Editorial

THE WORDING OF SPECIFICATIONS.

One of the most frequent causes of trouble between owners, engineers and contractors is the inability of some engineers to express their requirements clearly, concisely and in plain, unequivocal English, so that all concerned may read and know what their specifications mean and call for. Most of this trouble can be ascribed to the practice of copying specification provisions from some other person's work or from some ancient specifications with no regard or consideration as to whether the class of materials is the present market classification or whether even obtainable except at an exorbitant price. Such specifications usually contain ambiguous phrases which have been rightly named "club" or "big stick" clauses, unfair to all parties, and which create the impression that the engineer himself does not know what he wants, and that he expects to cover up his deficiency by other common phrases such as "the decision of the architect as to the true construction and meaning of the drawings and specifications shall be final"; "that all work and materials must be to the entire satisfaction of the engineer"; "that all materials must be of the best quality"; "that all work must be done in the best manner as the engineer shall direct," etc. Nor do these expressions always accomplish the expected result. Some examples that well illustrate this were enumerated by Wm. L. Bowman, C.E., LL.B., in a paper entitled "The Engineer and the Law," read before the Harvard Engineering Society, of New York. One instance he cites was where a contract for a heating plant provided for a "complete and perfect job, even though every item required to make it such is not specially noted in the drawings or these specifications"; also that the contractor "shall furnish all labor, tools, and appliances necessary to complete his work according to these specifications, and shall perform his work in a true workmanlike manner in every particular, and thus provide the building with a durable and mechanically perfect system"; it was held that the contractor was not required to improve upon the plans in order to make a mechanically perfect system.

Another example given by Mr. Bowman was where a contract required the construction of a cellar according to specifications, it was held that an additional requirement that "the whole to be perfectly watertight and guaranteed" only bound the contractor so far as his own work was concerned, and that he was not held to guarantee that the plans would produce a watertight job. In another instance, where a tin roof of the "best quality" was called for, the trial justice in charging the jury held that such a requirement was satisfied when the roof as finished "was equal to the standard contemplated by the contract." In another contract a reservoir was required to be built according to definite plans and specifications, and the contract further provided that "the work contemplated . . . is the construction of a watertight reservoir," and it was held that that did not impose upon the contractors the responsibility of making the reservoir watertight, because consideration of the entire terms of the contract showed that they had no discretion as to the method or means of doing the work.

These numerous examples are given because of the tendency on the part of some architects and engineers to reject work under such circumstances, involving all concerned in expensive and needless litigation, and opening themselves to severe and sometimes well-merited criticism.

CO-OPERATION BETWEEN SCIENCE AND BUSINESS.

Professor Ed. D. Jones, in his new book on business administration, makes some interesting allusions to the fruitful co-operation of men of widely differing talents, in business. He shows clearly how industry and science agree in making extensive use of that simple form of co-operation, commonly known as division of labor, by which men of unlike genius are united in the same enterprise for the accomplishment of different functions. He turns first to pure science of modern times and displays a striking instance, in the life history of two noted men, of the benefits of individual co-operation. Tycho Brahe, the leading astronomer of the latter half of the sixteenth century, was a nobleman of proud spirit and, by reason of a certain dramatic talent which attracted attention, able to secure from his royal patrons large grants for astronomical apparatus. He was an expert instrument maker, and an accurate observer. His life was spent largely in compiling tables of observations of planetary movements. Kepler, who came under his patronage, and who worked with him for many years, was a poor observer, suffering from defective eyesight. He was awkward in his movements and possessed little mechanical ability. He was, however, a good mathematician, and he possessed the rare ability to become enthusiastic over statistical calculations. The five laws of planetary motion which Kepler discovered, and the Rudolphine tables which he completed, are monuments to a splendid and devoted co-operation between two geniuses of entirely different endowments.

As for applied science, the writer reverts to the more familiar case of Isaac Watt and Matthew Boulton. Watt has described himself in the following words: "I am not enterprising. I would rather face a loaded cannon than settle an account or make a bargain; in short, I find myself out of my sphere when I have anything to do with mankind." Boulton was a man of affairs, full of energy and common sense, and possessed of property. He is remembered because he was able to perceive and respect the talent of a man entirely different from himself, and because he tenderly encouraged and courageously defended that genius through manifold attacks and disappointments, to the lasting benefit of the world.

Professor Jones treats the subject in a manner that permits of but brief mention here. One observation of his will bear frequent repetition, however. It is this: "There are even enough men of wealth ready to enter into an arm's-length alliance with science and education, by means of a cold bequest. But there is a waiting opportunity for men of affairs to go into living, daily partnership with the arts and sciences, by entering into close personal relationships with men who need help of a natural administrator to make their contribution to progress. A good many captains of industry might weave their names firmly into the fabric of history, as did Boulton, by aiding some delicate flower of genius with energetic counsel and a wise corrective influence.