P. J. McELROY.

SYRINGE.

APPLICATION FILED JAN. 29, 1908.

962,657. Patented June 28, 1910.

Fig. 1.

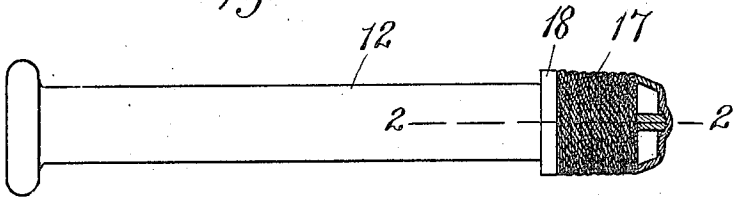


Fig. 2.

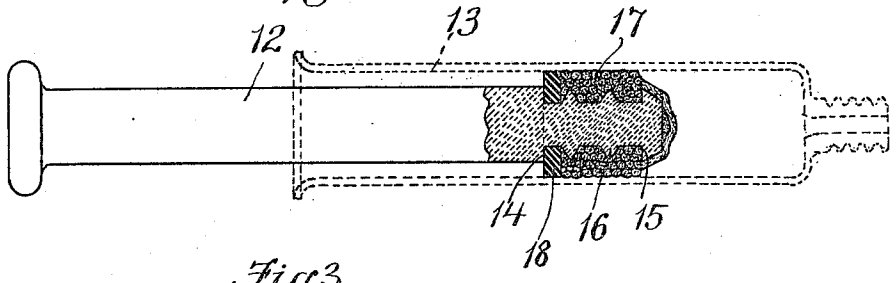


Fig. 3.

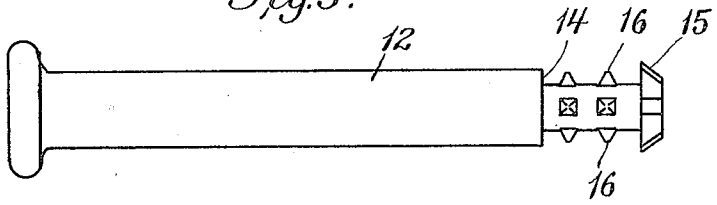
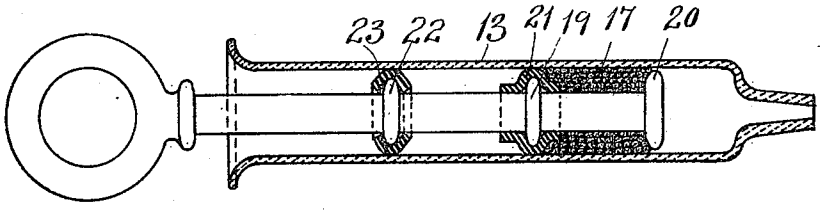


Fig. 4.



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UNITED STATES PATENT OFFICE.

PATRICK J. McELROY, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO HIMSELF, AND RANDALL-FAICHNEY COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

SYRINGE.

962,657. Specification of Letters Patent. **Patented June 28, 1910.**

Application filed January 29, 1908. Serial No. 413,241.

To all whom it may concern:

Be it known that I, PATRICK J. McELROY, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Syringes, of which the following is a specification.

This invention relates to an antiseptic syringe adapted for use as a container for a liquid to be administered in hypodermic injections through a needle attached to the barrel of the syringe, the syringe being composed of a barrel of glass or other material, and a plunger comprising an elongated rod which is movable in the barrel, and has a piston head closely fitting the interior of the barrel, and adapted to eject liquid from the barrel through the needle when the plunger is forced into the barrel. It is customary to charge a syringe of this character with a quantity of anti-toxin serum, or other liquid, to be administered when needed, so that the liquid in many cases is kept in the syringe a long time. It is very important that the liquid be kept absolutely free from danger not only of leakage, but also of contamination. The piston head is compressible, and is adapted to conform closely to the interior of the barrel, so as to have a tight sliding fit thereon. The portion of the piston head, which is in direct contact with the liquid, must be made of a compressible material which is aseptic and free from liability to harbor or develop bacteria when subjected to long continued contact with the serum employed. It is desirable that the piston head while closely fitting the interior of the barrel, be adapted to move thereon without excessive frictional resistance. It has been found that the above-mentioned requirements so far as freedom from liability to contaminate the serum is concerned, are met by a piston head composed of asbestos, and formed preferably by winding an asbestos thread or cord upon the body of the plunger, to form an enlargement adapted to fit the interior of the barrel. While asbestos is very desirable on account of its aseptic and relatively anti-frictional nature, which permits it to be moved without undue resistance in the barrel, while tightly fitting the same, it is open to the objection that it is somewhat porous, so that when subjected to long continued contact with the liquid in the syringe, some of the liquid is liable to filter through the asbestos to the rear side of the piston head. A piston head composed wholly of yielding vulcanized rubber, while preventing the leakage of the liquid around the piston, is not sufficiently aseptic. Moreover, a rubber head when made of such length as to give it a desirable extent of surface area and make it suitably strong and durable, develops after long standing so much friction on the interior of the barrel as to make the operation of the device undesirably difficult on account of the force required to move the plunger in the barrel. While this difficulty may be overcome in part by lubricating the rubber with graphite, or other similar material, this practice is objectionable because particles of the graphite may become loose and mingle with the serum. I have found that by combining an aseptic, relatively anti-frictional, although porous, material, such as asbestos, and a non-porous liquid-proof material, such as rubber, in such manner as to form a piston head of which the anti-frictional material will form the outer portion in contact with the liquid, I am enabled to produce a piston head which is not only aseptic, but is adapted to be operated without excessive frictional resistance, and is also liquid tight, so that none of the liquid charge will work back between the piston head and the interior of the barrel, even though the syringe is left charged for a long time.

My invention, therefore, is embodied in a syringe, comprising a tubular barrel and a plunger having a compressible head closely fitting the interior of the barrel, said head being composed in part of an aseptic relatively anti-frictional material, such as asbestos, and in part of a liquid-proof material, such as rubber, the aseptic material being the only part of the head which is in contact with the body of liquid.

Of the accompanying drawings, forming a part of this specification,—Figure 1 represents a side elevation of a syringe plunger embodying my invention. Fig. 2 represents a section on line 2—2 of Fig. 1, the syringe barrel being shown in dotted lines. Fig. 3 represents a side view of the body of the plunger without the compressible head.

Fig. 4 represents a view similar to Fig. 2, showing a somewhat different construction of the plunger.

The same figures of reference indicate the same parts in all the figures.

In the drawings, 12 represents the elongated body of a syringe plunger, the same being composed preferably of glass, and provided at its inner end portion with shoulders adapted to engage the compressible material which forms a piston head adapted to have a close sliding fit on the interior of the usual syringe barrel 13, the latter being also preferably of glass. In the construction shown in Figs. 1 and 2, the plunger body 12 is reduced at its inner end portion to form two oppositely facing shoulders 14 and 15. The reduced portion between said shoulders is preferably provided with intermediate projections 16 adapted to engage the compressible material of the head.

The outer portion of the compressible head or that which is nearest the discharge end of the barrel, and therefore is in contact with the body of liquid forming the charge of the syringe, is of an aseptic material such as asbestos, and is preferably a winding 17 of asbestos thread or cord, wound upon the reduced portion of the body, as thread is wound upon a spool, an annular body of asbestos being thus formed on the reduced end portion of the body. The diameter of the winding is such that its periphery closely fits the interior of the barrel 13, and is slightly compressed thereby. In the embodiment of my invention shown in Figs. 1 and 2, the liquid-proof member of the head is a washer or washers 18 composed of yielding vulcanized rubber interposed between the shoulder 14 and the inner end of the asbestos winding 17, the diameter of the rubber washer or washers 18 being substantially equal to that of the winding 17. A piston head is thus produced, the greater part of the surface area of which is composed of aseptic and relatively anti-frictional material. The member 18 of the piston head is relatively narrow, so that while it closely fits the interior of the barrel, and prevents the leakage of liquid around the piston head, it does not offer excessive frictional resistance to the movement of the head in the barrel, and does not come in contact with the body of the charge of liquid.

In Fig. 4 I show the plunger body 12 provided with a peripheral enlargement or ridge 19, and an end flange 20. 21 represents an elastic rubber sleeve or collar formed to contract into engagement with the ridge 19. The asbestos winding 17 is applied between the rubber collar 21 and the flange 20 so that the completed head has its outer portion composed of the asbestos winding, and its inner portion composed of the narrow peripheral edge of the rubber collar 20. In all cases, the area of the rubber or other non-porous portion or portions is to be reduced to the minimum, having in view the utilization of the non-porous material to prevent leakage of the liquid between the piston head and the barrel, and the interposition of the aseptic material between the non-porous material and the charge of liquid. The plunger body 12, shown in Fig. 4, is provided with an annular cushion or buffer 23, preferably formed by allowing an elastic rubber collar to contract upon a peripheral ridge 22 formed on the body. The barrel 13 has an opening at one end, of the same diameter as the interior of the barrel, and the plunger body, which is of smaller diameter than the interior of the barrel, passes through said opening. The body is therefore adapted to be tilted against the wall of the barrel. The function of the yielding collar or buffer 23 is to prevent injurious contact between the body and the barrel.

I do not limit myself to the materials hereinbefore specified, although the same are the preferred materials.

I claim:

A syringe comprising a tubular barrel and a plunger having a compressible head closely fitting the interior of the barrel, said head including two separate members of substantially equal diameters possessing different degrees of elasticity and having different surface areas, one of said members consisting of an aseptic relatively anti-frictional portion of material such as asbestos, and the other member being relatively smaller and consisting of a liquid-proof relatively frictional portion of material such as rubber, both portions being in contact with the barrel.

In testimony whereof I have affixed my signature, in presence of two witnesses.

PATRICK J. McELROY.

Witnesses:

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