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2,442,758

INJECTION APPARATUS

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Fig. 1

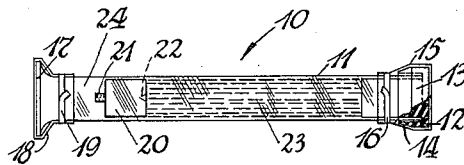


Fig. 2

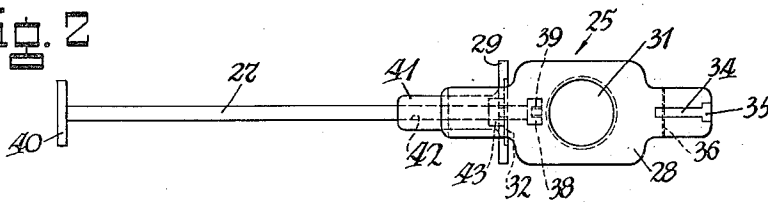


Fig. 3

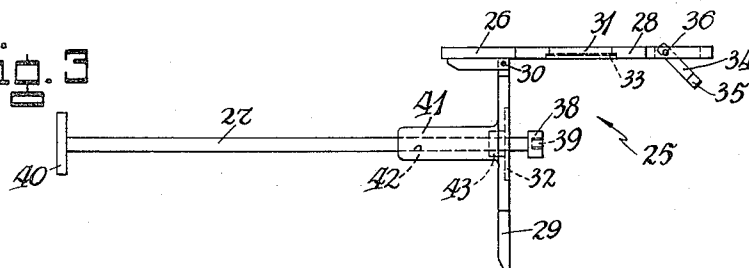


Fig. 4

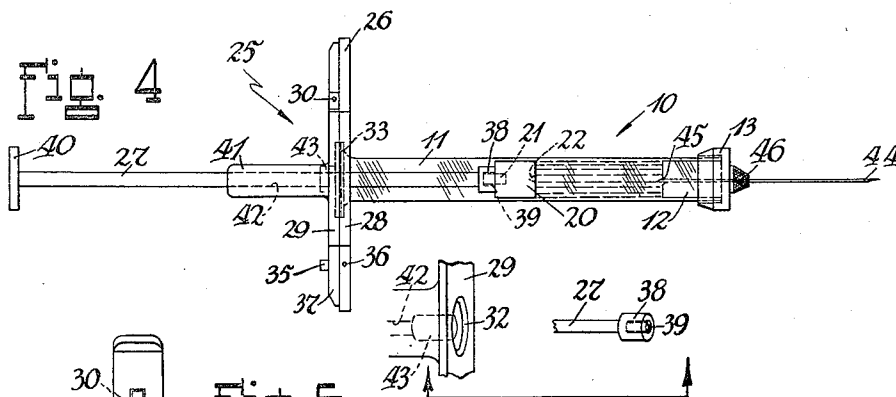


Fig. 5

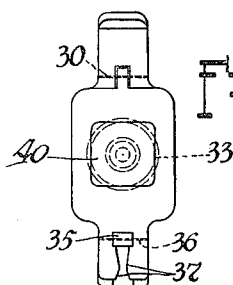
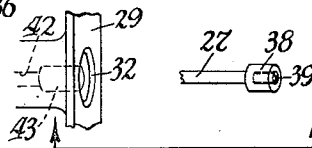


Fig. 6



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UNITED STATES PATENT OFFICE

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INJECTION APPARATUS

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1

This invention relates to an improved fluid dispensing device; more particularly to an improved apparatus for discharging sterile fluids into a body without contamination, and which efficiently permits the utilization of certain desirable technique. More specifically the invention relates to an improved fluid dispensing apparatus designed primarily to replace the conventional hypodermic syringe; said apparatus consisting of an inexpensively constructed ampul that may be factory sterilized serving as a disposable barrel; and a simple applicator to hold said ampul, with a minimum number of moving parts, yet providing the essential elements of finger grip and plunger.

While the invention is described herein with special reference to hypodermic injection for medical purposes, it is to be understood that the invention is adapted for use wherever similar efficiency or technique of injection is desired, from which it will be apparent that the instant invention has a wide field of industrial utility.

The use of the conventional hypodermic syringe for injecting drugs into the human body possesses certain disadvantages. The syringe repeatedly must be sterilized, with attendant wastage of time. Medicaments used for injection are frequently oil solutions, and sterilization of syringes results in damage to hot water sterilizers due to the action of the oil. The use of a syringe perforce requires aspiration of a dose of medicament into the syringe barrel before administration of the injection. The aspiration exposes the medicament to air and risk of contamination. The aspiration process also frequently imposes upon the physician an unnecessary burden of measuring exactly the dose he wishes to apply.

Medicaments for injection customarily are supplied to physicians in multiple or single dose containers for use with a syringe. The conventional multiple dose package consists of a rubber-stoppered glass vial. To withdraw a portion of the vial's contents air must be injected into the vial. Frequently this causes eruption of the stopper and loss of expensive medicaments. The injection of air may contaminate the residual solution. Multiple dose vials usually show some sediment or discoloration of the contents before they are entirely used, many times requiring the last few cubic centimeters of solution to be discarded. Another disadvantage of this type container is that two sterilized hypodermic needles must be used instead of one—a

2

needle to aspirate a dose from the vial and another to make the injection.

A single dose of medicament is usually packed in a glass ampul. The glass must be broken and the contents drawn into a syringe before injection. Improper fracture of the glass sometimes causes loss of solution. Extreme care is necessary to aspirate all the contents of the ampul in order to obtain a full dosage; in fact, a wasteful overage is frequently supplied in such an ampul to offset the amount of solution that clings to the side of the container.

Medicinal ampuls have been provided which, to some extent, eliminate the disadvantages previously stated. These ampuls, however, are not adapted to use in certain important injection techniques. The medicaments used are generally very potent drugs. Some must be injected directly into a blood vessel for speedy absorption into the body. Others must be injected intramuscularly for relatively slow absorption. It is necessary, in many cases, for the physician to know whether the point of the hypodermic needle is inside a blood vessel before proceeding with the injection. When an ordinary syringe is used the physician merely retracts the plunger a short distance after the needle is inserted within the body, and if blood globules appear in the syringe, he is relatively certain the needle has penetrated a blood vessel. If he wishes to make an intramuscular injection he must shift the needle until no blood globules appear upon such test. The previous construction of single dose ampuls does not permit the physician to make this test.

It is desirable, therefore, to provide an apparatus for making hypodermic injections that will have none of the disadvantages mentioned above.

A prime object of my invention is to provide an improved easily assembled apparatus for injecting a full and exact dose of medicament into a body without contamination; no operation of aspiration being required to fill said apparatus; and said apparatus being capable of withdrawing a sample of body fluid thereby permitting the use of certain desirable technique.

Another object of my invention is to provide an improved factory-filled and sterilized ampul, charged with an exact dose of medicament which may be discharged into a body without contamination by the use of a simple applicator, and including means for aspirating a sample of body fluid, yet inexpensively constructed so as to be disposable after use.

Yet another object of my invention is to pro-

3

vide an improved applicator for use with a medicinal ampul, simply constructed with a minimum number of parts, and which does not require sterilization as it cannot contaminate the solution within the ampul.

Other objects and advantages of my invention will become apparent from a reading of the following disclosure and an examination of the drawing, in which:

Figure 1 is a side elevational view of my improved medicinal ampul or cartridge as it appears when fully wrapped and ready for commercial distribution and use;

Figure 2 is a plan view of my improved medicinal applicator in open position as it appears before insertion of an ampul;

Figure 3 is a side elevation of the open applicator;

Figure 4 is a side elevational view of the complete injection apparatus ready for use;

Figure 5 is an end elevational view of the applicator; and

Figure 6 is an exploded view in perspective of a portion of the applicator showing the end of the plunger and associated parts.

Like reference characters are used to designate similar parts in the drawing and in the description of the invention which follows.

Referring now more particularly to the drawing, Figure 1 discloses an ampul of medication 10. The ampul 10 includes a tube 11 made from an inert, preferably transparent material such as glass. The tube 11 is closed at one end by a plug 12 made from any inert, resilient material having high sealing qualities such as rubber. The plug 12 has an annular flange 13 which, when a hypodermic needle is being inserted through the plug, prevents the latter from being forced down the tube 11. The annular flange 13 extends into a lip 14 which is cemented to the outside of the tube 11. The lip 14 cemented to the tube 11 aids in preventing the eruption of the plug 12 when pressure is developed within the tube. A wrapper 15, made from a material such as Pliofilm, hermetically seals this end of the tube 11 to prevent contamination of its contents by the atmosphere. The wrapper 15 can be quickly loosened by removing a tape 16.

The other end of the tube 11 is not plugged, but is constructed with an annular flange 17 of greater diameter than the flange 13. As will be apparent below, the flange 17 acts as a stop when the ampul is inserted into the applicator. This end of the tube 11 is also hermetically sealed with a wrapper 18 to protect the contents of the tube from contamination. The wrapper 18 is similar to the wrapper 15 and can be quickly loosened by removing the tape 19.

A piston 20 is positioned within the tube 11. Said piston 20 is made from an inert material, such as rubber, having high sealing qualities yet being flexible enough to permit ready reciprocation of the piston within the tube. A male screw 21 protrudes from the rear face of the piston to furnish a connection to a reciprocating plunger. A small depression or dimple 22 is centered in the forward face of the piston 20 to receive the rear point of a hypodermic needle when the piston is pushed full forward. The piston 20 divides the tube 11 into a fluid-filled section 23 and an air-filled section 24.

The applicator 25 holds the ampul 10, furnishes a grip for the operator's hand, and provides the means for reciprocating the piston 20. The applicator 25 includes a finger grip 26 and a plunger

4

27. The finger grip 26 includes two plates, a finger grip plate 28 and a plunger housing plate 29, that are connected in hinged fashion by the hinge pin 30. Circular, axially-aligned openings 31 and 32 are formed in the plates 28 and 29 respectively. The opening 31 is of such radius as to catch and seat the flange 17 when the ampul 10 is inserted through the opening in assembling the apparatus. A washer 33, made of a resilient material such as rubber, may, if desired, be fitted within the opening 31 to cushion the flange 17.

The finger grip plate 28 is provided with a locking stud 34 constructed with a head 35 and pivoted upon a pin 36. The plunger housing plate 29 is constructed with a pair of spring jaws 37 to receive and lock the stud 34 when the applicator is closed.

The forward end of the plunger 27 consists of a collar 38 constructed with a female threaded tap 39 centered in the forward face. This female threaded tap 39 joins with the male screw 21 to form the connection between the piston 20 and the plunger 27. The rear end of the plunger 27 consists of a flat round button 40 which serves as a thumb press to aid the fingers of the operator in holding the applicator and pressing the plunger forward with the use of only one hand. The plunger 27 is held by the plunger housing 41 which is integrally formed upon the plate 29. The plunger housing 41 is pierced by the plunger bearing 42 which fits closely about the plunger 27 but not so tightly as to prevent easy reciprocation. The plunger bearing 42 is of sufficient length to steady and guide the plunger 27 directly down the center axis of the ampul 10 when the plunger is pushed forward. Thus the plunger collar 38 cannot come in contact with and contaminate the walls or contents of the ampul 10. The plunger bearing 42 is enlarged in radius at its forward end to form the collar receiving cavity 43. When the plunger 27 is fully retracted the plunger collar 38 is drawn into this cavity 43 so that the plunger is fully behind and clear of the opening 31 in the finger grip plate 28. The full retraction of the plunger 27 permits the plate to be swung open without catching the plunger within the opening 31.

The apparatus is completed for use by piercing the plug 12 of the ampul 10 with a conventional double pointed hypodermic needle 44. The rear point 45 of the needle 44 protrudes from the rear face of the plug 12 a distance just sufficient to clear the channel through the needle for the passage of the injection solution. When the plunger 27 is pushed full forward this protruding point 45 is received into the dimple 22 in the face of the piston 20 thus permitting the discharge of a full and exact dose of medicament. A knurled knob 46 is formed on the needle 44 to provide ease in handling the needle and to limit its extension through the plug 12.

In assembling the entire apparatus for use, the hermetic seals 15 and 18 are first removed from the ampul 10. The plunger 27 of the applicator 25 is fully retracted and the plates 28 and 29 are opened. The ampul 10, plugged end foremost, is inserted through the opening 31 until the flange 17 is seated upon the resilient washer 33 in the opening 31. The plates 28 and 29 are then closed and the locking stud 34 is engaged with the spring-jaws 37, thereby locking the assembly into an operative unit.

The hypodermic needle 44 is inserted to pierce the plug 12. The plunger 27 is moved forward until the collar 38 touches the male screw 21 of

5

the piston 20. The plunger 27 is rotated and the female threaded top 39 engages the male screw 21 to form the connection between the piston 20 and the plunger 27.

The apparatus is now ready for use. The operator has full control of the assembly, and by retracting the plunger may ascertain whether the needle is properly positioned in the patient. The plunger is pushed full forward thus injecting all the contents of the ampul, a full, exact dose of medicament, into the body of the patient. The hypodermic needle is withdrawn, the apparatus disassembled, and the exhausted ampul removed and discarded. The applicator does not require sterilization before it may be used again.

Thus it is apparent from the foregoing disclosure that the objects of my invention have been accomplished. It is to be understood that various changes and modifications may be made without departing from the spirit of my invention or the scope thereof as set forth in the appended claims.

Having thus described my invention and illustrated its utility, I claim:

1. An ampul package for hypodermic injection purposes, consisting of a barrel, a flange upon one end of said barrel adapted to lock said barrel into an applicator, a pierceable plug sealing the other end of said barrel, a flange upon said plug of lesser diameter than said flange upon the other end of said barrel, a lip extending from said plug flange and cemented to the outside of said barrel, a piston in said barrel dividing the same into two compartments, fluid in the compartment adjacent the plugged end, a male screw projecting from said piston toward the flanged end of said barrel for engagement with a female threaded tap, a plurality of wrappers hermetically sealing the ends of said barrel, and tapes securing said wrappers over said barrel.

2. An ampul package for hypodermic injection purposes comprising a barrel, a flange upon one end of said barrel, a pierceable plug in the other end of said barrel, a flange upon said plug extending into a lip over the outside of said barrel, a piston in said barrel, a male screw projecting from said piston toward the flanged end of said barrel, fluid between said plug and said piston, and a plurality of wrappers over the ends of said barrel.

3. A package for injection purposes, comprising a tube, flange means on said tube for retaining the same in an applicator, a pierceable plug in one end of said tube, a piston in said tube, means for fastening said piston to a plunger, and fluid filling said tube between said plug and said piston.

4. An applicator for dispensing the contents of a flanged ampul provided with a piston having a male screw thereon, consisting of: a plunger; a female threaded tap in the end of said plunger for engagement with said screw; a bearing member for aligning said plunger; a finger grip for convenience in operating said plunger, said finger grip being hingedly connected with said bearing member and having a recess therein for seating the flange on said ampul; a lock stud hingedly connected with said finger grip; and spring jaws on said bearing member for engaging said lock stud, whereby said ampul may be locked in said applicator.

5. An applicator for dispensing fluid from a flanged ampul containing a piston, comprising a plunger, means for locking said piston to said plunger, a housing for guiding said plunger, a grip member hinged to said housing, means on

6

said grip member for retaining said ampul, and means for locking said housing to said grip member, whereby said plunger is aligned with said ampul.

6. A hypodermic injection apparatus consisting of a plunger; a female threaded tap in one end of said plunger; a plunger housing plate containing a bearing for aligning said plunger; a finger grip plate hingedly fastened to said plunger housing plate; spring jaws formed in said plunger housing plate; a locking stud hingedly fastened to said finger grip plate and engageable with said spring jaws for locking said finger grip plate and said plunger housing plate together; a circular opening in said finger grip plate co-axially aligned with said bearing in said plunger housing plate when said plates are locked together; circular recesses, concentric with said circular opening, countersunk in said finger grip plate and said plunger housing plate; a tube extending through said circular opening; a flange, integrally formed upon one end of said tube, seated in said circular recesses, whereby said tube is aligned co-axially with said plunger; a pierceable plug in the other end of said tube; a flange upon said plug extending into a lip over the outside surface of said tube and cemented thereto; a piston within said tube dividing the same into two compartments; fluid in the compartment between said piston and said pierceable plug; a male screw projecting from said piston and detachably engaged with said female threaded tap in said plunger; and a double ended hypodermic needle piercing said plug.

7. An injection apparatus comprising: a plunger; a plunger housing containing a bearing for guiding said plunger; a finger grip member hinged to said plunger housing; means for locking said finger grip member to said plunger housing; a fluid container; a projection upon one end of said container to be clasped between said finger grip member and said plunger housing for retaining said container in alignment with said plunger; means to retain said projection between said finger grip member and said plunger housing; a piston within said container; means for operatively connecting said piston and said plunger; a pierceable plug in the free end of said container; and fluid conveying means communicating through said pierceable plug with the interior of said container.

8. A hypodermic injection apparatus consisting of a plunger; a female threaded tap in one end of said plunger; a plunger housing plate containing a bearing for aligning said plunger; a finger grip plate hinged to said plunger housing plate and having a circular opening therethrough; jaws in said plunger housing plate; a locking stud hinged to said finger grip plate and engageable with said jaws for locking said finger grip plate and said plunger housing plate together, said circular opening in said finger grip plate being co-axially aligned with said bearing in said plunger housing plate when said plates are locked together; countersunk circular recesses concentric with said circular opening and said bearing in said finger grip plate and said plunger housing plate, respectively; a tube extending through said circular opening; a flange integral with one end of said tube, said flange being seated in said circular recesses, whereby said tube is aligned co-axially with said plunger; a pierceable plug in the other end of said tube; a flange upon said plug extending into a lip over the outside surface of said tube and cemented thereto; a piston within said tube dividing the same into two compartments; fluid

7

in the compartment between said piston and said pierceable plug; a male screw projecting from said piston and detachably engaged with said female threaded tap in said plunger; and a double ended hypodermic needle piercing said plug.

9. An applicator for dispersing fluid from a flanged ampul containing a piston, comprising a plunger, means for locking said piston to said plunger, a housing for guiding said plunger, a grip member hinged to said housing, whereby said housing and said grip member may be clasped together in operative position, and means for retaining the flanged portion of said flanged ampul between said housing and said grip member in said operative position.

10. An applicator for dispensing the contents of a flanged ampul containing a piston, comprising: a plunger, means for locking said piston to said plunger, a housing for guiding said plunger, a clamp member hinged to said housing, said clamp member having an opening therein the configuration of which complements at least a portion of the flange of said flanged ampul, and means for locking said housing and said clamping member together in a clamped position, said opening in said clamp member being axially aligned with said plunger when said applicator is in said clamped position.

8

11. In an injection apparatus including a plunger, a plunger housing, a finger grip member having an opening therein, and an ampul having a flange on one end thereof, means for retaining said ampul in said injection apparatus, said means comprising: hinge means connecting said plunger housing to said finger grip member, whereby said housing and said member may be swung apart for the purpose of inserting said ampul into said opening, and whereby said housing and said member may be clasped together for the purpose of retaining said flange of said ampul therebetween.

H. DUANE CREVISTON.

15

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