a sufficient degree of either calcification or cyst formation may be detected directly if there is sufficient difference in attenuation of ultrasound by these tumors in comparison to normal cerebral tissue. To establish the ultimate capabilities and limitations of ultrasonic methods, we are pursuing a number of fundamental studies on the behavior of ultrasound in biological tissues.

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A Slicer for Sampling Liquids[1]

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A mechanical slicer has been developed for sampling various levels of liquids contained in plastic tubes. This technique obtains small, accurately determined samples, with a minimum of stirring, and with high volumetric recovery.

Fig. 1 presents two views of such a slicer designed for ½-in. diameter plastic tubes of 8.2-cc capacity used in a quantity ultracentrifuge. The plastic tube *T*, filled with liquid to be sampled, is held by clamps *C* in plastic plates *P* and *Q* just above and below the desired level of division. A very thin (.007-in.) knife blade *B* made from razor blade stock[3] is carried in a rigid frame *F*, which slides in ways *W* machined in the plates. This frame is moved by a lever *L*. The sharpened edge of the blade cuts the tube wall, and the flat body of the blade serves as a sealing partition between the upper and lower levels of liquid. The plates are held together by two compressed springs *CS* adjusted to prevent leakage of the liquid above the blade. The upper liquid sample is removed with a hypodermic syringe or pipette. The clamps are loosened, the top section of the plastic tube is removed, and the blade withdrawn. A screw drive *D*, carrying an indicator *I*, which reads against a fixed scale *S*, raises the remaining portion of the tube to the level of the next slice, and the entire operation is repeated.

In order to prevent loss of liquid because of capillary action if surfaces become wet, a nonwetting grease is spread over the knife blade and other parts near the tube. We have used a mixture of 3 parts vaseline to 1 part mineral oil for this purpose, although probably a silicone grease is preferable. Since such greases are almost insoluble and chemically inert, this procedure will seldom affect subsequent analyses of the samples. Grease cups

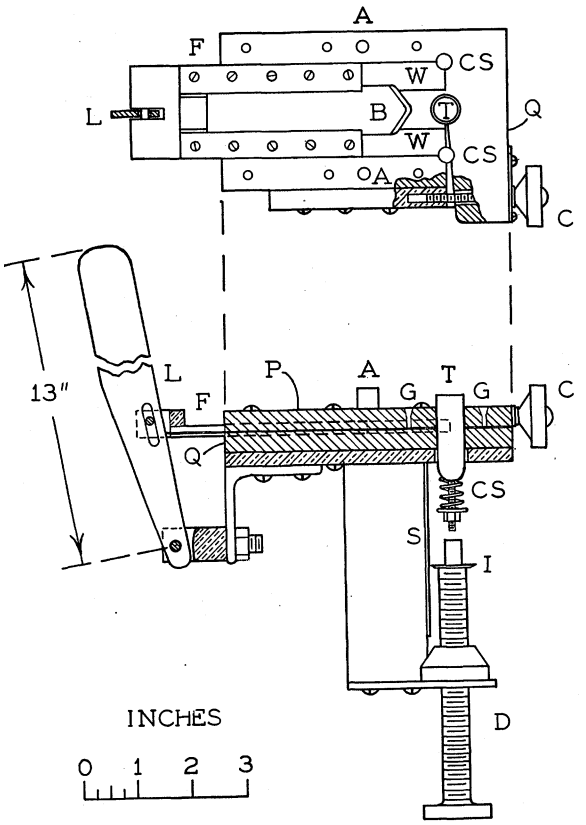

FIG. 1.

G, tapered to fit a hypodermic syringe, permit adding grease at any time.

For stability, the device is held in a heavy vise or bolted to a workbench. None of the dimensions is critical save that the plates must bear against the blade to insure proper slicing. In our instruments, each of the springs exerts a force of about 15 pounds. Our plates are made from ⅜-in. Plexiglas, with tapered pins *A* to insure alignment.

Using this technique to sample groups of three 8.2-cc tubes of ultracentrifuged serum, we recover about 92% of the liquid when dividing each tube into 10 samples. Part of the volume lost remains on the walls of the plastic tube and part in the 10 hypodermic syringes used. These residues are increased by the high viscosities in the lower regions of each tube, where we find 30g% of protein. Sampling similar tubes filled with water and using only one syringe, we recover 99% or more of the volume.

[1] This work has been supported in part by a grant from the Committee on Growth, acting for the American Cancer Society.

[2] We wish to express our appreciation to R. H. Turner and his group for the suggestion of this device and for encouragement during its development.

[3] We are grateful to Howard Gambrill, Jr., of the Gillette Razor Blade Company, Boston, Mass., for this stock.