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GLUING APPARATUS WITH MULTI-PORTED APPLICATOR

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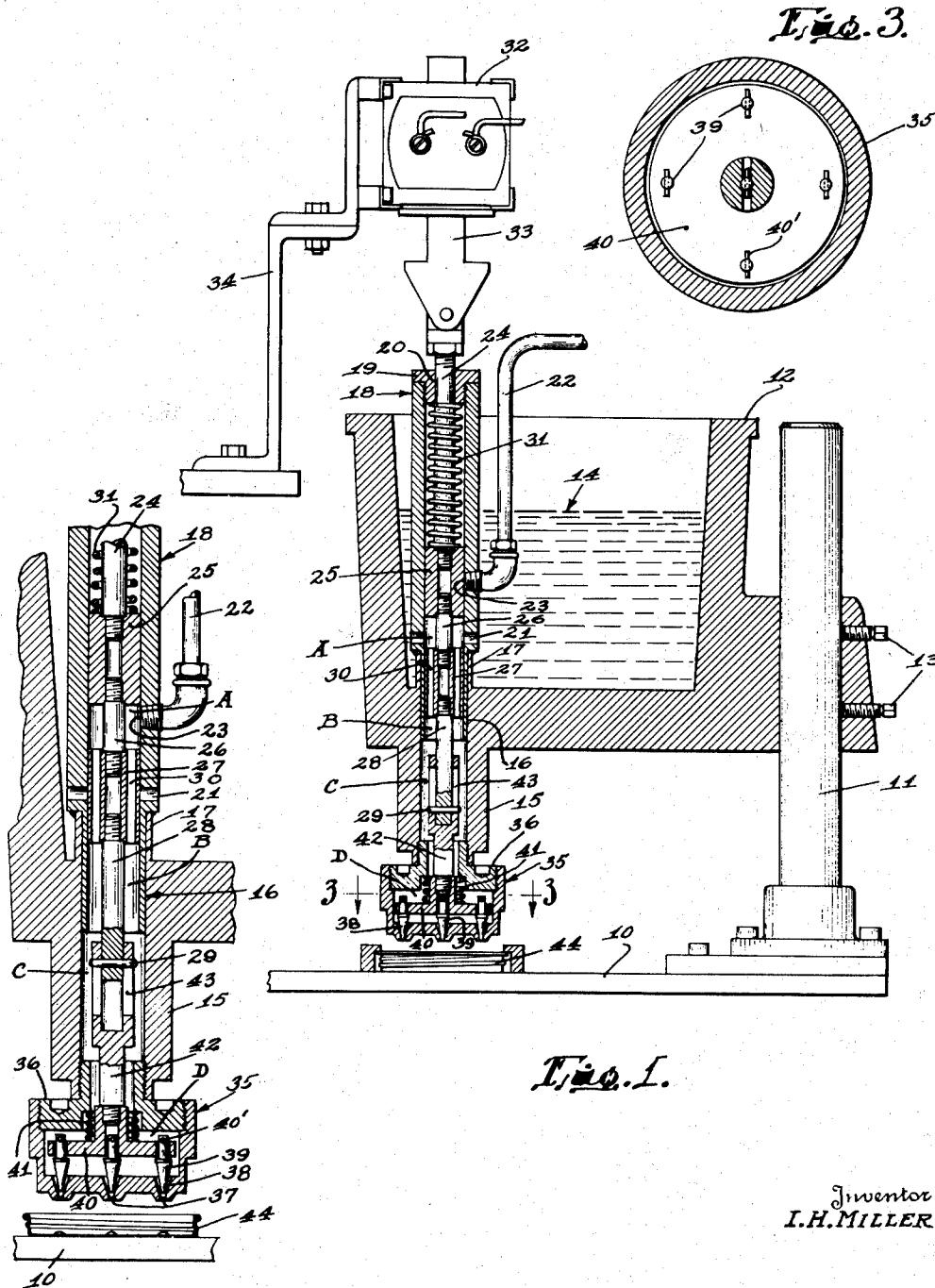


Fig. 1.

Fig. 2.

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GLUING APPARATUS WITH MULTIPORTED
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My invention relates to a machine for applying measured quantities of glue, adhesive, or similar substance in a liquid state to closure devices for bottles or other containers.

In the art as commonly practiced, the glue is fed to the closure devices in small quantities from a pot containing a comparatively large quantity of glue, usually at a high temperature and under a head of compressed air or other gas applied to the entire mass of glue in the pot. This involves a serious hazard and is highly objectionable from a safety standpoint, as the large volume of hot glue under pressure could cause severe injury to an operator in the case of pot failure or negligence on the part of the operator in replenishing the adhesive.

An object of the invention is to overcome the above noted objection. I attain this object by providing a mechanism wherein the glue pot remains open to atmospheric pressure and in which superatmospheric pressure is applied to a chamber containing only a small portion of glue at any one time, after such portion has been segregated from the mass of glue in the pot.

Other objects will be in part apparent and in part pointed out hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a part sectional elevation of the machine with the glue applicator in the neutral or no-feed position.

Fig. 2 is a sectional elevation of the lower half of the glue feeder showing the moving parts of the feeder in the upper or feed position.

Fig. 3 is a section at the line 3-3 on Fig. 1.

Referring to Fig. 1, the framework of the machine comprises a base 10 and post 11 rigidly attached to the base 10. The glue pot 12 is mounted for up and down and lateral adjustment on the post 11 and is held in adjusted position by means of securing bolts 13. Glue 14 is fed from the glue pot 12 and forced into closure devices by means of a forced feed applicator in the form of a piston motor which forms a chamber to receive the segregated liquid and dropper head assembly. The piston motor comprises a cylinder assembly, and a sectional piston assembly. The piston assembly is reciprocated within the cylinder assembly, first admitting a small quantity of glue, then shutting off entrance of glue, and finally admitting air under pressure to force the glue out of the glue dropper head assembly.

Piston motor

The cylinder assembly consists of an integral tube extension 15 of the glue pot 12, an opening

16 in the floor of the glue pot 12, an upward extension 17 of the glue pot 12 in fixed connection with a cylinder 18. All of these elements are in register. A cap 19 with an opening 20 is threaded to the upper end of the cylinder 18. The cylinder is provided with suitable openings 21 through the wall of the cylinder 18 to the glue pot 12. A pressure pipe 22 leading to a suitable source of air under pressure, opens into the cylinder 18 through a port 23 above the glue openings 21.

The sectional piston assembly consists of an upper piston rod 24 passing through the opening 20 in the cap 19 and threaded to an air valve piston 25; an intermediate piston rod 26 threaded to the air valve piston 25 at its upper end and to a glue valve piston 27 at its lower end; a lower piston rod 28 threaded at its upper end to the glue valve piston 27 and provided with a pin 29 at its lower end. The space A between the valve pistons 25 and 27 provides an inner chamber having its end and side walls formed by the valve pistons and the cylinder wall respectively so that the position of the chamber is shifted up and down with the movements of the pistons. The glue valve piston 27 is provided with vertical channels 30. A coil spring 31, mounted on the upper piston rod 24 and held under compression between the air valve piston 25 and the cap 19, serves to hold the pistons in their lowered position. The upper piston rod 24 is threaded to a suitable mechanism for causing a reciprocating action. In its preferred form this comprises a solenoid 32 and plunger 33. The solenoid 32 is mounted by means of a bracket 34 on any suitable stationary support.

Glue dropper head assembly

A stationary glue dropper head 35 is attached to the glue pot 12 by means of a coupling 36 which has screw-threaded connections with the tube extension 15 and the dropper head 35. The dropper head 35 is provided with glue discharge orifices 37 and valve seats 38 in which valves 39 may seat. The valves 39 are loosely mounted in a valve plate 40 and held therein by small pins 40' (Fig. 3). A spring 41 mounted on the hub of the valve plate 40 and held under compression between said plate and the coupling 36, yieldingly holds the valves 39 seated. The valve plate 40 is threaded to a shaft 42. The upper portion of the shaft 42 is of larger diameter and tubular and is also provided with vertical slots 43 in which the pin 29, on the lower piston rod 28, can move up and down.

Operation

The operation is as follows:

As shown in Fig. 1 when the machine is in neutral position, the discharge orifices 37 are closed, the valves 39 being held on the valve seats 38 by the spring 41. At this time the piston valve assembly is held in its lowered position by the spring 31. The air valve piston 25 is closing off the air line opening 23 while the glue valve piston 27 is allowing hot glue to flow through the glue opening 21 into the space A between the valve pistons and through the channels 30 to space B, and thence to space C, filling the space D in the glue dropper head 35. As a closure device 44 is brought beneath the glue dropper head the solenoid is actuated by suitable means (not shown) and draws the upper piston rod upward and with it, the valve pistons. During this movement, the glue valve piston first closes the opening to the glue pot and then the air valve piston opens the air port, thus admitting air under pressure to the small measured volume of glue trapped in the cylinder. During the final upward movement of the piston assembly the pin 29 which has reached the top of the slots 43, lifts the valve plate and discharge valves 39, allowing adhesive to flow or be forced out of the glue orifices 37 in the glue dropper head (Fig. 2). As the shaft moves down, first the spring 41 reseats the valves, and then the air valve piston and the glue valve piston resume their neutral positions, thus completing the cycle.

Suitable means (not shown) may be provided for regulating the air pressure to any desired value, depending on the viscosity of adhesive used. I have found that in some instances no air pressure is necessary. Suitable means (not shown) may be provided for heating the glue in the pot. Means may also be provided for heating the glue dropper head for heating or regulating the temperature of the glue passing there-through.

Modifications may be resorted to within the spirit and scope of my invention as defined in the appended claims.

I claim:

1. A liquid applicator comprising an open pot containing liquid, a cylinder assembly partially submerged in said liquid, including a lower tube extension of the pot, the pot having an opening therethrough, the walls of which form a part of the cylinder assembly, the assembly also including an upper tube extension to the pot, and a cylinder in fixed connection with said upper tube extension, all in register, said cylinder assembly having an opening to a source of gas under pressure and an opening to the liquid in the open pot, a piston valve assembly including a sectional shaft, a solid valve piston, and a valve piston with channels there-through parallel to the longitudinal axis, said pistons so arranged that the gas and liquid openings are alternately opened and closed by the action of said pistons, means for reciprocating said piston valve assembly, a liquid dropper comprising a head having a fixed connection to the cylinder assembly and having liquid discharge orifices, valves seated in said orifices and actuated by the piston assembly in timed relation with the opening and closing of the gas and liquid openings.

2. A liquid applicator comprising an open pot containing liquid, a cylinder assembly partially submerged in said liquid including a lower tube

extension on the pot, an opening through the pot, an upper tube extension to the pot, a cylinder in fixed connection with said upper tube extension, all in register, said cylinder assembly having an opening to a source of gas under pressure and an opening through the submerged section of the cylinder assembly to the liquid, a piston valve assembly consisting of a sectional shaft, a solid valve piston, a valve piston with channels parallel to its longitudinal axis, means for reciprocating said piston valve assembly and thereby alternately admitting gas and liquid, a dropper including a head having a fixed connection to the cylinder assembly and having liquid discharge orifices, valves seated in said orifices, a plate to which the valves are loosely connected, means providing a lost motion connection between the said plate and piston valve assembly permitting a limited up-and-down movement of the latter relative to the plate.

3. Apparatus for applying an adhesive in liquid form to a plurality of articles in succession, said apparatus comprising an open container for a supply body of the liquid, a dropper head comprising a chamber having discharge orifices, a cylinder, a valve assembly, mounted for reciprocating movement within the cylinder and including an air valve piston and a liquid valve piston spaced to provide a pressure chamber, said cylinder having an air port opened and closed by the reciprocation of the air valve piston, and a liquid port opened and closed by the reciprocation of the liquid valve piston, means for supplying air under pressure to the said air port, the liquid port being in communication with the supply body of liquid, said ports and valve pistons being relatively spaced and positioned to cause the ports to be opened alternately by the reciprocation of the valve assembly, means providing a passageway from the pressure chamber to the dropper head chamber, discharge valves for opening and closing the discharge orifices, and means for moving said discharge valves to open position when pressure is applied within the pressure chamber.

4. Apparatus for applying an adhesive in liquid form to a series of articles in succession, said apparatus comprising an open container for a supply body of the liquid adhesive, the floor of the container being formed with an opening extending therethrough, a vertically disposed cylinder in register with said opening and formed in part by the walls of said opening, a piston assembly mounted for up-and-down movement within the cylinder and comprising a pressure valve piston and a liquid valve piston, said cylinder having a liquid valve port immersed in said supply body, said valve pistons being spaced to provide a pressure chamber movable up and down with the valve pistons, said port being positioned to open into the pressure chamber when the valve pistons are lowered and being closed by the liquid piston when the latter is in its upper position, said cylinder having a pressure port positioned to be closed by the pressure valve piston when the latter is lowered and opened to said pressure chamber when the valve pistons are lifted, a pressure pipe opening into said pressure port and through which gas under pressure is supplied to said pressure chamber, a dropper head comprising a discharge chamber having discharge orifices, and means providing a passageway extending from the pressure chamber to said discharge chamber.

5. The apparatus defined in claim 4, the said

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liquid valve piston being formed with channels extending therethrough, the passageway to the discharge chamber being formed in part by said channels.

6. Apparatus for dispensing a liquid adhesive, comprising a vertically disposed cylinder, a piston assembly mounted for reciprocation within the cylinder, said assembly comprising a pressure control valve and a liquid valve spaced therebelow to provide a pressure chamber, means providing a passageway through which gas under pressure is supplied to said chamber when the valve assembly is lifted, means for supplying liquid adhesive to said chamber when the valve assembly is lowered, the liquid supply being cut off by the liquid valve when the latter is lifted, a dropper head having a stationary mounting below the cylinder and comprising a discharge chamber having bottom outlet orifices, valves mounted for up-and-down movement in the discharge head for opening and closing said discharge orifices, means providing a passageway formed in part by the cylinder and extending from the pressure chamber to the discharge chamber, means providing a lost motion connection between the valves and the piston assembly by which the valves are lifted to open position during the final upward movement of the valve piston assembly, and means for periodically reciprocating the valve piston assembly.

7. The apparatus defined in claim 6, the means for lifting the piston assembly comprising a power motor operatively connected thereto, and the means for lowering said assembly comprising a coil spring held under compression and exerting a yielding downward pressure on said piston assembly.

8. A liquid applicator comprising a cylinder having a gas port and a liquid supply port in communication respectively with a source of gas under pressure and a source of liquid, a piston valve assembly reciprocable within said cylinder and comprising a gas valve piston and a liquid valve piston spaced apart lengthwise of the cylinder providing an inner chamber therebetween movable with the pistons, the pistons being positioned to open and close the ports in moving in said cylinder and thereby bringing the said chamber into communication with said ports alternately, one of said ports being closed while the other is open, means for reciprocating said piston valve assembly, a liquid applicator including a head having a fixed connection to the cylinder and having a discharge orifice, and means connected to said piston valve assembly for opening and closing said orifice in timed relation to the opening and closing of said liquid and gas ports.

9. The liquid applicator as defined in claim 8, said source of liquid comprising an open pot containing liquid, said liquid supply port being submerged in the liquid.

10. A liquid applicator comprising a cylinder having a gas port and a liquid supply port in communication respectively with a source of gas under pressure and a source of liquid, a piston valve assembly reciprocable within said cylinder and comprising a gas valve piston and a liquid valve piston spaced apart lengthwise of the cylinder providing an inner chamber therebetween movable with the pistons, the pistons being positioned to alternately open and close the ports in moving in said cylinder and thereby bringing the said chamber into communication with said ports alternately, one of said ports

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being closed while the other is open, means for reciprocating said piston valve assembly, a liquid applicator including a head having a fixed connection to the cylinder and having a discharge orifice, a valve seated in said orifice, and means connected to said piston valve assembly for actuating said valve to open and close the discharge orifice in timed relation with the opening and closing of said liquid and gas ports.

11. A liquid applicator comprising a cylinder having in its side wall a gas port and a liquid supply port, said ports opening respectively to a source of gas under pressure and to a source of liquid, a piston valve assembly mounted for movement within the cylinder and including a solid valve piston positioned to open and close the gas port, a valve piston positioned to open and close the liquid port, said pistons being spaced apart lengthwise of the cylinder and thereby providing an inner chamber shiftable with the pistons, a sectional shaft connecting said pistons and so spacing them apart that one of said openings is closed while the other is open, means for reciprocating said piston valve assembly to alternately open and close said openings and thereby alternately admit liquid and gas to said inner chamber, a liquid dropper comprising a head having a fixed connection to the cylinder and having a liquid discharge orifice, a valve seated in said orifice, and actuated by the piston valve assembly in timed relation with the opening and closing of the gas and liquid supply ports.

12. A liquid applicator comprising a cylinder having openings respectively to a liquid and to a source of gas under pressure, a piston valve assembly reciprocable within said cylinder and consisting of a sectional shaft, a solid valve piston operable to open and close the gas opening, and a liquid valve piston operable to open and close the liquid opening, said liquid valve piston having channels therethrough parallel to its longitudinal axis, means for reciprocating said piston valve assembly and thereby alternately admitting gas and liquid to the cylinder through the respective cylinder openings, a dropper including a head fixed to the cylinder assembly, and having a liquid discharge orifice, a valve seated in said orifice, a plate to which the valve is loosely connected, and means providing a lost motion connection between said plate and piston valve assembly permitting a limited up-and-down movement of the latter relative to the plate.

13. A liquid applicator comprising a chamber having in its side wall a gas port and a liquid supply port in communication respectively with a source of gas under pressure and a supply body of liquid, closure devices forming end walls of said chamber and including a closure device for the gas port and a second closure device for the liquid supply port, connecting means between said closure devices, means for moving the closure devices as a unit and thereby moving the first mentioned closure device into and out of position to close the gas port and to move the second closure device into and out of position to close the liquid supply port, the closure devices being so positioned that the second closure device is held in open position while the first closure device is in position to close the gas port and by which the first closure device as it moves toward its port opening position, moves the second closure device into position to close the liquid supply port and thereafter opens the gas port

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while the liquid supply port remains closed, means providing a liquid discharge orifice in communication with said chamber, and means interconnected with said closure devices for alternately opening and closing the discharge orifice in timed relation to the opening and closing of said ports.

14. The apparatus defined in claim 13, and in combination therewith a pot containing the supply body of liquid, said chamber being mounted within the pot with the said liquid supply port immersed in the body of liquid.

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