

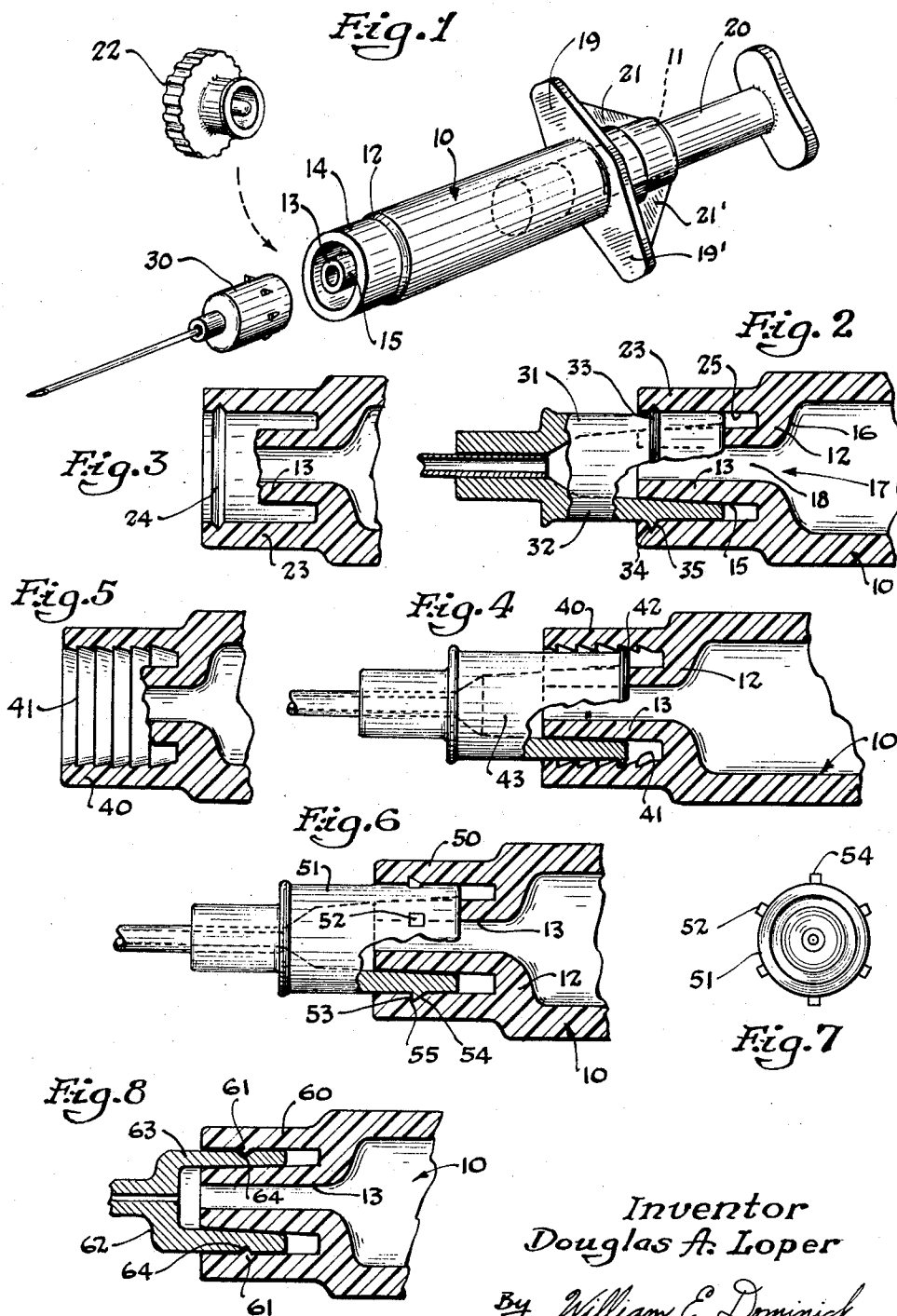
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HYPODERMIC SYRINGE AND NEEDLE HUB STRUCTURE

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## HYPODERMIC SYRINGE AND NEEDLE HUB STRUCTURE

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9 Claims. (Cl. 128—215)

This invention relates to a hypodermic syringe assembly and more particularly to an improved plastic hypodermic syringe structure adapted to be fixedly engageable with a hypodermic needle hub and to the improved hypodermic needle hub.

There is presently in use a plastic hypodermic syringe which serves as a container for a medicament having a closure cap member disposed in sealing engagement with the discharge outlet and in the absence of said closure member the discharge outlet is adapted to support a hypodermic needle. In at least one plastic syringe of the foregoing type, however, there is a tendency for the hypodermic needle hub to be forced out of axial alignment or become disengaged from the discharge outlet of the syringe body while insertion of the hypodermic needle into the patient or during administration.

It is therefore an object of the present invention to provide a plastic hypodermic syringe having a more economical means for fixedly securing a hypodermic needle hub thereto.

It is also an object of the present invention to provide an improved plastic hypodermic syringe having a more economical means for maintaining a hypodermic needle hub in axial alignment with the hypodermic syringe barrel.

It is a still further object of the invention to provide an improved hypodermic needle hub structure for use with a plastic hypodermic syringe which is more readily fixedly secured to the said plastic hypodermic syringe.

The foregoing and other objects of the invention will be readily appreciated by reference to the following detailed description and claims when considered in connection with the accompanying drawing wherein:

Figure 1 is an exploded perspective view of a hypodermic syringe embodying one form of the present invention;

Figure 2 is a fragmentary vertical sectional view partially in elevation of the end of a hypodermic syringe barrel and hypodermic syringe needle hub of the present invention;

Figure 3 is a fragmentary vertical sectional view showing the end structure of the hypodermic syringe of Figure 2;

Figure 4 is a fragmentary vertical sectional view partially in elevation of a modified hypodermic syringe body and a modified hypodermic needle hub of the present invention;

Figure 5 is a fragmentary vertical sectional view showing the end structure of the hypodermic syringe shown in Figure 4;

Figure 6 is a fragmentary vertical sectional view partially in elevation of a modified form of hypodermic syringe body and modified hypodermic needle hub of the present invention;

Figure 7 is an end view of the hypodermic needle hub shown in Figure 6;

Figure 8 is a fragmentary vertical sectional view of

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a modified form of hypodermic syringe body and modified hypodermic needle hub of the present invention.

In Figure 1 of the drawing, the syringe illustrating the present invention is composed essentially of three principal parts, namely a hypodermic syringe body section or barrel 10, a piston-plunger 20, and a hypodermic needle and hub assembly 30. The barrel 10 is a hollow plastic cylindrical tube, such as molded polyethylene plastic, having an open end 11 and having the opposite end thereof partially closed by a generally transverse end wall 12. The transverse end wall 12 has an axially aligned dispensing or discharge tube 13 integral therewith and extending outwardly therefrom. Also extending outwardly from the end wall 12 and disposed concentrically about the axial discharge tube 13 is an axial flange or skirt member 14. The exterior surface 15 of the discharge tube 13 is preferably tapered to approximately the dimensions of a standard Luer taper for engagement with a hypodermic needle hub having a standard female Luer taper on the interior surface thereof. A removable cup-shaped cap member 22 is disposed on the end of the hypodermic syringe in the absence of a hypodermic needle hub assembly and is adapted to form a sealing engagement with the discharge tube 13 and with the axial flange 14 of the syringe body. Integral with the wall of the barrel 10 and disposed adjacent the upper end thereof are finger grips 19, 19' which extend laterally from the syringe barrel 10. Braces 21, 21' are preferably provided to strengthen each of the finger grips 19, 19'.

In accordance with the form of the present invention disclosed in greater detail in Figures 2 and 3, the hypodermic syringe body 10 is provided with an axial flange or skirt member 23 extending outwardly from end wall 12. Disposed on the inner lateral surface of the axial flange 23 and adjacent the outer end thereof is a circular groove or notch 24 forming a circular recess or retaining groove in the axial flange 23. Mounted on the discharge tube 13 is a hypodermic needle hub assembly 31 having a standard Luer taper at the end thereof and having a substantially cylindrical exterior surface 32, said cylindrical surface 32 having a diameter substantially the same as the interior diameter of the circular flange 23. Intermediate the ends of the cylindrical surface 32 of the hub and disposed on the outer surface thereof is a circular ridge or ring member 33 extending circumferentially about the cylindrical hub surface 32. The circular ridge 33 is preferably provided with a bearing surface 34 which extends substantially perpendicular to the lateral cylindrical surface 32 of the hypodermic needle hub and an inwardly and rearwardly tapered surface 35 which merges into the cylindrical surface 32. The inner surface 16 of the end wall 12 is preferably concave inwardly with a central funnel-shaped opening 17 extending into the axial passage or bore 18 through the discharge tube 13.

In the modified form of the invention shown in Figures 4 and 5 of the drawing, the hypodermic syringe body 10 is provided with an axial flange or skirt member 40 which extends outwardly approximately the length of the discharge tube 13. On the inner lateral surface of the axial flange 40 are disposed at least one and preferably a plurality of circular saw-tooth retaining rings 41 extending approximately from the end wall 12 outwardly, preferably to the outer end thereof. Seated on the end of the hypodermic syringe discharge tube 13 is a further modified hypodermic needle hub structure having disposed about its outer cylindrical hub surface 43 and preferably adjacent the inner end thereof a circular flange or retaining ring 42 of a diameter slightly larger than the diameter of the cylindrical surface 43 of the hypodermic needle hub.

In the modified form of the invention shown in Figures

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6 and 7 of the drawing, the hypodermic syringe body 10 is provided with an axial flange 50 extending outwardly a distance approximately the length of the discharge outlet 13. Mounted on the discharge outlet 13 is a still further modified form of hypodermic needle hub assembly having intermediate the ends of the cylindrical section 51 a plurality of laterally extending projections or barbs 52 each of which has a bearing surface 53 extending substantially perpendicular to the lateral cylindrical surface 51 and an inwardly tapered surface 54 which merges into the cylindrical surface 51 to form a relatively sharp edge 55 at the outer extremity of the projection 52.

In the modified form of the invention shown in Figure 8 of the drawing, the hypodermic syringe body 10 is provided with an axial flange 60 extending outwardly a distance approximately the length of the discharge outlet 13. The inner lateral surface of the axial flange 60 intermediate the ends thereof is provided with an integral inwardly extending ring section 61. Mounted on the tube 13 and engaging the flange 60 is a hypodermic needle hub 62 having a cylindrical lateral hub surface 63 provided with a groove or notch 64 intermediate the ends thereof, said groove 64 being disposed so as to coact with the ring section 61 when the hypodermic needle hub is substantially fully seated on the discharge tube 13.

In operation, the cap member 22 normally sealing the discharge outlet of the hypodermic syringe container is removed immediately before use and a hypodermic needle hub of the type described herein is placed securely in engagement with the discharge outlet 13. In the modification illustrated in Figures 2 and 3 of the drawing, the hypodermic needle hub having the circular ridge 33 intermediate the ends on the cylindrical surface 31 is inserted into the raceway formed between the outer tapered surface 15 of the discharge outlet 13 and the inner surface 25 of the axial flange 23. While the hypodermic needle hub is being seated on the discharge outlet 13 and immediately before becoming fully seated thereon, the circular flange 33 moves into seating engagement with the groove 24 adjacent the outer end of the axial flange 23. The bearing surface 34 securely engages the inner surface of the groove 24 and resists outward longitudinal movement and tilting of the hypodermic needle and hub is substantially eliminated.

The modified form of the invention shown in Figures 4 and 5 is assembled in substantially the same manner as is the modification shown in Figure 2 of the drawing with the circular flange 42 engaging one of the plurality of saw-tooth rings adjacent the inner end of the axial flange 40, thereby securely holding the hypodermic needle hub in rigid, non-tilting engagement with the hypodermic syringe body.

In the modified form of the hypodermic syringe and hypodermic needle hub shown in Figures 6 and 7 of the drawing, the hypodermic needle hub having the plurality of laterally extending barbs 52 is inserted into the raceway formed by the discharge outlet 13 and the axial flange 50 and is moved inwardly until the hypodermic needle hub is fully seated on the tapered discharge outlet 13. While the hypodermic needle hub is being seated, the barbs 52 slide over the inner surface of the axial flange 50. When the hub is fully seated, the barbs 52 penetrate into the inner walls of the axial flange 50 and become imbedded therein. When an outwardly axial force or tilting force is exerted on the hypodermic needle or hub, the bearing surfaces 53 of the barbs 52 engage the axial flange 50 and firmly resist any outwardly longitudinal or tilting force exerted on the hypodermic needle or hypodermic needle hub, thereby securely holding the hypodermic needle in rigid, non-tilting engagement with the hypodermic syringe barrel.

In the modification of the invention shown in Figure 8 of the drawing, the hypodermic needle hub 62 having the groove 64 in the cylindrical lateral surface thereof is assembled by inserting the hub into the raceway be-

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tween the axial flange 60 and discharge tube 13 and moved inwardly until the hub is fully seated on the discharge outlet and the ring section 61 is fully in engagement with the groove 64 of the hypodermic needle hub, thereby firmly holding the hypodermic needle hub in operative association with the discharge outlet tube of the syringe body.

In the embodiments of the present invention herein described, the hypodermic syringe body is preferably made of an inexpensive plastic, such as polyethylene plastic, nylon or other material having similar properties. Polyethylene is particularly suitable since it has a marked degree of flexibility and a high tensile strength. A syringe made of the foregoing plastic material is practically non-breakable and can withstand considerable abuse. Polyethylene is also very inert toward most medicaments, thereby making it particularly suitable for use as a syringe which also functions as a medicinal container.

Others may readily adapt the invention for use under various conditions of service, by employing one or more of the novel features disclosed or equivalents thereof. As at present advised with respect to the apparent scope of my invention, I desire to claim the following subject matter.

I claim:

1. An improved hypodermic syringe comprising a plastic syringe body having at one end an axial tapered delivery tube and an axially extending deformable wall section spaced outwardly from said delivery tube and disposed concentrically thereabout forming a hypodermic needle hub receiving raceway between the delivery tube and the said wall section which has a length substantially equal to the delivery tube, the inner surface of said deformable wall section being substantially cylindrical throughout its entire length and having formed therein intermediate the ends thereof a circular retaining groove adapted to resiliently engage an enlarged diameter ring of a hypodermic needle hub when the said hub is in operative engagement with the said delivery tube.
2. An improved hypodermic syringe comprising a plastic syringe body having at one end an axial delivery tube and an axially extending deformable wall section spaced outwardly from said delivery tube and disposed concentrically thereabout forming a hypodermic needle hub receiving raceway between the delivery tube and the said wall section which has a length substantially equal to the delivery tube, the inner surface of said deformable wall section being substantially cylindrical throughout its entire length and having intermediate the ends thereof a plurality of saw-tooth retaining rings adapted to resiliently engage an enlarged diameter ring of a hypodermic needle hub when the said hub is in operative engagement with the said delivery tube.
3. An improved hypodermic syringe comprising a plastic syringe body having at one end an axial delivery tube and an axially extending deformable wall section spaced outwardly from said delivery tube and disposed concentrically thereabout forming a hypodermic needle hub receiving raceway between the delivery tube and the said wall section which has a length substantially equal to the delivery tube, the inner surface of said deformable wall section being substantially cylindrical throughout its entire length and having intermediate the ends thereof an integral ring section lying in a single plane extending into said raceway and adapted to resiliently engage a small diameter section of the hypodermic needle hub when the said hub is in operative engagement with the said delivery tube.
4. An improved hypodermic syringe comprising a plastic syringe body having at one end an axial delivery tube and an axially extending deformable wall section spaced outwardly from said delivery tube and disposed concentrically thereabout forming a hypodermic needle hub receiving raceway between the delivery tube and the

said wall section, the said deformable wall section having a length substantially equal to the said delivery tube, and the inner surface of said deformable wall section forming a substantially smooth cylindrical surface throughout its entire length and being adapted to be penetrated by one or more protruding barbs mounted on the hub of a hypodermic needle disposed in operating engagement with the delivery tube of the said hypodermic syringe.

5. An improved hypodermic needle in combination with a disposable plastic syringe, comprising a plastic syringe having a tapered discharge outlet and an axially extending deformable wall section having a length substantially equal to the discharge outlet and spaced outwardly from said discharge outlet and concentrically disposed thereabout forming a hypodermic needle hub receiving raceway, and a hypodermic needle with a cylindrical hub section which has a length substantially equal to the delivery tube being substantially cylindrical throughout its entire length and with a hypodermic needle cannula secured therein and the other end thereof telescopically engaging the discharge outlet of the plastic syringe, said hub section having at least one annular section thereof with a diameter differing substantially from the normal diameter of the said hub section which fits in said raceway and resiliently engages the said wall section of the plastic syringe.

6. An improved hypodermic needle in combination with a disposable plastic syringe, comprising a plastic syringe having a tapered discharge outlet and an axially extending deformable wall section having a length substantially equal to the discharge outlet and spaced outwardly from said discharge outlet and concentrically disposed thereabout forming a hypodermic needle hub receiving raceway, and a hypodermic needle with a cylindrical hub section with a hypodermic needle cannula secured therein and the other end thereof telescopically engaging the discharge outlet of the plastic syringe, said hub section having intermediate the ends thereof a circular ridge section of greater diameter than the cylindrical hub section and resiliently engaging the said inner deformable wall section of the hypodermic syringe.

7. An improved hypodermic needle in combination with a disposable plastic syringe, comprising a plastic syringe having a tapered discharge outlet and an axially extending deformable wall section having a length substantially equal to the discharge outlet and spaced outwardly from said discharge outlet and concentrically disposed thereabout forming a hypodermic needle hub receiving raceway, and a hypodermic needle with a cylindrical hub section with a hypodermic needle cannula secured therein and the other end thereof telescopically en-

gaging the discharge outlet of the plastic syringe, said hub section having disposed on the lateral surface thereof intermediate the ends thereof a retaining ring of greater diameter than the said hub section resiliently engaging a retaining groove in the said wall section of the hypodermic syringe.

8. An improved hypodermic needle in combination with a disposable plastic syringe having a discharge outlet and an axially extending deformable wall section having a length substantially equal to the discharge outlet and spaced outwardly from said delivery tube and concentrically disposed thereabout forming a hypodermic needle hub receiving raceway, comprising a cylindrical hub section with a hypodermic needle cannula secured therein and the other end thereof adapted to telescopically receive the discharge outlet of the plastic syringe, said hub section having intermediate the ends thereof a circular groove section of smaller diameter than the said hub section resiliently engaging an enlarged diameter ring section on the said wall section of the hypodermic syringe when the hypodermic needle hub is in operative engagement with the discharge outlet of the hypodermic syringe.

9. An improved hypodermic needle in combination with a disposable plastic syringe having a discharge outlet and an axially extending cylindrical deformable wall section having a length substantially equal to the discharge outlet and spaced outwardly from said delivery tube and concentrically disposed thereabout forming a hypodermic needle hub receiving raceway, comprising a cylindrical hub section with a hypodermic needle cannula secured therein and the other end thereof adapted to telescopically receive the discharge outlet of the plastic syringe, said hub section having mounted on the lateral surface of the cylindrical hub section a plurality of barbs resiliently engaging the inner surface of the cylindrical deformable wall section of the hypodermic syringe when the hypodermic needle hub is in operative engagement with the discharge outlet of the hypodermic syringe.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |          |               |
|-----------|----------|---------------|
| 2,538,390 | Smith    | Jan. 16, 1951 |
| 2,661,740 | Hickey   | Dec. 8, 1953  |
| 2,677,374 | Burnside | May 4, 1954   |
| 2,695,612 | Fields   | Nov. 30, 1954 |
| 2,757,672 | Ogle     | Aug. 7, 1956  |
| 2,764,978 | Everett  | Oct. 2, 1956  |

##### FOREIGN PATENTS

|           |               |               |
|-----------|---------------|---------------|
| 496,910   | Great Britain | Dec. 8, 1938  |
| 1,036,042 | France        | Sept. 2, 1953 |

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 2,902,995

September 8, 1959

Douglas A. Loper

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, lines 17 to 19, strike out "which has a length substantially equal to the delivery tube being substantially cylindrical throughout its entire length and".

Signed and sealed this 1st day of March 1960.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON  
Commissioner of Patents