

Oct. 14, 1958

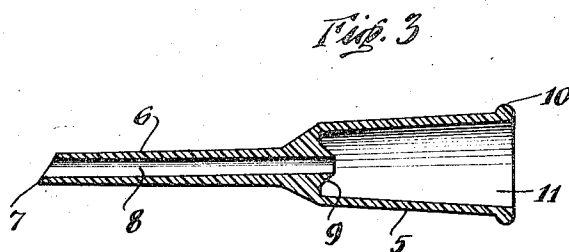
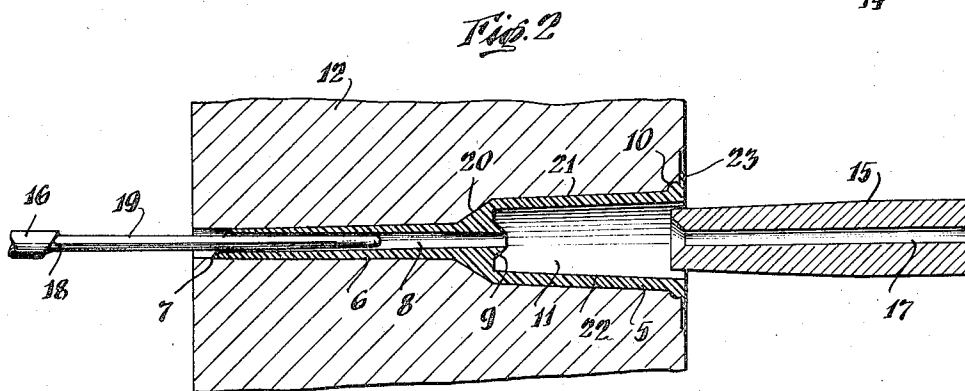
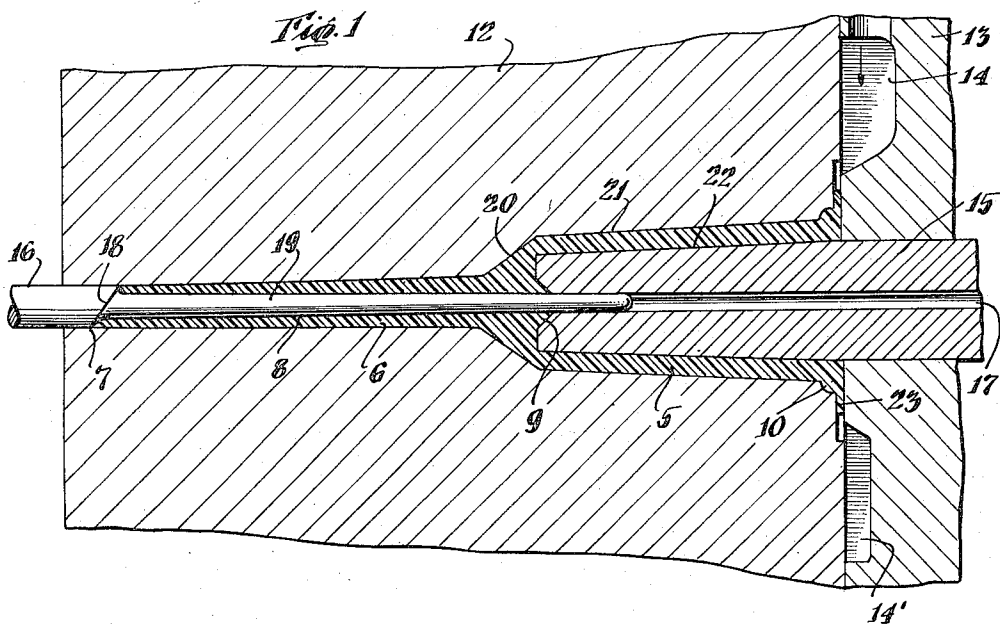
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2,855,929

VENTING NEEDLE

Filed June 20, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4

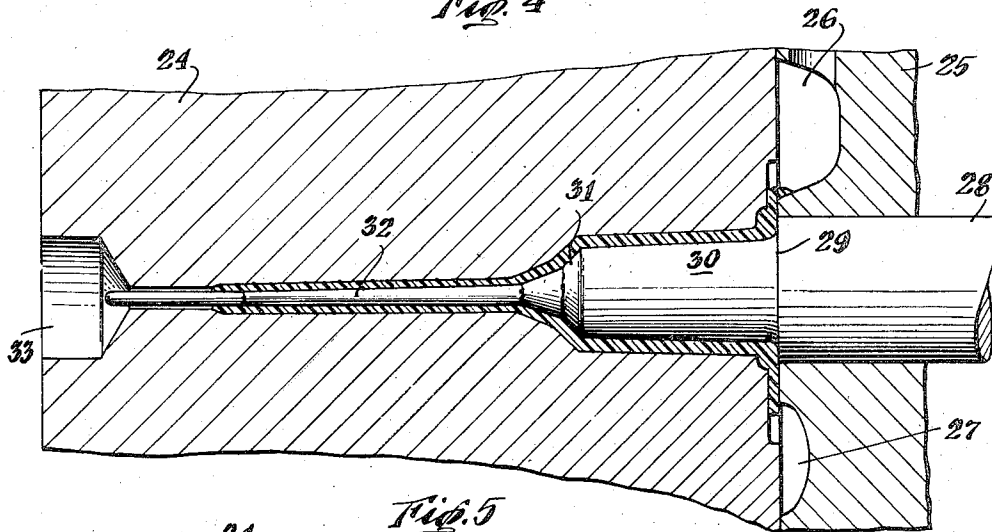


Fig. 5

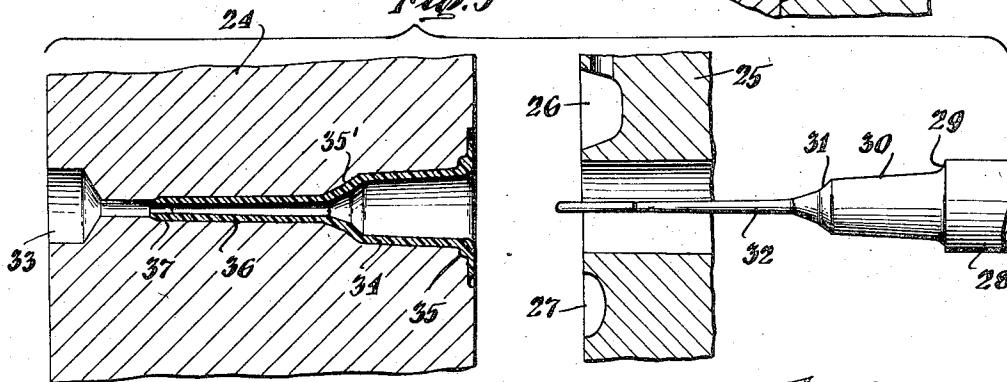


Fig. 7

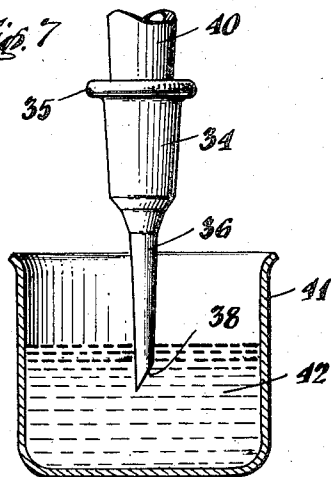
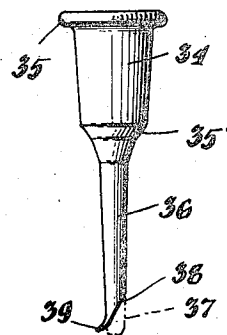


Fig. 6



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VENTING NEEDLE

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2 Claims. (Cl. 128—221)

This invention relates to a structurally and functionally improved venting needle for use in connection with medical techniques and also teaches a method of manufacturing the same.

It is a primary object to furnish a needle suitable for puncturing the diaphragms or stopper portions of seals such as are commonly associated with flasks used in medical practice to receive and dispense blood, plasma and other liquids. A unit is provided by the present teachings, which will be quite inexpensive in comparison with needles of the hypodermic type as heretofore commonly employed for similar purposes. Also, the needle may be coupled to tubing where desired and will otherwise perform the requirements of venting containers.

A further object of the invention is that of teaching efficient methods of forming a needle of this type, which methods may be economically practiced by relatively unskilled labor.

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

Fig. 1 is a fragmentary sectional side view of a die assembly used to produce the venting needle;

Fig. 2 is a view in smaller scale of the parts as shown in Fig. 1, but illustrating them in a different position;

Fig. 3 is a sectional side view of one form of venting needle produced in accordance with the present teachings;

Fig. 4 corresponds to Fig. 1, but illustrates an assembly different from that shown in the earlier figure;

Fig. 5 shows the parts of Fig. 4 in a subsequent position;

Fig. 6 is a side elevation of a needle produced by the practice shown in Figs. 4 and 5; and

Fig. 7 illustrates a final step in that practice.

Referring primarily to Fig. 3, the numeral 5 indicates the hub of a venting needle structure which includes a forward needle or cannula portion 6 terminating in a preferably inclined edge providing a piercing point 7. The wall thickness of the cannula is preferably tapered in the direction of the point and the lumen 8 of the same may present a constantly increasing diameter. The inner or rear end of the hollow needle is defined by a thickened portion 9 extending inwardly of the hub 5. That hub may terminate in an outwardly extending bead 10. Under certain circumstances, this bead may be completely eliminated from the assembly. The bore 11 of hub 5 should be preferably tapered so that it will correspond to the configuration of a "Luer" fitting. Accordingly, it may be coupled to the nozzle portion of a standard hypodermic syringe.

A needle assembly of this type will incorporate adequate strength so that it may be caused to penetrate a diaphragm or seal formed of rubber or other suitable materials. Likewise, it may—without damage—be withdrawn from that seal. A collapse of the parts is precluded incident to the strength incorporated in the assembly at the zone of juncture of the hub and cannula. This will be especially true if, as shown, an inwardly pro-

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jecting portion 9 defines the entrance end of the cannula within the hub bore 11 and/or if a tapered surface is provided to connect the cannula and hub. The forward piercing end of the hollow needle may, of course, be reduced or extend tangentially to a greater degree than the amount shown. This will depend upon the desire of the ultimate user and the character of the material which the venting needle is to penetrate.

As will be understood, that needle will ordinarily be associated with the seal or stopper of a flask in order to admit air into the latter. This will be necessary if the liquid in that flask is being withdrawn as, for example, in the case of a transfusion. Likewise, the needle will serve to conduct liquids into and from the interior of a flask or other receptacle when the needle assembly is attached to the conventional tube. Where so attached, it may in many instances be desired to completely eliminate bead 10 so that the tube may be readily slipped over or removed from a position at which it ensleaves the hub portion. Otherwise, an adaptor may be used for this purpose.

As shown in Figs. 1 and 2, and especially the former, the die assembly may include a body portion formed with a suitable bore to receive the metal from which the venting needle is to be formed. That metal may be one of a number of different types. The body of the die will, of course, be formed of a suitable block 12 of metal. The die cap 13 may be similarly formed and be provided with a gate 14 opposite which a venting pocket 14' may be disposed. A core pin 15 extends through the opening in die part 13 and into the forming bore of part 12. A second core pin 16 extends into the bore of part 12 from a side opposed to that within which pin 15 is positioned. The latter may be formed with a bore 17 providing an air vent. Core pin 16 is furnished with a shoulder 18 capable of being disposed within the die bore and the angularity of which corresponds to the angularity to be imparted to the outer end of cannula 6. Beyond this, pin 16 is continued in the form of a reduced portion 19 which is tapered and has a length such that it may extend into the bore 17 of pin 15.

The recess or bore of die part 12 is flared at a point intermediate its ends as indicated in 20. Thus, there is included within the venting needle a shoulder portion which is inclined as in Fig. 3 and defines the zone between the cannula and hub. To the rear of surface 20, the bore or cavity of die part 12 is flared, as indicated at 21. This part may terminate in a recess or groove in communication with gate 14 in the event that a bead 10 is to define the rear edge of hub 5. Otherwise and as aforementioned, this bead may be completely eliminated.

In operation, it will be assumed that the parts of the die assembly are disposed in the manner shown in Fig. 1. Under these circumstances and with metal introduced through gate 14, a unit as illustrated in Fig. 3 will be produced. After such production, core pin 16 may be retracted as in Fig. 2. Core pin 15 and die cap 13 are then simultaneously retracted. The casting will shrink onto pin 15. Therefore, it will be withdrawn from body 12. By further subsequent retraction of pin 15, the casting is stripped thereof. This occurs as a consequence of die cap 13 remaining stationary. While, for the purposes of illustration, the casting has in Figs. 2 and 5 been shown in association with the body of the die, it will be borne in mind that ordinarily the foregoing operation will occur.

In the event that fin portions 23, shown in Fig. 2, come into being adjacent the open end of the hub 5 and whether bead 10 is incorporate therein or not, such portions may be readily removed. For example, a suitable configuration in combination of punch and coining operations will in many instances assure the desired results. This same operation may also serve to eliminate bead 10

where desired. Otherwise any fins or other parts which should be removed may be eliminated by one of any desirable number of suitable processes.

If it is found that the pointed outer end 7 and the adjacent surfaces of the hollow needle require further operations after release from the die, the outer tip end of the cannula may be beveled. This is achievable by, for example, a belt sander or by means of a stone. Where such operations are resorted to, objectionable burrs will come into being at the tip and in the lumen. These may be eliminated in a manner hereinafter described.

A method different in certain details from that shown in Figs. 1 and 2 has been illustrated in Figs. 4 and 5. In those views, the numeral 24 indicates the die body with which a cap 25 may be associated. Conveniently formed in the latter is a gate 26, and a venting cavity or pocket 27. The cap and die body are formed with openings or bores. Projectable into the latter is a core pin 28 provided with a shoulder portion 29 beyond which it presents a tapered surface 30. In turn, beyond the latter is a surface of reduced area indicated at 31 which, as illustrated, may embrace two angularly disposed faces or zones. In turn, beyond these is a reduced pin portion 32. The latter, together with parts 30 and 31 of the core pin, extend into the bore formed in die body 24. That bore may be enlarged as at 33 immediately beyond the outer end of the reduced pin portion 32.

As is apparent with the parts in the position shown in Fig. 4, metal may be introduced into the spaces intervening the core pin, the die body and the cap. With the core pin fully projected, this metal will be distributed in a manner such that a desirable venting needle is produced. After the die is opened as in Fig. 5, then the core pin may be retracted as also shown in that figure. Under these circumstances, the casting is stripped off.

That casting, as shown especially in Fig. 6, will include a hub 34 which is conveniently flared both on its exterior and bore surfaces. Adjacent its rear end, a bead 35 may extend outwardly from the hub. This bead—as afore brought out—may be eliminated together with any fin portions which have come into existence. In any event the forward end of the hub will be continued in the form of a generally tapered part 35', which is continued as a cannula 36, the lumen of which is tapered toward the outer needle end. That end of the cannula will terminate, generally, in a configuration as indicated in dash lines at 37. Due to the tapered surfaces, the necessary strength will be incorporated in the parts.

Now, in order to include a suitable piercing point in the needle, a belt sander or stone-grinding technique may be resorted to. This will result in the end of the cannula extending tangentially as indicated at 38. It will ordinarily also result in an objectionable burr or fin 39 coming into being. A similar burr may extend into the lumen of the needle. These will have to be eliminated.

Regardless of the method followed in reducing the

casing, such removal may be achieved with facility by coupling with a suitable water-supplying nozzle. That nozzle may embrace the tip 40 of a bulb syringe filled with water. A receptacle 41 filled to a proper depth with acid 42 is utilized. The acid employed may be nitric acid. As shown in Fig. 7, the outer end of the cannula is immersed in this body of acid for around four to five seconds. It is removed from the acid bath and plunged into water. By expressing liquid through tip 40, oxides are flushed out of the venting needle. Under this procedure, all objectionable burrs are removed.

After the venting needles are thus formed, they could be sharpened (if this were found to be necessary) and plated if desired. Obviously, a number of the needles could be handled by an operator with certain implements so as to simultaneously bevel, de-burr and punch trim if one or all of such operations were desired. Ordinarily, however, with a cannula portion slightly in excess of one-half inch and by following the procedure outlined, no sharpening or removal of flash metal would be required. With no sharp edges on the inside of the bevel defining the piercing end of the needle and the end zone of the lumen, the danger of plug cutting will be minimized. If as afore brought out the step of immersing the point of the needle in acid is resorted to, then agents other than nitric acid may, of course, be employed.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously numerous changes in construction and rearrangements of the parts might be resorted to as might also changes in the steps of the method without departing from the spirit of the invention as defined by the claims.

I claim:

1. A venting needle including in combination a cannula, a perforating point at one end thereof, the wall thickness of said cannula being reduced towards that point and the lumen of such cannula being tapered in the same direction.

2. In a venting needle as specified in claim 1, a hub connected to the opposite cannula end and a relatively thickened portion at the zone of juncture of said cannula and hub; said thickened portion diminishing in thickness in the direction of said cannula.

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