

Dec. 19, 1961

A. J. PALLOTTA

3,013,557

COMBINATION SYRINGE, SHIPPING CONTAINER AND CENTRIFUGE TUBE

Filed April 13, 1959

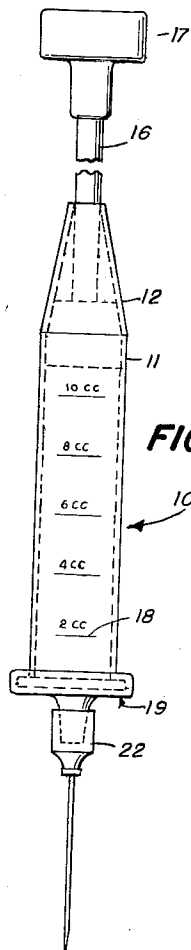


FIG. 1

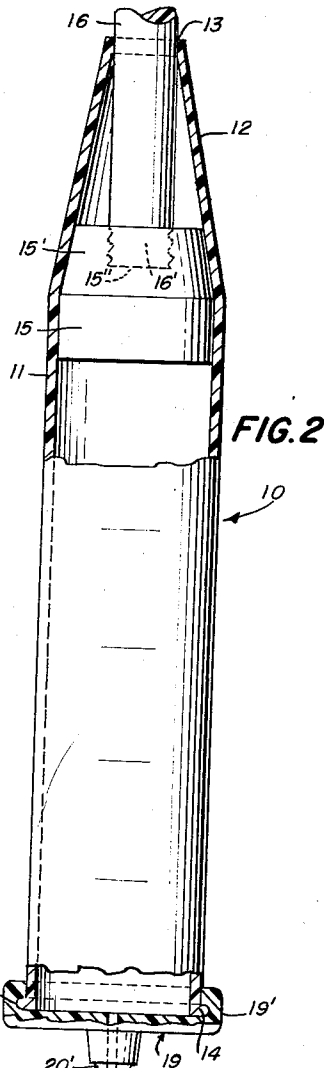


FIG. 2

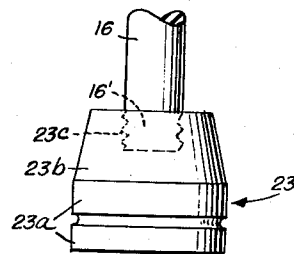


FIG. 5

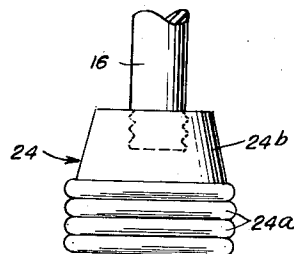


FIG. 6

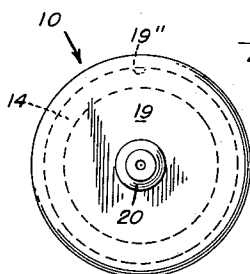


FIG. 4

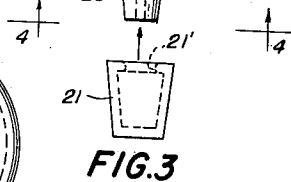


FIG. 3

INVENTOR

ARTHUR J. PALLOTTA

BY *Beale and Jones*

ATTORNEYS

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COMBINATION SYRINGE, SHIPPING CONTAINER AND CENTRIFUGE TUBE

Arthur J. Pailotta, Falls Church, Va., assignor to Hazleton Laboratories Incorporated, Falls Church, Va., a corporation of Virginia

Filed Apr. 13, 1959, Ser. No. 806,171

9 Claims. (Cl. 128—218)

This invention is directed to an improved syringe construction adaptable as a shipping container and a centrifuge tube.

An object of this invention is to provide a combined syringe which may be used to take a sample, may be sealed and shipped and later used as a centrifuge container.

Another object of the invention is to provide a syringe having a plastic cylinder of relatively flexible material with an open front end adapted to receive a cap for connection with a hypodermic needle and a tapered rear end apertured to receive a piston rod, there being received in the cylinder a piston of relative rigid material having a squeezing fit with the surrounding flexible wall of the cylinder and a tapered rear end for sealing fit in the tapered rear end of the cylinder.

A further object of the invention is to provide a combination syringe, shipping container and centrifuge tube that may be economically made of plastic material that is easily sterilized for use, sealable for shipping and usable as a centrifuge tube after which it may be thrown away.

A still further object of the invention is to provide a syringe type of container with a flexible wall which has an elastic contracting engagement with a relatively hard piston and wherein a piston rod receiving end has a tapered configuration to seal with a like shaped rear portion of the piston when drawn therein and the other end of the cylinder has a snap fitting engaging means with a cap having snap fitting engagement over the end of the cylinder and a hypodermic needle receiving apertured boss or nipple extending outward therefrom which after detachment of the hypodermic needle may receive a closure cap.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiment thereof shown in the accompanying drawing and it comprises the features of construction, combination of elements and arrangement of parts that will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawing, in which:

FIG. 1 is a side elevation of this combination syringe;

FIG. 2 is a side elevation of the syringe in section at each end and on an enlarged scale;

FIG. 3 is a closure cap for the hypodermic needle receiving nipple of the syringe;

FIG. 4 is a view along line 4—4 of FIG. 2;

FIG. 5 is a view of a modified form of piston; and

FIG. 6 is a further modified form of piston with the piston rod upper portion broken off.

Throughout the description like reference numbers refer to similar parts.

A syringe according to the invention is generally indicated at 10. It comprises a body member 11 which is cylindrical throughout the greater extent and has a tapered rear end portion 12 decreasing in cross section toward the rear end aperture 13 thereof while the front

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end is open and has an outwardly extending flange 14 thereon. This body member or generally cylindrical member 11 is made of plastic material such as polyethylene as by injection molding or pressure molding. It is of such character that its walls are slightly yieldable and squeeze in against a piston 15 of relatively harder plastic material such as polyethylene or nylon. Other materials may be employed for the cylinder 11 and the piston so long as they are sterilizable and there is a squeezing cooperation between the walls and the piston to insure a suction making fit. The piston 15 has a rear portion 15' that is tapered in decreasing circular cross section about mid length of the piston to the rear end. This tapered piston portion 15' is of like taper to the rear tapered portion 12 of the body member 11 and when the piston 15 is pulled thereinto by the piston rod 16 attached thereto as a threaded end 16' received in a threaded end aperture 15'' in the piston, a seal is formed at the rear end of the syringe 10. Piston rod 16 is of somewhat brittle material that may be broken off when a sample of blood, for example, has been drawn into the syringe. The piston rod 16 may be of certain selected hardness nylon or even glass. A knob or hand grasp portion 17 may be attached or integrally formed on the outer end of piston rod 16.

On the body member 11 conventional indicia volume indications such as 18 may be stamped or etched or formed therein.

Over the front open end and outwardly extending flange 14 of body member 11 is received a cap member 19 having a rearwardly extending shoulder 19' having an annular recess 19'' therein that is received by a snap fit engagement over the flanged end 14 of member 11. Cap 19 has a central aperture and an apertured boss or nipple 20 extending from the front face so that the aperture therethrough is in alignment with the aperture in the cap 19. The nipple 20 has a tapered outer surface, decreasing in cross section from rear to front end and intermediate its length there is formed therein an annular groove 20'. This nipple or boss 20 receives thereon a hypodermic needle such as 22 so that the syringe may be used to take a blood sample or the like.

A cover cap or closure member 21 is provided to be received over the boss or nipple 20. The cover cap 21 is formed with an inwardly extending annular lip at its rear end and is tapered so as to be received tightly over the boss 20 after the hypodermic needle 22 has been removed. The lip 21' of the cover cap 21 is received in the annular groove 20' within which it tightly seats and grips.

In practice the hypodermic needle may be left in place on the boss 20 and sealed by binding or by embedding. However, if the needle is removed, the cover cap 21 may be installed over the boss 20.

In FIG. 5 a modified form of piston 23 is shown. It is formed with a pair of spaced apart lands 23a which have a diameter slightly in excess of the internal diameter of the cylindrical body portion 11 of the syringe so as to provide a fit which will provide a suction ahead of the piston 23. The rear end of piston 23 at 23b is tapered in a manner like tapered portion 15' of piston 15. The rear end of piston 23 has an apertured axially extending threaded recess therein such as 23c to receive the threaded end 16' of piston 16.

In FIG. 6 a further modification of the form a piston 24 may take is illustrated. Here a plurality of lands 24a, such as four, are provided which have a semi-circular shaped peripheral cross section. The rear tapered portion 24b serves as a seal with the surrounding tapered wall 12 of the syringe when such a piston as 24 is used. A piston rod 16 is likewise secured to the piston 24.

An example of a syringe might be one made according

to this invention that has an overall length for member 11 of $3\frac{3}{4}$ inches while the inside diameter is .60 of an inch. An example of the size of the cooperating piston 15 is one having a diameter of .60 of an inch. In FIG. 5 the piston 23 may have a diameter of .595 inch while in FIG. 6, for example, the piston 24 is made with the diameter of the lands transverse to the axis of the piston as .6312 inch. These respective sizes of the elements have been found to provide a high suction and efficient syringe. An example of the length of the piston is .50 inch with the tapered portion thereof having a 15 degree included angle.

While the boss has been illustrated, for example, as extending about $\frac{3}{8}$ inch with an included taper angle of 4 degrees, a longer boss may be provided of more flexible material.

This syringe may be used for most purposes for which a glass syringe is utilized. It is especially advantageous in the collection of blood for bacteriological, chemical, or other clinical studies. The syringe according to the invention is received as a sterile package ready for use. When the blood has been drawn, the unit can be shipped intact to the laboratory, and there the barrel of the syringe can be used as a container and as a centrifuge tube. It is discarded along with the blood at the completion of the study.

While the preferred type of combined syringe, shipping container and centrifuge tube has been disclosed as having the container of relatively flexible material and the piston of relatively hard material, it is within the scope of the invention to have the container of relatively hard material, such as glass material, while the piston is of relatively flexible material as rubber or a suitable plastic composition.

The invention is claimed as follows:

1. A medical sampling and specimen container comprising, in combination, a cylinder of an elastic material having an outwardly extending flange at the front open end thereof and a gradually tapering rear end portion decreasing in cross section toward the rear open end; a plunger having a relatively rigid head slidable in snug fitting engagement within the surrounding elastic wall of said cylinder and having substantially the rear half end thereof tapering to be received in a surrounding tapered portion of the cylinder when drawn therein and a plunger rod attached to said plunger head and extending through the rear open end of said cylinder, said plunger rod being of a relatively rigid yet breakable material permitting it to be broken off adjacent the rear end of the cylinder after the plunger head is drawn to the rear and secured in the rear tapered end of the cylinder; and a cap having a rearwardly extending shoulder with an annular recess therein yieldably received in snap fitting engagement over said outwardly extending flange at the front end of the cylinder, said cap having a forwardly extending boss on the outer face thereof having an axially extending aperture therethrough in communication and alignment with an axially extending aperture through said cap, said boss being adapted to receive a hypodermic needle attachable thereto.

2. A medical sampling and specimen container according to claim 1 including in combination therewith a cover cap received by and secured on said forwardly projecting boss on said cap of the cylinder.

3. A medical sampling and specimen container according to claim 1 wherein said tapered rear end of the cylinder tapers down to the aperture thereof which has tight fitting but slidable engagement with said plunger rod.

4. A medical sampling and specimen container according to claim 1 wherein said boss on said cap for the cylinder has a gradual taper from rear end where it joins the cap to forward end and has an annular recess therein intermediate the rear and forward end thereof and a cap for said boss, said cap for the boss

having a tapered inner surface and an inwardly extending annular lip at its rear open end, said cap for the boss being received over the boss in close fitting engagement and said inwardly extending lip received within the annular recess of the boss thereby securing the cap on the boss.

5. A medical sampling and specimen container comprising, in combination, a cylinder of an elastic material having an outwardly extending flange at the front open end thereof and a gradually tapering rear end portion decreasing in cross section toward the rear open end; a plunger having a relatively rigid head formed with a plurality of annular lands thereon of larger diameter than the inside diameter of the cylinder and slidably received in snug fitting engagement within the surrounding elastic wall of said cylinder when drawn therein whereby the cylinder wall has generally radially inward gripping engagement on said lands and a plunger rod attached to said plunger head and extending through the rear open end of said cylinder, said rear open end of the cylinder having a radially inwardly extending gripping engagement with said rod, said plunger rod being of a relatively hard yet breakable material permitting it to be broken off adjacent the rear end of the cylinder after the plunger head is drawn to the rear and secured in the rear tapered end of the cylinder; and a cap having a rearwardly extending shoulder with an annular recess therein yieldably received in snap fitting engagement over said outwardly extending flange at the front end of the cylinder, said cap having a forwardly extending boss on the outer face thereof having an axially extending aperture therethrough in communication and alignment with an axially extending aperture through said cap, said boss being adapted to receive a hypodermic needle attachable thereto.

6. A medical sampling and specimen container according to claim 5 wherein said boss on said cap for the cylinder has a gradual taper from rear end where it joins the cap to forward remote end and has an annular recess therein intermediate the rear and forward ends thereof and a cap for said boss when a needle is not attached thereto, said cap for the boss having a tapered inner surface and an inwardly extending annular lip at its rear open end, said cap for the boss being received over the boss in close fitting engagement and said inwardly extending lip received within the annular recess of the boss thereby securing the cap on the boss.

7. A medical sampling and specimen container according to claim 5 wherein the cylinder instead of being of elastic material is of relatively hard material and the plunger instead of being of a relatively rigid material is of a relatively flexible material.

8. A medical sampling and specimen container comprising, in combination, a cylinder having an outwardly extending flange at the front open end thereof and a gradually tapering rear end portion decreasing in cross section toward the rear open end; a plunger having a head slidable in snug fitting engagement within the surrounding wall of the cylinder and having substantially the rear half end thereof tapering to be received in a surrounding tapered portion of the cylinder when drawn therein and a plunger rod attached to said plunger head and extending through the rear open end of said cylinder, said plunger rod being of relatively rigid yet breakable material permitting it to be broken off adjacent the rear end of the cylinder after the plunger head is drawn to the rear and secured in the rear tapered end of the cylinder; and a cap having a rearwardly extending shoulder with an annular recess therein yieldably received in snap fitting engagement over said outwardly extending flange at the front end of the cylinder, said cap having a forwardly extending boss on the outer face thereof having an axially extending aperture therethrough in communication and alignment with an axially extending

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aperture through said cap, said boss being adapted to receive a hypodermic needle attachable thereto.

9. A medical sampling and specimen container comprising an elongated hollow member having an opening at one end thereof, a detachable closure means secured to said hollow member for closing said open end, said detachable closing means having an aperture extending therethrough in communication with said opening and being adapted for engaging a hypodermic needle in communication with said aperture, said hollow member having converging internal wall portion at the opposite end thereof provided with an opening adjacent the point of convergence, a plunger slidably disposed within said hollow member, said plunger having an end adjacent said converging internal wall portion and being provided with an inclined side wall portion adjacent said converging internal wall portion, one of said internal wall and inclined wall portions being more resilient than the other so that said plunger inclined wall portion is thereby adapted for

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positive engagement with said hollow member converging internal wall portion, and a rod member secured to said plunger and extending from said end thereof and through the opening in the converging end of said hollow member, said rod having a side wall coextensively engaging the converging end of said hollow member and being a frangible member to permit the removal of the portion thereof extending outwardly from the adjacent end of said hollow member.

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