

CLASS: Cipher Machine (Electro-mechanical)
SYSTEM: Monographic Substitution, Polyalphabetic (Related Sequences)
METHOD: Single Circuit Rotor, Reciprocal Wiring, Regular Motion

NAME: Hebern Electric Code Machine

DEVELOPMENT:

Invented by Edward H. Hebern, assignor to H and H Patent Developing Company of Oakland, California. Application for patent filed in the United States, 31 March 1921. Also patented in Great Britain, France, Netherlands, Switzerland, Denmark and Norway.

This is the first of several machines involving circuit rotors patented by Hebern, a limited number of which have been manufactured and sold by the Hebern Electric Code Company of Oakland, California and its successor, International Code Machine Company of Reno, Nevada.

PATENTS:

U. S. 1,510,441 (E. H. Hebern, 30 September 1924, Cl. 197-4). Most important features are the details of the circuit rotor design.

DESCRIPTION:

A single circuit-rotor machine used in conjunction with a solenoid operated typewriter in which the rotor contacts are wired in complementary pairs and the rotor is stepped regularly one position between successive encipherments.

The cipher unit consists essentially of a keyboard, a twenty-six point circuit rotor between two endplates, and means for stepping the rotor. Each endplate is provided with twenty-six equally spaced spring contacts arranged in a circle. Each spring contact on the right endplate is connected to a keyboard contact of the cipher unit. Each spring contact on the left endplate is connected to one of the electromagnets which, through mechanical linkages, operate the key levers of an ordinary typewriter.

The rotor, which is removable from the machine and which rotates on a shaft between the two endplates, has twenty-six circular contacts in the form of flat-headed screws on each of its two faces, corresponding in position and spacing to the endplate spring contacts. Each of the fifty-two flat rotor contacts is provided with a terminal to which one end of an insulated wire may be attached. Terminals on opposite sides of the rotor are connected by twenty-six such wires in complementary pairs. A normal alphabet is engraved around the periphery of the rotor for setting purposes. The rotor is displaced $1/26$ th of a revolution between encipherments by means of a weight and pulley arrangement attached to the rotor shaft which operates in conjunction with a dog and ratchet wheel. After a key is depressed, a universal bar releases the ratchet dog, thereby allowing the action of the weight to advance the rotor one step.

In order to prevent any sparking due to the movement of the rotor, the succession of operations is arranged, by means of a main contact and the universal bar action, so that current is supplied to the keyboard contacts only after such contact has been made and is cut off before it has been broken; likewise current is cut off from the rotor contacts before the stepping action occurs.

By means of a cam geared to the rotor shaft, a lever riding on the surface of this cam and a mechanical linkage to the space bar of the typewriter, cipher text is automatically spaced in five-letter groups. No provision is made for spacing deciphered plain text or for automatic line feed and carriage return on the typewriter (which prints page copy).

To encipher, a given key on the cipher-unit keyboard is depressed, its associated contact is closed and a circuit path is completed through the rotor to one of the electromagnets which then activates a keylever of the typewriter, thus causing the cipher equivalent of the depressed key to be printed. The main contact is then opened, current is cut off and the rotor is stepped forward one position. The deciphering process is identical and, due to the reciprocal wiring of the rotor, no encipher-decipher switch is necessary.

Variable keying elements include the rotor wiring used (which may be changed with the aid of a screw-driver), the particular rotor selected from a set which is to be provided with the machine, and the initial setting of the rotor for a particular message encryption.

In the patent an alternate version in which characters are printed vertically one below the other on a paper tape (instead of on the usual page-printing typewriter) is briefly described. The possibility of increasing the number of rotors used in the machine is also suggested, but no method for moving them relative to one another is proposed. Though not described in the patent, a small keyboard operated, non-printing model of this machine in which the typewriter is replaced by a bank of signal lamps is shown in an advertising brochure and was apparently manufactured under the trade name, "Commercial Portable Code".

(Advertising brochures with photographs and brief descriptions of this machine are available in the files of CSCAS-76C.)