United States Patent

Loewenthal

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[54] DOSAGING DEVICE FOR VISCOUS SUBSTANCES

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[52] **U.S. Cl.** **222/217,** 222/273, 222/362, 417/481

[51] **Int. Cl.** **G01f 13/00**

[58] **Field of Search** 222/427, 367, 362, 332, 305, 222/217, 216, 273; 417/481; 141/248; 92/122, 123

[56] **References Cited**

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Assistant Examiner—David A. Scherbel
Attorney—Singer, Stern & Carlberg

[57] **ABSTRACT**

The dosaging device comprises rotary slide valve in the housing of which is arranged a rotatable cylindrical main cock which is combined with an independently rotatable auxiliary cock, both of which are rotatable about the same horizontal axis. The main cock is provided with a plurality of axially alined chambers which open toward the circumference of the cock and are adapted to communicate with an inlet aperture in the housing. Each chamber extends over a sector angle of about 180° along the perimeter of the main cock. In each chamber extends a displacement sector extending over a sector angle of 90° and forming a part of the auxiliary cock whose other part is formed by a shaft about which the main cock is rotatable relatively to the auxiliary cock. The housing has two parallel rows of outlet apertures connectable with the containers which receive the dosages expelled by the cooperation of the two cocks from the chambers in the main cock.

1 Claims, 6 Drawing Figures

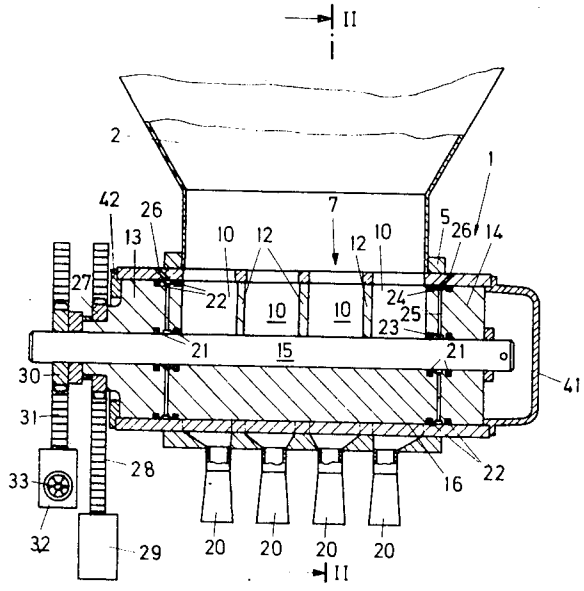

Fig.2

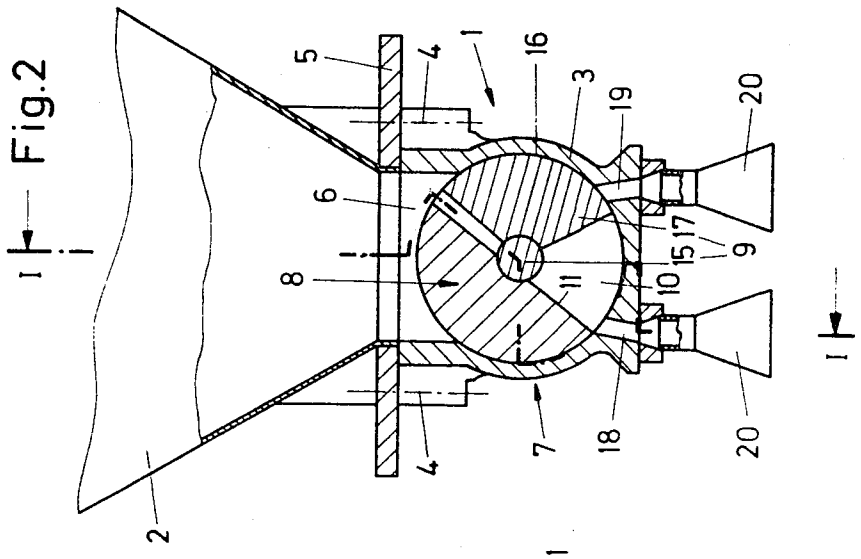
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Fig.1

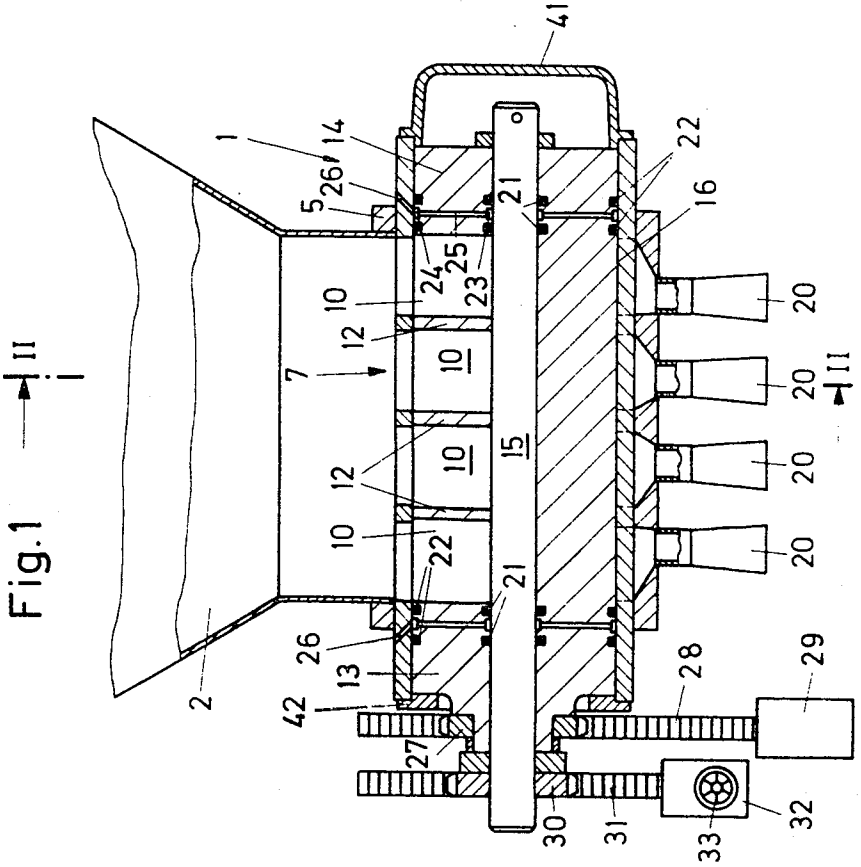
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Fig. 3a

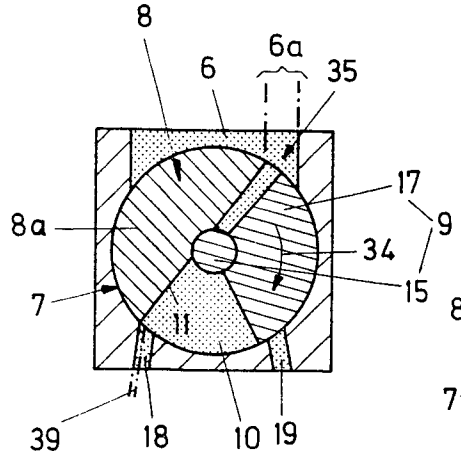
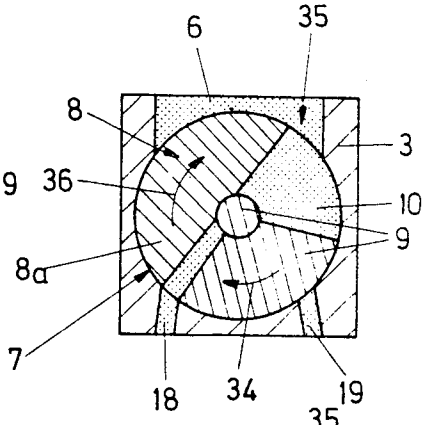


Fig. 3b



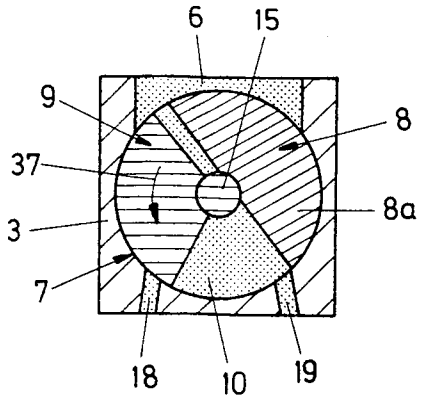


Fig. 3c

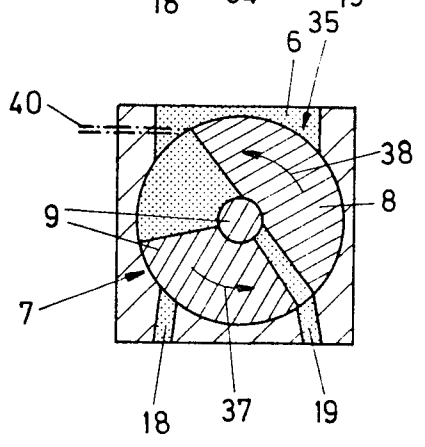


Fig. 3d

DOSAGING DEVICE FOR VISCOUS SUBSTANCES

The invention relates to a dosaging device for viscous substances with at least one rotary slide valve, in whose housing a main cock and an auxiliary cock are rotatably arranged coaxially independently of one another, whereby in the main cock at least one chamber is recessed which extends over a sector angle of approximately 180°, and in which is positioned a displacement sector formed by the auxiliary cock and fixedly connected with a shaft, said displacement sector extending over a sector angle of approximately 90°, and whereby in the housing an inlet aperture is provided, through which the viscous substance to be dosaged is drawn by means of the displacement sector into a part of the chamber corresponding to its angle of rotation, as well as an outlet aperture, through which the dosage of the substance measured thereby, by means of the displacement sector is forced out of the chamber part and through an outlet pipe arrives at a vessel to be filled. In a known dosaging device of this type, which is designated somewhat as "Sector-dosaging device" or "segment-dosaging device," two rotary slide valves are arranged as twins adjacent one another, in order to fill at the same time a plurality of containers arranged in two rows with a predetermined dosage of the viscous substance, whereby during each operative cycle of a rotary slide valve from each chamber only one dosage is ejected. As will be explained further on in detail, the present invention insures in very simple manner, a doubling of the output of the previous devices, or in making use of a single rotary slide valve only of the same size instead of two rotary slide valves, although providing the possibility of providing in the dosaging device of the invention two rotary slide valves. The invention is distinguished by an inlet aperture which extends at the periphery of the two cocks over a sector angle of approximately 90°, and that in the housing outside of the mentioned outlet aperture, still a second outlet aperture is provided in addition to the mentioned outlet aperture, however, no ventilation aperture, so that with each operative cycle of the cock, a dosage of the substance is forced through each of the two outlet apertures.

The drawings illustrate by way of example an embodiment of the device of the invention.

In the drawings:

FIG. **1** illustrates a vertical section of a rotary slide valve for a dosaging device along the line I—I of FIG. **2**.

FIG. **2** illustrates a vertical section along the line IIII of FIG. 1, and

FIGS. *3a*, *3b*, *3c* and *3d* illustrate each a diagrammatic sectional view corresponding to FIG. **2**, namely, for four different operative positions of the rotary slide cock.

The dosaging device illustrated in the drawing has a rotary slide valve **1**, which is arranged on the lower end of a supply-funnel **2**. The rotary slide valve **1** has a housing which by screws, indicated solely by their center lines **4**, is secured to a horizontal frame **5** having an aperture in which the lower end of the funnel **2** is mounted, which communicates with an inlet aperture **6** of the housing **3**. The interior of the housing **3** contains a rotary slide cock **7**, which consists of two coaxial parts **8** and **9** rotatable oppositely to each other. The part **8** is designated in the following as "main cock" and consists of a circular-cylindrical body, in which four axially alined chambers **10** disposed parallel adjacent one another have been produced by a milling operation. These chambers **10** extend each over a sector angle exceeding somewhat 180° to a chord **11** of the cylinder-cross-section adjacent to the diameter. The chambers **10** are separated from one another by three partitions **12**, whereby the two outer chambers **10** are limited by the end portions **13** and **14** of the member **8**. The main cock **8** is rotatably journaled on the shaft **15** and extends on its outer periphery at a sector angle of over 180° along a cylindrical inner surface **16** of the housing, and indeed, with a play of preferably about 0.1 to 0.3 mm.

The part **9** of the rotary slide cock **7** is designated in the following as "auxiliary cock" and comprises the shaft **15** and four similar displacement sectors **17** which extend into the chambers **10**, and are fixed on this shaft **15**. The sectors **17** extend each over a sector angle of somewhat beyond 90°, whereby between them and the inner circumferential housing surface **16** or the partitions **12**, respectively, again a play of about 0.1 to 0.3 mm. is provided.

On the lower side of the housing **3** are provided for each chamber **10** two outlet apertures **18** and **19**, to which funnel-shaped outlet pipes **20** are attached. Accordingly eight funnels **20** are present in all which serve for the simultaneous filling of eight containers, not shown, for example, eight deeply dished cans made of a synthetic foil, which in known manner, are still connected with the foil, and placed under the funnels **20**. The funnels **20** are removably mounted so that they may easily be replaced by other funnels corresponding in each case to the inlet aperture of the receptacles to be filled.

In order to seal the two outer chambers **10** in axial direction towards the outside, the end portion **13** and **14** of the member **8** are provided each with a pair of annular seals or packings **22** which are disposed between member **8** and housing **3**. The packings **21** and **22** are inserted in annular grooves of the body **8**, but they could also be disposed in annular grooves of the shaft, or of the housing **3**, respectively, or in annular grooves of bushings mounted on the member **8**. Between the two annular packings **21** and **22**, respectively, of each pair of packings is provided an annular groove **23** and **24**, respectively, in the member **8**. These annular grooves **23** and **24** are connected with one another by radial channels **25**. In the well of the housing **3** are provided channels **26**, which insure the introduction of a sealing fluid into the annular groove **24** and accordingly also in the other annular groove **23**. The sealing fluid, which stands under a slight excess pressure and preferably consists of a greatly diluted disinfecting solution, prevents an escape of the substance to be dispensed in dosages as described, for example, of butter or jogurt from the interior of the rotary slide valve **1**.

For the operation of the main cock **8** serves a pinion **27**, fixed on the end portion **13** and which is in engagement with a toothed rack bar **28**. The toothed rack bar **28** is moved to and fro by the piston of a doubly-acting, pneumatic cylinder **29**. For the operation of the auxiliary cock **9** serves a pinion **30** which is fixed on the shaft **15**, and is in engagement with a toothed rack bar **31**. The toothed rack bar **31** is moved to and fro by the piston of a doubly-acting pneumatic cylinder **32**, whereby it carries out on the forward path as well as on the return path two steps, whose length may be continuously altered by a hand-wheel **33**, for example, by adjustment of stop members.

For the explanation of the operation of the rotary slide valve **1**, reference is now made to the four diagrammatic FIGS. *3a*, *3b*, *3c* and *3d*. FIG. *3a* shows the rotary slide cock **7** in the same position as in FIG. **2**, wherein the somewhat semicylindrical solid part **8a** of the cylindrical member **8** which remained after the milling operation forming the chambers **10** is rotated up to the outlet openings **18** which all are disposed consecutively in a row, without, however, covering these outlet apertures **18**. The sector **17** is disposed in starting position to the right above in the chamber **10**.

Now the cylinder **32** and the toothed rack bar **31** rotate the auxiliary cock **9** about an angle which is adjusted by the hand wheel **33** in the direction of the arrow **34** of FIGS. *3a* and *3b*, so that the viscous substance **35** in accordance with FIG. *3b* is drawn into the right hand upper part of the chamber **10**, while at the same time the substance which was delivered by a previous operative cycle according to FIG. *3a* into the left hand lower part of the chamber **10** is forced out through the aperture **18**.

Thereupon, the cylinder **29** and the toothed rack bar **28** rotate the main cock **8** in direction of the arrow **36** (FIG. *3b*) and moves with the part *8a* up to the outlet apertures **19** without, however, covering the same, as shown in FIG. *3c*. At the same time, the auxiliary cock **9** is rotated further in the direction of the arrow **34** up to the suction position shown in FIG. *3c*.

Now, the auxiliary cock **9** is rotated in direction of the arrow **37** of FIG. **3***c*, so that the substance disposed in the lower part of the chamber **10** is pushed to the aperture **19** and at the same time new substance from the funnel **2** is drawn into the upper part of this chamber **10**. FIG. **3***d* shows the condition at the end of the rotary movement in direction of the arrow **37**.

Finally, the cocks **8** and **9**, according to the arrows **37** and **38**, are rotated back from the positions shown in FIG. **3***d* to the position shown in FIG. **3***a*, whereupon another operative cycle commences.

It is apparent that the FIGS. **3***a* and **3***c*, or the FIGS. **3***b* and **3***d*, respectively, show the two-part rotary cock **7** in positions symmetrical to the vertical axial central plane of the rotary slide valve **1**, and that with each operative cycle, each chamber **10** pushes the substance **35** for two cans from the device, one through the aperture **18** and the other through the aperture **19**. In this connection, the size of the can to be filled is dependent on the size of the angle about which the auxiliary cock **9** is rotated when the main cock **8** remains stationary (between FIG. **3***a* and FIG. **3***b*, or FIG. **3***c* and FIG. **3***d*, respectively), namely from the adjustable size of the first stroke of the entire stroke of the cylinder **32** and the toothed rack bar **31**, respectively.

With each of the two rotary slide valves of the known dosaging device mentioned at the beginning, the inlet aperture was only about as wide as indicated in dotted lines in FIG. **3***a* and designated with **6***a*. Furthermore, in place of the outlet aperture **18**, solely a ventilation aperture **39** indicated by dotted line, and of very small cross-section was present, through which upon rotation of the sector **17** from the position of FIG. **3***a* into that of FIG. **3***b*, air was blown out, which was present in the lower empty part of the chamber **10**. A substance dosage was only discharged upon the movement of the sector **17** from the position shown in FIG. **3***c* into that of FIG. **3***d* through the aperture **19**, while through a further ventilation aperture **40** indicated in FIG. **3***d*, air could enter into the part of the chamber **10** which was emptied. It is obvious from the foregoing that the known rotary slide valve, in spite of similar main dimensions of the housing and of the two cocks has only one-half as large a dosage yield as the present rotary slide valve, and that the doubling now attained of the yield, on the one hand is due to the second outlet aperture **18**, and on the other hand, is due to the circumstance, that the inlet aperture **6** extends along the periphery of the two cocks **8**, **9**, over a very much larger sector angle which in the present case is somewhat greater than 90°.

In order to fill at the same time $2 \times 4 = 8$ containers, it was necessary when using the known dosaging device to arrange two rotary slide valves having each four outlets adjacent one another (twin device), while with the device of the present invention a single rotary slide valve of the same size is sufficient which, however, is provided with eight outlets. Since only a single adjustment is necessary for obtaining the desired dosage, the result is also a more accurate dosaging than with the known twin device.

A further very great advantage of the present dosaging device is that it may very easily be cleaned, for example, in that steam is introduced through the inlet **6** and is blown through the housing while the cocks **8** and **9** are being rotated, without any dismounting of parts being necessary. On account of the relatively large play of 0.1 to 0.3 mm. between the cocks and the housing, there exists no danger of jamming, and the steam reaches all surfaces throughout reliably. In the known dosaging device, there existed during operation on account of the ventilation conduits **39** and **40**, a much greater danger of infection, which it was sought to combat by means of as great as possible a reduction of the play—which, however, made the manufacture expensive and could lead in operation to jamming. With the present device, in spite of the great play, no substance can leak from the rotary slide valve **1** and no air which might lead to infection can enter the same. This is insured by the sealing fluid between the pairs of packings **21** and **22** in the annular grooves **23** and **24**.

On account of the mentioned advantages, and particularly on account of the assurance of a sterile filling operation, the range of utilization of the present dosaging device is appreciably greater than that of the device previously known.

If, by way of exception, a disassembly of the rotary slide valve **1** should be desired, then it is sufficient to remove a closure cap **41** from one end of the housing **3**, for example, by means of loosening of screws, not shown, in order to be able to axially pull the cocks **8**, **9**, from the housing.

While, according to the present description, the main cock **8** consists of one single piece, the same may obviously also consist of several parts fixedly connected with one another, by screws or the like. Inversely, the auxiliary cock **9** could also be made from one single piece.

It may also be mentioned that preferably an agitator means or a worm rotatable about vertical axis is arranged in the funnel **2** in order to feed the viscous substance to the inlet aperture **6**, because the specific weight of the substance in many cases may not be sufficient for this purpose.

What I claim is:

1. A dosaging device for viscous substances, comprising a cylindrical housing having a substantially horizontal axis, a rotary slide valve member in said housing, a shaft extending through said valve member in concentric relation to said valve member and said cylindrical housing and being freely rotatable in said valve member, at least one chamber in said valve member extending inwardly from the peripheral surface thereof to said shaft and circumferentially through an angle of approximately 180°, a vane in said chamber secured to said shaft and having an axial width substantially equal to that of said chamber and an angular dimension of approximately 90°, said housing having a top inlet opening and two bottom outlet openings spaced from each other circumferentially of said housing, means for intermittently causing rotary reciprocation of said valve member and said shaft with the vane in relation to each other to introduce doses of material into said chamber alternately at one side of said vane and the other and to discharge said doses alternately through said two bottom openings of the housing, a pair of annular sealing means spaced from each other between said valve member and said shaft adjacent each end of said valve member, pairs of correspondingly disposed annular sealing means between said valve member and said housing, inner and outer annular grooves in said valve member disposed between said pairs of sealing means around said shaft and the inside of said housing, respectively, passage means through said valve member interconnecting said inner and outer grooves, and means in said housing for supplying a sealing fluid to said grooves, there being a play of at least 0.1 millimeter between the outer surfaces of said valve member and vane and the inner surface of said housing thereby enabling thorough cleaning of the device by a stream of steam without disassembly of the device.

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