

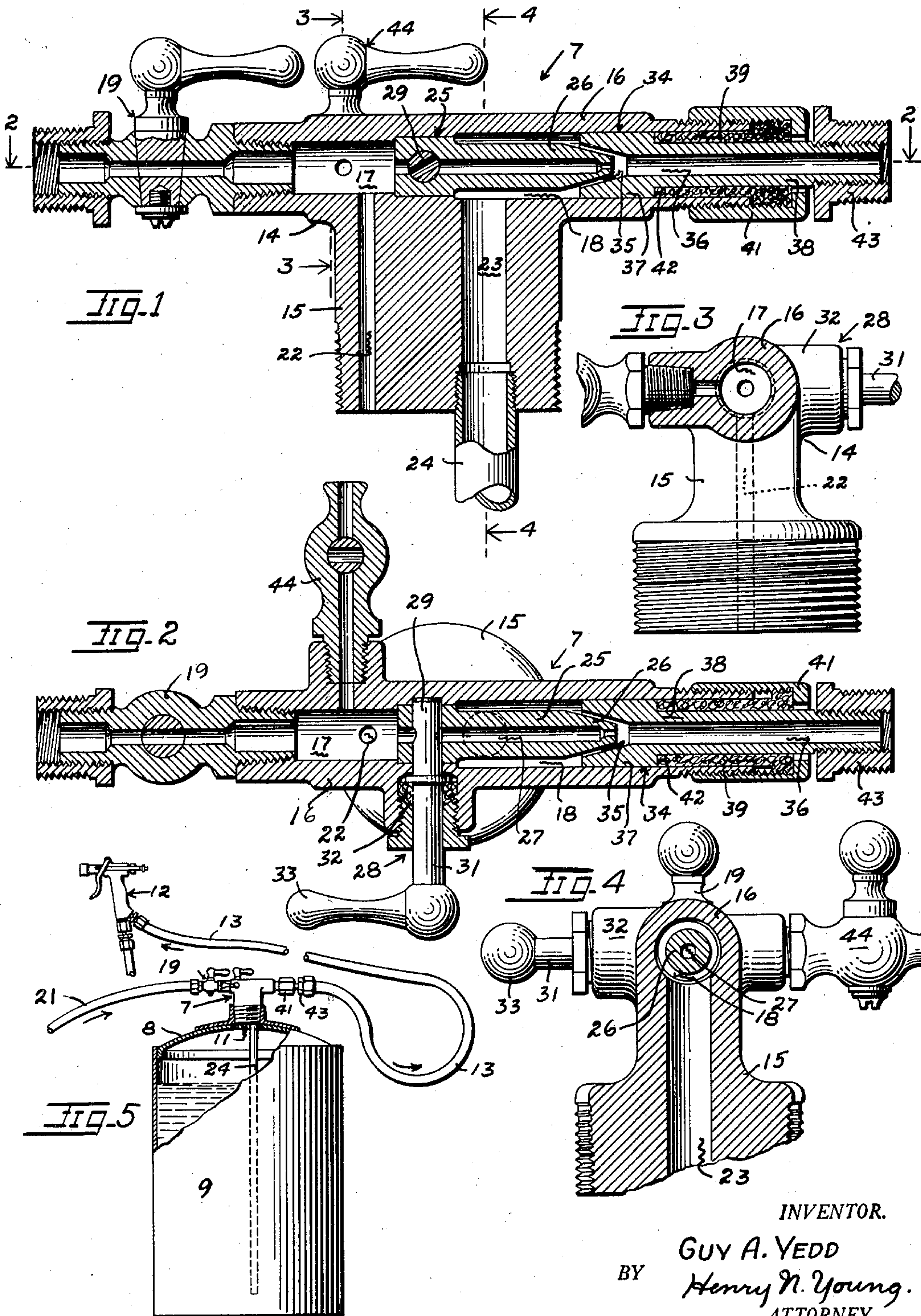
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LIQUID DISCHARGE DEVICE FOR CLOSED TANKS

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LIQUID DISCHARGE DEVICE FOR  
CLOSED TANKS

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2 Claims. (Cl. 261—78)

The invention relates to a device for effecting a delivery of liquid from a closed tank thereof and to a point remote from the tank through a flexible hose or other type of duct.

An object of the invention is to provide improved means effecting a pressure delivery of the liquid.

Another object is to effect a preliminary atomization and air-dilution of the liquid to increase its fluidity.

A further object is to provide a control element of the character described wherein the degree of dilution of the liquid may be adjustably varied.

An added object of the invention is to provide for the aforesaid ejection and dilution of the liquid through use of a unitary element for application as an attachment to a tank head.

The invention possesses other objects and features of advantage which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment of the invention which is illustrated in the accompanying drawing, in which,

Figure 1 is a vertical section through a liquid control device embodying the invention.

Figure 2 is a plan section of the device at 2—2 in Figure 1.

Figure 3 is a fragmentary section at 3—3 in Figure 1.

Figure 4 is a fragmentary section at 4—4 in Figure 1.

Figure 5 is a partially sectional elevation showing the device in operative association with a pressure tank of a paint spraying apparatus.

As particularly illustrated, the features of the present invention are incorporated in the structure of a control element or unit 7 mounted on the head 8 of a pressure tank 9. In the present instance the control unit 7 is shown as mounted in a flanged and threaded opening 11 of the tank head; it is to be understood however, that said unit might be provided as an integral portion of the tank head. The present control unit 7 has been particularly designed for use in discharging paint, or other relatively viscous liquids to a spray gun 12 through a pipe or flexible hose 13, the complete system being illustrated and described in detail in my copending application Ser. No. 535,866, filed May 8, 1931 which has since matured into Patent No. 1,980,464, dated Nov. 13, 1934.

In conveying spray-paint or other viscous liquids through elongated ducts such as the hose 13, it is frequently desirable and necessary that

the liquid be rendered more fluid by means of air or some other gas for minimizing friction in the hose and preventing a coating of the interior hose duct surface with adhesive elements of the liquid. Furthermore, proper delivery of such liquids is best assured through effecting their flow through the delivery duct by means of the application of a positive pressure therebehind. In accordance with the present invention both of the aforesaid objectives are accomplished by use of the control unit 7 which is arranged to be applied as an attachment for existing tanks having top openings.

Referring now more specifically to the structure of the unit 7, said unit is seen to comprise a generally T-shaped body 14 having its "stem" portion 15 cylindric and threaded for mounted engagement at the tank head opening 11. The cross portion 16 of the body 14 is arranged for horizontal disposal and is provided with mutually aligned and separated bores 17 and 18. The outer end of the bore 17 is threaded for the mounting thereat of a suitable air valve 19 which provides a connection between said bore and an air hose 21, said hose connected with a compressed air source (not shown) whereby it is itself a source of compressed air for application and use in a manner to be brought out. A reduced duct or passage 22 leads from the bore 17 and downwardly through the body portion 15 to the bottom thereof whereby the bore 17 is constantly connected with the tank cavity above the liquid therein; in this manner, the pressure of the air supply to the bore 17 is constantly operative on the liquid in the tank.

A liquid passage 23 extends downwardly from the bore 18 through the body portion 15, and a riser pipe 24 is threadedly mounted in the lower end of said passage and extends approximately to the bottom of the tank cavity and the liquid therein. In this manner, the air pressure in the tank is arranged to urge a discharge of liquid through the pipe 24 and passage 23 into the bore 18, whereby, with the spray gun in liquid-discharging condition, the liquid may be continuously delivered thereto.

It will now be noted that a member 25 separates the body bores 17 and 18, and that said member provides a nozzle portion 26 which protrudes axially into the bore 18 and toward the discharge end of said bore. A restricted passage or duct 27 extends axially through the member 25 from the bore 17 for discharging air axially into the bore 18 for mixing with the liquid as it flows through the latter bore. A valve 28 is



preferably provided for adjustably controlling the air flow through the air duct 27, said valve comprising a rotary plug 29 having a diametrical passage therethrough and disposed in a bore transversely intersecting the duct 27. The stem 31 of the valve 28 extends from the body 14 through a suitable stuffing box 32 and is provided with a handle 33 for effecting adjustment of its operative position; in this manner the relative proportion of liquid and air discharged from the control device may be varied.

Means are preferably provided whereby the air discharged into the liquid in the bore 18 is arranged to effect an atomization and uniform air dilution of the liquid. Accordingly, and as shown, a tubular member 34 is slidably engaged in the bore 18 forwardly of the fixed nozzle 26, said member being operative to receive and mix the fluids. A discharge duct extends axially through the member 34 and the inner end portion 35 of said duct is conically expanded in the manner of a funnel for receiving the discharged fluids, the remaining duct portion 36 being of uniform cross-section. Preferably, and as shown, the outer nozzle end is conically tapered in the same order as is the opposed inner duct portion 35 whereby the liquid is caused to be delivered from the passage 18 and into the duct portion 36 in a stream of annular section.

Means are provided for controlling the disposal of the receiving member 34 with respect to the nozzle 26. As particularly shown, the inner end portion of the member 34 is slidably fitted in the bore 18, and the outer portion 38 of said member is of reduced diameter whereby an annular space is defined outwardly of the portion 37 of the member and between the member and bore 18 for the reception of suitable soft packing 39. An axially perforated gland cap 41 threadedly engages the forward extremity of the body portion 16 whereby to compress the packing 39 in the space provided therefor. Since the packing engages the external shoulder 42 defined at the juncture of the portions 37 and 38 of the member 34, it will be understood that a screwing-up of the cap 41 will force the member 34 inwardly against the pressure obtaining in the bore 18; in this manner the member 34 is sealedly engaged in the bore 18 and its position in said bore may, at the same time, be adjustably varied for varying the flow rate of liquid into the member 34. This arrangement, it is noted, provides a valve means for the liquid wherein the nozzle tip is operative as a plug valve in and with respect to the seat provided by the duct portion 35 of the member 34, it being further noted that it is the valve seat which is adjustable in the present instance. An outwardly extending end of the portion 38 of the member 34 threadedly carries a coupling member 43 for use in attaching the member to the hose 13.

The liquid valve now described is understood to permit a cleaning out of the hose 13 by the use of the air, since it is merely necessary to shut off the liquid at the nozzle point for effecting a discharge of air only into the member 34 and through the hose 13. If, on the other hand, a solid stream of liquid is desired, it is merely necessary to close the valve 28. If both valve means are open, the proportioning and total flow may be varied as desired or required.

A suitable relief valve 44 is provided on the body 14, said valve connected with the bore 17.

With the liquid discharge shut off at the nozzle 26 in the described manner and the air supply valve 19 closed, an opening of the valve 44 relieves the working pressure in the connected tank chamber and control unit passages to permit a return to atmospheric pressure conditions therein. It is noted that the bore 17 is utilized as an air manifold with respect to the ducts 22 and 27. Said bore also provides, in effect, an expansion chamber for the air delivered from the valve 19 whereby the expansion of the air thereinto may condense therein any moisture in the air, particularly during cold weather. Under the latter circumstances it may be desirable to slightly open the relief valve 44 while the control device is in use whereby to remove the moisture air which is found adjacent the manifold walls.

From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made, when desired, as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent of the United States the following:

1. In combination with a closed tank for fixed disposition and from which liquid is to be discharged by air pressure, a control unit support- edly mounted on the tank head and comprising a body provided with a discharge passage for the liquid and an air passage for connection to a source of air under pressure, a nozzle member discharging longitudinally in said first passage and provided with an air duct directed toward the discharge end of the passage, said air duct connected with said second passage, and a tubular member slidably and sealedly mounted in said first passage forwardly of said nozzle member and arranged to simultaneously receive and merge liquid from the passage and air from said duct, opposed ends of said nozzle and receiving members coactive as a valve to control the flow of liquid to the latter member, and means to adjust the setting of said receiving member for varying the permitted liquid flow.

2. In combination with a closed tank for fixed disposition and from which liquid is to be discharged by air pressure, a source of air under pressure, a control and mixing unit supportedly mounted on the tank head and comprising a body block provided with an air manifold chamber, valve means in the connecting said chamber with said air source, a duct in said block connecting said chamber with the tank cavity, a valved relief passage for said chamber, a liquid discharge passage in said block, a riser pipe extending from within the liquid in the tank to a connection with said passage, a duct from said chamber and with said block for discharging air into the liquid in said passage, and means to independently control the fluid flow rates in said duct and passage whereby to adjustably control the discharge pressure and degree of air dilution of the liquid emitted from the control and mixing unit.

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