, avec laquelle les conteneurs aseptiques flexibles sont remplis, **caractérisé en ce qu'**il présente des moyens de chargement (1) comprenant une tasse de tenue (2) pour fixer une feuille en aluminium (51 ou 52) à une zone extérieure à la tête de remplissage, et présente aussi des moyens (6) et (10) pour transférer le moyen de chargement (1) avec la feuille (51 ; 52) d'une zone extérieure au système de remplissage, la dite feuille (51 ; 52) étant placée sur la dite tasse de tenue (2) par un operateur près de la dite zone extérieure, vers la tête de remplissage du système de remplissage, en manière d'introduire la dite feuille (51 ; 52) dans son intérieur.

2. Appareil semi-automatique selon la revendication 1, dans lequel la dite tasse de tenue (2) est interchangeable.

3. Appareil semi-automatique selon la revendication 1, **caractérisé en ce que** le moyen de chargement (1) comprend un bras (1a) avec la dite tasse interchangeable (2) sur son extrémité libre, qui a une cavité (3) adaptée pour fixer la feuille à transférer et ayant la même géométrie de la feuille ; et une deuxième partie (1b) montée en rotation sur un pivot vertical (5).

4. Appareil semi-automatique selon la revendication 3, **caractérisé en ce que** les moyens de transfert comprennent un piston (6) agissant sur la deuxième partie (1b) et un autre piston (10) dont la tige coïncide avec le pivot vertical (5).

5. Appareil semi-automatique selon les revendications 2 à 4, **caractérisé en ce que** la dite tasse interchangeable (2) a une cavité (3) avec une forme variable en fonction de la feuille à appliquer.

6. Appareil semi-automatique selon l'une quelconque des revendications 3 à 5, **caractérisé en ce que** une dite cavité (3) a un trou (4) connecté avec un système d'aspiration qui génère un degré de vide requis pour la feuille pour rester dans la position correcte pendant son transfert dans la tête de remplissage.

7. Appareil semi-automatique selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** les moyens de transfert (1) pour déplacer la feuille de la station de chargement à l'extérieur de la zone aseptique de remplissage pour l'insertion dans la tête de thermo-scellage, sont constitués par des moteurs électriques ou pneumatiques, connectés à des racks ou des engrenages en général.

8. Appareil semi-automatique selon l'une quelconque des revendications 5 à 7, **caractérisé en ce que** la cavité (3) est adaptée pour loger une feuille plane, non gaufrée.

9. Dispositif semi-automatique selon l'une quelconque des revendications 4 à 8, **caractérisé en ce que** les moyens de transfert comprennent un piston (6) agissant sur la partie (1b), et un autre piston (10) dont la tige coïncide avec le pivot vertical (5).

10. Système de remplissage de conteneur aseptique flexible comprenant un appareil semi-automatique de chargement de feuilles selon l'une quelconque des revendications 1 à 9.

FIG. 3
Section A-A

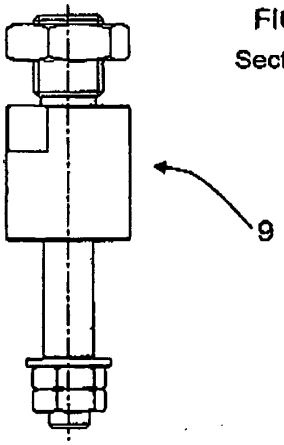


FIG. 1

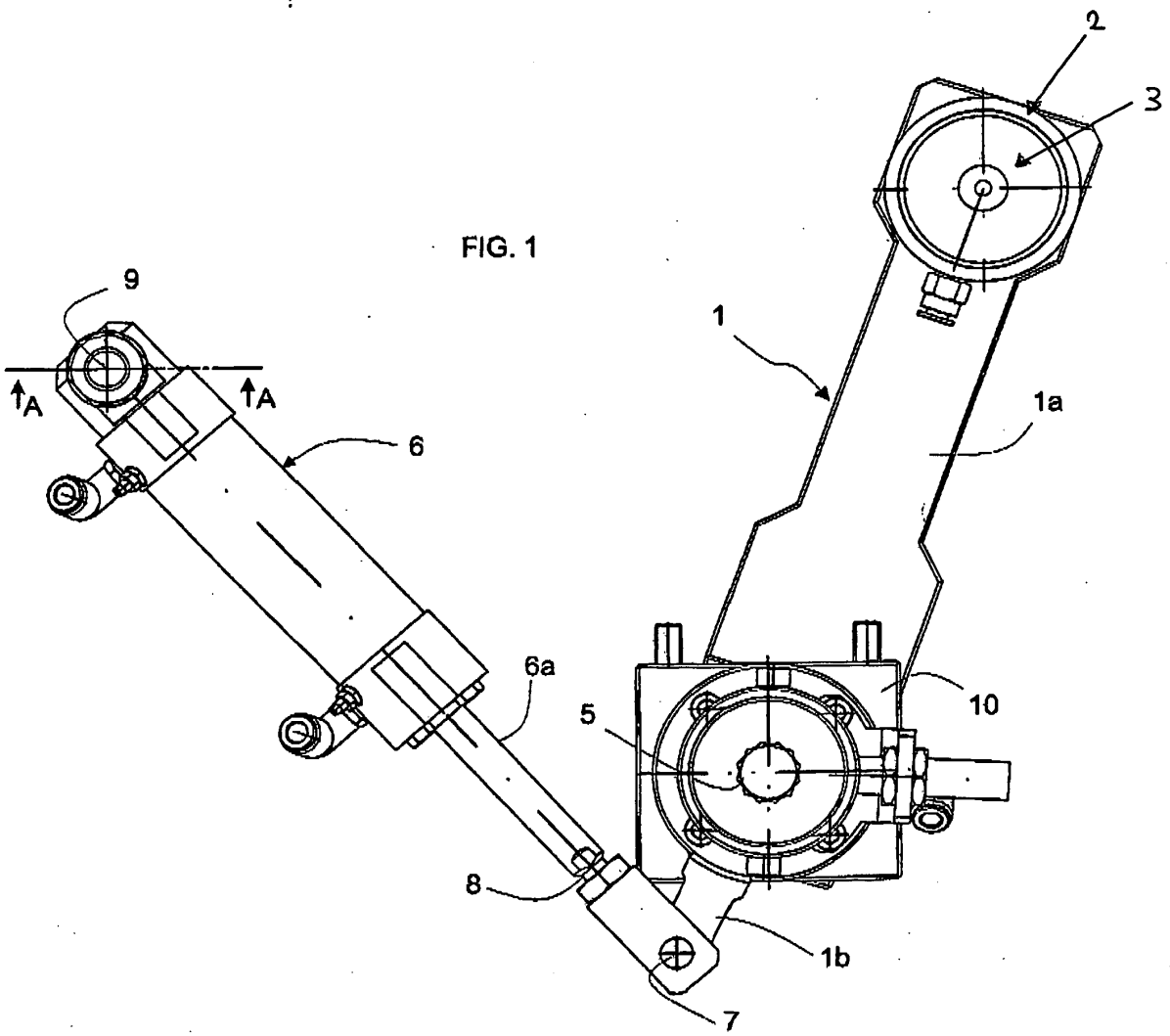


FIG. 2

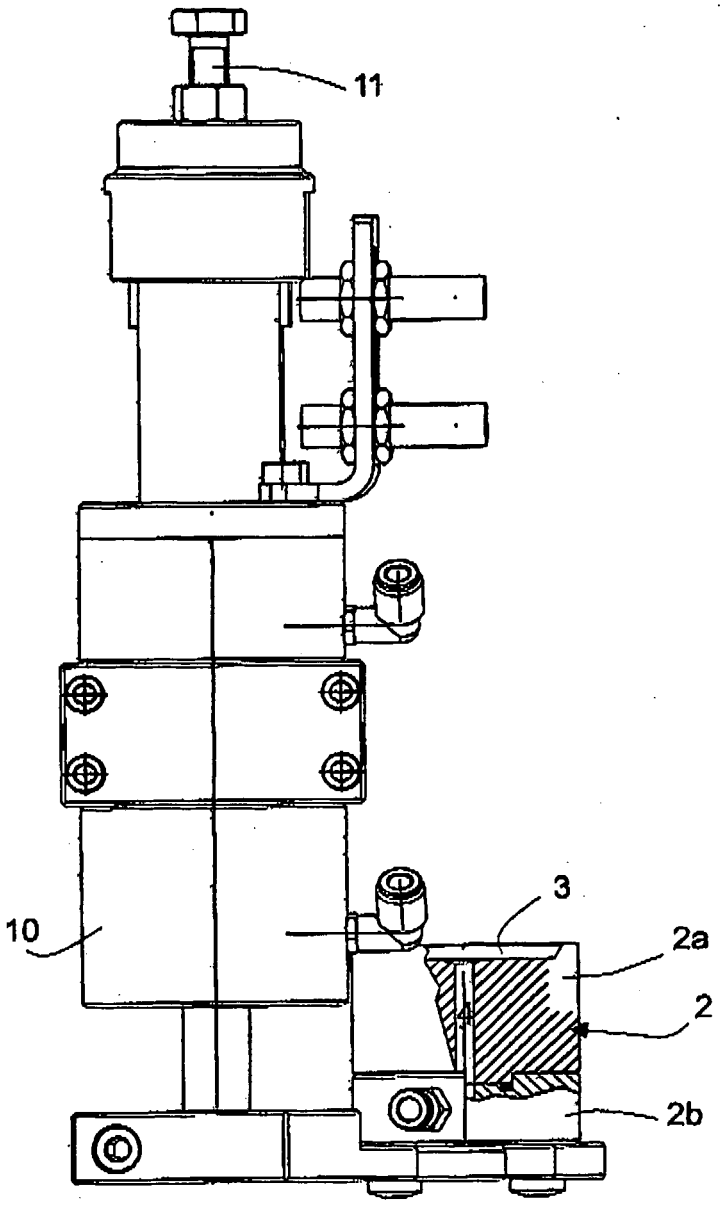


FIG. 4

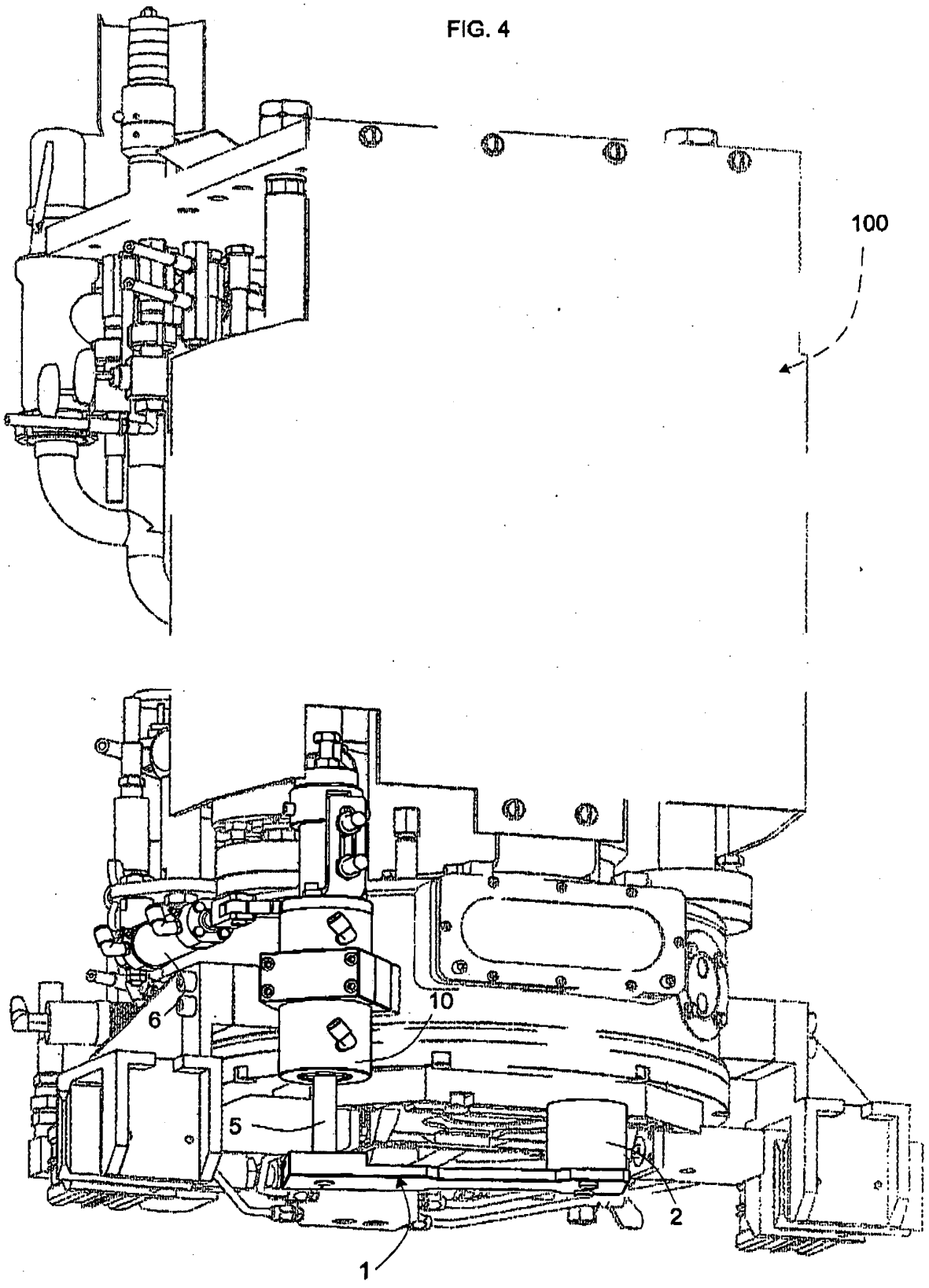


FIG. 5

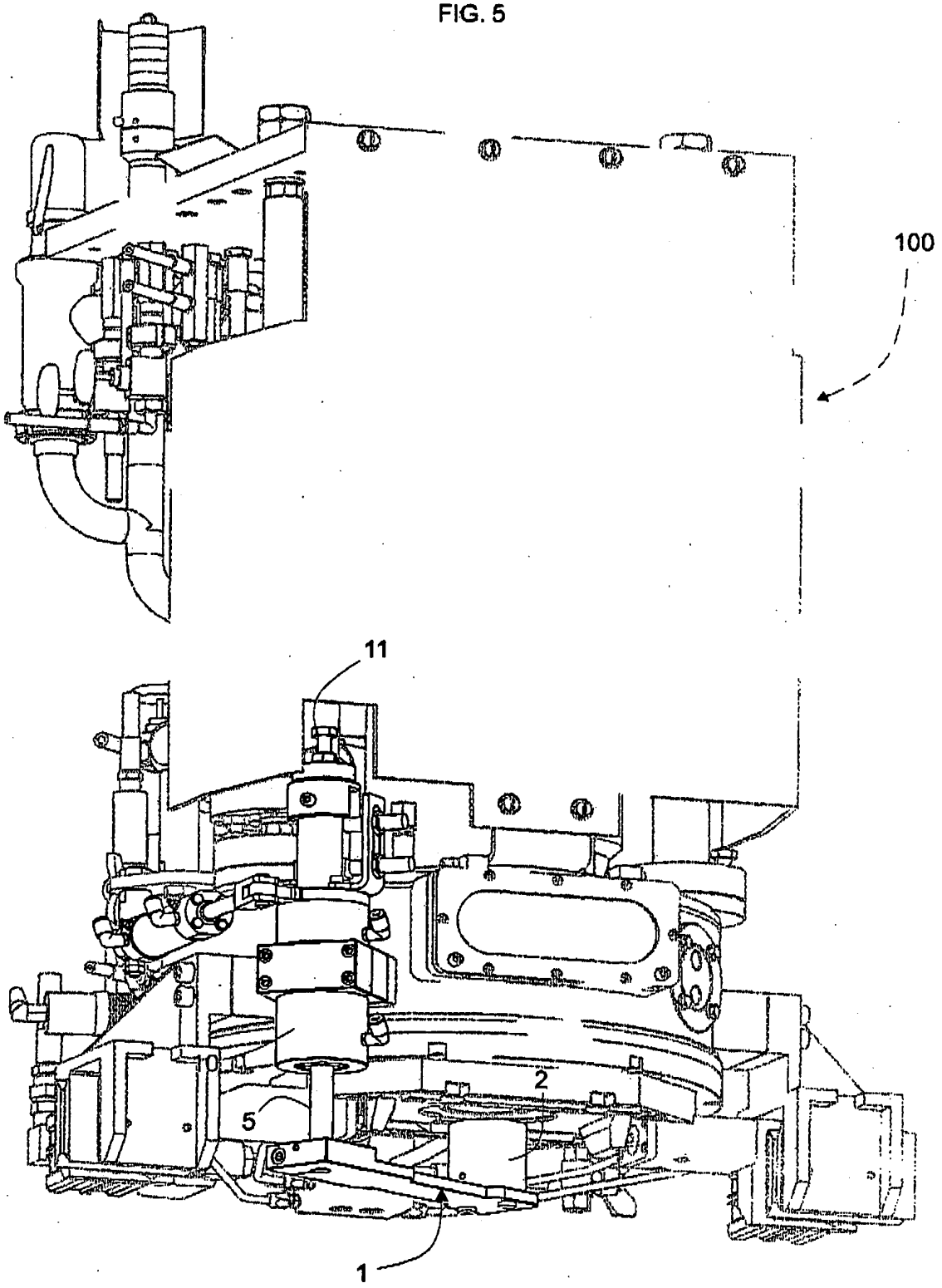


FIG. 6

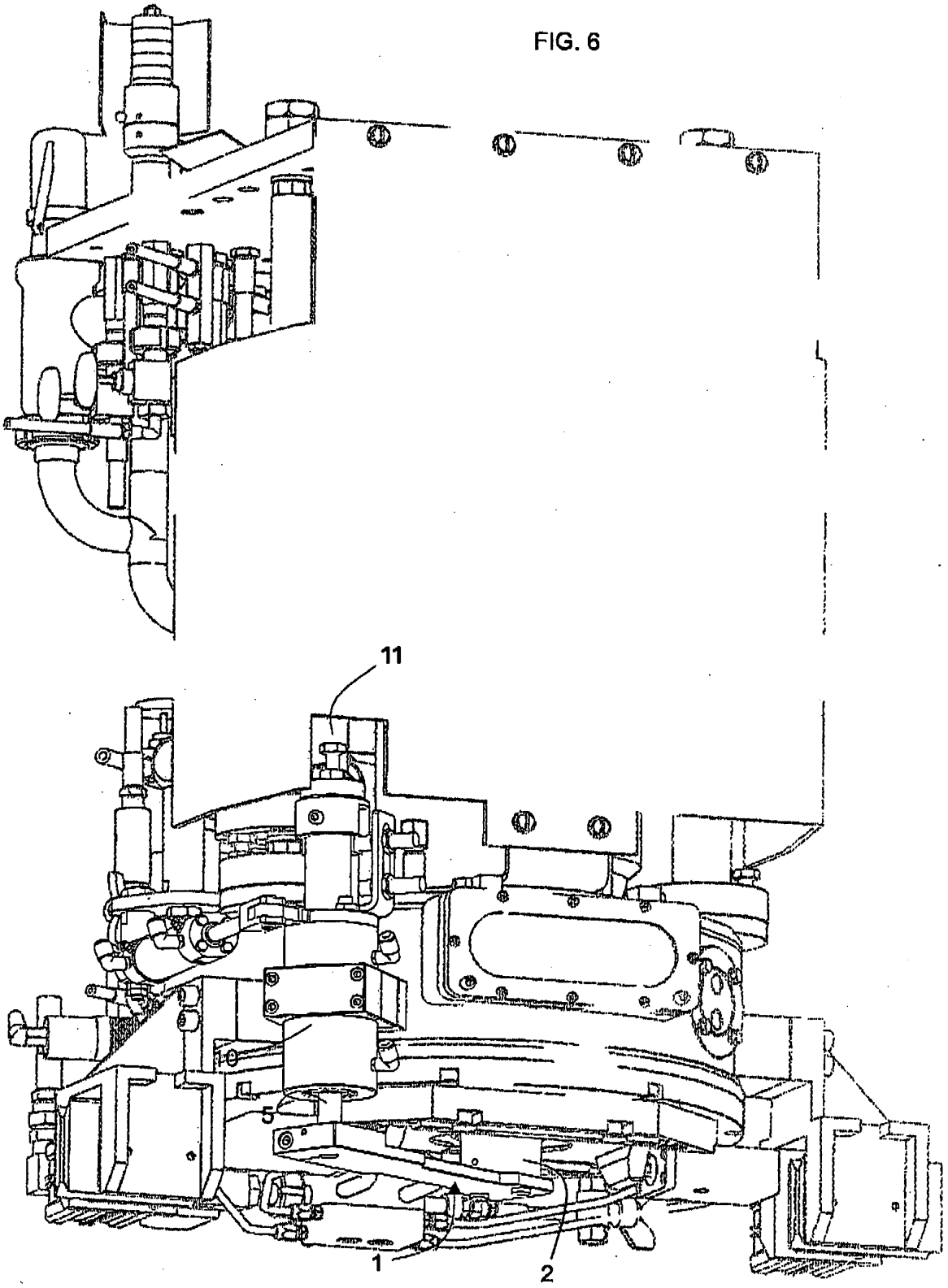
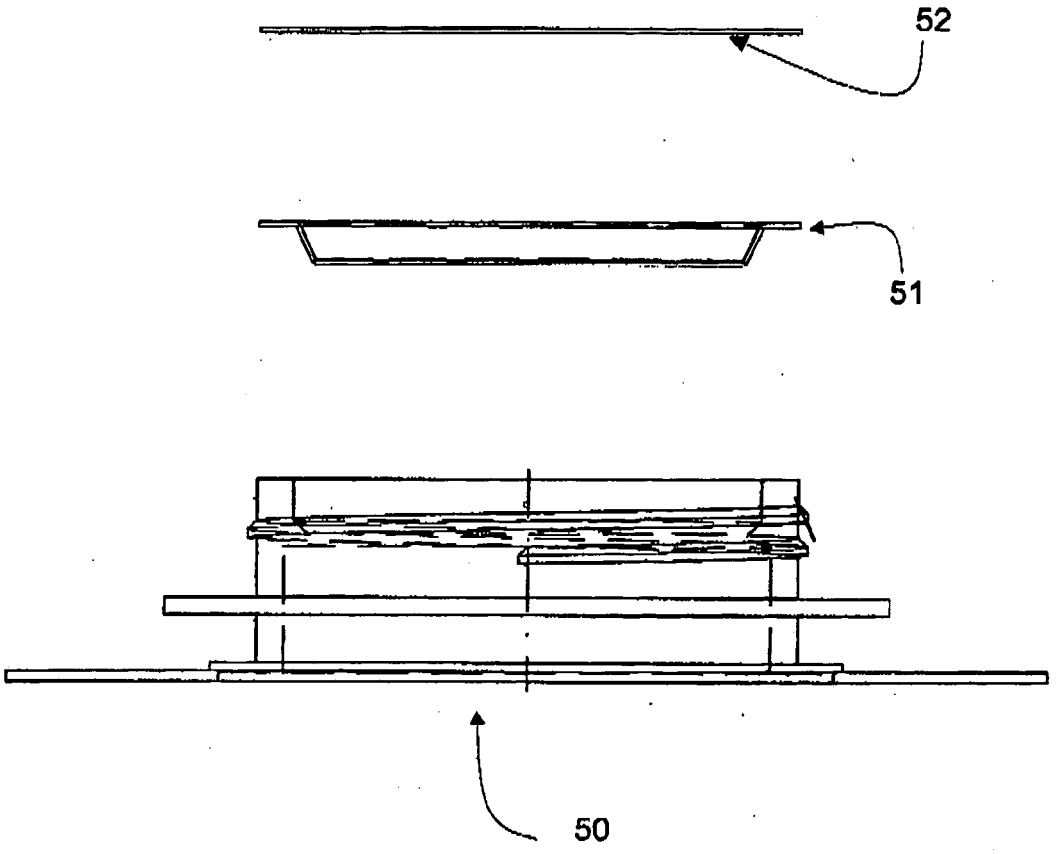


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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