CLAIMS

WHAT IS CLAIMED IS:

1. A plunger for use with a syringe, the plunger comprising:

a plunger body defining a central longitudinal axis and having a proximal end, a distal end, and a circumferential sidewall connecting the proximal end and the distal end; and

at least one retaining member associated with and extending proximally from the plunger body, the at least one retaining member comprising:

a first end connected to the plunger body;

a second end proximal to the first end and radially and resiliently deflectable relative to the first end; and

at least one catch on the second end,

wherein the at least one retaining member has an outer surface configured to engage a plunger engagement sleeve of a plunger engagement mechanism on a piston of a fluid injector system when the plunger is in a locked state with the piston,

wherein the at least one retaining member has an inner surface configured to engage a plunger engagement post of the plunger engagement mechanism when the plunger is in the locked state with the piston,

wherein the at least one catch is configured to engage a locking feature on one of the plunger engagement sleeve and the plunger engagement post when the plunger is in the locked state with the piston to prevent axial movement of the plunger relative to the piston, and

wherein the at least one catch is configured to radially deflect the second end of the at least one retaining member upon axial movement of the piston relative to the plunger in an unlocked state of the plunger from the piston due to engagement of the at least one catch with the locking feature on one of the plunger engagement sleeve and the plunger engagement post.

2. The plunger according to claim 1, wherein the at least one retaining member comprises a plurality of retaining members spaced apart around the central longitudinal axis.

3. The plunger according to claim 2, wherein the plurality of retaining members are spaced apart at equal intervals around the central longitudinal axis.

4. The plunger according to any of claims 1 to 3, wherein the at least one retaining member extends proximally in a direction parallel with the central longitudinal axis.

5. The plunger according to any of claims 1 to 3, wherein the at least one retaining member extends proximally in a direction angled relative to the central longitudinal axis.

6. The plunger according to any of claims 1 to 5, wherein the at least one retaining member is linearly contiguous between the first end and the second end.

7. The plunger according to any of claims 1 to 5, wherein the at least one retaining member is curvilinearly contiguous between the first end and the second end.

8. The plunger according to any of claims 1 to 7, wherein the plunger is configured to engage the plunger engagement mechanism regardless of angular orientation of the plunger relative to the piston of the fluid injector.

9. The plunger according to any of claims 1 to 8, wherein the at least one catch has a first surface at a proximal end of the at least one catch configured for engaging a distal end of the locking feature on one of the plunger engagement sleeve and the plunger engagement post during engagement of the plunger to the piston, and a second surface at a distal end of the at least one catch configured for engaging a proximal end of the locking feature on one of the plunger engagement sleeve and the plunger engagement post during disengagement of the plunger from the piston.

10. The plunger according to any of claims 1 to 9, wherein the at least one catch protrudes radially inward from the inner surface of the at least one retaining member in a direction toward the central longitudinal axis.

11. The plunger according to any of claims 1 to 10, wherein the at least one catch protrudes radially outward from the outer surface of the at least one retaining member in a direction away from the central longitudinal axis.

12. The plunger according to any of claims 1 to 11, wherein the at least one catch defines a locking recess for receiving at least a portion of the plunger engagement mechanism when the plunger is connected to the piston.

13. The plunger according to any of claims 1 to 12, wherein the at least one catch protrudes radially inward from the inner surface of the at least one retaining member in a direction toward the central longitudinal axis, and wherein the at least one catch is configured to be received within the locking feature that is shaped as a locking groove protruding radially inward from an outer surface of the plunger engagement post when the plunger is in the locked state with the piston.

14. The plunger according to any of claims 1 to 13, wherein the plunger body has conical-shaped portion at the distal end and a cylindrical-shaped portion at the proximal end.

15. The plunger according to claim 14, wherein the at least one retaining member protrudes proximally from an inner surface of the conical-shaped portion.

16. The plunger according to claim 14 or 15, further comprising a plurality of release tabs protruding radially inward from an inner surface of the cylindrical-shaped portion or proximally from the inner surface of the cylindrical-shaped portion, each of the plurality of release tabs configured for interacting with the plunger engagement sleeve to effect a release of the plunger from the piston upon rotation of the plunger about the central longitudinal axis.

17. The plunger according to claim 16, wherein a proximal end of each of the plurality of release tabs has a pointed guide surface.

18. The plunger according to any of claims 1 to 17, further comprising a plunger cover covering at least a portion of a distal surface of the plunger body and comprising a seal disposed around at least a portion of the circumferential sidewall of the plunger body.

19. The plunger according to any of claims 1 to 18, wherein the plunger is configured to be slidably positioned within a barrel of a syringe.

20. The plunger according to claim 19, wherein the plunger is configured for reciprocal movement within the barrel of the syringe.