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APPARATUS FOR SECURING A SAMPLE OF BLOOD PLASMA FOR TESTING

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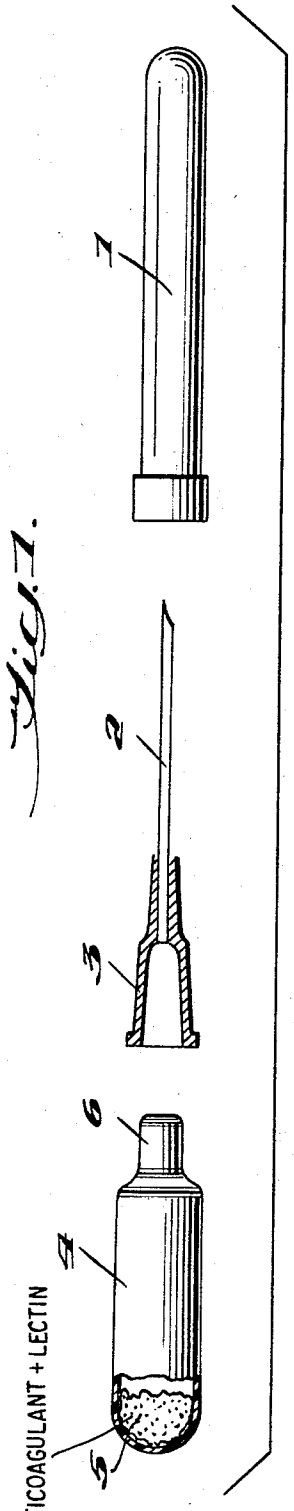


Fig. 1.

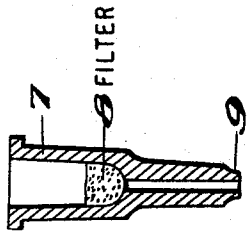


Fig. 2.

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APPARATUS FOR SECURING A SAMPLE OF BLOOD PLASMA FOR TESTING

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ABSTRACT OF THE DISCLOSURE

The invention resides in a composition of an anticoagulant and a lectin in a suitable container such as a disposable syringe to which a sample of blood may be added whereby the blood cells are coagulated by the lectin while clotting of the blood is prevented by the anticoagulant and the blood plasma is separated.

Samples of blood plasma of humans and various animals are required for carrying out a variety of tests such as those described in U.S. Patent No. 3,074,853.

The tests described in said patent require only a small amount of plasma such as the quantity available from only a few drops of blood that readily may be obtained e.g. by puncturing a finger of a person with a lancet but for some tests or for carrying out a plurality of tests more plasma frequently is needed and it is an object of our invention to provide apparatus that is adapted to obtain and deliver from a few drops up to several cubic centimeters of blood plasma.

The invention resides primarily in a hypodermic needle of a suitable diameter and length for extracting blood from a person or animal secured to the neck of a bottle or container of a suitable transparent or at least translucent plastic such as polyethylene, said bottle containing an anticoagulant such as heparin or one of the salts of ethylenediaminetetraacetic acid and a lectin or phytoagglutinin material such as that extracted from *Phaseolus communis* or *Phaseolus vulgaris*. For example, in the separation of plasma from swine blood said bottle may contain 1 mg. of lectin and 1 mg. ethylenediaminetetraacetic acid.

In the preferred form of our invention the needle is secured to a hub which in turn is detachably secured to the bottle and the apparatus comprises also a dispensing nozzle adapted to be applied to the bottle after the needle has been detached, said dispensing nozzle optionally containing a filter.

The invention is illustrated in the accompanying drawings in which:

FIG. 1 is an exploded side elevational view of the bottle containing a mass of a mixture of anticoagulant and lectin, the needle and its hub and a protective cap for the needle and

FIG. 2 is a sectional view of the dispensing nozzle provided with a filter.

Referring to the drawings **1** is the needle protective cap, **2** is the hypodermic needle, **3** is the needle hub, **4** the bottle, **5** is a mass of anticoagulant and lectin and **6** is the neck of the bottle. The needle cap, needle and hub are all well known and need not be described. The bottle **4** is formed of a flexible and elastic or resilient plastic such as polyethylene, the wall of the bottle being of such thickness that it retains its normal shape e.g. cylindrical but is readily deformable i.e. collapsed by the pressure of the thumb and finger of the operator and will return to its original shape when the pressure is released. The wall of the bottle should be sufficiently resilient to create a slight suction and thus to draw blood through the needle into the bottle but not so resilient as to prevent collapsing

by the pressure of the fingers or to create sufficient suction on the vein from which blood is being drawn to cause collapse of the vein. We have found that a bottle the wall of which is sufficiently rigid to maintain its shape and requires only gentle pressure of the thumb and finger to collapse it will, due to its resilient tendency to return to its original shape when the pressure is relaxed, create sufficient suction to draw blood from the vein of a human or animal but not sufficient ordinarily to collapse the vein.

Anticoagulants and phytoagglutinins or lectins are well known and the kinds and quantities thereof required to prevent clotting (anticoagulant) and to cause agglomeration of the blood cells (lectin) of the kind and quantity of the blood sample are well known and need not be discussed. For a disclosure of lectins and their uses we refer to the book entitled "Introduction to Immunochemical Specificity" by William C. Boyd, John Wiley & Sons, 1962.

The anticoagulant and lectin may be introduced into the bottle **4** either separately or mixed with each other, in either liquid or solid form, and either through the neck of the bottle or through the bottom end of the bottle before it is closed and sealed.

The dispensing nozzle **7** may be of the same shape as the hub **3** of the needle, and as appears in FIG. 2, contains a filter **8** and has a short neck **9** which serves to deliver a drop of plasma of a suitable size for the spot test described in Patent No. 3,074,853. The filter **8** may be formed of a variety of filter materials such as pressed glass fiber, pressed nitrocellulose fiber, non-absorbent cotton, filter paper or the like and may be formed by packing loose fiber into the conical end of the nozzle or by cutting a disc from a filter in sheet form and inserting it in the conical space. The filter should be such as will remove solid particles such as blood cells from the plasma but not so difficultly pervious that the pressure required to force the plasma through the filter will effect hemolysis of the blood cells. It is within the scope of our invention to impregnate the filter with lectin or anticoagulant or both to render it more effective i.e. to assist in maintaining the plasma uncoagulated and in agglomerating the blood cells and preventing their passage through the filter. It is also within the scope of our invention to omit the filter.

The apparatus is used as follows.

The bottle **4** containing the lectin and anticoagulant is partially collapsed by the pressure of the thumb and finger and the needle **2** which is attached by its hub **3** to the neck **6** of the bottle is inserted into a vein of a person or animal and the pressure on the bottle released whereupon blood flows through the needle into the bottle and the bottle returns to its normal uncompressed shape. The needle is then withdrawn from the vein and the contents of the bottle shaken to effect mixing of the blood with the lectin and anticoagulant and then allowed to stand whereupon the agglomerated blood cells separate and settle to the bottom of the bottle leaving a supernatant layer of clear plasma. By careful manipulation some of the clear plasma generally can be discharged through the needle or the needle may be removed and the plasma discharged through the neck **6**. However it is preferred to replace the needle by the dispensing nozzle **7** and to discharge the plasma from the bottle through the filter **8**. If preferred the neck of the plastic bottle can be cut-off thereby forming a small test tube from which clear plasma can be removed with a capillary tube.

The whole apparatus is inexpensive and disposable and is not intended for reuse.

We claim:

1. A device for drawing a sample of blood and separating plasma therefrom comprising a bottle having a transparent or translucent, flexible and resilient side wall

capable of being collapsed by the pressure exerted by the thumb and finger of the operator and of returning to its normal shape when said pressure is released, a hypodermic needle attached to said bottle for aspirating blood from a vein of a person or animal into said bottle and an anticoagulant and a lectin in said bottle of a kind and in quantity sufficient to prevent clotting and to cause agglomeration of the cells of the kind and quantity of blood to be delivered into said bottle and to cause the separation of plasma from the collected blood.

2. A device for drawing a sample of blood and separating plasma therefrom as defined in claim **1** in which said bottle has a neck and said needle has a hub that detachably fits said neck, said device including a dispensing nozzle adapted to be attached to said neck.

3. A device for drawing a sample of blood and separating plasma therefrom as defined in claim **2** in which said dispensing nozzle contains a filter.

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