June 9, 1936. M. W. KRATZ 2,043,832

HYPODERMIC SYRINGE

Filed June 28, 1934

Fig. 1.

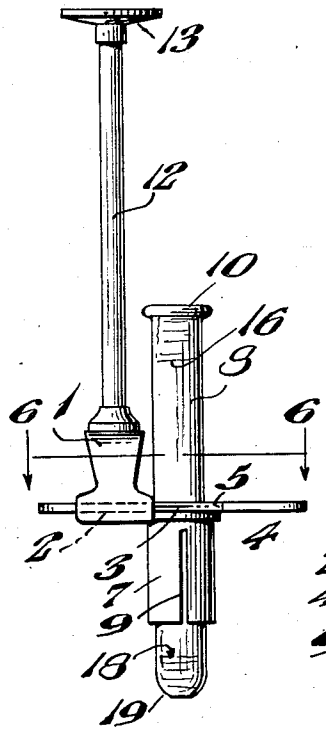


Fig. 2.

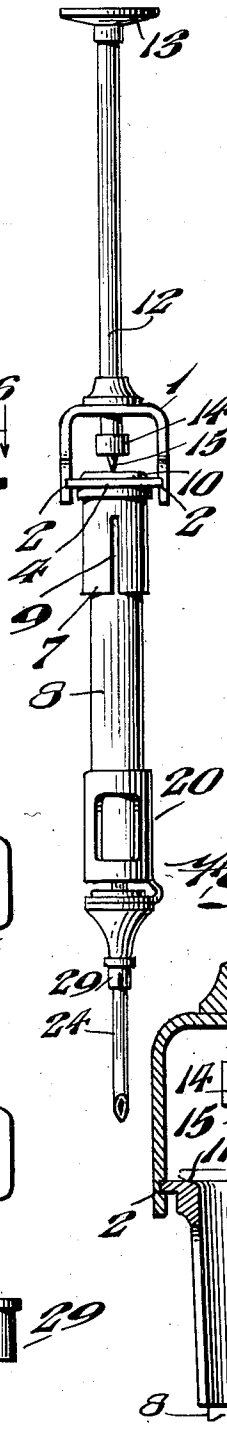


Fig. 3.

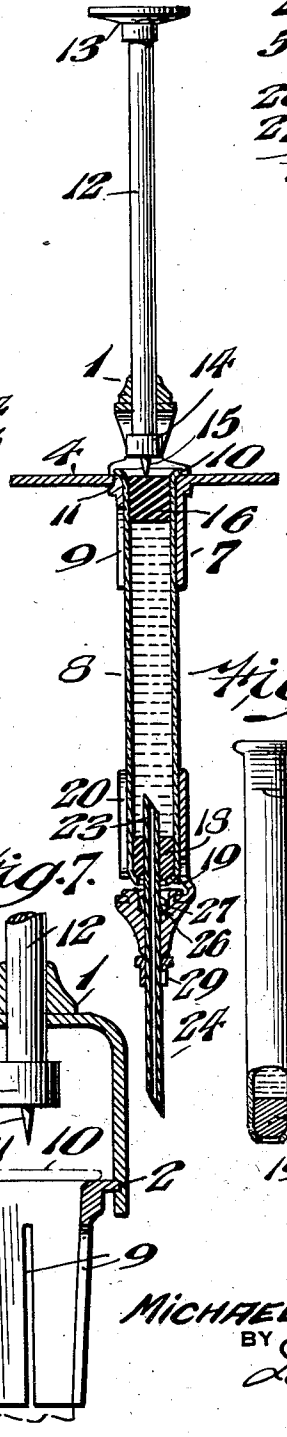


Fig. 4.

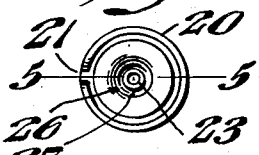


Fig. 5.

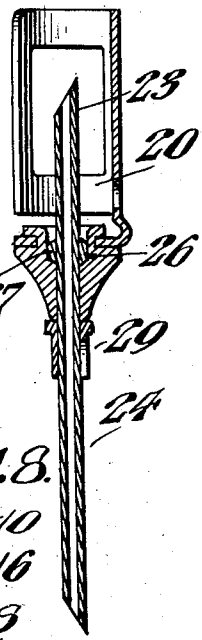


Fig. 6.

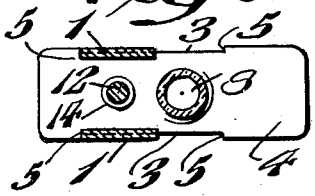


Fig. 7.

Fig. 8.

Fig. 9.

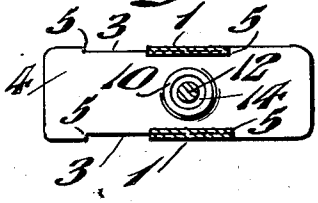


Fig. 10.

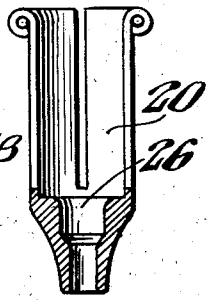


Fig. 11.

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HYPODERMIC SYRINGE

Michael W. Kratz, Philadelphia, Pa.

Application June 28, 1934, Serial No. 732,858

4 Claims. (Cl. 128—215)

My invention relates to a new and useful hypodermic syringe and it relates more particularly to a hypodermic syringe in which a removable pre-filled and sealed ampoule containing the liquid to be injected forms part of the operative structure and in which the sterilization as well as the assembly of the permanent metallic parts of the syringe with the ampoule is greatly expedited and facilitated.

My invention still further relates to a hypodermic syringe of this character which is of an extremely simple, light and durable construction and which is very easy of operation and manipulation.

My invention still further relates to a syringe of this character in which the ampoule, containing the liquid to be injected, and which is usually made of glass, is not subjected to any mechanical stress or strain during the injection of the liquid contained therein, thus safeguarding against breakage of the glass ampoule during the manipulation of the syringe.

My invention still further relates to a syringe of this character which is adapted yieldably, but nevertheless firmly, to engage the ampoule so as to compensate for small inequalities which may occur in the manufacture of the glass ampoules.

My invention still further relates to a syringe of this character, the ampoule forming part of which is provided with a stopper adapted to act as a piston at one end thereof and the other end of which is slightly crimped to prevent exit of the stopper in this end of the ampoule under pressure of the liquid during injection.

My invention still further relates to a syringe of this character comprising means for effecting positive engagement of the piston rod of the syringe with the stopper adapted to serve as the piston, as well as means for exerting the pressure necessary to eject the contents of the ampoule without producing any pressure on the glass ampoule proper or upon the part of the body into which ejection is made.

In the accompanying drawing:

Fig. 1 represents a fragmentary view in side elevation of a syringe embodying my invention, illustrating the method of inserting a detachable ampoule.

Fig. 2 represents a view in side elevation at right angles to Fig. 1 showing the complete syringe ready for use.

Fig. 3 represents a view at right angles to Fig. 2, partly in section and partly in elevation, showing details of construction.

Fig. 4 represents a plan view of the cap engaging the bottom end of the ampoule and shown in Figs. 2 and 3.

Fig. 5 represents a vertical sectional view on line 5—5 of Fig. 4.

Fig. 6 represents a section on line 6—6 of Fig. 1.

Fig. 7 represents a fragmentary sectional view, on an enlarged scale, showing details of construction.

Fig. 8 represents a side elevation of the ampoule forming part of my invention, certain parts being shown in section.

Fig. 9 represents a view similar to Fig. 6, with the piston in registration with the ampoule and ready for use.

Fig. 10 represents a vertical sectional view of a modified form of the bottom cap shown in Figs. 4 and 5.

Fig. 11 represents a view in side elevation, on an enlarged scale, of a stop forming part of the needle assembly and shown in Figs. 2, 3, and 5.

Referring to the drawing in which like reference characters indicate like parts, my novel syringe comprises a yoke 1, the limbs of which are provided with grooves 2 which are slidably adapted to engage the edges 3 of the finger piece 4. The movement of the yoke 1 longitudinally of the finger piece 4 is limited by the shoulders 5. The finger piece 4 carries the pendant sleeve 7 which is adapted to receive and retain the ampoule 8 which contains the liquid to be injected. The sleeve 7 is split as at 9 to give it a certain amount of resiliency and to enable it firmly and yieldably to engage the ampoule 8 and to compensate for slight variations or irregularities in the dimensions of the ampoule 8. The ampoule 8 is provided with the upper flange 10 which rests upon the upper edge or rim 11 of the finger piece 4, as best seen in Figs. 3 and 7. Sliding through the yoke 1 is a piston rod 12 which has the upper thumb or pressure piece 13 and the bottom head 14 which carries a pin or the like 15 adapted to engage the rubber or other stopper 16 in the upper end of the ampoule, in the manner best shown in Fig. 3. In the bottom end of the ampoule 8 is another stopper of rubber or other material 18 and the bottom end of the ampoule 8 is crimped or restricted as at 19 to prevent exit of the stopper 18 when it is subjected to pressure while the syringe is in use. Engaging the bottom end of the ampoule 8 is a cap 20 which is split as at 21, firmly and resiliently to engage the ampoule 8 and to compensate for slight variations or irregularities in the size or contour of the ampoule. The cap 20 is provided with an aperture to permit insertion of the cannula 23 of the hypo-

dermic needle 24 and is further provided with a seat 26 adapted to accommodate the detent 27 carried by the needle 24. 29 represents a stop, best shown in Fig. 11, which is slid over the portion of the needle protruding through the cap 20, and which aids in holding the needle in position. In Fig. 10 I have shown a modified form of the cap 23, which except in certain features of construction serves the same purpose and possesses the same advantages as those described in connection with the cap best shown in Fig. 5.

When it is desired to use the hypodermic syringe embodying my invention, the yoke 1 is moved longitudinally of the finger piece 4 to the position shown in Figs. 1 and 6. This takes the piston rod out of alignment or registration with the sleeve 7 and permits insertion of the ampoule 8. After the ampoule 8 has been inserted in the position shown in Figs. 2 and 3 the yoke 1 is moved longitudinally of the finger piece 4 into the position shown in Figs. 2, 3, and 9 to bring the piston rod 12 in registration with the ampoule. Pressure upon the thumb piece 13 will force the pin 15 at the bottom of the piston rod 12 into the stop 16 in the upper end of the ampoule 8, firmly to engage the piston rod 12 with the stopper 16 which under pressure will act as a piston with the ampoule 8 as the cylinder. The needle 24 is then applied to the cap (of either of the forms shown) in the manner shown in Fig. 5 and the cap is then pulled over the bottom end of the ampoule 8. This forces the upper cannula 23 of the needle 24 to penetrate the stopper 18 in the lower end of the ampoule in the manner best seen in Fig. 3. The syringe is now ready for use, and with the fingers engaging the finger piece 4 and the thumb or the palm of the hand exerting pressure on the pressure piece 13 the upper stopper 16 is pushed towards the fixed stopper 18 which is retained within the ampoule by the crimped or restricted bottom end 19 and acts as a piston to force the liquid contained within the ampoule out through the needle which has already been inserted under the skin or into the vein, as the case may be. It will be noticed that the ampoule 8 is not subjected to any material pressure against unyielding metallic surfaces and that the only pressure to which the ampoule is subjected is the pressure between the flange 10 thereof and the rim 11 of the upper sleeve 7 while pressure is being applied on the upper piston-like stopper 16. Due to the distribution of the pressure over the entire flange 10, the risk of any breakage is completely eliminated. Due to the lack of any rigid connection between the upper sleeve 7 and the bottom cap 20, the thin walls of the ampoule, as well as the relatively fragile lower end thereof, are not subjected to any pressure during the injecting operation.

I claim:

1. In a hypodermic syringe of the character stated, a finger piece, a sleeve carried thereby and adapted to support an ampoule containing the liquid to be injected, a yoke slidable longitudinally of said finger piece, means for limiting the movement of said yoke, a piston rod slidable through said yoke, means on the bottom end of said piston rod for engaging a stopper in the upper end of an ampoule carried by said sleeve, a separate cap adapted to engage the bottom end of said ampoule, a hollow needle carried by said cap and having its lower end protruding through the bottom of said cap and its upper end extending upwardly within said cap, whereby the upper end of said needle is adapted to penetrate a stopper in the lower end of said ampoule to permit ejection of the liquid contained in said ampoule through said needle when pressure is applied by means of the piston rod on the stopper in the upper end of said ampoule, the bottom end of said ampoule being restricted to prevent exit of said lower stopper.

2. In a hypodermic syringe of the character stated, a finger piece, a split resilient sleeve pendant therefrom and adapted to receive and support a removable ampoule containing the liquid to be injected, a yoke having grooves therein permanently engaging the edges of said finger piece and slidable longitudinally thereof, means for limiting the movement of said yoke, a piston rod slidable through said yoke, means on the bottom of said piston rod for engaging a stopper in the upper end of the ampoule supported by said sleeve, a split resilient separate cap adapted to engage the bottom end of said ampoule, a hollow needle carried by said cap and having its lower end protruding through the bottom of said cap and its upper end extending upwardly within said cap, there being a detent on said needle engaging a seat in said cap, whereby the upper end of said needle is adapted to penetrate a stopper in the lower end of said ampoule to permit ejection of the liquid contained in said ampoule through said needle when pressure is applied by means of the piston rod on the stopper in the upper end of said ampoule, the bottom end of said ampoule being restricted to prevent exit of said lower stopper.

3. The combination of a hypodermic syringe, comprising a finger piece, a sleeve carried thereby, a yoke slidable longitudinally of said finger piece, means for limiting the movement of said yoke, a piston rod slidable through said yoke, a separate bottom cap, a hollow needle having the lower end thereof protruding through said cap and the upper end thereof extending upwardly through said cap, there being a detent on said needle engaging a seat in said cap, of an ampoule containing the liquid to be injected and adapted to be inserted through said sleeve, said ampoule having an upper flange adapted to engage and rest upon the upper rim of said sleeve, a movable stopper in the upper end of said ampoule adapted to act as a piston in co-operation with said piston rod, a stopper in the lower end of said ampoule adapted to be penetrated by the upper end of said needle when said cap is drawn over the bottom end of said ampoule, the lower end of said ampoule being restricted to prevent exit of said stopper during the injecting operation.

4. In a hypodermic syringe of the character stated, a finger piece, a sleeve carried thereby and adapted to support an ampoule containing the liquid to be injected, a yoke slidable longitudinally of said finger piece, a piston rod carried by and movable through said yoke, and means for limiting the movement of said yoke with respect to said finger piece.

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