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RESEARCH IN ENGINEERING[1]

By Sir ALEXANDER GIBB, G.B.E., C.B., F.R.S.

ENGINEERING started as an art; at a later stage it developed into a somewhat scientific but purely empirical practice; it is now the final stage of applied science.

That engineering is a science has not always—and still in some quarters is not—recognized or appreciated, even among engineers themselves. For that we have no one to blame but ourselves. Too long were we content to act by the light of accumulated experience, not always fully assimilated. But engineering has now for some time past realized that, without research, progress and improvement are impossible.

Engineers have sooner or later always made use of the discoveries of science; but the connection with science has been casual and haphazard. "It seems exceedingly doubtful if Watt or any other inventor," wrote Professor Lea, "would have thought of the independent condenser, if it had not been for the fundamental work of a purely scientific character done by Toricelli, Boyle and others, on the pressure of the atmosphere, and that by Black and Watt which led to the discovery of the latent heat of fluids, and thus to a quantitative appreciation of the heat units involved in changing water into steam."

But organized research was then something still unknown. For the first fifty years of its life the Royal Society had to bear the jeers and sneers of the pulpit, the platform and the literary world. When Harvey published his tract describing the circulation of the blood it was received with ridicule, as the utterance of a crack-brained impostor, and he was deserted by almost all his friends. This attitude of distrust on the part of the public lasted into the nineteenth century. But scientific research was at last becoming a matter not only for the individual crank and dilettante, but for scientific cooperation. The encouragement of research and the advancement of useful knowledge were

[1] Address of the president of Section G—Engineering, British Association for the Advancement of Science, Nottingham, September 2, 1937.

Over this face may be poured a thin layer of the partially polymerized methyl methacrylate, which will solidify on the already formed solid without appreciable demarkation. This work is being continued.

JAMES H. HIBBEN

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A PARAFFIN BLOCK TRIMMER[1]

THE description of a paraffin block trimmer is offered because of its usefulness, inexpensiveness and simplicity of construction. An old discarded Bausch and Lomb dissecting microscope stand, with lens arm and glass stage removed, and a regular microtome blade were utilized in constructing the trimmer. The microtome blade can be inserted and removed by merely tightening and loosening two wing nuts.

A hard tough wood was used in the trimmer. The following procedure is suggested for constructing it. Cut out a piece $2\frac{1}{4}''$ ($2\frac{5}{8}''$ plus width of saw used) $\times 1\frac{5}{8}'' \times 6''$. If several are to be made increase the length accordingly. Drill holes for the four wood screws (a) on the $1\frac{5}{8}''$ side, $\frac{3}{8}''$ from one edge. These screws clamp block A and B to the rack. Rip the block so as to obtain block A, $\frac{3}{4}''$ thick, and block B, $1\frac{3}{8}''$ thick. Cut the groove for the toothed part of the rack only in the middle of block A. Make a V-shaped groove for the triangular-shaped rack in block B. On the opposite side from the V-shaped groove cut out an area $\frac{1}{4}'' \times 1\frac{1}{2}''$. Cut the inclined plane, on which the microtome blade rests, at 30° with the horizontal

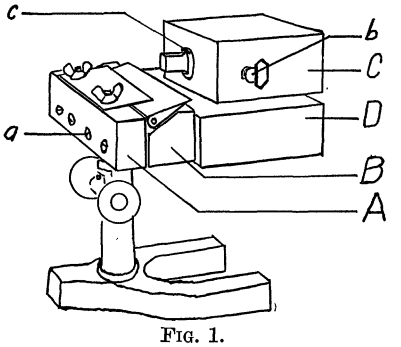

FIG. 1.

plane, beginning the cut at the corner. The finished block B should measure about 29/32″ on the side that clamps to A and 1 7/16″ on the opposite side. Finished block A measures $\frac{3}{4}'' \times 1$ 5/16″. Block C measures $1\frac{5}{8}'' \times 3\frac{1}{4}'' \times 3\frac{1}{2}''$. A $\frac{1}{4}''$ stove bolt (b), as a set-screw, holds the object block tight in the block. Block D measures $1\frac{3}{8}'' \times 3\frac{1}{2}'' \times 6''$. Cut out an area $\frac{1}{4}'' \times 1\frac{1}{2}''$ to coincide with the same size opening in block B. These two combined openings ($\frac{1}{2}'' \times 1\frac{1}{2}''$) allow trimmed-off paraffin to fall below.

This blade holder was constructed for use with a Spencer No. 942 blade. If a smaller blade is used the dimensions should be changed so that when block C is pushed up against block B, in the process of trimming the paraffin block, there will be about $\frac{1}{8}''$ clearance between block C and the cutting edge of the microtome blade. This obviously is for protecting the cutting edge.

The microtome blade is held in place by a piece of sheet metal $1\frac{1}{4}'' \times 4''$ fastened to block A by means of two stove bolts with wing nuts.

The trimming of the paraffin block is accomplished in the following manner: Block C, with the object block (c) held securely in a $\frac{3}{4}''$ hole drilled for that purpose, is pushed up repeatedly against block B. The height of the microtome blade is regulated by turning the pinion. It is suggested that the cutting edges at each end of the blade, which can not be used for sectioning, be used for trimming the block.

GEO. E. CAUTHEN

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MANHATTAN

[1] Contribution No. 183, Department of Zoology.

BOOKS RECEIVED

Anales del Museo Argentino de Ciencias Naturales. Pp. xliv + 439. 124 figures. University of Buenos Aires.

BABCOCK, ERNEST B. and G. LEDYARD STEBBINS, JR. *The Genus Youngia.* Pp. 106. 31 figures. 5 plates. Carnegie Institution of Washington.

CLEMENTS, GUY R. and LEVI T. WILSON. *Manual of Mathematics and Mechanics.* Pp. vii + 266. McGraw-Hill. $2.50.

COLLINS, HENRY B. *Archeology of St. Lawrence Island, Alaska.* Pp. xl + 431. 26 figures. Smithsonian Institution.

DEXTER, SMITH O., Editor. *Concord River; Selections from the Journals of William Brewster.* Pp. vi + 258. Illustrated by Frank W. Benson. Harvard University Press. $3.50.

DITMARS, RAYMOND L. and WILLIAM BRIDGES. *Wild Animal World.* Pp. x + 301. Illustrated. Appleton-Century. $3.00.

DUKES, H. H. *The Physiology of Domestic Animals.* Pp. xiv + 695. 167 figures. Comstock. $6.00.

FRANCIS, CARL C. *Fundamentals of Anatomy.* Pp. 320. 176 figures. Mosby. $2.75.

HARRISSON, TOM. *Savage Civilization.* Pp. 461. Illustrated. Knopf. $4.00.

HASLETT, A. W. *Everyday Science.* Pp. xiv + 305 + xii. Knopf. $2.75.

HOOPER, DAVID. *Useful Plants and Drugs of Iran and Iraq.* Pp. 241. Field Museum. $1.50.

LYNDE, C. J. *Science Experiences with Home Equipment.* Pp. xiii + 226. Illustrated. International Textbook Co. $1.25.

MANEVAL, WILLIS E. *A List of Missouri Fungi.* Pp. 150. University of Missouri. $1.25.

RECHINGER, K. H., JR. *The North American Species of Rumex.* 25 figures. Field Museum. $1.50.

SEASHORE, CARL E., Editor. *Objective Analysis of Musical Performance.* Pp. 379. University Press, Iowa City.

South African Journal of Science; Report of the South African Association for the Advancement of Science, 1936. Pp. lxii + 1144. Illustrated. The Association, Johannesburg. 30s.