

C. C. FOGG

METHOD OF REPAIRING GLASS HYPODERMIC SYRINGES

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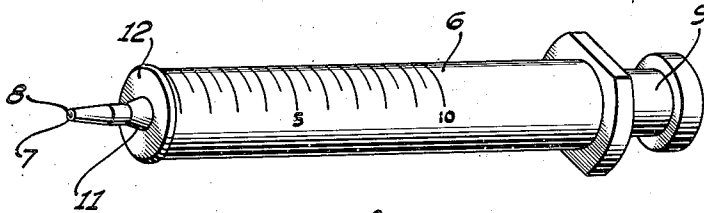


Fig. 1.

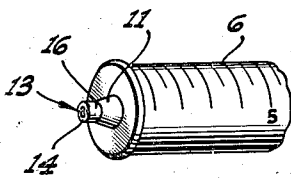


Fig. 2.

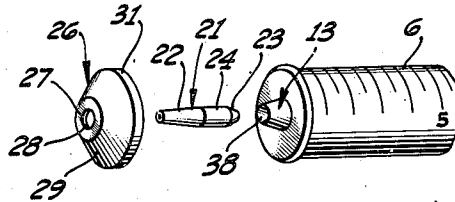


Fig. 3.

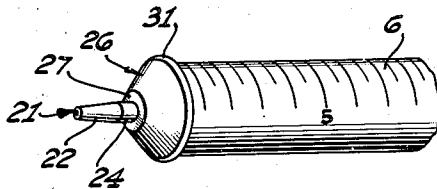


Fig. 4.

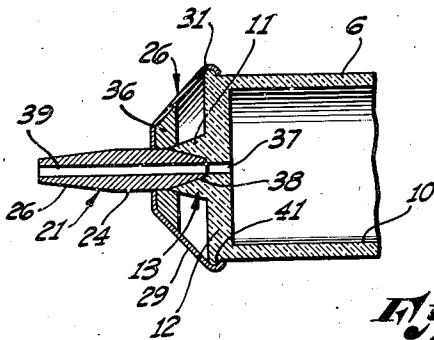


Fig. 5.

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METHOD OF REPAIRING GLASS
HYPODERMIC SYRINGES

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4 Claims. (Cl. 29—148.2)

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This invention relates to hypodermic syringes, and more particularly to the repair of broken hypodermic syringes.

The type of hypodermic syringe which is in most common use includes a hollow, cylindrical body portion composed of glass and having a glass tip integral therewith on which a standard hypodermic needle may be removably mounted so that fluid may be ejected through the needle from the interior of the body portion by actuation of a plunger fitted to the bore of the syringe. The most readily broken portion of the syringe is the tip, since it is in the form of a relatively long and slender thin-walled tube projecting from the comparatively heavy body portion of the syringe, with the result that those institutions and persons who employ hypodermic syringes commonly accumulate a large number of these materially expensive pieces of apparatus which are damaged only to the extent that their tips have been broken, and accordingly cannot have needles affixed thereto.

The present invention seeks to remove this cause of inconvenience and expense by providing a replacement unit and a method of attachment thereof, whereby a hypodermic syringe from which the original tip has been broken, can be reequipped with a replacement tip fully as satisfactory as the original tip, and at a cost sufficiently below the purchase price of a new syringe to justify their use.

It is a further object of the present invention to provide a replacement unit for retipping a hypodermic syringe from which the original tip has been broken, which is of such design, construction, and arrangement that after it has been mounted upon the body portion of a syringe it presents a sufficiently neat, finished appearance to avoid conveying the impression that the hypodermic syringe has been repaired.

A further object is to provide a replacement unit of the general character indicated wherein the replacement tip is composed of material less frangible and therefore more durable than the glass of which the original tip was constructed, with the result that after a hypodermic syringe has been repaired by the unit of the present invention and by means of the method which also forms a portion of the subject matter of the present invention, the syringe is less apt to become damaged and therefore capable of standing harder usage than the conventional, new hypodermic syringe.

The invention possesses other objects and valuable features, some of which, with those enu-

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merated, will be set forth in the following description of the preferred embodiment of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said drawings and description, as I may adopt variations of the preferred form within the scope of my invention, as defined by the claims.

Referring to the drawings:

Figure 1 is a protective view of a conventional, glass hypodermic syringe having the regular glass needle-receiving tip with which such syringes are conventionally provided.

Figure 2 is similar to Figure 1 but showing the original glass tip broken, leaving only a stub tip with the result that the syringe no longer is serviceable. Portions of the figure are broken away to reduce its length.

Figure 3 is an exploded view showing the syringe of Figure 2 after its stub tip has been ground smooth and provided with a tapered bore for the reception of the replacement tip unit, which also is shown in this figure with its constituent parts separated the better to reveal its construction.

Figure 4 is a view similar to Figure 2 showing the replacement tip mounted thereupon in operative position.

Figure 5 is an enlarged detailed view in longitudinal, medial section showing the replacement tip mounted in operative position upon the body portion of the syringe in readiness to receive the conventional hypodermic needle.

A glass hypodermic syringe of conventional design is illustrated in Figure 1. It comprises a hollow, tubular body or barrel portion 6 having a glass needle-receiving tip 7, the bore 8 of which communicates with the interior of the body portion 6 so that fluids can be discharged through a needle (not shown) carried by the tip 7 by means of a plunger 9 which is fitted to the interior of the bore 10 (see Figure 5) of the body portion 6. The tip 7 is integral with the body portion 6; and since it is of relatively long and slender form and is in the nature of a thin-walled tube, it is quite delicate and hence is more readily broken than any other portion of the entire syringe. It almost invariably occurs therefore, that when a glass hypodermic syringe is broken the only portion thereof which is damaged is the tip 7 and, of course, after the tip 7 has been broken, the entire syringe becomes inoperative and must be replaced. In view of the fact that

syringes of this type are constructed in accordance with very exacting requirements and specifications, they are relatively expensive and accordingly, when the tip 7 is broken from such a syringe the cost of its replacement often is burdensome.

As clearly shown in Figures 1 and 2 the base 11 of the tip 7 is slightly enlarged, usually being in the form of a truncated cone resembling an enlarged fillet at the area of juncture at the inner end of the tip 7 with the end 12 of the body portion 6 of the syringe. Consequently, when the tip 7 is broken on a syringe it usually is somewhere between the extreme outer end of the tip and the outer end of the conical base 11. Figure 2 illustrates a broken glass syringe from which the tip has been broken, leaving a stub tip 13 which is representative of the broken syringe tips most frequently encountered. Its outer end 14 is relatively jagged and irregular owing to the brittle nature of the glass of which it is constructed. However, the conical base 11 and usually a portion of the less steeply tapered end portion 16 remains.

The replacement unit of my design whereby a broken hypodermic syringe of the type illustrated in Figure 2 can readily be repaired is illustrated in Figures 3, 4, and 5. It comprises a tubular replacement tip 21 of any suitable rigid material such as glass, metal or any of several of the new plastics which are inert to the chemicals apt to be administered by means of a hypodermic syringe. Whereas it is believed that a replacement tip 21 composed of glass would prove entirely satisfactory, it is believed that it would be more desirable to form the tip of less frangible material because by the use of such material the liability of subsequent fracture of the replacement tip 21 would be minimized.

The outer end 22 of the replacement tip 21 is tapered preferably at an angularity coinciding with that of the original tip 7, it being understood that the degree of this taper is standard and is complementary to the angularity of the bore of the taper at the socket end of the conventional hypodermic needle (not shown) which therefore can be quickly and firmly mounted in operative position upon the tip merely by pressing the needle thereupon with sufficient firmness to seat the tapered tip within the tapered bore of the needle socket. The inner end 23 of the replacement tip 21 also is tapered, but at a considerably more abrupt degree of angularity than the outer end 22. It is preferred that the intermediate portion 24 of the replacement tip 21 also be tapered at a very slight angle, the direction of this taper being outward, i. e., with the smaller end of the intermediate portion 24 being proximal to the outer end 22 of the replacement tip.

Cooperatively associated with the replacement tip 21 is a cap 26 the central portion 27 of which is provided with a central hole 28 so dimensioned that when the replacement tip 21 is thrust through the hole 28 with the outer end 22 of the tip 21 leading, the taper of the intermediate portion 24 will "take up" tightly within the central hole 28 thus fitting the cap 26 rigidly in position upon the replacement tip 21. From the outer edge of the flat portion 27, a flaring portion 29 extends outward and away from the outer end 22, i. e., toward the body portion 6 of the syringe when the inner end 23 of the replacement tip 21 is placed against the tip stub 13. At its outer peripheral edge, the flaring portion 29 is provided with a substantially cylindrical flange 31 the

function of which will become apparent as this description progresses.

After the replacement tip 21 and its mounting cap 26 are assembled together by pressing the tip 21 so firmly into the hole 28 of the cap 26 that the taper of the intermediate portion 24 of the replacement tip 21 "takes up" tightly within the hole 28, I prefer that a suitable bonding agent 36 be employed to unite these parts permanently. One form of such bonding agent which has proven to be highly effective is a mixture, in suitable proportions, of litharge and glycerine. Figure 5 illustrates such a bonding agent 36 placed within the cap 26 in such position that it serves to bond itself to both the interior surface of the cap 26 and the exterior surface of the replacement tip 21. In this showing, it will be observed that a suitable quantity of the bonding agent has been employed so that a portion of it also bonds itself to the exterior surface of the conical base 11 of the tip stub 13 on the syringe body 6, with the result that the bonding agent 36 also adds to the security with which the replacement tip unit is mounted upon the body 6. It will be understood that when reliance is placed upon the bonding agent 36 to function in this manner it will be placed within the cap 26 at only a relatively short time before the completed cap is to be placed in position upon the syringe body 6 with the result that the replacement unit can be placed in operative position upon the body 6 before the bonding agent 36 has solidified.

In order to prepare the broken stub tip 13 for the reception of the replacement unit, the outer edge thereof is ground smooth, and the outer end of the bore 37 is then tapered as indicated at 38, the angularity of its taper being complementary to that of the tapered inner end 23 of the replacement tip 21. A suitable "lapping" material such as emery dust, or a mixture of emery dust and water is then placed upon either the tapered end 23 of the replacement tip 21 or within the tapered outer end 38 of the bore 37, or both, whereupon the tapered end 23 is inserted into the tapered bore 32 and the parts rotated with respect to each other so as to grind the joint between these two portions and thus develop a perfect tip. This grinding operation is most expeditiously performed by placing the replacement tip 21 within the chuck of a lathe or drill press and holding the syringe body 6 by hand and thus pressing the interior surface of the tip stub 13 against the rotating tapered end 23 of the replacement tip 21. After the grinding operation has been completed, the parts should be thoroughly cleansed so as to remove all traces of the grinding material and the parts are then reassembled by placing the tapered end 23 into the tapered bore 38 and pressing the parts so securely together that their tapers "take up" upon each other thus fitting the replacement tip 21 so firmly upon the stub tip 13, with their bores 39 and 37, respectively, communicating with each other, that they are firmly united. The flange 31 of the cap 26 is then bent inward by a crimping, or fitting operation so that it extends around the bead 41 which is conventionally formed upon the end of the body portion 6 of a glass syringe.

I claim:

1. The method of repairing a hypodermic syringe from which the outer end of the tip has been broken, leaving a tip stub, which comprises tapering the outer end of the bore of said stub, fitting the inner end of a replacement tip

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thereto, and enclosing and reinforcing the juncture between said tip stud and said replacement tip by crimping the edge of an attaching flange on said replacement tip around a bead on said syringe to lock said replacement tip in operative position upon said syringe.

2. The method of repairing a hypodermic syringe having a tip stub from which the outer end has been broken, which comprises lapping the inner end of a replacement tip to the outer end of said stub and enclosing and reinforcing the juncture between said tip stud and said replacement tip by crimping the edge of an attaching flange on said replacement tip around a bead on the barrel of said syringe to lock said replacement tip in operative position on said syringe.

3. The method of repairing a hypodermic syringe having a tip stub from which the outer end has been broken, which comprises anchoring a flange upon a replacement tip, fitting the inner end of said replacement tip to the outer end of said stub, and enclosing and reinforcing the juncture between said tip stud and said replacement tip by crimping the edge of said flange around a projection on the barrel of said syringe to anchor said replacement tip in operative position thereupon.

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4. The method of repairing a hypodermic syringe having a tip stub from which the outer end has been broken, which comprises mounting a flange upon a replacement tip, cementing said flange and replacement tip to each other, rotating said replacement tip and syringe with respect to each other with the inner end of said replacement tip frictionally engaging said stub and with abrasive therebetween, removing said abrasive, and enclosing and reinforcing the juncture between said tip stud and said replacement tip by crimping the edge of said flange around a projection on said syringe to anchor said replacement tip in operative position thereupon.

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