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Description

This invention relates to a method for dispensing a viscous liquid, using a valve comprising a body having an inlet and an outlet and a valve member movable perpendicularly to the plane of said outlet, wherein as soon as the entire desired quantity of liquid has passed the outlet the valve member is moved to the outlet at such a velocity, that by suddenly decelerating upon closing the outlet the last quantity of liquid is pushed through the outlet.

In the prior art methods and apparatuses (see i.e. DE—A—2,819,245), use is made of a seal ring or washer which normally consists of elastic material (see also the used hatching). This implies that when closing the valve, a resiling will occur. Further the construction is so that in the closed end position the valve member will not fully fill up the outlet, so that the valve becomes fouled and starts dripping, when containers are changed thereby causing fouling of the container and the base on which it rests. This requires thorough cleaning of the valve, the container and the base. This need is even greater in those cases in which perishable materials are handled. Consequently, in the methods and apparatuses of the prior art, a considerable amount of additional work and hence, a considerable amount of additional cost are entailed in maintaining adequate standards of cleanliness and hygiene.

It is an object of the present invention to overcome these drawbacks.

According to the present invention in the end position of the valve member, the bottom surface thereof is coplanar with the end of the outlet and the outlet is fully filled up and the liquid will be fully released from the valve member.

In a further elaboration of the invention the valve member can be decelerated with a shock or optionally shockwise in a plurality of steps, whereas the liquid continues to advance under the influence of inertia. As the desired quantity of liquid is forced through the outlet as one whole, no liquid will cling to the wall of the outlet.

Preferably, the liquid is pushed outward in the vertical, downward direction. As a consequence, the amount of liquid is released from the decelerated valve member not only on the basis of inertia, but in addition by gravity.

The invention further relates to an apparatus for carrying out the methods according to the invention, comprising a valve including a body having an inlet and an outlet and a valve member adapted to close said outlet and movable perpendicularly to the plane of the outlet, wherein the valve member includes a shoulder which in the closed condition of the valve is in contact with the valve seat of the outlet and which construction is characterized in that the form and dimensions of the valve member correspond to those of the outlet, so that, in the closed end position of the valve, the bottom surface of the valve member is co-planar with the end of the outlet and the outlet is fully filled up. In this way no liquid can remain

behind in the outlet. At the same moment, the shoulder of the valve member strikes the seat, so that the valve member is abruptly stopped. As a consequence, the contact between the valve member and the liquid is broken, so that the liquid is moved along into the container and does not cling to the valve, thus preventing the latter from starting to drip, as no liquid can be present between the valve member and the valve seat.

Preferably, the transition between the shoulder and the valve member is rounded, and the associated part of the valve seat is similarly rounded. The result of this rounding is that the valve member is centred as it is pushed into the outlet. As it is further pushed through the outlet, the valve member will then come to lie in proper sealing relationship with the inner wall of the outlet. As the valve member moves into the outlet, liquid present between the valve member or the shoulder and the valve seat is pushed back into the valve along the rounded surfaces, so that, in the closed condition of the valve, no liquid can be present between the valve member and the valve seat.

In order to prevent, as much as possible, that any liquid clings to the valve member, the valve member may be made of polytetrafluoroethylene. Furthermore, the valve seat may be made of stainless steel, which can easily be cleaned. Such a combination of polytetrafluoroethylene and stainless steel additionally provides for proper guidance of the valve member in the outlet.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings. In said drawings:

Fig. 1 shows a valve with a drive and control unit for the valve member present in the valve; and

Fig. 2 shows a detail of the valve member according to the invention.

Referring to the drawings, there is shown a valve comprising a body 1 with an inlet 2 and an outlet 3. The outlet can be closed by a valve member 4 having a shoulder 5. Shoulder 5 rests upon a valve seat 6. The valve seat has a rounded edge and terminates in a portion defining the outlet 3. In the closed position of the valve, valve member 4 fills the entire outlet 3, while the rounding between shoulder 5 and valve member 4 is in contact with the rounded edge of the valve seat. Valve member 4 is coupled at the top to a driving rod 7. The valve member can be fixedly connected to the driving rod, for example, by means of bolt 8 via bores 9, 10 and 11 (see Fig. 2).

At the top of the body, rod 7 is mounted for axial movement by means of a bearing 12 provided with seals 16 and 17. The axial movement of the driving rod can be effected with a pneumatic driving system 13 arranged above the valve. For this purpose, driving rod 7 is connected to two cylinders 14 and 15, arranged in series, and together providing for a stepped length of stroke of driving rod 7. The driving system is shut off from its surroundings by a cover 18.

When liquid has to be dispensed, for example, a

container should be filled, valve member 4 will be raised under the influence of cylinders 14 and 15 and driving rod 7. Liquid can then enter valve 1 through inlet 2 and leave it through outlet 3. When the desired quantity to be withdrawn has almost been reached, valve member 4 is moved downwards at a high velocity by means of cylinders 14 and 15 and driving rod 7. During this movement, the last amount of liquid will be pushed by the valve member through the outlet 3 as a lump. At the moment when all liquid has been pushed through the outlet, and the bottom surface of valve 4 is co-planar with the outlet end, shoulder 5 strikes seat 6 with some force.

As a consequence, the valve member is instantaneously stopped, while the contact between the liquid and the valve member is broken as a result of the inertia of the liquid.

As the valve member enters the outlet, it is centered to some extent by the rounded edges of valve seat 6. Subsequently, valve member 4 will come to lie in contact with the valve seat, and any liquid remaining between valve seat 6 and valve member 4 will be forced back into the valve until shoulder 5 is in contact with valve seat 6 and no liquid is left between valve member 4 and valve seat 6.

Claims

1. A method of dispensing a viscous liquid, using a valve comprising a body having an inlet and an outlet and a valve member movable perpendicularly to the plane of said outlet, wherein as soon as the entire desired quantity of liquid has passed the outlet the valve member is moved to the outlet at such a velocity, that by suddenly decelerating upon closing the outlet the last quantity of liquid is pushed through the outlet, characterized in that in the end position of the valve member, the bottom surface thereof is coplanar with the end of the outlet and the outlet is fully filled up and the liquid will be fully released from the valve member.

2. A method as claimed in claim 1, characterized in that the valve member is decelerated shockwise in a plurality of steps.

3. A method as claimed in claim 1 or 2, characterized in that the liquid is pushed outward in the vertical, downward direction.

4. Apparatus for carrying out any of the methods as claimed in the preceding claims, comprising a valve including a body having an inlet and an outlet and a valve member adapted to close said outlet and movable perpendicularly to the plane of the outlet, wherein the valve member includes a shoulder which in the closed condition of the valve is in contact with the valve seat of the outlet characterized in that the form and dimensions of the valve member correspond to those of the outlet, so that, in the closed position of the valve, the bottom surface of the valve member is co-planar with the end of the outlet and the outlet is fully filled up.

5. Apparatus as claimed in claim 4, charac-

terized in that the transition between shoulder and valve member is rounded and that the associated part of the valve seat is similarly rounded.

Patentansprüche

1. Verfahren zum Abgeben einer viskosen Flüssigkeit mit Hilfe eines Ventils, das einen Körper mit einer Einlaß- und einer Auslaßöffnung aufweist sowie ein senkrecht zur Ebene der Auslaßöffnung bewegliches Ventilelement, wobei das Ventilelement, sobald die gesamte, gewünschte Flüssigkeitsmenge die Auslaßöffnung durchflossen hat, zur Auslaßöffnung mit einer solchen Geschwindigkeit hinbewegt wird, daß durch das plötzliche Abbremsen beim Schließen der Auslaßöffnung die letzte Flüssigkeitsmenge durch die Auslaßöffnung gestoßen wird, dadurch gekennzeichnet, daß in der Endstellung des Ventilelementes (4) sich seine Bodenfläche in einer Ebene mit der Stirnseite der Auslaßöffnung (3) befindet, so daß die Auslaßöffnung (3) dadurch vollkommen ausgefüllt ist, und sich die Flüssigkeit vollständig vom Ventilelement löst.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß das Ventilelement (4) stoßartig in mehreren Schritten abgebremst wird.

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Flüssigkeit nach unten in vertikaler Richtung ausgestoßen wird.

4. Vorrichtung zur Durchführung eines der Verfahren, die in den vorangegangenen Ansprüchen beansprucht sind, mit einem Ventil, das einen Körper mit einer Einlaß- und einer Auslaßöffnung besitzt sowie ein Ventilelement, das zum Schließen der Auslaßöffnung angeordnet ist und senkrecht zur Ebene der Auslaßöffnung beweglich ist, wobei das Ventilelement einen Bund aufweist, der in geschlossenem Zustand des Ventils mit dem Ventilsitz der Auslaßöffnung in Berührung steht, dadurch gekennzeichnet, daß Form und Abmessungen des Ventilelementes (4) mit denen der Auslaßöffnung (3) so übereinstimmen, daß im geschlossenen Zustand des Ventils die Bodenfläche des Ventilelementes (4) mit der Stirnseite der Auslaßöffnung (3) in einer Ebene liegt und die Auslaßöffnung (3) dadurch vollständig ausgefüllt ist.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß der Übergang zwischen dem Band (5) und dem Ventilelement (4) abgerundet gestaltet ist und der korrespondierende Teil des Ventilsitzes (6) ähnlich abgerundet ist.

Revendications

1. Une méthode de distribution d'un liquide visqueux en utilisant une valve comprenant un corps comportant une admission et un échappement, et un élément de valve mobile perpendiculairement au plan du dit échappement, méthode selon laquelle, dès que la quantité désirée totale de liquide a franchi l'échappement, l'élément de valve est poussé sur l'échappement à une vitesse telle qu'en décélérant brusquement lors de la

fermeture de l'échappement, la dernière quantité de liquide se trouve poussée dans l'échappement, la méthode étant caractérisée en ce que dans la position de fin de course de l'élément de valve, la surface de fond de celui-ci est coplanaire avec l'extrémité de l'échappement, l'échappement est entièrement rempli et le liquide sera entièrement évacué à partir de l'élément de valve.

2. Une méthode selon la revendication 1, caractérisée en ce que l'élément de valve est décéléré par secousses dans une pluralité de phases.

3. Une méthode selon la revendication 1 ou 2, caractérisée en ce que le liquide est poussé vers l'extérieur en direction verticale et en direction du bas.

4. Appareil pour la mise en oeuvre de l'une des méthodes revendiquées dans les revendications précédentes, comprenant une valve incluant un

corps comportant une admission et un échappement et un élément de valve adapté pour fermer le dit échappement et mobile perpendiculairement par rapport au plan de l'échappement, appareil dans lequel le dit élément de valve inclue un épaulement qui dans la condition fermée de la valve est en contact avec le siège de valve de l'échappement, le dit appareil étant caractérisé en ce que la forme et les dimensions de l'élément de valve correspondent à la forme et aux dimensions de l'orifice, de sorte que dans la position fermée de la valve, la surface de fond de l'élément de valve est co-planaire avec l'extrémité de l'orifice, et que l'orifice est entièrement rempli.

5. Appareil selon la revendication 4, caractérisé en ce que la transition entre l'épaulement et l'élément de valve est arrondie et que la partie associée du siège de valve est similairement arrondie.

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