March 17, 1942. C. A. CLERICI 2,276,610

HYPODERMIC SYRINGE

Filed Aug. 14, 1940

Fig. 1.

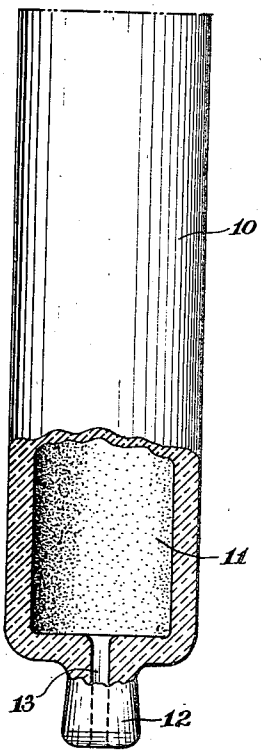
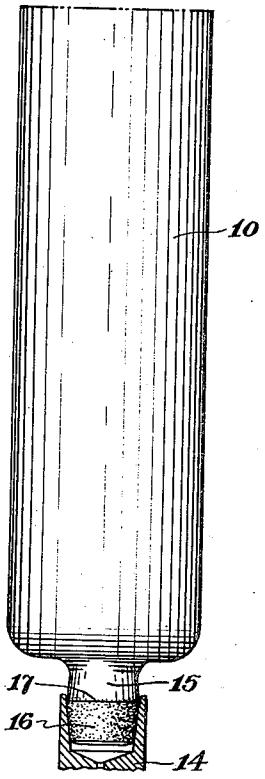


Fig. 2.



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HYPODERMIC SYRINGE

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2 Claims. (Cl. 51—283)

This invention relates to the manufacture of hypodermic syringes of glass or like material and particularly to that type of syringe having a conically ground nozzle adapted to receive the hub of a suitable hypodermic needle.

Heretofore, syringes of this type have usually been prepared by forming a conical nozzle blank upon the end of the barrel by the application of suitable shaped tools after the glass has been softened by heating it. This nozzle blank was given the approximate shape of the finished ground nozzle, i. e., a frustum of a cone having its larger base adjacent the syringe barrel, except that a certain amount of extra glass was allowed to be removed by the grinding operation.

A portion of the blank was then ground to the final proper conical shape and dimensions by means of a grinding tool and abrasive material. Due to this operation a shoulder or ridge was formed at the boundary line on the blank where the ground and unground portion met. Due to the abrupt change in diameter at this point and to the fact that the skin of the glass had been ground away, this region was relatively weak and breakage at this point was frequent.

It is an object of this invention to eliminate this weak point by causing the line of demarcation between the ground and unground portions of said nozzle to be, not a shoulder, a groove or a definite line, but a zone of appreciable width through which the ground surface gradually merges into the unground surface, thus preventing localization of strains which always precedes a break.

The method by which I accomplish this result is best understood by reference to the accompanying drawing in which Figure 1 represents in elevation the blank formed in accordance with my invention, and Figure 2 represents a similar view of the completed product.

In the drawing the numeral 10 denotes the usual syringe barrel having the interiorly ground piston receiving cylinder 11. Projecting from the lower end of the barrel 10 is the nozzle blank 12 which is of the form of a frustum of a cone with its smaller base next adjacent the syringe barrel 10. I form this blank by applying to the softened hot glass suitable moulding tools in a manner well known in the art. A duct 13 is formed through the center of the nozzle blank.

I next apply to the nozzle blank a grinding tool 14, charged with suitable abrasive, which tool is provided with an interior conical grinding surface. The taper of this conical surface is, however, the reverse of that of the nozzle blank, i. e., the larger portion of the conical grinding surface faces the nozzle barrel. The application of this grinding tool grinds the lower end of the nozzle blank 12 into the form of a frustum of a cone but with a taper the reverse of the original taper. Thus, the nozzle tip is left in its final form of two frustums joined end to end at their larger bases and joined to the syringe barrel by the smaller base of one of them.

The upper frustum 15 is the unground portion of the original nozzle blank while the frustum 16 is the ground portion. The intersection 17 of the surfaces of the two frustums will not be a sharp line of demarcation but will be a zone of relatively gradual merging from ground to unground surface as will now be explained.

The grinding tool 14 is so shaped that at the finish of the grinding operation its end having the larger opening will project over the unground portion of the blank. The angles of taper of the two frustums are very small so that the angle between the interior grinding surface of the tool 14 and the surface of the unground frustum 15 will be very small. The abrasive material used contains an assortment of sizes of grains and it will thus be seen that as the grinding operation proceeds, that while all sizes of abrasive grains are effective in grinding the surface of frustum 16, only the larger grains are effective to grind upon the lower portion of frustum 15, i. e., only those grains of a diameter sufficient to reach across from the surface of the grinding tool 14 to the surface of the frustum 15. As the interior surface of the tool 14 and the exterior surface of frustum 15 are divergent it will be seen that progressively larger grains are required to span the gap and since these sizes form a diminishing proportion of the abrasive material, the amount of grinding done on the lower portion of frustum 15 will gradually diminish in a direction toward the syringe barrel 10. Thus the fully ground surface of frustum 16 will gradually merge into the unground surface of frustum 15 and no sharp line of demarcation is produced.

Due to the inaccuracies always present in the surface of the blank and to the practically mathematical perfection of the ground surface of the frustum 16 the zone of merger between the two surfaces will vary along the length of the tip in a somewhat haphazard fashion thus further distributing the strains which tend to cause breakage.

It will be seen that the crux of my invention lies in the provision of the slight angle between the surface of the ground and unground portion.

While I have shown two frustums tapering in opposite directions it is evident that this result would also be obtained by making frustum 15 in the form of a cylinder or even a frustum tapering in the same direction as frustum 16 but with a smaller angle. The method shown and described, however, is my preferred form.

It is of course obvious that these as well as other details of my method may be varied to suit the individual requirements of manufacture without departing from the spirits of my invention. I therefore desire the above description and accompanying drawing to be considered as illustrative and not restrictive, my invention being limited only by the scope of the appended claims.

I claim as my invention:

1. In the manufacture of hypodermic syringes having a needle-hub receiving nozzle, the steps which comprise the forming of a nozzle blank, the application thereto of a grinding tool charged with suitable abrasive and having an internally tapered grinding surface, the angle formed between the two opposite sides of the grinding surface being different from the angle between two opposite sides of the surface of the blank whereby at the end of the grinding action a portion of the grinding surface diverges from and overlies a portion of the unground surface of said blank, said divergence being on a slight angle whereby a decreasing proportion of said abrasive is effective to abrade the surface of the blank at the zone of divergence.

2. The method of forming, upon a hypodermic syringe tip, a gradual zone of mergence of considerable width between the ground and unground areas of said tip which comprises the application to said tip of a grinding member charged with a suitable abrasive material and having a tapered internal surface of such form and dimension that upon completion of the grinding operation a portion of said internal surface will overlie and gradually diverge from, at a very small angle, the unground portion of said tip, said angle of divergence being of such order that a gradually decreasing proportion of the abrasive material will be of sufficient size to span the gap between the two surfaces and be effective as a grinding agent.

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