

RESEARCH ON MOTOR-CAR ENGINES

Collected Researches on Cylinder Wear

By C. G. Williams. Pp. vii+119. (London: Institution of Automobile Engineers, 1940.) 10s. 6d.

THE work being carried on at the research station of the Institution of Automobile Engineers at the Great West Road, Brentford, which was outlined in a description of the Laboratory in *NATURE* of November 23, 1940, is exemplified in the publication of "Collected Researches on Cylinder Wear", by C. G. Williams.

It is pointed out in the late Lord Austin's foreword that the problem of cylinder wear is one of the most serious with which motor-car manufacturers have had to deal. Individually, they have done much useful work towards its solution in their own laboratories, but owing to its complexity it was thought best to have it dealt with comprehensively by the Institution, and the several reports which constitute this publication confirm the advantage of this arrangement, not only in unifying the direction of the investigations but also in bringing together and releasing for general use the full range of information collected.

These collected researches include four interim reports on experiments carried out at the Institution's Laboratory, a discussion of published information on the subject, the collected experiences of manufacturers and operators giving the accumulated data prior to the adoption of the work at the new laboratory, a later report of more recent experiences and the results of an investigation of cylinder liner materials.

It had been suspected for some time that it was during the initial warming-up period that wear

mainly takes place, but this partial knowledge led to an accentuation of the trouble as, in ignorance of the main source of wear, a wrong procedure was adopted. The contributory causes are many and various, associated as they are with mechanical and frictional conditions, the properties and chemical reactions of fuel and exhaust gases, high temperature, composition and structure of the metals in contact, influence of lubricating oils and so on. It is proved, however, that corrosion, not abrasion, is the main cause of cylinder wear, and there are several sources from which it may arise. Besides the action of water, which, as shown, can cause corrosion through oil films, there is the certainty of acidic conditions being produced from organic acids, sulphuric, nitric and carbonic acids derived in small proportions from the normal components of the fuel. The investigation of these miniature chemical processes will be found one of the most interesting phases of this series of researches, dealing as they do with many other complex and almost infinitesimal actions and reactions.

These researches were carried out with the view of making immediate use of the knowledge gained in the improvement of engines, and the report dealing with the more recent experiences of manufacturers and operators bears out their value. One improvement of major importance is the use of more suitable cylinder materials; special reference is made to nitrogen-hardened cast iron with its resistance to abrasive wear, and to austenitic cast iron, which can withstand both corrosive and abrasive wear. On many other points, this section gives details of the practical results which have accrued from the work of the Laboratory.

AGRICULTURAL PRODUCTION IN UGANDA

Agriculture in Uganda

By the Staff of the Department of Agriculture, Uganda. Edited by Dr. J. D. Tothill. (Published by authority of the Government of the Uganda Protectorate.) Pp. xvi+552+30 plates. (London: Oxford University Press, 1940.) 20s. net.

THIS is a comprehensive volume of information contributed by the staff of the Department of Agriculture in Uganda on agricultural conditions—including native agriculture, land tenure, soils, manures—imported, artificial, green and cover crops; climate, crops and allied subjects. The

important associative sciences of mycology and entomology are also dealt with very thoroughly, the fungus and insect pests being discussed at length under each crop, though bees and locusts are treated in a separate section.

Under "Native Agriculture: Development of Ox-Cultivation", it is recorded that chiefs in Budama were first instructed in the use of the plough in 1909 and a ploughing school was started in 1910 at Kumi (in Teso). The first ploughs used in Teso were wooden, made locally from an Indian pattern; but, these, it is stated, were soon dis-