Jan. 10, 1950 W. ERHARD 2,494,290

HYPODERMIC UNIT AND METHOD OF MAKING SAME

Filed June 3, 1944

Fig. 1.

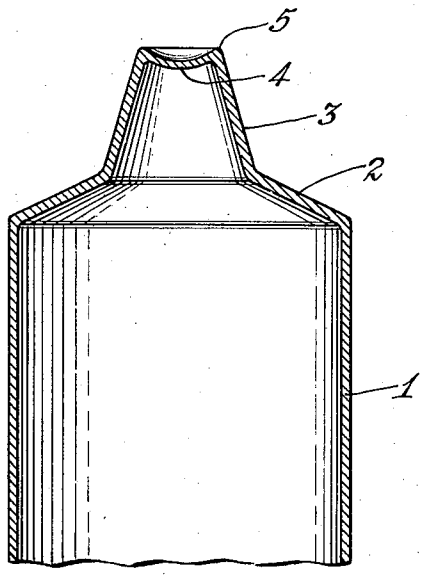


Fig. 2.

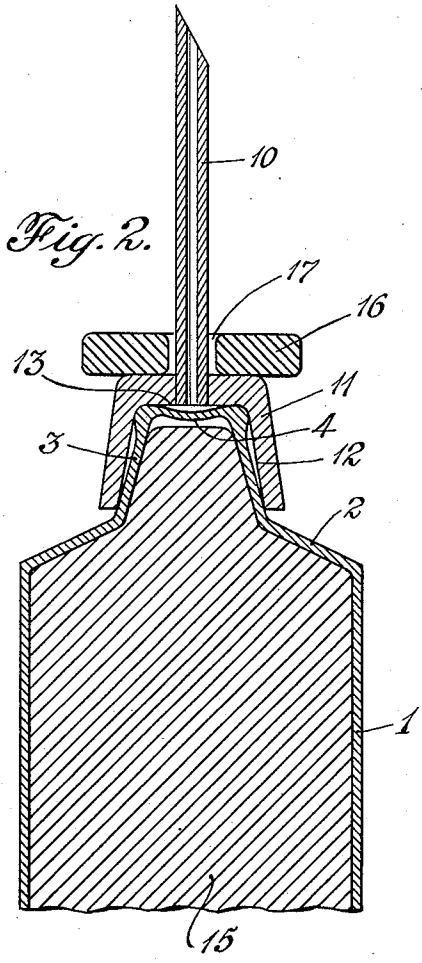
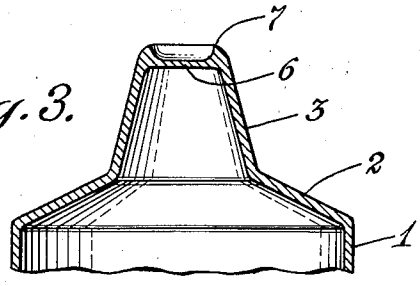


Fig. 3.



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HYPODERMIC UNIT AND METHOD OF MAKING SAME

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2 Claims. (Cl. 128—216)

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This invention relates to articles commonly known as hypodermic units, enabling medicines and other substances to be promptly and efficiently administered by injection directly from sterile original packages; and it relates particularly to hypodermic units of the type shown and described in United States Patent No. 2,219,301, comprising a hermetically-sealed collapsible soft-metal tube having an integrally-extruded, readily-pierceable, blind discharge end, a hypodermic needle immovably secured to the tube, with the lumen of the needle communicating with the outside of the blind end, and a stiff wire longer than and carried in the lumen of the needle, for piercing the blind end.

In the commercial production of these units prior to this invention, the collapsible soft-metal tube was formed with an externally-tapered neck terminating in the integrally-extruded, readily-pierceable blind end, the hypodermic needle was rigidly secured to a hub having a corresponding internal taper; and the needle was secured to the tube by positioning the needle hub over the tube neck and forcing it into frictional engagement therewith. Occasionally, in the production of such units on a large scale, defective units were obtained, with the needle hub so insecurely attached to the tube neck that these parts became disengaged on manipulation of the unit—especially when removing a tightly-fitting protective cover (the cover enclosing the needle and wire and detachably secured to the needle hub). To assure absence of such defect (which would, of course, nullify the manifestly vital dependability-in-use characteristic of these units), the completed units had to be tested to determine whether the attachment of the needle hub to the tube neck was sufficiently secure. The defect was found to arise principally from the variations in the internal taper of the needle hubs, it being difficult to keep within the necessarily narrow tolerance in the machining of these hubs.

It is the object of this invention to provide an advantages method of producing hypodermic units, and improved collapsible tubes for the production of hypodermic units.

The improved collapsible tubes of this invention are characterized by an externally-tapered neck terminating in an intergrally-extruded readily-pierceable blind end having a substantially-overall concavity (hereinafter referred to as a dished blind end); and the advantageous method of this invention essentially comprises extruding such improved collapsible tube, positioning the hub of a hypodermic needle over the

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tube neck, the hub having a corresponding internal taper terminating in a substantially-flat inside face at a depth less than the height of the tube neck, and forcing the needle hub upon the tube neck until the rim of the dished blind end is deformed by the inside face of the hub. (The term "taper" is employed herein in its conventional sense as designating a regular or gradual narrowing toward one end, and hence excluding a threaded neck, for example.)

By the use of this invention, a tight fit of the needle hub at both ends of the tube neck is assured; because the lower end of the hub wall always fits tightly somewhere near the base of the tube neck, and as the needle hub is forced down further on the neck, its inside face is pressed against the rim of the dished blind end and causes the metal of the rim to be transported outwardly against the upper end of the hub wall, providing a tight fit in this zone also.

The invention will be described in detail in connection with the accompanying drawing, wherein:

Fig. 1 is an enlarged fragmentary axial section of the improved collapsible tube of this invention, various dimensions (e. g., the taper of the neck) being exaggerated for purposes of clear illustration;

Fig. 2 is an enlarged fragmentary axial section of the collapsible tube shown in Fig. 1 assembled with the needle hub, and illustrating the mode of assembly, various dimensions again being exaggerated for purposes of clear illustration; and

Fig. 3 is a view similar to Fig. 1 of an alternative form of the collapsible tube.

Referring first to Fig. 1, there is shown an extrusion-formed collapsible soft-metal (e. g., tin) tube having a cylindrical wall 1, a conventionally-shaped shoulder 2, and an externally-tapered neck 3 terminating in a readily pierceable blind end 4, which is dished, the rim 5 constituting in effect an extension of the tapered neck beyond the plane of the central portion of the blind end.

In the alternative form shown in Fig. 3, the dished blind end 6 has a flat central portion, and the rim 7 constitutes in effect an extension of the tapered neck 3 beyond this central portion.

The collapsible tube shown in Fig. 1, for example, is assembled with the needle as follows: [As shown in Fig. 2, the needle is of the conventional type comprising a pointed cannula 10 (e. g., of stainless steel) rigidly secured to hug 11 (e. g., of brass), the hub wall having a corresponding

internal taper 12 terminating in a substantially-flat inside face 13 at a depth less than the height of the tube neck.] The open-ended tube is slipped over and held upright by an appropriately-shaped supporting mandrel 15; the hub of the needle is positioned over the tube neck and then forced down to the position shown in Fig. 2 by means of a plate 16 having an aperture 17 to accommodate the cannula 10. As the hub is forced down, the lower end of the hub wall will always fit tightly somewhere near the base of the neck. If the internal taper of the hub wall fully corresponds with that of the tube neck (and the parts are equidimensioned), there will then be a maximum area of intimate contact, with a consequent perfect frictional attachment. If the internal taper of the hub is such that the upper end of the tube neck seats at a distance from the inside face of the hub, the hub may be forced further on until there is also a tight fit between the lower end of the hub wall and the base of the neck. But there is another type of disconformity, namely where the hub can be forced all the way on without intimate contact between the upper end of the hub wall and the upper end of the tube neck, which disconformity was the primary cause of the production of defective units prior to this invention. In the case of the latter disconformity, illustrated with exaggeration in Fig. 2, the inside face 12 of the hub is pressed against the rim of the dished blind end, causing the metal of the rim to be transported outwardly and into intimate contact with the upper end of the hub wall.

The assembled tube and needle is then used for the production of hypodermic units as described in U. S. Patent 2,219,301; i. e., by inserting the stiff wire into the lumen of the needle (preferably a pointed and headed wire of non-rustable metal, having a slight bow to prevent its accidental dislodgement from the lumen of the needle), attaching the protective cover, filling the collapsible tube through its open end with the desired medicament or other substance, and hermetically-sealing the open end. The resultant hypodermic unit is, of course, used in the same manner as the unit described in that patent.

The invention may be variously otherwise embodied—for example, as to shapes and proportions—within the scope of the appended claims.

I claim:

1. The method of producing a hypodermic-unit comprising extruding a collapsible soft-metal tube having an externally-tapered neck terminating in an integrally-extruded, readily-pierceable externally dished blind end, positioning the hub of a hypodermic needle over the tube neck, the hub wall having a corresponding internal taper terminating in a substantially-flat inside face at a depth less than the height of the tube neck, and forcing the hub upon the tube neck until the rim of the dished blind end is deformed by the inside face of the hub and brought into intimate contact with the hub wall.

2. A hypodermic unit comprising a collapsible soft-metal tube having an externally-tapered neck terminating in an integrally-extruded, readily-pierceable blind end, and a hypodermic needle having a hub frictionally and immovably secured to the outside of the tube neck, the lumen of the needle communicating with the outside of the blind end, the hub wall having a corresponding internal taper terminating in a substantially-flat inside face at a depth less than the height of the tube neck, and the blind end of the tube neck having an integral annular outward extension in intimate contact with the inside face and wall of the hub.

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