

MACHINE DESIGN.

The Elements of Machine Design. By Prof. W. Cawthorne Unwin, F.R.S. (London and New York: Longmans, Green, and Co., 1890.)

THIS is the eleventh edition of an excellent and most useful book for engineers and students in the engineering departments in our technical colleges. Prof. Unwin is so well known in the profession that any work of his is sure to receive full attention and careful study; for even in the present day one unfortunately often sees machinery and engineers' tools, the design and construction of which give us cause to wonder how they manage to work at all. The author is one of those Professors whose books are eagerly sought after by practical men for guidance. To say this is to say very much indeed, for engineers have to make their machines "pay" and creditable to themselves; a bad machine tool in a shop is very soon found out by the repairs it requires, and the quality of the work it can produce.

In this, the new edition of the work, the author has found it necessary to divide the book into two parts, the first of which is now before us. It deals principally with the general principles of design, fastenings, and transmissive machinery.

The author, well knowing the conditions of every-day work in the drawing office and shops, has, we are glad to observe, used throughout the standard English units of weight and length. Another good point is that the mathematics used in the calculations are well within the range of the average engineer; at the same time accuracy is obtained in the results, although useless refinements are omitted.

In the chapters on rivetted joints, and the one on journals and the friction of the same in their bearings, the experimental results obtained from experiments inaugurated by the Institution of Mechanical Engineers are fully described and the results tabulated; and they are embodied in the chapters in many useful forms suitable for the guidance of engineers. Under the heading of rivetted joints, it may be interesting to observe that the question of punching *versus* drilling steel or iron plates has solved itself in, at any rate, one first class bridge works in the north, and in this particular works the invariable practice is to drill all the holes throughout the bridge work because it is cheaper, with suitable machinery, to do so. On p. 97 the author does not say whether his remarks apply to boilers as well as other constructions, but to punch an iron boiler-plate is considered bad practice, and a punched steel plate, even if it is annealed afterwards, certainly comes under the same head.

In most of the locomotive works in this country the boilers are drilled, finally, after all the plates are in position, the barrel being fitted to the fire-box casing after each portion has been drilled; and certainly no good locomotive builder would use a punched steel plate in a boiler, even after annealing. One eminent locomotive superintendent, we believe, uses punched steel boiler shell plates; this is probably the only exception in this country, and is generally considered risky and not sound practice. On p. 140 the system of applying the direct stays to the

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crown of locomotive fire-boxes might have been added and illustrated with advantage.

The illustrations are particularly good, and all represent good practice. The thanks of engineers are due to Prof. Unwin for placing within their reach a volume in which theory and practice are judiciously treated to their great advantage. N. J. L.

OUR BOOK SHELF.

Investigation of the Fur-Seal and other Fisheries of Alaska. Report from the Committee on Merchant Marine and Fisheries of the House of Representatives. (Washington: Government Printing Office, 1889.)

THE fisheries of Alaska are among the great questions of the day, and those of our legislators who wish to take part in the inevitable debate on the subject will do well to possess themselves of the present volume, and digest the large amount of information that it contains. As is well known, the fur-seal fisheries of the Northern Pacific, which supply the ladies' jackets so much prized in Europe, are rented by the Alaska Commercial Company, and produce a considerable revenue to the United States. It is therefore a standing grievance among our American friends, that, as shown by the testimony collected in the present Report, the number of seals on the Pribiloff Islands, whence the principal supply is derived, "has materially diminished during the last two or three years." This is attributed to the fact that a large number of British vessels, "manned by expert Indian seal-hunters," have frequented Bering's Sea, and destroyed "hundreds of thousands of fur-seals." It is shown that, of the seals thus killed on the ocean, not more than one in seven is secured, because a wounded seal sinks so quickly. Thus, for every thousand seal-skins realized by the British sealing-vessels, some seven thousand seals are killed. Now, during the three years 1886-88, it appears that the number of what the Americans call "illicit skins" secured by the British traders was over 97,000, so that, if these calculations are correct, it follows that nearly three-quarters of a million of fur-seals were destroyed by British vessels during that period. American citizens, we are told, "have respected the law, and have made no attempt to take the seals."

While we fully sympathize with the Americans in their view that the fur-seal is a most useful animal, and deserves protection by special legislation, it seems to be doubtful whether they have any right, in their praiseworthy efforts in this direction, to turn a large tract of the Northern Pacific into a "*mare clausum*," without obtaining the consent of other nations. But the arguments by which they justify this somewhat strong proceeding are fully set forth in the present volume, and deserve special study. We may also commend Mr. Dunn's Report as containing a large amount of information on the history and habits of *Callorhinus ursinus*, and some excellently drawn illustrations of what the Americans consider to be the only legitimate method of obtaining this animal's skin.

Pond Life: Algae and Allied Forms. By T. Spencer Smithson. (London: Swan Sonnenschein and Co., 1890.)

"THE Young Collector" series, to which this hand-book belongs, deals generally with classes of objects which can be permanently preserved. The present volume describes plants which, as the author says, "are not well adapted for preservation." His task, therefore, has been to give an account of the structure and habits of these plants, and to explain how they may be procured in the best form for observation. He begins with information about