Remote Pipetting Apparatus for Dispensing Solutions of Radioisotopes[1]

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A remote pipetting apparatus for the handling of "hot" solutions is an essential item of equipment for most radioisotope laboratories. Although equipment for this type of operation has been reported (*1*) and is available commercially (*2*), the remote pipetting apparatus herein described is more versatile, provides truly remote operation, and can be assembled from materials more generally available in the laboratory.

The unique feature of this apparatus is the use of a manometer for measuring the delivered volume. This manometer can be placed at the site of the operator at any desired distance from the radioactive source. Filling and delivery from the pipette are accomplished by turning a micrometer screw attached to the plunger of a syringe. The complete apparatus is shown in Fig. 1.

The main parts of the apparatus are the aluminum syringe assembly, the manometer and scale, the pipette support and arm, and the pipette. The syringe assembly consists of a syringe, *A*, (20 ml), held by a strap, *B*, in a semicircular grooved support, *C*; this support can be moved forward or backward on rod *D*, between the arms of the angle block, *E*. The micrometer screw, *F*, is connected to the syringe plunger, *G*, by means of a tubular rubber connection, *H*. The tip of the syringe is connected to a glass Y tube, *I*. One of the forks of the Y tube is connected to the manometer, *J*, the other to stopcock, *K*. This stopcock is used to adjust the level of the colored water in the manometer. One-mm cross-section paper, *L*, is mounted on a board behind the manometer. The other end of the manometer is connected to a straight length of glass tubing, *M*, by rubber tubing, *N*. The glass tubing in turn is connected to a 1-ml pipette, *O*. The supports, *P*, and the horizontal rod, *Q*, can be set at any height or length. The container or receiver, *R*, can be set behind lead bricks (not shown).

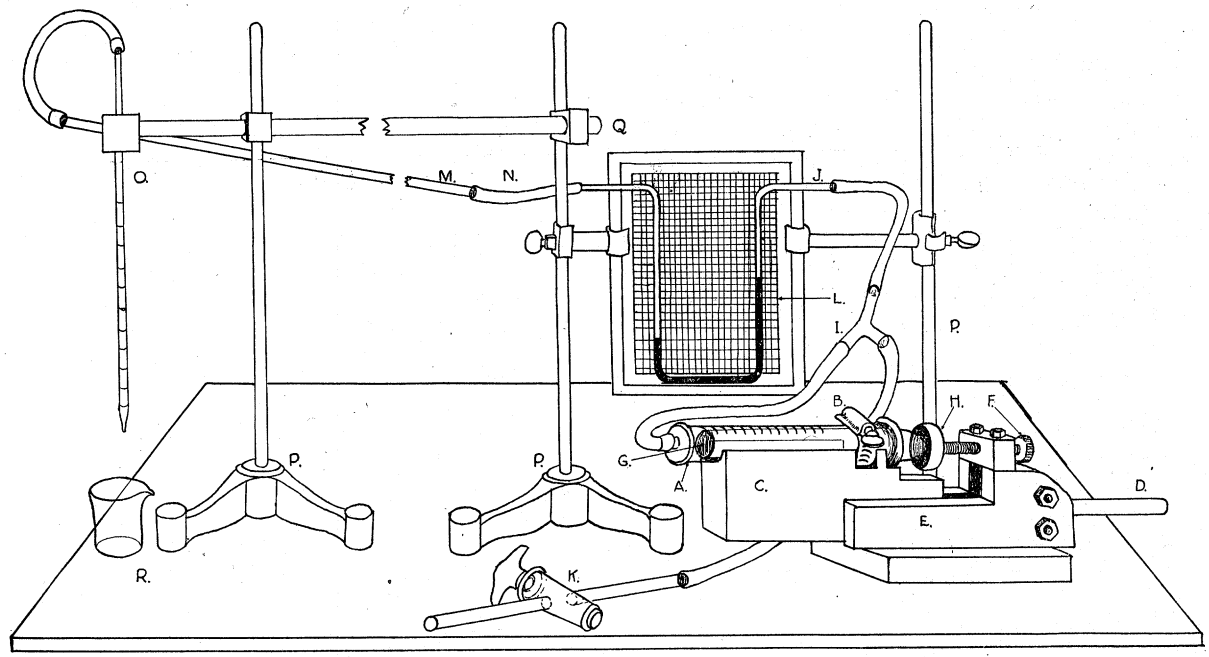

FIG. 1.

Accurate delivery over the entire range of the manometer can be obtained only by using carefully selected tubing of uniform bore for the manometer and by having

TABLE 1

VOLUMES DELIVERED FROM THREE DIFFERENT SECTIONS OF THE MANOMETER SCALE AND THE REPRODUCIBILITY OF REPLICATE SAMPLES*

Section of manometer used	Weight of water delivered	Volume of water delivered at 25° C	Standard deviation σ
	mg/100 mm	ml/100 mm	
215 mm–155 mm	556	0.558	± 0.002 ml
155 mm– 95 mm	563	0.565	± 0.014 ml
95 mm– 35 mm	560	0.562	± 0.007 ml
Mean		0.560	± 0.01 ml

* Four replicates determined for each section.

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all joints leakproof. If uniform bore tubing is not used, then selected sections of the manometer should be used for delivery. The apparatus is calibrated by weighing portions of water delivered by the pipette. Table 1 shows the reproducibility of the volumes delivered, using various sections of a manometer made from random laboratory glass tubing. The accuracy of the delivered volumes compares favorably with that obtained by hand pipetting from calibrated pipettes.

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