Sept. 13, 1955 R. L. HUBER 2,717,600

NEEDLE STRUCTURE

Original Filed Feb. 18, 1952

Fig. 1

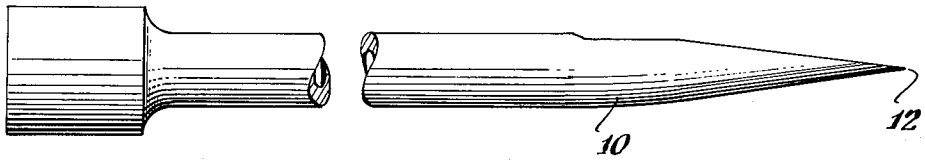


Fig. 2

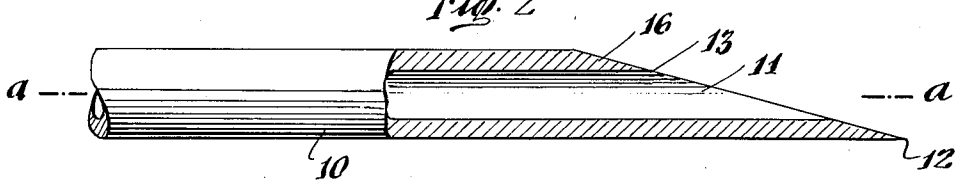


Fig. 3

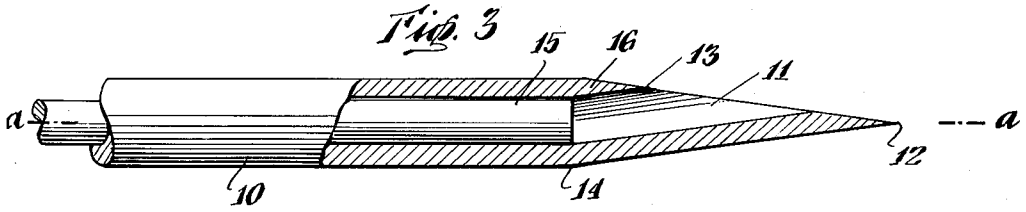


Fig. 4

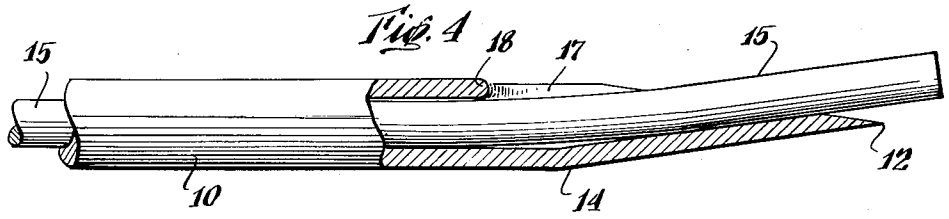


Fig. 5

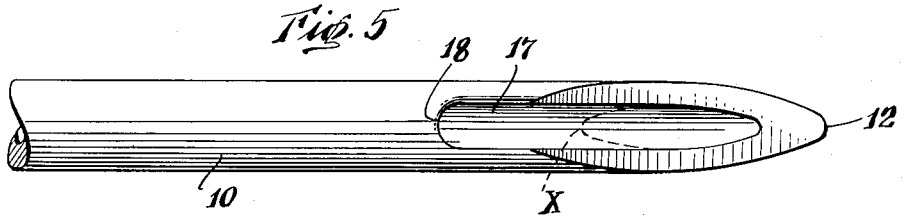
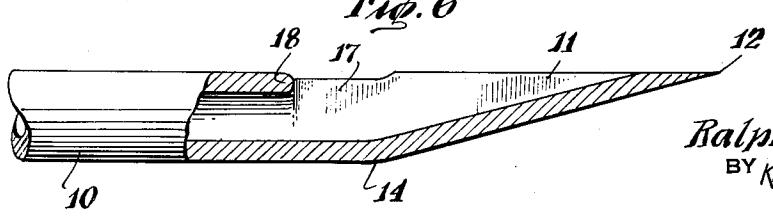


Fig. 6



INVENTOR
Ralph L. Huber
BY Kane, Dalsimer and Kane
ATTORNEYS

United States Patent Office 2,717,600 Patented Sept. 13, 1955

2,717,600

NEEDLE STRUCTURE

Ralph L. Huber, Seattle, Wash.; Jennie Huber, administratrix of said Ralph L. Huber, deceased

Original application February 18, 1952, Serial No. 272,025. Divided and this application November 24, 1954, Serial No. 471,665

1 Claim. (Cl. 128—221)

This invention relates to improvements in tubular needles and cannulas that are designed to be projected into or through layers of flesh and tissue for hypodermic injection, or to puncture a stopper or other pierceable material forming a pharmaceutical closure such as used in a blood storage vessel. The present case is a division of the prior application for U. S. Letters Patent in the name of Ralph L. Huber, on Needle Structure, filed on February 18, 1952, and identified by the U. S. Patent Office as Serial #272,025.

More particularly, the invention has reference to improvements in needles of those kinds having the point forming portion thereof angularly bent relative to the axial line of the cannula and the outlet of the channel opening to the side of the point forming portion. As an example of such needles, reference is directed to that of my U. S. patent issued on October 22, 1946, under No. 2,409,979 wherein the needle point is formed by first beveling the end of the cannula and then bending the point defining portion thereof laterally at such an angle that the beveled surface is brought parallel with the axial line of the cannula and flush with the longitudinal side edge of the cannula toward which the point is bent. In so bending the needle point, the channel of the cannula is likewise angularly deflected, and the opening therefrom as defined in the flat beveled surface will then open to the side of the point forming portion. If the bending of the point be of any lesser extent than provided for and shown in my above patent, the sharpened top edge of the channel outlet will be unprotected and tissue plug cutting will result when the needle is projected into the flesh.

It is an object of this invention to provide an improved form of needle, wherein all the advantages provided for in the formation of the point of the needle of my prior patent are retained and other advantages are gained; whereby the needle is made applicable to more uses; whereby objectionable plug cutting in any use of the needle will be eliminated, even in needles having the point forming portion bent laterally to a substantially lesser degree than in the needle of the above patent; whereby the tendency of needle deflection in puncturing a pharmaceutical closure is eliminated and hindrance to or disadvantages in use of a stylet, that results from the point bending operation, is overcome.

Another object of this invention is to so recess the heel end portion of the outlet of the needle channel that a stylet of substantially the full diameter of the channel can be employed and passed through the needle channel without causing any outward deflection of the heel defining portion of the needle outlet, this extending of the outlet along the cannula being effected in such manner that use of the needle is in no way hindered and tissue or plug cutting thereby is avoided.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is an enlarged, side view of a needle, embodying the improvements of the present invention therein;

Figs. 2, 3 and 4 are enlarged longitudinal sectional views of the pointed end portion of a cannula, showing respectively, successive steps taken in the formation of the needle point;

Fig. 5 is a view of the pointed end portion of the needle as seen from the outlet side of the point and particularly illustrating the recessing of the cannula wall; and

Fig. 6 is an enlarged sectional view of a needle with a point like that of my previously mentioned prior patent, as recessed to permit the easy use therein of stylet of the full diameter of the channel.

The commonly used types of hypodermic needles are formed with points by beveling the ends of the cannulas at an angle of about twenty degrees relative to their axial lines. In such needles, the channel of each cannula is straight from end to end and the outlet therefrom opens in the axial direction of the needle and from the beveled surface. Needles having their points so formed have certain disadvantages, one of which is that of tissue plug cutting. By means of the present teachings, this difficulty is overcome and a needle is provided through the bore of which a stylet may be introduced and which needle may also be efficiently employed in the piercing of pharmaceutical type closures and stoppers.

More specifically stated, the advantages and objects of the present invention reside in the manner of relieving or cutting away the material of the cannula that forms the heel portion across the top edge of the outlet in needles which have the point forming portion angularly bent laterally to any degree that is lesser than shown in my prior patent.

Referring more in detail to the drawings—

In Fig. 1, I have shown in an enlarged side view, a needle embodying the features of the present invention. In order to impart a better understanding, it will be explained that the needle point is formed by a succession of operations on a cannula, **10**. The first operation consists of cutting off or beveling the end of the cannula **10** at an angle of about 15 degrees relative to its axial line, thus to give it the beveled form shown in Fig. 2.

The second step in formation of the point has been illustrated in Fig. 3, and it preferably consists in bending the beveled point forming portion laterally, thus causing the channel of the cannula to be similarly bent or angularly deflected and the outlet **11** of the channel, which opens through the beveled surface, to be faced angularly or laterally of the axial line *a—a* of the cannula body. This bending of the point forming portion can be to more or lesser degree, but it is now preferred that the piercing end of the beveled portion of the cannula, that is, the extreme point, as herein designated by numeral **12**, be brought approximately to the axial line of the cannula.

The needle may be used in the form shown in Fig. 3 and due to the fact that the beveled surface is substantially flat, having a cutting edge defining its sides, and also due to the fact that it inclines towards the extended axial line of the cannula body at a relatively small angle, plugging is substantially eliminated. However, it is noted by reference to Fig. 3, that the bend of the point starts at a location, designated at **14**, that is substantially opposite the top or heel forming portion about the channel outlet. This rather abrupt bending of the cannula, noted best in Figs. 3 and 4, places the angular back wall portion of the needle point in a position at which it offers an obstruction to an easy and direct passing of a stylet through the channel be-

yond the location of the bend. In Fig. 3, a stylet is designated at numeral **15** and the hindrance to its being projected through the channel by the inclined wall is obvious. The forcing of the stylet past this point results in an outward deflection of the sharpened top edge, or heel defining portion, with the very undesirable result of forming a tissue gouging burr or edge.

As a consequence of such hindrance, a stylet of substantially lesser diameter than the channel must be used, but use of such has its objections and disadvantages.

In order to overcome these above noted difficulties and disadvantages in use of a stylet and to provide that a stylet of substantially full diameter can be passed through this type of needle and beyond the point, I have, according to the objects of this invention, relieved, recessed or cut away the top edge forming portion of the channel outlet, that is, I cut away or recess that portion designated at **16**, in Figs. 2 and 3, defining the top edge of the outlet **11** to a predetermined depth as illustrated in Fig. 5, depending on the angle to which the needle point is bent. In Fig. 5 the normal top edge boundary of the outlet, as defined by the sharp cutting edge **13** shown in Fig. 3 is indicated by the dotted line *x* and the recess formed by cutting away the heel and part of the cannula wall is designated by numeral **17**. It is noted that the recess extends away from the point somewhat beyond the point **14** where the needle channel starts to bend. The position of this point may be varied.

To insure against tissue cutting by the top edge of the recess, it is rounded off as at **18**. Thus, although the top edge of the outlet is, in this specific form of needle, unprotected by the extending point-forming portion of the needle, the rounding off of this edge is of such character that its exposure is not objectionable, nor is it a hindrance to use of the needle. By so relieving or recessing the heel end of the channel outlet, a stylet **15** of full size can be passed through the channel; this being due to the fact that a sufficient length of stylet passes beyond the base of the recess before its end engages the curve or bend of the needle point forming wall. Accordingly it can bend in conformity with the angular surface of the needle point as has been indicated in Fig. 4. Aside from the provision for use of a full sized stylet, the present needle, as shown in Figs. 1 and 4, has no tendency to be deflected laterally when pressed through a stopper or pharmaceutical closure, this being due to the fact that the point is substantially in the axial line of the needle and the beveled side surface and the back wall surface of the point are substantially at the same degree relative to the axial line of the cannula; as shown in Fig. 4.

It is not the intent, however, that the extent of the bending of the point be limited to that shown in Fig. 3, but it is anticipated that it might be somewhat less or go beyond that shown even to the extent shown in Fig. 6. Therefore, it is not the intent that the invention shall be confined in scope to the angular position of the point as shown in Fig. 4, but that the invention shall apply to bending of the point to any degree between the opposite side limits of the cannula body that is, to any extent between the position of the points **12** as seen in Figs. 2 and 6.

Also, it is not the intent that the relieving or recessing of the heel shall be to any definite extent, but shall be governed by the requirements of the particular needle and results desired to be accomplished.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is:

A needle structure designed for use therein of a stylet of the full diameter of the channel of the cannula, comprising a cannula with an angular bend at one end, and formed across the bent portion with a beveled surface lying in a plane that is parallel with and tangential to the longitudinal surface of the cannula at that side thereof toward which the cannula is bent, and there being a recess formed in said beveled surface and extending from the channel outlet and to the full diameter of the channel, along the cannula wall as an upper end elongation of the said outlet.

No references cited.