A. ROESCH.

HYPODERMIC SYRINGE AND CARTRIDGE THEREFOR.

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Fig. 1.

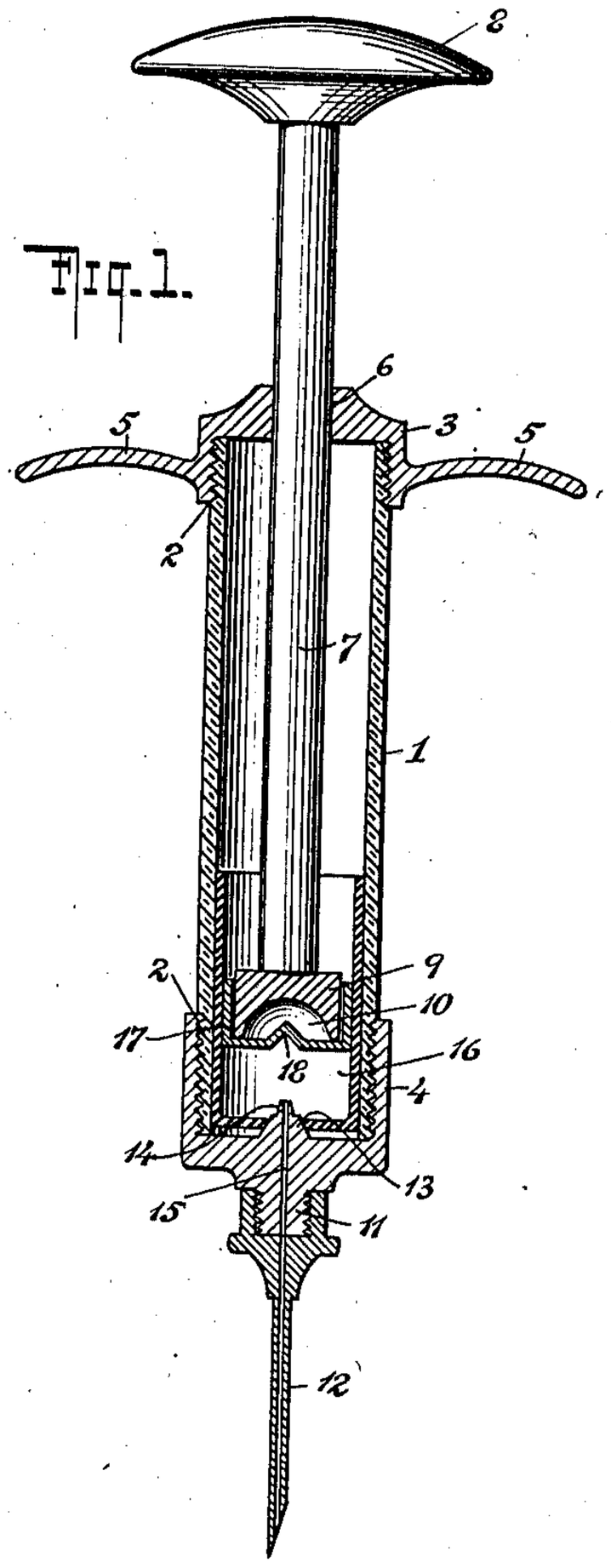


Fig. 2.

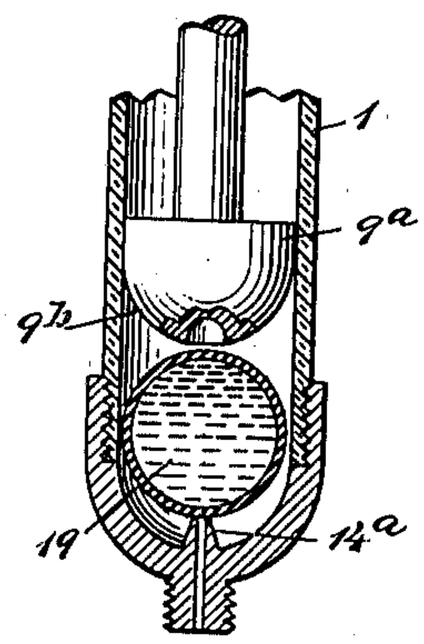


Fig 3.

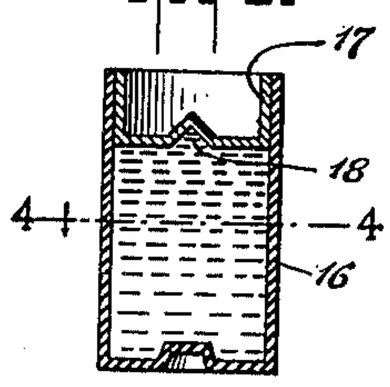
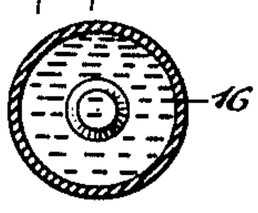


Fig. 4.



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HYPODERMIC SYRINGE AND CARTRIDGE THEREFOR.

978,488. Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed March 2, 1910. Serial No. 546,799.

To all whom it may concern:

Be it known that I, ALFRED ROESCH, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Improvement in Hypodermic Syringes and Cartridges Therefor, of which the following is a specification.

My invention relates to hypodermic syringes and has for its object to construct such syringes in a manner to permit the use of a cartridge or capsule in connection therewith, which capsules or cartridges each contain a predetermined amount of solution or matter to be injected and which are provided with a closing cap capable of being forced axially of said cartridges in the capacity of a plunger to eject the contents thereof. Heretofore it has been necessary in each particular and separate instance for the physician to carefully prepare the solution or other material to be injected. As in most cases only a small quantity of injection material is needed at one time and as it is often difficult to properly prepare such material in these small quantities, it is necessary to prepare a larger supply than is required; so that ofttimes on account of the nature of the matter used in the syringe the surplus thereof spoils before it can be again used thus resulting in a great waste of material. Furthermore if it becomes necessary for the physician to prepare an injection in a hurry a mistake in ingredients is likely to be made ofttimes endangering the life of the patient.

The particular object of my invention is to overcome these objections and to provide a receptacle for a fixed amount of material which may be carefully prepared under most favorable circumstances so that a mistake in the compounding thereof is not likely to occur. Also, by having each receptacle or cartridge contain such fixed amount, to make it unnecessary for the physician to carefully watch the usual graduations and to carefully manipulate the syringe in order to inject the proper amount of material.

Another object of my improvement is to keep the usual piston or the inside surface of the syringe barrel from coming into contact with the matter to be injected so that if these parts should happen to be in an infected condition and not perfectly clean there is no danger of the infection and unclean matter being transmitted to the patient.

My invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings in which—

Figure 1 is a central longitudinal sectional view of a syringe with my improvement applied thereto; Fig. 2 is a similar view of a portion of another form of syringe; Fig. 3 is an enlarged detail section of the cartridge or capsule used in connection with my improved syringe and Fig. 4 is a horizontal section thereof on the line 4—4 of Fig. 3.

In the drawings 1 represents the usual barrel of the syringe which may be made of any suitable material as for instance glass and which is provided with oppositely screw-threaded ends 2 adapted to receive the caps 3 and 4. The cap 3 is provided with oppositely extending finger pieces 5 for manipulating the syringe and further has a central aperture 6 for the accommodation of the customary piston rod 7. The said piston rod 7 carries an operating head 8 at one end and at its opposite end is provided with a piston or plunger 9 which may be integral therewith or a separate element secured thereto as desired and which has a recess 10 formed in its lower face. It will be noticed that the diameter of the piston or plunger 9 is somewhat smaller than the interior diameter of the syringe barrel so that an annular space is formed between the interior surface of said syringe barrel and the exterior periphery of said plunger the purpose of which will be more fully disclosed hereinafter.

The cap 4 is provided with an externally screw-threaded neck 11 arranged to receive the usual hypodermic needle 12. The said cap 4 is further provided centrally of the horizontal surface which is adjacent to the discharge end of the barrel 1 with an inwardly extending projection 13 preferably cone shaped and formed with an inwardly projecting point 14. A channel or passage 15 extends centrally through said cap from the extreme inner or free end of the point 14 to the free end of the neck 11 and serves to establish communication between the interior of the syringe barrel 1 and the hypodermic needle 12.

A cartridge or capsule 16 formed to correspond to the interior shape of the syringe barrel and to slidably fit therein is adapted

to contain the solution or other matter to be injected. This cartridge may be made of any suitable material such as metal, celluloid or gelatin the only requirement being that the material must be proof against attack by the matter which it contains, and preferably should be of such a nature as to be readily punctured by the point 14 as will be more fully disclosed hereinafter. Each cartridge is of a capacity to contain a predetermined amount of material suitable for special and all purposes and is preferably marked to indicate the nature of its contents as well as the quantity thereof. The open end of said cartridge 16 is hermetically closed by means of a cup shaped or dished closure 17 which is preferably held in position in said cartridge merely by friction and is provided with a recess 18. The combined thickness of the vertical walls of the cartridge and the corresponding walls of the closure is such as to readily extend into the annular space between the barrel and the piston, which piston is of a diameter to easily slide into the cup shaped closure and to snugly fit the same.

In operation when it is desired to use the syringe the cap 3 is unscrewed and the piston 9 and piston rod 7 removed from the barrel. A cartridge 16 containing the matter to be injected in proper proportions and of the required amount necessary for the particular case in hand is then slipped into said syringe barrel. After this has been done the cap 3 is again secured in position on the barrel and the piston rod and piston pushed inwardly so as to force the said cartridge toward the discharge end of the syringe. As the said cartridge is thus forced home the bottom thereof will finally engage the point 14 which as the pressure on the piston continues will be forced through said bottom so as to puncture it and thus establish communication between the interior of the cartridge and the hypodermic needle, after which the syringe is ready for use. A further inward pressure of the piston will now cause the closure 17 to slide lengthwise of the cartridge 16 so as to expel the contents thereof through the passage 15 and then through the needle 12 until finally the said closure reaches the bottom of the cartridge in which position the point 14 extends into the recess 18 and does not puncture the bottom of said closure. The recess 10 of the piston 9 is provided for the purpose of accommodating the inwardly extending portion of the bottom of the closure which forms the walls of the recess 18.

With my improvement a predetermined amount of injecting material is supplied which has been carefully and sanitarily prepared and which is protected against contamination before use. Owing to the fact that this injecting material does not contact with the syringe cylinder it is not essential that the said cylinder be sterilized before use. Furthermore the said contents are protected against infection from the piston or plunger which as it is surrounded by the closure 17 cannot come into contact with said contents as clearly shown in Fig. 1. This closure 17 thus acts in the nature of a protector as well as a plunger to expel the injecting matter and does away with leaky and otherwise troublesome pistons owing to the fact that said closure may readily be made to fit the said cartridge as snugly as desired. By providing this previously prepared and measured injection the danger of a mistake in mixing being made by a physician in a hurry is done away with and the necessity for the usual graduations on either the piston rod or the syringe barrel is also obviated. A careful manipulation of the syringe is thus unnecessary to guard against an overdose of injecting matter as all that is necessary in using the syringe is to insert a cartridge with the required amount of matter therein and then force the piston home so as to expel the entire previously measured contents of said cartridge. As any number and variety of these loaded cartridges may be carried about or in stock a great deal of time in mixing is saved. Furthermore as the said cartridges are easily and cheaply made it is unnecessary to use the same more than once so that after one cartridge has been emptied and used it is simply removed from the syringe and discarded. The patient is therefore securely guarded against infection from unclean syringes or from solutions which may have become infected after mixing by being kept in an exposed condition and location and with only ordinary precaution to use the correct cartridge is also exempt from the danger of overdose of injecting material.

Instead of making the syringe of a shape to accommodate cylindrical and angular cartridges the same may be made as shown in Fig. 2 for use in connection with capsules or cartridges of spherical or oval conformation. In the illustration a gelatin capsule 19 is shown in position in the barrel and the piston 9^a is formed with a rounded or convex surface 9^b. As this piston is moved inwardly it will force the capsule toward the point 14^a which will puncture said capsule in the same manner as hereinbefore described. A continued operation of the piston will compress said capsule without however breaking the walls thereof and force the contents through the hypodermic needle. In this instance the material of which the capsule is made serves to protect the contents against contact either with the barrel 1 or with the piston 9^a. Otherwise this form of my invention may be constructed in the same manner as is the syringe shown in Fig. 1.

Various modifications and changes in the specific forms shown and described may be made within the scope of the claims without departing from the nature of my invention.

Claims:

1. A syringe comprising a barrel having a discharge end, a receptacle for containing a predetermined amount of fluid removably secured in said barrel and communicating with said discharge end, a separate closure for one end of said receptacle movable lengthwise thereof and means for moving said closure lengthwise of said receptacle to expel the contents thereof.

2. A syringe comprising a barrel having a discharge end, a receptacle for containing a predetermined amount of fluid removably secured in said barrel, means for establishing communication between said receptacle and said discharge end, a cap or closure for closing one end of said receptacle and a plunger movable in said barrel and adapted to engage said cap and move it lengthwise of said receptacle to discharge the contents thereof.

3. A syringe comprising a barrel having a discharge end, a receptacle for containing a predetermined amount of fluid removably secured in said barrel and communicating with said discharge end, a cup shaped closure for one end of said receptacle movable lengthwise thereof and a movable plunger adapted to closely fit said closure and arranged to move it to expel the contents of the receptacle.

4. A syringe comprising a barrel, a receptacle for containing a predetermined amount of fluid removably secured in said barrel, a projection provided with a passage and arranged to puncture the bottom of said receptacle and establish communication with the discharge end, a cup-shaped closure for closing the one end of said receptacle and slidable lengthwise thereof, and a plunger movable in said barrel and adapted to fit in said cup-shaped closure to move it lengthwise of the receptacle for discharging the contents thereof.

5. A syringe comprising a barrel having a discharge end, a receptacle made of easily punctured material in said barrel for containing a predetermined amount of fluid, permanently fixed means in said barrel for puncturing said receptacle and establishing communication with the discharge end and means for expelling the contents of the receptacle.

6. A syringe comprising a barrel having a curved discharge end, a permanently fixed projection having a passage therethrough and located in said barrel adjacent to said discharge end, a receptacle of soft material for a predetermined amount of fluid arranged to be forced over said projection and to be punctured thereby and a plunger having a curved end for compressing said receptacle and expelling the contents thereof.

7. A cartridge for syringes comprising a tubular receptacle having a closed and an open end and adapted to contain a predetermined amount of fluid and to be inserted in the barrel of a syringe and a separate closure adapted to seal the open end of said cartridge and slidable lengthwise thereof to eject the fluid.

8. A cartridge comprising a tubular receptacle having a closed and an open end and adapted to contain a predetermined amount of fluid and to be inserted in the barrel of the syringe and a separate cup-shaped closure for sealing the open end of said cartridge and slidable lengthwise thereof to eject the fluid.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALFRED ROESCH.

Witnesses:
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