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VALVED NOZZLE

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2 Sheets-Sheet 1

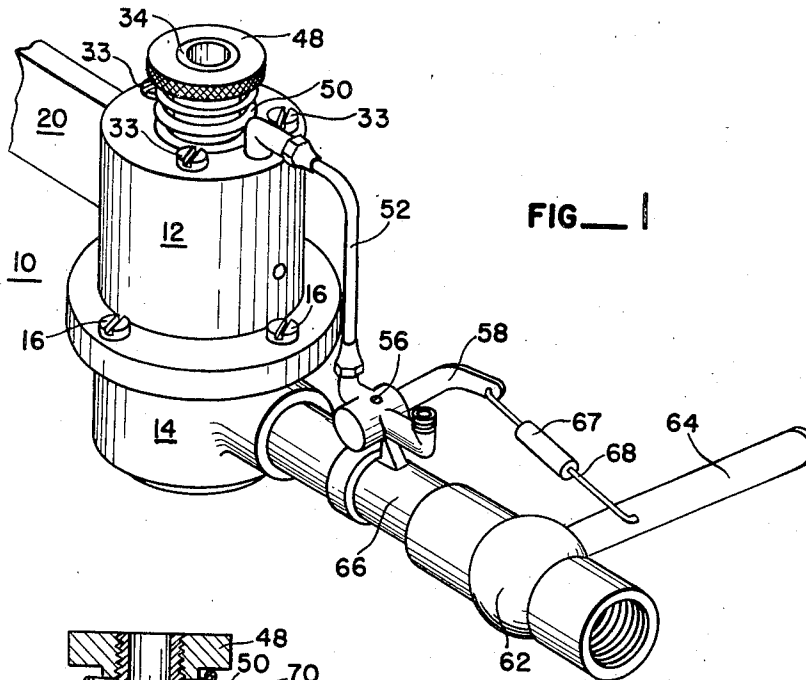


FIG. 1

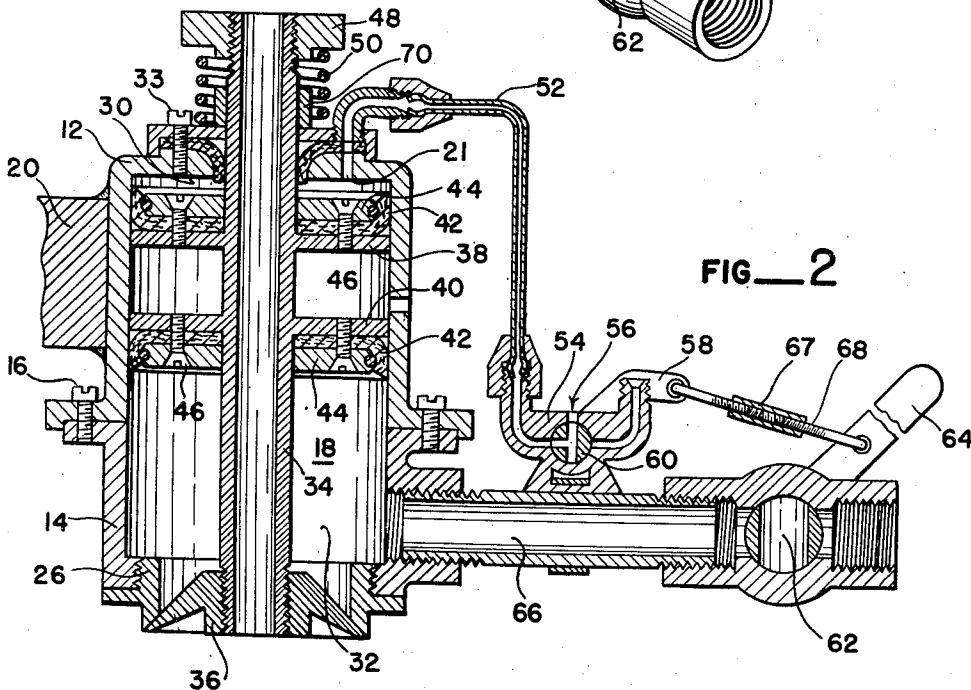


FIG. 2

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FIG__4

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VALVED NOZZLE

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This invention relates to improvements in a valved nozzle for dispensing liquids, and, more particularly, to a dispensing mechanism that is particularly useful in filling containers with paint and like liquid and semi-liquid materials.

The handling of paints and the like into containers has always been a vexatious problem to the paint manufacturer for many reasons. A simple device commonly used is the well-known spigot cock that is fitted to a container and is manually operated. Upon rotation of the tapered element to effect a connection between the inlet and the outlet passages the fluid flows. This device is slow in starting, particularly with heavy liquids, and does not form a suitable stream since the latter is small and solid and will tend to spatter as it drops to the container if there is any appreciable distance of descent. Other devices have been used but they are normally accompanied with disadvantages that, generally, include undue foaming of the liquid, splattering of the liquid caused by bursting bubbles, slow and inefficient operation not usually geared to the higher speed of normal production in a paint plant or the like, dripping between filling periods with a consequent fouling of the containers, difficulty in cleaning between runs of different materials or materials of different colors, complications of structure that raise the cost of manufacture and maintenance above that considered economical, and limited in design to such an extent that one suitable for a viscous material is not properly operable for a more fluid material.

Throughout this specification I shall speak of my invention as it pertains to the paint industry and its application to handling the various fluid media common to that business. Such reference, however, is intended to be purely exemplary as it will be obvious that the invention has application to other fields and other materials. For that reason, I wish to point out that I have no intention of limiting the invention beyond the scope and spirit of the subjoined claims.

Having in mind the defects and problems of the prior practices, it has been among the important objects of this invention to provide, in liquid dispensing equipment, a nozzle means that will speedily and efficiently pass a large variety of liquids of varying viscosity and weight; that will discharge a large and hollow stream of liquid at a relatively high velocity for fast operation; that will pass such liquids with a minimum of turbulence and bubble or air entrapment to the end that foaming is minimized; that will form a stream that is hollow and can readily be vented

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to permit the escape of air from a container and reduce entrapment; that is simple and inexpensive to construct and easy to operate and maintain; that is easily cleaned with rapidity where frequent changes of the material passed occurs; and that is adapted to avoid drip and splash during non-filling periods.

The foregoing and other objects of my invention will be more clearly understood from a reading of the following detailed description of the structure embodying my invention. The construction and arrangement of parts will be more fully understood by reference to the accompanying drawings in which:

Figure 1 is a perspective view of my valved nozzle;

Figure 2 is a vertical sectional view on the axis of the nozzle in Figure 1 showing the same in closed condition;

Figure 3 is a view similar to Figure 2 but showing the nozzle in dispensing condition; and

Figure 4 is a view in vertical section of a modified form of my dispensing valve.

The valved nozzle of this invention, as a unit, is shown in Figure 1 and has a casing 10 formed by the upper cup 12 and lower cup 14, which have rim flanges that are joined in a gasketed and fluidtight manner by screws 16 to form chamber 18. The upper cup may be supported by an arm 20 over a container filling line, or the device may be otherwise supported in any suitable manner. Upper cup 12 has a top opening 22 which is aligned with the lower outlet opening or port that is formed in the lower cup by nipple 26 that is screwed into a suitably threaded port in the bottom of cup 14. Between these openings chamber 18 is divided into the pressure portion 30 above, and the fluid portion 32 below.

Tube 34 is mounted in casing 10 in alignment with the axis of the latter and its ends protrude beyond the casing above and below as shown in the drawings. The opening 21 in upper cup 12, through which the tube extends, is sealed by gland to prevent leakage around the tube.

At its lower end, tube 34 carries the reciprocal frusto-conical valve element 36 which seats on a mating conical seat 24 of nipple 26 to close the outlet from chamber 32. The seat 24 of nipple 26 surrounds the outlet opening from chamber 32 and is of a size that is comparable to the cross-section of the chamber that lies thereabove.

It will be noted that the passage through tube 34 extends from below the casing 10 and valve element 36 to a point that is above the casing

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so that air can rise from a container that is being filled and will exhaust through the nipple and not otherwise have to be accommodated.

The tube 34 carries within the casing 10 a pair of flanges 38 and 40 which, together with leathers 42 and washers 44, constitute a piston means that separate the chambers into the upper pressure chamber 30 and the lower fluid chamber 32. Screws 46 hold the leathers in proper position on the flanges of the piston means.

The upper end of tube 34 is threaded to receive adjustment nut 48 that forms an abutment for the spring 50, which is located between the end of tube 34 and the upper end of casing 10 and tends to upwardly bias tube 34 to a position that brings valve member 36 against the seat 24 of nipple 26 to close opening 25.

Fluid, such as air, under pressure is supplied to the upper chamber 30 above the piston means through conduit tube 52 which extends between valve 54 and casing 10. The latter valve is of the well-known two-position vented type that receives fluid under pressure from a suitable source (not shown), and permits it to pass to above the piston or, when the supply line is closed, permits an exhaust of fluid from above the piston through discharge opening 56. Valve 54 is operated by a lever 58 which, on swinging, rotates the revoluble member 60 between its two positions.

The material being dispensed, including paint and similar products of the paint industry, passes through valve 62, the operation of which is controlled by lever 64, into conduit 66 that delivers it to lower chamber 32 from the side and above valve 36. In order to coordinate the operation of valves 54 and 62, levers 58 and 64 are interconnected by the adjustable coupler 67 in link 68 so that movement of lever 64 to open valve 62 results in a simultaneous opening of valve 60. Thus, both fluid under pressure and fluid to be dispensed flow at the same time. The former enters the upper chamber 30 and initiates downward displacement of the piston on tube 34 and causes valve 36 to be unseated to open outlet 24. At the same time, paint and like material flowing through passage 66 enters the lower chamber and flows therethrough down and around the conical valve member 36.

The pattern of flow of the material being dispensed is suggested in Figure 3 to be in the form of an outwardly flared tubular stream that is hollow in the center. This tubular or cylindrical stream has substantial width and, naturally, will be relatively thin. It is an observed tendency that the stream of fluid flowing out of the nozzle tends to strike the walls of a container C and then is deflected downward, sweeping with it any foam that may tend to form on the wall of container C. Such a stream is completely cylindrical and unbroken and obviously traps air that is in the container C and is being displaced by the incoming fluid. The venting action of tube 34 is then effective. Such air as is leaving the container readily flows upward and out through the axial opening of tube 34 as suggested in Figure 3. Thus, a free escape is provided for air which would normally be trapped in the fluid stream. At the same time, foam that is carried down into the container, or is formed within the hollow descending stream, is enclosed and squelched and reduced by the pressure of the incoming fluid and, to a certain extent, by the larger amount of air encased to the result that foaming is reduced and abated. Actual observa-

tions disclose that, with the valve properly adjusted, container after container can be filled without foaming.

When a filling operation is terminated, as when the fluid level arrives at the top of the container, the operator swings lever 64 to the right in Figure 2 to close valve 62. At the same time, swing valve 54 is moved to the closed position to shut off incoming air while permitting the air trapped above the piston to evacuate through opening 56. Under such circumstances, spring 50 takes over and raises the tube 34 and closes opening 24 by seating the valve member 36 therein. The upward movement of the piston means places the interior of chamber 18 under a slight negative pressure and causes a slight suckback on the fluid around the edge of valve 36, thus reducing drip at that point. Such precludes fouling of containers during the interval between filling operations, during which the full container is removed and an empty one is placed under the nozzle.

In Figure 4 I have shown a modified form of my nozzle which, in most respects, functions as that previously described. This form of nozzle comprises the casing 72, having a lower nipple 73 which includes the seat 74 with which valve element 75 cooperates in closing the opening in the nipple. The tube 76 is flanged at 77 to receive the diaphragm 78 which is peripherally secured and sealed in the cup by means of the cover 79. Below the diaphragm is filling chamber 80, and chamber 81 thereabove is the pressure chamber with air or like fluid under pressure being supplied through conduit 82. The upper extension of tube 76 protrudes above cover 78 and nut 84 and forms a seat for one end of spring 85 which otherwise rests on casing cover 78. Paint or the like to be dispensed is supplied through passage 86 in the side of chamber 80.

Various adjustments in the operation of the nozzle are possible by reason of the manner in which the parts are associated together. Assuming a condition wherein air under pressure is supplied to valve 54 at a constant pressure, the operator may vary its operativeness by shortening the distance between nut 48 and the top of the casing 10, thus further compressing spring 50 and shortening the stroke of the piston means within the casing. In this case, the amount of opening that occurs between valve member 36 and seat 24 will be to a reduced degree slower to open and faster to close, or the stroke may be increased by slackening off the compression of spring 50 by turning nut outward on tube 34. This will also result in a quick opening of the valve with a slower closing moment. By varying the pressure of air or similar medium to valve 54, variations in the effect on the piston and valve will be obtained. The pressure on the fluid being dispensed may also be increased or decreased to alter the period during which a given quantity flows in filling a container. These adjustments combine in the nozzle to permit the handling of fluids of differing viscosity as is so commonly the case in the paint and like industries.

It should also be noted that cleaning of the nozzle is facilitated by the manner in which the parts are assembled. For example, when a change is made in the fluid being dispensed, all the operator need do is to remove nut 48 from tube 34, whereupon the latter can be dropped into the lower part of chamber 18 to permit flushing upward through nipple 26 and cleaning of the fully exposed valve element 36, or a flushing and

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cleaning solvent or the like may be introduced through valve 62 and nozzle operated several times with the result that the interior is completely washed clean.

The timing of the opening of valves 54 and 62 can be varied by adjusting the length of link 68 by turning the coupler 67 one direction or the other.

I have shown a sleeve 70 under the nut 48, and resting on casing 10, which may be employed as a stop means for the stroke of tube 34 instead of depending upon the closing of the coils of spring 50.

The nozzle shown can readily be accommodated to filling various sized containers by making sets of nipples 26 and valve elements 36. For example, the nozzle when adapted to fill gallon cans should have an opening of about five inches while a quarter pint can is best filled with the opening adjusted to one and one-half inches. Normally three sets of mating sleeves and valves will accommodate the fractional sized containers between one quarter pint and one gallon.

Having thus described my invention, I claim:

1. A nozzle for dispensing paints and the like, comprising: means forming an upright chamber having a lower outlet of a size substantially equal to the cross-section of said chamber and shaped to provide an external conical valve seat therearound; an open-ended tube extending vertically through said chamber coaxial with the axis of said lower outlet; an element on said tube within said chamber in spaced relation above said outlet and dividing said chamber into non-communicating expansible-contractible portions; a reciprocally operable conically-shaped valve member carried by said tube exterior of said chamber and cooperable with said seat to close said outlet; means exterior of said chamber to bias said valve to the closed position; means for supplying fluid under pressure to said upper

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chamber portion above said element to move said valve to the open position against said bias, and means for supplying fluid to be dispensed to said lower chamber portion below said element.

2. A nozzle for dispensing paints and the like, comprising: means forming a chamber having a lower outlet; an open-ended tube extending vertically through said chamber coaxial with the axis of said lower outlet; an element on said tube within said chamber in spaced relation from said outlet and dividing said chamber into non-communicating portions; a reciprocally operable valve element carried by said tube and cooperable with the rim of said outlet to close the same; means exterior of said chamber to bias said valve to the closed position; fluid pressure means in communication with said chamber above said element to move the valve against its bias and to open said outlet, and means for supplying fluid to be dispensed to said chamber below said element.

3. A nozzle for dispensing paints and the like, comprising: means forming a chamber having a lower outlet; an open-ended tube extending vertically through said chamber coaxial with the axis of said lower outlet; a piston on said tube within said chamber in spaced relation from said outlet and dividing said chamber into non-communicating portions; a reciprocally operable valve element carried by said tube and cooperable with the rim of said outlet to close the same; means exterior of said chamber to bias said valve to the closed position; fluid pressure means in communication with said chamber above said piston to move the valve against its bias and to open said outlet, and means for supplying fluid to be dispensed to said chamber below said piston.

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No references cited.