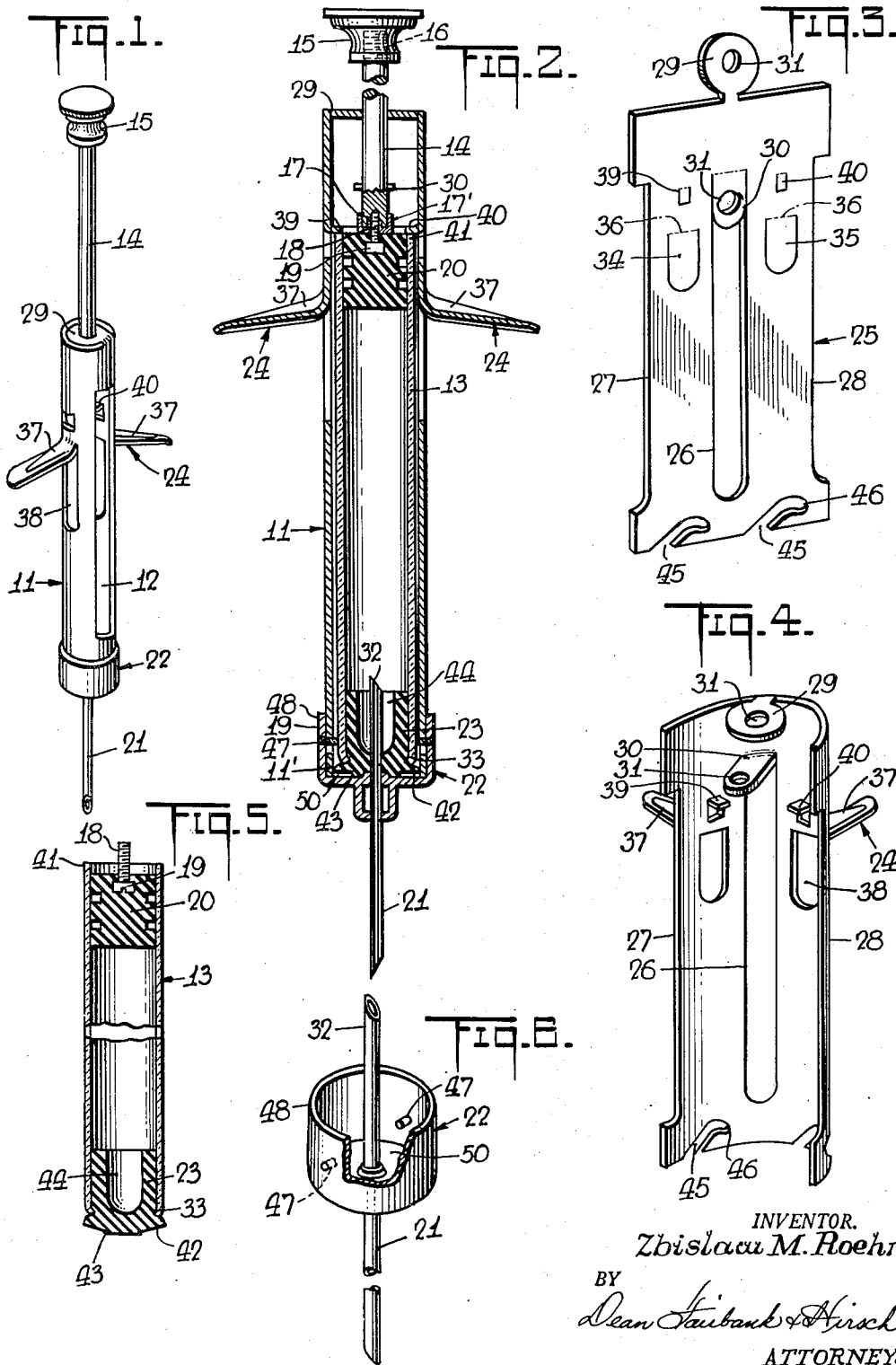


Nov. 28, 1950

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HYPODERMIC SYRINGE

Filed Oct. 25, 1947

2,531,893



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UNITED STATES PATENT OFFICE

2,531,893

HYPODERMIC SYRINGE

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Application October 25, 1947, Serial No. 782,058

6 Claims. (Cl. 128—215)

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It is among the objects of the invention to provide a surgical syringe of simple and inexpensive construction suitable for manufacture by mass production methods, which has relatively few parts that are not likely to get out of order and which is extraordinarily light in weight, sturdy and of small size for enhanced convenience of manipulation.

Another object of the invention is to provide a syringe suitable for repeated use, in which the hypodermic needle bearing cap may readily be applied to the barrel to be maintained in position thereon without shift, under the substantial thrust exerted in the use of the syringe and in which a cartridge may be securely seated in the syringe barrel without play or movement therein, yet without resort to spring metal parts.

This application is a continuation in part of my copending application Serial Number 537,378, filed May 26, 1944, now issued as Patent No. 2,461,481, dated February 8, 1949.

The subject matter in the present application, which is not claimed in the parent application, is the bayonet slot structure whereby the cap will be removably, yet securely retained on the end of the barrel by a resilient closure at the end of the cartridge.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view of the syringe,

Fig. 2 is a longitudinal cross section thereof on a larger scale, with a cartridge therein,

Fig. 3 is a plan view of the metal blank from which the syringe barrel is fashioned,

Fig. 4 is a perspective view showing the blank of Fig. 3 in the process of being conformed into shape,

Fig. 5 is a longitudinal cross sectional view of the cartridge and

Fig. 6 is a perspective view with parts broken away of the needle bearing cap.

Referring now to the drawings, the syringe comprises a metal barrel 11 having longitudinal window openings 12 exposing to view the glass cartridge or ampule 13 contained therein, said cartridge being substantially similar to the one shown and described in co-pending application Serial No. 508,484, filed November 1, 1943, now issued as Patent No. 2,429,183 dated October 14, 1947. The upper end of the barrel provides a bearing or guide for the plunger rod 14 which is equipped with a knob 15 at one end threaded thereon as at 16 and which has an internally threaded collar 17 at the other end fitted into

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a cavity 17 in said rod 14. The collar meshes with the shank of a screw 18, the head 19 of which is embedded in piston 20 in the upper end of the cartridge.

By means of the plunger rod 14, the piston 20 may be forced into the cartridge to eject the anesthetic or other fluid therein through a hypodermic needle 21 mounted in the cap 22 on the free end of the barrel and penetrating the closure plug or stopper 23 of the cartridge. The barrel has outstanding finger grip portions 24 to be grasped by the fingers while pressure is exerted upon the plunger knob 15 by means of the thumb.

The barrel of the syringe according to the invention is made of a unitary blank 25 of sheet metal, shown in Fig. 3 and desirably of brass which may be less than .03 inch thick. The blank is generally rectangular in form and has a median longitudinal slot 26 providing one window and longitudinal shallow lateral notches 27 and 28 along the side edges thereof which when the device is rolled into a cylinder as suggested in Fig. 4 determine the diametrically opposed window by the lateral edge to edge contact of the side portions of the blank.

Manifestly the blank 25 may be longitudinally creased to provide a barrel of any desired regular polygonal cross section, for instance, of square, hexagonal or octagonal shape, but the cylindrical form is generally to be preferred.

The blank is formed with a unitary circular median extension 29 at its upper end, which, when turned over at right angles to the blank, as shown in Fig. 4, forms a head or end of the barrel. The blank also has a unitary extension or tongue 30 slightly spaced from said upper end and slit from the blank preferably in alignment with the side walls of the window formed by slot 26. The extension 30 is also bent at right angles to extend parallel to the head 29. The head 29 and extension 30 are centrally perforated as at 31 to afford a bearing or guide for the plunger rod 14, the internally threaded cavity end 17 of which coacts with screw 18 extending from the piston 20 in the cartridge.

The blank also has a pair of short tongues 34 and 35 with their root ends 36 spaced desirably approximately a half inch from the upper end of the barrel and their free ends extending downward therefrom as shown in Fig. 3. These tongues are turned outward to extend in diametrically opposed directions and are longitudinally embossed as at 37 to form stiff finger grips 24, which are thus integral with the barrel, the slots 38 vacated by said finger grip tongues con-

stituting additional windows for exposure of the cartridge to view. The blank also is desirably provided with short inturned tangs 39 and 40 which serve as stops for the upper end 41 of the cartridge 13.

The rubber plug or stopper 23 at the discharge end of the cartridge is preferably provided with a thick flange 42 not less than $\frac{1}{16}$ inch thick, which extends over the rim 33 of the cartridge 13. The outer face of the plug may have an annular ridge 43 thereon to define the area in which the upper end 32 of the canula or needle 21 should be inserted in order that it may penetrate into the depression 44 in the inner face of the plug 23.

The lower end of the blank is provided with a pair of bayonet slots 45 each with a locking depression 46 at its inner end. Cap 22 of the syringe which has the axially extending hypodermic needle 21 rigidly mounted therein as by welding or soldering is provided with a pair of diametrically opposed inturned bayonet pins 47 on the inner walls thereof desirably inserted in said walls. The cap rim 48 extends snugly over the barrel end with the end 32 of the needle extending beyond said rim.

It will be seen that in the process of applying the cap to the barrel the thrust of the needle end 32 in penetrating the rubber plug 23 is transmitted through the length of the cartridge against the back stops 39 and 40 as best shown in Fig. 2, so that complete penetration of the rubber plug is assured as might not be the case if the cartridge were not thus arrested. The length of the cartridge is so chosen relative to the construction of this barrel that the end of the rubber plug 23 extends slightly beyond the bottom rim 11 of the barrel when the rim 41 of the cartridge abuts against stops 39 and 40.

As the cap 22 is turned on the barrel and the bayonet slots 45, the flange 42 of the rubber plug 23 will be axially compressed from the form shown in Fig. 5 to the form shown in Fig. 2, between the bottom rim 33 of the cartridge and the inner face 50 of the cap 22. Thus after the cap has been manually turned to its axially innermost position in the bayonet slots 45 and then released, the resilient expansion of flange 42 of the compressed rubber plug will force the bayonet pins 45 downward into their locking depressions 46. Thus any possible loosening of the cap during the expulsion of the contents of the cartridge is avoided as is the possibility of movement of the cartridge in the barrel.

The present construction provides a resilient flange 42 which overlaps rim 33 of the cartridge and lies between said rim and the inner face 50 of the cap to act as a resilient buffer therebetween. As there can be no direct contact between the cartridge rim 33 and the inner face 50 of the cap, there is no danger of the cartridge cracking when the cap is turned home.

To use the syringe, it is merely necessary to insert a cartridge into the barrel, affix the needle-bearing cap thereon and then thread the internally threaded cavity end 17 of plunger rod 14 on screw 13 in the manner heretofore described. The point of the needle is then applied to the tissue to be injected and the syringe is grasped between the finger grips 24 and the plunger knob 15 and pressure is applied.

The rigid connection between the plunger rod 14 and the piston 20 enables the latter to be withdrawn slightly at each use for aspiration, to guard against injection into a vein where intramuscular or intratissue injection is intended.

After injection a fresh cartridge and a fresh cap and needle may be introduced for re-use of the barrel, or the barrel, together with the cap and needle, may be sterilized for repeated use.

While the barrel has been shown as shaped from a unitary piece of sheet metal, it could be similarly shaped of any suitable material such as a blank of plastic, or impregnated textile fabric or it could be moulded of any suitable material.

As the syringe is of small bulk and light in weight, it can be manipulated by the user with greater ease and precision than the conventional bulky and heavy syringe.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. A surgical syringe, having a barrel for accommodating a cartridge, a hypodermic needle bearing removable cap having a locking bayonet slot connection to said barrel and a resilient needle penetrable closure interposed between the cartridge end and the cap, tending during use of the syringe to push the cap outward and thereby effectively to lock the bayonet slot.

2. A surgical syringe, comprising a barrel having bayonet slots with locking ends, a closure cap having bayonet pins in the interior thereof for coaction with said bayonet slots, a hypodermic needle permanently mounted in said cap, and a cartridge in said casing having a flexible rubber stopper extending beyond the end of said barrel and compressed against said cap in the assembly thrust of the latter upon said barrel, whereby said compressed stopper resiliently urges the bayonet pins into the locking ends of the bayonet slots.

3. A surgical syringe comprising a barrel having bayonet slots with downwardly turned locking ends, a closure cap having bayonet pins in the interior thereof for coaction with said bayonet slots, a hypodermic needle permanently mounted in said cap, and a cartridge in said casing having a flexible rubber stopper with a flange unitary therewith, extending beyond the end of said barrel and overlapping the end of said cartridge, said flange being compressed against the end of said cartridge in the assembly thrust of said cap upon said barrel, whereby said flange resiliently urges said bayonet pins downward into the locking ends of said bayonet slots, and thereby securely maintains the cap on said barrel.

4. A surgical syringe, comprising a barrel, a cartridge therein having a plunger in one end thereof and a rubber stopper in the other end thereof, inturned stops in said barrel near the upper end thereof for limiting the position of said cartridge, a hypodermic needle bearing cap having a bayonet slot connection upon the free end of said barrel, the stops taking the thrust upon the cartridge in the application of the cap upon the cartridge and the penetration of the needle through the rubber stopper.

5. The combination recited in claim 4, in which the rubber stopper has a thick flange, compressed in the application thrust of the cap, and the bayonet slot has a locking depression, in which the

pins of the cap are resiliently held by the expansion of the compressed rubber flange.

6. A surgical syringe comprising a barrel, a cartridge therein having a piston in one end thereof and a rubber stopper in the other end thereof, a screw having a head embedded in said piston with the shank of said screw extending upwardly therefrom, a plunger rod slidably mounted in said barrel, said plunger rod having an internally threaded cavity at one end coacting with the shank of said screw, intumed stops in said barrel near the upper end thereof for limiting the position of said cartridge, a hypodermic needle bearing cap having a bayonet slot connection with the free end of said barrel, the stops taking the thrust through the cartridge in the application of the cap upon the barrel and the penetration of the needle through the rubber

stopper in the assembly thrust of the cap upon said barrel.

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