LARGE CAPACITY SYRINGE

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ABSTRACT

A syringe adapted to inject substantial amounts of medicament, said syringe comprising a syringe barrel having a necked portion at one end with a central through-bore while the other end is open and provided with a peripheral flange. A cannula assembly is fixedly fitted into the necked end of the syringe barrel, said cannula assembly including a body portion fixedly fitting into the necked portion of the syringe barrel with a cannula extending outwardly therefrom. A cylindrical needle support extends rearwardly from the body and mounts a needle within the syringe barrel. A cartridge assembly is slidably carried within the syringe barrel and includes a cylindrical cartridge body having a necked end closed by a stopper. The open end of the cylindrical body is closed off by a plunger whereby the medicament is held between the stopper and the plunger. The necked end of the cartridge body mounts a cap having an outwardly extending sleeve sized to fit over the needle support. Interengaging positioning portions are provided on the sleeve and needle support to lock the cartridge assembly in inactivated and actuated position. A retaining clip fits over the open end of the syringe barrel to retain the cartridge assembly within said barrel.

6 Claims, 4 Drawing Figures
LARGE CAPACITY SYRINGE
SUMMARY OF THE INVENTION

There is today more than ever a great need for hypodermic syringe assemblies capable of dispensing relatively large amounts of medicament, for example, in the orders of 10cc and 50cc. In addition, the unit must be economical and foolproof in use. This need immediately suggests a device having disposable cartridges and cannula needles. In addition, the syringe unit must be stowable for rather lengthy periods of time without loss of effectiveness. It is with the above in mind that the syringe assembly of this invention has been developed.

In view of the foregoing, it is an object of this invention to provide a hypodermic syringe having a substantial capacity and further having a disposable cartridge assembly and cannula assembly.

It is another object of this invention to provide a syringe comprising a holder barrel, a cannula assembly fixedly positioned in one end of the barrel and a cartridge assembly slidably mounted within the barrel for communication with the cannula.

It is a further object to provide a syringe comprising a syringe barrel having a necked portion at one end with a central through-bore while the other end is open and provided with a peripheral flange. A cannula assembly is fixedly fitted into the necked end of the syringe barrel, said cannula assembly including a body portion fixedly fitting into the necked portion of the syringe barrel with a cannula extending outwardly therefrom. A cylindrical needle support extends rearwardly from the body and mounts a needle within the syringe barrel. A cartridge assembly is slidably carried within the syringe barrel and includes a cylindrical cartridge body having a necked end closed by a stopper. The open end of the cylindrical body is closed off by a plunger whereby the medicament is held between the stopper and the plunger. The necked end of the cartridge body mounts a cap having an outwardly extending sleeve sized to fit over the needle support. Interengaging means are provided on the sleeve and needle support to lock the cartridge assembly in inactivated and actuated position. A retaining clip fits over the open end of the syringe barrel to retain the cartridge assembly within said barrel.

It is yet another object of this invention to provide as a single assembled unit the combination of a cannula assembly and a cartridge assembly wherein the unit as such is sterile and ready for assembly into a syringe barrel.

It is still another object of this invention to provide a single assembled unit as above wherein the cannulas may be changed depending upon the particular need.

IN THE DRAWINGS

FIG. 1 is a sectional view of the syringe as it appears when ready for use, with the cannula sheath still in place.

FIG. 2 is a sectional view of the syringe after the device has been actuated by pressing on the plunger to cause the cartridge assembly to move toward the cannula end whereby the stopper is pierced by the rear needle and communication is established between the medicament and the cannula.

FIG. 3 is an exploded view illustrating the parts of the syringe, and

FIG. 4 is a sectional view of the top portion of a modification wherein a retaining member is fitted over the open end of the cylindrical cartridge body to retain the plunger within said body.

DETAILED DESCRIPTION

As shown in FIG. 3, the syringe 10 comprises a cylindrical syringe barrel 20 which slidably carries within it a cylindrical cartridge body 30. Plunger 40 frictionally fits within the cylindrical cartridge body 30 and has a plunger rod 50 threadedly affixed thereto. A retainer 60 clips down over the peripheral flange 22 of barrel 20 to hold the cartridge body 30 and plunger 40 within the barrel 20. A cap 70 fits over the necked end of the cartridge body 30 and slidably receives the needle end of cannula assembly 80. A sheath 120 fits over the injection cannula 87 for safety and sterility.

More specifically, as illustrated in FIGS. 1 and 2, the syringe 10 comprises a transparent cylindrical syringe barrel 20 having an open end with the other end being formed into an axially extending necked flange 24 of a diameter less than that of the barrel. The flange 24 has internal threads 25 for purposes to be described later. The open end of the syringe barrel is provided with a peripheral flange 22.

A cartridge assembly is slidably carried within the syringe barrel 20 and comprises a cylindrical body 30 open at one end and closed at the other. The closed end has a necked portion 31 which is substantially smaller than the cartridge body to form an opening 32 aligned with the longitudinal axis of the cartridge body 30. The necked portion 31 terminates in a peripheral flange 34. A stopper 90 closes off the opening 32, and specifically includes a disc portion 92 fitting over the entire end of the peripheral flange 34 with a sleeve portion 94 extending outwardly from the disc portion 92 and being sized to snugly fit within the necked portion 31. A retaining ring 96 fits over the stopper disc portion 92 and over and around the peripheral flange 34 to hold the stopper 90 securely in place.

A cap 70 fits over retaining ring 96 and includes a cylindrical body 72 having inwardly projecting lugs 74 which fit over flange 34 to retain the cap 70 in position. A cap sleeve 76 extends from the cap body 72 and has a diameter less than that of the body with its longitudinal axis in alignment with that of the cartridge body 30. A positioning and retaining annular bead 78 is internally formed on the sleeve 76 adjacent the end thereof.

A cannula assembly 80 is fixedly mounted in the syringe barrel 20 and comprises a threaded body portion 81 sized for threading into threads 25 of the syringe barrel flange 24. The body portion 81 has a circular flange 82 at one end of the threaded portion which flange bears against the inner end of the syringe barrel flange 24 to firmly position the cannula body in the syringe barrel. The body portion 81 has a horizontal section 83 extending outwardly therefrom for wrench use when assembly takes place and is further formed with a central opening aligned with the longitudinal axis of the cap sleeve 76. An inner sleeve 84 extends coaxially from the body 81 coaxially and spaced from inner sleeve 84. The inner surface of outer sleeve 85 is provided with threads 86 of the standard "Luer-Lok" type.
An injection cannula 87 with attached hub 88 and outwardly extending peripheral flange 89 is fitted over inner sleeve 84 with the flange 89 being threaded into outer sleeve threads 86. The hub 88 may be provided with peripheral flat portions to accommodate a wrench for assembly purposes. A cylindrical needle support 100 of reduced diameter extends rearwardly from the body 81 and has its longitudinal axis in alignment with that of the body. Needle support 100 mounts a needle 102 at its outer end for ultimate communication with the medicament within the cartridge cylinder 30. A peripheral bead 104 is formed on the needle support 100 adjacent the needle to frictionally engage the inner wall of the cap sleeve 76 and maintain sterility. Additionally, needle support 100 is provided with an annular recess 106 forwardly of the bead 104 and also with a peripheral shoulder 108 forwardly of the annular recess 106. The diameter of needle support 100 is sized to fit within cap sleeve 76 while annular recess 106 is adapted to be engaged by the bead 78 and later by shoulder 108 engaging bead 78.

The medicament 110 within the cylinder 30 is held therein by stopper rod 90 and plunger 49 which snugly fits within the cartridge cylinder 30. The plunger 40 has a plurality of annular peripheral beads which engage the inner surface of the cartridge cylinder 30 to provide a good seal and yet moderate friction. The exposed end of the plunger 40 is provided with an internally threaded hold adapted to threadedly receive the threaded end 52 of plunger rod 50 while the outer end of the plunger rod 50 is formed with a finger grip 54 to assist in operation of the syringe device.

The cartridge cylinder 30 and plunger 40 are retained within the syringe barrel 20 by means of retaining clip 60. As shown in FIG. 3, clip 60 has a pair of opposed wings 62 extending outwardly from disc base 66. A clip element 64 extends downwardly from the end of each wing 62. As shown in FIG. 1, the retaining clip 60 fits over the end of syringe barrel 20 so that the clips 64 will fit over the barrel flange 22. Further, the injection cannula 87 is protected in storage condition by means of cannula sheath 120 whose open end fits snugly over outer sleeve 85 of the cannula body 81 to maintain sterility.

The assembly and operation of the syringe device should now be obvious in view of the foregoing description. Even so a brief description follows. First of all, the cap 70 is assembled to cannula assembly 80 as illustrated in FIG. 1 with the bead 78 on sleeve 76 fitting into recess 106 on needle support 100. After this, the cap 70 is affixed to the stoppered end of cartridge body 30 by fitting same over retaining ring 96. The thus assembled unit is then introduced into the open end of syringe barrel 20 so that the threaded body portion 81 is threaded into threads 25 in the syringe barrel flange 24. Next, the retaining clip 60 is positioned over the flange 22 to hold the cartridge assembly within the syringe barrel.

When the syringe is to be used, the plunger rod 50 is threadedly affixed to the plunger 40 and the syringe unit is then activated by pushing forwardly on the plunger rod to force the cartridge assembly toward the needle 102 to the position shown in FIG. 2 wherein the needle 102 has pierced the stopper 90 and the peripheral bead 78 on sleeve 76 fits into annular recess 106 to lock the cartridge assembly in place. At this stage, the cannula sheath 120 is removed and the injection cannula 87 is directed into the patient. Next, the plunger rod is pulled slightly rearwardly to aspirate after which the plunger rod is pushed forwardly whereby the medicament 110 is injected. Alternatively, the syringe unit may be stored with the plunger rod threadedly affixed to the plunger in order to avoid delay at the time of use.

As will be noted, the activating of the syringe unit, the insertion of the cannula into the patient and the injection of the medicament are all accomplished by a thrust in the direction of the injection cannula by the person handling the syringe unit. This coupled with the usual aspiration step assures that the party using the syringe will be able to follow standard injection steps and thus obviate any possibility of improper injection.

The medicament 110 may be of the type which over a period of time will give off gases or even expand under high temperature conditions. In order to make certain that the plunger 40 is not forced out of the cylindrical cartridge body 30 when the cartridge assembly is stored prior to assembly in the syringe barrel 20, a retaining member 130 is fitted over the open end of body 30 as illustrated in FIG. 4. The retaining member 130 comprises an outer circular sheath 132 and a generally coextensive inner circular sheath 134 inwardly therefrom to form an annular space 136. The two sheath portions 132 and 134 are connected at one end to close off this space 136. When the retaining member 130 is fitted down over the open end of the cartridge body 30, the end of the inner sheath 136 will bear against plunger 40 in the manner indicated in FIG. 4. As will be readily apparent, the embodiment of FIG. 4 is the same as that of FIG. 1, except for the addition of the retaining member 130.

1. A syringe adapted to inject substantial amounts of medicament, said syringe comprising a cylindrical syringe barrel having a rear open end and a forward end provided with internal threads, a cylindrical cartridge body slidably carried within said barrel, said cartridge body having a rear open end and a necked portion at the forward end, a plunger slidably carried within the cartridge body, a stopper mounted in the necked end of the cartridge body to form a closed medicament chamber between said stopper and the plunger, retaining means on the rear end portion of the syringe barrel to retain the cartridge body within the barrel and the plunger within the cartridge body, the improvement comprising:
   a cannula mounting body member having a threaded section threadedly engaging the internal threads on the forward end of the syringe barrel so as to fixedly position said body member in the forward end of said barrel, a needle support integral with and extending rearwardly from the cannula mounting body member, a hollow needle affixed to the needle support with its free end spaced from the cartridge stopper, cooperating means on the necked portion of the cartridge and the needle support to provide sterility of the needle and to maintain relative position of the needle with respect to the cartridge stopper, a cannula hub mounting portion integral with and extending forwardly from the body member, said cannula hub mounting portion comprising an integral forwardly extending outer sleeve having internal threads thereon, an integral inner sleeve within said outer sleeve, a cannula
having a hub with an annular peripheral flange thereon, the cannula hub fitting over the inner sleeve with the hub flange engaging the internal threads on the outer sleeve, a passage connecting the needle and the cannula, said inner sleeve forming a portion of the passage connecting the needle and the cannula, and a cannula sheath covering the cannula and snugly engaging the outer surface of the outer sleeve of the cannula hub mounting portion to form a sterile seal so as to maintain sterile integrity of the cannula.

2. A syringe adapted to inject substantial amounts of medicament, said syringe comprising a cylindrical syringe barrel having a rear open end and a forward end provided with internal threads, a cylindrical cartridge body slidably carried within said barrel, said cartridge body having a rear open end and a necked portion at the forward end, a plunger slidably carried within the cartridge body, a stopper mounted in the necked end of the cartridge body to form a closed medicament chamber between said stopper and the plunger, retaining means on the rear end portion of the syringe barrel to retain the cartridge body within the barrel and the plunger within the cartridge body, the improvement comprising:

a cannula mounting body member having a threaded section threadedly engaging the internal threads on the necked portion of the syringe barrel so as to fixedly position said body member in the necked portion of said barrel, a cap fitting over and secured to the necked portion of the cartridge body, said cap having a cylindrical sleeve extending forwardly and coaxially with the longitudinal axis of the cartridge body, a cylindrical needle support extending from the rearward side of the body member and slidably fitting within the cap sleeve, a hollow needle affixed to the outer end of the support with its free end spaced from the stopper, cooperating with the needle support and cap sleeve to maintain the relative position of the needle and the stopper,

cannula hub mounting portion integral with and extending forwardly from the body member, said cannula hub mounting portion including an integral and forwardly extending sleeve, a cannula with a hub at one end thereof for the forward end of the syringe, engaging means on the cannula hub and the forwardly extending sleeve securing the cannula to the cannula hub mounting portion, a passage connecting the needle and cannula, and a cannula sheath covering the cannula and snugly engaging the forwardly extending sleeve to form a sterile seal so as to maintain sterile integrity of the cannula.

3. A syringe adapted to inject substantial amounts of medicament, said syringe comprising a cylindrical syringe barrel having a rear open end and a necked forward end provided with internal threads, a cylindrical cartridge body slidably carried within said barrel, said cartridge body having a rear open end and a necked portion at the forward end, a plunger slidably carried within the cartridge body, a stopper mounted in the necked end of the cartridge body to form a closed medicament chamber between said stopper and the plunger, a flange on the rear end portion of the syringe barrel, and a retaining clip fitting over the rear end of the barrel and secured to the flange to retain the cartridge body and plunger within the barrel, the improvement comprising:

cannula mounting body member having a threaded section threadedly engaging the internal threads on the necked portion of the syringe barrel so as to fixedly position said body member in the necked portion of said barrel, a cap fitting over and secured to the necked portion of the cartridge body, said cap having a cylindrical sleeve extending forwardly and coaxially with the longitudinal axis of the cartridge body, a cylindrical needle support integral with and extending from the rearward side of the body member and slidably fitting within the cap sleeve, a hollow needle affixed to the outer end of the support with its free end spaced from the stopper, cooperating with the needle support and cap sleeve to maintain the relative position of the needle and the stopper,

cannula hub mounting portion integral with and extending forwardly from the body member, said cannula hub mounting portion including an integral and forwardly extending sleeve, a cannula with a hub at one end thereof for the forward end of the syringe, engaging means on the cannula hub and the forwardly extending sleeve securing the cannula to the cannula hub mounting portion, a passage connecting the needle and cannula, and a cannula sheath covering the cannula and snugly engaging the forwardly extending sleeve to form a sterile seal so as to maintain sterile integrity of the cannula.

4. The invention as set forth in claim 3 and wherein the outer sleeve of the cannula hub mounting portion is provided with an enlarged section immediately adjacent the threaded portion of the cannula mounting body member, said enlarged section having outer surfaces thereof for wrench engagement.

5. The invention as set forth in claim 3 and wherein a plunger rod is secured to the plunger and fits through the retaining clip.

6. The invention as set forth in claim 3 and wherein the retaining member comprises a sheath fitting over the rear end of the cartridge body and extending forwardly on both sides thereof whereby the sheath edge on the inner side of the cartridge body will abut the plunger.