does not sufficiently perform his duties. An inspector should be the intermediary between the owner and the contractor, and it should be his duty to see that everything runs smoothly, his main object being to keep the interests of the contractor in line with those of the owner, thereby securing the best results. An over-anxious inspector is apt to disgust the contractor, causing him to lose interest in the construction, with the result that poor work must follow. It is assumed, of course, that good materials and workmanship are always to be demanded.

The following instructions for inspecting ferro-concrete construction, written for the benefit of our inspectors, may be of interest:—

"Centering and supports must be properly braced and cross-braced in two directions. False work or centering should be removed with great care, and without injuring the construction by dropping heavy sections thereon. No centering should be removed in less than three weeks. A good rule governing the length of time for the centering to remain in position is two days for each foot of span; that is, a span of 12 feet should remain centered for 24 days, and a span of 16 feet should remain centered for 32 days. The supports should under no consideration be removed in less than three weeks. No centering need remain in position longer than 45 days, no matter how great the span. Temporary shores should be placed under all main girders which might be subjected to heavy loads during the course of construction. Where centering supports come on soft ground, a heavy plank or timber should be placed underneath them to prevent their being forced into the earth. Reinforcing steel should be free from oil and paint. A slight film of rust is not objectionable, but all loose scales should be cleaned off with a stiff wire brush.

"Samples of materials used should be subjected to mechanical tests. Only clean water, free from acids and strong alkali, should be used in the mixing. The resultant should be that known as a wet mixture rather than that termed a dry mixture. No concrete which has once begun to set should be deposited thereafter in the forms. Sections which have recently been concreted should not be travelled over. Concreting should never be carried on in freezing weather. In case the concrete, after having been deposited, should become frozen, the centering should never be removed until it is absolutely certain that all the frost has disappeared."

Lack of time prevents the consideration of these instructions in more detail, but a similar set of instructions can be drawn up by any engineer in charge of this form of construction. Probably one-half of the responsibility of a reinforced concrete structure depends upon the inspector in charge, and it is important that he should be as familiar with the class of work as the foreman who is to carry it out, and, at the same time, he should bear in mind the objection to his being too theoretical in his inspection; the practical man will secure better results.

Since the Royal Institute of British Architects thought that reinforced concrete, as a structural material, was of sufficient value to devote to it the attention and research of a special committee, which committee summarized the general principles for designing reinforced concrete, and published formulæ recommended by them, there is no necessity for me to burden this paper with any mathematical problems. Nor is it necessary to attack the methods of calculations employed by the patentees of the various systems, unless such calculations are based purely upon empirical formulæ. Empirical formulæ should not now be used, for sufficient progress has been made in scientific research to establish definite results, and, though various authors who do not employ empirical formulæ differ widely in their methods of calculation, it will usually be found that there is very little difference in the result, no matter what method is used.

The theory and calculations adopted by the author are practically the same as those adopted by the committee appointed by the Royal Institute of British Architects. However, in using these formulæ it must be borne in mind that no method of designing beams, based only on the calculations of the bending strain, can be correct. Such a design assumes that the concrete will, within itself, resist all the shearing strains, and all internal tensile strains resulting therefrom. That concrete is incapable of doing this is now generally recognized, and in proper designing provision is made for overcoming all internal strains, whether they occur at the end of a beam in the web, or at the centre of the beam in the bottom flange.

In brief, I would state that reinforced concrete is, in my opinion, the best form of construction when properly handled, and the worst when improperly handled. Such being the case, it behoves the owner and the architect to ensure that only the best class of contractor is employed on his work. Reliable contractors can only afford to carry out work which will ensure them a fair amount of profit, and if, by the adoption of reinforced concrete, the owner is saved 10 per cent. of the cost of construction, it is advisable to grant the contractor any extra saving, so as to ensure his giving a construction which will prove satisfactory in every respect.

When owners and engineers realize this point, and act accordingly, reinforced concrete will then reach that position in the category of structural materials where it justly belongs.

Probably every engineer recognizes the extensive field wherein reinforced concrete can be used. It immediately recommends itself for use in all harbor works and waterworks in general. Buildings of every description have already been, and are being, built with it, and engineering problems of the most complicated character are successfully carried out by its adoption.

RUSTING OF REINFORCING STEEL.

During 1905 Mr. J. M. Braxton, United States assistant engineer at Key West, Florida, prepared four blocks of coral sand and broken brick concrete, in each of which was embedded a ½-inch steel rod. Two of these were placed in about four feet of water in the ocean and two in a dry-closet in the testing laboratory and left over a year. The blocks were then broken and the rods carefully examined for rust. The rod in one of the blocks which had remained in the dry-closet showed signs of rusting, but the other three rods were as bright and smooth as when they were placed in the blocks. The test was on so few specimens, however, that it was decided the next year to make more extensive tests. The results of these latter have just been reported to the United States engineer officer in charge of fortification works on the east coast of Florida. The blocks tested were 12 in. by 12 in. by 6 in., made under usual working conditions of one part Portland cement, three parts sand and five parts broken brick. Embedded in the centre of each block was ⅝-in. diameter twisted-steel rod 8 in. long. Fifteen sets of two blocks each were made, ten with the coral sand, or disintegrated coral rock, common to the beaches of the Florida coast, and five with ordinary silica sand. Of the ten coral sand blocks, five were with brick crushed to pass through a 1-in. ring and five through a 2-in. ring; all the silica sand blocks were made with 1-in. crushed brick aggregate. Some of the rods were dipped in either a fresh or salt water grout before being embedded in the block and some were put into the concrete clean and dry. Of every set half of the blocks were placed in the ocean after a twenty-four hour set and half were kept in the air without roof protection. After one year and twenty-one days the blocks were all broken and the rods examined for evidences of rust. It is a fact worthy of note that all the blocks allowed to remain in sea water show no