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BLOOD SAMPLE COLLECTION APPARATUS

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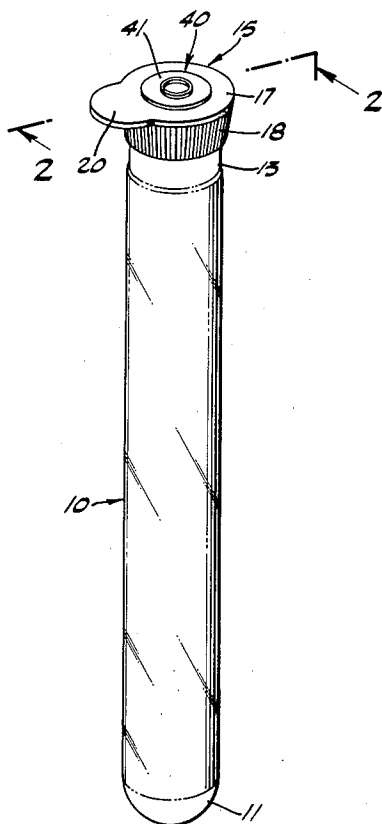


FIG. 1.

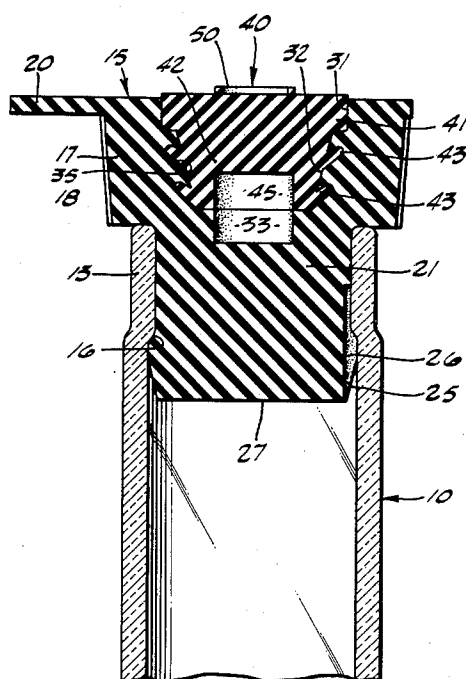


FIG. 2.

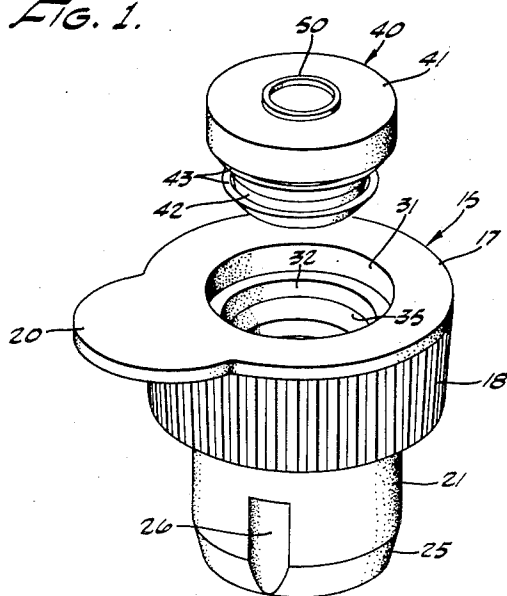


FIG. 3.

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BLOOD SAMPLE COLLECTION APPARATUS
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2 Claims. (Cl. 215-48)

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.

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 can-
nula or hollow needle which is either directly or indirectly in communication with a vein of the patient. The stop-
per is generally formed with an inner axial recess extend-
ing partially from the lower end thereof and in many
cases a similar recess extends downwardly from the top
of the stopper. In either event, a diaphragm is thus
formed in the stopper, the primary purpose of the dia-
phragm being to present a reduced-thickness portion per-
mitting ready insertion of the needle therethrough. Such
stoppers are disadvantageous from the standpoint that a
portion of the blood in the vial tends to collect in the
inner recess and upon opening of the vial by removal of
the stopper this blood often spatters the working area
with droplets, generally spotting the clothes of the user
or other surrounding surfaces. Another disadvantage of
stoppers which include the top recess is that dust, dirt
and other foreign particles settle therein and such foreign
particles are difficult if not impossible to remove, thus re-
sulting in a condition of existing or potential contamina-
tion.

One of the principal objects of this invention is to provide a novel blood sample collection apparatus which is not subject to these 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 reduced-thickness area but having substantially smooth top and bottom surfaces.

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 of the apparatus of this invention.

FIGURE 2 is a sectional elevation, on an enlarged scale, taken substantially on the line 2-2 of FIGURE 1.

FIGURE 3 is an exploded perspective view, on an enlarged scale, of the stopper of this invention.

Referring now to the drawings, the apparatus of this invention includes a tube or vial 10, preferably of glass, having a closed bottom end 11, the top open end 13 being closed by a stopper 15. Preferably the open end 13 is of slightly reduced diameter providing a circumferential shoulder 16.

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. The periphery 18 of the head portion is fluted and a tab portion 20 extends from the head portion, providing a means for facilitating removal and handling of the stopper. Integral with the head portion 16 is a body portion 21 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

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inserted into the vial as shown. The lower end of the body portion is bevelled as at 25 to facilitate assembly of the stopper and the vial. A plurality of longitudinal grooves 26 are provided on the periphery of the body portion to permit evacuation of the vial in the customary manner with the stopper lightly resting in the vial.

As shown in FIGURE 2, the bottom surface 27 of the 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 16 is provided with a central recess extending downwardly from the top thereof a substantial distance into the body portion. The uppermost portion 31 of the recess is substantially cylindrical, the intermediate portion 32 is tapered or frusto-conical in shape and the lowermost portion 33 is also substantially cylindrical but smaller in diameter than the portion 31. The wall forming the portion 32 is provided with a pair of spaced circumferential grooves 35. Inserted into the recess 30 is a plug member 40 shaped in conformity with the recess and thus having a cylindrical head portion 41 and a frusto-conical body portion 42 provided with circumferential beads 43. The bottom of the body portion 41 is provided with a central recess 45 which communicates with the lowermost portion 33 of the head portion recess, thus forming a central void in the stopper. The top surface of the plug member 40 is provided with a central annular bead 50, which serves merely as a locator for the proper positioning of the needle (not shown) used in collecting the blood sample.

From the description thus far, it will be understood that an improved stopper and vial assembly for blood sample collecting has been provided. The stopper is so designed as to avoid the customary upper and lower recesses which are troublesome from the standpoint of sterility maintenance and of pick-up of blood with the resulting spattering of droplets thereof when opened. The stopper is provided with a central void, made possible by the recessed plug member, reducing the effective thickness of rubber through which the needle must be inserted. Without such a void it would be extremely difficult, if not impossible, to pierce the stopper with the needle.

It will be noted that the upturned beads 43 on the plug member 40 cooperate with the upturned grooves 35 to form locking means to prevent removal of the plug member from the stopper proper once the two parts have been assembled as shown. Additionally, it has been found that the temperature of about 250° F., which is required for proper sterilization of the assembled apparatus, is sufficient to cause vulcanization of the plug member and stopper, a further assurance against accidental disassembly. Additionally, due to compression of the rubber of the plug member and this vulcanization, the plug member is effectively sealed in place so that the top of the stopper is in fact imperforate.

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

We claim:

1. In a blood sample collection apparatus, a stopper of resilient self-sealing material, said stopper having a frusto-conical central recess extending downwardly from the top thereof, the bottom of said stopper being imperforate, a frusto-conical plug member of resilient material seated in sealing relation with said stopper in said recess, the lower portion of said plug member terminating short of the bottom of said recess whereby a central void is formed in said stopper, and means for locking said plug member to said stopper, said means including an upturned circumferential bead on the periphery of said plug cooperating

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with an upturned circumferential groove in said central recess.

2. In a blood sample collection apparatus, a stopper of material selected from the group consisting of rubber and rubber-like self-sealing materials, said stopper having a frusto-conical central recess extending downwardly from the top thereof and spaced a substantial distance from the bottom of said stopper, the bottom of said stopper being imperforate, a frusto-conical plug member of resilient material seated in vulcanized relation with said stopper in said recess, the lower portion of said plug member terminating short of the bottom of said recess whereby a central void is formed in said stopper, and means

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for locking said plug member to said stopper, said means including an upturned circumferential bead on the periphery of said plug cooperating with an upturned circumferential groove in said central recess.

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