

[54] SPECIMEN TUBE FOR MICROSCOPIC EXAMINATION

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[56]

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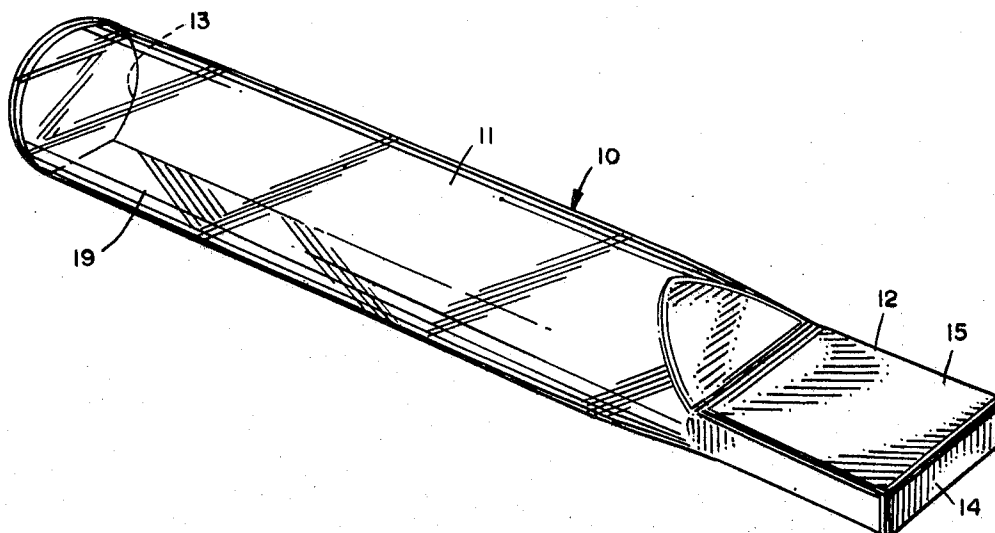
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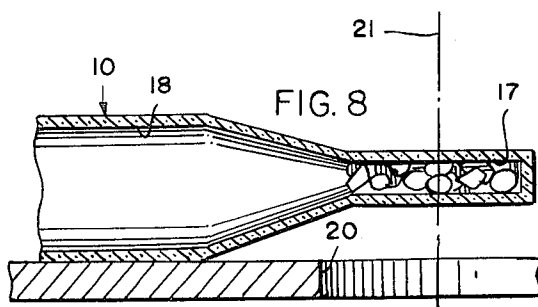
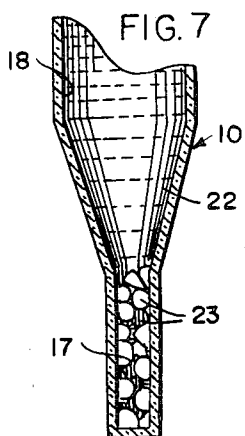
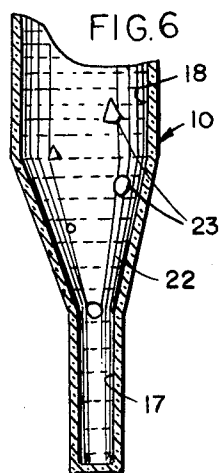
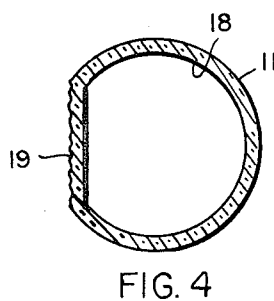
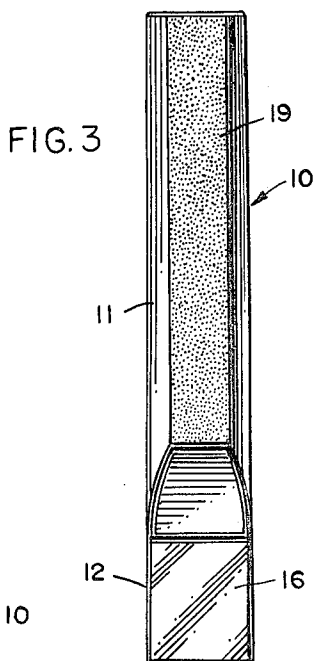
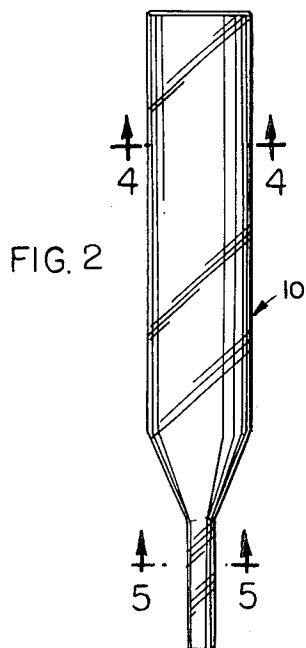
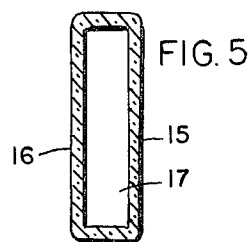
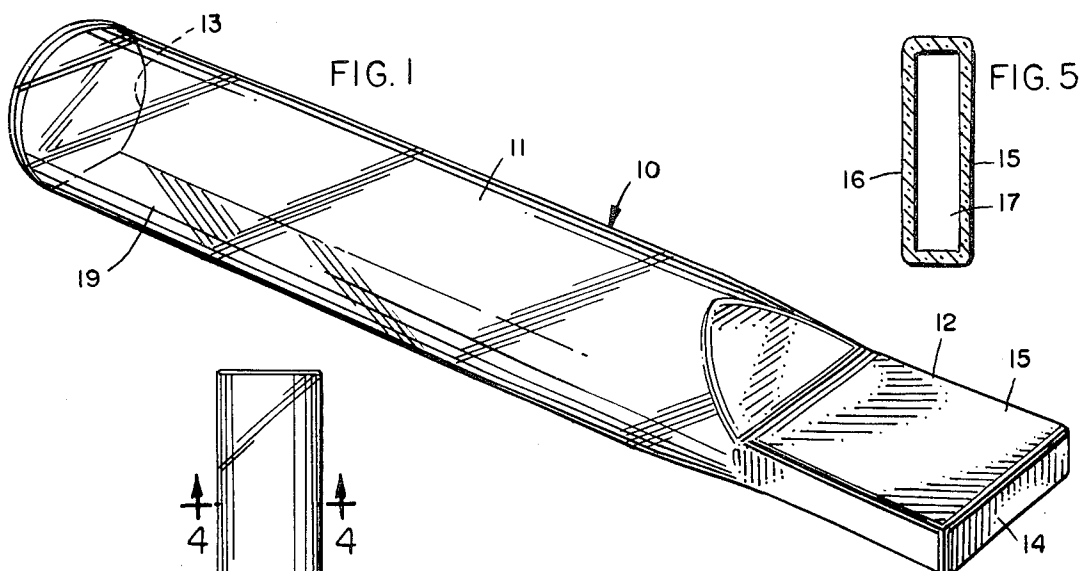
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ABSTRACT

A tube and method particularly useful in urinalysis and other analytical procedures in which the sediment in a sample of body fluid is subjected to microscopic examination. The tube is transparent, open at its upper end, and suitable for use in a centrifuge. The closed lower end of the tube is flattened to define a reduced chamber portion for retaining only a thin layer of sample, thereby permitting microscopic examination of the sediment within the flattened portion. The main body portion of the tube is provided with a flat surface extending along a plane parallel with the tube's flattened lower end portion.

9 Claims, 8 Drawing Figures





SPECIMEN TUBE FOR MICROSCOPIC EXAMINATION

BACKGROUND

The microscopic examination of sediment in a fluid is a standard procedure in urinalysis but might also be performed in connection with other types of laboratory tests. As is well known, urinalysis is important as a screening procedure and as an aid in differential diagnosis, and the microscopic examination of urinary sediment is a basic part of the total urinalysis procedure. Despite the need for exercising a high degree of care in performing such examinations, errors nevertheless occur, sometimes through carelessness, in the transfer of the sediment from centrifuge tubes to microscopic slides, or in the undesirable drying of the sediment upon the slides, or in properly correlating the specimens (multiple specimens from different patients are often placed on the same slide) with the patients from whom they were obtained. Furthermore, the standard procedure tends to be time consuming because of the manipulative steps in first mixing the sediment with a small amount of supernatant so that the sediment may be transferred to a microscope slide, and then pipetting the mixed sediment to such a slide. Of at least equal importance is the fact that such mixing and transferring steps, to the extent that they involve three items of laboratory equipment in direct contact with the sediment (centrifuge tube, pipette, and microscope slide), increase the risk of specimen contamination before the actual examination is undertaken.

SUMMARY

The present invention is concerned with a device and method for overcoming the major shortcomings of current procedures as described above. Specifically, the invention is concerned with a centrifuge tube construction and its method of use which eliminate the mixing and transferring steps required under prior procedures. As applied to urinalysis, the invention gives rise to a relatively fast clinical procedure which tends to produce more dependable results because it eliminates manipulative steps that might be performed differently by different technicians (or by the same technician on different occasions), and which also reduces the risks of contamination and possible error arising therefrom.

The device comprises a tube having an upper body portion and an integral lower end portion. The lower end portion of the tube is flattened along a plane generally parallel with the axis of the tube to provide a pair of substantially parallel transparent walls or windows which define a flat terminal chamber therebetween. The body portion of the specimen tube defines a main chamber which communicates directly with the terminal chamber. Therefore, when the tube and its contents are centrifuged, particulate matter in the sample will be forced into the terminal chamber at the tube's lower end.

The main body of the tube is provided with a flat side surface portion, the flat surface extending along a plane substantially parallel with the plane of the tube's flattened lower end portion. Therefore, immediately following centrifugation and the decanting of the supernatant, the tube may be placed upon a microscope stage, the flat side of the tube resting upon the stage and the sediment in the terminal chamber extending in a plane

normal to the line of sight through the microscope. The tube therefore performs the function of a microscope slide without requiring transfer of the sediment following centrifugation and the risks of contamination that such transfer would involve.

THE DRAWINGS

FIG. 1 is a perspective view of a specimen tube embodying the present invention;

FIG. 2 is a side elevational view of the tube;

FIG. 3 is another side elevational view of the tube, taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged cross sectional view taken along line 4—4 of FIG. 2;

FIG. 5 is an enlarged cross sectional view taken along line 5—5 of FIG. 2;

FIGS. 6, 7, and 8 illustrate successive steps in the method of performing the present invention.

DESCRIPTION

The numeral 10 generally designates a specimen tube embodying the invention, the tube having an enlarged upper body portion 11 and a reduced lower end portion 12. It will be observed that the body portion assumes the major portion of the length of the tube. While the size of the tube may be varied, depending on the test and the equipment with which it is to be used, the dimensions must be such that the tube is capable of being supported in a laboratory centrifuge.

The upper body portion and lower end portion are integrally formed of glass although other materials such as transparent plastic might conceivably be used. At its top, the tube is provided with an opening 13, the opposite lower end 14 of the tube being closed as shown in FIG. 1. Lower end portion 12 is flattened along a plane generally parallel with the axis of the tube to provide a pair of flat or planar transparent walls 15 and 16 which define a thin, flat terminal chamber 17 therebetween (FIG. 5). In general, the distance between the inside surfaces of walls 15 and 16 should be uniform and should fall within the general range of 0.2 to 2.0 millimeters. A preferred range has been found to be approximately 1.0 to 1.5 millimeters. As shown in FIGS. 3-5, the width of the terminal chamber is approximately the same as the maximum internal cross section of the main chamber 18.

Body portion 11 has a main chamber 18 communicating directly with the terminal chamber 17. The body portion may be generally cylindrical in shape (as shown) except that it is provided with at least one flattened external surface 19. It is to be noted that planar surface 19 is parallel with the axis of the tube and, of particular importance, is substantially parallel with the plane of the tube's flattened lower end portion 12. Therefore, the tube will remain stable when laid upon its flat side. If the supporting surface is a microscope stage 20 (FIG. 8), the tube may be positioned in stable condition upon that stage with the line of sight 21 (and line of illumination) of the microscope extending through the flattened terminal portion 12 and normal to the plane of that terminal portion.

Surface 19 may be roughened or etched by sandblasting or by any other suitable means. Such roughening of the surface helps to retain the tube in a selected position upon a supporting surface and, in addition, provides a surface upon which a laboratory technician may write identification symbols or other indicia. Since the

main body portion constitutes by far the greater portion of the bulk or mass of the tube, there is no tendency for the tube to tip out of the stable position illustrated in FIG. 8 even when the main chamber 18 is empty and the terminal chamber 17 contains sediment or a sediment-liquid mixture. However, in mounting the tube upon a microscope stage, it is contemplated that some clamping or supporting means (not shown) might be used to insure against relative movement of the tube during microscopic examination of its contents.

In carrying out the method of the invention, a technician simply pipettes a liquid specimen 22 containing particulate matter 23 into the tube (FIG. 6) and the tube is then centrifuged to force the sediment into terminal chamber 17 (FIG. 7). The supernatant fluid is then poured off and the tube is placed in horizontal condition on a microscope stage 20 as shown in FIG. 8. Microscopic examination of the sediment therefore takes place immediately following the centrifuging and decanting steps, without the use of microscope slides or any of the manipulative steps required in the past. Because of its inexpensive construction, the tube may be discarded immediately following use, thereby avoiding the problems of contamination and expense which cleaning and reuse might present.

While in the foregoing we have disclosed an embodiment of the invention in considerable detail for purposes of illustration, it will be understood by those skilled in the art that many of such details may be varied without departing from the spirit and scope of the invention.

We claim:

1. A specimen tube having an upper body portion and an integral lower end portion, said lower end portion being flattened along a plane generally parallel with the axis of said tube to provide a pair of substantially parallel transparent walls spaced slightly apart to define a thin flat terminal chamber therebetween, said body portion defining a main chamber communicating directly with said terminal chamber and having an enlarged flat outer surface portion substantially parallel with the plane of said flattened lower end portion, said flat outer surface portion being spaced from the axis of said tube a distance substantially greater than the dis-

tance between said axis and each of said parallel transparent walls of said terminal chamber.

2. The structure of claim 1 in which said terminal chamber is of substantially uniform thickness throughout its entire extent.

3. The structure of claim 2 in which said thickness falls within the range of about 0.2 to 2.0 millimeters.

4. The structure of claim 3 in which said thickness falls within the range of about 1.0 to 1.5 millimeters.

5. The structure of claim 1 in which said tube is open at its upper end.

6. The structure of claim 1 in which said upper body portion is of substantially uniform cross section throughout its entire longitudinal extent, said upper body portion constituting a major part of the length of said tube.

7. The structure of claim 6 in which said upper body portion is of generally cylindrical configuration except for said flat outer surface portion, said terminal portion having a width substantially the same as the maximum internal cross sectional dimension of said upper body portion.

8. The structure of claim 1 in which said flat surface is roughened.

9. A method for analyzing the sediment in a body of fluid, comprising the steps of placing a quantity of said fluid into a tube closed at its lower end, said tube having a lower end portion with transparent and substantially parallel side walls spaced slightly apart to define a thin flat terminal chamber therebetween and having an enlarged upper end portion with a flat outer surface parallel with said side walls and spaced farther from the axis of said tube than said side walls, centrifuging said tube and its contents to direct said sediment into said terminal chamber, then removing the supernatant fluid from said tube, then turning said tube so that its axis extends horizontally and resting the flat surface thereof upon a microscope stage so that the line of sight of the microscope passes through said flat terminal chamber and is substantially normal to the plane of said chamber, and thereafter microscopically examining said sediment through the transparent side walls of said end portion.

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