United States Patent [19]

Baldwin

[11] **3,848,593**

[45] **Nov. 19, 1974**

[54] **SIDE LOADING DISPOSABLE CARPULE SYRINGE**

[75] Inventor: **Brian E. Baldwin**, Wilmette, Ill.

[73] Assignee: **Affiliated Hospital Products, Inc.**, St. Louis, Mo.

[22] Filed: **Dec. 7, 1972**

[21] Appl. No.: **312,986**

Related U.S. Application Data

[63] Continuation of Ser. No. 79,585, Oct. 9, 1970, abandoned.

[52] **U.S. Cl.** ..... **128/218 DA**, 128/218 N, 128/221

[51] **Int. Cl.** **A61m 5/24**, A61m 5/32

[58] **Field of Search**.... 128/215, 216, 218 R, 218 N, 128/218 D, 218 NV, 218 C, 218 DA, 221, 220, 218 F; 279/89, 1 B, 1 Q, 1 T; 287/103 A, DIG. 8; 285/394, 395, 325

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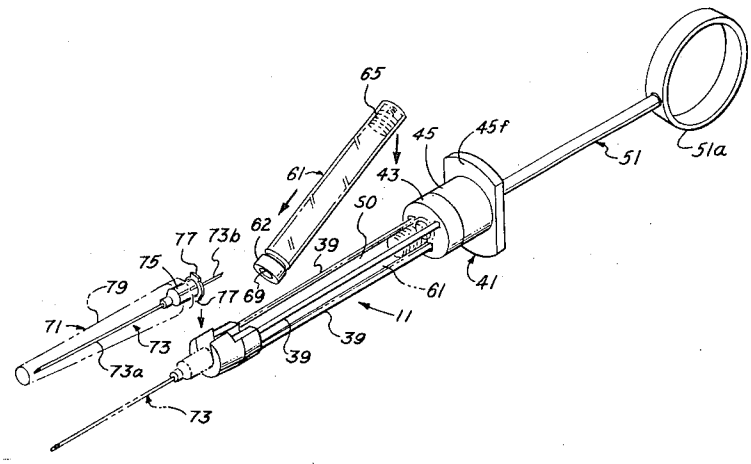
Primary Examiner—Richard A. Gaudet
Assistant Examiner—J. C. McGowan
Attorney, Agent, or Firm—Reginald F. Pippin, Jr.

[57] **ABSTRACT**

A syringe having a body or barrel and a piston, with an opening in the side of the body or barrel to receive a disposable carpule, and a further needle-unit-receiving lateral opening in the forward needle-unit-connection end of the syringe body, for lateral insertion of a protruding beveled butt end of a needle unit, the needle unit being laterally separately insertable into the lateral needle-unit-receiving opening and releasably secured to a connector formed on the needle-unit-connection end. The needle unit is removably secured in the syringe by a cam-action flange-gripping slot in the head end of the syringe, gripping and releasing being effected by relative rotational motion between the needle-unit and the needle-unit-gripping head end of the syringe. A puncturable membrane carpule or cartridge ampule is side loaded into the syringe body after attachment of the needle unit.

17 Claims, 14 Drawing Figures



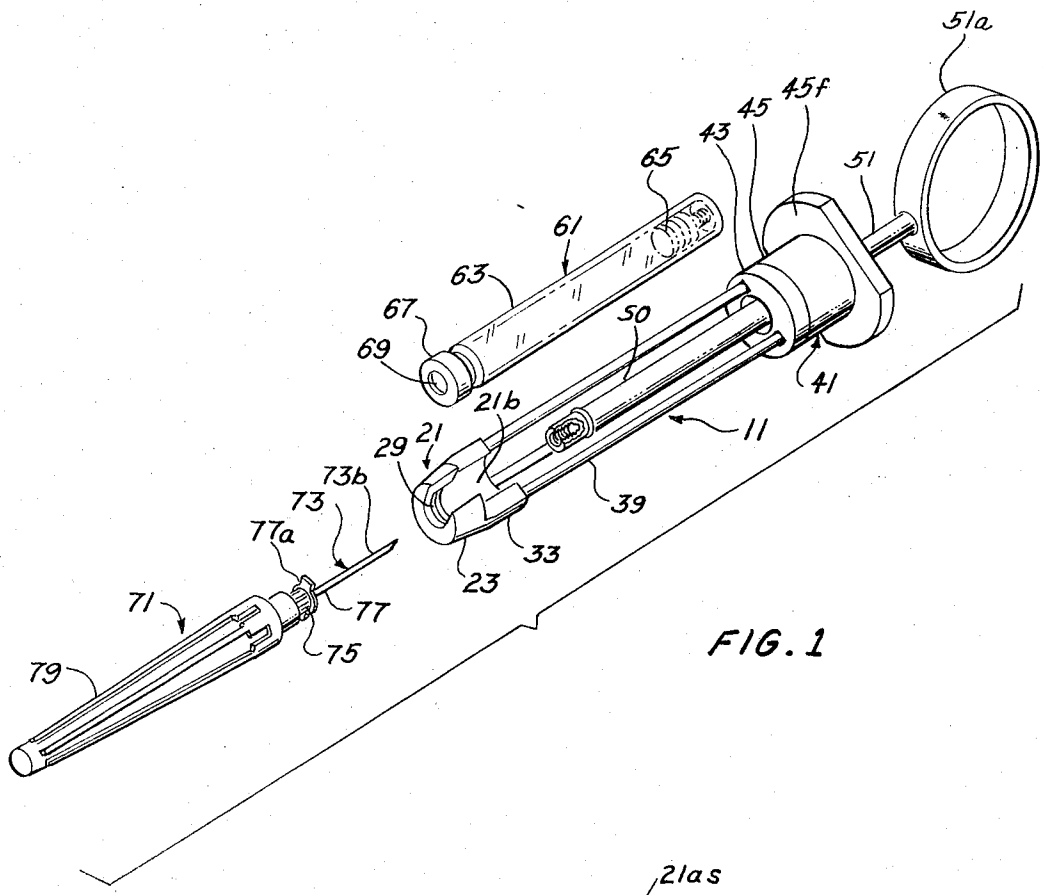


FIG. 1

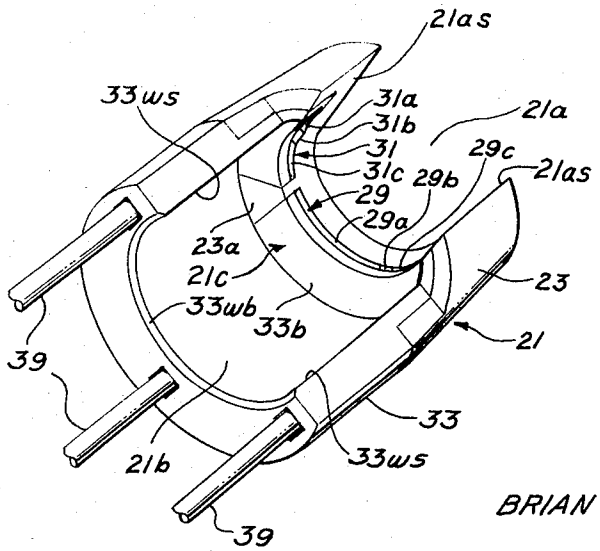


FIG. 2

BRIAN E. BALDWIN
INVENTOR

BY

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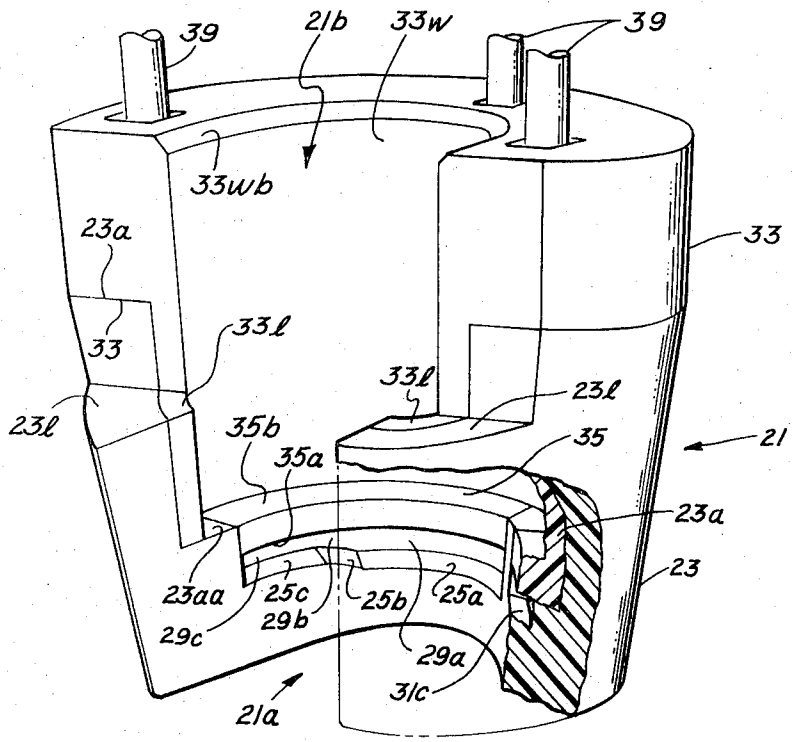

FIG. 3

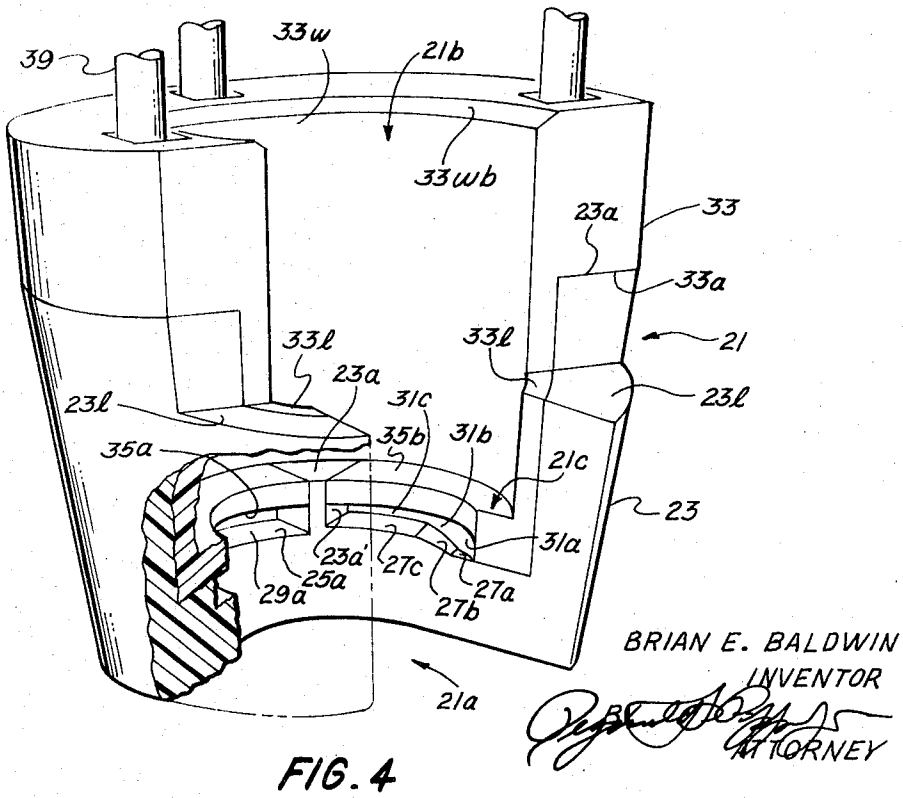

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FIG. 4

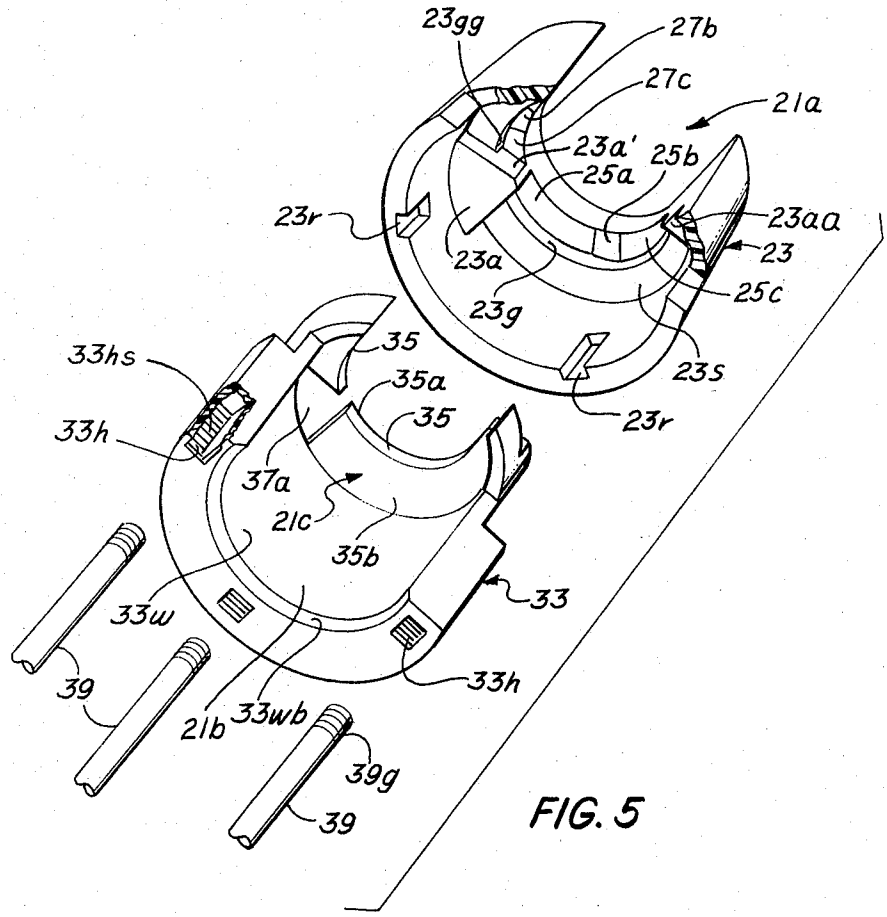

FIG. 5

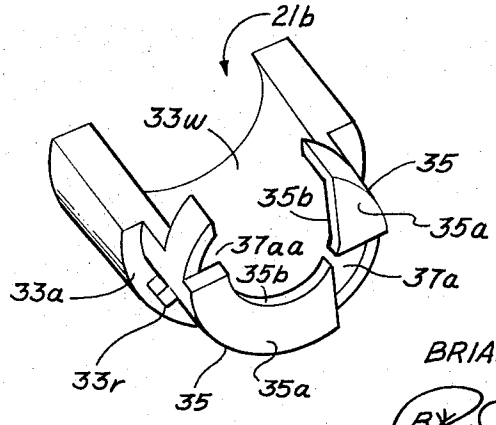

FIG. 6

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INVENTOR
BY
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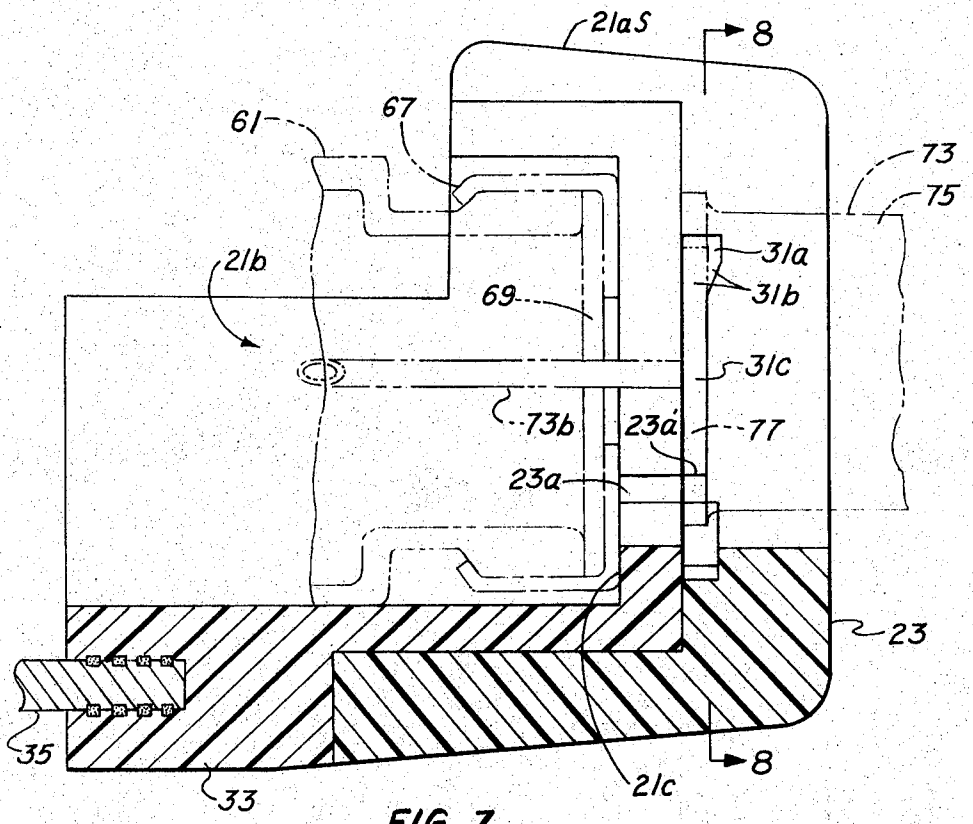

FIG. 7

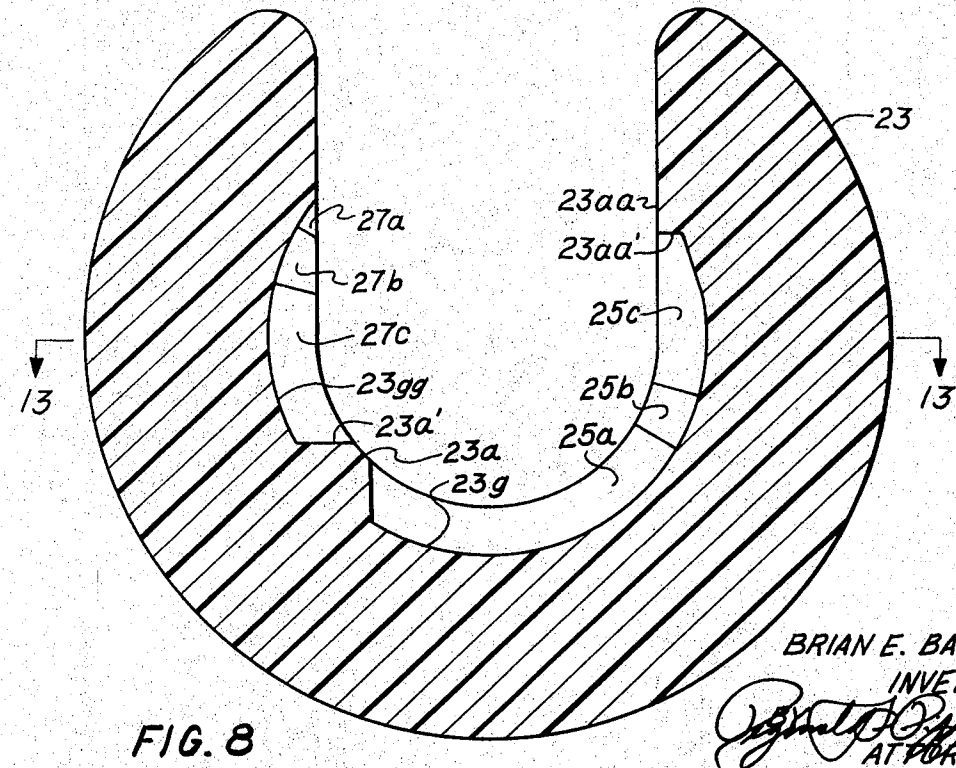

FIG. 8

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INVENTOR
ATTORNEY

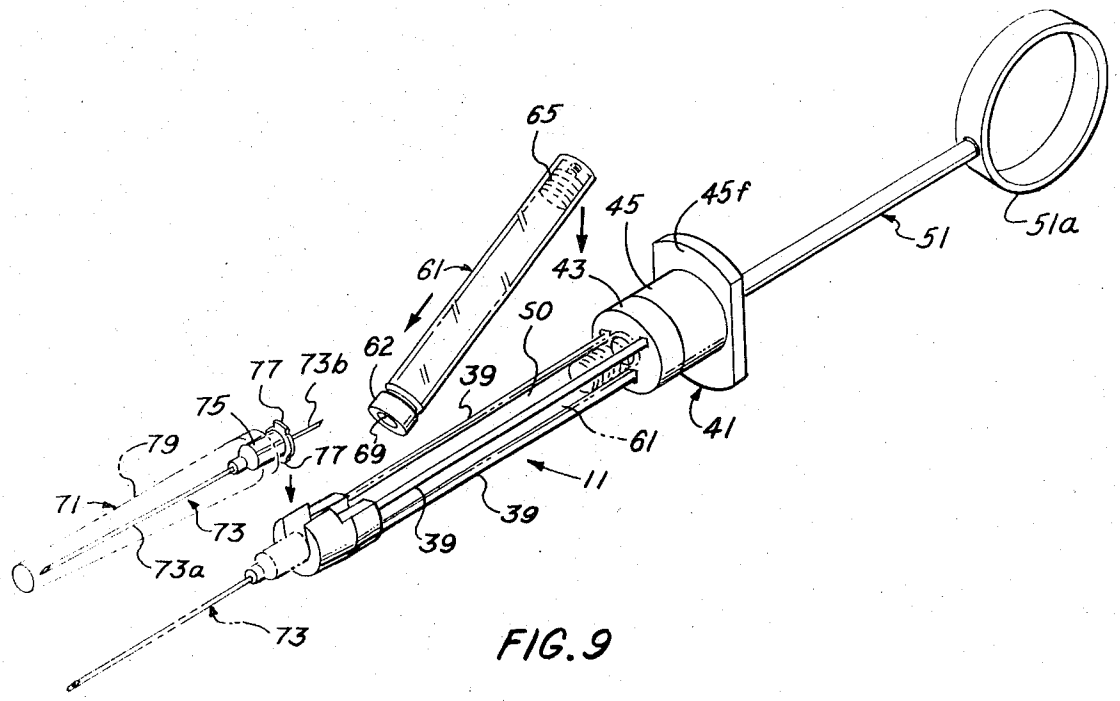

FIG. 9

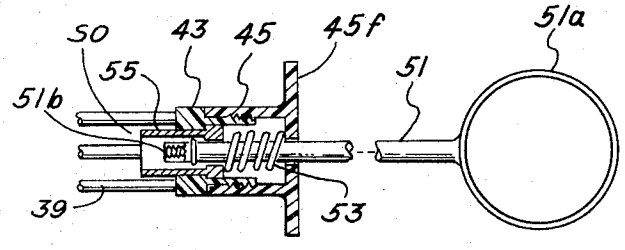

FIG. 10

BRIAN E. BALDWIN
INVENTOR

ATTORNEY

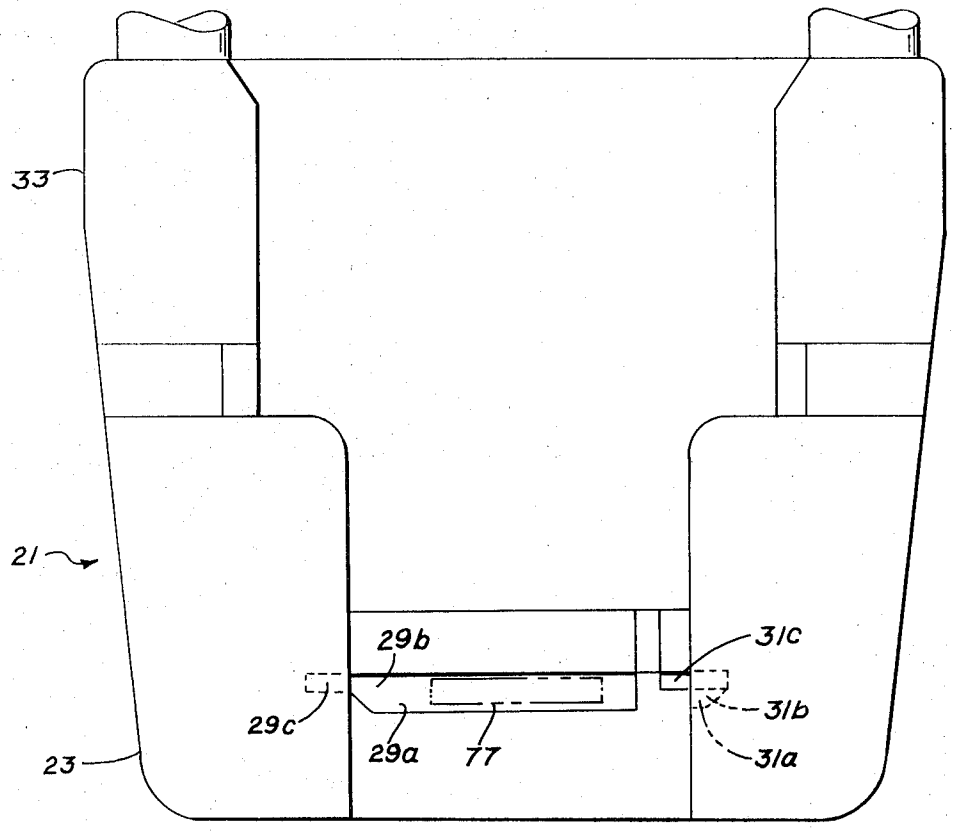

FIG. 11

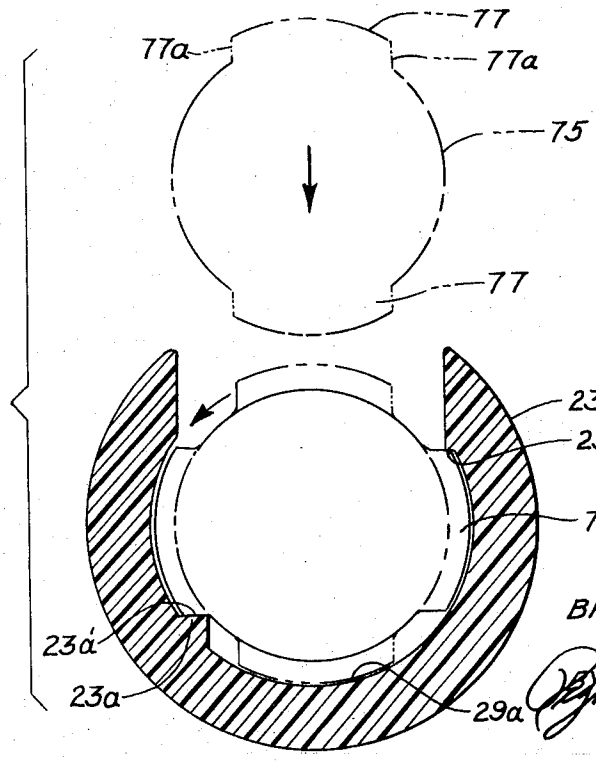

FIG. 12

BRIAN E. BALDWIN
INVENTOR
BY
ATTORNEY

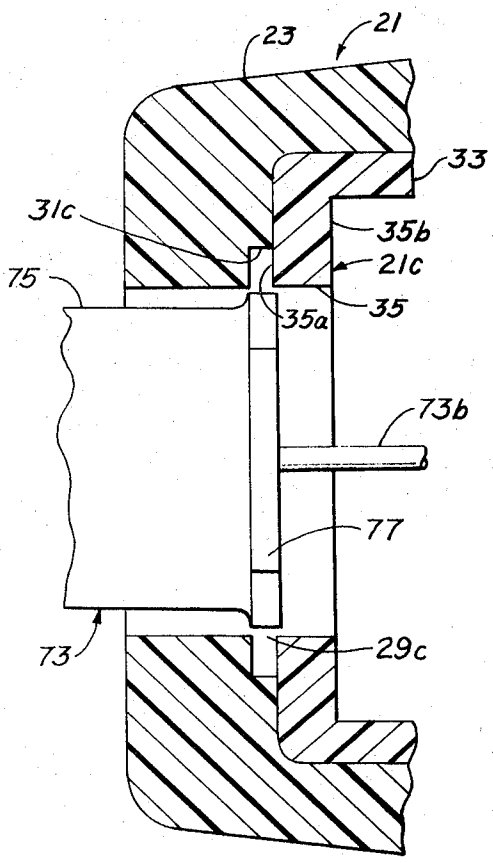

FIG. 13

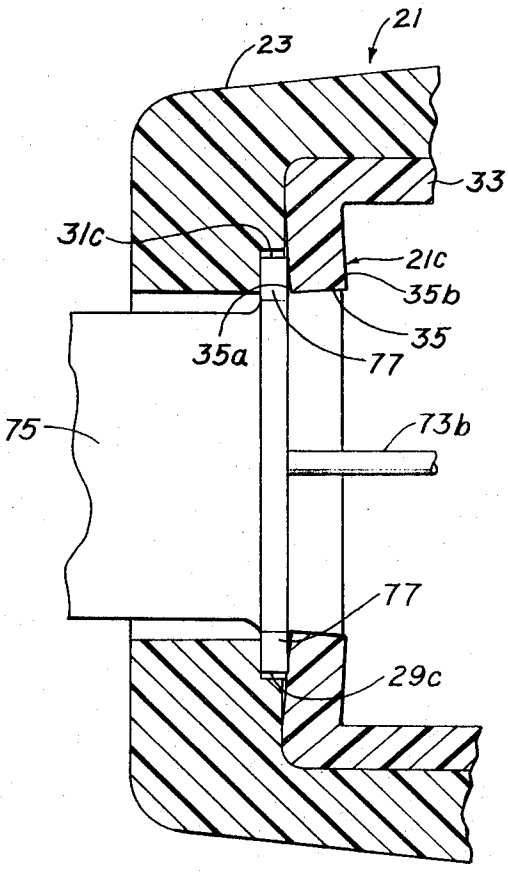

FIG. 14

BRIAN E. BALDWIN
INVENTOR
BY
ATTORNEY

SIDE LOADING DISPOSABLE CARPULE SYRINGE

This is a continuation of application Ser. No. 79,585 filed Oct. 9, 1970, now abandoned.

This invention relates to medical and dental syringes of the type employing a disposable needle and a disposable cartridge ampule or carpule, and more particularly to an improved disposable needle syringe which is capable of separate side insertion of a needle unit and a separate carpule unit.

It is common practice to provide disposable needle units or needles of a type having a securing hub and a double ended needle or cannula pointed at both ends. Carpules or cartridge ampulses having a puncturable elastic forward membrane or diaphragm are also commonly used in the art.

Previous surgical syringes which employ disposable needles and disposable carpules have been constructed such that the butt end of the needle must be longitudinally passed through a small annular opening formed at the forward end of the syringe, after which the hub of the needle is secured to the end of the syringe as by screwing onto a threaded nipple formed thereon. The beveled butt end of the needle pierces the puncturable elastic diaphragm at the forward end of the anesthetic carpule or cartridge ampule during insertion of the carpule into the syringe, which may be accomplished either by lateral insertion of the carpule or by insertion at the end of the syringe opposite to the needle receiving end. During the process of injection of the anesthetic or other fluid into the patient, the patient's tissue fluid, and possibly blood, is aspirated back into the carpule, thereby contaminating it. When the needle is unscrewed and the butt end is pulled through the narrow opening in the end of the syringe, it will be apparent that contamination of this small opening can easily occur. Unless the syringe is autoclaved or otherwise sterilized prior to or after the new needle is passed through the narrow longitudinal bore opening in the syringe, the new needle can easily be contaminated by engagement with the contaminated wall of this small opening, and that contamination may be passed via the carpule to the next patient.

It is a feature of the present invention to provide a syringe of the individually disposable needle unit and disposable carpule type which will enable separate assembly of the needle and the carpule therewith and which will materially reduce the likelihood of contamination of a new needle being inserted into the syringe, and consequently will materially reduce the likelihood of cross-contamination between patients which might be caused by contamination of a needle during assembly with the syringe, as in the prior syringes of this type.

It is still a further feature to provide a side loaded syringe having a simple side-insert-and-removal needle-unit connector arrangement.

Another object is to provide a syringe having a simple side-insert-and-removal needle-unit connector arrangement, which provides releasable securing of the hub of a needle unit by female gripping of side flanges or ears on the needle hub through release rotation after needle unit insertion into the syringe connector.

A further object is to provide a side-loading syringe having a simple body construction which enables maximized visibility, from all lateral directions, of cartridges inserted therein, and of the contents of such cartridges while inserted therein.

Still a further object is the provision of a syringe of simple and inexpensive construction which enables ease of viewing of removable cartridges while inserted therein, yet provides good strength and rigidity.

Still other objects, features and attendant advantages will become apparent to those skilled in the art from a reading of the following detailed description of a preferred physical embodiment constructed in accordance with the invention, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is an exploded view in perspective of a syringe according to the invention, and a cartridge and needle unit for use therewith;

FIG. 2 is a fragmentary perspective view of the forward nose section of the syringe body of FIG. 1, viewed from the midsection toward the front nose section;

FIG. 3 is a further perspective view, partially broken away for clarity of illustration, of the nose section of the syringe of FIG. 1;

FIG. 4 is a view similar to FIG. 3, taken from a different angle to illustrate further aspects of the nose section;

FIG. 5 is an exploded view of the forward or nose section of the syringe;

FIG. 6 is a perspective view of the nose rear subsection, as viewed toward its forward end;

FIG. 7 is a longitudinal section view of the nose section of the syringe, illustrating in phantom fragmentary portions of a cartridge and a needle unit secured thereto;

FIG. 8 is a transverse section view taken along the line 8—8 of FIG. 7, omitting the phantom view elements;

FIG. 9 is an exploded perspective view similar to FIG. 1, illustrating the method of insertion of a needle unit and cartridge into the syringe;

FIG. 10 is a fragmentary view of the rear section of the syringe, in partial longitudinal section;

FIG. 11 is a plan view of the nose section of the syringe, illustrating in phantom the initial general position of a needle unit hub flange within the securing slot or groove of the nose section;

FIG. 12 is a transverse section view taken through the longitudinal central zone of the needle unit securing slot of the syringe nose. looking rearwardly and illustrating successive sequential steps in the insertion and securing of a needle unit into the needle unit securing slot of the syringe, the final secured position being indicated in full lines;

FIG. 13 is a longitudinal fragmentary section view of the syringe nose section, taken through the transverse midsection of the nose, and illustrating the initial position of the needle unit as initially inserted into the needle unit securing slot of the syringe;

FIG. 14 is a view similar to FIG. 13, and schematically illustrating the position of the needle unit and associated gripping elements of the nose unit upon approximately 90° rotation of the needle unit in the secured position.

Referring now in detail to the figures in the drawings, the illustrated physical embodiment takes the form of a syringe 11 having a main body 21, 39, 41 and a plunger 51 which is adapted to be moved longitudinally within the body. The syringe body has a lateral or side opening SO formed therein and extending along a major extent of its length to enable the insertion and removal of a cartridge ampule or carpule 61 of anes-

thetic or the like into and from a central longitudinal chamber generally laterally bounded by the midsection forming portions and a portion of the nose section of the body.

The syringe body includes a nose section generally indicated at **21**, a rear section **41**, and a midsection therebetween formed by annularly spaced rods **39**, which are preferably three in number. Two of the rods **39** are widely spaced apart with respect to one another and have a sufficient spacing therebetween to form the side opening SO for entry and exit of the cartridge **61** into and from the effective central chamber laterally bounded by the three rods **39**. The laterally middle rod **39** forms the back retaining portion of the midsection of the syringe.

It will readily be seen that with this construction, the cartridge or carpule **61** is at all times easily visible from substantially all direction for inspection of its contents by the syringe operator. Likewise, the cartridge or carpule **61** may be easily inserted and removed through the side opening SO.

The syringe rear body section **41** is preferably formed of two major parts, including a threaded securing head **43**, and any one of several forms of finger gripping head or and caps **45**, one embodiment of which is illustrated as having finger gripping flanges **45f** formed thereon. Various other conventional or desired finger gripping constructions may be employed in lieu of the flanged end cap **45**, such as finger gripping rings.

As seen in more detail in FIG. **10**, the plunger **51** extends through the finger gripping and cap **45** and threaded securing head **43**, and is adpated to be moved forwardly and rearwardly within the syringe body under manual control by the insertion of the operator's thumb in a thumb grip ring **51***a* formed thereon. The syringe is otherwise held by the operator during use as by gripping the flanged rear body section **41** between the first and second fingers in the normal fashion.

The forward or nose section **21** of the syringe body has an inwardly directed end wall forming an end shoulder generally indicated at **21***c* against which the forward conventional metal ring end cap **67** of a cartridge or carpule **61** is rested and retained after assembly of the cartridge in the syringe. The cartridge may be retained within, and selectively removed from, the syringe, after insertion thereinto, as through the medium of a slidable sleeve **55** (see FIG. **10**), and a compression spring **53**, the sleeve **55** being retractable against the compression spring **53** by the rearward movement of the plunger **51** to enable a cartridge to be laterally seated within the syringe body chamber. Upon release of the plunger **51**, the sleeve **55** will press the rigid glass side wall of the cartridge or carpule **61** forward to seat the cartridge against the forward end shoulder **21***c*, and thereby substantially anchor the cartridge in position for use.

The plunger **51** may have any of several conventional or desired connectors secured or formed at its forward end, for securing to the cartridge or carpule piston **65**, which is normally of elastic material such as rubber or the like for sliding press fit within the tubular glass or plastic wall of the cartridge. In the illustrated assembly, the piston connector formed on the forward end of the plunger **51** takes the form of a threaded female connector which may be threadedly engaged with a rear male screw projection as is conventionally formed in various cartridge piston constructions. This enables aspirating engagement of the cartridge piston **65** by the plunger **51**, and such is normally desirable to enable operator aspiration to the extent as may be desired. However, if aspirating engagement is not required nor desirable, the piston connector may be omitted, thereby enabling only forward controlled motion of the cartridge piston **55** without controlled aspiration. Alternatively, various other aspirating engagement connections may be effected at the forward end of the plunger **51**, as by forming a harpoon or a corkscrew attachment thereon.

The forward shouldered end or nose section **21** of the syringe body has an end shoulder **21***c*, as discussed above, against which the forward end of the cartridge or carpule **61** is seated. As is conventionally practiced, the cartridge or carpule **61** has a metal cap **67** formed on this forward end of its glass or plastic wall body **63** opposite the rubber piston **65**, and this metal cap **67** has a circular cutout at its center which is underlayed with a thin puncturable rubber or plastic membrane, the elastic rubber or plastic membrane being securely held in place by the metal cap **67**. The bevel pointed butt end of a needle unit is placed through this membrane to gain access to the anesthetic solution in conventional practice, and this approach is employed in the present invention. However, contrary to the normal practice of axial insertion of the needle butt end through an annular-walled longitudinal bore in the forward end of the syringe body, with concomitant sterility and contamination problems, as noted heretofore, in the present invention, the needle and hub unit **73** is laterally inserted in a novel manner prior to insertion and seating of the cartridge or carpule **61** within the syringe body with resultant substantial reduction of likelihood, and minimizing the dangers of, cross-contamination between patients by contamination of the needle during assembly with the syringe after initial use. Whereas in the normal prior art syringe of this type, autoclaving or other suitable sterilization must be carried out after each use, the present invention requires no such autoclaving or other such sterilization to enable a normally skilled practitioner to disassemble and reassemble the syringe with a new needle unit and a new cartridge or carpule, while minimizing danger of contamination from the previous injection. To this end, the forward or nose end **21** of the syringe body has an improved needle unit insertion/removal and connection arrangement, including a transverse arcuate flange-gripping slot arrangement, with a side opening **21**a formed in the nose section for entrance, seating and removal of a needle unit **73**.

The flange-gripping slot securing arrangement in the nose **21** of the illustrative and preferred embodiment takes the form of a pair of angularly spaced slots **29** and **31**, which are formed between spaced interfacing wall portions of the forward and rear nose subsections **23** and **33** of the nose section **21**, which subsections are suitably secured together, as by cement, such as epoxy cement. Needle unit **73** is formed with a securing hub **75** having radially extending opposite flanges **77** which are preferably formed with generally parallel straight sides **77***a* to effect optimum utilization of the present invention. The securing flanges **77** havv an arcuate radially outer edge surface, and the securing flanges **77** are engageable with the slots **29** and **31** respectively in the nose section **21**. Each of the slots **39** and **31** is formed with a feed slot section **29***a*, **31***a*, which is of greater thickness or width than the thickness of the

flanges 77, so as to enable ease of insertion of the flanges 77 thereinto. As will be noted, the feed section 29*a* is generally opposed to the side opening 21*a*, thereby enabling the insertion of the needle unit 73 into the side opening 21*a* with the opposed flanges 77 directed respectively toward and away from the feed slot section 29*a*. Likewise, the needle unit 73 is removable after being returned to this general angular position.

Adjacent each of the feed slot sections 29*a* and 31*a* are ramp cam sections 29*b* and 31*b*, each of which also join with gripping slot sections 29*c* and 31*c*. The gripping slot sections 29*c* and 31*c* are of lesser width or thickness than the thickness of the flanges 77, and thereby effect an elastic gripping action on the flanges, as is illustrated in FIG. 14, upon the rotation of the needle unit 73 through an angle of approximately 90°after initial insertion through the side opening 21*a* and seating of one of the flanges 77 in the slot feed section of slot 29. This elastic gripping action by the gripping slot sections or zones 29*c*, 31*c* is effected through the elasticity of the material forming one or both of the interfacing surfaces 27*c*, 35*a* of the slots 29,31 in these zones, the major elastic deformation normally being effected through the elastic deflection and compression of the shoulder 35 forming the slot surface 35*a*.

Stop posts 23*a* and 23*aa* are formed on the forward nose subsection 23 and serve to separate the two slots 29 and 31 and form angular stop surfaces 23*a'* and 23*aa'* for the respective slots 31 and 29.

As will be seen more particularly in FIGS. 3–6, the interfacing wall portions of the nose subsection 23 forming the respective zones 29*a*, 29*b*, 29*c* and 31*a*, 31*b*, 31*c* of slots 29 and 31 are indicated at, respectively, 27*a*, 27*b*, 27*c*, and 29*a*, 29*b*, 29*c*. The opposite wall portions of the slots 29 and 31 are formed by the interfacing wall surfaces indicated at 35*a* on the forward end of the rear nose subsection 33. The shoulder segments 35, forming surfaces 35*a*, are seated against a seating surface 23*s* (see FIG. 5), which is longitudinally spaced from the surfaces 25*a*, 25*b*, 25*c* and 27*a*, 27*b*, 27*c* by a distance corresponding to the desired spacing between slot surfaces 35*a* on the one hand, and slot surfaces 25*a*, 25*b*, 25*c*, and 27*a*, 27*b*, 27*c* on the other hand, thereby effecting the desired slot thickness or width formation. the radially outer arcuate bottoms of the respective slots 29 and 31 are formed by the arcuate peripheral walls 23*g* and 23*gg*, respectively, as shown in FIG. 5. Preferably, these wall surfaces 23*g*, 23*gg* are of a radius and are coaxially so spaced from the longitudinal centerline of the syringe as to provide general radially centering and guiding action for the needle unit flanges 77, while providing a small amount of radial clearance, as schematically indicated in FIGS. 12 and 14.

Stops posts 23*a* and 23*aa* fit respectively within forward openings 37*a* and 37*aa* of the nose rear subsection 33. As an aid to guided assembly of the two nose subsections 23, 33, guide recesses 23*r*, and guide protrusions 33*r* may be formed respectively on the subsections 23 and 33.

Entry of the cartridge or carpule 61 into the longitudinal opening 21*b* therefor formed by the arcuate wall surface 33*w* may be facilitated by a tapered or beveled entrance surface 33*wb*, as indicated in FIGS. 2–5. The laterally spaced wall edges 33*ws* are preferably of sufficient width to enable the passage of the cartridge nose 67 laterally therebetween, and the lateral side walls 21*as* forming the side opening 21*a* are of sufficient width to enable the lateral passage therebetween of the hub 75 of a needle unit 73, but are of insufficient width to enable the nose 67 of the cartridge 61 to pass laterally therebetween. Accordingly, the retention segments 23*L* and 33*L* forming the opposing side walls 21*aa* of side opening 21*a* serve to laterally retain the cartridge nose end 67 against lateral dislodgement from its seated position against the shoulder 21*c* in the nose section 21 during utilization of the syringe, while the wider side opening SO, which continues generally between the wall edges 33*ws* of the nose section 21, enables the radially tilted entry and removal of the cartridge 61 relative to the syringe 11.

The midsection rods 39 are preferably formed of metal, for desired rigidity and strength with desired small diameter, while the nose section 21 and the threaded securing head 43 are preferably formed of plastic, such as Delrin acetal resin which is considered desirable for its dimensional stability and strength, as well as its sufficient elasticity to enable the desired gripping action by the walls of the slots 29 and 31. The finger gripping flanged head 45 of the rear body section 41 may likewise be formed of plastic or other desired material, while the plunger 51 is preferably formed of metal in its entirety. However, it will readily be apparent that various other materials may be employed, as may be desired by one skilled in the art for his particular use.

Midsection body rods 39 are secured to the respective nose section 21 and rear body section 41 through the medium of male/female interengagement therewith, and the utilization of a suitable adhesive or cement. To this end, both the rear nose subsection 33 and the threaded securing head 43 are provided with longitudinal holes into which the respective ends of the rods 39 are inserted and secured, as by epoxy cement. The preferred hole construction is illustrated in FIG. 5 in which the holes are designated at 33*h* and are provided with lateral internal serrations or undercuts 33*hs*, and the rods 39 are provided with similar grooves 39*g*, both the grooves 39*g* and serrations 33*hs* being provided to effect a better gripping and securing action by the cement therebetween.

While other securing connections may be formed between the rods 39 and the opposite rear and nose body sections, such as through threaded screw engagement, as with oppositely pitched screw threads formed on the rod ends, the illustrated embodiment is preferred as being fast and affording ease of construction with good strength.

In operation, the needle unit 73 and the cartridge 61 are assembled with the syringe 11 in the following manner. Firstly, the syringe is held in one hand at a comfortable angle, which may suitably be approximately horizontal, with the side opening SO oriented toward the operator's face or in this general direction, and visible by the operator. The needle unit 73, with a conventional plastic sheath 79 removably secured thereon, is then brought into juxtaposition to the general position illustrated in full lines for the needle unit 73 in FIG. 9. This places the needle unit in general alignment with the longitudinal axis with the syringe body 11 and with the securing flanges 77 of the hub 75 generally in rough alignment with the slot 29. The sheath and needle unit assembly 71 is then moved downwardly relative to the syringe body 11 to pass the hub through the side open-

ing 21*a* and seat the downwardly depending securing flange 77 in the feed slot section 29*a* of slot 29. Torque is then applied to the needle unit 73 by rotational action thereon with the gripping fingers acting on the larger diameter periphery of the sheath 79 to effect rotational motion of the entire needle unit 73 with its hub 75 and hub flanges 77 within the slots 29 and 31, thereby moving the flanges 77 through the ramp cam sections 29*b* and 31*b* and into the gripping slot sections 29*c* and 31*c*, at which point the leading side edge 77*a* of each of the securing flanges 77 is brought into engagement with the respective stop surfaces 23*a'* and 23*aa'*. This angular rotational seating of the needle unit 73, with its securing flange 77 within the gripping slot sections 29*c* and 31*c* is effected through approximately a 90° angular motion of the needle unit 73 about its longitudinal axis. This angular movement of the needle unit is substantially facilitated by the mechanical advantage afforded by the larger diameter of the sheath 79 covering the hub 75, as distinguished from the diameter of the hub adjacent the flanges 77, and for this and other reasons it is highly desirable to effect both the securing and removal of the needle unit 73 with the sheath 79 in at least partial gripping position on the hub body 75. It will be apparent that the sheath will, of course, be removed from the needle unit 73 during utilization of the syringe and needle assembly. Sufficient gripping action between the sheath and the body of the hub 75 is effected by the usual longitudinal serrations, indentations, raised surfaces, etc., on the hub body surface, in conjunction with the usual light press fit of the plastic sheath 79 onto the hub body 75.

As will be seen from FIG. 7, the insertion and seating of the needle unit 73 within the nose section 23 and slots 29, 31, results in the bevel point of the needle butt end section 73*b* being disposed well within the cartridge receiving opening 21*b*, bounded at its forward end by the shoulder 21*c* and along the arcuate periphery by arcuate walls 33*w*. Also, as will be noted, as the butt end section 73*b* of the needle 73 extends beyond the open base end of the hub 75 a distance greater than the length of the side wall surfaces 21*as*, inadvertent contact of the needle butt end section 73*b* with the walls 21*as* will be along the side of the needle substantially forward of the beveled end point, thereby aiding and minimizing risk of contamination of the bevel pointed cartridge-entry end of the needle during assembly of the needle unit with the syringe.

After assembly and securing of the needle unit 73 with the syringe 11, a cartridge 61 is inserted in the syringe 11 by passing its forward puncturable elastic membrane end through the lateral opening SO in the syringe body, and bringing the cartridge member 69 into puncturing contact with the bevel pointed butt end section 73*b* of the needle, the cartridge being seated within the chamber formed within the body 21, 39,41 of the syringe 11 during slide thumb retraction of the plunger 51 to enable ease of passage of the cartridge 61 into seated relation within the body of the syringe 11. The plunger 51 may then be released to enable the sleeve 55 to resiliently retain the cartridge in position under the longitudinal compression stress of compression spring 53. The plunger 51 is then rotated relative to the cartridge 61 to secure the plunger to the threaded connector on the piston 65. The needle sheath 79 may be removed at this time or prior thereto, as may be desired, and the assembled cartridge-syringe unit is now ready for use.

This assembly is readily accomplished by unscrewing the plunger 51 from the piston 65 in the cartridge 61, and then retracting the plunger 51 against the compression spring 53 while grasping the cartridge 61 with the fingers of the opposite hand and tilting the cartridge and sliding such rearwardly and sideways out through the side opening SO in the syringe body, thereby disengaging the cartridge from the needle 73*b*. The needle unit 73 may then be removed, by reverse rotation of the needle unit, counter to the direction of rotation for securing of the needle unit within the nose section 21 and securing slots 29,31. Thus, in the illustrative embodiment, the needle unit 73 is rotated counter-clockwise as viewed in FIG. 9 through an angle of approximately 90° to return the flanges 77 to the generally up and down direction relative to the opening 21*a*, after which the needle unit 73 is removed laterally through the opening 29*a*. As mentioned previously, the operator may facilitate this removal, while also guarding against inadvertent piercing of the operator's hand by the needle 73*a*, by reassembling the sheath onto the hub 75 before removal of the needle unit 73, thereby affording improved mechanical advantage for rotational disengagement of the flanges 77 from the slots 29 and 31.

While the invention has been illustrated and described with respect to a single preferred embodiment, it will be readily apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, the invention is not to be limited by the particular illustrative embodiment, but only by the scope of the appended claims.

That which is claimed is:

1. A syringe adapted for connection of a needle hub having laterally projecting side flanges, comprising

a body adapted to receive a removable carpule having a closed needle-pierceable forward section,

said body having a forward shouldered end, with a carpule-retaining shoulder,

said shouldered end having connecting means thereon for connection of a needle hub thereto,

said shouldered end having a laterally central needle-but-end-receiving opening and a laterally interconnecting side opening formed therein and extending along and beyond the entire longitudinal thickness of said shoulder for enabling lateral assembly of a butt-end-protruding needle and hub unit with said syringe body,

said body having a transverse needle-hub-flange-securing open-sided non-screw-thread-forming slot having longitudinally oppositely facing longitudinally spaced needle-hub-flange-gripping walls and being formed at said shouldered end and forming said connecting means for receiving and gripping the flanged portion of a flanged needle hub as a function of side insertion of a flanged needle hub through said side opening,

said longitudinally oppositely facing longitudinally spaced needle-hub-flange-gripping walls of said slot having a circumferential angular extent to enable relative rotational motion between a flanged needle hub and said gripping walls after insertion of said flanged needle hub through said flange-securing open-sided slot,

said flange-gripping walls defining said slot being variably spaced along the length of said slot to form both a loose-fitting feed slot zone and a laterally relatively more narrow and closer fitting flange-gripping zone which serves to frictionally secure a flanged needle hub open its rotational movement within said slot to bring its flange portion into opposite gripping wall engagement within said laterally relatively more narrow and closer fitting flange-gripping slot zone angular spaced from and angularly connecting with said loose-fitting feed slot zone.

2. A syringe according to claim 1,
said flange-securing slot including a ramp cam zone disposed angularly between said loose-fitting feed slot zone and said closer fitting flange-gripping slot zone.

3. A syringe according to claim 2,
further comprising two similar said flange-securing slots spaced angularly apart,
and a pair of stop elements disposed angularly between and angularly separating said two slots.

4. A syringe according to claim 3,
said feed slot zone in one of said slots being disposed opposite to and facing said laterally interconnecting side opening formed in said shouldered end.

5. A syringe according to claim 3,
said slots being in diametrally transverse alignment.

6. A syringe according to claim 1,
said feed slot zone being disposed opposite to and facing said laterally interconnecting side opening.

7. A syringe arrangement according to claim 1, further comprising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engagable by said transverse flange-securing open-sided gripping walls of said slot as a function of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

8. A syringe arrangement according to claim 7,
said needle unit including a butt-end extending penetrating cannula for side insertion and removal movement through said laterally central needle-butt-end-receiving opening.

9. A syringe arrangement according to claim 2, further comprising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engageable by said transverse flange-securing open-sided gripping wals of said slot as a walls of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

10. A syringe arrangement according to claim 9,
said needle unit including a butt-end extending penetrating cannula for side insertion and removal movement through said laterally central needle-butt-end-receiving opening.

11. A syringe arrangement according to claim 3, further comprising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engageable by said transverse flange-securing open-sided gripping walls of said slot as a function of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

12. A syringe arrangement according to claim 4 further comprising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engagable by said transverse flange-securing open-sided gripping walls of said slot as a function of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

13. A syringe arrangement according to claim 5, further comrising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engagable by said tranverse flange-securing open-sided gripping walls of said slot as a function of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

14. A syringe arrangement according to claim 6, further comprising
a removable needle unit connected to said shouldered end and having a cannula and a hub connected to said cannula,
said hub having laterally projecting flanges which are narrower in angular width extent than the effective angular length extent of said open-sided slot, and laterally insertable into said slot and grippingly engagable by said transverse flange-securing open-sided gripping walls of said slot as a function of insertion of said needle unit flanges into said slot and rotation of said needle unit in said slot for securing of said needle unit to said shouldered end.

15. A syringe comprising
a unitary body having a cartridge-receiving section and a nose section,
said nose section having a needle-unit receiving side opening therein for lateral insertion of a needle-unit thereinto,

said nose section having a needle-unit securing means formed thereon and connecting with said side opening,

said needle unit securing means comprising an arcuate transversely extending flange-securing slot narrowing in width along a portion of its arcuate length for both relative ease of flange insertion in one zone and flange securing in another narrow width zone formed in said nose section for gripping and securing the flange of a flanged-hub needle unit.

16. A syringe comprising

a unitary body having a rear section, a nose section and a midsection,

said midsection comprising a plurality of angularly spaced longitudinal rods connecting with and between said nose and rear sections,

said rods being angularly spaced to provide a partially encompassing cartridge retention cage,

and two of said rods being laterally spaced to provided a side opening for a cartridge to be inserted into and removed from said retention cage,

said nose section having a needle-unit receiving side opening therein in longitudinal alignment with said side opening formed in said midsection,

said nose section having a needle-unit securing means formed thereon,

said needle-unit securing means comprising an arcuate transversely extending flange-securing slot formed in said nose section for gripping and securing the flange of a flanged-hubbed needle unit,

and a second flange-securing slot angularly spaced from said first mentioned slot and in substantially transverse alignment,

and a flange rotation stops disposed between said slots.

17. A syringe according to claim **16,**

said slots being diametrically opposed.

and said stops being at diametrically opposite spaced positions.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,848,593

DATED : November 19, 1974

INVENTOR(S) : Brian E. Baldwin

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col.	Line	
1	61	change "release" to ---relative---
3	25	change "and" to ---end---
3	31	change "and" to ---end---
3	32	change "adpated" to ---adapted---
4	62	change "havv" to ---have---
5	45	change "the" to ---The---
5	55	change "stops" to ---stop---
7	14	change "flange" to ---flanges---
7	54	change "member" to ---membrane---
9	6	change "open" to ---upon---
9	10	change "angular" to ---angularly---
9	63	change "wals" to ---walls---
9	63	change "walls" (second occurrence) to ---function---
10	19	after the numeral 4, insert a comma (,)
10	35	change "comrising" to ---comprising---
12	17	change "diametrically" to ---diametrally---
12	19	change "diametrically" to ---diametrally---

Signed and Sealed this

twentieth Day of *April 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks