~~delivery apparatus comprising a pressure reducing valve for adjusting~~ pressure of pressurized gas, a pressure supply joint for supplying the pressurized gas having the adjusted pressure, ~~and~~ a solenoid valve for selectively establishing or cutting off communication between the pressure reducing valve and the pressure supply joint, the solenoid valve and the pressure reducing valve being arranged integrally with a ~~manifold having channels formed therein.~~

[0011]

According to a second aspect of the present invention, in the liquid delivery apparatus according to the first aspect, the solenoid valve and the pressure reducing valve are arranged on outer surfaces of the manifold.

[0012]

According to a third aspect of the present invention, in the liquid delivery apparatus according to the first or second aspect, the manifold includes a first channel for communicating the pressure reducing valve and the pressure supply joint with each other, and a second channel for communicating the pressure reducing valve and the solenoid valve with each other.

[0013]

According to a fourth aspect of the present invention, in the liquid delivery apparatus according to the first, second or third aspect, the manifold is directly connected to the pressure reducing valve, the pressure supply joint, and the solenoid valve.

[0014]

According to a fifth aspect of the present invention, in the liquid delivery apparatus according to one of the first to fourth aspect, the

delivery apparatus comprising a pressure supply joint, a pressure reducing valve for adjusting pressure of pressurized gas from the pressure supply joint, a delivery pressure supply joint adapted to be connected with a pipe for supplying an adjusted pressurized gas to a liquid material stored in a liquid reservoir, a solenoid valve for selectively establishing or cutting off communication between the pressure reducing valve and the delivery pressure supply joint, the solenoid valve and the pressure reducing valve being arranged integrally with a manifold, characterized in that: the manifold is a block having the channels formed therein by boring penetration holes in a predetermined block and closing unnecessary portions of the bored holes by inserting screw plugs, or by forming grooves in one or both surfaces of each of plural blocks and combining them in stacked relation.

[0011]

According to a second aspect of the present invention, in the liquid delivery apparatus according to the first aspect, the solenoid valve and the pressure reducing valve are arranged on outer surfaces of the manifold.

[0012]

According to a third aspect of the present invention, in the liquid delivery apparatus according to the first or second aspect, the manifold includes a first channel for communicating the pressure reducing valve and the pressure supply joint with each other, and a second channel for communicating the pressure reducing valve and the solenoid valve with each other.

[0013]

According to a fourth aspect of the present invention, in the liquid delivery apparatus according to the first, second or third aspect, the manifold is directly connected to the pressure reducing valve, the pressure supply joint, and the solenoid valve.

[0014]

According to a fifth aspect of the present invention, in the liquid delivery apparatus according to one of the first to fourth aspect, the

CLAIMS

[1] A liquid delivery apparatus comprising a pressure reducing valve for adjusting pressure of pressurized gas, a pressure supply joint (2) for supplying the pressurized gas having the adjusted pressure, a delivery pressure supply joint (8) for supplying the pressurized gas to a liquid material, a solenoid valve for selectively establishing or cutting off communication between the pressure reducing valve and the delivery pressure supply joint (8), a manifold having channels formed therein, and a base (17), the solenoid valve and the pressure reducing valve being arranged integrally with the manifold.

[2] The liquid delivery apparatus according to Claim 1, wherein the pressure reducing valve, the pressure supply joint (2), the delivery pressure supply joint (8), the solenoid valve, and the manifold are constituted as a unit capable of being integrally assembled in advance, the unit being fixable to the base (17).

[3] The liquid delivery apparatus according to Claim 1 or 2, wherein the manifold includes a first channel for communicating the pressure reducing valve and the pressure supply joint with each other, and a second channel for communicating the pressure reducing valve and the solenoid valve with each other.

[4] The liquid delivery apparatus according to Claim 3, further comprising a pressure release joint (9) for releasing the pressurized gas,

wherein the manifold has a third channel formed therein to communicate with the pressure release joint (9), and

the solenoid valve is a selector valve for switching communication of the delivery pressure supply joint (8) with the second channel or the

third channel.

[5] The liquid delivery apparatus according to any one of Claims 1 to 4, wherein the solenoid valve and the pressure reducing valve are face-joined to the same side surface among outer surfaces of the manifold.

[6] The liquid delivery apparatus according to Claim 3 or 4, wherein the manifold has therein a fourth channel for communicating the first channel and the third channel with each other, and a valve chamber (31) for communicating the first channel and the fourth channel with each other, and

a liquid dripping preventing mechanism is constituted with a valve (55) inserted in the valve chamber.

[7] The liquid delivery apparatus according to Claim 6, wherein the valve (55) is a flow control valve including a valve member which slides in close contact with an inner wall surface of the valve chamber (31),

the fourth channel has a thin channel (40) near a junction point with the third channel, and

the liquid dripping preventing mechanism is capable of adjusting a flow rate in the first channel and the fourth channel depending on an opening degree of the valve (55).

[8] The liquid delivery apparatus according to Claim 7, wherein the flow control valve comprises an annular valve seat (50) inserted in and fixed to an innermost portion of the valve chamber (31), a shaft (53) screwed to a fixture (52), a valve member (51) provided at a front end of the shaft, and a knob (54) provided at a rear end of the shaft.

[9] The liquid delivery apparatus according to Claim 6, 7 or

8, wherein the manifold is formed in a substantially L-shape with a space left on a front lower side, and the solenoid valve is face-joined to two surfaces of the space left on the front lower side.

[10] The liquid delivery apparatus according to Claim 9, wherein the pressure reducing valve is face-jointed to a side surface of the manifold.

[11] The liquid delivery apparatus according to any one of Claims 1 to 10, wherein the pressure reducing valve includes a pressure adjusting knob directly coupled to the pressure reducing valve.

CLAIMS:

1. A liquid delivery apparatus comprising a pressure supply joint (2), a pressure reducing valve (4) for adjusting pressure of pressurized gas from the pressure supply joint (2), a delivery pressure supply joint (8) adapted to be connected with a pipe for supplying an adjusted pressurized gas to a liquid material stored in a liquid reservoir, a solenoid valve (7) for selectively establishing or cutting off communication between the pressure reducing valve (4) and the delivery pressure supply joint (8), the solenoid valve (7) and the pressure reducing valve (4) being arranged integrally with a manifold (3, 60), and the manifold (3, 60) includes therein a first channel (12, 30, 35) for communicating the pressure reducing valve (4) and the pressure supply joint (2) with each other, and a second channel (13, 36) for communicating the pressure reducing valve (4) and the solenoid valve (7) with each other, characterized in that:

the manifold (3, 60) is a block having the channels (12,13,14, 30,31,32,33,34,35,36,37, 40) formed therein by

boring penetration holes in a predetermined block and closing unnecessary portions of the bored holes by inserting screw plugs, or by

forming grooves in one or both surfaces of each of plural blocks and combining them in stacked relation.

2. The liquid delivery apparatus according claim 1, wherein the solenoid valve and the pressure reducing valve are arranged on outer surfaces of the manifold.

3. The liquid delivery apparatus according claim 1 or 2, wherein the manifold is directly connected to the pressure reducing valve, the pressure supply joint and the solenoid valve.

4. The liquid delivery apparatus according to any one of claims 1 to 3, wherein the delivery pressure supply joint is directly connected to the solenoid

valve.

5. The liquid delivery apparatus according to any one of claims 1 to 4, wherein the pressure reducing valve is provided with a pressure adjusting knob directly connected to the pressure reducing valve.

6. The liquid delivery apparatus according to any one of claims 1 to 5, wherein the manifold further includes a channel serving as an ejector for generating negative pressure.

7. The liquid delivery apparatus according to claim 6, wherein the channel serving as an ejector is a third channel (14, 34, 37) for communicating the solenoid valve and a pressure release port (16, 39) with each other inside the manifold.

8. The liquid delivery apparatus according to claim 7, wherein the channel serving as an ejector further includes a fourth channel (32, 40) for communicating the first channel (30, 35) and the third channel (34, 37) with each other inside the manifold (60), the fourth channel (32, 40) having a smaller inner diameter in a portion (40) near a junction with the third channel (34, 37).

9. The liquid delivery apparatus according to any one of claims 1 to 8, further comprising a control valve (55) having a valve member which slides in close contact with an inner wall surface of a channel (31) inside the manifold (60).

10. The liquid delivery apparatus according to claim 9, wherein the control valve selectively establishes or cut off communication between the first channel and the fourth channel at a junction between the first channel and the fourth channel.