Oct. 4, 1949. S. D. GOLDBERG 2,483,825

SYRINGE AND AMPOULE COMBINATION AND AMPOULE

Filed Aug. 12, 1946 2 Sheets-Sheet 1

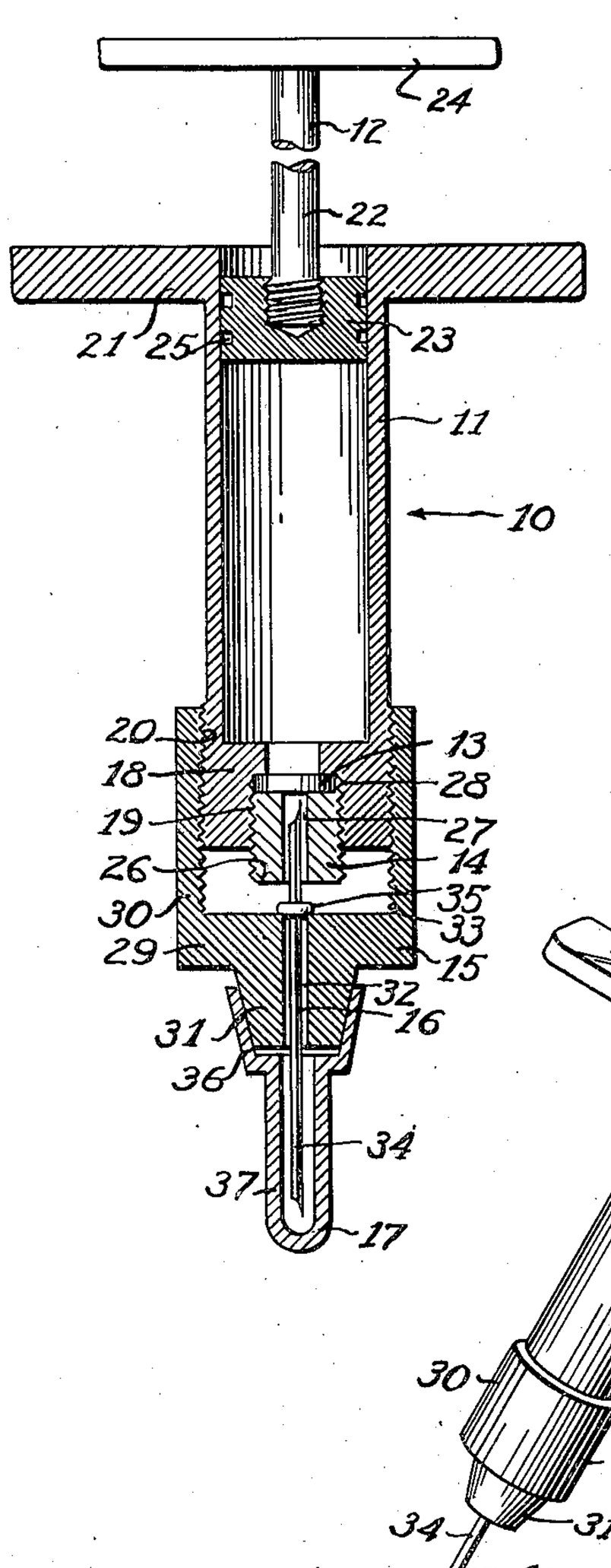

Fig. 2

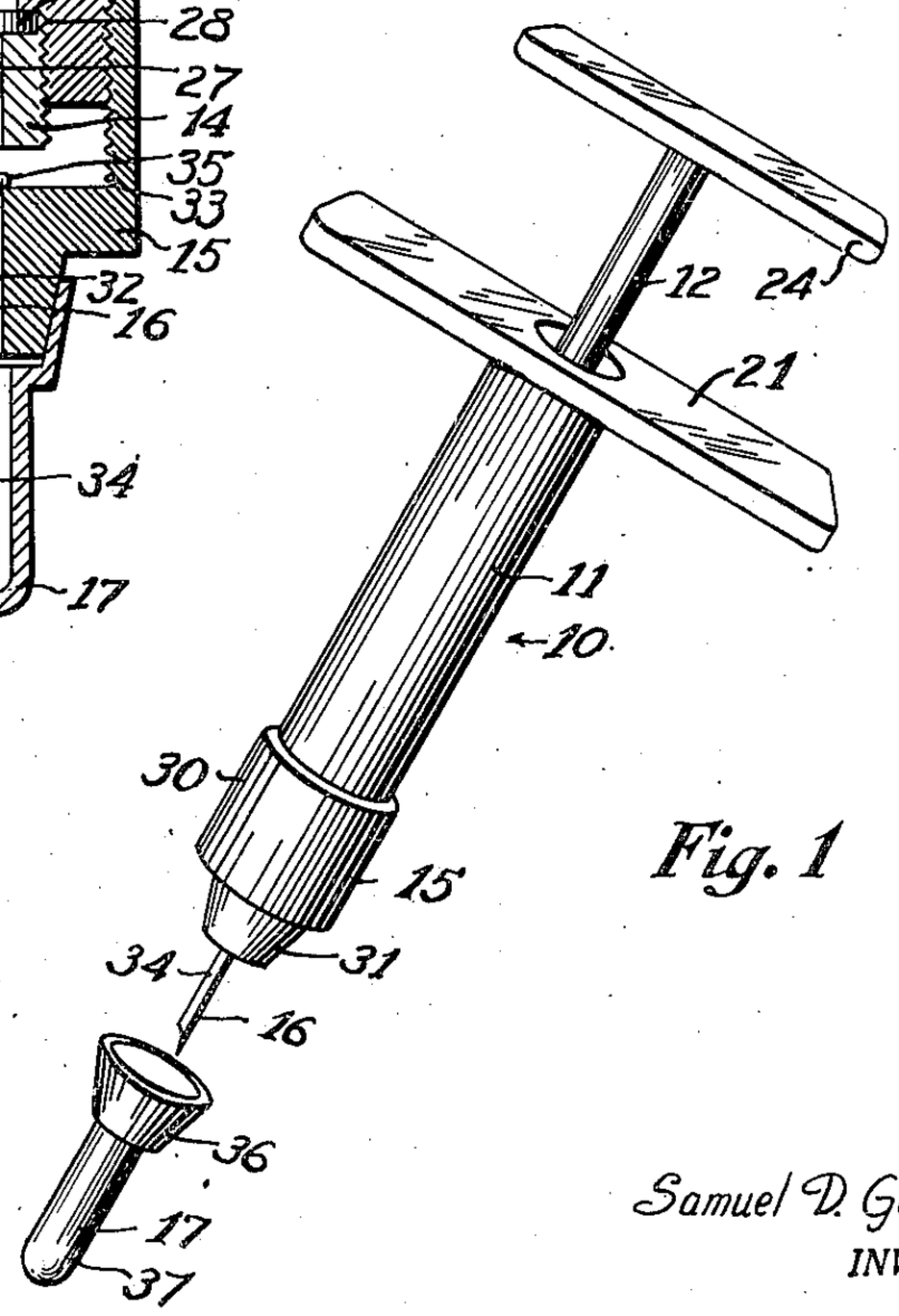

Fig. 1

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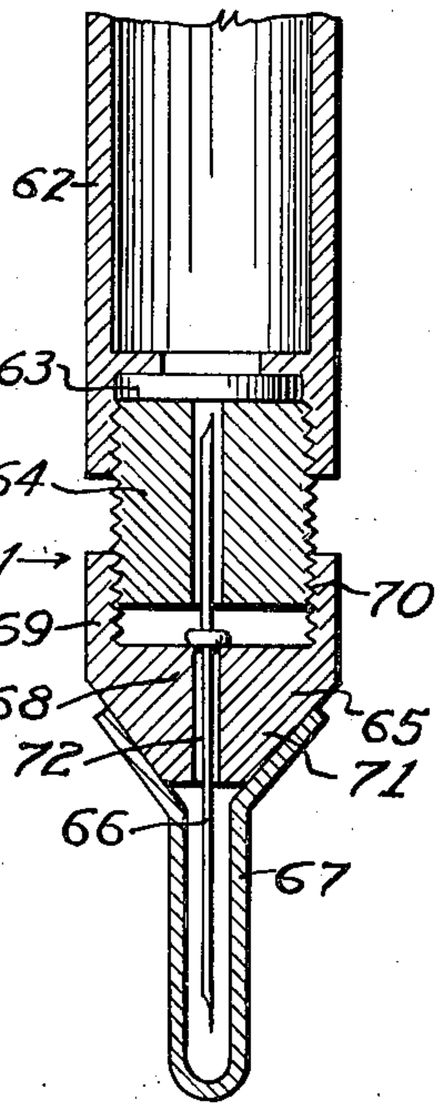

Fig. 5

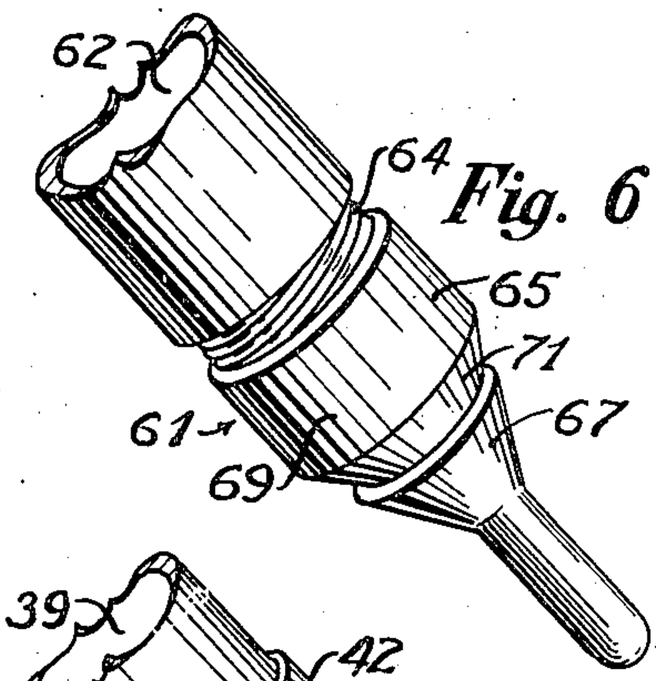

Fig. 6

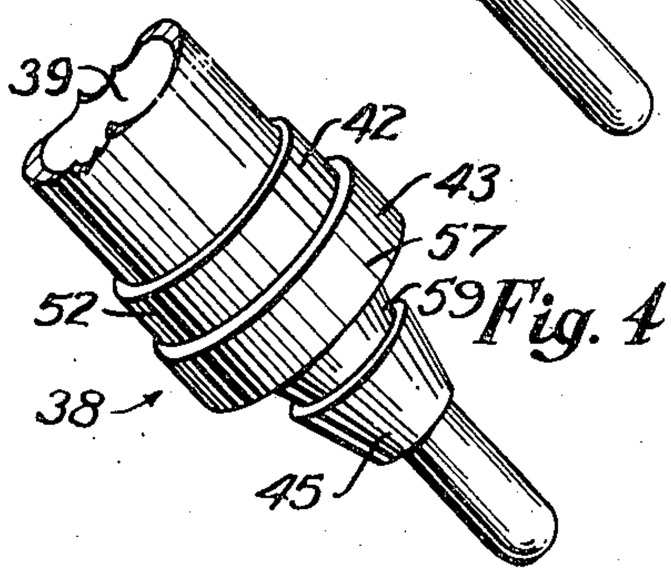

Fig. 4

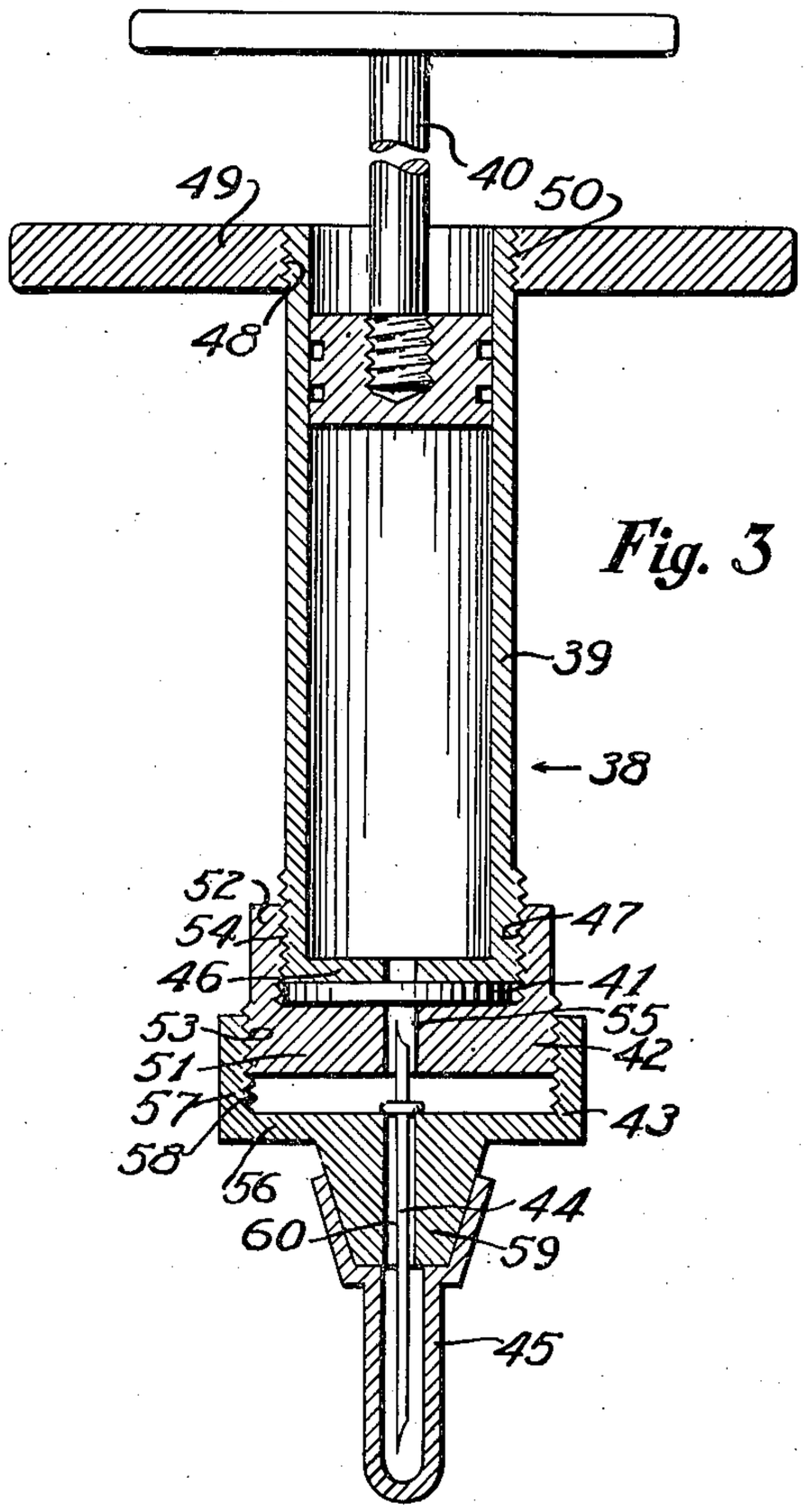

Fig. 3

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UNITED STATES PATENT OFFICE

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SYRINGE AND AMPOULE COMBINATION AND AMPOULE

Samuel D. Goldberg, Jamaica, N. Y.

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11 Claims. (Cl. 128—218)

1

My invention relates to syringes and reservoirs therefor suitable for containing and ejecting fluid through a cannula or needle and more particularly to a combination instrument comprised of an ejecting means, reservoir and cannula.

Heretofore most injecting instruments have been formed of a syringe frame, a separate cartridge or ampule containing the medicament to be injected, and a needle. To combine these elements into an injecting instrument ready for use, it was necessary to sterilize the frame and needle and assemble them together, and then sterilize the ampule head and insert the ampule into the frame. Other instruments have been formed with a sterilizing case to hold the instrument elements but these required that that elements be assembled and the ampule or cartridge inserted.

The assembling and sterilizing of the instrument elements required time, and their exposure during this time, which was after sterilization, permitted them to become contaminated. In addition, the sterilization given to the rubber and other resilient cover of the ample was never perfect as it consisted of a hasty washing with alcohol or a short flashing with fire, alcohol not killing all germs and a too long flashing burning or melting the rubber and charring its surface.

It is therefore an object of the invention to form a complete assembled, sterile, one-shot syringe, which is always ready and available for use without sterilization or assembly.

The needle holding means heretofore in use has been of two types, one, where the needle is kept separate and positioned on the syringe when the syringe is about to be used, and the other where the needle is built into the framework of the syringe. The first type required a complicated and costly end on the needle and a corresponding end piece in the syringe. The second type requires the steel framework of the syringe to be enlarged and lengthened to provide a grip for the frame about the needle above and below the flange.

An object of the invention is to form the syringe reservoir itself with extending elements which hold the needle, thus eliminating the frame work, with its extended needle holding means, but using a simple flanged needle and holding it between elements of the reservoir barrel and its closure.

The syringes in use, at present, are formed suitable for use with the ordinary quick flowing fluids of low viscosity and so have been designed with a small orifice at the filling end. The present syringe is designed for use especially with high

2

viscosity material of a wax or oil base and so differs from the former syringe reservoirs in the method of closure, filling and size of orifice to permit rapid filling and closure of the reservoir.

Syringes heretofore in use have been made of steel or like metal and their ampules of glass. This is an expensive procedure and the question of sterilization is always present.

It is an object of this invention therefore to form a combination syringe and ampule into a single unit of a plastic or other like substance with a cannula which will be retained sterile and covered from the moment of the filling of the ampule till the time of use, particular attention being paid to the shape, position and form of the elements and the methods of their joinder to permit their being cast from simple and inexpensive molds, to insure a perfect sealing of the medicament in its reservoir, to provide a secure means of holding the needle, and to result in a well built, sturdy over all structure.

Another object is to form a simple, inexpensive ampule with a plunger means attached.

Some of these and other objects are accomplished by forming my single shot combination syringe and ampule unit of a barrel with a partial closure at one end and a slidably positioned plunger means at the other end, a resilient puncturable disk being seated over the partial closure, a disk retaining element engaging the barrel and retaining the disk sealing the partial closure, a cap having an outwardly extending conical projection, and engaging either the retaining element or the barrel and the retaining element, its projection and the cap having aligned passageways, axial of each element, a cannula or needle extending in the passageways with its flange between the cap and retaining element and one of its ends adjacent the disk to be punctured, and a sheath or cover being fitted to the conical projection and covering the exposed end of the needle.

Other of these objects are accomplished by forming an ampule of a barrel with a partial closure in the vicinity of one of its ends and a plunger means at the other end, covering the partial closure with a disk and holding it in a sealing condition by a retaining element secured to the barrel, the retaining element having a longitudinally extending passageway whereby a needle end can be inserted through the disk into the barrel.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and

the accompanying drawings and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a single shot sterile syringe with an integrally contained reservoir and a cap shown detached, embodying the invention.

Fig. 2 is a longitudinal axial section through the syringe shown in Fig. 1.

Fig. 3 is a longitudinal, axial section through a syringe showing a variation of the invention.

Fig. 4 is a perspective detail showing the sheath and needle end of the syringe of Fig. 3.

Fig. 5 is a fragmentary longitudinal axial section through a syringe showing a further variation of the invention.

Fig. 6 is a perspective detail showing the sheath and needle end of the syringe of Fig. 5.

In the drawings and in this specification, in which like reference numbers designate similar parts, a syringe 10, shown in Figs. 1 and 2 and constructed in accordance with the invention herein, is comprised of an elongated barrel 11, suitable for containing a hypodermic solution, a plunger means 12 positioned at one end of the barrel, a seal or disk 13, a disk-retaining element 14, a cap 15 positioned at the other end of the barrel, a cannula 16, extending through and adjustably positioned for use by the cap, and a sheath 17, covering and protecting an exposed end of the cannula.

The barrel 11 is cylindrically shaped and is provided, in the vicinity of but not at its needle bearing end, with an inwardly extending flange 18, which forms a partial closure for the barrel, and acts as a recessed seat for the disc 13. The barrel wall, adjacent the seat, is provided on its inner face with female thread 19, and its outer face with male threads 20. The other end of the barrel is provided with extending arms 21, forming finger grips.

The plunger means 12 is formed with a piston 22, a piston head 23, threaded to one end of the piston, to permit forward and retracting movement thereof, and hand grips 24, extending laterally from the other end of the piston. The piston head, which is slidably positioned within the barrel is provided with concentric grooves 25, filled with lubricant to cause smooth action within the barrel.

The disk 13, which is seated on the flange 18 of the barrel, is formed of rubber, neoprene or a like resilient pierceable material suitable for being punctured by a hypodermic needle.

The disk retaining element 14 is structurally formed like a pipe nipple, with end faces 26, a hole 27, and external threads 28, and is positioned with its hole co-axial with the opening of the seat and barrel and with one of its end faces 26 holding the disk 13 securely against the flange seat 18 to seal the hypodermic within the barrel, while its threads 28 coact with the barrel threads 19.

The cap 15 is formed with a top 29, sides 30 extending laterally from the rim of the top, and with a conical axially located projection 31 extending laterally from the top and oppositely to the sides. The top and the projection of the cap are provided with an axial hole, opening or passageway 32, and the inside face of the sides 30 of the cap with threads 33. The cap is retained over the ends of the barrel, removed from the plunger means, by the engagement of its threads 33 with the threads 20, of the barrel.

The cannula 16, which is a common hypodermic needle formed with a tube 34 and a ball or flange 35 extending about the tube, intermediate its ends is positioned, until the syringe is about to be used, with one of its ends extending in the bore 27 of the disk retaining element, adjacent the disk 13 and its other end extending through the passageway 32 of the cap and its ball 35 between the outer end face 26 of the retaining element and the inside of the top 29 of the cap and when the syringe is about to be used, the cap is tightened on to the barrel, advancing the end of the cannula within the retaining element through the disk into the hypodermic. The bore of the retaining element and the passageway 32 of the cap are large enough to permit the cannula tube to slide easily, but are small enough so that together with the gripping action of the top and end of the retaining element on the ball, when the cap is advanced on the barrel, they hold the cannular firmly during an injection.

The sheath 17 is formed with a conical portion 36 and a tube portion 37 and is positioned with its conical portion fitting snugly over and gripping the projection 31 of the cap and its tube containing, protecting and holding sterile the end of the hypodermic needle which is suited for piercing the body.

The above described elements, except the disk 13 of the syringe 10, can be inexpensively and easily formed of plastic, glass or the like as they are all of a simple form, well adapted to be cast.

Omitting the precautions that must be taken with surgical instruments of this kind to make and keep them sterile, the hypodermic filled sterile syringe is quickly and easily produced from the elements in the following manner: assembling the plunger means and inserting it into the open end of the barrel, filling the barrel with the hypodermic solution through partial closure 18, positioning the disk, screwing the disk retaining element tightly against the disk, screwing the cap partially on to the barrel with the cannular prepositioned with its ball between the cap top and retaining element end, and finally forcing the sheath on to the projection of the cap.

The syringe, as produced, is prepared for use by tightening the cap onto the barrel until the cannula end within the disk retaining element 14 is advanced to and through the disk and into the hypodermic and the sheath is removed from the cap projection.

The medicament carried by the syringe now can be ejected by pressing the hand grips of the piston toward the finger grips of the barrel thus advancing the piston head towards the disk 13 and forcing the fluid through the tube of the cannula.

The form of construction and the shape of the elements above disclosed is particularly well suited for use with wax based and heavy oil hypodermics of a high viscosity as the relatively large size of the opening in the partial closure permits a quick and simple filling of the barrel of the syringe with the hypodermic.

Variations of the invention which follow all embody the basic principle of forming a single shot syringe with a wide mouthed partial closure, sealed by a disk, held by a retaining element and screwing or otherwise advancing a cap to force a cannula end through the disk and providing a sheath to cover the exposed needle end.

A syringe variation 38, shown in Figs. 3 and 4, is comprised of a barrel 39, a plunger means 40, a seal or disk 41, a disk retaining element 42, a cap 43, a cannula 44 and a sheath 45. The

plunger means 40, the cannula 44 and the sheath 45 are similar to the plunger means 12, cannula 16 and the sheath 17, respectively.

The barrel 39 is formed with an axially positioned partial closure 46 at one end and exterior threadings 47 and 48 at its partial closure and other end, respectively. A finger grip bar 49 provided with a threaded hole 50 is positioned on the barrel about its threaded portion 48.

The seal or disk 41, which is formed of material similar to the disk 13, is positioned adjacent the partial closure 46 and outside the barrel.

The disk retaining element 42 is formed similar to a cylindrical cap with a closure 51 and sides 52 extending therefrom.

The outer face of the sides adjacent the closure is provided with threads 53 and the inner face of the sides with threads 54. The closure is provided with an axially disposed hole 55 extending therethrough. The disk retaining element is positioned about an end of the barrel with its threads 54 engaging the threads 47 of the barrel and its closure resting against and sealing the disk to the partial closure of the barrel preventing the hypodermic from escaping.

The cap 43 is formed with a cover 56 and sides 57 extending therefrom, the sides being provided with female threads 58, the cover with an axially aligned conical projection 59 extending oppositely to the sides and the cover and projection having an axially aligned hole 60. The cap is positioned about the disk retaining element with its threads 58 engaging the threads 53 of element.

The cannula 44 is positioned with its tube extending in the holes 55 of the element 42 at 60 of the cap and with its flange between the outside face of the closure 51 of the element and the cover 56 of the cap. The normal position of the cannula, when it is not ready for use, is with one of its ends in the vicinity of the disk 41. The syringe is prepared for use by tightening the cap on the retaining element and so advancing the needle until its end, in the retaining element, pierces the disk and enters the hypodermic in the barrel.

The conical portion of the sheath 45 fits over the conical projection of the cap 43 and encases and protects the exposed end of the cannula.

A syringe 61, containing another variation of the invention and shown in part in Figs. 5 and 6 is comprised of a barrel 62, disk 63, a disk retaining element 64, a cap 65, a cannula 66 and a sheath 67.

The barrel 62 as shown, the cannula 66 and the sheath 67 are similar to and similarly positioned to their corresponding parts in the syringe 10 and the disk retaining element 64 is shaped similarly to the element 14.

The element 64 is positioned partly in the barrel and partly extending therefrom.

The cap 65 is formed with a cover 68 and sides 69, the sides being provided with female threads 70 and the cover with projection 71 and hole 72 similar to the projection and hole of the cap 15. On the present syringe, the cap is positioned as the outwardly extending end of the retaining element with the threads 70 of the cap engaging the threads of the retaining element.

To prepare the syringe 61 for use, the cap is advanced over the retaining element until the cannula end within the retaining element pierces the disk.

Each of the combination instruments shown, comprised of the liquid filled barrel with the needle in position and the sheath covering the needle is a sterile protected complete unit. However, the barrel with its disk and disk retaining element together form a complete ampule and as such is a marketable product by itself, either with or without the plunger means.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in any or all of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent, is:

1. A syringe comprising a barrel member having a reservoir suitable for containing fluid medicament, a puncturable disk, a disk-retaining member, a needle, a cap for advancing the needle to puncture the disk, and means to exert pressure on and forcibly eject the medicament from the reservoir, the barrel member slidably carrying the pressure means at one end and a partial closure positioned in the vicinity of the other end forming a recess, the disk being disposed in the recess sealing the partial closure, the disk-retaining member having an opening therethrough and extending within the recess and holding the disk firmly in sealing position, the cap having a cover portion with an opening therethrough and sides engaging one of the members, the needle extending through the openings with one of its ends adjacent the disk and its other end projecting outwardly from the opening in the cap, and the pressure means having a piston slidably disposed in the barrel reservoir and a plunger extending outwardly from the piston.

2. A syringe comprising a barrel member having a reservoir suitable for containing fluid medicament, a puncturable disk, a disk-retaining member, a needle, a cap for advancing the needle to puncture the disk, and means to exert pressure on and forcibly eject the medicament from the reservoir, the barrel member slidably carrying the pressure means at one end and a partial closure positioned in the vicinity of the other and forming a recess, the disk being disposed in the recess sealing the partial closure, the disk-retaining member having an opening therethrough and extending threadably within the recess and holding the disk firmly in sealing position, the cap having a cover portion with an opening therethrough and threaded sides engaging one of the members, the needle extending through the openings with one of its ends adjacent the disk and its other end projecting outwardly from the opening in the cap, and the pressure means having a piston slidably disposed in the barrel reservoir and a plunger extending outwardly from the piston.

3. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a cylindrical member with external threads and an axial hole, a cap having a covering portion and sides laterally extending therefrom with female threads thereon, and the covering portion having an opening therethrough, a needle capable of puncturing the disk, and means to exert pressure on the medicament including a piston and a plunger, the barrel having the pressure means in one end and a partial closure set somewhat inwardly from the other end forming a recess, the disk being disposed in the recess sealing the partial closure, the cylindrical member being disposed partly in the recess and retaining the disk securely in sealing position, part of the threaded

portion of the cylindrical member extending outwardly from the recessed end of the barrel and engaging the female threads in the cap, the needle extending partly in the hole in the cylindrical member and through the cap with its perforating end adjacent the disk and its other end projecting outwardly from the opening in the cap flange, the piston being slidably disposed in the barrel reservoir, and the plunger extending outwardly from the piston.

4. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a cylindrical member with external threads and an axial hole, a cap having a covering portion and sides laterally extending therefrom with female threads thereon, and the covering portion having an opening therethrough, a needle capable of puncturing the disk, and means to exert pressure on the medicament including a piston and a plunger, the barrel having the pressure means in one end and a partial closure set somewhat inwardly from the other end forming a recess, said recess having female threads, the disk being disposed in the recess sealing the partial closure, the cylindrical member being disposed partly in the recess with some of its external threads engaging the female threads of the barrel recess and holding the disk tightly in sealing position, the threaded portion of the cylindrical member projecting outwardly from the recessed end of the barrel being engaged with the female threads in the cap, the needle extending partly in the hole in the cylindrical member and through the cap with its perforating end adjacent the disk and its other end projecting outwardly from the opening in the cap flange, the piston being slidably disposed in the barrel reservoir, and the plunger extending outwardly from the piston.

5. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a threaded cylindrical piece and an axial hole, a cap having a covering piece and laterally extending sides, the covering piece having an opening therethrough and the sides having female threads, a needle having an end capable of puncturing the disk, and means to exert pressure on the medicament, the barrel having the pressure means in one end and a partial closure set somewhat inwardly from the other end forming a recess, said recessed barrel end being provided with male and female threads, the disk being disposed in the recess sealing the partial closure, the cylindrical piece being disposed in the recess with its outside threads engaging the female threads in the barrel recess retaining the disk firmly in sealing position, the cap extending about the recessed end of the barrel with its female threads in engagement with the barrel male threads, the needle extending partly in the hole in the cylindrical piece and through the cap with its perforating end adjacent the disk and its other end projecting outwardly from the opening in the cap cover, and the pressure means including a piston slidably disposed in the barrel reservoir and a plunger extending outwardly from the piston.

6. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a threaded cylindrical piece and an axial hole, a cap having a covering piece and laterally extending sides, the covering piece having an opening therethrough and the sides having female threads, a needle having an end capable of puncturing the disk and an enlarged portion intermediate its ends, and means to exert pressure on the medicament, the barrel having the pressure means in one end and a partial closure set somewhat inwardly from the other end forming a recess, said recessed barrel end being provided with male and female threads, the disk being disposed in the recess sealing the partial closure, the cylindrical piece being disposed in the recess with its outside threads engaging the female threads in the barrel recess retaining the disk firmly in sealing position, the cap extending about the recessed end of the barrel with its female threads in engagement with the barrel male threads, the needle extending partly in the hole in the cylindrical piece and through the cap with its perforating end adjacent the disk and its other end projecting outwardly from the opening in the cap cover, the enlarged needle portion being positioned between the cap and the cylindrical piece, and the pressure means including a piston slidably disposed in the barrel reservoir and a plunger extending outwardly from the piston.

7. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a disk-retaining member with male threads and an axial hole, a cap having a covering piece and laterally extending sides with female threading, the covering piece having an opening therethrough, a needle having an end capable of puncturing the disk, and means to exert pressure on the medicament, the barrel having the pressure means in one end and a partial closure in the vicinity of the other end forming a recess, said recessed barrel end being provided with female threads, the disk being disposed in the recess sealing the partial closure, the disk-retaining member being disposed with one end within the recess and some of its male threads engaging the female threads in the barrel recess retaining the disk firmly in sealing position, the cap extending about the other end of the disk-retaining member with the cap female threads engaging others of the male threads of the disk-retaining member, the needle extending in the hole in the disk-retaining member and through the cap with its perforating end adjacent the disk and its other end projecting outwardly through the opening in the cap cover, and the pressure means including a piston slidably disposed in the barrel reservoir and a plunger extending outwardly from the piston.

8. A syringe comprising a barrel having a reservoir for fluid medicament, a puncturable disk, a disk-retaining member, a needle having an end capable of puncturing the disk, a sheath, a cap for advancing the needle to puncture the disk, and means to exert pressure on the medicament, the barrel having the pressure means in one end, a partial closure at its other end, and male threads at said partially closed end, the disk covering the partial closure and sealing it, the disk-retaining member having a bottom with an opening therethrough, sides with female threads engaging the barrel male threads to retain the disk in sealing position and male threads about its bottom closure, the cap having a cover portion with an opening therethrough and sides with female threads in engagement with the male threads of the disk-retaining member, the sheath removably engaged to the cap, the needle extending in the openings with its perforating end adjacent the disk and its other end projecting outwardly from the cap and into sheath, and the pressure means having a piston slidably disposed

in the barrel reservoir and a plunger extending outwardly from the piston.

9. An ampule, suitable for use in a syringe, comprising a tube, a closure means, a puncturable disc and a disc retaining member, said tube in the vicinity of one of its ends bearing the closure means and at its other end provided with a recessed seat bearing the puncturable disc, said discs retaining member and the tube end in the vicinity of the seat having co-acting threading means for advancing the disc retaining member toward the seat and imprisoning the disc thereagainst.

10. An ampule, suitable for use in a syringe, comprising a tube, a closure means, a puncturable disc, and a disc retaining member, said tube bearing the closure means at one end and having an inturned rib in the vicinity of, but not at, its other end, said disc retaining member and tube end adjacent the rib having coacting threading means for advancing the member on the tube and retaining the puncturable disc on the rib.

11. An ampule, suitable for use in a syringe, comprising a tube, a closure means, a puncturable disc and a disc retaining member, said tube in the vicinity of one of its ends bearing the closure means and in the vicinity of, but not at, its other end having an inwardly extending element partially blocking the bore of the tube and functioning as a seat for the puncturable disc, the tube end bearing the inwardly extending element and the disc retaining member having coacting registering means holding them together and the disc against its seat.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,961,490	Hein	June 5, 1934
2,102,704	Hein	Dec. 21, 1937

FOREIGN PATENTS

Number	Country	Date
639,855	Germany	Dec. 14, 1936