LETTERS FROM GRADUATES

(Courtesy of Prof. C. M. Spofford.)
Tientsin-Pukow Railway, China.

I have been out here for about two years now. The first year, I was up in Tientsin at the University trying to teach the youth of China something of mechanics, railroad work and structures. The courses given there now are in Civil Engineering, Mining Engineering and Law. On paper, at any rate, they would look as well as almost any courses anywhere.

Before entrance the student is supposed to have completed his study of physics, chemistry, mathematics (including calculus), and all other subjects not strictly technical. The courses there are for three years, the first class completing the revised course of study graduating next year. The institution went to pieces entirely during the Boxer troubles and is now just getting fairly on its feet again. On the whole, I believe that the University will do a big work in time but it will require time to prepare suitable conditions for it to grow to its full height in. The great difficulties now are a lack of students with proper preparation, there not being enough teachers or money here to properly man the primary and secondary schools for them to act as satisfactory feeders. Another difficulty is that, in order to command the respect of the Chinese, the students must have been well educated along Chinese lines and that is a task of many years in itself. This brings the students to the University at too great an age and after undergoing a long course of training tending to cause their minds to set. These difficulties are gradually being overcome and it ought not to be many years before the Chinese Universities can take rank with those in Japan if the Government will only maintain the policies it has begun and then improve on them as fast as it knows how. Taking account of the very great handicaps that the Chinaman suffers under, both through his national history and religion and social and economic conditions, and through the character of his own individual training, most of us admit that he does remarkably well when he has to. The latter thing is the important one—to get them so that they want to and have to.

But so much for a long-winded discussion of the educational situation. I found Tientsin in some ways to be a very pleasant place to live in. The great thing that gives life its peculiar features to a newcomer, particularly an American, is the cheap and fairly efficient supply of servants so that everyone can keep up an establishment that would require a very good financial standing at home. Bachelors can especially appreciate the advantages since they can start up housekeeping by simply hiring the "boy" and thereafter doing nothing but paying the bills. A competent boy can be gotten for about five dollars or a little more a month. Of course he requires a force of assistants but their pay is in proportion and they are supposed to feed themselves, though the way food disappears leads one to believe that this supposition is honored more in the breach than in the observance.

I came down here a year ago. The railroad is also a Government affair. The bonds were underwritten by a British-German syndicate and so the line was divided into two sections. The northern end, in Shantung, where the Germans hold forth mainly, is being built under a German Chief Engineer and Germans and German products generally have the inside track.

Down here it is the British. The Chinese Director on this end was educated in America, however, and so he insisted on running in a few Americans.

For the first eight or nine months I was here, I was engaged in running the preliminary survey, using the stadia method throughout. Since then I have been on what has been nominally construction but, even under foreign supervision, things do not move with a lightning speed in China. There are all sorts of complications and delays and so we have made very little progress so far and I am afraid that the completion of our little two hundred and fifty miles on this end is a long way in the future. Just between ourselves, I think that if we had a little American spirit of hustling things along and getting them done, we might be running some profit earning trains before long. But, of course, that would not do to say here.

On my return, I will, of course, be very glad to tell the students what I know about China and railroading here. Apparently, from the newspapers, it is something that will begin to interest American engineers before long, much more than it has in the past, if the American financiers do all that is claimed for them.

Frank E. Hermanns

To the Editor of the Tech:

My dear Sir—I have for many years taken an interest in the courses of study at the Institute and have watched the progress of the graduates with pleasure. On the whole I believe that the courses of study in the different Departments are well arranged. As a rule they occupy a position very near the average of the other leading Technical schools and Colleges which make a specialty of technical training. I mean by this that the number of hours devoted to the different courses are not very far fom the average of the other principal training institutions. If this is generally accepted as true it will go far towards dissipating the common belief that Technology pushes its students too severely.

As far as the quality of the instruction is concerned I believe that M. I. T. compares favorably with any other school.

I have had the good fortune to employ at different times a number of Technology graduates as well as those from other educational institutions and it has been my experience that men from M. I. T. are, when compared with others, well trained, bright, alert and ready for the different problems of the profession.

It would be almost invidious to pick out special courses for commendation, where all are animated by the spirit of ambition and emulation. It is delightful to consider in this connection that there can never be a "Trust" in Education.

As time goes on many more technical schools will spring up in different parts of the land. The more the better. There is room for all, but as far as we can see at present they will all have to hustle to show advantages over our own Technology.

Faithfully,
Desmond FitzGerald.

To the Editor of The Tech:

Answering your request made to some of the graduates of the Civil Engineering Department for accounts of their professional careers, I submit the following statement of my engineering work covering a period of sixteen years. The summer following my junior year was spent as transitman on surveys and designs for a water supply system. After graduation, in 1893, one year was given to a post-graduate course at the Institute, principally in structural, hydraulic and laboratory work, for which a Master's degree was granted in 1894. The summer of that year was devoted to structural drafting at the Boston Bridge Works. In 1895 I entered the employ of the Engineering Department of the City of Boston and have been engaged in municipal engineering work there ever since.

My work for the city began under the late John E. Cheney, the Assistant City Engineer, a man of the finest type and an engineer of thorough training and sound common sense who had come to be recognized as one of the foremost bridge engineers in the country. As draftsman and Assistant Engineer I was in responsible charge of bridge designing under Mr. Cheney from 1897 until his death, in 1906, since which time I have had charge of the design and construction of city bridges, reporting directly to the City Engineer. My city work has included the design, construction or reconstruction of over thirty municipal bridges built for the heaviest traffic (including in some instances steam and electrated railroad traffic) and costing several million dollars; the most important of these being the new Cambridge bridge, a three million dollar structure. Many of the bridges are over navigable tide-water and contain draw spans of one or another type. The Charlestown bridge draw span is the widest swing draw in the world and the Northern Avenue draw, slightly heavier than the Charlestown draw, is the heaviest movable span in New England. Unlike the experience usually gained in the service of a bridge company, this structural work has included foundations in tide-water and on land as well as bridge superstructures. In my work for the City of Boston I have had to deal with a variety of problems other than those of structural engineering, considerable time having been devoted to statistical work.

Mr. Cheney's reputation was such that he was frequently consulted by railroad and other corporations, and by individuals, upon various structural matters, and for eleven years, I was associated with Mr. Cheney in his consulting practice. This work included examinations and reports on existing bridges and the design of many new bridges for steam and electric railroad and highway uses throughout New England, involving tide-water and other foundation and draw spans; also, the design of cantilever and other foundations and the steel frame construction of many large buildings, the design of dams and of structures of reinforced concrete.

In addition to other duties I have, during the past twelve years, done a certain amount of consulting work on my own account, this independent practice having included bridge work for some Canadian railroads and for the Province of New Brunswick, and bridge structural building and foundation work in different parts of New England. In connection with the large ship lock of the Charles River Dam, I designed, for the contractors, the coffer-dam for unwatering two acres of the harbor bed, which structure resisted between forty and fifty feet head of tide-water; and for the same contractors, I made a design for a shut-off-dam about a thousand feet in length. A most interesting piece of work was that in connection with the building of the Washington Street tunnel, beneath the foundations of the Ames building, a massive masonry structure two hundred feet high, on which I served as consulting engineer for the owners of the building. Legal engineering and expert testimony have formed a part of my professional work.

The things which have helped me most, professionally, are: my undergraduate training at the Institute, my post-graduate course there, which was in many ways of greater value than the whole four undergraduate years, intimate association with able engineers like Professor Swain and the late John E. Cheney, and membership in professional societies, notably the American, Canadian and Boston Societies of Civil Engineers. I advise Tech men to join professional societies as soon as they are eligible and to mix with their fellow members, socially as well as professionally.

From my experience with men trained at other institutions and from some knowledge of teaching methods elsewhere, I am of the opinion that the course in structural engineering at the Institute has long been, and continues to be, the best to be had at any institution in the country.

Yours truly,
Frederic H. Fay

STRUCTURES

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the arrangement and the details of these members.

The post-graduate course is intended more especially for those wishing to specialize in structural engineering, and is open only to those who have finished the undergraduate course in Structures or who have taken its equivalent elsewhere. It deals with long-span bridges and arches, and with complicated types of structures for which more precise methods than those used for ordinary structures are needed.

In the class-room work in this subject the fact that Civil Engineering is an art founded upon comparatively few well-established basic principles is clearly recognized, and every effort is made to thoroughly establish these principles in the student's mind by frequent applications to varying and unfamiliar conditions. The practical side of the subject is also clearly presented and questions of cost, and of practice in field and shop are freely discussed. The value of the analytical character of the subject in the development of logical thinking is thoroughly appreciated, and the attempt is made to give to the course a high value as a source of mental discipline entirely aside from its practical value to the engineer.

CURRICULUM

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Railroad and Highway Engineering, Geology, Astronomy and Geodesy, which include both class and field work. The greater geological processes, erosion, sedimentation, deformation and eruption, are discussed in order by means of lectures, illustrated by maps, diagrams, specimens and stereopticon. Other lectures, illustrated by trips to places in the vicinity of Boston, consider the broader structural features of the earth's crust and the application of the principles of Structural Geology to practical problems of interest to the Civil Engineer. A course in Building Stones consists of a systematic laboratory study of the common rocks, alternating with illustrated lectures upon their application in engineering works. In connection with lectures in practical astronomy and geodesy as of interest to the surveyor, observations are made with the engineer's transit for latitude, longitude, time and azimuth.

The study, during the first term of the third year, of the strength of various materials of construction, including a mathematical discussion of shearing, bending and torsional stresses and strains in beams, columns, hooks, springs and riveted sections, furnishes an introduction to a course in the Theory of Structures in the second term. This course comprises a study of the loads, reactions, shears and moments acting upon structures of various kinds, principally roofs and bridges, and includes the practical designing of beams. Practise is also given in the testing laboratory in the actual determination of the strength of various materials. An elementary lecture course in Direct and Alternating Current Electric Machinery, designed to present the principles governing the utilization of electricity for power purposes, is also introduced.

In the comparatively advanced work of the fourth year, the student in Civil Engineering is offered a choice between two options or lines of study. The first, treating Civil Engineering in general, emphasizes more particularly the study of Hydraulic and Sanitary subjects. A condensed treatment of the drainage of buildings and lands and the disposal of sewage in cities and towns, gives a limited instruction in the principles of Sanitary Engineering. In the second option, more attention is devoted to Highways, Railroads and Railroad Management. In addition, courses, common to both options, are given in general Structures, Bridges and Bridge Design, Foundations, Theoretical Hydraulics and Steam Engineering, the latter dealing with valve-gears, steam-engines, power-station accessories, thermodynamics, and steam boilers. Laboratory instruction in Hydraulics and the testing of materials is also given.

The work in Structures comprises the computation and design of structures of wood, steel and masonry by analytical and graphical methods. The subjects considered are simple beams, plate girders, roof and bridge trusses of various forms, trestles of wood and steel, earth pressure, retaining walls, masonry dams, arches of metal, stone and concrete, and other reinforced concrete structures. The course in Foundations is devoted to the methods of constructing foundations for bridges and buildings, and to a study of the properties, manufacture and methods of use of concrete and various cements.

In the several courses treating of Hydraulics, the student is taught, partly by means of lectures and class work, and partly through direct experimental observation, the principles of hydrostatic and hydrodynamic pressure, the flow of water in open channels, through pipes and orifices, and over weirs, as well as the determination of losses from friction and other sources. There are also considered problems of water supply and power for cities and towns, including a computation of the necessary storage to insure a required amount of supply, the designing of dams, standpipes, conduits and distribution systems, modes of estimating the power capacity of water privileges, and elementary principles involved in water wheels and turbines.

The Railroad class work of the third year comprises a thorough study of

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