

problem of conditioned observations, in which no set of values can be assumed to satisfy approximately the observation equations which does not exactly satisfy some *a priori* conditions. This problem may not necessitate any fresh method of treatment, but the applications are somewhat unusual, and, again, it is of very great importance to know what is done in actual practice. The authors have given us a valuable treatise, prepared with care, and generally free from errors. There is some confusion in the numbering of the figures after p. 193, but this, if annoying, is of less importance than any error in the formulæ.

W. E. P.

#### OUR BOOK SHELF.

*Modern Milling Machines.* By Joseph G. Horner. Pp. ix+304. (London: Crosby Lockwood and Son, 1906.) 12s. 6d. net.

A MODERN machine shop in any large works would be very incomplete indeed without a full complement of milling machines. The proportion of this class of machinery very largely depends upon the class of work dealt with. For instance, in a sewing-machine, cycle, or motor-car factory the milling machine would predominate, being in many specialised forms, each machine designed for some particular function. On the other hand, in a general engineering establishment any milling machines installed would be of the universal type, and capable of dealing with many different operations, such as the universal machines made by Brown and Sharpe, of U.S.A., and many others.

It is only during recent years that milling machinery has come prominently to the front, principally due to the fact that designers of such machines have grasped the fact that they must be made of ample weight with large bearing and wearing surfaces, so as to ensure steady running without spring of the machine and consequent vibration. Another very important consideration is the possibility of obtaining suitable material for the cutters used. The cost of making a milling cutter is infinitely more than the value of the cast steel used. It is evident, therefore, that when once completed the cutter should have a long life. This desideratum has been rendered possible by the introduction of high-speed tool steel, the results obtained being of a most satisfactory nature, particularly those from the "Air-hardened" steel manufactured by Edgar Allen and Co., of Sheffield. The cost of the material, therefore, is a secondary consideration.

In the volume under notice the author describes very fully many different types of machines, and probably one of the best chapters is that dealing with the design and manufacture of the cutters. The power required very largely depends on the design of cutter used, other things being equal; to use a cutter in any degree dull is also poor economy.

Another valuable assistant to the milling machine and its cutters is the introduction of special cutter grinding machines, which, I believe, emanated from the Brown and Sharpe Manufacturing Company. Many of these machines are described and illustrated, the author having gone very fully into the subject. This is as it should be, since a good cutter is of the utmost importance in milling work.

Chapter xi. is too short, though very interesting; it deals with the subject of feeds and speeds. On these constant worries of a machine-shop manager our author has much to say, and sensible advice to give, and we cordially agree with him where he

points out how easy it is to get wonderful results by means of a sharp tool running for short periods by comparison with work done under ordinary shop conditions. Such work, as a rule, does not pay.

We can recommend this volume to all interested in machine-shop practice. The machines dealt with are of the latest type, and much useful information will be found scattered through its pages.

N. J. L.

*Lectures on the Method of Science.* Edited by T. B. Strong, Dean of Christ Church. Pp. viii+249. (Oxford: Clarendon Press, 1906.) Price 7s. 6d. net. THESE lectures formed part of a course on scientific method delivered at the University Extension summer meeting at Oxford last August. The discourses are intended to illustrate the forms taken by scientific method in various departments of research. Prof. Case deals with scientific method as a mental operation; Prof. Francis Gotch, F.R.S., treats of various aspects of the method; Prof. C. S. Sherrington, F.R.S., describes the scope and method of physiology; the lecture by the late Prof. Weldon discusses inheritance in animals and plants; Dr. W. McDougall explains the psychophysical method; Dr. A. H. Fison applies the method to the question of double stars, Sir Richard Temple to the evolution of currency and coinage, Prof. W. M. Flinders Petrie, F.R.S., to archaeological evidence, and the Rev. Dr. Strong to history.

From the nature of the case, the arguments are such as to appeal to persons of general culture rather than to specialists. If Oxford were as energetic in the prosecution of scientific research as she is in popularising knowledge by means of extension lectures, men of science would probably be disposed to think her activities better and more suitably directed. The omission of an index can never be justified in the case of a scientific book, but that a work devoted to scientific method should be deficient in this respect is an irony which cannot be overlooked.

*The Secrets of Dog-Feeding.* By "Great Dane." Pp. ix+58. (Southampton: Toogood and Sons, 1906.)

THE mere fact that this little work has reached its second edition within less than a year of the date of its first appearance may be taken as a sufficient guarantee that it has obtained the verdict of approval from dog-owners, and is therefore a success. The author is of opinion that the nature of the food is a matter of prime importance in the case of valuable, highly-bred dogs, and one which too often receives but insufficient attention on the part of their masters. While advocating a mixed diet, he deprecates the use of green vegetables, which has of late years come much into fashion among many dog-owners; and he adds that to a dog which has been kept largely upon farinaceous food the change to a meat diet in later years will often produce highly satisfactory results. The constituents of nearly all the foods referred to are given, so that readers can judge for themselves as to their nutritious value.

R. L.

*In My Garden.* A Little Summer Book for Nature Lovers. Pp. 72. (Wellingborough: The Lavender Press; London: Philip and Tacey, Ltd., 1906.) Price 1s. net.

THIS dainty little memorandum book, with its blank pages for notes on experiments in gardening and other observations of natural objects, will please all students of country life. The well-selected quotations and the hints on table decoration should appeal to a wide circle of readers.