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(54) Fluid injector

(57) A fluid injector is provided for filling a fluid into a container (30) and includes a filling pipe (10) having an upper portion (11) located outside of a top portion (33) of the container and a lower portion (16) disposed in a chamber (302) of the container. A first and a second cavity (110,160) are defined in a periphery of the upper and the lower portions (11,16), respectively, of the filling pipe. A discharge tube (20) has a lower portion (21) disposed in the filling pipe (10) and extending through the second cavity (160), and an upper portion (22) extending outwards of the upper portion (11) of the filling pipe through the first cavity (110). An opening (210) is defined in a distal end of the lower portion (21) of the discharge tube (20) and communicates with the chamber.

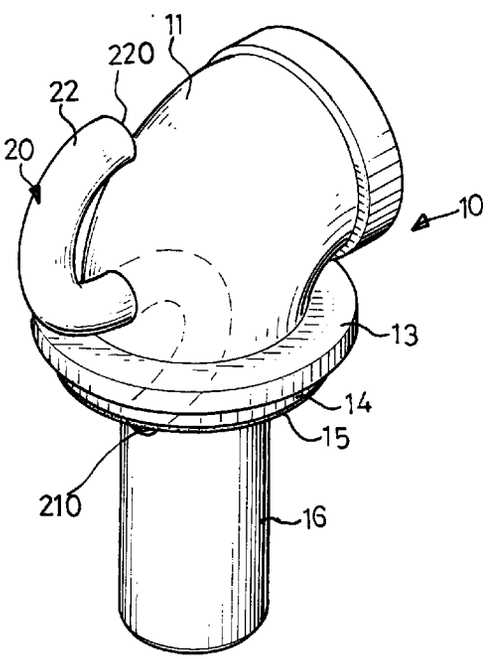

FIG. 1

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Description

The present invention relates to a fluid injector.

A conventional fluid injector is shown in Fig. 5, however, there still remain shortcomings therein.

In accordance with one aspect of the present invention, there is provided a fluid injector for filling a fluid into a container which has a chamber defined therein and an insertion socket defined in a top portion thereof.

The fluid injector comprises a filling pipe mounted on the container and includes an upper portion located outside of the top portion of the container and a lower portion disposed in the chamber. A first cavity is defined in a periphery of the upper portion of the filling pipe, and a second cavity is defined in a periphery of the lower portion of the filling pipe.

A discharge tube includes a lower portion disposed in the filling pipe and extending through the second cavity, and an upper portion extending outwards of the upper portion of the filling pipe via the first cavity to surroundings. An opening is defined in a distal end of the lower portion of the discharge tube and communicates with the chamber.

In the drawings:

Fig. 1 is a perspective view of a fluid injector in accordance with the present invention;

Fig. 2 is a front plan cross-sectional view of Fig. 1;

Fig. 3 is a front plan cross-sectional view showing the fluid injector being assembled with a container and a control valve;

Fig. 4 is a perspective view of a fluid injector in accordance with one embodiment of the present invention; and

Fig. 5 is a front plan partially cross-sectional view of a conventional fluid injector in accordance with the prior art.

For a better understanding of the present invention, reference is made to Fig. 5, illustrating a conventional fluid injector in accordance with the prior art.

The conventional fluid injector includes a cap 60 detachably mounted on a top portion 53 of a container 50. A filling tube 61 mounted on the cap 60 is engaged on an inlet hole 51 defined in the top portion 53 of the container 50 for filling fluid such as oil and the like from an oil tank (not shown) into the container 50.

A drainage tube 62 mounted on the cap 60 is engaged on an outlet hole 52 defined in the top portion 53 of the container 50 for transferring an oil/gas mixture produced during the filling process from the container 50 into the oil tank. The oil/gas mixture can then be separated into oil and gas and the recovered oil can be conveyed into the oil tank for reuse.

By such an arrangement, however, containers 50 of different sizes have top portions 53 of different dimensions such that a span defined between the inlet hole 51 and the outlet hole 52 is not identical for containers 50 of different sizes and such that it is necessary to prepare caps 60 of different dimensions so as to suit for containers 50 of different sizes.

Referring to the remaining drawings, and initially to Figs. 1-3, a fluid injector in accordance with the present invention is provided for filling a fluid such as oil, petroleum, gasoline and the like into a container 30.

The container has a chamber 302 defined therein, a cylindrical lug 32 protruding upwardly from a top portion 33 thereof, and an insertion socket 31 defined in the cylindrical lug 32 and communicating with the chamber 302.

The fluid injector comprises a filling pipe 10 mounted on the container 30 and including an upper portion or upper bent tube 11 located outside of the top portion 33 of the container 30 and a lower portion or lower upright tube 16 disposed in the chamber 302 of the container 30 through the insertion socket 31.

A first and a second cavity 110 and 160 are defined in a periphery of the upper and the lower portion 11 of the filling pipe 10 respectively.

The upper portion 11 of the filling pipe 10 includes an annular flange 13 extending radially and outwardly. A magnetic ring 14 is fixedly mounted on an underside of the flange 13 and abuts on the cylindrical lug 32. The magnetic ring 14 has an outer diameter smaller than that of the annular flange 13 and greater than that of the cylindrical lug 32.

A sealing gasket 15 is mounted between the magnetic ring 14 and the cylindrical lug 32.

A discharge tube 20 is mounted on the filling pipe 10 and includes a lower portion 21 disposed in the filling pipe 10 and extending through the second cavity 160, and an upper portion 22 extending outwards of the upper portion 11 of the filling pipe 10 and through the first cavity 110 to surroundings to be engaged in a drainage tube 46.

An inlet opening 210 is defined in a distal end of the lower portion 21 of the discharge tube 20 and communicates with the chamber 210. An outlet opening 220 is defined in a distal end of the upper portion 22 of the discharge tube 20 and communicating with the drainage tube 46.

In assembly, the upper bent tube 11 of the filling pipe 10 has an inner threaded portion 12 threadedly engaged on an outer threaded portion 41 of a bidirectional connector 40 coupled with a control valve 42 coupled with a first quick connector 43 which is engaged on a second quick connector 45 of a supply tube 44 connected with an oil reservoir (not shown).

In operation, when an operator intends to fill oil into the container 30 front the oil reservoir, the lower tube 16 of the filling pipe 10 can be inserted into the chamber 302 via the insertion socket 31, with the magnetic ring 14 abutting on the cylindrical lug 32.

The operator can then operate the control valve 42, thereby allowing oil to be injected into the container 30 from the oil reservoir until oil in the container 30 reaches

a predetermined position.

At the same time, an oil/gas mixture produced in the container 30 during the filling process can be transferred through the inlet opening 210 into the discharge tube 20 and the drainage tube 46 and can then be delivered into the oil reservoir. Finally, the oil/gas mixture can be separated into gas and oil respectively for reuse.

By such an arrangement, the oil/gas mixture can be directly returned into the oil reservoir via the discharge tube 20, without a possibility of leaking into surroundings.

In addition, the discharge tube 20 can serve as an overflow tube such that when oil in the container 30 exceeds a level of the top portion 33, the overflow oil can also be directly returned into the oil reservoir via the discharge tube 20, thereby preventing the oil from overflowing into surroundings.

Referring to Fig. 4, the upper portion 22 of the discharge tube 20 can be disposed in a horizontal manner such that the drainage tube 46 connected with the discharge tube 20 can by-pass the control valve 42.

Claims

1. A fluid injector for filling a fluid into a container (30) having a chamber (302) defined therein and an insertion socket (31) defined in a top portion (33) thereof and communicating with said chamber (302), **characterized in that** said fluid injector comprising:

   a filling pipe (10) mounted on said container (30) and including an upper portion (11) located outside of the top portion (33) of said container (30) and a lower portion (16) disposed in said chamber (302) of said container (30) through said insertion socket (31), a first cavity (110) defined in a periphery of the upper portion (11) of said filling pipe (10), and a second cavity (160) defined in a periphery of the lower portion (16) of said filling pipe (10); and
   a discharge tube (20) mounted on said filling pipe (10) and including a lower portion (21) disposed in said filling pipe (10) and extending through said second cavity (160), and an upper portion (22) extending outwards of the upper portion (11) of said filling pipe (10) through said first cavity (110) to surroundings, an opening (210) defined in a distal end of the lower portion (21) of said discharge tube (20) and communicating with said chamber (210).

2. The fluid injector in accordance with claim 1, **characterized in that** said container (30) has a lug (32) formed on and protruding upwardly from the top portion (33) thereof, said insertion socket (31) being defined in said lug (32), the upper portion (11) of said filling pipe (10) has a flange (13) extending outwardly therefrom, and a magnetic ring (14) fixedly mounted on an underside of said flange (13) and abutting on said lug (32).

3. The fluid injector in accordance with claim 2, **characterized in that** a sealing gasket (15) is mounted between said magnetic ring (14) and said lug (32).

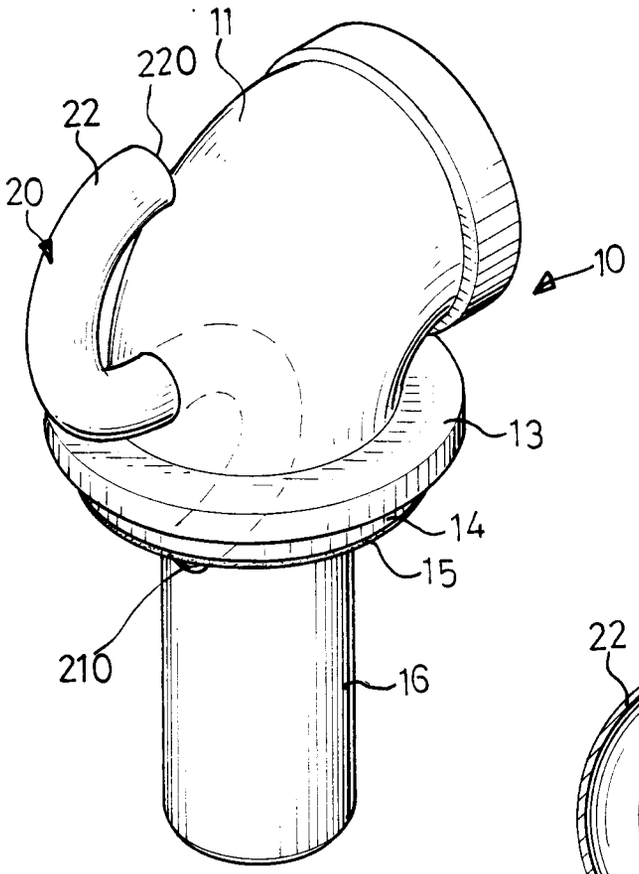
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FIG. 1

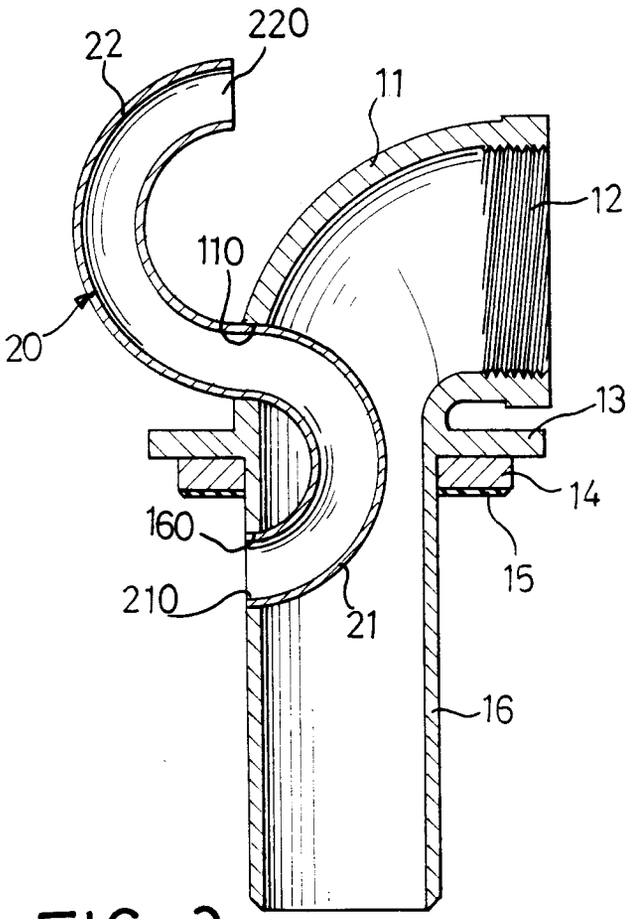
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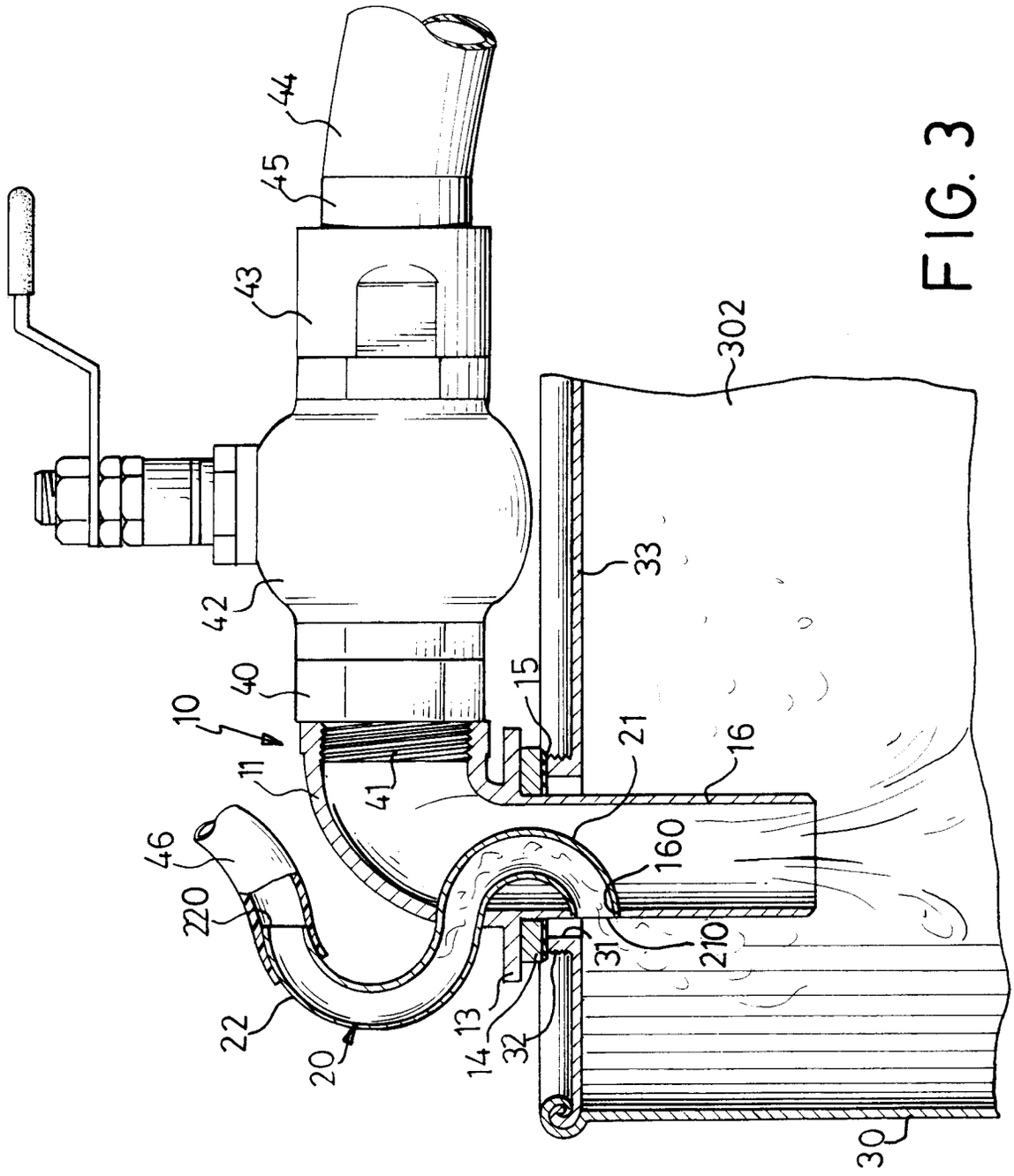
FIG. 2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41
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302
30

FIG. 3

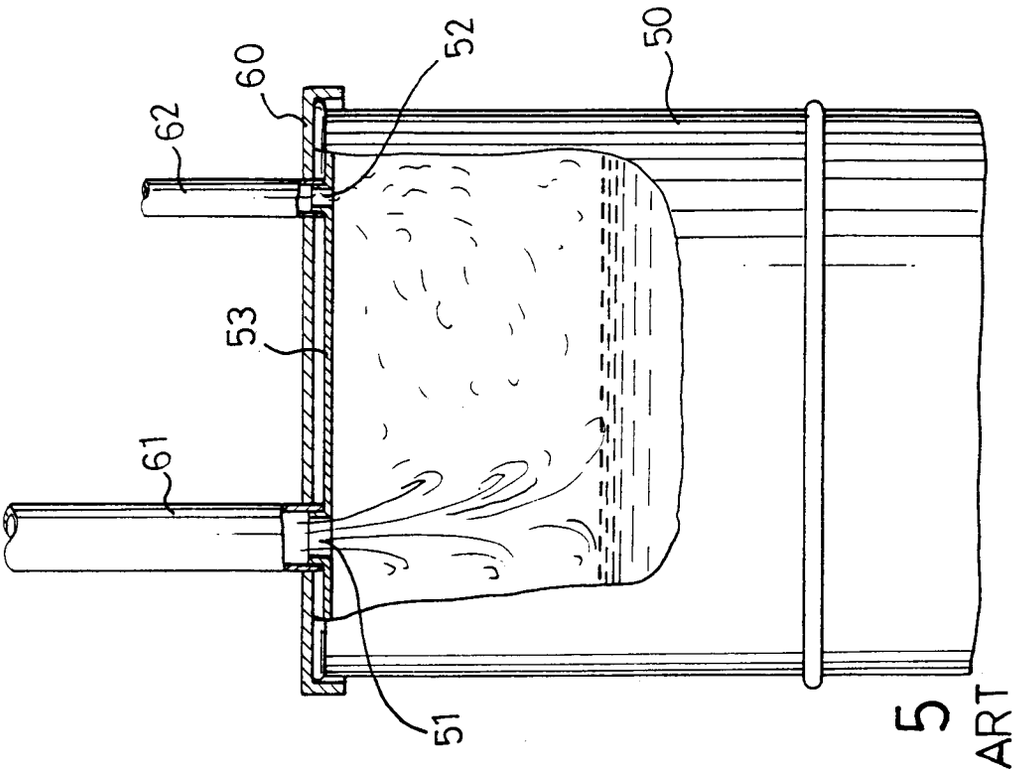

FIG. 5
PRIOR ART

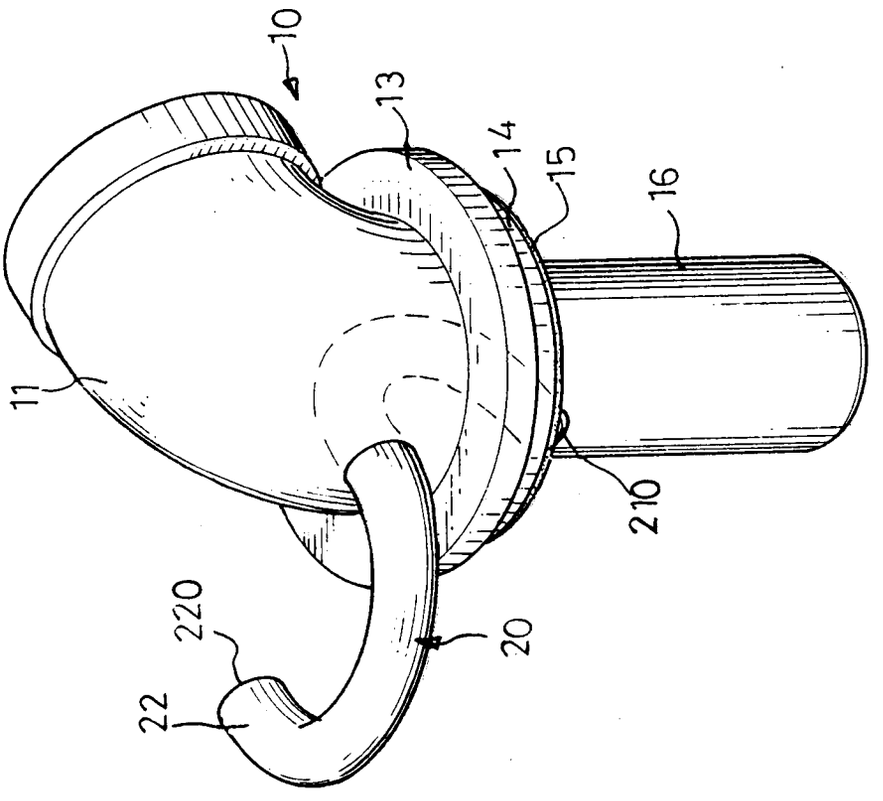

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 8713

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 Y	US 3 105 527 A (MAYEUX) 1 October 1963 * figure 1 *	1 2,3	B67D5/378 B67D5/01
Y	GB 1 501 517 A (ATLANTIC RICHFIELD CO) 15 February 1978 * page 4, line 90 - line 97; figure 3 *	2,3	
X Y	GB 24 348 A (CARL BORG FABRIK) 26 June 1913 * figures 2,3 *	1 2	
Y	DE 38 14 962 A (GRIEGEL KATHARINA) 16 November 1989 * column 2, line 9; figure 1 *	2	
X	FR 2 230 582 A (MITSUBISHI HEAVY IND LTD) 20 December 1974 * figure 15 *	1	
X	GB 1 118 921 A (HURST ET AL.) 3 July 1968 * figure 2 *	1	
A	GB 267 368 A (LEES) 7 April 1927 * figures 1,2 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B67D
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 April 1997	Martínez Navarro, A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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