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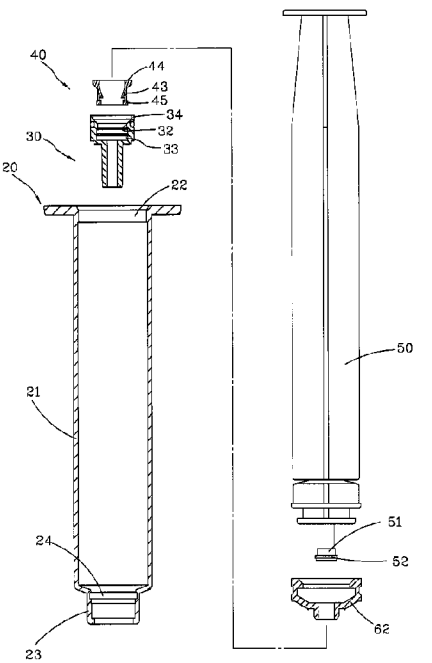
(54) Titre : SERINGUE DE SECURITE
(54) Title: SAFETY SYRINGE



(57) Abrégé/Abstract:
A safety syringe includes a barrel having a positioning groove, a needle holder mounted in the barrel and having a first internal flange engaged in the positioning groove of the barrel and a first positioning flange, an interlocking seat mounted in the needle holder and having an elastic flap and a first external flange, and a plunger mounted in the barrel and having a second external flange. By means of engagement between the elastic flap of the interlocking seat and the second external flange of the plunger, the interlocking seat can be pulled by the plunger to let the first external flange to be forced into engagement with the first internal flange of the needle holder for allowing the needle holder with an attached needlestick to be pulled backwardly into the inside of the barrel to assure the safety of the syringe after the injection.

ABSTRACT OF THE DISCLOSURE

A safety syringe includes a barrel having a positioning groove, a needle holder mounted in the barrel and having a first internal flange engaged in the positioning groove of the barrel and a first positioning flange, an interlocking seat mounted in the needle holder and having an elastic flap and a first external flange, and a plunger mounted in the barrel and having a second external flange. By means of engagement between the elastic flap of the interlocking seat and the second external flange of the plunger, the interlocking seat can be pulled by the plunger to let the first external flange to be forced into engagement with the first internal flange of the needle holder for allowing the needle holder with an attached needlestick to be pulled backwardly into the inside of the barrel to assure the safety of the syringe after the injection.

SAFETY SYRINGE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to medical equipment and more particularly, to a safety syringe.

2. Description of the Related Art

A syringe is an implement adapted for use with a needlestick to inject a liquid medicine, blood or other nutrient solution into the human body. After the injection, the needlestick has the human blood adhered thereto. Therefore, the needlestick should be disposed of safety after the use, avoiding medicare personnel or other persons from being injured by the needlestick accidentally.

The most commonly applied method for disposal of a used needlestick is to insert the needlestick into a needlestick cap after its use. However, when the medicare personnel inserts the needlestick into a needlestick cap, the hand of the medicare personnel can be injured by the needlestick accidentally due to their own carelessness or by other external forces, increasing the risk of infection.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a safety syringe, which is easy to operate and can accurately receive the needlestick after its use, reducing the risk of accidental needlestick injuries.

To achieve this and other objects of the present invention, a safety syringe comprises a barrel, a needle holder, an interlocking seat, and a plunger. The barrel comprises a barrel body, a tubular neck outwardly extending from one end of the barrel body, and a positioning groove extending around an inside wall of the tubular neck.

The needle holder is detachably mounted in the tubular neck of the barrel, comprising a first ring wall, a first internal flange located in the first ring wall, and a first positioning flange located at one end of the first ring wall and elastically engaged in the positioning groove inside the tubular neck of the barrel. The interlocking seat is axially movably mounted in the first ring wall of the needle holder, comprising a second ring wall, at least one elastic flap mounted in the second ring wall, and a first external flange located at one end of the second ring wall for engagement with the first internal flange of the needle holder by means of an axial movement of the interlocking seat. The plunger is axially movably mounted in the barrel body of the barrel, comprising a pressing portion inserted into the inside of the second ring wall of the interlocking seat and a second external flange located at an outer surface of the pressing portion and adapted for engagement with the elastic flaps of the interlocking seat upon an axial movement of the plunger relative to the barrel. Thus, the interlocking seat can be moved by a pull force of the plunger in direction away from the needle holder to carry the needle holder and an attached needlestick into the inside of the barrel.

Preferably, the needle holder further comprises an end wall located at an opposite end of the first ring wall, and a second internal flange extending around an inner surface of the first ring wall. The second internal flange is disposed between the first internal flange and the end wall. Thus, when mounting the interlocking seat in the needle holder, the first external flange can be forced into engagement with the second internal flange to achieve a good positioning effect.

Preferably, the interlocking seat comprises two slots located in the second ring wall, and two elastic flaps respectively mounted in the two slots. Further, the distance between these two elastic flaps is smaller than the outer diameter of the

second external flange at the pressing portion of the plunger. Thus, during the injection, the two elastic flaps of the interlocking seat are forced to expand by the second external flange at the pressing portion of the plunger for enabling the pressing portion to pass over. After the second external flange passed over the elastic flaps of the interlocking seat, the elastic flaps of the interlocking seat immediately return to their former shape and are stopped against the second external flange at the pressing portion of the plunger.

Preferably, the interlocking seat further comprises a second positioning flange located at an opposite end of the second ring wall and stopped against the first positioning flange of the needle holder to elastically deform the first positioning flange of the needle holder and to force it into the positioning groove of the barrel.

Preferably, the plunger has a bottom end thereof mounted with an elastic stopper. The elastic stopper comprises a buffer portion at a top end thereof. Thus, when the buffer portion is stopped at the second positioning flange, a further force should be employed to force the elastic flaps into engagement with the second external flange.

Other advantages and features of the present invention will be fully understood by reference to the following specification in conjunction with the accompanying drawings, in which like reference signs denote like components of structure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional assembly view of a safety syringe in accordance with the present invention.

FIG. 1A is an enlarged view of a part of FIG. 1, illustrating the configuration of the buffer portion at the elastic stopper.

FIG. 2 is a sectional exploded view of the safety syringe in accordance with

the present invention.

FIG. 3 is an elevational view of the needle holder in accordance with the present invention.

FIG. 4 is a sectional view of the needle holder in accordance with the present invention.

FIG. 5 is an elevational view of the interlocking seat in accordance with the present invention.

FIG. 6 is a sectional view of the interlocking seat in accordance with the present invention.

FIG. 7 is a sectional view of a part of the present invention, illustrating the first external flange of the interlocking seat engaged with the second internal flange of the needle holder.

FIG. 7A is an enlarged view of a part of FIG. 7, illustrating the buffer portion stopped at the second positioning flange.

FIG. 8 is similar to FIG. 7, illustrating the first external flange of the interlocking seat engaged with the first internal flange of the needle holder.

FIG. 9 is similar to FIG. 8, illustrating the needle holder moved with the interlocking seat to the inside of the barrel.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. 1 and 2, a safety syringe **10** in accordance with the present invention is shown. The safety syringe **10** comprises a barrel **20**, a needle holder **30**, an interlocking seat **40**, and a plunger **50**.

The barrel **20** comprises a barrel body **21**, an opening **22** located in a top end of the barrel body **21**, a tubular neck **23** forwardly extending from an opposing bottom end of the barrel body **21**, and a positioning groove **24** extending around an inside wall

of the tubular neck **23**.

Referring to FIGS. 3 and 4, the needle holder **30** is adapted for the mounting of a needlestick (not shown), comprising a first ring wall **31**, a first internal flange **32** and a second internal flange **33**. The first internal flange **32** and the second internal flange **33** extend around an inner surface of the first ring wall **31** and spaced from each other at a distance. Further, the inner diameter of the first internal flange **32** is smaller than the inner diameter of the second internal flange **33**. Further, a leak-proof gasket ring **60** is mounted around the outer surface of the first ring wall **31**. The needle holder **30** further comprises a first positioning flange **34** radially outwardly extending from a top end of the first ring wall **31** and having an outer diameter larger than the outer diameter of the first internal flange **32** and the outer diameter of the second internal flange **33**, an end wall **35** located at an opposing bottom end of the first ring wall **31** and spaced from the second internal flange **33** at a distance smaller than the distance between the end wall **35** and the first internal flange **32**, and a tubular wall **36** outwardly extending from the end wall **35** in direction away from the first ring wall **31**.

Referring to FIGS. 5 and 6, the interlocking seat **40** comprises a second ring wall **41**, two slots **42** located in the second ring wall **41** at two opposite sides, an elastic flap **43** mounted in each slot **42**, a second positioning flange **44** radially outwardly extending from a top end of the second ring wall **41**, and a first external flange **45** extending around the outer surface of the second ring wall **41** at an opposing bottom end thereof. Further, the outer diameter of the second positioning flange **44** is larger than the outer diameter of the first external flange **45**. Further, the outer diameter of the first external flange **45** is larger than the inner diameter of the first internal flange **32** of the needle holder **30**.

When assembling the barrel **20**, the needle holder **30** and the interlocking

seat **40**, as shown in FIGS. 4, 6, 7 and 7A, insert the needle holder **30** through the opening **22** of the barrel body **21** of the barrel **20** into the inside of the tubular neck **23** of the barrel **20** to expose the tubular wall **36** of the needle holder **30** to the outside of the tubular neck **23** of the barrel **20**, then insert the interlocking seat **40** into the inside of the first ring wall **31** of the needle holder **30** to force the first external flange **45** into engagement with the second internal flange **33** of the needle holder **30**. At this time, the second positioning flange **44** of the interlocking seat **40** is forced to push the first positioning flange **34** of the needle holder **30**, thereby radially deforming the first positioning flange **34** of the needle holder **30** and forcing the first positioning flange **34** to engage into the positioning groove **24** of the barrel **20**. Based on this design, the needle holder **30** can be firmly positioned in the tubular neck **23** of the barrel **20** to bear the pressure from the needlestick in the injection.

The plunger **50** is inserted through the opening **22** of the barrel **20** into the inside of the barrel body **21**, and can be reciprocated up and down in the barrel **20** by an external force. Further, as shown in FIGS. 1 and 1A, the plunger **50** has a bottom end thereof mounted with an elastic stopper **62**. Further, the plunger **50** comprises a pressing portion **51** located at the bottom end thereof and extending out of the elastic stopper **62**, and a second external flange **52** extending around the periphery of the pressing portion **51**. The outer diameter of the second external flange **52** is larger than the distance between the two elastic flaps **43** of the interlocking seat **40**. Further, the elastic stopper **62** comprises a buffer portion **63** protruded from a top end thereof. In this embodiment, the buffer portion **63** is an annular flange located at the top end of the elastic stopper **62**. However, this configuration is not a limitation. Alternatively, the buffer portion **63** can be made in the form of a post or any other structure capable of providing a buffering effect.

When pushing the plunger **50** forwards in an injection operation, the pressing portion **51** of the plunger **50** will be inserted into the inside of the second ring wall **41** of the interlocking seat **40**, and the elastic flaps **43** of the interlocking seat **40** will be stretched open by the second external flange **52** of the plunger **50** for enabling the pressing portion **51** to pass over. After the second external flange **52** passed over the elastic flaps **43** of the interlocking seat **40**, the elastic flaps **43** of the interlocking seat **40** immediately return to their former shape subject to their elastic restoring force and are stopped against the second external flange **52** at the pressing portion **51** of the plunger **50**, as shown in FIG. 7. When continuously pushing the plunger **50** forwards, the second external flange **52** at the pressing portion **51** of the plunger **50** will be stopped against the first external flange **45** of the interlocking seat **40**, and the residual fluid in the needle holder **30** will be minimized subject to the movement of the pressing portion **51** of the plunger **50**, thereby finishing the injection. During engagement between the interlocking seat **40** and the plunger **50**, the buffer portion **63** at the top end of the elastic stopper **62** provides a buffer stroke so that when the buffer portion **63** is stopped at the second positioning flange **44**, it needs to push the plunger **50** further forward to force the second external flange **52** into engagement with the elastic flaps **43**.

After injection, the medical personnel can pull the plunger **50** backwards. At the time the plunger **50** is pulled backward, as shown in FIG. 8, the interlocking seat **40** and the plunger **50** are engaged together, and the needle holder **30** is secured to the barrel **20**, and therefore the first external flange **45** of the interlocking seat **40** will be disengaged from the second internal flange **33** of the needle holder **30** at first upon a backward movement of the plunger **50**, enabling the interlocking seat **40** to be moved in direction away from the needle holder **30** to the extent where the first external flange

45 of the interlocking seat **40** is forced into engagement with the first internal flange **32** of the needle holder **30**. At this time, the second positioning flange **44** of the interlocking seat **40** is disengaged from the first positioning flange **34** of the needle holder **30** to release the push force of the first positioning flange **34** of the needle holder **30**, and thus the needle holder **30** is unlocked. Under this condition, as shown in FIG. 9, when continuously pulling the plunger **50** backwards, due to the engagement relationship between the interlocking seat **40** and the needle holder **30**, the needle holder **40** with the attached needlestick can be pulled backwardly away from the tubular neck **23** of the barrel **20** into the inside of the barrel body **21** of the barrel **20** and received therein.

In conclusion, subject to the arrangement and engagement relationship among the needle holder **30**, interlocking seat **40** and plunger **50** of the safety syringe **10**, the structural stability of the needle holder **30** is maintained and the needle holder **30** will not fall from the barrel **20** accidentally during the injection operation and the amount of residual fluid can be minimized to avoid waste. After the injection, the needle holder **30** with the attached needlestick can be accurately carried by the interlocking seat **40** backwardly into the inside of the barrel **20** when the plunger **50** is pulled back, preventing needlestick injuries and facilitating implementation of single-use. Further, after the plunger **50** is pushed to the end in the injection, the user needs to apply a further push force to the plunger **50** so that the interlocking seat **40** can be pulled backwardly into the inside of the barrel **20**. This two-stage force application design avoids accidental engagement between the interlocking seat **40** and the plunger **50** due to the use of unnecessarily excessive force during the injection.

The embodiments of the present invention for which an exclusive property or privilege is claimed are defined as follows:

1. A safety syringe, comprising:

a barrel comprising a barrel body, a tubular neck outwardly extending from one end of said barrel body, and a positioning groove extending around an inside wall of said tubular neck;

a needle holder detachably mounted in said tubular neck of said barrel, said needle holder comprising a first ring wall, a first internal flange, a second internal flange and a first positioning flange, said first internal flange and said second internal flange located in said first ring wall, said first internal flange and said second internal flange being spaced from each other at a predetermined distance, an inner diameter of said first internal flange is smaller than an inner diameter of said second internal flange, said first positioning flange located at one end of said first ring wall and elastically engaged in said positioning groove inside said tubular neck of said barrel;

an interlocking seat axially movably mounted in said first ring wall of said needle holder, said interlocking seat comprising a second ring wall, a first external flange and a second positioning flange, at least one elastic flap mounted between said first external flange and said second positioning flange in said second ring wall, said first external flange located at one end of said second ring wall for selectively engaging with said first internal flange or said second positioning flange of said needle holder by an axial movement of said interlocking seat, the second positioning flange located at an opposite end of said second ring wall and stopped against said first positioning flange of said needle holder; and

a plunger axially movably mounted in said barrel body of said barrel, said plunger comprising a pressing portion inserted into the inside of said second ring wall of said interlocking seat and a second external flange located at an outer surface of said pressing portion and adapted for engagement with said elastic flaps of said interlocking seat upon an axial movement of said plunger relative to said barrel.

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2. The safety syringe as claimed in claim 1, wherein said needle holder further comprises an end wall and a tubular wall, said end wall being located at an opposite end of said first ring wall remote from said first positioning flange, a distance between said end wall and said second internal flange being smaller than a distance between said end wall and said first internal flange, said tubular wall extending from one end of said end wall to the outside of said tubular neck of said barrel in direction away from said first ring wall.

3. The safety syringe as claimed in claim 1, wherein said interlocking seat further comprises at least one slot located in said second ring wall; each said elastic flap is located in one respective said slot.

4. The safety syringe as claimed in claim 3, wherein said interlocking seat comprises two said slots located in said second ring wall at two opposite sides, each said slot having one said elastic flap located therein, a distance between the two said elastic flaps being smaller than an outer diameter of said second external flange at said pressing portion of said plunger.

5. The safety syringe as claimed in claim 1, wherein an outer diameter of said second positioning flange of said interlocking seat is larger than an outer diameter of said first positioning flange of said needle holder and said second positioning flange of said interlocking seat is forced to push the first positioning flange of said needle holder when said interlocking seat inserting into said needle holder; the outer diameter of said first positioning flange of said needle holder is larger than an outer diameter of said first external flange of said interlocking seat.

6. The safety syringe as claimed in claim 1, wherein said plunger has a bottom end thereof mounted with an elastic stopper, said elastic stopper comprising a buffer portion located at a top end thereof.

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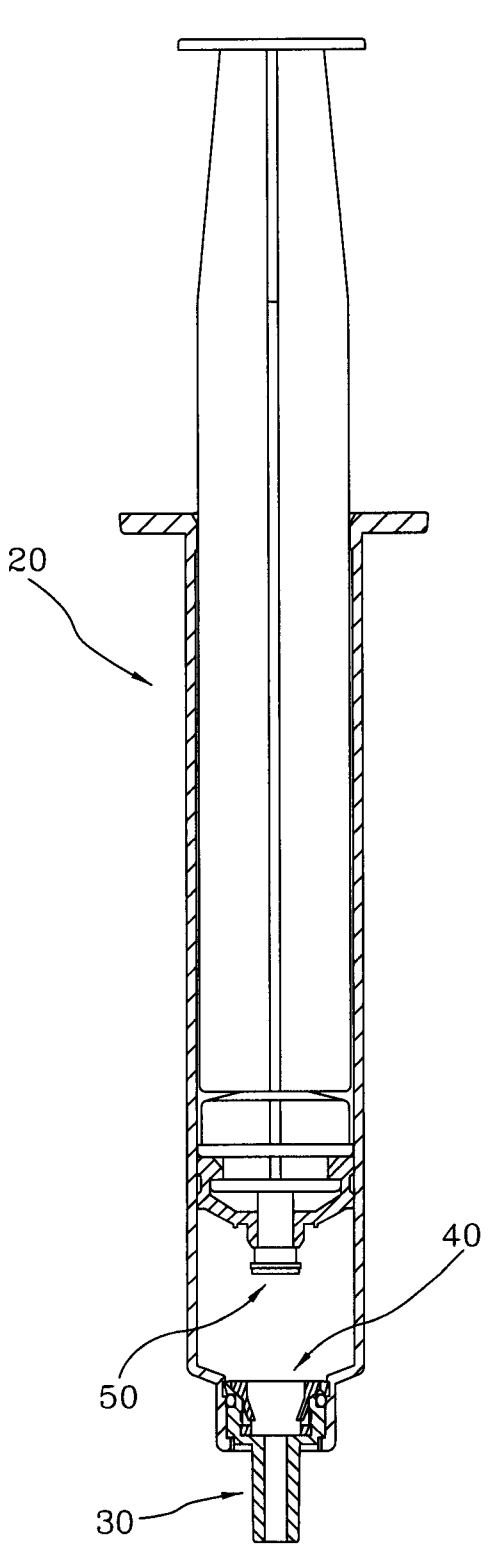


FIG. 1

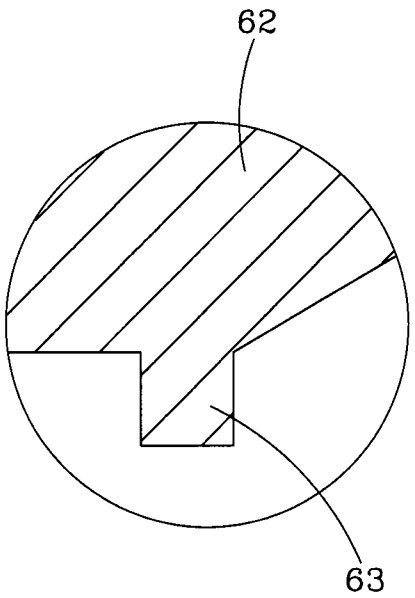


FIG. 1A

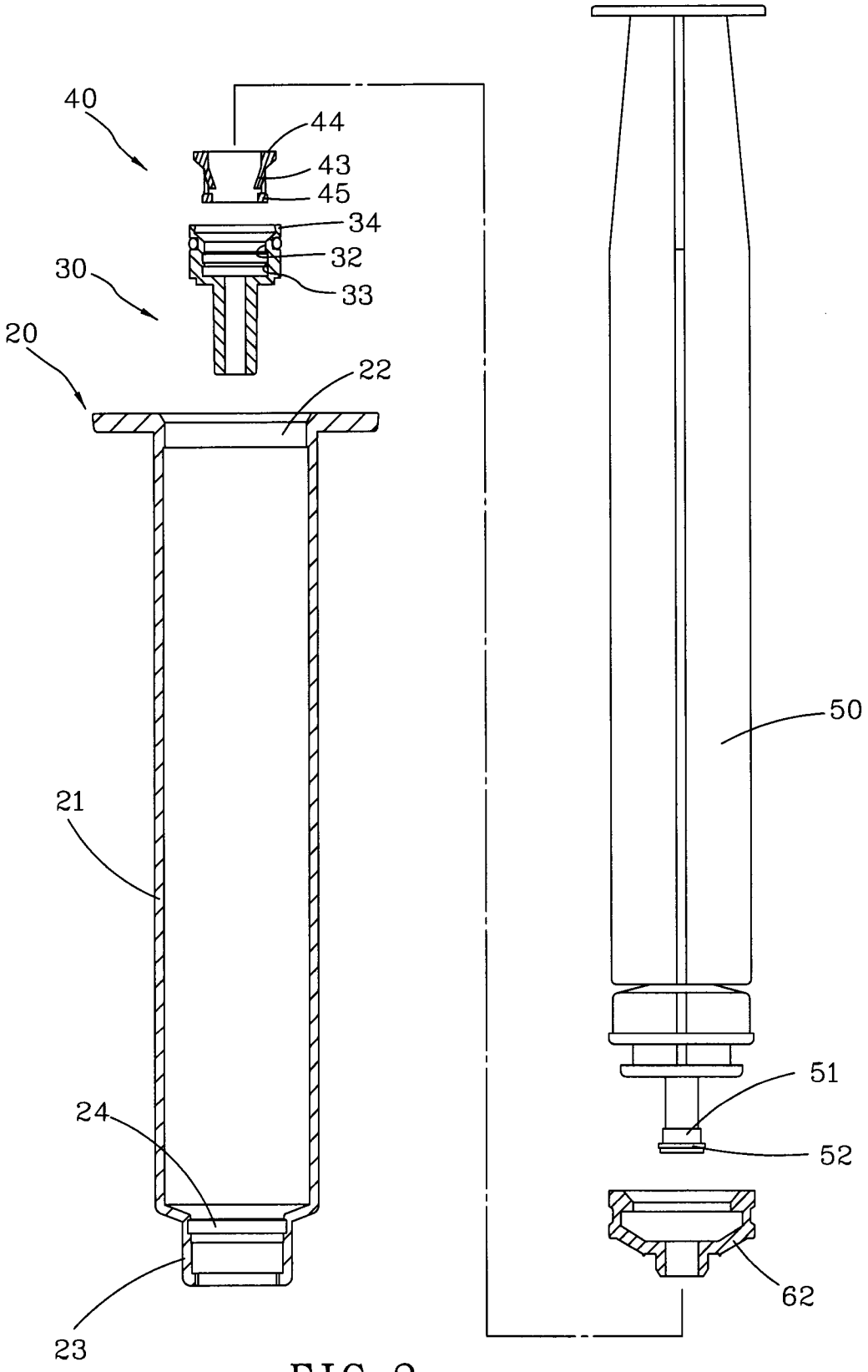


FIG. 2

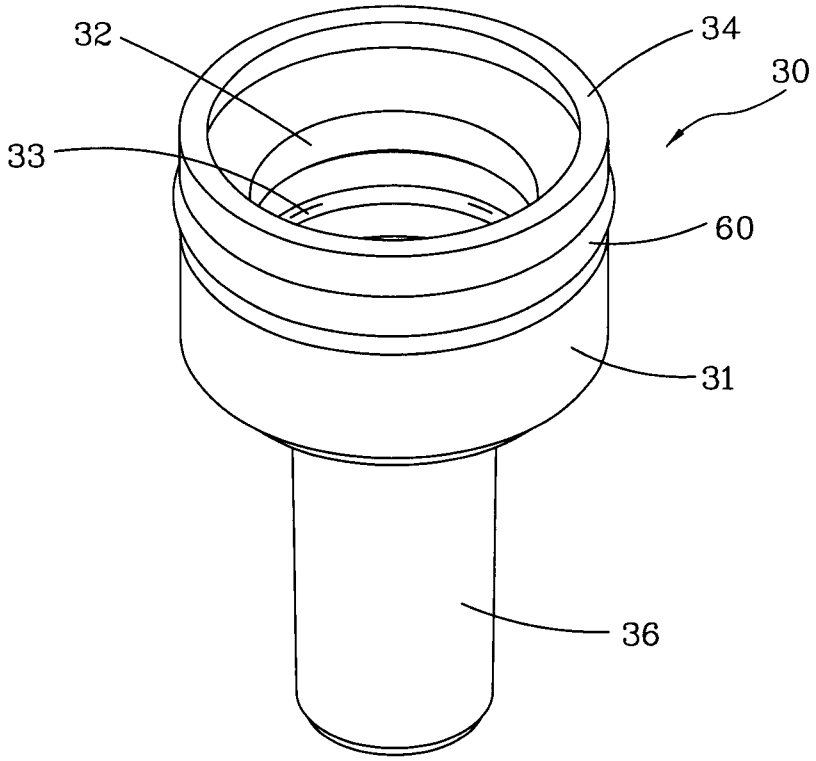


FIG. 3

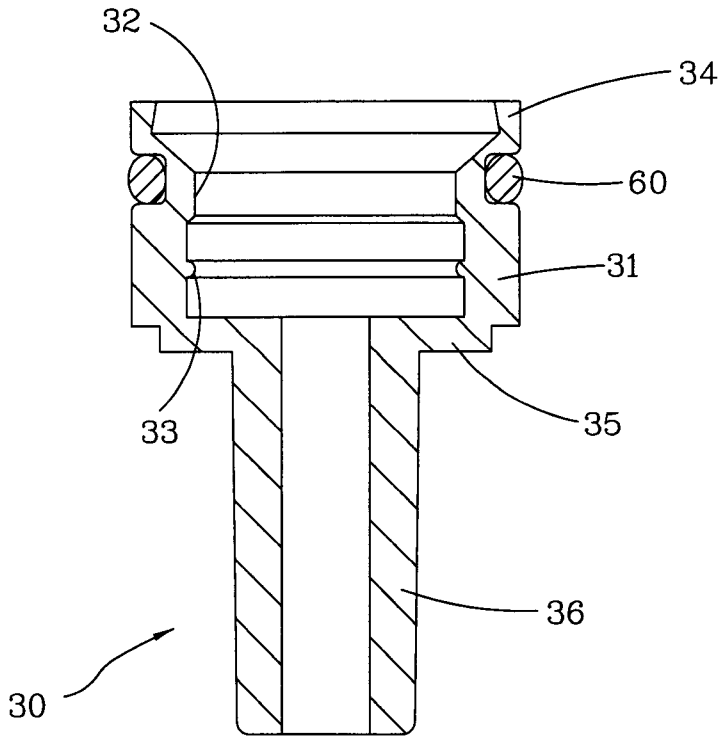


FIG. 4

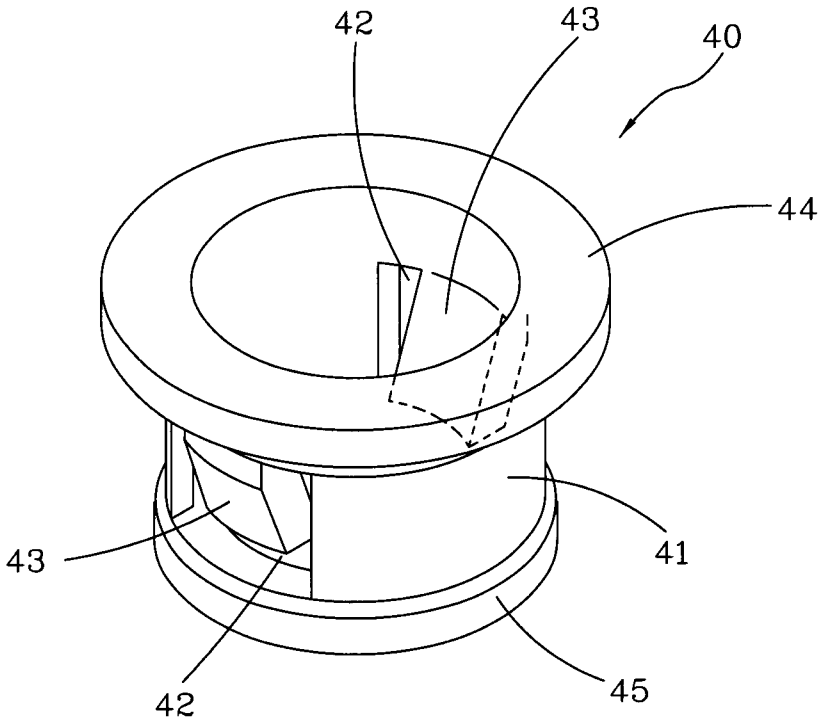


FIG. 5

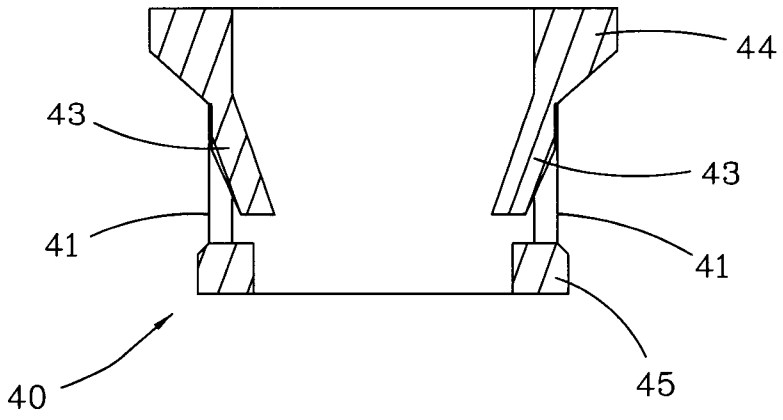


FIG. 6

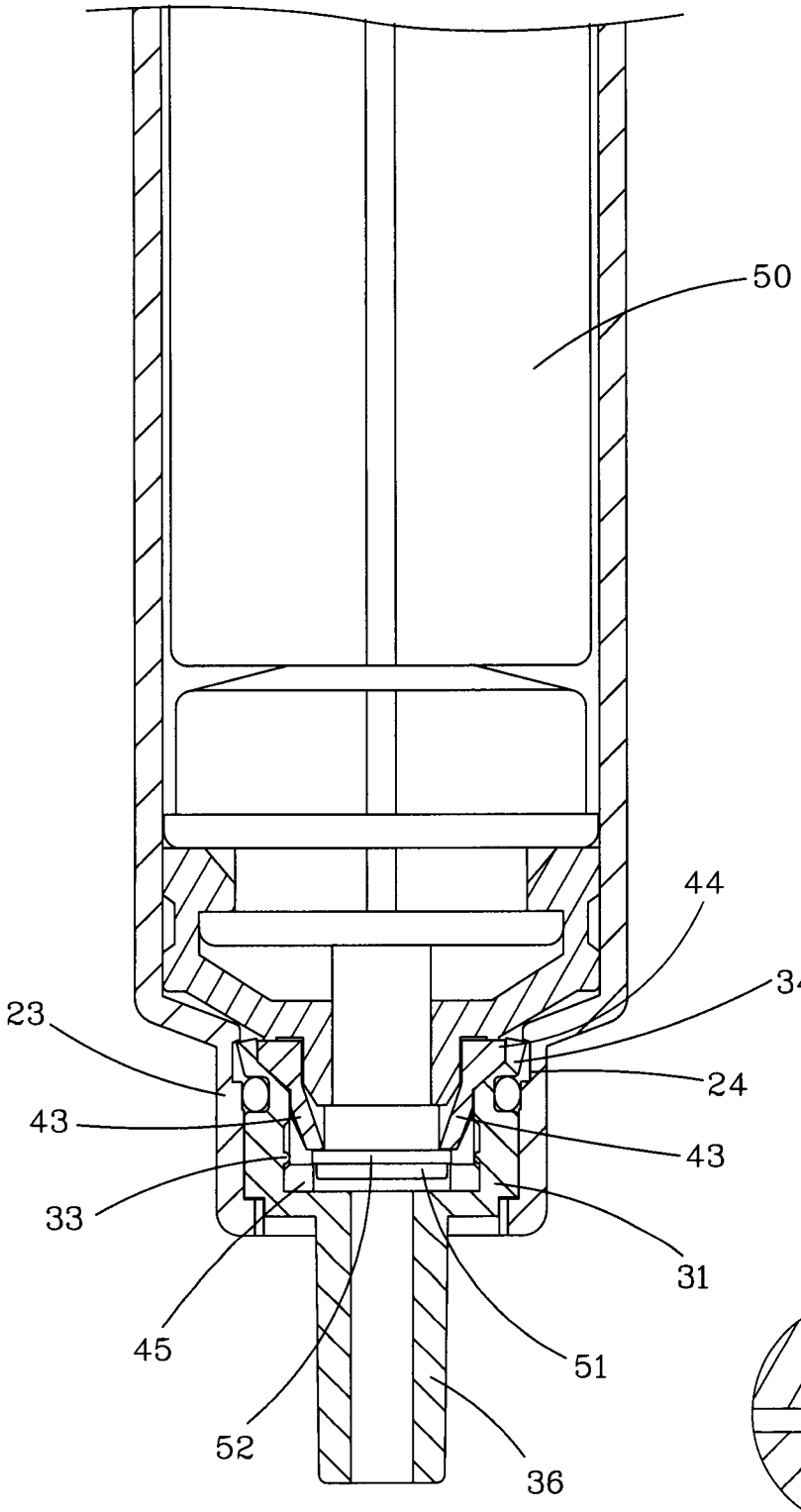


FIG. 7

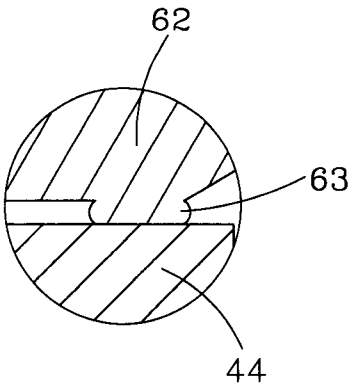


FIG. 7A

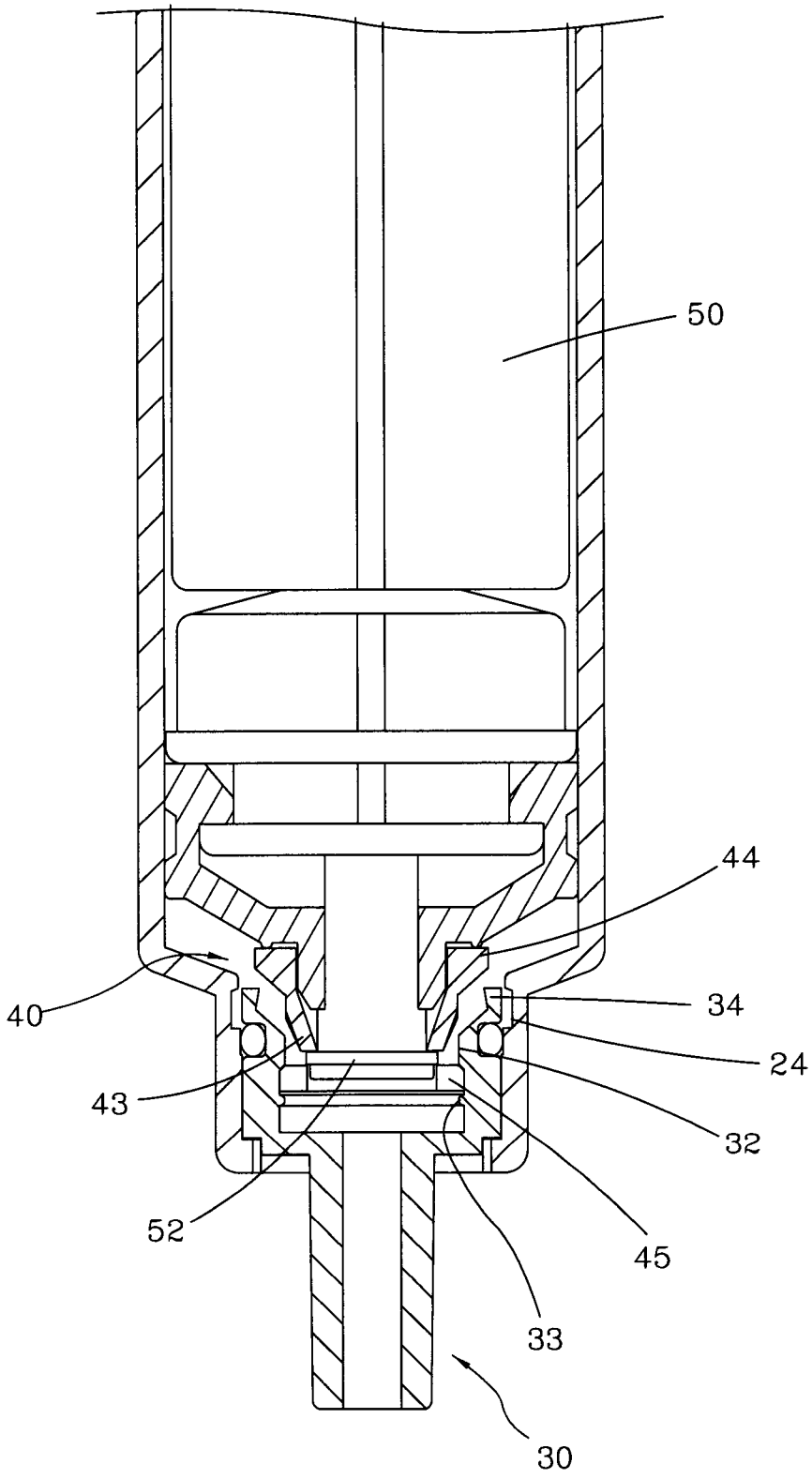


FIG. 8

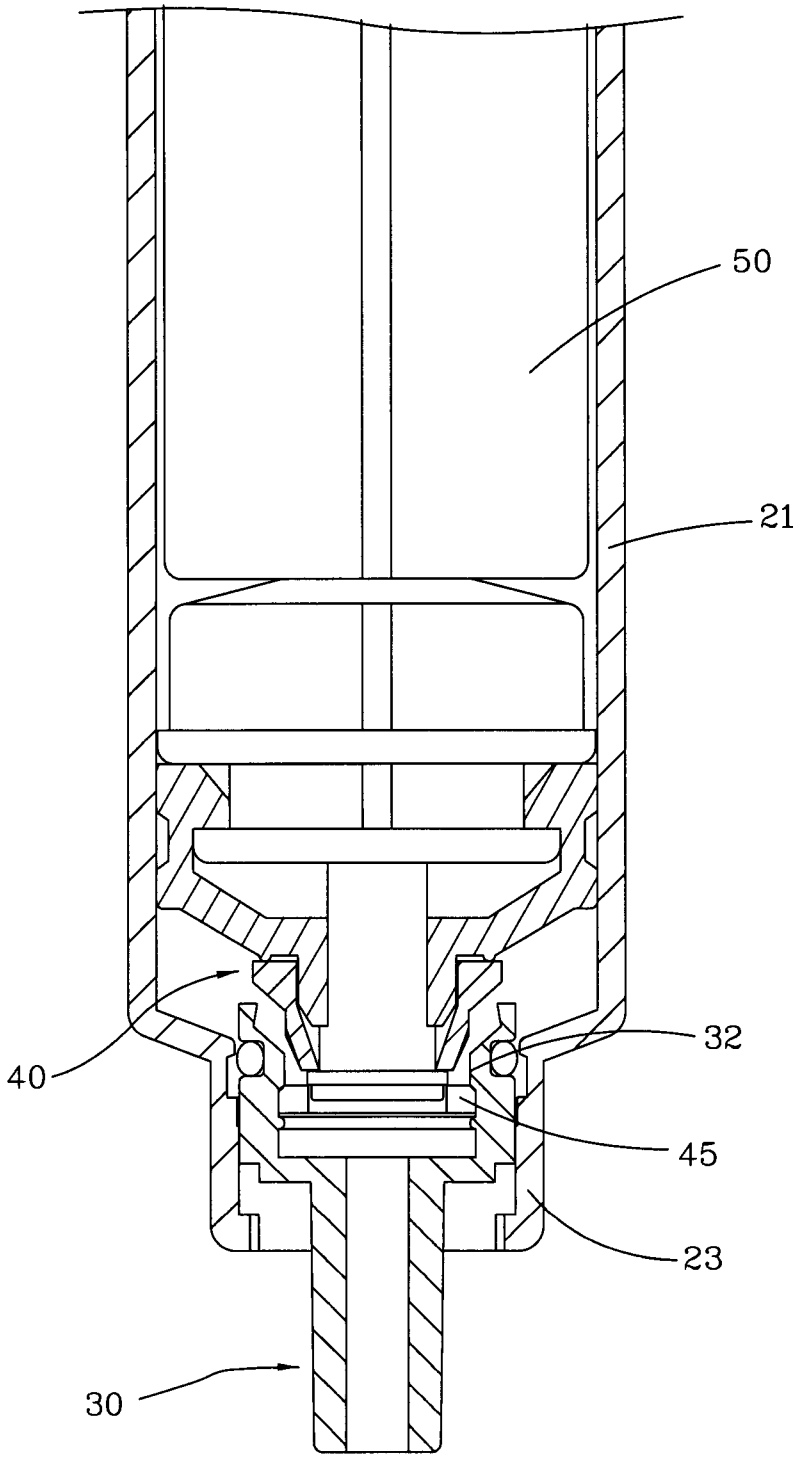
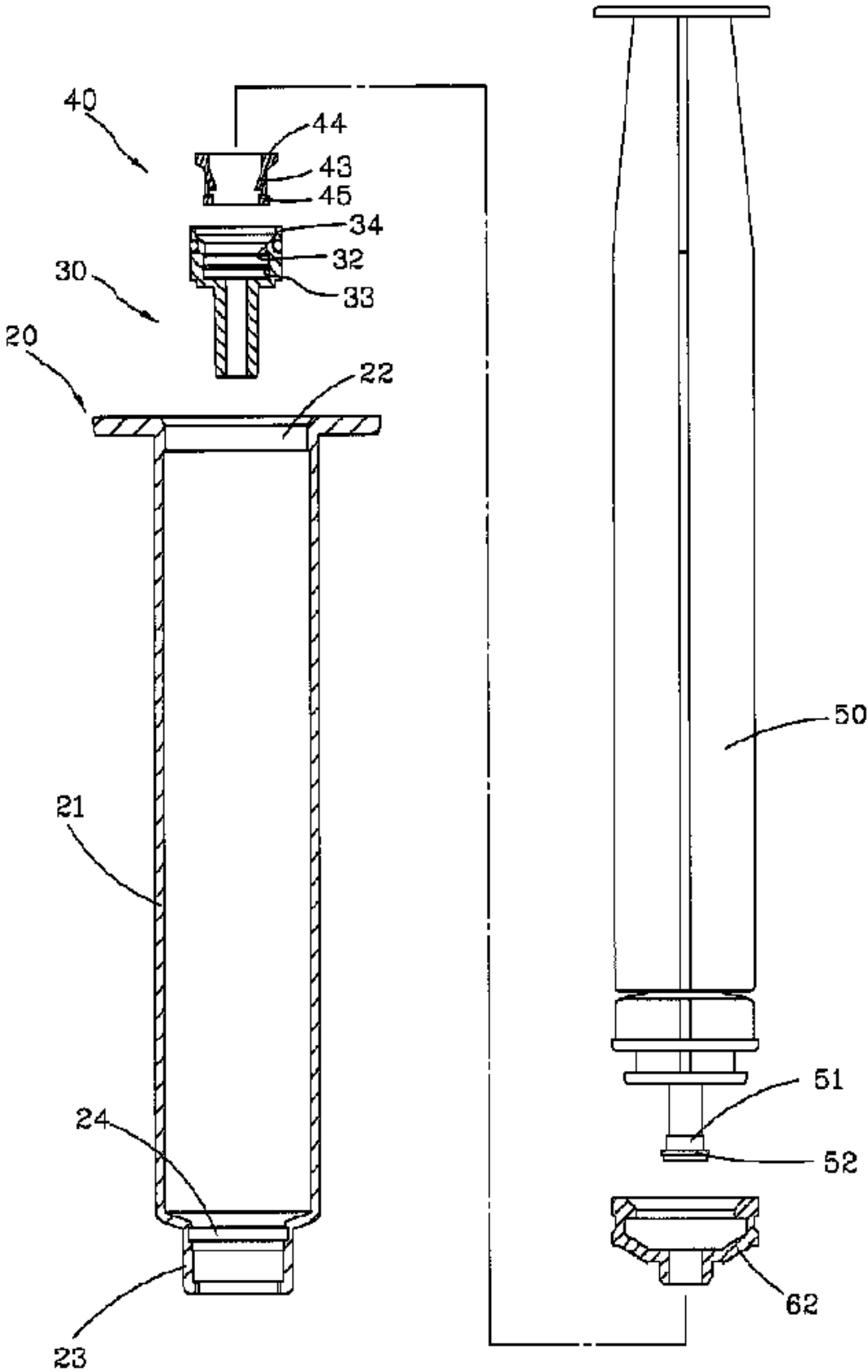


FIG. 9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