

the Ohio River at the Ironton plant during August, 1923, averaged 22,000 B. Coli per 100 cc. It has been necessary, then, for each step in the water purification process to be operated at a maximum degree of efficiency and most especially that of filtration. It is the writer's opinion that the most important factor in obtaining a high degree of filtration efficiency is the proper preparation of the water for filtration. A limited amount of well-formed floc in the influent water to the filters is essential. Secondly, the size of the sand must be fine enough and of uniformity enough to intercept and retain suspended flocculated material as well as to furnish the medium for proper film development.

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Author Answers Points in Discussion

BY JOHN R. BAYLIS

IT WAS not intended that the conclusions set forth in the study of filter beds at Baltimore should be applied elsewhere without first checking up on local conditions. The fact that a vast number of filter beds throughout the United States form clogged places forces us to admit that we have a problem. Observations at other places having variable characters of water leads to the belief that alkalinity, turbidity and properly coagulated water are not the controlling factors, though they may have some influence. Evidence seems to prove conclusively that no rate of wash that may be applied under the beds will prevent clogging in many plants. An additional force is necessary to maintain such filter beds in good order, whether it be in the form of air, rakes, water jets or other means. It is believed that water jets will prove the more economical in many instances. Any device that merely corrects a bad condition, only to let the beds become bad again before correcting, is a makeshift that should not be tolerated. Whatever be the force necessary to keep beds in good condition, it should be applied. Attention to a satisfactory washing adjunct is almost as essential as it is to apply the necessary chemicals for proper treatment.

The statement that the top 16 to 18 in. of sand should be of uniform size was not intended to imply that this should be the total depth of sand in the bed; 6 to 10 in. of fairly coarse sand from 1.5 to 2.0 mm. below the filtering sand is very desirable. The coarse sand will aid in breaking up clogged masses that might escape the surface wash. The purpose of surface wash is not to break up clogged masses that have settled to the gravel layer, but to prevent them from forming. It is probably cheaper to break up the clogged places already formed by other means. Later experiments with chlorine tend to confirm the fact that it cannot be relied upon to prevent clogging under our conditions, although it probably offers some aid.

The idea of omitting the underdrains is Mr. Armstrong's, and full credit should go to him. It might be interesting to note that two years' operation of such a filter in our plant has shown that its condition is as good as that of the other filters.

The burden of proof that colloidal adsorption is responsible for shrinkage rests with its advocates. The pulling away of the sand from any vertical surface occurred only when filtering and when there was settlement.

It is not expected that there will be general agreement on sand sizes. Sand having an effective size of 0.6 mm. will filter properly coagulated water to a colloidal turbidity of 0.2 p.p.m., and a floc turbidity of 0.02 p.p.m., which is the desired standard for well operated plants. Unless there is bacterial action taking place in the filter beds, the bacterial removal is largely in proportion to the colloidal turbidity of the filter effluent. If the larger size offers aid in preventing cracks, it is the better size to use.

Bill Restricts Use of Wooden Passenger Cars

Use of wooden passenger cars between or in front of a steel or a steel-underframe car is prohibited in a bill which has been reported favorably by the Senate Committee on Interstate Commerce. Penalties are provided for violations of the proposed law. The legislation is based on an urgent recommendation from the Interstate Commerce Commission.

Towers of First Suspension Bridge Over Hudson River Completed

Erection of 350-Ft. Steel Towers for Highway Bridge Accomplished—Approaches and Anchorage Tunnels Under Way

DURING February the erection of the towers for the suspension bridge across the Hudson River at the lower edge of the Highlands, which is being built for the Bear Mountain-Hudson River Bridge Corporation, was completed, and riveting is now nearly completed. Work on the cables will begin this spring, and it is hoped that erection may be completed by the end of the year.

Erection of the steel towers was done by methods and equipment much like those used some years ago on the Manhattan bridge across the East River at New York. A creeper traveler carrying a stiffleg derrick of 50 tons capacity was erected on the river side of the tower, and as the successive sections of the main columns were set the creeper was pulled up by a special hoisting engine to a new position from which the next sections of the tower could be set. Each post consisted of three pieces above the bottom section, which consisted of seven pieces. The heaviest erection piece was 55 ft. long and weighed 50 tons. The posts of these towers are battered inward toward the top; the suspension and fastenings of the traveler were therefore designed to suit the different widths between posts at the successive settings.

For the cable erection a foot bridge or working platform will be erected just under the two main cables. The girders for anchoring the foot-bridge cables are now being placed in the anchorage pits.

It is only two years since the conception of the project for the bridge, although the first charter for a bridge at this site was obtained in 1868 and many attempts to undertake construction were made subsequently. The present charter was obtained less than two years ago; after securing permits and completing the financial arrangements, a contract for construction was signed on March 24, 1923, and work was immediately begun.

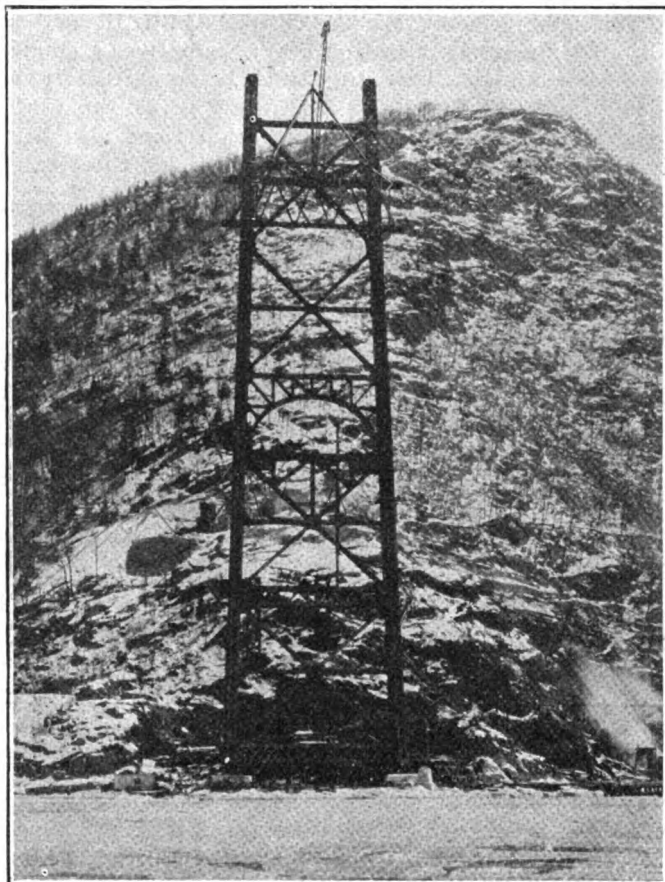
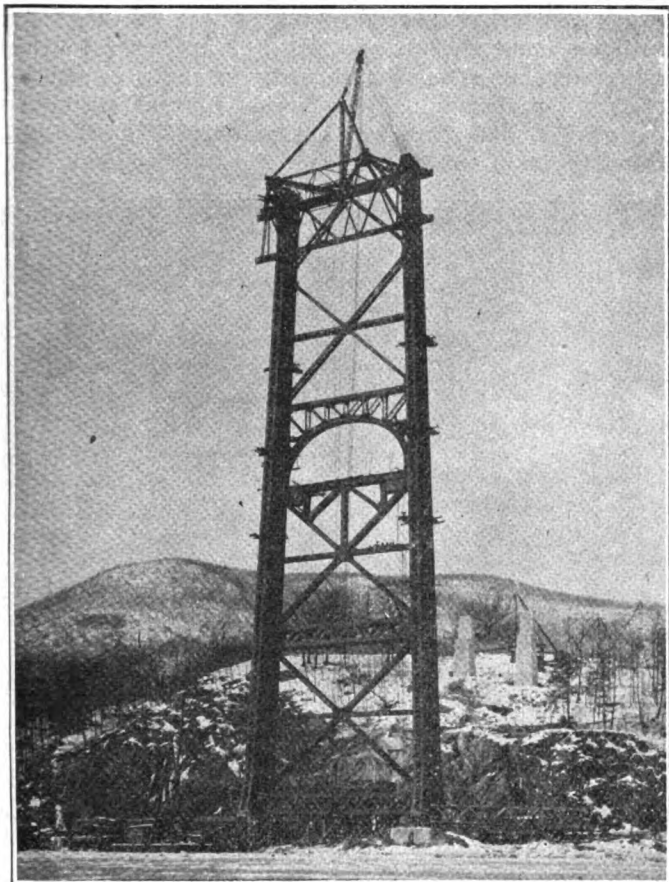
The bridge will be a suspension bridge with straight (unloaded) backstays, of 1,632-ft. main span and with a clearance at high tide of 155 ft. It is to carry a reinforced-concrete roadway 38 ft. wide and two 5-ft. sidewalks. The west approach consists of two 50-ft. spans, one 100-ft. span, and one 220-ft. span, while the east approach consists of a single 220-ft. span. The main towers are 350 ft. high and rest on concrete piers carried on rock near water level. The two main cables will be 18 in. in diameter each. The anchor pits are inclined tunnels, those on the west bank about 110 ft. deep and those on the east bank about 90 ft. deep. The cast-steel bases to which the anchorage eyebars will be fastened are now being set in these tunnels. The cables carrying the suspended structure will be woven in place and will consist each of 7,452 parallel wires of 0.192 in. diameter. The stiffening trusses will be 30 ft. deep and spaced 55 ft. apart; they will be placed below the roadway, so that a clear view up and down the river will be obtained from the floor of the bridge. A horizontal truss under the bottom chord will act as wind-bracing. The transverse struts of this truss extend outside the chord and the suspender ropes from the cables are connected to them.

A large amount of highway work is required in constructing approaches to the bridge. On the east side a road is being built about 3 miles long from the end of the bridge to a connection with the present main road at a point near the state military camp at Peekskill. This is very difficult work, being side-hill construction through granite and for a long distance being immediately over the main-line tracks of the New York Central R.R. The west approach road will be only about 800 ft. long extending to the Henry Hudson Highway.

E. Roland Harriman is president of the bridge company and Wilson Fitch Smith is chief engineer. How-

Defect in Illinois Drainage Law

THE 1923 Illinois legislature amended the Drainage Act to provide that no bonds could be issued without submitting the bond issue to a vote of the District and that the rate of taxation for all purposes, exclusive of bonds and interest, should not exceed 0.66 per cent. Prior to the amendment the rate for all purposes exclusive of bonds and interest was 1.33 per cent, or in other words the rate was reduced 50 per cent. In the extension of 1923 taxes for the East Side Levee and Sanitary District, East St. Louis, the county clerk of St.



WEST (BEAR MOUNTAIN) TOWER AND EAST (ANTHONY'S NOSE) TOWER OF HIGHWAY BRIDGE ACROSS THE HUDSON

ard C. Baird, consulting engineer, is responsible for the design of the bridge. J. V. W. Reynders is in charge of construction for the contractors, the Terry & Tench Co., Inc., who obtained the charter and have the contract for the whole work.

New Type of Fishway

A possible means of overcoming the objection of the fish industry on the Pacific Coast to the construction of dams on such streams as the Columbia, and the Sacramento and the Klamath Rivers and the rivers on the west coast of Alaska, is expected to be found in a type of fishway recently developed in California. Heretofore the Bureau of Fisheries has taken the position that fish will not cross a dam over 30 ft. in height regardless of what may be provided to facilitate their passage, but the recent experiments with a fishway providing a series of resting pools has demonstrated that fish will climb to this or greater heights.

Clair county felt that he must abide by this amendment and refused to extend a rate more than 0.66 per cent.

Attorneys for the District contended that the amendment was not legally passed in the legislature and in a mandamus proceeding in the Circuit Court to compel the county clerk to extend the taxes on the law prior to its purported amendment in 1923, the Circuit Court held that the act had not legally passed. Taxes were therefore extended by the county clerk based on the law in effect in 1923. The basis of the court's decision was that the Senate, in receding from an amendment in which the House had refused to concur, had voted without a legal majority being present.

While the law in question is general in its terms, the East Side District is the only one now operating under its provisions. The principal differences between this law and the Levee Act are: (1) It contains a provision allowing the organization of districts including territory in more than one county; (2) the manner of taxation is changed from a benefits assessment on property to a general tax on all classes of property.

Edward F. Terry

Edward F. Terry, whose associates termed him one of the most successful construction engineers in America, and whose death was noted in these columns last week, began life on a New England farm. He was born near Concord, New Hampshire, in 1857. Both of his parents died while he was very young, and he was sent to live with an uncle in Wisconsin. As a boy, the railroad and everything that pertained to its building and operation interested him and he spent most of his spare time with the workmen along the tracks.



Michael Riney, an old time bridge builder, took a liking to the young man and offered him a job as a riveter. That was before the days of electric tools and the job of riveting was arduous, but young Terry was a physical giant and thrived on hard work. Later Riney was badly hurt in Rochester, N. Y., while working on a viaduct for the Rochester Bridge Works. Terry was put in charge of the work in his place. He finished the job satisfactorily and his real career as a leader in steel construction then began.

Mr. Terry directed construction work shortly afterwards for the Youngstown Bridge Co., and built the steel arch bridge at St. Paul, Minnesota. Altogether he bridged the Mississippi River five times as well as erecting spans over the Missouri and other rivers in the middle west. Later he did much construction work on the Union Pacific R.R. in Idaho and Oregon under George H. Pegram.

Mr. Terry formed a partnership with Frederick Tench, under the firm name of Terry and Tench Construction Co., in 1895, their first contract being the erection of the New York Central four-track drawbridge over the Harlem river, the first of its kind. Since then they have built many bridges and elevated railroads. Mr. Terry had personal charge of the third tracking of the 2nd, 3rd, and 9th Avenue Elevated roads in New York. He also directed the erection of the Manhattan Bridge. The Boston Elevated R.R., Grand Central Terminal, Biltmore Hotel and other big steel construction contracts were handled by his firm. Three of the city of New York's piers at Stapleton, S. I., were built under his firm's direction.

During the war Mr. Terry formed the Terry Shipbuilding Corporation at Savannah, Ga.

Engineers Address New England Health Institute

A half dozen engineers and chemists were included on the "faculty" of more than eighty members that addressed the New England Health Institute at Boston during the week of May 5 to 10. The institute was held under the joint auspices of the U. S. Public Health Service, the various state health departments of New England, the Yale and Harvard schools of public health,

the departments of biology and public health of the Massachusetts Institute of Technology and Simmons College, with Dr. Eugene R. Kelly, State Commissioner of Health of Massachusetts, as director. Thirteen "courses" were offered, including public health administration, sanitation and engineering, and industrial hygiene. The chairman of the section on sanitation and engineering was I. V. Hitchcock, assistant professor of public health at Yale University.

Papers on engineering and related subjects included: "Sanitation of Swimming Pools and Other Bathing Places," Stephen DeM. Gage, Providence; "Private Water Supplies and Their Dangers," C. P. Moat, Burlington, Vt.; "Sewage Disposal and Drainage," Prof. George C. Whipple of Harvard University; "Garbage Collection and Disposal," M. N. Baker, New York City; "Some Unsolved Problems of Public Health," Prof. C-E. A. Winslow, Yale University; "Stream Pollution by Industrial Waste and Its Control," J. Frederick Jackson, Hartford; "Water Supplies and Their Protection," X. H. Goodnough, Boston.

Engineering Societies

Calendar

Annual Meetings

AMERICAN WATER WORKS ASSOCIATION, New York City; Annual Convention, New York City, May 19-24, 1924.

AMERICAN ASSOCIATION OF ENGINEERS, Chicago, Ill.; Annual Meeting, San Francisco, Calif., June 11-13, 1924.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; Annual Convention, June 18-20, Pasadena, Calif.

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia, Pa.; Annual Meeting, Atlantic City, N. J., June 23-28, 1924.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION, University of Pittsburgh; Annual Meeting, Boulder, Colo., June 25-28.

AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS, St. Petersburg, Fla.; Annual Convention, Boston, Mass., Sept. 29-Oct. 3, 1924.

The New England Water-Works Association will hold its annual convention Sept. 23 to 26 inclusive at Rochester, N. Y. Headquarters will be at the Powers Hotel.

Personal Notes

MUSSON & GALE, engineers and accountants, Oklahoma City, Okla., announce that by reason of increase in their business they have separated their civil work into a department at the head of which is Colonel Frank B. King, consulting engineer, who has been president of the Oklahoma City

chapter of the American Association of Engineers and of the Oklahoma Society of Engineers, who served as lieutenant-colonel and colonel of engineers in France, and who has practiced civil engineering in Oklahoma for twenty years.

RAY E. BEHRENS, formerly county engineer of Waukesha County, Wis., has been appointed assistant civil engineer in Milwaukee County, for service in the department of regional planning and zoning.

WALTER C. BENEDICT has resigned as district engineer of the Buffalo district of the Empire Engineering Co., Inc., to become president of the Twin City Construction Corp. of North Tonawanda, N. Y. Associated with Mr. Benedict in the company are Fred. W. Ives, former president of the New York State Builders Supply Association, and William E. O'Reilly, formerly of the firm of Bewley & O'Reilly, Inc., contractors of Lockport, N. Y.

GEORGE F. WIEGHARDT, formerly highway engineer for the city of Baltimore and for some time engaged in engineering work in Reading, Pa., has been appointed business manager for the Baltimore public schools. Before he was made highway engineer Mr. Wiegardt was assistant engineer in the water department of Baltimore.

WILLIAM C. RUDD has established an office as consulting engineer at 307 Hazen Bldg., Main and 9th Sts., Cincinnati, Ohio, for special practice in steam engineering and combustion for water-works, power plants, heating plants and for industries. Mr. Rudd has been in similar work for twelve years, for the past year associated with George W. Hubley, consulting engineer of Louisville, Ky., and for the six preceding years engineer of water service for the Louisville & Nashville Railroad Co.

THE DOCK & TERMINAL ENGINEERING Co. has acquired the engineering business formerly conducted by the Cleveland Dock Engineering Co. and will continue with Cleveland office at 4614 Prospect Ave. and New York City office at 15 Park Row, and with the following personnel: Gaylord W. Feaga, president; Joseph S. Ruble, vice-president; James D. Carey, secretary; Edgar B. Thomas, chief engineer; and Wilbur J. Watson, consulting engineer.

THOMAS W. SASSCER has been promoted to be assistant construction engineer in the highways department of the city of Baltimore, Md. Frank A. Lucas, Ferdinand S. Schmiedecke, Edward W. Boyce, Harry J. Lummis, Jr., and Rudolph F. Zerner have been appointed assistant topographical engineers in the city surveyor's department, and John B. McCrone, Jr., an engineering aid in the same department. Leon Small, for several years assistant engineer in the water department, has been appointed mechanical engineer in that department.

M. J. STINCHFIELD, JR., assistant state engineer for the Indiana Conservation Department for the past three years, has resigned to take charge of the engineering staff of the Walb Construction Co., LaGrange, Ind., and will