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H. G. LEVY

2,198,256

CENTRIFUGE TUBE

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FIG. 1

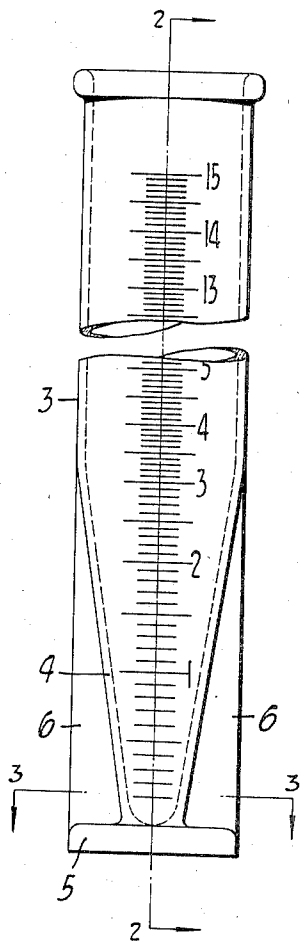


FIG. 2

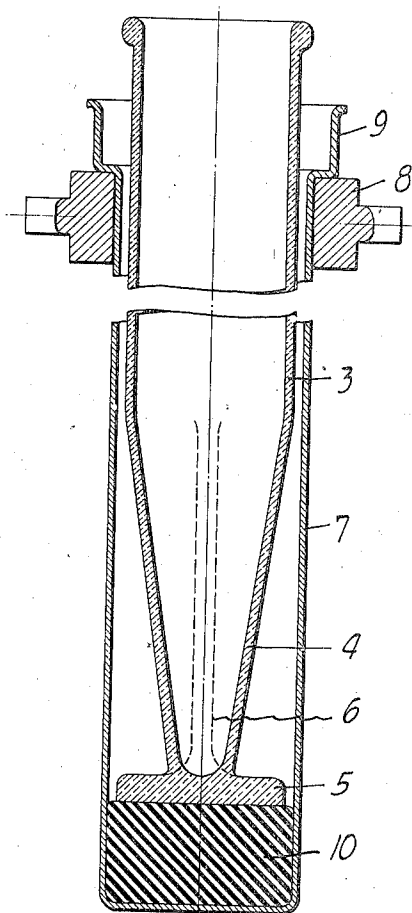
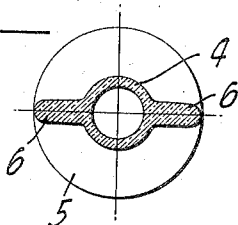


FIG. 3



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CENTRIFUGE TUBE

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2 Claims. (Cl. 233—26)

This invention relates generally to tubes used in centrifuges of the type used in clinical and chemical laboratories, for the purpose of subjecting small confined samples of material to centrifugal action.

An object of the invention is to provide an accurately graduated centrifuge tube capable of quantity production.

Another object of the invention is to provide a centrifuge tube which is free of the breakage liability existing in the present glass tubes.

A further object of the invention is to provide a centrifuge tube which may be readily removed, without being subjected to strain, from the centrifuge tube holder.

The invention possesses other advantageous features, some of which with the foregoing, will be set forth at length in the following description, in which reference is had to the accompanying drawing, in which

Fig. 1 is a side elevational view of the centrifuge tube of my invention.

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1, and showing the tube as applied to a centrifuge.

Fig. 3 is a cross section taken on the line 3—3 of Fig. 1.

Centrifuge tubes of this type usually comprise a cylindrical body portion merging at its lower or outer end in a tapered or conical portion. These tubes are usually calibrated with vertically spaced graduations, and due to the varying volume or diameter of the conical or tapered lower portion, the spacing of the graduations on this portion are varied, in counter-distinction to the regular spacing of the graduations on the cylindrical portion. These tubes have heretofore been formed of molded glass and in molding glass, the outer surface of the tube fits accurately to the mold, whereas the inner surface, particularly in the tapered portions is not molded and is irregular. Due to this irregularity of the inner surface of the tapered portion, each tube is individual so that, if it is desired that the graduations on the tube accurately indicate the volume of material in the tube, the tube must be separately calibrated and the graduations must be applied by hand and individually with respect to each tube. In the event that such tubes are made in mass production, and the graduations applied by machine, the readings given by such graduations are inaccurate. In accordance with my invention, I mold the inner surface of the tube, so that the inner dimensions of all tubes made on the same mold are identical, thereby permitting graduations to

be applied mechanically and since all of the tubes so made, are of invariable inner dimensions, the mechanically applied graduations give accurate readings.

The tubular metal retainers in the centrifuge into which these tubes are inserted are generally provided in the lower ends with cushions, usually comprising a rubber block, against which the tapered end of the tube rests, during the operation of the machine. The pressure exerted by the pointed or tapered end of the tube against the rubber block, causes a wearing of the block to form a seat into which, in time, the tapered end extends, sometimes wedging itself so tightly that it is difficult to remove the tube from the holder. After continued use, these rubber blocks have been known to wear sufficiently to bring the lower end of the tube into contact with the metal end of the holder, thereby causing under the tremendous pressures exerted in the centrifuge, breakage of the tube. In accordance with my invention, I provide a foot or enlargement on the lower end of the tube, which rests against the cushion block, so that wear is minimized and so that the tube will not become seated in the block.

The centrifuge tube of my invention is preferably formed of a moldable transparent condensate product which does not possess the frangible disadvantages of glass. The centrifuge tube preferably comprises a cylindrical body portion 3, having a conical or tapered portion 4 at its lower end. At such lower end, the tube is provided with a foot 5, preferably of disk form, and preferably of the same diameter as the body portion 3 of the tube. When used in a centrifuge machine, the lower portion or tapered portion of the tube is subjected to the greatest internal pressure and, to resist this pressure, the tube is preferably provided with ribs 6 connecting the tapered portion with the foot 5. The outer surface of these ribs is preferably coplanar with the outer surface of the tube and the ribs are preferably diametrically opposed.

The tube is provided with graduations along the tapered portion and along the body, the graduations being spaced apart vertically to indicate the volume of the tube at the respective graduations. On the tapered portion, the graduations preferably are disposed along that portion of the surface of the tube lying between the ribs, so that no distortion will occur in the reading of the contents of the tube. The graduations are preferably molded into the tube as the tube is molded, thereby providing an ac-

curate indication of the volume of the tube at the respective graduation readings.

Fig. 2 illustrates application of my tube to a tubular metal retainer 7 of the "Cornell" type.

5 This retainer is removably disposed within the trunnion ring 8 of the centrifuge, and is shown provided with a raised lip or rim 9 to facilitate its removal from the trunnion ring. The foot 5 rests upon the rubber cushion 10 at the lower end of the retainer.

The foot or base on the tube provides the additional advantage of permitting the tube to stand on a shelf or table without being racked.

By virtue of this invention I have not only 15 provided a substantially non-breakage centrifuge tube, but I have provided a centrifuge tube which may be made in quantity production and on which the graduations will give an accurate indication of the volume of the tube. It is possible that the molded condensate product may react with some materials which it is desired to 20 subject to centrifugal action, and in such cases, it is advisable to use tubes of such material that no reaction will occur.

25 It is essential in analysis, that the amount of sediment precipitated to the bottom of the tube by centrifugal action be accurately determined and for this reason the tube is provided with a tapered lower end, which results in more widely spaced graduations which are conducive to more 30 accurate readings. Also by this expedient, the reading error due to parallax is minimized.

The material of which the tube is made may be any suitable moldable transparent condensate 35 product, such as "Lucite" manufactured by Du

Pont, which product is a polymerized methyl methacrylate.

I claim:

1. A container adapted to be positioned within the tubular holder of a centrifuge and serving 5 to retain a sample for centrifuging, said container comprising a tubular body formed of one piece of molded transparent synthetic resin, the interior of the body being accurately formed to predetermined dimensions and the walls being 10 provided with integrally formed indicating graduations, the upper open portion of the body being cylindrical in shape and the lower portion being conical shaped, a foot formed on the lower end of the conical portion, said foot being circularly 15 contoured and having a diameter corresponding substantially to the diameter of the cylindrical portion.

2. A container adapted to be positioned within the tubular holder of a centrifuge and serving to 20 retain a sample for centrifuging, said container comprising a tubular body formed of one piece of molded transparent synthetic resin, the interior of the body being accurately formed to predetermined dimensions and the walls being 25 provided with volume indicating graduations, the upper portion of the body being cylindrical in shape and the lower portion being conical shaped, a foot formed on the lower end of the conical portion, and reinforcing ribs extending 30 from the foot upwardly along opposite sides of the conical portion, the remaining side walls of the conical portion being substantially unobstructed for viewing the graduations.

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