SUMMARY

In a first aspect, there is provided a dose indicator comprising, an indexable first display unit indexable about a first display axis, an indexable second display unit indexable about a second display axis, the second display axis being transverse to the first display axis, and a chassis comprising a chassis frame, a displacement portion comprising a drive means adapted to engage the first display unit on a curved path, the drive means being driven by a force from outside the circumference of the first display unit, and at least one hinge means directly or indirectly connecting the displacement portion and chassis frame. The drive means is preferably configured to index the dose indicator.

This is advantageous because it provides a dose indicator/counter that has a small number of components yet is effective, reliable and compact. Furthermore, the invention allows the provision of a cheap, simple and reliable dose-by-dose counter that is capable of counting 200 doses or puffs. It may count down from 200 to 0 and is able to fit within a pMDI actuator of similar shape and comparable size to existing actuators.

The hinge means (e.g. hinge or hinges) may generally be any connecting portion including such that allows restricted but controlled relative movement of the displacement portion and the chassis frame, including relative rotational and/or translational movement.

The second display axis and the first display axis may be arranged so that they do not intersect. However, generally the second display axis will intersect the first display axis.

The second display axis may, preferably, be at an acute or an obtuse angle to the first display axis. In some circumstances, the second display axis may be substantially orthogonal to the first display axis.

Generally, the first display unit and/or the second display unit will be substantially circular in a cross-section (usually a cross section transverse, preferably generally orthogonal, to the first and/or second display axis respectively) and will be rotatably indexable about the first display axis and/or about the second display axis respectively. The term "substantially circular" in this context includes annular or disc-shaped embodiments and polygonal shapes with at least five sides.

The drive means is preferably adapted to engage the first display unit. In particular, it is preferred if the drive means is adapted to engage the first display unit on a curved path, the drive means being driven by a force from outside the circumference of the first display unit. This improves the stability of indexing because it allows freer

Claims

1. A dose indicator comprising,

an indexable first display unit indexable about a first display axis,

an indexable second display unit indexable about a second display axis, the second display axis being transverse to the first display axis, and

a chassis comprising a chassis frame, a displacement portion comprising a drive means adapted to engage the first display unit on a curved path, the drive means being driven by a force from outside the circumference of the first display unit, and at least one hinge means directly or indirectly connecting the displacement portion and chassis frame.

2. A dose indicator as claimed in claim 1, wherein the first display unit and/or the second display unit are ~~substantially~~ circular and are rotatably indexable about the first display axis and/or about the second display axis respectively.

~~3. A dose indicator as claimed in either claim 1 or claim 2, wherein the drive means is adapted to engage the first display unit.~~

~~4. A dose indicator as claimed in claim 3, wherein the drive means is adapted to engage the first display unit on a curved path, the drive means being driven by a force from outside the circumference of the first display unit.~~

~~5~~3. A dose indicator as claimed in any one of the preceding claims, wherein the chassis is moulded as a unitary piece.

~~6~~4. A dose indicator as claimed in any one of the preceding claims, wherein the drive means is integrally comprised in the displacement portion.

~~7~~5. A dose indicator as claimed in any one of the preceding claims, wherein the drive means comprises a drive pawl.

~~8~~6. A dose indicator as claimed in claim ~~7~~5, wherein the drive pawl has an end that engages with the first display unit, said end being angled in towards the axis of rotation of said first display unit.

~~9~~7. A dose indicator as claimed in any one of the preceding claims, wherein the displacement portion is adapted to be displaced along a displacement path.

~~10~~8. A dose indicator as claimed in claim ~~9~~7, wherein the displacement path is at least partly transverse to the first display axis.

~~11~~9. A dose indicator as claimed in either claim ~~9~~7 or claim ~~10~~8, wherein the displacement path is at least partly arcuate.

~~12~~10. A dose indicator as claimed in any one of the preceding claims, wherein the drive means is located on the displacement portion at a position remote from the hinge means or hinges~~, preferably at a position distal to the hinge means or hinges~~.

~~13~~11. A dose indicator as claimed in any one of the preceding claims, wherein the displacement portion comprises at least one press member.

~~14~~12. A dose indicator as claimed in any one of the preceding claims, further comprising at least a first display non-return means, the first display non-return means being ~~preferably~~ at least partly located on the chassis frame.

~~15~~13. A dose indicator as claimed in claim ~~14~~12, wherein the first display non-return means comprises a non-return arm adapted to interact with one or more detents on the first display unit.

~~16~~14. A dose indicator as claimed in any one of the preceding claims, wherein the chassis further comprises at least one return means.

~~17~~15. A dose indicator as claimed in claim ~~15~~ 14 wherein the return means comprises at least one spring.

~~18~~16. A dose indicator as claimed in any one of claims ~~16~~ 14 to ~~17~~15, wherein the at least one return means directly or indirectly connects the displacement portion and chassis frame, ~~preferably~~ at a position remote from the hinge means or hinges.

~~19~~17. A dose indicator as claimed in any one of the preceding claims, wherein the chassis comprises polyoxymethylene.

~~20~~18. An actuator for an inhaler, the actuator comprising a dose indicator as claimed in any one of the preceding claims.

~~21~~19. An inhaler comprising an actuator as claimed in claim ~~20~~18.