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2,627,856

SYRINGE

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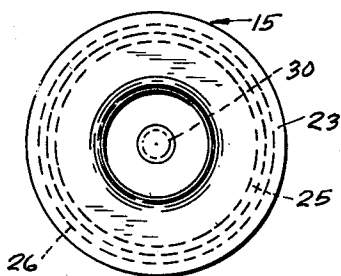


Fig. 2

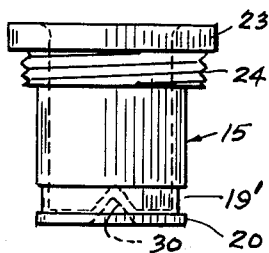


Fig. 3

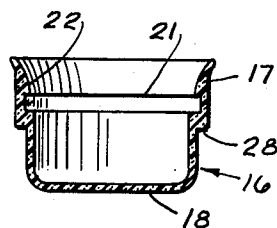


Fig. 4

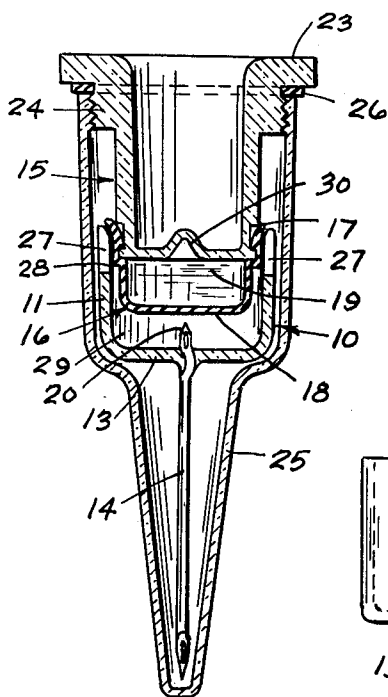


Fig. 1

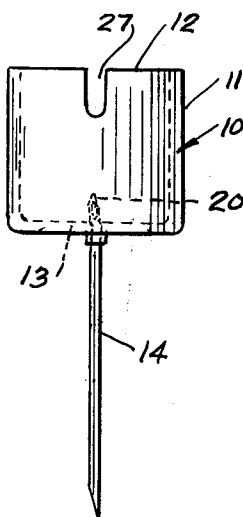


Fig. 5

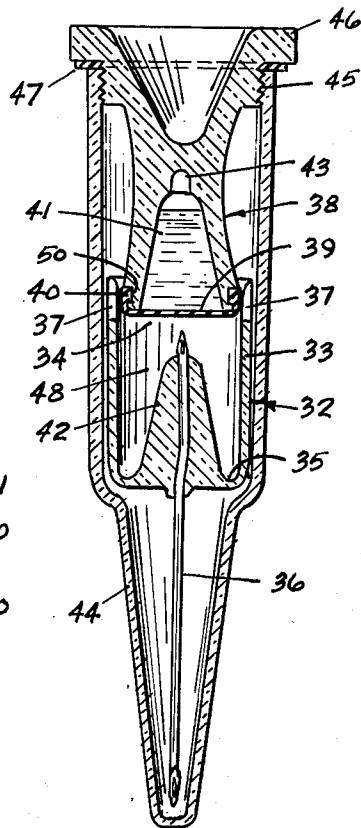


Fig. 6

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6 Claims. (Cl. 128—218)

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This invention relates to new and useful improvements in syringes.

An important object of this invention is to provide syringes with superior aspiration. With normal syringes it is necessary that the needle be engaged into the body and the plunger pulled back a small distance before it is pushed completely forward in order to test whether or not a blood vessel has been pierced. If a blood vessel has been reached and the plunger is pulled slightly back the blood will ooze out and be readily seen. If this occurs the needle must be drawn completely out and a new spot located. Prior syringes, being collapsible tubes, make no provision for aspiration.

This invention proposes a new construction which makes it possible to immediately determine whether the needle has pierced a vein without requiring that the needle be drawn out a small distance, or other operation. Specifically, it is proposed that the syringe be constructed of transparent plastic or other transparent material and that an arrangement be provided which will permit the blood to flow through the needle and be readily visible through the plastic if a vein is pierced.

Another object of this invention resides in the provision of openings communicating with the atmosphere and formed in the body of the syringe which will prevent the body from being air bound so that blood may readily flow through the needle and be visible if a vein is pierced. It is also proposed that the plunger of the syringe be so arranged that it may be forced downwards for ejecting the liquid of the syringe, and said plunger should close the said openings immediately upon the slightest downward motion of said plunger in order that the liquid may be entrapped and forced through the needle and into the body.

Another important advantage of the new syringe resides in the fact that because it is constructed of transparent material the liquid contents may be inspected to determine whether or not it is still fresh enough to be used. Sediment or change of color of the liquid will easily be noted if the liquid has spoiled. In prior syringes inspection of the liquid was not possible because the tubes used to hold the liquid were not transparent.

Another important object of this invention resides in the provision of a resilient seal mounted across the bottom of the plunger of the syringe and arranged to hold the liquid in position adjacent the bottom of said plunger. A novel construction is proposed for mounting the resilient

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seal on the plunger and for using the edge portion of the resilient seal as a seal between the sides of the plunger and the cylindrical body of the syringe.

Another object of the invention is the construction of a syringe as described, which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a vertical sectional enlarged view of a syringe constructed in accordance with this invention.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is an elevational view of the plunger of the syringe shown in Fig. 1.

Fig. 4 is an enlarged sectional view of the resilient seal used in the syringe shown in Fig. 1.

Fig. 5 is an elevational view of the cylindrical body of the syringe.

Fig. 6 is a vertical sectional enlarged view of another syringe constructed in accordance with a modified form of this invention.

The syringe illustrated in Figs. 1-5 inclusive, includes a cylindrical body 10 having side walls 11, an open top 12, a closed bottom 13, and a hollow steel needle 14 mounted through the closed bottom 13. A plunger 15 is slidably mounted in said cylindrical body 10 and is normally positioned in the top portion of the body 10. A resilient seal 16 having an edge portion 17 is mounted around the bottom portion of said plunger 15 and engages against the inner face of the body 10 for forming a liquid seal between the plunger 15 and the body 10.

The resilient seal 16 has a bottom portion 18 extending across the bottom of the plunger 15 for holding a quantity of liquid 19 against the bottom of said plunger 15. The top end 20 of the needle 14 projects upwards from the said closed bottom 13 of the body 10 and is normally spaced a short distance beneath the bottom 18 of the seal 16. The top end 20 of the needle is adapted to pierce the said bottom 18 when the plunger 15 is moved downwards in order that said liquid 19 may then be forced through the needle 14 and out of the bottom end of the needle 14. The plunger 15 has a peripheral groove 19' near its bottom end.

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Beneath this groove 19' there is a flange 20. The resilient seal 16 is formed with a groove 21 spaced downwards a short distance from its top end. This groove 20 is adapted to receive and mate with the flange 20 to connect the seal 16 with the plunger 15. The seal 16 has a flared portion 22 above the groove 21 which will facilitate the engagement of the flange 20 of the plunger 15 in the groove 21. It is merely necessary to force the flange 20 downwards along the flared portion 22 until it engages in the groove 21. The plunger 15 is formed with an enlarged top portion 23 by which it may be easily held. Beneath this portion 23 there is a threaded portion 24 used to hold a cap 25 for the syringe in position. A washer 26 is interposed between the top edge of the cap 25 and the enlarged portion 23 of the plunger 15. The cap 25 encases a portion of the plunger 15 and the entire cylindrical body 10, including the needle 14.

The side walls 11 of the cylindrical body 10 are formed with openings 27 at their top edges. These openings 27 are in the nature of slots formed downwards from the top edge of the body 10. These slots 27 extend downwards a very small distance to a point beneath a shoulder 28 formed externally upon the resilient seal 16 while said plunger is in its normally raised position. The shoulder 28 is formed by reducing the diameter of the seal 16 beneath said shoulder 28. The openings 27 will connect the outside atmosphere, when the cap 25 is removed, with the space 29 above the bottom of the body 10 and beneath the seal 16. It is proposed that the body 10 and the plunger 15 be made of stiff rigid type transparent plastic material, as styrene, which is transparent. The needle 14 may be made of steel. The resilient seal 16 should be made of flexible, resilient and rigid type plastic material such as polyethylene, which is translucent. The cap 25 may also be made of stiff rigid type plastic material. The bottom of the plunger 15 is formed with a recess 30 into which the top 29 of the needle 14 may engage when the plunger 15 is in its complete bottom position.

The operation of the device may be understood from the following:

To use the syringe the cap 25 is first removed. Then the point of the needle 14 is inserted into a portion of a person's body. The inner end 29 of the needle 14 is observed to see whether blood starts entering the space 29 to determine if a vein has been pierced. The blood may easily enter the space 29 because the openings 27 in the body 10 avoid air binding the space 29. If a vein is pierced the needle 14 is withdrawn and a new spot selected. If a vein has not been pierced the liquid 19 is injected by merely forcing the plunger 15 downwards. The top end 20 of the needle 14 will pierce the bottom 18 of the resilient seal 16 when the plunger is started downwards. Then further downward motion of the plunger 15 will force the liquid 19 through the needle 14. Because the seal 16 is made from resilient material and because it is a tight fit between the plunger 15 and the inner face of the body 10, the seal 16 will prevent the liquid 19 from coming out between the body 10 and plunger 15, insuring that the liquid 19 will be forced through the needle 14.

Before the liquid 19 is injected it may easily be inspected to see whether it is in good condition. If the color of the liquid 19 has altered, or if the liquid 19 has become cloudy, or sedi-

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ment has formed in it, the syringe is rejected and not used. The color of the liquid and the presence of sediment may be seen through the bottom of the plunger 15.

In Fig. 6 another form of the invention has been disclosed. This syringe includes a cylindrical body 32 having side walls 33, an open top 34, a closed bottom 35, and a hollow needle 36 mounted through the closed bottom 35. The side walls 33 are formed with openings 37 at its top edge portion. A plunger 38 is slidably mounted in the cylindrical body 32 and is normally positioned in the top of the body 32. A resilient seal 39 is mounted across the bottom of the plunger 38. This seal 39 has an edge portion 40 mounted around the bottom portion of the plunger 38 and engaging the inner face of the body 32 for forming a liquid seal between the plunger 38 and body 32. The bottom portion of the seal 39 extends across the bottom of the plunger 38 and holds a quantity of liquid 41 against the bottom portion of the plunger 38. More particularly, the bottom portion of the plunger 38 is hollowed out forming a reservoir in which the liquid 41 engages. The cylindrical body 32 is formed with a large projection 42 which is of the same shape as the said hollowed out portion of the plunger 38 so as to be capable of mating with the said hollowed out portion when the plunger 38 is forced downwards, and in this way eject all of the liquid 41 through the needle 36. The hollowed out portion of the plunger 38 is formed with a top recessed portion 43 into which the top of the needle 36 may engage when the plunger 38 is in its extreme bottom position. The bottom portion of the seal 39 is adapted to be pierced on the top end of the needle 36 when the plunger 38 is moved downwards in order that the liquid 41 may be forced out from the bottom of the needle 36.

A cap 44 engages over the needle 36, over the body 32, and is threadedly engaged upon a threaded portion 45 formed near the top of the plunger 38. The plunger 38 has an enlarged top portion 46 by which it may be easily gripped. A washer 47 is engaged beneath the top portion 46 and the top edge of the cap 44. The openings 37 in the top portion of the body 32 normally extend slightly beneath the bottom portion of the seal 39 so that the space 48 between the bottom of the body 32 and the bottom of the plunger 38 is connected with atmosphere when the cap 44 is removed. The bottom portion of the plunger 38 is formed with a peripheral groove 50 into which the top portion 49 of the resilient seal 39 engages and by which the resilient seal 39 is mounted upon the bottom of the plunger 38.

It is proposed that the plunger 38 and the body 32 be made from stiff transparent rigid type plastic material so that the space 48 and the liquid 41 may be inspected. The seal 39 is made from flexible and resilient rigid type plastic material such as polyethylene so that a good seal is formed between the plunger 38 and the cylindrical body 32 when the plunger 38 is moved downwards in the cylindrical body 32.

The operation and use of this form of the invention is identical to the prior form.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. A syringe, comprising a cylindrical body having side walls, an open top, a closed bottom and a hollow needle mounted through said closed bottom, a plunger slidably mounted in said cylindrical body and normally positioned in the top of said body, a resilient seal having an edge portion mounted around the bottom portion of said plunger and engaging against the inner face of said body for forming a liquid seal between said plunger and body, said seal having a bottom portion extending across the bottom of said plunger for holding a quantity of liquid against the bottom of said plunger, said bottom portion of said seal being adapted to be pierced on the top end of said needle when said plunger is moved downwards in order that said quantity of liquid may be forced out from the bottom of said needle when said plunger is moved downwards, said body and plunger being transparent, and said side walls of said body having in their top portions openings which extend below said plunger when said plunger is in its initial raised position.

2. A syringe as defined in claim 1, in which said plunger is formed with a peripheral groove around its bottom portion, and said edge portion of said seal engages said peripheral groove.

3. A syringe as defined in claim 1, in which said plunger is formed with a flange at its bottom and the edge portion of said seal is formed with a groove into which said flange engages for as-

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sisting in mounting said seal around the bottom portion of said plunger.

4. A syringe as defined in claim 3, in which the edge portion of said seal is flared above said groove to facilitate engaging said flange in said groove.

5. A syringe as defined in claim 1, in which said plunger is formed with a reservoir in its bottom for accommodating said quantity of liquid, and said cylindrical body is formed with a projection on its closed bottom shaped to mate into said reservoir when said plunger is moved down in said body.

6. A syringe as defined in claim 1, in which a cap encases said body, and said cap is removably mounted on said plunger.

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