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A metering device

This invention concerns a device for the delivery of metered quantities of an, at least partially liquid, product, comprising a hopper, a metering cylinder, a plunger reciprocating within the cylinder and a connecting element with a shut-off valve located in between the hopper and the cylinder, said element having the form of a housing, with a port towards the hopper, towards the cylinder and towards the location for product to be delivered, the connections in between said ports being controlled by a valve which is displaceable into several positions within the chamber of the housing the innerwall of the metering cylinder extending to within the valve housing. Such a device is known from GB—A—1 225 903.

The valve in this known device consists of a hollow rotatable plug with a large opening in its periphery. The hollow portion of the valve forms a permanent connection to the hopper whilst the metering cylinder is in permanent connection with the location for the product to be delivered. The connection with the location of delivery is opened and closed by means of a separate plunger. It is possible that by starting the device a quantity of gas (mostly being air) may assemble below the head of the plunger reciprocating in the metering cylinder. The presence of said gas or air may cause an incorrect metering to take place, so that a regular check and even a possible dismounting of the respective device is required.

The present invention aims to provide a construction such, that an occurrence of the above mentioned phenomenon is obviated.

This is attained according to the invention in that:

- the head of the plunger extends to within an axial recess of the valve at the end of the metering stroke;
- the axial recess of the valve is extends along its periphery, said recess alone providing a straight connection between the ports towards the hopper and the cylinder, in the suction position of the valve.

In view of these features a bubble of gas or air being present below the plunger during the lowermost position of the latter, can flow through the axial recess in the plug to the hopper from which said bubble may then ascend towards the surface of the liquid.

The present invention relates in particular to a metering device the valve of which comprises a rotatable plug with a transverse bore for establishing a connection between the metering cylinder and the location of delivery of the product. In that case the valve is preferably provided with a circumferentially extending groove located between the axial recess and the transverse bore. This enables the valve to be

rotated from one end position to another end position at the moment that the metering plunger is in its lowermost position without the risk of obstruction by the plunger head.

In this connection it is observed that US—A—2 666 564 discloses a same type of device with a metering cylinder and a valve comprising a solid tapering rotatable plug with a circumferentially extending groove connected with a transverse bore. The purpose of this groove is to establish a permanent communication between the bore and the metering cylinder.

An embodiment of the most important portion of the present metering device in accordance with the invention and some operational stages of same, will now be illustrated with respect to the accompanying drawings, wherein:

Figure 1 shows a vertical section of the metering device;

Figure 2 is a section according to line II—II of the lowermost part of the device in Figure 1;

Figures 3a—f diagrammatically show five operational stages of the device as shown in Figures 1 and 2.

The drawings disclose a metering device which could be part of a complete device of the type as described in the aforementioned U.S. Patent Specification No. 2,666,564. A device of this type comprises a number of metering units all of them being of analogous construction, their operation also being identical. The present Specification is therefore limited to a single unit being composed of a metering cylinder 1 and a plunger 2. Said plunger 2 is connected with a roll 3 protruding beyond the cylinder 1, said roll serving to reciprocate said plunger in between its lowermost invariable position (shown in Figure 1) and an adjustable uppermost position, depending upon the quantity of product to be metered, such as for instance soup, jams or suchlike partially liquid products. As can be seen in Figure 2 the cylinder 1 is positioned at short distance adjacent a hopper 4 for storing said products. A connecting element in the form of a valve housing 5 is located below the cylinder 1 and the hopper 4. The wall of said housing comprises three orifices constituting a port 6 towards the hopper 4, a port 7 towards the cylinder 1 and a port 8 towards the location for delivering the liquid or partially liquid product (see Figure 3). The housing 5 comprises a cylindrical chamber in which a correspondingly shaped valve 9 is disposed. This valve 9 comprises a transverse bore 10 constituting a connection between the metering cylinder 1 and the location for the delivery of products, to wit in between the ports 7 and 8. The valve 9 is along its periphery further provided with an axially extending recess 11. Said recess 11 forms the connection between the ports 6 and 7

during the sucking stage of the relative device, when liquid product is fed to the cylinder 1 from the hopper 4.

As can be seen in Figures 1 and 2, the inner wall of the metering cylinder 1 extends to within the valve housing, whilst the surface of the head 12 of the plunger 2 extends within the valve 9 at the end of the metering stroke. From this it follows that the latter metering cylinder 1 will hardly exhibit any "dead" space during the lowermost position of the plunger 2. The recess 11 further maintains a connection with the hopper 4. The latter is favourable relative to the operation of the device, which will be described hereinafter with respect to Figures 3a—f.

The valve 9 further comprises a circumferentially extending cavity 13 in between the axial recess 11 and the transverse bore 10 (see Figure 1). This enables a rotation of the valve 9 in the lowermost position of the plunger 2. As can be seen in Figure 2 the left-hand end of the valve 9 is further provided with a collar 14 fitting in a groove 15 of the valve housing 5. In view of the latter the valve 9 may be simply retained by a cover 16. Due to the provision of a complementary recess at a suitable location along the circumference of the collar 14, the body of the valve 9 may be easily drawn out of the housing 5, when being in an inoperative position.

The operation of the metering device according to the invention substantially corresponds to that as, for example, described in U.S. Patent Specification No. 2,666,564 as mentioned hereinbefore, wherein a roll 3 co-operates with a cam path 17, as diagrammatically illustrated in Figures 3a—f. During stage A (Figure 3a) the plunger is ascending and liquid product is sucked from the hopper 4, through the ports 6 and 7 and the recess 11. In stage B (Figure 3b) the plunger 2 has achieved its uppermost position, so that the valve 9 can be displaced (that is to say be rotated) for closing off the connection between the hopper 4 and the cylinder 1 and for opening the connection between the cylinder 1 and the location of delivery, in this case a tin 18.

This stage C (Figure 3c) merges into stage D (Figure 3d) during which the plunger moves downwards whilst the desired quantity of product is pressed towards the location of delivery. Finally plunger 2 is in its lowermost position, to wit in operational stage E (Figure 3e), whereby the surface of the head 12 of the plunger 2 penetrates to within the valve 9, said valve 9 being subsequently turned towards its initial position, see Figure 1. As a result of the location of the small "dead" space below the plunger 2 and in view of the fact that the head of the plunger in its lowermost position, will press the product and the eventual bubble of gas or air back to within the valve, said bubble assembling below the plunger 2, may escape in the direction of the hopper 4. This avoids the presence of gas or air in a subsequent opera-

tional stage, which could hamper an accurate filling of the aimed metered portion into the tin 18. The small dead space is further very useful in the situation of a so-called emergency-stop, i.e. a sudden disconnection of the machine. Due to this small space only a reduced quantity of product is contained in said space. This small quantity can easily be taken up in the container to be filled (tin or glass jar), without an overflow of the container. A pollution of the filling station will thus be prevented.

The device in accordance with the present invention is especially adapted to being employed in foodstuff-producing industries, for instance in factories for the preparation of tinned soups or for jams in jars. The plunger filler may be used for processing, for example, so-called "filled" soups, to wit soups consisting mostly of liquid substances, the remains of said soup (consisting for instance of pieces of vegetables or meat, minced meat balls and the like) being entrained in the flow.

Claims

1. A device for the delivery of metered quantities of an, at least partially liquid, product, comprising a hopper (4), a metering cylinder (1), a plunger (2) reciprocating within the cylinder and a connecting element (7) with a shut-off valve (5) located in between the hopper and the cylinder, said element (7) having the form of a housing, with a port (6, 7, 8) towards the hopper (3), towards the cylinder (2) and towards the location (18) for product to be delivered, the connections in between said ports being controlled by a valve (5) which is displaceable into several positions within the chamber of the housing (7) the innerwall of the metering cylinder (1) extending to within the valve housing (7), characterized in that

- the head (12) of the plunger (2) extends to within an axial recess (11) of the valve (9) at the end of the metering stroke;
- the axial recess (11) of the valve extends along its periphery, said recess alone providing a straight connection between the ports (6, 7) towards the hopper (4) and the cylinder (1), in the suction position of the valve (5).

2. A metering device according to claim 1, in which the valve comprises a rotary plug (9) with a transverse bore (10) for establishing a connection between the metering cylinder (1) and the location (18) for the delivery of product (18) characterized in that the valve (9) is provided with a circumferentially extending groove (13) located between the axial recess (11) and the transverse bore.

3. A metering device according to claim 1 or 2, in which the valve (9) has a cylindrical shape, one end of said valve being provided with a

collar (14) which cooperates with a local cover (16).

Patentansprüche

1. Einrichtung für die Abgabe dosierter Mengen eines wenigstens teilweise flüssigen Produkts, mit einem Schüttbehälter (4), einem Dosierzylinder (1), einem in dem Zylinder hin und her beweglichen Kolben (2) und einem Verbindungselement (7) mit einem zwischen dem Schüttbehälter und dem Zylinder angeordneten Absperrventil (5), wobei das Verbindungselement (7) die Form eines Gehäuses mit jeweils einem Durchlaß (6, 7, 8) zum Schüttbehälter (3), zum Zylinder (2) und zu der für die Abgabe des Produkts bestimmten Stelle (18) hin hat, die Verbindungen zwischen den Durchlässen durch ein in verschiedene Stellungen bewegbar in der Kammer des Gehäuses (7) angeordnetes Ventil (5) gesteuert sind und sich die Innenwand des Dosierzylinder (1) in das Ventilgehäuse (7) hinein erstreckt, dadurch gekennzeichnet, daß sich der Kopf (12) des Kolbens (2) am Ende des Dosierhubs bis in eine axiale Vertiefung (11) des Ventils (9) hinein ersteckt und daß sich die axiale Vertiefung (11) des Ventils entlang dessen Umfang erstreckt und in der Saugstellung des Ventils (5) allein eine direkte Verbindung zwischen den Durchlässen (6, 7) zum Schüttbehälter (4) und zum Zylinder (1) hin darstellt.

2. Dosiereinrichtung nach Anspruch 1, bei welcher das Ventil einen drehbaren Zapfen (9) mit einer Querbohrung (10) zum Herstellen einer Verbindung zwischen dem Dosierzylinder (1) und der Stelle (18) für die Abgabe des Produkts aufweist, dadurch gekennzeichnet, daß das Ventil (9) mit einer sich in Umfangsrichtung erstreckenden, zwischen der axialen Vertiefung (11) und der Querbohrung angeordneten Nut (13) versehen ist.

3. Dosiereinrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Ventil (9) zylindrische Form aufweist und an einem Ende mit einem hervorstehenden Rand (14) ver-

sehen ist, welcher mit einer örtlichen Abdeckung (16) zusammenwirkt.

Revendications

1. Dispositif pour délivrer des quantités déterminées d'un produit au moins partiellement liquide, comprenant une trémie (4), un cylindre de mesure (1), un piston (2) allant et venant dans le cylindre et un élément de liaison (7) muni d'une vanne de fermeture (5) disposée entre la trémie et le cylindre, ledit élément (7) présentant la forme d'un boîtier muni d'une ouverture (6, 7, 8) en direction de la trémie (4), en direction du cylindre (2) et en direction du point (18) où le produit est délivré, les liaisons entre ces ouvertures étant commandées par la vanne (5) qui est déplaçable dans plusieurs positions dans la chambre du boîtier (7), la paroi interne du cylindre de mesure (1) s'étendant à l'intérieur du boîtier (7) de la vanne, caractérisé par le fait que

- la tête (12) du piston (2) s'étend dans un logement axial (11) de la vanne (9) à la fin de la course de mesure;
- le logement axial (11) de la vanne s'étend le long de sa périphérie, ce logement seul réalisant une liaison directe entre les ouvertures (6, 7) en direction de la trémie (4) et le cylindre (1), dans la position d'aspiration de la vanne (5).

2. Dispositif de mesure selon la revendication 1 dans lequel la vanne comporte un bandeau rotatif (9) présentant un perçage transversal (10) pour réaliser une connexion entre le cylindre de mesure (1) et le point (18) pour la distribution du produit, caractérisé par le fait que la vanne (9) est munie d'une gorge (13) s'étendant circonférentiellement située entre le logement axial (11) et le perçage transversal.

3. Dispositif de mesure selon la revendication 1 ou la revendication 2 dans lequel la vanne (9) présente une forme cylindrique, l'une des extrémités de cette vanne étant munie d'un collier (14) coopérant avec un couvercle (16).

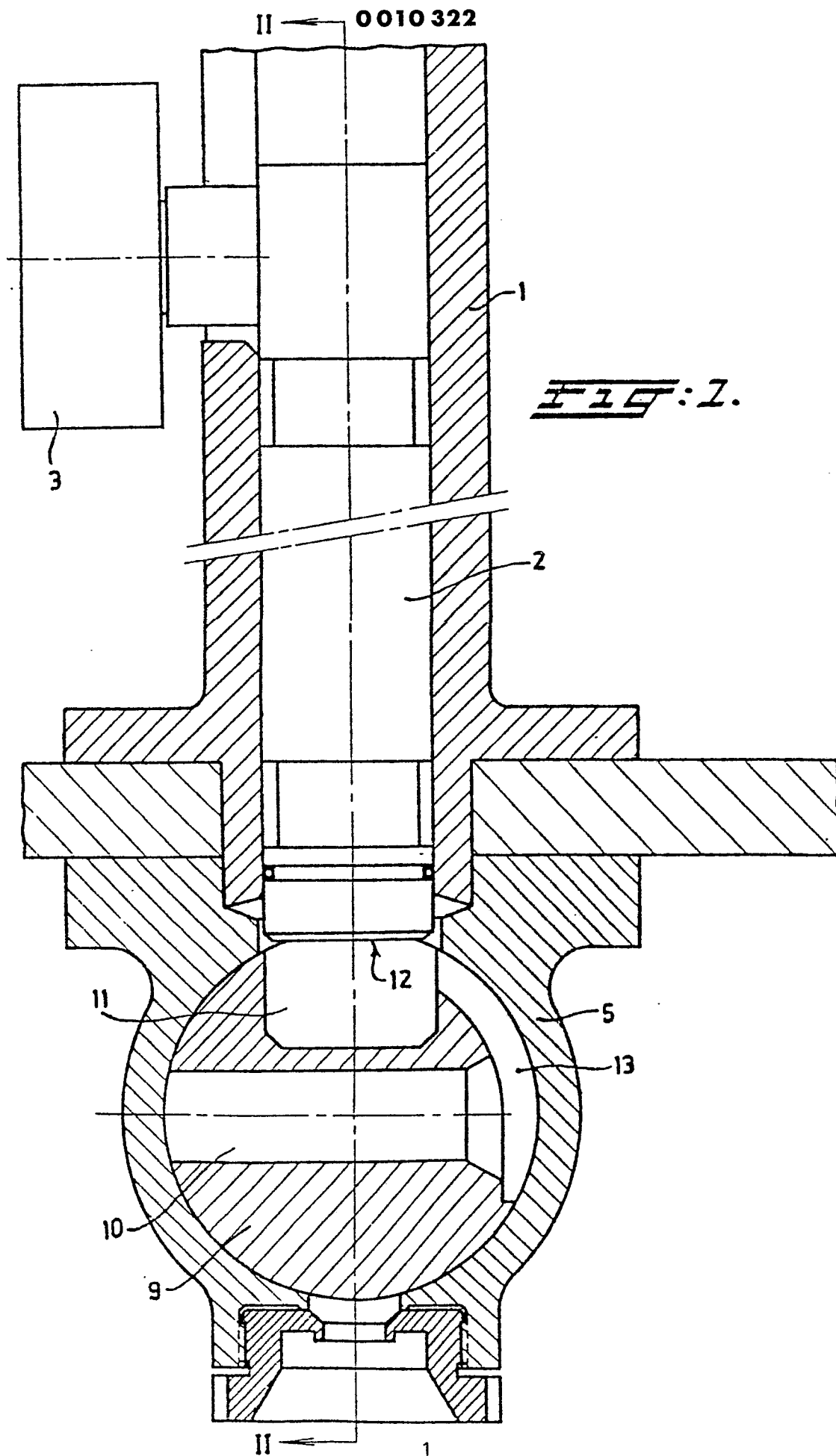
50

55

60

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4



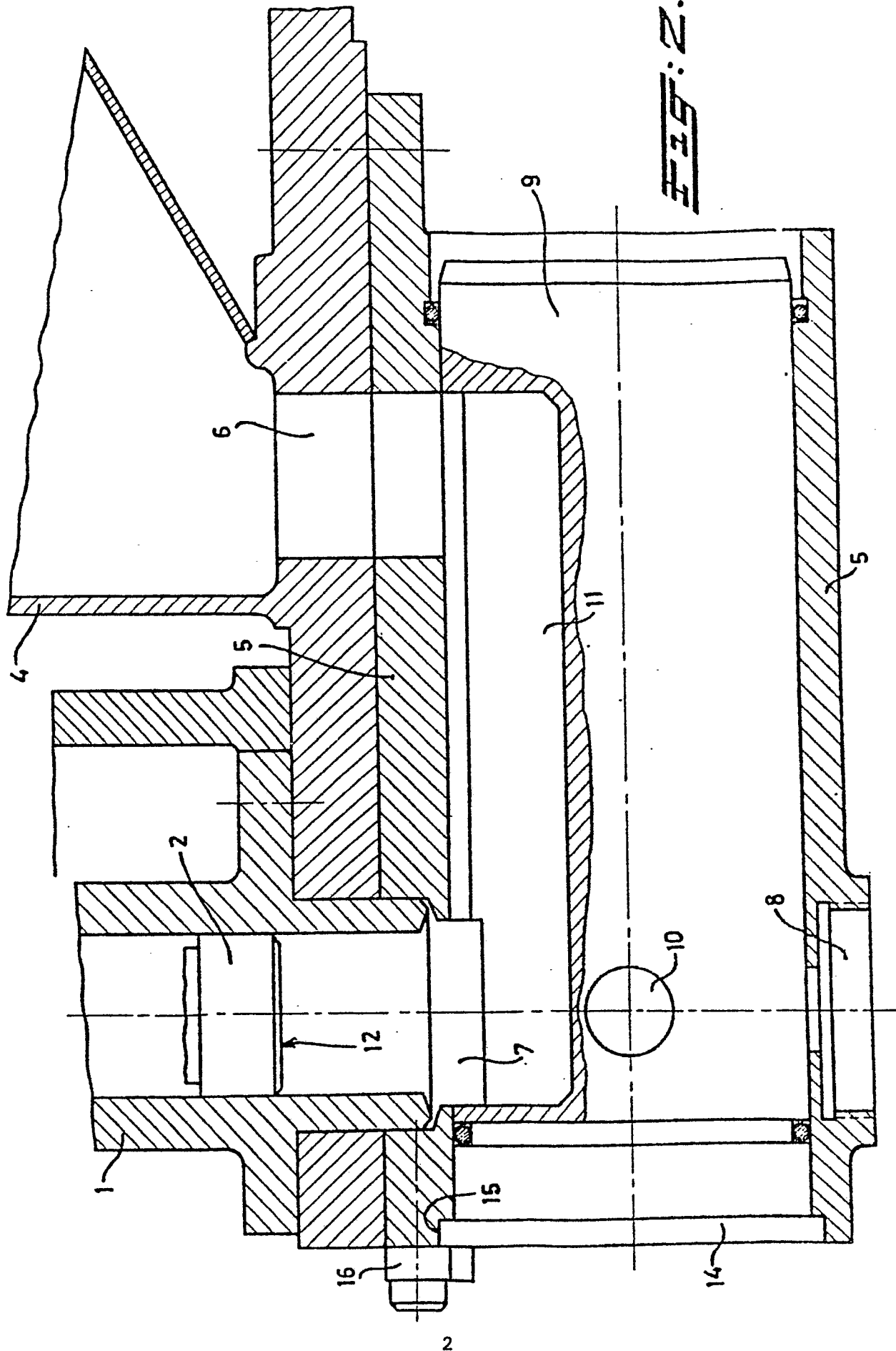


FIG: 3a.

FIG: 3c.

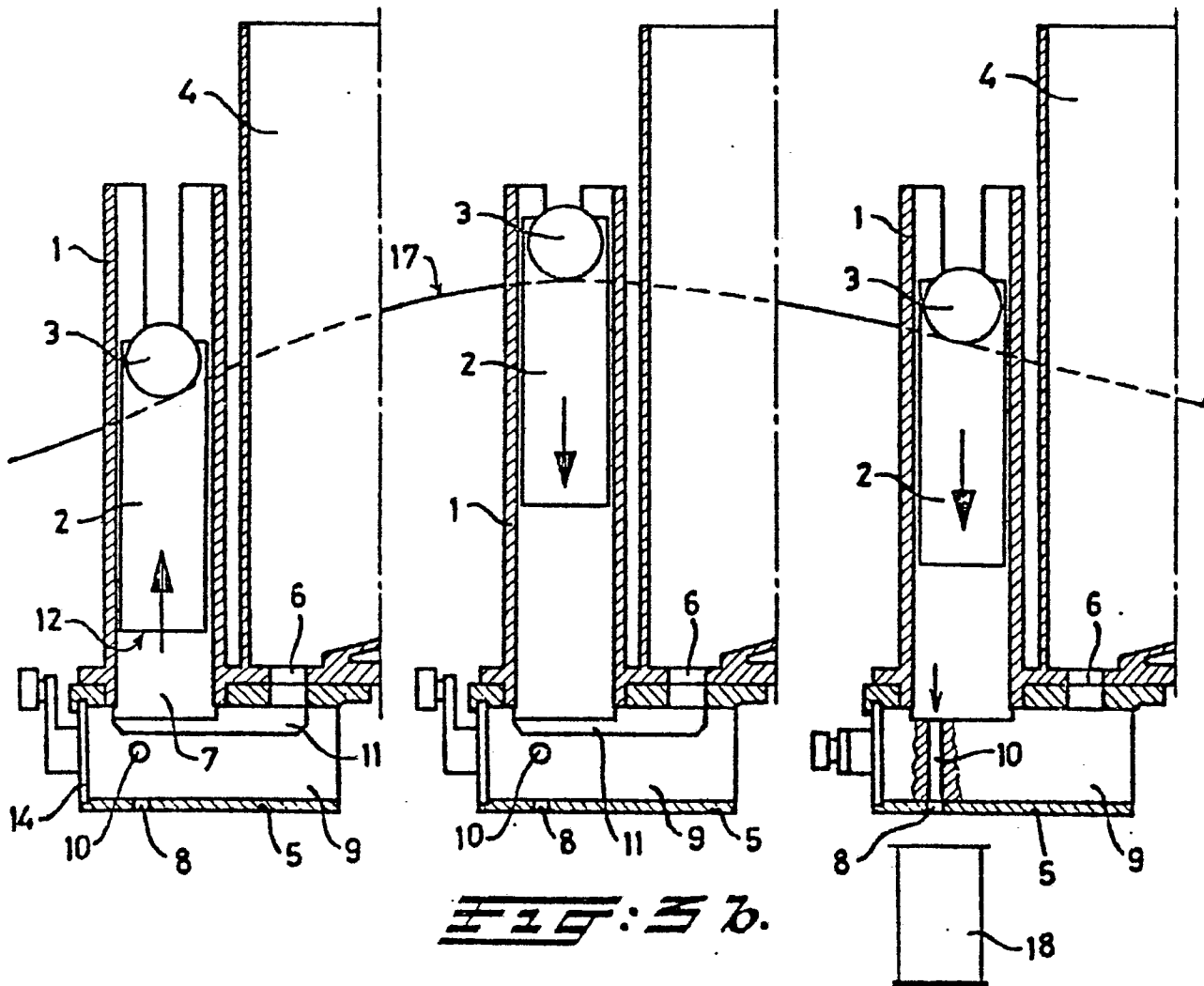


FIG: 3d.

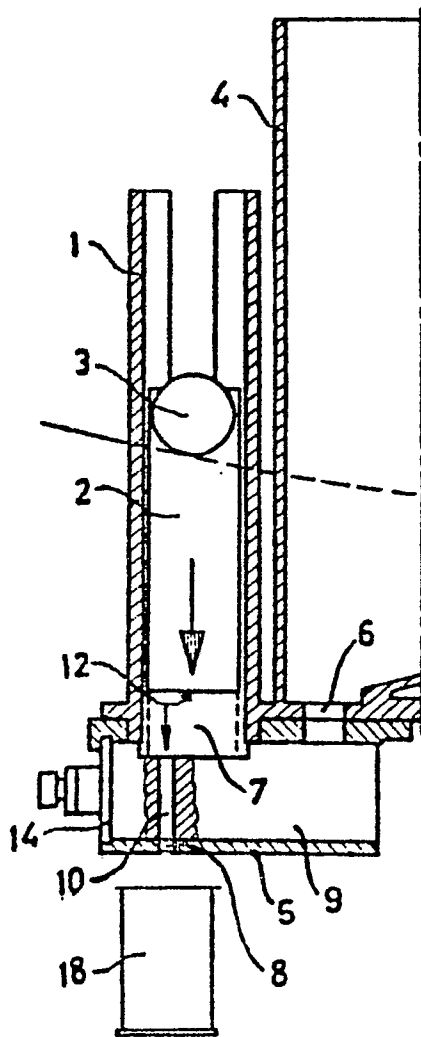


FIG: 3f.

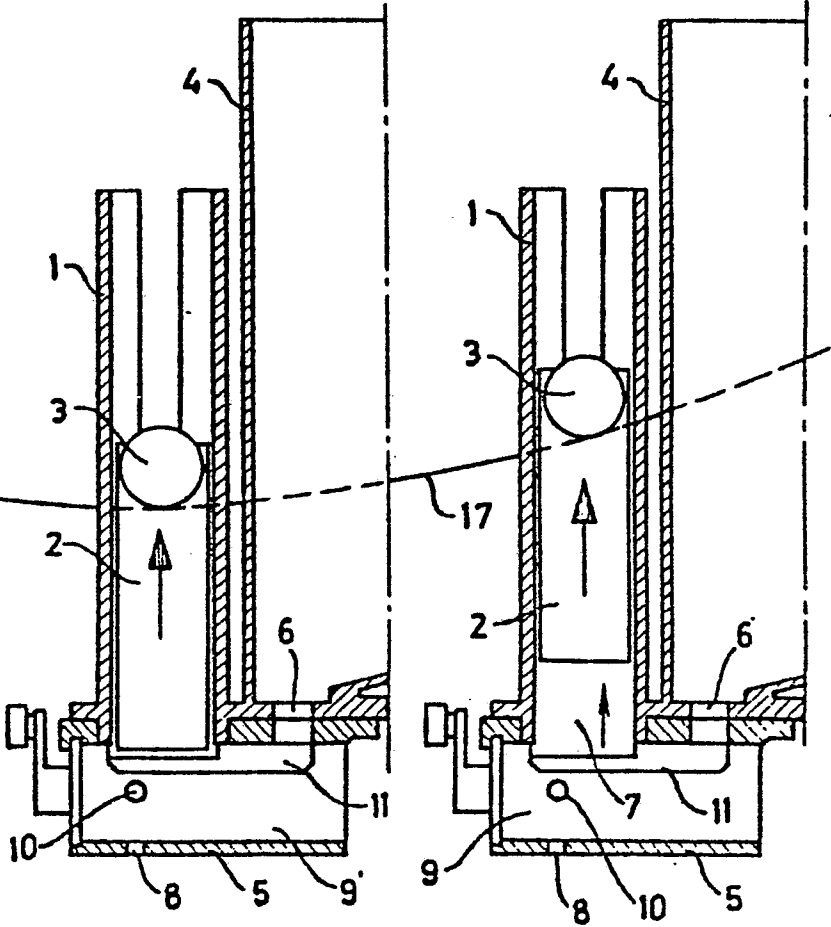


FIG: 3e.