

## A Half Century of Engineering

In September, 1886, I strolled up the stone walk to Old Capitol, a grass-green freshman, about to register. At times that seems like a misty midsummer night's dream and again it is but yesterday. The first shot out of the box I was "called" by the Registrar. "Young man, sign your first name in full; there might be a dozen C. P.'s."

How did I happen to fancy engineering? It is amusing to recall. When I was twelve years old I read in *Harper's Weekly* that the Chief Engineer of the United States was paid \$50,000 a year — more than the President. I showed the item to my mother and said, "That is the job for me."

She told me I would have to go to college and that cost a lot of money, so I immediately began to work and save for the great adventure. Later I was invited to the University commencement by a graduating friend and my inquiries sealed my fate. It was engineering. I immediately applied for a vacation job with a bridge company and was hired at fifty cents per day. The first course was heating rivets and I found that if they were not passed out sputtering, white hot, they were

"socked" back at me. That was exasperating, but it taught me that heating and throwing rivets was an art and a serious job. Then followed laying out patterns in the shop, mixing chemicals, making blueprint paper, blueprinting, and assembling prints, and the mysteries of mechanical drawing and tracing. On the side I learned how to spill a bottle of India ink over a tracing and erase it so it could still be used.

I was initiated into the work of erecting bridges by being given the job of carrying off three-inch planks covered with dust. Pulling out old piers and killing rattlesnakes by the dozen was another of the "kids'" jobs. My first experience with concrete was filling piers. We were told by the foreman that if "we did not mix like hell" it would turn to rock. I was the only good swimmer on the job and one of my duties was to rescue tools that fell in the river. "Get it Charlie" was a daily order, not so bad at 100 in the shade. How proud I was when I pulled our best bridge man out, half drowned. He couldn't swim and I kept a plank between me and his crazy clutching. A great dispute once arose as to the length of some vertical rods that did not fit. I solved it for them on the rule of the square of the hypotenuse and a surplus foot was cut off. That word, hypotenuse, floored them.

Before long there was a fall crispness in the air. September 15, 1886, the time for the trek to the State University of Iowa approached and I planned to be on hand early. An all-day ride on a fast freight brought me to the Athens of Iowa. My first requirement was a room with heat and light in a comfortable locality within reasonable walking distance of the University. Rooms were hard to find. You furnished your own fuel and boiled all water before speaking to it. There was no electricity and kerosene lamps were needed, for the city gas pressure might fail.

Board was fair and reasonable. Once I tried a club, at \$1.90 per week with milk and \$1.80 without. The meals were filling, if not balanced, but dad came out, took one meal, and said "move"! There were three choices for a bath — a sponge, the river, or the barber shop.

After registration, the next step was to find the engineering department and I was directed to the "first brick building north of the Capitol". The armory was on the first floor, the engineering department on the second floor, and a heating plant in the basement. What a shock that bare room was. It was 30 by 60 feet, with cracked walls, dirty windows, and an old pine floor. In one corner were field instruments and equipment; on the west side was a blackboard. The windows on the

east side looked out across the campus to Clinton Street and the view included the Indian standing stoically in front of Wieneke's cigar store. The room was equipped with a half dozen crude drawing tables, school desks for the drawing and art classes, and a couple of filing cases. The only object of beauty was a girl who sat in front of me.

Our professors — Philetus H. Philbrick, W. E. Crane, and Charles E. Magowan — were all civil engineers in from the great but then expiring era of railroad building. Their work had been building bridges and railroads and these were supposed to be the only worth-while projects. The course was entitled "Civil Engineering", and embraced all lines; modern subdivisions and specialties had not yet arrived.

Military drill was popular and was accepted without question; and the raw uncouth freshmen of September were erect, peppy, keen-eyed boys, full of snap as a new whip, when the competitive drills came in the spring, with girls there to watch them. How the girls loved those uniforms! Military drill is an asset to any engineer for it cultivates a good bearing, alertness, and leadership, and a big job or a great contracting outfit must be handled on military principles.

Time marched on. Philbrick and Crane left and Charles Jameson came in. New buildings

were built and Jameson, a diplomat, saw that the engineers were taken care of. He was a young man, fresh from many activities, and brought us many new visions of engineering. His enthusiasm and optimistic predictions for engineering were stimulating and infectious and he understood the psychology of youth. He instituted prizes for accurate surveys and bridge designs, sponsored competitions in railroad location, paid us for designing and building apparatus and testing machines, and found paying jobs in drafting to give us pocket money. We did not fight the "laws" then. Their feud was with the "medics" and our little handful of engineers sided with the "laws".

Within a year I found that my high school algebra had been a farce. I had had no idea of its importance or practical application or that it was a foundation for the higher branches and sciences. Of course machines, tables, and graphs do wonders in saving time and brain work for ordinary purposes, but knowledge counts, although there are exceptions. We had a mathematical wonder in school, with a grade of 99 for four years, and Professor Laenas G. Weld said that the only reason he did not give him 100 was that no man could be perfect in "Math". But this man was not a successful engineer in later years, because he had a disagreeable personality.

Professor Jameson would not let engineers go in for athletics much; he said he would give us plenty of exercise in the field and he did. However he injected engineers' athletics into the events. I won a transit race, I remember, but did not think much of the fact until the following summer when it gave me my first large independent job in a U. S. government hydrographic survey for the location of bridges, under George T. Baker, later president of the Iowa State Board of Education. He selected his chief transit man by a competition in alacrity in taking a point, setting the line, and reversing. My experience in the transit race enabled me to win the first place by a good margin.

I joined a debating society at the University in order to learn to talk on my feet, and a fraternity to get the social angle. My drafting money paid the expenses. My four years cost \$1,200, "with milk", and the money was well invested.

I left the commencement ball at midnight and at 7 A. M. the next morning reported at the Clinton Bridge Works for duty. The hours were seven to six. You carried your lunch. There was no provision for overtime or extra hours, and \$45 a month was supposed to be a liberal starter. The chief engineer and draftsman had just left on some kind of a "get up and git" strike, and I found myself making plans for a large part of a Mississippi

River bridge. As I had worked there four summers, I knew much of the routine. I received instructions, somewhat like this — "Use the La Crosse 160' for that span", which simply meant, make a blueprint with some minor adjustments.

After a month the company hired an excellent Norwegian bridge engineer, a graduate of the Royal Engineering School of Stockholm, to handle the cantilever span. I stayed till the big job was well under way on erection and then, my particular duties finished, after an average of 12 hours a day for \$45 a month, I looked around for something more lucrative.

Our old city engineer at Clinton had died in the meantime and I stepped into his shoes. Brick paving was one of the new things booming in Clinton. I had conducted extensive experiments, investigations, and tests, and had written a thesis on it in the University, so I was ready for the job. The city took it up enthusiastically and let contracts for five miles. D. W. (Dan) Mead was our principal contractor and as fine a man to work with as I ever encountered.

For a while I was the only engineer in Clinton County outside of the bridge works. There were no State, county, industrial, or consulting engineers then. Engineers were paid a per diem compensation and I soon found out there was no

money in working on that basis; the State law set the county surveyor's pay at \$4 per day and engineers' pay at \$6 and everyone wanted to gauge our pay accordingly. Many subdivisions were to be laid out. I took a small one by the day, laid it out carefully and fully, and kept account of the exact cost, with proper allowances for overhead and contingencies. I then made a price by the lot and with two field parties made very substantial profits. At the same time I was working on something else.

Many of my young friends have asked me "does engineering pay?" Well, frankly, not what it should. We were underpaid, but my average run of strictly engineering commissions provided a comfortable living, with one very shining exception. This was "the big job", \$42,000 net. I had some small losses in engineering, but I have found some very generous profits in the allied accessories of the business which my engineering training called to my attention. I learned there were "diamonds all about us". Many instances arose where contractors were afraid to bid and we did the job at good profits, and very little personal time.

Clinton has much low ground edging on bluffs and "filling" was in demand. I bought a sandstone bluff that no one would look at for building purposes, and sold 60,000 yards of dirt and rock

off of it which brought it down to a good building site. Then I graded it off, landscaped and planted it, built a house on it, and sold it, doubling my money. I bought lumber yards "for a song", then purchased a sawmill that was to be dismantled, and sang the song myself. I put four days on the project and made a fair year's salary on the deal.

In the days before sand and gravel plants, we needed a large amount of sand so I rigged up a centrifugal pump on a barge with an old traction engine and then sold the outfit and the contract at a good profit. On one occasion some houses were to be moved off a site. I bought twenty-five of them at \$100 each, set them on my own lots, reconditioned them, and sold them. I once ran a stone quarry. I bought a waterpipe system in the ground and sold the cast iron pipe (good as new) at 500 per cent advance. I "shot" some wells with dynamite that contractors would not bid on, quadrupled the flow, and made \$500 in one day. I used dynamite for everything to save manual labor and gained the nickname, "Dynamite Charlie".

I always kept close cost accounts of everything and soon built up an appraisal business. The Dubuque and Cedar Rapids waterworks were bought at my appraisal figures, after fierce court fights. There were many little dabs of \$50 and \$100.

Before the days of the Highway Commission there were no State or county engineers and we had consultation calls from all over the northwest. All was not pleasant sailing, however; for twenty-five years I carried on a fierce fight with the multi-millionaire owner of public utilities and with newspapers, who spent thousands of dollars and many years trying to "bust" me and run me out of town because I "was inimical to the utility interests".

When World War I broke out, a hurry-up summons came from Washington, and I landed in the U. S. Bureau of Housing and Transportation, a stranger among several hundred persons. John Alvord, the chief, was the only one I knew, but I was determined to know all about that Bureau. It was a wonderful opportunity and all my experience was called into play. Hundreds of millions of dollars were to be spent and 17,000 men had to be handled. Military discipline came handy. I finally achieved my chief engineership of a U. S. Bureau but not at \$50,000 a year.

All education does not come from books or classes. An engineer needs the ability to meet people on their own ground and understand their views, natures, and objects. He must be able to handle and entertain one or a crowd. He must know customs, social forms, and covenants of both classes and masses, understand the psychology of

life, the mind, and human events. He must acquire the habit of independent thought. His conduct must be quiet, normal, and self-regulated, not influenced by others or swayed by the crowd. He must learn how and where to find facts and he must be able to file them away in his mind. He can't know it all, so he must learn to find what he needs when it is wanted. He must learn to lead rather than to follow, study people, and be able to read and mold human nature — "put up, the front up", as the Jap says.

"The greatest asset of the engineering profession", it is said, "is its reputation for honesty", but there is one thing more. Some one has said it well: "I expect to pass through this world but once. Any good therefore that I can do, or any kindness that I can show to any fellow creature, let me do it now. Let me not defer or neglect it, for I shall not pass this way again." This I adopted for my own use and guidance. Selah.

CHARLES PERRY CHASE