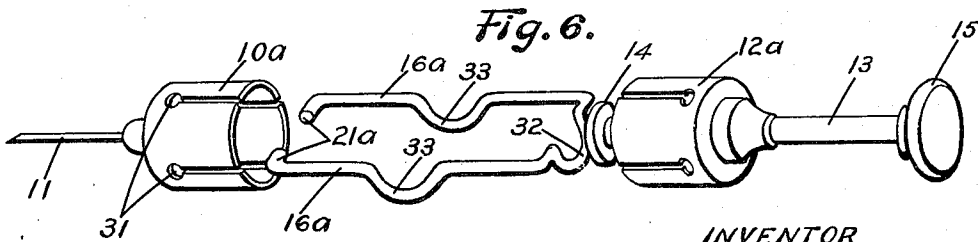
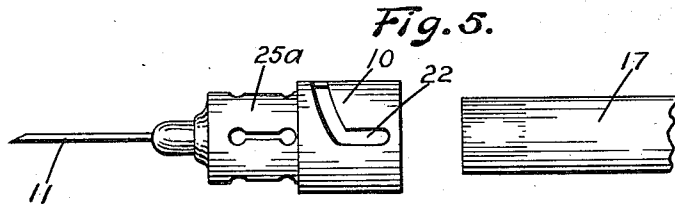
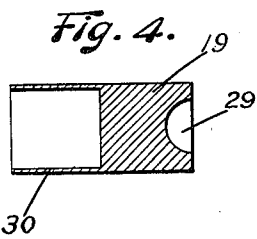
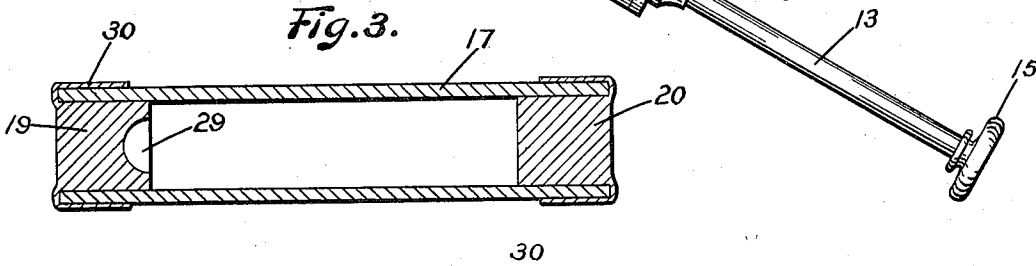
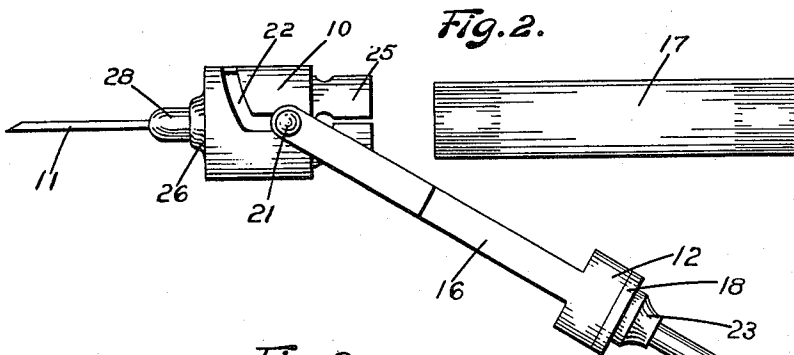
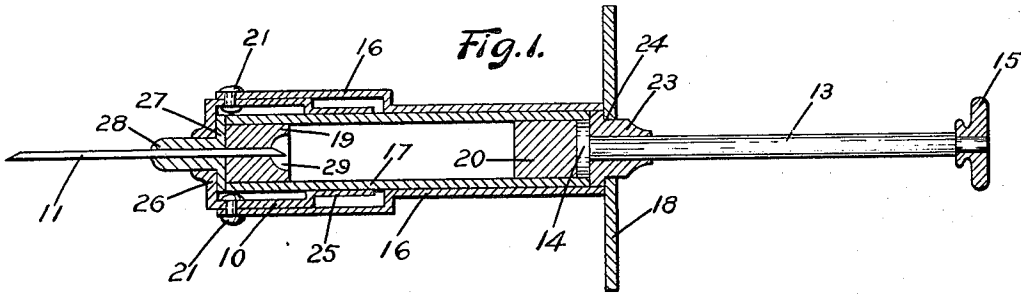


Oct. 21, 1924.

1,512,294

E. H. MARCY
HYPODERMIC SYRINGE
Filed May 2, 1922



INVENTOR
E. H. Marcy.

By *Wright, Brown, Quincy & Co.*
Attys.

UNITED STATES PATENT OFFICE.

ERNEST H. MARCY, OF FRAMINGHAM, MASSACHUSETTS.

HYPODERMIC SYRINGE.

Application filed May 2, 1922. Serial No. 557,937.

To all whom it may concern:

Be it known that I, ERNEST H. MARCY, a citizen of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Hypodermic Syringes, of which the following is a specification.

The object of the present invention is to provide a hypodermic syringe which may be loaded or charged with the medicine to be injected, by the insertion of a complete package or ampul containing the medicine, and in which the parts respectively mounting the needle and the pusher or ejector are or may be so connected as to prevent their separation from one another and from the ampul when in the assembled operative position, but which may be easily disengaged from the ampul to permit removal of the discharged ampul and the substitution of a full one.

Another object is to furnish a hypodermic instrument of the sort indicated which shall be of simple construction, capable of production at low cost and at the same time amply strong and rigid for the purposes of use, and to provide means in such an instrument for the inexpensive substitution of new needles for damaged ones. Still a further object is to provide for use in and as a part of the combination of such syringe an ampul having novel sealing and discharging elements.

These objects are accomplished by the hypodermic syringe which, with modifications, is described in the following specification and shown in the drawings accompanying the same. The invention consists in such syringe and all modifications and equivalents thereof within the scope of the appended claims.

In the drawings:—

Figure 1 is a longitudinal section of a hypodermic syringe made according to this invention.

Figure 2 is a side elevation of the syringe showing the parts thereof disassembled.

Figure 3 is a longitudinal section on an enlarged scale of the ampul or medicine cartridge by itself.

Figure 4 is a sectional view of one of the sealing plugs of the ampul.

Figure 5 is an elevation of a modified form of needle-holding sleeve adapted to be used in the combination of Figures 1 and 2 in

substitution for the particular needle-holding sleeve there shown.

Figure 6 is a perspective view of a modified construction of syringe with the parts thereof separated from one another.

Like reference characters designate the same parts in all the figures.

The syringe comprises as its main parts a needle-holding sleeve 10 carrying a hypodermic needle 11, a pusher-guiding sleeve 12, a pusher rod 13 guided in the latter sleeve and having a head 14 on one end and a knob 15 on the other, tie-members 16 connecting the sleeves 10 and 12, and an ampul or medicine holding cartridge 17. With the plunger-guiding sleeve may be combined finger holds 18, or, in other words, abutments for receiving the reaction of the fingers of the operator when the thumb is pressed upon the knob 15 in ejecting the medicinal charge.

The ampul 17 is a tube of glass or any other suitable material which is impervious to liquid, is capable of being made sterile by heat, and is rigid enough to resist collapsing under lateral pressure in handling or any pressure applied endwise through the ejecting plunger in discharging the contents. In the ends of the ampul are plugs 19 and 20 forming closures, one of which is adapted to be moved endwise by the pusher head 14 through the tube to expel the medicine. These plugs may be made of cork, rubber or other material which is impervious to the liquid, is capable of being sterilized, and is adapted to make a liquid-tight joint with the walls of the ampul, while capable of being moved through the tube in the manner of a piston. In commercial practice these requirements demand that the plugs should have considerable elasticity. They do not, however, exclude the possibility of providing the plugs with a metallic or other surface covering in case the nature of the medicine requires that it be kept out of direct contact with the substance of which the plugs as a whole are made.

In assembling the ampul with the other parts of the syringe, one of its ends is placed in the needle holding sleeve 10 and the sleeve 12 is then passed over the opposite end. To permit such assemblage the sleeve must be movable relatively to one another, and in the form shown in Figures 1 and 2 they are movable both endwise and angularly. The tie-members 16 permit these movements and also lock the sleeves in their assembled posi-

tions so that they cannot accidentally be displaced from those positions. For this purpose the ends of the tie-members are connected with one of the sleeves, as 10, by pivots 21 which occupy bayonet joint slots 22 in the sleeve. These slots have a portion extending parallel to the axis of the sleeve and another portion so inclined to such axis as to pull upon the tie-members with a cam action and also to lock them when the pivots reach or approach the ends of such inclined portions. A suitable form for the bayonet joint cam slots is indicated in Figure 2. There are preferably two such tie-members and slots arranged at opposite sides of instrument, or at least so separated that the ampul may pass between them. The opposite ends of the tie-members are connected in any suitable way to the sleeve 12, being here shown as integral with such sleeve, but permissibly otherwise secured, either rigidly or pivotally.

Referring to the sleeve 12 more in detail, the latter is closed by a head or plug 23 which is soldered or otherwise rigidly secured within the sleeve, and has an internal guideway for the pusher rod 13 and an external shoulder 24 on which the bar providing the finger holds 18 is seated, such bar having a hole in its middle through which the reduced part of the plug passes, and being secured by soldering or any other suitable means. The sleeve 10 is formed with a part 25 which is slotted so as to be springy and is of small enough internal diameter to engage the ampul and exert pressure on it to center it and hold it steady. The adjacent part of the sleeve is made of larger diameter in order to admit between it and the ampul the inner heads on the pivot members 21 which overlap the walls of the slots 22 and retain such pivots in place. In the form of the invention shown in Figures 1 and 2, the part of large diameter is between the needle-holding end wall of the sleeve and the part 25, but the relative arrangement of these parts may be reversed as shown by the modification in Figure 5, wherein the part 25^a which fits and resiliently embraces the ampul is the part nearest to the closed end of the sleeve, and the enlarged part containing the bayonet joint slots is at the open end of the sleeve.

Whatever may be the form of sleeve I preferably make it separable from the needle in order that the latter may be removed when damaged and a new one substituted. Accordingly the end wall 26 of the sleeve 10 has a central opening through which the needle may pass freely, and the needle carries a collar 27 which rests on the inner side of this end wall when in place. A hollow stem 28 may be provided to extend from the collar 27 surrounding the needle and fitting the opening in end wall 26, but

such stem may be omitted if desired and the collar formed as a simple disk soldered to the needle. The needle itself is made of hollow wire or fine tubing of the sort ordinarily used for hypodermic needles, but it has piercing points at both ends and the collar 27 is placed at a distance from the inner point approximately equal to, or slightly greater than, the length of one of the plugs 19 or 20. Hence, when the ampul is inserted in the sleeve 10, after the needle has been placed therein, the inner point of the needle penetrates the plug at the adjacent end of the ampul and provides a passage for discharge of the medicine. Preferably the plug 19 has a central depression or well 29 in its inner end and the distance from the collar 27 to the inner orifice of the needle is made approximately equal to the distance between the outer end of the plug and this recess, an arrangement which enables substantially all of the contents of the ampul to be discharged.

It will be apparent that when the parts of the syringe are displaced or opened as shown in Figure 5, a sterile filled ampul may be placed in the syringe without exposing its contents to septic matter. After one end of the ampul has been placed in the sleeve 10, the sleeve 12, with the plunger fully withdrawn, may be passed over the other end of the ampul and then the parts all firmly locked and secured together by shifting the pivot pin into the inclined parts of the bayonet joint cam slots as far as possible. The ampul is then gripped between the heads of the two sleeves and the whole syringe is a firm and rigid unit. The inner end of the needle has been caused to penetrate the plug 19 by thus assembling the parts, and the head 14 of the pusher has been brought against the opposite plug 20 and slightly entered into the adjacent end of the ampul. Thereafter the syringe may be used in the ordinary manner to discharge its contents into the vein or tissues of a patient by displacement of the pusher. In being thus displaced the pusher forces the plug 20 before it and said plug acts as a piston to displace the contents of the ampul and force said contents through the bore of the needle.

An important advantage which I claim as part of this invention relates to the ampul and its plugs as parts of the combination just described. These plugs are both closures and antiseptic sealing means for the ampul, and either of them is adapted to serve as an ejecting piston. Thus they are made to fit the bore of the ampul with capacity for sliding endwise through such bore. Their antiseptic sealing function is accomplished by providing each plug with a thin tubular extension or skirt 30, as shown in detail in Figure 4, which skirt is made of elastic, flexible and at the same time sufficiently tough material. After the plugs have

been inserted in the ends of the ampul, this skirt is rolled back over the outer walls, as permitted by its flexibility, and when thus placed its resilience causes it to hug the outer walls of the ampul and prevent entrance of any micro-organisms. When so closed the ampul may be sterilized, and after sterilization it is a sealed, sterile medicine package.

When the ampul is to be used in the syringe, the sealing skirt may be torn off from the plugs, or the ampul may be inserted in the sleeves of the syringe without preliminary removal of these skirts, for the pressure applied to the piston plug by the pusher will be sufficient to tear this plug away from its skirt. Plugs having skirts of the qualities necessary and sufficient to serve the purposes here set forth may be made of vulcanized rubber of qualities well known to those acquainted with the art of rubber manufacture.

The form of syringe just described has the characteristic that the sleeves 10 and 12 are permanently connected together with provision for limited separation. For some purposes this is a valuable feature. However, for other purposes a syringe of which the parts are entirely separable may be desired, and such a one is shown in Figure 6 as a modification of the invention. Here the needle-carrying sleeve 10^a and the pusher-carrying sleeve 12^a are provided entirely separate from one another, each having slots extending inwardly from its open end to divide its walls into spring tube-gripping tongues and these slots terminate in enlarged holes 31, at least as to one of the sleeves, and preferably the sleeve 10^a.

The tying device equivalent to the tie-members 16 is made of a piece of wire bent to form two parallel legs 16^a with inwardly directed points or pivot ends 21^a, and its central loop portion 32 is bent over at right angles to the plane of the legs 16^a. Preferably bends 33 are formed in some part of the legs in order to give elasticity and capacity for stretch in the longitudinal direction. The tying device so made is assembled with the sleeve 10^a by slipping its pivot ends into two of the oppositely located holes 31 in the latter, and then when the ampul has been inserted at one end into this sleeve, and the sleeve 12^a has been passed over the other end of the ampul, the tying device is

turned about its pivots and sprung over the sleeve 12^a. Its legs 16^a then lie at opposite sides of the ampul and sleeve 12^a, and its offset loop 32 surrounds the plunger but bears against the end wall of the sleeve, being of such radius and extent of offset that it will occupy that position and serve as an abutment to prevent removal of the sleeve. The resilience given by the bends 33 enables the abutment loop 32 thus to be placed across and removed from the end of sleeve 12^a, and to exert pressure on such sleeve to hold it in place.

What I claim and desire to secure by Letters Patent is:

1. A hypodermic syringe adapted to receive and to discharge a sterile medicine package comprising end members adapted to be passed over the ends of such package, a tying device pivoted to one of said members and adapted to embrace the medicine package and tie the other of said end members to the first member, a hypodermic needle carried by one of said end members adapted to make communication with the interior of the package when so assembled, and an ejector associated with the other end member, the package having a plunger adapted to be displaced by said ejector for expelling the contents of the package.

2. A hypodermic syringe comprising a needle-carrying sleeve adapted to embrace one end of a medicine package, a plunger-carrying member adapted to engage the opposite end of such package, and tie-members extending from one of the aforesaid members and having pivotal and sliding connection with the other of said end members, whereby the members are adapted to be displaced for receiving a medicine package and then to be locked in assembled position with such package.

3. In a hypodermic syringe, a sleeve adapted to receive and embrace one end of a medicine package, said sleeve having a portion of approximately the same diameter as said package and provided with spring tongues to bear upon the package, and having another portion of larger diameter provided with cam slots.

In testimony whereof I have affixed my signature.

ERNEST H. MARCY.