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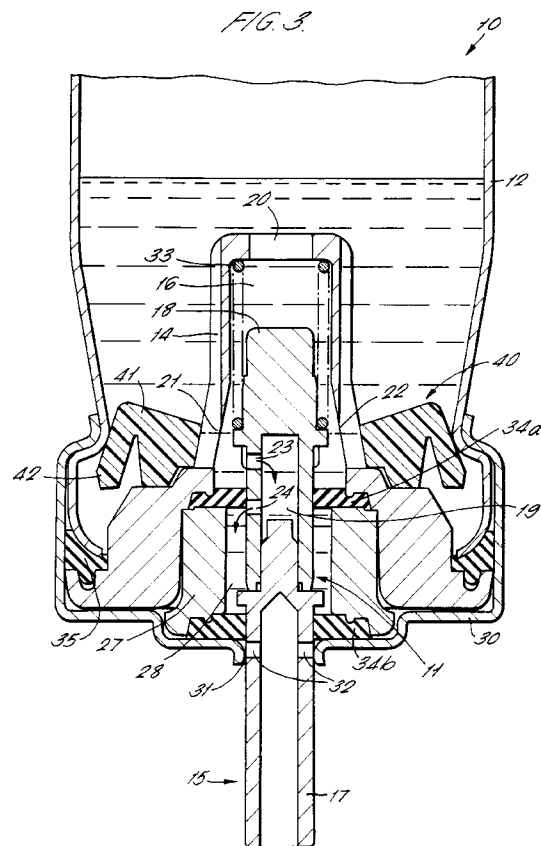
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(54) Valve seal for pressurised dispensers

(57) The invention relates to valves for apparatus for dispensing a liquid product (13) from a pressurised container (12) which is required to dispense an accurately metered quantity of the liquid product (13). The dispensing apparatus (10) comprises a metering valve (11) for use with the container (12) for pressurised liquid (13), the valve (11) comprising a valve body (14) defining a chamber having one or more inlets (20, 21, 22) for pressurised liquid (13) and an annular seal member (40) positioned around the valve body (14) and in sealing contact with an inner surface of the container (12). The seal member (40) comprises an annular inner section (41) providing a liquid flow path from the container (12) to one or more inlets (21, 22) providing support for an outwardly extending flexible outer flange section (42) which flexes to make sealing contact with the container (12).



Description

The invention relates to valves for apparatus for dispensing a liquid product from a pressurised container where it is required to dispense an accurately metered quantity of the liquid product.

Pressurised dispensing containers are used for dispensing a wide variety of liquid products and generally employ a liquid propellant, such as a hydrocarbon or fluoro-carbon, mixed with the liquid product having a sufficiently high vapour pressure at normal working temperatures to propel the liquid product through the dispensing apparatus.

The accuracy of the metered dose is very important in certain applications, such as dispensing medications from the first to the last dose. Dispensing containers therefore usually bear information pertaining to the number of metered doses available. This is usually less than the optimum number of doses which could be obtained from the total volume of liquid in the container, as a certain quantity of the liquid cannot be dispensed accurately as the container gets emptier, and is therefore wasted.

The object of the present invention is to minimise the wastage of a liquid product as the container empties and to minimise the mobility of any product not easily dispensable.

According to the invention there is therefore provided dispensing apparatus comprising a metering valve for use with a container for pressurised liquid, the valve comprising a valve body defining a chamber having one or more inlets for pressurised liquid and an annular seal member positioned around the valve body and in sealing contact with an inner surface of the container, said seal member comprising an annular inner section providing a liquid flow path from the container to the one or more inlets providing support for an outwardly extending flexible outer flange section which flexes to make sealing contact with the container.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Fig. 1 is a sectional elevation of conventional apparatus for dispensing a metered dose of a liquid;

Fig. 2 is a sectional elevation of the dispensing apparatus of Fig. 1 illustrating wastage of the product;

Fig. 3 is a sectional elevation of dispensing apparatus according to the present invention;

Fig. 4 is a sectional elevation of the dispensing apparatus of Fig. 3 showing reduced product wastage;

Figs. 5 and 6 are sectional elevations of an alternative dispensing apparatus according to the present invention showing reduced product wastage;

Fig. 7 is a schematic plot of dose delivery from conventional dispensing apparatus; and

Fig. 8 is a schematic plot of dose delivery from the apparatus of the present invention.

Referring to Fig. 1, there is illustrated conventional dispensing apparatus 10 comprising a valve 11 which is fitted to a pressurised dispensing container 12 containing a liquid 13 to be dispensed in metered doses.

The valve 11 comprises a valve body 14 and a valve stem 15, which stem 15 is reciprocable axially within the body 14. The valve stem 15 shown in Fig. 1 comprises two sections, a first portion 17 and a second portion 18. The second portion 18 of the valve stem 15 is solid at one end and hollow at the other end and a spigot on the end of the valve stem first portion 17 is located in the hollow end of the second portion 18 such that a by-pass chamber 19 is defined within the valve stem second portion 18. A pair of ports 23, 24 are defined in the side wall of the by-pass chamber 19 to permit the ingress and egress of liquid 13 respectively. The first portion 17 defines a bore communicating with ports 32 in the side walls of the first portion 17. The valve stem 15 may alternately be molded as a single part.

The valve body 14 is substantially funnel-shaped, the narrow section of which defines a collecting chamber 16 which extends around the second portion 18 of the valve stem 15. The collecting chamber 16 has an aperture 20 at one end and further apertures 21, 22 which allow the ingress of liquid from the dispensing container 12.

In the wider section of the valve body 14 is located a cup 27 which defines an annular metering chamber 28 through which the valve stem 15 passes. The ports 32 permit the ingress of liquid 13 into the valve stem 15 from the metering chamber 28.

The valve 11 is held in place on the dispensing container 12 by a crimped cup 30 such that the valve stem 15 projects through an aperture 31 in the cup 30. An annular can seal 35 provides a seal between the cup 30, the valve body 14 and the container 12.

A pair of annular sealing rings 34a, 34b are located at either end of the cup 27 around the valve stem 15. The ring 34a is sandwiched between the cup 27 and the crimped cup 30 and the ring 34b between the cup 27 and the valve body 14, so that the valve stem 15 can slide relative to the rings 34a, 34b.

The valve 11 is actuated by manual depression of the valve stem 15 and the operation of the valve 11 is such that at each depression of the valve stem 15 a volume of liquid 13 equal to the contents of the metering chamber 28 is discharged therefrom, via ports 32 and through the stem 15. The valve stem 15 is returned to its rest position with the ports 32 sealed off from the chamber 28 by the sealing ring 34b by a return spring 33 acting between the valve stem second portion 18 and the inside of the collecting chamber 16. As the valve

stem 15 returns to its rest position the metering chamber 28 is replenished by an influx of liquid 13 which enters the collecting chamber 16 through the apertures 20, 21, 22, passes through the by-pass chamber 19 via ports 23, 24 and into the metering chamber 28.

It should be noted that, when the valve stem 15 is depressed for the dispensing operation, the metering chamber 28 is sealed off from the by-pass chamber 19 as the port 24 moves past the sealing ring 34a.

Turning now to Fig. 2, the dispensing apparatus 10 is illustrated at the end of its pack life. The level of liquid 13 in the container has dropped below the apertures 21, 22 and can therefore no longer enter the collecting chamber 16. Although tipping and shaking the apparatus 10 can achieve a certain degree of success in dislodging the remaining liquid 13a, this is very imprecise. As a result, this remaining product 13a cannot be dispensed in a controlled manner. This situation is reflected in the graph shown in Fig. 7 which shows the weight of each shot (or dose) of liquid dispensed throughout the pack life, with the final few doses being erratic.

Referring to Fig. 3 the dispensing apparatus 10 according to the present invention, further comprises a sealing insert 40. The insert 40 is preferably made of a polymeric material such as polypropylene or polyamide (nylon). The sealing insert 40 comprises a substantially rigid annular inner section 41 which is positioned over the valve body 14 and dimensioned so as to provide a sealing fit against the valve body 14. The insert 40 alters the flow path of the liquid 13 to the apertures 21, 22 to the collecting chamber 16. The annular section 41 generally has a conical or inwardly dished shape, therefore ensuring the optimum fill level at the re-fill apertures 21, 22. The insert 40 has an outwardly extending flexible outer flange section 42 which has a diameter greater than that of a neck of the container 12 in which the insert 40 is located such that it flexes to seal against the inner profile of the neck of the container 12. The insert 40 helps to fill and seal off the areas of the container 12 in which liquid 13 can be trapped and does not compromise the seal geometry of the can seal 35 of the dispensing apparatus 10 with the insert 40.

As can be seen from Fig. 4, the amount of waste liquid 13a remaining towards the end of the pack life is substantially reduced from that shown in the conventional apparatus 10 illustrated in Figs. 1 and 2. The improvement in the efficiency of dispensing at the end of the pack life is illustrated in Fig. 8 which shows a good life performance to the final shots.

In addition to reducing the quantity of waste liquid 13a in the dispensing apparatus 10, the sealing insert 40 also reduces the surface area of the can seal 35 which is exposed to the product which increases its life span and reduces the risk of any contamination of the liquid 13. The gasket area defining the seal between the cup 30 and container 12 is to a greater degree mechanically isolated from the product 13, thereby increasing the efficiency of the can seal 35.

It should be noted that the sealing effect of the insert 40 is not always 100% so these advantages depend on the actually sealing efficiency of the insert 40. It does, however, provide a substantial improvement over the prior art.

As the rigid section 41 of the sealing insert 40 remains clear of the container 12, this ensures an optimum seal between the flexible section 42 and the container 12 and does not restrict the compression of the can seal 35 during crimping of the cup 30 to the container 12.

In a modified embodiment of the invention, the valve body 14 may have locating pips on its outer surface to assist in the positioning of the sealing insert 40.

Claims

1. Dispensing apparatus (10) comprising a metering valve (11) for use with the container (12) for pressurised liquid (13), the valve (11) comprising a valve body (14) providing a chamber (19) having one or more inlets (20, 21, 22) for pressurised liquid (13) characterised in that an annular seal member (40) is positioned around the valve body (14) in sealing contact with an inner surface of the container (12), said seal member (40) comprising an annular inner section (41) providing a liquid flow path from the container (12) to the one or more inlets (21, 22) providing support for an outwardly extending flexible outer flange section (42) which flexes to make sealing contact with the container (12).
2. Dispensing apparatus (10) as claimed in claim 1 in which one surface of the seal member inner section (41) has an inwardly dished shape and the seal member (40) is located with the bottom of the dish adjacent to the one or more liquid inlet ports (21, 22).
3. Dispensing apparatus (10) as claimed in claim 1 or claim 2 further comprising a cup (30) in sealing engagement over the mouth of said container (12), the annular seal member (40) being located so as to isolate the seal between said cup and said container (12) from the pressurised liquid and said container (12).
4. Dispensing apparatus (10) as claimed in any one of the preceding claims in which the outer flange section (42) of the annular seal member (40) is of a resilient material.
5. Dispensing apparatus (10) as claimed in any one of the preceding claims in which the annular seal member (40) is of a polymeric material.

FIG. 1.

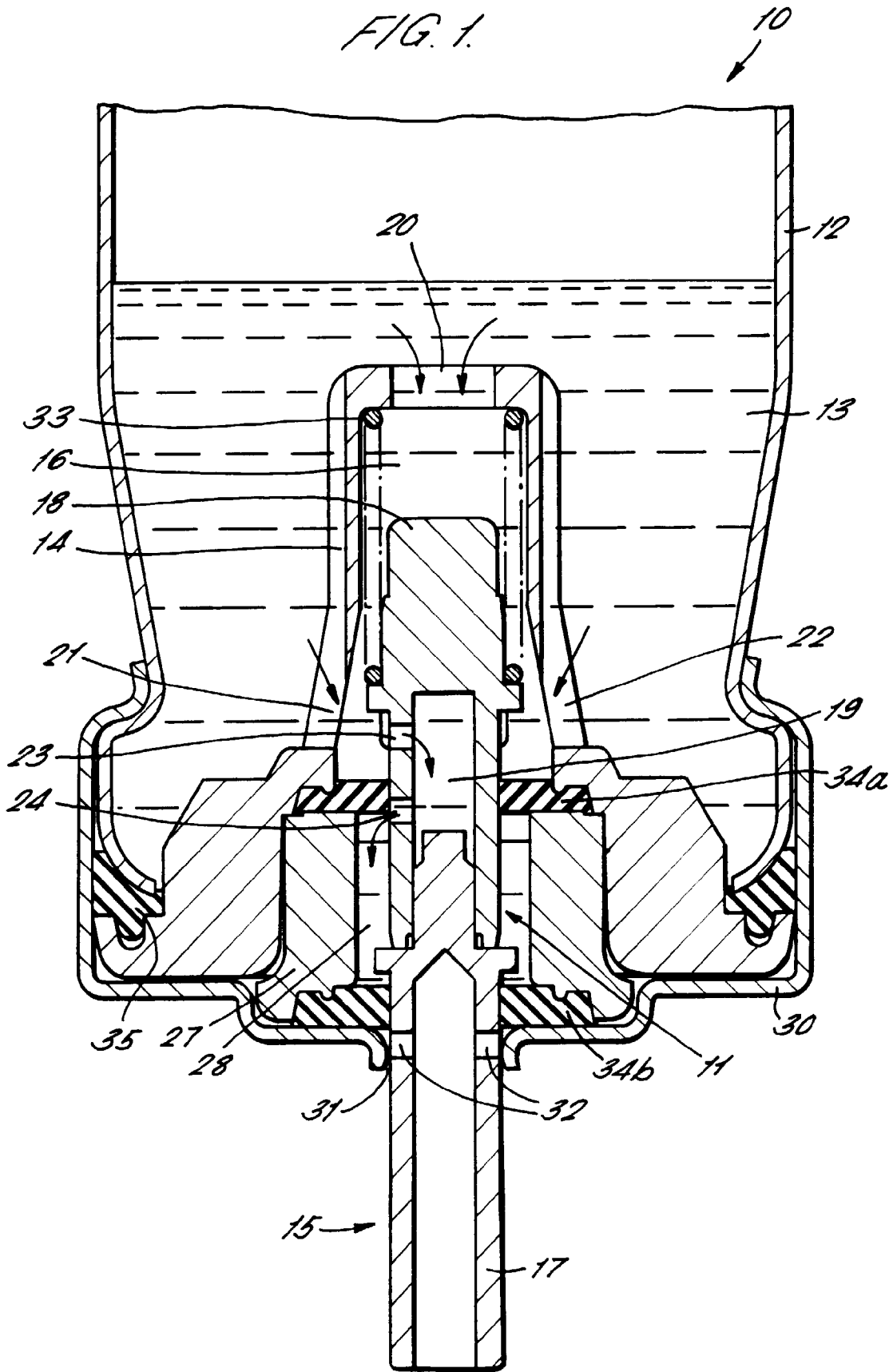


FIG. 2.

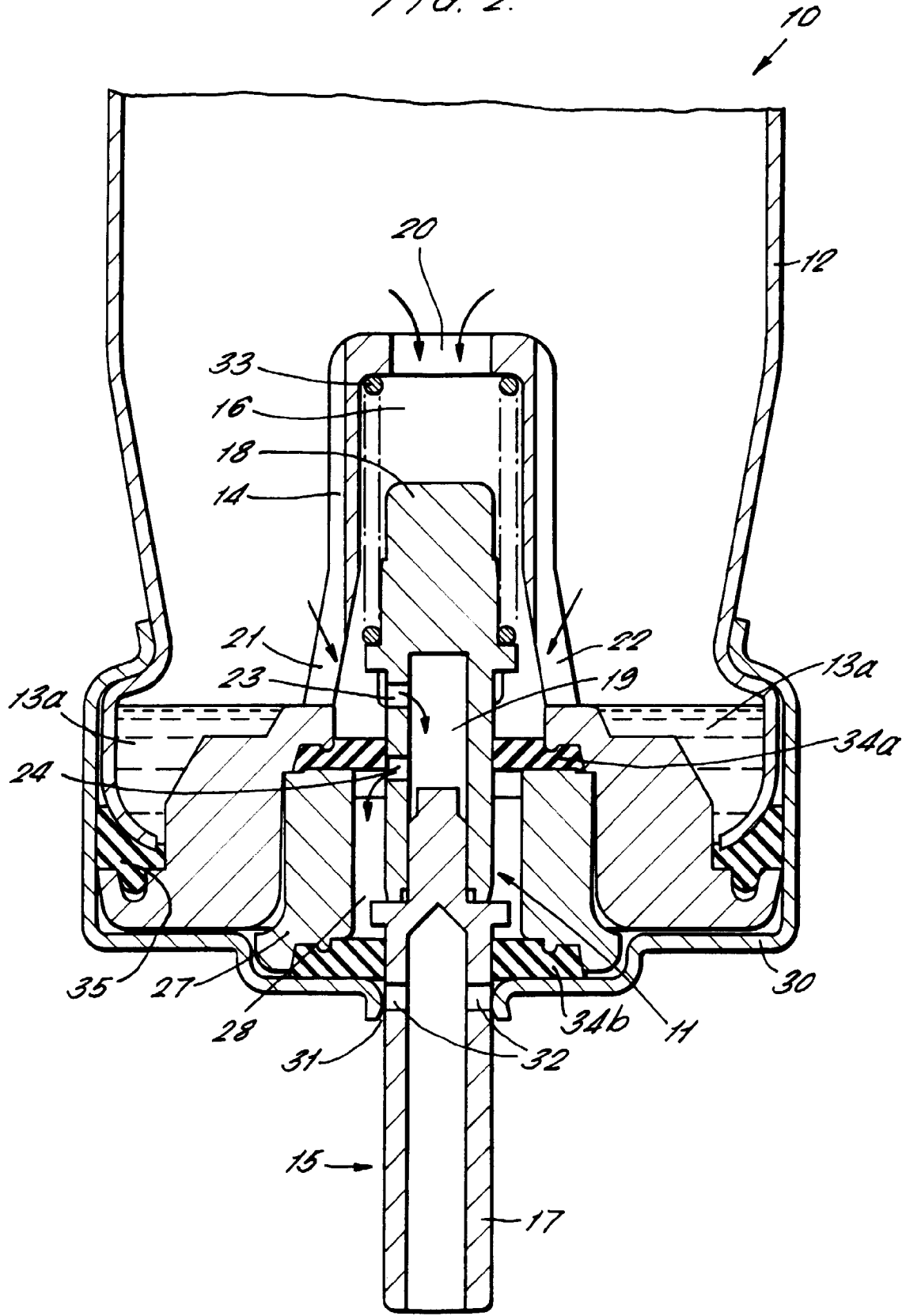


FIG. 3.

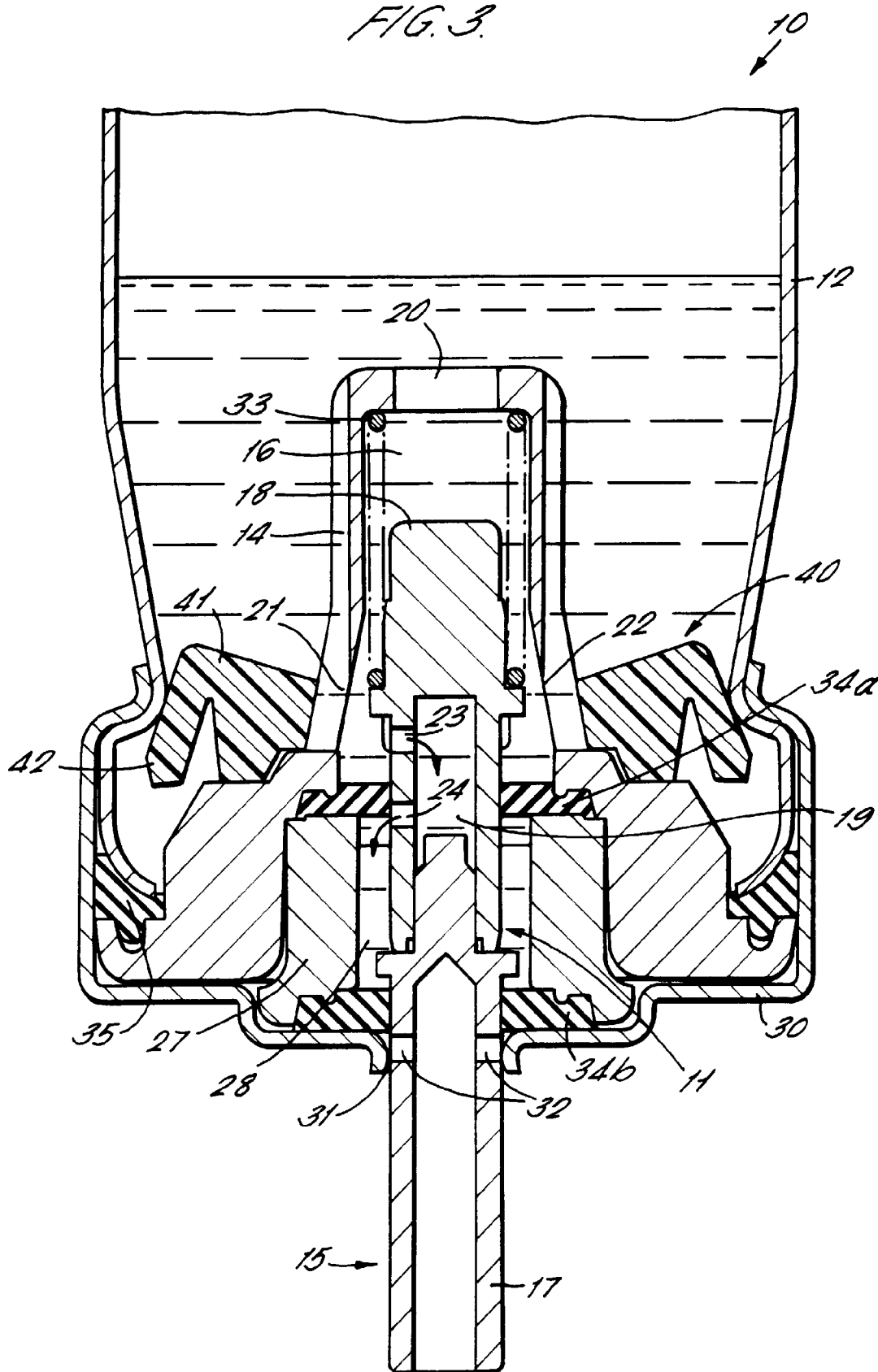


FIG. 5.

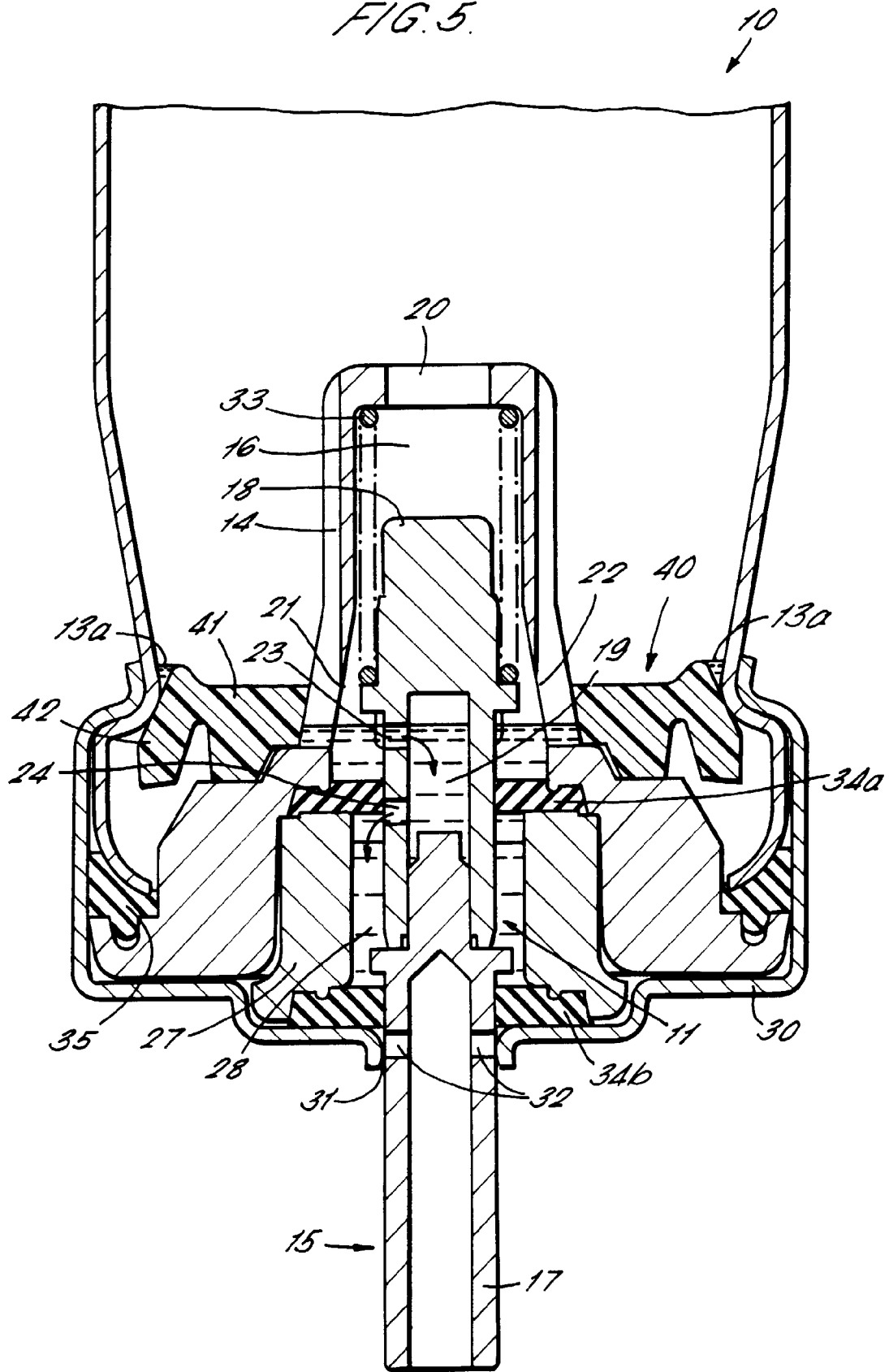


FIG. 6.

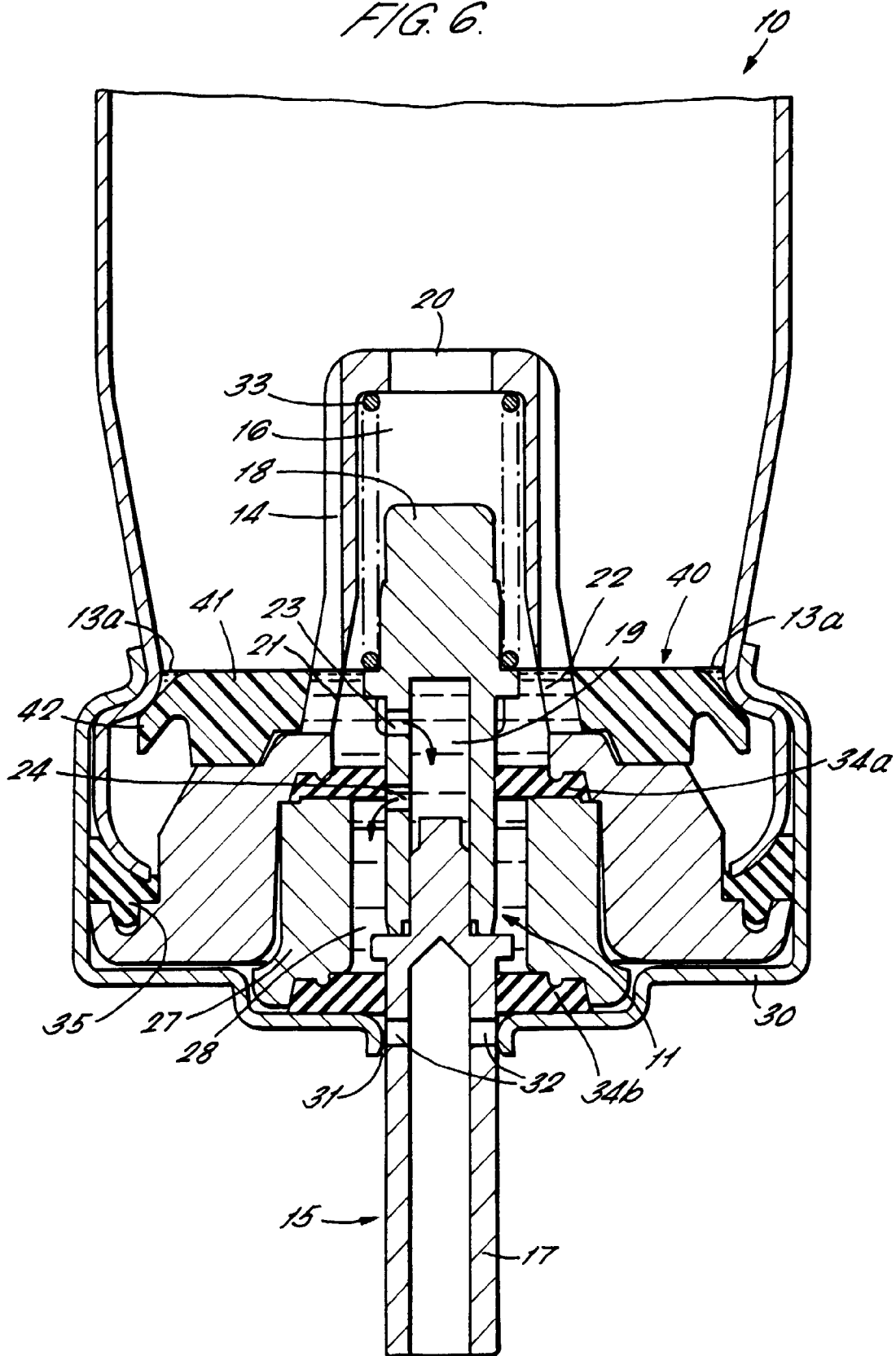


FIG. 7.

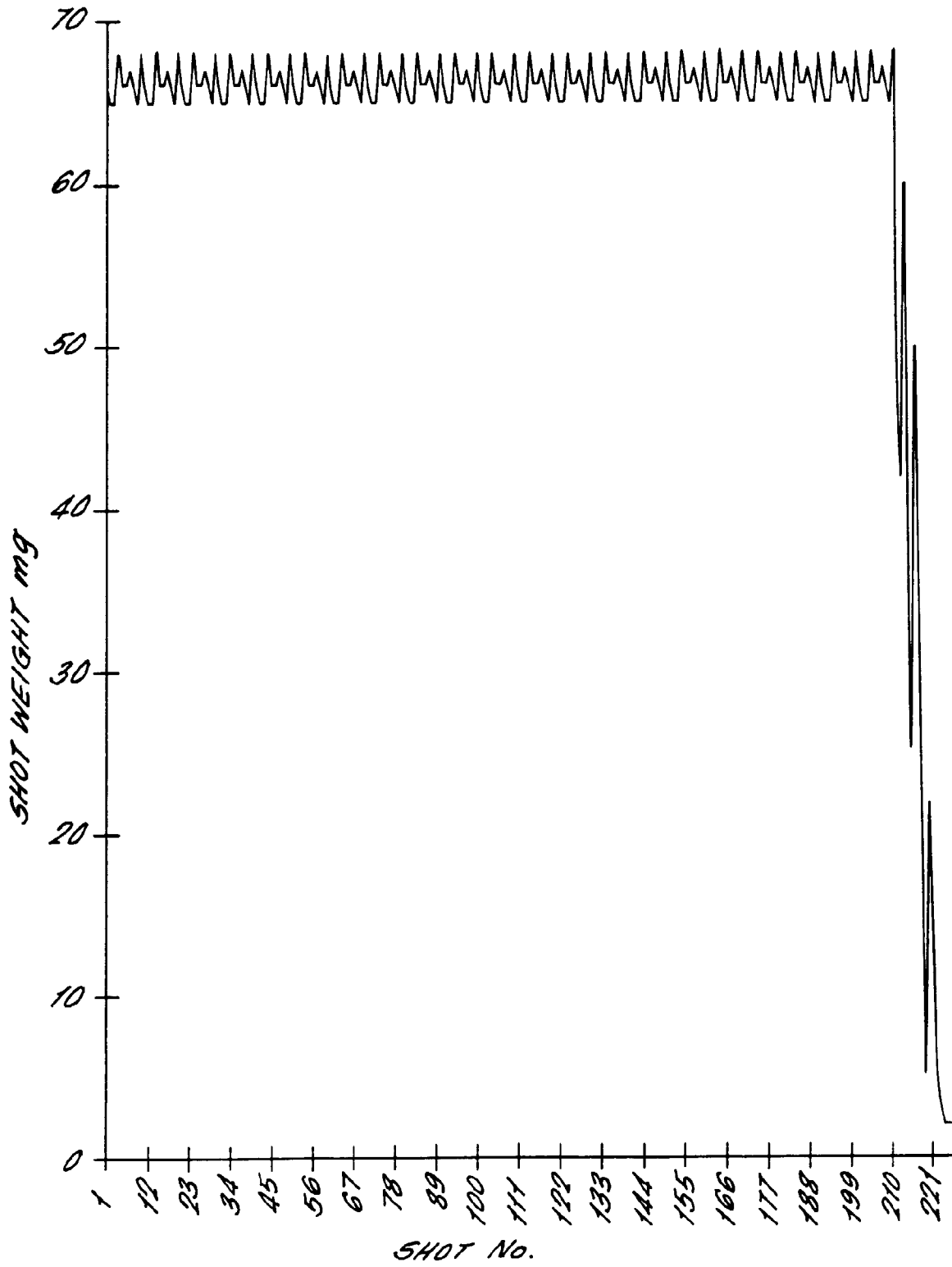
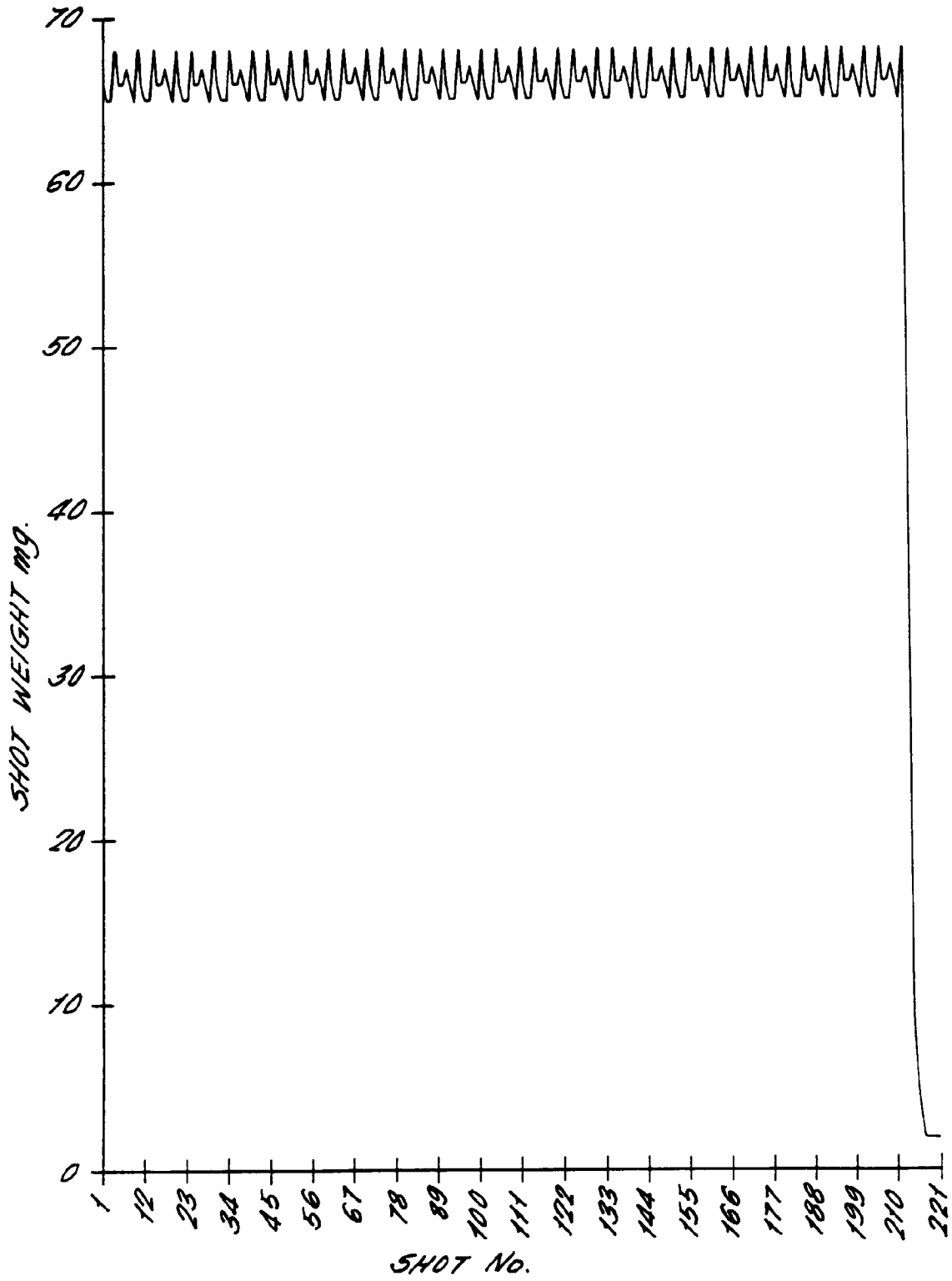


FIG. 8.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 8185

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR 2 615 124 A (VALOIS) 18 November 1988 * page 4, line 16 - line 25; figure * ---	1-5	B65D83/14
A	US 5 037 012 A (LANGFORD ALAN K) 6 August 1991 * column 1, line 66 - column 2, line 5; figures * ---	1-5	
A	EP 0 326 122 A (BOEHRINGER INGELHEIM KG ;BOEHRINGER INGELHEIM INT (DE)) 2 August 1989 * column 2, line 13 - column 3, line 7; figures * ---	1-5	
A	WO 95 03985 A (MINNESOTA MINING & MFG) 9 February 1995 * page 6, line 6 - line 12; figure 1 * -----	1-5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65D
Place of search	Date of completion of the search	Examiner	
BERLIN	24 January 1997	Olsson, B	
CATEGORY OF CITED DOCUMENTS		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	
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