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FLUID INJECTOR

The present invention relates to a fluid injector.

A conventional fluid injector is shown in Fig. 5, however, there still remain shortcomings therein. There will be a complete illustration in the detailed description of the preferred embodiments, concerning the conventional fluid injector.

The present invention has arisen to mitigate and/or obviate disadvantages of the conventional fluid injector.

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 and communicating with the chamber.

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 of the container through the insertion socket. 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 is mounted on the filling pipe and 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 through the first cavity to surroundings. An opening is defined in a distal end of the lower portion of the

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discharge tube and communicates with the chamber.

Further features of the present invention will become apparent from a careful reading of the detailed description provided hereinbelow, with appropriate reference to the accompanying drawings.

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 back 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 often 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, thereby greatly increasing the cost in manufacturing.

In addition, the distance between the inlet hole 51 and the outlet hole 52 may not be identical even for a container 50 of the same size due to an error in production such that the filling tube 61 and the drainage tube 62 cannot exactly align with the inlet hole 51 and the outlet hole 52 respectively, thereby easily causing a difficulty of installation.

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 formed on and 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 for providing a sealing effect.

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 which is coupled with a control valve 42 which is 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 from the oil reservoir, the lower tube 16 of the filling pipe 10 can be inserted into the chamber 302 of the container 30 via the insertion socket 31, with the magnetic ring 14 securely 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 via the lower tube 16 and the supply tube 44 until oil in the container 30 reaches a full level or a predetermined position.

At the same time, an oil/gas mixture produced in the container 30 during the filling process is transferred through the inlet opening 210 of the discharge tube 20 into the drainage tube 46 via the outlet opening 220 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.

It should be clear to those skilled in the art that further embodiments of the present invention may be made without departing from the scope and spirit of the present invention.



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), 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, wherein the upper portion (22) of said discharge tube (20) has an opening (220) defined in a distal end thereof.

3. The fluid injector in accordance with claim 1, wherein the upper portion (11) of said filling pipe (10) is



a bent tube and the lower portion (16) of said filling pipe (10) is an upright tube.

4. The fluid injector in accordance with claim 1, wherein 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).

5. The fluid injector in accordance with claim 4, further comprising a sealing gasket (15) mounted between said magnetic ring (14) and said lug (32).

6. The fluid injector in accordance with claim 4, wherein said magnetic ring (14) has an outer diameter smaller than that of said flange (13).

7. The fluid injector in accordance with claim 4, wherein said magnetic ring (14) has an outer diameter greater than that of said lug (32).