Nov. 25, 1941. J. L. BAILEN 2,263,865

SYRINGE

Filed Nov. 22, 1939

Fig. 1.

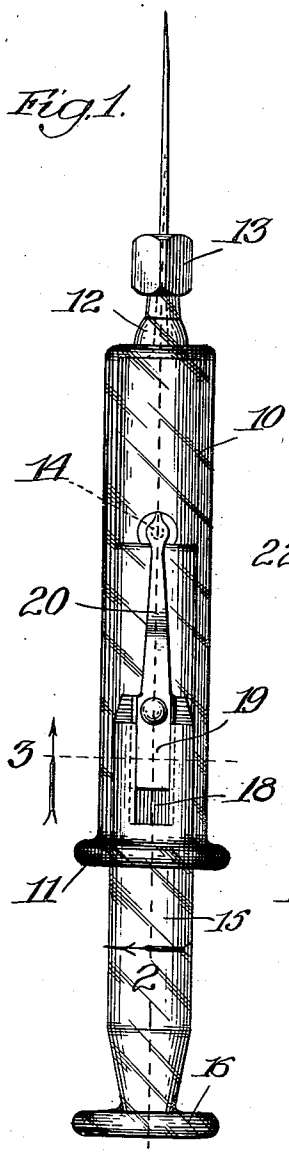


Fig. 4.

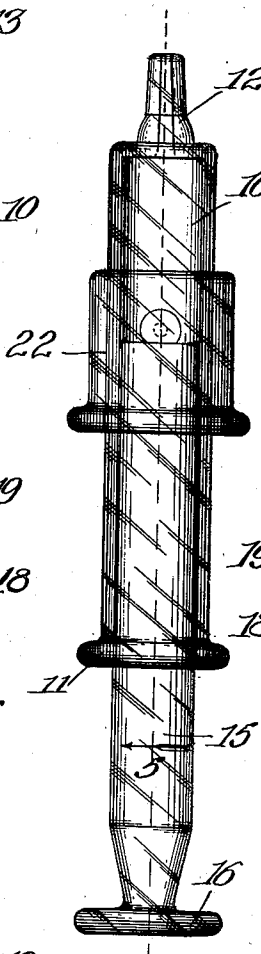


Fig. 2.

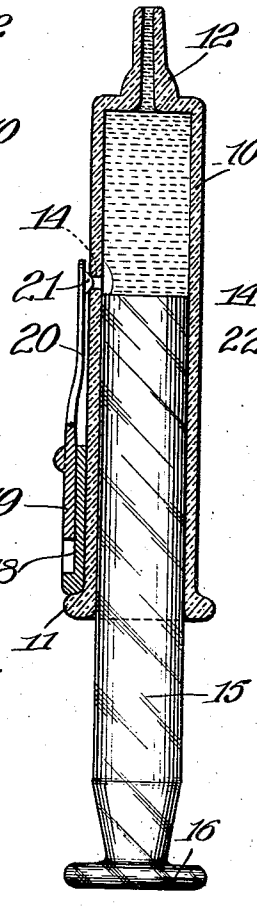


Fig. 5.

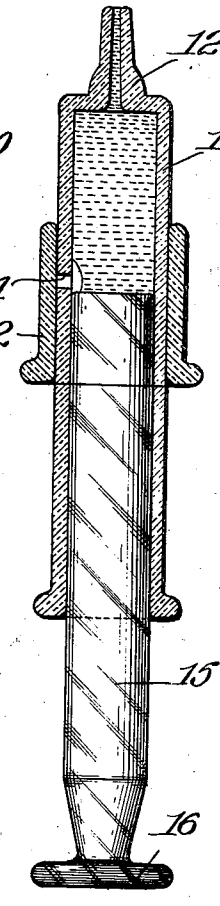
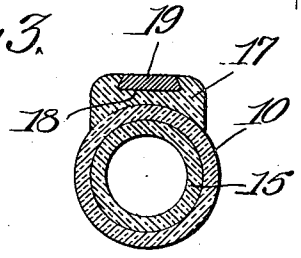


Fig. 3.



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2,263,865

SYRINGE

Jacob Lewis Bailen, Chicago, Ill.

Application November 22, 1939, Serial No. 305,744

1 Claim. (Cl. 128—215)

This invention relates to a syringe. It is particularly useful in connection with the injection of parenteral solutions obtained from ampoules, vials, and other containers.

An object of the present invention is to provide a syringe which may be employed for withdrawing liquids from ampoules, vials, and other containers and then, without removal of the syringe plunger, permits air trapped within the syringe to be withdrawn so that the liquid, free of air bubbles, may be injected. Another object is to provide a syringe of extremely simple construction which may be manipulated to create a suction upon the needle or inlet to the syringe upon the retraction of the plunger while at the same time permitting air to be withdrawn from the barrel of the syringe as the plunger is advanced. Other specific objects and advantages will appear as the specification proceeds.

The invention is illustrated in preferred embodiments, by the accompanying drawing, in which—

Figure 1 is a plan view of a syringe embodying my invention; Fig. 2, a longitudinal sectional view, the section being taken as indicated at line 2 of Fig. 1; Fig. 3, a transverse sectional view, the section being taken as indicated at line 3 of Fig. 1; Fig. 4, a plan view of a modified form of syringe embodying my invention; and Fig. 5, a longitudinal sectional view of the modified structure shown in Fig. 4 at line 5.

It has heretofore been proposed that a syringe barrel might be provided with an opening through which trapped air might be removed. In all of such structures, it has been found necessary to introduce liquid into the barrel by pouring the same into the open end of the barrel after the plunger is removed. The plunger is then inserted and manipulated to bring about the escape of the air, the front portion of the plunger being brought past the opening. Such apparatus, which has been in use for many years, however, could not be used with ampoules, narrow necked vials, and other containers, such as rubber diaphragm equipped bottles through which a needle is inserted, etc. With modern sterile containers, it is impracticable to attempt to introduce the liquid by pouring the same while on the other hand one can, with extreme accuracy, withdraw a desired amount from a container or ampoule by creating suction within the barrel of the syringe.

I have found that by providing simple manipulable means in conjunction with the barrel of the syringe, an air escape opening can be quickly closed for the suction operation, permitting the desired amount of liquid to be drawn into the barrel under suction while at the same time the opening can be uncovered to permit the escape of air when the plunger is slightly advanced. The syringe can be handled with ease with respect to filling and discharging and with respect to the removal of the air bubble, while at the same time the danger of contamination through pouring is eliminated.

In the illustration given, the syringe is provided with a hollow barrel 10 which may be formed of glass or other suitable material. In the illustration given, glass is employed which is ground on the interior thereof. The barrel is provided with a bead 11 at its open end at the rear thereof and with a reduced extension 12 at the suction or discharge forward end thereof. If desired, the extension 12 may be equipped with the usual suction or injection needle 13 or with any other suitable instrument. The barrel 10 is provided with an air escape opening 14 at a point toward the forward end of the barrel. Within the barrel 10 is mounted a plunger 15 which may be formed of glass and ground to provide a tight substantially air-sealing engagement with the internal surface of barrel 10. The outer end of the plunger 15 is provided with a handle button 16.

In the illustration given in Figs. 1, 2 and 3, the barrel 10 has cemented thereto or secured thereto by any other suitable means a glass block 17 which is provided with a slide recess 18 having undercut edge portions. Mounted within the recess 18 is a slide 19 having edge portions dovetailing within the recess. The slide 19 is provided with a reduced extension 20 equipped at its forward end with a rounded knob 21. The slide 19 may be formed of any suitable material. The use of metal is advantageous in that it provides a spring member 20 which causes the knob 21 to seat firmly within the valve seat provided in the outer portion of the air opening 14.

In the modification given in Figs. 4 and 5, the block 17 and the slide 19 are omitted. Instead, a sleeve member 22 which may be formed of glass with an internal ground surface is mounted upon the barrel 10 and provides a sealing engagement about the air opening 14.

In the operation of the device, the air opening 14 is sealed either through the slide member 19 and the knob 21 carried by the spring arm 20 or by the sleeve member 22. In this position, the syringe is effectively closed except for the suc-

tion opening at the forward end of the barrel. When the plunger is retracted, liquid is withdrawn from the container through the needle 13 and thence into the barrel 10, the exact amount being determined through the use of graduations on the barrel (not shown).

In the injecting operation, the slide 19 or the sleeve 22 are retracted to open the air escape opening 14 and then the plunger is advanced to bring the air bubble adjacent the opening through which it readily escapes. The plunger may then be advanced to inject the liquid without carrying forward air bubbles.

It will be noted that the barrel 10 is shown with an open end. If desired, however, this end may be substantially closed except for a reduced opening through which a slender handle attached to the plunger or piston may be attached. In other words, the invention may be used with the type of syringe illustrated in which the barrel is open at the rear or it may be used with the type of syringe in which the rear end of the barrel is closed save for a reduced barrel opening. The particular form of syringe forms no part of the invention, and it is believed clear that the invention is applicable to practically every form of syringe or injecting device that may be used in conjunction with a hollow barrel and piston.

By the present method, it is no longer necessary to waste considerable amounts of the liquid in an effort to get rid of air bubbles. In fact, no liquid need be lost at all because the air bubble can be readily aligned with the opening through the operation of the plunger. At the same time, it is unnecessary to fill the barrel by pouring, with accompanying inaccurate results. The filling operation can be carried on with a high degree of nicety because the air escape closure devices permit the syringe to be used as a suction member in the filling operation.

While I have described certain detailed means for effecting the opening and closing of the air escape channel, it will be understood that such details may be varied widely by those skilled in this art without departing from the spirit of my invention.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim.

A syringe of the class set forth, comprising a hollow barrel having a handle opening at one end and a suction and discharge opening at the other end, a handle-equipped piston within said barrel, the handle portion extending through said handle opening and rearwardly of said barrel, said barrel being provided with an air escape opening provided with a ball-seat in the outer portion of the opening, and a valve-controlled member slidably carried by said barrel and provided with a spring arm and a ball carried by said arm urged into sealing engagement with the seat of said air escape opening, said valve-controlled member being slidable rearwardly to open said air escape opening.

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