

CLASS: Cipher Machine (Electro-mechanical)  
 SYSTEM: Monographic Substitution, Polyalphabetic (Related Sequences)  
 METHOD: Circuit Rotor Maze, Through Path, Gear Motion Control

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NAME: "Securitas" Cipher Machine

DEVELOPMENT:

Application for patent filed in Germany, 23 February 1918, by Gewerkschaft Securitas, of Berlin, one of the companies later associated with the development of the "Enigma". Inventor's name does not appear in the patent papers, but other evidence indicates that credit should be given to either Hugo A. Koch or Dr. Arthur Scherbius, or possibly both.

It is not known whether this machine was ever manufactured commercially. The patent, however, is especially significant since it is the first one (with respect to filing date) in which the circuit rotor principle is used.

PATENTS:

- GER. 416,219 (Gewerkschaft Securitas, 8 July 1925, Cl. 42n-14).  
The basic patent.
- GER. 416,833 (Gewerkschaft Securitas, 27 July 1925, Cl. 42n-14).  
Addition to GER. 416,219, providing for non-electric (e.g.,  
pneumatic) rotors.

DESCRIPTION:

An electro-mechanical cipher machine in which the circuit paths between a keyboard and a bank of incandescent lamps are irregularly permuted by means of an intermediate rotor maze.

The chief embodiment of this invention is shown in a machine with a keyboard and lamp bank mounted on a hinged plate above the rotor maze. The latter includes four circuit rotors between two endplates, the rotors being stepped irregularly between encipherments by a set of gap-toothed gears. Pressure on any key causes current to flow from positive battery through an encipher-decipher switch, via a conductor to one endplate, thence through the four rotors to the other endplate, back through the encipher-decipher switch to one of the indicating lamps, and from there to negative battery, thus completing the circuit. By means of the encipher-decipher switch current may be sent through the rotor maze in the opposite direction to permit decipherment.

The rotors are advanced irregularly by means of a mechanical linkage consisting of a main driving gear stepped forward one position each time a key is depressed and four gap-toothed gears of different sizes, each of which controls the movement of one of the rotors. The gap-toothed gears are mounted on two separate shafts, two gears on each shaft, the latter being coupled by intermediate pinions to the main driving gear. Two setting knobs are provided, by means of which the shafts can be pulled out, allowing the gears to be disengaged and realigned; in addition, the four interchangeable rotors may be arranged in any order and moved by hand to any desired setting at the beginning of a particular message encryption.

The specifications also mention the possibility of stepping the rotors as in a counter so that, for example, Rotor 2 will advance only after a

complete revolution of Rotor 1; Rotor 3 will step only after a complete revolution of Rotor 2; etc. In an additional patent, the drawbacks of electrical conductors are pointed out and provision is made for carrying energy through the cipher maze by the use of water, oil, compressed air and other means.