SUMMARY

However, a problem with the configuration of the conventional two-fluid nozzle disclosed in PTL 1 is that, despite of the complex nozzle structure, the liquid to be sprayed is not sufficiently atomized, ending up spraying a liquid having a large particle size. Specifically, the liquid sprayed through the two-fluid nozzle disclosed in PTL 1 has a particle size of 50 μm or greater. The liquid sprayed having a large particle size as such requires time to vaporize. In other words, an object sprayed with the liquid gets dripping wet due to late vaporization.

The present disclosure solves the conventional problem and has an object to provide a spraying apparatus which sprays liquid which has a small particle size and vaporize so quickly that an object sprayed with the liquid does not get dripping wet. More specifically, the object of the present disclosure is to provide a two-fluid nozzle spraying apparatus which sprays a liquid which has a small particle size such as 10 μm or less and vaporizes so quickly that an object sprayed with the liquid do not get dripping wet.

According to one aspect of the present disclosure,

a spraying apparatus main body having a liquid passageway and a gas passageway;

an inner lid which includes an inner lid plate, the inner lid being disposed on a distal end of the spraying apparatus main body and

covering an opening of the liquid passageway, the inner lid plate being flat;

an outer lid which includes an outer lid plate which is flat and faces the inner lid plate of the inner lid, the outer lid being disposed on the distal end of the spraying apparatus main body and covering the inner lid and an opening of the gas passageway;

a gas-liquid mixing section for mixing a gas that enters through the gas passageway and a liquid that enters through the liquid passageway, the gas-liquid mixing section being a space between the inner lid and the outer lid and having a disc-shaped profile defined by the inner lid plate of the inner lid and the outer lid plate of the outer lid;

a liquid inlet for introducing the liquid that enters through the liquid passageway into the gas-liquid mixing section, the liquid inlet passing through the inner lid plate of the inner lid at least at one place in a circumferential direction and communicating with the gas-liquid mixing section;

a gas inlet for introducing the gas that enters through the gas passageway into the gas-liquid mixing section to the liquid that entered the gas-liquid mixing section through the liquid inlet, the gas inlet communicating with the gas-liquid mixing section on a side portion of the gas-liquid mixing section between the inner lid and the outer lid; and

a spout for spouting a liquid atomized by the gas and the liquid being mixed in the gas-liquid mixing section, the spout communicating

with the gas-liquid mixing section and passing through the outer lid plate of the outer lid. In an embodiment, a spraying apparatus is provided which includes: a spraying apparatus main body having a liquid passageway and a gas passageway; an inner lid which includes an inner lid plate, the inner lid being disposed on a distal end of the spraying apparatus main body and covering an opening of the liquid passageway, the inner lid plate being

[Claims]

[Claim 1]

A spraying apparatus comprising:

a spraying apparatus main body having a liquid passageway and a gas passageway;

an inner lid which includes an inner lid plate, the inner lid being disposed on a distal end of the spraying apparatus main body and covering an opening of the liquid passageway, the inner lid plate being flat;

an outer lid which includes an outer lid plate which is flat and faces the inner lid plate of the inner lid, the outer lid being disposed on the distal end of the spraying apparatus main body and covering the inner lid and an opening of the gas passageway;

a gas-liquid mixing section for mixing a gas that enters through the gas passageway and a liquid that enters through the liquid passageway, the gas-liquid mixing section being a space between the inner lid and the outer lid and having a disc-shaped profile defined by the inner lid plate of the inner lid and the outer lid plate of the outer lid;

a liquid inlet for introducing the liquid that enters through the liquid passageway into the gas-liquid mixing section, the liquid inlet passing through the inner lid plate of the inner lid at least at one place in a circumferential direction and communicating with the gas-liquid mixing section;

a gas inlet for introducing the gas that enters through the gas passageway into the gas-liquid mixing section to the liquid that entered the gas-liquid mixing section through the liquid inlet, the gas inlet communicating with the gas-liquid mixing section on a side portion of the gas-liquid mixing section between the inner lid and the outer lid; and

a spout for spouting a liquid atomized by the gas and the liquid being mixed in the gas-liquid mixing section, the spout communicating with the gas-liquid mixing section and passing through the outer lid plate of the outer lid.

[Claim 2]

The spraying apparatus according to claim 1, wherein

one of the outer lid plate of the outer lid and the inner lid plate of the inner lid has an annular projection, and the annular projection, the outer lid plate of the outer lid, and the inner lid plate of the inner lid form the gas-liquid mixing section which is the disc-shaped profile, and the gas inlet is formed by cutting a portion of the annular projection.

[Claim 3]

The spraying apparatus according to claim 1 or 2, wherein the gas inlet and the liquid inlet are located on opposite sides relative to a center of the spraying apparatus main body.

[Claim 4]

The spraying apparatus according to claim 1 or 2, wherein the gas inlet is disposed proximate the liquid inlet in a manner that a flow of the liquid through the liquid inlet and a flow of the gas through the gas inlet

intersect.

[Claim 5]

The spraying apparatus according to claim 4, wherein

a projection in a disc shape is formed on the inner lid plate of the inner lid to form an annular passageway around the projection in a disc shape in the gas-liquid mixing section.

[Detailed Description of the Invention]

[Technical Field]

[0001]

The present invention relates to a two-fluid nozzle spraying apparatus which atomizes a liquid using a gas.

[Background Art]

[0002]

Nozzles for atomizing liquids are widely used in, for example, space/material cooling apparatuses, humidifying apparatuses, chemical solution dispensing apparatuses, combustion apparatuses, and dust control apparatuses. The atomization nozzles can be broadly divided into a single-fluid nozzle which atomizes a liquid by spouting the liquid from a micro aperture, and a two-fluid nozzle which atomizes a liquid, using a gas such as an air, nitrogen, steam, etc. Comparing the single-fluid nozzle and the two-fluid nozzle, in general, the two-fluid nozzle is superior to the single-fluid nozzle in atomization performance because the two-fluid nozzle atomizes a liquid using energy of a gas.

[0003]