membership guarantees to them the qualifications they wish to secure.

The standing of the Society among engineers is improving. This is shown by the large increase in the number of applications, and the steadily increasing membership.

Owing to the incoherence of the profession, it has no established code of ethics, and the influence of the Society should be exerted in this direction. The necessity of a code is not so apparent among civil engineers as elsewhere, for the reason that it is in the nature of the profession to abhor all that tends to fraud or quackery. Still, a code must exist, even if it is an unwritten one, and the diversity of professional employment is such that nice questions may arise between engineers, or between them and their employers or clients, which may lead them into error. The Society is perhaps not in a position to formulate and recommend such a code, and yet it can do much to establish the right relations between its members. It can, through the influence of its members, exercise a wise restraint on unprofessional tactics. Members acting in their individual capacity may create a sentiment in the profession and among employers for equitable remuneration of the engineer's services. Engineers in administrative positions may stand for fair salaries and professional consideration for those in subordinate positions. Consulting engineers may educate their clients to a reasonable knowledge of the value of advice, and, by their conduct, may exhibit the distinction between such as are entitled to be termed consulting engineers and those who assume the title without the knowledge and experience to qualify them for it. One of the weak spots in the profession is the lack of a standard of capacity. It should be the case that an engineer's rating of competency is established by the opinions of his fellow engineers, whose duty it is to recognize his merits and class him accordingly. For this reason, engineers should seek to enlarge their acquaintance in the profession, and should desire the honor and responsibility of membership in the Society.

This address may be subject to the criticism that it relates to the American Society of Civil Engineers, rather than to the status of the engineer's profession. The reply to such a criticism is to admit it to be just, and to explain that the subjects are inseparable, and that the status of the profession depends more upon the status of the Society than upon any other factor.

THE PROTECTION OF STEEL BY CONCRETE was shown by some small iron bolts recently removed from blocks of concrete in which they had been imbedded for about 13 years. They were used to hold the rails of a railway on the foreshore on the English coast and were alternately covered and exposed as the tide rose and receded. They were 6½ in. long, 11/16 in. in diameter, and the head end was imbedded to a depth of 4 in., leaving 2½ in. of the nut end exposed. The particular bolt examined, according to "The Engineer," London, showed that the head and about 1 in. of the shank were absolutely unrusted and retained the original black scale. The shank then tapered from the unrusted part to the surface of the concrete, at which point it was reduced to less than ½ in. in diameter. There was an abrupt increase in diameter then to that of the projecting portion of the bolt, which had decreased to 9/16 in. The nut was reduced to a smooth knob and the projecting portions showed that they had suffered from the grinding action of sand and gravel. The examination indicated that the rust had spread from the surface of the concrete, and it is believed that the hole acted as a retainer of the salt water, keeping the bolt constantly wet, whereas the exposed part of the bolt dried quickly when the tide receded.

THE FRANKLIN & CLEARFIELD RAILROAD.

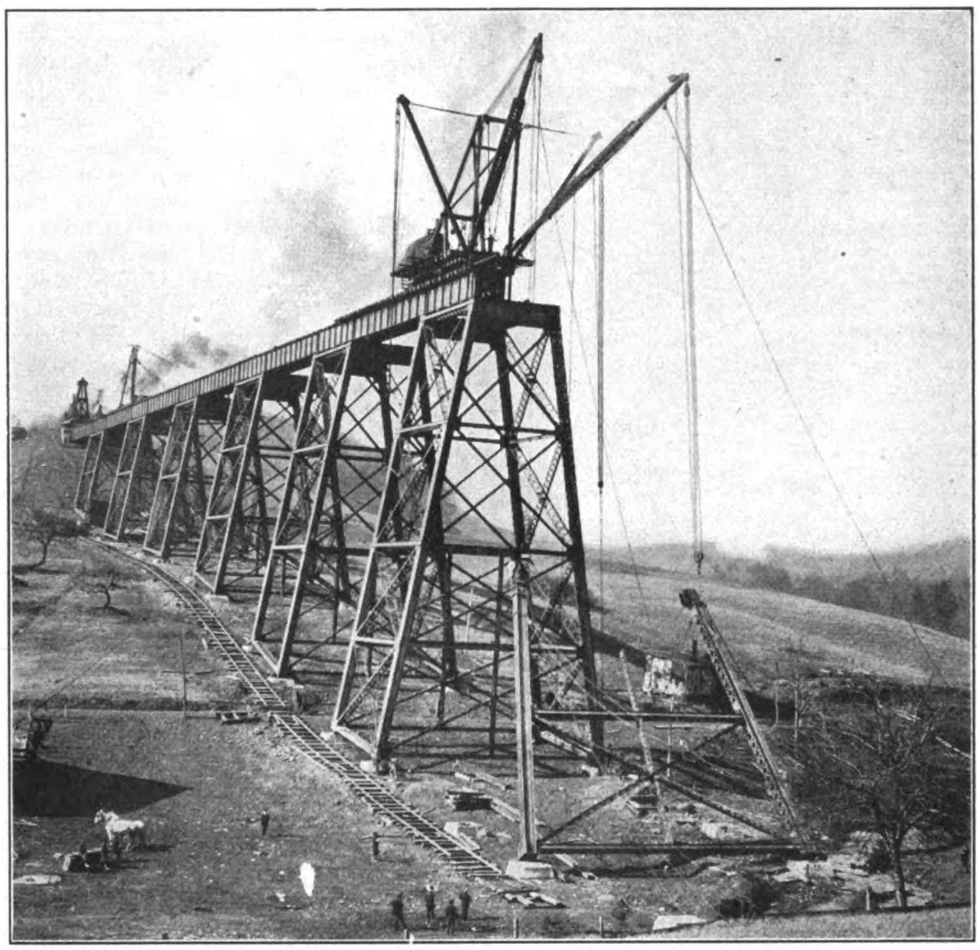
The Franklin & Clearfield Railroad, which has been under construction during the past four years, extends easterly from Franklin, Pa., for a distance of 60 miles, to Brookville, through Venango, Clarion, and a portion of Jefferson counties; this territory is in the Allegheny Mountain region, and hence the construction is very heavy and difficult. The greater portion of the roadbed is graded double track, and over 6,000,000 cu. yd. of grading have been required. There are 55 steel bridges, which required 15,000 tons of steel in their construction. These bridges were all built of a capacity about equal to Cooper's E 60 loading. The construction required 162,000 yd. of concrete and 15,000 yd. of stone masonry.

The 90-ft. spans, of which there are 26, are very heavy, each girder weighing about 33 tons. These girders were all placed by the American Bridge Company with a 35-ton derrick car. The several large viaducts, the largest of which is 1,200 ft. long and 135 ft. in greatest depth, were also erected by the American Bridge Company. These larger bridges are all double-track structures. The viaducts of no greater depth than about 50 ft. were erected with the 35-ton derrick car. Those of greater depth were erected by this same derrick car, with the assistance of a 2-boom traveler.

In the erection of Welch Run Viaduct, which is 135 ft. deep and 1,200 ft. long, the traveler operated from the end of the track, picking up all material from the valley below, the derrick car bringing material from the material yard out onto the bridge, and letting it down into the valley below, where it was run to a point under the traveler on a track laid in the valley.

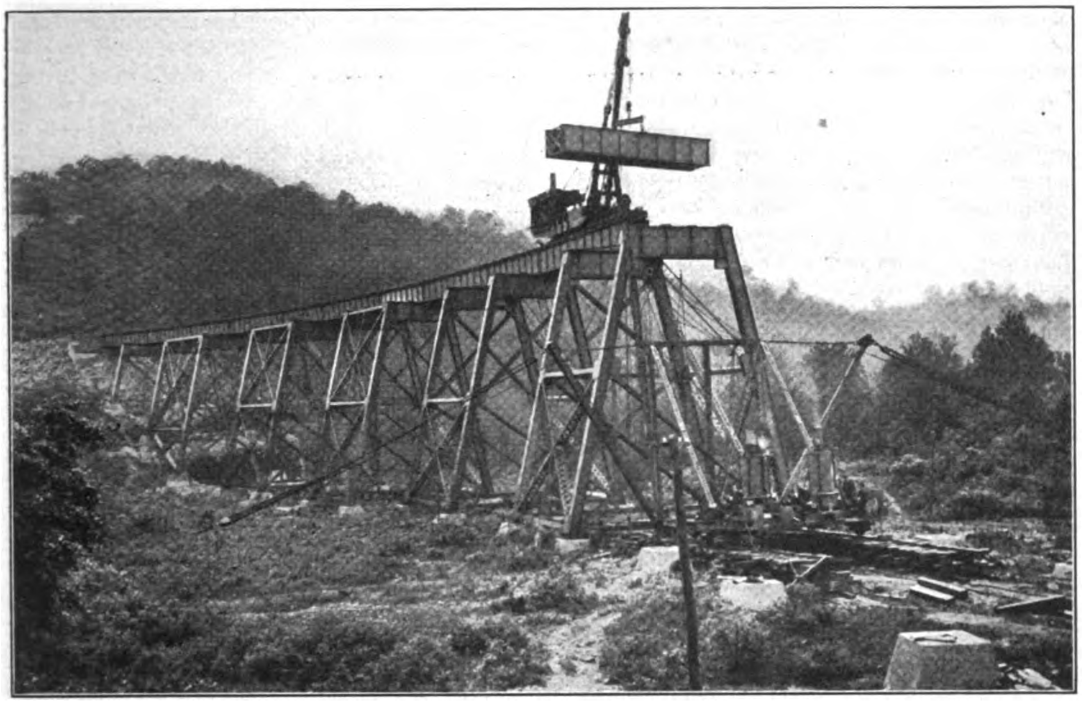
Coder Run Viaduct, which is 880 ft. long and about 90 ft. high, and which is on a 5½-deg. curve, was erected with the same outfit as that used at Welch Run, but with the difference that the traveler was placed on the ground, and backed up between pedestals as the construction advanced. The derrick car operated on the track above, and brought all material from the yard to the end of the track on the bridge. All tower material was let down to the traveler below, where the posts and bracing were placed by the traveler, the derrick car meanwhile proceeding to get out the material, and at the proper time placed all the girders in position; by this method absolute safety from overturning of the traveler, on account of the sharp curvature, was procured. The girders for one track only are being placed at present. This made it impracticable for a traveler to stand on the north track above and reach out far enough to place the south posts of the towers. Also the traveler and derrick car were in a position to work independently, and exceptionally rapid progress was made in the erection of this bridge.

All bridge erection was carried right along with the track. All concrete substructure work was done along with the grading, cement being hauled in with teams, and the crushed stone procured wherever required by crushing up the fine-grain sandstone boulders which cover the ground through this territory. The sand was also procured by crushing up this sand rock with rollers.



Erecting the Welch Run Viaduct, Franklin & Clearfield Railroad.

Two bridges, the Allegheny River bridge, 1,362 ft. long and weighing 3,800 tons, and the Clarion River bridge, 835 ft. long and weighing 3,100 tons, were erected by the King Bridge Company, of Cleveland. The channel span of the Allegheny River bridge is the only through span on the line; all other bridges being deck structures. There was nothing unusual in the erection of these two bridges, with the exception of the channel span of the Clarion River bridge. This is a deck Pratt span, 275 ft. in length. The bed of the Clarion River is 150 ft. below the track. This river is subject to a sudden rise of water and ice jams in cold weather, and in warm weather is navigated by lumber rafts. For these reasons false work was impracticable and impossible. The method adopted by the King Bridge Company was to erect the 200-ft. shore span at the end of the track, and then, by means of a barge, the material for the 200-ft. shore span on the opposite side of the river was transported, and this span was erected. False compression and tension members were then put in place, and the channel span was erected from both sides of the river as a cantilever, with the aid of large wedges and screws, with which the cantilever ends were kept slightly elevated until they met in the middle, and were then let down in place by the screws and wedges, and the false members were removed. This plan was carried out very successfully, and when the two cantilever arms met at the center no difficulty was experienced in fitting the two ends of the bridge together and then completing the erection.



Placing a 43-Foot Tower Span, Coder Run Viaduct.

The grading for this construction work was done principally by about twenty steam shovels, most of which were of 60 and 70 tons capacity.

The classification ran about 20 per cent earth, 30 per cent loose rock and 50 per cent solid rock.

The track is now laid with 80-lb. steel, and fully ballasted with granulated slag, there being 1 ft. of ballast under the ties. All curves are fully tie-plated.

The heaviest grades are 0.7 per cent compensated for curves, and the heaviest curves are 6 deg. The roadbed throughout is well protected from water by surface ditches above all cuts and deep side ditches. Three double-track tunnels of a total length of 4,900 ft. were found necessary. These tunnels are lined throughout with concrete side walls and brick arch overhead. They are fully tiled, and the tracks are ballasted with brushed limestone. The effort to make the tunnel roof waterproof was very successful, and the tunnels are practically dry throughout. The waterproofing was done by applying a 1-inch coat of neat cement over the brick arch, over which was placed from three to six layers of 2-ply Diamond tar paper, which paper was given additional coats of straight run coal tar pitch.

This construction work has been carried on under the direction of Mr. Samuel Rockwell, chief engineer, assisted by Mr. H. M. North, engineer of construction, and Mr. F. H. Walker, first assistant engineer, in charge. During the early part of the construction of this work, Mr. F. E. Bissell served as engineer of construction, and Mr. L. W. Tucker as first assistant engineer.

THE SECOND PAIR OF HUDSON RIVER TUNNELS belonging to the Hudson & Manhattan Railroad are to be placed in operation on July 19. They connect the lower end of New York City with Jersey City. The line on the Jersey side connecting the Pennsylvania, Erie and Lackawanna railroad stations will not be operated till Aug. 2.

NOTES ON THE TANK TREATMENT OF SEWAGE.

At the recent meeting of the Incorporated Association of Municipal and County Engineers, at Malvern, England, Mr. A. P. I. Cotterell discussed the fifth report of the Royal Commission on Sewage Disposal so far as it concerned certain phases of the tank treatment of sewage. The following paragraphs give the paper practically in full. A summary of the recommendations and conclusions of the Royal Commission's report was published in The Engineering Record of Sept. 26, 1908.

The Royal Commission has proposed to differentiate not only between sewage of varying strengths, but also between the different kinds of tanks generally used for primary treatment. Sewage, as we know, has been roughly divided by them into three classes—strong, medium, and weak. They also propose that the general design of the remainder of the works, especially the capacity of the filters, shall be dependent upon the class of primary tank that is adopted, basing their figures upon five different types of tank more or less representative of those at present in use.

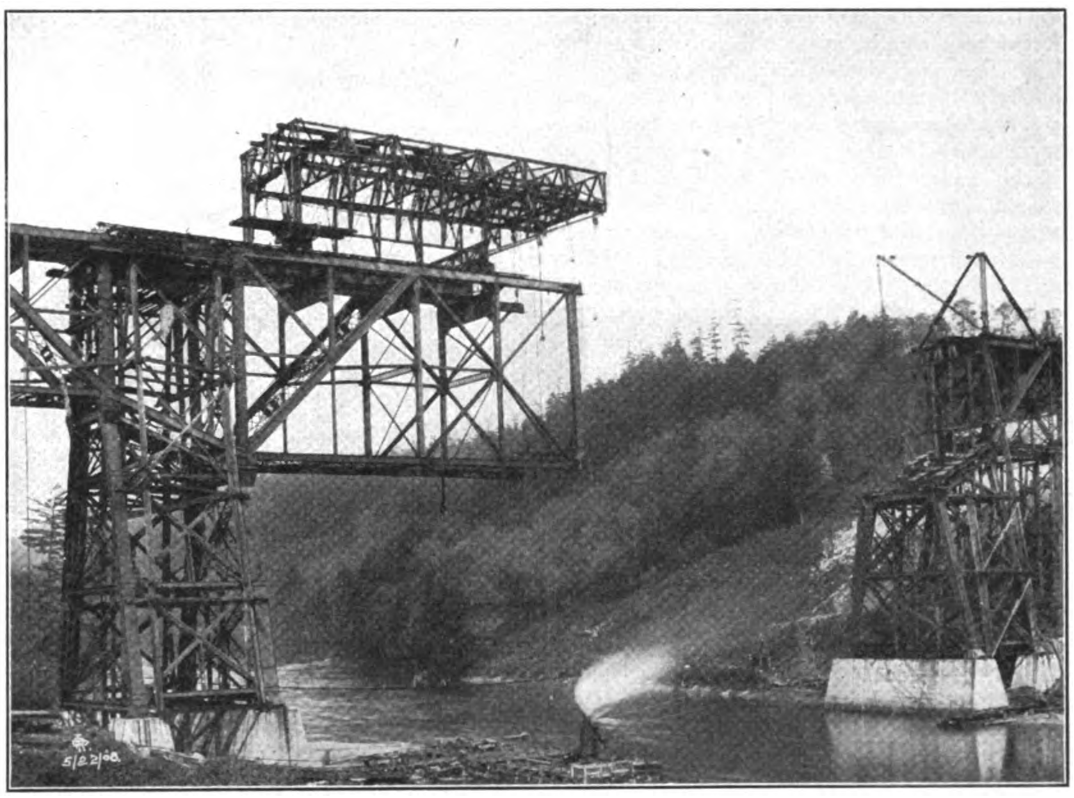
The Local Government Board has practically adopted these proposals and has issued instructions based upon them. The tank treatment to be adopted, therefore, becomes a more than ever vital part of the design.

In these notes the subject is approached by Mr. Cotterell from an engineering, not from a chemical, point of view. Our present knowledge of tank treatment, he stated, has not much chemistry about it; the problem is mostly an engineering one.

The classification of tank treatment above alluded to is under the following five heads: (a) Septic tanks; (b) continuous flow settlement without chemicals; (c) quiescent settlement without chemicals; (d) continuous flow settlement with chemicals; (e) quiescent settlement with chemicals.

All are generally agreed that except possibly in very small sewage works, tank treatment, even if it be only a detritus tank, is necessary. Even with land irrigation some form of tank is valuable, and tends to reduce the liability of nuisance through clogging or pounding of the surface.

One of the most important factors in tank design, Mr. Cotterell said, is the effect of storm water. The normal variation of the dry-weather flow, whether from domestic habits or from trade wastes, occurs at predetermined times and can be arranged for. But, storm flow is a complete uncertainty and can only be limited as regards quantity, not as regards time. Increased flow due to storms compensates itself to some extent in that the sewage is more dilute, but even then the more rapid flow caused in the tank is harmful if continuous flow settlement or septic action is relied upon.



Erection of Clarion River Bridge, Franklin & Clearfield Railroad.

The Local Government Board proposes to limit the quantity of sewage and storm water to be dealt with by the tank to a maximum of three times dry-weather flow, stipulating that the surplus up to six times dry-weather flow shall be poured into stand-by tanks, or, when sufficient suitable land is available, on to a special irrigation area as in the past. Storm filters are happily to be given up. The storm overflow is to be placed at the further end of the stand-by tanks, and the supernatant water in the tank may run