

[54] APPARATUS FOR BLOOD TESTS

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128/218 NV, 128/218 C

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221, 218 M; 73/425, 425.2, 425.4 P, 61.4;
23/258.5, 230 B

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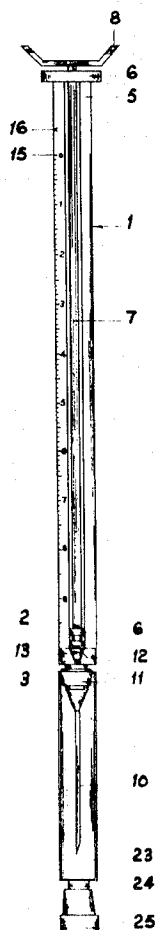
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[57] ABSTRACT

Erythrocyte sedimentation rate measuring apparatus in the form of a hypodermic syringe, the cylinder of which is made to conform to the specification of a Wintrobe sedimentation rate tube, the syringe being preferably of a disposable nature and having a valve means including an agitator ball and anti-coagulant in the interior thereof.

10 Claims, 5 Drawing Figures



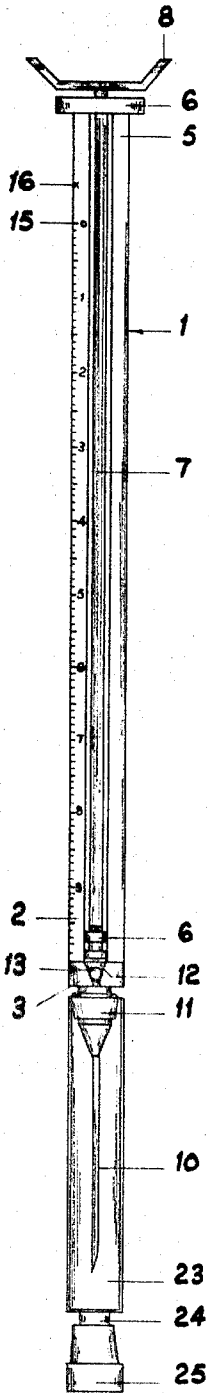


fig. 1

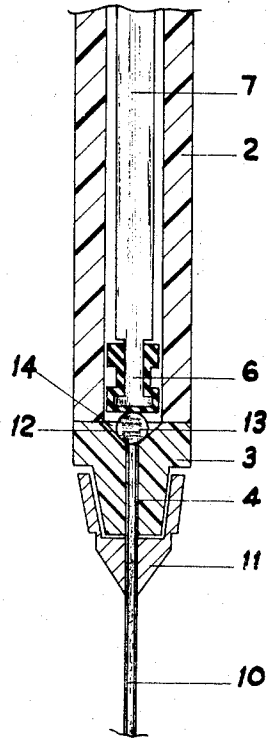


fig. 2

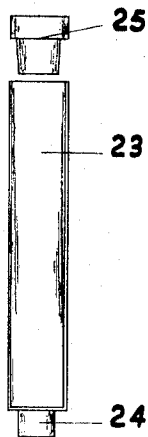


fig. 5

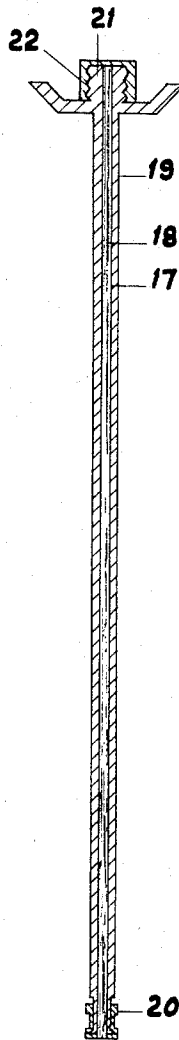


fig. 3

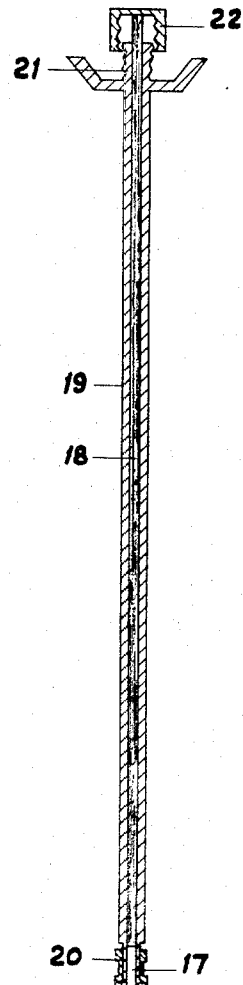


fig. 4

APPARATUS FOR BLOOD TESTS

This invention relates to blood tests and more particularly to tests whereby the erythrocyte sedimentation rate is estimated.

The general procedure for such tests is to withdraw venous blood from a patient by means of an hypodermic syringe. The blood in the syringe is then transferred to a bottle containing suitable anti-coagulant and mixed therewith. This is then usually sent to a medical laboratory where, after remixing, the contents are transferred to a Wintrobe sedimentation rate tube. On allowing the tube to rest on a rack, the sedimentation rate may be estimated by recording the time taken for the erythrocyte to deposit and the level reached. The above-described procedure is time-consuming, involves several pieces of apparatus which require cleaning, drying and sterilizing and usually takes place in stages and at different places.

It is an object of this invention to improve the apparatus used in such tests.

According to this invention there is provided erythrocyte sedimentation rate measuring apparatus comprising a syringe having a cylinder conforming to the specification of a Wintrobe sedimentation rate tube.

Further features of this invention provide for the anti-coagulant to be included in the bore of the syringe cylinder and for an agitator ball to be held against the outlet through the bore when the plunger is in its innermost position.

Still further features of the invention provide for means to be associated with the plunger of the syringe for removing air from the barrel thereof during use and for a needle cover to be provided for the hypodermic needle, the needle cover being in the form of a container and having a projection adapted to retain a stopper for the mouth of the needle cover when it is desired for use as a container.

Other features of the invention will become apparent from the following description of a preferred embodiment of the invention. In this description reference is made to the accompanying drawings in which:

FIG. 1 is an elevation view of the complete apparatus;

FIG. 2 is an enlarged sectional elevation view of the end of the syringe from which the needle extends;

FIGS. 3 and 4 are elevation views of an alternative and preferred plunger assembly in two different conditions; and

FIG. 5 is an elevation view of the needle cover for the syringe.

In this embodiment of the invention the apparatus consists of a syringe with a syringe cylinder 1 which is graduated and dimensioned to conform to the specifications of a Wintrobe sedimentation rate tube, one end 2 of the cylinder being closed by a shaped base 3 having a central bore 4 therethrough. The other end 5 is open for a plunger 6 and a plunger shaft 7 to extend therethrough. Finger holds 8 and 9 are provided on the plunger and cylinder in the normal way.

A hypodermic needle 10 extends outwardly through the bore 4 of the base 3 and is rigidly retained in position by a support 11 fixed on the base 3.

The inner side of the base is counter sunk as indicated by numeral 12 to provide a valve seat for an agitator ball 13 and the plunger is arranged to hold the ball

in a seated condition when it is in its innermost position.

A suitable anti-coagulant 14 is enclosed in the assembly in the space between the ball 13 and inner end of the plunger 6.

In use blood is withdrawn from a patient by using the syringe as a conventional sampling syringe, that is, when the plunger is retracted the ball 13 lifts off the bore and allows the blood to enter the cylinder via the needle. In the cylinder the blood is mixed with the anti-coagulant which prevents clotting of the blood.

The plunger is pulled back past the zero graduation 15 on the cylinder scale to a position 16 which is conveniently marked thereon, such as by an 'X' and the needle is then removed from the patient.

The syringe is then inverted slowly and repeatedly to mix the anti-coagulant with the blood. The mixing process is aided by the movement of the ball 13 in the cylinder bore.

The syringe is then held vertically with the hypodermic needle uppermost and the excessive blood and any air bubbles are expelled by moving the plunger until it coincides with the zero mark on the graduated scale.

The syringe is inverted and allowed to rest on a rack, in which position the ball and seat act as a valve. Sedimentation rate may be estimated in the usual manner by recording the time taken for the erythrocyte to deposit and the level reached.

It will in general be found that an air bubble, caused by the air initially in the hypodermic needle, may adhere to the plunger and not be expelled using the above procedure. If it is desired to eliminate such an air bubble, the plunger and plunger shaft may be provided with a bore 17 therethrough, a rod 18 being located therein as illustrated in FIGS. 3 and 4. The shaft 19 and rod 20 are provided at their outer ends with a screw threaded spigot 21 and complementary cap 22 respectively such that upon rotation of the cap relative to the shaft, the rod may be partly withdrawn. The two extreme positions of the rod are illustrated in FIGS. 3 and 4.

When this type of shaft is used, the blood is firstly drawn and then the bubble adhering to the plunger is withdrawn into the bore through the shaft by suitably rotating the cap 22 relative to the shaft. The procedure above is then followed in order to obtain the sedimentation rate.

Alternatively, the rod may be omitted but in this case the cap must seal effectively on the spigot. Rotation of the cap will again result in the air bubble being drawn into the bore which in this case may be of appreciably smaller diameter than in the case where the rod is used.

The syringe is preferably made of synthetic resin as in conventional syringes with the exception of the needle and ball which are of steel or other suitable material and the plunger is preferably of rubber or like polymeric material.

The apparatus is, of course, generally provided with a needle cover 23 in order to keep the needle sterile. Preferably, this needle cover is in the form of a cylindrical container having on the closed end thereof a formation 24 adapted to support a cap 25 for the mouth of the container when it has been removed from the needle. This needle cover cum container may then be used as a sample bottle to retain the blood sample for further tests which may be required.

The advantages anticipated from the above apparatus include low cost of apparatus, decrease in testing time and chemicals needed for cleaning and sterilizing, test may be more accurate since there is substantially no time delay and the test may be performed on site. The latter is particularly beneficial to patients in rural areas.

I claim:

1. Apparatus for use in the measurement of erythrocyte sedimentation rate comprising a syringe member constituted as a tubular cylindrical body which is graduated and dimensioned to form a sedimentation rate measuring tube, a hypodermic needle, said tubular cylindrical body having opposite ends, a base supported at one end of said body and including means for supporting the hypodermic needle therefrom, said base having a bore which opens into said tubular cylindrical body and through which said hypodermic needle extends to supply blood from a patient into said cylindrical body, a plunger disposed in said cylindrical body, a plunger shaft supported in said tubular cylindrical body and having an inner end supporting said plunger and an outer end extending from said tubular cylindrical body, said plunger shaft being slidable in said tubular cylindrical body to move the plunger between an advanced position opposite the bore in said base and a retracted position remote from said base, and valve means in said syringe member normally held in closed position by said plunger to close said bore, said valve means allowing inflow of blood into said tubular cylindrical body when the plunger is retracted and closing said bore to prevent outflow of blood from the tubular cylindrical body during testing of erythrocyte sedimentation rate with the plunger remaining in retracted position.

2. Apparatus as claimed in claim 1 comprising an anti-coagulant in the interior of the tubular cylindrical body.

3. Apparatus as claimed in claim 2 in which said valve means comprises an agitator ball in the syringe member.

4. Apparatus as claimed in claim 3 in which said base has a shaped valve seat and the ball is dimensioned to seat on the valve seat of the base to cover said bore therein, the plunger shaft being of a length such that the plunger applies the ball in a seated condition on the valve seat when the plunger is in its advanced position.

5. Apparatus as claimed in claim 1 in which the plunger and plunger shaft are provided with a bore therethrough and means at the outer end of the bore for drawing a quantity of fluid from the syringe member into the latter said bore.

6. Apparatus as claimed in claim 5 in which said means for drawing fluid from the syringe member into the bore comprises a rod extending through the bore in the plunger and shaft and a screw threaded device coupled to said rod for withdrawing the rod from the bore to a limited extent.

7. Apparatus as claimed in claim 5 in which said means for drawing fluid from the syringe member into the bore comprises a screw thread cap secured to said rod, and a complementary threaded spigot on said shaft, the cap being in threaded, sealing engagement with said spigot.

8. Apparatus as claimed in claim 1 comprising a cover for the hypodermic needle, said cover being a container which is removably attached to said base.

9. Apparatus as claimed in claim 8 comprising a formation on said cover, and a closure member for the container detachably supported by the said formation.

10. Apparatus as claimed in claim 1 in which the tubular cylindrical body, and base, are made of plastic material and are disposable.

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