Sept. 13, 1927. 1,641,976

A. A. LAURENT

HYPODERMIC SYRINGE

Filed Aug. 21, 1926

Fig.-2.

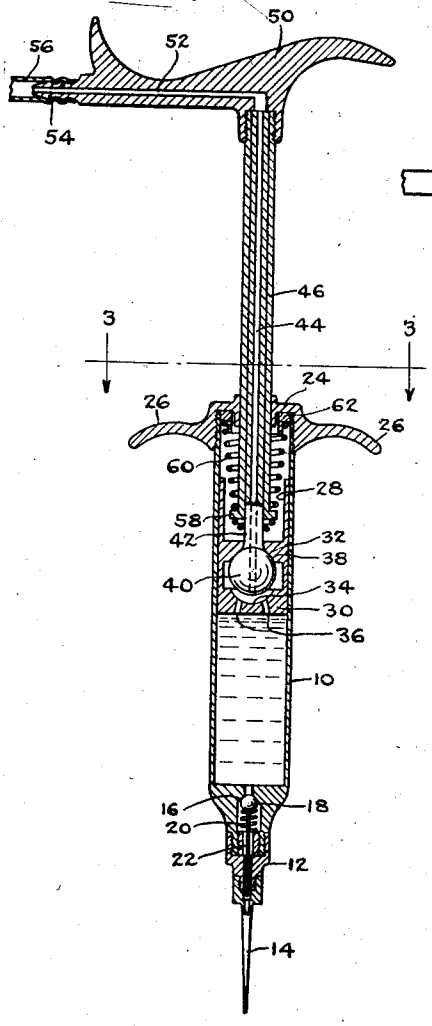
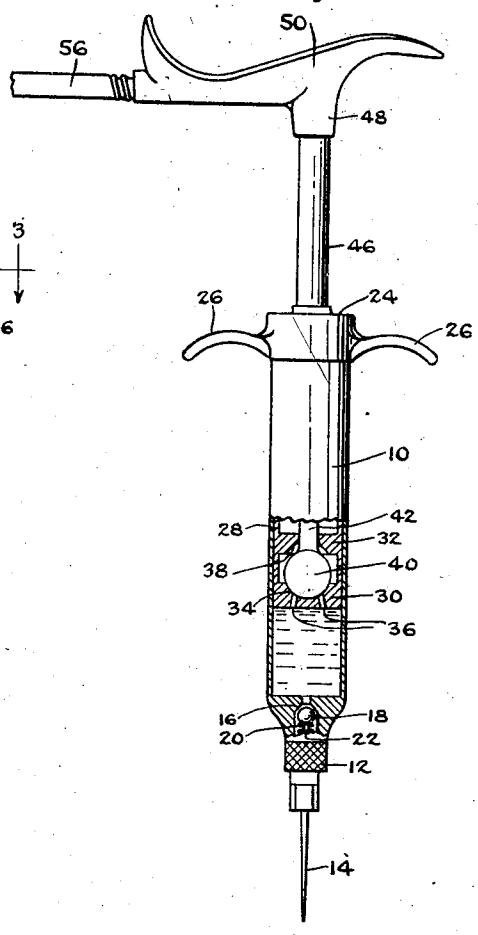


Fig.-1



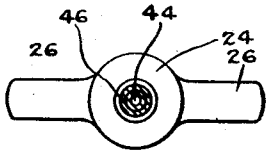


Fig.-3

Inventor:
A. A. Laurent.
By Whiteley and Ruckman
Attorneys.

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UNITED STATES PATENT OFFICE.

ANTOINE A. LAURENT, OF MINNEAPOLIS, MINNESOTA.

HYPODERMIC SYRINGE.

Application filed August 21, 1926. Serial No. 130,761.

My invention relates to hypodermic syringes, and has for an object to provide a syringe which can be held and operated with great convenience and which can be maintained filled with a supply of liquid to be injected hypodermically into the human body. This syringe is employed to inject liquid into the human body for the production of what is known as local anæsthesia, and may also be used for injecting serums and vaccines. It is essential for producing local anæsthesia to introduce relatively large quantities of the liquid into the area to be anæsthetized and it is therefore desirable that a syringe be provided which can be refilled or kept in filled condition without having to remove the hypodermic needle after it has been inserted. This invention is in the nature of an improvement on Patent No. 1,367,008 granted Feb. 1, 1921, to A. N. Bessessen, and involves an improvement on the valve construction and arrangement disclosed in said patent.

The full objects and advantages of my invention will appear in connection with the detailed description thereof, and the novel features of my inventive idea will be particularly pointed out in the claims.

In the accompanying drawings which illustrate a practical embodiment of my invention,—

Fig. 1 is a view of the device partly in elevation and partly in central vertical section and showing the plunger moved inwardly. Fig. 2 is a view of the device in central vertical section showing the plunger moved outwardly. Fig. 3 is a view in cross section on the line 3—3 of Fig. 2.

Referring to the drawings for the purpose of describing the invention in detail, the syringe comprises a cylindrical barrel 10 which at its forward end is threaded to receive a perforated cap 12. This cap is in turn threaded at its forward end to receive a hypodermic needle 14. The interior of the forward end of the barrel 10 is provided with a valve seat 16 with which a forwardly opening check valve 18 is adapted to cooperate, being normally held upon the valve seat by a spring 20. The valve 18 is in the form of a ball to which is secured a stem 22 extending out through the passage in the cap 12 but smaller than this passage so as not to prevent the flow of liquid therethrough. The rear end of the barrel 10 is provided with a screw cap 24 having two lateral diametrically opposed curved finger grips 26. Slidable in the barrel 10 is a hollow plunger 28 having a head 30 at the lower end thereof, and a transverse partition 32 intermediate the upper and lower ends. The upper surface of the head 30 is provided centrally with a rounded recess 34 from which perforations 36 extend to the lower surface of the head. These perforations are located outside of the axial line of the plunger. The lower side of the partition 32 is provided centrally with a rounded recess 38. The recesses 34 and 38 constitute seats for a ball valve 40 having a limited movement between the two seats. A rod 42 extends upwardly from the ball 40, this rod being hollow to provide a passage 44 which is extended centrally through the ball. The rod 42 in effect constitutes a plunger rod. Tightly secured upon the rod 42 is a sleeve 46 which except for convenience in manufacture might be made integral with the rod. The sleeve 46 passes snugly through a central opening in the cap 24 and at its upper end is threaded to receive an internally threaded boss 48 formed on a hand piece 50 shaped to receive the palm of the hand. The hand piece 50 contains a passage 52 which communicates with the passage 44 and extends through a nipple 54 to which is attached a piece of rubber tubing 56, adapted to be connected with the source of supply of liquid. The lower end of the sleeve 46 has a flange 58 to which is anchored a coiled spring 60 whose upper end is anchored to a ring 62 held between the cap 24 and the upper end of the barrel 10.

In use, the hypodermic needle may be readily inserted where desired in the human body and with the fingers around the finger grips 26 and the palm of the hand upon the hand piece 50, pressure is exerted upon the plunger to cause the liquid below the latter to be forced through the needle into the part to be anæsthetized or into which serum or vaccine is to be injected. At the same time, the spring 60 is stretched and the ball valve moves from the upper seat 38 into engagement with the lower seat 34. Upon releasing the pressure of the hand, the spring retracts the plunger thereby producing a vacuum in the barrel below the plunger and causing liquid to flow from the source of supply into the vacuum chamber, the ball 40 then being in the position shown in Fig. 2 so that there is a free passage through the ball 40 and the

perforations 36. Upon starting to depress the plunger, the ball 40 first moves into position upon the seat 34 as shown in Fig. 1 so that back-flow of the liquid is prevented. While the ball has a limited amount of movement between the two seats, the construction in effect constitutes a ball and socket connection between the plunger and its rod so that there is no liability of the plunger being subjected to side thrust which might cause it to bind. The ball, therefore, has a three-fold function since it acts as a check valve when in the position shown in Fig. 1 and allows the liquid to pass directly therethrough when in the position shown in Fig. 2. There is a special utility for the stem 22 attached to the check valve 18 due to the fact that there is liability of this valve becoming stuck to its seat after the device has been used. When such sticking occurs, the valve is readily released by pushing sidewise on the projecting end of the stem when the needle is detached.

I claim:

1. In a hypodermic syringe having a barrel provided with an outlet opening containing an outwardly opening check valve, the combination of a plunger working in said barrel, a plunger rod, a ball on the inner end of said rod for connecting the latter with said plunger and having a limited movement with relation thereto, said rod and ball together having a passage for liquid, a perforated head for said plunger with which said ball engages when in forward position for preventing backward flow of liquid through said passage, and means for connecting the outer end of said rod with a source of liquid supply.

2. In a hypodermic syringe having a barrel provided with an outlet opening containing an outwardly opening check valve, the combination of a plunger working in said barrel, a plunger rod, a perforated head and a transverse partition for said plunger, said head and partition having rounded recesses facing each other, a ball on the inner end of said plunger rod having a limited movement between said recesses, said ball and rod together having a passage for liquid, said ball when in forward position engaging the recess in said head for preventing backward flow of liquid through said passage, and means for connecting the outer end of said rod with a source of liquid supply.

3. In a hypodermic syringe having a barrel provided with an outlet opening containing an outwardly opening check valve, the combination of a plunger working in said barrel, a spring for normally holding said plunger in retracted position, a plunger rod, a ball on the inner end of said rod for connecting the latter with said plunger and having a limited movement with relation thereto, said ball and rod together having a passage for liquid, means for preventing backward flow of liquid through said passage, and means for connecting the outer end of said rod with a source of liquid supply.

In testimony whereof I hereunto affix my signature.

ANTOINE A. LAURENT.