

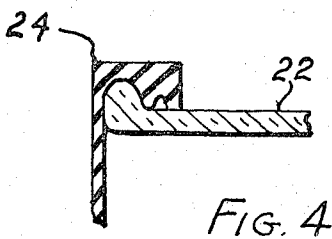
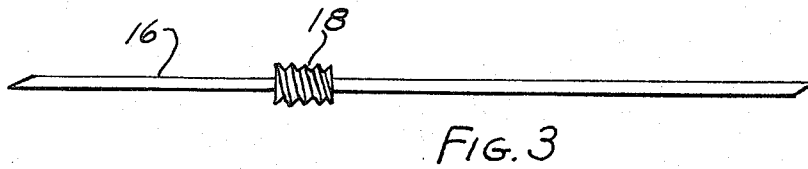
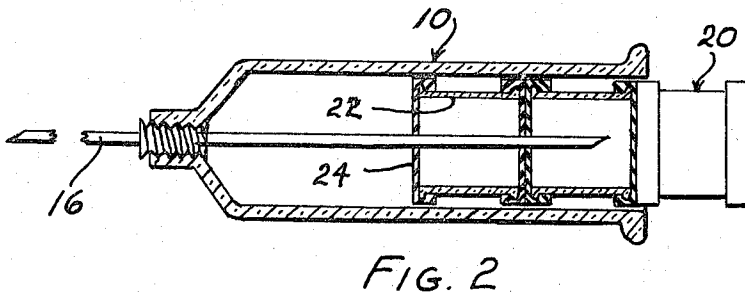
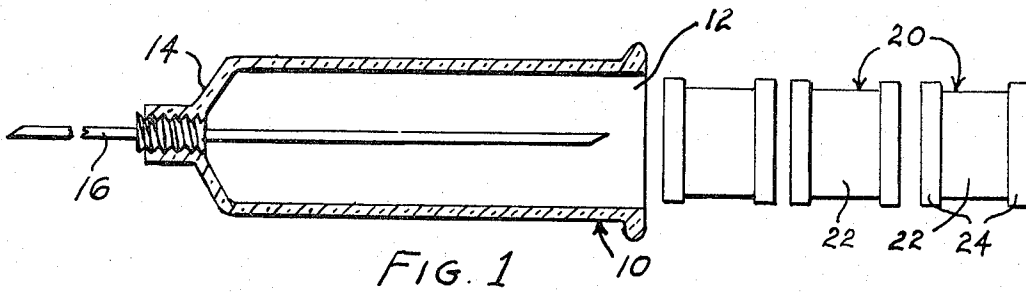
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DEVICE FOR TAKING MULTIPLE BLOOD SAMPLES OR THE LIKE

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DEVICE FOR TAKING MULTIPLE BLOOD SAMPLES OR THE LIKE

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ABSTRACT OF THE DISCLOSURE

A device for taking a plurality of separate blood samples is provided and it includes a plurality of hollow cartridges having self-sealing but puncturable ends thereon received in a tube larger in diameter than the cartridges. A hollow needle sharpened at both ends engages a closed end of the tube with a portion of the needle extending outwardly of the tube and a portion extending inwardly of the tube and terminating adjacent the other end of the tube to puncture the individual cartridges as moved axially of the tube.

This invention relates to an article of manufacture which takes multiple blood samples from a patient wherein the patient's vein is punctured only once, and only one sterilized hypodermic needle and syringe are used in the blood taking process.

Heretofore, there have been various types of clinical devices provided for taking samples of human blood, but all such devices are equipped for taking only a single sampling of the human blood. Since in many cases more than one sample of blood may be needed for laboratory purposes, the technician taking the blood samples from the patient may need more than one sterilized hypodermic needle and other additional equipment. If more blood samples are needed, the consecutive use of prior art devices often result in undue manipulation on the part of the technician, danger and discomfort to the patient, danger of loss of sterilization, and a possible need for repeated punctures of the patient at, or around, the sampling point from which the blood is taken.

It is the general object of the present invention to overcome the stated, and other difficulties, of the prior art by providing an inexpensive, practical apparatus by which a plurality of blood samples can be taken from a patient with the need for only one puncture at the sampling point and where only one hypodermic needle and syringe are used.

Another object of the present invention is to provide a plurality of cylindrically shaped plastic cartridges which are slidably received by the hypodermic needle and syringe which consecutively and independently fill with the flow of blood taken from the sampling point.

Another object of the invention is to provide a hypodermic needle which not only extends longitudinally outwardly from a syringe but is also extended longitudinally inwardly in the syringe. Such a needle allows the blood sample cartridges slidably received by the syringe to be consecutively pierced by the longitudinally inwardly extending end of the hypodermic needle.

Another object of the invention is to manufacture the blood sample cartridges with a partial vacuum therein. This enables the sample blood taken to flow easily into

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the lower pressure area of the blood sample cartridges.

Another object of the invention is to construct the hypodermic needle and syringe used in the multiple blood sample device so that the hypodermic needle may be threadably removed from the syringe after the blood samples have been taken from the patient. This permits the syringe to act as a protector for the blood sample cartridges contained therein if they need to be transported from the place the sampling was taken to a laboratory.

These and other objects of the invention which will become apparent as the description proceeds are achieved by providing a device for taking blood samples comprising a plurality of cartridges each formed of a cylindrically shaped plastic tube having a diameter of about between one-quarter inch and one inch and a length of about between one-half inch and two inches; a plurality of pairs of disposable rubber-like end caps adapted to be fitted on each end of said plastic tube to form the complete cartridge; a transparent, cylindrically shaped plastic guide tube having a closed end and an open end, said tube adapted to slidably receive at its open end, one by one, a plurality of said cartridges in a sliding, complementary relationship therewith; and a surgical needle, sharpened at both ends, threadably received at about its mid-point by the closed end of said guide tube wherein one end of said needle extends longitudinally outwardly from the closed end of said guide tube and the other end of said needle extends longitudinally inwardly from the closed end of said guide tube thereby causing the end caps of the cartridges to be pierced in turn by the longitudinally inwardly extending end of said needle when a plurality of the cartridges are slidably received by and pressed into the open end of said glass or plastic guide tube.

For a better understanding of the apparatus of the invention, reference should be had to the following drawings wherein:

FIG. 1 is a longitudinal sectional view of one preferred embodiment of the apparatus of the invention and showing the cartridges in position to be pressed into the guide tube;

FIG. 2 is a view like FIG. 1 and illustrating the blood sample cartridges as pressed in turn into the cartridge guide tube;

FIG. 3 is a side elevation of the precision hypodermic needle employed in the apparatus of the invention;

FIG. 4 is an enlarged fragmentary cross sectional view showing details of the cartridge tube and cap.

In the drawings, and looking particularly at FIG. 1, the numeral 10 generally indicates a syringe-like body or guide tube constructed of high strength transparent glass or plastic. The body 10 has an open end 12 and a closed end 14. A hollow precision hypodermic needle 16, best illustrated by FIG. 3, is adapted to be threadably received by the closed end 14 of the body. In order to facilitate this, an internally threaded metal ferrule (not shown), can be fused to the closed end of the body but the body 10 usually is made of plastic, and a metal ferrule is not always needed. A threaded sleeve is secured to the needle 16 at a point closer to one end than the other, and the threaded sleeve is releasably screwed into the ferrule.

The surgical needle 16 has been particularly adapted for use in the apparatus of the invention by sharpening both ends of the needle rather than just one end. When the needle 16 is threadably received by the closed end of

the guide tube 14, (this being best indicated in FIGS. 1 and 2), the shorter portion of the needle 16 extends longitudinally outwardly from the closed end of the tube with the longer portion of the needle extending longitudinally inwardly from the closed end of the tube, this longer portion being contained within the guide tube 10. Guide tube and needle lengths dependent upon number of cartridges required.

A plurality of blood sample cartridges 20 are adapted to be slidably received in the open end of the body 10. The length of the body and the needle received therein is usually dependent upon the number of blood sample cartridges required for the laboratory experiments. These blood sample cartridges 20, although they can be constructed of any suitable material, are best suited for use in the apparatus of the invention when the tube 22 is made from a high temperature resistant, cylindrically-shaped transparent plastic. Glass may also be used. Each tube 22 is capped at each end by a disposable rubber-like diaphragm end cap 24. The caps 24 are preferably made from good quality latex or like rubber. The purpose of such a disposable end cap 24 will become evident hereinafter.

In the manufacturing or assembly process of the blood sample cartridges 20, the cartridge formed by capping the tube 22 with the end caps 24 is brought to a negative internal pressure in any desired manner.

In the actual operation of the apparatus of the invention, the first step in the blood sampling process is to puncture the skin of the patient at a point from which the blood samples are to be taken. This point is usually at some readily accessible vein with the vein being punctured by the outwardly extending end of the needle 16. By the process best indicated in FIG. 2, a blood sample cartridge 20 is slidably inserted in the open end of the body 10 until its end cap 24 is punctured by the inwardly extending end of the needle 16. When this occurs, the partial vacuum within the blood sample cartridge 20 and the blood pressure causes the blood taken from the patient to easily flow into the lower pressure area within the blood sample cartridge.

When the first cartridge has been filled the desired amount with the blood sample, a second cartridge is pressed inwardly against the first cartridge causing the inwardly extending end of the needle 16 to puncture the opposite end cap of the first cartridge and the leading end cap 22 of the second cartridge. In the manner hereinbefore described, the lower pressure area within the second cartridge now causes the blood to flow therein. In a like manner, when the second cartridge is full, a third cartridge 20, if needed, is pressed inwardly against the second cartridge causing the surgical needle to again puncture the opposite end cap of the second cartridge and the leading end cap of the third cartridge. It should be noted that the peripheral dimensions of each cartridge 20 are such that the cartridge assembly slides easily into the body 10.

This process can be repeated until three, four, or even more separate blood samples have been taken. When the desired number of samples have been taken, the surgical needle 16 is unscrewed and removed leaving the body 10 containing the blood sample cartridges 20. The rubber-like caps act to close and seal themselves upon withdrawal of the needle 16. The open end of the guide tube 10 is usually then capped with some suitable protective device such as a rubber stopper (not shown), permitting the entire assembly to be ready for preferably prompt transportation from the point of sampling to a laboratory where the separate samples taken can be separately analyzed. During this transportation process, the body 10 acts as a protector for the cartridges. The removal of the blood sample from each cartridge normally simply involves removing a cap 24 and pouring out the sample.

While a certain representative embodiment and details have been shown for the purpose of illustrating the inven-

tion, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. A device for taking a plurality of separate blood samples comprising

a plurality of cylindrically shaped plastic tubes having a diameter of about between one-quarter inch and one inch and a length of about between one-half inch and two inches,

a pair of self-sealing end caps fitted on the ends of each of said plastic tubes and forming a cartridge-like enclosure therewith, said enclosure having a sub-atmospheric pressure therein,

a transparent, cylindrically shaped elongate glass or plastic guide tube having a closed end and an open end, said tube being of a length and size as to be adapted to slidably receive at its open end a plurality of said plastic enclosures in sliding, concentric relationship therewith, one of said plastic tubes being at least partially received in said guide tube and another plastic tube being in substantial alignment therewith, and

a hypodermic needle, sharpened at both ends, threadably engaging the closed end of said guide tube intermediate the ends of the hypodermic needle so that one end portion of said needle extends longitudinally outwardly from the closed end of said guide tube and the other end portion of said needle extends longitudinally inwardly from the closed end of said guide tube, the end portion of said needle within said guide tube extending to a point adjacent the open end of said guide tube but within said guide tube thereby causing each of said pair of end caps fitted on the ends of a plastic tube to be pierced in turn by the longitudinally inwardly extending end of said needle when one and then an additional enclosure is pushed into the open end of said glass guide tube.

2. A device for taking a plurality of separate blood samples comprising

a plurality of cylindrically shaped tubes,

a pair of self-sealing end caps fitted on the ends of each of said tubes and forming a cartridge-like enclosure therewith,

a transparent, cylindrically shaped elongate guide tube having a closed end and an open end, said tube receiving at least an axially inner and an axially outer enclosure in sliding, concentric relationship therewith, and

a hypodermic needle, sharpened at both ends, threadably engaging the closed end of said guide tube intermediate the ends of the hypodermic needle so that one end portion of said needle extends longitudinally outwardly from the closed end of said guide tube and the other end portion of said needle extends longitudinally inwardly from the closed end of said guide tube, the end portion of said needle within said guide tube extending to a point adjacent the open end of said guide tube but within said guide tube, each of said pair of end caps fitted on the axially inner of said enclosures and the axially inner end cap of the axially outer enclosure being pierced in turn by the longitudinally inwardly extending end of said needle when one and then an additional enclosure is pushed into the open end of said glass guide tube to obtain separate blood samples in the said enclosures.

3. A device for taking a plurality of separate blood samples comprising

a plurality of cylindrically shaped tubes,

a pair of self-sealing end caps fitted on the ends of each of said tubes and forming a cartridge-like enclosure therewith,

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a transparent, cylindrically shaped elongate guide tube having a closed end and an open end, said tube receiving at least an axially inner and an axially outer enclosure in sliding, concentric relationship therewith, and

a hypodermic needle, sharpened at both ends, engaging the closed end of said guide tube intermediate the ends of the hypodermic needle so that one end portion of said needle extends longitudinally outwardly from the closed end of said guide tube and the other end portion of said needle extends longitudinally inwardly from the closed end of said guide tube, said axially inner enclosure being impaled on the longitudinally inwardly extending end of said needle, which

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end extends into the axially outer of said enclosures.
4. An apparatus according to claim 3 wherein said cartridges are provided with sub-atmospheric internal pressure.

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