syringe within the housing between a first position and a second position. The syringe carrier can have at least one opening configured to align with the window and the reservoir when the syringe carrier is in the first position and at least one pair of legs defining at least a portion of the at least one opening.

For example and as embodied here, the at least one opening can be configured to align with the reservoir when the syringe carrier is in the first position. The at least one opening can include a first opening and a second opening, and the at least one pair of legs can define at least a portion of the first opening. The first opening can be configured to align with the window and the reservoir when the syringe carrier is in the first position, and the second opening can be configured to align with the window and the visual indicator when the syringe carrier is in the second position. For example, if a window is provided on a front and a rear of the housing, then corresponding first and second openings can be provided on the front and rear of the syringe carrier, respectively.

The syringe carrier can include a middle portion between the first and second openings, and the middle portion can be sized to resist deformation of the syringe carrier. The pair of legs can extend from the middle portion of the syringe carrier, and each leg can be tapered with a greater cross-dimension proximate the middle portion of the syringe carrier.

Furthermore and as embodied here, each leg of the at least one pair of legs can include an anchor portion to engage the at least one interior stop to prevent movement of the syringe carrier toward the injection site. The anchor portion of each leg can project radially outwardly. The anchor portion can include at least one or more projections sized to prevent movement of the syringe carrier toward the injection site and/or away from the injection site.

In some embodiments, the at least one pair of legs can include a first pair of legs and a second pair of legs, and the first elongated opening can include a front opening portion and a rear opening portion. The first pair of legs can define at least a portion of the front opening portion, and the second pair of legs can define at least a portion of the rear opening portion.

Additionally and as embodied here, the autoinjection device includes a liquid beneficial agent in the reservoir. The syringe carrier can be configured to allow viewing of substantially all of the liquid beneficial agent in the reservoir when the syringe carrier is in the first position. For example and not limitation, the liquid beneficial agent can have a volume of 0.4 mL. Alternatively, in some embodiments,

CLAIMS

We claim:

1. An automatic injection device comprising:

a housing having a first end, a second end, and a barrel between the first end and the second end, the barrel comprising an elongated window to allow viewing of contents inside the housing;

a syringe disposed within the housing and having a first end, a second end, and a reservoir between the first end and the second end;

a plunger at least partially disposed within the syringe and comprising a visual indicator on a portion of the plunger; and

a syringe carrier disposed within the housing and configured to contain the syringe and displace the syringe within the housing between a first position and a second position, the syringe carrier having at least one opening and at least one pair of legs defining at least a portion of the at least one opening.

2. The automatic injection device of claim 1, wherein the at least one opening is configured to align with the reservoir when the syringe carrier is in the first position.

3. The automatic injection device of claim 1, wherein the at least one opening comprises a first opening and a second opening, the at least one pair of legs defining at least a portion of the first opening, the first opening configured to align with the window and the reservoir when the syringe carrier is in the first position, and the second opening configured to align with the window and the visual indicator when the syringe carrier is in the second position.

4. The automatic injection device of claim 3, wherein the first opening is positioned nearer to the first end of the housing than the second opening.

5. The automatic injection device of claim 3, the syringe carrier further comprising a middle portion between the first and second openings, the middle portion sized to resist deformation of the syringe carrier.

6. The automatic injection device of claim 5, wherein the pair of legs extend from the middle portion of the syringe carrier and each leg is tapered with a greater cross-dimension proximate the middle portion of the syringe carrier.

7. The automatic injection device of claim 1, the housing further comprising at least one interior stop configured to engage the at least one pair of legs to prevent movement of the syringe carrier toward the injection site.

8. The automatic injection device of claim 7, each leg of the at least one pair of legs comprising an anchor portion to engage the at least one interior stop to prevent movement of the syringe carrier toward the injection site.

9. The automatic injection device of claim 8, wherein the anchor portion of each leg projects radially outwardly.

10. The automatic injection device of claim 8, the anchor portion comprising at least one projection sized to prevent movement of the syringe carrier toward the injection site.

11. The automatic injection device of claim 8, the anchor portion comprising at least one projection sized to prevent movement of the syringe carrier away from the injection site.

12. The automatic injection device of claim 8, the anchor portion comprising a first projection and a second projection, the first projection sized to prevent movement of the first projection past the at least one interior stop to prevent movement of the syringe carrier away from the injection site, the second projection sized to prevent movement of the syringe carrier toward the injection site until the syringe carrier is urged in the direction of the injection site to move the second projection past the at least one interior stop.

13. The automatic injection device of claim 12, wherein the first projection is larger than the second projection.

14. The automatic injection device of claim 12, wherein the second projection has comprises an arcuate surface portion and the interior stop comprises a chamfered edge portion configured to abut the arcuate surface portion when the syringe carrier is urged toward the injection site.

15. The automatic injection device of claim 12, wherein a first force amount applied to the syringe carrier to move the second projection past the interior stop is less than a second force amount applied to the plunger to advance the plunger within the syringe.

16. The automatic injection device of claim 1, the at least one pair of legs comprising a first pair of legs and a second pair of legs, and the first elongated opening comprising a front opening portion and a rear opening portion, the first pair of legs defining at least a portion of the front opening portion and the second pair of legs defining at least a portion of the rear opening portion.

17. The automatic injection device of claim 1, wherein the first position is a pre-injection position.

18. The automatic injection device of claim 1, wherein the second position is a post-injection position.

19. The automatic injection device of claim 1, further comprising a liquid therapeutic agent in the reservoir.

20. The automatic injection device of claim 19, wherein the liquid therapeutic agent comprises a protein.

21. The automatic injection device of claim 19, wherein the liquid therapeutic agent comprises adalimumab.

Claims

1. An automatic injection device comprising:

a housing having a first end, a second end, and a barrel between the first end and the second end, the barrel comprising an elongated window to allow viewing of contents inside the housing;

a syringe disposed within the housing and having a first end, a second end, and a reservoir between the first end and the second end;

a plunger at least partially disposed within the syringe and comprising a visual indicator on a portion of the plunger; and

a syringe carrier disposed within the housing and configured to contain the syringe and displace the syringe within the housing between a first position and a second position, the syringe carrier having at least one opening configured to align with the window and the reservoir when the syringe carrier is in the first position and at least one pair of legs defining at least a portion of the at least one opening.

2. The automatic injection device of claim 1, wherein the at least one opening comprises a first opening and a second opening, the at least one pair of legs defining at least a portion of the first opening, the first opening configured to align with the window and the reservoir when the syringe carrier is in the first position, and the second opening configured to align with the window and the visual indicator when the syringe carrier is in the second position.

3. The automatic injection device of claim 2, wherein the first opening is positioned nearer to the first end of the housing than the second opening.

4. The automatic injection device of claim 2, the syringe carrier further comprising a middle portion between the first and second openings, the middle portion sized to resist deformation of the syringe carrier.

5. The automatic injection device of claim 4, wherein the pair of legs extend from the middle portion of the syringe carrier and each leg is tapered with a greater cross-dimension proximate the middle portion of the syringe carrier.

6. The automatic injection device of claim 1, the housing further comprising at least one interior stop configured to engage the at least one pair of legs to prevent movement of the syringe carrier toward the injection site.

7. The automatic injection device of claim 6, each leg of the at least one pair of legs comprising an anchor portion to engage the at least one interior stop to prevent movement of the syringe carrier toward the injection site.

8. The automatic injection device of claim 7, wherein the anchor portion of each leg projects radially outwardly.

9. The automatic injection device of claim 7, the anchor portion comprising at least one projection sized to prevent movement of the syringe carrier toward the injection site.

10. The automatic injection device of claim 7, the anchor portion comprising at least one projection sized to prevent movement of the syringe carrier away from the injection site.

11. The automatic injection device of claim 7, the anchor portion comprising a first projection and a second projection, the first projection sized to prevent movement of the first projection past the at least one interior stop to prevent movement of the syringe carrier away from the injection site, the second projection sized to prevent movement of the syringe carrier toward the injection site until the syringe carrier is urged in the direction of the injection site to move the second projection past the at least one interior stop.

12. The automatic injection device of claim 11, wherein the first projection is larger than the second projection.

13. The automatic injection device of claim 11, wherein the second projection comprises an arcuate surface portion and the interior stop comprises a chamfered edge portion configured to abut the arcuate surface portion when the syringe carrier is urged toward the injection site.

14. The automatic injection device of claim 11, wherein a first force amount applied to the syringe carrier to move the second projection past the interior stop is less than a second force amount applied to the plunger to advance the plunger within the syringe.

15. The automatic injection device of claim 1, the at least one pair of legs comprising a first pair of legs and a second pair of legs, and the at least one opening comprising a front opening portion and a rear opening portion, the first pair of legs defining at least a portion of the front opening portion and the second pair of legs defining at least a portion of the rear opening portion.

16. The automatic injection device of claim 1, wherein the first position is a pre-injection position.

17. The automatic injection device of claim 1, wherein the second position is a post-injection position.

18. The automatic injection device of claim 1, further comprising a liquid therapeutic agent in the reservoir.

19. The automatic injection device of claim 18, wherein the liquid therapeutic agent comprises a protein.

20. The automatic injection device of claim 18, wherein the liquid therapeutic agent comprises adalimumab.