

COPIES IN SECONDS

How a Lone Inventor and an Unknown Company Created the Biggest Communication Breakthrough Since Gutenberg – Chester Carlson and the Birth of the Xerox Machine

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1. Chester Carlson

"Office copying as we know it didn't arrive until 1960, when a small photographic supply company in Rochester, New York, shipped the first Haloid Xerox 914 Office Copier. The 914's manufacturer, which had started life as the Haloid Company, is known today as the Xerox Corporation. The 914 employed a copying process that was revolutionarily different from anything used in machines made by other companies; that process was called xerography, and unlike all competing techniques, it made sharp, permanent copies on ordinary paper. The 914, furthermore, was simple enough for a child to operate. Essentially overnight, people began making copies at a rate that was orders of magnitude faster than anyone had believed possible."

— David Owen

Chester Floyd Carlson, the inventor of xerography, was born in Seattle, Washington on February 8, 1906. His father Olof (the son of Swedish immigrants) supported his family as a barber until he contracted tuberculosis and arthritis. From that time on, his father's ill health would dominate Chester's life as the family moved from Washington to California to Arizona and then eventually to Mexico in search of a climate which would be bearable for his father. When the Mexican Revolution commenced in November 1910, the family moved back to Los Angeles.

By the time he was at high school, Chester Carlson had become his family's principal provider. He would rise each morning at four o'clock so he could work two or three hours before school and then when classes ended, he would go to work again. In addition to working as a janitor for a number of local businesses, he also did a variety of odd jobs. The \$50 or \$60 a month he was earning was all his family had to survive on. Yet, despite these hardships, Chester made good grades and he began to think about a future as an inventor.

"It looked very doubtful if I could ever go to college and still my interests were in things that almost required a college education to make anything out of them. Invention was one chance to start with nothing and end up with a fortune. I had read of Edison and other successful inventors, and the idea of making an invention appealed to me as one of the few available means to accomplish a change in one's economic status, while at the same time bringing to focus my interest in technical things and making it possible to make a contribution to society as well."

— Chester Carlson

At age 15, Chester started jotting down his ideas for new inventions in a pocket diary. He envisaged a rotating billboard, a machine for cleaning shoes, a fastener for bags and clothing, a new type of lipstick and a disposable handkerchief. Chester was particularly fascinated, however, by printing and the graphic arts. He had even started publishing his own newspaper at age 10 which he painstakingly typed out on a Simplex toy typewriter (which had a manually operated print wheel instead of a keyboard). Since there was only one copy, he included a routing list and asked each person who read the newspaper to pass it along after finishing it.

One of Chester's part-time jobs was cleaning the offices of a local printer. His employer actually allowed him to take home an old superceded printing press in lieu of a paycheck. Chester had grand visions of publishing a new magazine he would call *The*

Amateur Chemists' Press which he intended to sell subscriptions for 65-cents for six months. He found, however, that setting the type for a single issue required about a week of close and tedious work and then the printing process itself was powered by a foot pedal that was very hard to operate. He gave up after two or three issues.

"I was impressed with the tremendous amount of labor involved with getting something into print. That set me to thinking about easier ways to do that, and I got to thinking about duplicating methods."

— Chester Carlson in a 1965 interview

During Chester's junior year at high school (when he was aged 17), his mother died of tuberculosis at the age of fifty-three. This was a crushing blow for Chester because he depended on his mother for moral support. It also meant the entire burden of looking after his invalidated father now fell on him. Chester looked for more part-time work, but to save money, he and his father moved to a former chicken coop which consisted of a single room with a concrete floor. In order to avoid catching tuberculosis from his father, Chester would sleep outside in a sleeping bag he himself had made.

Despite all the personal hardships he faced, Chester Carlson graduated from high school. He was also able to attend Riverside Junior College and eventually the California Institute of Technology where he studied physics, chemistry, mechanics, electricity and magnetism. He graduated from Caltech in 1930 — right in the midst of the Great Depression. Carlson wrote to more than eighty potential employers and received three replies and one unsuccessful job interview. Eventually, Bell Telephone Laboratories offered him a job as a research engineer in New York for \$35 a week. With no other prospects, Chester Carlson accepted the job.

Carlson's original job turned out to be little more than a glorified waste of time. He therefore applied for a transfer to Bell Telephone's patent department and was appointed to be an assistant to one of the patent attorneys.

"This sounded more interesting to me. I thought it would be a chance to get a bird's eye view of everything that was going on in the labs."

— Chester Carlson

An additional benefit of working in Bell's patent department was that Carlson could keep working on his own ideas in his spare time. He had personal notebooks that contained more than 400 new ideas for potentially lucrative ideas. He never had the time to actually patent any of these innovations, but he kept on developing his ideas. Carlson also kept coming back to his initial idea that it was too difficult to make copies of things like patents.

"The patent department at Bell Labs, like patent offices all over the country, required large numbers of copies of the patent documents it handled. They were sent to associates in foreign countries, to companies, to inventors, and others. We would need a dozen or so of every specification. To make twelve copies with carbon paper is pretty difficult. Often it involved two typing operations. A specification would be typed and then someone would just have to sit down with a typewriter and retype the whole detailed specification of many pages. Then typographical errors would creep in and two girls would have to read them back to each other. It was a very tedious thing."

— Chester Carlson

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