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# Made Bigger Cities Possible

By Paul Gardner

**T**HE trolley car is forty years old. This year marks the anniversary of the first trolley line in America—the Richmond Union Passenger Railway.

The building of that venerable tramway is an epic in traction history, and the man who wrote that epic in lines of steel rails, overhead trolley wires and electric motors is Frank Julian Sprague. I called on him in his office in Canal Street, Manhattan. He looks and acts like fifty, despite the fact that he is in his sixties. He seemed to be as active as a youngster. His pep won my admiration. I asked him how he managed to retain his vitality.

"Work," he came right back; "that's the tonic to keep a man young. Laziness means stagnation."

Born in one of those New England frame houses of the middle fifties, Frank Julian Sprague was the elder of two sons. When he was eight years old his mother died and his father decided to move to new fields out West. He left the children with a maiden aunt in North Adams. She taught school. A sympathetic woman, the boys revered her and learned much from her.

Soon young Sprague started going to high school. Poverty did not deter him in the least—only spurred him on. He sold apples in the shoe factories, peddled lemonade on hot summer afternoons, and even got subscriptions to local newspapers.

Strange to say, he showed scarcely any degree of his later mechanical ability. Perhaps he was too busy. Yet his marks were always good in "math" at the "high."

He decided to take the examination to enter the Naval Academy at Annapolis. Then he remembered he was without resources. A man would need a lot of money—about four hundred dollars—and he hadn't a fraction of that.

He went to William Stanley, a contractor, who had watched him during the period Stanley was constructing the Hoosac Tunnel. He told him about himself and his plans for the future. Finally he said: "Have you enough faith in me to loan me one hundred dollars?" The contractor measured his man and nodded his head.

Next Sprague went to a local manufacturer. His straightforwardness once more made the right impression. Indorsements on his note procured him a loan from a bank for the remaining funds he needed. He passed the entrance tests.

At Annapolis his grades in "math," often an essential in inventive work, continued to be excellent.

Talk began going the rounds of the Academy that a certain Alexander Graham Bell was showing a queer contrivance in Philadelphia called the telephone. He attended the exhibition and thereafter his head was full of that sort of thing. He read all the books of electricity he could lay hands on. He tinkered around in his spare hours. The fascination of it showed him his true bent. He had never been too strongly inclined to the sea anyway. On a voyage to Japan, China and the Philippines the youthful ensign experimented constantly. He conducted many electrical development projects for the Navy at the Norfolk and Brooklyn navy yards.

For a while he worked with Thomas A. Edison. Sprague had recognized the value of the electric motor. He perceived it would be useful for traction purposes and started out independently. As a consequence, against painful odds, the "father of the modern trolley" built the originally successful trolley.

In 1887 he took the Richmond contract on a "make-or-break" proposition. "Satisfaction guaranteed" or no payment.

The experts joined in saying it couldn't be done. Conditions in Richmond, they claimed, were impossible. The grades were too high, the tracks too weak to hold a car on it, the motor not powerful enough. . . . Sprague didn't wait to hear it all. He and his backer, Edward

## Frank J. Sprague, Inventor of Train Control Systems, Built First Trolley Line Forty Years Ago

Johnson, had one hundred thousand dollars nominal capital in their Sprague Electric Railway and Motor Company. Wasn't an idea worth risking one hundred thousand dollars?

Some time before the venture Sprague married and had to sell a few shares of stock in his company to get enough money for a wedding trip.

An attack of typhoid fever forced him to send Lieutenant Crosby and Dana Greene down to Richmond ahead of him.

"Get started," he told them. "I'll be down there to finish the job."

Scarcely out of a sick bed, he saw Richmond for the first time. Mr. Sprague described his reaction:

"If I had not known it was a man's job before, I realized it at a glance. Remember, we were pioneers in the industry. There had been other inventors, but each had contrived so differently from the other you couldn't convince the capitalists the dream was practical. The capitalists couldn't be sure the trolley wasn't only a plaything, a mere novelty. I moved on Richmond to show them the truth, to make them dig, for what I knew must inevitably grow into a great industry.

"If I had foreseen the difficulties involved I might not have undertaken the job. Then again... who knows? I believed in myself and staked a fortune.

"All hands worked with a vengeance. There was much to do, little time to do it in. Heartbreak followed heartbreak. One track would be higher than another or the engines would break down. Terrible storms sleeted our overhead wires. Pat O'Shaughnessy, a faithful mechanic, would get out a broom and break the ice off.

"I shan't forget the morning we tried the first trolley up the steepest grade. Would it make it? If so, the battle was won. It crept up the ten percent grade slowly, steadily, wabbling here and there. After an eternity it reached the crest and the men cheered.

"Our company went into a receivership in the end. But we were saved. Contracts poured in from all over the States. In two years we had over a hundred—including lines in Italy and Germany. Traction lines have grown to a great extent since then.

"People also thought electricity would doom gas, the telegraph would banish the cable. Senator Depew believed the electric locomotive would oust the steam locomotive within ten years. All these facilities remain and are doing better than ever.

"In cities the trolley is a most essential cog in the wheel. Subways are too expensive, costing millions to the mile. Whenever a well-established industry is threatened by a new one folks get deceived by the novelty. But time restores the balance. There is a place for the different facilities. As long as there are cities there will be trolleys."

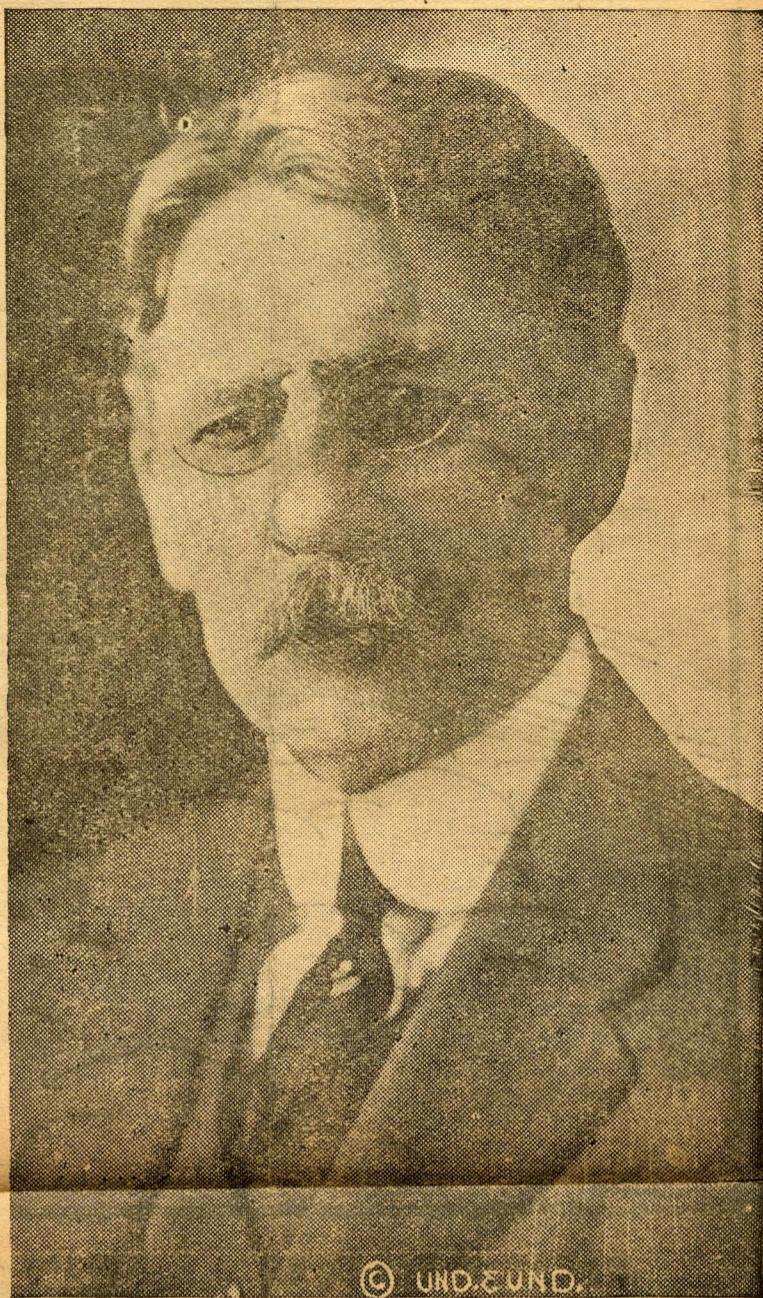
"How would you define a genius, inventively speaking?" I essayed.

After a pause, "Edison's old dictum," he began, "about 95 percent perspiration and 5 percent inspiration is the best definition. In the old days I averaged sixteen hours work a day, sometimes not going to sleep for as much as forty-eight hours. I take it easier now—only fourteen hours."

"Getting several ideas on a certain problem, elimination is in order to test the practical theories. When we finally hit the right one we expand on it. You can visualize what work, what patience, the inventor must have. Failures must not discourage him and, at last, he will get what he is seeking. In the long run it is the incessant labor that counts. If you don't fall asleep on your job you will make good.

Mr. Sprague once tried to electrify the elevated rail-ways of New York years before it was carried out.

He arranged a demonstration on the tracks of a sugar



Frank Julian Sprague

refinery near the Thirty-fourth Street "L" station. Tests proceeded smoothly until the day Jay Gould, the financier, came to see them. An unfortunate short circuit occurring as he looked on, he withdrew. Thus electric elevated systems were long delayed for the straphanger.

On another occasion a project to extend the "L" along Broadway was advanced. Mr. Sprague campaigned against the plan and urged a subway instead. His suggestions prevailed.

In the case of the subway, an invention of Mr. Sprague's ushered the "rapid transit era" in earnest. This was his multiple-unit control system. By this system each separate car has its own motors, and when the cars are hooked together they still act as a single unit. As many cars as are desired can be cojoined.

Mr. Sprague's work, it will be noted, has had much to do with the expansion of New York and various large cities and communities.

When questioned about his philosophy of success Mr. Sprague smiled.

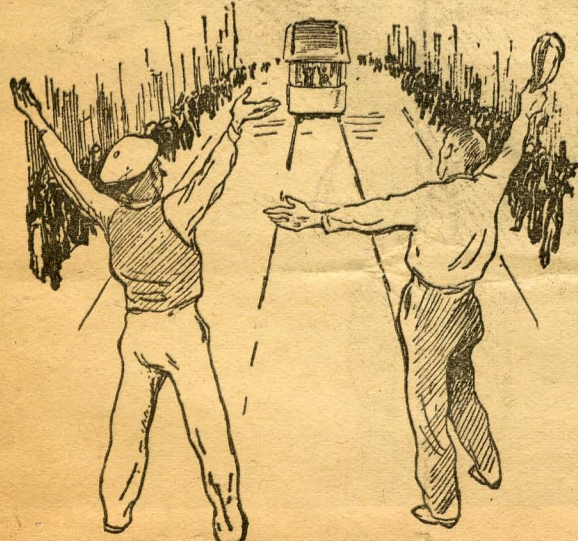
"I am not a moralist," he answered, "far from it. I have no set rules for business or sleeping or eating. But certain facts taught me in my particular experiences might be worth mentioning.

"One is if you like your job that is a fine foundation to the ultimate victory. Always do your best, even if it is a sacrifice for the time being. It pays in the end to extend yourself.

"Another is, don't chase rainbows. If you can, work for humanity's sake and not merely for money. Believe in yourself. That goes a long way. Don't be afraid to fight for your ideas, providing you think you are justified.

"Don't worry too much about the mercenary profits. Let your word be as good as your bond. And work, work, work. Success must come!"

Frank Sprague is past president of the American Institute of Electrical Engineers, New York Electrical Society, American Institute of Consulting Engineers, and Inventors Guild, and member or honorary member of all of the leading engineering societies in this country and many abroad. He has been awarded the Cresson medal, Edison medal and Franklin medal by various scientific societies for his outstanding accomplishments. He has received honorary degrees from several universities. He has been married twice and has three sons and one daughter.



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