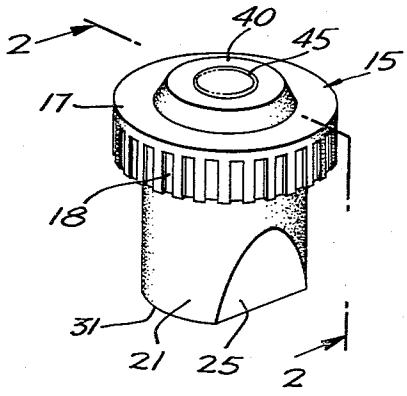
Jan. 21, 1964 P. W. BOGIKES 3,118,557

BLOOD SUPPLY COLLECTION VIAL AND STOPPER

Filed Dec. 16, 1958

FIG. 1.



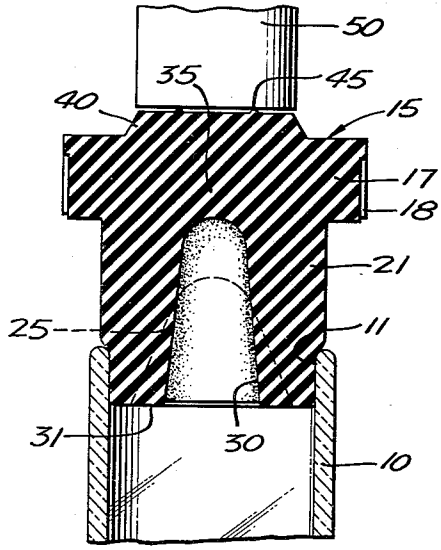


FIG. 2.

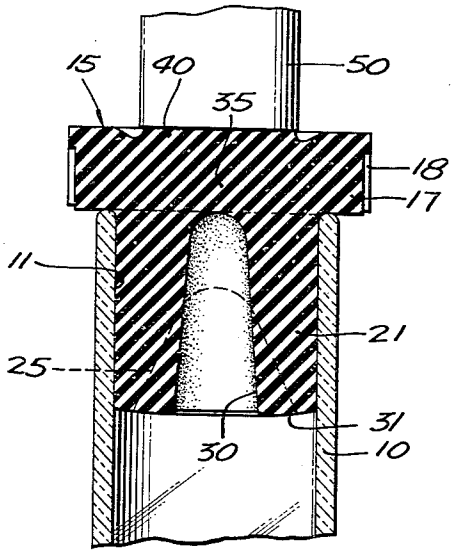


FIG. 3.

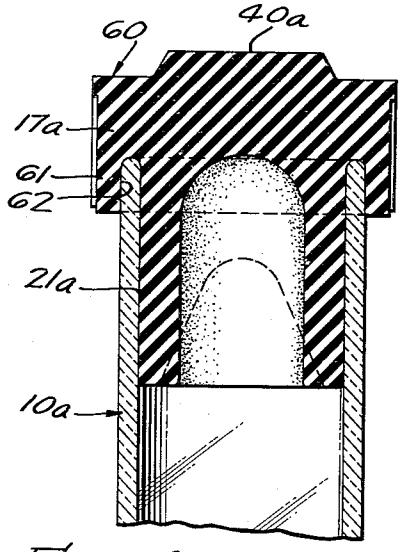


FIG. 4.

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BLOOD SUPPLY COLLECTION VIAL AND STOPPER

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1 Claim. (Cl. 215—47)

This invention relates to the collection of blood and has particular reference to an evacuated vial and stopper assembly for use in the collection of blood samples.

Conventional practices in the collection of blood samples from live subjects include the use of an evacuated tube or vial closed at one end by a stopper of rubber or other resilient material adapted to be pierced by a cannula or hollow needle which is either directly or indirectly in communication with a vein of the patient. These stoppers are, of necessity, quite small, yet they must be of substantially greater diameter than the vials so as to effectively seal the vials against loss of vacuum. Accordingly, the stoppers are difficult to insert into the open ends of the vials during production of the finished assemblies, and production rates of such articles are somewhat low even when using automatic machines to carry out the assembly.

One of the principal objects of this invention is to provide a novel stopper and blood sample collection assembly which is not subject to the above and other disadvantages of the apparatus of the prior art.

Another object of this invention is to provide a novel blood sample collection apparatus and more particularly a novel stopper therefor, the stopper being provided with a central protrusion on the upper surface thereof which greatly facilitates insertion of the stopper into the vial, and which presents a surface which is easier to make and maintain in a sanitary condition than the stoppers heretofore proposed and/or used.

Other objects and advantages of this invention it is believed will be readily apparent from the following detailed description of a preferred embodiment thereof when read in connection with the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view illustrating the novel stopper of the present invention.

FIGURE 2 is a sectional elevation taken substantially on the line 2—2 of FIGURE 1, illustrating the manner in which the stopper is introduced into the vial.

FIGURE 3 is a view similar to FIGURE 2, but showing the stopper completely inserted into the vial.

FIGURE 4 is a view similar to FIGURE 3, but illustrating a modified form of stopper.

Referring now to the drawings, the apparatus of this invention includes a tube or vial **10**, preferably of glass, having a closed bottom end (not shown), the top open end **11** being closed by a stopper **15**.

The stopper **15** is made of rubber or rubber-like material of suitable composition and has a flanged head portion **17** overlying the end of the vial **10** in the assembled position shown in FIGURE 3. The periphery **18** of the head portion is preferably fluted, as shown, to provide a finger grip for removal of the stopper from the vial. Integral with the head portion is a body portion **21** which extends into the open end of the vial, the diameter of the body portion being somewhat greater than the inside diameter of the vial so that the body portion is under compression when inserted into the vial as shown. The lower end of the body portion is bevelled as at **25** to facilitate insertion of the stopper into the vial and to permit evacuation of the vial in the customary manner with the stopper lightly resting in the vial. If desired, the lower end of the body portion may be provided with

a bevel extending completely around the periphery thereof to facilitate fully automatic assembly.

The body portion is provided with a central recess **30** extending upwardly from the bottom surface **31** thereof. The walls of the body portion surrounding the recess **30** are sufficiently strong to retain the stopper in place in the vial, but the recess limits the thickness of rubber through which the cannula (not shown) used in taking the blood sample must be inserted. This thickness of rubber is represented by the portion between the top of the recess **30** and the top surface of the stopper and comprises a self-sealing diaphragm portion **35**.

Extending upwardly from and integral with the head portion **17** is a central raised portion or protrusion **40** which is preferably frusto-conical in shape, having a maximum diameter slightly less than the diameter of the body portion **21**. The top surface of the raised portion is provided with a central annular bead **45**, which serves merely as a locator for the proper positioning of the cannula (not shown) used in collecting the blood sample.

In assembly of the stopper and vial, the stopper is placed in the position shown in FIGURE 2 and the finger or ram member **50** of the stoppering machine is brought down on the stopper to force it into the vial to the assembled position of FIGURE 3. It has been found through actual experience in stoppering thousands of vials with the stopper **15** and with conventional stoppers having a substantially planar top surface, that the stoppers of the present invention are much more easily inserted into the vials than are the conventional stoppers. In fact, the substitution of the stoppers of the present invention for the stoppers of conventional shape has resulted in a production increase of more than 35 percent. The reasons for this are not entirely understood, but it is theorized that the application of pressure to the raised portion **40**, as by the downward force of the ram **50**, causes the stopper to elongate, reducing the diameter of the body portion so that it is easier to insert in the mouth of the vial. Release of the pressure allows the rubber of the stopper to tend to return to its original dimensions, assuring a tight fit in the vial.

The stopper of the present invention is also advantageous in that the raised portion functions to hold the stopper away from the face of any holder with which it may be incorporated thus preventing the entire top face of the stopper from picking up any blood accidentally deposited on the holder face. Moreover, the raised portion presents a surface which is easily wiped clean and from which alcohol or the like readily drains. Thus, the stopper of the present invention can be more readily rendered in a sanitary condition and maintained as such than the conventional stoppers having recessed top surfaces.

The modified form of stopper **60** illustrated in FIGURE 4 is generally similar to the stopper **15**, being provided with a head portion **17***a*, body portion **21***a* and a raised portion **40***a*. Here, however, the head portion is provided with a downwardly extending skirt **61** which is provided by an annular groove **62** extending upwardly from the bottom face of the stopper. As shown in FIGURE 4, the vial **10***a* extends upwardly into the groove **62**, the groove being slightly undersized to assure a tight fit. This structure results in improved vacuum retention, providing an improved seal. Additionally, the snug fit between the stopper and the vial, and the excellent frictional gripping action thus provided, prevents accidental withdrawal of the stopper from the blood-filled vial when the cannula is pulled out of the stopper.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details set forth, but my invention is of the full scope of the appended claim.

I claim:

In a blood sample collection apparatus, a stopper of resilient material, said stopper having a solid head portion, a body portion having a solid, unitary periphery which is of reduced thickness integral with said head portion, said head portion having an annular groove extending upwardly from the lower face thereof, the inner wall of said groove forming a continuation of the surface of said body portion, and a raised portion extending upwardly from the head portion, the maximum diameter of said raised portion being less than the diameter of said body portion.

References Cited in the file of this patent

UNITED STATES PATENTS

2,908,274	Bujan	Oct. 13, 1959

FOREIGN PATENTS

4,746	Great Britain	of 1900
539,891	Great Britain	Sept. 26, 1941
83,216	Denmark	Aug. 19, 1957