What is claimed is:

1. A pressure regulator assembly comprising:

a pressure regulator disposed in an interior volume of the dispensing vessel including a housing having a chamber with an inlet and an outlet, the chamber including therein a pressure-sensing assembly with a stationary portion fixed relative to the housing and a movable portion, the stationary and movable portions being interconnected by a bellows structure with diaphragm elements adapted to expand and contract in response to pressure variations in the chamber;

a damper assembly adapted to dampen oscillations and stabilize movement of the pressure-sensing assembly between open and closed positions, the damper assembly disposed within a sleeve formed on the movable portion; and

a poppet closure assembly operatively coupled to the pressure-sensing assembly and adapted to regulate fluid pressure between the inlet and outlet of the chamber, the poppet closure assembly including a poppet element and a seating structure located at the inlet of the chamber, the poppet element having a surface with the upper part cut into a hemispherical shape that is adapted to mate and contact the seating structure to form a seal,

wherein the poppet closure assembly further includes an O-ring member interposed between the upper end of the poppet element and the seating structure.

2. The pressure regulator assembly of claim 1, wherein the diaphragm elements of the bellows structure is configured to have single weld diaphragm elements.

3. The pressure regulator assembly of claim 1, wherein the poppet closure assembly is further comprised of a material of construction having a low level of deformation while under pressure.

4. The pressure regulator assembly of claim 1, wherein the poppet closure assembly is further comprised of a poppet element of a non-conical sealing shape with a complimentary-shaped seating structure.

5. The pressure regulator assembly of claim 1, wherein the seating structure of the poppet closure assembly is comprised of a non-metallic material.

6. The pressure regulator assembly of claim 1, wherein the bellows structure with diaphragm elements is comprised of a material having a thickness and an elasticity configured to reduce a

travel distance of the poppet element within the poppet closure assembly thereby partially attenuating a fluid dispensed from the vessel at inception of fluid dispensing.

7. The pressure regulator assembly of claim 1, wherein the damper assembly includes an axial member with a body, a circumferential sleeve and a spring member, the axial member body having a proximal end coupled to the stationary portion and a distal end protruding towards the movable portion, the axial member body having the spring member disposed circumferentially about the distal end of the axial member with the circumferential sleeve located about the proximal end of the axial member and in contact with an upper end of the spring member.

8. A fluid supply package comprising:

a pressure-regulated fluid storage and dispensing vessel;

a pressure regulator disposed in an interior volume of the dispensing vessel including a housing having a chamber with an inlet and an outlet, the chamber including therein a pressure-sensing assembly with a stationary portion fixed relative to the housing and a movable portion, the stationary and movable portions being interconnected by a bellows structure with single weld diaphragm elements adapted to expand and contract in response to pressure variations in the chamber;

a damper assembly adapted to dampen oscillations and stabilize movement of the pressure-sensing assembly between open and closed positions, the damper assembly disposed within a sleeve formed on the movable portion;

a poppet closure assembly operatively coupled to the pressure-sensing assembly and adapted to regulate fluid pressure between the inlet and outlet of the chamber, the poppet closure assembly including a poppet element and a seating structure located at the inlet of the chamber, the poppet element having a surface with the upper part cut into a hemispherical shape that is adapted to mate and contact the seating structure to form a seal; and

a valve head coupled to the dispensing vessel and adapted for dispensing of a fluid from the vessel through a discharge port, the pressure regulator being disposed upstream of the discharge port and coupled to the valve head, the valve head including a flow control valve that is operable to control fluid dispensing from the vessel,

wherein the poppet closure assembly further includes an O-ring member interposed between the upper end of the poppet element and the seating structure.

9. The fluid supply package of claim 8, wherein the damper assembly includes an axial member with a body, a circumferential sleeve and a spring member, the axial member body having a

proximal end coupled to the stationary portion and a distal end protruding towards the movable portion, the axial member body having the spring member disposed circumferentially about the distal end of the axial member with the circumferential sleeve located about the proximal end of the axial member and in contact with an upper end of the spring member.