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(54) **APPARATUS FOR CONTROLLING DISCHARGE OF FLOWABLE MATERIAL**

VORRICHTUNG ZUR STEUERUNG DER ABFÜHRUNG VON FLIESSFÄHIGEN MATERIALIEN

APPAREIL DE COMMANDE DE DECHARGE DE MATERIAU FLUIDE

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(56) References cited:
EP-A- 1 264 991
WO-A-00/10893
WO-A-90/08724
WO-A-96/31422
GB-A- 2 121 014
GB-A- 2 178 731
US-A- 6 123 233

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Description

[0001] The invention relates to apparatus, according to the preamble of claim 1, for controlling discharge of flowable material from a container thereof.

[0002] Apparatus for controlling discharge of flowable material from a container is known which generally comprises a part for contacting the valve of the container which is under the control of an actuator, the actuator functioning to bring the part into contact with the valve and move the valve from its seat, usually upwardly into the container to initiate product flow. A known form of actuator in this type of device is a pneumatically operated bellows. However, a problem which has been encountered with this type of actuator is that it is difficult to achieve a fine degree of control, the bellows itself essentially having two positions, inflated or deflated. The nature of the flowable materials which apparatus of this kind must handle varies widely and can include virtually any product which is flowable, from powders for use in the pharmaceutical and foodstuffs industries to friable products such as products in tablet form. Friable products such as tablets present special difficulties in handling because of their delicate nature, as they can be destroyed by impact and crushing. Thus WO 90/08724 discloses apparatus, according to the preamble of claim 1, for controlling discharge of flowable material from a container thereof through an outlet obturated by a valve which is raisable into the container for material flow through the outlet, the apparatus comprising a part for contacting the valve, operatively connected to an actuator, and position sensing means for sensing the position of the actuator or the valve. There is a limited control means for the actuator.

[0003] The present invention seeks to mitigate problems such as those referred to above.

[0004] The invention is defined in accordance with appended claim 1. Apparatus for controlling discharge of flowable material from a container thereof through an outlet obturated by a valve which is raisable into the container for material flow through the outlet comprises a part for contacting the valve, operatively connected to an actuator, and position sensing means for sensing the position of the actuator or the valve, the actuator being located below the valve, control means comprising a modulating valve device, and the modulating valve device is under the control of the position sensing means for determining the position and/or speed of the actuator.

[0005] Thus, using the position sensing means it is possible to obtain information on the position of the actuator or valve and either maintain or vary the position according to the requirements of the operation being undertaken.

[0006] The actuator comprises a pneumatically operated bellows and the position sensing means may comprise a linear position sensor adapted to sense the position of the bellows. The linear position sensor may be adapted to sense the position of a guide member of the bellows. Alternatively, the linear position sensor may be adapted to sense the distance between the upper and lower surfaces of the bellows.

[0007] The linear position sensor may comprise any suitable device such as, but not limited to, a linear potentiometer, a bar code device, an LVDT, a rectilinear displacement transducer or a draw wire sensor.

[0008] It is preferred that the guide member is located within the bellows. This protects the mechanism from ingress of contaminating material, allows for greater accuracy in sensing and saves space. The guide member which triggers the sensor may comprise a guide rod slidable within a guide tube, or a guide tube, in which a guide rod is slidable. The guide member may comprise a double telescopic guide device. This is particularly useful where the height of the device must be restricted, for example, in a tablet hopper.

[0009] The apparatus comprises control means for controlling the position and the speed of movement of the actuator in response to position information from the position sensing means. The actuator comprises a pneumatic operated bellows and the control means comprises a pneumatic modulating valve. The pneumatic modulating valve may be controlled by manual means or by a logic controller. In this way, the apparatus can be operated in a better controlled way as compared to prior apparatus, making it particularly suitable for use in discharging friable products. Thus, for example, compared to prior bellows actuated apparatus, a slower lift/lower speed (e.g. 5-10 mm/sec) can be fully maintained irrespective of product headload i.e. the air supply can be increased/decreased to maintain the lift/lower speed automatically. This provides a much more uniform discharge rate and a more controlled feed to downstream process equipment.

[0010] It is preferred that the stroke of the actuator is limited solely by the control means. In previous devices it has been necessary to use tie-rods to limit the actuator stroke. With the present arrangement the tie-rods can be omitted thereby making the apparatus more economical.

[0011] The position sensing means may be adapted to sense when the actuator is fully lowered and/or when the valve is in the obturating position. This is particularly important when handling toxic or otherwise dangerous substances which might become exposed to operators.

[0012] The apparatus may include means to cause the valve to vibrate in order to enhance product flow. Where this has been the case it has been necessary to provide means to isolate the vibrating valve as far as possible from the actuator and associated structures to prevent noise and damage thereto. In the present arrangement, where the actuator is a bellows, the actuator itself provides damping of the vibration so that additional damping components can be omitted, thereby saving costs.

[0013] Where the valve comprises a cone valve the bellows are preferably mounted inside the valve. Having an internally mounted bellows means that the bellows can be more robust and so less prone to damage and

failure.

[0014] As will be appreciated, the apparatus may be included as part of the outlet structure of a suitable container which is therefore self-emptying or alternatively can be provided in the form of a discharge station for initiating product flow from a container including a simple valve.

[0015] The valve and/or outlet of the container may be adapted to prevent damage to the flowable material. For example, the valve and/or outlet may have rounded edges, and/or the valve may comprise a soft edge seal.

[0016] The invention further provides apparatus for controlling discharge of flowable material from a container thereof through an outlet obturated by a valve which is raisable into the container for material flow through the outlet and which vibrates to assist product flow, the apparatus comprising a part for contacting the valve, operatively connected to an actuator, vibration of the valve being isolated by the actuator.

[0017] The invention will further be described by way of example and with reference to the following drawings in which:

Figure 1 is a schematic sectional view of a container according to the prior art;

Figure 2 is a schematic sectional view of a container incorporating apparatus according to the invention;

Figure 3 is a schematic sectional view of a discharge station incorporating apparatus according to the invention; and

Figure 4 is a schematic sectional view of apparatus according to the invention.

[0018] Referring to Figure 1 there is illustrated the outlet part 1 of a container in the form of an inverted frusto-conical hopper. Within the hopper, a frusto-conical valve member 2 rests on the inner surface 3 of the outlet part 1. A circular seal member 2a is mounted at the lower (as viewed) edge of the valve member 2. When it is required for product in the container to flow out through the outlet part 1 the valve member 2 is raised so that product can flow through the annular space created between the valve member 2 and the inner surface 3 of the outlet part 1. Raising of the valve member 2 is accomplished by an actuator 4 in the form of a pneumatically operated bellows device which comprises a cylindrical, resiliently expandable body 6 mounted between a lower plate 7 and an upper plate 8. The lower plate 7 is attached via support frame 9 to the inner surface 3 of the outlet part 1. The support frame 9 is constructed such that it does not appreciably impede product flow through the outlet. A cylindrical guide tube 10 is fixedly mounted in the centre of the lower plate 7. The guide tube 10 extends into the space between the lower plate 7 and upper plate 8 and also some distance below the lower plate 7. The bottom end (as viewed) of the tube 10 is closed. A rod 11 is slidably mounted within the guide tube 10 and extends from the guide tube 10 upwardly through the upper plate 8 to a carrier frame 12 which is bolted to the top surface of the upper plate 8. Thus, the guide tube 10 is fixed to the lower plate 7 and the rod 11 is fixed (via the carrier frame 12) to the upper plate 8. As viewed in the drawing, to the left side of upper plate 8 an anti-rotation bracket 13 is fixed. At its right hand side as viewed, upper plate 8 is provided with a circular aperture 15 which corresponds in position and size to a similar aperture 16 in lower plate 7. A tie-rod 17 passes through both apertures. The ends 18 of the tie-rod 17 are dimensioned to be wider than the apertures 15,16. The tie-rod 17 is slidable in the apertures 15,16. Three such tie rods are equispaced around the bellows. On top of the carrier frame 12, are fixed elastomeric mounts 19.

[0019] Inside the apex of the valve member 2 a plate 20 is fixed to which is attached a vibrator device 21, as is well known in the art. Below the vibrator 21 a support ring 22 is attached to the inner surface of the valve member 2.

[0020] In use, to raise the valve member 2 for product flow air is forced by pneumatic lines (not shown) into the space between the lower plate 7 and upper plate 8 which expands the bellows 6 upwardly. As the lower plate 7 is fixed to the inside of the outlet part 1, the upper plate 8 is forced upwards. The elastomeric mounts 19 contact the support ring 22 and the valve member 2 is thus raised into the container. The extent of the stroke of the actuator 4 is limited by the tie-rods 17. In its upward movement the upper plate 8 is assisted and guided by rod 11 sliding upwardly within guide tube 10.

[0021] Referring now to Figure 2, there is illustrated apparatus 23 for controlling discharge of flowable material from a container thereof according to the invention, the apparatus 23 comprising a part 8 for contacting the valve member 2, operatively connected to an actuator 4, and position sensing means 25 for sensing the position of the actuator.

[0022] As can be seen from the illustration, the apparatus is greatly simplified when compared with the apparatus of Figure 1, still taking the form of the outlet part of a container such as an I.B.C. The actuator 4 still comprises a lower plate 7, upper plate 8 and extendable body 6 with a guide tube 10 attached to the lower plate 7 in which is slidably mounted guide rod 11 attached to upper plate 8. Lower plate 7 is attached via support frame 9 to the inner surface 3 of the outlet part 1. However, in this device rod 11 has a central blind bore 26 extending about three quarters of the way along its length. Guide tube 10 includes a substantially vertically disposed rod 27 which passes up into the bore 26 of the guide rod 11. A bar code is printed on the outer surface of the vertical rod 27 and a bar code reading device 28 is mounted at the mouth of the bore 26 of the guide rod 11. A conduit 29 is provided for electrical connection of the position sensing means 25 to a power supply and control means such as a com-

puter which may also control directly the pneumatic feed to the actuator 4. As previously mentioned, an alternative, the position sensing means 25 could comprise a linear potentiometer which is a well known device which will not be described further here. A particularly compact device is a draw-wire sensor consisting of a spring-retractable wire 33 wound onto a reel 34, like a tape measure (see Figure 4). An electronic encoder monitors the revolutions (or parts of revolutions) and interprets them as linear movement. Such a device is particularly useful in apparatus according to the invention where the actuator 4 is of the bellows type, where the shallow slopes of the hopper prevent use of a taller device. The height of the device is further reduced by means of a double telescopic guide device 35.

[0023] The apparatus 23 comprise control means (not shown) for controlling the position and the speed of movement of the actuator in response to position information from the position sensing means 25. The control means comprises a pneumatic modulating valve, for example, a 0-10V modulating valve. The modulating valve may be controlled manually or by a logic controller.

[0024] The position sensing means 25 may be adapted so that it can sense when actuator 4 is fully lowered and/or when the valve member 2 is in the obturating position.

[0025] Referring now to Figure 3, there is illustrated a device known as a discharge station which includes apparatus 23 according to the invention. The discharge station comprises a frusto-conical hopper 31 in which the apparatus 23 is mounted on support frame 9. As in the previous embodiment, the apparatus 23 includes lower plate 7 and upper plate 8 and resiliently extendable body 6, lower plate 7 being attached to support frame 9. In this embodiment however upper plate 8 carries a conical probe part 32 in which is mounted a vibrator 21. The probe 32 can be extended upwards by means of the actuator 4 to contact the inner surface of a valve of a container for flowable material (not shown) to move the valve upwardly for product flow. In this embodiment, the position sensing means 25 comprises a linear potentiometer although a bar code reading device could be used as described in the previous embodiment.

[0026] In use, the embodiments of Figure 2 and 3 are operated in much the same way. When it is desired to raise the probe 32 or the valve member 2, air is pumped into the bellows via pneumatic lines (not shown) so that the upper plate 8 moves upwardly relative to the lower plate 7. The guide rod 11 which is attached to the upper plate 8 slides upwardly and the extent of movement is detected by the position sensing means 25 and information is sent to a control device as in the previously described embodiment where the extent of operation can for example be registered by a user. By using a linear position sensor 25 within the actuator and sending back height information to the control means the pneumatic supply can be controlled so that the valve height is either maintained at a predetermined position or made to perform some other function such as pulsing between high and low, or open and closed positions. Using the further control logic the height could be remotely adjusted in response to need such as to maintain a flow rate or react to a blockage or flush situation. The speed of movement of the actuator is also controlled.

[0027] As will be appreciated, apparatus according to the invention provides a significant advantage over the prior available devices. The apparatus can be manufactured significantly more cheaply and quickly than prior devices because tie-rods are rendered unnecessary. Furthermore, vibration isolation devices are not required because, with the actuator stroke now limited by pneumatic means, the bellows actuator also functions as the vibration isolator.

Claims

1. Apparatus for controlling discharge of flowable material from a container thereof through an outlet obturated by a container valve (2) which is raisable into the container for material flow through the outlet, the apparatus (23) comprising:

   a part (8) for contacting the valve operatively connected to an actuator (4), the actuator (4) comprising a lower plate (7), a bellows (6) and an upper part (32) for raising the container valve (2);
   position sensing means (25) for sensing the position of the actuator (4) or the container valve (2); and
   control means for controlling the position of the actuator (4) in response to position information from the position sensing means (25), **characterised by**:

   the bellows being a pneumatically operated bellows;
   the control means comprising a pneumatic modulating valve device, and by the control means further controlling the speed of movement of the actuator (4) in response to the position information from the position sensing means (25).

2. Apparatus according to claim 1, **characterised by** the position sensing means (25) comprising a linear position sensor adapted to sense the position of the bellows (6).

3. Apparatus according to claim 2, **characterised by** the linear position sensor (25) being adapted to sense the position of a guide member (10) of the bellows (6).

4. Apparatus according to claim 3, **characterised by** the linear position sensor (25) comprising a linear

potentiometer.

5. Apparatus according to claim 3, **characterised by** the linear position sensor (25) comprising a bar code device.

6. Apparatus according to claim 2, **characterised by** the linear position sensor (25) being adapted to sense the distance between upper and lower surfaces of the bellows (6).

7. Apparatus according to claim 6, **characterised by** the linear position sensor (25) comprising a draw-wire sensor.

8. Apparatus according to any of claims 3 to 7, **characterised by** the guide member (10) being located within the bellows (6).

9. Apparatus according to any of claims 3 to 8, **characterised by** the guide member (10) comprising a guide rod (11) slidable within a guide tube (10).

10. Apparatus according to any of claims 3 to 8, **characterised by** the guide member (10) comprising a guide tube, in which a guide rod (11) is slidable.

11. Apparatus according to any preceding claim, **characterised by** the guide member (10) comprising a double telescopic guide (35).

12. Apparatus according to any preceding claim, **characterised by** the pneumatic modulating valve device being controlled by manual means.

13. Apparatus according to any of claims 1 to 11, **characterised by** the pneumatic modulating valve device being controlled by a logic controller.

14. Apparatus according to either of claims 12 or 13, **characterised by** the stroke of the actuator (4) being limited solely by the control means.

15. Apparatus according to any preceding claim, **characterised by** the position sensing means (25) being adapted to sense when the actuator (4) is fully lowered and/or when the container valve (2) is in the obturating position.

16. Apparatus according to any preceding claim, **characterised by** further comprising means (21) to cause the container valve (2) to vibrate.

17. Apparatus according to any preceding claim, **characterised by** the container valve (2) comprising a cone valve, and by the bellows (6) being mounted inside the container valve (2).

18. Apparatus according to any preceding claim, **characterised by** the apparatus being mounted at the outlet of a container for flowable material.

19. Apparatus according to any of claims 1 to 17, **characterised by** the apparatus being mounted in a discharge device for discharging flowable material from a container thereof, and by the discharge device including a flow path for flow of material from the container.

20. Apparatus according to claim 18 or claim 19, **characterised by** the container valve (2) and/or outlet of the container being adapted to prevent damage to the flowable material.

21. Apparatus according to claim 20, **characterised by** the container valve (2) and/or outlet having rounded edges.

22. Apparatus according to claim 20 or claim 21, **characterised by** the container valve (2) comprising a soft edge seal (2a).

23. A method for discharging flowable material from a container thereof, **characterised by** use of apparatus (23) according to any preceding claim.

24. Apparatus according to any of claims 1 to 22, **characterized by** the apparatus further including means to cause the valve (2) to vibrate to assist product flow, where vibration ot the container valve (2) is isolated by the bellows (6).

Patentansprüche

1. Vorrichtung zur Steuerung der Abführung von fließfähigem Material aus einem Behälter dafür durch einen Auslass, der mittels eines Behälterventils (2) verschlossen wird, das in den Behälter für den Materialfluss durch den Auslass angehoben werden kann, wobei die Vorrichtung (23) aufweist:

ein Teil (8) für das Kontaktieren des Ventils, das funktionell mit einem Betätigungselement (4) verbunden ist, wobei das Betätigungselement (4) eine untere Platte (7), einen Faltenbalg (6) und einen oberen Teil (32) für das Anheben des Behälterventils (2) aufweist;
eine Positionsmesseinrichtung (25) für das Messen der Position des Betätigungselementes (4) oder des Behälterventils (2); und
eine Steuereinrichtung für das Steuern der Position des Betätigungselementes (4) als Reaktion auf eine Positionsinformation von der Positionsmesseinrichtung (25), **dadurch gekennzeichnet, dass**:

der Faltenbalg ein pneumatisch betätigter Faltenbalg ist;
die Steuereinrichtung eine pneumatische modulierende Ventilvorrichtung aufweist und die Steuereinrichtung außerdem die Geschwindigkeit der Bewegung des Betätigungselementes (4) als Reaktion auf die Positionsinformation von der Positionsmesseinrichtung (25) steuert.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Positionsmesseinrichtung (25) einen linearen Positionssensor aufweist, der ausgebildet ist, um die Position des Faltenbalgs (6) zu ermitteln.

3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** der lineare Positionssensor (25) ausgebildet ist, um die Position eines Führungselementes (10) des Faltenbalgs (6) zu ermitteln.

4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** der lineare Positionssensor (25) ein lineares Potentiometer aufweist.

5. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** der lineare Positionssensor (25) eine Strichkodevorrichtung aufweist.

6. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** der lineare Positionssensor (25) ausgebildet ist, um den Abstand zwischen der oberen und der unteren Fläche des Faltenbalgs (6) zu ermitteln.

7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** der lineare Positionssensor (25) einen Ziehdrahtsensor aufweist.

8. Vorrichtung nach einem der Ansprüche 3 bis 7, **dadurch gekennzeichnet, dass** das Führungselement (10) innerhalb des Faltenbalgs (6) angeordnet ist.

9. Vorrichtung nach einem der Ansprüche 3 bis 8, **dadurch gekennzeichnet, dass** das Führungselement (10) eine Führungsstange (11) aufweist, die innerhalb eines Führungsrohres (10) verschiebbar ist.

10. Vorrichtung nach einem der Ansprüche 3 bis 8, **dadurch gekennzeichnet, dass** das Führungselement (10) ein Führungsrohr aufweist, in dem eine Führungsstange (11) verschiebbar ist.

11. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Führungselement (10) eine doppelte teleskopische Führung (35) aufweist.

12. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die pneumatische modulierende Ventilvorrichtung durch manuelle Mittel gesteuert wird.

13. Vorrichtung nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** die pneumatische modulierende Ventilvorrichtung mittels eines Logikreglers gesteuert wird.

14. Vorrichtung nach entweder Anspruch 12 oder Anspruch 13, **dadurch gekennzeichnet, dass** der Hub des Betätigungselementes (4) nur mittels der Steuereinrichtung begrenzt wird.

15. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Positionsmesseinrichtung (25) ausgebildet ist, um zu ermitteln, wenn das Betätigungselement (4) vollständig abgesenkt ist, und/oder wenn das Behälterventil (2) in der verschließenden Position ist.

16. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie außerdem eine Einrichtung (21) aufweist, um das Schwingen des Behälterventils (2) zu veranlassen.

17. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Behälterventil (2) ein Kegelventil aufweist und dadurch, dass der Faltenbalg (6) innerhalb des Behälterventils (2) montiert ist.

18. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Vorrichtung im Auslass eines Behälters für fließfähiges Material montiert ist.

19. Vorrichtung nach einem der Ansprüche 1 bis 17, **dadurch gekennzeichnet, dass** die Vorrichtung in einer Abführvorrichtung für das Abführen von fließfähigem Material aus einem Behälter dafür montiert ist, und dadurch, dass die Abführvorrichtung einen Strömungsweg für den Materialfluss aus dem Behälter umfasst.

20. Vorrichtung nach Anspruch 18 oder Anspruch 19, **dadurch gekennzeichnet, dass** das Behälterventil (2) und/oder der Auslass des Behälters so ausgebildet sind, dass eine Beschädigung beim fließfähigen Material verhindert wird.

21. Vorrichtung nach Anspruch 20, **dadurch gekennzeichnet, dass** das Behälterventil (2) und/oder der Auslass abgerundete Ränder aufweisen.

22. Vorrichtung nach Anspruch 20 oder Anspruch 21, **dadurch gekennzeichnet, dass** das Behälterventil

(2) eine weiche Randdichtung (2a) aufweist.

23. Verfahren für das Abführen von fließfähigem Material aus einem Behälter dafür, **gekennzeichnet durch** die Benutzung der Vorrichtung (23) nach einem der vorhergehenden Ansprüche.

24. Vorrichtung nach einem der Ansprüche 1 bis 22, **dadurch gekennzeichnet, dass** die Vorrichtung außerdem eine Einrichtung umfasst, um das Schwingen des Ventils (2) zu veranlassen, um den Produktfluss zu unterstützen, wobei die Schwingung des Behälterventils (2) durch den Faltenbalg (6) isoliert wird.

Revendications

1. Appareil destiné à contrôler la décharge d'un matériau fluide à partir d'un récipient le contenant, à travers une sortie obturée par une soupape du récipient (2) pouvant être soulevée dans le récipient pour permettre un écoulement du matériau à travers la sortie, l'appareil (23) comprenant :

une partie (8) destinée à contacter la soupape, connectée en service à un moyen d'actionnement (4), le moyen d'actionnement (4) comprenant une plaque inférieure (7), un soufflet (6) et une partie supérieure (32) pour soulever la soupape du récipient (2) ;
un moyen capteur de la position (25), pour détecter la position du moyen d'actionnement (4) de la soupape du récipient (2) ; et
un moyen de commande pour contrôler la position du moyen d'actionnement (4) en réponse aux informations sur la position transmises par le moyen capteur de la position (25), **caractérisé en ce que** :
le soufflet est un soufflet à actionnement pneumatique ;
le moyen de commande comprend un dispositif de soupape de modulation pneumatique, et **en ce que** le moyen de commande contrôle en outre la vitesse du déplacement du moyen d'actionnement (4) en réponse aux informations sur la position transmises par le moyen capteur de la position (25).

2. Appareil selon la revendication 1, **caractérisé en ce que** le moyen capteur de la position (25) comprend un capteur de position linéaire adapté pour détecter la position du soufflet (6).

3. Appareil selon la revendication 2, **caractérisé en ce que** le capteur de position linéaire (25) est adapté pour détecter la position d'un élément de guidage (10) du soufflet (6).

4. Appareil selon la revendication 3, **caractérisé en ce que** le capteur de position linéaire (25) comprend un potentiomètre linéaire.

5. Appareil selon la revendication 3, **caractérisé en ce que** le capteur de position linéaire (25) comprend un dispositif de code à barres.

6. Appareil selon la revendication 2, **caractérisé en ce que** le capteur de position linéaire (25) est adapté pour détecter la distance entre des surfaces supérieure et inférieure du soufflet (6).

7. Appareil selon la revendication 6, **caractérisé en ce que** le capteur de position linéaire (25) comprend un capteur à fil d'étirage.

8. Appareil selon l'une quelconque des revendications 3 à 7, **caractérisé en ce que** l'élément de guidage (10) est agencé dans le soufflet (6).

9. Appareil selon l'une quelconque des revendications 3 à 8, **caractérisé en ce que** l'élément de guidage (10) comprend une tige de guidage (11) pouvant glisser dans le tube de guidage (10).

10. Appareil selon l'une quelconque des revendications 3 à 8, **caractérisé en ce que** l'élément de guidage (10) comprend un tube de guidage, dans lequel peut glisser une tige de guidage (11).

11. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément de guidage (10) comprend un double guide télescopique (35).

12. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif de soupape de modulation pneumatique est contrôlé par un moyen manuel.

13. Appareil selon l'une quelconque des revendications 1 à 11, **caractérisé en ce que** le dispositif de soupape de modulation pneumatique est contrôlé par un moyen de commande logique.

14. Appareil selon les revendications 12 ou 13, **caractérisé en ce que** la course du moyen d'actionnement (4) est uniquement limitée par le moyen de commande.

15. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le moyen capteur de la position (25) est adapté pour détecter l'abaissement complet du moyen d'actionnement (4) et/ou le positionnement de la soupape du récipient (2) dans la position d'obturation.

16. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend en outre un moyen (21) pour entraîner la vibration de la soupape du récipient (2).

17. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la soupape du récipient (2) comprend une soupape conique, le soufflet (6) étant monté à l'intérieur de la soupape du récipient (2).

18. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'appareil est monté au niveau de la sortie d'un récipient de matériau fluide.

19. Appareil selon l'une quelconque des revendications 1 à 17, **caractérisé en ce que** l'appareil est monté dans un dispositif de décharge, pour décharger le matériau fluide d'un récipient le contenant, le dispositif de décharge englobant une trajectoire d'écoulement en vue de l'écoulement du matériau à partir du récipient.

20. Appareil selon les revendications 18 ou 19, **caractérisé en ce que** la soupape du récipient (2) et/ou la sortie du récipient sont adaptées pour empêcher un endommagement du matériau fluide.

21. Appareil selon la revendication 20, **caractérisé en ce que** la soupape du récipient (2) et/ou la sortie comportent des bords arrondis.

22. Appareil selon les revendications 20 ou 21, **caractérisé en ce que** la soupape du récipient (2) comprend un joint de bordure souple (2a).

23. Procédé de décharge d'un matériau fluide à partir d'un récipient le contenant, **caractérisé par** l'utilisation de l'appareil (23) selon l'une quelconque des revendications précédentes.

24. Appareil selon l'une quelconque des revendications 1 à 22, **caractérisé en ce que** l'appareil englobe en outre un moyen pour entraîner la vibration de la soupape (2), pour faciliter l'écoulement du produit, la vibration de la soupape du récipient (2) étant isolée par le soufflet (6).

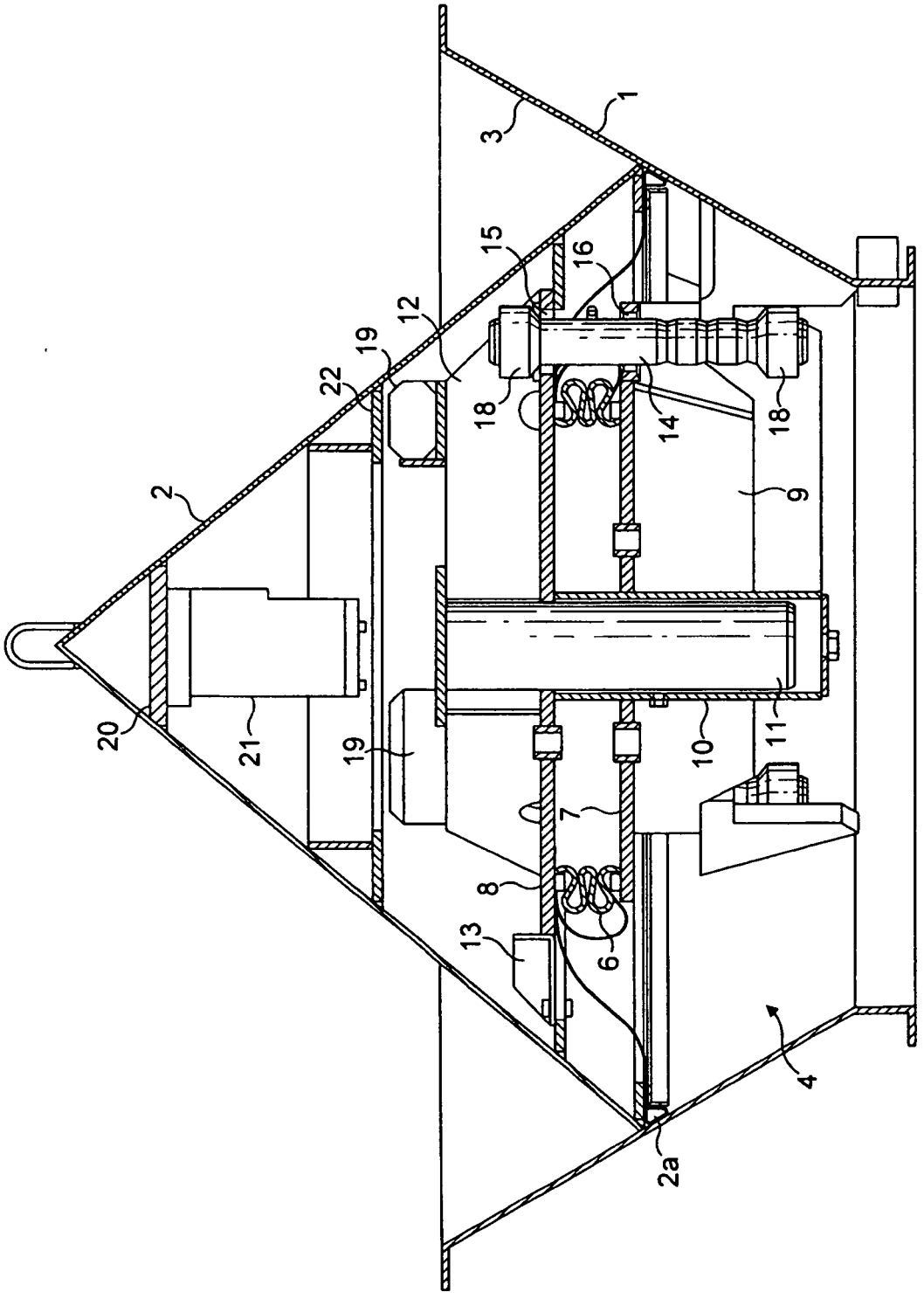

FIG. 1

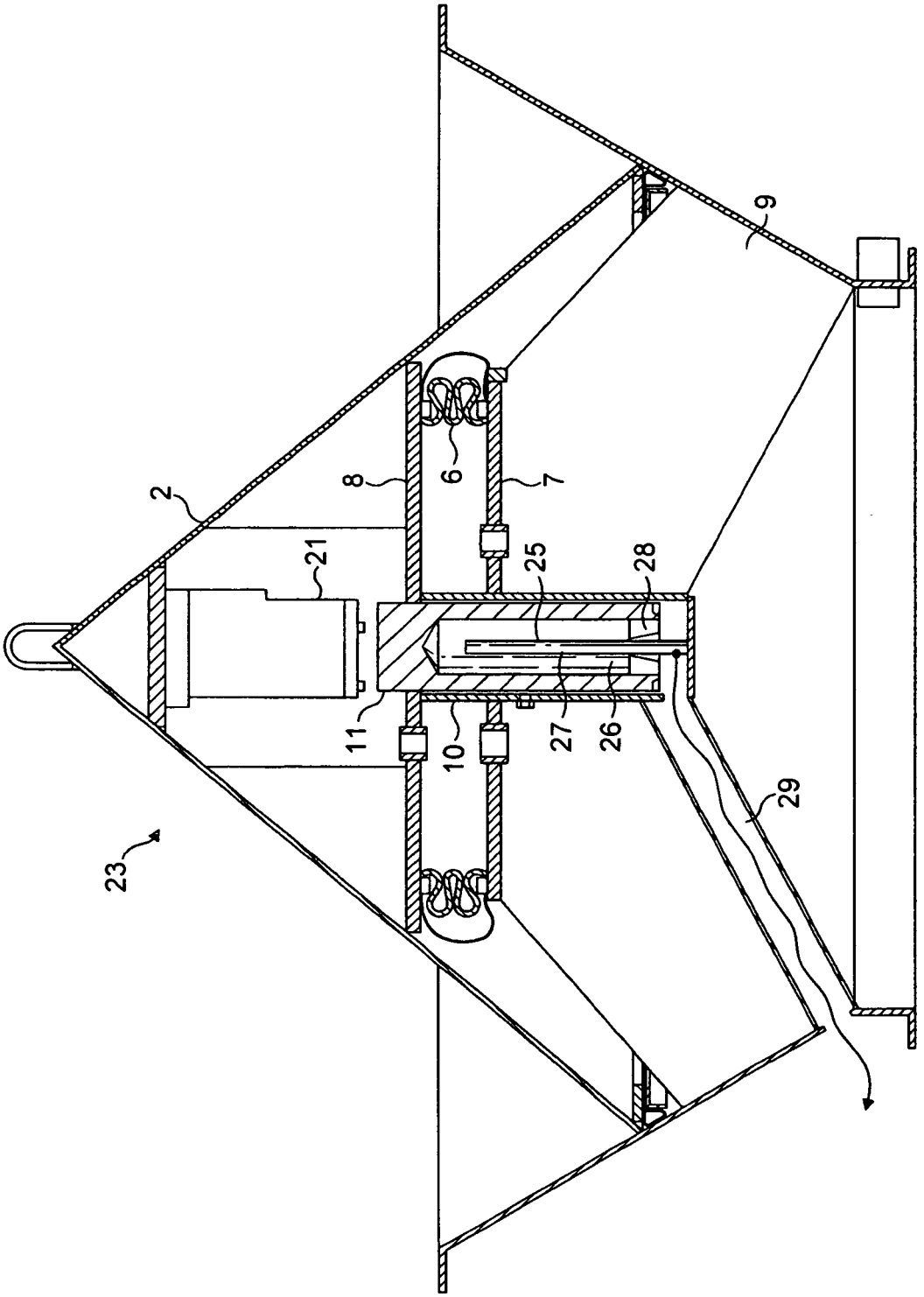

FIG. 2

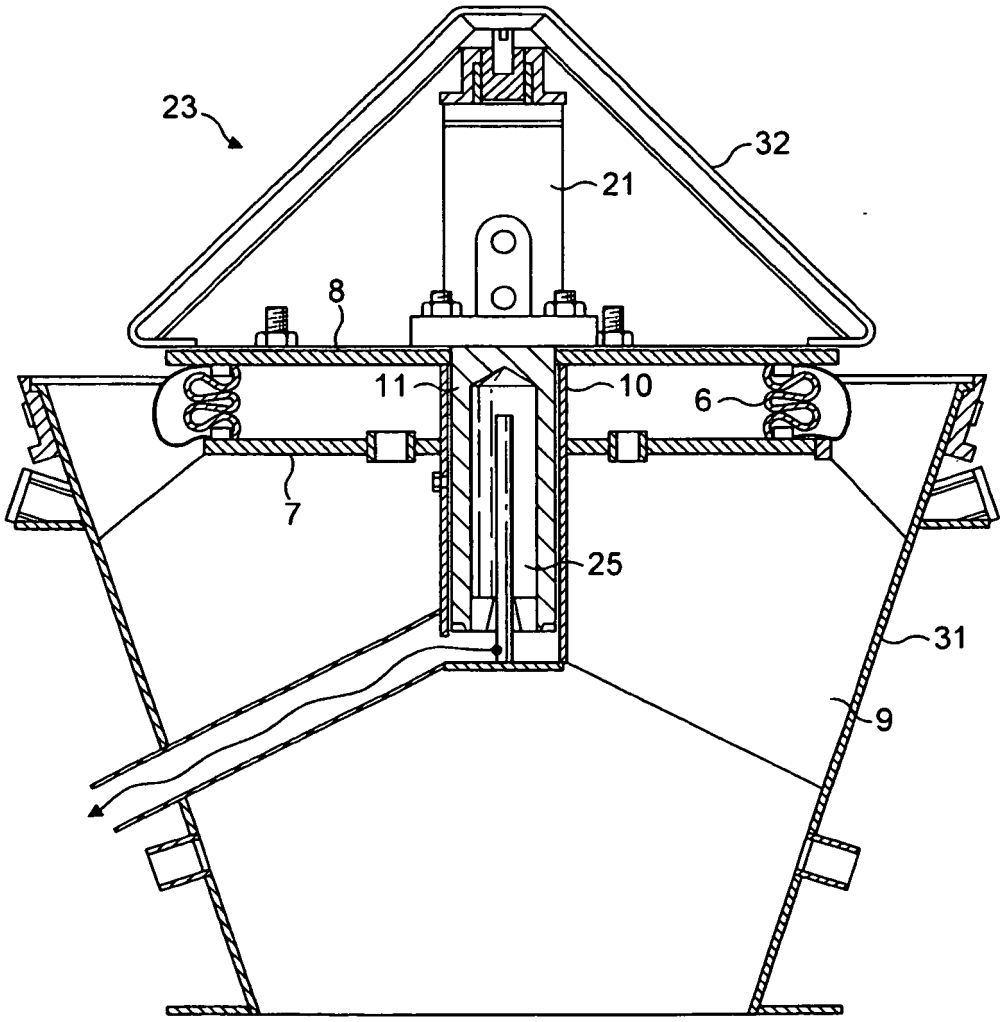

FIG. 3

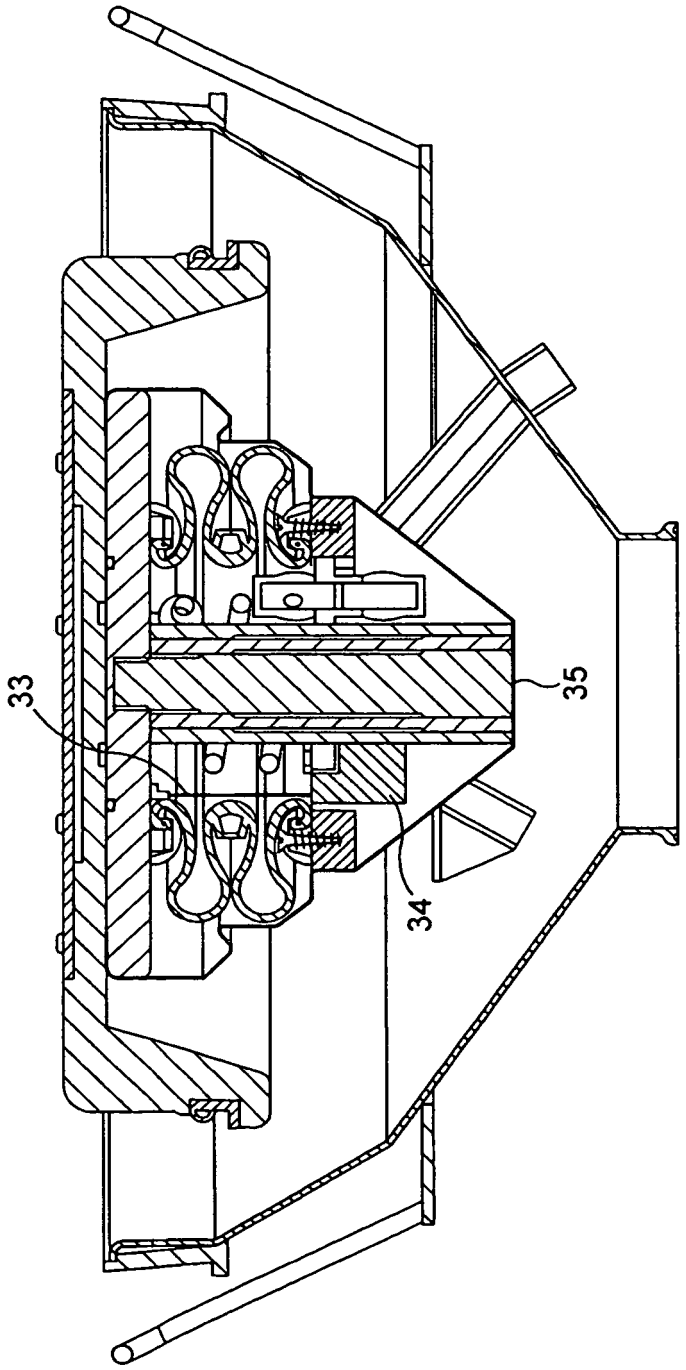

FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 9008724 A **[0002]**