

nomenal growth of the science. But let us look back. In our histories of the middle ages much space was given up to the records of the pontiffs or bridge builders, and even in those early times were recorded the labors of the chief engineer of maintenance of way, as the records of the pontifex maximus, the chief bridge builder, bear witness. This labor of bridge building was of such importance that it was considered essentially the field for men of learning, and we find the priests leading in this work as in teaching, preaching and ministering. It was necessary that these labors of such great public interest should be intrusted to men of scholarly and gentlemanly attainments. And yet, since that early day, when problems of infinitely greater complexity have arisen, it has been thought that scholarship, temperance and integrity are not essential to the successful engineer. On the contrary, lax morals, intemperance and flexibility of conscience have been passed over without serious comment, if not, indeed, smiled upon.

It is interesting to note that a prosperous engineering society flourished during the early days of the Roman Empire, when the "Fratres Pontifici," Brotherhood of Bridge Builders, was organized by a band of monks who chose as their particular work the building and repairing of bridges. Many an old bridge and ancient cathedral stand to-day as the witness to the thoroughness and efficiency with which these and other engineers of their time did their work. In the process of time the extent of the work increased so rapidly that specialization became necessary, and the monks, the men of letters to whom the world had looked as the chief lords of knowledge, withdrew to their sacred works of love and mercy and others appeared to build the bridges and buildings, and attend to the arts of the times. The engineer became merely an artisan with little if any book learning, depending upon precedent and physical strength to accomplish his designs.

IMPORTANCE OF HEARTY AND SINCERE CO-OPERATION.

The organization of these Benedictine monks emphasized an essential factor in successful engineering work which ought not to be passed over without comment. This brotherhood of engineers appreciated the all-importance of hearty and sincere co-operation for the successful termination of any great industrial work. It should be the aim of every engineer and of every engineering student to foster and encourage the spirit of constant striving for the best good of all—the spirit which constantly seeks the better things of life. Standards of right living should be upheld that shall make every engineer of the greatest possible good to the world of men and things about him. He should see beyond his own sphere of activities and come into close touch with those who have preceded him, as well as with those of his own time. It is only with this point of view that the least injury shall happen and the greatest benefit result to all.

The essential deep sympathy and wide outlook will come only as broad knowledge is gained. The engineer must not be learned in his profession only, but in history, political science, etc., as well. He must know everything about his

own, and something about everything. For, as the engineer stands before the world as the equal in rank of the philosophers, lawyers, doctors and preachers, will he not be looked to for an example of right living as a citizen and as a man? I believe that the right is not his to seclude himself from society, politics and affairs of general importance, saying that the engineer must always be the serious, self-centered, pre-occupied individual that some tell us he must be. A lofty conception of universal brotherhood and happiness should keep him from being hedged about in this manner. The realm of the engineer's work is such as to inspire him to strive at all times to add his mite, however small it may be, to the store of happiness of the whole world.

THERE IS NEED OF THE "BIG" MAN

Success and power in the life of an engineer, as in any life, are indications of energy, truthfulness, temperance, manly courage, self-respect and address. The engineer must be a man, true and strong. He must be not only scientific, scholarly and business-like, but healthy, erect and pure-minded, possessing "manner" as well as manners. In no profession is there greater need for the truly "big" man.

An engineering feat once undertaken must be prosecuted with unceasing vigor and enthusiasm until the end is attained. The tunnels under the river in Greater New York were not built by dilatory methods, nor was the harness of our great Niagara Falls designed and constructed by indifferent engineers. If success is to crown his efforts, the engineer must keep "everlastingly at it" until he attains, for there is no greater need in any profession than this for "stick-to-it-iveness." This characteristic energy should be exhibited, not only in his work, but in his play as well. Other things being equal, that engineer will be the most successful who works while he works and plays while he plays, with all the vim and energy that a healthy mind and body can put forth.

No proverb is more golden, though perhaps none is more reviled in the broad field of engineering, than the one we have all known all our lives: "Honesty is the best policy." There is no one thing that will make for ultimate happiness and success so surely as unswerving devotion to the principles of truth and honesty. And, on the other hand, there is nothing that will so surely bring ruin to one's self and work as disregard of these principles. The engineer must be true to himself, his work and to the world. If he is false to himself, nothing is surer than the ruin of his work with its author. Great mistakes have been made in medicine, law, theology, etc., and false theories advanced that have stood for years, yes, hundreds of years, without their falsity being proved, but a similar condition is not to be imagined in engineering. Would the great bridges that have been built and which stand as living witnesses of the engineer's proficiency, have withstood the tests of time if constructed on a false theory of the strength of materials or design? Certainly not, and so be sure that false engineers cannot endure.

PERSONAE HONOR.

The consideration of honesty as an essential part of an engineer's life

should not be left without a plea for that, gentlemanly attribute, personal honor, that is being too little cultivated in this day when men are striving so fiercely for wealth and commercial supremacy. Such a quality of character must become a part of every true engineer. It should keep him above the advancements of those who are ever ready to offer inducements for professional influence. It should and will do away with the force of so-called "expert testimony," when two engineers of similar training take opposite sides in a case in court, swearing to different effects from the same causes, the effect being influenced largely by the size of the interested party's pocketbook. Surely if the engineer is to maintain his position in the world where he has been placed by the great development of nature's forces, he must cultivate this princely attribute. It is only thus that he may expect to deserve, secure and hold the confidence of those who are looking to him from time to time to "do things."

THE "GOOD MIXER."

The frequent records of discipline in the large industrial corporations of our country afford abundant evidence of the attitude against intemperance in the ranks of the employed. This hostility towards intemperate habits shows a very encouraging development along the line of all industrial pursuits, and should serve as a warning, especially to young engineers. The old theory that a "good mixer" is necessarily more or less intemperate, is rapidly losing ground. The history of railroad management and operation is particularly noteworthy in reference to this subject. Can anyone imagine that the president or general manager of any of our great trunk lines would demand, as an essential requirement of service, that the prospective employee give evidence of a tendency to dissipate? In modern progressive industry, the intemperate man has no show with the alert, clear-eyed, moral fellow with a healthy and vigorous mind. Though men are to be found occasionally, not strictly temperate, who are in commanding positions, they invariably require temperance in their employees. The "good mixer" of the present is, and for the future shall be, the well rounded man of ability, good address, and congenial temperament, but without, of temperate habits in all points of life.

In the preface of one of our prominent engineering books the following paragraph appears: "A good engineer must be of inflexible integrity, sober, reliable, accurate, resolute, discreet, of cool and sound judgment, must have command of his temper, must have courage to resist and repeal attempts at intimidation; a firmness that is proof against solicitation, flattery or improper bias of any sort; must take an interest in his work; must be energetic, quick to decide, prompt to act, and must be fair and impartial as a judge on a bench." These wholesome thoughts give more in detail those that have been discussed herein. These are the indications of high honor and gentlemanliness.

Living in the sphere of action in such close touch with nature's forces, the whole trend of the engineer's life should be influenced. Every day should make him a better and a "bigger" man. If this is not true, and his conduct is guided by