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HYPODERMIC SYRINGE HAVING IMPROVED NEEDLE
HUB RETAINING SLEEVE MEANS
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3,301,256

FIG. 1.

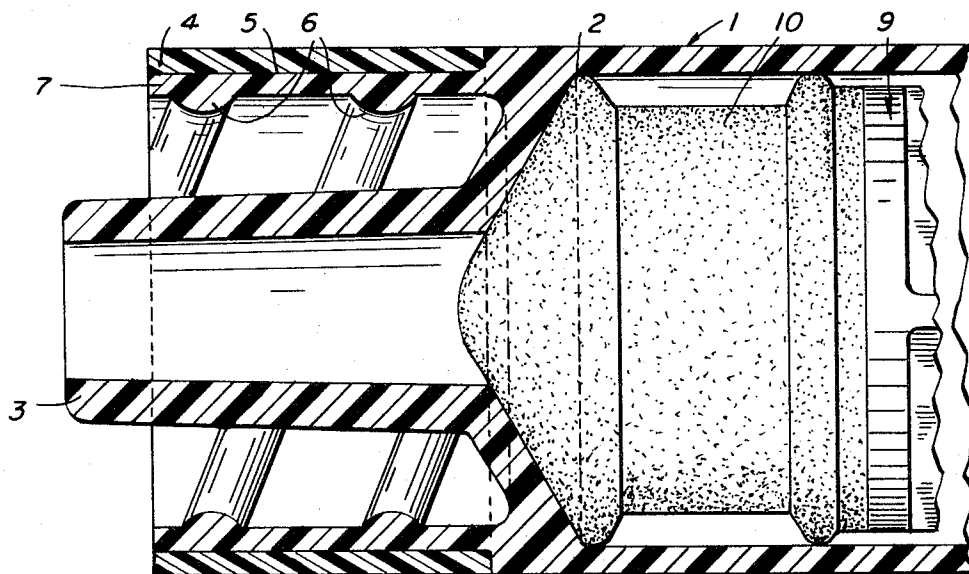


FIG. 2.

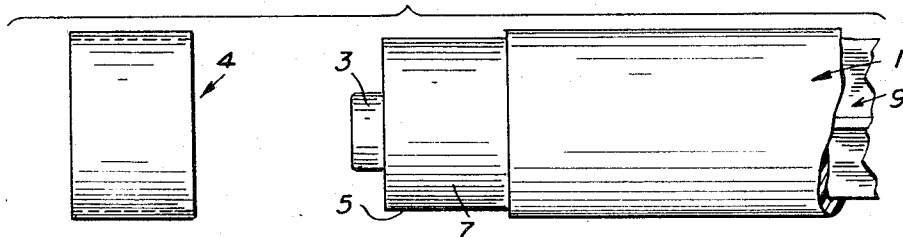


FIG. 3.

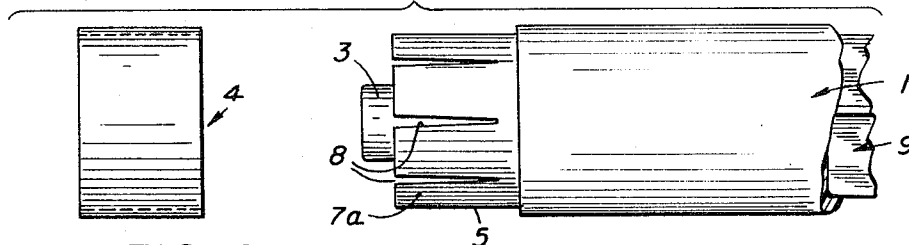
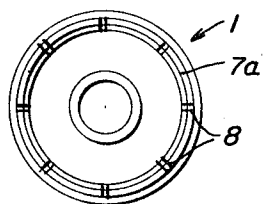


FIG. 4.



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HYPODERMIC SYRINGE HAVING IMPROVED NEEDLE HUB RETAINING SLEEVE MEANS

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4 Claims. (Cl. 128—218)

This invention relates to a hypodermic syringe, and more particularly to a locking mechanism on the forward end of the syringe to releasably secure it to a hypodermic needle or other medical device and a method for making same.

In certain medical procedures, as for instance thoracentesis or infant exchange transfusion, it is extremely critical that the syringe barrel remain firmly attached to the hypodermic needle, valve, or other medical device. If the syringe should happen to come loose, as for instance in a thoracentesis procedure, the patient's lung could collapse as a result of air rushing into the lung cavity from the loose needle.

The term Luer lock has been used to designate a general class of locking mechanisms located at one end of a hypodermic syringe. Essentially, the Luer lock is an internally threaded retaining sleeve located concentrically about a tapered Luer adapter or post of a syringe. This sleeve mates with and firmly holds a hypodermic needle or other device to the syringe. Previously, manufacturers formed a separate metal Luer unit including a tapered Luer adapter and a Luer lock and then attached the entire unit to a glass syringe barrel. United States Patent No. 2,811,155 represents this general type of separate metal Luer lock used in combination with a glass syringe. A syringe of this type is costly to manufacture and also is likely to leak at the joint between the Luer unit and the syringe barrel.

To overcome the disadvantages of leaking and the expense of separately forming the Luer unit, I have invented an all-plastic Luer lock that is molded integrally with the syringe barrel and which does not involve expensive molding techniques to remove the entire syringe barrel from the mold.

The usual way of removing small threaded parts from a mold, such as caps for toothpaste tubes is called "screw ejection." In this process the molded part is first formed in the mold and then each individual part is unscrewed from the mold. This process is time consuming and costly in that it delays the mold cycle time during the step of unscrewing and also requires additional machinery to remove the parts.

A much simpler method of removing parts from a mold when the parts have no undercut sections, such as threads, is called "strip ejection." In this process the article is simply pulled or pushed out of the mold along the axis of the core pin. There is no machinery required to rotate the part as it is being removed, and this method has a very fast cycle time as compared with "screw ejection." However, strip ejection would damage any threads molded on the inner surface of the Luer lock.

It is an object of this invention to provide a disposable plastic hypodermic syringe with an integral Luer lock capable of being removed from a mold by "strip ejection."

Another object of this invention is to provide an inexpensive disposable plastic hypodermic syringe having an integral Luer lock that will not laterally expand under tightening stresses when attached to a hypodermic needle or other device.

Still another object of this invention is to provide a disposable plastic hypodermic syringe having an integral Luer lock sufficiently flexible to strip from a mold

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but which will not laterally expand when tightened on a hypodermic needle or similar device.

Another object of this invention is to provide a disposable plastic hypodermic syringe with an integral Luer lock that will not slip and become loose when attached to a hypodermic needle or other medical device.

Another object of this invention is to provide a method for making a disposable plastic hypodermic syringe having an integral Luer lock.

Other objects of this invention will become apparent upon further description of which the following are illustrations:

FIGURE 1 is a side elevational view partially in section of the forward end of the syringe;

FIGURE 2 is an exploded side elevational view of the forward end of the syringe, showing an embodiment of this invention with a cylindrical retaining sleeve and a rigid band;

FIGURE 3 is an exploded side elevational view of the forward end of the syringe showing a separate embodiment of my invention wherein the retaining sleeve is slotted; and

FIGURE 4 is a front view of the syringe of FIGURE 3 showing the slotted sleeve, without the rigid band.

As shown in FIGURE 1 the syringe is comprised of a barrel 1 having a partially closed end 2 with a hollow needle adapter 3 extending from this partially closed end. Concentrically disposed about this needle adapter 3 is a thin, flexible retaining sleeve 7 which is integrally molded with the syringe barrel. On the outside of this retaining sleeve 7 is a recess 5 in which is held a rigid band 4. Internal of the retaining sleeve 7 is a set of double helical threads which serve as the locking means. As illustrated in FIGURE 1, each thread directly opposes a thread on the opposite side of the sleeve and hence gives better alignment and faster attachment to a hypodermic needle or other device than would a single spiral thread. To either draw fluids into the syringe or force fluids out through the needle adapter 3, a plunger 9 with a resilient stopper 10 is axially slideable within barrel 1.

The two separate embodiments of my invention are shown in FIGURES 2 and 3. In FIGURE 2, the retaining sleeve 7 forms a continuous cylinder which may be slightly tapered toward the forward end. Retaining sleeve 7a in FIGURES 3 and 4, which also may be tapered toward the forward end, has at least one but preferably several longitudinal slots in its wall to assist in "strip ejection" of the syringe barrel. Rigid band 4, when fitted over the retaining sleeve 7a, may completely or partially close the slots 8.

The syringe barrel, including the retaining sleeve, is preferably made of polypropylene but may be made of any other medicament-compatible plastic material which is sufficiently flexible to strip from a mold. Polystyrene, for instance, which is a very rigid material, will not effectively strip from the mold and tends to crack if stripped, and therefore cannot be used. In addition to being molded of a somewhat flexible material as polypropylene, the retaining sleeve has a thin wall preferably between .015 and .030 inch.

The retaining sleeves 7 or 7a formed as explained above, tend to radially expand or cold flow under stress when the operator is tightening down on a hypodermic needle or other device. This expansion can cause the threads to slip, and the hypodermic needle or other device thereby becomes loose. A rigid band 4 checks this radial expansion or cold flow of the retaining sleeves 7 or 7a. Hence, the nurse or physician can attach the syringe to a hypodermic needle or other medical device without

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having the fear of the syringe coming loose at a critical time.

The material of band 4 is more rigid than the material of the syringe barrel and retaining sleeve. Delrin and nylon bands work quite well but any other rigid medical-grade material may be used. Friction, spin welding, adhesive, or other means can hold band 4 firmly on sleeves 7 or 7a.

While the foregoing describes the preferred embodiments of my invention, it is understood by those skilled in the art that certain modifications and changes may be made without departing from the spirit and scope of this invention.

I claim:

1. In a hypodermic syringe with a plastic barrel having an integral adapter extending from a partially closed end thereof and with an axially slideable stopper of a plunger in the barrel; the improvement of an integral plastic retaining sleeve concentric with the adapter and having locking means along a length of an interior surface of the retaining sleeve, said retaining sleeve being sufficiently flexible to expand radially outwardly along an entire length of said locking means for release of the integral barrel, adapter, and retaining sleeve from a mold; and a separately formed rigid band about an exterior surface of said sleeve and extending along substantially the en-

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tire length of said locking means whereby the locking means is not distorted outwardly when attached to a medical device.

2. The improvement in a hypodermic syringe barrel as set forth in claim 1 wherein the locking means comprises threads.

3. The improvement in a hypodermic syringe barrel as set forth in claim 1 wherein the retaining sleeve has at least one slot partially closed by said rigid band.

4. The improvement in a hypodermic syringe barrel as set forth in claim 1 wherein the retaining sleeve has a wall thickness of from .015 to .030 inch.

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