some users may apply a large turning force (i.e., a large torque load) when attempting to dial a dose that exceeds the amount of medication left in the cartridge, it is important that the drug delivery device be able to withstand a large force.

There is, therefore, a general need to take these perceived dose accuracy issues into consideration when designing either resettable or non-resettable drug delivery devices, such as pen type drug delivery devices.

It is therefore an object of the present invention to provide a dose setting mechanism for a drug delivery device which is improved with regard to above explained needs.

Summary

According to an exemplary arrangement, a dose setting mechanism for a drug delivery device is provided. Preferably, the dose setting mechanism is a pen type drug delivery device. The dose setting mechanism for a drug delivery device with a cartridge is operable to select a dose of medication which shall be administered out of the cartridge of medication. The dose setting mechanism further comprises means that prevent a user of the dose setting mechanism from setting a dose of medication that is greater than the medication remaining in the cartridge. The dose setting mechanism comprises a shaft and a nut member disposed on a helical groove of the shaft, wherein the helical groove comprises a first pitch which is provided along a first portion of the rotatable shaft. The means preventing a user from setting a dose that is greater than said remaining medication in the cartridge comprise a second pitch which is provided along a second portion of the shaft. The first pitch is different from the second pitch, wherein the second pitch is preferably greater.

During dose setting, the shaft is rotated relative to the nut member while the nut member traverses in a longitudinal direction along the groove from a first~~distal~~ end of the shaft towards a second~~proximal~~ end of the shaft. The nut member traverses along the groove until the user attempts to select a dose greater than the medication remaining in the cartridge and the nut member prevents the shaft and the nut from rotating relative to each other and increasing the dose. The dose setting mechanism comprises means preventing a user of said dose setting mechanism from setting a dose of said medication that is greater than said remaining medication in said cartridge, said means comprising a second pitch provided along a second portion of said shaft, wherein said first pitch is different from said second pitch, wherein said second pitch is preferably greater than said first pitch, characterized by a third pitch provided along a third portion of said shaft, wherein said first pitch provided along said first portion of said shaft is preferably generally equal to said third pitch.

According to another exemplary arrangement, a drug delivery device for a dose setting mechanism according to an arrangement is provided.

Claims

1. A dose setting mechanism for a drug delivery device ~~(1)~~, preferably a pen type drug delivery device, with a cartridge ~~(25)~~ of medication, wherein the dose setting mechanism ~~(4)~~ is operable to select a dose of medication which shall be administered out of said cartridge ~~(25)~~, the dose setting mechanism ~~(4)~~ comprising:
a shaft ~~(30)~~,
a helical groove ~~(32)~~ having a first pitch provided along a first portion ~~(32)~~ of said shaft ~~(30)~~, and
a nut member ~~(40)~~ disposed on said helical groove ~~(32)~~ of said shaft ~~(30)~~,
wherein during dose setting of said drug delivery device, said shaft ~~(30)~~ is rotated relative to said nut member ~~(40)~~ while said nut member ~~(40)~~ traverses in longitudinal direction along said helical groove ~~(32)~~ from a first end ~~(38)~~ of said shaft ~~(30)~~ towards a second end ~~(39)~~ of said shaft ~~(30)~~, and
means preventing a user of said dose setting mechanism ~~(4)~~ from setting a dose of said medication that is greater than said remaining medication in said cartridge ~~(25)~~, said means comprising a second pitch provided along a second portion ~~(36)~~ of said shaft ~~(30)~~, wherein said first pitch is different from said second pitch,
wherein said second pitch is preferably greater than said first pitch,
characterized by a third pitch provided along a third portion ~~(35)~~ of said shaft ~~(30)~~,
wherein said first pitch provided along said first portion ~~(34)~~ of said shaft ~~(30)~~ is preferably generally equal to said third pitch.

2. The mechanism of claim 1 wherein the relative movement of shaft ~~(30)~~ and nut member ~~(40)~~ comprises a start position ~~(52)~~ and a stop position ~~(62)~~ of shaft ~~(30)~~ and nut member ~~(40)~~ relative to each other, wherein the displacement distance of the nut member ~~(40)~~ between said start position ~~(52)~~ and said stop

position ~~(62)~~ along the shaft ~~(30)~~ corresponds to the amount of medication contained in said cartridge ~~(25)~~.

3. The mechanism of any one of the preceding claims wherein when said dose is dispensed from said cartridge ~~(25)~~, said nut member ~~(40)~~ does not rotate relative to said shaft ~~(30)~~ but rather both said nut member ~~(40)~~ and said shaft ~~(30)~~ move in a substantially axial direction, wherein said nut member ~~(40)~~ preferably comprises at least one spline feature ~~(44)~~, said at least one spline feature ~~(44)~~ preventing relative rotation between said nut member ~~(40)~~ and a housing of said drug delivery device ~~(1)~~.

4. The mechanism of any one of the preceding claims wherein said nut member ~~(40)~~ comprises a partial thread ~~(46)~~, preferably two half turns of a two start thread.

5. The mechanism of any one of the preceding claims wherein said first portion is located near a proximal end ~~(38)~~ of said shaft ~~(30)~~ and said second portion is located near a distal end ~~(39)~~ of said shaft ~~(30)~~.

6. The mechanism of any of the preceding claims wherein said nut member ~~(40)~~ comprises at least one substantially radial stop face ~~(42)~~, said at least one substantially radial stop face ~~(42)~~ engaging at least one substantially radial stop face ~~(43)~~ on said shaft ~~(30)~~ so that said nut member ~~(40)~~ prevents said shaft ~~(30)~~ from rotating relative to said nut member ~~(40)~~.

7. The mechanism of claim 6 wherein said nut member ~~(40)~~ comprises a plurality of substantially radial stop faces ~~(42)~~, said plurality of radial stop faces ~~(42)~~ engaging a plurality of substantially radial stop faces ~~(43)~~ on said shaft ~~(30)~~.

8. The mechanism of any one of the preceding claims wherein said drug delivery device ~~(1)~~ comprises a non-reusable pen type drug delivery device.

9. The mechanism of any of claims 1 to 8 wherein said third pitch provided along said third portion ~~(35)~~ of said shaft ~~(30)~~ is similar to a thread of said nut member ~~(40)~~.

10. The mechanism of any one of the preceding claims wherein said nut member ~~(40)~~ is a complete circular nut.

11. The mechanism of any one of the preceding claims, wherein the second portion ~~(36)~~ begins at a location corresponding to the last 45 to 360 degrees of rotation when the shaft ~~(30)~~ is rotated relative to said nut member ~~(4)~~ prior the nut member ~~(40)~~ reaches the stop position ~~(62)~~.

12. The mechanism of any one of the preceding claims wherein said first end ~~(38)~~ of said shaft comprises a distal end and said second end ~~(39)~~ of said shaft comprises a proximal end.

13. The mechanism of any one of the preceding claims wherein the shaft ~~(30)~~ is rotatable and the nut member ~~(40)~~ is non-rotating.

14. A drug delivery device comprising a dose setting mechanism according to any of the preceding claims and a cartridge ~~(25)~~ of medication.