

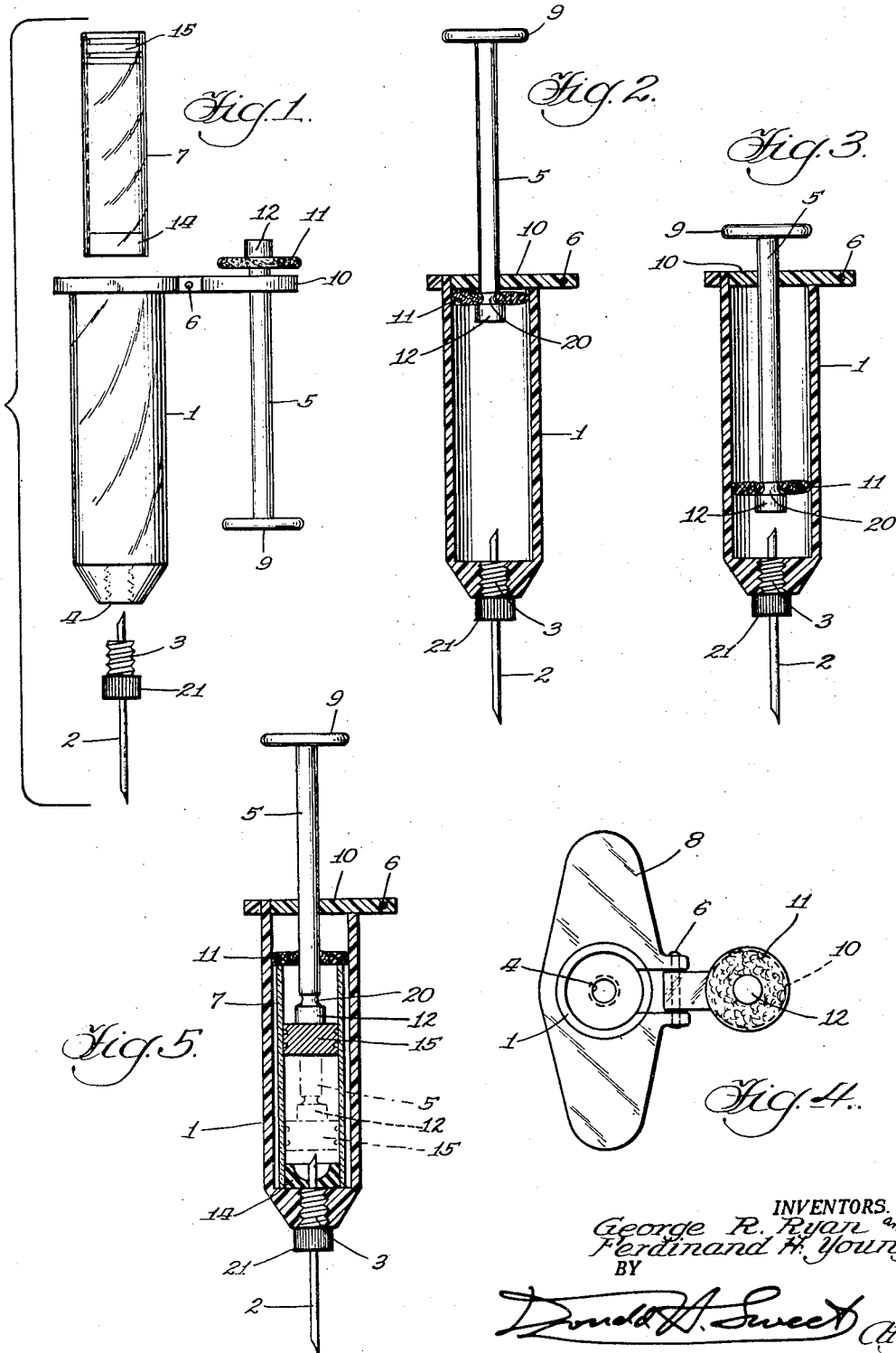
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HYPODERMIC SYRINGE

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HYPODERMIC SYRINGE

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The present invention relates to medical hypodermic syringes and more particularly to syringes for use with the standard or conventional medicament cartridge or capsule.

Hypodermic syringes of various types and constructions are well known and widely employed in the medical profession. Among the various types of syringes in common usage are ones utilizing a capsule or cartridge containing liquid or medicament for injection. The capsule is an elongated glass cylinder having a plug or stopper at each end, and the stopper is generally flush with the edge of the cylinder. With capsules of this type one of the plugs generally remains stationary and the other plug acts as a piston to force a liquid out of the capsule through a needle inserted through either of the plugs. Such a capsule is very convenient for use, as the medicament can be sterilized by the manufacturer and may be dispensed directly from the capsule, requiring very little sterilized apparatus. These glass cylinder containers have become quite prevalent for very viscous and oily medicinal preparations. This is particularly true in the case of penicillin-oil preparations, which are usually viscous suspensions. For these containers, special hypodermic syringes are required, and the majority of the syringes are of the disposable type, thereby increasing greatly the cost of the injections.

Among the objects of the present invention is to make an economical and efficient hypodermic syringe for use with the cylinder type container. Another object of the invention is to produce a syringe which is capable of being aspirated to make certain that the needle is not in a blood vessel. This overcomes the disadvantages of most disposable syringes, in which it is not possible to aspirate.

Other and further advantages will be understood and appreciated by those skilled in this field or will be apparent or pointed out hereinafter.

In the accompanying drawings:

Fig. 1 is an elevation of a syringe according to our invention;

Fig. 2 and Fig. 3 are sections of the syringe as used in aspirating;

Fig. 4 is a plan view of the syringe; and

Fig. 5 is a sectional view of a syringe with a cartridge in injection position.

In the embodiment of Fig. 1, we have shown the main body of the hypodermic syringe 1, the double ended cannula 2 with an intermediate threaded boss 3 of plastic, for engaging the out-

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let 4, which is also threaded to fit the boss. The piston plunger 5 is shown in Fig. 1 in the external position being folded back away from the body 1, around the hinge 6. The standard cylinder cartridge 7, is in position to be inserted into the syringe body 1. The syringe has manipulating handles 8 for grasping the same, and a thumb rest 9 on the plunger 5, completes the handle grip.

The hypodermic syringe is assembled for use by engaging the boss 3 of the cannula 2 with the outlet 4 of the body, and the plunger 5 is turned on its hinge 6 and inserted into the syringe as shown in Fig. 2. In this position the plunger guide 10 is in the open end of the syringe body 1, centrally aligning the plunger with the body. The resilient washer or gasket 11 engages the interior walls of the syringe body in light frictional engagement. The plunger 5 is pushed toward the cannula 2, toward the position shown in Fig. 3, and the cannula is inserted into the patient. The plunger is then withdrawn from the lower position causing an aspiration effect. If the cannula is in a blood vessel, blood will be drawn into the syringe by the aspirating effect. If the cannula is in a blood vessel the syringe must be withdrawn from the patient and reinjected until it is not in a blood vessel. With the cannula correctly inserted in the patient the plunger 5 is withdrawn from the syringe body 1, and the cartridge 7 is placed in the syringe. With the cartridge in place, the plunger 5 is again turned on its hinge and inserted into the syringe body. The plunger 5 is depressed toward the cannula moving the cartridge before it. The plunger end 12 is adapted to freely fit the interior of the cartridge 7 so that the stopper 15 may be pushed into the cartridge acting like a piston. The initial portion of the stroke of the plunger forces the cartridge 7 against the cannula 2, so that the cannula pierces the lower stopper 14 and enters the cartridge interior. Further depression moves the upper stopper 15 toward the lower stopper 14, discharging the contents of the cartridge through the cannula.

The gasket 11 is slidable on the piston, but the normal resting place is in an annular groove 20 adjacent the plunger stop. The gasket will remain in the groove during the aspiration procedure by proportioning the dimensions of the gasket, such that the frictional force between the gasket and the syringe body is less than the force necessary to move the gasket out of the groove. With the cartridge in place in the syringe body, the plunger end or stop rests on the upper stop-

per of the cartridge. The gasket aids in centering the plunger squarely on the stopper. The initial depression of the plunger forces the cartridge downwardly onto the cannula, and further depression moves the upper stopper in a piston-like action in the cartridge. The gasket is retained by the top edge of the cartridge, moving out of the annular groove and sliding on the plunger, as the plunger pushes the stopper downwardly. When the plunger is withdrawn from the cartridge, the plunger guide retains the gasket which slides on the plunger back to its normal resting point in the annular groove on the piston plunger. When the gasket is in its normal resting position on the plunger, further withdrawal of the plunger will move the plunger guide out of its position in the syringe body opening, and the plunger is turned around the hinge, out of operative position. The plunger stop 12 prevents the plunger 5 from being pulled through the plunger guide 10 and at the same time prevents the gasket 11 from being moved out of the groove 20 and off the plunger. The plunger stop provides a positive means for holding the gasket on the plunger.

The only element of the embodiment shown in Fig. 1 which requires sterilizing is the cannula, since it is the only element which touches either the patient or the medicament. To facilitate manipulation of the cannula, a knurled handle section 21 is provided adjacent the boss 3. The syringe, the plunger and the gasket need merely be washed after each injection.

When the syringe is aspirated as above and if blood is withdrawn through the cannula, unless the volume of blood is large, it may remain in the body 1. If the volume of blood is large, the syringe is disconnected from the cannula and blood is washed out of the syringe. The cannula is then reconnected and another injection made.

Utilizing the embodiment of Fig. 1 the syringe body may be used repeatedly, thereby lowering the cost of the injection. The detachable cannula may be constructed as a non-disposable needle, as by having a metallic boss 3. Such a cannula may be sterilized and used repeatedly.

The plunger 5, as shown, is attached to the body by means of the hinge 6. The plunger need not be attached or some other type of hinge may be utilized. It is desirable to have a hinge connecting the plunger with the body to facilitate the operation of the syringe and to hold the plunger guide in a relative position.

In the embodiment shown, the body 1 and the plunger 5 may be made of a transparent plastic or other suitable material, which may be washed and reused many times. The plastic, however, provides a durable, practically non-breakable syringe. The gasket 11 is preferably of soft rubber material frictionally fitting the plunger 5 and body 1, giving a weak aspiration effect, which is sufficient to ascertain whether or not the needle is in a blood vessel.

Others may readily adapt the invention for use under various conditions of service by employing one or more of the novel features disclosed or equivalents thereof. It will, for instance, be obvious that the construction may be modified by having the plunger separate from the body or various attaching devices between the plunger and the body. As at present advised with respect to the apparent scope of our invention we desire to claim the following subject matter.

We claim:

1. A hypodermic syringe comprising, in combination: a barrel having one end open; means at

the other end for detachably engaging a cannula; a plunger having one end insertable in said barrel; a resilient gasket slidable on said plunger and in said barrel; stop means on the insertable end of said plunger for positively retaining said gasket; and an annular groove adjacent said stop means; said annular groove being the normal resting place of said gasket; said groove resisting the sliding movement of said gasket on said plunger, when said gasket is seated in said groove, up to a predetermined force greater than the friction between said gasket and said barrel; whereby said gasket can be inserted and moved down in said barrel by axial thrust on said plunger only, to permit subsequent withdrawal to exert an aspirating action; said groove releasing said gasket under forces in excess of said predetermined force, such as that resulting from abutment of said gasket with the end of a cartridge tube telescopically receiving the plunger end.

2. A hypodermic syringe comprising, in combination: a cylindrical barrel; a sterile cannula removably insertable in one end of said barrel; a plunger of a size to telescope inside a cartridge inserted in said barrel; and aspirating means on said plunger of a size to fill said barrel and function as a piston in the absence of a cartridge.

3. Hypodermic syringe equipment comprising, in combination: a cylindrical barrel; an actuating plunger small enough to telescope inside a cartridge placed in said barrel; and annular piston means on said plunger large enough to engage the wall of the barrel and function as a piston; a retaining connection between said piston means and plunger for positively preventing said piston means from slipping off the end of said plunger; a releasable connection between said piston means and plunger for holding said piston means in a predetermined position near the inner end of said plunger up to a predetermined axial thrust, and then yielding to permit said piston means to be dislodged and move axially away from the end of said plunger; and a slidable friction connection for resisting any relative axial movement between said dislodged piston means and said plunger; said retaining connection being an annular stop near the end of said plunger, constituting part of said plunger; said releasable connection being a recess in said plunger adjacent said stop, and a resilient piston portion shaped to fit in said recess; said friction connection being said resilient piston portion and a cylindrical portion of said plunger large enough to distort said resilient piston portion and extending from said recess axially away from said stop.

4. Hypodermic syringe equipment comprising, in combination: a cylindrical barrel; an actuating plunger small enough to telescope inside a cartridge placed in said barrel; and annular piston means on said plunger large enough to engage the wall of the barrel and function as a piston; a retaining connection between said piston means and plunger for positively preventing said piston means from slipping off the end of said plunger; a releasable connection between said piston means and plunger for holding said piston means in a predetermined position near the inner end of said plunger up to a predetermined axial thrust, and then yielding to permit said piston means to be dislodged and move axially away from the end of said plunger; and a slidable friction connection for resisting any relative axial movement between said dislodged piston means and said plunger, up to a predetermined force of a magni-

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tude easily exceeded by the physical strength of the operator.

5. Hypodermic syringe equipment comprising, in combination: a cylindrical barrel; an actuating plunger small enough to telescope inside a cartridge placed in said barrel; annular piston means on said plunger large enough to engage the wall of the barrel; and operative connecting means for holding said piston means in place on said plunger to function as a piston in the absence of a cartridge, and for permitting said plunger to advance through said piston means into a cartridge, when a cartridge is present.

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