

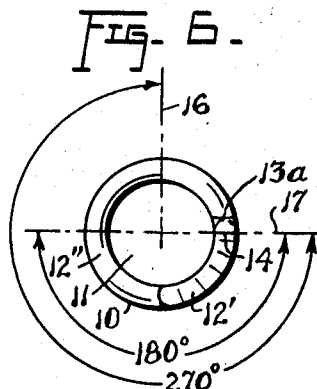
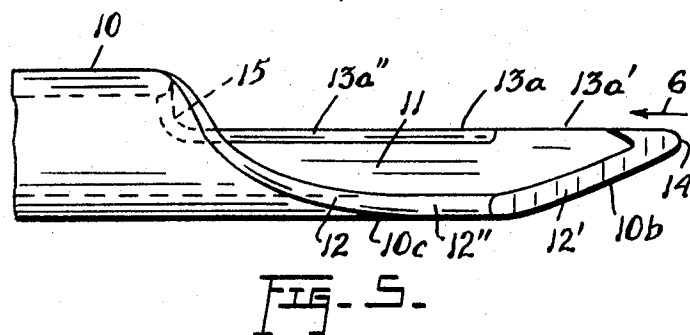
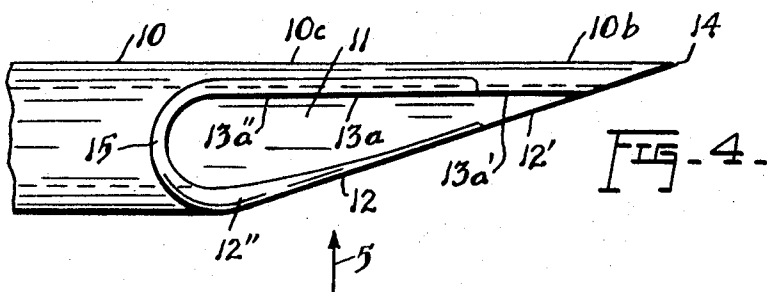
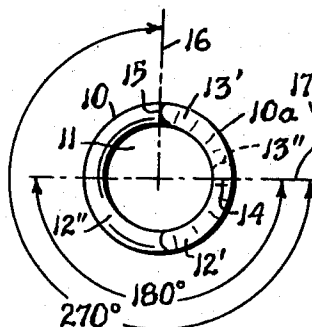
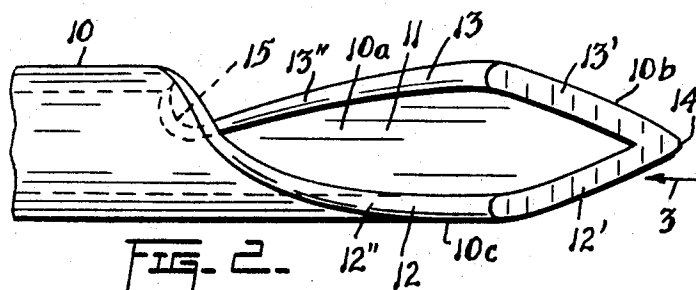
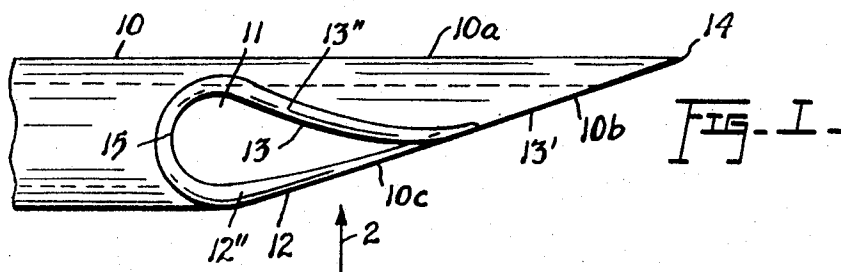
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F. H. J. FIGGE

3,448,740

NONHEEL SHAVING HYPODERMIC NEEDLE

Filed June 24, 1966



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3,448,740

NONHEEL SHAVING HYPODERMIC NEEDLE

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12 Claims

ABSTRACT OF THE DISCLOSURE

A noncoring hypodermic needle, comprising a heel portion and a tip portion terminating in a piercing point characterized in that at least one side wall portion is spirally curved from the piercing point to the heel portion and the heel portion is rotatably displaced approximately within the range of 260° to 280° and preferably about 270° from the piercing point in the same direction as the direction of spiral of said side wall portion.

This invention relates to new and useful improvements in hypodermic needles, and the like. Such needles usually comprise a cannula having a lumen extending therethrough, the cannula being provided with a bevelled end which terminates in a piercing point. When the needle is used and is pushed through material such as a bottle stopper or human skin, the material punctured by the needle has a tendency to bulge into the lumen and cause what is commonly known as "coring" and/or "heel shaving." When this occurs, a piece of the material plugs the lumen so that it is difficult to eject fluid through the needle, and even when fluid is ejected, the plug of material becomes lodged under the skin and causes irritation and soreness.

It is, therefore, the principal object of the invention to eliminate the above outlined disadvantages of conventional hypodermic needles, this being attained by providing a needle in which the possibility of "coring" and/or "heel shaving" is substantially minimized, if not altogether eliminated.

As such, the needle of the invention has an open side with an elongated tongue-like or lancet-like cannula wall segment which, for purpose of description, comprises a tip portion terminating at a piercing point and a rear portion terminating at a heel. The tongue-like or lancet-like cannula wall segment is defined by a pair of side edges terminating forwardly at the piercing point and rearwardly at the heel in a smooth curve.

For purpose of description a radial line extending from the projected axis of the needle through the piercing point in a plane normal to the axis will be considered the reference line of zero degrees from which angular measurements used in locating various features of the needle are made.

The hypodermic needles which are presently known in the art commonly have a lancet-like cannula wall segment terminating at a piercing point, and an open side with a heel located on a radial line through the axis of the needle which is at an angle of 180° rotated from a radial line through the piercing point. Examples of needles of this type are shown in U.S. Patents Nos. 2,560,162, George W. Ferguson, July 10, 1951, and 2,711,733, George W. Jacoby, Jr., June 28, 1955, to cite only two examples of many patents showing hypodermic needles having the heel rotatably displaced 180° from the piercing point. Many attempts have been made to modify the lancet points of hypodermic needles where the heel is rotatably displaced 180° from the piercing point to make the needle noncoring. Tests made by the present inventor show that these attempts have not resulted in hypodermic needles which completely eliminate "coring" or "heel shaving."

It is an object of this invention to locate the heel on the side of the needle so that it lies on a radial line through the axis of the needle which is displaced approximately 270° from the piercing point in either a clockwise or counterclockwise direction (looking rearwardly from the piercing point). This shifts the position of the heel approximately 90° in a clockwise or counterclockwise direction from the position of the heel on needles known in the prior art as referred to above. While it is preferred that the heel be displaced approximately 270° from the piercing point in either direction, satisfactory results are obtained for the purpose of this invention if the displacement as defined above is within a range of from 260° to 280°. One side edge of the tongue-like cannula wall segment is spiralled rearwardly to the heel from a position on the tip portion at the side opposite the heel in the same direction of rotation as the displacement of the heel from the piercing point. The one side edge thus is spiralled rearwardly from a position of less than 180° displacement from the piercing point through the 180° radial line to the heel. The function of the one spiralled side edge is to push material which has a tendency to bulge into the lumen outward or in a centrifugal direction as the needle penetrates the material. The other side edge of the tongue-like cannula wall segment may be spiralled from a position on the tip portion on the same side as the heel to the heel in the same direction of rotation as the direction of displacement of the heel from the piercing point. The other side edge may alternatively be straight or substantially straight.

It is within the scope of this invention that the tip end portion of the needle take various forms provided that the heel is rotatably displaced approximately 270° from the piercing point considering the direction of rotation to be the same as the direction of spiral of the one side edge described above.

The tip end portion may be symmetrical or non-symmetrical and the side edges of the tip end portion may be bevelled to lie within the same plane or they may be otherwise angled. One side edge may be straight or almost straight and the other side edge spiral.

It is a further object of this invention to provide a hypodermic needle tip having an opening wherein one side of the opening is curved and extends across the arch of the lumen to the heel on the opposite side of the needle. The curved side is dulled and curved in such a manner as to push any material which would bulge into the lumen out of it so that the material could not be shaved off by the heel of the needle.

It is another object to provide, in a modified form of the invention, a hypodermic needle tip having an open side with an elongated tongue-like cannula wall segment defined by a pair of side edges terminating at a piercing point, one side edge being approximately straight and nearly longitudinal with a sharp knife-like edge on the straight side, and the other side edge being dull and spirally curved to cross the lumen and meet the straight edge in a smooth curve.

The needle of the invention is simple in construction, efficient in operation, and lends itself to convenient and economical manufacture.

With the foregoing more important objects and features in view and such other objects and features as may become apparent as this specification proceeds, the invention will be understood from the following description taken in conjunction with the accompanying drawings, wherein like characters of reference are used to designate like parts, and wherein:

FIG. 1 is a fragmentary side elevational view showing the piercing end portion of the improved needle;

FIG. 2 is a fragmentary side elevational view thereof taken in the direction of the arrow 2 in FIG. 1;

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FIG. 3 is an end view taken in the direction of the arrow 3 in FIG. 2;

FIG. 4 is a fragmentary side elevational view showing a modified embodiment of the needle;

FIG. 5 is a fragmentary side elevational view taken in the direction of the arrow 5 in FIG. 4; and

FIG. 6 is an end view taken in the direction of the arrow 6 in FIG. 5.

Referring now to the accompanying drawings in detail, more particularly to FIGS. 1-3 which show one embodiment of the invention, the hypodermic needle comprises a tubular body or cannula 10 having a longitudinal passageway or lumen 11 extending therethrough. The piercing end portion of the cannula 10 has an open side and is constituted by an elongated, tongue-like cannula wall segment 10a defined by a pair of side edges 12, 13 which terminate in a piercing point 14.

The tongue-like cannula wall segment 10a comprises a tip end portion 10b terminating in the piercing point 14 and a rear portion 10c terminating at the heel 15. The heel 15 is located on the cannula wall on a radial line 16 which is rotatably displaced approximately 270° in a clockwise direction (looking rearwardly from the tip) from a radial line 17 extending through the piercing point 14. The tip end portion 10b is defined by side edge portions 12' and 13' while the rear portion 10c is defined by side edge portions 12'' and 13'.

One of the side edges of the rear portion 10c, for example, the side edge portion 12'', is spiralled rearwardly throughout the length of the rear portion as shown in FIG. 2. The other side edge of the rear portion 10c, for example, the side edge portion 13'' is also rearwardly spiralled in form and extends from the rear of the tip portion to the heel 15. The side edges 12 and 13 smoothly merge together in a curved or arcuate manner at the heel 15, as best shown in FIG. 1.

The side edge portions 12' and 13' in the tip end portion are sharply bevelled, providing a front cutting region. As shown in FIGS. 1-3, the side edge portions 12' and 13' are flat and lie approximately within the same plane. It is, however, not intended that the invention be limited to the configuration of the side edge portions 12' and 13' shown in FIGS. 1-3. In addition to being flat and lying in the same plane, they may also be spiralled from the tip end rearwardly to the junction of the rear portion 10c, or otherwise configured to provide a sharp cutting tip end portion. It is, however, of primary importance that at least one of the side edges be spirally curved throughout at least the rear portion of its length to the heel which lies approximately 270° rotatably displaced from the point 14.

The side edge portions 12'' and 13'' extending rearwardly from the tip end portion 10b to the heel 15 are preferably dulled. In manufacture, the dull edge regions 12'' and 13'' may be formed by sand blasting them into a blunt, rounded form while keeping the sharp edge regions 12' and 13' protected against said blasting by appropriate covering.

When the needle is used to puncture material such as a bottle stopper or human skin, the material is first penetrated by the piercing point 14 and the sharp edge regions 12', 13', whereupon the blunt or dull edge regions 12'', 13'', by virtue of their spiralled form, effectively serve to prevent the material from bulging into and coring in the lumen 11, this being because the spiralled edge regions in contact with the material deflect the material laterally outwardly through the open side of the cannula, rather than permit the material to bulge inwardly into the lumen where it would eventually be shaved off by the heel 15 to form a plug or core.

The modified embodiment of the needle shown in FIGS. 4-6 is for most part the same as the already described embodiment of FIGS. 1-3 and, where applicable, the same numerals of reference are employed. The primary difference between the two embodiments is that in the

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embodiment of FIGS. 4-6 the side edge 13a is straight and extends substantially longitudinally rearwardly from the piercing point 14 to the heel 15, while in the embodiment of FIGS. 1-3 the side edge 13 is spiralled. However, the side edge 13a also has a sharply bevelled front cutting edge region 13a' and a relatively dull region 13a'' extending rearwardly therefrom to the heel 15, as will be clearly apparent. The operation of both embodiments is substantially the same as already described, but with the embodiment of FIGS. 4-6 it is not necessary to provide a spiralled edge at both sides of the cannula wall segment and the spiralled edge 12'' at one side is primarily relied upon to perform the action of deflecting the pierced material outwardly from the lumen of the needle.

Although two forms of the invention have been shown in the drawings which illustrate the manner in which the side edges of the tongue-like segment of the cannula may be varied and still provide the non-coring function of the invention, various modifications may be resorted to, falling within the scope of the invention as claimed. Various forms falling within and even outside the range of extremes shown by FIGS. 1-3 and FIGS. 4-6 wherein changes are made with regard to length and curvature are fully within the scope of the invention.

While in the foregoing there have been described and shown the preferred embodiments of the invention, various modifications may become apparent to those skilled in the art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure, and various modifications may be resorted to, falling within the spirit and scope of the invention as claimed.

I claim:

1. A hypodermic needle comprising a cannula having a lumen extending therethrough, one end portion of said cannula having an open side and comprising an elongated tongue-like cannula wall segment having a tip end portion terminating in a piercing point, and a rear portion integrally joined to said tip end portion and terminating in a heel, said tongue-like cannula wall segment being defined by a pair of side edges terminating forwardly at said piercing point and rearwardly at said heel, one of said side edges of said wall segment being dull and spiralled in a smooth curve rearwardly from said tip end portion to said heel at the opposite side of the wall segment, the other of said side edges of the wall segment extending rearwardly from said tip end portion to said heel, said spiralled side edge serving to deflect a core of material pierced by the needle laterally outwardly from said lumen through the open side of the cannula, said heel being located on the cannula wall on a radial line extending outwardly from the cannula axis, which line is rotatably displaced through an angle within the approximate range of 260°-280° from the piercing point in the same direction as the direction of spiral of said one side edge.

2. The device as defined in claim 1 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel.

3. The device as defined in claim 1 wherein said other side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull region extending in a spiralled form from said cutting region to said heel.

4. The device as defined in claim 1 wherein said other side edge of said wall segment is substantially straight and extends substantially longitudinally rearwardly from said piercing point to said heel.

5. The device as defined in claim 1 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel, the other side edge of the wall segment also including a sharply bevelled front cutting edge region and

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a dull region extending in a spiralled form from the last mentioned cutting region to said heel.

6. The device as defined in claim 1 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel, the other side edge of the wall segment being substantially straight and extending substantially longitudinally rearwardly from said piercing point to said heel.

7. The device as defined in claim 1 wherein said heel is located on the cannular wall on a radial line extending outwardly from the cannula axis which line is rotatably displaced approximately 270° from the piercing point in the same direction as the direction of spiral of said one side edge.

8. The device as defined in claim 7 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel.

9. The device as defined in claim 7 wherein said other side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull region extending in a spiralled form from said cutting region to said heel.

10. The device as defined in claim 7 wherein said other side edge of said wall segment is substantially straight and extends substantially longitudinally rearwardly from said piercing point to said heel.

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11. The device as defined in claim 7 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel, the other side edge of the wall segment also including a sharply bevelled front cutting edge region and a dull region extending in a spiralled form from the last mentioned cutting region to said heel.

12. The device as defined in claim 7 wherein said one side edge of said wall segment includes a sharply bevelled front cutting edge region and a dull core deflecting region extending rearwardly from said cutting region to said heel, the other side edge of the wall segment being substantially straight and extending substantially longitudinally rearwardly from said piercing point to said heel.

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