CLAIMS

1. A liquid material discharge device comprising:

a liquid chamber that is communicated with a discharge port and is supplied with a liquid material;

a plunger that is coupled to a piston, and that has a tip advancing and retreating within the liquid chamber in a state not in contact with a lateral surface of the liquid chamber;

a resilient member that applies a biasing force to the plunger;

a main body including a piston chamber in which the piston is disposed;

a solenoid valve that supplies a pressurized gas, supplied from a pressurized gas source, to the piston chamber, or that exhausts the pressurized gas from the piston chamber; and

a controller that controls operation of the solenoid valve,

wherein the solenoid valve is constituted by a plurality of solenoid valves that are connected to a same space of the piston chamber in parallel, and the plural solenoid valves are each constituted by a selector valve that is switchable over between a first position at which the pressurized gas source is communicated with the piston chamber and a second position at which the piston chamber is communicated with the atmosphere.

2. The liquid material discharge device according to Claim 1, wherein the plural solenoid valves are plural solenoid valves having the same valve opening/closing speed and the same flow rate.

3. The liquid material discharge device according to Claim 1 or 2, further comprising a holder including a holding member that holds the plural solenoid valves, and a relay member that has an inner flow passage communicating the plural solenoid valves with the piston chamber,

wherein the holding member has a supply port communicating with the pressurized gas source and has a plurality of delivery ports that distribute the pressurized gas, supplied to the supply port, to the plural solenoid valves, and

the relay member has an inner flow passage that communicates the plural solenoid valves with the piston chamber.

4. The liquid material discharge device according to Claim 3, wherein the relay member has a plurality of inner flow passages that communicate the plural solenoid valves individually with the piston chamber.

5. The liquid material discharge device according to Claim 3 or 4, wherein the holder is detachably fixed to the main body.

6. The liquid material discharge device according to any one of Claims 1 to 5, wherein the solenoid valve is constituted by three or four solenoid valves.

7. The liquid material discharge device according to any one of Claims 1 to 6, wherein the controller establishes communication between the pressurized gas source and the piston chamber by the solenoid valves at timing different for each of the solenoid valves.

8. The liquid material discharge device according to any one of Claims 1 to 7, wherein the liquid material discharge device is of desk-top type.

9. A liquid material discharge method comprising:

a step of preparing a liquid material discharge device including:

a liquid chamber that is communicated with a discharge port and is supplied with a liquid material,

a plunger that is coupled to a piston, and that has a tip advancing and retreating within the liquid chamber in a state not in contact with a lateral surface of the liquid chamber,

a resilient member that applies a biasing force to the plunger,

a main body including a piston chamber in which the piston is disposed,

a solenoid valve that supplies a pressurized gas, supplied from a pressurized gas source, to the piston chamber, or that exhausts the pressurized gas from the piston chamber, and

a controller that controls operation of the solenoid valve;

a step of constituting the solenoid valve by a plurality of solenoid valves that are connected to a same space of the piston chamber in parallel,

the plural solenoid valves being each constituted by a selector valve that is switchable over between a first position at which the pressurized gas source is communicated with the piston chamber and a second position at which the piston chamber is communicated with the atmosphere;

a first step of operating the plural solenoid valves to communicate the pressurized gas source with the piston chamber at desired timings;

a second step of operating the plural solenoid valves to communicate the piston chamber with the atmosphere at the same timing; and

a third step of continuously discharging droplets by repeating the first and second steps.

10. The liquid material discharge method according to Claim 9, wherein the plural solenoid valves are constituted as plural solenoid valves having the same valve opening/closing speed and the same flow rate.

11. The liquid material discharge method according to Claim 9 or 10, wherein, in the first step, the plural solenoid valves communicate the pressurized gas source with the piston chamber at the same timing.

12. The liquid material discharge method according to Claim 9 or 10, wherein, in the first step, the plural solenoid valves successively communicate the pressurized gas source with the piston chamber.

13. The liquid material discharge method according to any one of Claims 9 to 12, wherein the pressurized gas distributively supplied to the plural solenoid valves from one pressurized gas source is supplied to the piston chamber through one flow passage communicating with each of the plural solenoid valves.

14. The liquid material discharge method according to any one of Claims 9 to 12, wherein the pressurized gas distributively supplied to the plural solenoid valves from one pressurized gas source is supplied to the

piston chamber through a plurality of flow passages communicating with the plural solenoid valves in one-to-one relation.

15. The liquid material discharge method according to any one of Claims 9 to 14, wherein the solenoid valve is constituted by three or four solenoid valves.

16. The liquid material discharge method according to any one of Claims 9 to 15, wherein, in the second step, the plunger is advanced and stopped in a state that the plunger tip is not contacted with an inner wall of the liquid chamber, the inner wall being present in an advancing direction of the plunger, thereby applying an inertial force to the liquid material and discharging the liquid material in form of a droplet.

17. The liquid material discharge method according to any one of Claims 9 to 16, wherein, in the third step, the droplets are continuously discharged at a rate of 300 shots or more per sec.