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3,490,451

HYPODERMIC JET INJECTOR NOZZLE

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FIG. 1.

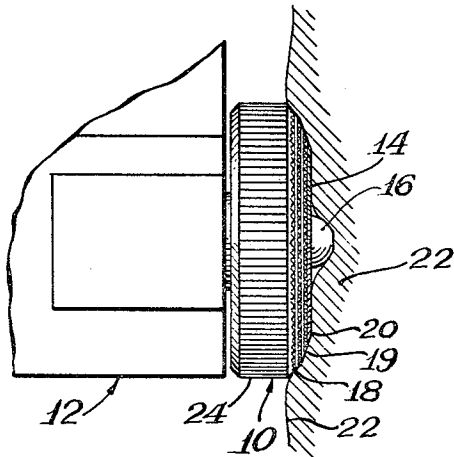


FIG. 2.

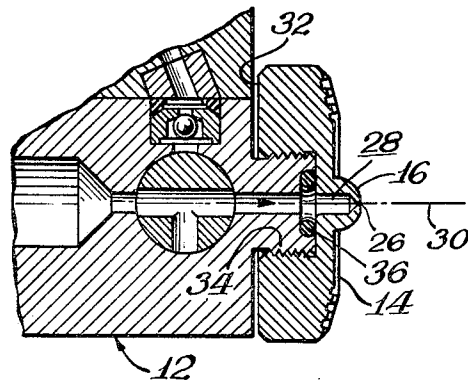


FIG. 3.

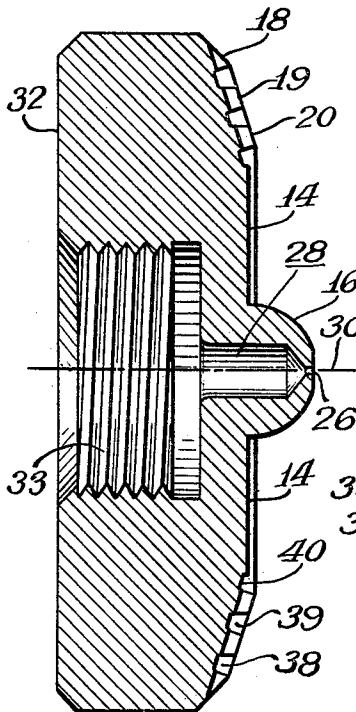
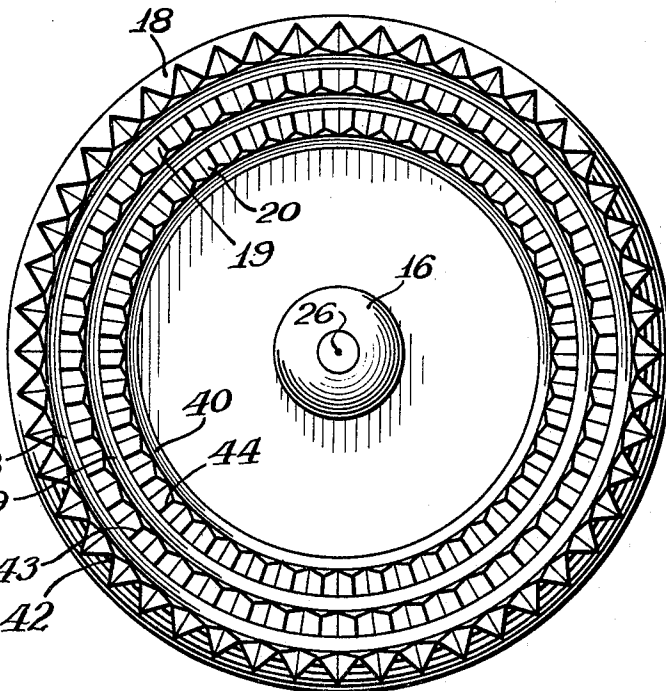


FIG. 4.



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HYPODERMIC JET INJECTOR NOZZLE

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3 Claims

ABSTRACT OF THE DISCLOSURE

A hypodermic jet injector nozzle which is threadably attached to the medicament discharge end of a hypodermic jet injector. The nozzle is disk shaped with the outside surface of the nozzle substantially flat except for a central protrusion with an orifice therethrough for the passage of medicament. The central protrusion tightens the skin to more easily permit the medicament to pierce a patient's skin. Circular rows of teeth are defined on the outside perimeter of the nozzle disk. The teeth hold the nozzle in non-slidable contact with the skin of a patient receiving an injection.

BACKGROUND OF THE INVENTION

This invention relates to an improved nozzle construction for a hypodermic jet injector.

Hypodermic jet injectors have found wide spread acceptance especially for mass inoculation programs. A typical hypodermic jet injector construction is illustrated by U.S. Patent No. 3,330,276 issued to Gordon on July 11, 1967.

Generally the nozzle construction for such an injector consists of a circular disk which is threadably attached to the injector unit. A central orifice is defined through the circular disk for carrying the medicament to the patient.

Such a nozzle construction has not proven to be entirely satisfactory. For example, one of the problems encountered is slippage of the nozzle along the skin of a patient. Also, the patient's skin near the medicament orifice is often loose making it difficult and painful to pierce for inoculation.

SUMMARY OF THE INVENTION

In a principal aspect the present invention of an improved nozzle for a hypodermic jet injector is a nozzle which includes a protrusion from the outside surface through which the medicament orifice passes. In addition, gripping means are provided to securely hold the nozzle in contact with the skin of a patient.

It is thus an object of the present invention to provide an improved hypodermic jet injector nozzle.

It is still a further object of the present invention to provide a hypodermic jet injector nozzle which does not slip or shift out of position on a patient's skin.

It is still another object of the present invention to provide a hypodermic jet injector nozzle which stretches the skin in the area of the medicament orifice to provide easier piercing through the skin.

These and other objects, advantages and features will be more fully set forth in the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWING

In the detailed description which follows, reference will be made to the drawing comprised of the following figures:

FIGURE 1 is a partial side view of a hypodermic jet injector with the improved nozzle in contact with the skin of a patient;

FIGURE 2 is a cross sectional view of the improved nozzle as illustrated in FIG. 1;

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FIGURE 3 is a typical cross sectional view of the improved nozzle; and

FIGURE 4 is a front view of the improved nozzle illustrating the construction of the outside surface.

DESCRIPTION OF PREFERRED EMBODIMENT

In FIGS. 1 and 2 the improved nozzle 10 is shown attached to the front end of a hypodermic jet injector unit 12. A jet injector unit of the type shown by Gordon, referred to above, is typical of those units with which the improved nozzle may be used. The nozzle 10 has a substantially flat outside surface portion 14 with a protrusion 16 extending from the center of the surface portion 14 of the nozzle 10. Three rows of teeth 18, 19 and 20 circumferentially surround the central protrusion 16 and the flat surface portion 14. The nozzle 10 has a cylindrical side surface 24 which is knurled to facilitate gripping and twisting of the nozzle 10 for easy removal and replacement.

When pressed against skin 22 of a patient the protrusion 16 stretches and tightens the skin in the immediate vicinity of a central orifice 26 (to be more fully described below). The rows of teeth 18, 19 and 20 grip the skin and prevent the nozzle 10 from twisting or slipping. Thus when medicament is discharged through the orifice 26 in the protrusion 16, it is discharged at a selected and easily maintained position, for example, on the arm of a patient. In addition, since the protrusion 16 stretches and tightens the skin 22, the jet of medicament pierces the skin more cleanly and quickly with less pain noticed by the patient. The medicament thus easily passes from the jet injector unit 12 in the measured doses through the orifice 26 in the nozzle 10 and into the patient.

In FIG. 3 the construction of the central orifice 26 through the protrusion 16 is more fully illustrated. A central passage 28 has a centerline axis which is substantially coincident with a centerline axis 30 of the central orifice 26. The central passage 28 terminates at a point just short of the outside surface of the protrusion 16. The connecting portion between the larger diameter central passage 28 and the smaller diameter orifice 26 is funnel shaped to facilitate guiding of the medicament into and through the orifice 26.

The central passage 28 leading to the orifice 26 is counterbored from an inside surface 32 of the nozzle 10. The counterbore 33 is threaded to mate with the threaded knob portion 34 of the jet injector unit 12. An O-ring 36 provides a seal between the nozzle 10 and the jet injector 12.

In FIGS. 3 and 4 the arrangement and construction of the rows of teeth are illustrated. The teeth in each successive row 20, 19, 18 are arranged in a circle with each circular row 20, 19, 18 being on a level successively closer to the inside surface 32. Each circle has a constant radius as measured from the central orifice 26. This provides a nozzle surface with a contour that permits each row of teeth to grip the skin tightly since the skin is forced into the shape of a cavity or depression by the central protrusion 16. The arrangement of teeth surrounding the nozzle also assures even pinching and tightening of the skin prior to injection of the medicament.

The teeth may be fabricated by cutting three channels 38, 39, and 40 in the nozzle surface outside the flat surface portion 14 of the nozzle 10. This defines three circumferential ridges arranged about the central orifice 26. A cutter wheel then makes equally spaced radial cuts on radii extending from the central orifice 26 to the edge of the nozzle 10. This defines a plurality of radially aligned teeth such as 42 in row 18 and 43 in row 19 and 44 in row 20, with the teeth in row 18 larger than those in rows 19 and 20 and the teeth in row 19 larger than those in row 20.

The teeth grip the patient's skin and prevent the nozzle

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from slipping thereon. Simultaneously the central protrusion stretches the patient's skin to permit easy piercing by the medicament. This combination of features, teeth and protrusion, produces a markedly improved inoculation which is faster and safer than inoculation with prior art devices.

What is claimed is:

1. In a hypodermic jet injector having a medicament discharge end, the improvement comprising, a discharge nozzle attached to said discharge end, said nozzle having an outside surface and an inside surface, said outside surface being placed in contact with an individual's skin during injection of medicament, a protrusion extending from said outside surface, an orifice for discharging medicament, said orifice having the centerline axis perpendicular to said outside surface and said orifice extending from said inside surface of said nozzle through said protrusion, and means for gripping said skin, having a plurality of rows of teeth defined circumferentially about said outside surface, each of said rows being symmetrically arranged about said orifice, and each of said rows having progressively increasing diameters, with correspondingly progressively increasing tooth size in each of said rows of increasing diameter such that said nozzle may be maintained in substantially immovable contact with said skin during injection of medicament.

2. The device of claim 1 including a threaded counter-

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bore defined in said inner surface coaxial with said orifice, said counterbore providing the means for attaching said nozzle to said jet injector, and wherein said orifice includes a central passageway coaxial with said orifice and terminating at a point short of the surface of said protrusion, said central passageway having a diameter greater than that of said orifice, said central passageway being connected to said orifice by a funnel shaped passageway narrowing down from said central passageway to said orifice.

3. The device of claim 1 wherein said discharge nozzle is of metallic material and said plurality of circular rows of teeth comprise three circular rows of teeth.

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