

ELECTRICAL ENGINEERING HALL OF FAME

CHARLES F. KETTERING

In 1958, the American Institute of Electrical Engineers (AIEE) selected Charles F. Kettering (Fig. 1) as the recipient of the Edison Medal. He was cited “for invention, research, and development in the broad fields of industry, engineering, transportation, medicine, education, energy, and power resulting in service to all mankind.” He was elected a Fellow of the AIEE in 1914. Remembered especially for his early work on electric self-starters for automobiles, he received 185 patents for inventions in several fields and also became known for his philanthropy later in life.



Fig. 1. Charles Kettering. (Courtesy of Kettering University Archives, Flint, MI.)

I. EARLY LIFE

The son of a farmer/carpenter, Charles Franklin Kettering was born on August 29, 1876, near the small town of Loudonville, OH. After graduating from high school in Loudonville, he taught in local rural schools for three years. He attended college in Wooster, OH, during the summer of 1896 and, subsequently, enrolled as an undergraduate in engineering at The Ohio State University in 1898. He left Ohio State during his second year due to an eye problem and worked for about two years on the installation of a telephone system. He then returned to Ohio State, from whence he graduated in electrical engineering in 1904.

II. NCR AND DELCO YEARS

Soon after graduation, Kettering accepted a job offer from the National Cash Register Company (NCR) in Dayton, OH. Among the projects he worked on was the development of an

electric cash register. It used a compact electric motor that could withstand brief overloads without damage. He and some of his coworkers at NCR became automobile enthusiasts and worked during their free time on a battery-powered electric ignition system. The system was adopted by the Cadillac Company in 1910.

In 1909, Kettering decided to leave NCR and establish his own laboratory, which became known as the Dayton Engineering Laboratories Company (Delco). The first major success of his new enterprise was the development of an electric self-starter for automobiles with internal-combustion engines. The self-starter utilized a compact battery-powered electric motor to crank the automobile. It was an alternative to the hand crank, which required considerable physical strength to use and often injured the user. Kettering’s invention converted the internal-combustion powered car into a more formidable competitor for steam-engine or electric-powered vehicles. Equipped with the self-starter, the automobile became a more egalitarian mode of transportation and soon dominated the streets and roads of America.

Another early Delco product was an electric power plant suitable for providing electricity for homes or farms not yet served by central power systems. The Delco power plants generally utilized one-cylinder internal combustion engines to drive an electric generator. A problem encountered with the engines employed was the so-called “knock.” This could be destructive especially when the compression was increased to obtain more output power from small engines. This led Kettering and his colleagues at Delco to initiate a long research effort to discover a way to reduce or eliminate knocking.

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During World War I, Kettering became a leading participant in a project to develop a pilotless flying bomb for the U.S. Army. It used an internal combustion engine and was designed to fly toward an intended target at a predetermined altitude. As it approached the target, the fuel was cut off and the missile went down to explode on impact. It was flown successfully but was not deployed in time to be used against German forces. Experiments with radio control were carried out with the missile after the war. However, its incompatibility with the doctrine of flying officers who strongly advocated manned-bomber aircraft led further development to be halted. The missile was quite similar in concept to the V-1 or “buzz bomb” weapon introduced by Germany during World War II.

III. GM LABS

Delco merged with the General Motors Company (GM) in 1918 and, subsequently, became the General Motors Research Laboratories. Kettering remained as director of the laboratories and became a vice-president of GM. He also was elected to membership in the National Academy of Sciences. Kettering and his research staff, including Thomas A. Boyd and Thomas Midgley, Jr., continued to search for a fuel additive that would prevent knock in high-compression engines. In 1921, they discovered that adding tetraethyllead to gasoline would suppress knock. A new company, the Ethyl Gasoline Company, was established to exploit the innovation, with Kettering as its president.

The laboratories, directed by Kettering, developed a variety of new products for the parent company, including quick-drying paints for automobiles and a refrigerant known as “Freon.” Another project that proved less successful was an attempt to develop more efficient internal-combustion engines for automobiles using copper for heat transfer instead of a conventional radiator. Kettering

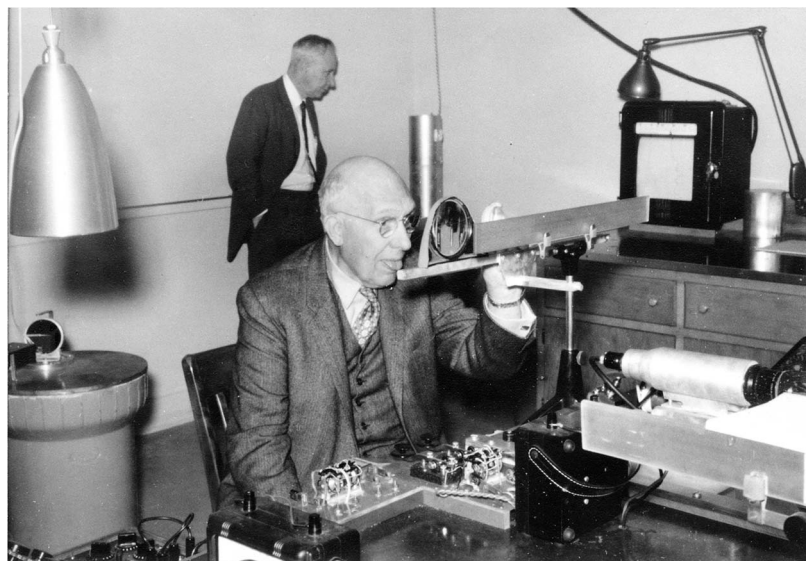


Fig. 2. Charles Kettering working on solar energy. (Courtesy of Kettering University Archives, Flint, MI.)

initiated developmental work on mobile diesel engines suitable for use on ships, railroad locomotives, and trucks during the 1920s. He invented an improved fuel injector to produce a more precisely controlled ignition in diesel engines. Eventually, this effort became a spectacular success and

revolutionized railroad transportation after World War II.

IV. PUBLIC SPEAKER AND PHILANTHROPIST

In his later years (Fig. 2), Kettering frequently received invitations to



Fig. 3. At center is the architect’s sketch of the proposed Sloan-Kettering Institute for Cancer Research at Memorial Hospital in New York. Studying the sketch are (left to right) Charles F. Kettering, C. P. Rhoads, R. G. Coombe, and Alfred P. Sloan, Jr. (Courtesy of Memorial Sloan-Kettering Cancer Center.)



Fig. 4. Laying of the cornerstone for the Sloan-Kettering Institute of Cancer Research.
(Courtesy of Memorial Sloan-Kettering Cancer Center.)

speak at college commencement exercises and other events. His topic usually concerned technology and enterprise and the factors he believed tended to foster or hinder invention and its exploitation. He presented a series of brief talks during intermissions of radio broadcasts of symphony concerts. The transcripts of the talks were published with the title *Short Stories of*

Science and Invention in 1945. He retired from GM in 1947 but continued to give public lectures. In retrospect, his reputation as a research manager and innovator was diminished somewhat due to the eventual realization that leaded gasoline and Freon produced unacceptable environmental pollution.

Kettering became quite wealthy and supported various causes, includ-

ing medical research. Along with Alfred P. Sloan, Jr., he established the Sloan-Kettering Institute for Cancer Research (Figs. 3 and 4). Kettering also contributed to a work-study program at Antioch College. He died on November 25, 1958, in Dayton at age 82. ■

JAMES E. BRITAIN