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(54) Abstract Title: **Syringe with dose adjustment means**

(57) A substance delivery device 1 for use with a container containing the substance, the device comprising: a body 2 arranged to house or hold the container 82; a plunger 40 which is movable with respect to at least a portion of the body 2, the plunger 40 being arranged to act upon the container 82 so as to move the container with respect to said portion of the body 2; wherein the plunger 40 is also arranged to expel at least a portion of the substance from the container 82; and wherein the device comprises means 44 for adjusting the amount of substance to be expelled from the container 82. The device may also comprise means 70 for priming the container 82.

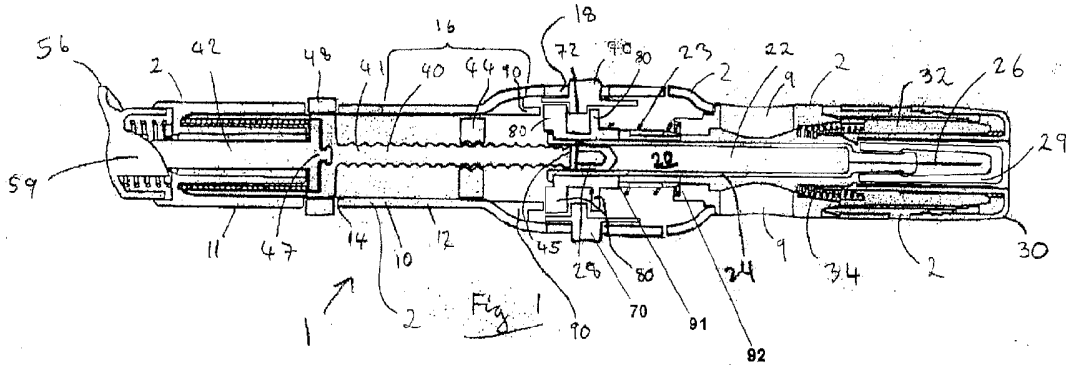

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Fig. 1

Improvements Relating to Substance Delivery Devices

The present invention relates to substance delivery devices (e.g. injection devices) and parts thereof, in particular an adjustment mechanism for use in such devices.

Although not limited thereto, the present invention finds particular application in substance delivery devices (in particular drug delivery devices) which are intended to house, or include, a container which, during the delivery process, is moved in distal direction so that the container is moved towards the skin of a patient, whereby the movement of the container is followed by a substance contained in the container being expelled. The container can for example be a syringe so that, when the container (syringe) moves in distal direction, the needle of the syringe penetrates the skin of the patient so that the substance in the syringe is subsequently injected into the patient. As used in the present specification, the term "distal" is intended to designate a location or direction towards the (injection site of the) patient's skin, and the term "proximal" is intended to designate a location or direction away from the (injection site of the) patient's skin.

The substance to be expelled will in most cases be a fluid, in particular a liquid. It is however conceivable that the substance could comprise a powder, suspension or similar, or a mixture of any of these substances. The container can also comprise a dual chamber cartridge, e.g. with a liquid in one chamber and a powder in the other which are mixed just prior to being expelled. For the sake of simplicity the description will proceed using fluid as an example of the substance to be expelled, and a syringe with needle will be used as an example of a container, but it will be appreciated that the invention encompasses applications without needle.

Many injection devices of the above type (i.e. where a syringe is moved in distal direction during the injection operation) are particularly easy to use since the entire injection process (causing the needle of the syringe to penetrate the skin and the dose to be injected) can be triggered simply by pushing one button. One example of such an injection device is disclosed in WO 03/011378, which is incorporated herein by

reference in its entirety. Whilst this device works well, the present inventors have appreciated at least two drawbacks with this device: there is no provision for adjusting the dose to be injected, and there is also no provision for priming the syringe. By way of explanation, "priming" refers to the process of expelling from the syringe any air and perhaps a small amount of fluid which is initially contained in the syringe. The present invention has been made with a view to overcoming these drawbacks. However, it will be appreciated, on consideration of the present specification, that the various aspects of the invention find application also in other types of injection/substance delivery devices.

Whilst dose adjustment and a priming function are generally known (the attention of the reader is directed to WO 2005/044346 and WO 2005/046770, also incorporated herein by reference in their entirety), it will be appreciated that thus far there has not been any attempt to provide the injection device of e.g. WO 03/011378 with an adjustment and/or priming function. As will be appreciated, the way in which the adjustment and the priming function pursuant to the present invention work is quite different from any adjustment or priming function disclosed in WO 2005/046770 and WO 2005/044346. This is why in particular the dose adjustment mechanism is useful in its own right, that is, it can be used with a range of other injection devices, not limited to injection devices in which a syringe is moved in distal direction during the injection process.

Aspects of the invention are set out in the independent claims.

Some preferred embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 shows a longitudinal section through an injection device according to an embodiment of the present invention.

Figure 2 shows a longitudinal section through the injection device shown in Figure 1, whereby the section plane of the Figure 2 view is perpendicular to the section plane of the Figure 1 view.

The injection device 1 shown in section in Figure 1 is shown in a condition before use. Figure 2 shows the same device, also before use, but sectioned at 90° to the Figure 1 view.

Referring both to Figures 1 and 2 (not all reference numbers are shown in both figures), the injection device 1 comprises a body or housing 2, which has three portions. These are (in the order from the proximal end of device 1 to the distal end): a main body 10, a mid body 13 and a shroud retainer 15, the main body 10 is subdivided into a proximal main body portion 11 and a distal main body portion 12. These portions can be formed as one piece. The housing 2 carries or houses a sleeve-like syringe carrier 82, which in turn carries a syringe 20. Syringe 20 comprises a generally cylindrical container portion 24 for accommodating a fluid 22, and a needle 26. The needle is in communication with the interior of container portion 24 so that the fluid 22 may be expelled through needle 26. A bung 28 is inserted in the container portion 24 at the proximal end. This prevents leakage of the fluid 22 out of the proximal end of container portion 24. Syringe 20 is biased towards the proximal end by means of spring 23. This spring is however relatively weak. Needle 26 is initially protected by a needle sheath 29.

A safety cap or needle sheath remover 30 is provided at the distal end of injection device 1. This safety cap is carried by a shroud retainer 15 of housing 2. Towards its proximal end the safety cap is hooked over the proximal end of needle sheath 29 so that, when safety cap 30 is removed, the needle sheath is removed as well.

The distal end of injection device 1 is also provided with a needle guard 32 or "lockout shroud". This needle guard is moveable along the longitudinal axis of the injection device over a limited range. The needle guard 32 is however initially covered, and prevented from moving, by safety cap 30. Only once safety cap 30 has been removed (as will be explained below) can needle guard 30 move.

Towards the proximal end of injection device 1 there is provided a plunger 40, which has a distal portion 41 and a proximal portion 42. The plunger is biased by spring 50

towards the distal direction. This bias is relatively strong, and much stronger than the bias provided by spring 23.

At the very proximal end of injection device 1 there is provided a firing button assembly 51. Its structure and function will be explained below.

The core principle of operation and much of the structure of the injection device 1 is very similar to the technique disclosed in WO 03/011378. Essentially, as in that earlier document, after removal of the safety cap 30 (and needle sheath 29) the needle guard 32 extends in distal direction because of the bias provided by spring 34. The distal end of the injection device 1 is then pressed against a patient's skin. This pushes needle guard 32 in proximal direction against the bias of spring 34. However, during this action the needle 26 does not project beyond the distal end of needle guard 30.

As in the earlier-disclosed technique, when the firing button is depressed the plunger is released and can move in distal direction. When the front surface 45 of plunger 40 contacts bung 28, continued movement of the plunger in distal direction initially moves syringe 20 (i.e. not just bung 28) in distal direction. This is so because the force required to move bung 28 in distal direction with respect to container portion 24 is greater than the force required to move the entire syringe 20 in distal direction (to this end the interior surface of the container portion 24 can be provided with circumferential ribs or other friction increasing formations). During this movement of syringe 20 the needle 26 penetrates the skin of the patient. Eventually the movement in distal direction of syringe 20 comes to a halt, but plunger 40 is still able to move further in distal direction. This leads to bung 28 being moved in distal direction with respect to container portion 24, which means that fluid 22 is expelled from container portion 24 through needle 26 into the patient. Hence the movement of the syringe 20 (as a whole) and the movement of bung 28 within syringe 20 is brought about by plunger 40 acting on bung 28. It will be appreciated that the portion of plunger 40 (i.e. distal end surface 45) which acts on the syringe 20 to move the syringe is the same as the portion of the plunger which acts on the syringe to move bung 28 so as to expel the fluid. When the plunger 40 has its movement in distal direction stopped the injection operation has been

completed. The user can then move the injection device 1 in proximal direction so as to withdraw the needle from the injection site. As the injection device 1 is withdrawn from the skin of the patient the needle guard 32 is moved in distal direction due to the bias provided by spring 34. The guard 32 then locks in the distal position rendering the device safe. The injection device 1 can then be disposed of.

In contrast to the earlier-disclosed injection device, the injection device shown in Figures 1 and 2 has several additional features. Most notably these additional features are an adjustment means for adjusting the dose to be injected, and a priming function.

The adjustment means primarily comprises a stop member 44 which is carried by the distal plunger portion 41. Stop member 44 is, in the preferred embodiment, provided with an internal thread co-operating with an external thread 43 on the circumferential surface of the distal plunger portion 41. Additionally, stop member 44 is keyed at 46 to the inner surface of distal housing portion 12. With stop member 44 being threadibly engaged with the distal plunger portion 41 and being keyed to distal housing portion 12 (e.g. by means of splines or similar, not shown), the stop member 44 will move in distal or proximal direction when distal plunger portion 41 is rotated about its longitudinal axis.

Distal plunger portion 41 can be rotated by means of adjustment ring 48. Adjustment ring 48 is keyed to a relatively large diameter proximal portion 49 of the distal portion 41 of plunger 40. This means that, on rotation of adjustment ring 48, the distal plunger portion 41 will carry out the same rotation, but the distal plunger portion 41 is substantially free to move in a direction parallel to the plunger axis, independently from adjustment ring 48. The proximal portion 49 of the distal plunger portion 41 is engaged with the distal portion 47 of the proximal plunger portion 42 such that the distal plunger portion 41 can substantially freely rotate with respect to the proximal plunger portion 42 but has to make the same movements in distal or proximal direction as the proximal plunger portion 42.

The adjustment ring 48 is located between proximal and distal main body portions 11 and 12. Windows 14 are provided on opposite sides of main body 10 where the proximal and distal main body portions 11 and 12 meet.

The injection device 1 has a generally oval cross section. The windows 14 are provided on those "sides" of the oval which have the smaller distance from the centre of the oval. The main body is continuous on those "sides" of the oval which have the greatest distance from the centre of the oval. This means that the main body 10 with proximal and distal main body portions 11 and 12 can be formed (e.g. moulded) in one piece and further that adjustment ring 48 can project through windows 14 whilst being securely held within main body 10.

In order to adjust the dose to be injected the user can rotate adjustment ring 48, thereby rotating the distal portion 41 of plunger 40. As mentioned, this sets the axial position of stop member 44 along distal plunger portion 41. Through setting this axial position the user can determine how far the plunger is allowed to project into container portion 24. This is so because movement of the plunger in distal direction during the injection process is stopped when stop member 44 makes contact with the proximal end of container portion 24. The axial position of stop member 44 along distal plunger portion 41 (before the beginning of the injection operation) can be viewed by the user through a further window 16 provided in the distal main body portion 12. Suitable indications may be provided at window 16 to indicate to the user which dose corresponds to the set position of stop member 44 with respect to window 16.

While Figures 1 and 2 show the injection device 1 generally in the same state, it will be noted that the position of stop member 44 is different in these two figures. Stop member 44 has been moved in proximal direction in Figure 1 so as not to obscure any details.

Turning now to the priming function of injection device 1, two priming buttons 70 are provided in the distal housing portion 12 (it is to be noted that the priming function could be achieved with only one priming button, but two priming buttons are preferred).

Priming buttons 70 can be slid parallel to the longitudinal axis of injection device 1 over a small distance determined by the length of window 18. A projection 72 is provided on the radially inner side of each priming button 70, which projection engages with engagement formations 80 of the syringe carrier 82 around container portion 24. The co-operation between projection 72 and engagement formations 80 means that, initially, the syringe carrier 82 is locked against axial movement with respect to priming buttons 70. Container portion 24 in turn is sufficiently firmly attached to syringe carrier 82, which means that syringe 20 is also locked against axial movements with respect to priming buttons 70. The priming buttons may be formed such that accidental priming can be prevented. For example, priming buttons 70 may be formed with a catch or similar (not shown) so that they must be depressed before they can be moved in proximal direction.

In order to prime syringe 20 a user would hold injection device 1 upright so that the distal end points upwards. The user then moves priming buttons 70 in proximal direction (i.e. downward) until the priming buttons 70 contacts the proximal ends of windows 18. Syringe carrier 82 and syringe 20 perform the same proximal movement. As a result of this proximal movement the bung 28 is pushed in distal direction with respect to container portion 24 as its proximal end contacts the distal end 45 of the distal plunger portion 41. Any air contained in container portion 24 is thus expelled through needle 26 (and perhaps also a small amount of fluid 22).

As syringe 20 and syringe carrier 82 move in proximal direction the syringe carrier 82 is pivoted slightly about the axis of the syringe. This pivoting movement is achieved by a camming arrangement at the proximal end of syringe carrier 82. The camming arrangement comprises cam surfaces at the proximal end of syringe carrier 82 and a corresponding cam surface provided at the distal end of projections or ribs 90 which are provided on the inside of distal main body portion 12. As these cam surfaces contact and slide along each other the syringe carrier 82 is pivoted. This pivoting movement has the effect that syringe carrier 82 (and therefore also syringe 20) is no longer locked against axial movement with respect to priming buttons 70 since internal projections 72 and the engagement formations 80 on the syringe carrier 82 are limited in

circumferential direction. This means that, once syringe carrier 82 has turned, the engagement formation 80 can freely move past internal projection 72 so as not to impede or prevent the injection operation. The syringe 20 may turn with syringe carrier 82 during priming, although this is not essential.

The way in which the priming function is implemented means that the injection operation cannot normally be performed without the priming operation having been performed first since without the priming operation having been performed the syringe 20 cannot move in distal direction since it is locked with respect to priming buttons 70, which in turn are prevented from moving in distal direction as they contact the distal ends of windows 18.

In preferred embodiments the projections or ribs 90 and most of the structure of priming buttons 70 (preferably all of the structure of priming buttons 70, apart from their internal projections 72) are accommodated in an enlarged diameter portion of the distal main body portion 12. This can ensure that, once the priming operation has been completed, the projections or ribs 90 and the priming buttons 70 do not interfere with stop member 44 when plunger 40 moves in distal direction.

However, in alternative embodiments no such enlarged diameter portion of distal main body portion 12 is provided and the projections or ribs 90 and much of the structure of priming buttons 70 project into distal main body portion 12. In those embodiments the stop member 44 is provided with recesses at the circumferential positions of projections 90 (and priming buttons 70) so that stop member 44 can move past projections 90 and priming buttons 70 when plunger 40 and stop member 44 move in distal direction. Interference between plunger 40 and projections 90 or priming buttons 70 can thus be avoided. The recesses (not shown) in stop member 44 could conveniently be used as part of a recess and spline arrangement for keying stop member 44 with respect to main body 10.

Mid body 13 is provided with two viewing windows 9 on opposite sides so as to permit a user to view container 24. In the preferred embodiment the viewing windows 9, the

windows 14 and the windows 16 are all provided on the same side(s) of the housing 2. Whilst it is preferred that two opposing ones of each type of window 9, 14 and 16 are provided, the device 1 may also be formed with only one, or more than two of each type of window 9, 14 and 16.

The firing button arrangement 51 will now be explained, although it will be appreciated that alternative firing arrangements could be used. The firing button arrangement 51 comprises a firing button 52 carried by, and slidable within, the proximal end of the proximal main body portion 11. In the initial position however the firing button 52 is not slidable. The reason for this is as follows. At the proximal end of the proximal plunger portion 42 there are provided two or more fingers which are provided with outwardly projecting teeth or plunger retaining barbs indicated by 58. These outwardly projecting teeth 58 butt against a shoulder 19, which is firmly attached to proximal main body portion 11 or is formed integrally thereto. This prevents the proximal plunger portion 42 from moving in distal direction. A safety tab 56 is provided at the centre of firing button 52, and the distal end of the safety tab 56 also butts against shoulder 19. This prevents safety button 52 from being depressed. When the injection device is to be used the user would tear safety tab 56 off (it is connected to firing button 52 by a thin bridge 57, which is easily severed) and remove the safety tab 56 from the firing button 52. This enables firing button 52 to be depressed in distal direction against the bias of spring 54. Firing button 52 is provided with at least one internal projection 59, preferably an annular projection 59, which is arranged to squeeze the fingers at the proximal end of proximal plunger portion 41 together so that teeth 58 have cleared shoulder 19. Plunger 40 is thus released, which enables it to perform the injection operation.

At the end of the injection operation syringe carrier 82 has moved in distal direction such that a set of locking barbs 61 has moved in distal direction past a set of housing barbs 17. Housing barbs 17 are provided on an internal surface of mid body portion 13 whilst locking barbs 61 are provided on flexible legs 60 formed integrally with syringe carrier 82. Locking barbs 61 project outwardly so that they can engage housing barbs

17 to prevent syringe carrier 82 from moving in proximal direction after the injection operation has been completed.

Locking barbs 61 and housing barbs 17 have the following purpose. When the injection device 1 has been pressed against a patient's skin the needle guard 32 will have moved in proximal direction (to the position shown in Figures 1 and 2, since needle guard 32 will have moved in distal direction as soon as safety cap 30 has been removed, due to the bias provided by spring 34). During the injection operation, as syringe carrier 82 moves in distal direction, the distal ends 62 of legs 60 move inwardly, using the proximal surface of housing barbs 17 as a ramp. This enables legs 60 to slide between and through guard legs 38 attached proximally to needle guard 32 (guard legs 38 are provided with an opening 37 so that legs 60 can project into/through guard legs 38). Eventually, legs 60 come to a halt between guard legs 38 when the syringe carrier 82 has completed its movement in distal direction due to a stop surface 91 of syringe carrier 82 stopping against a stop feature 92 of mid body 13. After the injection operation, when injection device 1 is withdrawn from the injection site, needle guard 32 moves in distal direction, due to the bias provided by spring 34. While this happens the guard legs 38 slide in distal direction past the distal ends 62 of legs 60, and whilst syringe carrier 82 does not move in axial direction legs 60 move outwardly as they are no longer biased inwardly by guard legs 38. Once legs 60 have moved outwardly the locking barbs 61 are approximately at the same radial position as housing barbs 17 but slightly more distal than housing barbs 17, which means that syringe carrier 82 cannot be moved in proximal direction beyond a position where locking barbs 61 engage housing barbs 17.

If, once legs 60 have moved outwardly, any attempt is made to move needle guard 32 in proximal direction, then the proximal end of guard legs 38 will butt against the distal end 62 of legs 60. Because of this (syringe carrier 82 being prevented from movement in proximal direction because of the engagement of locking barbs 61 and housing barbs 17) the needle guard cannot be moved any further in proximal direction. This ensures that the needle 26 cannot be caused to project beyond the distal end of needle guard 32 after the injection device 1 has been used.

The injection device 1 is particularly easy to use. In order to perform an injection operation a user would "work their way up" along the injection device 1, starting at the distal end. Initially, the user would remove the safety cap 30. The user would then prime the syringe by means of priming buttons 70, then set the desired dose by turning adjustment ring 48, then remove the safety tab 56, then press the injection device against the skin and then press the firing button 52. After the injection operation the user would withdraw the injection device 1 from the skin and dispose of the device.

The injection device 1 can also accommodate different syringe diameters (i.e. sizes) with minimal modifications. If a smaller diameter syringe is desired to be used, then syringe carrier 82 should have a relatively small bore in which to accommodate the syringe. If a larger diameter syringe is to be used, then the bore of syringe carrier 82 should be made larger. Accordingly, a range of syringe carriers 82 with different bore diameters can be provided for use with the injection apparatus. All other parts of the injection apparatus may be the same for any syringe diameter (of course, the diameter of the distal plunger portion needs to be sufficiently small so that the plunger can project into container portion 24). This enables all parts of the injection device 1 (apart from the syringe carrier 82) to be manufactured in large numbers at reduced cost

Whilst the present invention has been described using a preferred embodiment as an example, it will be appreciated that the invention is not limited to a device having all of the features of the embodiment described with reference to Figures 1 and 2. In particular, it will be appreciated that the dose adjustment mechanism may be useful in its own right, and can be used in connection with other kinds of injection devices.

Whilst in the description of the preferred embodiment reference has been made to a syringe carrier 82, in the claims the term "container carrier" is used. This is to take into account that, as mentioned above, the invention may be equally applicable to devices which deliver a substance from a container which is not necessarily a syringe.

Although the invention has been described in terms of preferred embodiments as set forth above, it should be understood that these embodiments are illustrative only and that the claims are not limited to those embodiments. Those skilled in the art will be able to make modifications and alternatives in view of the disclosure which are contemplated as falling within the scope of the appended claims. Each feature disclosed or illustrated in the present specification may be incorporated in the invention, whether alone or in any appropriate combination with any other feature disclosed or illustrated herein.

CLAIMS:

1. A substance delivery device for use with a container containing the substance, the device comprising:

a body arranged to house or hold the container;

a plunger which is movable with respect to at least a portion of the body, the plunger being arranged to act upon the container so as to move the container with respect to said portion of the body;

wherein the plunger is also arranged to expel at least a portion of the substance from the container; and

wherein the device comprises means for adjusting the amount of substance to be expelled from the container.

2. A device according to claim 1, wherein the plunger is arranged to act on a bung of the container to move the container.

3. A device according to claim 2, wherein the only portion of the container which is arranged to be contacted by the plunger in order to move the container is the bung.

4. A device according to any of claims 1 to 3, wherein the adjustment means comprises a stop member mounted with respect to the plunger.

5. A device according to claim 4, wherein the body further comprises a guide means for co-operating with the stop member, wherein the stop member is:

a) mounted with respect to the plunger and

b) arranged to co-operate with the guide means

such that it travels longitudinally along the axis of the plunger on rotation of the plunger.

6. A device according to claim 4 or 5, wherein the plunger is arranged to project into the container when it expels said portion of the substance, the expelling of substance being stopped by the stop member contacting the container.

7. A device according to any of claims 1 to 6, wherein the adjustment means comprises means for rotating the plunger about its axis.

8. A device according to claim 7, wherein the rotating means is keyed to the plunger, the rotating means not substantially impeding movement of the plunger parallel to its axis.

9. A device according to any of claims 1 to 8, wherein the plunger comprises a rear portion opposite that longitudinal end which is arranged to contact the syringe, the rear portion being substantially freely rotatable with respect to the remainder of the plunger.

10. A device according to any of claims 1 to 9, further comprising means for priming the container.

11. A substance delivery device for use with a container containing the substance, the device comprising:

a body arranged to house or hold the container;

a plunger which is movable with respect to at least a portion of the body, the plunger being arranged to act upon the container so as to move the container with respect to said portion of the body;

wherein the plunger is also arranged to expel at least a portion of the substance from the container; and

wherein the device comprises means for priming the container.

12. A device according to claim 10 or 11, wherein the priming means comprises means for moving the container towards the plunger.

13. A device according to claim 12, wherein the moving means comprises a moveable member arranged to engage the container so as to move the container towards the plunger.

14. A device according to claim 13, wherein, on completion of the priming operation, the moveable member is arranged to become disengaged from the container.

15. A device according to claim 14, wherein, on completion of the priming operation, at least a portion of the container is arranged to have pivoted about its axis.

16. A device according to claim 15, wherein the body comprises a cam surface for pivoting at least said portion of the container.

17. A device according to any of claims 1 to 16, further comprising a said container.

18. A device according to claim 17, wherein the container comprises a cam surface for pivoting at least said portion of the container when the container moves towards the plunger.

19. A device according to claim 17 or 18 as directly or indirectly dependent on any of claims 10 to 16, wherein the container comprises an engagement formation enabling the priming means to engage the container, the engagement formation being non-uniform in circumferential direction.

20. A device according to any of claims 17 to 19, wherein the force which the plunger is required to exert on the container so as to move the container with respect to said portion of the body is less than the force which the plunger is required to exert on the container so as to expel said portion of the substance.

21. A device according to claim 20 as directly or indirectly dependent on any of claims 10 to 16 as directly or indirectly dependent on claim 2, wherein the container is formed with at least one formation arranged to increase the force required to move the bung with respect to the container.

22. A device according to any of claims 17 to 21, wherein the container comprises a container carrier and a container portion, the container portion containing the substance and the container carrier holding the container portion.

23. A device according to any of claims 17 to 22, further comprising a needle so that the needle and the container form a syringe.

24. A device according to any of claims 1 to 16, further comprising a carrier for holding the container.

25. An adjustment mechanism for adjusting the amount of a substance to be expelled by a substance delivery device, the adjustment mechanism comprising:

a plunger;

a stop member mounted with respect to the plunger for limiting the substantially unobstructed travel of the plunger; and

means for rotating the plunger about its longitudinal axis,

wherein the stop member is:

a) mounted with respect to the plunger and

b) arranged to cooperate with a lateral guide means

such that it travels longitudinally along the axis of the plunger on rotation of the plunger.

26. An adjustment mechanism according to claim 25, wherein the plunger is externally threaded and the stop member is internally threaded, the stop member comprising keying means for being keyed to the lateral guide means.

27. An adjustment mechanism according to claim 25 or 26, wherein the rotating means is keyed to the plunger, the rotating means not substantially impeding movement of the plunger parallel to its axis.

28. A kit of parts suitable for forming a substance delivery device, the substance delivery device being arranged to be used with a container containing a substance, the kit of parts comprising:

a body arranged to accommodate the container;

a plunger which is movable with respect to at least a portion of the body, the plunger being arranged to act upon the container so as to move the container with respect to said portion of the body;

wherein the plunger is also arranged to expel at least a portion of the substance from the container; and

at least two different container carriers, each container carrier having a receiving formation for holding a said container, each container carrier being arranged to be located in the body so as to hold a said container in the body,

wherein the receiving formations of said at least two different container carriers are of different size or shape so as to be able to accommodate containers of different size or shape.

29. A kit of parts according to claim 28, wherein the receiving formation comprises an opening into which a said container can be inserted.

30. A kit of parts according to claim 29, wherein the opening comprises a cylindrical bore.

31. A kit of parts according to any of claims 28 to 30, wherein, apart from the shape or size of the receiving formations, the container carriers are substantially identical.

32. A device or a kit of parts, substantially as herein described with reference to, or as illustrated in, the accompanying drawings.

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Application No: GB0524978.4 **Examiner:** Dr Matthew Parker

Claims searched: 1-10 **Date of search:** 28 September 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-10	US5514097 A (KNAUER), see column 2, lines 66, to column 3, line 17
X	1-4, 6	US2002/0165500 A1 (BECHTOLD), see embodiment of Figures 14-31

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

A5R

Worldwide search of patent documents classified in the following areas of the IPC

A61M

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI