MODERN ADVANCES IN TECHNOLOGY

Modern Engineering

By C. H. S. Tupholme. Pp. xi+201+23 plates. (London: Faber and Faber, Ltd., 1942.) 15*s*. net.

IT is one of the disadvantages of war that scientific and technical people are often dispersed far and wide, are unable to meet each other at scientific meetings, and have not, through the technical censorship, access to the latest information respecting new materials and processes. It frequently happens that individuals are simply not aware of the newest developments in science and technology, and this may have an adverse effect on their own work, or delay its successful prosecution. This enforced isolation is mitigated to a large extent by the present text. The author, within the limits tolerated by security, conducts his reader through many technical developments spread over a wide field. Many of these were introduced before the War, but the exigencies of the latter have forced them beyond the experimental stage, until they can no longer be deemed experimental or even developments, but must be included as regular practice in up-to-date manufacture.

The author commences with mechanical power generation from fuels, and shows that appreciable advances in fuel economy must result in the newer types of forced-circulation boilers, mercury boilers, super-charged Diesels, and multiple-fuel engines. Whereas workshop practice was revolutionized by precision grinding, even greater changes have been brought about by automatic oxygen-cutting of forgings to pattern, flame hardening and softening, surface hardening by depositing hard metals, high-speed steel, diamond and cemented carbide tips for super-speed lathe work, the manufacture of gauges and re-surfacing with hard chromium plating, and general restoration of worn parts. While these techniques have improved the product, and lowered the cost by reduction in time of manufacture, many of them would not have been possible without the testing gauges for measuring surface finishes. The piezo effect has been called in to detect the irregularities of a surface in terms of 10^{-6} inch, while the principle of the optical flat, made of quartz, has been applied to the workbench for testing the flatness of a surface by showing the interference bands. Photographing templates on material to be cut and profile projection are becoming routine practice.

For protecting workers and utilizing certain processes requiring absence of dust and a controlled climate, the principle of air-conditioning has been greatly assisted by new safe refrigerants. Air-conditioning in mines, in railway coaches and motor-cars, both for passengers and produce, is becoming common in many parts of the world. Where carbon dioxide is a production by-product it has become a habit to install plant for making 'dry-ice', for which there seems an insatiable demand in many fields. An important production advance has been made by cooling softened duralumin and so delaying the age-hardening, which sets in after two hours, until the material has been worked.

On the chemical side the various plastic materials offer wide scope for designers, and while we are warned by the plastics industry not to be too optimistic about the wholesale replacement of metal parts by plastics, it is obvious that for economy, lightness and conservation of metallic resources, plastics will play a great part in replacing metal objects, and offer new scope in artistic design. New hyper-pressures of 1,000 atmospheres are already in use for ammonia synthesis. Aluminium and magnesium alloys need scarcely be mentioned, apart from the fact that die-cast parts of light-alloy can be designed to require no machine-finishing. A new development is to clad duralumin with pure aluminium, with marked reduction in corrosion, particularly in the hulls of flying-boats. The chrome-nickel stainless steel has the virtue that it is actually toughened by welding, and does not require subsequent annealing, apart from its remarkable retention of strength, impact and anti-corrosion properties at high temperatures. The admixture of lead to steels has vastly diminished the time and cost of machining mass-produced parts. Welding has gone ahead with carburizing techniques, especially valuable for long pipes, while electric valve control has speeded up and made more uniform electric welding. Electro-magnetic and X-ray detection of flaws in metallic bodies has been increasingly used. The development of bright-annealing of metals in controlled atmospheres, especially conditioned town-gas, has many incidental advantages.

On the fabrication side there is the new technique of forming tubes into any contour of section and the electro-deposition of metal inside intricate moulds, such as can be made of rubber or fusible metal. The electrical instruments for precision control, whether of thickness of a continuous product, for limit-gauges or combustion recording, are endless; fluorescent lamps find applications for sterilizing air in schools and factories, detecting manuscript frauds, and for stage and factory lighting. While infra-red lamps have been used for the local baking of coloured car finishes, whole tunnels have been used for processing the complete motor-car. While the advances in traction, marine engineering, and aeronautics make abundant usage during manufacture of all the preceding processes and materials, the last makes several *ad hoc* applications of science, particularly in de-icing, navigation, and blind-flying and landing.

Because the author is discrete in many of his references and also covers so wide a field, he would often appear scrappy to a particular specialist and perhaps obscure to the inquiring layman. The reviewer would normally direct attention to two important fabrication processes which have been omitted; there are in addition a few misprints. Nevertheless, there is a considerable field of usefulness for this type of book at the present time, and, in this type of survey, the author has discharged his task well with regard to prevailing conditions.

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RESEARCHES ON FUNGI

A Revision of Melanconis, Pseudovalsa, Prosthecium and Titania

By Lewis E. Wehmeyer. (University of Michigan Studies, Scientific Series, Vol. 14.) Pp. viii+161+11 plates. (Ann Arbor, Mich.: University of Michigan Press; London: Oxford University Press, 1941.) 14*s*. net.

IN this book Dr. Wehmeyer continues his systematic revision of the stromatic Pyrenomycetes, which commenced with his "The Genus Diaporthe and its Segregates" published in 1933. The species concerned