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DELIVERY OF LIQUIDS FROM CONTAINERS

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FIG. 1.

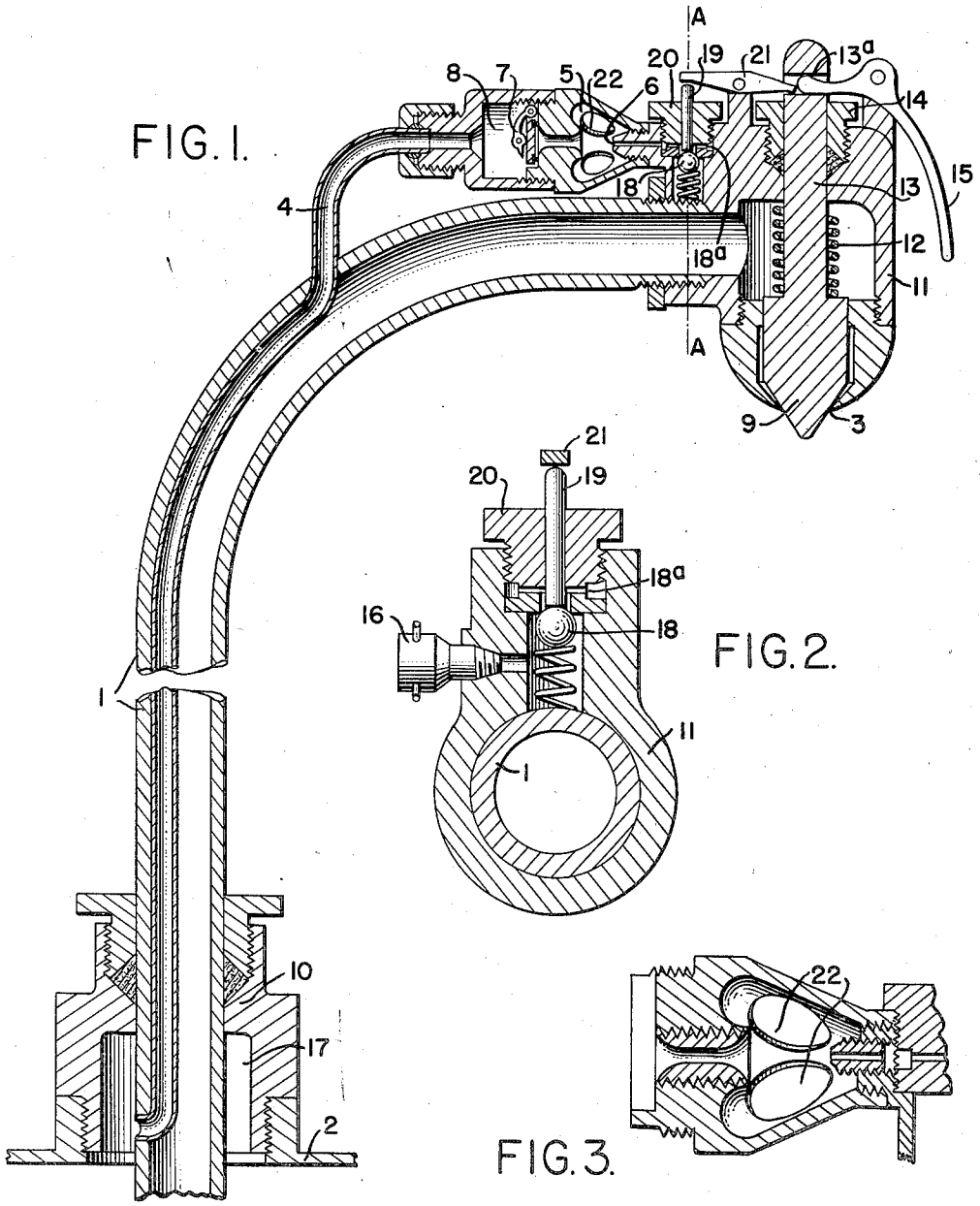


FIG. 2.

FIG. 3.

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DELIVERY OF LIQUIDS FROM CONTAINERS

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The invention relates to the delivery of liquids from containers, in connection with which, it is known to force air into containers for the purpose of causing liquid to flow or discharge therefrom.

The object of the invention, is to provide improvements whereby air under pressure may be utilized to cause liquid to be dispensed, or be discharged from containers in portions or quantities as desired, by means of apparatus adapted to be connected with a source of air pressure, and capable of being operated, so that each time a portion or quantity of liquid is required to be drawn therefrom, said portion or quantity is ejected from the container, either under the action of air pressure in the latter, or as the result of opening the container to the air pressure source, or by both, as may be desired or found necessary.

The improvements provided by the invention, reside in the use of a liquid discharge or flow pipe with a valve controlled liquid outlet therefrom, adapted to be inserted in a container, and to extend therefrom; an air transfer pipe or passage fitted with a nonreturn valve, and an air admission control valve, adapted for connection with a source of air under pressure to direct the latter into the container, and operating means common to the liquid outlet control valve and the air admission control valve, whereby said liquid outlet control valve is enabled to be opened, without opening the air admission control valve, and also whereby said control valves are enabled to be both opened at the same time.

The invention will however be more particularly described, with the aid of the accompanying drawing, in which

Figure 1 is a view in sectional elevation of apparatus embodying the improvements,

Figure 2 a cross sectional view on the line A—A, Figure 1, and

Figure 3 a detail view in sectional elevation, illustrating means for enabling the air pressure in the container to be varied as required.

In carrying out the invention, there is provided a liquid discharge or flow pipe 1 which is inserted in a closed liquid container 2 and extends to or near the bottom thereof, said pipe 1 having externally of the container 2 and above the highest available liquid level therein, a valve controlled outlet 3 for liquid to be discharged from the container 2.

Means for introducing air under accurately controlled pressure into the container 2, comprise an air transfer pipe or passage 4 leading to

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the interior of the container 2 above the highest liquid level obtainable therein from a chamber 5, to which air under pressure is admitted through a jet 6 and a Venturi arrangement, past a non-return valve 7, provided in a suitable position in the pipe or passage 4, to prevent the escape of air pressure from the container 2, other than what is utilised to discharge liquid therefrom.

The air transfer pipe 4 is open to atmosphere through ports 22 in the wall of the chamber 5 for the purpose of enabling air at atmospheric pressure to be drawn into pipe 4.

Although chamber 5 is always open to the atmosphere, provision is made in the arrangement for maintaining pressure in the container 2 by the positioning of the non-return valve 7 between the container 2 and the chamber 5 as set forth above.

The air transfer pipe or passage 4, the valve chamber 8, the jet 6, and the Venturi arrangement, can either be incorporated in or be combined with the discharge or flow pipe 1 and its fittings, or be formed in or be provided by fittings formed separately therefrom.

The air admission is automatic in operation, in that it is not actuated separately but operates with the fluid dispensing valve 9 when required, and admits a controlled charge of air pressure equal to, or less than, a predetermined maximum, which may be varied to give with a suitable co-acting Venturi arrangement an ultimate pressure in the container, which may be necessary to suit any condition.

In one form of apparatus suitable for enabling air under pressure to be utilised to dispense or cause liquid to be discharged from a container 2 in quantities as required, the liquid discharge or flow pipe 1 is passed through a stuffing box 10 or the like fitted in a container 2, so as to extend downwards to the required depth therein, and also so as to extend above the same to the height required.

The upper or external portion of the discharge or flow pipe 1 is curved and has fitted thereto a valve housing 11 which contains a downwardly discharging opening 3 controlled by a cone shaped or tapered valve 9 seating therein under the action of a spring 12 on the valve stem 13, and in compression between the valve body and the upper portion of the housing 11.

The stem 13 of the aforesaid cone shaped or tapered valve 9 extends through a gland 14 in the housing 11, and is engaged by a lever 15 pivoted on the latter, said lever being capable

of being operated by hand to raise the valve 9 against the action of its spring 12 and open the liquid discharge opening 3.

Preferably the upper end of the valve stem 13 is formed with an opening of a recess 13a therein to receive one end of the lever 15, which is so shaped and mounted that it need only be pressed against the fitting 11 to raise the valve 9.

The housing 11 on the liquid discharge or flow pipe 1 is also provided with a nipple 16 or other means, whereby a compressed air supply line is enabled to be connected thereto so that air under pressure can be passed through said housing 11, the jet 6, Venturi arrangement, and the valve chamber 8 containing the non-return valve 7 preferably of the hinged flap type, to the air transfer pipe 4, which leads through the liquid discharge or flow pipe 1 to a chamber 17 in the stuffing box 10, above the highest liquid level obtainable in the container 2.

The admission of air under pressure through the valve housing 11 aforesaid to the jet 6 is controlled by a spring pressed ball valve 18, which normally closes the air inlet from the nipple 16 to the jet 6 via air admission passages 18a in the gland 20, means for operating said ball valve 18 so as to open the passages 18a comprising a pin 19 operable through the gland 20 by a lever 21 on the housing 11, and actuated from and by the stem 13 of the cone shaped or tapered valve 9 aforesaid, as the result of the hand lever 15 on the housing 11 being pressed thereagainst.

The admission of air under pressure to a liquid container 2 through a chamber or fitting provided with a non-return valve 7, enables air under pressure to be retained in the container 2 and to be utilised as required, solely for the expulsion of liquid therefrom, without the necessity of providing for a continuous supply of air under pressure to the container.

Thus air under pressure can be passed into a container, until air pressure therein is built up to the head required, the liquid being dispensed or discharged from the container 2 in portions or quantities, as required, through the discharge or flow pipe 1, under the action of the stored pressure, merely upon opening the liquid outlet control valve 9, and without opening the air admission valve 18, provision being made for lost motion between the lever 21 which engages the pin 19 adapted to act on the air admission valve 18 and said pin 19 so that the liquid outlet control valve 9 can be opened without opening the air admission valve 18.

With the apparatus described, it is however, possible to admit air under controlled pressure to the container 2, each time a quantity of liquid is drawn off, thereby maintaining the air head in the container 2 constant, and not of a gradually diminishing quantity, operation of the hand lever 15 on the liquid discharge or flow pipe 1, first opening the liquid discharge valve 9, and after the lost motion before referred to has been overcome, also opening the air admission control valve 18, and admitting sufficient air under pressure to the container 2, to replenish, or compensate for, that used or lost in forcing the quantity or portion of liquid from the container 2, out through the discharge or flow pipe 1.

Provision is also made for enabling the air admission control valve 18 to be opened to admit air under pressure to the container 2, without opening the liquid outlet control valve 9, by providing for lost motion between the end of the lever 21 which engages the valve stem 13, and the latter, whereby said lever 21 may be operated to depress the pin 19, and open the valve 18 without imparting movement to the valve stem 13.

In order to enable the maximum air pressure acting in the container 2, to be altered to suit varying conditions which may be encountered, as for instance, should the air pressure obtainable from the source of supply not be suitable for the conditions encountered, or where liquids of varying weight and viscosity require to be dealt with, the jet 6 may be made removable (Figure 3) so as to be capable of being replaced by a further jet of different length, and or, containing a bore of different diameter, said jet acting in conjunction with a suitable co-acting Venturi arrangement also made removable, for replacement purposes, as required.

Dripping of liquid from the outlet 3 following the closing of same by the valve 9, is reduced to a minimum by forming the seating for said valve coincident with the point of exit of liquid from the discharge apparatus, or in other words, by providing the cut "off" of the liquid at said point of exit.

Further the valve 9 is made to decrease in diameter downwards either by being tapered or rounded, and so as to project below the point of exit of the liquid, when closed on its seating, for the purpose of causing liquid which may run down same, either after the valve has been closed on its seating, or when it has been opened slightly to deliver a small stream of liquid, to concentrate on the lower portion of the valve and leave same from a predetermined point or position thereon.

What we do claim and desire to obtain by Letters Patent of the United States of America is:

1. Means for use in the delivery of liquids from containers, comprising, a liquid discharge pipe adapted to be inserted in a container, and to extend therefrom; a valve controlled liquid outlet from said pipe; an air transfer pipe open to the atmosphere fitted with a non-return valve, said non-return valve being positioned between the container and the opening in said air transfer pipe to the atmosphere, an air admission control valve adapted for connection with a source of air under pressure to direct the latter into the container; and a pair of operating means capable of being separably operated common to the liquid outlet control valve and the air admission control valve, whereby said liquid outlet control valve is enabled to be opened, without opening the air admission control valve, and also whereby said control valves are enabled to be both operated at the same time.

2. Means for use in the delivery of liquids from containers, as claimed in claim 1, wherein the liquid outlet control valve is enabled to be opened in advance of the air admission control valve.

3. Means for use in the delivery of liquids from containers, as claimed in claim 1, wherein the air admission control valve is enabled to be opened without opening the liquid outlet control valve.

4. Means for the purpose set forth, as claimed in claim 1, wherein the liquid outlet control valve and the air admission control valve are adapted to be operated at the same time by means mounted for operation on the liquid discharge pipe.

5. Means for the purpose set forth, as claimed in claim 1, wherein the liquid outlet control valve is spring actuated to normally close said outlet,

and the air admission control valve is spring actuated to normally prevent the admission of air, means being provided between said valves whereby the liquid outlet control valve is adapted to be opened in advance of the air admission valve.

6. Means for the purpose set forth, as claimed in claim 1, wherein the means for opening the valves, comprise a hand lever pivoted on the liquid discharge pipe, adapted to engage the stem of the liquid outlet control valve, and a further lever pivoted on said pipe, adapted to engage said valve stem, and a pin which engages the air admission control valve, provision being made for lost motion between the lever adapted to engage said pin and the latter, and also for lost motion between said last mentioned lever and the stem of the liquid outlet control valve.

7. In means for use in the delivery of liquids from containers, as claimed in claim 1, liquid discharge apparatus, provided with a seating for a liquid cut-off valve, coincident with the point of exit of the liquid from said apparatus.

8. In means for use in the delivery of liquids from containers, liquid discharge apparatus as claimed in claim 7, wherein the liquid cut-off valve is formed to decrease in diameter downwards and projects below the point of exit, when closed on its seating.

9. Means for use in the delivery of liquids from containers, comprising, a liquid discharge pipe adapted to be inserted in a container, and to extend therefrom: an air transfer pipe fitted with a non-return valve, for directing air under pressure to said container; said air transfer pipe being open to the atmosphere, a valve housing

on the liquid discharge pipe; a valve controlled liquid outlet in said housing; means for connecting a source of air under pressure, with a valve chamber in said housing; an air admission control valve in said chamber; a jet and a Venturi arrangement between the latter and the air transfer pipe, the air openings in said air transfer pipe being between said non-return valve and said air admission valve, an operating lever on the housing adapted to engage the liquid outlet control valve: a further lever on said housing adapted to engage the liquid outlet control valve, and a pin which acts on the air admission control valve, with provision for lost motion between said pin and the lever adapted to engage same, and also between said last mentioned lever and the stem of the liquid outlet control valve.

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