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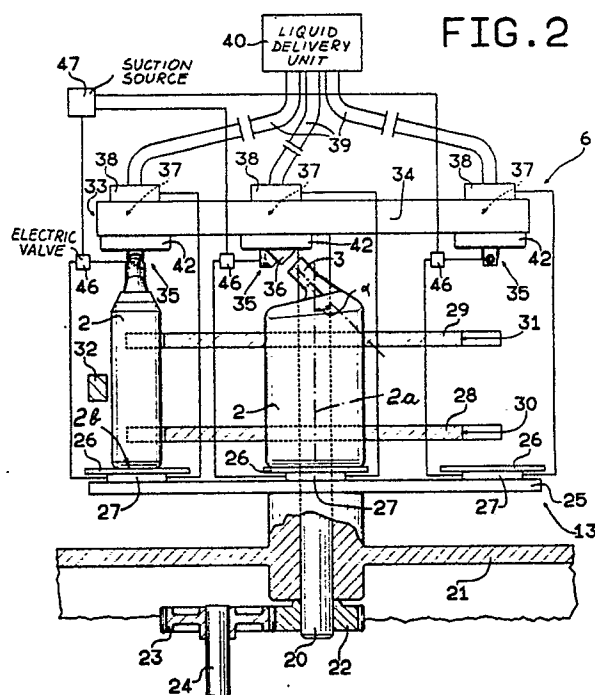
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54 **Apparatus for filling containers.**

57 Apparatus (1) for filling containers (2) which have a mouth (3) inclined with respect to the vertical axis, comprising conveyor means (6) for conveying the containers (2) in succession to a filling station (48), delivery ducts (36) for introducing liquid into the mouth (3) of the containers (2), and a unit (40) for delivering liquid to the delivery ducts (36); the delivery duct (36) is inclined with respect to the vertical axis by an angle which is substantially equal to the angle of inclination of the mouths (3) of the containers (2). A suction element (45) is arranged proximate to the outlet of the duct (36) in order to remove any drops of liquid which have remained on the outlet of the delivery duct (36).



APPARATUS FOR FILLING CONTAINERS

The present invention relates to an apparatus for filling containers.

In particular, the present invention relates to an apparatus for filling containers, such as bottles, phials and the like, the neck whereof is inclined with respect to the longitudinal axis of said containers.

According to the prior art, containers of the described kind are usually filled with liquid by means of appropriate filling machines which receive the vertically arranged containers, incline them to bring the axis of their mouths in vertical position, fill them by pouring liquid by means of nozzles which deliver the liquid along a vertical direction, and then straighten them again before passing them to further processing lines.

Filling machines of this kind naturally have considerable complications due to the above mentioned need to incline said containers. Said inclination is in fact obtained by means of cam and lever mechanisms which considerably increase the cost of said machines.

The aim of the present invention is to provide a container filling apparatus of the described kind which is extremely simple and scarcely expensive and does not have the disadvantage described with reference to the prior art.

This aim is achieved by an apparatus for filling containers, as defined in the appended claims.

The present invention is now described merely by way of non-limitative example with reference to the accompanying drawings, wherein:

figure 1 is a schematic plan view, with some parts removed for the sake of clarity, of a portion of a filling machine which includes a container filling apparatus according to the present invention;

figure 2 is a schematic and partially sectional elevation view of a detail of the apparatus of figure 1; and

figure 3 is a partially sectional and enlarged-scale view of a detail of figure 2.

With reference to figures 1 and 2, the reference numeral 1 generally indicates an apparatus for transferring containers 2 which have a mouth 3 which is inclined by a preset angle α with respect to the vertical axis 2a extending perpendicular to the resting base 2b of the containers (figure 2); said apparatus is a part of a filling machine which is only partially illustrated and is generally indicated by the reference numeral 4.

Said transfer apparatus 1 comprises an advancement line which is defined by a rotary conveyor 5 which can transfer containers 2, which are fed thereto in a known manner (not illustrated), along a circular path and can pass them to a rotary

filling conveyor 6 which is adapted to fill said containers 2 and send them toward a rotary conveyor 7 which is in turn adapted to pass the filled containers 2 in succession to a known closure unit 8 which comprises a rotary conveyor 9.

Said rotary conveyor 5 essentially comprises a drum 10 with a vertical axis which rotates counter-clockwise (with reference to figure 1) and is provided, along its periphery, with a plurality of recesses 11 which are equally spaced from one another and are intended to accommodate each a respective empty container 2. A curved fixed guide 12 is arranged adjacent to a portion of the periphery of the drum 10 and has the purpose of keeping the containers 2 inside the recesses 11 while they are transported by the conveyor 5.

The filling conveyor 6 comprises a substantially cylindrical conveyor head 13 which rotates in the opposite direction with respect to the conveyor 5 and is substantially tangent thereto. The conveyor 6 will be described in greater detail hereinafter.

The rotary conveyor 7 essentially comprises a drum 14 with a vertical axis which rotates counter-clockwise (with reference to figure 1) and is provided, along its periphery, with a plurality of recesses 15 which are equally spaced from one another and are intended to accommodate each a respective full container 2. The periphery of the drum 14 is flanked by a curved fixed guide 16 which has the purpose of keeping the containers 2 inside the recesses 15 while they are transferred by the conveyor 7.

The rotating conveyor 9 of the closure unit 8 essentially comprises a drum 17 with a vertical axis which rotates clockwise (with reference to figure 1) and is provided, along its periphery, with a plurality of recesses 18 which are equally spaced from one another and are intended to accommodate each a respective container 2 filled by the filling conveyor 6. The periphery of the drum 17 is flanked by a curved fixed guide 19 which has the purpose of keeping the containers 2 inside the recesses 18 while they are transferred by the conveyor 9. When they reach the recesses 18, the containers 2 are already filled with liquid by the filling conveyor 6, and during their permanence within the recesses 18 they are closed in a known manner which is not illustrated.

As visible in particular in figure 2, the filling conveyor 6 comprises a vertical shaft 20 which is rotatably supported by the base 21 of the apparatus 1; a toothed wheel 22 is keyed below said shaft 20 and meshes with a toothed wheel 23 which is keyed onto a vertical shaft 24 which is connected, in a manner which is not illustrated, to a source of

rotary motion. A disk 25 is keyed to the shaft 20 above the base 21 and is upwardly provided with a plurality of plates 26 which are equally spaced from one another and are connected to the disk 25 by means of weighing elements 27 of a known type which are constituted, for example, by loading cells.

Two horizontal disks 28 and 29 are keyed onto the shaft 20 above the disk 25 and are vertically aligned to each other. Said disks 28 and 29 are provided, along their own periphery, with an equal number of respective recesses 30 and 31 which are equally spaced from one another and are vertically aligned in pairs to one another and to said plates 26, so as to define accommodations for the containers 2 which arrive from the recesses 11 of the rotary conveyor 10. Advantageously, the recesses 30 and 31 are counter-shaped to the containers 2 so as to ensure perfect and reliable angular positioning of the containers on the plates 26.

A fixed guide 32 extends adjacent to the filling conveyor 6 along a portion thereof which is comprised between the regions at which said conveyor is substantially tangent to the rotary conveyors 5 and 7; the fixed guide 32 having the purpose of keeping the containers 2 within the accommodations defined by the recesses 30 and 31.

Above the disks 28 and 29, the shaft 20 supports a filling apparatus 33 which comprises a disk 34 on the periphery of which delivery devices 35 are fixed; the number of said delivery devices is equal to that of the recesses 30 and 31 of each disk 28, 29; said devices 35 are equally spaced from one another and are arranged substantially overlying the mouths 3 of the containers 2 which are supported by the plates 26. Each delivery device 35 essentially comprises (see also figure 3) a spout or delivery duct 36 which protrudes from the lower surface of the disk 34 and is connected, through a hole 37 provided in said disk 34, with a respective electric valve 38 which is fixed to the upper surface of said disk 34. Each electric valve 38 is connected in a known manner, through connecting means schematically indicated by ducts 39, to a unit 40 for delivering liquid intended to fill the containers 2 which is supported and rotated by the conveyor 6 in a manner which is not illustrated.

According to figure 3, each delivery element 35 comprises a disk-like element 41 which is centrally perforated and is kept adjacent, by a threaded ring 42 and with the interposition of a sealing element 43 (constituted for example by an O-ring), to a cylindrical raised portion 44 which is rigidly associated with the lower surface of the disk 34 at the outlet of said hole 37. The hole 37 of the cylindrical raised portion 44 is connected to said electric valve 38.

The delivery spout 36 is connected to the disk-

like element 41 at its central hole and comprises a tubular element which protrudes downward from said disk-like element 41 and is inclined with respect to the vertical axis 50 by an angle β which is substantially equal to the angle of inclination α of the mouths 3 of the containers 2 with respect to the vertical axis 2a. Said delivery spout 36 is substantially coaxial to the mouths 3 of the containers 2.

Each delivery spout 36 supports, with a portion of its outer lateral surface which is directed downward, a drop removal means including a suction element 45 which comprises a small block adjacent to the delivery outlet of said delivery spout 36 and has an open portion directed toward said delivery outlet. The suction element is connected, through an activation means comprising an electric valve 46 which is controlled by the respective weighing element 27, to a suction or vacuum source schematically indicated by a block 47 in figure 2.

In use, the containers 2 are transferred in a known manner into the recesses 11 of the rotary conveyor 5 and are conveyed in succession onto the plates 26 of the filling conveyor 6. The containers 2 are all arranged in an equal and precise manner on the plates 26 by virtue of known alignment means which are arranged ahead of the conveyor 6 and are not illustrated since they do not relate to the present invention. In order to ensure the correct entry of the liquid into the containers 2, the recesses 30 and 31 define a precise angular position of the containers 2 on the plates 26 so that the delivery spouts 36 and the inclined mouths 3 of the containers 2 to be filled are substantially coaxial. The containers 2 are thus filled with liquid in succession by the overlying delivery spouts 36, at a filling station indicated at 48, by virtue of the coupling which is performed in a known manner by the electric valves 38 between said spouts 36 and said liquid delivery unit 40.

By virtue of the described inclination of the spouts 36 with respect to the vertical axis, the liquid flows out of said spouts 36 along a direction which is parallel to the direction of the mouths 3 of the containers 2 and enters said containers 2 correctly without requiring, as occurred in known filling devices, the inclination of the containers 2 so as to vertically arrange the axis of their mouth 3. When the desired amount of liquid has been poured into a container 2, the respective weighing element 27 controls the electric valve associated therewith in a known manner in order to cutoff the connection between the delivery spout 36 and the delivery unit 40. The weighing element 27 simultaneously activates the respective electric valve 46 and connects the block 45, which is associated with the spout 36 which has just delivered the liquid, to the suction source 47 for a preset time. In this manner

the block 45 removes any drops of liquid present on the lower end of the delivery spout 36 and prevents their fall, which would dirty the filling conveyor 6.

The containers 2 are then passed to the rotary conveyor 7, which sends them to the closing unit 8 which closes them in a known manner and sends them to further processing stations which are not illustrated.

The described apparatus is naturally susceptible to numerous variations without thereby abandoning the scope of the present invention.

The suction through said blocks 45 might for example be exerted continuously.

As an alternative, said electric valve 46 may keep each suction element 45 connected to the suction source 47 for all the time during which the respective bottle 2 remains on the filling conveyor 6.

The suction elements 45 may furthermore be replaced with any drop-removing means, for example constituted by a collection element (not illustrated) which is capable of collecting the drops which fall by gravity from the free ends of the spouts 36 after filling the containers 2.

From what has been described it is evident that the described configuration of the delivery beaks 36 allows easy filling of containers 2 having a mouth 3 which is inclined with respect to the vertical axis without having to resort to the complicated solution described with reference to the prior art.

The presence of said suction elements 45 associated with the delivery nozzles 36 furthermore allows the filling conveyor 6 to operate without dirtying the apparatus 1.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. An apparatus (1) for filling containers (2) having a mouth (3) which is inclined with respect to the vertical axis, comprising conveyor means (6) for sending said containers (2) in succession to a filling station (48), delivery means (36) for feeding liquid into the mouth (3) of said containers (2), and a unit (40) for delivering said liquid to said delivery means (36), characterized in that said delivery means comprise at least one delivery duct (36) having an outlet which is inclined with respect to

the vertical axis by an angle which is substantially equal to the angle of inclination of said mouths (3) of said containers (2), drop removal means (45) being provided proximate to said outlet of said delivery duct (36) in order to remove any drops remained at the outlet of said delivery duct (36) after each container filling operation.

2. An apparatus according to claim 1, characterized in that said drop removal means comprise a suction element (45) which is arranged proximate to said outlet of said delivery duct (36).

3. An apparatus according to claim 2, characterized in that it comprises activation means (46) for operatively connecting said suction element (45) to a suction source (47) after each filling operation.

4. An apparatus according to claims 1 and 2, characterized in that it comprises activation means (46) for operatively connecting said suction element (45) to a suction source (47) as long as each container (2) remains on said conveyor means (6).

5. An apparatus according to claim 2, characterized in that said suction element (45) is directly connected to a suction source (47).

6. An apparatus according to any of the preceding claims, characterized in that said conveyor means (6) comprises container positioning means (30,31) for positioning said containers (2) with respect to said delivery duct so that the mouth (3) of the container being transported on said conveyor means is substantially coaxial to said outlet of said delivery duct (36).

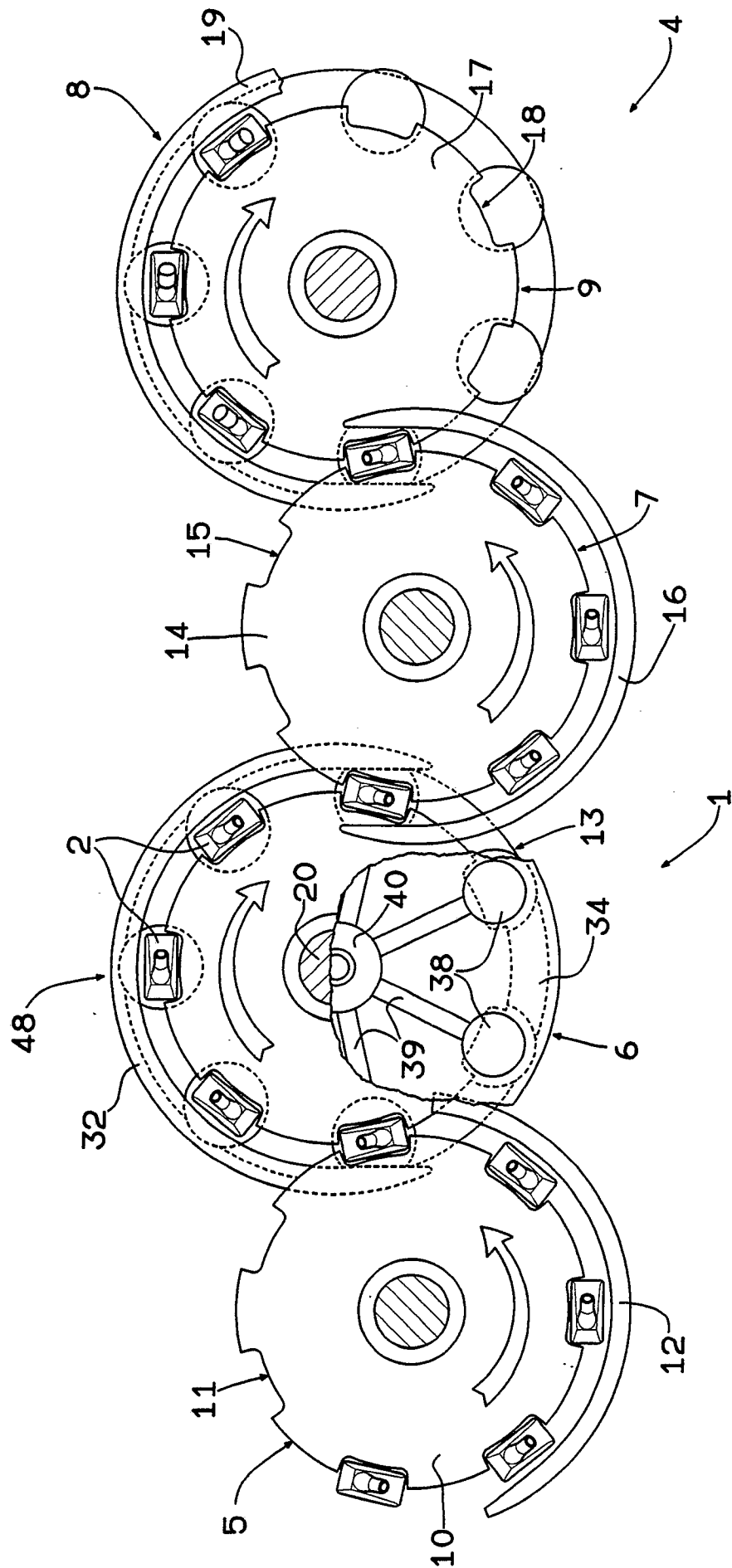


FIG. 1

FIG. 2

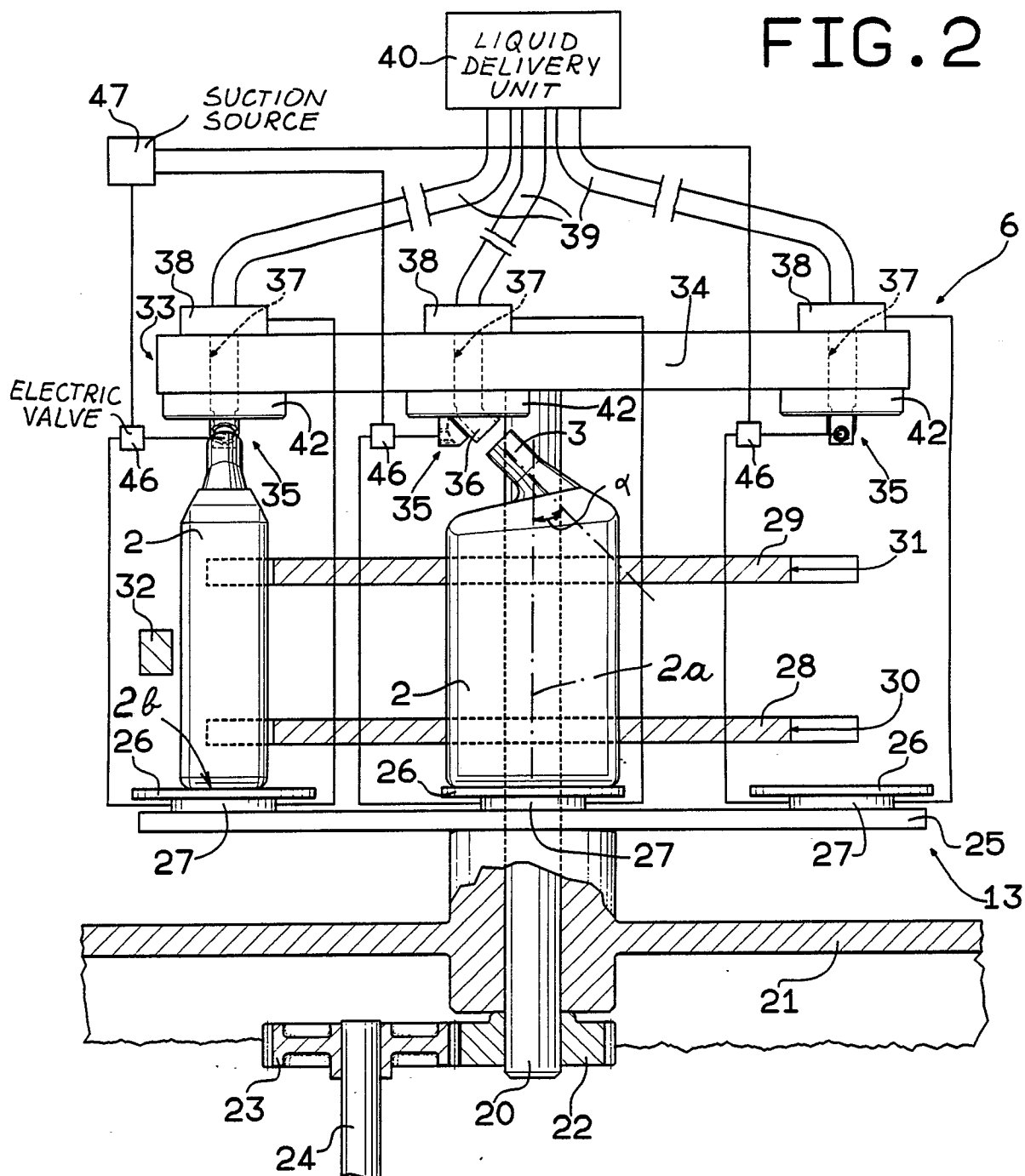
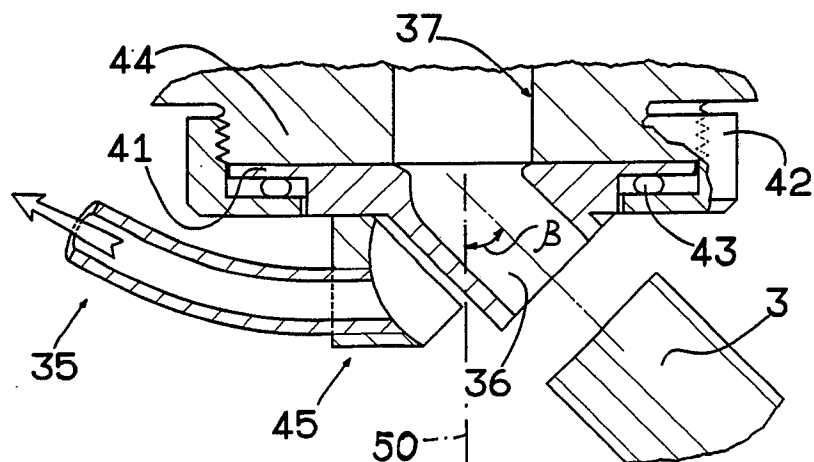


FIG. 3





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.5)
Y	DE-U-8 704 446 (ADRIANS) * Page 6, paragraph 2; fig. * ---	1-3,6	B 65 B 39/00
Y	DE-A-2 363 584 (RAUSING) * Page 8, line 1 - page 9, line 21; figures 4A-5 * ---	1-3,6	
Y	US-A-4 506 489 (SCHIESER) * Column 5, line 26 - column 6, line 41; figures 3,4 * -----	6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07-03-1990	Examiner CLAEYS H.C.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : 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			