Oct. 9, 1928. 1,687,324

H. S. COOK

HYPODERMIC SYRINGE

Filed Feb. 26, 1925

Fig. 1.

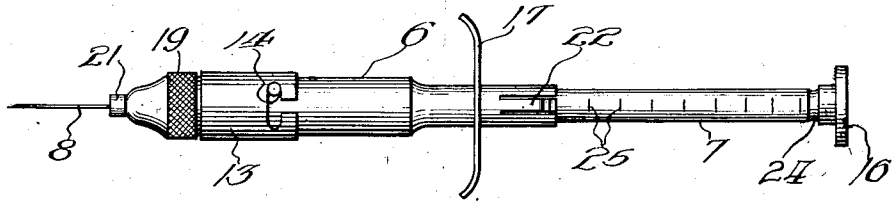


Fig. 2.

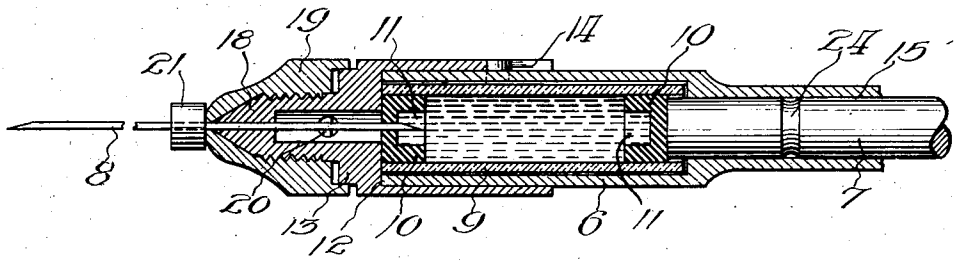


Fig. 3.

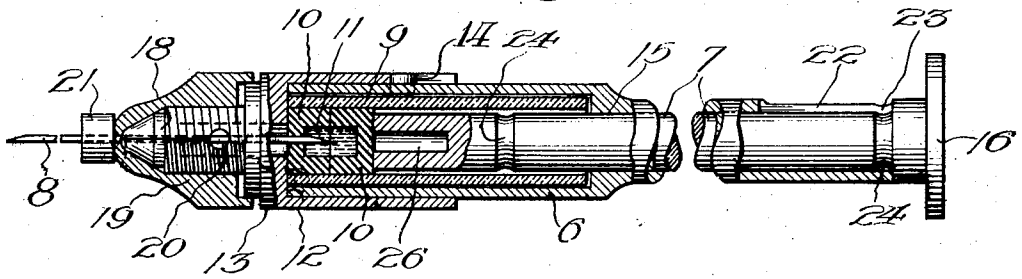


Fig. 4.

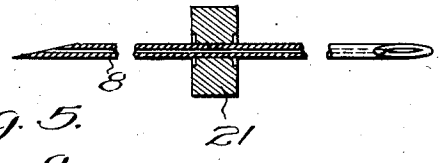
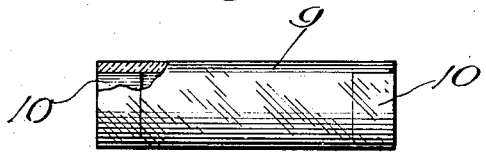


Fig. 5.



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UNITED STATES PATENT OFFICE.

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HYPODERMIC SYRINGE.

Application filed February 26, 1925. Serial No. 11,707.

This invention relates to hypodermic syringes and aims generally to provide an improved syringe of the cartridge type exemplified in Patent No. 1,231,497, granted to me June 26, 1917.

The invention may be understood by reference to one illustrative embodiment shown in the accompanying drawings, in which:

Fig. 1 is an elevation of the syringe, showing the plunger in extended position;

Fig. 2 is an enlarged longitudinal section of the same, showing the plunger at the start of the medicament-dispensing stroke;

Fig. 3 is a similar view, with parts in elevation, showing the plunger at the end of its stroke;

Fig. 4 is an enlarged longitudinal section through the syringe needle; and

Fig. 5 is an elevation of the medicament package.

Referring to Figs. 1 and 2, the syringe shown comprises a barrel 6 constituting a cartridge holder; and a medicament conduit extending from the interior of the barrel to the point of injection, herein provided by a double-pointed hypodermic needle 8. The medicament-containing component of the syringe comprises a sealed package or cartridge, which may contain a sterile charge of definite volume; and this package is so constructed and arranged that it may be carried within the barrel chamber and be collapsed or have its interior volume reduced by means of the plunger, thereby expelling the medicament when the needle is in communication with its interior.

As shown, the medicament-dispensing package is made from a tube 9, preferably commercial glass tubing cut to the desired length, and sealed at opposite ends by rubber plugs 10, at least one of which has an inwardly-opening axial cavity 11, or in other words is cup-shaped. This package is insertible into the barrel, which as shown may have one end 12 open for that purpose; and it is secured by the barrel head 13 removably held on the barrel end 12 by a double-bayonet joint 14, Fig. 1. At the opposite end of the barrel, there is a bore 15 for the plunger 7 whose outer end is enlarged as at 16 to provide a knob co-operating with finger grips 17, so that the plunger may be slid into the barrel to push the adjacent plug 10 through the tube 9, thereby dispensing the medicament.

To put the needle in communication with the interior of the package, its inner end is passed through a cup-shaped plug 10, which is much easier to pierce than if it were of uniform axial thickness. When both plugs are of the same construction as shown, either end of the package may be presented to the needle. Both during the piercing of the plug and during an injection, the needle 8 may be held immovably by clamping between the two halves of a split screw-threaded neck or extension 18 projecting outwardly from the barrel head 13. The screw-threaded extension 18 may taper as shown, and is contracted by means of a tapered nut 19 screwed upon the extension. To increase the resiliency of the split extension, a small lateral bore 20 is provided at the inner end of the split.

As the dispensing operation slides one of the plugs toward the other, it is desirable that the inner end of the needle project a minimum distance beyond the inner (cupped) face of the plug through which it passes, so that the sliding plug may not be thrust by the plunger against the needle end, thereby sealing it before ejection of substantially all the fluid, as will be understood from Fig. 3. To prevent this action, the needle 8 at an intermediate point has an enlargement 21 secured in any desirable way thereon, for example by swaging, as shown in Fig. 4, and providing a stop. This enlargement may have any form, provided it be easily grasped by the fingers without liability of needle contamination. In practice, such a needle will be carried in a sealed, aseptic envelope or container until immediately before use, and may then be secured to the barrel head, which provides a convenient needle handle during the piercing operation. An alternative procedure is to pass the needle through the nut 19, screw the latter loosely on the extension 18, push the needle through the plug, and then tighten the nut to secure the needle. If, however, the length of the medicament package is materially less than the chamber provided for it within the barrel, the plug may not be pierced by the needle even when properly positioned. In such cases, the reaction from the sliding resistance of the plunger-pushed plug thrusts the package as a whole against the inner end of the secured needle, which thereupon pierces the adjacent plug.

To hold the plunger in either the extended position of Fig. 1 or in the position of Fig. 3, latching means is provided in the form of a

spring tongue or tongues 22 struck out from the plunger guiding portion of the syringe and having a bent extremity 23 shaped to fit the annular grooves 24, one of which is preferably adjacent the knob 16. Thus the plunger may only be withdrawn from the syringe by a deliberate movement. As the barrel is usually of opaque material, such as metal, for obvious reasons, the contents of the medicament package are hidden during an injection; and therefore a scale 25 is marked on the plunger, enabling the practitioner accurately to proportion the dose according to conditions. Under certain arrangements of the parts of the syringe, or when using considerable force in expelling the medicament, the plunger may force the needle entirely through both plugs and break the needle, to prevent which the inner plunger end has an axial bore 26.

The cartridge or medicament package herein shown, and a syringe organization embodying the same as an operative component, are the subjects-matter of and broadly and specifically claimed by me in my co-pending application filed July 1, 1921, Serial No. 481,997; hence I make no claim therefor in this application apart from particular features or combinations of the present invention as set forth in claims.

This application is in part a continuation of my application filed April 8, 1921, Serial No. 459,680½, and is in part based upon the original disclosure thereof and in part based upon an organization comprising the cartridge shown in said co-pending application Serial No. 481,997 in assembly with the instrument shown in said application Serial No. 459,680½.

What is claimed is:

1. A hypodermic syringe comprising, in combination, a barrel providing a chamber, said chamber being adapted to receive a package of medicament sealed with a closure; a barrel head closing the chamber and forming an abutment for the end of the package; a needle holder on the head; a plunger slidable into the barrel; co-operating means on the barrel and plunger for holding the plunger against accidental displacement; a needle held by and passing through the barrel so as to project into the chamber and penetrate one of the closures; and a stop on the needle to determine automatically the position of the needle end within the package relative to the closure penetrated by it.

2. A hypodermic syringe comprising, in combination, a barrel providing a chamber; a package of medicament having an opening and insertible into said chamber; a recessed closure sealing said opening; a barrel head at one end of the chamber and providing a needle holder; a plunger movable into the barrel; a needle held upon the barrel head so as to project into the chamber and penetrate the closure; and a stop on the needle to determine automatically the position of the needle end within the package relative to the recess of the closure.

3. A hypodermic syringe comprising in combination, a barrel having one end constructed to receive a medicament package, and the other end adapted to receive a plunger; a plunger slidable therein; an enlarged knob on said plunger; the plunger having an annular groove adjacent the knob thereof; and a spring secured to the barrel and constructed and arranged to engage in said groove to hold the plunger within the barrel.

4. A hypodermic syringe comprising, in combination, a medicament package constructed and arranged to have its interior volume reduced for expelling of its contents; a barrel constructed and arranged to receive said package; needle securing means at one end of the barrel; a needle having an enlargement thereon; said medicament package having an opening; a resilient plug closing said opening and of reduced thickness axially to provide a cup-like recess facilitating axial piercing thereof by the needle; the needle enlargement positioning the inner point of the needle relative to the discharge end of the package.

5. A hypodermic syringe comprising, in combination, a medicament package constructed and arranged to have its interior volume reduced for expelling of its contents; a barrel constructed and arranged to receive said package; a needle having an enlargement thereon; said medicament package having an opening; a resilient plug closing said opening and of reduced thickness axially to provide a cup-like recess facilitating axial piercing thereof by the needle; the needle enlargement positioning the inner point of the needle so that it lies substantially within the recess of the plug aforesaid.

6. A hypodermic syringe comprising, in combination, a syringe body constructed and arranged for endwise insertion of a tubular medicament package; a syringe plunger; a needle having an intermediate enlargement held upon said body with its inner end in position to penetrate completely one end of the package; the package comprising a tube sealed at opposite ends by resilient plugs, one of which is of reduced axial thickness for easy piercing by the needle, the other of which may be pushed by the syringe plunger for dispensing of the medicament through the needle; and means forming a part of the syringe for holding the package and needle in operative positions.

7. An instrument of the class described comprising, in combination, a syringe body member constructed and arranged for insertion of a medicament-dispensing package; a removable head closing one end of said body

member and having an axial recess open at its inner end, and a fine axial bore at its outer end in communication with said recess; a double-pointed hypodermic needle having an intermediate stop thereon, the inner branch of said needle being entered through said fine axial bore and axially of said recess and adapted to pierce through a pierceable stopper in the fore end of said package; said head embodying means securing said needle in place; and a syringe plunger for operating on said package to expel its fluid contents through the needle.

8. A hypodermic syringe comprising, in combination, a cartridge embodying a rigid tube of substantially uniform bore having resilient stoppers in its opposite ends; and associated holding and operating means including a canula arranged to pierce through one of said stoppers and a plunger adapted to enter said tube to force the other stopper therethrough for expelling its fluid contents through the canula, said plunger being axially recessed to protect the inner end of the canula if during the medicament-expelling operation it should pierce through both of said resilient stoppers.

In testimony whereof, I have signed my name to this specification.

HARVEY S. COOK.