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(54) **Filling head for an aseptic filling machine in particular for flexible containers with a pressure cap.**

Füllorgan für eine aseptische Füllmaschine, insbesondere für flexible Behälter mit Druckkappe

Tête de remplissage pour une machine de remplissage aseptique, en particulier pour des récipients flexibles avec bouchon sous pression

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Description

[0001] The present invention relates to a filling head for an aseptic filling machine in particular for flexible containers with a pressure cap.

[0002] For some time now it has become widespread practice in the food sector to store tomato or fruit juice in containers which are in the form of a flexible bag closed by a cap which is inserted under pressure into a spout welded to the bag and provided with at least one annular groove for gripping of the spout itself during filling of the bag.

[0003] The container or bag is provided pre-sterilized internally, but the outside of the spout and the cap are exposed to the contaminated external environment.

[0004] Aseptic filling machines for filling these bags are already known, said filling machines comprising one or more filling heads which are fixed onto groups movable in the vertical direction so as to fill, from the bottom, the containers, which generally have a capacity of 1000 litres, and avoid any tension in the zone where the spout is welded onto the bag.

[0005] Said filling heads are located inside a sterile filling chamber which is kept under a steam atmosphere and inside which chamber the operations of opening, filling and closing are performed in sequence.

[0006] Before carrying out these operations it is necessary to perform the operation of sterilization of the spout which is the only contaminated element which enters into the sterile chamber. For this purpose it has already been envisaged using, inside the sterile chamber, a pre-chamber or bell for sterilizing the spout either with steam at 100°C or with sterilizing liquids, such as hydrogen peroxide, at a lower temperature. The pre-chamber, which incorporates grippers for opening and closing the cap, is supported by a vertical shaft able to perform two possible types of movement: a rotational movement and a vertical translation movement.

[0007] The rotational movement is used to bring the pre-chamber from a position where it is located above the spout gripping means into a position located away from said means during the bag filling stage, while the vertical translation has the function of extracting the cap from the spout or reinserting it. The walls which form the pre-chamber are provided with channels for supplying the steam.

[0008] It has been found that the spout and cap sterilization pre-chambers of the known type have certain drawbacks, some of which may be listed below:

- there is no control of the steam temperature inside the spout sterilization pre-chamber, so that it is not possible to guarantee the degree of efficiency of sterilization itself;
- the means for gripping the spout do not provide a pressure-tight seal with respect to the steam present in the pre-chamber;
- the grippers for opening and closing the cap are op-

erated by resilient means which do not always guarantee efficient operation, so that they require considerable maintenance;

- the spout gripping means are generally pneumatically or resiliently operated and suffer from the same maintenance problems mentioned above;
- the shaft supporting the pre-chamber which must rotate and travel vertically is mounted inside bushes which are subject to considerable wear owing to the high radial cantilever loads.

[0009] From EP-A-0429960 it is known a continuous monitoring of the temperature reached during a sterilization operation by means of a temperature sensor.

[0010] The object of the present invention is that of overcoming all the drawbacks mentioned above and in particular of being able to verify constantly the degree of efficiency of spout sterilization inside the pre-chamber.

[0011] A further object is that of providing the filling head with gripper operating devices, both for the cap and for the spout, which are precise and constant over time and require little maintenance.

[0012] These and other objects are achieved by the filling head for an aseptic filling machine characterized by the contents of the appended claims.

[0013] This characteristic feature, together with others, will emerge more clearly from the following description of a preferred embodiment illustrated, purely by way of a nonlimiting example, in the accompanying illustrative plates, in which:

- Figure 1 shows a cross-sectional elevation view of the filling chamber with pre-chamber in the position for sterilization and gripping of the cap;
- Figure 2 shows a further cross-sectional view of the filling head with the pre-chamber in the position displaced from the spout so as to allow filling of the bag;
- Figure 3 shows a partial top plan view of the filling head with the spout engaging grippers closed.

[0014] With reference to the Figures, 1 denotes a sterile chamber inside which a filling head 2 with a cylindrical design of the known type is able to penetrate in a sealing manner. A bottom wall 3 of the chamber 1 is provided with an opening 4 inside which a spout 5, provided with a cap 6 and welded to a bag 7, can be inserted. The spout 5 of the known type has at least one annular groove into which gripping means, which retain the spout itself during all the operations necessary for filling of the bag, penetrate. The internal surface of said bottom wall 3 is provided, in fact, with spout gripping means which are indicated in their entirety by 8.

[0015] The gripping means 8 comprise two jaws or grippers 9 and 10, each of which is pivotably mounted on a pin 11 and is able to oscillate about said pin upon actuation of a pawl 12a on which there is an idle roller

wheel 12 inserted inside a positive cam 13 keyed onto a vertical shaft 14 inserted inside the chamber 1.

[0016] The vertical shaft 14 is supported by two bushes 15 and 16 which are inserted respectively in the bottom wall 3 and in the upper wall 3a of the chamber.

[0017] The vertical shaft 14 is able to perform rotational oscillations by means of operating systems of a known type and not described.

[0018] 34 denotes a plate which is fixed to the bottom wall 3 at a distance therefrom and underneath which plate 34 both of the two jaws 9 and 10 are inserted with pressure so as to ensure a perfect seal.

[0019] A hollow vertical shaft 17 penetrates through the upper wall 3a of the chamber 1, said shaft rotating on itself and being vertically displaceable by means of actuating systems known and not described. The hollow shaft 17 has fixed to its bottom a pre-chamber for sterilization of the spout, indicated in its entirety by 20. The pre-chamber 20 comprises an upper plate 21, a side wall 22 and a bottom wall 23, the latter two being provided with a sealing ring 24 pressing against the underlying grippers 9 and 10.

[0020] The pre-chamber 20 has, defined inside it, two compartments indicated respectively by 25 and 26, into the first of which saturated steam at a temperature higher than 100°C is injected. The steam is injected by means of a flexible pipe 35 which enters inside the sterile chamber 1. The chamber 25 also houses a temperature sensor 40 for continuously monitoring the temperature reached during each sterilization operation.

[0021] The sensor is advantageously connected to a control system which is able to prevent operation of the entire machine if the value of the temperature detected falls below a minimum predefined value, so as to ensure perfect sterilization of the spout.

[0022] The chamber 26 houses operating means 27 for grippers 28 which extend into the chamber 25 and are designed to grip the cap for extraction or insertion thereof from or into the spout.

[0023] The operating means 27 comprise a pin 18 which is inserted coaxially inside the hollow shaft 17 with the possibility of rotating inside it. The pin 18 has, fixed to its end, a positive cam 29 containing, in its seat, a roller wheel 30 mounted idle on a small pin 31 supported by the gripper 28 which is pivotably mounted at 32 on the upper plate 21 of the pre-chamber.

[0024] The upper wall 3a has, fixed to it, a support 33 which supports the hollow shaft 17 with the arrangement, in between, of at least two sleeves comprising ball bearings 19 (only one of which is visible in the Figure) allowing the hollow shaft to perform the two movements described above in such a way as to withstand considerable cantilever radial loads without losing its freedom of vertical movement.

[0025] The spout engaging grippers are designed with a pressure-tight closing action and with forced-contact sliding by means of the plate 34 underneath which the engaging grippers are forcibly inserted.

[0026] Operation of the filling head will now be described:

[0027] The spout with cap is inserted into the opening 4 by means of devices which are known and not illustrated. Then the grippers 9 and 10 intervene and, actuated by the positive cam 13, grip the spout, also ensuring sealing of the overlying chamber 25 of the pre-chamber 20, as illustrated in Figure 1.

[0028] At this point, steam at a temperature higher than 100°C is introduced into the chamber 25 by means of a flexible pipe 35.

[0029] Once sterilization of the cap and the spout has been performed, the hollow shaft 17 is raised slowly, drawing upwards the sterilization pre-chamber and therefore removing the cap from the spout. The pre-chamber moves upwards slowly so as to allow discharging of the pressure inside the sterile chamber so as to prevent the entry of steam into the bag. At this point the hollow shaft rotates on itself so as to move the cap away from the filling zone (see Figure 2) and allow the head 2 to move down until it is above the spout and start filling, after which, the head is raised and the pre-chamber 20 together with the gripped cap is positioned above the spout again so as to perform closing of the bag.

[0030] The temperature sensor constantly detects the temperature in the pre-chamber, especially during the injection of steam into the pre-chamber, so as to verify the sterilization efficiency thereof.

Claims

1. Filling head for an aseptic filling machine in particular for flexible containers with a pressure cap inserted into a spout welded to the container of the type comprising:

- a sterile chamber (1) inside which the operations of opening, filling and closing of the container are performed, said sterile chamber being provided on a bottom wall (3) with means (8) for gripping the spout;
- a pre-chamber (20) for sterilization of the spout by means of injection of steam, which is supported by a vertical shaft (17) rotating on itself and displaceable vertically, said pre-chamber incorporating grippers (28) and associated operating means (27) for opening and closing the cap;
- a temperature sensor (40) which is located inside the spout sterilization pre-chamber (20), for continuously monitoring the temperature reached during each sterilization operation,

characterized in that the operating means (27) of the grippers for opening and closing the cap comprise a positive cam (29) which is made to rotate by a pin (18) which is inserted coaxially inside the ro-

tating vertical shaft (17) which supports the pre-chamber, a roller wheel (30) actuated by the cam being connected to the grippers (28) which are hingeably mounted on the pre-chamber.

2. Filling head according to Claim 1, wherein the pre-chamber (20) is shaped in such a way as the sealing of a overlying chamber (25) for introducing steam takes place through a rotation of the vertical shaft (17) and an engagement of the grippers (28) with the spout (5).
3. Filling head according to Claim 1, **characterized in that** the spout gripping means (8) comprise a positive cam (13) which is housed inside the sterile chamber (1), two roller wheels (12) each engaging with a gripper (9) and (10) hingeably mounted on the bottom wall (3) of the sterile chamber.
4. Filling head according to Claim 1, **characterized in that** it comprises a sleeve with ball bearings (19) for seating the vertical shaft (17) which supports the pre-chamber (20).
5. Filling head according to Claims 1 and 3, **characterized in that** the spout gripping means (8) comprise a plate (34) which is fixed to the bottom wall of the sterile chamber and underneath which the grippers (9) and (10) are inserted when the spout is gripped.

Patentansprüche

1. Füllorgan für eine aseptische Füllmaschine, insbesondere für flexible Behälter mit einer Druckkappe, die in einen an den Behälter geschweißten Ausguss eingesetzt ist, bestehend aus:
 - einer Sterilkammer (1), in der die Arbeitsvorgänge zum Öffnen, Füllen und Schließen des Behälters durchgeführt werden, wobei die genannte Sterilkammer auf einer unteren Wand (3) mit Mitteln (8) zum Ergreifen des Ausgusses vorgesehen ist;
 - einer Vorkammer (20) zum Sterilisieren des Ausgusses durch Dampfinjektion, die von einer vertikalen Welle (17) getragen wird, die sich um sich selbst dreht und vertikal verstellbar ist, wobei die genannte Vorkammer Greifer (28) und zugehörige Betätigungsmittel (27) zum Öffnen und Schließen der Kappe umfasst;
 - einen Temperatursensor (40), der in der Vorkammer (20) zur Ausgusssterilisierung angeordnet ist und zur kontinuierlichen Überwachung der bei jedem Sterilisierungsvorgang erreichten Temperatur dient,

dadurch gekennzeichnet, dass die Betätigungsmittel (27) der Greifer zum Öffnen und Schließen der Kappe einen formschlüssigen Nocken (29) umfassen, der durch einen Stift (18) in Drehung versetzt wird, welcher koaxial in die rotierende vertikale Welle (17) eingesetzt ist, welche die Vorkammer trägt, und dass ein von dem Nocken betätigtes Walzenrad (30) mit den Greifern (28) verbunden ist, die gelenkig auf der Vorkammer montiert sind.

2. Füllorgan nach Anspruch 1, bei dem die Vorkammer (20) so geformt ist, dass die Versiegelung einer darüber liegenden Kammer (25) zur Einleitung des Dampfes durch das Drehen der vertikalen Welle (17) und das Eingreifen der Greifer (28) mit dem Ausguss (5) erfolgt.
3. Füllorgan nach Anspruch 1, **dadurch gekennzeichnet, dass** die Ausgussgreifmittel (8) einen formschlüssigen Nocken (13) beinhalten, der in der Sterilkammer (1) untergebracht ist, sowie zwei Walzenräder (12), die jeweils in einen Greifer (9) und (10) eingreifen, der gelenkig auf der unteren Wand (3) der Sterilkammer montiert ist.
4. Füllorgan nach Anspruch 1, **dadurch gekennzeichnet, dass** es eine Hülse mit Kugellagern (19) zur Aufnahme der vertikalen Welle (17) beinhaltet, welche die Vorkammer (20) trägt.
5. Füllorgan nach Anspruch 1 und 3, **dadurch gekennzeichnet, dass** die Ausgussgreifmittel (8) eine Platte (34) beinhalten, die an der unteren Wand der Sterilkammer befestigt ist und unterhalb derer die Greifer (9) und (10) beim Ergreifen des Ausgusses eingeführt werden.

Revendications

1. Une tête de remplissage pour une machine de remplissage aseptique, en particulier pour des récipients flexibles avec bouchon sous pression inséré dans un goulot soudé sur le récipient du type comprenant:
 - une chambre stérile (1) dans laquelle sont réalisées les opérations d'ouverture, remplissage et fermeture du récipient, ladite chambre stérile étant pourvue d'une paroi inférieure (3) avec des moyens (8) pour saisir le goulot;
 - une pré-chambre (20) pour la stérilisation du goulot au moyen de l'injection de vapeur, supportée par un arbre vertical (17) pivotant sur lui-même et mobile verticalement, ladite pré-chambre incorporant des organes de préhension (28) et des moyens d'actionnement (27) pour ouvrir et fermer le bouchon;

- un capteur de température (40) situé dans la pré-chambre (20) de stérilisation du goulot, pour le contrôle permanent de la température atteinte pendant l'opération de stérilisation, **caractérisée en ce que** les moyens d'actionnement (27) des organes de préhension pour ouvrir et fermer le bouchon comprennent une came positive (29) mise en rotation par une tige (18) insérée coaxialement à l'intérieur de l'arbre vertical rotatif (17) qui supporte la pré-chambre, une roulette (30) actionnée par la came étant reliée aux organes de préhension (28) montés pivotants sur la pré-chambre. 5 10

- 2. Une tête de remplissage selon la revendication 1, dans laquelle la pré-chambre (20) est conformée de manière à ce que l'étanchéité d'une chambre superposée (25) pour introduire la vapeur se vérifie de part la rotation de l'arbre vertical (17) et l'engagement des organes de préhension (28) sur le goulot (5). 15 20

- 3. Une tête de remplissage selon la revendication 1, **caractérisée en ce que** les moyens de préhension du goulot (8) comprennent une came positive (13) logée dans la chambre stérile (1), deux roulettes (12) s'engageant sur deux organes de préhension (9) et (10) montés pivotants sur la paroi inférieure (3) de la chambre stérile. 25 30

- 4. Une tête de remplissage selon la revendication 1, **caractérisée en ce qu'elle** comprend un fourreau avec des roulements à billes (19) pour loger l'arbre vertical (17) qui supporte la pré-chambre (20). 35

- 5. Une tête de remplissage selon les revendications 1 et 3, **caractérisée en ce que** les moyens (8) de préhension du goulot comprennent une plaque (34) fixée à la paroi inférieure de la chambre stérile et au-dessous de laquelle les organes de préhension (9) et (10) sont insérés lorsque le goulot est saisi. 40

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FIG.1

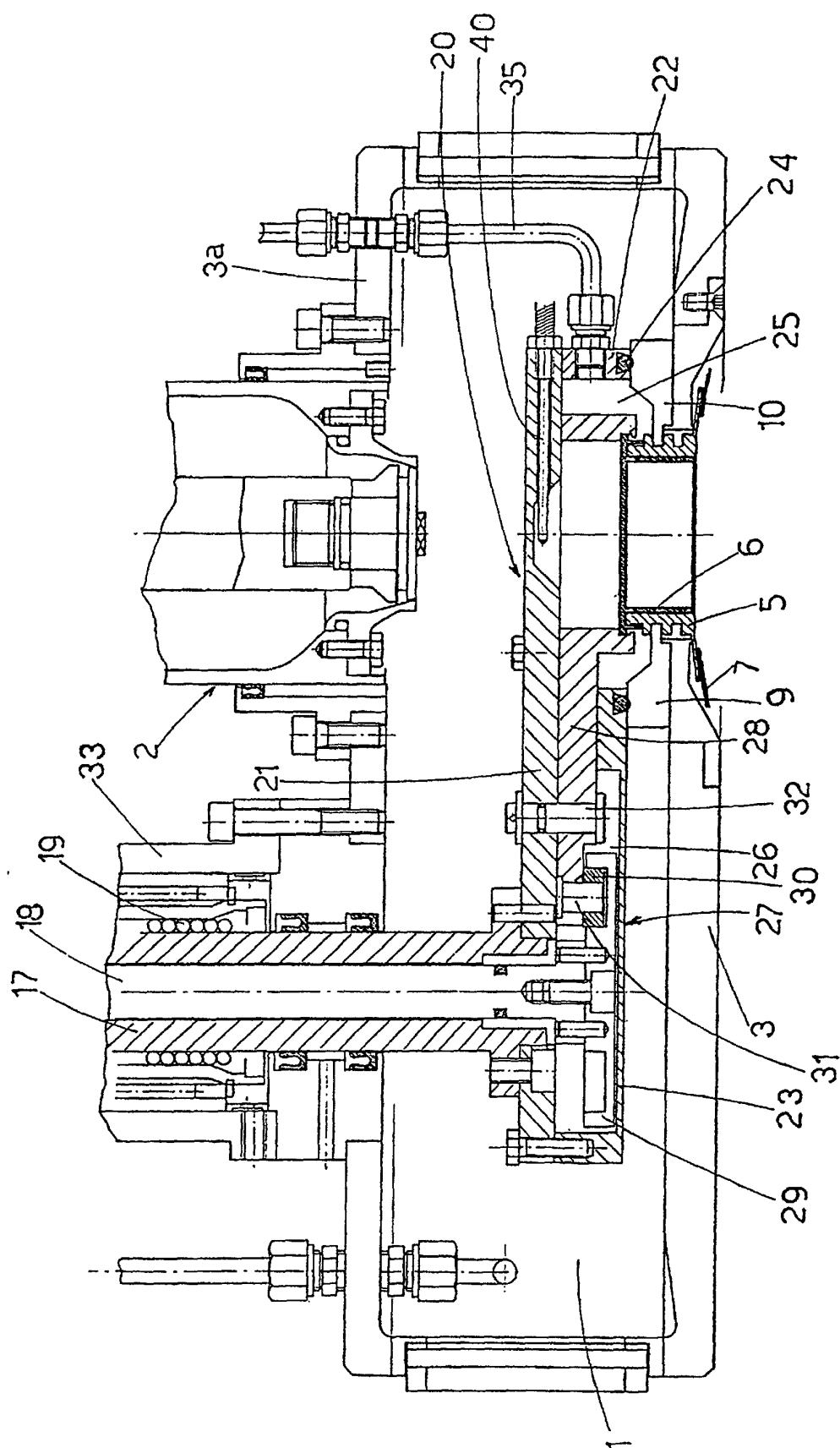


FIG.2

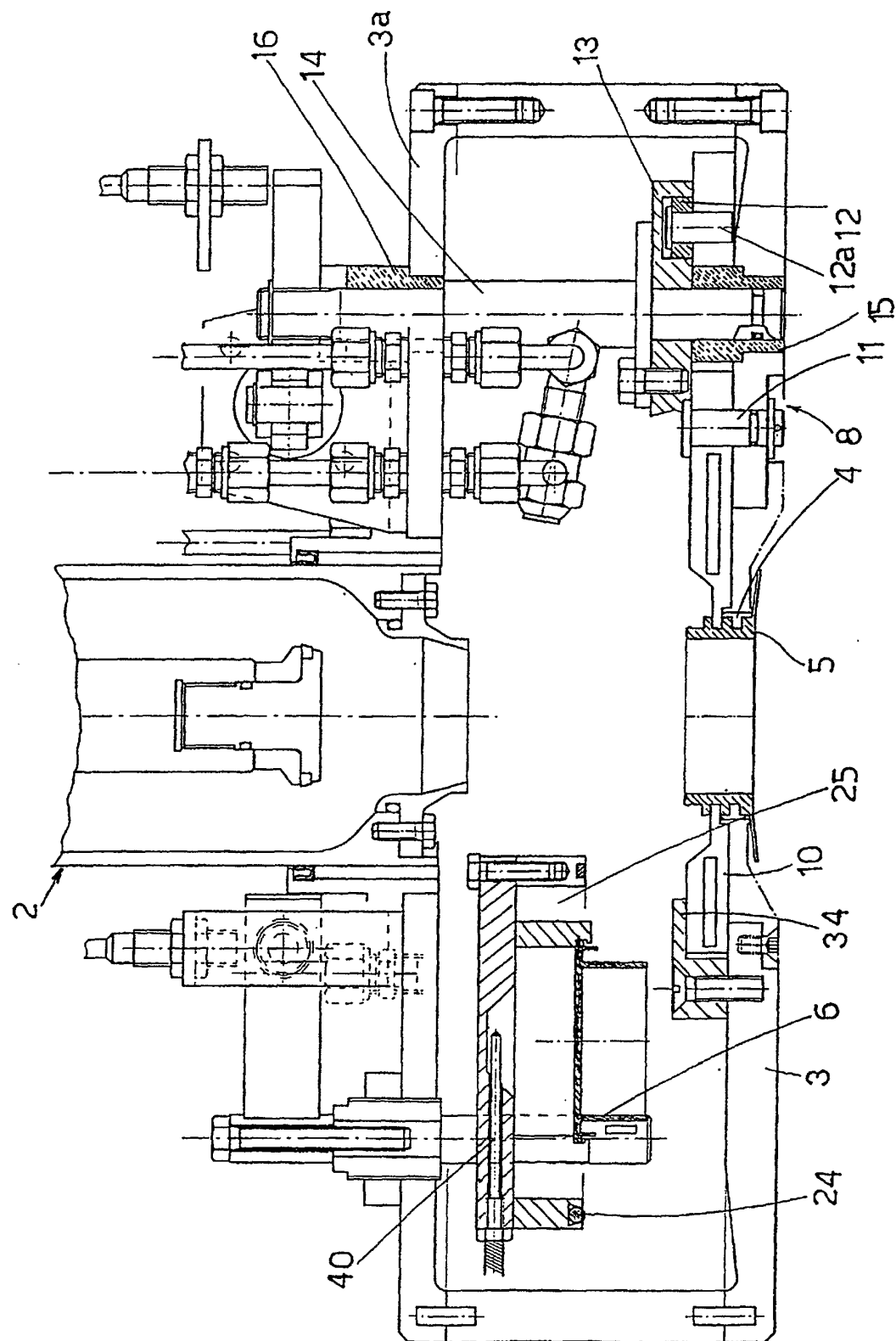


FIG3

