

In Comparative Example 3, air was injected only from the under-liquid nozzle. In this case, oil droplets could be taken out from the nozzle connecting to the machining center. This shows that oil spray could be produced by air injection from the stored oil.

In Example 1, air discharge from the gas discharge nozzle was stopped and the air flow rate from the under-liquid nozzle was increased. Furthermore, the flow rate from the spray injection nozzle was set to be 52 NL/min, which was the same as in Comparative Example 2. When the flow rate from the under-liquid nozzle was 40 NL/min, oil spray could be taken out in the form of oil droplet from the nozzle connecting to the machining center. Yet, visual observation showed that the flow amount was increased as compared with Comparative Example 2. The results shows that oil spray, which was produced from the liquid surface of oil, played a role as increasing the amount of the discharged oil droplet.

Example 2 was carried out while increasing the air flow rate from the gas discharge nozzle in the state of Example 1. When the air flow rate was 20 NL/min, the internal pressure of the container became the same as that of Comparative Example 2. In this state, the total flow rate (112 NL/min) of Comparative Example 2 was substantially the same as the total flow rate (110 NL/min) of Example 2. However, the amount of oil droplet from the nozzle connecting to the machining center was larger in Example 2 by visual observation. This shows that sufficient amount of oil droplets could be secured by adjusting the air flow rate both from the under-liquid nozzle and from the gas discharge nozzle.

#### Industrial Applicability

As mentioned above, the liquid spray device of the present invention permits spraying liquid to the target object by feeding spray of the container, so that the device can be used as a device for supplying a cutting member of a machine tool, for example, a machining center, a grinding machine, a turning machine, or the like, with a cutting oil.

Furthermore, the cutting method of the present invention uses a device of spraying liquid to the target object by feeding the spray in the container, so that it can be used for cutting method for processing the target object by using a machining center, a grinding machine, a turning machine, or the like.

What is claimed is:

1. A cutting device, comprising a container, a spray injection nozzle for injecting oil spray into the container, and a spray feeding path for feeding the oil spray in the container to an outside of the container, wherein a gas discharge nozzle is provided having a tip portion in the air within the container and discharging gas, wherein most of the injected spray flow from the spray injection nozzle is allowed to strike a wall face in the container before being fed to the spray feeding path, and wherein the wall face is an inner wall face of a dome member opening downward.

2. The cutting device according to claim 1, wherein an inside of the container is divided into an upper space and a lower space by the wall face, and the injection port of the spray injection nozzle is located in the lower space.

3. The cutting device according to claim 1, wherein an inside of the container is divided into an upper space and a lower space by the wall face, and the injection port of the spray injection nozzle is located in the upper space.

4. The cutting device according to claim 1, further comprising a pressure control means for keeping the pressure in the container constant in the path for supplying the gas to the gas discharge nozzle.

5. The cutting device according to claim 1, wherein a tip-tapered discharge part is connected to the tip of the spray feeding path.

6. The cutting device according to claim 1, wherein gas and oil are fed to the spray injection nozzle, and the spray is injected into the container by mixing the gas and the oil in the spray injection nozzle.

7. The cutting device according to claim 6, wherein the oil stored in the container flows into a liquid supply means and the oil discharged from the liquid supply means is fed to the spray injection nozzle.

8. The cutting device according to claim 7, wherein the liquid supply means is an oil pump.

9. The cutting device according to claim 6, further comprising a pressure control means for keeping the pressure in the container constant in a path for supplying the gas to the spray injection nozzle.

10. A cutting device, comprising a container, a spray injection nozzle for injecting oil spray into the container, and a spray feeding path for feeding the oil spray in the container to an outside of the container, wherein a gas discharge nozzle is provided having a tip portion in the air within the container and discharging gas, wherein most of the injected spray flow from the spray injection nozzle is allowed to strike a wall face in the container before being fed to the spray feeding path, and wherein the wall face is an outer wall face of a dome member opening downward.

11. A cutting device, comprising a container, a spray injection nozzle for injecting oil spray into the container, and a spray feeding path for feeding the oil spray in the container to an outside of the container, wherein a gas discharge nozzle is provided having a tip portion in the air within the container and discharging gas, wherein most of the injected spray flow from the spray injection nozzle is allowed to strike a wall face in the container before being fed to the spray feeding path, and wherein the injected spray flow, after striking the wall face and before being fed to the spray feeding path, strikes another wall face formed separately from the wall face.

12. A cutting method, comprising attaching a liquid spray device to an oil supplying part of a machine tool, the liquid spray device comprising a container, a spray injection nozzle for injecting oil spray into the container, a spray feeding path for feeding oil spray in the container to an outside of the container, wherein a gas discharge nozzle is provided having a tip portion in the air within the container and discharging gas, wherein most of the spray from the injection nozzle is allowed to strike a wall face in the container before being fed to the spray feeding path, and wherein the wall face is an inner wall face of a dome member opening downward; and cutting a target object to be processed by supplying the spray to a cutting member of the machine tool.

13. The cutting method according to claim 12, wherein the inside of the container is divided into an upper space and a lower space by the wall face, in which the injection port of the spray injection nozzle is located in the lower space.

14. The cutting method according to claim 12, wherein the container is divided into an upper space and a lower space by the wall face, in which the injection port of the spray injection nozzle is located in the upper space.

15. A cutting method, comprising attaching a liquid spray device to an oil supplying part of a machine tool, the liquid spray device comprising a container, a spray injection nozzle for injecting oil spray into the container, a spray feeding path for feeding oil spray in the container to an outside of the container, wherein a gas discharge nozzle is provided having a tip portion in the air within the container and discharging