priately selected cork-borers. In order to prevent cracking of the disc it is necessary that the cork-borer be hot. I have found that immersion of the instrument in hot water does this best. So heated, a little well-like curbing is formed around the hole which serves nicely to keep the seedling raised from the flat upper surface of the disc.

It will be at once evident that this device is capable of any modification necessary to suit the individual need. It also allows of easy adjustment of depth of culture solution and degree to which the roots are immersed therein. Its convenience will be apparent to those who have wrestled as I have with the unplastic cork.

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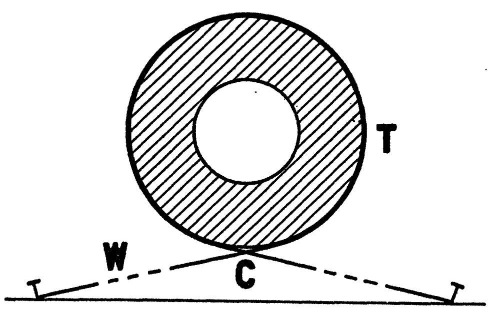
A METHOD FOR CUTTING GLASS TUBING

THE accompanying figure illustrates a method which has been found to be successful for cutting heavy glass tubing. A piece of bare, soft-drawn copper wire "W" is wrapped once around the tube "T" and fastened to the work bench. A mixture of carborundum powder and glycerine makes a convenient grinding compound. A to and fro motion of the glass in a direction parallel to the plane of the figure produces relative motion between the wire and glass and the carborundum is thus carried around. The glass should occasionally be turned so as to make a cut of uniform depth. In case it is



necessary to locate the cut exactly some kind of clamp or guide should be used until a groove is started. If a deep cut is made the point "C" where the wire crosses causes binding. When this stage is reached it is well to mount the tube in a lathe and hold the wire in the groove using only one half of a turn. (Be sure to protect the lathe from the compound.) New wire should replace the old frequently to avoid binding when the new is used.

The author's first use of the method was in cutting a Pyrex tube having an outside diameter of 4.4 centimeters and 1.2 centimeter walls. Number 80 carborundum powder was used, first with Number 18 wire and then with Number 20. The cutting time was about three hours. Finer wire and powder would be better for smaller or more delicate pieces.

The method has the advantages of simplicity, small breakage risk and freedom from strains introduced by methods using heat. It is particularly useful in cutting short lengths of tubing.

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SPECIAL ARTICLES

REFLECTION OF LIGHT FROM THE SURFACES OF LEAVES

THE classical studies of Brown and Escombe[1] on the interchange of energy between the leaf and its environment form our only important sources of information as to the quantitative income and outgo of energy during the processes of photosynthesis, transpiration and thermal emissivity. They measured the solar radiation with much care, determined the coefficient of absorption of energy by the leaf, measured the amount of energy expended in the various forms of internal work, and the gain and loss of energy during positive or negative thermal emissivity at the leaf surface. From these various determinations they attempted to construct a balance sheet of the energy income and outgo of the leaf.

Careful consideration of their work makes it obvious that their figures, which account for 100 per cent. of the energy inflow in terms of work and transmission, can not be as accurate as they appear to be at first glance. The most patent error is one to which they referred, but neglected because they thought it was a small error. This is the reflection of light from the leaf surface, which, they say, with perpendicular incidence "must be very small in amount." The reflected light was allowed to enter, as an error, into the calculation of the coefficient of absorption, which is therefore too large.

During the last two years many measurements of the reflection of light from leaf surfaces have been made by means of the Keuffel and Esser direct reading spectrophotometer. This instrument is designed to measure the percentage of reflection at an angle of 90° to the surface of the leaf when the incident light falls upon the leaf from almost every possible angle. By means of a wheel, carrying a wave-length

[1] Brown, Horace T., and Escombe, F. "Researches on some of the Physiological Processes of Green Leaves with Special Reference to the Interchange of Energy between the Leaf and its Surroundings." *Proc. Royal Soc.* London B. 76: 29–111. 1905.