

July 21, 1959

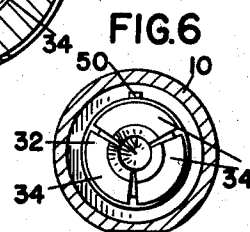
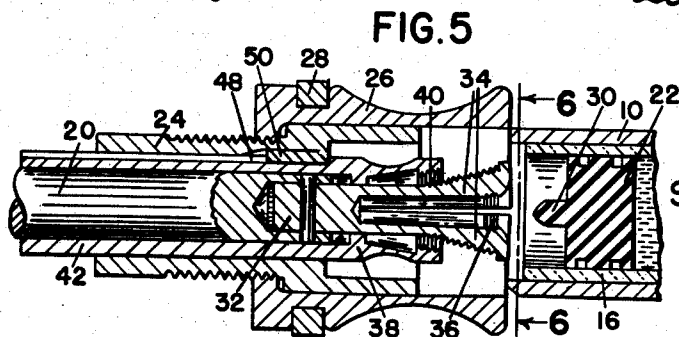
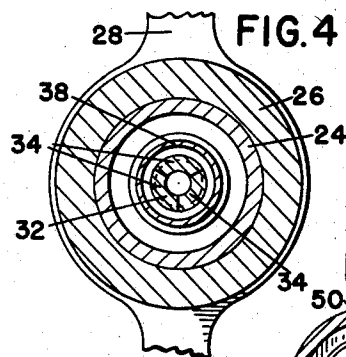
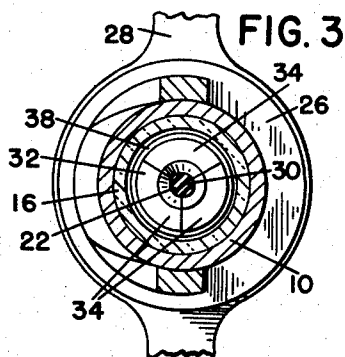
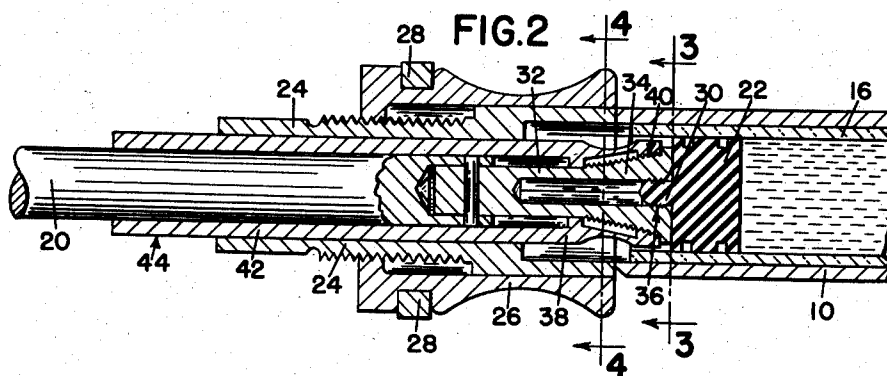
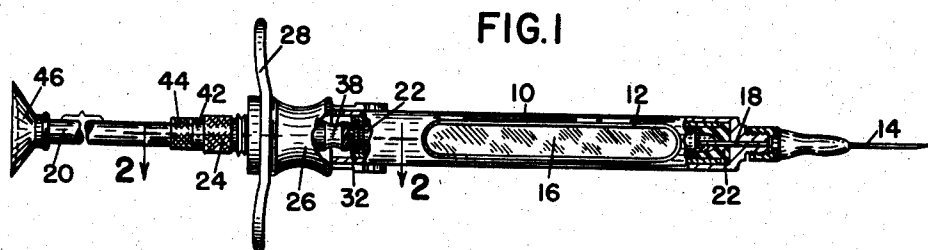
S. REZNEK

2,895,474

ASPIRATING CARTRIDGE SYRINGE

Filed Jan. 4, 1955

3 Sheets-Sheet 1



INVENTOR
SOLOMON REZNEK

by Charles R. Fay,

ATTORNEY

July 21, 1959

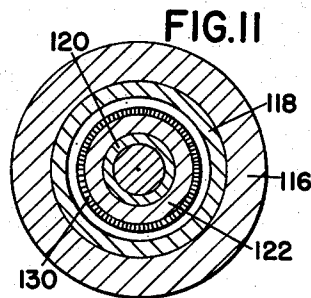
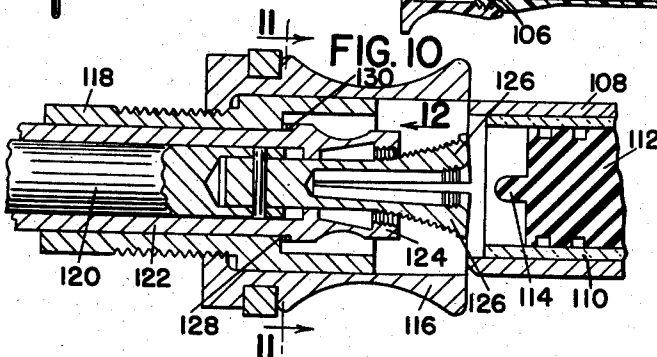
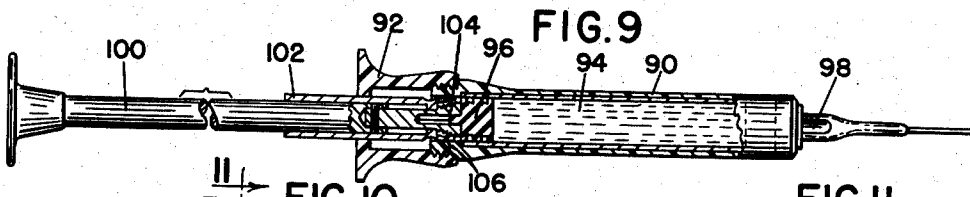
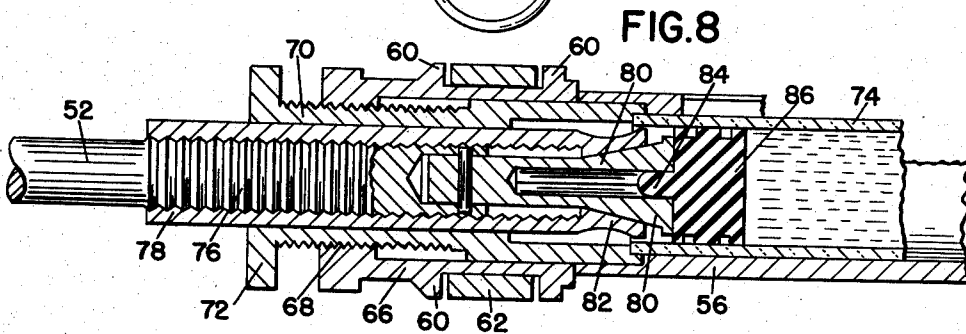
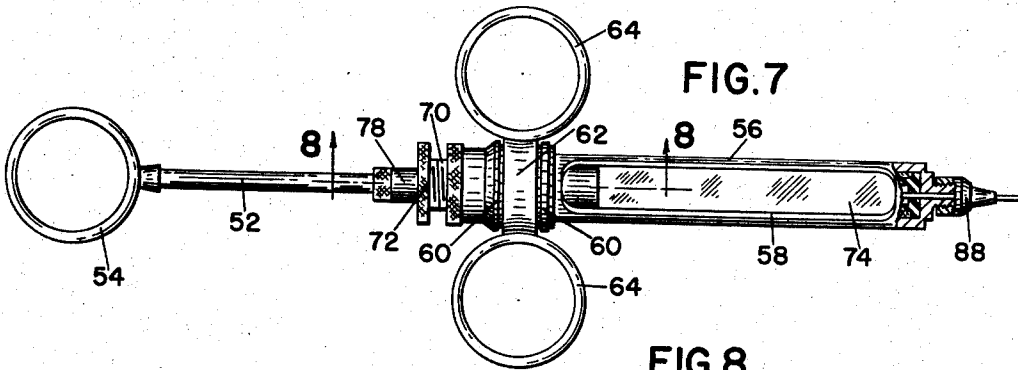
S. REZNEK

2,895,474

ASPIRATING CARTRIDGE SYRINGE

Filed Jan. 4, 1955

3 Sheets-Sheet 2



INVENTOR
SOLOMON REZNEK

Charles R. Fay

ATTORNEY

July 21, 1959

S. REZNEK

2,895,474

ASPIRATING CARTRIDGE SYRINGE

Filed Jan. 4, 1955

3 Sheets-Sheet 3

FIG. 12

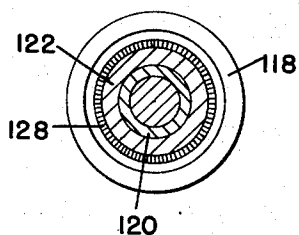


FIG. 13

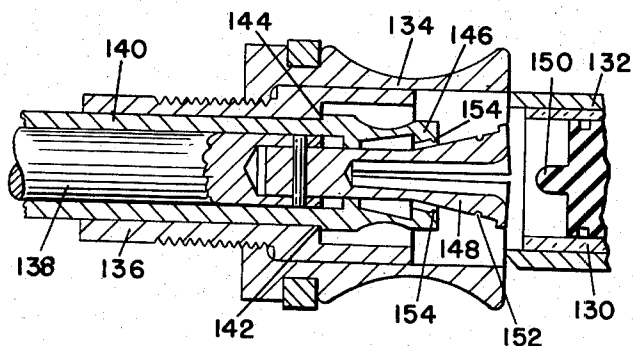


FIG. 14

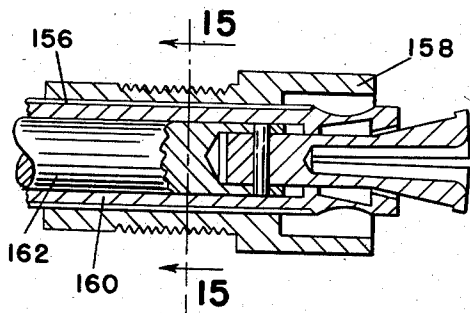
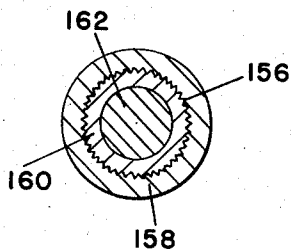


FIG. 15



INVENTOR
SOLOMON REZNEK

Charles R. Fay

ATTORNEY

1

2,895,474

ASPIRATING CARTRIDGE SYRINGE

Solomon Reznick, Albany, N.Y., assignor to Cook-Waite Laboratories, Inc., New York, N.Y., a corporation of Delaware

Application January 4, 1955, Serial No. 479,818

2 Claims. (Cl. 128—218)

This invention relates to the type of cartridge syringe which utilizes a disposable ampoule or cartridge containing the material to be injected, and this invention is also directed to the ampoule or cartridge itself. The present invention is directed to novel structure of the syringe and also to the syringe in cooperative combination with a novel plunger or cork for the ampoule or cartridge for providing a connection between the cartridge plunger and the piston rod of the syringe to provide for an aspirating effect as well as injection.

It has been found that in many cases the use of this type of syringe, that the operator may puncture a vein, and the consequent injection of the local anesthetic is at least partially intravenous, resulting in undesirable side reactions and loss of anesthetic efficiency, so that aspiration is of considerable importance to locate a desired spot prior to injection.

A principal object of the invention resides in the provision of a syringe usable for injection as conventional with prior art types of cartridges or ampoules, but which also is provided with means to grip the cartridge plunger to move the latter in either direction relative to the cartridge, for aspiration as well as injection; and the provision of a novel cartridge or ampoule including a plunger having means by which it may be gripped by the piston rod of the novel syringe, said novel cartridge being also usable in the usual manner with prior art syringes.

Another object of this invention resides in the provision of a syringe using a disposable cartridge having a cork or plunger made wholly of rubber or like material and having an extending tip, and including inter-engaging means between the piston rod for the syringe and the tip of the rubber plunger of the ampoule or cartridge, whereby the latter may be positively engaged and retracted by the piston rod for aspiration prior to injection, as well as moved in a direction to cause injection.

Further objects of the invention include the provision of a new and improved ampoule or cartridge which is very easily disengaged from the syringe piston rod when the injection is finished; and in addition, the invention provides against the staining by corrosion of the usual metal inserts of prior art aspirating cartridges, etc. during storage.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a view in side elevation of a device according to the present invention, parts being in section;

Fig. 2 is an enlarged section on line 2—2 of Fig. 1; Figs. 3 and 4 are sections on respective lines 3—3 and 4—4 in Fig. 2;

Fig. 5 is a view similar to Fig. 2 but showing the syringe piston disengaged from the plunger of the cartridge and a modified actuating structure;

Fig. 6 is a section on line 6—6 of Fig. 5;

2

Fig. 7 is a side elevation of a different type of syringe using the invention;

Fig. 8 is an enlarged section on line 8—8 of Fig. 7; Fig. 9 is a longitudinal section through a different type of syringe;

Fig. 10 is an enlarged section showing a modification, parts being broken away;

Fig. 11 is a section on line 11—11 of Fig. 10;

Fig. 12 is a view in elevation, looking in the direction of arrow 12 in Fig. 10, parts being in section;

Figs. 13 and 14 are sections showing still further modifications; and

Fig. 15 is a section on line 15—15 of Fig. 14.

One syringe used as illustrative of the present invention includes a barrel 10 which may be provided with one or more observation windows or openings 12; a hypodermic needle 14 for conducting the contents of a disposable ampoule or cartridge 16 in the barrel 10 through a cartridge-end piercing inner needle 18 located in the tip of the barrel as shown in Fig. 1; and a piston rod 20 for exerting pressure upon the plunger 22 of the cartridge to expel the contents thereof through the needle.

The cartridge 16 being provided with the plunger or cork 22, normally is engaged by the inner end of the piston rod 20 to exert pressure thereon to move the same along in the cartridge to expel the contents of the cartridge as stated. In the prior art, however, there can be no aspirating by means of the needle 14, and the only possible action is to press the piston rod 20 for instance to the right in Figs. 1 and 2. The cartridge plunger cannot be withdrawn or moved to the left. Of course when the cartridge has been used, it is thrown away and another cartridge is placed in the syringe. The terms "cartridge" and "ampoule" are used interchangeably in this case.

Loosening of the rotary locking sleeve 24 as in Figs. 1 and 2 in a manner well known in the art to allow pivoting of the hinged head 26, provides for opening the breech end of the barrel 10 for the extraction of a spent cartridge and insertion of a new cartridge without interference from the piston rod 20 or the hinged head 26. The head 26 may be provided with the usual fingerhold 28.

In the present case, the invention provides an integrally molded, distortable rubber-like tip on the cartridge plunger 22, as clearly shown at 30 in Fig. 2, this rubber tip extending or at least facing to the exterior of the cartridge 16. Any rubbery material may be used for the plunger and its tip, and the tip may be plain and smooth as in Fig. 5, or serrated or toothed as indicated in Fig. 2.

In addition, for cooperation with this rubber tip 30 there is provided a gripping member generally indicated at 32 in Fig. 2, attached to the piston rod 20 or the like at the inner end thereof as respects the barrel 10. Member 32 is provided with resilient gripping fingers 34 which may be provided with serrations 36 at the interior thereof, the fingers being arranged generally radially (see Fig. 3) and designed to be radially compressed to be brought toward each other to firmly grip the rubber tip 30.

The means provided for causing the gripping fingers to move radially toward each other to grip the rubber tip may take the form of an exterior barrel or sleeve indicated at 38. This barrel may be rotatable relative to the gripping fingers and member 32, and if desired, may be provided with inter-engaging threads 40 for providing relative longitudinal motion between gripping fingers 34 and the actuating sleeve 38 in order to cause the fingers 34 to move inwardly relative to each other. The exterior surfaces of the gripping fingers extend radially outwardly past the internal diameter of sleeve 38 in normal extended condition, and the sleeve 38 acts

in the nature of a cam to compress the fingers upon the required relative axial motion thereof.

The sleeve 38 may be extended as at 42 and may be knurled at this end as at 44 and it may extend outwardly of the knurled locking sleeve 24 for convenience in operation (see Fig. 1).

After inserting the cartridge 16 in the barrel in the usual manner, the head 26 is replaced in its operative position axially aligned with barrel 10. The locking sleeve 24 is then turned up to lock the parts in position in the usual manner.

The knurled end 44 of sleeve 42 may then be turned relative to piston rod 20, either the rod or sleeve being held by one hand while the other member is rotated by the fingers of the other hand, so that with the inner end of the piston rod adjacent the plunger 22, gripping fingers 34 will move radially inwardly and firmly grip the rubber tip 30, so that the plunger 22 and piston rod 20 will move together in either direction. The act of aspiration then becomes simple and clearly apparent to those skilled in the art, since merely by withdrawing slightly on piston rod 20, as for instance by means of the thumbpiece 46 thereon, blood from any vein pierced by needle 14 will be withdrawn and the piercing of the vein will then be apparent to the operator.

A modification is shown in Fig. 5 wherein the gripping fingers are illustrated as retracted, and the cartridge plunger 22 is free. The gripping finger actuator barrel 42 instead of being rotatable within the locking sleeve 24, is axially slidably keyed thereto as by slot 48 and key 50, so that the locking sleeve 24 upon being rotated to lock the cartridge in position also rotates the gripper finger actuating sleeve 42 relative to the piston rod 20, thus accomplishing two actions, that of locking the head 26 as usual, and also of causing gripper fingers 34 to be moved radially inwardly to firmly engage and grip the rubber tip 30.

The key may be provided with a tight fit interiorly of the locking sleeve 24 and with a loose fit with reference to keyway 48 to provide for axial sliding of the sleeve 42 relative to locking sleeve 24, so that the sleeve 42 and piston rod 20 may be slid inwardly from the Fig. 5 position to the position of Fig. 2, to contact the tip 30, and in the construction shown in Fig. 5, this operation is done prior to actually locking the head 26 in position by means of the locking sleeve 24.

It will be seen that if the locking sleeve 24 is fairly well seated, the syringe piston rod 20 and sleeve actuator 42 may be independently slid axially to engage or release the plunger 22. In this case, the sleeve 42 is held against rotation by the seated sleeve 24, and merely by digitally rotating the piston 20, the fingers 34 will be actuated to grip or release tip 30.

The piston rod and cartridge tip gripping device may be made for replacement of the usual piston in the conventional syringe of the class described. With the locking sleeve released and slightly pivoted to make a small angle with the barrel of the syringe, the usual piston is removable by axially sliding it inwardly through a barrel window, after removing the thumbpiece 46 which is threaded in the piston. The new piston is then applied in a reverse manner.

Referring now to Fig. 7, there is shown a more or less conventional type of syringe which is different from that shown in Fig. 1 in that the piston rod 52, operated by a handle 54, does not pivot in any way with respect to the cartridge-receiving barrel 56. This barrel is open at least at one side thereof as indicated at 58 and receives the disposable cartridge or ampoule through this opening. This type of syringe is commonly referred to as a "side loader."

In this case, the barrel 56 has fixed thereto a pair of annular members 60 which axially constrain a rotary ring 61 provided with fingerholds 64. The rings 60 may be mounted on a ferrule or the like 66 which is

internally threaded at 68 to receive the locking member 70 externally threaded as shown and having a thumb-piece or the like in annular form at 72 for locking the disposable cartridge, as for instance that indicated at 74, in position in the barrel 56. The locking member 70 may be adjustably secured in position by well known means and need not be removed in any way, see particularly Fig. 8.

The syringe piston rod 52 may have a threaded engagement at 76 with respect to the operating sleeve 78 which corresponds in general to that at 42 in Fig. 2. This assembly is slidable within the locking member 70 and the piston rod 52 terminates in a series of compressible fingers 80 which are comparable to those at 34. The operating sleeve 78 is provided with the collet member 82, and upon rotation of piston rod 52 relative to operating sleeve 78, fingers 80 will be moved inwardly to grasp the rubber tip 84, which in this case may be the same as that at 30 in Fig. 2. Tip 84 is of course made as a portion of the plunger 86 of the disposable cartridge 74.

In the operation of this type of syringe, the locking member is backed off to release the used ampoule or cartridge which is then disposed of through the window 58, whereupon a new cartridge or ampoule is disposed in the barrel 56 and the locking member 70 is then turned up to engage and lock the ampoule or cartridge in the position of Fig. 8. The assembly of the syringe piston rod 52 and operating sleeve 78 is then slid inwardly, i.e. to the right in Fig. 8, until the rubber tip 84 is included between the fingers 80, whereupon relative rotation of the piston rod 52 relative to the sleeve 78 causes the fingers 80 to grip the tip 42 as previously described. It is to be understood, of course, that the syringe of Fig. 7 is provided with the needle tip assembly 88 as is customary.

Fig. 9 illustrates the use of the device with still a further type of syringe, wherein a barrel 90, which may be of clear glass or plastic tubing, is provided with a screw cap 92 completely removable therefrom to allow the insertion of the replaceable cartridge or ampoule 94, the same having a rubber cork or plunger 96 with a tip, as before described. Also, the barrel 90 is provided with a needle assembly 98 as is customary, and the syringe piston rod 100 is provided in assembled relation with respect to the removable cap 92 which is preferably made of plastic or the like. There is also present an operating sleeve 102 which is comparable to that at 78 and gripping fingers 104 may be utilized in a manner similar to that in Figs. 2 and 8.

The operation of this type of syringe will be readily apparent. The cap 92 is completely removed and the spent cartridge or ampoule is taken out of the barrel and thrown away and the new ampoule or cartridge is inserted. The cap 92 is then re-applied and the piston and sleeve assembly 100 and 102 is slid into place as shown in Fig. 9, whereupon relative rotation of piston rod 100 and sleeve 102 will result in the threads indicated at 106 compressing the fingers (as in Fig. 2) to grip the tip on the cork or cartridge plunger 96.

It is to be understood that the threads 76 and 106 are interchangeable as mechanical expedients, it only being necessary to provide a positive sliding action between the syringe piston rod and its operating sleeve in order to compress the gripping fingers as described to grip the rubber tip and to thereupon carry out the aspiration and injection as desired.

A modified type of device is shown in Figs. 10, 11 and 12 wherein the reference numeral 108 indicates a barrel receiving the ampoule or cartridge 110 having the plunger 112 with the rubber tip 114. This barrel 108 is operatively connected to a head or the like generally shown and indicated at 116, this head being comparable mechanically to that at 66 in Fig. 8 or 26 in Fig. 2, and

5

provides a housing for a part of the locking sleeve which is indicated at 118.

The syringe piston rod is indicated at 120 and it is surrounded at least in part by the operating sleeve 122 which extends forwardly in the collet member 124 which will cause the finger members 126 to move radially inwardly to grip the tip 114 when aligned with the same as will be apparent from the discussion above.

In this case, however, the locking member 118 is provided with a radially serrated forwardly-extending shoulder indicated at 128 and having clutching engagement with a similar serrated rearwardly facing shoulder 130 which is on the sleeve 122 inwardly of the collet member 124.

In this case, the members meet so that when the locking sleeve 118 is almost but not quite in its inwardmost locking position, fingers 126 will substantially embrace the tip 114. Rotation of sleeve 118 will then cause rotation of operating sleeve 122 relative to piston rod 120 and the threads on the collet member 124 and fingers 126 will engage to cause a relative axial motion, clamping the fingers 126 on to the tip 114, so that rotation of the locking sleeve to locking position of the cartridge, also will cause the piston rod to grip the tip of the plunger of the disposable cartridge.

Fig. 13 shows a still further modification wherein the disposable cartridge is indicated at 130 and the barrel in which it is located is indicated at 132. The barrel head is 134 and the locking sleeve is indicated at 136. The piston rod 138 of the syringe has an operating sleeve 140. In this case, the locking head 136 is provided with the shoulder 142 and the inward end of the operating sleeve 140 is provided with an opposite complementary shoulder 144, so that when the locking sleeve 136 is moved to the right in Fig. 13, it will also move the operating sleeve 140, and this action causes the collet member 146 to slide on the smooth outer surfaces of fingers 148 and thus compress the same to clamp the rubber tip 150. In this case, there may also be provided detents at 152 and corresponding projections at 154 in order to lightly secure the operating sleeve 140 to the piston rod 138 in order to provide for the temporary and light securement of these parts together in order to accomplish the aspirating function, but it is clear that a deliberate pull on piston rod 138 will release the detent and allow the retraction of the fingers to release the tip 150.

Figs. 14 and 15 illustrate a still further form of the invention but in this case the difference between the construction of Fig. 14 and the construction of Figs. 5 or 10 resides in a circumferential series of parallel axially arranged corresponding serrations 156, so that the locking sleeve 158, which may be the same as that at 136 otherwise, will rotate the operating sleeve 160 relative to syringe piston rod 162 as the locking sleeve is rotated to bring it into locking engagement with the disposable cartridge or ampoule. Otherwise the construction and operation of the parts is the same as before but it will be appreciated that in all of the cases of Figs. 5, 10, 14 and 15, the piston rod for the syringe and the operating sleeve for the gripping fingers are capable of relative axial motion, but are relatively non-rotational

6

when it is desired to lock the cartridge in place and to engage the gripping fingers with the rubber tip of the cartridge plunger.

This application is a continuation-in-part of my prior application Serial No. 442,494 filed July 12, 1954.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A syringe for use with a disposable ampoule cartridge having a plunger and said plunger having an exposed tip extending therefrom, said syringe comprising a barrel for receiving the cartridge, a needle and a piston rod associated with the barrel, and means on said piston rod for gripping the cartridge plunger tip for movement of the cartridge plunger with the piston rod in either direction for both aspiration and injection, the plunger tip gripping means comprising radially movable gripping fingers on the piston rod at the inner end thereof and including means for moving said fingers radially inwardly to grip the tip, said fingers being resilient and normally retracted, the means for actuating the gripping fingers comprising a locking sleeve, a second sleeve rotatable on the piston rod and non-rotatably associated with the locking sleeve for rotation by the locking sleeve, and inter-engaging means between said second sleeve and the gripping fingers moving said fingers radially inwardly upon relative axial motion thereof.

2. A syringe for use with a disposable ampoule cartridge having a plunger and said plunger having an exposed tip extending therefrom, said syringe comprising a barrel for receiving the cartridge, a needle and a piston rod associated with the barrel, and means on said piston rod for gripping the cartridge plunger tip for movement of the cartridge plunger with the piston rod in either direction for both aspiration and injection, the plunger tip gripping means comprising radially movable gripping fingers on the piston rod at the inner end thereof and including means for moving said fingers radially inwardly to grip the tip, said fingers being resilient and normally retracted, the means for actuating the gripping fingers comprising a locking sleeve, a second sleeve rotatable on the piston rod and associated with the locking sleeve for rotation by the locking sleeve, inter-engaging means between said second sleeve and the gripping fingers moving said fingers radially inwardly upon relative axial motion thereof, and means to selectively engage or disengage the two sleeves for unirotational motion or separate, relative rotation with respect to each other.

References Cited in the file of this patent

UNITED STATES PATENTS

1,929,247	Hein	Oct. 3, 1933
2,413,303	Folkman	Dec. 31, 1946
2,542,814	Hoskins	Feb. 20, 1951
2,688,966	Huber	Sept. 14, 1954
2,693,804	Pontius	Nov. 9, 1954

FOREIGN PATENTS

620,824	Great Britain	Mar. 30, 1949
---------	---------------	---------------