

March 12, 1968

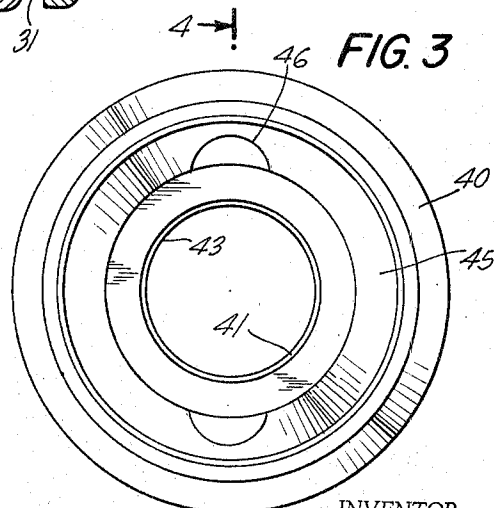
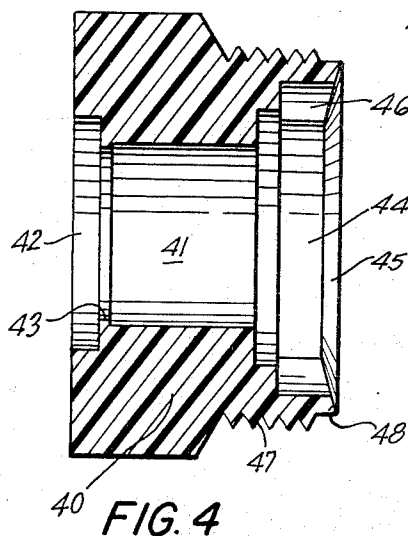
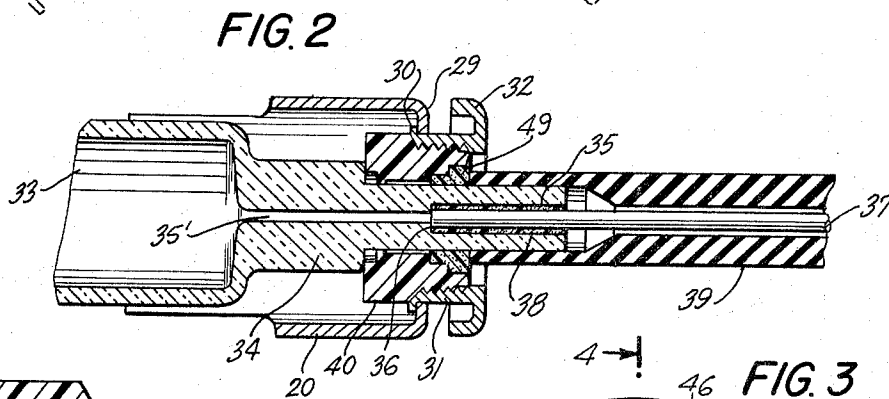
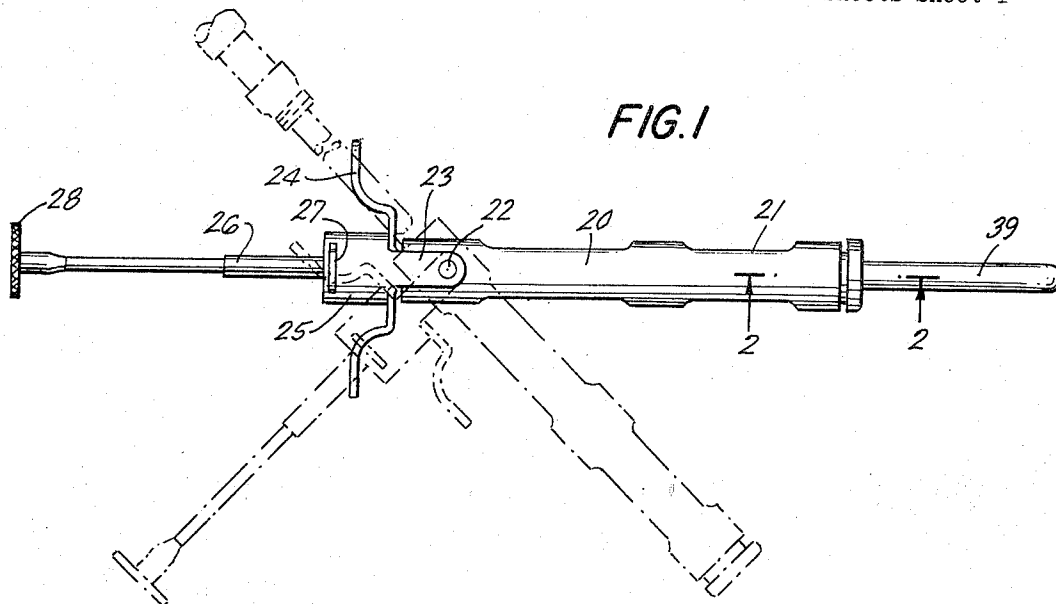
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3,372,697

SYRINGE CARTRIDGE AND ASSEMBLY

Filed Dec. 31, 1962

4 Sheets-Sheet 1



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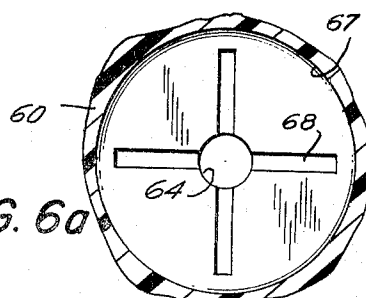
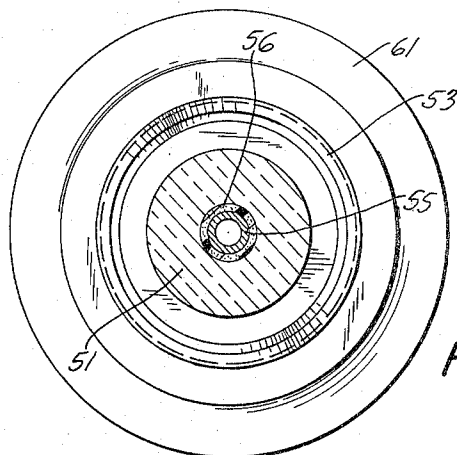
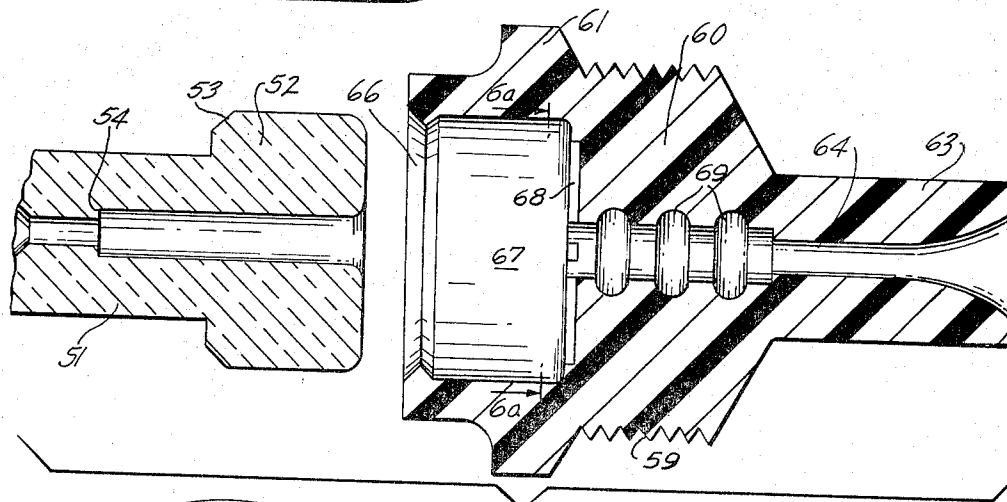
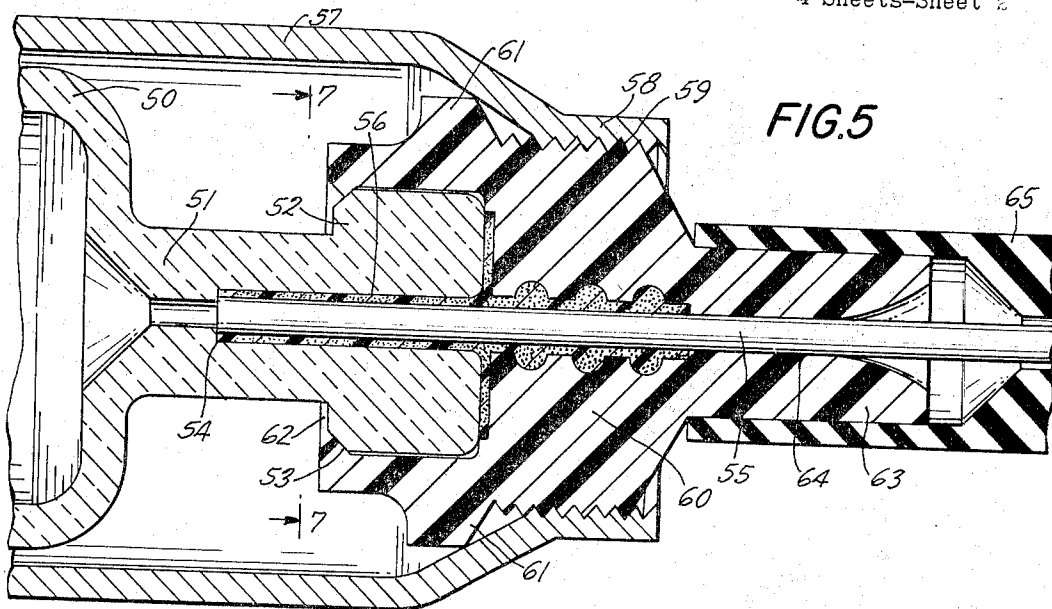
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SYRINGE CARTRIDGE AND ASSEMBLY

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4 Sheets-Sheet 2



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SYRINGE CARTRIDGE AND ASSEMBLY

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FIG. 8

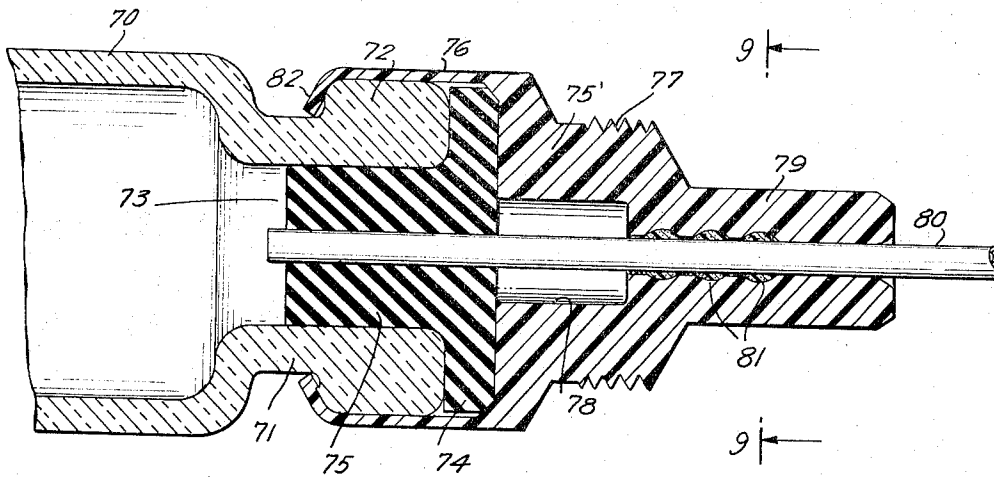
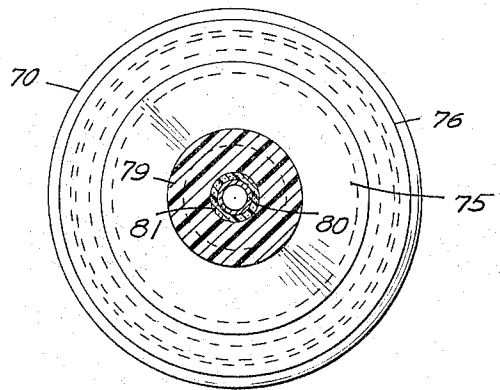


FIG. 9



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SYRINGE CARTRIDGE AND ASSEMBLY

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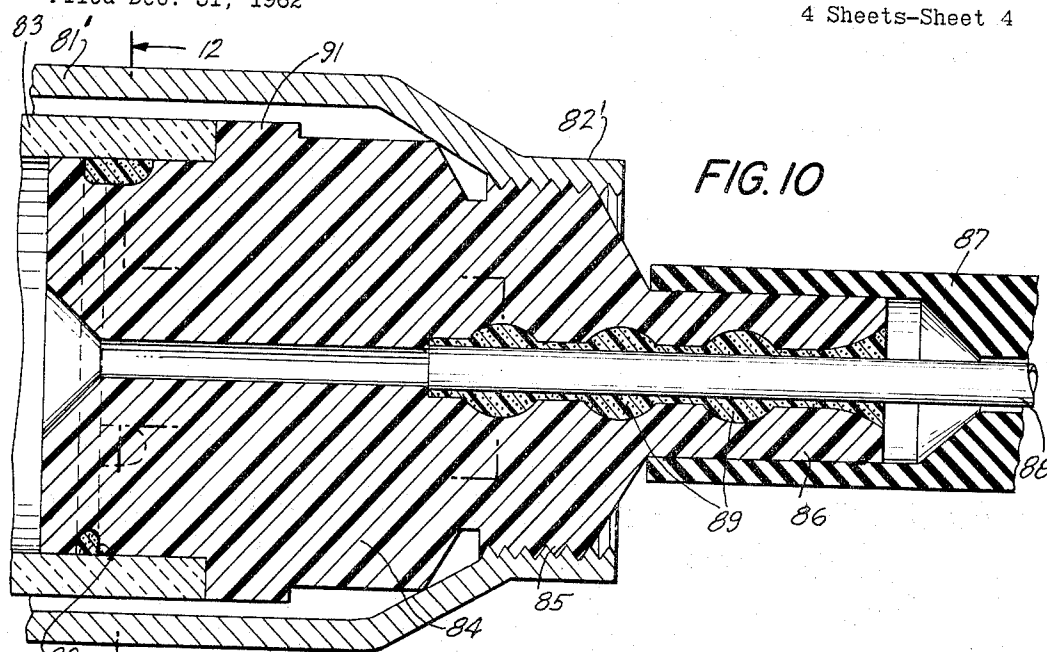


FIG. 10

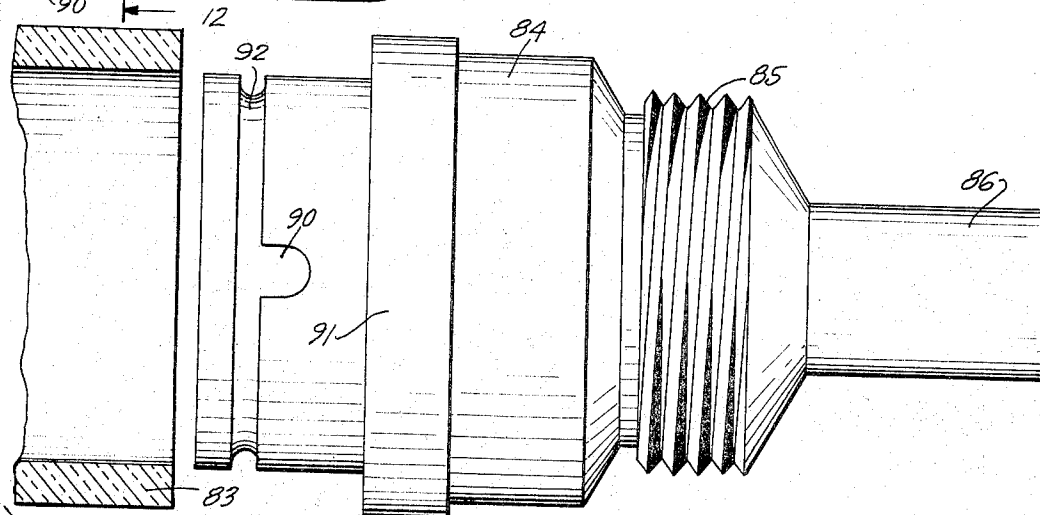


FIG. 11

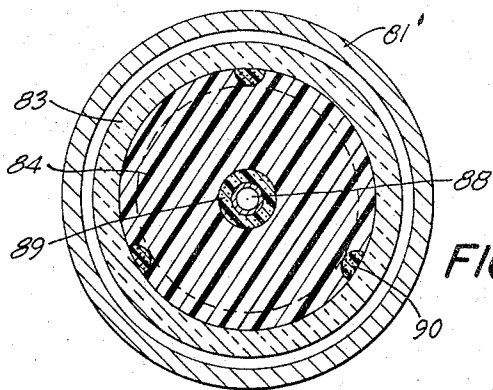


FIG. 12

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SYRINGE CARTRIDGE AND ASSEMBLY

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1 Claim. (Cl. 128—221)

This invention relates to a structurally and functionally improved medicament containing cartridge with which a cannula is associated to form a part of a hypodermic syringe assembly.

It is a primary object of the invention to furnish a cartridge of this type involving an improved and economical design such that after a single use it may be discarded.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating practical embodiments of the invention and in which:

FIG. 1 is a side elevation of the syringe assembly;

FIG. 2 is a fragmentary enlarged sectional side view of the forward portion of the assembly taken along the line 2—2 in the direction of the arrows as indicated in FIG. 1;

FIG. 3 is a view of the syringe cartridge tip assembly taken from the front end;

FIG. 4 is a sectional side view taken along the line 4—4 in the direction of the arrows as indicated in FIG. 3;

FIG. 5 is a view similar to FIG. 2 but showing an alternative form of structure;

FIG. 6 shows the major parts present in FIG. 5 in separated condition;

FIG. 6a is a section taken along the line 6a—6a and in the direction of the arrows as indicated in FIG. 6;

FIG. 7 is a transverse sectional view taken along the line 7—7 in the direction of the arrows as indicated in FIG. 5;

FIG. 8 is again a view similar to FIGS. 2 and 5 showing a further structure provided in accordance with the present teachings;

FIG. 9 is a transverse sectional view taken along the line 9—9 in the direction of the arrows as indicated in FIG. 8;

FIG. 10 is a fragmentary sectional side view showing another arrangement of the parts;

FIG. 11 is an exploded view of the parts as illustrated in FIG. 10; and

FIG. 12 is a transverse sectional view taken along the line 12—12 in the direction of the arrows as indicated in FIG. 10.

While the present syringe assembly may include a cartridge holder and actuator of various types it is preferred that this unit embody a structure as shown in FIG. 1. In that view the numeral 20 indicates a cylindrical casing conveniently of metal and interrupted through certain zones to provide sight openings 21. Pivotaly secured as at 22 adjacent the rear end of this casing is a yoke 23 having outstanding flanges 24 for finger engagement. A head portion 25 also forms a part of this yoke and extends rearwardly of the same. It serves to slidably support a plunger 26 the forward end of which (not shown) may carry a fitting presenting a threaded bore for coupling with a correspondingly threaded stem extending rearwardly from a piston carried in the bore of a cartridge. A locking slide 27 is also conveniently carried by head 25 and shiftable to different positions. In one of these it will not interfere with axial movement of plunger 26. In another position it will limit retraction of the plunger by engaging with a shoulder portion forming a part of the same. The outer end of the plunger carries a suitable actuating head 28 which by thumb pressure against its surface will cause plunger projection.

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The forward end of casing 20 has an inturned flange portion 29 (see FIG. 2) which defines an opening. In engagement with the inner face of this flange is an outwardly extending lip 30 forming a part of a collar 31. That member projects through the opening at the forward end of casing 20 and which opening is preferably defined by an outwardly extending hood 32. The bore of the collar is internally threaded from a zone short of its outer end through to its inner edge.

One form of cartridge constructed in accordance with the present teachings has been partially shown in FIG. 2. It will include a cylindrical body 33 to contain medicament; the rear of the body bore being sealed by a piston (not shown) which is connectible with plunger 26 as aforescribed. Its forward end will be reduced to furnish a tip zone embracing a base portion 34 of relatively large diameter and an extension 35 of smaller diameter. The tip is formed with a passage or bore 35' communicating with the interior of body 33. This bore is conveniently enlarged adjacent its outer end to thus define a shoulder or abutment 36. Bearing against the surface of the latter is the base of a cannula 37 furnishing the hypodermic needle of the assembly.

To secure that needle in position the enlarged portion 25 of the bore 35' will embrace a diameter such that adequate clearance exists between the bore surface and the outer cannula face. Within the space thus provided a layer 38 of bonding material is disposed. It is preferred to use a material such as an epoxy resin which will have good bonding affinity both with the metal of the cannula and the glass of the tip portion. The diameter of the tip portion is such that it may be freely passed through the bore of collar 31. The outer area of the tip zone is ensheathed by a sheath 39 of rubber or similar material. This 35 encloses the needle and thus serves to maintain the sterility of the assembly.

Forming a part of the cartridge tip assembly is an annular hub body 40 as especially shown in FIG. 3 and 4. This embraces a suitable plastic. It is preferred to employ polypropylene as a material best suited for this purpose. Body 40 will include a central bore zone 41 having a diameter substantially equal to the reduced outer portion 35. The rear end of this bore is enlarged as at 42 and has a diameter less than the diameter of the base portion 34. An inwardly extending lip 43 intervenes bore areas 41 and 42 and bears against extension 35. Adjacent the forward or outer end of body 40 its bore is enlarged as at 44 and conveniently continued in an outwardly flared surface as at 45. In the face defining enlarged portion 44 50 grooves 46 are formed. These are conveniently two in number and disposed at diametrically opposite points. The rear zone of this member has a diameter greater than the bore of collar 31. From approximately its central portion to its outer edge it presents a diameter slightly less 55 than the bore diameter of the collar. This surface is formed with threads 47 cooperative with the threads in the collar bore but preferably having a slight clearance such that a somewhat loose fit results.

By this expedient no stretching effects or thread distortions will occur as these parts are coupled. It will be noted that threads 47 are interrupted at a point short of the outer zone of body 40 as indicated at 48; a body diameter existing within this zone equal to the bore of collar 31 beyond its threaded zone. A stop will be furnished between the main portion of body 40 and the collar, limiting the introduction of body 40 into the collar 31 as shown in FIG. 2. As also shown in that figure a bonding agent 49 is disposed to fill the spaces intervening the outer bore zones of body 40 and the adjacent tip portion. This bonding agent will additionally fill the grooves or recesses 46. Again it is preferred to employ an epoxy resin. This will

have good bonding affinity with the glass of the cartridge tip as afore brought out. It will have a lesser bonding affinity with the plastic material providing body 40. However, by keying into recesses 46 former parts of that body it will provide abutments preventing rotation of the latter with respect to the tip.

In the second form of assembly as illustrated in FIGS. 5 to 7, inclusive, the body of the glass cartridge has been indicated at 50 and terminates in a bored tip 51 presenting at its outer end a head portion 52, the rear edge of which terminate in an inclined surface 53. In common with the structure shown in FIG. 2 the tip bore is enlarged towards its outer end to thus define a shoulder 54. This provides an abutment against which the inner end of a cannula 55 seats. The diameter of the latter is less than that of the enlarged bore section. Accordingly, a layer 56 of bonding material (such as epoxy resin) provides a sleeve intervening the bore and cannula surfaces and serves to prevent detachment of the hypodermic needle from the cartridge.

The holder or encasing portion 57 at its forward end differs slightly from the part as indicated by the reference numeral 29 in FIG. 2. More particularly, its side walls (FIG. 5) taper in the direction of the outer end of the assembly to define a collar 58 the bore surface of which is threaded as indicated at 59. As in the earlier form a plastic hub member embracing a body 60 is carried by the tip portion of the cartridge. Again this member is preferably formed of polypropylene. The forward edge zone of its main portion is threaded to interengage with the threads 59 of the collar. To the rear of this portion it is furnished with an outwardly extending flange 61 the forward face of which may be tapered. The diameter of this flange is such that it will engage the inner face of the tapered portion of casing or holder 57 when the parts are in the position shown in FIG. 5 and thus function as a stop to prevent too great a movement of the cartridge towards the forward end of the holder. The rear portion of body 60 defines a cavity having an area and configuration substantially identical with the head 52 of the cartridge tip. The rear of this cavity is open and terminates in a relatively flexible flange portion 62 the edges of which involve a diameter substantially equal to the external diameter of tip 51. Body 60 at its outer end terminates in a neck 63 and is provided throughout its length with a bore 64. The forward zone of this bore in advance of shoulder 54 has a diameter greater than that of the cannula 55. This bore at its inner end communicates with the cavity embracing flange 62 and at its outer end is conventionally flared.

As will be understood with such a structure and with cannula 55 preferably mounted on the cartridge that cannula may have its outer end introduced into bore 64 and with body 60 moved rearwardly towards the cartridge 50, head 52 will come to occupy a position within the cavity and with the flange 62 overlying the rear face of head 52. Accordingly, a "snap-on" structure is furnished which permits a ready coupling of body 60 with the cartridge. The surface of bore 64 serves to center cannula 55 so that the axis of the needle will not extend angularly beyond permissible limits. Due to the angularly extending surface 53, the flange will readily assume a properly overlapped position with reference to the rear surface of head 52. A sheath 65 corresponding to sheath 39 may have its base end telescoped over neck 63 to enclose the exposed portion of cannula 55 and thus maintain sterility. As indicated at 66, lip or flange portion 62 of FIG. 5 might be modified to present inclined surfaces cooperating in camming contact with the angular surface 53 of head portion 52 to furnish a functionally corresponding detent structure.

In many instances it may be desired to directly bond body 60 to the head portion 52. If so, and as shown in FIGS. 5, 6 and 6a, the inner face of the recess 67 formed in body 60 is provided with a number of grooves 68 which may be arranged in the form of arms extending radially from the rear end of bore 64. Accordingly, when the bonding material 56 is introduced to extend between the

bore and the cannula 55 it will not alone flow into the recesses 69 but will also distribute through channels or grooves 68 as shown in FIG. 5. Incident to keying into recesses 69 axial shifting of the needle will be prevented. By being in direct contact with the base portion of recess 67 the outer face of the tip head 52 will be directly secured to cartridge 60.

Next referring to FIGS. 8 and 9 it will be understood that the cartridge therein illustrated is to be used with a holder or actuator involving generally structures of the type shown in FIGS. 1, 2, 5 and 10. In these figures the numeral 70 indicates the body of the glass cartridge which has its forward end zone in the form of a neck 71 continued in an enlarged head portion 72 providing a tip. This tip is formed with a bore 73. A cap or stopper preferably of rubber includes a head portion 74 and a stem 75. The latter is introduced into bore 73 at any proper stage during the assembly of the parts; its head limiting such introduction.

A hub, together with the stopper or cap, serves to support the cannula. The latter is preferably associated with the hub prior to mounting the latter on the tip. The hub includes a body 75' formed of plastic as heretofore described and provided with a rearwardly extending skirt 76 terminating in an edge zone extending beyond the flange portion defining head 72.

Body 75' is conveniently formed with screw threads 77 for cooperation with the parts of the holder or actuator and also has adjacent its rear end an enlarged cavity 78. Its forward end is continued as a tip 79 having a bore the diameter of which accommodates the cannula 80. This bore is provided with preferably more than one recess. The recess or recesses receive a bonding material which will preferably be epoxy resin and which will fill these spaces as indicated at 81.

It will be apparent by this form of structure that again the medicament will not come into direct contact with the plastic material of the hub. This will be prevented by the stem and head portion of the stopper or cap. When the hub has been disposed in the position shown in FIG. 8 then the rear zone of its skirt 76 is deformed as indicated at 82 to underlie the flange defining the rear portion of head 72. Such deformation is conveniently achieved by a spinning operation. It is apparent that tip portion 79 may serve as a mounting for a sheath such as 39 or 65.

Referring to FIGS. 10 to 12, inclusive, the numeral 81' indicates the cartridge holder formed with a reduced forward bore portion defining an internally threaded collar 82'. The glass cartridge 83 in this instance terminates in an outer edge having a diameter equal to that of the main body of the cartridge. The tip assembly is in this structure formed by a plastic body 84 which may involve a material such as polycarbonate. That body adjacent its forward end is provided with threads 85 cooperating with the threads of the collar 82'. Beyond this point it terminates in a neck or tip 86. The latter provides a mounting for a sheath 87 telescopically disposed thereover. Also it provides a bore receiving the butt end of a cannula 88. This bore presents a suitable number of annular recesses 89. These recesses together with the space intervening the cannula and the bore surface receive a bonding agent such as epoxy resin.

Polycarbonate as well as the metal of the cannula present good wetting characteristics. Therefore, a proper anchoring of the cannula against displacement with respect to body 84 is assured. Likewise a proper anchoring is assured between that body and the glass cartridge 83 in that in its peripheral surface and adjacent its rear zone body 84 is formed with, for example, three recesses 90, each of which receive bonding material for this purpose. A flange extends outwardly from body 84 adjacent this rear zone as indicated at 91. It overlaps the outer edge of the glass cartridge to produce a completely unitary article. Recesses 90 are conveniently connected by a channel 92. This will assure a flow of the bonding material

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into all of the recesses. It will also be apparent that throughout the area of the channel the bonding material will adhere to the inner face as defined by the bore of cartridge 82.

It will be seen as a consequence of the foregoing that cartridge units are provided which require no metal fitting at the forward end of their glass body. Rather a suitable plastic member is furnished at this point and provides, as part of the tip assembly, a member enclosing and/or mounting the cannula. This member may be turned out in a variety of colors for coding purposes or otherwise. Also the member conveniently serves as a mounting for the sheath which encloses the needle.

In all of the foregoing embodiments it is apparent that the cannula will form a unitary part of the cartridge and will not have undesired movements with respect to the same. Also, it will be guided and supported so that it extends substantially in line with a prolongation of the cartridge axis. As that cartridge is disposed within a holder or actuator its outer end will be cushioned to prevent any breakage. In the several forms shown in FIGS. 1 to 9, inclusive, the medicament will not come in contact with the material of the plastic hub. If desired a suitable structure for achieving this end result could be included in the assembly of FIGS. 10 to 12, inclusive. Otherwise and as shown such assembly would be used with medicaments not reacting in an unfavorable manner to direct contact with plastics of the types specified.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A medicament cartridge assembly including in com-

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5 bination an elongated hollow cylindrical barrel formed of glass, a hub of plastic material mounted upon an end of the barrel and having a part thereof extending into the barrel at said end, said hub having a substantially co-axially disposed bore, a cannula extending into said bore, a layer of bonding material interposed between the bore surface and the cannula with the bore surface of the tip defining a recess such that said bonding material keys 10 into said recess, the part of said hub extending into the barrel being formed with a number of recesses in its surface with an encircling channel communicating with said number of recesses, and a bonding agent keying into said number of recesses and said channel and engaging with 15 the barrel to prevent movement of the hub relative to the barrel, said hub presenting upon its face a retaining surface to be engaged by a corresponding surface of a cartridge holder for securing the latter against movement with respect to the hub and said barrel, said retaining sur- 20 face embracing screw threads encircling said hub.

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