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(54) **FILLING VALVE, IN PARTICULAR FOR HOT LIQUIDS**

FÜLLVENTIL, INSBESONDERE ZUM ABFÜLLEN VON WARMEN FLÜSSIGKEITEN

CLAPET DE REMPLISSAGE, NOTAMMENT POUR LIQUIDES CHAUDS

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Description

TECHNICAL FIELD AND BACKGROUND ART.

[0001] The present invention relates to a mechanical filling valve, in particular for hot liquids, of the type comprising at least a conduit for the inflow of the liquid into a container and at least an outflow conduit to eject the air present within the container during the filling operation and to allow to recirculate the product at the end of the filling operation.

[0002] It is well known that one of the major problems connected with filling containers with hot liquids, for instance tea or fruit juices, is represented by the need to maintain the filling valve at the proper temperature, in order not to cool the product, thereby assuring its optimal preservation during storage.

[0003] Currently, filling valves are kept at the proper temperature by making the hot product recirculate continuously.

[0004] This, however, is particularly inconvenient, since recirculation necessarily subjects the product to numerous heating cycles which could compromise its organoleptic characteristics.

[0005] A first known prior art solution for maintaining the filling valves at the proper temperature, whilst reducing product recirculation, consists of introducing localised head losses on the outflow conduit.

[0006] This solution has the important drawback of "inflating" the container (obviously, in the case of containers made of deformable material, such as PET), because head losses, in addition to reducing recirculation, also prevent the escape of air during the filling operation. This entails undesired "splash out" of liquid at the end of the filling operation, due to the elastic return of the container.

[0007] A second prior art solution provides for the use of pneumatic devices for opening and closing the delivery conduit, with their operation synchronised with the duration of the filling operation.

[0008] However, the use of pneumatic devices, especially if associated to rotary machines, is particularly complex, due to the presence of flexible conduits connected to rotating mechanical parts. EP-A-0337913 discloses a filling valve as in the preamble of claim 1.

DISCLOSURE OF THE INVENTION

[0009] An object of the present invention is to eliminate the aforesaid drawbacks, making available a mechanical filling valve, in particular for hot liquids, which is able to handle product recirculation, according to productive requirements and to the type of product employed.

[0010] Another object of the present invention is to propose a mechanical filling valve which can be installed on different types of machines, in particular on rotary machines.

[0011] A further aim is to obtain the result expressed above, within the context of a simple, rational and reliable

constructive solution.

[0012] Said objects are fully achieved by the filling valve, in particular for hot liquids, of the present invention, which is characterised by the contents of the claims set out below.

BEST MODE FOR CARRYING OUT THE INVENTION.

[0013] This and other characteristics shall become more readily apparent from the following description of a preferred embodiment illustrated, purely by way of non limiting example, in the accompanying drawing tables, in which:

- Figure 1 shows a partially sectioned front view of a mechanical filler valve according to the invention;
- Figure 2 shows a top A-A section view of the filling valve of Figure 1;
- Figure 3 shows a side view of the filling valve of Figure 1;
- Figures 4, 5 and 6 show a schematic view of the filling valve of Figure 1 in three different operative configurations, respectively in a second speed of the filling step and sanitising step, filling step, valve closure step with decompression and recirculation.

[0014] With reference to the figures, the mechanical filling valve is globally designated by the number 1 and finds particular and effective use on rotary filling machines, i.e. those in which the filling valves are positioned on a rotating star, or carousel.

[0015] The filling valve 1 comprises at least a conduit 2 for the inflow of the filling liquid, for instance tea or fruit juices, to a container (not shown), and an outflow conduit 3 for ejecting the air present inside the container during the filling operation and to allow product recirculation at the end of the filling operation.

[0016] The inflow conduit 2 and the outflow conduit 3 are respectively connected to a delivery conduit 2a and to a return conduit 2b from/to a tank of the product.

[0017] The filling starts as soon as the container, typically a bottle, is approached to the valve 1 and thrusts a sliding coupling 4 upwards, uncovering a passage port 5 of the inflow conduit 2. The container is approached to the valve in a known manner, for instance by means of a plate (not shown) which lifts the container until it brings it in position for filling. Alternatively, the valve 1 can also be approached to the container, also in known fashion not shown herein.

[0018] At the end of the filling operation, the container is moved away from the valve 1 and the coupling 4 thus closes the passage port 5.

[0019] The filling valve 1 originally comprises mechanical means for managing the recirculation of liquid at the end of the filling operation. Said means are movable between at least a stable open position (Figure 4) and a stable position of total or partial closure (Figures 6 and 5) of the inflow conduit 2.

[0020] Recirculation takes place in two different manners, depending on whether the container is present or not. If the container is present, the liquid recirculates in the outflow conduit 3, since, upon exiting the passage port 5, it is deviated by the walls of the mouth of the container (which is thus completely filled). Vice versa, in the absence of the container, the liquid coming from the inflow conduit 2 is deviated into the outflow conduit 3 thanks to the presence of the coupling 4 which obstructs the passage port 5.

[0021] The mechanical means for managing the recirculation comprise a cam 6 where to is integrally connected a shaft 7. At one end of the shaft 7 is in turn integrally connected a shutter 8, which intercepts the inflow conduit 3 and is immersed in the flow of liquid.

[0022] Also present are means for actuating the cam 6, making it rotate by a predetermined angle, between at least two stable positions corresponding to the opening (Figure 4) and to the closing (Figure 6) of the inflow conduit 2 by the shutter 8.

[0023] The means for managing recirculation further comprise a link rod 10 having a first end 10a inserted in a cavity 6a of the cam 6 and a second end 10b inserted in a cavity 6b of a support assembly 11 of the shaft 7. The cavities 6a and 6b are elastically pressed against each other, preferably by means of a helical spring 12.

[0024] The means for managing recirculation are also provided with at least an abutment element 13 able to maintain the cam 6 stably positioned in a predetermined operative position.

[0025] The cam 6, together with the abutment element 13, enable to obtain an actuation of the shutter 8 between stable operative configurations, corresponding to the opening and/or (total or partial) closure of the inflow conduit 2.

[0026] With particular reference to Figure 2, the abutment element 13 comprises a piston 14 inserted in a cavity 15 of the support assembly 11 of the shaft 7 and an elastic element, preferably a helical spring 16, operatively active on the piston, to maintain it pressed against the cam 6.

[0027] The means for managing liquid recirculation comprise a plurality of abutment elements (not shown) integral with a frame of a filling machine, which activate the rotation of the cam 6 by impact (consequently controlling the motion of the shutter 8). Specifically, it is the motion of the carousel itself, whereon the filling valves are located, which causes the cam 6 to impact against the abutment elements.

[0028] The abutment elements will be positioned on the frame of the filling machine in such a way as to cause the opening and/or the (total or partial) closure of the shutter 8, according to the angular positioning of the carousel.

[0029] With particular reference to Figures 4, 6 and 5, the shutter allows alternatively fully to open, shut or throttle the inflow conduit 2, thereby managing product recirculation. In this way, it is possible to choose how much

product flow rate is to be recirculated, and possibly even to eliminate recirculation altogether, for instance in the case of maintenance operations or machine down time caused by sudden failures.

[0030] The invention achieves important advantages.

[0031] First of all, such a filling valve allows to manage recirculation according to the productivity and operating conditions of the installation. In particular, the ability to stop recirculation at any time facilitates maintenance operations and prevents the loss of liquid in case of sudden failures.

[0032] Another advantage is represented by the fact that such a filling valve, having no pneumatic device for actuating the shutter, can easily be installed on rotary machines.

Claims

1. Filling valve (1), for liquids in particular for hot liquids comprising:

at least a conduit (2) for the inflow of the liquid to a container;

at least an outflow conduit (3) for ejecting air present inside the container during the filling operation and to allow a recirculation of the liquid at the end of the filling operation;

mechanical means for managing recirculation of liquid at the end of the filling operation, said mechanical means comprising

a cam (6);

a shaft (7) rigidly connected to the cam (6);

at least a shutter (8) connected to the shaft (7) and intercepting the inflow conduit (2), said shutter (8), when in use, being in contact with liquid;

means for actuating the cam (6), causing it to rotate by a predetermined angle between at least a stable open position corresponding to the opening of the inflow conduit (2) and a stable position corresponding to the total or partial closure of the inflow conduit (2) by the shutter (8),

characterised in that the mechanical means further comprise:

an assembly supporting the shaft (7);

at least a link rod (10) having a first end (10a) inserted in a cavity (6a) of the cam (6) and a second end (10b) inserted in a cavity (6b) of said assembly supporting the shaft (7), said cam (6), second end (10b) and link rod (10) being elastically pressed against each other;

at least an abutment element (13) to maintain the cam (6) stably positioned in a predetermined operative configuration, said cam (6) and said abutment element (13) allowing an actuation of the shutter (8)

between stable operative configurations corresponding at least to the opening and to the closure of the outflow conduit (2).

2. Filling valve as claimed in claim 1, **characterised in that** the abutment element (13) comprises:

at least a piston (14) inserted in a cylindrical cavity (15) of the support assembly (11) of the shaft (7);
at least an elastic element (16) operatively active on the piston (14) to maintain it pressed against the cam (6).

Patentansprüche

1. Füllventil (1) für Flüssigkeiten, insbesondere für warme Flüssigkeiten, umfassend:

zumindest einen Kanal (2) zum Zuführen der Flüssigkeit zu einem Behälter;
zumindest einen Abfuhrkanal (3) zum Ausstossen von Luft aus dem Behälterinneren während des Abfüllvorgangs und zur Ermöglichung einer Rückführung der Flüssigkeit nach Beendigung des Abfüllvorgangs;
mechanische Mittel zum Bewerkstelligen der Rückführung von Flüssigkeit nach Beendigung des Abfüllvorgangs, wobei diese mechanischen Mittel umfassen
einen Nocken (6);
eine fest mit dem Nocken (6) verbundene Welle (7);
zumindest ein fest mit der Welle (7) verbundenes und den Zufuhrkanal (2) verschliessendes Schliessorgan (8), das bei Gebrauch mit der Flüssigkeit in Berührung kommt;
Mittel zum Betätigen des Nockens (6), welche eine Drehung desselben um einen vorbestimmten Winkel zwischen mindestens einer stabilen, der Öffnung des Zufuhrkanals (2) entsprechenden Öffnungsposition und einer stabilen, der vollständigen oder teilweisen Schliessung des Zufuhrkanals (2) durch das Schliessorgan (8) entsprechenden Position, **dadurch gekennzeichnet, dass** die mechanischen Mittel ferner umfassen:

eine Lageranordnung für die Welle (7);
zumindest eine Verbindungsstange (10), die ein erstes, in eine Ausnehmung (6a) des Nockens (6) eingreifendes Ende (10a) und ein zweites, in eine Ausnehmung (6b) der genannten Lageranordnung für die Welle (7) eingreifendes Ende (10b) aufweist, wobei der Nocken (6), das zweite Ende (10b) und die Verbindungsstange (10) elastisch gegeneinander gepresst werden;

zumindest ein Anschlagelement (13), das den Nocken (6) stabil in einer vorbestimmten Betriebsanordnung hält,
wobei durch den Nocken (6) und das Anschlagelement (13) eine Betätigung des Schliessorgans (8) zwischen stabilen, zumindest der Öffnung und der Schliessung des Abfuhrkanals (2) entsprechenden Betriebsanordnungen ermöglichen.

2. Füllventil nach Anspruch 1, **dadurch gekennzeichnet, dass** das Anschlagelement (13) umfasst:

zumindest einen in eine zylinderförmige Ausnehmung (15) der Lageranordnung (11) für die Welle (7) eingebrachten Kolben (14);
zumindest ein elastisches Element (16), das betrieblich auf den Kolben (14) wirkt, um diesen gegen den Nocken (6) gepresst zu halten.

Revendications

1. Clapet de remplissage (1) pour liquides, en particulier pour liquides chauds, comprenant:

- au moins un conduit (2) pour l'afflux du liquide dans un conteneur;
- au moins un conduit d'échappement (3) pour éjecter l'air présent à l'intérieur du conteneur pendant l'opération de remplissage et pour permettre une recirculation du liquide au terme de l'opération de remplissage;
- des moyens mécaniques pour effectuer une recirculation du liquide au terme de l'opération de remplissage, lesdits moyens mécaniques comprenant:

une came (6);
un arbre (7) connecté rigidement à la came (6);
au moins un obturateur (8) connecté à l'arbre (7) et interceptant le conduit d'afflux (2), ledit obturateur (8), lorsqu'il est utilisé, étant en contact avec le liquide;
des moyens d'actionnement de la came (6), causant sa rotation selon un angle prédéterminé entre au moins une position stable ouverte correspondant à l'ouverture du conduit d'afflux (2) et une position stable correspondant à la fermeture totale ou partielle du conduit d'afflux (2) par l'obturateur (8), **caractérisé en ce que** les moyens mécaniques comprennent en outre:

un ensemble supportant l'arbre (7);
au moins une bielle (10) ayant une première extrémité (10a) insérée dans une

cavité (6a) de la came (6) et
 une seconde extrémité (10b) insérée
 dans une cavité (6b) dudit ensemble
 supportant l'arbre (7), ladite came (6),
 la seconde extrémité (10b) et la bielle 5
 (10) étant élastiquement pressées
 l'une contre l'autre;
 au moins un élément de butée (13) pour
 maintenir la came (6) positionnée de
 manière stable dans une configuration 10
 opérationnelle prédéterminée,
 ladite came (6) et ledit élément de butée
 (13) permettant un actionnement de
 l'obturateur (8) entre des configura- 15
 tions opérationnelles stables corres-
 pondant au moins à l'ouverture et à la
 fermeture du conduit d'échappement
 (2).

2. Clapet de remplissage selon la revendication 1, **ca-** 20
ractérisé en ce que l'élément de butée (13) com-
 prend:

- au moins un piston (14) inséré dans une cavité
 cylindrique (15) de l'ensemble de support (11) 25
 de l'arbre (7);
 - au moins un élément élastique (16) opération-
 nellement actif sur le piston (14) pour le main-
 tenir pressé contre la came (6).

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FIG. 1.

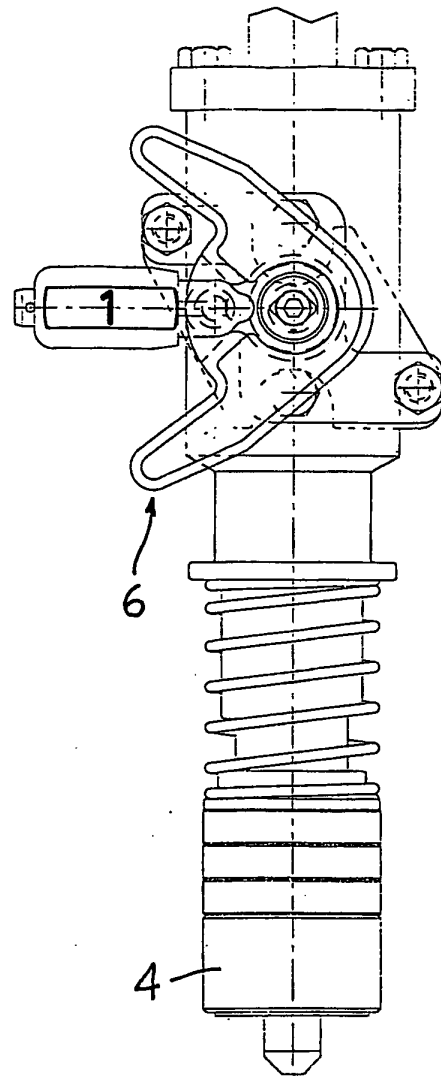
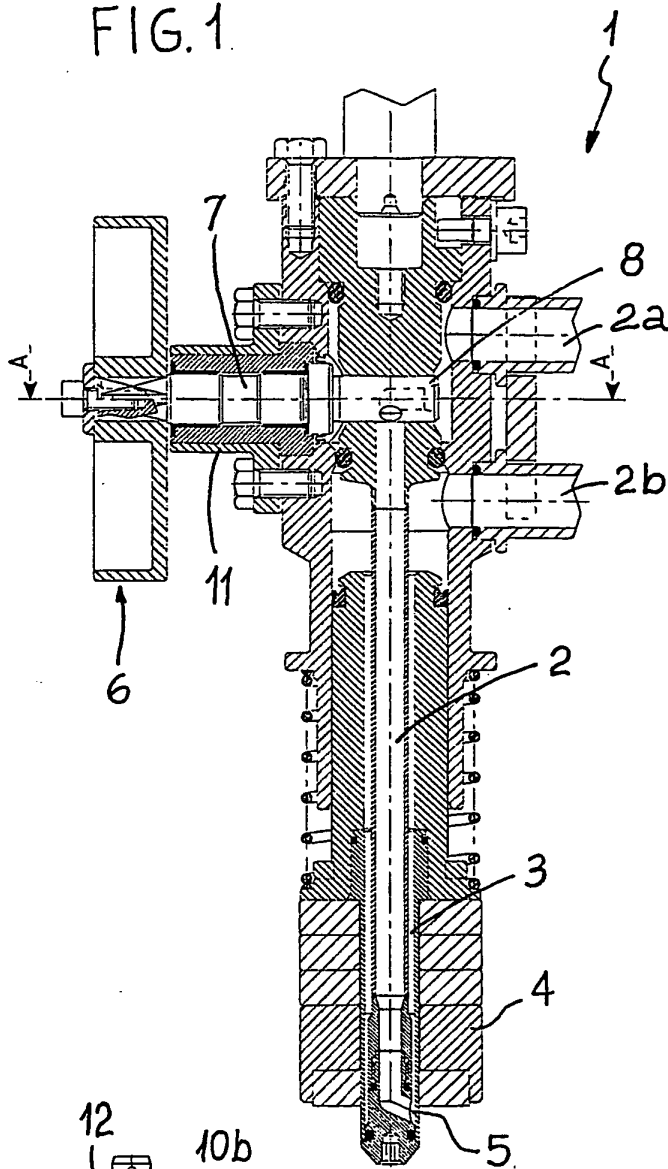


FIG. 3

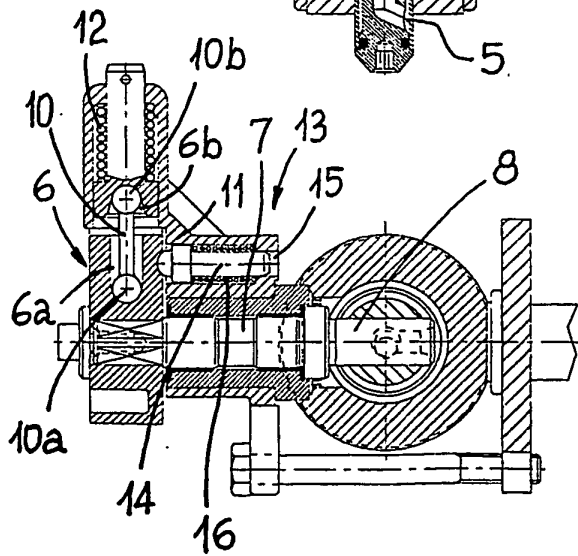


FIG.2

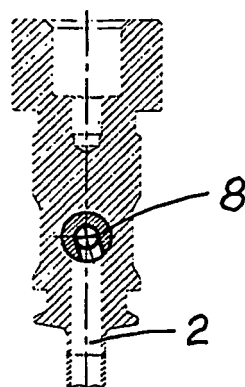
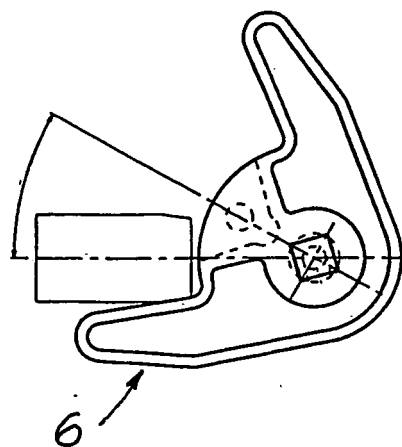


FIG. 4

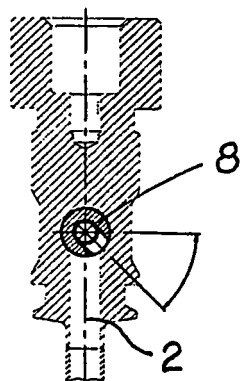
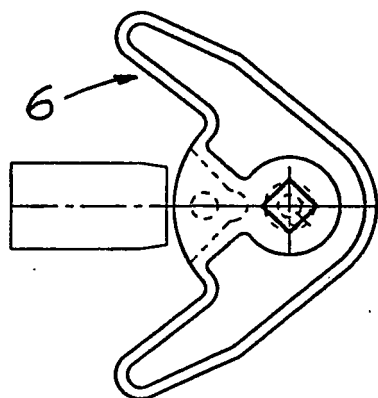


FIG. 5

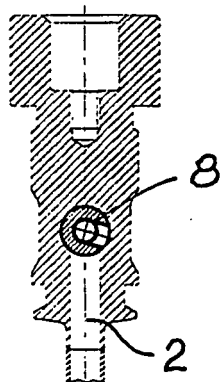
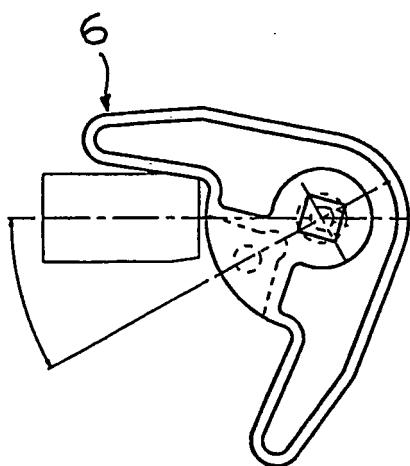


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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