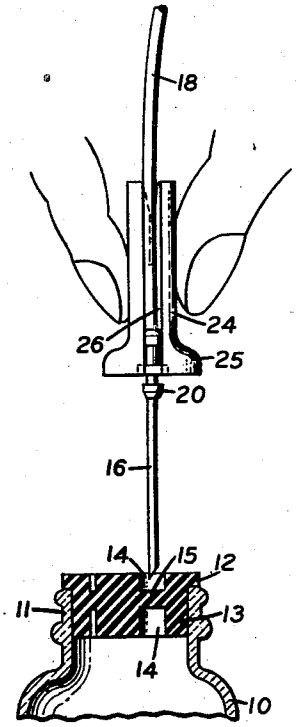
March 15, 1960 A. E. KRUG 2,928,391

HOLDER-CLAMP

Filed July 8, 1953

FIG. 1.



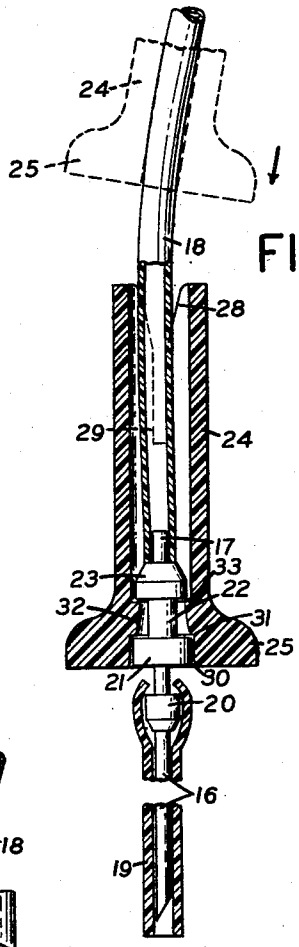
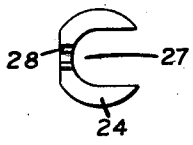


FIG. 2.

FIG. 5.



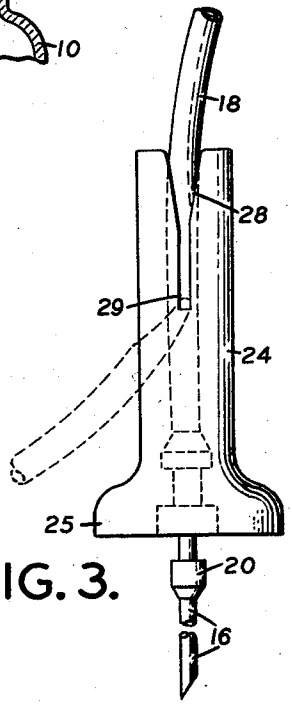
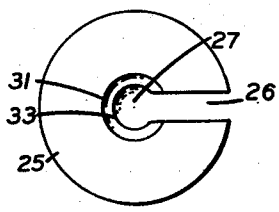


FIG. 3.

FIG. 4.



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HOLDER-CLAMP

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7 Claims. (Cl. 128—214)

This invention relates to a structurally and functionally improved holder-clamp unit primarily intended for use in connection with the transfer of liquids from one receptacle to another within the laboratory. Having in mind that the present teachings are dedicated to an apparatus which will be useful in a blood donor program, the assembly also has primary utility in connection with the transfer of blood from a donor to a suitable receptacle.

It is a primary object to provide a structure with which a cannula may be readily associated so that the needle may be caused to pierce a receptacle seal with minimum effort.

A further object is that of furnishing a holder-clamp which may be employed by a nurse or other attendant to control the flow of liquid to or from the hollow needle without the necessity of employing accessory apparatus.

Still another object is that of devising an assembly of this type which, when combined with a needle, will rigidly support the latter for all desired manipulations and which thereafter may be discarded and replaced by a new unit with which another sterilized needle may again be quickly combined.

An additional object is that of furnishing a readily manufactured apparatus including a needle of improved structure and in which the several parts will be simple in design and sufficiently rugged to withstand all normal usage.

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 sectional side view of the upper end of a receptacle and showing a needle being applied thereto;

Fig. 2 is an enlarged sectional side view of the holder-clamp assembly together with the needle associated therewith;

Fig. 3 shows the reverse side of the assembly from that illustrated in Fig. 1;

Fig. 4 is a bottom view of the unit; and

Fig. 5 is a top plan view thereof.

The present structure is especially adapted for use in a blood donating technique or program. This will involve the use of receptacles which may ordinarily take the form generally illustrated in Fig. 1 in which the numeral **10** indicates the body of a receptacle or bottle conveniently terminating in a neck portion **11** having an exterior thread to receive an enclosing cap (not shown). The neck of the receptacle is ordinarily sealed by a stopper, conveniently formed of rubber having a flanged head portion **12** and a plug **13** which enters and bears against the inner surfaces of neck **11**. This stopper is preferably provided with recesses **14** in its opposite faces. These recesses have their base positions terminating at points spaced from each other so that a diaphragm or pierceable layer **15** intervenes them. The interior of the receptacle may be partially or substantially wholly evacuated and the stopper is subjected to radial compression such that the diaphragm portion **15** is in effect self-sealing. In other words, it may be perforated by a hollow needle but when the latter is withdrawn the seal will be reestablished.

To pierce this diaphragm a hollow needle **16** is employed. This terminates, as in Fig. 2, in a rearward portion **17** to which the end of a flexible tube **18** is connected conveniently by ensleeving it thereover. This tube is preferably formed of a suitable plastic which allows the tube walls to be moved towards each other, or in other words "pinched," for the purpose of constricting or interrupting the flow of fluid through the tube bore.

As shown in the latter figure, the outer pointed end of needle **16** may be enclosed within a protecting sheath **19**. If the latter is used, it may be constricted around and beyond a flanged needle portion **20** so as to retain the sheath in place. At a point between this flange and the rear end **17** of the cannula, a collar **21** extends outwardly from the latter. This collar and its associated parts are conveniently formed separately of the needle but are secured against movement with respect to the same. A tubular part **22** is in turn disposed to the rear of collar **21** and terminates in a truncated cone **23**, the surfaces of which extend inwardly towards the reduced end portion **17** of the assembly.

The holder is preferably formed of plastic and includes a tubular body **24** provided with an enlarged head portion **25**. As shown especially in Figs. 1 and 4, the side wall of body **24** is interrupted by a slot **26** communicating with the bore **27** of that body. The width of this slot should be such that tube **18** may be laterally shifted through the same to occupy the bore **27**. At a point preferably opposite slot **26**, body **24** may be formed with a notch **28** extending through to its upper edge and having outwardly flaring edge portions which are continued in the form of a reduced well portion **29**. The maximum spacing between the edges defining slot **28** should be in excess of the diameter of tube **18** while the well portion **29** should be sufficiently constricted that, with the tube disposed therein, the bore of that tube is substantially completely constricted so that no fluid may flow through it.

Adjacent the lower or headed end of the holder, its bore is enlarged, as at **30**, to define a socket within which collar **21** may be received. That socket terminates in a constriction defined by a shoulder or flange **31** beyond which the surfaces of the bore are tapered inwardly, as at **32**, and terminate in a second shoulder **33**. It is to be noted that the bore portion, defined by surfaces **32**, has an entrance such that the reduced end of the truncated cone part **23** may readily be received therein. Also shoulder **33** defines a constricted radius which is less than the maximum radius of part **23**. Shoulder **31** defines a diameter less than that of collar **21**.

Finally, it will be understood that in the present assembly the tube **18** may be of any desired and suitable length and will ordinarily mount adjacent the end opposite that to which cannula **16** is connected, to a second needle. That second needle may either be substantially identical with the structure of the needle assembly just described, or it may be a tissue piercing needle of the veinous type. With a needle of the latter type it is, for example, feasible to penetrate into the vein of a donor and through the tube **18** conduct blood through to needle **16**. With the latter extending through the seal **13**, the donated blood may be caused to flow into receptacle **10**. Likewise, with this type of needle the stopper or seal of a second receptacle may be perforated in order to transfer liquids such as blood from one vessel to another. However, ordinarily if the latter procedure is resorted to, then it is definitely preferred to employ a needle of the type designated by **16**, together with a holder such as has been herein described.

In proceeding to use that holder, a nurse or other technician will simply move tube **18** in a lateral direction

towards bore 27 through slot 26. With the tube thus disposed, as in dotted lines in Fig. 2, that tube may be axially shifted with respect to the holder to cause the attached needle to move towards the head portion 25 of the latter. So moved, truncated part 23 will enter socket 30 and the bore defined by the tapered wall surface 32. As it contacts this surface and due to the inherent resiliency of the holder, the faces of these parts will cam against each other. This action will continue until the base of part 23 clear shoulder 33. Thereupon, the bore of the holder adjacent these parts will constrict so that, as shown in Fig. 2, shoulder 33 will underlie part 23 and function as a keeper. Accordingly, a pawl, detent or latch action will have occurred under which the parts will be locked against an outward and separating movement. Simultaneously collar 21 will enter socket 30 to bear against shoulder 31 which will thus function as a stop to limit further inward movement of the parts.

Accordingly, the needle will, in effect, be locked against movement with respect to the holder and the latter may be grasped to manipulate the needle as a unit with that holder. Due to the bearing surfaces provided by head 25, no difficulty will be experienced in grasping the holder and projecting the entire assembly so that the needle pierces the seal as shown generally in Fig. 1. When an operation or series of steps has been completed, then the holder, the needle, the tubing and other parts associated with the same may simply be discarded. During the transfer of liquid, the flow through tube 18 may, of course, be controlled by introducing that tube into slot portion 28 and moving the same inwardly into the well portion 29 as shown in Fig. 3. Under these circumstances, it is apparent that the tube bore will be completely collapsed, thereby preventing all further fluid flow. The withdrawal of the needle from the stopper or other seal may be achieved by simply grasping head 25 and exerting a pull thereon.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. It is apparent that numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined in the claims.

I claim:

1. For use in a set of the blood donor type, a tubular body, said body being provided with an axial slot extending outwardly from its bore, a hollow needle having a pointed outer end, a flexible tube connected to the inner end of said needle, such inner needle end and the adjacent part of said tube being disposed within said slot, means providing surfaces on the faces of the bore and needle to interengage and prevent axial movements of the same with respect to each other, said body being formed of flexible material whereby said tube and needle may be moved laterally through said slot into said bore to cause the surfaces of the latter and needle to interengage, one end of said body being formed with a tapered notch to receive and constrict said tube.

2. For use in a set of the blood donor type, a tubular body, said body being provided with an axial slot extending outwardly from its bore, a hollow needle having a pointed outer end, a flexible tube connected to the inner end of said needle, one end of said body being formed with a tapered notch to receive and constrict said tube, a retaining portion attached to said needle, a collar also attached to said needle at a point spaced from said portion, and between the same and the needle point, spaced shoulders formed in the bore surface of said body and engaging the surfaces of said portion and collar respectively to prevent axial movements of said body and needle with respect to each other, and said tube and needle being movable laterally through said slot into said bore to cause the surface of the latter and needle parts to interengage.

3. For use in a set of the blood donor type, a tubular body, said body being provided with an axial slot extending outwardly from its bore, a hollow needle having a pointed outer end, a flexible tube connected to the inner end of said needle, one end of said body being formed with a tapered notch to receive and constrict said tube, a truncated cone portion attached to said needle and facing in the direction of the inner end of the same, a collar also attached to said needle at a point spaced from said cone portion and between the same and the needle point, spaced shoulders formed in the bore surface of said body and engaging the surfaces of said portion and collar respectively to prevent axial movements of said body and needle with respect to each other, and said tube and needle being movable laterally through said slot into said bore to cause the surface of the latter and needle parts to interengage.

4. For use in a set of the blood donor type, a tubular body, said body being provided with an axial slot extending outwardly from its bore, a hollow needle having a pointed outer end, a flexible tube connected to the inner end of said needle, one end of said body being formed with a tapered notch to receive and constrict said tube, a truncated cone portion attached to said needle and facing in the direction of the inner end of the same, a collar also attached to said needle at a point spaced from said cone portion and between the same and the needle point, spaced shoulders formed in the bore surface of said body and engaging the surfaces of said portion and collar respectively to prevent axial movements of said body and needle with respect to each other, said body bore having an inward taper in a direction away from the needle point and between said shoulders whereby said tube and needle are movable in a lateral direction through said slot into said bore and are subsequently movable axially of said bore to cause said truncated cone portion to cam against the taper of said body to a position at which said portion lies adjacent one of the shoulders of said bore surface with the collar lying adjacent the second of the same.

5. For use in a set of the blood donor type, a tubular body formed with an axial slot extending through from its bore to its outer face, a flexible tube, a hollow needle having an outer pointed end and a rear end connected to said flexible tube, a pair of spaced flanges formed in the bore of said body, a pair of collars affixed to said needle adjacent its rear end, said tube being laterally movable through said slot into the bore of said body and together with said needle being axially movable with respect to said body to dispose the rear end of said needle and the attached tube within the bore of said body and to shift the collars into engaging relationship one with each of the flanges to prevent further axial movements of the needle with respect to the tubular body, and the latter being formed with a notch in its wall to receive an adjacent part of said flexible tube and retain and constrict it.

6. For use in a set of the blood donor type, a holder comprising a tubular body having an inwardly tapered bore portion, spaced shoulders defining the ends of that portion and forming a part of said body, a hypodermic needle having a rear end, a tube connected to that end, a truncated cone and a collar carried by said needle forwardly of said tube and bearing respectively one against each of said shoulders, and said tapered bore portion being expansible whereby the tuncated cone carried by said needle is axially movable through said bore portion to position said needle therein with the collar and cone carried thereby bearing against such shoulders.

7. A unit of the type described including in combination a tubular body having upper and lower ends, a hypodermic needle having a pointed outer end, a tube connected to the inner end of said needle and extending through the bore of said body, detent means extending inwardly of the bore of said body as well as being carried by the needle, said detent means cooperating as said needle and tube are shifted axially of said body to automatically retain said needle with its point extending beyond the lower end of said body, and locking means

forming a part of said detent means to prevent subsequent movements of said needle axially of said body.

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