April 28, 1964 J. L. HIGGINS ETAL 3,130,724

SYRINGE STRUCTURE

Filed May 7, 1962

Fig.1

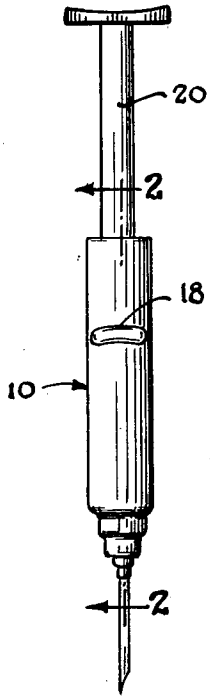
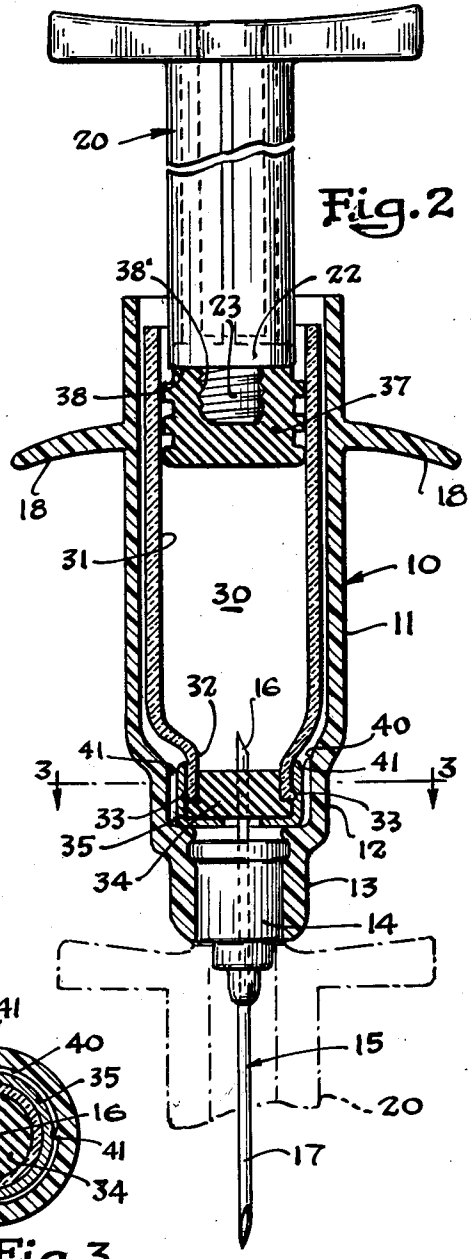


Fig.2



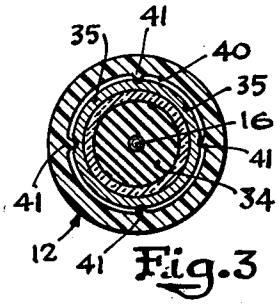


Fig.3

Inventors
John L. Higgins
Fritz Deuschle
By Hibben, Noyes & Bicknell
Attorneys

United States Patent Office 3,130,724 Patented Apr. 28, 1964

3,130,724

SYRINGE STRUCTURE

John L. Higgins, Daytona Beach, and Fritz Deuschle, St. Augustine, Fla., assignors to Roehr Products Company, Inc., De Land, Fla., a corporation of Delaware

Filed May 7, 1962, Ser. No. 192,638
3 Claims. (Cl. 128—218)

The present invention relates generally to a cartridge-type syringe, and more particularly to a disposable hypodermic syringe of the cartridge-type which has a barrel adapted to receive a cartridge or vial containing a medicinal composition.

It has been found convenient and economical to package and dispense many medicinal compounds in a single or multiple dosage form by enclosing a measured quantity of the medicinal compound in a sealed disposable cartridge or vial, such as a glass or plastic tube which is sealably closed at one end by a fixed pierceable diaphragm and sealably closed at the other end by a plunger slidably mounted in the glass or plastic tube. The plunger or piston is adapted to have a piston rod secured thereto to permit reciprocably moving the piston. Since it is important to form a secure engagement between the piston rod and the piston in order to permit aspiration prior to injection or to draw a fluid into the cartridge, it is preferable to have the piston rod form a secure threadable engagement with the piston.

When a cartridge of the above type is inserted into a cartridge syringe barrel and the piston rod inserted into a threaded recess or threaded projection formed on the piston, it is frequently difficult to threadably engage the piston rod with the piston because the cartridge or vial in which the piston is mounted tends to rotate about its longitudinal axis when the piston rod is rotated to effect the desired threadable engagement.

The forming of a threadable engagement between a piston rod and piston becomes a problem where it is desired to have a completely closed sterile cartridge syringe unit, since there can be no lateral openings in the syringe barrel through which the cartridge can be held stationary by the operator's fingers, as in the conventional cartridge syringe. And, where it is necessary to use cartridge units which vary appreciably in diameter, the problem of preventing their rotating in the syringe barrel when engaged by the plunger rod is particularly troublesome.

It is therefore an object of the present invention to provide a disposable cartridge-type syringe having improved means of forming a threadable engagement between a piston rod and a piston disposed in a cartridge unit mounted within a syringe barrel.

It is a further object of the present invention to provide a cartridge-type hypodermic syringe with improved means of forming a threadable engagement between a piston rod and a piston of a cartridge disposed in a syringe barrel which does not have lateral openings extending through the syringe barrel.

It is still another object of the present invention to provide a sterile cartridge-type hypodermic syringe unit which is adapted to securely engage cartridges of varying diameter when disposed in the barrel of the syringe and which is able to maintain the cartridge in a predetermined position within the syringe barrel.

Other objects of the present invention will be apparent from the following detailed description read in conjunction with the accompanying drawing wherein:

FIGURE 1 is a side elevational view of a cartridge-type hypodermic syringe having a cartridge mounted therein in accordance with the present invention;

FIGURE 2 is a longitudinal vertical sectional view partially in elevation taken along the line 2—2 of FIGURE 1; and

FIGURE 3 is a horizontal sectional view taken along the line 3—3 of FIGURE 2.

The foregoing objects of the present invention are achieved by providing adjacent the lower or discharge end on an interior lateral wall of a cartridge-type hypodermic syringe barrel one or more axially extending ribs projecting radially inwardly a short distance sufficient to engage a lateral end surface of a cartridge or vial structure which is mounted in the syringe barrel so that the cartridge or vial is securely held within the syringe barrel in a predetermined position.

In FIGURES 1–3 illustrating one form of the present invention there is shown a molded plastic cartridge syringe **10** having a continuous generally cylindrical barrel section **11** with a reduced diameter section **12** at the lower end of said barrel section **11** with a diameter slightly larger than the discharge outlet end of the cartridge to be mounted therein. A hypodermic needle hub mounting section **13** is provided at the forward or lower end of the section **12** which is adapted to engage securely the hub **14** of a double-ended hypodermic needle cannula **15**. The double-ended cannula **15** is formed with an inwardly or rearwardly extending relatively short closure piercing section **16** and an elongated outwardly or forwardly extending administration section **17** adapted to be inserted into the patient. Integral finger-engaging arms or wings **18** are provided adjacent the upper end of the barrel **11**.

In the embodiment shown in FIGURES 1 through 3 a combined piston rod-sheath member **20** is adapted to be mounted over the end of the cannula section **17** and hub **14** to protectively enclose the cannula section **17**. The extreme forward end of member **20** is sealably closed by a reduced diameter end section **22** which has threads **23** formed on the outer surface thereof. The member **20** after being removed from the syringe **10** is adapted to have the end section **22** placed in threadable engagement with a piston **37** slidably mounted in the end of a medicinal cartridge **30**.

The cartridge **30** can be of any conventional structure, and in the form illustrated in FIGURES 1–3 is made of a short length of glass tubing **31** open at both ends and having a maximum diameter such that the cartridge is freely slidable within the syringe barrel **11**. The forward end of the cartridge **30** is formed with a reduced diameter neck portion **32** and an end flange **33**. A pierceable diaphragm, such as a rubber end cap **34**, sealably closes the lower or forward end of the cartridge **30** and is sealably held against the flange **33** by a metal ferrule **35** which is crimped around the neck portion **32** and the end flange **33**. The ferrule **35** has an axial opening through which the inner cannula section **16** passes to permit piercing of the end cap **34**.

In the upper end of the tube **31** is a piston **37** sealably mounted for slidable engagement within the tubing **31**. The upper surface **38** of the piston **37** is recessed and also provided with an integrally threaded portion **38'** which is adapted to threadably receive the end section **23** of the piston member **20**.

The cylindrical section **12** at the forward end of the barrel section **11** has provided on the inner lateral wall surface **40** thereof one or more, and preferably two or more, oppositely disposed axially extending ribs **41** which project radially inwardly a short distance so that the ribs **41** are adapted to engage the forward end of the cartridge **30** and retain the cartridge **30** in a predetermined position within the syringe barrel **11** when the cartridge is fully seated in the barrel **11**.

In the preferred embodiment shown in FIGURES 1–3, the ribs **41** have a relatively narrow inner edge portion which exert a compression force on the metal ferrule **35** or other deformable circumferentially extending band sufficient to form indentations in the ferrule **35** to ef-

fectively hold the cartridge **30** in the syringe barrel **11** against relative rotary movement thereof with respect to the syringe barrel and piston rod when the piston rod member **20** is brought into threaded engagement with the piston **37**.

The syringe barrel of the present invention as herein described can be formed of any suitable material including glass, metal or the like. It is preferred, however, to mold the syringe of the present invention of a form-retaining plastic material, such as polyethylene, polypropylene or polystyrene. Other plastic materials having similar properties, whether or not the plastic is transparent or translucent, can be employed.

It should be understood that the syringe barrel with axial projections formed hereon of the present invention can be adapted to operatively engage a cartridge unit having a lower end diameter or discharge outlet diameter which is no smaller than the body portion of the cartridge unit. Also, if desired, the axial projections formed on the inner surface of the barrel section can be adjacent the upper end of the syringe barrel section or intermediate the ends thereof.

Others may practice the invention in any of the numerous ways which are suggested to one skilled in the art, by this disclosure, and all such practice of the invention are considered to be a part thereof which fall within the scope of the appended claims.

We claim:

1. A cartridge syringe and cartridge unit assembly which comprises; a cartridge-type hypodermic syringe having a generally cylindrical barrel section for slidably receiving therein a medicinal cartridge unit, a medicinal cartridge unit having a smooth lateral surface portion which is deformable and slidable within said barrel section for moving into operative engagement with a hypodermic needle cannula, said cartridge unit having slidably mounted therein a piston member adapted to form a threadable engagement with an actuating piston rod member, said syringe barrel section having on an inner lateral surface thereof at least one axially extending projection integral with said barrel section and extending radially inwardly with a relatively rigid inner edge surface which frictionally and deformably engages said smooth lateral surface portion of said cartridge unit when said cartridge unit is seated in said barrel section; whereby said cartridge unit is restrained against a tendency to rotate about its longitudinal axis when a piston rod member is brought into threadable engagement with said piston member.

2. A cartridge syringe and cartridge unit assembly which comprises; a cartridge-type hypodermic syringe having a generally cylindrical barrel section for slidably receiving therein a medicinal cartridge unit, a medicinal

cartridge unit having a smooth lateral surface portion which is deformable and slidable within said barrel section for moving into operative engagement with a hypodermic needle cannula, said cartridge unit having slidably mounted therein a piston member adapted to form a threadable engagement with an actuating piston rod member said syringe barrel section having on an inner lateral surface thereof a plurality of radial projections integral with said barrel section and extending radially inwardly with a relatively rigid inner edge surface which extend axially from an end wall of said barrel section and which deformably and frictionally engage said smooth lateral surface portion of said cartridge unit when said cartridge unit is disposed in said barrel section; whereby said cartridge unit is restrained against a tendency to rotate about its longitudinal axis when a piston rod member is brought into threadable engagement with said piston member.

3. A cartridge syringe and cartridge unit assembly which comprises; a cartridge-type hypodermic syringe having a generally cylindrical barrel section for slidably receiving therein a medicinal cartridge unit, a medicinal cartridge unit having smooth lateral surfaces slidably mounted in said barrel section for moving into operative engagement with a hydodermic needle cannula and having slidably mounted therein a piston member adapted to form an operative engagement with an actuating piston rod member, said cartridge unit having a lower end portion provided with a deformable smooth metal circumferential band, said syringe barrel section having on an inner lateral surface adjacent the lower end thereof a plurality of radial projections integral with said barrel section and extending axially from the lower end wall of said barrel section, and said radial projections provided with a relatively narrow inner edge portion which exert a compression force on said band sufficient to deform said band when said cartridge unit is seated in said barrel section; whereby a locking engagement is formed between said barrel section and said cartridge unit to maintain said unit in a predetermined position and restrain said cartridge unit against rotation about its longitudinal axis.

References Cited in the file of this patent

UNITED STATES PATENTS

1,594,493	Brown	Aug. 3, 1926
2,677,373	Barradas	May 4, 1954
2,778,359	Friedman	Jan. 22, 1957
2,789,559	Breitenbach	Apr. 23, 1957
2,954,029	Metten	Sept. 27, 1960

FOREIGN PATENTS

1,073,156	Germany	Jan. 14, 1960