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*TOWERS AND TANKS FOR WATER-SUPPLY.*

*Towers and Tanks for Water-Works. The Theory and Practice of their Design and Construction.* By J. N. Hazlehurst. Pp. ix+216. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1901.) Price 10s. 6d.

THIS book deals exclusively with a special subject relating to water-supply, namely, the design and construction of metal stand-pipes and tanks for storing up water at a sufficient elevation to provide adequate pressure for its proper distribution. An illustration of a stand-pipe, 20 feet in diameter and 120 feet high, at St. Augustine, Florida, is given in the frontispiece; and a view of a high cylindrical tank raised on a tower, or more strictly a trestle, consisting of light metal standards braced together, erected for the water-supply of West Tampa, Florida, is shown opposite p. 116; and these two examples very fairly indicate the structures which form the subject of the volume. These stand-pipes and tanks, besides serving as reservoirs for the storage of an adequate supply of water to meet any sudden increased demand, and admitting of a temporary suspension of the pumping, are also valuable as regulators of the distribution, and as relief-valves for preventing the occurrence of undue stresses in the pipes in the process of pumping.

A considerable number of municipal water-works in the United States have been furnished with some form of metallic reservoirs, especially within recent years, in places where there is not a suitable site at a sufficient elevation for the construction of an ordinary reservoir of earth or masonry. Thus, out of more than three thousand complete municipal water-works in the United States, nine hundred and ninety-two have been equipped with elevated metallic reservoirs, five hundred and thirty-five of which have been erected since 1890. These structures exhibit great variety in their dimensions; for the largest tank in the United States, erected at Greenwich, Connecticut, in 1889, is made of wrought iron, 80 feet in diameter and 35 feet high, having a capacity of nearly 1,320,000 gallons, and rests on a concrete foundation; whilst a steel stand-pipe erected at Winona, Minnesota, in 1876, has a diameter of only 4 feet, and a height of 210 feet, with a capacity of 20,000 gallons, and rests upon a masonry foundation 18 feet thick.

Stand-pipes are by far the most common form of metallic reservoirs adopted in the United States, exceeding eight hundred in number; but steel tanks supported at the requisite height on steel trestles are now very often preferred, as a cheaper and safer way of supporting the effective upper column of water, 20 to 30 feet high, than by a column of water below enclosed in a cylinder; and already one hundred and sixty-one such tanks have been erected, most of them since 1890. The stand-pipes vary, for the most part, from 50 to 120 feet in height and from 11 to 39 feet in diameter, being exposed to maximum pressures of 82 to 130 lbs.; whilst their average dimensions and pressures are, 63 feet height, 20 feet diameter, with a capacity of 150,000 gallons, an ordinary pressure in the distributing pipes of 62 lbs. per square inch, and

an emergency pressure of 104 lbs. The tanks, on the average, have a height of 37 feet, a diameter of 21½ feet, a capacity of 101,000 gallons, and an elevation on a trestle, or tower, of 63½ feet. To obtain the average pressure of 62 lbs., the effective height of the stand-pipe or tank would require to be 142 feet; but generally advantage can be taken of some natural elevation in the neighbourhood to reduce the actual height of the stand-pipe or tank. A chapter is devoted to the design of each of these structures, dealing also, in the case of stand-pipes with the bed-plate, connections, stiffener at the top against wind, and anchorage, and in the chapter on tanks, with wind-bracing and anchorage.

The author, however, leads up to the subject of design by five preliminary general chapters, on the chemical and physical properties of wrought iron and steel, the relative merits of these metals, the stability of structures, mechanical principles, and riveting; and after the two chapters on designing, he proceeds to deal, in three successive chapters, with foundations, painting, and shop-practice and erection. Accordingly, the book embraces a wider range of subjects than might be anticipated from its title; and by a very comprehensive treatment, a complete guide is provided for the design and construction of a special class of structures, of limited application, which have not hitherto received adequate consideration.

*ELEMENTARY ZOOLOGY.*

*Animal Life: a First Book of Zoölogy.* By President D. Starr Jordan, Ph.D., LL.D., and Prof. V. L. Kellogg, M.S. of Leland Stanford Junior University. Pp. ix+329. (London: H. Kimpton, 1901.)

THIS volume is one of the twentieth century text-book series, and adds another to the rapidly growing stock of elementary science manuals. It contains more than 300 pages, with 180 text figures, and its only novelty is the method of treatment, the authors combining the most elementary detail with the most abstruse ideas set forth in simple language. The reason of this is their conviction that "the veriest beginner ought to be an independent observer and thinker," and that "the point of view which the zoölogical beginner should take is the point of view that the best and most enlightened zoölogical scholar takes."

There are sixteen chapters to the book, with a brief classification and a glossary. The lives of the simple and the more complex organisms are first dealt with, then come chapters on multiplication and sex, on function and structure, on the life cycle, and so on. The struggle for existence, adaptation, commensalism and symbiosis, parasitism, protective resemblance, and other topics are all in turn considered, and the whole closes with a chapter on distribution.

There are incorporated in the book a selection of the elementary facts and the commonplaceisms of the modern fantasies of zoology. Both are reasonably dealt with, but we find nothing for very especial comment. Novelty mainly attaches to some of the illustrations; for example, the frontispiece—a photograph of a group of red-faced cormorants—a companion plate of a family of fur seals, a striking picture of the angler fish (*Corynolophus*) enticing its prey (not lighting up the sea-bottom