

[54] **NEEDLE POINT FOR STOPPER
PENETRATION AND METHOD OF MAKING
IT**

[75] Inventor: **Waldemar A. Ayres**, Rutherford,
N.J.

[73] Assignee: **Becton, Dickinson and Company**,
East Rutherford, N.J.

[22] Filed: **Feb. 27, 1974**

[21] Appl. No.: **446,346**

[52] **U.S. Cl.**..... **128/2 F; 128/221; 128/272;**
222/80; 72/369

[51] **Int. Cl.²**.... **A61B 5/14; A67B 7/24; B21D 9/00**

[58] **Field of Search** **128/221, 339, 218 N, 215,**
128/218 NV, 218 D, 218 R, 218 DA, 218 M,
220, 272, 347, 2 F, 329; 72/367, 369, 470,
341; 163/5; 222/80-82; 141/329

[56] **References Cited**

UNITED STATES PATENTS

1,331,271	2/1920	MacGregor.....	128/221
3,181,336	5/1965	Schofield	128/221 X
3,327,710	6/1967	Freeberg et al.	128/218 M
3,540,112	11/1970	Knox.....	128/221 X
3,594,296	7/1971	Derwall.....	128/221 X

FOREIGN PATENTS OR APPLICATIONS

591,985	2/1960	Canada	128/221
---------	--------	--------------	---------

Primary Examiner—Richard A. Gaudet
Assistant Examiner—J. C. McGowan
Attorney, Agent, or Firm—Kane, Dalsimer, Kane,
Sullivan and Kurucz

[57] **ABSTRACT**

A needle point particularly suited for insertion through a container stopper is not deflected to one side during penetration of the stopper. The needle is also non-coring during its passage through the stopper. The needle point has two diagonal faces instead of the usual one. The two faces are on opposite sides of the cannula body so that vector forces applied to each face during passage through a stopper are equal and opposite (therefore self-cancelling). During passage through the stopper, the needle continues in a straight path along the axial line of the needle without side-ways deflection.

The method of fabricating the new needle comprises (1) making a first diagonal grind on the cannula, (2) rotating the cannula 180° and making a second diagonal grind, and (3) bending the cannula wall tips to bring them together at the axial line.

5 Claims, 8 Drawing Figures

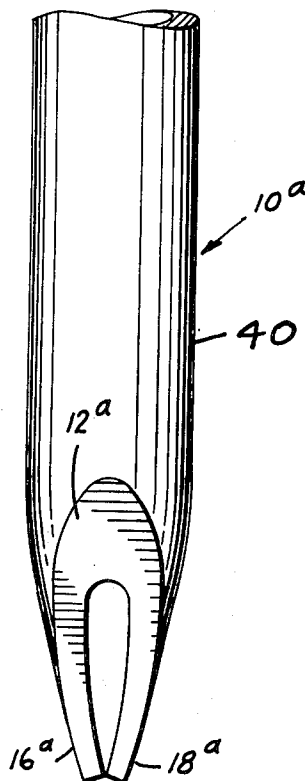


Fig. 1

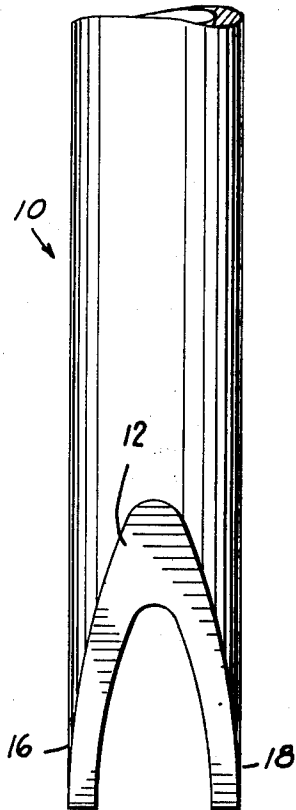


Fig. 2

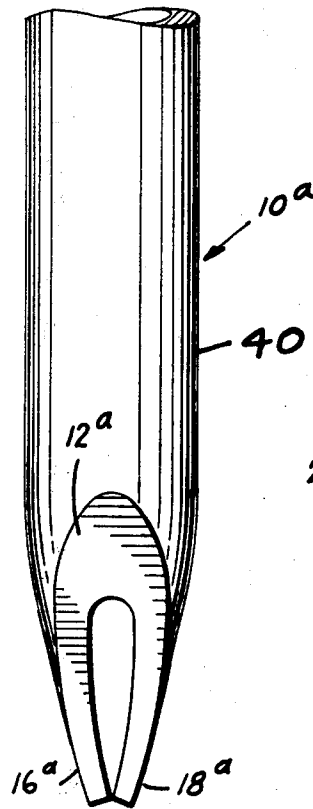


Fig. 5

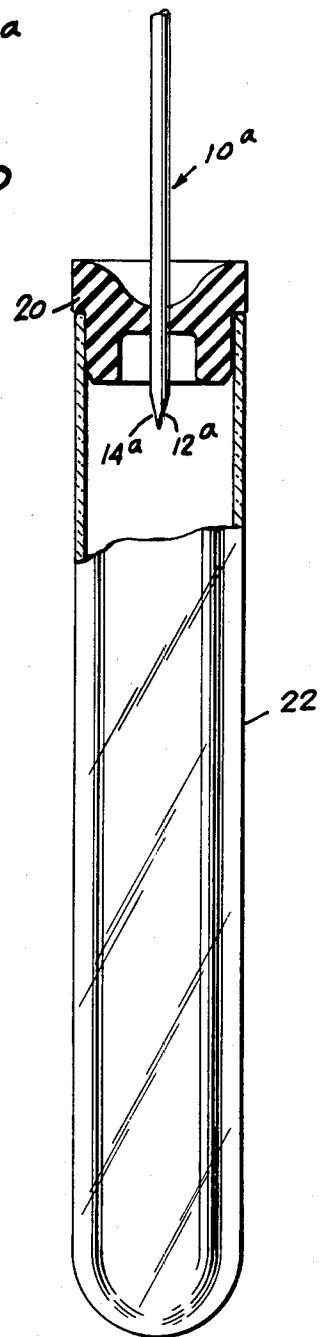


Fig. 3

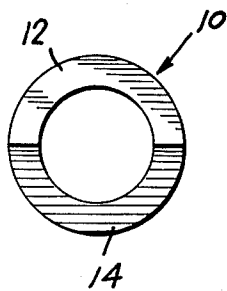


Fig. 4

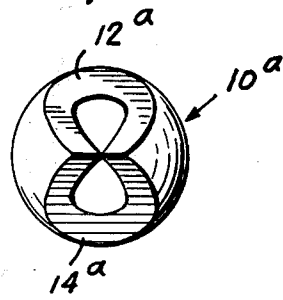


Fig. 6

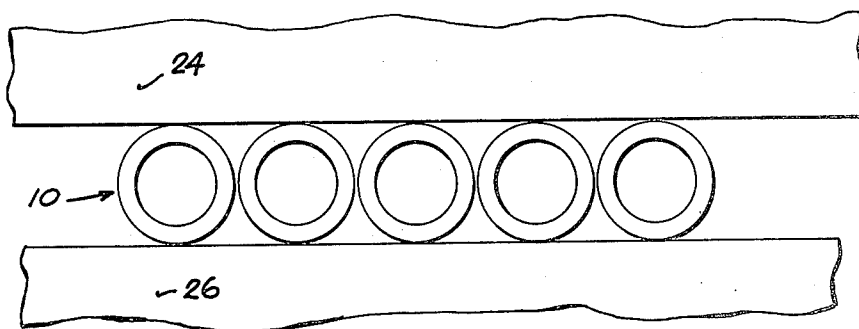


Fig. 7

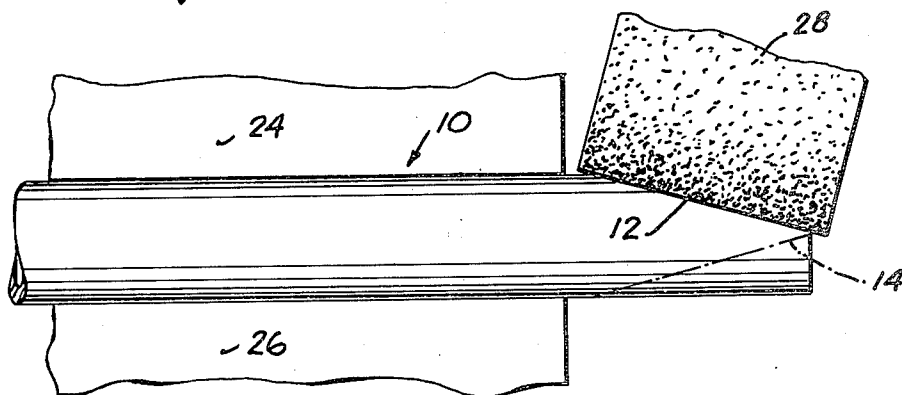
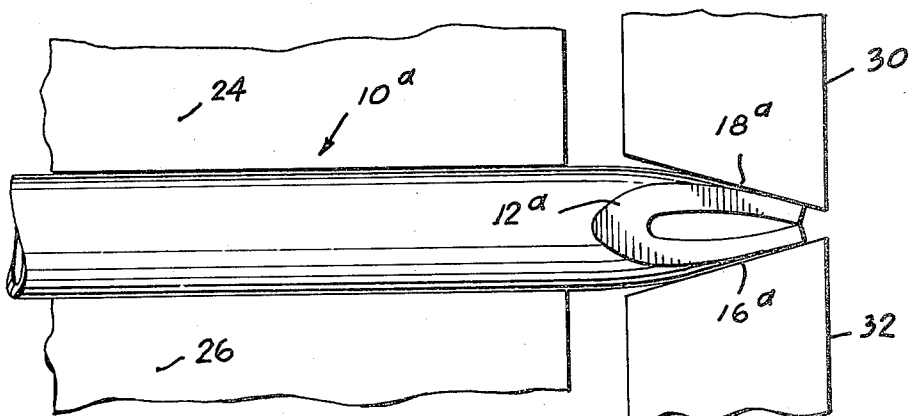


Fig. 8



NEEDLE POINT FOR STOPPER PENETRATION AND METHOD OF MAKING IT

BACKGROUND OF THE INVENTION

With the double ended needle used in the Vacutainer tube supplied commercially by Becton, Dickinson and Company of East Rutherford, N.J., the usual diagonal bevel of the point which penetrates the rubber stopper frequently causes this needle to be deflected considerably off-center. This occasionally results in the needle point failing to emerge into the central well of the stopper (instead, remaining embedded in the sidewall), whereupon no blood can enter the Vacutainer tube and the device is a failure. The diagonal face of the needle point is clearly the factor which causes this deflection off-center, in most cases.

This difficulty is also a design limitation in devising various kinds of stoppers, particularly for new and special purposes. To avoid the hazard of the above type of malfunction, present stopper design practice requires that a large central well, on the lower side of the stopper, be maintained, and that the "roof" of this well be horizontal, or substantially so, across its diameter. For various special types of Vacutainer tubes, the diameter of the central well could advantageously be made much smaller and, in some cases, provide a curved or conical roof. In these cases, if the needle were deflected substantially off-center during insertion, the needle point would be likely to remain embedded in the stopper sidewall, or within the increased thickness of the curved or conical roof, without emerging, thus preventing blood from flowing and causing failure of the device.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide a new needle point which eliminates the forces tending to produce needle deflection during stopper penetration thereby rendering it further feasible to permit increased design flexibility for producing new stoppers.

A further object is to provide a needle point for stopper penetration which is bilaterally symmetrical so that any deflection forces, due to diagonal surfaces, are made equal and opposite so that they are self-cancelling, about the long axis of the needle; the needle point does not core; the needle point is simple, inexpensive and practical to manufacture in large quantities; and the needle point does not produce excessive hemolysis.

Other objects and advantages will become apparent from the following detailed description which is to be taken in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

In the drawings

FIG. 1 is a side elevational view of a stopper penetrating needle at an intermediate stage of its manufacture with the opposed tips being spaced apart;

FIG. 2 is the final needle with the tips bent towards one another in substantially abutting relationship;

FIG. 3 is the bottom plan view of the partially formed needle point of FIG. 1;

FIG. 4 is the bottom plan view of the finished needle of FIG. 2;

FIG. 5 is an elevational view with certain parts broken away and removed and sectioned for clarity showing

ing the needle of the present invention penetrating a stopper of an evacuated tube;

FIG. 6 is a side elevational view of a quantity of needle blanks lying side by side between rigid plates in the course of manufacture, and one plate is moved laterally relative to the other to rotate the needles a predetermined amount;

FIG. 7 is a side elevational view illustrative of a grinding operation contemplated by the present invention; and

FIG. 8 shows the partially formed needle blank being supported between plates with bevel-faced squeeze bars moved towards one another to bend the tips in substantial abutting relationship to form the finished needle of FIG. 2.

DETAILED DESCRIPTION

Referring initially to FIGS. 1 and 3, a partially formed needle blank for penetrating a stopper is initially provided with a pair of opposed bevel-faces 12 and 14 to form a pair of diametrically opposed pointed tips 16 and 18. The force vectors produced by these faces during stopper penetration are equal and opposite and hence self-cancelling with no lateral deflection being produced and an axial vector remaining. However in actual practice the needle blank 10 as shown with beveled faces 12 and 14 would cut a core out of the rubber stopper and consequently this would be objectionable.

It has been found that finished needles 40 having tips 16 and 18 bent inwardly into abutting relationship thereby defining beveled faces 12a and 12b and inwardly bent substantially abutting tips 16a and 18a enter a stopper without any sideways deflection and without coring.

This penetration into stopper 20 of an evacuated tube 22 is depicted in FIG. 5.

Turning now to FIGS. 6 to 8, an exemplary manufacturing method is illustrated for producing the needles 10a illustrated in FIGS. 2, 4 and 5. Initially needle blanks 10 are disposed and pressed between rigid plates 24 and 26. The needles 10 lie side by side and upon lateral movement of one of the plates relative to the other, these needle blanks are adapted to rotate about their respective axes. In this fashion a grinding wheel may be actuated to pass across the tips of the group of needle blanks for purposes of grinding different faces at predetermined angles. Thus in FIG. 7 the needle blanks 10a are provided with bevel-face 12 by the grinding wheel 28. This wheel 28 will then grind bevel-face 14 following shifting of one of the plates 24 and 26 to rotate the needles 180°. Alternatively the needles 10 may be held stationary and a second grinding wheel may be passed along the underside to grind the bevel-faces 14. Following the grinding of the two beveled faces 16 and 17, the rigid plates 24 and 26 could be moved relative to each other so that each of the needle blanks would be rotated 90° about their respective axes to the position shown in FIG. 8. Then bevel-faced squeeze bars 30 and 32 would be reciprocated towards one another to bend the tips 16a and 18a as shown to produce the finished needle 10a. Thereafter the processes of deburring, cleaning, etc., could be followed in accordance with well known techniques in the needle art.

Although several somewhat preferred embodiments of the invention have been disclosed and described in detail herein, it should be understood that this inven-

tion is in no sense limited thereby and its scope is to be determined by that of the appended claims.

What is claimed is:

1. A stopper penetrating needle including a tubular portion having a stopper penetrating end, the end having two beveled faces 180° apart from each other and in converging relationship defining a pair of opposed tips, the tips being bent toward one another whereby the points of each tip are substantially adjacent one another but not united to provide a stopper penetrating pointed end being substantially free of lateral deflection and coring when inserted into the stopper.

2. The invention in accordance with claim 1 wherein the points of the tips are bent into contact with one another.

3. A method of producing a stopper penetrating needle with an end free of lateral deflection and coring when inserted into the stopper, including the steps of:

a. providing a plurality of needle blanks essentially in tubular form each having a stopper penetrating end;

b. grinding opposed convergent beveled faces in the tubular needle blanks at the stopper penetrating ends and thereby defining a pair of opposed pointed tips at this end; and

c. bending the tips towards one another into substantial engagement but not united with one another to form the finished stopper penetrating end.

4. The invention in accordance with claim 3 wherein the needle blanks are pressed between two rigid plates relatively movable in a lateral direction with respect to one another and in forming the beveled faces the needle blanks are rotated about their respective axes 180° to permit a grinding wheel to pass twice over the needle blank ends to form the two beveled faces.

5. The invention in accordance with claim 4 wherein the pressed needle blanks are moved 90° about their respective axes through the relative lateral reciprocation of the plates to thereby expose the needle blank ends with beveled faces to a pair of bevel-faced squeeze bars for bending the pointed tips.

* * * * *

25

30

35

40

45

50

55

60

65