

June 3, 1924.

J. W. LIVINGSTONE

1,496,126

SYRINGE

Filed June 9, 1922

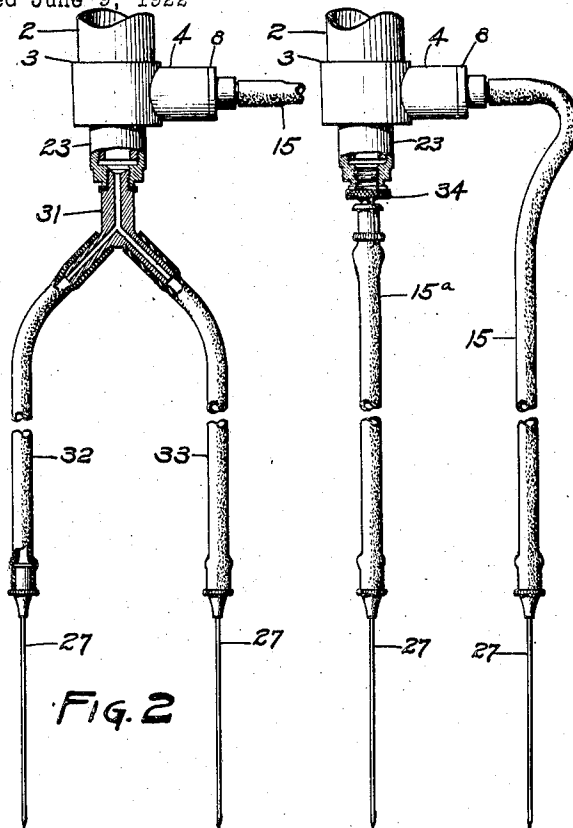
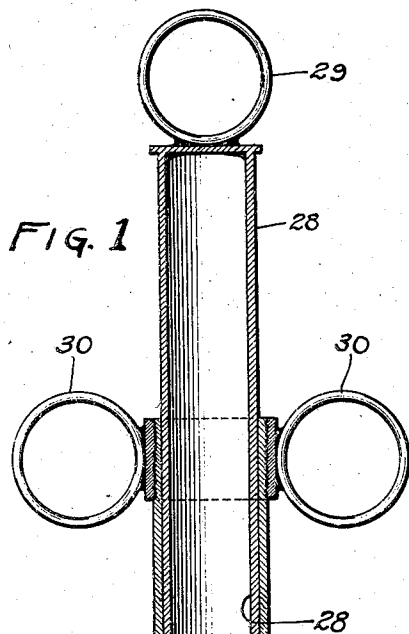


Fig. 3

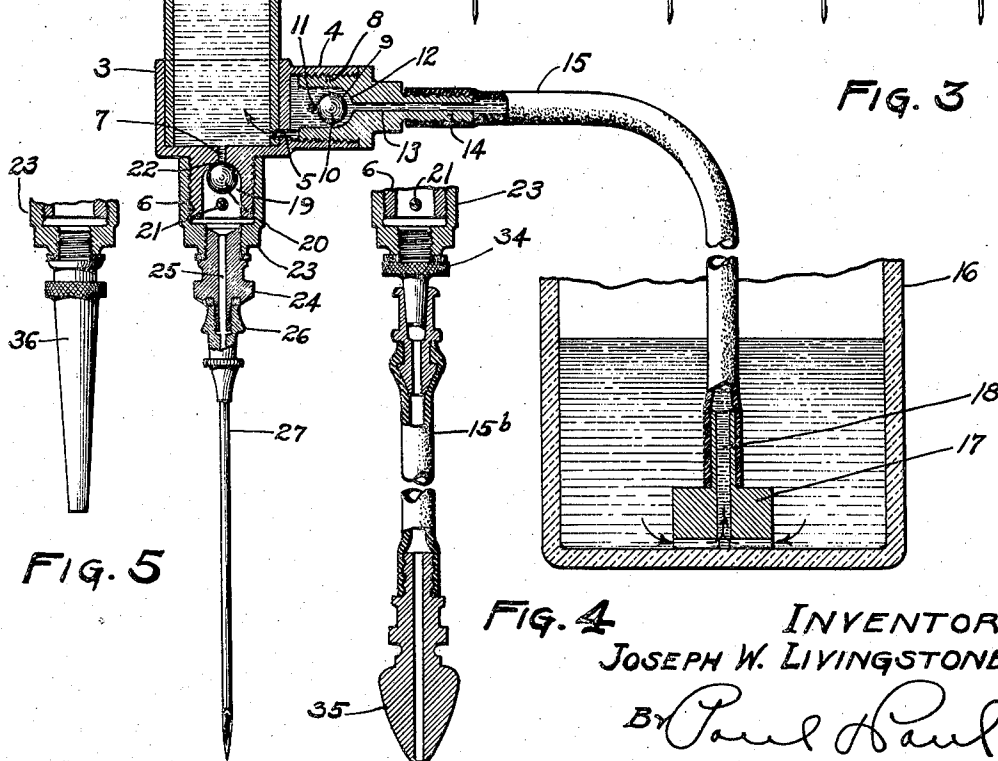


Fig. 5

Fig. 4

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JOSEPH W. LIVINGSTONE, OF HUDSON, WISCONSIN.

SYRINGE.

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To all whom it may concern:

Be it known that I, JOSEPH W. LIVINGSTONE, a citizen of the United States, resident of Hudson, county of Saint Croix, State of Wisconsin, have invented certain new and useful Improvements in Syringes, of which the following is a specification.

My improved syringe is adapted for a variety of purposes in the practice of medicine and surgery. The primary object of the invention is to provide a syringe which can be filled without placing the needle in the tissue or closing the end of the needle, no air being allowed to enter the barrel of the syringe or be forced from the syringe into the tissues or blood vessels.

A further object is to provide a syringe which can be used as an aspirator in removing fluid from the pleural or abdominal cavity, no air being allowed to enter the cavity during the operation.

A further object is to provide a syringe which can be used for the direct transfusion of blood with no danger of forcing air into the blood vessels.

A further object is to provide a syringe adapted for the injection of fluids into the tissues to combat shock following injury or prolonged operations.

A further object is to provide a syringe which can be easily and quickly adapted for douche or spraying purposes.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification,

Figure 1 is a longitudinal sectional view through a syringe embodying my invention, illustrating its use for injecting a liquid into the tissues,

Figure 2 illustrates the adaptation of the device for injecting fluids at two points into the tissues, following injury or long operations,

Figure 3 illustrates the syringe adapted for the direct transfusion of blood,

Figures 4 and 5 illustrate how the syringe may be adapted for use as a douche or for spraying purposes.

In the drawing, 2 represents the syringe barrel, made of metal, glass or any other suitable material. At one end the syringe barrel has a cap 3 provided on one side with an interiorly threaded nipple 4 communi-

cating through a port 5 with the interior of the barrel. The exteriorly threaded nipple 6 is formed on the cap 3 and communicates through a port 7 with the syringe barrel. An exteriorly threaded plug 8 is fitted into the nipple 4 and has a valve chamber 9 in which is arranged a ball valve 10 having a limited movement in said chamber between the pin 11 and the seat 12 at the entrance of a duct 13 which extends through the plug 8 and through a nipple 14 formed thereon. This nipple has a grooved outer surface and is adapted to be inserted into the end of a piece of tubing 15 that is inserted into a fluid containing receptacle 16 and is provided with a weight 17 having a port 18 therein through which the fluid is conducted to the tubing and from thence to the syringe barrel. Within the nipple 6 is a valve chamber 19 adapted to receive a valve 20 which has freedom of movement between a pin 21 and a seat 22 adjacent the duct 7 through which the fluid in the syringe barrel is discharged. An interiorly threaded cap 23 is adapted to receive the nipple 6 and a plug 24 is tapped into said cap and has a duct 25 therein and a nipple 26 adapted to receive the end of a hypodermic needle 27 of ordinary construction. A plunger 28 is mounted in the barrel 2 and is provided with a thumb grip 29 and corresponding finger grips 30 are mounted on the barrel to be grasped by the user for holding the barrel in the desired position while the plunger is being manipulated to draw the fluid into the syringe barrel through the inlet and to discharge said fluid through the outlet.

The device as shown in Figure 1 is adapted for the injection of a fluid into the tissues without the necessity of first inserting the needle into the tissues or closing the end of the needle. When the plunger is withdrawn to the position indicated in this figure, the fluid in the receptacle will flow up through the tubing into the barrel, the check valve opening for this purpose, and simultaneously the check valve 20 will close, preventing the entrance of air into the barrel and eliminating the necessity of closing the end of the hypodermic needle either by inserting it into the tissues or closing the orifice in the end of the needle.

When the syringe barrel has been filled, the user may force the plunger into the barrel, discharging the fluid through the needle and simultaneously closing the check valve

in the passage leading to the fluid receptacle. Thus the valves will alternate in operation, one opening and the other closing as the plunger is reciprocated.

5 It is often desirable to inject a fluid at different points in the tissues to combat shock following a severe injury or in cases where an operation has been unexpectedly prolonged. My syringe is adapted for such
10 uses. The single needle is removed and in place thereof a Y 31 is substituted, having tubes 32 and 33 thereon provided with needles corresponding to the one described. The method of operation is the same as described
15 with reference to Figure 1.

The apparatus can also be used for the direct transfusion of blood without any danger of forcing air into the blood vessels. In such cases I mount a hypodermic needle on
20 the end of the inlet tube 15 and insert this needle into the blood passage of the donor. A section of tubing 15^a is mounted on a coupling 34 that is fitted into the outlet nipple and the hypodermic needle on the tubing
25 15^a is then inserted into the blood vessel of the recipient and with the movement of the syringe plunger the blood is transfused without exposure to the air and without possibility of air entering the blood vessels.

30 In Figure 4 the coupling 34 is shown connected to a section of tubing 15^b on which is a nozzle 35 and in Figure 5 another form of nozzle 36 is shown. With these nozzles the syringe is adapted for douching or spray-
35 ing purposes.

I claim as my invention:

1. A syringe comprising a barrel, a detachable cap having inlet and outlet valve chambers therein, the outlet valve chamber

being integral with the cap and the inlet 40 valve chamber being detachable from said cap, valve seats and ball valves thereon, whereby said syringe may be easily taken apart and sterilized, an inlet passage at the bottom of the inlet valve chamber connecting 45 said valve chamber with the barrel whereby air that might enter the inlet valve chamber would be trapped therein when fluid is being pumped through said chamber into the barrel and out through the outlet chamber. 50

2. A syringe comprising a barrel, a piston, the outward surface of which closely fits within the barrel throughout its length and which, therefore, may be easily removed from the barrel for sterilization purposes, 55 said barrel having a cap at one end, an opening in the side of the barrel registering with an inlet opening in the cap, said cap having also an outlet passage, valve seats and valves, said cap being also removable 60 from said barrel for sterilization purposes.

3. A syringe comprising a barrel, a piston of the same dimensions throughout as the interior of the barrel, said barrel having also at one end a detachable cap, said cap 65 having detachable inlet and outlet connections, valves, valve seats and valve chambers adapted to be easily sterilized, the inlet valve chamber being connected at its bottom to said barrel whereby the syringe may be 70 easily taken to pieces and sterilized and any air drawn in with the fluid through the inlet chamber will be trapped therein and will not be projected through the outlet valve chamber to injure the patient. 75

In witness whereof, I have hereunto set my hand this 5th day of June, 1922.

JOSEPH W. LIVINGSTONE.