

Contributions of Polish Jews:

Joseph Tykociński–Tykociner (1877–1969), Pioneer of Sound on Film

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Joseph T. Tykociner was born 5 October 1877 in Włocławek, Poland, to a Jewish family. His father, a grain merchant, wanted his son to join him in business, but Tykociner preferred a career in science. He left Poland at age 18 for study in the United States and found a job in a workshop in New York, where he also ran experiments on his own inventions. His ideas drew attention even then from such prominent scientists as Nicolas Tesla and Professor Michael Pupin of Columbia University.

In the fall of 1897 he returned to Europe to study in Germany. He finished the Höheres Technisches Institut in Cöthen and then went to London, where in 1901, he took a job with Guglielmo Marconi. He participated in the successful establishment of the first transatlantic radio communication.

In 1903 he started a job in the firm Telefunken in Berlin. In 1904, when the war started in the Far East, the Russians asked Tykociner to establish a radio communications system for their fleet. Tykociner became a pioneer in shortwave radio and helped develop a system to link the Russian fleets in the Baltic with those in the Black Sea, receiving an award from the tsar for his efforts. He worked on this project until the October Revolution began.

Tykociner returned to Poland during the war for Polish independence. At the beginning of 1919 he proposed to the new Ministry of Post and Telegraphy a project to create a direct radio link between Poland and the United States. He remained in Poland working for the Ministry for eight months.

In January 1920 the Polish National Railroads contacted Tykociner asking for help in organizing a telegraphic communications system for the Polish railroad system. In April of the same year, the Polish military authorities approached him with a similar request. Tykociner also received a proposition that he organize a national Radio-Telegraphic Institute. It is not known to what extent he became engaged in these activities.

Seeking more opportunity to pursue his interest in inventions, he again left for America. In 1920 he took a position with the Westinghouse Research Laboratory. When Tykociner was head of the Russian radio communications effort, he had befriended the young Vladimir Zworykin. After fleeing the Bolshevik revolution in Russia, Zworykin also came to Westinghouse and later went on to invent television.

In 1921 Tykociner accepted a laboratory position as research professor of electrical engineering at the University of Illinois in Urbana. He studied antennas by use of models, working in high-frequency measurements, dielectrics, piezoelectricity, photoelectric tubes, and microwaves.

Tykociner advanced rapidly and achieved his greatest accomplishment, the adding of sound to motion pictures. He devised a way of recording sound on film. On 9 June 1922 he demonstrated the operation of this invention at a conference of the American Institute of Electrical Engineers in Urbana, Illinois. His wife, Helena, spoke the first words on the film.

Tykociner had been working on a photo-optical method of recording sound on light-sensitive celluloid film by taking advantage of a special mercury lamp connected to the electric

circuit with a microphone. The receiver consisted of a system with lenses, light-sensitive elements, and amplifiers. With this new method of recording sound on film, mechanical devices such as a phonograph were no longer needed. The era of silent movies had come to an end.

Although Tykociner filed a patent application a few days before his famous 1922 experiment in Urbana, the patent for this technology issued rather late, in mid-1926. Tykociner had disagreements with university president David Kinley who would retain patent rights. Kinley told Tykociner that in order to stay at Illinois he would have to pursue other fields. Tykociner dropped his sound on film work and switched his area of research. In the mid-1920s he experimented with antennas, which was a precursor to radar development.

The famous inventor, Lee de Forest of New York, patented in 1923 his own process of photographically recording sound on film, which was similar to Tykociner's but even more effective. He is thus often credited with inventing sound on film, although Tykociner was the pioneer.

Tykociner was the originator of many other inventions, including one with Jakob Kunz and Lloyd Garner. In 1941 they patented an improved, extremely sensitive photo-optical element that could be used in cameras or sensors. In contrast to the traditional design, they applied the impact of hydrogen atoms on the electrode, which greatly increased the sensitivity of the device. In the period from 1924 to 1941, alone or with coworkers, Tykociner was granted at least five patents in the United States and one in Canada. He was the author of many scientific publications in the field of electronics.

In 1962 he retired from the university in order to dedicate himself to the theory of "zetetics," the science of research activity and the creative process. He explained its purpose as the collection and systematization of "all information about research activities, including creative processes, with the view of extending that knowledge which leads to discoveries, inventions, and the solution of human problems." He had described its fundamentals three years earlier in a book entitled *Research as a Science: Zetetics* (Urbana 1959). From then on his publications were mainly on zetetics.

In 1965, at the age of 84, he came out of retirement to teach the first classes in zetetics and continued to teach the subject until the time of his death. Many of his papers are now housed in boxes in the University of Illinois archives.

In 1964 the National Electronics Conference in Chicago honored him with its third Award of Merit, and in the same year, he was named a Fellow of the Institute of Electrical and Electronic Engineers.

Tykociner is hardly remembered in Poland, the country where he was born and grew up, in spite of his engagement in various tasks undertaken for the Polish government in the early years of Polish independence during the interwar period.

From the earliest days of the German occupation, Tykociner and his wife maintained contact with family and friends in Poland, writing letters in Polish and trying to help them as best they could. Tykociner died 11 June 1969 in Urbana, Illinois, leaving no immediate survivors.