SUMMARY OF EMBODIMENTS OF THE INVENTION

[0004] Exemplary embodiments of the present invention address at least the above problems and/or disadvantages and provide at least the advantages described below.

[0005] Herein disclosed is a medication injection pen. The medication injection pen includes a housing, a push button at a proximal end of said housing, a dose set knob (DSK) having at least one internal tooth and a ring of DSK ratchet teeth on said dose set knob. The medication injection pen further includes a driver including at least one external tooth and a ring of driver ratchet teeth on the driver and a clicker operatively engaged between the dose set knob and the driver having at least a DSK ratchet arm for engaging the DSK ratchet teeth and at least a driver ratchet arm for engaging said driver ratchet teeth. The driver is prevented from rotating with the dose set knob while moving axially with the dose set knob during dose setting and dose correcting, and the push button is depressed, the clicker is moved distally and pushes the driver distally such that the at least one external tooth of the driver engages the at least one internal tooth of the dose set knob thereby forcing the driver to rotate with the dose set knob during an injection.

[0005a] According to an aspect of the present invention, there is provided a medication injection pen, comprising: a housing; a push button at a proximal end of said housing; a dose set knob (DSK) comprising at least one internal tooth and a ring of DSK ratchet teeth on said dose set knob; a driver including at least one external tooth and a ring of driver ratchet teeth on said driver; and a clicker operatively engaged between said dose set knob and said driver having at least a DSK ratchet arm for engaging said DSK ratchet teeth and at least a driver ratchet arm for engaging said driver ratchet teeth, wherein said driver is not rotating with said dose set knob while moving axially with said dose set knob during dose setting or dose correcting, due to at least one external tooth of said driver not engaging said at least one

internal tooth of said dose set knob, a rotating direction of the dose set member for dose setting is opposite to a rotating direction of the dose set member for dose correcting, and when said push button is depressed, said clicker is moved distally and pushes said driver distally such that said at least one external tooth of said driver engages said at least one internal tooth of said dose set knob thereby forcing said driver to rotate with said dose set knob during an injection; and a hollow piston rod rotationally fixed with respect to the housing and moved axially during the injection by rotation of said lead screw.

[0006] Additional objects, advantages and salient features of exemplary embodiments of the invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with annexed drawings, discloses exemplary embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The above and other exemplary features and advantages of certain exemplary embodiments of the present invention will become more apparent from the following description of certain exemplary embodiments thereof when taken in conjunction with the accompanying drawings in which:

CLAIMS

1. A medication injection pen, comprising:

a housing;

a push button at a proximal end of said housing;

a dose set knob (DSK) comprising at least one internal tooth and a ring of DSK ratchet teeth on said dose set knob;

a driver including at least one external tooth and a ring of driver ratchet teeth on said driver; and

a clicker operatively engaged between said dose set knob and said driver having at least a DSK ratchet arm for engaging said DSK ratchet teeth and at least a driver ratchet arm for engaging said driver ratchet teeth,

wherein said driver is not rotating with said dose set knob while moving axially with said dose set knob during dose setting or dose correcting, due to at least one external tooth of said driver not engaging said at least one internal tooth of said dose set knob, a rotating direction of the dose set member for dose setting is opposite to a rotating direction of the dose set member for dose correcting, and when said push button is depressed, said clicker is moved distally and pushes said driver distally such that said at least one external tooth of said driver engages said at least one internal tooth of said dose set knob thereby forcing said driver to rotate with said dose set knob during an injection; and

a hollow piston rod rotationally fixed with respect to the housing and moved axially during the injection by rotation of said lead screw.

2. The medication injection pen according to claim 1, wherein

said dose set knob rotating with respect to said clicker during dose setting generates a first audible indicia when the DSK ratchet arm of the clicker slides over the DSK ratchet teeth of the dose set knob, and said driver rotating with respect to said clicker member during dose correction generates a second audible indicia when the driver ratchet arm of the clicker slides over the driver ratchet teeth of the driver.

3. The medication injection pen according to claim 1, wherein

a lead screw is rotationally and axially fixed during the dose setting and the dose correcting, and said lead screw rotates with said driver during the dose injection.

4. The medication injection pen according to claim 1, wherein

said driver is moved axially with respect to a lead screw during said dose setting and said dose correcting.

5. The medication injection pen according to claim 4, wherein

said lead screw has a key and said driver has a slot to receive said key such that said driver moves axially relative to said lead screw during the dose setting.

6. The medication injection pen according to claim 5, wherein

a length of said slot corresponds to a maximum dose setting.

7. The medication injection pen according to claim 1, wherein

a dose stop member is disposed on said driver, said dose stop member moving axially on said driver during the dose setting and the dose correcting and said dose stop member rotating with said driver during the dose injection.

8. The medication injection pen according to claim 7, wherein

said dose stop member engages a protrusion disposed on an inner surface of said dose set knob to prevent setting a dose in excess of medicament remaining in said injection pen.

9. The medication injection pen according to claim 1, further comprising

a brake member having a plurality of axially extending splines and said driver has at least one spline ratchet arm engaging said plurality of axially extending splines.

10. A medication injection pen according to claim 9, wherein

said at least one spline ratchet arm engages said plurality of axially extending splines to prevent rotation of said driver with said dose set knob during dose setting and dose correcting, and said at least one spline ratchet arm passes over said axially extending splines to allow rotation of said driver with said dose set knob during the dose injection.

11. The medication injection pen according to claim 10, wherein

said dose set knob rotating with respect to said driver during dose setting and dose correcting generates a first audible indicia, and said driver rotating with respect to said brake member during the injection generates a second audible indicia.

12. The medication injection pen according to claim 1, wherein

said DSK ratchet teeth are located at a proximal end of said dose set knob.

13. The medication injection pen according to claim 1, wherein

said driver ratchet teeth are located at a proximal end of said driver.

14. The medication injection pen according to claim 1, wherein

said clicker DSK ratchet arm is an arcuate cantilever.

15. The medication injection pen according to claim 1, wherein

said clicker driver ratchet arm is an arcuate cantilever.

16. The medication injection pen according to claim 1, wherein

said clicker DSK ratchet arm is arcuate cantilever having a first radius and said clicker driver ratchet arm is an arcuate cantilever having a second radius, less than said first radius.

17. The medication injection pen according to claim 1, wherein said push button has a distal protrusion which engages a central opening in said clicker.

18. The medication injection pen according to claim 10, wherein

a first rotation friction to rotate said driver, thereby ratcheting said at least one spline ratchet arm is greater than a second rotation friction to rotate said driver

with respect to said clicker, thereby ratcheting said at least one driver ratchet arm.