March 6, 1934. F. LE C. DOWE 1,950,137

SYRINGE

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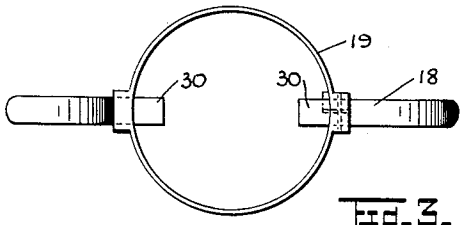


Fig. 3.

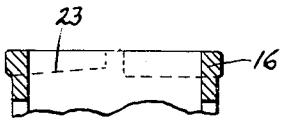


Fig. 6.

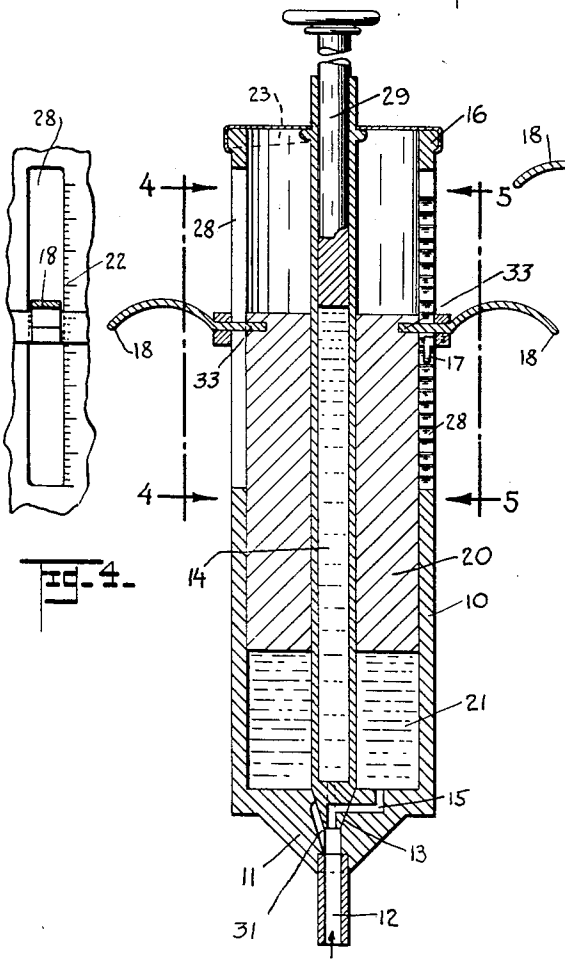


Fig. 4.

Fig. 1.

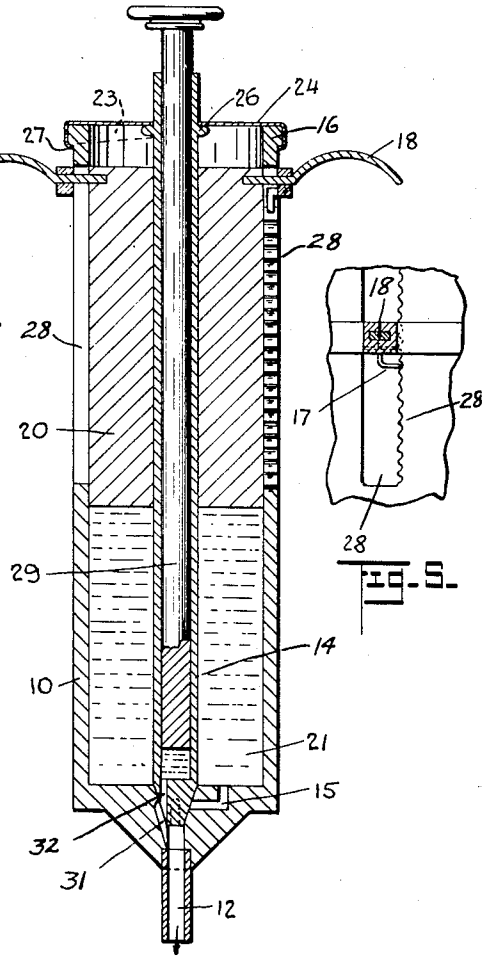


Fig. 2.

Fig. 5.

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SYRINGE

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8 Claims. (Cl. 128—214)

This invention relates to a syringe methods and means, and more especially to a double-acting syringe of particular value to physicians and surgeons.

The article which comprises this invention is essentially a double-barrel and double-plunger syringe, made preferably of all glass and self-contained. Its primary use is to draw fluids from the human body through a needle attached to the tip of the syringe, and then without removing the needle or changing its position, to inject into the body a solution to take the place of that withdrawn, and thereby treat the pathological condition.

One of the greatest present needs for this device is in the new method for the treatment by obliteration of enlarged and varicose veins. The present method of treatment is to inject into the enlarged and tense vein, which is full of blood, an irritating substance which tends to destroy that portion of the vein so treated. Now it is evident that the strength of the solution varies with the amount of the blood in the vein, and which dilutes it; and there is always the possible danger of death from an embolus (or clot) which may be washed off the wall of the vein and carried to the heart.

This invention consists essentially of two cylindrical barrels and two pistons or plungers so arranged as to permit the withdrawal of the blood from the vein for instance, and then the injection of the solution into the vein without withdrawing the needle, and in such manner that the blood withdrawn and the solution injected do not come in contact at any time.

One of the advantages in this method permits the use of a tourniquet to prevent the solution going into the general circulation until such time as it is safe.

A further advantage is that a much smaller amount of the solution can be used, and it also permits of a treatment with a milder solution undiluted by a volume of blood.

It is self-evident that if a deflated and empty vein is injected with a solution intended to destroy or shrink the walls of the vein, this same solution does away with the danger from embolism if there is no blood in the vessel.

The blood is drawn from the vein by pulling outwardly on the finger clips attached to the outer double-ground piston, which piston is a little more than half the length of the outer syringe. The finger clips work through two slots in the barrel of the outer syringe and start from the middle thereof and move upwardly to the top flange. This construction in no way interferes with the operation of the central treatment syringe, and does not make the syringe bulky or obstruct the view from the field of operation.

This syringe is used in the treatment of varicose veins; for the treatment of enlarged bursæ (housemaid's knee; miners' elbow, etc.) where the surgeon can withdraw the serous fluid and inject a solution to produce adhesions of the sac to prevent filling up again; for the withdrawal of pus from the pleural cavity (empyemia) following pleurisy and the injection of a serum or solution to eliminate the formation of new pus cells; for the withdrawal of spinal fluid and the simultaneous injection of fluid to produce spinal anæsthesia.

In dentistry where the X-ray shows an encysted pus sac this syringe permits the aspiration of the contents and the injection of the treatment antiseptic solution.

This invention is also of the utmost use for the treatment of hemorrhoids, for the injection method of treatment; for the treatment of chronic abscesses or tubercular joint diseases where it is necessary to draw out poison fluids and inject an antitoxin or germicide.

In pulmonary tuberculosis where it is possible to inject to produce fibrosis there is a great advantage in the use of this invention in the withdrawal of the broken-down fluid before injecting. In fact, it is quite possible great discoveries will yet be made with the aid of this syringe in the future study of pulmonary tuberculosis.

The invention has an additional use generally for the removal of a fluid from any part of the body where we desire to replace the fluid withdrawn by another fluid; also in the treatment of hydrocele and varicocele by the injection method.

All these and other objects as suggested herebelow are attained by the methods and means now to be described and illustrated in the accompanying drawing, in which—

Figure 1 is a cross-sectional view through a vertical diametral plane of a preferred embodiment of the invention showing the outer piston part way up on its stroke of sucking in the blood, as for instance from a vein, and prior to the injection of the fluid from the inner cylinder;

Fig. 2 is a similar sectional view showing the outer piston at the top of its stroke with the blood completely sucked into the syringe and the inner piston at the lower-most position of its stroke with the treatment fluid entirely ejected;

Fig. 3 is a top plan view of the finger clip ring shown in section in Fig. 1;

Fig. 4 is a side elevational view through the plane 4—4 of Fig. 1;

Fig. 5 is a side elevational view through the plane 5—5 of Fig. 1;

And Fig. 6 is an incomplete sectional view of the flange top for holding the metal cap.

Like numerals refer to like parts throughout the several views.

The outer syringe barrel 10, in one form and size of the invention, has a total capacity of about 10 cubic centimeters without the inner syringe in place. Barrel 10 is made with a glass tip (Luer taper) to fit all Luer tapers of different gauges.

The lower part of this barrel 10 is solid as shown at 11, with the exception of the regulation hole 12 which is bored or formed through the entire length or thickness of this solid base 11.

There is a tapered opening 13 in this space to conform exactly to the ground surface of the syringe barrel 14, except that a small passage 31 is cut from the inner beveled opening of member 11, on one side, and a T-shaped passage 15 cut from its opposite side, as shown.

The upper half of barrel 10 is slotted on opposite sides 28—28 up to the flange at the top 16, and is made with a slight thickening of the edges of the slots, to reinforce the syringe and to provide a surface for the fine saw-toothed indentations shown to the right in Figs. 1 and 2, and also in Fig. 6, for contact with a small spring 17, Figs. 1 and 5, and this spring is riveted or otherwise fastened to the finger clips 18, Figs. 1 and 3, of ring 19, (removably or pivotally secured to piston 20, as by sliding into notches).

The ground taper hole 13 in the solid base of the glass bottom 11 of the syringe, is in the preferred embodiment, formed as in Figs. 1 and 2.

There is an L-shaped slot in the inner syringe wall 14, adapted in one position of wall 14 to connect with passage 15 to enter chamber 21 beneath piston 20, as shown in Fig. 1. When the members 10 and 14 are revolved one-quarter turn relative to each other, however, the passages 31 in member 11 and 32 in member 14 are in communicating alignment, as shown in Fig. 2, to permit access from inner syringe 14 to exit tip or needle connection 12, while at the same time cutting off any connection between member 12 and outer syringe 21.

The lower end 11 of the outer barrel has its outer surface tapered to 30 or 45 degrees to lighten the base and to help keep the field of operation in view to better advantage.

Suitable calibration marks are formed at 22, Fig. 4, to mark the contents of the chamber 21 in cubic centimeters or other convenient measure.

The under side of flange top 16 is beveled slightly upward at 23, Fig. 6, from the two depressed slots formed on opposite sides and so arranged as to permit tightening of the cap 24 on top of flange 16.

It will be understood that cap 24 has two outward projections on its lower rim surface diametrically opposite to each other, and for which there are corresponding vertical slots in flange 16. The cap 24 is thus positioned over flange 16, and revolved slightly to permit one of its projections to engage the slant surface 23 to tighten the cap on the flange, and at the same time to press downwardly on flange rim 26 of inner syringe 14 to hold its taper lower end tightly in the tapered bore of member 11.

The barrel 14 of the inner syringe has a ground inner bore adapted to slidably contain an inner piston 29. The barrel 14 of the inner syringe is made preferably a half inch or so longer than the large syringe 10 to permit the operator to hold the small syringe firmly beyond the metal cap 24 to permit rotating the outer syringe 10 relative to the inner one to close the opening for the blood flow in the manner shown in Fig. 1.

It is understood, of course, that the outer piston 20 has both the inside and outside surfaces ground and is ring shaped in cross-section.

It will, of course, be understood that there are suitable slots or openings in the upper portion of piston 20 at diametrically opposite points for the insertion of the projections or dogs of the finger clips 18 Fig. 1, these projections being numbered 33 and adapted, for instance, to be slid outwardly to removably position the ring from below into piston 20, after which members 33 are forced inwardly in the slots and so permit hand clips 18 on ring 1 to be used to raise piston 20.

It is to be understood that the present disclosure is for the purpose of illustration only, and that the invention is not limited thereto. To those skilled in the art, many modifications of the invention will be readily apparent, and it will also be obvious to such skilled persons that part of the method and means may be used without other parts thereof, many such combinations of the parts readily suggesting themselves. Therefore, it should be and is to be distinctly understood that for a definition of the limitations of the invention, reference must be had to the appended claims.

Having now described the invention what is claimed as new and for which Letters Patent of the United States is desired is:

1. The combination in a double-acting syringe of an inner piston, a cylinder surrounding it, an outer piston having a longitudinal hole permitting it to slide over the cylinder and an outer cylinder enclosing the outer piston.

2. The invention, as in claim 1, the outer cylinder terminating in a nozzle-like opening, connecting with passages to the inner and outer cylinders in such manner that relative movement between them is adapted to open one passage and close another passage.

3. The combination of an outer suction syringe and an inner syringe, the inner syringe being positioned in a hole in the piston of the outer syringe and surrounded by the outer syring barrel substantially throughout its length, the nozzle of the two syringes terminating in a common opening.

4. The invention as in claim 3, the inner syringe being positioned parallel to and its operating end projecting beyond the upper end of the outer syringe barrel and being adapted to be rotated laterally in relation thereto.

5. The combination in a syringe having a slotted casing and a ring-like piston therein, of a second syringe positioned in the hole of said piston, and removable finger clip means for moving the ring-like piston, said means projecting through the slots of said casing.

6. The invention as in claim 5, including resillent holding means between the finger clip means and the casing adapted to retain the piston in any position against normal forces to dislodge it.

7. The combination of an outer syringe and an inner syringe concentrically arranged therein each syringe comprising a piston within a casing, there being a tapered ground bore in the lower end of the outer syringe connected to an

exit hole through the end thereof, and a similarly tapered outer end of the inner syringe adapted to engage said bore in fluid-tight relation, and connecting passage-ways from the exit hole to the inner syringe and to the outer syringe, one of said passageways being adapted to be opened when the other is closed.

8. The invention as in claim 1, including means attached to the outer syringe adapted to retain the inner syringe in fluid-tight engagement with the outer syringe at a common exit end.

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