

"Each and every Hungarian I have met was original - in fact, extremely original." So said *Enrico Fermi*, the world famous physicist. *Sparks*, a documentary of eight minutes and fifty seconds, attempts to depict in its imagery and musical mood this special sensitivity of the Hungarian spirit. This *civilization spot* portrays in an exciting story-telling style the role of Hungarian brain power in the past, present and prospective future. The long list of Hungarian inventors and inventions that were the pioneers and developers of technical knowledge as we know it today comes alive in these pictures.

SPARKS Hungarian Creativity

Scientists, inventors and inventions presented in the film:



Ányos Jedlik (1800, Szimő-1895, Győr) Professor, Physicist
Inventor of the dynamo
 In 1861 in Hungary (six years before Siemens and Wheatstone) Jedlik developed the concept of the dynamo. To replace the easily exhausted galvanic cells he invented a steady power source, the dynamo. His work provided the basis for the development of the electric motor. Another invention of his of practical importance was seltzer water.



Tivadar (Theodore) Puskás (1844, Budapest-1893, Budapest) Inventor
Inventor of the telephone exchange and the telephone 'newspaper' (telephonograph)
 Puskás was a colleague of Edison. In 1877, in Brussels, he had the idea of the telephone exchange patented. His "speaking newspaper", the telephonograph was put into operation in 1892 and is considered as the ancestor of radio.



Károly Zipernowsky (1853, Vienna-1942, Budapest) Engineer
Ottó Titusz Bláthy (1860, Tata-1939, Budapest) Engineer
Miksa Déri (1854, Bács-1938, Merano, Italy) Engineer
Inventors of the transformer
 In 1884-1885 they elaborated a new alternating current-distribution system at Ganz factory in Budapest. This revolutionary invention has been the source of all artificial lights in our environment up to this day.



Károly Zipernowsky Engineer
The promoter of alternating current
 Zipernowsky was the first to recognize and promote the practical importance of alternating current. As a result of his experiments, the lighting of the Hungarian National Theatre was provided by a system already powered by alternating current in 1882.



Kálmán Kandó (1869, Budapest-1931, Budapest) Engineer
Inventor of the three-phase electric locomotive
 Following the experiments Kandó conducted at the Ganz factory, the first three-phase electric locomotive was put into operation around Lake Geneva as early as 1898. During his life, Kandó participated in the building of nearly 700 electric locomotives.



Donát Bánki (1859, Bakonybánk-1922, Budapest) Engineer and



János Csonka (1852, Szeged-1939, Budapest) Engineer
Designers of the carburetor
 The several hundred million petrol engines that run today all over the world still feature the same carburetors of which the first one was patented by these two engineers in 1893, following experiments they had conducted in Hungary. In addition, Bánki was also the inventor of the world's first steam turbine.



József (Joseph) Galamb (1881, Mako-1966, Detroit, USA) Mechanical engineer
Designer of the Ford T-model
 Henry Ford, founder of Ford factory, commissioned the first T-model - the inexpensive mass-produced automobile of the beginning of the 20th century - that was based on the designs of József Galamb. Between 1908 and 1927 more than 15 million T-models were released onto the streets of the world. In 1999, this model was chosen as the "Car of the Century".



Theodore von Kármán (1881, Budapest-1963, Aachen) Mechanical engineer
Scientist of hydrodynamics and aerodynamics and inventor of the jet and reaction-propelled aircraft
 Kármán designed the world's first helicopter in Hungary, in 1917. Then, in the United States, under the world-war military program and with the financial support provided by Guggenheim, he developed and implemented the theory of jet aeroplanes and the concept of rocketry.



János (Hans von) Neumann (1903, Budapest-1957, Washington D.C.) Mathematician

Inventor of the electronic computer

A former student of Budapest's legendary Lutheran High School, developed the first electronically programmable computer in the USA. Neumann is possibly the most famous of the Hungarian scientists.



Leó Szilárd (1898, Budapest-1964, La Jolla, USA) Physicist
Inventor of the nuclear chain reaction and designer of the first nuclear reactor

He had the neutron chain reaction patented in the UK. His activities reached new heights in the USA. He designed the world's first nuclear reactor and later built it together with Enrico Fermi, in Chicago. Throughout his life, he was opposed to the use of nuclear energy for military purposes.



Ede (Edward) Teller (1908, Budapest-) Physicist
Inventor of the thermonuclear chain reaction

A former student of the high school in Budapest's Trefort Street, along with Leó Szilárd and Jenő Wigner, Teller participated in the 'Manhattan Project', a nuclear energy research program in the USA. He not only developed the theory of thermonuclear chain reaction, but also put it into practice, thereby constructing the H-bomb.



Eugene Paul Wigner (1902, Budapest-1995, Princeton, USA) Physicist
Designer of the water-cooled nuclear reactor

Wigner also began his studies in the Lutheran High School. In 1939, together with Leó Szilárd, he developed the concept of nuclear fission. He was in charge of chemical issues involved in the nuclear energy program. He designed and built the first water-cooled nuclear reactor. His work was recognized by a Nobel Prize in 1963.



Albert Szent-Györgyi (1893, Budapest-1986, Woods Hole, USA) Physician/Biochemist
Discovered Vitamin C

Of the Hungarian scientists to win a Nobel Prize, Szent-Györgyi received his in 1937 for the work he performed while still in Hungary. His experiments involving Hungarian paprika contributed to the discovery of Vitamin C. The versatile scientist left Hungary in 1947. Abroad he became famous for his extensive research on cancer.



János (Hans) Selye (1907, Vienna-1982, Montreal) Physicist/Biochemist
Creator of the Stress Theory

Selye had finished his studies in Hungary, his work and accomplishments unfolded abroad, in Canada. He created the theory of 'stress' that became a fundamental concept of our modern age. He was the first to discover and define this physiological/biological phenomenon.



Ignác Semmelweis (1818, Budapest-1865, Vienna) Physician
Creator of the concept of asepsis

In the mid-1800s, in Hungarian hospitals, Semmelweis developed the theory of sterilisation by chlorine water. As a result, the number of deaths caused by puerperal fever radically decreased. To this day, his method is still used in hospitals all over the world.



László József Biro (1899, Budapest-1985, Buenos Aires) Inventor/Journalist

Inventor of the ball-point pen

Biró invented the ball-point pen at the end of the 1930s in Hungary. His invention shortly ousted the fountain pen from the 'writing market'. He also contributed several ideas to the design of the gearshift used in cars today.



Dennis Gabor (1900, Budapest-1979, London) Physicist/Electrical engineer

Inventor of the hologram

Gabor experimented and lectured in London. In 1962, he created the first hologram, also in London. His plasma research initiated the idea for the creation of a plasma screen, for which he was awarded a Nobel Prize in 1971.



János Kemény (1926, Budapest-1992, Dartmouth, USA) Mathematician

Creator of BASIC programming language, pioneer of e-mail

Kemény began his studies at the Berzsenyi High School, in Budapest. He is considered the greatest computer pioneer and professor-genius of the USA to date. In 1964, with Tom Kurtz, he developed BASIC, which is still one of the most widely used programming languages in the world. He was also the first to introduce the idea of e-mail.



Károly Simonyi, Jr. (1948, Budapest-) Programmer

Creator of Microsoft 'Word', 'Excel' and 'Windows'

He left Hungary in the mid-sixties. He has been working for Microsoft since the early 1980s, where he developed the 'Word for Windows' word processing and 'Excel' spreadsheet programs, both of which continue to enjoy world-wide success. He is the senior designer of the world's biggest software company.



János Harsányi (1920, Budapest-) Economist

Inventor of the game theory of multiple unknowns

Harsányi was another student of the Lutheran High School. This famous economist received a Nobel Prize in 1994 for his work in the field of game theories. His new game theory has been employed by the US government during disarmament negotiations and at the granting of oil leases.



Farkas Kempelen (1734, Pozsony, [at that time Hungary]-1804, Vienna) Inventor

Creator of the first automatic chess machine and phonograph

He worked in Hungary in the second half of the 18th century. The excitement evoked by his chess machine built in 1769 spread all over Europe. His speaking machine imitated the voice of a 3 to 4 year-old child and surprised the scientists of his age. With his invention he proved the theories he had developed on the mechanism of human speech.



Ernő Rubik (1944, Budapest-) Inventor

Inventor of the Magic Cube

The famous Rubik's Cube was created in Hungary in 1974 and went on to conquer the whole world. Within just a few years it became possibly the most famous creative toy in the history of toys. Its inventor, Ernő Rubik, is a professor of the Budapest College of Industrial Arts.



András István Gróf (Andrew Grove) (1938, Budapest-) Engineer

Constructor of the Pentium microprocessor

Gróf, the director of Intel, the world's largest manufacturer of micro-processors, left Hungary in 1956. He achieved fame in the United States as the creator of the Pentium microprocessor. In 1997, he was selected 'Man of the Year' by Time Magazine.



Antal Bejczy (1933, Budapest-) Engineer

Developer of the independent artificial intelligence used in the Mars vehicle

Bejczy has been living in the United States since 1956. He specializes in developing intelligent and independent robots suitable for use in space. He is one of the key experts of NASA research and testing.



Tibor Balogh (1956, Budapest-) Electrical engineer
Creator of the three-dimensional television system
 His company, Holografika, has been working on the problems involving the reproduction of perfect stereoscopic view for years. This technology developed by the company allows for objects to appear either before or even behind the screen. The invention could be applied in the area of simulators, virtual reality and CAD systems.



Gábor Bernáth (1983 Budapest-) Inventor
Inventor of ScanGuru
 Bernáth is the Hungarian 'wunderkind' of the 1990s. The 3D scanner he developed is able to copy stereoscopic forms into a computer, therefore it can be used in various areas ranging from plastic surgery all the way to shoe design. Bernáth was the winner of the Philadelphia Science Olympics at the age of 15.

GRAPHISOFT

Graphisoft Software design company (Established: 1962, Hungary)
Creator of the 3D software ArchiCAD
 This software is translated into 25 languages and is distributed in 80 countries. More than 75,000 architectural designers use its 'Virtual Building', which is considered the pioneer of 3D image design and modelling. In addition to its Budapest headquarters, Graphisoft operates 12 subsidiaries all over the world.



László Holakovszky (1952, Budapest-) Engineer
Inventor of the personal monitor
 With the help of two of his colleagues, Holakovszky constructed the smallest minivisor in the world: it can be attached to eyeglasses and has a total weight of 30 grams. Many areas may benefit from this invention. It can be used in the education of pilots and autistic children, and in various kinds of surgery.

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