

THE CLAIMS

What is claimed is:

1. A fluid injection device for injecting a dispensible fluid material into a pressurized system having therein relatively high and low pressure zones of a pressurized fluid, the fluid injection device comprising:

a tube having an inlet end and an outlet end, the inlet end having an inlet closure member which is connectible in fluid flow communication to such high pressure zone, and the outlet end having an outlet tube connector which is connectible in fluid flow communication with such low pressure zone, the outlet tube connector defining a discharge flow path extending therethrough to exteriorly of the device;

the tube defining therewithin a closed storage chamber disposed between the inlet closure member and the outlet tube connector, the storage chamber containing a dispensible fluid material and having an outlet end closed by an outlet valve, the outlet valve being configured to be opened by being contacted by a movable member; and

the movable member being disposed within the discharge flow path adjacent to and spaced downstream from the outlet valve and being movable within the flow path, the movable member being configured (a) to permit passage of the dispensible fluid material through the discharge flow path, and (b) so that upon connection of the outlet tube connector to such low pressure zone, the movable member is forced into contact with the outlet valve to open the outlet valve for discharge of the dispensible fluid material through the discharge flow path.

2. The device of claim 1 wherein the movable member further comprises a check valve passage for passage therethrough of the dispensible fluid material, and a check valve disposed within the check valve passage and configured to prevent backflow from such low pressure zone into the outlet valve.

3. The device of claim 2 wherein the movable member further comprises an O-ring and there is a clearance between the movable member and the outlet valve which clearance is sufficient to prevent or at least minimize the possibility of contact of the movable member and its O-ring with any dispensible fluid material which has leaked past the outlet valve.

4. The device of claim 3 wherein the clearance is from about 0.02 inch (0.051 cm) to about 0.04 inch (0.102 cm).

5. The device of claim 1 wherein such low pressure zone is accessible via a service port of such pressurized system and the outlet tube connector further comprises an installation member configured to secure the outlet tube connector to such service port and force the movable member into said contact with the outlet valve.

6. The device of claim 4 wherein the installation member comprises a threaded installation nut configured to be threaded onto such service port.

7. The device of claim 1 or claim 2 wherein the outlet valve comprises an operating member facing the movable member and aligned therewith whereby movement of the movable member into contact with the operating member displaces the operating member to open the outlet valve.

8. The device in claim 1 or claim 2, wherein the movable member comprises a circumferential V-groove within which is disposed an O-ring seal to prevent or at least inhibit leakage around the movable member during use of the device, and to retain the movable member in place to prevent actuation of the outlet valve caused by unintended movement of the movable member prior to use of the device.

9. The device of any one of claims 1, 2 or 3 wherein the dispensible fluid material is a sealant fluid suitable for sealing leaks in such pressurized system.

10. The device of any one of claims 1, 2, 3 or 5 wherein at least those portions of the device which are susceptible to contact with the dispensible fluid material prior to use of the device are comprised of one or more moisture-impermeable materials.

11. The device of any one of claims 1, 2, 3 or 5 wherein at least those portions of the device which are susceptible to contact with the dispensible fluid material prior to use of the device are comprised of one or more materials that are not subject to dimensional change by contact with the dispensible fluid material.

12. The device of claim 1 or claim 2 wherein the inlet closure member is configured to automatically, upon being connected to such high pressure zone, switch from a closed position to an open position.

13. A fluid injection device for injecting a dispensible fluid material into a pressurized system having relatively high and low pressure zones of a pressurized fluid, the fluid injection device comprising:

a moisture-impermeable tube having an inlet end and an outlet end, the inlet end having an inlet closure member which is connectible in fluid flow communication to such high pressure zone, and the outlet end having an outlet tube connector which is connectible in fluid flow communication with such low pressure zone via a service port of such pressurized system, the outlet tube connector defining a discharge flow path extending therethrough to exteriorly of the device;

the tube defining therewithin a closed storage chamber disposed between the inlet closure member and the outlet tube connector, the storage chamber containing a dispensible fluid material and having an outlet end closed by an outlet valve, the outlet valve comprising an operating pin facing the movable member and aligned therewith;

a movable member disposed within the discharge flow path adjacent to and spaced from the outlet valve and being movable within the flow path, the movable member being configured so that upon connection of the outlet tube connector to such service port, the movable member is forced into engagement with the operating pin to displace the operating pin to open the outlet valve for discharge of the dispensible fluid material through the discharge flow path; and

the movable member comprising a check valve passage within which is disposed a check valve configured to prevent backflow from such service port into the outlet valve.

14. The device of claim 13 wherein the check valve is spring-loaded.

15. The device of claim 13 wherein upon loosening or disconnection of the device from fluid flow communication with the low pressure zone of such pressurized system while the device is still connected in fluid flow communication to the high pressure zone of such pressurized system, the movable member is configured to automatically return to its position spaced downstream from the outlet valve to thereby close the outlet valve to shut off flow through the device of the dispensible fluid material.

16. The device of claim 13 wherein the dispensible fluid material comprises a liquid sealant suitable for sealing leaks in such pressurized system.

17. The device of any one of claims 13, 14 or 15 wherein the outlet tube connector further comprises a threaded installation nut configured to be threaded onto such service port whereby the movable member is urged by movement of the installation nut relative to

such service port to cause such service port to displace the operating pin whereby to open the outlet valve.

18. The device of any one of claims 13, 14 or 15 wherein the inlet closure member and the outlet valve each comprise a Schrader valve, the Schrader valve of the inlet closure member being configured to automatically open upon being connected to such high pressure zone.