

CLAIMS

1. A dispensing system to dispense viscous material on an electronic substrate, the dispensing system comprising:
- a frame;
 - 5 a support coupled to the frame, the support being configured to receive and support an electronic substrate during a dispense operation;
 - a dispensing unit assembly configured to dispense viscous material; and
 - a gantry coupled to the frame, the gantry being configured to support the dispensing unit assembly and to move the dispensing unit assembly in x-axis and y-axis
 - 10 directions,
- wherein the dispensing unit assembly includes a dispensing unit configured to dispense viscous material, the dispensing unit including
- a support housing,
 - a fluidic housing supported by the support housing, the fluidic housing
 - 15 including a chamber and an inlet configured to deliver viscous material to the chamber from a material feed tube,
 - a nozzle assembly releasably secured to the housing and configured to close an end of the fluidic housing,
 - a reciprocating piston disposed partially within the chamber of the fluidic
 - 20 housing, the piston being configured with the nozzle assembly to dispense viscous material from the nozzle assembly, and
 - a fixed flexible diaphragm seal configured to be secured to the fluidic housing and to the piston.
- 25 2. The dispensing system of claim 1, wherein the diaphragm seal includes an inner hub, an outer hub, and a flexible diaphragm portion that connects the inner hub and the outer hub.
3. The dispensing system of claim 1, wherein the inner hub of the diaphragm
- 30 seal is sized to fit within a reduced diameter notch formed in the piston and the outer hub of the diaphragm seal is sized to be compression fit within the fluidic housing.

4. The dispensing system of claim 1, wherein the flexible diaphragm portion is configured to flex as the piston reciprocates up and down within the fluidic housing.

5 5. The dispensing system of claim 1, wherein the nozzle assembly further includes a nozzle nut, a nozzle, and a nozzle adapter.

6. The dispensing system of claim 5, wherein the nozzle nut is threadably secured to a lower portion of the support housing and configured to secure the nozzle and
10 the nozzle adapter between the nozzle nut and the lower end of the fluidic housing.

7. The dispensing system of claim 6, wherein the valve assembly further includes a valve seat, and wherein the dispensing unit further includes an O-ring to seal the valve seat with a bottom of the fluidic housing.

15

8. The dispensing system of claim 5, wherein the valve seat includes a generally cylindrical member having a conical surface and a small-diameter bore formed therein.

20 9. A dispensing unit of a dispensing system configured to dispense viscous material on an electronic substrate, the dispensing unit comprising:

a support housing;

a fluidic housing supported by the support housing, the fluidic housing including a chamber and an inlet configured to deliver viscous material to the chamber from a
25 material feed tube;

a nozzle assembly releasably secured to the housing and configured to close an end of the fluidic housing;

a reciprocating piston disposed partially within the chamber of the fluidic housing, the piston being configured with the nozzle assembly to dispense viscous
30 material from the nozzle assembly; and

a fixed flexible diaphragm seal configured to be secured to the fluidic housing and to the piston.

10. The dispensing unit of claim 9, wherein the diaphragm seal includes an
5 inner hub, an outer hub, and a flexible diaphragm portion that connects the inner hub and the outer hub.

11. The dispensing unit of claim 10, wherein the inner hub of the diaphragm
seal is sized to fit within a reduced diameter notch formed in the piston and the outer hub
10 is sized to be compression fit within the fluidic housing.

12. The dispensing unit of claim 9, wherein the flexible diaphragm portion is
configured to flex as the piston reciprocates up and down within the fluidic housing.

13. The dispensing unit of claim 9, wherein the nozzle assembly further
15 includes a nozzle nut, a nozzle, and a nozzle adapter.

14. The dispensing unit of claim 13, wherein the nozzle nut is threadably
secured to a lower portion of the support housing and configured to secure the nozzle and
20 the nozzle adapter between the nozzle nut and the lower end of the fluidic housing.

15. The dispensing unit of claim 14, wherein the valve assembly further
includes a valve seat, and wherein the dispensing unit further includes an O-ring to seal
the valve seat with a bottom of the fluidic housing.

25 16. The dispensing unit of claim 15, wherein the valve seat includes a
generally cylindrical member having a conical surface and a small-diameter bore formed
therein.

30 17. A method of dispensing viscous material on an electronic substrate, the
method comprising:

- delivering an electronic substrate to a dispense position;
capturing at least one image of the electronic substrate;
analyzing the at least one image of the electronic substrate to determine a position
of the electronic substrate; and
- 5 performing a dispense operation with a dispensing unit including
a support housing,
a fluidic housing supported by the support housing, the fluidic housing
includes a chamber and an inlet configured to deliver viscous material to the
chamber from a material feed tube,
- 10 a nozzle assembly releasably secured to the housing and configured to
close an end of the fluidic housing,
a reciprocating piston disposed partially within the chamber of the fluidic
housing, the piston being configured to dispense viscous material from the nozzle
assembly, and
- 15 a fixed flexible diaphragm seal configured to be secured to the fluidic
housing and to the piston.
18. The method of claim 17, wherein the diaphragm seal includes an inner
hub, an outer hub, and a flexible diaphragm portion that connects the inner hub and the
20 outer hub.
19. The method of claim 18, wherein the inner hub of the diaphragm seal is
sized to fit within a reduced diameter notch formed in the piston and the outer hub is
sized to be compression fit within the fluidic housing.
- 25 20. The method of claim 17, wherein the flexible diaphragm portion is
configured to flex as the piston reciprocates up and down within the fluidic housing.
21. The method of claim 17, wherein the nozzle assembly further includes a
30 nozzle nut, a nozzle, and a nozzle adapter.

22. The method of claim 21, wherein the nozzle nut is threadably secured to a lower portion of the support housing and configured to secure the nozzle and the nozzle adapter between the nozzle nut and the lower end of the fluidic housing.

- 5 23. The method of claim 21, wherein the valve assembly further includes a valve seat, and wherein the dispensing unit further includes an O-ring to seal the valve seat with a bottom of the fluidic housing.