

successes, especially on work painted at the shops before shipment. The causes for the irregular and indifferent results are not difficult to ascertain. They are the improper application of the paint to dirty, greasy, moist or chilled, rusty or mill-scaled surfaces. No marked improvement in these uncertain results can be had until the same importance is attached to the 'paint question,' not only on paper, but in the actual supervision of the painting in all of its stages, as is given to the minutest construction details."

With regard to the coating to be applied to the metal after cleaning, it appears probable that not only red lead, but several of the graphite and red-oxide-of-iron paints, and perhaps certain enamel-like coatings, will give satisfactory protection.

10,000,000-GAL. RESERVOIR AT DAYTON

IN the year 1917-18, a covered masonry reservoir of 10 million gallons capacity was built for the water department of the city of Dayton, Ohio, to equalize the hourly fluctuations in water demand, to facilitate the making of minor repairs at the pumping station, and to provide fire service storage capacity corresponding to the 1916 standard of the National Board of Fire Underwriters. This reservoir was described by Leonard Metcalf and William T. Barnes, both of the firm of Metcalf and Eddy, of Boston, Mass., in a paper read last week at the convention of the New England Water Works Association. Following is Messrs. Metcalf and Barnes' summary of the points covered by their paper:—

The variation in rate of pumping at the main pumping station, to meet the demands of domestic, commercial and industrial water service, was from about 6 million to 35 million U.S. gallons per day. The storage required to equalize the hourly variations was approximately 3 million gallons, or 25% of the average daily water consumption.

The fire supply storage capacity required by the National Board of Fire Underwriters (1916 standard), corresponding to a ten-hour flow at maximum fire demand, was approximately 7 million gallons.

The sum of these two amounts (3 million and 7 million gallons) determined the capacity of the structure, which was reduced to the minimum on account of the difficulty and high cost of construction during war times.

The reservoir was built of concrete with walls of gravity section; inverted groined arch floor with 8-in. crown thickness; and 26-in. reinforced cylindrical concrete columns varying in length from about 20 ft. to 26 ft., supporting a flat-slab concrete roof 8½ ins. thick, reinforced with corrugated bars on the two-way system.

The original design prepared by the engineers for this work contemplated the construction of a groined arch floor and roof type of structure, with lighter walls than those finally used. This design was modified, however, on account of war conditions which made it impossible to secure outside bids and on account of the fact that the local bidders were more familiar with and better equipped to build the flat-slab roof construction and were therefore ready to submit relatively lower figures upon this type of construction than upon the groined arch structure. The unusual saving in cost here found justified the acceptance of a type of structure believed to have a somewhat smaller factor of safety and shorter life.

The total cost of the work to the contractor, excluding profit but including the cost of the materials furnished to him by the city, was \$126,805, equivalent to \$14.50 per cu. yd. of concrete, \$12,680 per million gallons of net storage capacity, \$2.08 per sq. ft. of net water surface, and \$90,600 per acre of net water surface (the water surface being approximately 60,917 sq. ft., or 1.4 acres, and its depth averaging approximately 23.2 ft.).

The total cost to the city, including the land and engineering was approximately \$153,041, equivalent to \$17.50 per cu. yd. of concrete, \$15,300 per million gallons of net water capacity, \$2.51 per sq. ft. of water surface, and \$109,300 per acre of water surface.

The character of the finished work was excellent, the concrete being dense and reasonably smooth.

The leakage of the finished structure was found to be 2½ ins. vertically, or 88,000 gals. per day; and three months after putting the reservoir into service, 1¼ ins. vertically, or 48,000 gals. per day.

RECENT PUBLICATIONS

LIFE SAVING STATIONS.—An interesting folder calling attention to the fact that typhoid fever and similar intestinal diseases are caused by pollution of water supplies and that sterilization plants are really life saving stations, located not at the seaside but on reservoirs, streams and pipe lines. Issued by the Wallace & Tiernan Co., Inc., 349 Broadway, New York City.

WEBER CHIMNEYS.—Catalogue, 56 pages and cover, 5 by 9 ins., illustrating and describing reinforced concrete chimneys, including a number in Canada. The frontispiece is a photograph of what is claimed to be the highest chimney in the world, designed and erected by the company at Saganezaki, Japan; height 570 ft.; inside diameter at the top, 26 ft. 3 ins.

YARHOLA OIL PIPE LINES.—Description of the oil pipe lines of the Yarhola Pipe Line Co. extending from near Healdton, Oklahoma, to the Wood River Refinery, near St. Louis, Mo. This line is the property of the Roxana Petroleum Co., one of the producing companies of the Royal Dutch-Shell Co. The pipe line was designed and built by Sander-son & Porter, consulting and contracting engineers, New York, who are the publishers of the pamphlet. Illustrated; 18 pages and cover; 8½ by 11 ins.

JEFFREY STRAIGHT FLO VENTILATORS.—Bulletin No. 270 of the Jeffrey Manufacturing Co., Montreal, P.Q., and Columbus, Ohio; 8 pages, 7½ by 10½ ins.; printed in two colors on coated paper, illustrated. This type of fan is equipped with a central disc about half the diameter of the wheel, on

which is mounted blades designed so that the expulsion of the air will be the same at all points. It is used for drying, or boosting purposes and also for removal of dust, heat and smoke from factories and other buildings.

ST. LAWRENCE RIVER POWER Co.—Interim order of the International Joint Commission in the matter of the application of the St. Lawrence River Power Co. for the approval of the construction and maintenance of a submerged weir in the south channel of the St. Lawrence river near the mouth of its power canal at Massena, N.Y.; 302 pages, folded maps and cover; 6 by 9 ins. The appendix comprises the larger portion of the book, presenting the detailed stenographic report of the evidence taken at the hearings.

HYDRAULIC TURBINE INSTALLATIONS.—New catalogue issued by the S. Morgan Smith Co., York, Pa., and Montreal, P.Q.; 64 pages and cover, 8½ by 11 ins., printed on coated paper in two colors and profusely illustrated. A number of views are shown of the company's various shops and foundries. A brief reference to the importance of runner and case design, and an explanation of type characteristic, together with efficiency contour charts, add to the reference value of the catalogue. The company's governor and pressure regulator are described, also the Gibbs oil thrust bearing, while the construction and erection of hydraulic turbines is described in considerable detail, illustrated by line drawings and half-tone views of numerous installations in Canada and the United States. The half-tones are beautifully printed and are typical of modern hydro-electric developments.