March 3, 1964 C. H. BARR, SR., ETAL 3,123,073

BLOOD SAMPLING ASSEMBLY

Filed Aug. 26, 1958

2 Sheets-Sheet 1

FIG. 1.

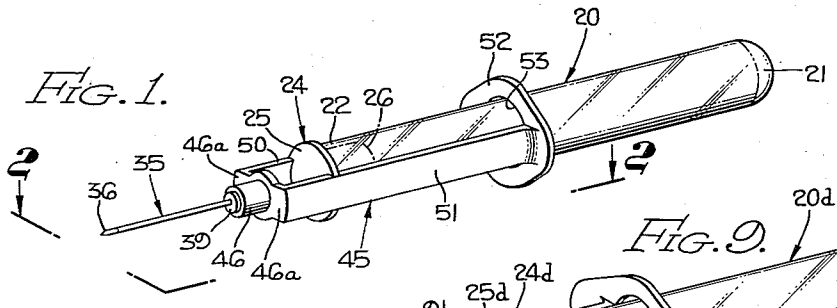
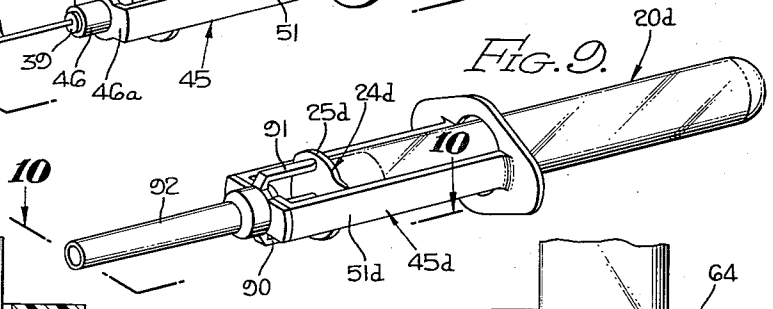


FIG. 9.



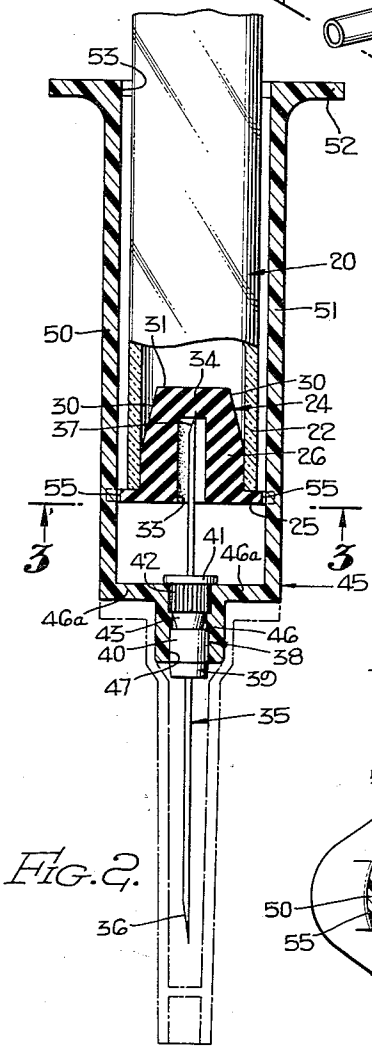


FIG. 2.

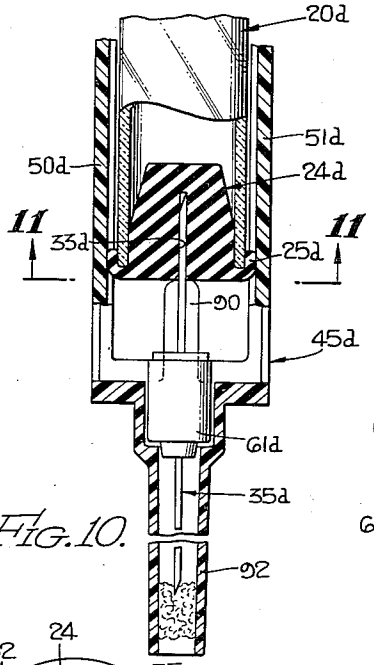


FIG. 10.

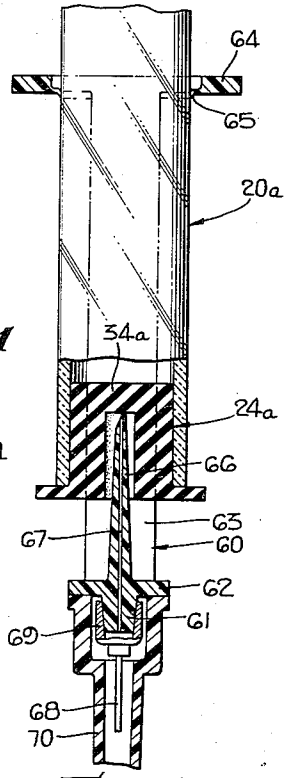


FIG. 4.

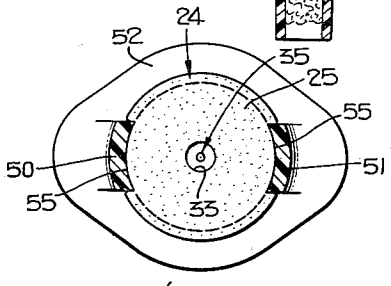


FIG. 3.

COURTLAND H. BARR, SR.
COURTLAND H. BARR, JR.
JOHN W. BARR
INVENTORS

BY Lyon & Lyon

ATTORNEYS

March 3, 1964 C. H. BARR, SR., ETAL 3,123,073

BLOOD SAMPLING ASSEMBLY

Filed Aug. 26, 1958 2 Sheets-Sheet 2

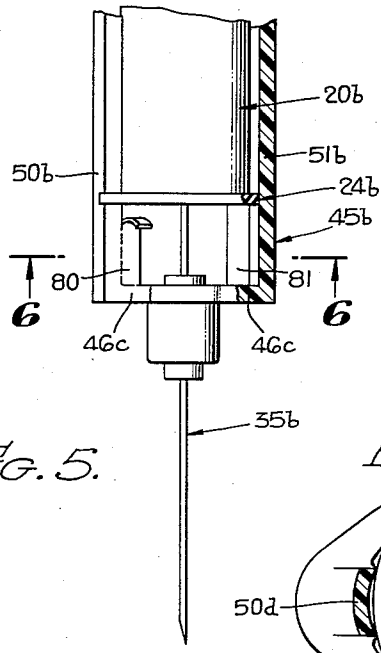


FIG. 5.

FIG. 6.

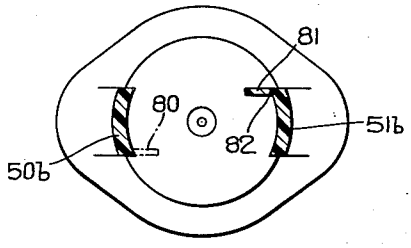
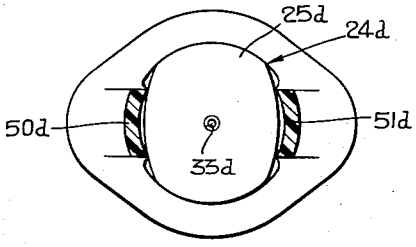


FIG. 11.



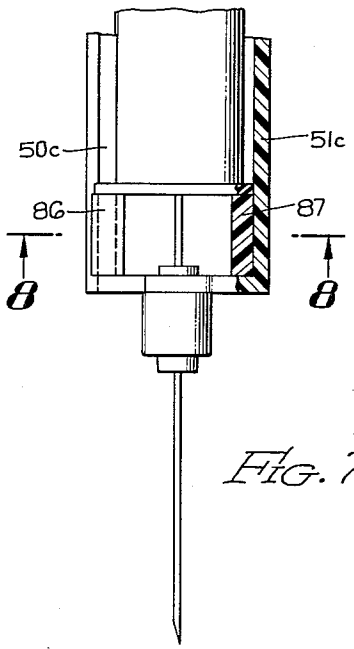


FIG. 7.

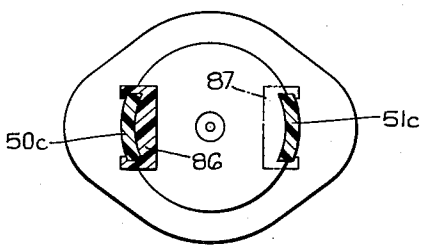


FIG. 8.

COURTLAND H. BARR, SR.
COURTLAND H. BARR, JR.
JOHN W. BARR
INVENTORS

BY Lyon & Lyon

ATTORNEYS

United States Patent Office

3,123,073
Patented Mar. 3, 1964

3,123,073

BLOOD SAMPLING ASSEMBLY

Courtland H. Barr, Sr., Courtland H. Barr, Jr., and John W. Barr, all % Courtland Laboratories, 5555 Valley Blvd., Los Angeles 32, Calif.

Filed Aug. 26, 1958, Ser. No. 757,308
11 Claims. (Cl. 128—276)

This invention relates to apparatus for the collection of blood samples and has particular reference to improved apparatus used in drawing or otherwise collecting blood from veins.

Our copending application Serial No. 537,978 filed October 3, 1955 discloses a novel blood sampling assembly designed to overcome many disadvantages of the assemblies theretofore proposed and used. A primary object of the present invention is to provide improvements in the basic structure disclosed in said copending application.

Another object of the present invention is to provide a disposable blood sampling assembly comprising a stoppered evacuated vial and a canula operably connected thereto, the assembly including novel means for connecting the cannula to the vial.

Another object of the present invention is to provide blood sampling assembly including novel means for preventing premature piercing of the vial stopper by the cannula.

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

In the drawings:

FIGURE 1 is a perspective view of a blood sampling assembly embodying the present invention.

FIGURE 2 is a sectional elevation taken substantially on the line 2—2 of FIGURE 1.

FIGURE 3 is a sectional view taken substantially on the line 3—3 of FIGURE 2.

FIGURE 4 is a vertical sectional view of a modified form of the invention.

FIGURE 5 is a fragmentary side elevation, partly in section, illustrating a further modified form of the invention.

FIGURE 6 is a sectional view taken substantially on the line 6—6 of FIGURE 5.

FIGURE 7 is a fragmentary side elevation, partly in section, illustrating another modified form of the invention.

FIGURE 8 is a sectional view taken substantially on the line 8—8 of FIGURE 7.

FIGURE 9 is a perspective view of still another modified form of the invention.

FIGURE 10 is a sectional elevation taken substantially on the line 10—10 of FIGURE 9.

FIGURE 11 is a sectional view taken substantially on the line 11—11 of FIGURE 10.

Referring now to the drawings, one embodiment of the present invention is illustrated in FIGURES 1–3. The blood sampling assembly shown therein includes a tube or vial 20, preferably of glass, having a closed bottom end 21, the top of the open end 22 being closed by a stopper 24.

The stopper 24 is made of rubber or rubber-like material of suitable composition and has a flanged head portion 25 overlying the end of the vial 20. Integral with the head portion is a body portion 26 which extends into the open end of the vial, the diameter of the body portion being somewhat larger than the inside diameter of the vial so that the body portion is under compression when inserted into the assembled position shown. The lower end of the body portion is bevelled as at 30 to facilitate assembly of the stopper and the vial.

As shown best in FIGURE 2, the bottom surface 31 of the stopper body portion is substantially planar and is imperforate, having no recess therein as is the case with conventional stoppers utilized in such apparatus. The head portion of the stopper is provided with a generally cylindrical central recess 33 extending downwardly from the top thereof a substantial distance into the body portion, a diaphragm 34 being thus defined.

The assembly also includes a cannula 35 having sharpened, bevelled ends 36 and 37. The cannula extends centrally through and is secured to a hub member 38 which is provided at one end with a tapered portion 39 merging into a cylindrical portion 40. The other end of the hub member is provided with a flange 41 and a fluted cylindrical portion 42. Intermediate the cylindrical portions 40 and 42 is a circumferential tapered groove 43.

Means are provided for operably connecting the cannula to the vial and as shown in FIGURES 1–3, these means include a cannula holder 45. The holder 45 is preferably molded of plastic and includes a central body portion 46 having lateral extension portions 46*a* and a central bore 47 into which the hub member 38 is driven, the flange 41, the fluted portion 42 and the shoulders formed by the groove 43 serving to hold the hub member and its cannula firmly in position, yet permitting quick and easy assembly of the parts. Finger grip means are also included on the holder and as shown these means include a pair of parallel leg portions 50 and 51, one on either side of the vial and provided at the ends thereof with an interconnection comprising a disk-like finger grip member 52 having a central opening 53 therein for the vial.

The flanged head portion 25 of the stopper is provided with a pair of diametrically opposed notched portions 55 slightly narrower than the width of the leg portions 50 and 51 so that the leg portions are frictionally engaged by the rubber stopper flange. It is this frictional engagement, plus the partial piercing of the diaphragm 34 by the cannula end 37, which connects the cannula and its associated parts to the vial and thus completes a unitary assembly.

The assembly described above is ready for immediate use merely by removal of the customary cannula cover member illustrated in phanton lines in FIGURE 2. The end 36 of the cannula is then inserted into the vein of the subject and thereupon the finger grip member 52 is grasped with two fingers and the thumb is held over the end of the vial. Thus the assembly may be operated in the manner of a syringe by pushing the thumb toward the fingers, whereupon the cannula end 37 pierces through the diaphragm 34 to establish communication with the evacuated interior of the vial, the differential in pressure causing a blood sample to be drawn into the vial through the cannula.

A modified form of the invention is illustrated in

FIGURE 4. This assembly includes an evacuated vial 20*a* having a stopper 24*a* substantially the same as the stopper 24.

The cannula holder 60 comprises a central, tapered body portion 61 having a flange 62, and integral therewith is a pair of leg members 63 connected at the other ends by means of a disk-like finger grip member 64 which is similar to that described above, but which has a central opening, defined by an annular "flash" 65 or thin portion of the grip member, smaller in diameter than the vial so as to frictionally grip the vial. Integral with the body portion 61 is a spike element 66 extending into the stopper recess and adapted to pierce the diaphragm 34*a*. The spike element is provided with a central opening 67 adapted to communicate with the cannula 68 which is provided with a tapered, cup-shaped hub member 69 driven onto the body portion.

A cannula cover member 70 completes the assembly, the operation of which is the same as that of the assembly of FIGURES 1–3.

A further modified form of the invention is illustrated in FIGURES 5 and 6. This assembly is substantially the same as that of FIGURES 1–3, being provided with a vial 20*b*, a stopper 24*b*, a cannula 35*b* and a cannula holder 45*b*. Here however, means are provided for preventing accidental piercing of the stopper with the cannula, such as might be occasioned by rough handling of the assembly. As shown in FIGURES 5 and 6, these means may include a pair of severable spacer members 80 and 81, one secured to each of the leg members 50*b* and 51*b* and extending between the top of the stopper and the underside of the lateral extension portions 46*c* The spacer members are formed integral with the leg members but are each provided with a groove 82 at the line of connection so as to be easily severed from the leg members immediately prior to use of the assembly. Until such severance is accomplished however, it will be understood that the spacer members prevent any longitudinal movement of the cannula and cannula holder in a direction toward the stopper and thus guard against accidental or premature piercing of the stopper with the resultant loss of vacuum and inoperability of the assembly.

The modified structure of FIGURES 7 and 8 is similar to that of FIGURES 5 and 6 except that here the spacer members 86 and 87 are not integral with the leg members 50*c* and 51*c*, but are generally C-shaped members adapted to be resiliently clamped onto the leg members, and to be readily removed therefrom for use of the device.

A further modified form of the invention is illustrated in FIGURES 9, 10 and 11. This device also includes an evacuated vial 20*d*, a stopper 24*d*, a cannula 35*d* and a cannula holder 45*d*, generally similar to those same elements shown in FIGURES 1–3. Here, however, the stopper flange 25*d* is not notched, but is merely permitted to be deformed or bent in those portions thereof which contact the leg portions 50*d* and 51*d*, thus providing a similar frictional engagement. The stopper recess 33*d* also differs from the recess 33 in that it is tapered and closely fits around the cannula to provide a further gripping connection between the cannula and the vial.

Means are also provided for preventing accidental piercing of the stopper, and as shown in FIGURES 9–11, these means include a pair of spacer members 90 and 91 extending downwardly from the cannula cover member 92, the ends of the spacer members contracting the upper surface of the stopper.

It will be understood to those skilled in the art that while the improvements constituting the present invention have been described in connection with a blood sampling assembly the use thereof is not inherently so limited and these improvements may be incorporated on other structures such as, for example, disposable assemblies for administering injectables.

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

We claim:

1. A cannula and vial assembly comprising the combination of a vial rigidly closed at one end by an integrally united member and closed at the other end with a stopper of resilient material, a cannula, and means operably connecting said cannula to said vial with one end of said cannula inserted in said stopper, said means including a cannula holder to which said cannula is secured, said holder including a pair of leg portions contacting portions of said stopper in friction fit relationship therewith, the end of the vial remote from said stopper extending beyond the ends of said leg portions, said assembly including rigid means for preventing piercing of said stopper by said cannula by forces tending to move said cannula toward said stopper.

2. The combination of claim 1, wherein said rigid means comprises a removable spacer element inserted between the stopper and said cannula holder.

3. The combination of claim 1, including a cannula cover member and wherein said rigid means comprises a spacer element carried on said cover member and contacting said stopper.

4. A cannula and vial assembly, comprising the combination of a vial rigidly closed at one end by an integrally united member and closed at the other end with a stopper of resilient material, said stopper having a central recess extending downwardly from the top thereof to form a diaphragm in said stopper, a cannula, and means operably connecting said cannula to said vial with one end of said cannula inserted in said central recess, said means including a cannula holder to which said cannula is secured, said holder including a pair of leg portions contacting portions of said stopper in friction fit relationship therewith and a finger-grip member securing together the ends of said leg portions, the end of the vial remote from said stopper extending beyond the ends of said leg portions, said assembly including rigid means for preventing piercing of said diaphragm by said cannula by forces tending to move said cannula toward said diaphragm.

5. The combination of claim 4 wherein said rigid means comprises a removable spacer element inserted between the stopper and said cannula holder.

6. A cannula and vial assembly comprising the combination of a vial rigidly closed at one end by an integrally united member and closed at the other end with a stopper of resilient material, said stopper having a central recess extending downwardly from the top thereof to form a diaphragm in said stopper, a cannula, and means operably connecting said cannula to said vial with one end of said cannula inserted in said central recess, said means including a cannula holder to which said cannula is secured, said holder including a pair of leg portions and a finger-grip member securing together the ends of said leg portions, the end of the vial remote from said stopper extending beyond the ends of said leg portions, said finger-grip members having a portion forming a central opening through which said vial extends in friction fit relationship with said portion, said assembly including rigid means for preventing piercing of said diaphragm by said cannula by forces tending to move said cannula toward said diaphragm.

7. The combination of claim 6, wherein said rigid means comprises a removable spacer element inserted between the stopper and said cannula-holder.

8. The combination of claim 1, wherein the central recess is tapered and fits closely upon the cannula.

9. The combination of claim 1 wherein the vial is evacuated.

10. The combination of claim 4 wherein the vial is evacuated.

11. The combination of claim 6 wherein the vial is evacuated.

References Cited in the file of this patent

UNITED STATES PATENTS

2,437,408	Soet	Mar. 9, 1948
2,460,641	Kleiner	Feb. 1, 1949
2,676,591	Fox	Apr. 27, 1954
2,737,949	Brown	Mar. 13, 1956
2,841,143	Bertram	July 1, 1958
2,845,067	Gabriel	July 29, 1958
2,880,723	Adams	Apr. 7, 1959

FOREIGN PATENTS

115,391	Austria	Dec. 10, 1929