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31 January 1949

MEMORANDUM TO: Mr. FriedmanSUBJECT: PATENTS ON ELECTRO-MECHANICAL CIPHER MACHINES

The patents listed below are those which may be pertinent to the Hebern case, inasmuch as they contain some of the features claimed in his inventions which are possibly infringed by U. S. Army machines.

The two Hebern patents which contain the claims presumed to be infringed are:

U.S. 1,683,072, filed 20 Nov. 1923 (renewed 17 May 1927 and issued 4 Sept. 1928).

U. S. 1,861,857, filed 17 May 1927 (issued 7 June 1932).

Stated briefly and in general terms, there are seven features claimed in these patents which may be infringed. These are:

- I Interchangeable and invertable rotors.
- II Rotors which may be set manually at the beginning of encipherment.
- III Pawl and ratchet means for stepping the rotors.
- IV Encipher-decipher switch which reverses the circuit paths through the rotor mass.
- V Cam contours on the rotors to control their stepping.
- VI Means for enciphering spaces and division of cipher text into five-letter groups.
- VII Electro-magnetic stepping of the rotors controlled from the keyboard.

Of these seven features, Items I, II, III and IV are claimed in U.S. Patent 1,683,072 and good anticipations must therefore occur in patents issued at least two years before 20 Nov. 1923 (Hebern's filing date). Items V, VI and VII are claimed in U.S. Patent 1,861,857 and anticipations must occur in patents issued at least two years prior to 17 May 1927.

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The patents in the attached listing are arranged in order according to earliest issue date. Under Romberg those items among the seven named above which appear in the various patents are indicated. Of these features, Item I, "Inter-changeable and invertable rotors," is the only one which does not occur in one or more prior patents. However, Item V, "Cam contours on the rotors to control their stepping," occurs only in the Korn patents on the commercial model of the Enigma machine, and the earliest issue dates of these patents are only a few months ahead of Hebern's filing date (17 May 1927) for the patent in which he definitely claims this feature.

All told, there are some sixty separate patented inventions relating to rotor machines which have appeared since 1911. The sixteen listed here are only those which it is thought might prove useful in connection with the Hebern case.

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INVENTOR and/or ASSIGNEE	U. S. PAT. NO.	EARLIEST FILING DATE	EARLIEST ISSUE DATE	REMARKS
Southby, F.F.		28 Sept. 1910 (G.B. 1910-22,477)	21 Sept. 1911 (G.B. 1910-22,477)	III (Not a true rotor machine- has single drum with interconnected rows of peripheral contact points).
Bumberg, C.F. and Weinhold, E.	1,138,832	9 Oct. 1912 (Austria 62,927)	10 Jan. 1914 (Austria 62,927)	First patent employing rotor principle (single rotor as described, but use of several in series is suggested as well as fact that they are interchangeable).
Scott, F.M.		14 July 1913 (G.B. 1913-16,192)	16 Feb. 1914 (G.B. 1913-16,192)	III, VII (Similar to Southby machine provides for two rotating contact drums used in series).
Dunn, A.G.		20 July 1915 (Sweden 45,343)	19 Oct. 1916 (G.B. 1915-12,001)	Rotating drums with contacts interconnected Viginere-wise along diagonals (cited by Koch).
Koch, H.A. (H.V. Ing. "Securitas")	1,533,252	7 Oct. 1919 (Neth. 10,700)	10 May 1920 (G.B. 165,357)	II, IV (First patent issued employing rotors in cascade).

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INVENTOR and/or ASSIGNEE	U.S. PAT. NO.	EARLIEST FILING DATE	EARLIEST ISSUE DATE	REMARKS
Beyer, P.G.G.	1,414,496	26 Aug. 1919 (Denmark 26,710)	15 Sept. 1920 (Denmark 26,710)	II, IV (Single rotor machine).
Damm, A.G.	1,502,376	10 Oct. 1919 (Sweden 52,879)	7 July 1921 (Germany 333,660)	II, III, VII (Rotors used are "half-Hebern" type).
Damm, A.G.	1,540,407	2 Mar. 1921 (Sweden 59,906)	11 Oct. 1922 (France 546,093)	VI (Improvements on preceding patent).
Scherbius, A. (H.V. Ing. "Securitas")	1,534,860	13 June 1920 (Germany 337,833)	27 June 1923 (France 559,995)	IV, VI, VII
Scherbius A. (Chiffrier- maschinen, A.G.)	1,657,411	12 Feb. 1922 (Germany 383,594)	20 Aug. 1923 (France 561,910)	VI, VII
Wahne, H.A.T.	1,472,775	4 Mar. 1922 (Denmark 32,710)	30 Oct. 1923 (U.S. 1,472,775)	IV, VII, (First patent issued with metric stepping of rotors.
Bernstein, F. (H.V. Ing. "Securitas")		18 Aug. 1923 (Germany 411,126)	24 Mar. 1925 (Germany 411,126)	VII
Gewerkschaft Securitas		23 Feb. 1918 (Germany 416,219)	8 July 1925 (Germany 416,219)	II, IV (First patent filed with rotors in cascade, metric stepping).
Bernstein, F. (Chiffrier- maschinen, A.G.)		23 Feb. 1924 (Germany 425,566)	27 Feb. 1926 (Germany 425,566)	VI

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INVENTOR and/or ASSIGNEES	U.S. PAT. NO.	EARLIEST FILING DATE	EARLIEST ISSUE DATE	REMARKS
Korn, W.	1,705,641	11 Mar. 1926 (Germany 460,487)	29 Jan. 1927 (France 621,062)	III, V (Patent on cipher unit of commercial Enigma).
Korn, W.	1,733,886	21 Mar. 1926 (Germany 458,194)	7 Feb. 1927 (France 621,515)	III, V (Basic patent on commercial Enigma).