tend to simplify the steps required for a user to reset a dose setting mechanism while also making the device less complex and more compact in size.

SUMMARY

Embodiments provide an improved dose setting mechanism for a drug delivery device.

Embodiments include a dose setting mechanism comprising an inner housing with means for guiding a dial sleeve and/or a driver of said mechanism.

According to an aspect, a dose setting mechanism for a drug delivery device is provided, said mechanism comprising an outer housing, a non-rotating inner housing, a first driver portion, a second driver portion, a spindle axially movable in both a proximal and a distal direction inside and relative to the driver portions, and a dial sleeve disposed between said outer housing and said inner housing, wherein the inner housing has an external groove, said inner housing being rotatably fixed relative to the outer housing and operatively coupled to the second driver portion and guiding said second driver portion to dispense a dose set by said dose setting mechanism and wherein said dial sleeve is rotatably engaged with said external groove of said inner housing such that the dial sleeve translates away from both the inner and outer housing during dose setting;
and with the dose setting mechanism further comprising
a) a first clutch operatively coupled to said dial sleeve and said second driver portion is provided, said first clutch allows said dial sleeve and said second and first driver portions to rotate together during a setting of a dose of said drug delivery device, and said first clutch allows relative rotation of said second and first driver portions and said dial sleeve during an injection of said dose; and
b) a second clutch configured to couple the first and second driver portions to each other during dose setting and to decouple the first and second driver portions when the spindle is moved axially in the proximal direction.

According to an exemplary arrangement (first embodiment), a dose setting mechanism for a drug delivery device comprises an outer housing and an inner housing having an external groove. The inner housing guides the driver to dispense a dose set by the
dose setting mechanism. A dial sleeve is disposed between the outer and inner housing and is rotatably engaged with the external groove of the inner housing. When a dose is set, the

dial sleeve is rotated with respect to both the outer housing and the inner housing. The dial sleeve is translated away from both the outer housing and the inner housing. Preferably, said external groove of said inner housing comprises a helical groove having a constant pitch.

The inner housing may comprise an internal surface having a mechanical configuration that guides said driver to dispense said dose set by said dose setting mechanism. According to a first aspect of this embodiment, said mechanical configuration of said inner housing comprises a spline that guides said driver to dispense said dose set by said dose setting mechanism. Alternatively, said mechanical configuration of said inner housing may comprise a groove that guides said driver to dispense said dose set by said dose setting mechanism.

To improve the mechanical properties of the dose setting mechanism, said dial sleeve may have a generally smooth outer surface. Preferably, a scale arrangement is provided along a portion of said generally smooth outer surface. According to a further

To improve the mechanical properties of the dose setting mechanism, said dial sleeve may have a generally smooth outer surface. Preferably, a scale arrangement is provided along a portion of said generally smooth outer surface. According to a further aspect of this embodiment, said scale arrangement provided along said portion of said generally smoother outer surface is viewable only through a window provided in an outer housing of said dose setting mechanism.

The dose setting mechanism may be coupled to a cartridge holder. For a disposable drug delivery device, said dose setting mechanism is permanently coupled to said cartridge holder.

According to a further example of this fourth embodiment a spindle is provided, which is operatively coupled to said driver, such that when said inner housing guides said driver to dispense said dose set by said dose setting mechanism, said driver pushes said spindle to act on a cartridge bung while said spindle translates in a distal direction to expel said dose from said cartridge.

A further embodiment is directed to the ratio of the length of the inner housing or body to the length of further components of the dose setting mechanism of a drug delivery device. Preferably, the inner housing has a length L in its axial direction which is essentially the same as the length of the dose setting mechanism, or the outer housing or the dose dial sleeve. Although it is preferred to choose the length L of the inner housing being nealy exactly the same as the length of the outer housing, preferred embodiments include a length L of the inner housing being between about 75 % to about 125 %, preferably between 90 % and 110 %, of the length of the dose setting mechanism, or the outer housing or the dose dial sleeve.

These as well as other advantages of various embodiments will become apparent to those of ordinary skill in the art by reading the following detailed description, with appropriate reference to the accompanying drawings.

CLAIMS

1. A dose setting mechanism for a drug delivery device, said mechanism comprising an outer housing, a non-rotating inner housing, a first driver portion, a second driver portion, a spindle axially movable in both a proximal and a distal direction inside and relative to the driver portions, and a dial sleeve disposed between said outer housing and said inner housing, wherein the inner housing has an external groove, said inner housing being rotatably fixed relative to the outer housing and operatively coupled to the second driver portion and guiding said second driver portion to dispense a dose set by said dose setting mechanism and wherein said dial sleeve is rotatably engaged with said external groove of said inner housing such that the dial sleeve translates away from both the inner and outer housing during dose setting;
and with the dose setting mechanism further comprising

a) a first clutch operatively coupled to said dial sleeve and said second driver portion is provided, said first clutch allows said dial sleeve and said second and first driver portions to rotate together during a setting of a dose of said drug delivery device, and said first clutch allows relative rotation of said second and first driver portions and said dial sleeve during an injection of said dose; and

b) a second clutch configured to couple the first and second driver portions to each other during dose setting and to decouple the first and second driver portions when the spindle is moved axially in the proximal direction.

2. The dose setting mechanism of claim 1 wherein a dose dial grip is non-rotatably coupled to a dose button, such that when a dose is set by rotating said dose dial grip of said dose setting mechanism, said dial sleeve is rotated with respect to both said outer housing and said inner housing and said dial sleeve is translated away from both said outer housing and said inner housing while said button does not rotate.

3. The dose setting mechanism of claim 1, wherein said inner housing comprises an internal surface, said internal surface comprising a mechanical configuration that guides said second driver portion to dispense said dose set by said dose setting mechanism.

4. The dose setting mechanism of claim 3 wherein said mechanical configuration of said inner housing comprises a spline that guides said second driver portion to dispense said dose set by said dose setting mechanism.

5. The dose setting mechanism of claim 3 wherein said mechanical configuration of said inner housing comprises a groove that guides said second driver portion to dispense said dose set by said dose setting mechanism.

6. The dose setting mechanism of claim 1 wherein said external groove of said inner housing comprises a helical groove having a constant pitch.

7. The dose setting mechanism of claim 1 wherein said dial sleeve has a generally smooth outer surface.

8. The dose setting mechanism of claim 7 comprising a scale arrangement provided along a portion of said generally smooth outer surface.

9. The dose setting mechanism of claim 8 wherein said scale arrangement provided along said portion of said generally smoother outer surface is viewable only through a window provided in an outer housing of said dose setting mechanism.

10. The dose setting mechanism of claim 1 comprising the spindle operatively coupled to said driver such that when said inner housing guides said second driver to dispense said dose set by said dose setting mechanism, said first driver pushes said spindle to act on a cartridge bung while said spindle translates in a distal direction to expel said dose from said cartridge.

11. The dose setting mechanism of claim 1 wherein the inner surface of said inner housing comprises at least one longitudinal groove.

12. The dose setting mechanism of claim 1 wherein the inner surface of said inner housing comprises at least a portion of a helical groove.

13. The dose setting mechanism of claim 1 wherein the inner surface of said inner housing comprises a male groove guide.

14. The dose setting mechanism of claim 1 wherein said spindle comprises at least one groove, said at least one groove allowing said spindle to translate in a distal direction to expel said dose from a cartridge.

15. The dose setting mechanism of claim 1 wherein the inner housing has a length in its axial direction which is essentially the same as the length of the dose setting mechanism, or the outer housing or the dose dial sleeve.