

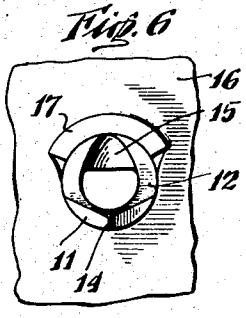
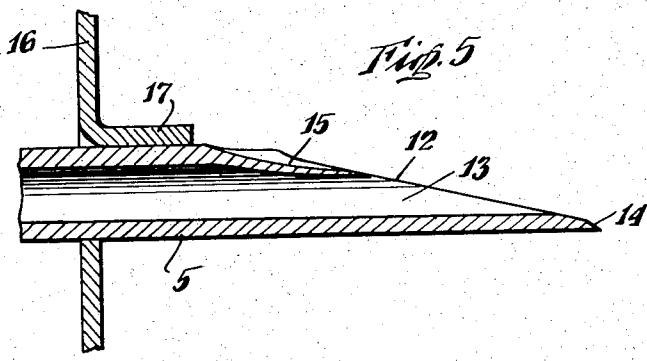
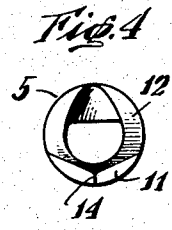
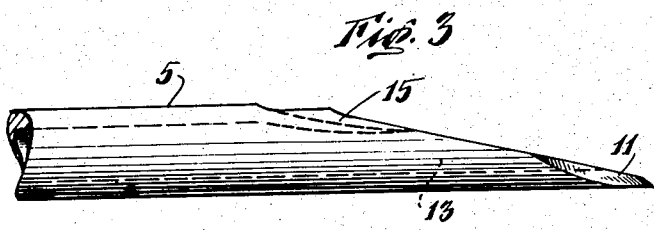
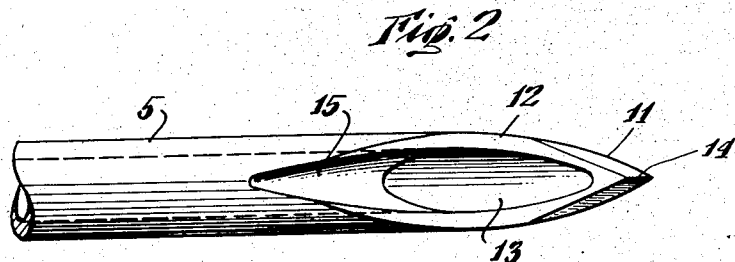
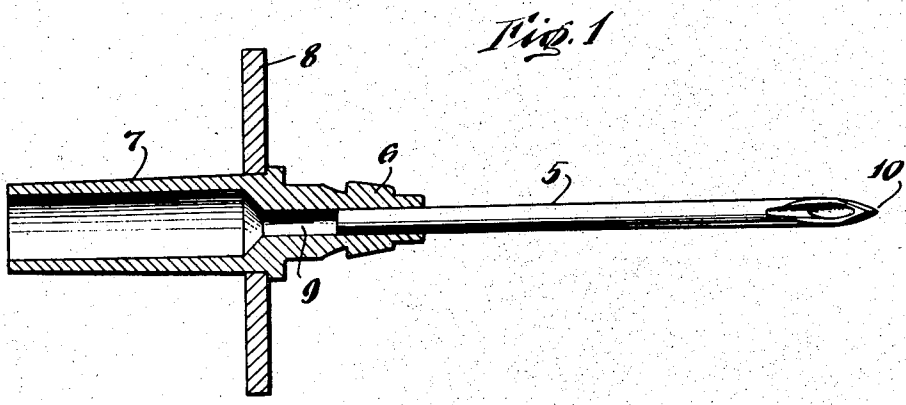
July 10, 1951

G. W. FERGUSON

2,560,162

NEEDLE STRUCTURE

Filed Feb. 10, 1950



INVENTOR.  
*Garwood W. Ferguson*  
BY *Duell and Kans*  
ATTORNEYS

# UNITED STATES PATENT OFFICE

2,560,162

## NEEDLE STRUCTURE

Garwood W. Ferguson, Paterson, N. J., assignor  
to Becton Dickinson and Company, Rutherford,  
N. J., a corporation of New Jersey

Application February 10, 1950, Serial No. 143,399

4 Claims. (Cl. 128—221)

1

This invention relates to a functionally improved hollow needle or cannula structure.

It is an object of the invention to furnish a structure of this nature which may pierce layers of material or skin and tissue without severing a plug from such materials.

Accordingly, in the case of a needle which is caused to puncture a diaphragm, stopper or other sealing portion of a pharmaceutical closure, material will not be cut from such closure. Therefore, there will be no danger of the bore of the cannula becoming clogged, nor will there be any danger of a plug dropping into the receptacle to which the seal is applied. Where the invention is embodied in a hypodermic needle and the latter pierces skin and underlying tissues no embolus will be cut.

An additional object of the invention is that of furnishing a device of this type which may readily be manufactured by quantity production methods and with minimum expense; the needle structure being equally applicable to cannulae which are merely intended to pierce closures or cannulae which are primarily intended for hypodermic injection purposes.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating one practical embodiment of the invention and in which:

Fig. 1 is a face view of a needle and showing the same mounted by a hub or coupling member such as would ordinarily be employed in connection with a needle to puncture diaphragms of rubber or other materials providing pharmaceutical closures;

Fig. 2 is a fragmentary enlarged face view of the pointed needle end;

Fig. 3 is a side view thereof;

Fig. 4 is an end view of the needle point;

Fig. 5 is a sectional side view of a thin material layer pierced by a needle, also shown in section;

Fig. 6 is an end view of the parts as shown in Fig. 5.

Referring primarily to Fig. 1, the numeral 5 indicates a cannula or hollow needle which, as shown, may be mounted upon a hub including a forward portion 6 and a tubular rear portion 7. This hub conveniently includes as part of its assembly a shield 8. The forward portion 6 of the hub is formed with a bore 9 which provides a continuation of the cannula bore. The needle is pointed at its outer end as generally indicated at 10 to furnish a piercing end or part.

Referring in detail to the structure provided adjacent the point of the needle it will be seen

2

as in Figs. 2, 3 and 4 that this may include a generally obliquely extending surface. This surface or zone preferably embraces forward side bevels 11, to the rear of which the ground surface 12 extends. Within the zone of surface 12 the end of the bore 13 is defined. To the rear of this bore is the heel portion of the needle. The forward bevel surfaces 11 merge as at 14 and this line of merger is continued to furnish the piercing point at the extreme end of the needle.

In accordance with the present teachings, the heel portion of the needle point is depressed as indicated at 15. Such depression extends to the rear of the zone of the ground surface. Also, this depression interrupts the rear zone of the ground surface.

To provide a unit of this character, a cannula is cut to lengths in the usual manner. Also, in the usual manner the end of the cannula is ground to furnish the obliquely extending surface as well as the side bevels 11 which interrupt or form continuations of the forward end of that surface. Thereafter, the heel portion of the needle is subjected to pressure exerted through a press mounting a suitable tool. In this manner the depression 15 is formed to define this heel portion. Thereupon, the cannula and the point are complete. At any stage in the manufacture, a suitable hub portion may be associated with the cannula.

As a result of the depression which is formed to provide the heel portion, no plug will be severed from a layer or layers pierced by a needle embodying the present teachings. Rather, if a thin layer 16 is punctured as shown in Figs. 5 and 6, the layer will have a flap portion 17 extending laterally from it and usually in direct sliding contact with the outer surface of the cannula 5. This flap portion will be attached through a substantial part of its circumference to layer 16. Therefore, there will be no danger of the flap being severed and detaching from the main layer during the piercing operation.

Where a relatively thick diaphragm or other closure layer is punctured by the needle, the point and adjacent edges of the latter will cut an arcuate slit as they initially pierce that layer. This slit may extend through substantially 120°. Continued projection of the needle will result in this slit being stretched or spread by the wedging action of the needle surfaces. Accordingly, a plug of material will in no case be deposited within the interior of a laboratory flask or bottle with consequent objectionable appearance to the contents of that receptacle and pos-

sible contamination of such contents. Neither will a plug come into being which will tend to or actually ride into the lumen of the cannula. Where the structure is embraced in hypodermic needles, no embolus will be cut and therefore the patient will experience no danger in this connection.

Thus, among others, the several objects of the invention as specifically afore noted are achieved. Obviously numerous changes in construction and rearrangement of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A needle structure including a cannula formed with a piercing point at one end, bevel surfaces extending rearwardly from said point and presenting a line of merger, a further surface extending obliquely from said bevel surfaces rearwardly across the cannula, a heel portion at the rear end of said oblique surface and a depression formed in the heel portion.

2. A needle structure including a cannula formed with a piercing point at one end, a surface extending obliquely from said point rearwardly across the cannula, the outer end of the cannula bore terminating in such surface, a heel portion contiguous with said surface and having its forward boundary defined by the rear edge portion of the cannula bore and said heel portion being depressed in the direction of the needle axis below the outer cannula surface.

3. A needle structure including a cannula formed with a piercing point at one end, a surface extending obliquely from said point rearwardly across the cannula, the outer end of the

cannula bore terminating in such surface, a heel portion contiguous with said surface and having its forward boundary defined by the rear edge portion of the cannula bore and said heel portion being depressed throughout its entire area in the direction of the needle axis and below the outer cannula surface.

4. A needle structure including a cannula formed with a piercing point at one end, a surface extending obliquely from said point rearwardly across the cannula, the outer end of the cannula bore terminating in such surface, a heel portion contiguous with said surface and having its forward boundary defined by the rear edge portion of the cannula bore, said heel portion being depressed in the direction of the needle axis below the outer cannula surface and the cannula bore in line with said heel portion being constricted incident to such depression.

GARWOOD W. FERGUSON.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
2,137,132	Cooly	Nov. 15, 1938
2,409,979	Huber	Oct. 22, 1946

#### FOREIGN PATENTS

Number	Country	Date
466,002	Great Britain	May 20, 1937
453,877	France	Apr. 16, 1913
739,717	France	Jan. 16, 1933