

their various opinions. The chapter on the Chaldæan civilisation is interesting, and is full of curious information. The volume is concluded by an appendix treating of the Pharaohs of the Ancient and Middle Empires, and by a useful index. M. Maspero is fortunate in having found so careful a translator as Mrs. McClure, who introduces her work in a preface which is at once business-like and to the point. The editor's remarks are, however, somewhat rambling, and in professing to criticise M. Maspero's knowledge of matters Egyptian or Babylonian, we think greatly out of place.

#### THE TRANSMISSION OF POWER.

*On the Development and Transmission of Power.* By William Cawthorne Unwin, F.R.S. (London: Longmans, Green, and Co., 1894.)

IT is well known that the author of this work has had special opportunities for studying the subject of transmission of power by all the various methods which have, at different times, been adopted, and the engineering world is to be congratulated on having received from his pen a summary of the principles utilised in this class of work, and of the possibilities of the future, as well as very complete and authentic information about the principal work that has been done in the past. This book is the outcome of a course of "Howard" lectures delivered before the Society of Arts in 1893. It deals with the generation, storage, and transmission or distribution of power. The methods of transmission and distribution include water under pressure, compressed air, wire ropes, steam, gas and electricity. The author recognises the fact that transmission of power to distances has not been so fully developed in the past as it is likely to be shortly, and that the electrical transmission and distribution of power has more to claim in the way of promises for the future than large achievements in the past.

The first chapters deal with the generation and the cost of generating power by steam or hydraulically. One of the most valuable parts of the book is found in those chapters where the economy of steam engines is considered. These chapters deal with the losses in boiler and engine in a very complete manner. The author has realised very fully the fact that in any case of generating power in large quantities, and distributing it to small consumers, the cost of the horse power depends largely upon the load curves at different times of the day, and he draws attention to the very large excess of cost per horse power of electric lighting stations over those which are delivering power at a constant rate. Even in a pumping station where the work is continuous, he finds that about 35 per cent. more fuel is required than in a careful trial, but in a station from which electric light or power is distributed, the losses due to banking of boilers and to engines working a portion of their time at an output which is not economical, are such that the quantity of fuel used per indicated horse power rises from 1½ lbs. per hour in a test trial with a condensing engine, to 3·3 lbs. under the special circumstances. The relative advantages of the condensing and non-condensing engines of the simple, compound, and triple expansion engines, of the steam-jacketing and superheating, are all discussed admirably. Some pages also are devoted to

the utilisation of house refuse as a fuel, and the Halpin system of thermal storage receives some attention.

Some of the most important cases of utilising water power are also discussed. It will surprise many readers to find that even in 1876, 70,000-horse power was generated for manufacturing purposes from waterfalls in Switzerland, and that in the United States in 1880, 36 per cent. of the power used in manufacturing was water power, and only 64 per cent. steam power.

Among the chapters devoted to transmission of power, the most important, as pertaining more especially to the author's experience, are those on hydraulic and compressed air transmission. But in all branches of the subject, not only are the general principles dealt with, but there is to a pretty full extent a recapitulation of what has already been done. The London Hydraulic Power Company is taken as the best example of hydraulic transmission, but Liverpool, Birmingham and Manchester are also referred to, whilst most interesting accounts of the hydraulic supply at Zurich and Geneva are given. The principles of pneumatic distribution are very completely described, and the author has certainly made out the case that when these principles are properly applied, this system of distribution deserves more consideration than is generally accorded to it. Naturally the Paris distribution by this method is dealt with very fully, but other examples of interest are added. With regard to the distribution of power by steam, the most important case is that of New York, which Dr. Emery started in 1881. Eight pages upon gas distribution for power purposes are well worth some study, whether with regard to manufactured gas, or the natural gas supply in Pennsylvania. Whilst compressed air receives the author's attention to the extent of forty-eight pages, electrical distribution is by no means so well favoured; but the author explains that, in the first place, it is not his own speciality, and, in the second place, there are at the present moment few cases of electrical transmission combined with a complete system of distribution in a town. A chapter is at the end devoted to the great work which is now approaching its full development at Niagara Falls.

This short review cannot pretend to give an adequate idea of the contents or value of Prof. Unwin's book. Regarding the merits of the work generally, it is sufficient to say, first, that throughout it is written with the utmost fairness and impartiality; and secondly, that if any engineer were planning a system of transmission and distribution of power in any special case, he would be labouring under very considerable disadvantages if he had not first consulted this latest and most complete work on the development and transmission of power. G. F.

#### OUR BOOK SHELF.

*A Treatise on Hygiene and Public Health.* By Thomas Stevenson, M.D., F.R.C.P., and Shirley F. Murphy. (London: J. and A. Churchill, 1894.)

THIS volume is devoted to the subject of sanitary law, and it well maintains the all-round excellence of the two volumes that preceded it. Health officers will welcome the appearance of such a lucid and comprehensive digest of the law relating to the public health in England and Wales, Ireland and Scotland.

During comparatively recent years an immense amount