

Injection Device

Field of the Invention

5 The present invention relates to an injection device for delivering an injection, as well as an injection kit and a method of operating the injection device.

Background of the Invention

10 Auto-injectors are known from WO 95/35126 and EP-A-0 516 473 and tend to employ a drive spring and some form of release mechanism that releases the syringe from the influence of the drive spring once its contents are supposed to have been discharged, to allow it to be retracted by a return spring.

15 An auto-injector is known from WO 2007/036676 which has a locking mechanism which must be disengaged before the release mechanism can be activated. In its locked position, the locking mechanism also prevents forward movement of the syringe out of the injection device against the bias of the return spring, for example when a cap gripping a boot covering the syringe needle, is removed. In the injection device described in WO 2007/036676, the locking mechanism comprises
20 a sleeve which protrudes from an open end of the injection device. The sleeve is biased into its extended position by a resilient spring mechanism which must be overcome to disengage the locking mechanism. The locking mechanism can be disengaged by, for example, moving the sliding sleeve inwardly into the injection device (i.e. retracting the sleeve). This can be done by forcing the end of the sliding sleeve against tissue and then activating the release mechanism.

25 It has been found that users of injection devices, such as those described in WO2007/036676, struggle to discern when the sliding sleeve has been retracted sufficiently order to allow activation of the device. This can be very frustrating for users, since they may make numerous unsuccessful attempts at activating the injection since they are unaware that the sliding sleeve has not been fully
30 retracted. Further, the frustrated user may attempt to force the injection device, i.e. by applying excessive pressure to the trigger, and so damage the injection mechanism.

There is therefore a need to provide an injection device that informs the user as to the progress of the injection device from a locked state to a state in which the injection may be carried out. The
35 present invention addresses such a problem.

Summary of the Invention

A first aspect of the present invention provides an injection device comprising an actuator adapted when actuated to cause commencement of an injection sequence; a locking mechanism adapted to be moved between a locked position in which the locking mechanism prevents the actuator from being actuated, and an unlocked position in which the actuator can be actuated to cause commencement of the injection sequence; and an indicator configured to provide a visual indication of whether the locking mechanism is in its locked position or in its unlocked position.

The indicator permits a user to visually inspect the status of the locking mechanism and thereby to discern whether or not the actuator may be actuated. Thus, the user need no longer hope or presume that the locking mechanism is in its unlocked state after attempting to move it there, but instead may obtain visual confirmation of that fact, or else see that more effort is required before actuating the actuator. This has been found to be comforting to users, particularly those with poor dexterity who may struggle to operate an injection device with such safety features.

The indicator may comprise an indicator component on the indicator which moves with the locking mechanism as it moves between its locked and unlocked positions. In an implementation which is straightforward to manufacture, the indicator may form part of the same component as the locking mechanism. Thus, no additional components are required. Moreover, the probability of the indicator functioning correctly (i.e. wherein the indication as to whether the locking mechanism is in an unlocked state is correct) is maximised, since it is not subject to external tolerances, and instead relates directly to the progress of the locking mechanism. Alternatively, the injection device may comprise a separate sliding component which forms the indicator, and which is acted on by the locking mechanism, either directly or via one or more additional components. This is advantageous because the separate sliding component may be specifically designed to maximise visibility of that component, and is therefore not subject to the design constraints of the locking mechanism.

The injection device may further comprise a housing to which the actuator and locking mechanism are moveably mounted. The housing may comprise an indicator aperture to facilitate visual inspection of the indicator. This permits the components of the indicator to be housed internally to the injection device, which protects them against tampering or damage.

Preferably at least part or all of the indicator component is visible through the indicator aperture when the locking mechanism is in its locked position. On the one hand, the aperture may be very large, such that a substantial portion of the locking mechanism is visible, and the indicator may be

a simple mark on the locking mechanism, the progress of which may be monitored through the aperture by the user. In that case, the user may see that the injection device is able to be actuated when the mark aligns with another mark on the housing, for instance. On the other hand, the aperture may be relatively small, and the indicator may simply be a particular portion of the locking mechanism itself, for instance a particular portion of having a distinct colour which is different from the remainder of the mechanism. In that case, the user may see that the injection device is able to be actuated when the aperture is entirely full of the distinct colour.

Of course, it will be appreciated that a coloured portion is just one way of providing a visual indicator in the present invention. The indication may be provided by one or more sections of different colour corresponding to the different states; by a colour gradient (for example red transitioning to green); by one or more symbols, characters or images on the indicator corresponding to the different states; or any any other way which would occur to a skilled person.

The relationship between the indicator and the indicator aperture may be implemented in various ways, as described below.

The indicator aperture may be wholly covered by at least a part of the indicator component when the locking mechanism is in its locked position. At least part of the indicator aperture may be not covered by the indicator component when the locking mechanism is not in its locked position.

Moreover, at least part or all of the indicator component may be visible through the indicator aperture when the locking mechanism is in its unlocked position.

Alternatively, the indicator aperture may be wholly covered by at least a part of the indicator component when the locking mechanism is in its unlocked position. At least part of the indicator aperture may be not covered by the indicator component when the locking mechanism is not in its unlocked position.

The locking mechanism may comprise a contact portion which is adapted to contact an engagement surface of the actuator when the locking mechanism is in its locked position. Thus, a physical barrier is provided against the actuator, which prevents the actuator from being actuated accidentally when the locking mechanism is in its locked position. The contact portion may be adapted not to contact an engagement surface of the actuator when the locking mechanism is in its unlocked position. For example, the physical barrier may be completely removed from interfering with the actuator when the locking mechanism is in its unlocked position.

In a particularly preferred embodiment, the locking mechanism is moveable between its locked position and its unlocked position such that the contact portion moves from a position in which it contacts the engagement surface of the actuator to a position in which it no longer contacts the engagement surface of the actuator.

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The actuator may be configured to move between a first position in which commencement of the injection sequence is prevented, and a second position in which commencement of the injection sequence occurs. The actuator may rotate between its first and second positions about a pivot.

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In certain embodiments of the invention, the injection device further comprises a drive mechanism. In such embodiments, the actuator may comprise a locking surface which inhibits the drive mechanism when the actuator is in its first position and which does not inhibit the drive mechanism when the drive mechanism is in its second position.

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Preferably, the injection device further comprises a syringe which is moveable by the drive mechanism on commencement of the injection sequence from a position in which the syringe is wholly contained within a body of the injection device to a position in which a needle of the syringe extends from a housing of the injection device via an injection opening, wherein the drive mechanism is adapted to expel contents of the syringe via the needle when the syringe is in its extended position. Naturally a syringe is merely preferred, and other means for containing and ejecting medicaments may be provided, such as vials or ampules with or without integral needles or cannula.

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Preferably, the locking mechanism comprises a sliding component which slides to move the locking mechanism between its locked and unlocked positions. The sliding component may be configured to slide inwardly into the injection device to move it from its locked position to its unlocked position.

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The sliding component may project from a sliding component opening (typically, but not necessarily, the injection opening) in the housing when it is in its unlocked position. Thus, the sliding component may engage the skin of a user, and be moved inwardly into the housing of the injection device as the user pushes the injection device towards the skin. In a preferred embodiment, the sliding component is a sliding sleeve.

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In any embodiment, the injection device may contain a substance selected from the group consisting of: golimumab, hormones, antitoxins, substances for the control of pain, substances for the control of thrombosis, substances for the control or elimination of infection, peptides, proteins,

human insulin or a human insulin analogue or derivative, polysaccharide, DNA, RNA, enzymes, antibodies, oligonucleotide, antiallergics, antihistamines, anti-inflammatories, corticosteroids, disease modifying anti-rheumatic drugs, erythropoietin, or vaccines, for use in the treatment or prevention of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, ulcerative colitis, hormone deficiency, toxicity, pain, thrombosis, infection, diabetes mellitus, diabetic retinopathy, acute coronary syndrome, angina, myocardial infarction, atherosclerosis, cancer, macular degeneration, allergy, hay fever, inflammation, anaemia, or myelodysplasia, or in the expression of protective immunity.

By 'the injection device may contain a substance' it is meant that the substance may be contained within a suitable medicament container, such as a vial or syringe, within the injection device. Such medicament container may contain other substances, such as further active or inactive ingredients.

In a further aspect of the invention, a substance is provided, the substance being selected from the group consisting of: golimumab, hormones, antitoxins, substances for the control of pain, substances for the control of thrombosis, substances for the control or elimination of infection, peptides, proteins, human insulin or a human insulin analogue or derivative, polysaccharide, DNA, RNA, enzymes, antibodies, oligonucleotide, antiallergics, antihistamines, anti-inflammatories, corticosteroids, disease modifying anti-rheumatic drugs, erythropoietin, or vaccines, for use in the treatment or prevention of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, ulcerative colitis, hormone deficiency, toxicity, pain, thrombosis, infection, diabetes mellitus, diabetic retinopathy, acute coronary syndrome, angina, myocardial infarction, atherosclerosis, cancer, macular degeneration, allergy, hay fever, inflammation, anaemia, or myelodysplasia, or in the expression of protective immunity, by delivery of said substance to a human subject using an injection device according to any of the above embodiments.

In yet another aspect of the invention, an injection device is provided for use in the treatment or prevention of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, ulcerative colitis, hormone deficiency, toxicity, pain, thrombosis, infection, diabetes mellitus, diabetic retinopathy, acute coronary syndrome, angina, myocardial infarction, atherosclerosis, cancer, macular degeneration, allergy, hay fever, inflammation, anaemia, or myelodysplasia, or in the expression of protective immunity, by delivery of a substance selected from the group consisting of: golimumab, hormones, antitoxins, substances for the control of pain, substances for the control of thrombosis, substances for the control or elimination of infection, peptides, proteins, human insulin or a human insulin analogue or derivative, polysaccharide, DNA, RNA, enzymes, antibodies, oligonucleotide, antiallergics, antihistamines, anti-inflammatories, corticosteroids, disease modifying anti-rheumatic

drugs, erythropoietin, or vaccines, to a human subject by using the injection device, where the injection device is an injection device of any of the above embodiments.

By 'delivery of a substance' it is meant that the injection device is used to inject said substance into the human subject, for example by subcutaneous, intradermal or intramuscular injection. Said substance may be administered in combination with other substances, such as further active or inactive ingredients.

10 **Brief Description of the Drawings**

The present invention is now described by way of example with reference to the accompanying drawings, in which:-

15 Figure 1 depicts an exemplary injection device showing the mechanism within the housing;

Figure 2 depicts a plan view of an injection device of the present invention;

20 Figure 3 depicts the detail of the release mechanism of an injection device of the present invention;

Figure 4 depicts a detailed view of parts of the release mechanism of an injection device with the present invention;

25 Figure 5 depicts a first embodiment of an injection device of the present invention;

Figure 6 depicts a second embodiment of an injection device of the present invention;

Figure 7 depicts a third embodiment of an injection device of the present invention;

30 Figures 8a and 8b depict the indicator of the embodiment in figure 7 in the locked and unlocked positions more detail;

Figure 9 depicts the internal mechanism of the embodiment of figure 7 in more detail;

35 Figure 10 depicts the internal mechanism of the embodiment of figure 5 in more detail;

Figure 11 depicts a frame element of an exemplary injection device;

Figure 12 depicts a frame element of the embodiment of figure 10; and

Figures 13 to 15 depict an alternative embodiment to that shown in figure 10.

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Detailed Description of the Drawings

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An exemplary injection device 110 is depicted in figures 1 and 2. The injection device 110 has an injection device housing 112 and a longitudinal axis 101. Figures 1 and 2 depict only the lower half of the housing 112. The upper part of housing 112 is absent so that the internal mechanism can be clearly seen.

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A syringe (not shown) is contained in the housing 112. The injection device 110 comprises a trigger 114 as part of the activation means. The trigger 114 is rotatable about a pivot 115 from a rest position (as shown in figure 2) to an active position. The proximal end 114b of the trigger 114 connects with a drive coupling 121 which is acted upon by a drive spring 120. The drive coupling 121 is in communication with the syringe. The drive coupling and drive spring all form part of the activation means which allow the delivery of the injection by acting on the syringe.

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The injection device 110 comprises a release mechanism 126 in the form of a cylindrical sleeve that protrudes from the distal end of the injection device 110.

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In order to effect delivery of the injection, the trigger 114 is rotated about the pivot 115 in a direction R (i.e. downwards into the housing 112 at its first end 114a). This causes the second end 114b of the trigger 114 to disengage from the drive coupling 121, thereby letting the drive spring 120 drive the syringe 122 (via the drive coupling 121) along the longitudinal axis 101 and out of an aperture 118 in the housing 112.

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However, when the release mechanism 126 is in its impeding position, which corresponds to the release mechanism protruding from the distal end of housing 112, an impediment in the form of a protrusion 154 (as depicted in figure 3) is positioned so as to abut the under-surface of portion 150 of trigger 114. In this way, the protrusion 154 impedes the rotation of the trigger and thus impedes the delivery of the injection. In order to carry out the injection, the release mechanism is moved into a second position, which corresponds to the release mechanism 126 being moved into the

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housing 112 along the direction of the longitudinal axis 101. When the release mechanism is in its second position the protrusion 154 aligns with cut out 152 in trigger 114. Protrusion 154 can be received in cut out 152 and so the trigger can be rotated about pivot 115 and the delivery of the injection can be effected.

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The release mechanism comprises a frame 116 extending proximally from a sliding sleeve 126. The protrusion 154 extends radially outwardly from a proximal portion of the frame 116. The frame is configured to couple the sliding sleeve portion 126, which engages the skin of a user at the distal-most end of the device, to the protrusion. It does so with two proximally extending legs, thereby using as little excess material as possible to prevent wastage and to avoid interference with other components of the injection device. Thus, the frame is largely open.

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Turning now to figure 5, a first embodiment of an injection device 500 according to the invention is shown. As with the exemplary injection device described above, the injection device 500 comprises a housing 502 having a casenose 504 and a sliding sleeve 506 configured to engage the skin of a user and thus be pushed proximally within the housing 502 of the device. As described above, the sliding sleeve is movable from a locked position, in which it prevents an actuator (such as a trigger) from being activated, to an unlocked position, in which it does not.

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The casenose of the housing comprises an aperture 508 through which a user may look to visually inspect the locking mechanism – in this case, the sliding sleeve 506 portion. The aperture may be a hole, or may be a transparent or translucent material. Through the aperture 508, the sliding sleeve is visible. The sliding sleeve thus acts as an indicator to the user as to the status of the sliding sleeve. For example, when the sliding sleeve is in a locked position, the indicator will show one scenario and when the sliding sleeve is in an unlocked position, the indicator will show another scenario. This is described in more detail below.

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A second embodiment of an injection device 600 according to the invention is shown in Figure 6. Like reference numerals depict corresponding features vis-à-vis figure 5. Again, the housing 604 comprises an aperture 608 through which a user may look to visually inspect the locking mechanism. However, with this embodiment the aperture is located not in the casenose 604, but in the main body of the housing 602. The aperture 608 is radially offset with respect to the actuator (i.e. trigger), such that it is easy to see when the injection device is held in the preferred fashion.

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A third embodiment of an injection device 700 according to the invention is shown in Figure 7. Like reference numerals depict corresponding features vis-à-vis figures 5 and 6. Again, the housing 704 comprises an aperture 708 through which a user may look to visually inspect the locking

mechanism. However, with this embodiment the aperture is located in the main body of the housing 702, but radially aligned with respect to the actuator (i.e. trigger) 710. Locating the aperture 708 at this part of the housing makes it easy to see when the injection device is held in an alternative fashion, and also permits a convenient internal arrangement of components, as described in more detail below.

Figures 8a, 8b, 9 and 10 show the third embodiment of the invention in use. In particular, Figure 8a shows the visual indicator through the aperture 708 when the locking mechanism is in the locked position. Figure 8b shows the visual indicator through the aperture 708 when the locking mechanism is in the unlocked position. As can be seen, the appearance of the visual indicator has changed, indicating that the locking mechanism is in the unlocked position.

Figure 9 shows the internal mechanisms of the embodiment of figure 7 in more detail. Here, it can be seen that locking mechanism provides a frame 716 from which protrusion 754 extends. As described above with respect to figures 1 to 4, the protrusion engages the actuator (i.e. trigger 714) in the locked position thereby preventing the actuator from being actuated. In more detail, the actuator 714 comprises an extension portion 760 which extends distally from the distal end of the trigger 714. The extension portion comprises a cut out 762 and a tab 764. In the locked position, the extension portion 760 engages the tab 764. In the unlocked position, the extension portion 760 engages the cut out 762.

It can also be seen that the aperture 708, which is radially aligned with the actuator, is located in the region of the extension portion 760, and directly over the cut out 762. Hence, when the locking mechanism is in the locked position, the locking mechanism (specifically, the extension portion) is not visible since it engages the tab. However, when the locking mechanism is in the unlocked position and engages the cut out, the locking mechanism (specifically, the extension portion) is visible through the aperture. Thus, a portion of locking mechanism itself acts a visual indicator of the status of the locking mechanism. By making the locking mechanism (specifically, the extension portion) a distinctive colour, the visual indicator is even more effective.

Figure 10 shows the internal mechanisms of the embodiment of figure 5 in more detail. The locking mechanism and actuator is identical to that shown in figure 9, except for the addition of an extra indicator tab 570, discussed in more detail below.

The aperture 508 is located in the casenose portion of the housing; that is, not in the region of the extension portion 560. Accordingly, an indicator tab 570 is provided on the locking mechanism in the region of the casenose. When the locking mechanism is in the locked position, the locking

mechanism (specifically, the indicator tab 570) is not visible since it is not in line with the aperture 508. However, when the locking mechanism is in the unlocked position the locking mechanism (specifically, the indicator tab 570) moves into line with the aperture 508 and is thus visible through the aperture. Thus, again, a portion of locking mechanism itself acts a visual indicator of the status of the locking mechanism. Again, by making the locking mechanism (specifically, the extension portion) a distinctive colour, the visual indicator is even more effective.

Figure 11 shows a frame element 1116 used in an exemplary injection device. Figure 12 shows a frame element 1216 used in the injection device of figure 10. As can be seen, the frame element 1216 comprises an indicator tab 516 at its distal end. The indicator tab 516 comprises an annular band of material with a cut out therein.

Figures 13 and 14 show an alternative frame element 1316 usable with an aperture in the casenose portion of an injection device. Figures 15a and 15b show the alternative frame element in use, wherein it can be moved into and out of alignment with an aperture in the case nose.

The skilled person would appreciate that the above embodiments could be implemented the other way around; that is, the locking mechanism could be configured to be in line with the aperture when it is in the locked position and moved out of line with the aperture when in the unlocked position. Depending on the particular location of the aperture and the particular configuration of the frame element, extension portion or indicator tab, the device may indicate to the user that the locking mechanism is in the locked position when the indicator aperture is wholly covered by at least a part of the indicator component and that the locking mechanism is not in its locked position when at least part of the indicator aperture is not covered by the indicator component. Alternatively the device may indicate to the user that the locking mechanism is in the unlocked position when the indicator aperture is wholly covered by at least a part of the indicator component and that the locking mechanism is not in its unlocked position when at least part of the indicator aperture is not covered by the indicator component.

The skilled person would furthermore appreciate that the locking mechanism could be provided as a single integrally molded component, or as separate components. For instance the frame elements could be separate from, and mechanically coupled to the sliding sleeve, or else could be provided as a single integrated component.

In use, such an injection device as described above might be used to deliver substances such as: golimumab, hormones, antitoxins, substances for the control of pain, substances for the control of thrombosis, substances for the control or elimination of infection, peptides, proteins, human insulin

or a human insulin analogue or derivative, polysaccharide, DNA, RNA, enzymes, antibodies, oligonucleotide, antiallergics, antihistamines, anti-inflammatories, corticosteroids, disease modifying anti-rheumatic drugs, erythropoietin, or vaccines, for use in the treatment or prevention of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, ulcerative colitis, hormone deficiency, toxicity, pain, thrombosis, infection, diabetes mellitus, diabetic retinopathy, acute coronary syndrome, angina, myocardial infarction, atherosclerosis, cancer, macular degeneration, allergy, hay fever, inflammation, anaemia, or myelodysplasia, or in the expression of protective immunity. In addition to these substances, any medicament contained within the injection device may also include other substances, such as inactive ingredients, as a skilled person would appreciate.

It will of course be understood by the person skilled in the art that particular substances are efficacious for use in the treatment or prevention of particular conditions, as is well known in the art. For instance, it is known that antiallergics are efficacious for use in the treatment or prevention of allergies; antihistamines are efficacious for use in the treatment or prevention of hay fever; anti-inflammatories are efficacious for use in the treatment or prevention of inflammation; and so on. Accordingly, any selection of one or more substances listed herein or in the claims for use in the treatment or prevention of one or more conditions for which those substance(s) are known to be efficacious is envisaged.

In a particular example, however, golimumab is known to be efficacious for use in the treatment or prevention of one or more of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis or ulcerative colitis, or any combination of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis and ulcerative colitis, or all of rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis and ulcerative colitis.

Golimumab may optionally be used in combination with one or more inactive ingredients such as any or all of L-histidine, L-histidine monohydrochloride monohydrate, sorbitol, polysorbate 80, and water. Golimumab may present in a composition in which golimumab is the only active ingredient. For example, golimumab may administered as SIMPONI®.

It will of course be understood that the present invention has been described above purely by way of example and modifications of detail can be made within the scope of the invention.

Claims

1. An injection device comprising:

an actuator adapted when actuated to cause commencement of an injection sequence;

a locking mechanism adapted to be moved between a locked position in which the locking mechanism prevents the actuator from being actuated, and an unlocked position in which the actuator can be actuated to cause commencement of the injection sequence, wherein the locking mechanism comprises a sliding component which slides to move the locking mechanism between its locked and unlocked positions, wherein the sliding component is configured to slide inwardly into the injection device to move it from its locked position to its unlocked position; and

an indicator configured to provide a visual indication of whether the locking mechanism is in its locked position or in its unlocked position.

2. The injection device of claim 1, wherein the indicator comprises an indicator component on the indicator which moves with the locking mechanism as it moves between its locked and unlocked positions.

3. The injection device of claim 2, further comprising a housing to which the actuator and locking mechanism are moveably mounted.

4. The injection device of claim 3, wherein the housing comprises an indicator aperture.

5. The injection device of claim 4, wherein at least part or all of the indicator component is visible through the indicator aperture when the locking mechanism is in its locked position.

6. The injection device of claim 5, wherein the indicator aperture is wholly covered by at least a part of the indicator component when the locking mechanism is in its locked position, and at least part of the indicator aperture is not covered by the indicator component when the locking mechanism is not in its locked position.

7. The injection device of claim 4, wherein at least part or all of the indicator component is visible through the indicator aperture when the locking mechanism is in its unlocked position.

8. The injection device of claim 5, wherein the indicator aperture is wholly covered by at least a part of the indicator component when the locking mechanism is in its unlocked position, and at least part of the indicator aperture is not covered by the indicator component when the locking mechanism is not in its unlocked position.

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9. The injection device of any one of the preceding claims, wherein the contact portion is adapted to contact an engagement surface of the actuator when the locking mechanism is in its locked position.

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10. The injection device of any one of the preceding claims, wherein the contact portion is adapted not to contact an engagement surface of the actuator when the locking mechanism is in its unlocked position.

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11. The injection device of claim 9 or claim 10, wherein the locking mechanism is moveable between its locked position and its unlocked position such that the contact portion moves from a position in which it contacts the engagement surface of the actuator to a position in which it no longer contacts the engagement surface of the actuator.

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12. The injection device of claim 1 wherein the actuator moves between a first position in which commencement of the injection sequence is prevented, and a second position in which commencement of the injection sequence occurs.

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13. The injection device of claim 12, further comprising a drive mechanism, wherein the actuator comprises a locking surface which inhibits the drive mechanism when the actuator is in its first position and which does not inhibit the drive mechanism when the drive mechanism is in its second position.

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14. The injection device of claim 13, further comprising a syringe which is moveable by the drive mechanism on commencement of the injection sequence from a position in which the syringe is wholly contained within a body of the injection device to a position in which a needle of the syringe extends from a housing of the injection device via an injection opening, wherein the drive mechanism is adapted to expel contents of the syringe via the needle when the syringe is in its extended position.

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15. The injection device of any one of the preceding claims, wherein the sliding component projects from a sliding component opening in the housing when it is in its unlocked position.

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16. The injection device of claim 15, when dependant on claim 14, wherein the sliding component opening is the injection opening.

17. The injection device of any one of the preceding claims, wherein the sliding component is a sliding sleeve.

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18. The injection device of any one of the preceding claims, wherein the actuator rotates between its first and second positions about a pivot.