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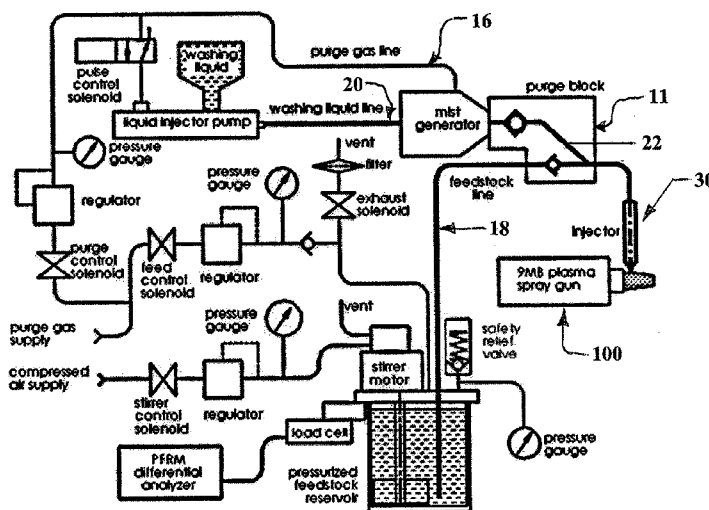
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(54) **Title:** PRESSURE BASED LIQUID FEED SYSTEM FOR SUSPENSION PLASMA SPRAY COATINGS

FIG. 1



(57) **Abstract:** Apparatus (1) for injecting a liquid in an area of a thermal spray gun (100). The apparatus (1) includes an injector cleaning device (10) having an inlet connectable (19) to at least one feedstock supply line (18), an inlet connectable (17) to at least one gas supply line (16), and an inlet connectable (21) to at least one liquid medium supply line (20). An injector (30) orifice is coupled to the injector cleaning device (10) and is adapted to at least one of inject a liquid jet into a hot stream created in the area of the thermal spray gun (100) and receive feedstock, gas and liquid passing into the inlets.

AMENDED CLAIMS

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1. An apparatus for injecting a liquid in an area of a thermal spray gun, the apparatus comprising:

an injector cleaning device comprising:

an inlet connectable to at least one feedstock supply line;

an inlet connectable to at least one gas supply line; and

an inlet connectable to at least one liquid medium supply line,

an injector orifice in fluid communication with the injector cleaning device and being adapted to at least one of:

inject a liquid jet into the area of the thermal spray gun; and

receive feedstock, gas and liquid passing into said inlets.

2. The apparatus of claim 1, wherein the injector cleaning device comprises a liquid atomizing chamber adapted to disperse liquid into a gas stream upstream of the injector orifice.

3. The apparatus of claim 1, wherein the at least one feedstock supply line, the at least one gas supply line, and the at least one liquid medium supply line are located upstream of the injector orifice.

4. The apparatus of claim 1, further comprising a mounting arrangement adapted to couple the injector cleaning device to a portion of the thermal spray gun.

5. The apparatus of claim 1, wherein the injector cleaning device comprises at least one of:

a purge block section and a mist chamber section;

a mist block section comprising a gas/liquid mixing chamber arranged upstream of a check valve;

a purge block section comprising a check valve and a filter for preventing contaminants entrained in liquid or gas from passing out of the injector orifice; and

a purge block section comprising a passage in fluid communication with a check valve arranged downstream of the inlets of the liquid medium and gas supply lines and in fluid communication with another passage arranged downstream of the feedstock supply line.

6. The apparatus of claim 1, wherein the injector cleaning device comprises a mist chamber section and the inlet connectable to at least one gas supply line and the inlet connectable to at least one liquid medium supply line are at least one of:

arranged on the mist chamber section; and
coupled to the mist chamber section.

7. The apparatus of claim 1, wherein the injector cleaning device comprises a purge block section and the inlet connectable to at least one feedstock supply line is at least one of:
arranged on the purge block section; and
coupled to the purge block section.

8. The apparatus of claim 1, further comprising a mounting arrangement adapted to couple the injector cleaning device to a discharge end of the thermal spray gun.

9. The apparatus of claim 8, the mounting arrangement comprising a gun mount securable to the thermal spray gun.

10. The apparatus of claim 8, the mounting arrangement comprising a gun mount removably securable to the thermal spray gun.

11. The apparatus of claim 8, the mounting arrangement comprising at least one of:
a gun mount securable to the thermal spray gun;
a mounting block; and
a support plate adapted to connect the mounting block to the injector cleaning device.

12. An injector cleaning apparatus for a thermal spray gun, comprising:
at least one feedstock supply line;
at least one gas supply line; and
at least one liquid medium supply line,
wherein the at least one feedstock supply line, the at least one gas supply line, and the at least one liquid medium supply line are located upstream of an injector orifice located in an area of the thermal spray gun.

13. The apparatus of claim 12, wherein at least one of the feedstock supply line, the gas supply line and the liquid medium supply line are removably connected to an injector assembly.

14. The apparatus of claim 12, wherein the at least one liquid medium supply line is connected to a liquid medium supply that contains a liquid medium.

15. The apparatus of claim 14, wherein the liquid medium is a rinsing agent.
16. The apparatus of claim 14, wherein the liquid medium is a liquid structured and arranged to clean an injector for injecting feedstock.
17. The apparatus of claim 12, wherein the feedstock supply line is connected to a hopper that contains a feedstock.
18. The apparatus of claim 17, wherein the feedstock is at least one of a suspension, a precursor and a solution.
19. The apparatus of claim 12, further comprising a mister that mists liquid medium prior to entry of the liquid medium into an injector for injecting feedstock.
20. The apparatus of any one of claims 12-19, further comprising a purging arrangement having two switchable mode as follows:
- a first mode wherein liquid feed is fed to the injector orifice; and
 - a second mode wherein liquid medium is fed to the injector orifice.
21. The apparatus of any one of claims 12-20, further comprising an injector cleaning device adapted to combine liquid medium and purge gas upstream of the injector orifice.
22. The apparatus of any one of claims 12-21, further comprising a controller adapted to control flow of at least one of:
- a feedstock;
 - a gas;
 - a liquid medium; and
 - a purging fluid.
23. A system for injecting a liquid jet into a hot stream or plasma of a thermal spray gun, comprising:
- a thermal spray gun; and
 - the injector cleaning apparatus of claim 12.

24. A system for injecting a liquid jet into hot stream or plasma of a thermal spray gun, comprising:

a thermal spray gun; and

the injector cleaning apparatus of claim 1.

25. A method of injecting a liquid jet into hot stream or plasma of a thermal spray gun, comprising:

arranging the injector cleaning apparatus of claim 12 on a thermal spray gun; and

at least one of:

discharging a liquid via the injector orifice;

discharging each of a feedstock and a cleaning liquid via the injector orifice at two different points in time; and

discharging a feedstock via the injector orifice during a feedstock feed cycle and discharging a cleaning fluid via the injector orifice during a cleaning fluid cleaning cycle.

26. A method of injecting a liquid jet into hot stream or plasma of a thermal spray gun, comprising:

arranging the injector cleaning apparatus of claim 1 on a thermal spray gun; and

injecting, via the injector orifice, a liquid jet into a hot stream or plasma created in the area of the thermal spray gun.

27. A method of using the apparatus or system of any one of claims 1-19, comprising at least one of:

activating a flow of liquid cleaning fluid in a gas dispersant upon a flow of liquid feedstock is stopped;

automatically producing a flow of an atomized liquid cleaning fluid after shut down of a flow of liquid feedstock; and

activating a flow of liquid cleaning fluid in a gas dispersant each time a flow of liquid feedstock is stopped or shut down,

whereby the activating or producing substantially prevents build-up of obstruction material or crust formation on at least one flow surface arranged upstream of the injector orifice.