US 20250262384A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0262384 A1**

Shaw (43) **Pub. Date: Aug. 21, 2025**

(54) **AUTO-DISABLING SYRINGE ASSEMBLY**

(71) Applicant: **Thomas J. Shaw**, Frisco, TX (US)

(72) Inventor: **Thomas J. Shaw**, Frisco, TX (US)

(21) Appl. No.: **19/051,863**

(22) Filed: **Feb. 12, 2025**

Related U.S. Application Data

(60) Provisional application No. 63/554,329, filed on Feb. 16, 2024.

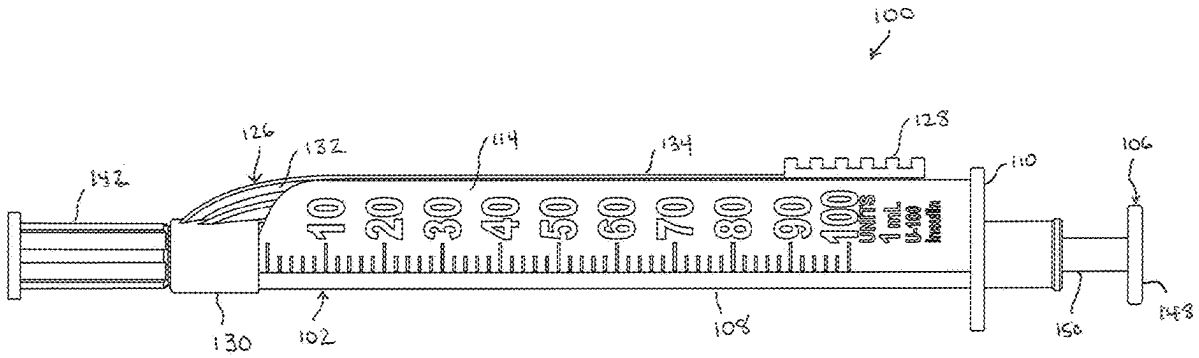
Publication Classification

(51) **Int. Cl.**
A61M 5/315 (2006.01)

(52) **U.S. Cl.**
CPC ***A61M 5/31505*** (2013.01); *A61M 2005/31508* (2013.01)

(57) **ABSTRACT**

Systems and methods are disclosed that include providing a syringe with a barrel having a cylindrical body portion and a nose end, a needle assembly having a needle extending from the nose end of the barrel, and a plunger assembly having a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the barrel and the plunger assembly. The elongated plunger body includes a ribbed portion, an annular clip channel disposed adjacent to the ribbed portion, and a disabling clip disposed around the elongated plunger body. The disabling clip allows withdrawal of the plunger assembly within the barrel and rides forward in the annular clip channel with compression of the plunger assembly to engage with the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.



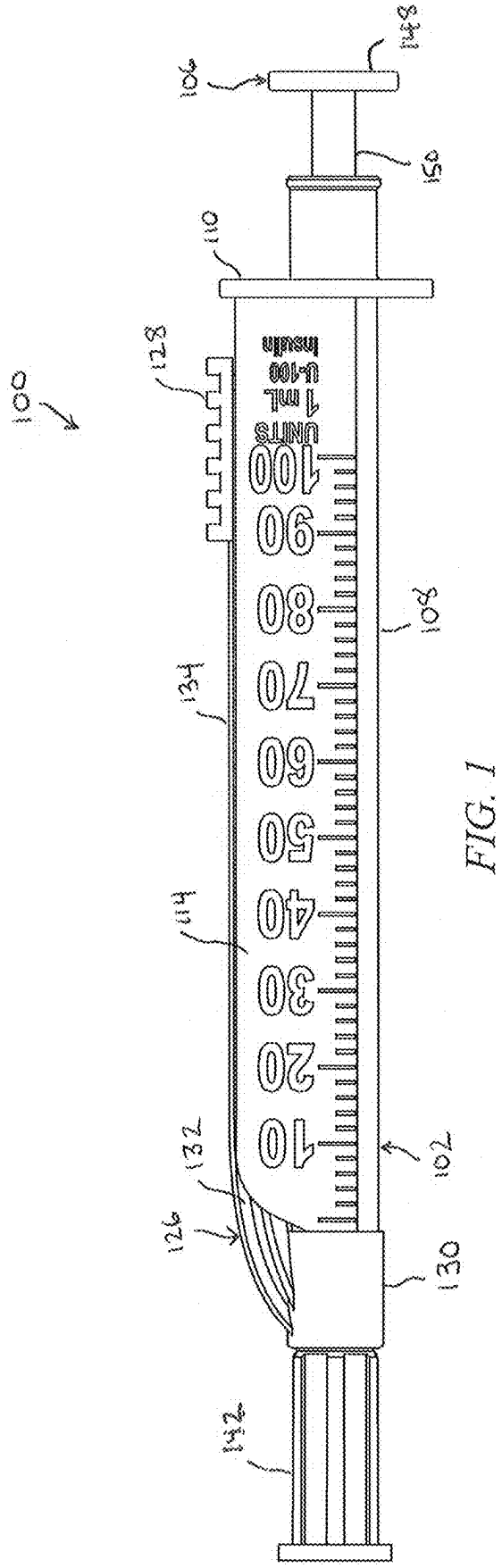

100
106
148
150
110
128
1 mL
U-100
Insulin
UNITS
100
90
80
70
60
50
40
30
20
10
134
104
114
102
132
126
130
142

FIG. 1

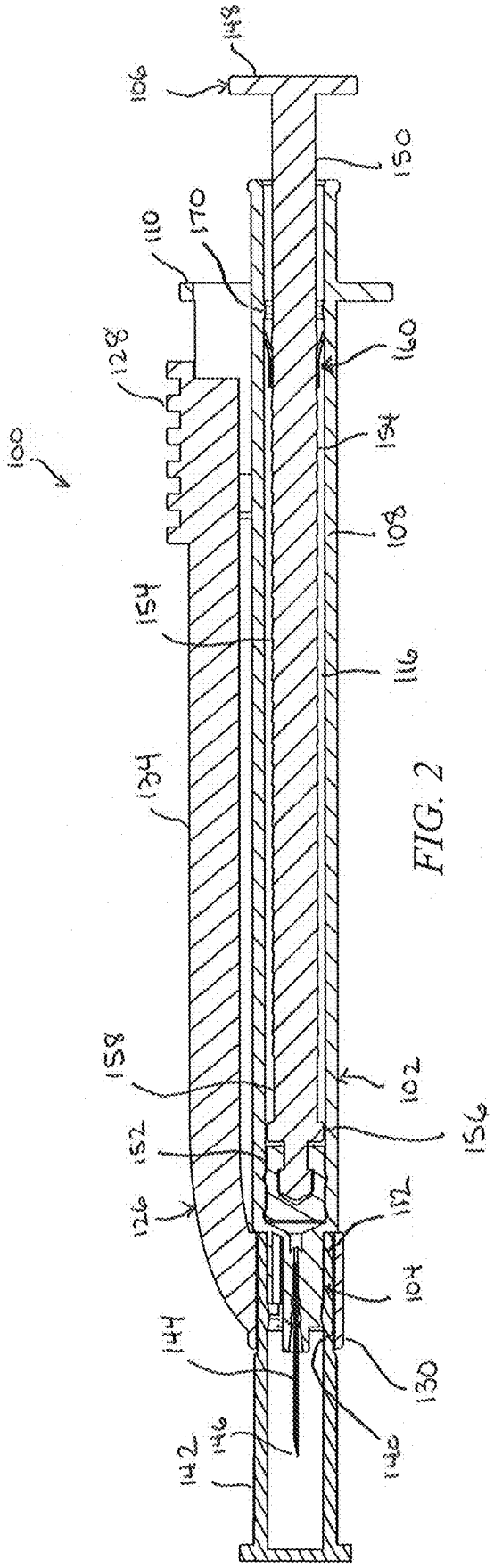

100
106
148
150
110
170
128
160
134
108
154
116
124
158
102
156
152
126
112
104
144
130
142
146
140

FIG. 2

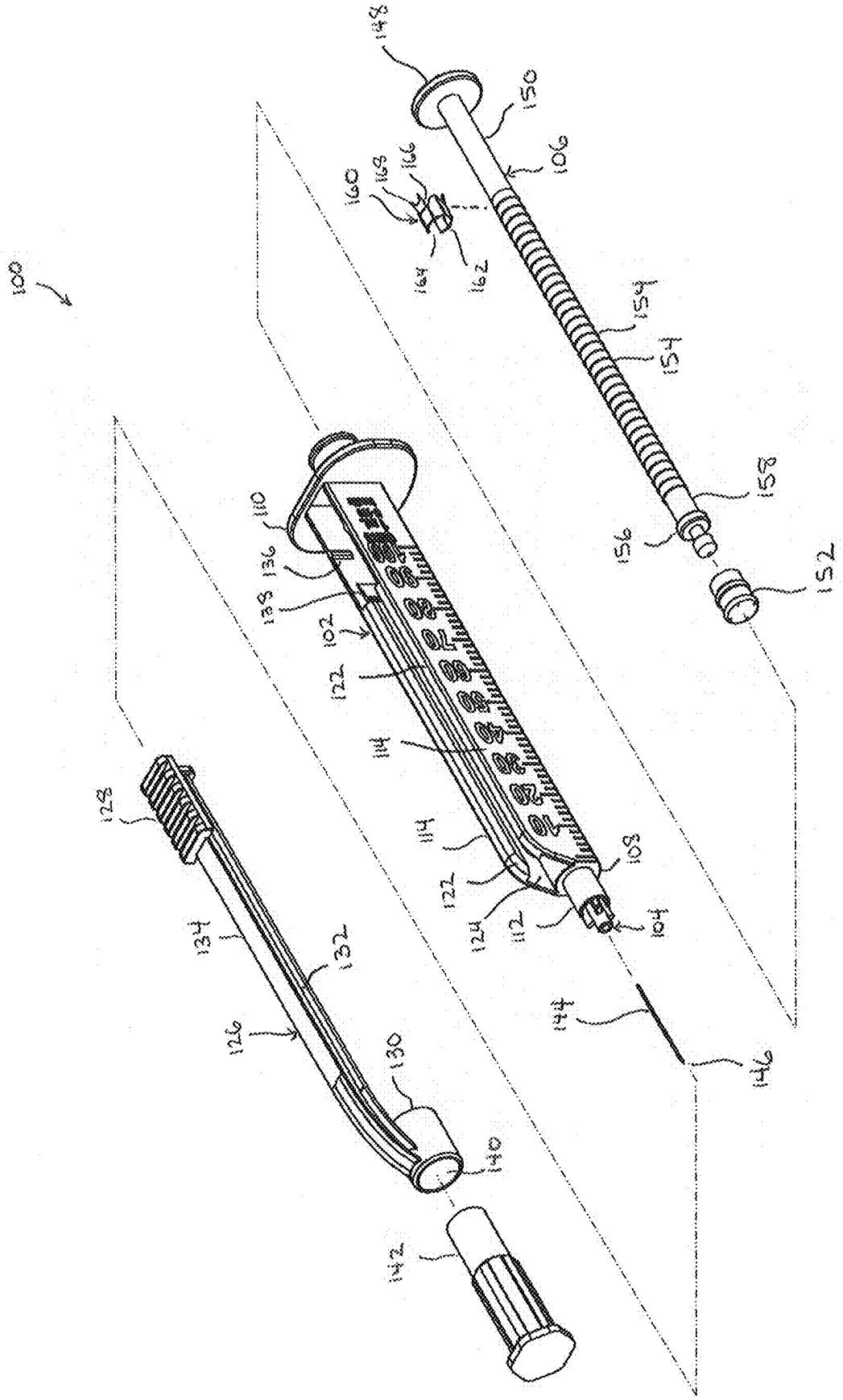

100
148
150
106
160
168
166
164
162
159
154
158
156
152
110
136
138
102
122
114
128
134
132
126
130
140
142
116
108
122
124
112
104
144
146

FIG. 3

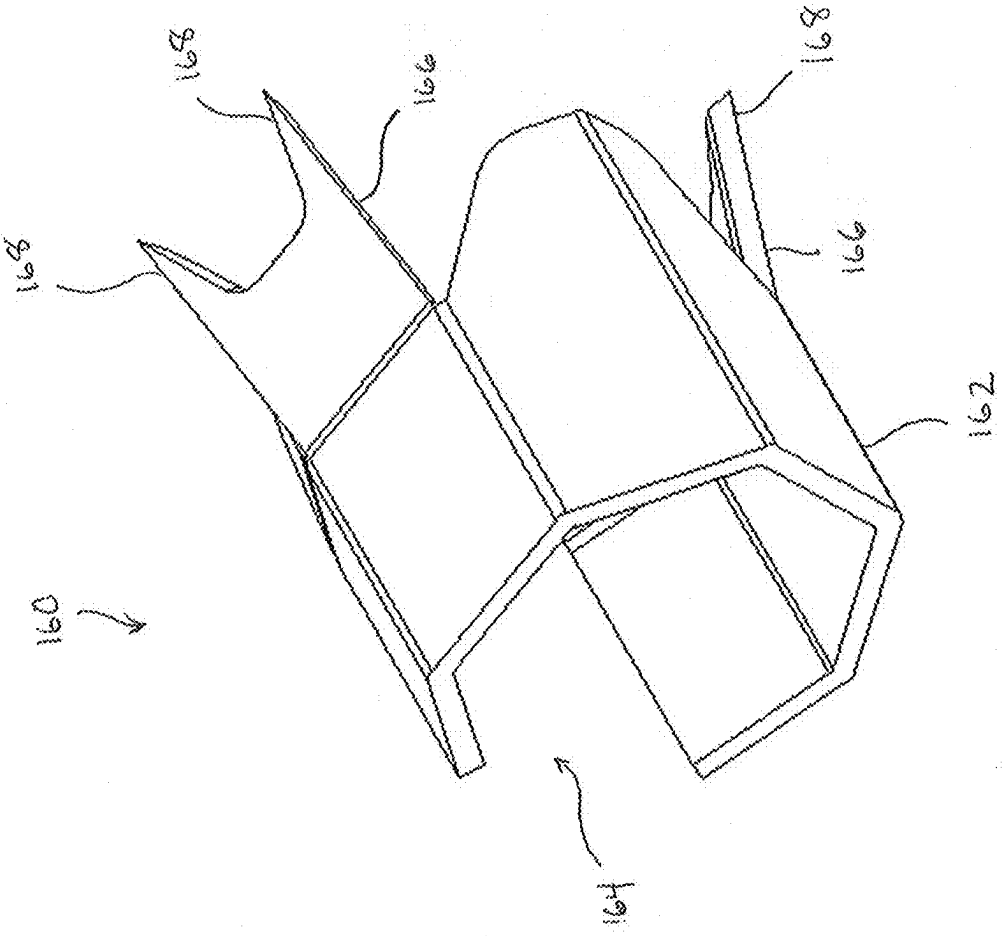


FIG. 4

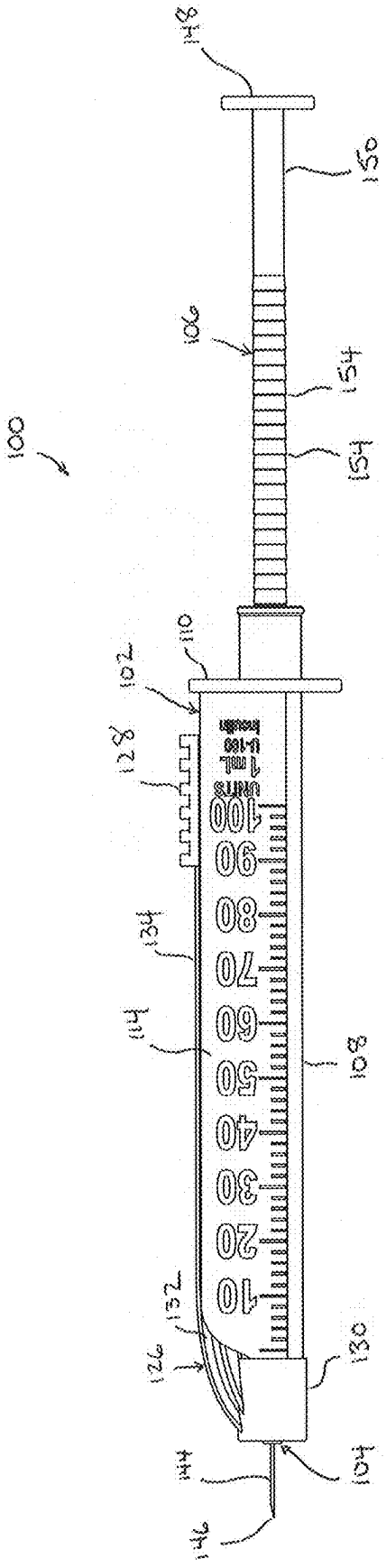

148
150
106
154
154
100
110
102
128
100
90
80
70
60
50
40
30
20
10
134
114
108
132
126
130
104
144
146

FIG. 5

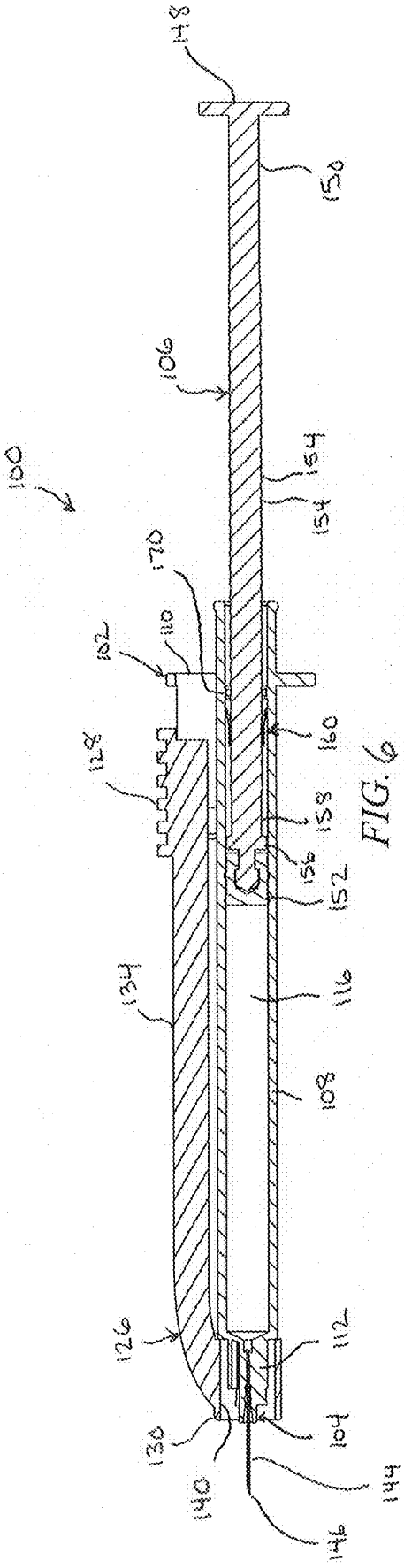

148
150
106
154
154
100
170
110
102
160
128
158
156
152
134
116
108
126
112
130
104
140
144
146

FIG. 6

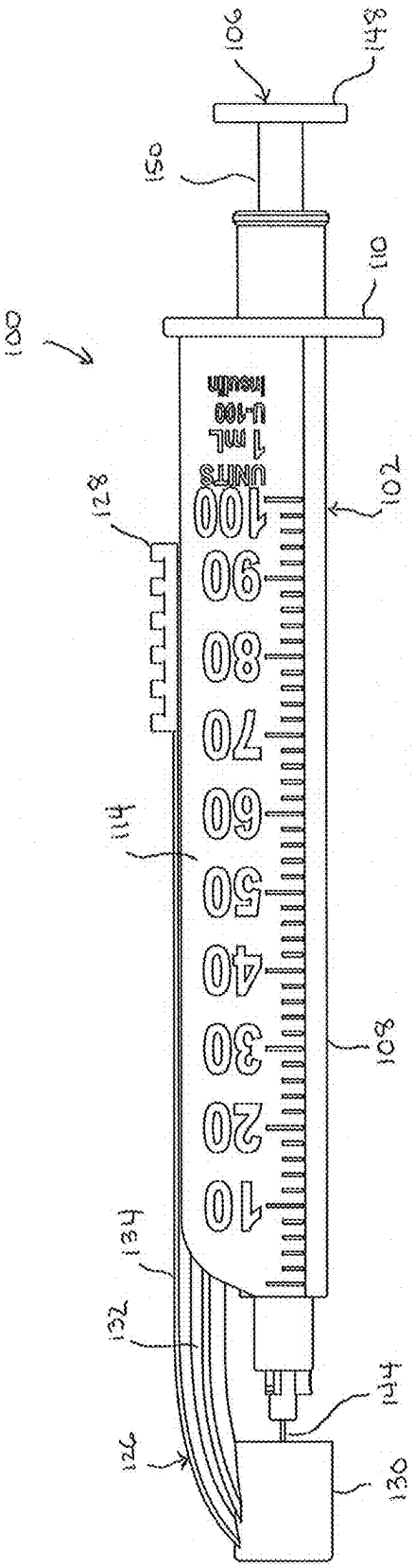

100
101
148
150
110
128
102
114
108
134
132
144
126
130
10
20
30
40
50
60
70
80
90
100
1 mL
U-100
Insulin

FIG. 7

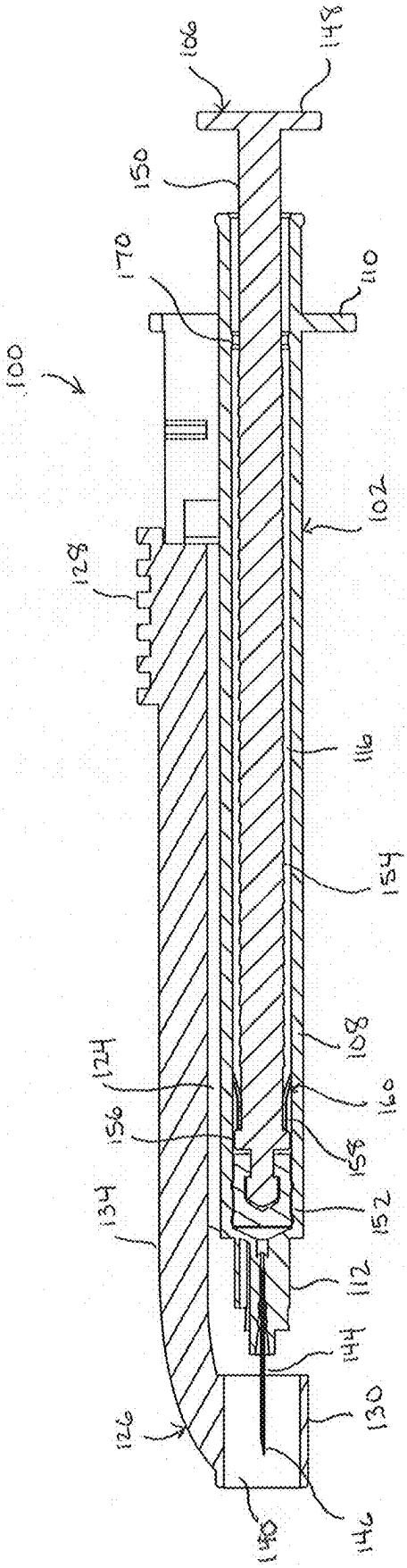

100
106
148
150
170
110
128
102
116
154
108
124
160
156
158
152
134
112
144
126
130
140
142

FIG. 8

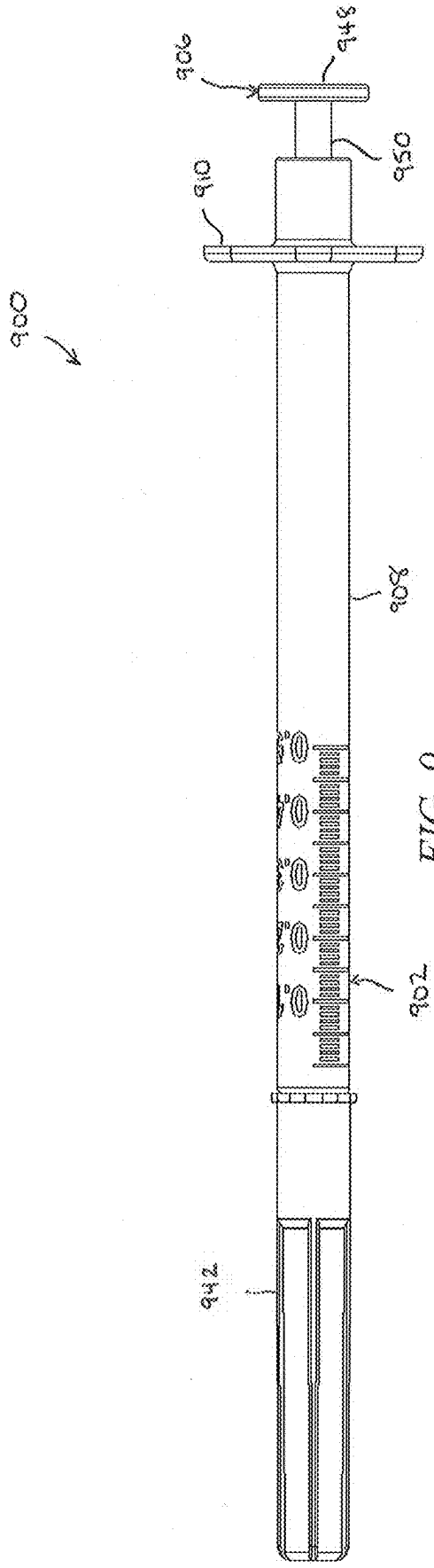

900
906
948
950
910
908
902
942

FIG. 9

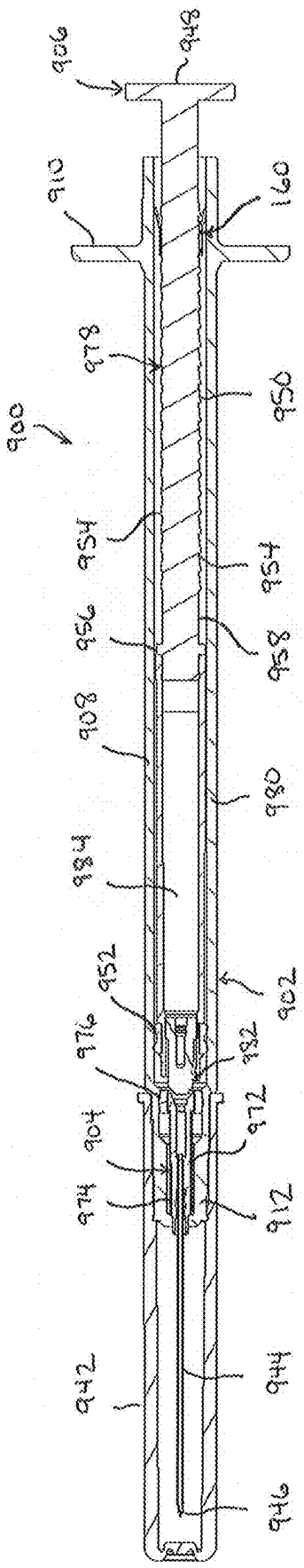

906
948
910
160
978
950
900
954
954
956
958
908
980
984
952
902
976
982
904
972
974
912
942
944
946

FIG. 10

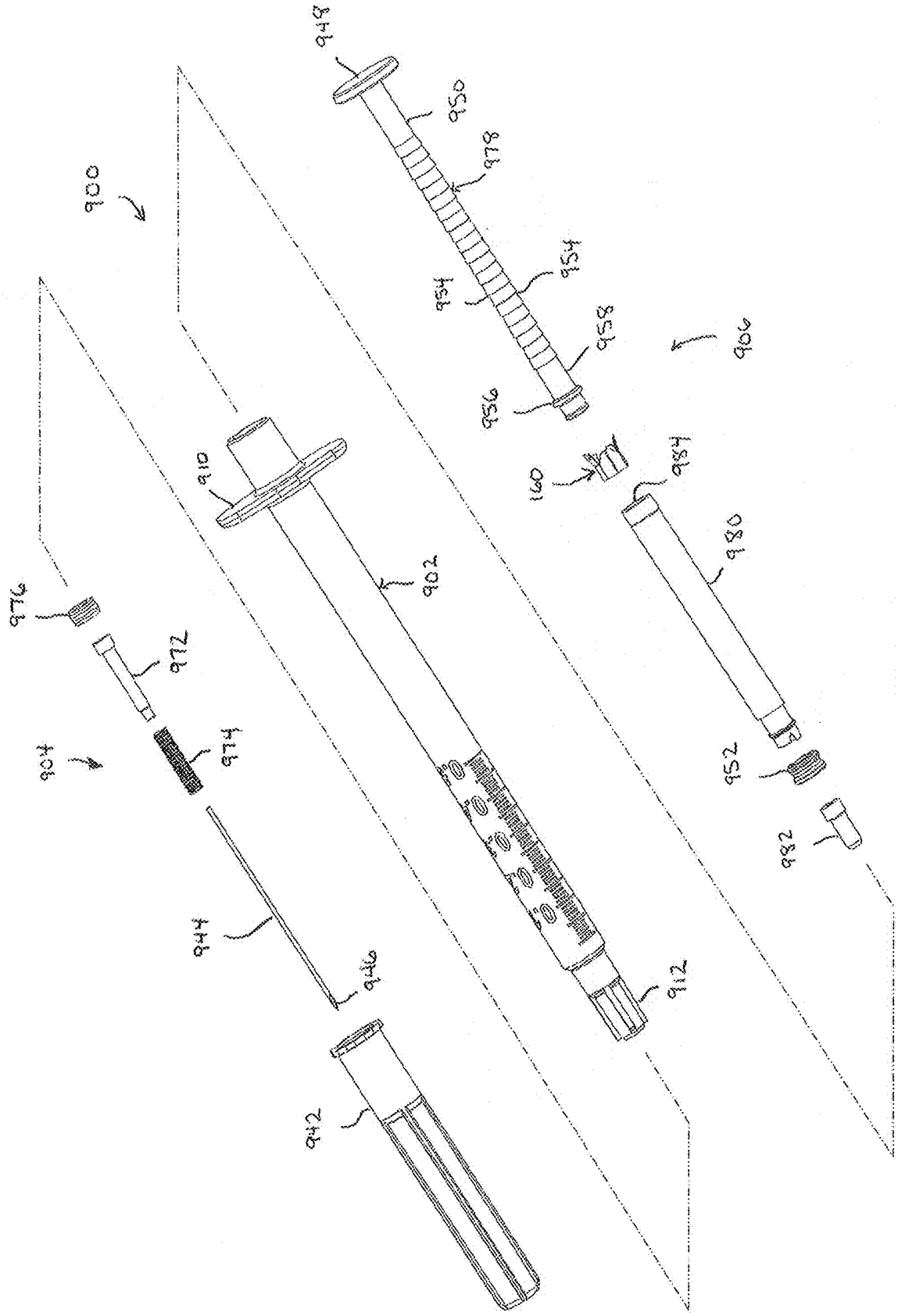

948
950
978
954
958
956
900
906
910
902
160
984
980
952
992
976
972
974
908
944
946
912
942

FIG. 11

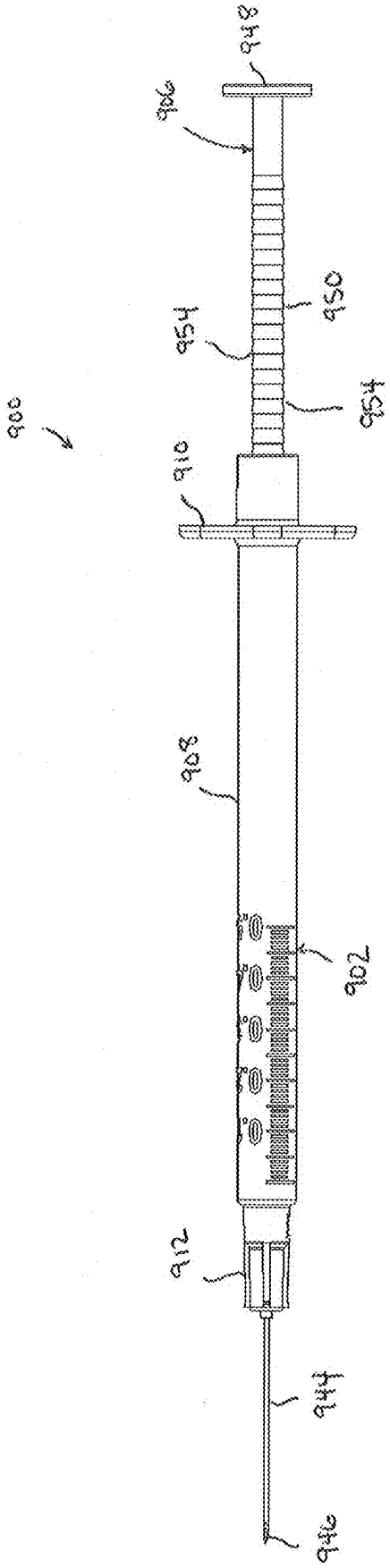

900
948
906
950
954
954
910
908
902
912
944
946

FIG. 12

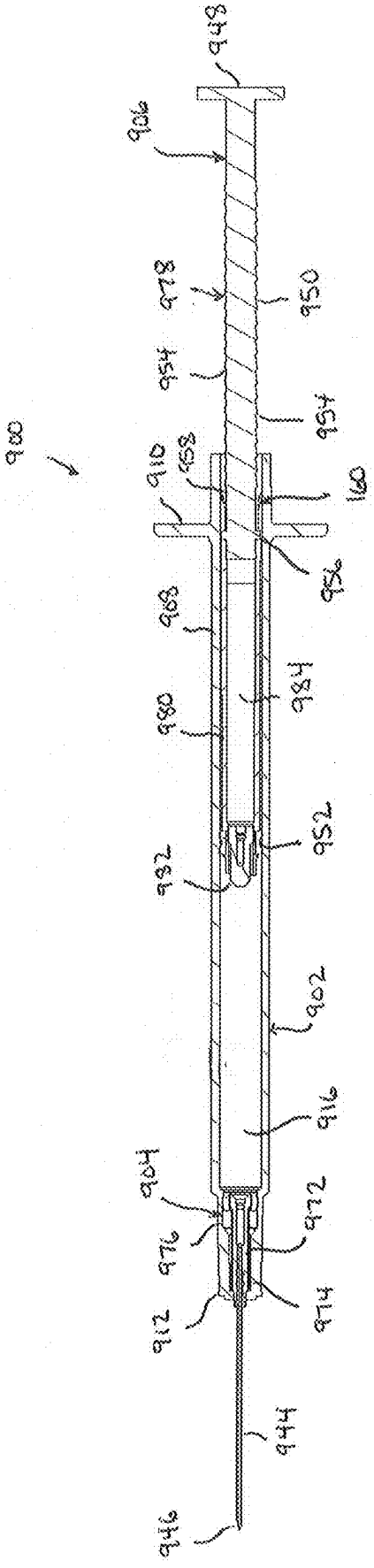

900
948
906
978
950
954
954
910
958
160
956
908
984
980
952
932
902
916
904
972
976
914
912
944
946

FIG. 13

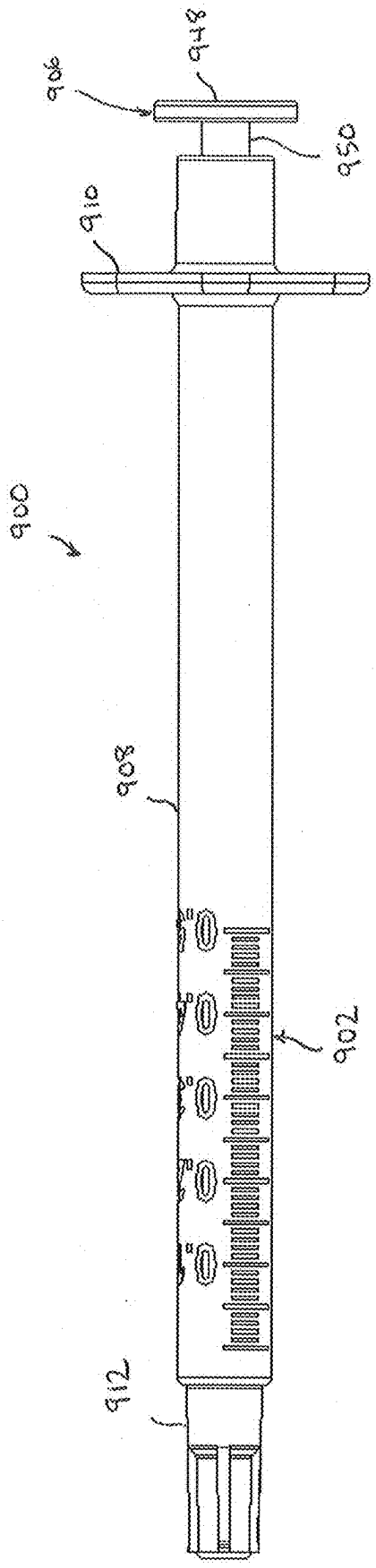

906
948
950
910
900
908
902
912

FIG. 14

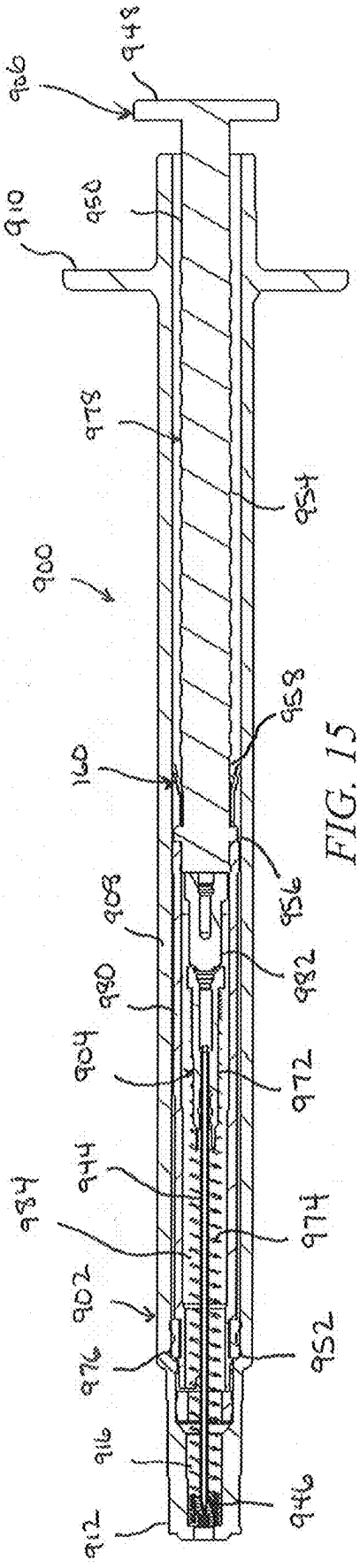

906
948
910
950
978
954
900
958
160
956
908
980
982
904
972
944
984
974
902
976
952
916
946
912

FIG. 15

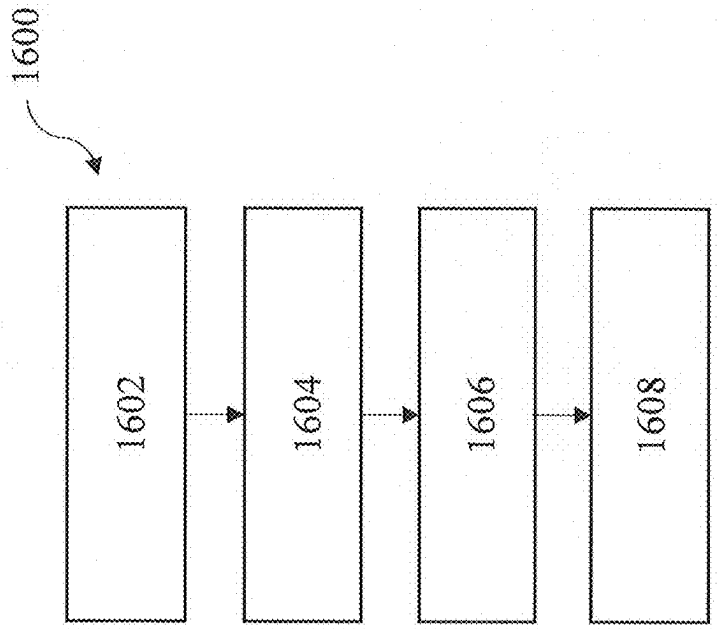


FIG. 16

AUTO-DISABLING SYRINGE ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 63/554,329, filed on Feb. 16, 2024, the disclosure of which is incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION

[0002] Medical syringes are used for administering injections or infusions of drugs, medicines, and vaccines all over the world. In an effort to control the spread of blood-borne pathogens and illnesses and the incidence of contamination by contact with either exposed needles or bodily fluids, syringes have been designed to embody various safety features, such as retractable needles and needle covers. These features are useful in protecting medical personnel from accidental "sticks" when administering injections or infusions. Syringes have also been designed to embody disabling features that only allow a single use from a syringe to prevent the reuse or sharing of syringes. These features are common in self-administering syringes that are often used for injections and infusions of drugs, medicines, and vaccines by the person receiving the injection or infusion. These disabling features are embodied to prevent the reuse or sharing of syringes to further prevent the spread of blood-borne pathogens and illnesses between users that may share a syringe or by a user that may reuse a syringe that has become contaminated. However, in some instances, the disabling features may be breached or overridden in an attempt to enable reuse of a syringe, thereby allowing multiple uses from a single syringe and increasing the likelihood of spreading blood-borne pathogens and illnesses between users. Thus, the medical industry continues to demand advances in syringe technology to reduce and/or eliminate syringe abuse and increase safety for the user.

SUMMARY

[0003] In some embodiments, the systems and methods described herein relate to a syringe, including: a barrel including a cylindrical body portion and a nose end; a needle assembly including a needle received within the needle assembly and extending from the nose end of the barrel; and a plunger assembly including a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body includes a ribbed portion, an annular clip stop, an annular clip channel disposed between the ribbed portion and the annular clip stop, and a disabling clip disposed around the elongated plunger body and configured to engage with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

[0004] In some embodiments, the systems and methods described herein related to a method of administering an injection, including: providing a syringe including: a barrel including a cylindrical body portion and a nose end; a needle assembly including a needle received within the needle assembly and extending from the nose end of the barrel; and a plunger assembly including a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body includes a ribbed portion, an annular clip stop, an annular clip channel disposed between the ribbed portion and the annular clip stop, and a disabling clip disposed around the elongated plunger body; drawing a medicine through the needle into the barrel by activation of the plunger assembly in a first direction; injecting the medicine from the barrel through the needle by activation of the plunger assembly in a second opposing direction; and preventing subsequent use of the syringe via engagement of the disabling clip with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] For a more complete understanding of the present disclosure and so that the manner in which the features and advantages of the embodiments can be understood in more detail, reference is now made to the following brief description, taken in connection with the accompanying drawings and detailed description.

[0006] FIG. **1** shows an orthogonal side view of a syringe according to an embodiment of the disclosure.

[0007] FIG. **2** shows an orthogonal cross-sectional side view of the syringe according to an embodiment of the disclosure.

[0008] FIG. **3** shows an oblique exploded view of the syringe according to an embodiment of the disclosure.

[0009] FIG. **4** shows an oblique view of a disabling clip of the syringe according to an embodiment of the disclosure.

[0010] FIG. **5** shows an orthogonal side view of the syringe prepared for use according to an embodiment of the disclosure.

[0011] FIG. **6** shows an orthogonal cross-sectional side view of the syringe prepared for use according to an embodiment of the disclosure.

[0012] FIG. **7** shows an orthogonal side view of the syringe after use according to an embodiment of the disclosure.

[0013] FIG. **8** shows an orthogonal cross-sectional side view of the syringe after use according to an embodiment of the disclosure.

[0014] FIG. **9** shows an orthogonal side view of a syringe according to another embodiment of the disclosure.

[0015] FIG. **10** shows an orthogonal cross-sectional side view of the syringe according to an embodiment of the disclosure.

[0016] FIG. **11** shows an oblique exploded view of the syringe according to an embodiment of the disclosure.

[0017] FIG. **12** shows an orthogonal side view of the syringe prepared for use according to an embodiment of the disclosure.

[0018] FIG. **13** shows an orthogonal cross-sectional side view of the syringe prepared for use according to an embodiment of the disclosure.

[0019] FIG. **14** shows an orthogonal side view of the syringe after use according to an embodiment of the disclosure.

[0020] FIG. **15** shows an orthogonal cross-sectional side view of the syringe after use according to an embodiment of the disclosure.

[0021] FIG. **16** shows a flowchart of a method of administering an injection with a syringe according to an embodiment of the disclosure.

[0022] The use of the same reference symbols in different drawings indicates similar or identical items.

DETAILED DESCRIPTION

[0023] Referring to FIGS. **1** to **3**, an orthogonal side view, an orthogonal cross-sectional side view, and an oblique exploded view of a syringe **100** are shown according to an embodiment of the disclosure. The syringe **100** may generally comprise a barrel **102**, a needle assembly **104** coupled to the barrel **102**, and a plunger assembly **106** disposed within the barrel **102**.

[0024] Barrel **102** may comprise a cylindrical body portion **108** having one or more projecting finger flanges **110**, a nose end **112** for receiving needle assembly **104**, and a pair of opposing indicia display surfaces **114** that extends from the cylindrical body portion **108**. The opposing indicia display surfaces **114** may generally be substantially flat and extend substantially tangentially from the cylindrical body portion **108**. One or more of the opposing indicia display surfaces **114** may be marked with an easily readable volumetric scale comprising appropriate indicia adjacent to the cylindrical body portion **108** to facilitate easy reading of a liquid level inside an inner fluid chamber **116** of the cylindrical body portion **108** of the barrel **102**. Each of the opposing indicia display surfaces **114** may comprise a longitudinally extending, inwardly projecting rail **122** provided on opposing inwardly facing walls **124** of each of the opposing indicia display surfaces **114**.

[0025] Barrel **102** may also comprise a needle safety device **126** unitarily molded from a polymeric material. The needle safety device **126** may comprise an activation surface **128** used to slide the needle safety device **126**, a needle tip shield **130**, and a pair of channels **132** disposed along a main body portion **134** of the needle safety device **126**. The longitudinally extending, inwardly projecting rails **122** of the opposing indicia display surfaces **114** may be cooperatively sized and configured to engage and provide a smooth, slidable interface with the channels **132** of the needle safety device **126**. Each of the opposing indicia display surfaces **114** may also comprise a rear stop **136** and a slide stop **138** disposed rearwardly of the longitudinally extending, inwardly projecting rails **122**. The rear stops **136** may be configured to engage the channels **132** of the needle safety device **126** and retain the needle safety device **126** in a first retracted position (shown in FIGS. **5** and **6**) prior to use of the syringe **100**, and the slide stops **138** may be configured to engage the channels **132** of the needle safety device **126** and retain the needle safety device **126** in a second extended position (shown in FIGS. **7** and **8**) after use of the syringe **100**.

[0026] In some embodiments, needle tip shield **130** may comprise an inner bore **140** that is coaxially aligned with the nose end **112** of the barrel **102** and configured to slide over and surround the nose end **112** of the barrel **102**. Further, in some embodiments, inner bore **140** of the needle tip shield **130** may receive and retain a needle cap **142**. Barrel **102** is preferably molded from a medical grade polymeric material that is sufficiently transparent to permit the liquid level drawn into the inner fluid chamber **116** of the cylindrical body portion **108** of the barrel **102** to be plainly viewed by a user through one or more of the opposing indicia display surfaces **114** comprising the easily readable volumetric scale.

[0027] Needle assembly **104** may generally comprise a needle **144** received within and extending from the nose end **112** of the barrel **102**. In some embodiments, needle assembly **104** may comprise a needle holder or hub (not shown) that retains the needle **144** within the nose end **112** of the barrel **102** and in fixed relation to the barrel **102** when the syringe **100** is fully assembled. As will be discussed later herein, the needle safety device **126** may be selectively positioned between the first retracted position (shown in FIGS. **5** and **6**) to expose a needle tip **146** of the needle **144** for selective use of the syringe **100** and the second extended position (shown in FIGS. **7** and **8**) to cover up the needle tip **146** of the needle **144** after use of the syringe **100** to protect a user or other from accidental "sticks" from an otherwise exposed needle of a traditional syringe not having the needle safety device **126**.

[0028] Plunger assembly **106** may generally comprise a plunger surface **148** for selectively actuating the plunger assembly **106**, an elongated plunger body **150** extending therefrom, and a plunger seal **152** disposed on or about a distal end of the elongated plunger body **150** of the plunger assembly **106**. The elongated plunger body **150** may be at least partially received within the cylindrical body portion **108** of the barrel **102**, such that the plunger seal **152** forms a fluid tight seal between plunger assembly **106** and the barrel **102**, and more specifically, between the elongated plunger body **150** of the plunger assembly **106** and the cylindrical body portion **108** of the barrel **102**.

[0029] The elongated plunger body **150** may comprise a series of beveled ribs **154** extending along a length of the elongated plunger body **150**, an annular clip stop **156**, and an annular clip channel **158** disposed therebetween. The beveled ribs **154** may generally comprise frustoconical segments that extend consecutively along the length of the elongated plunger body **150**, such that truncated portions of each segment angle away from nose end **112** of barrel **102** and form ridges facing the nose end **112** of the barrel **102**. This configuration orients beveled portions of each segment rearward towards the plunger surface **148** and away from the nose end **112** of the barrel **102**. The annular clip stop **156** comprises an enlarged annular ridge disposed above the plunger seal **152**. In some embodiments, the annular clip stop **156** may provide a rearward seating surface for the plunger seal **152**. The annular clip channel **158** comprises a cylindrical portion disposed between the beveled rib **154** disposed closest to the distal end of the plunger assembly **106** and the annular clip stop **156**.

[0030] Referring FIGS. **3** and **4**, plunger assembly **106** may also comprise a disabling clip **160** disposed around the elongated plunger body **150** of the plunger assembly **106**. The disabling clip **160** may comprise a main annular body portion **162** that extends around the elongated plunger body **150** of the plunger assembly **106**. In some embodiments, the main annular body portion **162** may comprise a notch **164** that provides the main annular body portion **162** a substantially C-shaped cross-sectional profile such that the main annular body portion **162** can be snapped onto the elongated plunger body **150** of the plunger assembly **106** and such that the main annular body portion **162** extends only partially around the elongated plunger body **150** of the plunger assembly **106**. In some embodiments, the main annular body

portion **162** may extend at least about 270 degrees around the elongated plunger body **150** of the plunger assembly **106**. However, in other embodiments, the main annular body portion **162** may extend all the way around the elongated plunger body **150** of the plunger assembly **106**.

[0031] Disabling clip **160** may also comprise a pair of opposing angled legs **166** extending angularly from the main annular body portion **162**. In some embodiments, the disabling clip **160** may comprise two opposing angled legs **166**. However, in other embodiments, the disabling clip **160** may comprise more than two angled legs **166**. The angled legs **166** may extend from the main annular body portion **162** at an angle of at least 15 degrees, or even at least 30 degrees. Each angled leg **166** may comprise one or more barrel tangs **168** extending from the end of the angled leg **166**. The disabling clip **160** may be formed from a corrosion-resistant metal, such as nickel, stainless steel, titanium, and any alloy thereof. In some embodiments, the one or more metallic barrel tangs **168** may be configured to engage and/or "bite into" the polymeric cylindrical body portion **108** of the barrel **102** to prevent the plunger assembly **106** from being withdrawn from the barrel **102** after the first use of the syringe **100**, thereby automatically disabling the syringe **100** after its first use.

[0032] Referring to FIGS. **5** and **6**, an orthogonal side view and an orthogonal cross-sectional side view of the syringe **100** prepared for use are shown according to an embodiment of the disclosure. With the needle safety device **126** disposed in the first retracted position, the needle cap **142** may be removed from the syringe **100** to prepare the syringe **100** for use. To use the syringe **100**, the needle **144** may be inserted through the stopper of a medicine vial (e.g., an insulin bottle), and the medicine may be drawn through the needle **144** and into the inner fluid chamber **116** of the cylindrical body portion **108** of the barrel **102** by pulling rearwardly on the plunger surface **148** of the plunger assembly **106**.

[0033] During withdrawal of the plunger assembly **106**, and due to the rearward-facing bevels of the beveled ribs **154** of the plunger assembly **106**, the beveled ribs **154** on the elongated plunger body **150** may slide through the disabling clip **160** with minimal restriction, while the disabling clip **160** may be held longitudinally stationary by an annular stop ridge **170** disposed at a rearward portion of the cylindrical body portion **108** of the barrel **102**. As shown in FIGS. **5** and **6**, plunger assembly **106** is withdrawn through the barrel **102** during medicinal withdrawal from the medicine vial. When the plunger assembly **106** is fully withdrawn within the cylindrical body portion **108** of the barrel **102**, the disabling clip **160** may become disposed within and/or lock into the annular clip channel **158**, which is disposed forwardly of the beveled ribs **154** and rearwardly of the annular clip stop **156**. The disabling clip **160** may be retained within the annular clip channel **158** and will ride forward in the annular clip channel **158** with the plunger assembly **106** as the plunger surface **148** of the plunger assembly **106** is pressed forwardly to administer the injection with the syringe **100**.

[0034] Referring to FIGS. **7** and **8**, an orthogonal side view and an orthogonal cross-sectional side view of the syringe **100** after use are shown according to an embodiment of the disclosure. After administration of the injection with the syringe **100**, the plunger seal **152** may reach the end of the cylindrical body portion **108** of the barrel **102**, and most, if not all, of the medicine will have discharged from the inner fluid chamber **116** of the cylindrical body portion **108** of the barrel **102** through the needle **144**. The barrel tangs **168** of the disabling clip **160** will interact with the cylindrical body portion **108** of the barrel **102** in response to any attempted withdrawal of the plunger assembly **106** from the barrel **102**. More specifically, the metallic barrel tangs **168** may engage or bite into the polymeric cylindrical body portion **108** of the barrel **102** and prevent the plunger assembly **106** from being withdrawn from the barrel **102** after use of the syringe **100**. This automatically disables the syringe **100** after its first use and prevents subsequent use of the syringe **100**.

[0035] Following an injection, needle safety device **126** may be activated forwardly by pressing on the activation surface **128**. As the needle safety device **126** slides forwardly, the slide stops **138** may engage the channels **132** of the needle safety device **126** and lock the needle safety device **126** in the second extended position. In the second extended position, the needle tip **146** may be disposed within the inner bore **140** of the needle tip shield **130**, thereby circumferentially surrounding the needle tip **146** and exposed portions of the needle **144**. Once engaged, the slide stops **138** effectively prevent the needle safety device **126** from being slid backwards to uncover the needle tip **146** and/or exposed portions of the needle **144**, thereby preventing unintended needle sticks or inadvertent contact with the needle **144**.

[0036] Referring now to FIGS. **9** to **11**, an orthogonal side view, an orthogonal cross-sectional side view, and an oblique exploded view of a syringe **900** are shown according to another embodiment of the disclosure. The syringe **900** may generally comprise a barrel **902**, a needle assembly **904** coupled to the barrel **902**, and a plunger assembly **906** disposed within the barrel **902**. Barrel **902** may comprise a cylindrical body portion **908** having one or more projecting finger flanges **910** and a nose end **912** for receiving needle assembly **904**. In some embodiments, barrel **902** may be marked with an easily readable volumetric scale comprising appropriate indicia adjacent to the cylindrical body portion **908**. Barrel **102** may preferably be molded from a medical grade polymeric material that is sufficiently transparent to permit the liquid level drawn into an inner fluid chamber **916** of the cylindrical body portion **108** of the barrel **102** to be plainly viewed by a user through one or more of the opposing indicia display surfaces **114** comprising the easily readable volumetric scale. In some embodiments, syringe **900** may also comprise a selectively removable needle cap **942** that slides over and engages the nose end **912** of the barrel **902** prior to use.

[0037] Needle assembly **904** may generally be received within and extending from the nose end **912** of the barrel **902**. Needle assembly **904** may comprise a needle holder **972** that retains a needle **944** and that is biased against the nose end **912** of the barrel **902** by a compression spring **974**. When the syringe **900** is fully assembled and ready for use, an elastomeric seal **976** may be disposed between a head section of the needle holder **972** and the barrel **902** to hold the needle assembly **904** in fixed relation to the barrel **902** prior to retraction of the needle assembly **904**. As will be discussed later herein, the needle assembly **904** may be selectively retracted between a first use position (shown in FIGS. **12** and **13**) to expose a needle tip **946** of the needle **944** for selective use of the syringe **100** and a second retracted position (shown in FIGS. **14** and **15**) where the

needle assembly **904** is retracted within the barrel **902** after use of the syringe **900** to protect a user or other from accidental "sticks" from an otherwise exposed needle and prevent subsequent use of the syringe **900**.

[0038] Plunger assembly **906** may generally comprise a main plunger body **978** comprising a plunger surface **948** for selectively actuating the plunger assembly **906** and an elongated plunger body **950** extending therefrom. Plunger assembly **906** may also comprise a needle retraction actuator **980** that engages with an end of the elongated plunger body **950** of the main plunger body **978**. A plunger seal **952** may be disposed on or about a distal end of the needle retraction actuator **980** of the plunger assembly **906**. In some embodiments, needle retraction actuator **980** may also comprise a plunger tip **982** that functions to maximize the fluid dispersed from the inner fluid chamber **916** of the barrel **902** during use. The plunger assembly **906** may be at least partially received within the cylindrical body portion **908** of the barrel **902**, such that the plunger seal **952** forms a fluid tight seal between plunger assembly **906** and the barrel **902**, and more specifically, between the needle retraction actuator **980** of the plunger assembly **906** and the inner fluid chamber **916** of the cylindrical body portion **908** of the barrel **902**.

[0039] The elongated plunger body **950** of the main plunger body **978** may comprise a series of beveled ribs **954** extending along a length of the elongated plunger body **950**, an annular clip stop **956**, and an annular clip channel **958** disposed therebetween. The beveled ribs **954** may generally comprise frustoconical segments that extend consecutively along the length of the elongated plunger body **950**, such that truncated portions of each segment angle away from nose end **912** of barrel **9102** and form ridges facing the nose end **912** of the barrel **902**. This configuration orients beveled portions of each segment rearward towards the plunger surface **948** and away from the nose end **912** of the barrel **902**. The annular clip stop **956** comprises an enlarged annular ridge disposed above the plunger seal **952**. In some embodiments, the annular clip stop **956** may provide a rearward seating surface for the needle retraction actuator **980**, such that forward motion of the main plunger body **978** also moves the needle retraction actuator **980** forwardly with respect to the barrel **902**. The annular clip channel **958** comprises a cylindrical portion disposed between the beveled rib **954** disposed closest to the distal end of the plunger assembly **906** and the annular clip stop **956**.

[0040] Referring FIGS. **4** and **11**, plunger assembly **906** may also comprise a disabling clip **160** disposed around the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **906**. The disabling clip **160** may comprise a main annular body portion **162** that extends around the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **106**. In some embodiments, the main annular body portion **162** may comprise a notch **164** that provides the main annular body portion **162** a substantially C-shaped cross-sectional profile such that the main annular body portion **162** can be snapped onto the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **906** and such that the main annular body portion **162** extends only partially around the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **906**. In some embodiments, the main annular body portion **162** may extend at least about 270 degrees around the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **906**. However, in other embodiments, the main annular body portion **162** may extend all the way around the elongated plunger body **950** of the main plunger body **978** of the plunger assembly **906**.

[0041] Disabling clip **160** may also comprise a pair of opposing angled legs **166** extending angularly from the main annular body portion **162**. In some embodiments, the disabling clip **160** may comprise two opposing angled legs **166**. However, in other embodiments, the disabling clip **160** may comprise more than two angled legs **166**. The angled legs **166** may extend from the main annular body portion **162** at an angle of at least 15 degrees, or even at least 30 degrees. Each angled leg **166** may comprise one or more barrel tangs **168** extending from the end of the angled leg **166**. The disabling clip **160** may be formed from a corrosion-resistant metal, such as nickel, stainless steel, titanium, and any alloy thereof. In some embodiments, the one or more metallic barrel tangs **168** may be configured to engage and/or "bite into" the polymeric cylindrical body portion **908** of the barrel **902** to prevent the plunger assembly **906** from being withdrawn from the barrel **902** after the first use of the syringe **900**, thereby automatically disabling the syringe **900** after its first use.

[0042] Referring to FIGS. **12** and **13**, an orthogonal side view and an orthogonal cross-sectional side view of the syringe **900** prepared for use are shown according to an embodiment of the disclosure. With the needle assembly **904** disposed in the first use position, the needle cap **942** may be removed from the syringe **900** to prepare the syringe **900** for use. To use the syringe **900**, the needle **944** may be inserted through the stopper of a medicine vial (e.g., an insulin bottle), and the medicine may be drawn through the needle **944** and into the inner fluid chamber **916** of the cylindrical body portion **908** of the barrel **902** by pulling rearwardly on the plunger surface **948** of the plunger assembly **906**.

[0043] During withdrawal of the plunger assembly **906**, and due to the rearward-facing bevels of the beveled ribs **954** of the plunger assembly **906**, the beveled ribs **954** on the elongated plunger body **950** of the main plunger body **978** may slide through the disabling clip **160** with minimal restriction, while the disabling clip **160** may be held longitudinally stationary at a rearward portion of the cylindrical body portion **908** of the barrel **902**. As shown in FIGS. **12** and **13**, main plunger body **978** of the plunger assembly **906** is withdrawn through the barrel **902** during medicinal withdrawal from the medicine vial. When the plunger assembly **906** is fully withdrawn within the cylindrical body portion **908** of the barrel **902**, the disabling clip **160** may become disposed within and/or lock into the annular clip channel **958**, which is disposed forwardly of the beveled ribs **954** and rearwardly of the annular clip stop **956**. The disabling clip **160** may be retained within the annular clip channel **958** and will ride forward in the annular clip channel **958** with the plunger assembly **906** as the plunger surface **948** of the main plunger body **978** of the plunger assembly **906** is pressed forwardly to administer the injection with the syringe **900**.

[0044] Referring to FIGS. **14** and **15**, an orthogonal side view and an orthogonal cross-sectional side view of the syringe **900** after use are shown according to an embodiment of the disclosure. After administration of the injection with the syringe **900**, the plunger seal **952** may reach the end of the cylindrical body portion **908** of the barrel **902**, and most, if not all, of the medicine will have discharged from the inner fluid chamber **916** of the cylindrical body portion **908** of the barrel **902** through the needle **944**. The barrel tangs

168 of the disabling clip 160 will interact with the cylindrical body portion 908 of the barrel 902 in response to any attempted withdrawal of the plunger assembly 906 from the barrel 02. More specifically, the metallic barrel tangs 168 may engage or bite into the polymeric cylindrical body portion 908 of the barrel 902 and prevent the plunger assembly 906 from being withdrawn from the barrel 902 after use of the syringe 900. This automatically disables the syringe 900 after its first use and prevents subsequent use of the syringe 900.

[0045] During administration of the injection, needle retraction actuator 980 may be driven forwardly with the forward motion of the main plunger body 978 through the engagement of the needle retraction actuator 980 and the annular clip stop 956 of the main plunger body 978. Needle retraction actuator 980 may contact the elastomeric seal 976 as the plunger assembly 906 nears complete forward advancement within the barrel 902. Needle retraction actuator 980 may drive the elastomeric seal 976 forward, thereby disengaging it from the needle holder 972. Without restriction from the friction force the elastomeric seal 976 provides between the needle holder 972 and the barrel 902, the compression spring 974 that rearwardly biases the needle holder 972 against the nose end 912 of the barrel 902 may expand, thereby driving the needle assembly 904 rearward into an inner cavity 984 of the needle retraction actuator 980. Retraction of the needle assembly 904 is complete when the needle tip 946 of the needle 944 is withdrawn into the nose end 912 of the barrel 902 of the syringe 900, thereby preventing unintended needle sticks or inadvertent contact with the needle 944 after administration of the injection.

[0046] FIG. 16 shows a flowchart of a method 1600 of administering an injection with a syringe 100, 900 according to an embodiment of the disclosure. The method 1600 may begin at block 1602 by providing a syringe 100, 900 as disclosed herein. In some embodiments, the syringe 100, 900 may comprise a barrel 102, 902, a needle assembly 104, 904 comprising a needle 144, 944 extending from the barrel 102, 902, and a plunger assembly 106, 906 at least partially disposed within the barrel 102, 902 and comprising a plunger surface 148, 948 for selectively actuating the plunger assembly 106, 906, an elongated plunger body 150, 950 extending therefrom, and a plunger seal 152, 952. In some embodiments, the elongated plunger body 150, 950 may comprise a series of beveled ribs 154, 954 extending along a length of the elongated plunger body 150, 950, an annular clip stop 156, 956, an annular clip channel 158, 958 disposed therebetween, and a disabling clip 160 disposed at least partially around the elongated plunger body 150, 950.

[0047] The method 1600 may continue at block 1604 by drawing a medicine through the needle 144, 944 into the barrel 102, 902 by activation of the plunger assembly 106, 906 in a first direction. In some embodiments, activation of the plunger assembly 106, 906 in the first direction may cause the series of beveled ribs 154, 954 extending along a length of the elongated plunger body 150, 950 to slide through the disabling clip 160 while the disabling clip 160 is retained at a rearward portion of a cylindrical body portion 108, 908 of the barrel 102, 902. In some embodiments, activation of the plunger assembly 106, 906 in the first direction may cause the disabling clip 160 to be disposed within and/or lock into the annular clip channel 158, 958.

[0048] The method 1600 may continue at block 1606 by injecting the medicine from the barrel 102, 902 through the needle 144, 944 by activation of the plunger assembly 106, 906 in a second opposing direction. In some embodiments, activation of the plunger assembly 106, 906 in the second direction may cause the disabling clip 160 to ride forward in the annular clip channel 158, 958 with the plunger assembly 106, 906.

[0049] The method 1600 may continue at block 1608 by preventing subsequent use of the syringe 100, 900. In some embodiments, preventing subsequent use of the syringe 100, 900 may be accomplished by the disabling clip 160 preventing withdrawal of the plunger assembly 106, 906 from the barrel 102, 902. More specifically, in some embodiments, preventing subsequent use of the syringe 100, 900 may be accomplished by the barrel tangs 168 engaging or biting into the cylindrical body portion 108, 908 of the barrel 102, 902. In some embodiments, preventing subsequent use of the syringe 100, 900 may be accomplished by sliding a needle safety device 126 from a first rearward position to a second forward position to cause a needle tip shield 130 of the needle safety device 126 to circumferentially surround a needle tip 146 of the needle 144 and/or exposed portions of the needle 144 to prevent unintended needle sticks or inadvertent contact with the needle 144. In some embodiments, preventing subsequent use of the syringe 900 may be accomplished by automatic retraction of the needle assembly 904 into the barrel 902 of the syringe 900. In some embodiments, automatic retraction of the needle assembly 904 may be accomplished by a needle retraction actuator 980 contacting an elastomeric seal 976 disposed between the needle holder 972 and the barrel 902 to disengage the elastomeric seal 976 from the needle holder 972 to allow a compression spring 974 that rearwardly biases the needle holder 972 against the nose end 912 of the barrel 902 to expand and drive the needle assembly 904 rearward into an inner cavity 984 of the needle retraction actuator 980. Retraction of the needle assembly 904 is complete when the needle tip 946 of the needle 944 is withdrawn into the nose end 912 of the barrel 902 of the syringe 900.

[0050] Embodiments of a syringe 100, 900 and/or method 1600 of administering an injection with a syringe 100, 900 may include one or more of the following embodiments:

[0051] Embodiment 1. A syringe, comprising: a barrel comprising a cylindrical body portion and a nose end; a needle assembly comprising a needle received within the needle assembly and extending from the nose end of the barrel; and a plunger assembly comprising a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body comprises a ribbed portion, an annular clip channel disposed forwardly of the ribbed portion, and a disabling clip disposed around the elongated plunger body and configured to engage with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

[0052] Embodiment 2. The syringe of embodiment 1, wherein the ribbed portion of the elongated plunger body comprises a series of beveled ribs extending along a length of the elongated plunger body of the plunger assembly.

[0053] Embodiment 3. The syringe of embodiment 2, wherein a beveled portion of each of the beveled ribs is angled rearwardly towards the plunger surface of the plunger assembly.

[0054] Embodiment 4. The syringe of embodiment 1, wherein an annular clip stop provides a rearward seating surface for the plunger seal, and wherein the annular clip channel is disposed between the ribbed portion and the annular clip stop.

[0055] Embodiment 5. The syringe of embodiment 1, wherein the disabling clip comprises a main annular body portion disposed around the elongated plunger body and a notch that provides the main annular body portion with a substantially C-shaped cross-sectional profile to enable the main annular body portion of the disabling clip to be laterally pressed onto the elongated plunger body of the plunger assembly.

[0056] Embodiment 6. The syringe of embodiment 5, wherein the notch comprises a width less than a diameter of the elongated plunger body.

[0057] Embodiment 7. The syringe of embodiment 5, wherein the disabling clip comprises a plurality of angled legs extending angularly from the main annular body portion of the disabling clip.

[0058] Embodiment 8. The syringe of embodiment 7, wherein each of the plurality of angled legs comprises one or more barrel tangs extending from an end of each of the plurality of angled legs.

[0059] Embodiment 9. The syringe of embodiment 1, wherein the disabling clip is formed from a corrosion-resistant metal, such as nickel, stainless steel, titanium, and any alloy thereof.

[0060] Embodiment 10. The syringe of embodiment 1, wherein the disabling clip is configured to allow the ribbed portion of the elongated plunger body to slide through the disabling clip while the disabling clip is held longitudinally stationary by an annular stop ridge disposed at a rearward portion of the cylindrical body portion of the barrel during withdrawal of the plunger assembly within the barrel to draw a medicine or drug into the cylindrical body portion of the barrel.

[0061] Embodiment 11. The syringe of embodiment 10, wherein the disabling clip is configured to lock into the annular clip channel of the elongated plunger body of the plunger assembly when the plunger assembly is fully withdrawn within the barrel.

[0062] Embodiment 12. The syringe of embodiment 11, wherein the disabling clip is retained within the annular clip channel and rides forward in the annular clip channel when the plunger assembly is advanced within the barrel to administer an injection with the syringe.

[0063] Embodiment 13. The syringe of embodiment 12, wherein one or more barrel tangs extending from the disabling clip engage with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after the first use of the syringe.

[0064] Embodiment 14. The syringe of embodiment 13, wherein the engagement between the one or more barrel tangs and the cylindrical body portion of the barrel automatically disables subsequent use of the syringe after the first use of the syringe.

[0065] Embodiment 15. The syringe of embodiment 1, wherein the barrel comprises a pair of opposing indicia display surfaces that extend substantially tangentially from the cylindrical body portion of the barrel.

[0066] Embodiment 16. The syringe of embodiment 15, wherein one or more of the opposing indicia display surfaces are marked with an easily readable volumetric scale comprising indicia adjacent to the cylindrical body portion to facilitate easy reading of a liquid level inside the cylindrical body portion.

[0067] Embodiment 17. The syringe of embodiment 16, wherein each of the opposing indicia display surfaces comprise a longitudinally extending, inwardly projecting rail disposed on opposing inwardly facing walls of each of the opposing indicia display surfaces.

[0068] Embodiment 18. The syringe of embodiment 17, further comprising: a needle safety device comprising an activation surface used to slide the needle safety device, a needle tip shield, and a pair of channels disposed along a main body portion of the needle safety device.

[0069] Embodiment 19. The syringe of embodiment 18, wherein longitudinally extending, inwardly projecting rails disposed on opposing inwardly facing walls of each of the opposing indicia display surfaces are cooperatively sized and configured to engage and provide a smooth, slidable interface with the pair of channels of the needle safety device between a first retracted position prior that exposes a needle tip of the needle for selective use of the syringe and a second extended position to cover up the needle tip of the needle after the first use of the syringe.

[0070] Embodiment 20. The syringe of embodiment 19, wherein the barrel comprises a pair of slide stops that engage the pair of channels of the needle safety device and lock the needle safety device in the second extended position to prevent unintended needle sticks or inadvertent contact with the needle after the first use of the syringe.

[0071] Embodiment 21. The syringe of embodiment 1, wherein the needle assembly comprises a needle holder that retains the needle, and wherein the needle assembly is rearwardly biased against the nose end of the barrel by a compression spring.

[0072] Embodiment 22. The syringe of embodiment 21, wherein an elastomeric seal is disposed between a head section of the needle holder and the barrel to hold the needle assembly in fixed relation to the barrel prior to retraction of the needle assembly.

[0073] Embodiment 23. The syringe of embodiment 22, wherein the plunger assembly comprises a main plunger body comprising the plunger surface for selectively actuating the plunger assembly and the elongated plunger body extending therefrom.

[0074] Embodiment 24. The syringe of embodiment 23, wherein the plunger assembly comprises a needle retraction actuator that engages with the elongated plunger body the main plunger body, and wherein the needle retraction actuator is driven forwardly with forward motion of the main plunger body.

[0075] Embodiment 25. The syringe of embodiment 24, wherein the needle retraction actuator comprises a plunger seal.

[0076] Embodiment 26. The syringe of embodiment 24, wherein the needle retraction actuator comprises a plunger tip configured to maximize fluid dispersed from the barrel during administration of an injection.

[0077] Embodiment 27. The syringe of embodiment 24, wherein the needle retraction actuator is configured to contact and move the elastomeric seal forward in the barrel in response to activation of the plunger assembly to disengage the elastomeric seal from the needle holder to initiate retraction of the needle assembly into the barrel.

[0078] Embodiment 28. The syringe of embodiment 27, wherein the needle assembly retracts rearwardly into an inner cavity of the needle retraction actuator.

[0079] Embodiment 29. A method of administering an injection, comprising: providing a syringe comprising: a barrel comprising a cylindrical body portion and a nose end; a needle assembly comprising a needle received within the needle assembly and extending from the nose end of the barrel; and a plunger assembly comprising a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body comprises a ribbed portion, an annular clip channel disposed forwardly of the ribbed portion, and a disabling clip disposed around the elongated plunger body; drawing a medicine through the needle into the barrel by activation of the plunger assembly in a first direction; injecting the medicine from the barrel through the needle by activation of the plunger assembly in a second opposing direction; and preventing subsequent use of the syringe via engagement of the disabling clip with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

[0080] Embodiment 30. The method of embodiment 29, wherein the ribbed portion of the elongated plunger body comprises a series of beveled ribs extending along a length of the elongated plunger body of the plunger assembly.

[0081] Embodiment 31. The method of embodiment 30, wherein a beveled portion of each of the beveled ribs is angled rearwardly towards the plunger surface of the plunger assembly.

[0082] Embodiment 32. The method of embodiment 29, wherein the annular clip stop provides a rearward seating surface for the plunger seal.

[0083] Embodiment 33. The method of embodiment 29, wherein the disabling clip comprises a main annular body portion disposed around the elongated plunger body and a notch that provides the main annular body portion with a substantially C-shaped cross-sectional profile to enable the main annular body portion of the disabling clip to be laterally pressed onto the elongated plunger body of the plunger assembly.

[0084] Embodiment 34. The method of embodiment 33, wherein the notch comprises a width less than a diameter of the elongated plunger body.

[0085] Embodiment 35. The method of embodiment 33, wherein the disabling clip comprises a plurality of angled legs extending angularly from the main annular body portion of the disabling clip.

[0086] Embodiment 36. The method of embodiment 35, wherein each of the plurality of angled legs comprises one or more barrel tangs extending from an end of each of the plurality of angled legs.

[0087] Embodiment 37. The method of embodiment 29, wherein the disabling clip is formed from a corrosion-resistant metal, such as nickel, stainless steel, titanium, and any alloy thereof.

[0088] Embodiment 38. The method of embodiment 29, further comprising: sliding the ribbed portion of the elongated plunger body through the disabling clip while the disabling clip is held longitudinally stationary by an annular stop ridge disposed at a rearward portion of the cylindrical body portion of the barrel during withdrawal of the plunger assembly within the barrel in the first direction to draw a medicine or drug into the cylindrical body portion of the barrel.

[0089] Embodiment 39. The method of embodiment 38, further comprising: locking the disabling clip into the annular clip channel of the elongated plunger body of the plunger assembly when the plunger assembly is fully withdrawn within the barrel.

[0090] Embodiment 40. The method of embodiment 39, further comprising: retaining the disabling clip is within the annular clip channel when the plunger assembly is advanced within the barrel in the second opposing direction to administer an injection with the syringe.

[0091] Embodiment 41. The method of embodiment 40, further comprising: preventing withdrawal of the plunger assembly from the barrel in the first direction after the first use of the syringe through engagement of one or more barrel tangs extending from the disabling clip with the cylindrical body portion of the barrel.

[0092] Embodiment 42. The method of embodiment 41, further comprising: automatically disabling subsequent use of the syringe after the first use of the syringe through engagement between the one or more barrel tangs and the cylindrical body portion of the barrel.

[0093] Embodiment 43. The method of embodiment 29, wherein the barrel comprises a pair of opposing indicia display surfaces that extends substantially tangentially from the cylindrical body portion of the barrel.

[0094] Embodiment 44. The method of embodiment 43, wherein one or more of the opposing indicia display surfaces are marked with an easily readable volumetric scale comprising indicia adjacent to the cylindrical body portion to facilitate easy reading of a liquid level inside the cylindrical body portion.

[0095] Embodiment 45. The method of embodiment 44, wherein each of the opposing indicia display surfaces comprises a longitudinally extending, inwardly projecting rail disposed on opposing inwardly facing walls of each of the opposing indicia display surfaces.

[0096] Embodiment 46. The method of embodiment 45, wherein longitudinally extending, inwardly projecting rails are cooperatively sized and configured to engage and provide a smooth, slidable interface with the pair of channels of a needle safety device between a first retracted position prior that exposes a needle tip of the needle for selective use of the syringe and a second extended position to cover up the needle tip of the needle after the first use of the syringe.

[0097] Embodiment 47. The method of embodiment 46, further comprising: locking the needle safety device in the second extended position to prevent unintended needle sticks or inadvertent contact with the needle with a pair of slide stops that engage the pair of channels of the needle safety device after the first use of the syringe.

[0098] Embodiment 48. The method of embodiment 29, wherein the needle assembly comprises a needle holder that retains the needle, and wherein the needle assembly is rearwardly biased against the nose end of the barrel by a compression spring.

[0099] Embodiment 49. The method of embodiment 48, wherein an elastomeric seal is disposed between a head section of the needle holder and the barrel to hold the needle assembly in fixed relation to the barrel prior to retraction of the needle assembly.

[0100] Embodiment 50. The method of embodiment 49, wherein the plunger assembly comprises a main plunger body comprising the plunger surface for selectively actuating the plunger assembly and the elongated plunger body extending therefrom.

[0101] Embodiment 51. The method of embodiment 50, wherein the plunger assembly comprises a needle retraction actuator that engages with the elongated plunger body the main plunger body, and wherein the needle retraction actuator is driven forwardly with forward motion of the main plunger body.

[0102] Embodiment 52. The method of embodiment 51, wherein the needle retraction actuator comprises a plunger seal.

[0103] Embodiment 53. The method of embodiment 51, wherein the needle retraction actuator comprises a plunger tip configured to maximize fluid dispersed from the barrel during administration of an injection.

[0104] Embodiment 54. The method of embodiment 51, wherein the activation of the plunger assembly in the second opposing direction causes the needle retraction actuator to contact and move the elastomeric seal forward in the barrel to disengage the elastomeric seal from the needle holder to initiate automatic retraction of the needle assembly into the barrel.

[0105] Embodiment 55. The method of embodiment 54, wherein the needle assembly retracts rearwardly into an inner cavity of the needle retraction actuator.

[0106] In the foregoing specification, the concepts have been described with reference to specific embodiments. However, those of ordinary skill in the art appreciate that various modifications and changes can be made without departing from the scope of the invention as set forth in the claims below. Other examples that occur to those skilled in the art are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims. Accordingly, the specification and figures are to be regarded in an illustrative rather than in a restrictive sense, and all such modifications are intended to be included within the scope of the invention.

[0107] Benefits, other advantages, and solutions to problems have been described above with respect to one or more specific embodiments. After reading the specification, those of ordinary skill in the art will appreciate that certain features that are, for clarity, described herein in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features that are, for brevity, described in the context of a single embodiment, may also be provided separately or in any subcombination. Further, references to values stated in ranges include each and every value within that range and include sub-ranges that overlap from one preferred range to another preferred range.

What is claimed is:

1. A syringe, comprising:

a barrel comprising a cylindrical body portion and a nose end;

a needle assembly comprising a needle received within the needle assembly and extending from the nose end of the barrel; and

a plunger assembly comprising a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body comprises a ribbed portion, an annular clip channel disposed forwardly of the ribbed portion, and a disabling clip disposed around the elongated plunger body and configured to engage with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

2. The syringe of claim **1**, wherein the ribbed portion of the elongated plunger body comprises a series of beveled ribs extending along a length of the elongated plunger body of the plunger assembly, and wherein a beveled portion of each of the beveled ribs is angled rearwardly towards the plunger surface of the plunger assembly.

3. The syringe of claim **1**, wherein an annular clip stop provides a rearward seating surface for the plunger seal, and wherein the annular clip channel is disposed between the ribbed portion and the annular clip stop.

4. The syringe of claim **1**, wherein the disabling clip comprises a main annular body portion disposed around the elongated plunger body and a notch that provides the main annular body portion with a substantially C-shaped cross-sectional profile to enable the main annular body portion of the disabling clip to be laterally pressed onto the elongated plunger body of the plunger assembly.

5. The syringe of claim **4**, wherein the notch comprises a width less than a diameter of the elongated plunger body.

6. The syringe of claim **4**, wherein the disabling clip comprises a plurality of angled legs extending angularly from the main annular body portion of the disabling clip.

7. The syringe of claim **6**, wherein each of the plurality of angled legs comprises one or more barrel tangs extending from an end of each of the plurality of angled legs.

8. The syringe of claim **1**, wherein the disabling clip is formed from a corrosion-resistant metal, such as nickel, stainless steel, titanium, or any alloy thereof.

9. The syringe of claim **1**, wherein the disabling clip is configured to allow the ribbed portion of the elongated plunger body to slide through the disabling clip while the disabling clip is held longitudinally stationary by an annular stop ridge disposed at a rearward portion of the cylindrical body portion of the barrel during withdrawal of the plunger assembly within the barrel to draw a medicine or drug into the cylindrical body portion of the barrel.

10. The syringe of claim **9**, wherein the disabling clip is configured to lock into the annular clip channel of the elongated plunger body of the plunger assembly when the plunger assembly is fully withdrawn within the barrel.

11. The syringe of claim **10**, wherein the disabling clip is retained within the annular clip channel and rides forward in the annular clip channel when the plunger assembly is advanced within the barrel to administer an injection with the syringe.

12. The syringe of claim **11**, wherein one or more barrel tangs extending from the disabling clip engage with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after the first use of the syringe.

13. The syringe of claim **12**, wherein engagement between the one or more barrel tangs and the cylindrical body portion of the barrel automatically disables subsequent use of the syringe after the first use of the syringe.

14. The syringe of claim **1**, wherein the barrel comprises a pair of opposing indicia display surfaces that extend substantially tangentially from the cylindrical body portion of the barrel, and wherein a needle safety device is slidably engaged with the pair of opposing indicia display surfaces between a first retracted position prior that exposes a needle tip of the needle for selective use of the syringe and a second extended position to cover up the needle tip of the needle after the first use of the syringe.

15. The syringe of claim **14**, wherein the barrel comprises a pair of slide stops that engage the pair of channels of the needle safety device and lock the needle safety device in the second extended position to prevent unintended needle sticks or inadvertent contact with the needle after the first use of the syringe.

16. The syringe of claim **1**, wherein the needle assembly comprises a needle holder that retains the needle, wherein the needle assembly is rearwardly biased against the nose end of the barrel by a compression spring, and wherein an elastomeric seal is disposed between a head section of the needle holder and the barrel to hold the needle assembly in fixed relation to the barrel prior to retraction of the needle assembly.

17. The syringe of claim **16**, wherein the plunger assembly comprises a main plunger body comprising the plunger surface for selectively actuating the plunger assembly and the elongated plunger body extending therefrom, wherein the plunger assembly comprises a needle retraction actuator that engages with the elongated plunger body of the main plunger body, and wherein the needle retraction actuator is driven forwardly with forward motion of the main plunger body.

18. The syringe of claim **17**, wherein the needle retraction actuator is configured to contact and move the elastomeric seal forward in the barrel in response to activation of the plunger assembly to disengage the elastomeric seal from the needle holder to initiate retraction of the needle assembly into the barrel, and wherein the needle assembly retracts rearwardly into an inner cavity of the needle retraction actuator.

19. A method of administering an injection, comprising:

providing a syringe comprising: a barrel comprising a cylindrical body portion and a nose end; a needle assembly comprising a needle received within the needle assembly and extending from the nose end of the barrel; and a plunger assembly comprising a plunger surface for selectively actuating the plunger assembly, an elongated plunger body extending therefrom, and a plunger seal that forms a fluid tight seal between the cylindrical body portion of the barrel and the plunger assembly, wherein the elongated plunger body comprises a ribbed portion, an annular clip channel disposed forwardly of the ribbed portion, and a disabling clip disposed around the elongated plunger body;

drawing a medicine through the needle into the barrel by activation of the plunger assembly in a first direction;

injecting the medicine from the barrel through the needle by activation of the plunger assembly in a second opposing direction; and

preventing subsequent use of the syringe via engagement of the disabling clip with the cylindrical body portion of the barrel to prevent withdrawal of the plunger assembly from the barrel after first use of the syringe.

20. The method of claim **19**, further comprising: sliding the ribbed portion of the elongated plunger body through the disabling clip while the disabling clip is held longitudinally stationary by an annular stop ridge disposed at a rearward portion of the cylindrical body portion of the barrel during withdrawal of the plunger assembly within the barrel in the first direction to draw a medicine or drug into the cylindrical body portion of the barrel.

21. The method of claim **20**, further comprising: retaining the disabling clip within the annular clip channel when the plunger assembly is advanced within the barrel in the second opposing direction to administer an injection with the syringe.

22. The method of claim **21**, further comprising: preventing withdrawal of the plunger assembly from the barrel in the first direction and automatically disabling subsequent use of the syringe after the first use of the syringe through engagement of one or more barrel tangs extending from the disabling clip with the cylindrical body portion of the barrel.

* * * * *